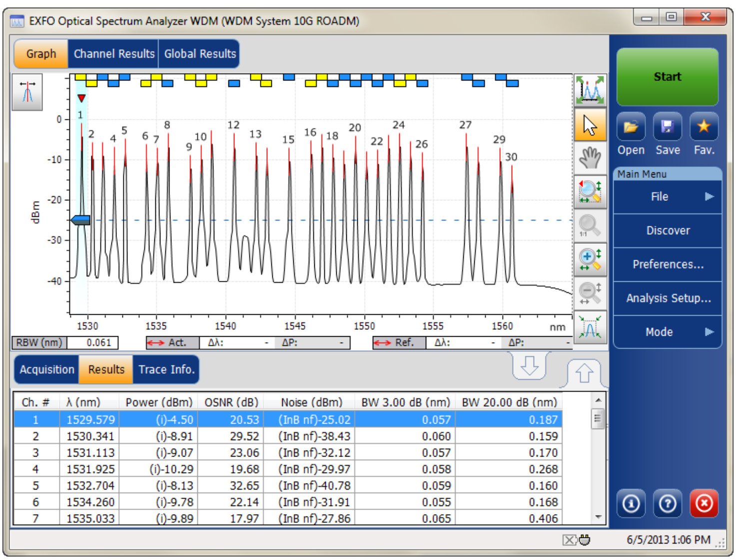
User Guide

FTB-5240S/S-P/BP

Optical Spectrum Analyzer



www.EXFO.com

Telecom Test and Measurement

EXPERTISE REACHING OUT

EXFO's Commerce And Government Entities (CAGE) code under the North Atlantic Treaty Organization (NATO) is 0L8C3.

The information contained in this publication is subject to change without notice.

Trademarks

EXFO's trademarks have been identified as such. However, the presence or absence of such identification does not affect the legal status of any trademark.

Units of Measurement

Units of measurement in this publication conform to SI standards and practices.

Patents

Feature(s) of this product is/are protected by one or more of US patents 6,636,306; 8,358,930; 8,364,034 and equivalent patents pending and granted in other countries; patent appl. US 2013/0163987 A1; and US patents 6,612,750 and 8,373,852.

Version number: 11.0.1

Contents

Certification Information

North America Regulatory Statement

This unit was certified by an agency approved in both Canada and the United States of America. It has been evaluated according to applicable North American approved standards for product safety for use in Canada and the United States.

Electronic test and measurement equipment is exempt from FCC part 15, subpart B compliance in the United States of America and from ICES-003 compliance in Canada. However, EXFO Inc. makes reasonable efforts to ensure compliance to the applicable standards.

The limits set by these standards are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the user guide, may cause harmful interference to radio communications. Operation of this equipment in a residential area is likely to cause harmful interference in which case the user will be required to correct the interference at his own expense.

Modifications not expressly approved by the manufacturer could void the user's authority to operate the equipment.

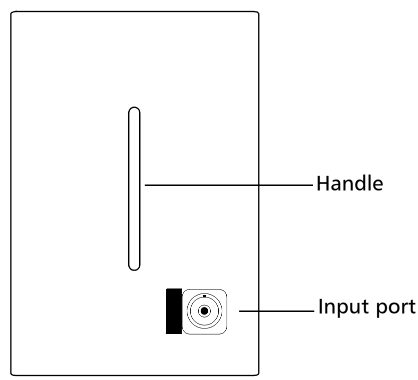
European Community Declaration of Conformity

An electronic version of the declaration of conformity for your product is available on our website at **www.exfo.com**. Refer to the product’s page on the Web site for details.

1 Introducing the FTB-5240S/S-P/BP Optical Spectrum Analyzer

The FTB-5240S/S-P/BP Optical Spectrum Analyzer (OSA) is designed to measure optical power as a function of wavelength or frequency and Optical Signal to Noise Ratio (OSNR).

Your OSA offers spectral characterization for CWDM/DWDM network component testing and manufacturing, network validation as well as commissioning, offering in addition InBand Optical Signal to Noise Ratio (OSNR) measurement for ROADM and 40 Gbit/s signals and networks, and Pol Mux OSNR for coherent 40 G/100 G networks.



Models

The OSA comes in different models:

- 5240S: The 5240S is a small form factor expert DWDM OSA designed for efficient commissioning, maintenance and troubleshooting of DWDM components and links in the field, from 25 GHz to CWDM. It can measure power as a function of wavelength for new modulation schemes, such as non-return-to-zero (NRZ), duo binary, which present large line widths and often display multiple peaks. In-depth analysis ensures the correct identification and signal measurement of each carrier. It also measures OSNR based on the IEC 61280-2-9 method.
- 5240S-P: It is the 5240S model with a polarization controller. It is a hardware-ready version of an expert OSA, without the software to compute the InBand/*i*-InBand OSNR. You can upgrade this model using the software key, and it will become fully capable of InBand/*i*-InBand/Pol Mux OSNR measurement.
- 5240S-P-InB: It is the 5240 S-P model with the software to compute the InBand/*i*-InBand OSNR. This software allows you to make either IEC-Based OSNR measurements, or In-Band OSNR measurements, required when the inter-channel noise is not representative of the noise under the signal peaks or when crosstalk is dominant.
- 5240BP: It is a three-slot high-resolution model with a polarization controller for InBand and Pol Mux testing, and better optical performance. It is designed for accurate and precise spectral measurements, even for channels with 12.5 GHz spacing.
- High Power Model (HPW): This model allows you to connect the FTB-5240S or FTB-5240S-P OSA to a network that carries very high optical power. This situation becomes more common with the deployment of latest CATV networks. The sensitivity of this OSA model is shifted accordingly and the module is protected to work under these extended power levels.

Typical Applications

You can use your OSA for the following tasks:

- Characterizing channels in the O- to U-band spectra
- Testing laser sources for spectral purity and power distribution
- Testing the transmission characteristics of optical devices
- Troubleshooting and monitoring key parameters on CWDM or DWDM signals to check system stability
- Characterizing all channel spacings, from 25 GHz DWDM to CWDM (from 12.5 GHz for 5240BP)
- Testing high-speed networks (beyond 40 Gbit/s)
- Measuring OSNR, but specifically within the channel (InBand or Pol Mux OSNR) for 5240S-P-InB and 5240BP models

Optional Software Packages

Optional software options are available for your application.

<table>
<tr><th>Option Name</th><th>Description</th></tr>
<tr><td>Advanced (Adv)</td><td>The Advanced option gives you access to the following test modes:
➤ Drift: time-based WDM analysis for signal monitoring.
➤ ST: characterization of the spectral transmittance of optical components such as filters.
➤ EDFA: characterization of the performance of an Erbium Doped Fiber Amplifier.
➤ DFB: characterization of a DFB laser source.
➤ FP: characterization of a Fabry-Perot laser source.</td></tr>
<tr><td>In-Band (InB)</td><td>The In-Band option enables you to perform In-Band noise analysis for WDM and WDM drift measurements.
When this option is activated, it is possible to have access to user-defined acquisition and analysis parameters for custom In-Band noise measurement (WDM and WDM drift modes)
Note: Not supported by the 5240S module but supported by the 5240S-P module.
Note: This feature is automatically available for the 5240BP module (no need to purchase the option).</td></tr>
</table>

Option Name	Description
WDM Investigator (Inv)	This option activates the WDM Investigator mode measurement diagnostics. When this option is activated, it is possible to have access to qualitative analysis of the noise source in measurement results for each channel through the WDM Investigator dashboard. ➤ Qualitative analysis of the noise source in measurement results for each channel through the WDM Investigator dashboard ➤ Qualitative analysis of the PMD pulse spreading on live noncoherent signals **Note:** *Not supported by the 5240S module but supported by the 5240S-P module.* **Note:** *The WDM Investigator (Inv) software option is dependent on the InBand (InB) option. The InBand (InB) option must be enabled for the WDM Investigator (Inv) software option to work.*
Commissioning (Com)	The commissioning option can be used to test channels individually by comparing one channel at a time with a trace where all channels are enabled (or on).

Post-Processing Application

A post-processing, or offline version of the application is available for you to use on a conventional computer. This offline version has most of the module application, but does not allow you to perform acquisitions.

Conventions

Before using the product described in this guide, you should understand the following conventions:

WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in *death or serious injury*. Do not proceed unless you understand and meet the required conditions.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in *minor or moderate injury*. Do not proceed unless you understand and meet the required conditions.

CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in *component damage*. Do not proceed unless you understand and meet the required conditions.

IMPORTANT

Refers to information about this product you should not overlook.

2 Safety Information

WARNING

Do not install or terminate fibers while a light source is active. Never look directly into a live fiber and ensure that your eyes are protected at all times.

WARNING

The use of controls, adjustments and procedures, namely for operation and maintenance, other than those specified herein may result in hazardous radiation exposure or impair the protection provided by this unit.

IMPORTANT

When you see the following symbol on your unit , make sure that you refer to the instructions provided in your user documentation. Ensure that you understand and meet the required conditions before using your product.

IMPORTANT

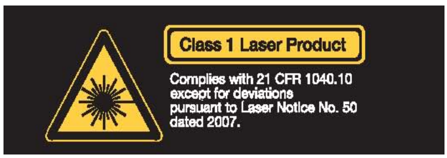
Other safety instructions relevant for your product are located throughout this documentation, depending on the action to perform. Make sure to read them carefully when they apply to your situation.

CAUTION

The following symbol indicates that your unit is equipped with a laser source: .

Your instrument is a Class 1 laser product in compliance with standards IEC 60825-1: 2007 and 21 CFR 1040.10, except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007. Invisible laser radiation may be encountered at the output port.

The following label indicates that a product contains a Class 1 source:



The maximum input power for the FTB-5240S/S-P/BP Optical Spectrum Analyzer is ⎓ 4 W for S and S-P modules, and 6 W for BP modules. For more information on equipment ratings, refer to the user documentation for your platform.

3 Preparing Your OSA for a Test

IMPORTANT

For optimal test results, you should allow a minimum warm up period of two hours for your OSA before starting your tests.

Cleaning and Connecting Optical Fibers

IMPORTANT

To ensure maximum power and to avoid erroneous readings:

- ➤ **Always inspect fiber ends and make sure that they are clean as explained below before inserting them into the port. EXFO is not responsible for damage or errors caused by bad fiber cleaning or handling.**
- ➤ **Ensure that your patchcord has appropriate connectors. Joining mismatched connectors will damage the ferrules.**

To connect the fiber-optic cable to the port:

1. Inspect the fiber using a fiber inspection microscope. If the fiber is clean, proceed to connecting it to the port. If the fiber is dirty, clean it as explained below.

2. Clean the fiber ends as follows:

2a. Gently wipe the fiber end with a lint-free swab dipped in isopropyl alcohol.

2b. Use compressed air to dry completely.

2c. Visually inspect the fiber end to ensure its cleanliness.

3. Carefully align the connector and port to prevent the fiber end from touching the outside of the port or rubbing against other surfaces.

   If your connector features a key, ensure that it is fully fitted into the port's corresponding notch.

4. Push the connector in so that the fiber-optic cable is firmly in place, thus ensuring adequate contact.

   If your connector features a screwsleeve, tighten the connector enough to firmly maintain the fiber in place. Do not overtighten, as this will damage the fiber and the port.

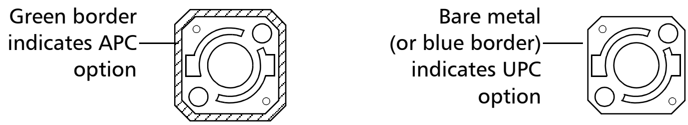
Note: *If your fiber-optic cable is not properly aligned and/or connected, you will notice heavy loss and reflection.*

EXFO uses good quality connectors in compliance with EIA-455-21A standards.

To keep connectors clean and in good condition, EXFO strongly recommends inspecting them with a fiber inspection probe before connecting them. Failure to do so will result in permanent damage to the connectors and degradation in measurements.

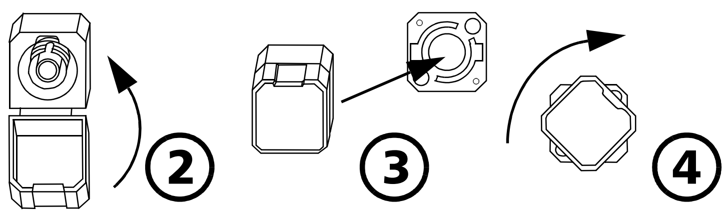
Installing the EXFO Universal Interface (EUI)

The EUI fixed baseplate is available for connectors with angled (APC) or non-angled (UPC) polishing. A green border around the baseplate indicates that it is for APC-type connectors.



To install an EUI connector adapter onto the EUI baseplate:

1. Hold the EUI connector adapter so the dust cap opens downwards.



2. Close the dust cap in order to hold the connector adapter more firmly.
3. Insert the connector adapter into the baseplate.
4. While pushing firmly, turn the connector adapter clockwise on the baseplate to lock it in place.

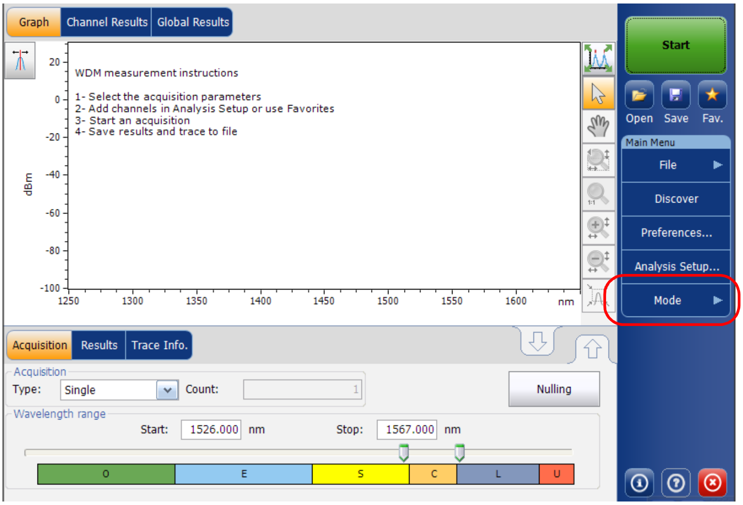
Selecting a Test Mode

Your module gives you different ways to test all your DWDM systems:

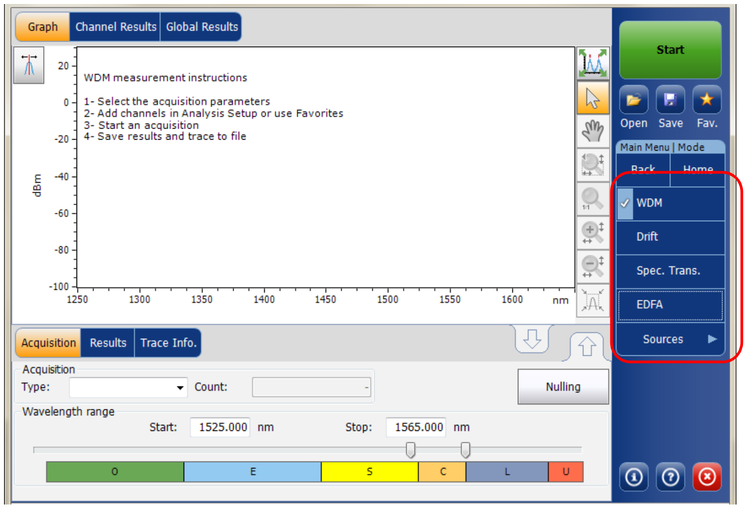
- WDM: Allows you to analyze an optical link. By default, the WDM test mode is selected.
- Drift: Allows you to monitor an optical link for a fixed duration.
- DFB: Allows you to characterize a DFB laser source.
- Fabry-Perot (FP): Allows you to characterize a Fabry-Perot laser source.
- Spectral Transmittance: Allows you to characterize the spectral transmittance of optical components such as filters.
- EDFA: Allows you to characterize the performance of an Erbium Doped Fiber Amplifier (EDFA) using the OSA module in field deployed systems (NB measurement assumes transmission conditions).

To select a test mode:

1. From the **Main Menu**, press **Mode**.



2. Select the desired test mode. The DFB and FP sources are under the **Sources** item.



Once you select the mode, you will notice a  against the selected mode and all the tabs on the main window and the main menu will change accordingly.

After selecting the test mode, you must configure it. You will find specific instructions for your test mode in the corresponding related chapters.

Switching Modes While a Trace is Open

If you switch test modes while a trace is already on-screen, the trace will be loaded in the new selected mode and analyzed using the current analysis setup, if the test modes are compatible.

WDM, Spectral Transmittance and EDFA test modes are made to ease the switch between the modes. The table below indicates the equivalencies between the trace types. For example, an active trace in WDM mode becomes an output trace in EDFA mode, and vice-versa.

WDM	ST	EDFA
Active	Output	Output
Reference	Input	Input

Nulling Electrical Offsets

The offset nulling process provides a zero-power reference measurement, thus eliminating the effects of electronic offsets and dark current due to detectors.

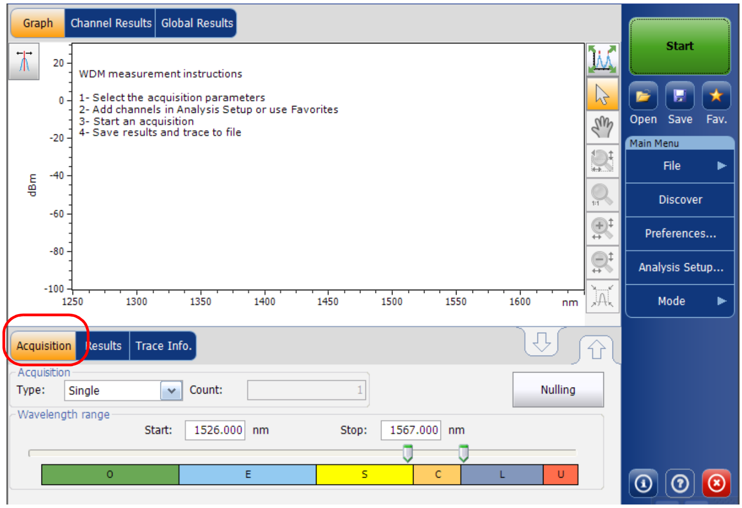
Temperature and humidity variations affect the performance of electronic circuits and optical detectors. For this reason, EXFO recommends performing a nulling of the electrical offsets whenever environmental conditions change.

Nulling can be performed for all tests modes. In addition, a nulling is performed automatically each time you start the OSA application, and at regular intervals afterwards.

Note: *You cannot perform an offset nulling in the offline version of the application.*

To perform an offset nulling:

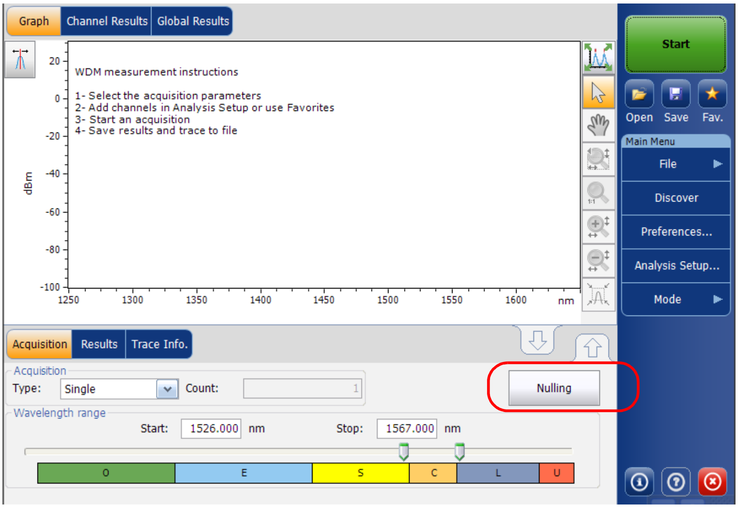
1. From the main window, select the **Acquisition** tab.



2. Disconnect any incoming signal to obtain an optimal accuracy.

3. Press **Nulling**.

You are notified that the nulling is in progress in the status bar. Nulling should be completed in a few seconds.



Note: *Several features, such as the **Start** button and Discover, are not available during the nulling process.*

Performing User Calibration

Calibrating your module can help you achieve better results. It is particularly important when the measurement accuracy is critical or when your OSA has experienced unusual shock or vibrations. To reach the highest possible accuracy, you can perform a wavelength or power calibration. Your OSA allows you to modify and read the user calibration values, revert to the factory calibration, load and save the modified user calibration file. The user configuration file (*.txt) contains the reference and modified wavelength and power values.

You can perform user calibration in any test mode. Select a test mode as explained in *Selecting a Test Mode* on page 12, and follow the procedures mentioned below for performing user calibration.

Note: *The procedure for performing user calibration is the same for all test modes. The procedure is explained with WDM mode only in this document.*

IMPORTANT

For optimal results, you should allow a minimum warm up period of two hours for your OSA before performing user calibration.

IMPORTANT

You must clear the correction factor list before making new calibration measurements. If calibration measurements are made when user correction factors are inside the module, the latter will affect the measurements and the calibration results become inapplicable.

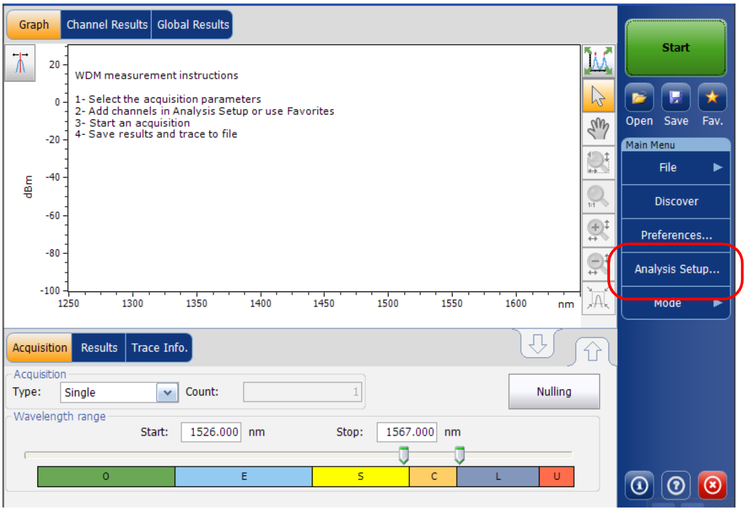
Note: *If you want to keep the correction factor list for a later use, save it under a different name in the folder.*

Note: *The user calibration feature is not available in the offline version of the application.*

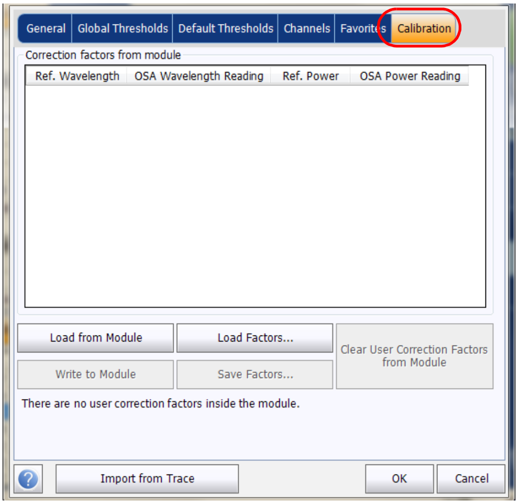
To perform a user calibration:

1. Allow your unit to warm up.

2. From the **Main Menu**, press **Analysis Setup**.

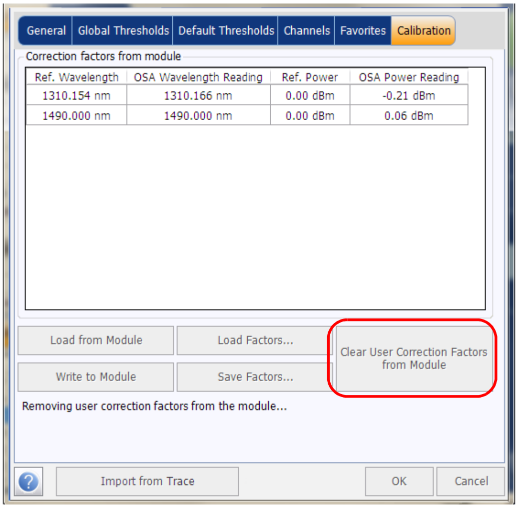


3. Select the **Calibration** tab.



Note: *You cannot edit the power or wavelength values directly from the application. The modifications in the user calibration have to be made in a text file, and then it can be loaded in the application.*

4. If user correction factors are in the system, press **Clear User Correction Factors from Module**, then confirm your choice.



5. Take measurements for your test mode.

6. Note the measurements to a .txt file using the following format:
   - The first column is the reference wavelengths, in nm.
   - The second column is the wavelength read by your module, in nm.
   - The third column is the reference power, in dBm.
   - The fourth column is the power read by your module, in dBm.

Note: *The columns are separated by a semi-colon (;). You can have up to 100 calibration points.*

Here is an example of a measurement file:

1310.154; 1310.167; -1.34; -1.55

1490.000; 1490.000; 1.09; 1.15

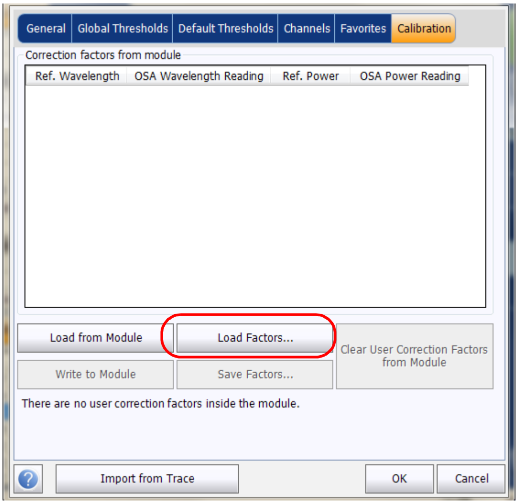
1551.334; 1551.298; -5.20; -5.45

1625.401; 1625.448; 0.00; 0.00

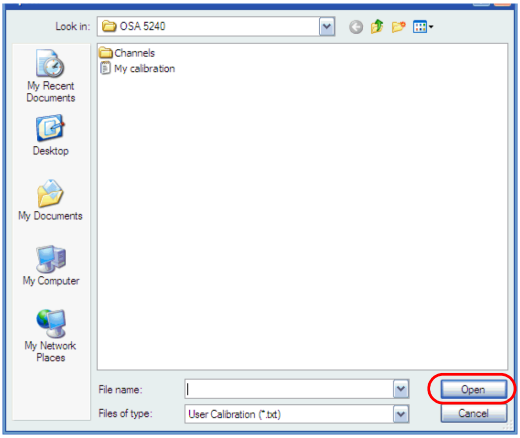
Note: *The decimal separator is a point (.). This format is independent of the regional settings.*

7. Save your .txt file in a location of your choice.

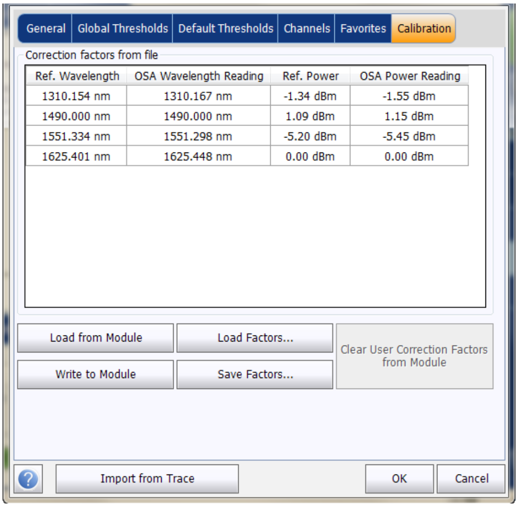
8. Back in the **Calibration** tab on your unit, load the file using **Load Factors**.



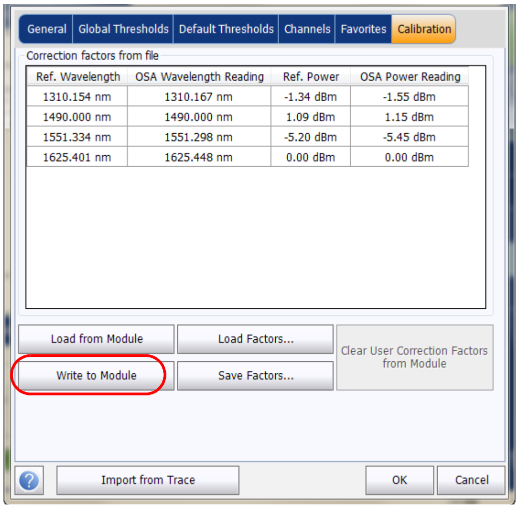
9. Select the modified user calibration file and press **Open**.



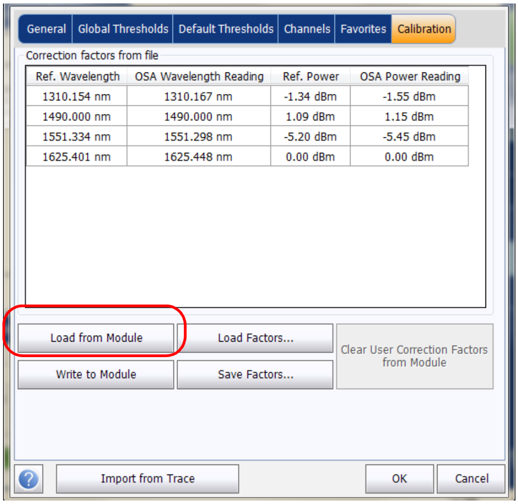
The calibration values will replace the Correction factors list in the **Analysis setup - Calibration** window.



10. Press **Write to Module** to apply the modified calibration values to the module.



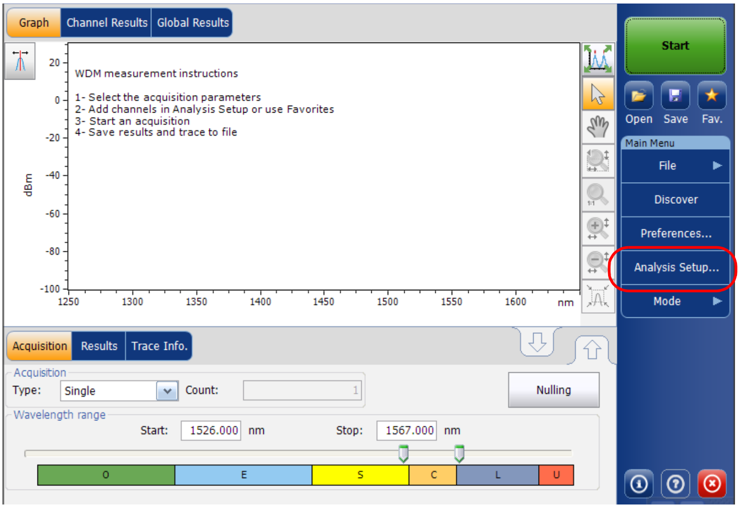
11. To verify that the calibration changes are properly applied to the module, press **Load from Module**.



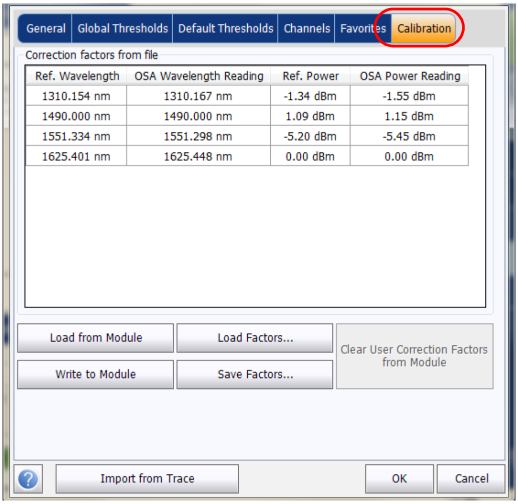
Note: *The **OK** and **Cancel** buttons do not have any impact on the calibration page or the correction factors inside the module.*

To save a user calibration:

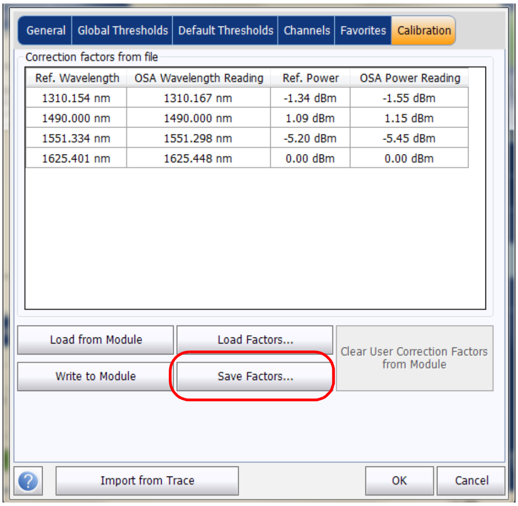
1. From the **Main Menu**, press **Analysis Setup**.



2. Select the **Calibration** tab.



3. Press **Save Factors**, to save the modified user calibration values.



Using the Autonaming Feature

Defining a file autonaming format will allow you to quickly and automatically name traces in a sequential order. The customized name appears when the file is saved using the Save As option. You can select which fields you want to include in the file name and the order in which they should be displayed.

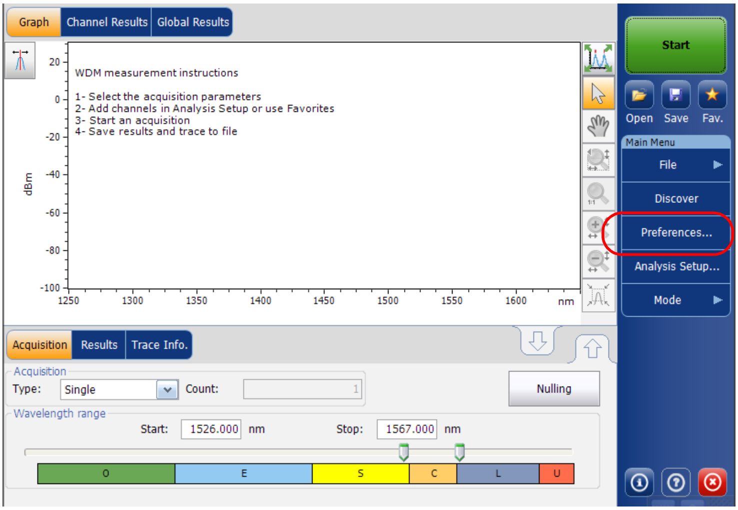
The Link ID is used by the application to suggest a file name when you want to save the current acquisition. The link parameters are prefix and suffix values (file names) for the link IDs.

Note: *The autonaming feature is not available in the offline application.*

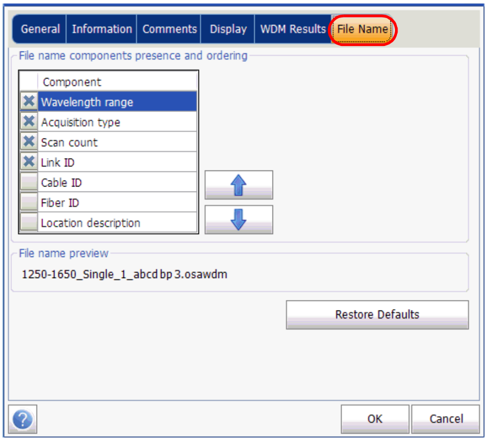
Note: *The procedure below uses the WDM test mode as an example, but the autonaming feature is available for all test modes.*

To customize the file name:

1. From the **Main Menu**, press **Preferences**.



2. Select the **File Name** tab.

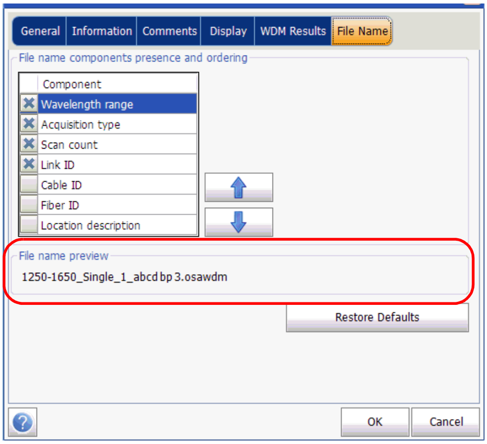


3. Select which parameters you want to include in the file name from the list of available choices:

- Wavelength/frequency range: current wavelength/frequency acquisition range.
- Acquisition type: current acquisition type.
- Scan count: current number of scans in the acquisition tab.
- Link ID: prefix value for the link ID configured in the **Preferences-Information** tab.
- Cable ID: prefix value for the cable ID configured in the **Preferences-General** tab.
- Fiber ID: prefix value for the fiber ID configured in the **Preferences-General** tab.
- Location description: location description provided in the **Preferences-Information** tab.

4. Press the up or down arrows to change the order in which the field values will appear in the file name.

Based on your selection, a preview of the file name is displayed under **File name preview**. The field values are separated with an underscore (_).



5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Press **Restore Defaults** to remove all the changes and apply the default settings.

4 Setting Up the Instrument in WDM Mode

Before performing a spectral analysis in the WDM mode, you must set up the test application with the appropriate parameters, as explained in this chapter.

Select the WDM test mode as explained in *Selecting a Test Mode* on page 12 before setting up the WDM test parameters.

- The *preferences* are the result displayed in the graph and tables, as well as the job information and related comments saved with each file.
- The *analysis parameters* include the channel list details, pass-fail threshold settings and allows you to select the noise and power calculation methods.
- The *acquisition parameters* include the type of measurement you want to perform and the wavelength range.

See *Defining Preferences* on page 35, *Setting Up WDM Analysis Parameters* on page 51 and *Setting Up Acquisition Parameters* on page 78 for more details.

You can set up your unit in different manners, depending on your testing needs.

➤ The preferred way is to use the complete analysis setup parameters and complete the information in all tables, as explained in *Setting Up WDM Analysis Parameters* on page 51. This setup will be used for the next acquisition.

➤ The easiest way to set up the instrument, especially when the operator does not know in advance what to expect at the input of the module is to use the **Discover** button. After the **Discover** button has been pressed, a measurement and analysis will be performed according to the best setup determined by the instrument and this setup will be used for the next scan. This is explained in *Using the Discover Feature* on page 239.

➤ The most efficient way to set up the instrument is to use one of the favorites configurations, uploading a pre-customized acquisition and analysis setup configuration. The operator in the field only has to press the  button, select the appropriate configuration and press **Start**. As an example, a pre-customized configuration could be: “32 channels DWDM 50GHz”; “Toronto-Montreal CWDM” or “Vendor ABC DWDM ROADM 40Gb”. This is explained in *Managing Favorites* on page 250.

➤ You can also import the setup from the current trace. This method will take the data and channel information from the current trace and apply them in the corresponding tabs. For more information, see *Setting Up WDM Analysis Parameters* on page 51.

Defining Preferences

The preferences window allows you to set general information and comments on trace, set display parameters and customize the WDM results table.

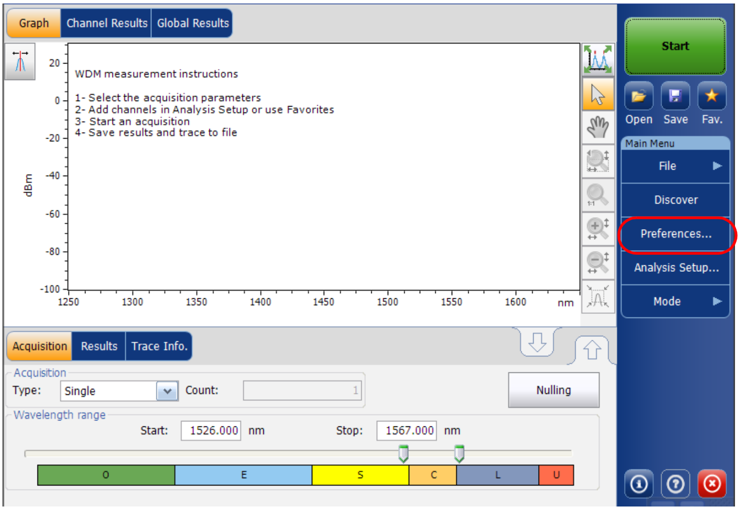
Note: *Only the **Display** and **WDM Results** tabs are available in offline mode.*

Defining Trace Information

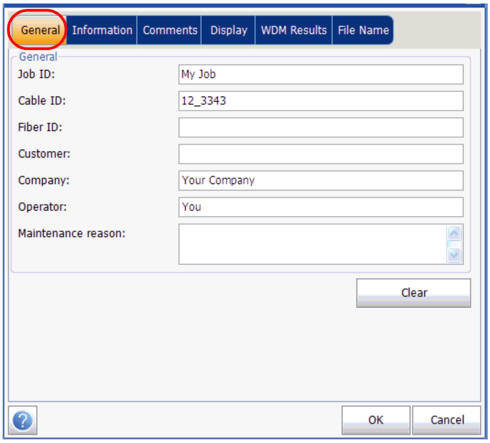
The trace information relates to the description of the job to be done, cable and job IDs, and any relevant information about what is being tested.

To enter general information:

1. From the **Main Menu**, press **Preferences**.



2. Select the **General** tab.



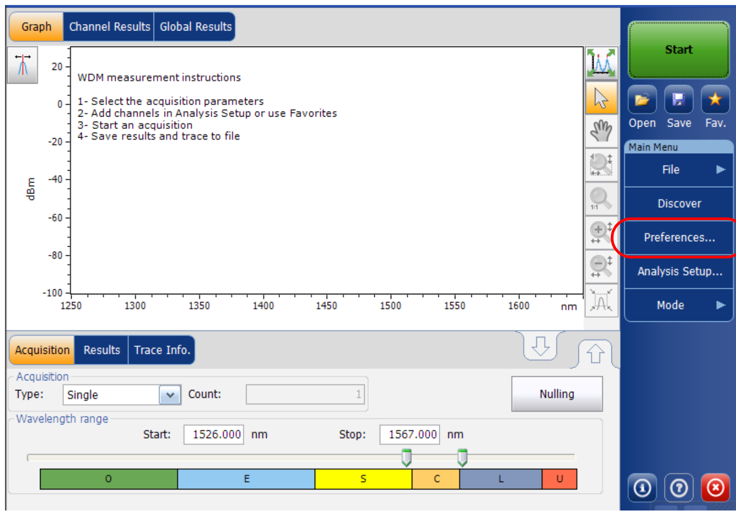
3. Define the general parameters as needed.

4. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

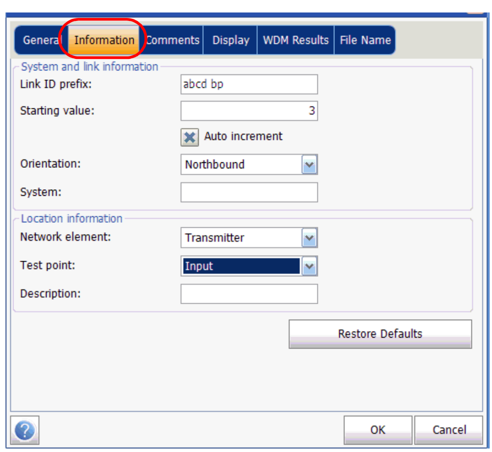
Press **Clear** to clear all the changes made in the **General** tab.

To enter link and location information:

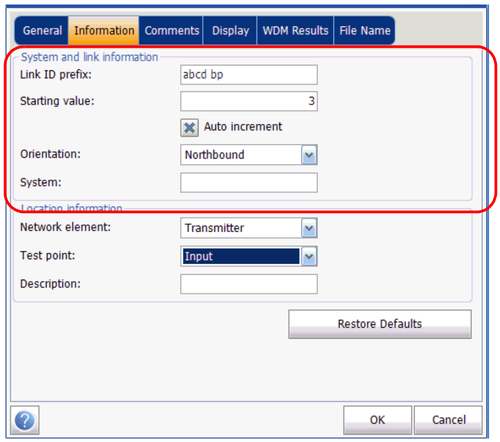
1. From the **Main Menu**, press **Preferences**.



2. Select the **Information** tab.



3. Under **System and link information**, define the following parameters as needed:



➤ Link ID prefix: The prefix value for the link ID. You can enter any alphanumeric value.

➤ Starting value: The suffix increment starting value for the link ID.

This value is incremented each time a new file is saved provided the **Auto Increment** option is selected.

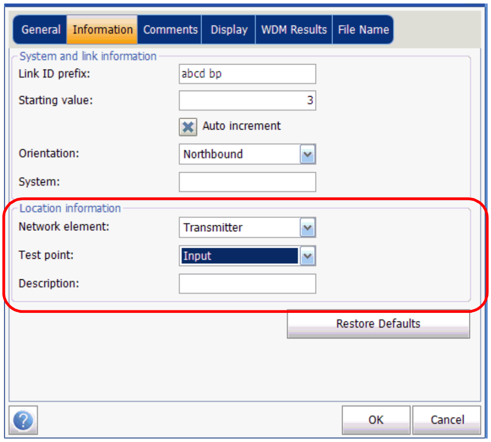
IMPORTANT

If the Auto Increment option is not selected, you have to manually change the file name when saving the trace file, otherwise the application will overwrite the previously saved file.

➤ Orientation: The orientation of the link.

➤ System: Information about the system under test.

4. Under **Location Information**, define the following parameters as needed:



➤ Network element: Sets the type of network element.

➤ Test point: Sets the location where the test is performed on the link.

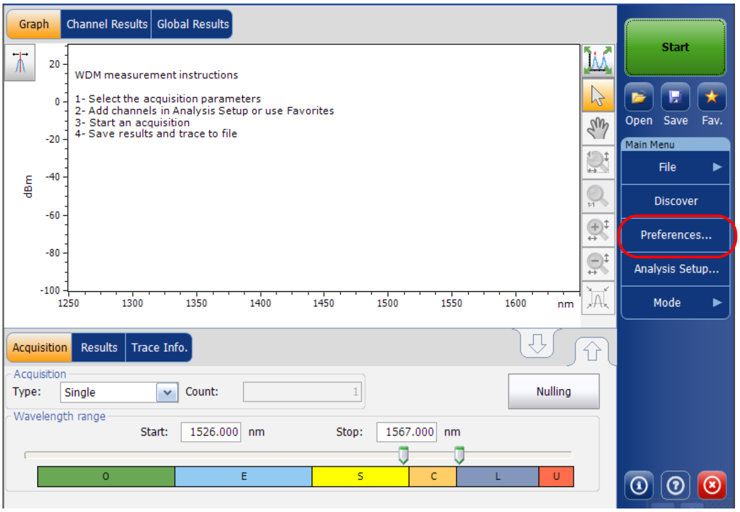
➤ Description: Enter the description of location if required.

5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

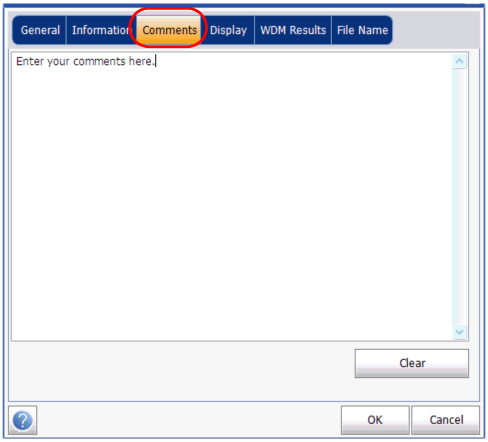
Press **Restore Defaults** to remove all the changes and apply the default values.

To enter comments:

1. From the **Main Menu**, press **Preferences**.



2. Select the **Comments** tab.



3. Enter your comments for the current trace.

4. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

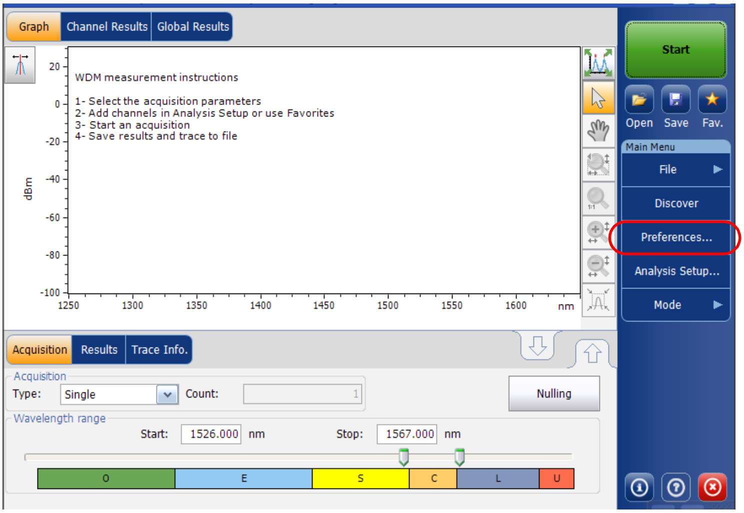
Press **Clear** to clear all the changes made in the **Comments** tab.

Defining Display Parameters

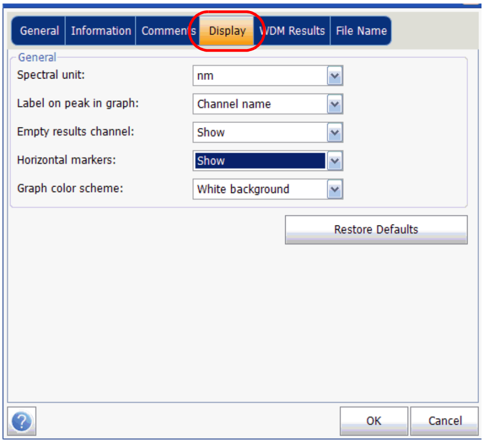
The application allows you to set display settings for the acquisition trace. You can set the spectral unit for the trace and the results table. You can also select the label that should appear on the peaks of the trace.

To define display parameters:

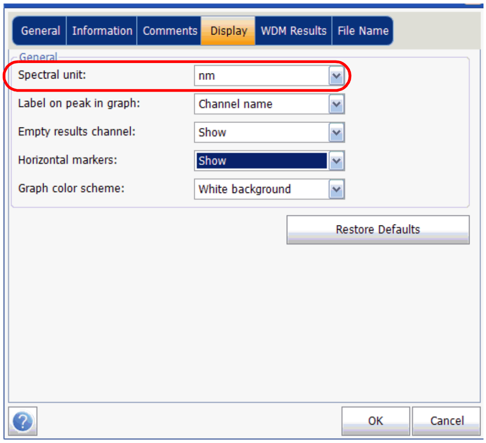
1. From the **Main Menu**, press **Preferences**.



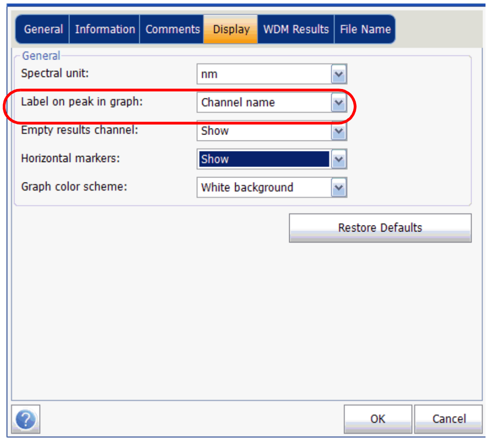
2. Select the **Display** tab.



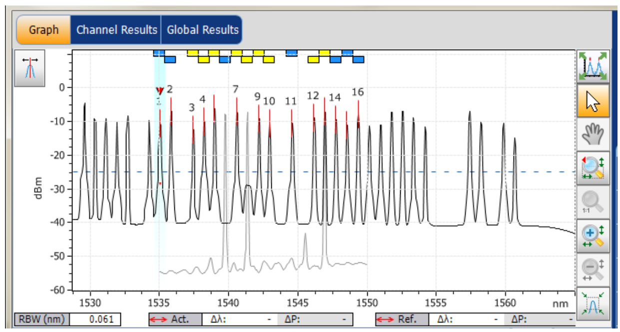
3. Select the spectral unit you want to work with, either nm or THz.



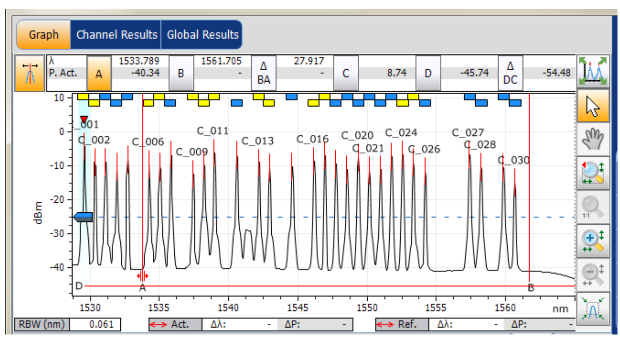
4. Select the label that will appear on the peaks in the graph, either the channel name, its number, or nothing.



Note: *The channel name and channel number cannot be shown at the same time.*

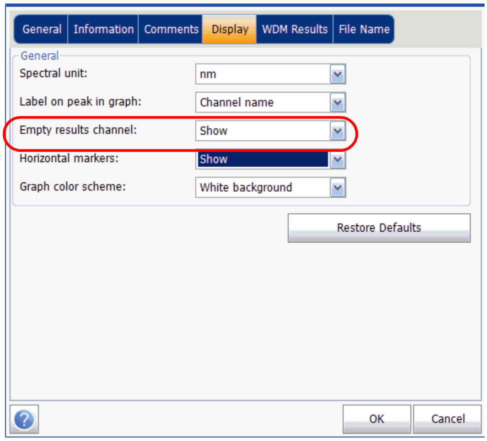


Channel numbers



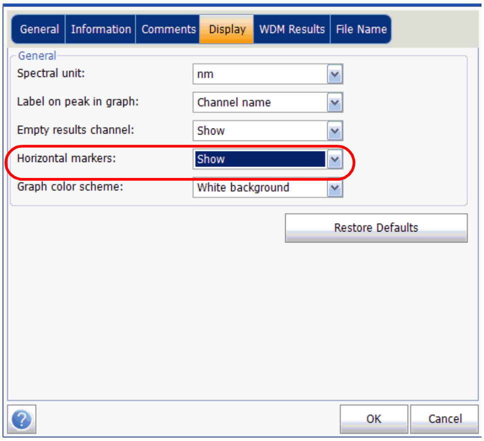
Defined channel names

5. Select whether you want to show or hide the empty channels from the channel list in the **Results** tab.

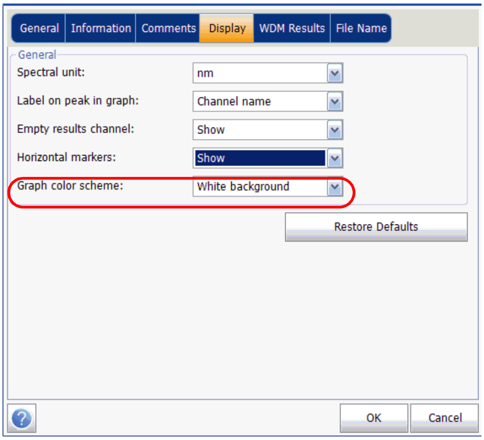


Note: *When selected, empty channels are shown on screen and in the report files.*

6. Select whether you want to show the horizontal markers or the integrated power and the Δ trace in the marker toolbar.



7. Select the background color scheme for the graph as desired.



8. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

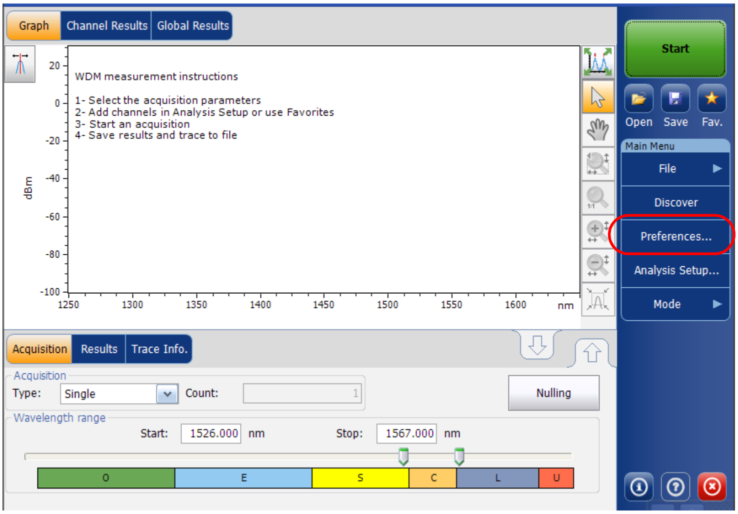
Press **Restore Defaults** to remove all the changes and apply the default values.

Customizing WDM Results Table

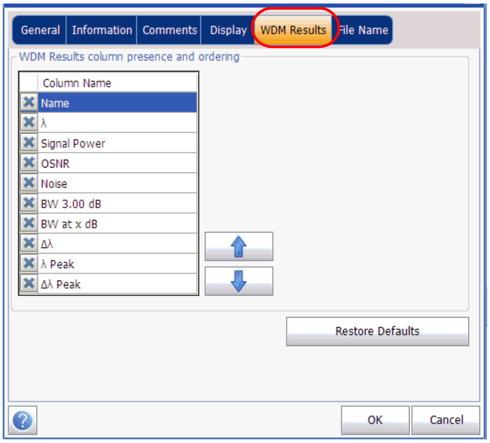
It is possible to select which results you would like to be displayed in the **Results** tab of your WDM tests.

To customize the results table:

1. From the **Main Menu**, press **Preferences**.



2. Select the **WDM Results** tab.



3. Select which parameters you want to display in the **Results** tab from the list of available choices:

- Name: name of channel.
- λ (Center wavelength/frequency): spectral center-of-mass for the peak in that channel.
- Signal Power: signal power for the selected channel (excludes noise).
- OSNR: optical signal to noise ratio, given by Signal power (according to the current calculation method, in dBm), minus Noise (according to the current calculation method, in dBm).
- Noise: noise level for the selected channel. The type of noise is indicated in front of the measurement (IEC, Fit, Inb, Inb nf, IECi, CCSA).
- BW 3.00 dB: bandwidth measured by taking the width of a signal at 50 % linear power of the peak, or -3 dB from the peak.
- BW at x dB: bandwidth measured by taking the width of a signal at x dB from the peak.

- ➤ Δλ/*f* : deviation of the spectral center of mass for the peak in that channel.
- ➤ λ/*f* Peak: spectral peak in that channel.
- ➤ Δλ/*f* Peak: deviation of the spectral peak in that channel.

4. Press the up or down arrows to change the order in which the columns will appear in the **Results** tab.
5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Press **Restore Defaults** to remove all the changes and apply the default values.

Setting Up WDM Analysis Parameters

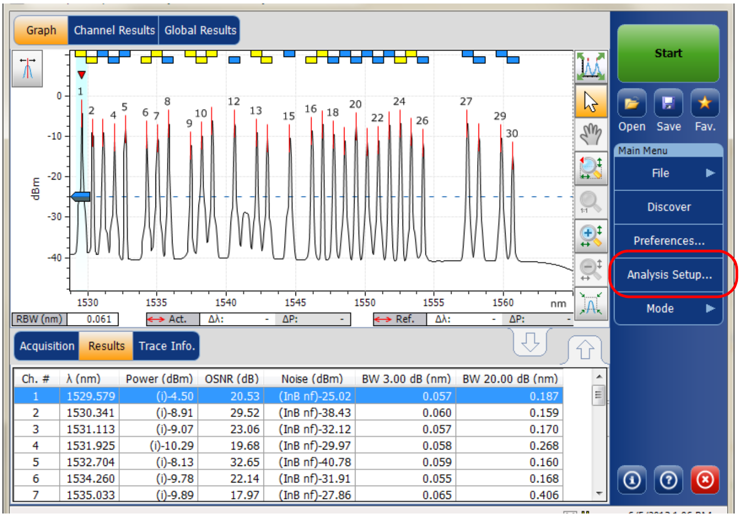
This section presents the various analysis settings for the application, particularly the channel list and settings. You can set the default channel parameters, channel list, global thresholds, default channel thresholds, manage favorite configurations and perform user calibration.

Note: *When you change the analysis setup parameters, the new settings are active as soon as you confirm your choice. The current trace is re-analyzed, and the analysis setup parameters will be applied to the global results and channel results for the following acquisitions.*

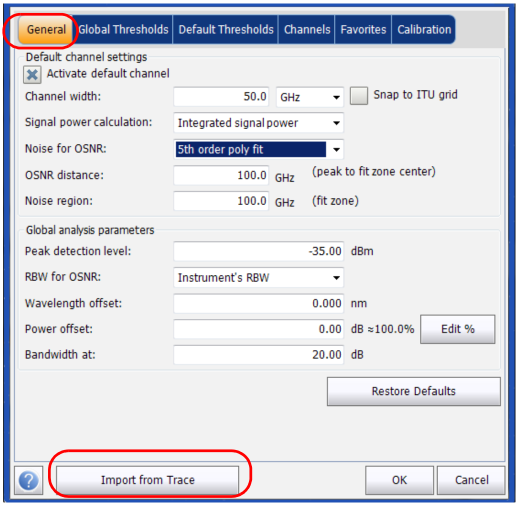
You can either set each parameter individually, or use parameters from the current trace and import them.

To import the parameters from the current trace:

1. Make sure that you have a trace on-screen.
2. From the **Main Menu**, press **Analysis Setup**.



3. From any tab, press **Import from Trace**.



4. Press **OK** to confirm the changes.

Defining General Settings

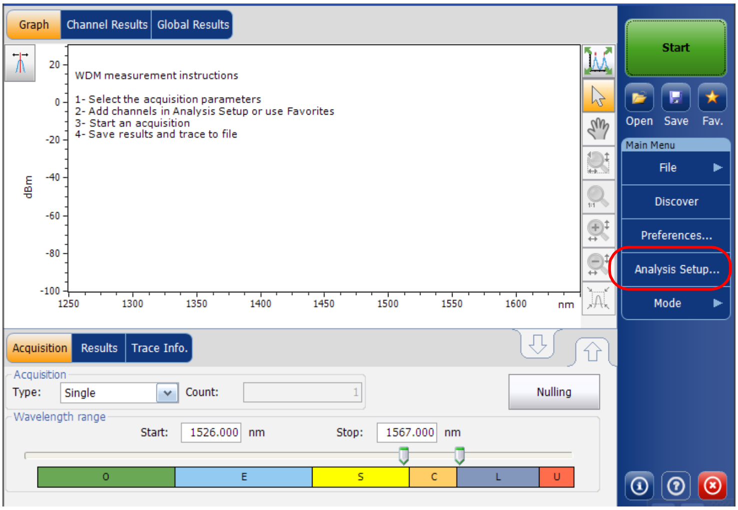
The general analysis parameters for WDM acquisitions affect the calculation of the results. Any change you make to the settings affect future traces, or you can apply them to the active trace when reanalyzing it.

IMPORTANT

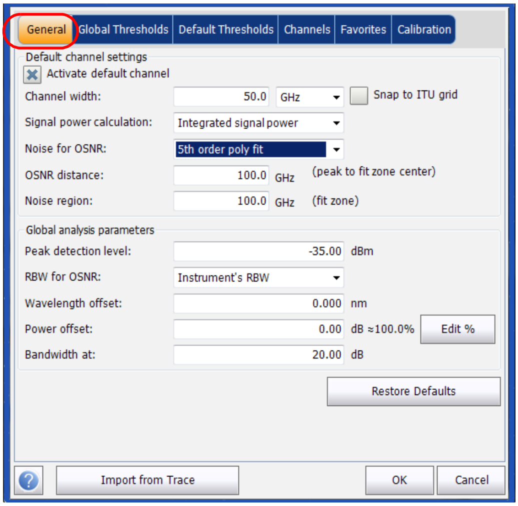
In the General tab, you can set the default channel parameters. Any channel found during an acquisition that is not defined in the channel list will be analyzed according to the default channel settings.

To define general settings:

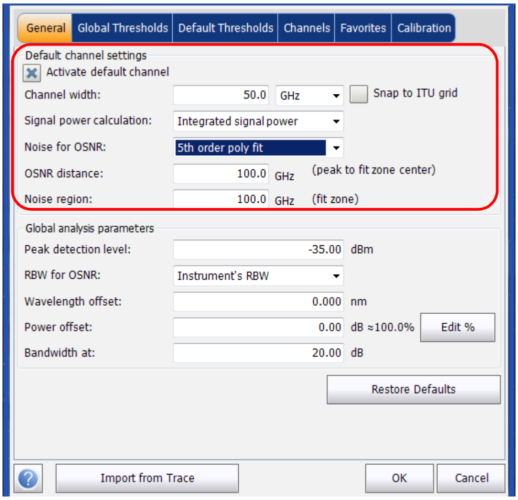
1. From the **Main Menu**, press **Analysis Setup**.



2. Select the **General** tab.



3. Under **Default channel settings**, define the following parameters as needed:



➤ Clear the **Activate default channel** option to use the currently defined channel list for analysis. This reduces the analysis time by eliminating the peak detection over the complete spectral range. The peaks outside the defined channel list will not be analyzed.

- Channel width (GHz or nm): indicates the limit inside which the power values will be considered in the channel.

  For default channels, the channel width that sets the limits of the channel, should be the same as the channel distance or smaller (channel distance is defined while creating a channel list). If the channel width is not compatible with the channel spacing, either a single peak may be found for two distinct channels and two analysis would be performed and displayed for that peak, or, it is possible that two peaks may be found within the same channel and be considered as one multi-peak signal. With this result, you can use markers to find the spacing between adjacent channels or to find the channel width.

- Snap to ITU Grid: When selected, each detected peak will be defined by the nearest ITU channel. The ITU grid is based on the selected channel width.

- Signal power calculation: indicates which calculation method to apply for signal power value.

  Integrated signal power: The integrated signal power represents the sum of the power values included between the channel limits of this channel, minus the estimated noise contribution between the same boundaries. In some cases, for instance CATV signals, signals with high-frequency modulation, or signals with an inherent line width similar or larger than the OSA's resolution bandwidth, this calculation becomes a better estimation of the true signal power.

  Peak signal power: The peak signal power represents the maximum power value inside the channel. Note that it differs a little from the peak measurement on the spectrum due to the fact that the estimated noise is subtracted to get the peak signal power.

  Total channel power: The total channel power represents the sum of the integrated signal power and of the noise within the channel. The OSNR calculation is not performed when the signal power calculation type is the total channel power.

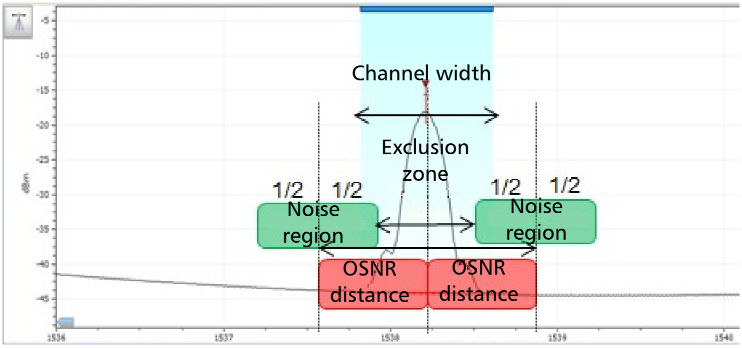
➤ Noise for OSNR: indicates which calculation method to use for OSNR value.

Fixed range IEC based (IEC): The IEC method uses the interpolation of noise measured on both sides of the signal to estimate the noise level. The position at which the noise is estimated from the center wavelength is given by the OSNR distance.

InBand (InB): The InBand method uses a series of scans having different polarization states to calculate the noise level under the peak (InBand).

InBand narrow filter (InB nf): The InBand narrow filter method uses additional processing to provide an accurate OSNR value for the narrow carved noise. This is because with narrow filters, the noise level under the peak is not uniform and the OSNR value depends on the processing width selected.

➤ *Fifth order polynomial fit (Fit):* The fifth order polyfit method calculates the noise curve and thus the signal to noise ratio. The OSA will approximate the noise curve using a fifth order polynomial fit. This fit definition relies on fit and exclusion zones. Only the points in the fit zones are used to calculate the fifth order polynomial fit. If you select the fifth order polyfit method, you have to define the fit and exclusion zones for your tests using the OSNR distance and noise region fields. The exclusion zone is indirectly obtained from the OSNR distance.



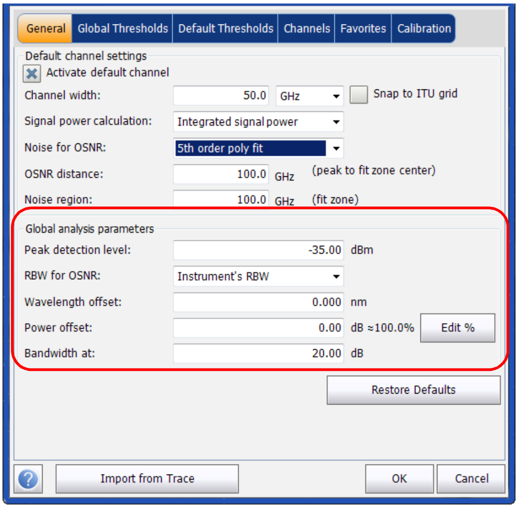
Channel center

➤ OSNR distance (GHz or nm): Except for the fifth order polyfit selection, the OSNR distance is automatically set at the channel edge, that is, at half of the channel width from the center wavelength.

For the fifth order polyfit, the OSNR distance corresponds to the distance from the channel peak to the center of the fit zone. It is independent of the channel width.

➤ Noise region: The noise region, or fit zone, defines the region where the polynomial fit applies. Two identical regions are centered at the OSNR distance.

4. Under **Global analysis parameters**, define the following parameters as needed:



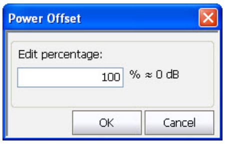
➤ Peak detection level (dBm): indicates the minimum power level from where the peak can be considered as a signal.

➤ RBW for OSNR (nm): indicates the resolution bandwidth selected for the OSNR calculation. This parameter is generally set to 0.1 nm to allow for a common basis of comparison between different OSAs having different effective resolutions. The instrument's RBW value is written below the graph. This parameter does not actually have an effect on the acquisition, but is only a normalization factor used to provide the OSNR value in a standardized manner.

- Wavelength offset (nm): indicates the offset value applied on the wavelength. This does not replace a calibration performed at EXFO, but it can help you temporarily sharpen the specifications if you have determined that, for example, your modules are used beyond the normal allowed use. Entering a value in THz is not possible. When an offset is applied, it is indicated at the bottom of the graph (λ).

- Power offset (dB): indicates the offset value applied on the power. This does not replace a calibration performed at EXFO, but it can help you achieve the specifications if you have determined that, for example, your modules are used beyond the normal allowed use. When an offset is applied, it is indicated at the bottom of the graph (P).

  To edit the power offset as a tap percentage, press the **Edit %** button.

  The percentage value entered in **Edit percentage** will be converted to a corresponding equivalent value in dB.

- Bandwidth at (dB): Set the power level used, relative to the channel peak power, to compute the second bandwidth result.

5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

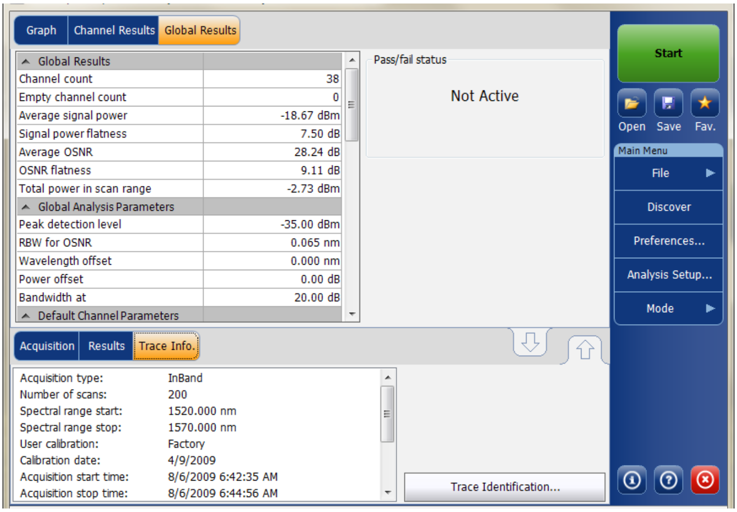
Press **Restore Defaults** to remove all the changes and apply the default values.

Defining Global Thresholds

Any change you make to the global threshold settings affect future traces, or you can apply them to the active trace when reanalyzing it.

The application allows you to activate and deactivate the threshold functionality with a single control. When thresholds are globally enabled, the results are displayed with the Pass/Fail status based on various settings (global results, channel results). In addition, a global pass/fail status is also displayed in the **Global Results** tab (See *Global Results Tab* on page 270).

When thresholds are globally disabled, results are displayed without a Pass/Fail status and the Global pass/fail status will not be active in the **Global Results** tab. The **P/F** column under the results table will not be displayed.

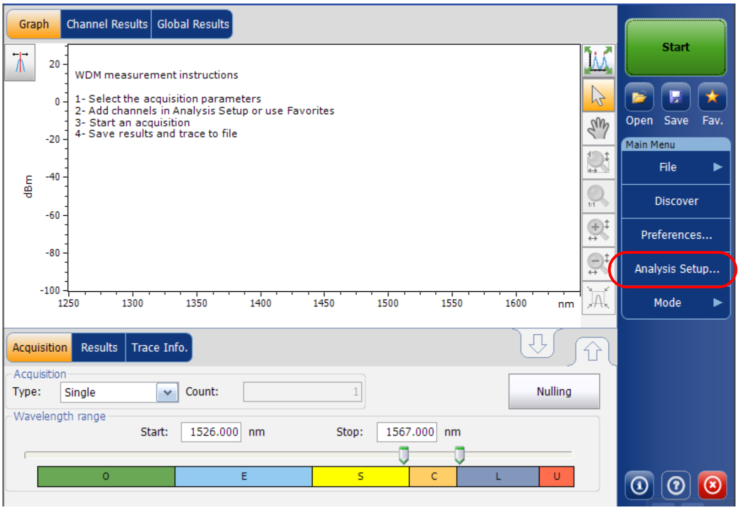


You can set your pass/fail threshold limits in different ways depending on the type of test you are performing.

Threshold Limit	Definition
None	No threshold limit is set. The results will be displayed without a Pass/Fail verdict.
Min. only	The threshold limit is set for a minimum value only. The Pass/Fail verdict is declared as Pass (in green), when the value is equal to or greater than the minimum threshold set. The verdict is declared as Fail (in red), when the value is below the minimum threshold set.
Max. only	The threshold limit is set for a maximum value only. The Pass/Fail verdict is declared as Pass (in green), when the value is equal to or less than the maximum threshold set. The verdict is declared as Fail (in red), when the value is above the maximum threshold set.
Min. and Max.	The threshold limit is set for the minimum and maximum value. The Pass/Fail verdict is declared as Pass (in green), when the value is equal to or within the minimum and maximum thresholds set. The Pass/Fail verdict is declared as Fail (in red), when the value is beyond the minimum or maximum thresholds set.
Use Default	When this limit is set, the corresponding threshold set for the default channels in the **Analysis Setup** tab will be applied to the channel.
Max. Deviation	The threshold limit is set for the deviation value. The Pass/Fail verdict is declared as Pass (in green), when the value is equal to or within the deviation threshold set. The Pass/Fail verdict is declared as Fail (in red), when the value is beyond deviation threshold set.

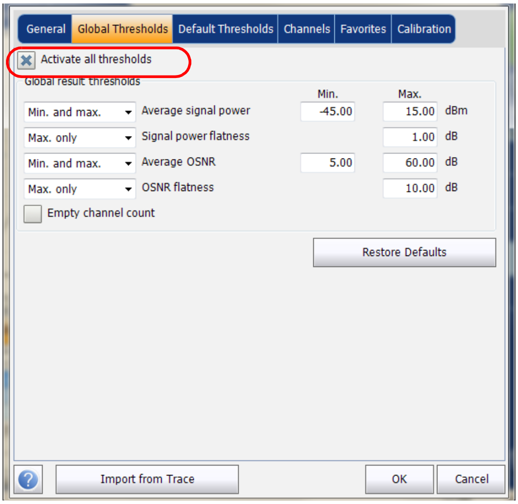
To define global thresholds:

1. From the **Main Menu**, press **Analysis Setup**.



2. Select the **Global Thresholds** tab.

3. Select the **Activate all thresholds** option to manually set the global threshold values. If this option is not selected, all the thresholds will be deactivated, results are displayed without a Pass/Fail status and Global pass/fail status are not active in the **Global Results** tab.



4. Enter values in the boxes as explained below:

➤ Average signal power (dBm): the sum of the signal powers of all the peaks detected in the current acquisition, divided by the total number of peaks.

➤ Signal power flatness (dB): the difference between the maximum and minimum signal power values of the detected peaks, in dB.

➤ Average OSNR (dB): the sum of the entire OSNR of the peaks detected in the current acquisition, divided by the total number of peaks.

➤ OSNR flatness (dB): the difference between the maximum and minimum OSNR values of the detected peaks, in dB.

➤ Empty channel count: The number of empty channels from the channel list.

5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Press **Restore Defaults** to remove all the changes and apply the default values.

Defining Default Thresholds

Default thresholds will be applied to any channel found outside the channel list during the acquisition or re-analysis.

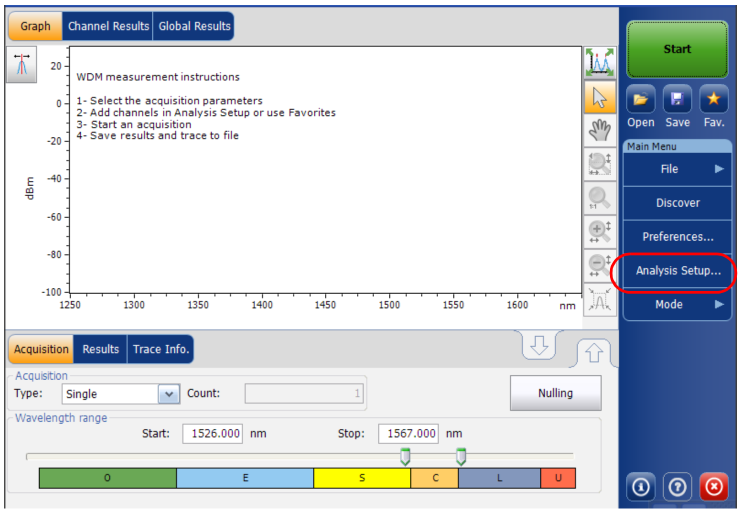
Note: *The default thresholds settings are enabled only when the* ***Activate all thresholds*** *option is selected in the* ***Global Thresholds*** *tab. For more information, see* Defining Global Thresholds *on page 62.*

You can set your pass/fail threshold limits in different ways depending on the type of test you are performing.

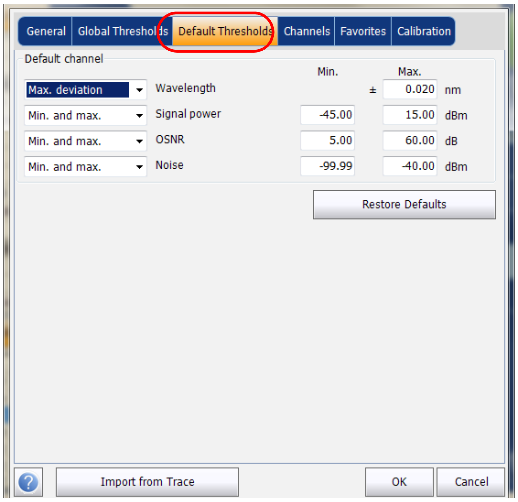
Threshold Limit	Definition
None	No threshold limit is set. The results will be displayed without a Pass/Fail verdict.
Min. only	The threshold limit is set for a minimum value only. The Pass/Fail verdict is declared as Pass (in green), when the value is equal to or greater than the minimum threshold set. The verdict is declared as Fail (in red), when the value is below the minimum threshold set.
Max. only	The threshold limit is set for a maximum value only. The Pass/Fail verdict is declared as Pass (in green), when the value is equal to or less than the maximum threshold set. The verdict is declared as Fail (in red), when the value is above the maximum threshold set.
Min. and Max.	The threshold limit is set for the minimum and maximum value. The Pass/Fail verdict is declared as Pass (in green), when the value is equal to or within the minimum and maximum thresholds set. The Pass/Fail verdict is declared as Fail (in red), when the value is beyond the minimum or maximum thresholds set.
Max. Deviation	The threshold limit is set for the deviation value. The Pass/Fail verdict is declared as Pass (in green), when the value is equal to or within the deviation threshold set. The Pass/Fail verdict is declared as Fail (in red), when the value is beyond deviation threshold set.

To define default Thresholds:

1. From the **Main Menu**, press **Analysis Setup**.



2. Select the **Default Thresholds** tab.



3. Enter values in the boxes as explained below:

- Wavelength/Frequency (nm/GHz): the channel's central wavelength/frequency.
- Signal power (dBm): the signal power for the default channel (excludes noise).
- Noise (dBm): the level of the noise for the selected channel.
- OSNR (dB): the optical signal to noise ratio, given by Signal power (according to the current calculation method, in dBm) minus Noise (according to the current calculation method, in dBm).

4. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Press **Restore Defaults** to remove all the changes and apply the default values.

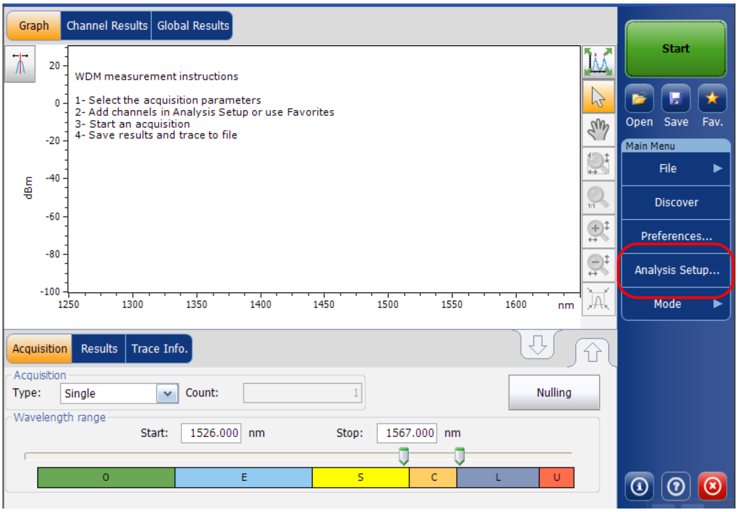
Managing Channels

Testing DWDM systems involves characterizing multiple signals in a link. The application allows you to define channels using a channel editor or quickly generate them from the current data. You can also rapidly create a list of equally spaced channels. Once a channel list is created, you can modify it as needed. You can edit the analysis parameters for one channel or multiple channels.

While creating the channel list, some channels may overlap. When the channel widths are specified in nm, two channels are considered to be overlapping when more than 1.2 GHz (approximately) of frequency range is common between the two channels.

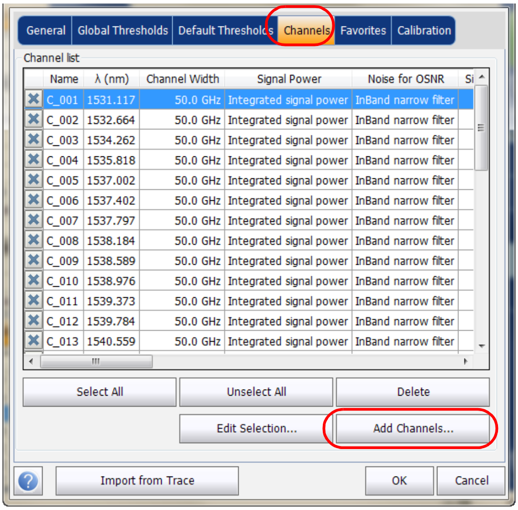
To add a channel list:

1. From the **Main Menu**, press **Analysis Setup**.

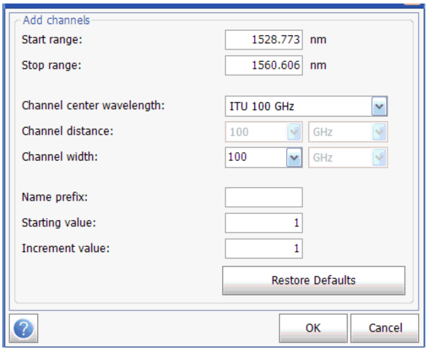


2. Select the **Channels** tab.

3. By default, the channel list is empty. Press **Add Channels**.



4. Enter values in the boxes as explained below:



- Start range (nm or THz): starting range of the channel list.
- Stop range (nm or THz): ending range of the channel list.
- Channel center wavelength/frequency: spectral center-of-mass for the peak in that channel.

Note: *When using the custom channel center wavelength option, the first channel will be centered at the Start Range, and the list will be created using channel distance and channel width.*

- Channel distance (nm or GHz): distance between channels. The value of channel distance will be set depending on the selection made for the channel center wavelength option. The channel distance box will be enabled only when the channel center wavelength option is set to custom.
- Channel width (nm or GHz): limit inside which the power values will be considered in the channel. Integrated power is calculated on channel width.
- Name prefix: adds a prefix to the channel names.

- Starting value: sets the increment starting value for the channel name in the channel list.
- Increment value: sets the increment value for the channel name in the channel list.

5. Press **OK** to return to the **Channels** window, which now lists the added channels.

Note: *When new channels are added, the **Use Default thresholds** selection will be applied to the channel parameters.*

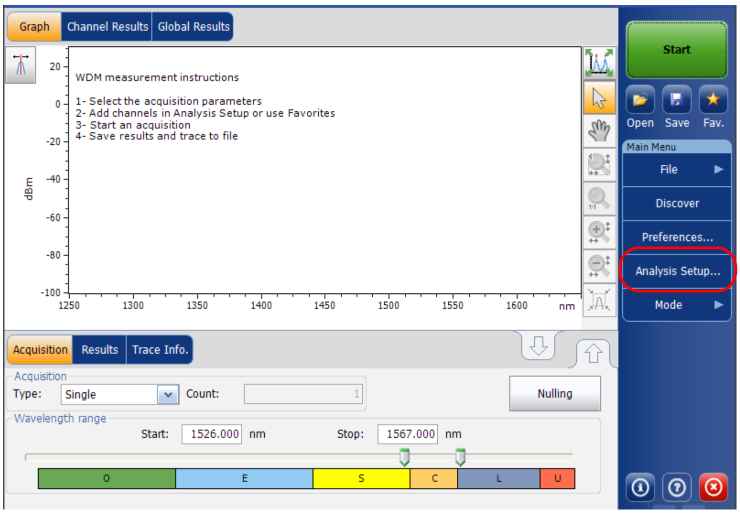
Note: *A warning message will be displayed if channels are overlapping, but the analysis can still be performed on overlapping channels. If any duplicate channels are added, a confirmation message will be displayed to overwrite the existing channels with the duplicate channels.*

6. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

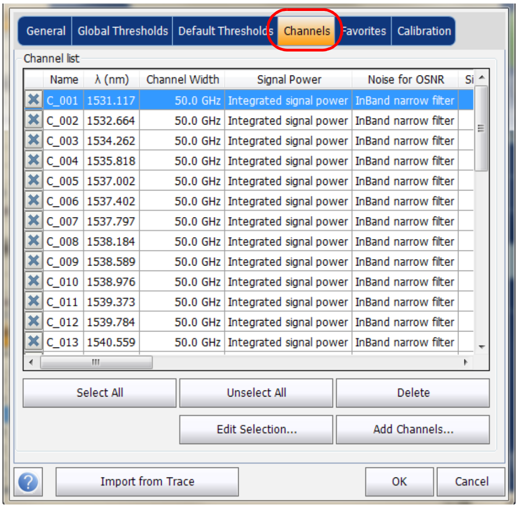
Note: *The application displays a message if more than 1000 channels are added. You can exit the **Analysis Setup** window only after deleting the extra channels from the channel list. You can delete the channels manually as required.*

To edit the parameters of a specific channel:

1. From the **Main Menu**, press **Analysis Setup**.



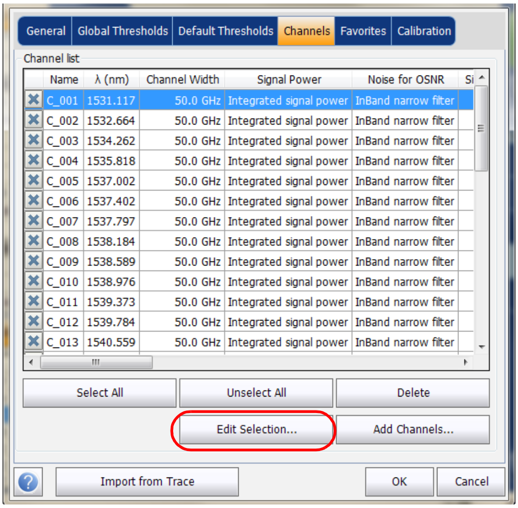
2. Select the **Channels** tab.



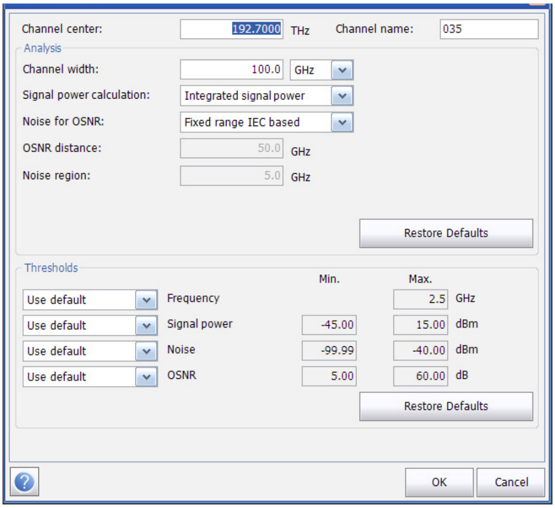
3. Select the channel or channels to be modified in the channel list.

If you want the changes to be applied to all of your channels, press **Select All**. Channels can be selected one by one or all together. You can press **Unselect All** to clear all channel selections. To delete the selected channels, press **Delete**.

4. Press **Edit Selection**.



5. Modify the settings as needed. For more information about the settings, see *Defining General Settings* on page 54 and *Defining Default Thresholds* on page 66. If you leave a box empty, it will remain as it was before your changes. Modify appropriate settings.



6. Press **OK** to return to the **Channels** tab, which now contains the modified settings.

7. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Setting Up Acquisition Parameters

Before performing your test, you must set the acquisition type and parameters.

There are five types of acquisitions in WDM mode:

➤ Single: Spectral measurement is performed once. The results are displayed according to this measurement.

➤ Averaging: Spectral measurements are performed based on the number of scans that you have entered for this parameter. The trace will be displayed after each acquisition and averaged with the previous traces.

➤ Real-Time: In real-time acquisition, spectral measurements are performed continuously until you press **Stop**. No averaging is done for spectral measurements. The graph and results are refreshed after each acquisition.

➤ InBand: The InBand type acquisition will perform a series of scans in different polarization conditions in order to enable the InBand OSNR calculation.

➤ *i*-InBand: The *i*-InBand acquisition enables an adaptive intelligent InBand OSNR calculation that takes into account the multiple scans (up to 500) in various polarization conditions to determine the best available InBand analysis parameters for the signals under test on a per channel basis. With this acquisition type, you do not need to make difficult parameter setting choices (the InBand or InBand narrow filter and number of scans are automatically determined), especially when you are faced with complex system configurations.

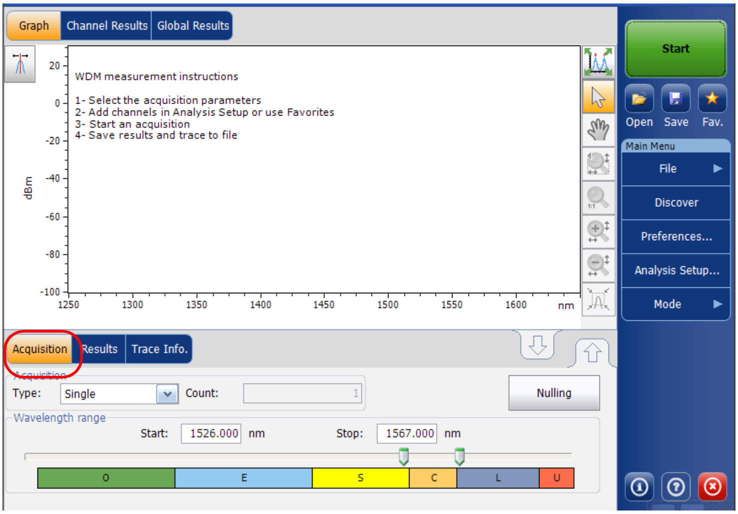
Note: *The InBand and* i-*InBand option are available only if the module supports it and you have purchased the corresponding InB software option.*

Before performing measurements on an optical spectrum, you must select the wavelength/frequency range to use. You can perform the scan on the full range, on spectral bands, or select a custom range.

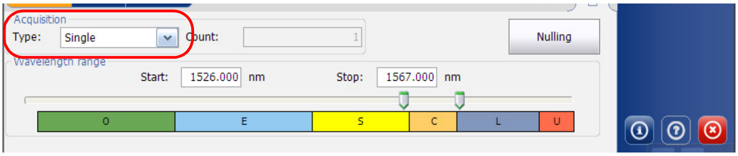
Note: *The shorter the wavelength or frequency range, the faster the acquisition.*

To set parameters in the Acquisition tab:

1. From the main window, select the **Acquisition** tab.



2. Select the acquisition type.



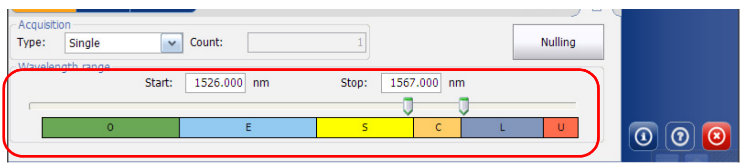
3. If you are performing an averaging type acquisition, enter the number of scans the unit will perform.

If you are performing an InBand type acquisition, either enter the number of scans or select a predefined number of scans the unit will perform.

Note: *You cannot modify the number of scans count value if you are performing a single or real-time or i-InBand acquisition.*

Note: *In i-InBand mode, the scan count value is always set to 500.*

4. Select the wavelength range for your acquisition.



You can select the wavelength range by entering the start and stop values or by selecting a range on the double slider.

To select the wavelength range using the double slider, move the left and right handles on the double slider or simply click on any band.

Note: *You can select more than one adjoining ranges to include in your range, for example, S + C.*

The wavelength range covered within these bands of the spectra are listed below.

- O band (original): 1255 to 1365 nm
- E band (extended): 1355 to 1465 nm
- S band (short wavelengths): 1455 to 1535 nm
- C band (conventional “erbium window”): 1525 to 1570 nm
- L band (long wavelengths): 1560 to 1630 nm
- U band (ultralong wavelengths): 1620 to 1650 nm.

Using the Commissioning Assistant

If you have purchased the commissioning (Com) option, you can use an assistant to calculate the OSNR of coherent channels.

The assistant lets you select a measurement file where all channels are on, or active, and then compares them to other measurement files on which one of the channels is off while all of the others are still on.

The commissioning assistant automates OSNR measurements of 40 G/100 G coherent signals based on two standards: the China Communications Standards Association (CCSA) YD/T 2147-2010 and the IEC recommendation 61282-10 (draft).

The Chinese CCSA YD/T 2147-2010 standard recommends calculating Pol-Mux OSNR as follows:

$$\text{Pol Mux OSNR} = 10\log_{10}((P-N)/(n/2))$$

where, for a 50 GHz channel:

- *P* is the integrated power (Signal + Noise) over the 0.4 nm channel bandwidth
- *N* is the integrated power (Noise) over 0.4 nm bandwidth
- *n* is the integrated power (Noise) inside 0.2 nm, then normalized to 0.1 nm

The IEC 61282-12 recommendation has not yet reached final approval stage, and therefore the calculation might differ slightly from that presented in this document. The standard defines OSNR as

OSNR (dB) = 10log (R) with

$$R = \frac{1}{B_r}\int_{\lambda_1}^{\lambda_2}\frac{s(\lambda)}{\rho(\lambda)}d\lambda$$

where:

- $s(\lambda)$: is the time-averaged signal spectral power density, not including ASE, expressed in W/nm.
- $\rho(\lambda)$ is the ASE spectral power density, independent of polarization, expressed in W/nm.
- B_r is the reference bandwidth expressed in nm (usually 0.1 nm if not otherwise stated) and the integration range in nm from λ_1 to λ_2 is chosen to include the total signal spectrum.

Note: *To be valid, the trace with all channels on, or all of the traces with a channel off must come from a module onto which the commissioning option was activated.*

Note: *The units and empty channel display information come from the user preferences set in your application.*

IMPORTANT

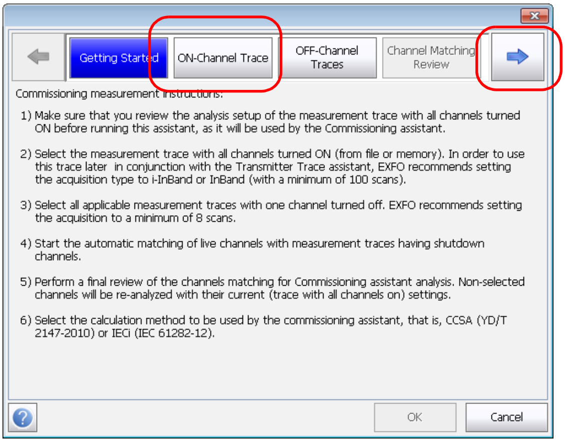
When performing OSNR measurements using the Commissioning Assistant, you must make sure that the noise level with the channel shutdown is representative of the real ASE noise level. For instance, ROADM equalization capabilities might change the noise level to compensate for the loss of one channel in the off trace measurement.

To use the commissioning assistant:

1. Review the analysis parameters of the trace you want to use with all channels on. This is the key measurement trace for the rest of the operation.

2. From the main window, select **Assistants**, then **Commissioning**.

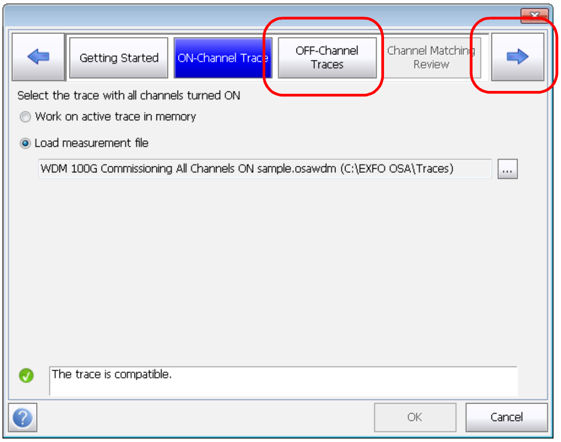
3. When you are ready to proceed, press either the right arrow button, or **On-channel trace**.



4. Select the trace that will be used with all channels ON. This trace can be the one presently in memory (active trace only, not the reference trace), or you can select another one that you have previously stored. Once the measurement file is selected, you can see at the bottom of the window whether this measurement is compatible or not for commissioning.

Note: *EXFO recommends setting the acquisition type to i-InBand or InBand (with a minimum of 100 scans) to acquire this trace.*

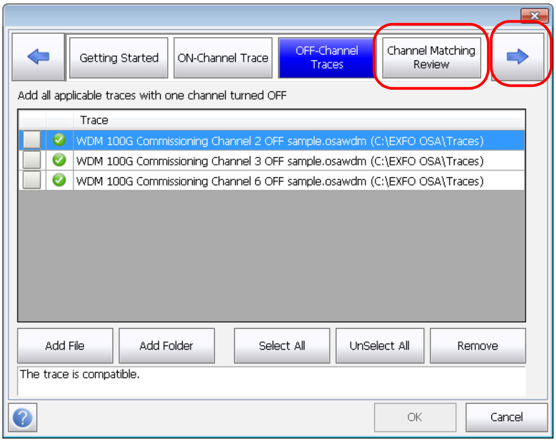
5. Once your choice is done, press the arrow button, or **OFF-channel traces**.



6. Using the buttons at the bottom of the window, select all of the applicable measurements traces (files) with one corresponding channel off. An indicator next to the trace shows if the measurement file is compatible or not.

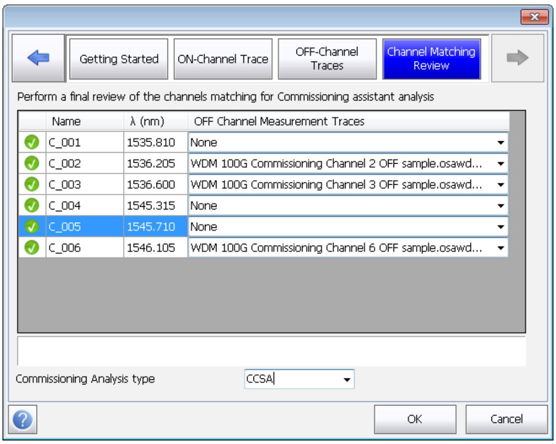
Note: *EXFO recommends setting the acquisition to a minimum of 8 scans.*

Once the traces are selected, press the arrow button, or **Channel matching review**.



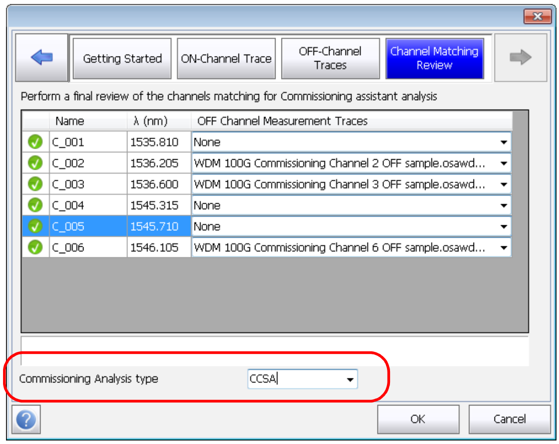
7. When channels can be associated automatically and that there is only one possible choice, the corresponding measurement file appears in the list. If no traces match some of the channels, they will be set to *none*.

   In the case of channels where there is more than one corresponding measurement file, select which measurement you want to use for the commissioning test using the choices in the drop-down lists.



Note: *You can go back in the assistant step to select or modify traces. However, if you do, the matches in the* ***Channel matching review*** *page will not be automatically reassigned and you have to perform a manual assignment (association) for the channels with modified or new measurement files.*

8. Select the type of analysis used to perform the noise calculation (CCSA or IECi, as explained on page 82).



9. When all channels are matched (or explicitly excluded when marked *None*), press **OK** to complete the analysis process and close the Assistant.

The results appear on-screen in the **Results** table and **Channel Results** tab. The type of analysis is indicated between parentheses. Non-selected channels will be re-analyzed with their current (trace with all channels on) settings.

Note: *To keep the results you have just obtained with the commissioning assistant, you must save your measurement trace.*

5 Setting Up the Instrument in Drift Mode

Before performing a spectral analysis in the Drift mode, you must set up the test application with the appropriate parameters, as explained in this chapter.

Select the Drift test mode as explained in *Selecting a Test Mode* on page 12 before setting up the Drift test parameters.

- The *preferences* are the result displayed in the graph and tables, as well as the job information and related comments saved with each file.
- The *analysis parameters* include the channel list details, pass-fail threshold settings and allows you to select the noise and power calculation methods.
- The *acquisition parameters* include the type of measurement you want to perform and the wavelength range.

See *Defining Preferences* on page 93, *Setting Up Drift Analysis Parameters* on page 107 and *Setting Up Acquisition Parameters* on page 131 for more details.

You can set up your unit in different manners, depending on your testing needs.

➤ The preferred way is to use the complete analysis setup parameters and complete the information in all tables, as explained in *Setting Up Drift Analysis Parameters* on page 107. This setup will be used for the next acquisition.

➤ The easiest way to set up the instrument, especially when the operator does not know in advance what to expect at the input of the module is to use the **Discover** button. After the **Discover** button has been pressed, a measurement and analysis will be performed according to the best setup determined by the instrument and this setup will be used for the next scan. This is explained in *Using the Discover Feature* on page 239.

➤ The most efficient way to setup the instrument is to use one of the favorites configurations, uploading a pre-customized acquisition and analysis setup configuration. The operator in the field only has to press the  button, select the appropriate configuration and press **Start**. As an example, a pre-customized configuration could be: “32 channels DWDM 50GHz”; “Toronto-Montreal CWDM” or “Vendor ABC DWDM ROADM 40Gb”. This is explained in *Managing Favorites* on page 250.

➤ You can also import the setup from the current trace. This method will take the data and channel information from the current trace and apply them in the corresponding tabs. For more information, see *Setting Up Drift Analysis Parameters* on page 107.

Defining Preferences

The preferences window allows you to set general information and comments on trace, set display parameters and customize the drift results table.

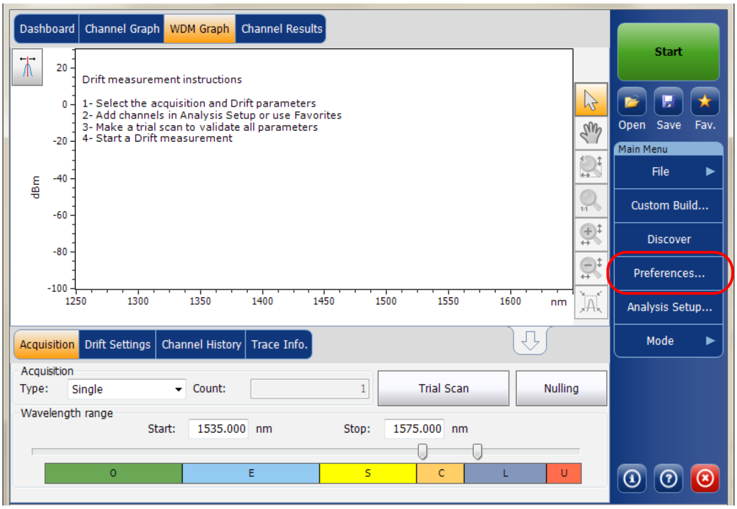
Note: *Only the **Display** and **Drift Results** tabs are available in offline mode.*

Defining Trace Information

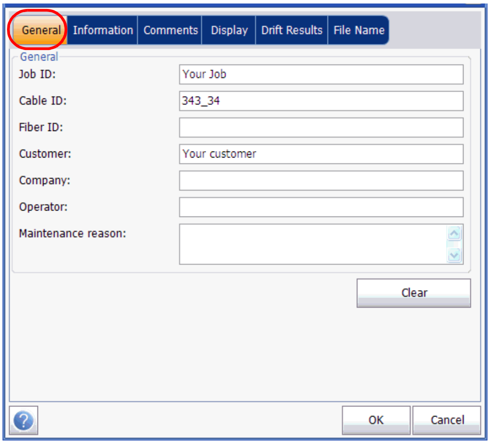
The trace information relates to the description of the job to be done, cable and job IDs, and any relevant information about what is being tested.

To enter general information:

1. From the **Main Menu**, press **Preferences**.



2. Select the **General** tab.



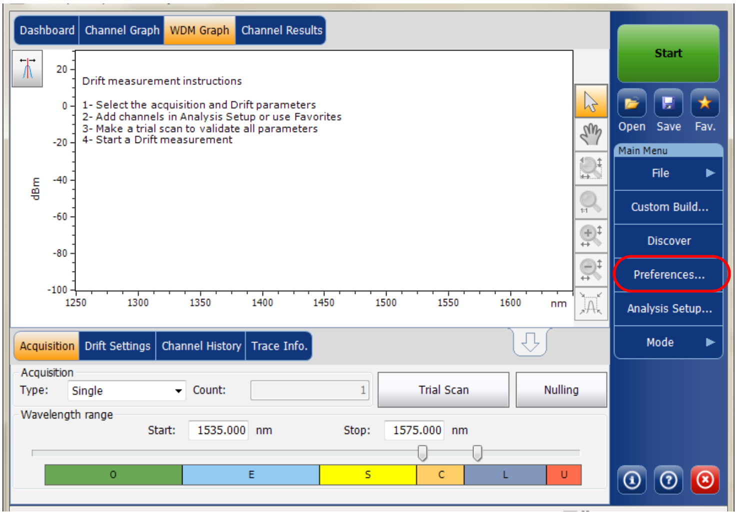
3. Define the general parameters as needed.

4. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

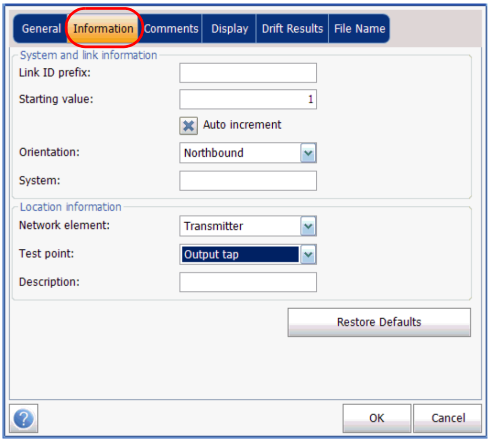
Press **Clear** to clear all the changes made in the **General** tab.

To enter link and location information:

1. From the **Main Menu**, press **Preferences**.



2. Select the **Information** tab.



3. Under **System and link information**, define the following parameters as needed:

➤ Link ID prefix: prefix value for the link ID. You can enter any alphanumeric value.

➤ Starting value: suffix increment starting value for the link ID.

This value is incremented each time a new file is saved provided the **Auto Increment** option is selected.

IMPORTANT

If the Auto Increment option is not selected, you have to manually change the file name when saving the trace file, otherwise the application will overwrite the previously saved file.

➤ Orientation: orientation of the link.

➤ System: information about the system under test.

4. Under **Location Information**, define the following parameters as needed:

➤ Network element: Sets the type of network element.

➤ Test point: Sets the location where the test is performed on the link.

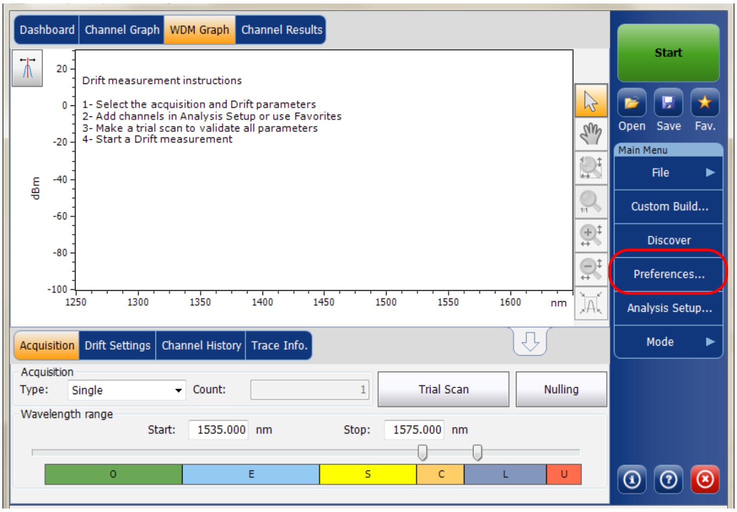
➤ Description: Enter the description of location if required.

5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

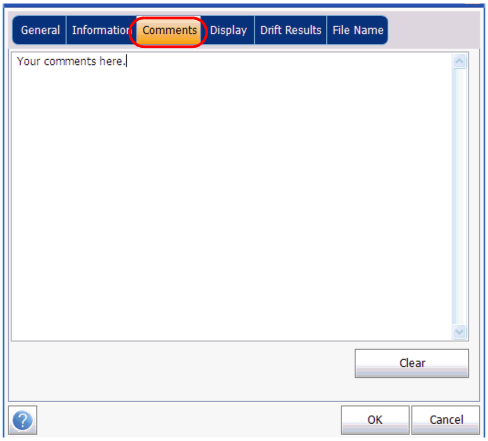
Press **Restore Defaults** to remove all the changes and apply the default values.

To enter comments:

1. From the **Main Menu**, press **Preferences**.



2. Select the **Comments** tab.



3. Enter your comments for the current trace.

4. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

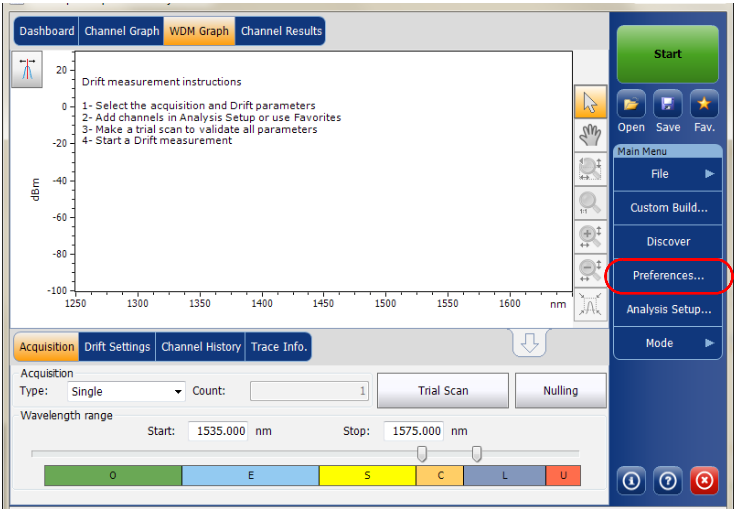
Press **Clear** to clear all the changes made in the **Comments** tab.

Defining Display Parameters

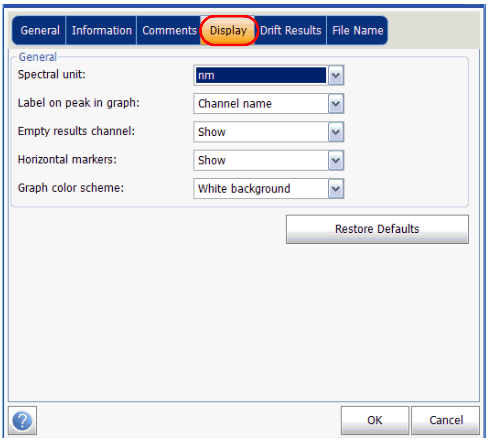
The application allows you to set display settings for the acquisition trace. You can set the spectral unit for the trace and the results table. You can also select the label that should appear on the peaks of the trace.

To define display parameters:

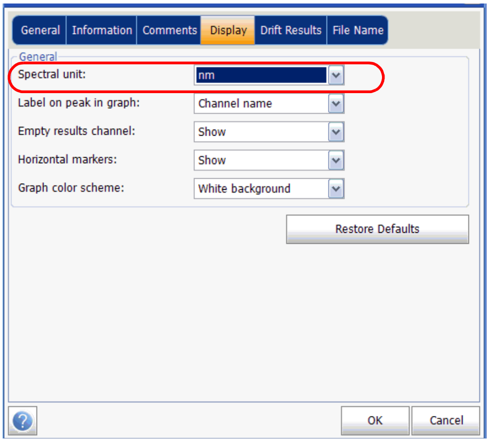
1. From the **Main Menu**, press **Preferences**.



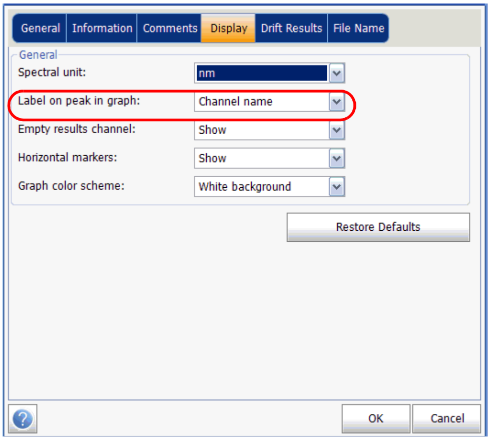
2. Select the **Display** tab.



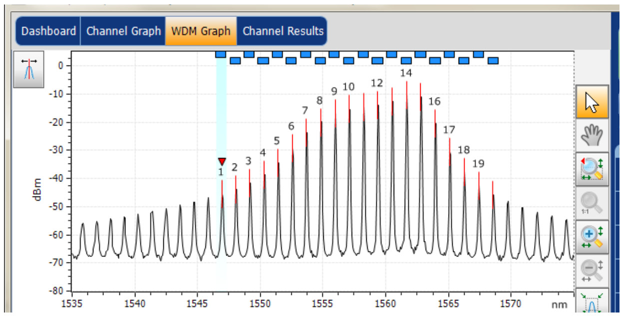
3. Select the spectral unit you want to work with, either nm or THz.



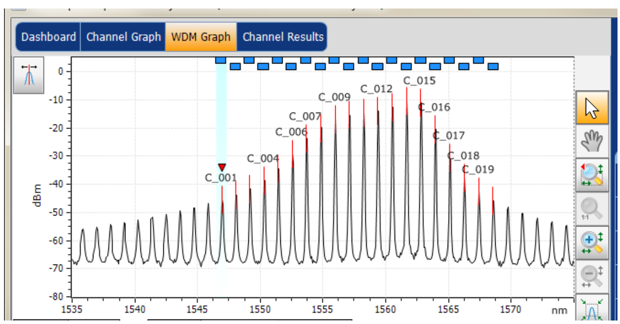
4. Select the label that will appear on the peaks in the graph, either the channel name, its number, or nothing.



Note: *The channel name and channel number cannot be shown at the same time.*

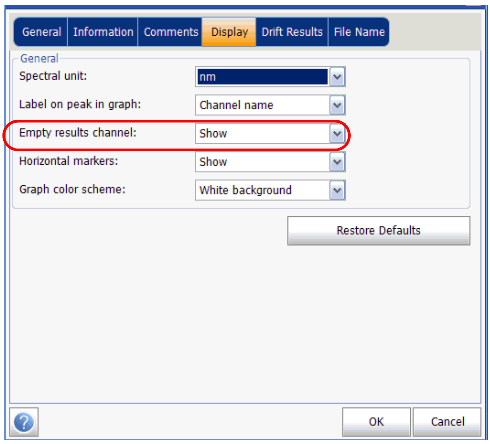


Channel numbers

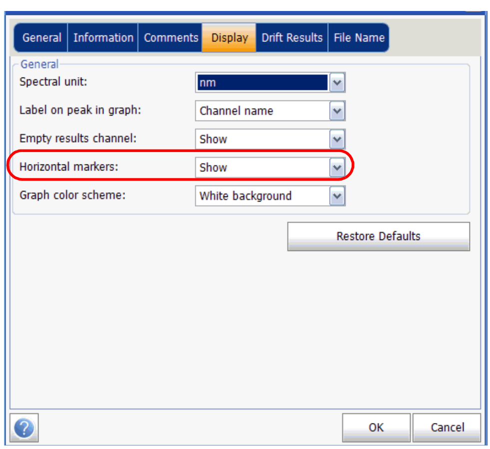


Defined channel names

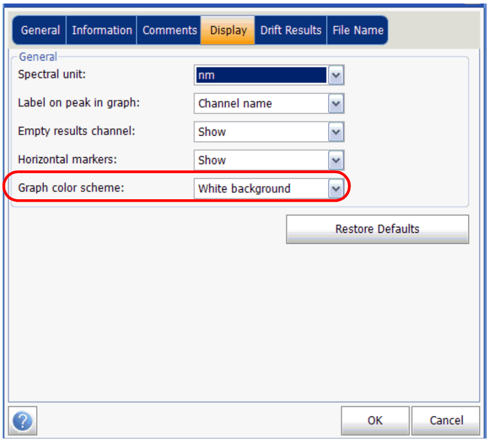
5. Select whether you want to show or hide the empty channels from the channel list in the **Dashboard**, **Channel Graph**, **Channel Results** and **Channel History** tabs.



6. Select whether you want to show the horizontal markers or the integrated power trace in the marker toolbar.



7. Select the background color scheme for the graph as desired.



8. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

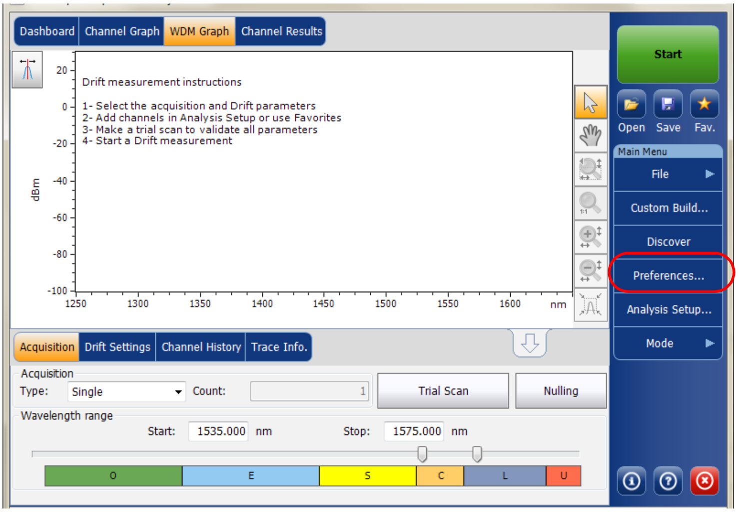
Press **Restore Defaults** to remove all the changes and apply the default values.

Customizing Drift Results Table

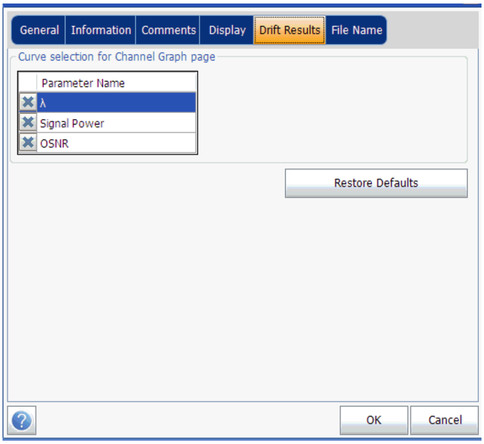
It is possible to select which results you would like to be displayed in the **Results** tab of your Drift tests.

To customize the results table:

1. From the **Main Menu**, press **Preferences**.



2. Select the **Drift Results** tab.



3. Select which parameters you want to display in the **Channel Graph** tab from the list of available choices:

- Center wavelength/frequency: spectral center-of-mass for the peak in that channel.
- Signal Power: signal power for the selected channel (excludes noise).
- OSNR: Optical Signal to Noise Ratio, given by Signal power (according to the current calculation method, in dBm) minus Noise (according to the current calculation method, in dBm).

4. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Press **Restore Defaults** to remove all the changes and apply the default values.

Setting Up Drift Analysis Parameters

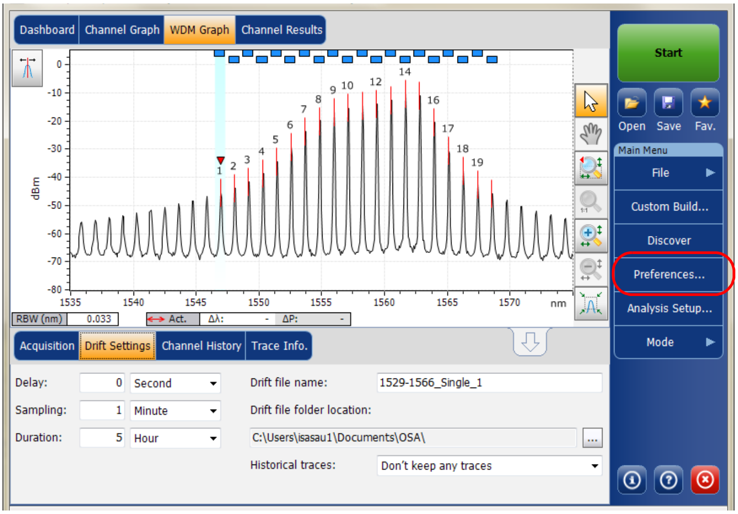
This section presents the various analysis settings for the application, particularly the channel list and settings. These settings are applied on subsequent acquisitions. You can set the channel list, global thresholds, default channel thresholds, channel parameters, manage favorite configurations and perform user calibration.

Note: *The analysis setup parameters will be applied to the global results and channel results, upon the next acquisition.*

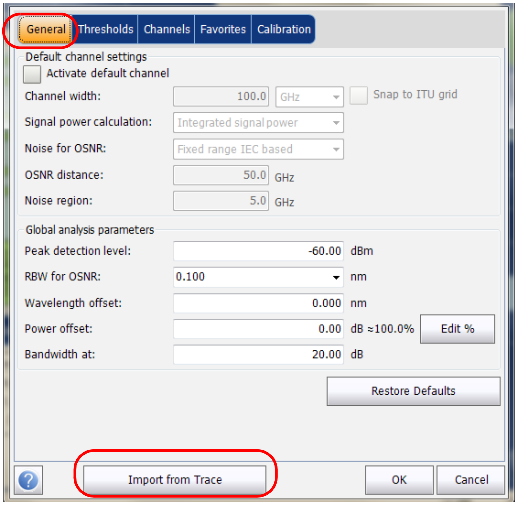
You can either set each parameter individually, or use parameters from the current trace and import them.

To import the parameters from the current trace:

1. Make sure that you have a trace on-screen.
2. From the **Main Menu**, press **Analysis Setup**.



3. From any tab, press **Import from Trace**.



4. Press **OK** to confirm the changes.

Defining General Settings

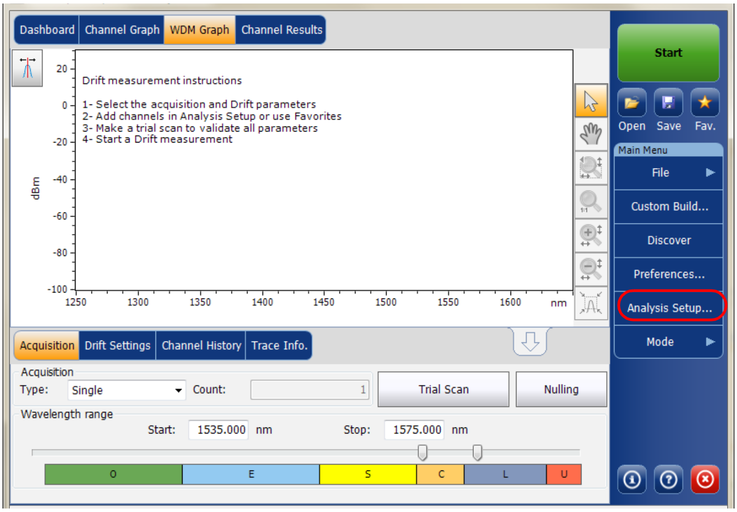
The general analysis parameters for drift acquisitions affect the calculation of the results. These calculations take place after an acquisition. If these settings are modified, they will be applied to the next acquisition.

IMPORTANT

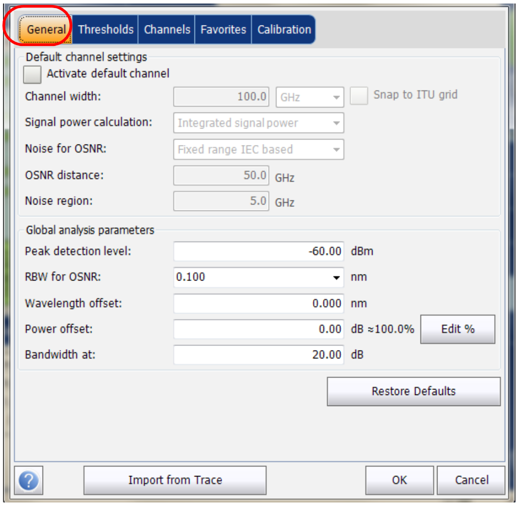
In the General tab, you can set the default channel parameters. Any channel found during an acquisition that is not defined in the channel list will be analyzed according to the default channel settings.

To define general settings:

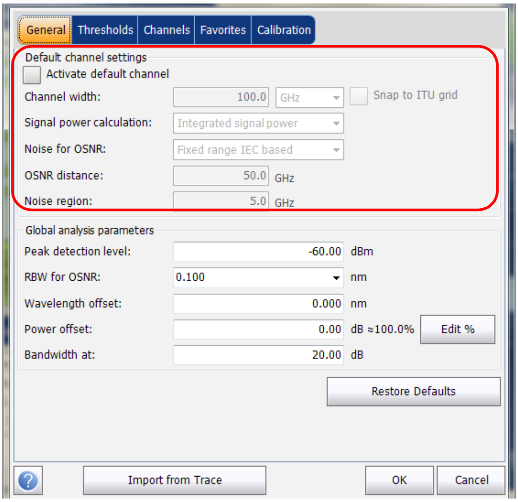
1. From the **Main Menu**, press **Analysis Setup**.



2. Select the **General** tab.



3. Under **Default channel settings**, define the following parameters as needed:



➤ Clear the **Activate default channel** selection, to use the currently defined channel for analysis. This reduces the analysis time by eliminating the peak detection over the complete spectral range. The peaks outside the defined channel list will not be analyzed.

- Channel width (GHz or nm): indicates the limit inside which the power values will be considered in the channel.

  For default channels, the channel width that sets the limits of the channel, should be the same as the channel distance or smaller (channel distance is defined while creating a channel list). If the channel width is not compatible with the channel spacing, either a single peak may be found for two distinct channels and two analysis would be performed and displayed for that peak, or, it is possible that two peaks may be found within the same channel and be considered as one multi-peak signal. With this result, you can use markers to find the spacing between adjacent channels or to find the channel width.

- Snap to ITU Grid: When selected, each detected peak will be defined by the nearest ITU channel. The ITU grid is based on the selected channel width.

- Signal power calculation: indicates which calculation method to apply for signal power value.

  Integrated signal power: The integrated signal power represents the sum of the power values included between the channel limits of this channel, minus the estimated noise contribution between the same boundaries. In some cases, for instance CATV signals, signals with high-frequency modulation, or signals with an inherent line width similar or larger than the OSA's resolution bandwidth, this calculation becomes a better estimation of the true signal power.

  Peak signal power: The peak signal power represents the maximum power value inside the channel. Note that it differs a little from the peak measurement on the spectrum due to the fact that the estimated noise is subtracted to get the peak signal power.

  Total channel power: The total channel power represents the sum of the integrated signal power and of the noise within the channel.

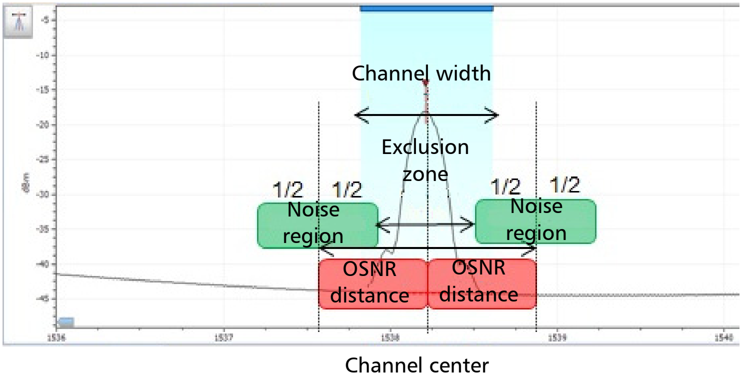
- Noise for OSNR: indicates which calculation method to use for OSNR value.

  Fixed range IEC based (IEC): The IEC method uses the interpolation of noise measured on both sides of the signal to estimate the noise level. The position at which the noise is estimated from the center wavelength is given by the OSNR distance.

  InBand (InB): The InBand method uses a series of scans having different polarization states to calculate the noise level under the peak (InBand).

  InBand narrow filter (InB nf): The InBand narrow filter method uses additional processing to provide an accurate OSNR value for the narrow carved noise. This is because with narrow filters, the noise level under the peak is not uniform and the OSNR value depends on the processing width selected.

Fifth order polynomial fit (Fit): The fifth order polyfit method calculates the noise curve and thus the signal to noise ratio. The OSA will approximate the noise curve using a fifth order polynomial fit. This fit definition relies on fit and exclusion zones. Only the points in the fit zones are used to calculate the fifth order polynomial fit. If you select the fifth order polyfit method, you will have to define the fit and exclusion zones for your tests using the OSNR distance and noise region fields. The exclusion zone is indirectly obtained from the OSNR distance.

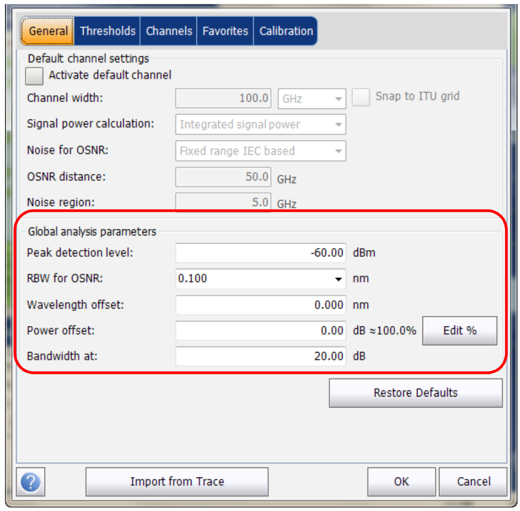


- OSNR distance (GHz or nm): Except for the fifth order polyfit selection, the OSNR distance is automatically set at the channel edge, that is, at half of the channel width from the center wavelength.

  For the fifth order polyfit, the OSNR distance corresponds to the distance from the channel peak to the center of the fit zone. It is independent of the channel width.

- Noise region: The noise region, or fit zone, defines the region where the polynomial fit applies. Two identical regions are centered at the OSNR distance.

4. Under **Global analysis parameters**, define the following parameters as needed:

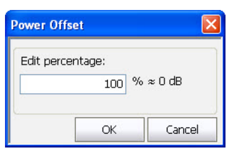


- ➤ Peak detection level (dBm): indicates the minimum power level from where the peak can be considered as a signal.
- ➤ RBW for OSNR (nm): indicates the resolution bandwidth selected for the OSNR calculation. This parameter is generally set to 0.1 nm to allow for a common basis of comparison between different OSAs having different effective resolutions. The instrument's RBW value is written below the graph. This parameter does not actually have an effect on the acquisition, but is only a normalization factor used to provide the OSNR value in a standardized manner.

- Wavelength offset (nm): indicates the offset value applied on the wavelength. This does not replace a calibration performed at EXFO, but it can help you temporarily sharpen the specifications if you have determined that, for example, your modules are used beyond the normal allowed use. Entering a value in THz is not possible. When an offset is applied, it is indicated at the bottom of the graph (λ ↔).

- Power offset (dB): indicates the offset value applied on the power. This does not replace a calibration performed at EXFO, but it can help you achieve the specifications if you have determined that, for example, your modules are used beyond the normal allowed use. When an offset is applied, it is indicated at the bottom of the graph (P ↔).

  To edit the power offset as a tap percentage, press the **Edit %** button.

  The percentage value entered in **Edit percentage** will be converted to a corresponding equivalent value in dB.

- Bandwidth at (dB): Set the power level used, relative to the channel peak power, to compute the bandwidth.

5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

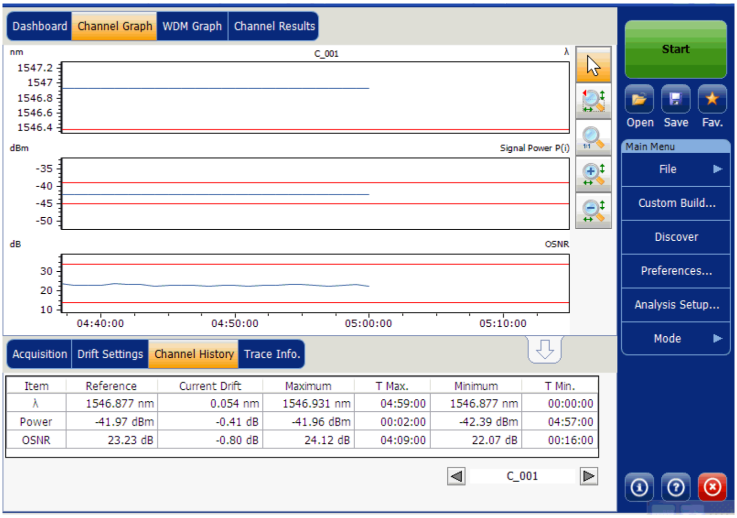
Press **Restore Defaults** to remove all the changes and apply the default values.

Defining Default Channel Thresholds

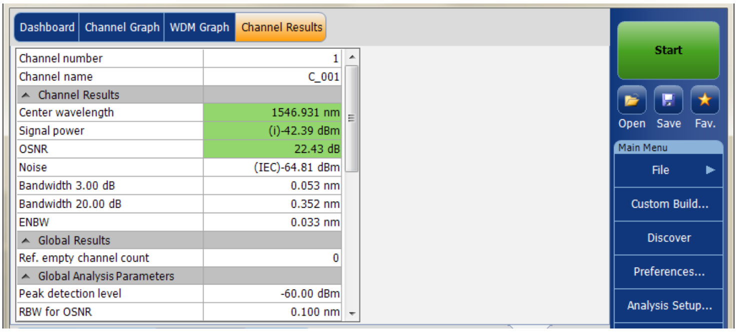
The thresholds will be applied to any channel found outside the channel list during the next acquisition. Thresholds will be applied to the channel results during the next acquisition.

The application allows you to activate and deactivate the threshold functionality with a single control. When thresholds are globally enabled, the results are displayed with the Pass/Fail status based on various settings.

When thresholds are globally disabled, results are displayed without a Pass/Fail status in the **Channel Graph** and **Channel History** tabs.



When thresholds are globally disabled, the results in the **Channel Results** tab are also displayed without a Pass/Fail status.

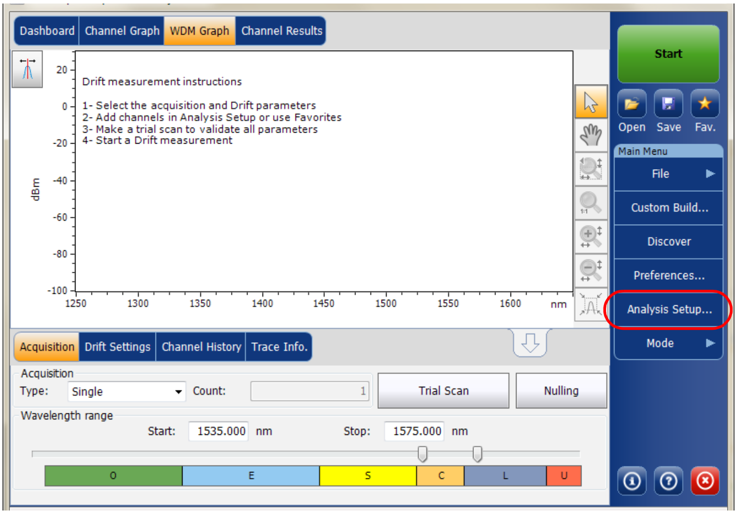


You can set your pass/fail threshold limits in different ways depending on the type of test you are performing.

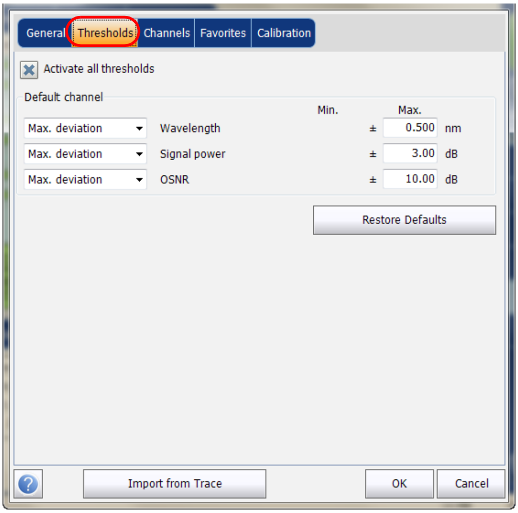
Threshold Limit	Definition
None	No threshold limit is set. The results will be displayed without a Pass/Fail verdict.
Min only	The threshold limit is set for a minimum value only. The Pass/Fail verdict is declared as Pass (in green), when the value is equal to or greater than the minimum threshold set. The verdict is declared as Fail (in red), when the value is below the minimum threshold set.
Max only	The threshold limit is set for a maximum value only. The Pass/Fail verdict is declared as Pass (in green), when the value is equal to or less than the maximum threshold set. The verdict is declared as Fail (in red), when the value is above the maximum threshold set.
Min and Max	The threshold limit is set for the minimum and maximum value. The Pass/Fail verdict is declared as Pass (in green), when the value is equal to or within the minimum and maximum thresholds set. The Pass/Fail verdict is declared as Fail (in red), when the value is beyond the minimum or maximum thresholds set.
Max. Deviation	The threshold limit is set for the deviation value. The Pass/Fail verdict is declared as Pass (in green), when the value is equal to or within the deviation threshold set. The Pass/Fail verdict is declared as Fail (in red), when the value is beyond deviation threshold set.

To define the default channel thresholds:

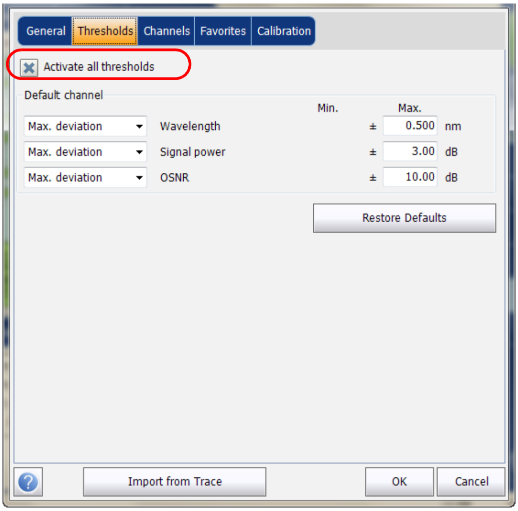
1. From the **Main Menu**, press **Analysis Setup**.



2. Select the **Thresholds** tab.



3. Select the **Activate all thresholds** option to manually set the channel threshold values. If this option is not selected, all the thresholds will be deactivated, results are displayed without a Pass/Fail status in the **Channel Graph**, **Channel History** and **Channel Results** tabs.



4. Enter values in the boxes as explained below:

➤ Wavelength/Frequency (nm/GHz): central wavelength/frequency of the channel.

➤ Signal power (dBm): signal power for the selected channel (excludes noise).

➤ OSNR (dB): Optical Signal to Noise Ratio, given by Signal power (according to the current calculation method, in dBm) minus Noise (according to the current calculation method, in dBm).

5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Press **Restore Defaults** to remove all the changes and apply the default values.

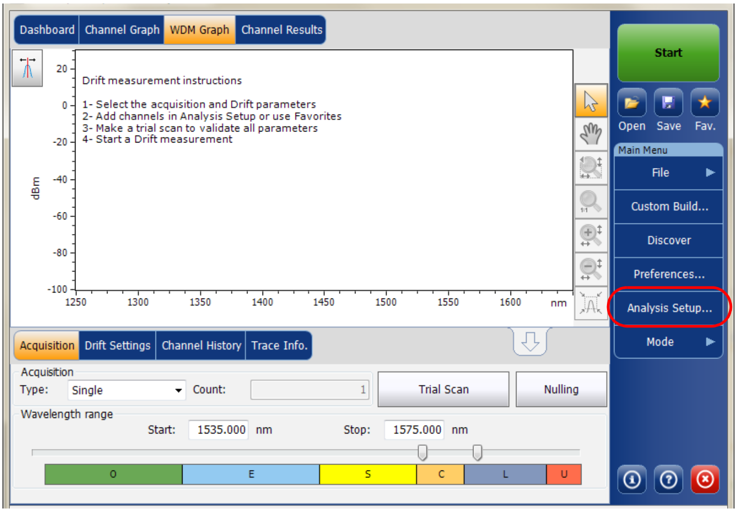
Managing Channels

Testing DWDM systems involves characterizing multiple signals in a link. The application allows you to define channels using a channel editor or quickly generate them from the current data. You can also rapidly create a list of equally spaced channels. Once a channel list is created, you can modify it as needed. You can edit the analysis parameters for one channel or multiple channels.

While creating the channel list, some channels may overlap. When the channel widths are specified in nm, two channels are considered to be overlapping when more than 1.2 GHz (approximately) of frequency range is common between the two channels.

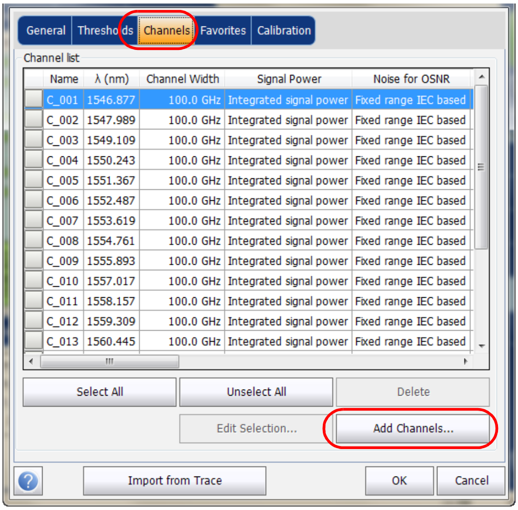
To add a channel list:

1. From the **Main Menu**, press **Analysis Setup**.

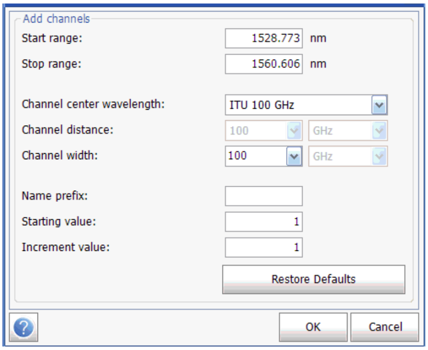


2. Select the **Channels** tab.

3. By default, the channel list is empty. Press **Add Channels**.



4. Enter values in the boxes as explained below:



- Start range (nm or THz): starting range of the channel list.
- Stop range (nm or THz): ending range of the channel list.
- Channel center wavelength/frequency: spectral center-of-mass for the peak in that channel.

Note: *When using the custom channel center wavelength option, the first channel will be centered at the Start Range, and the list will be created using channel distance and channel width.*

- Channel distance (nm or GHz): distance between the channels. The value of channel distance will be set depending on the selection made for the channel center wavelength option. The channel distance box will be enabled only when the channel center wavelength option is set to custom.
- Channel width (nm or GHz): limit inside which the power values will be considered in the channel. Integrated power is calculated on channel width.
- Name prefix: adds prefix to the channel names.
- Starting Value: increment starting value for the channel name in the channel list.
- Increment value: increment value for the channel name in the channel list.

5. Press **OK** to return to the **Channels** window, which now lists the added channels.

Note: *When new channels are added, the Use Default thresholds will be applied to the channel parameters.*

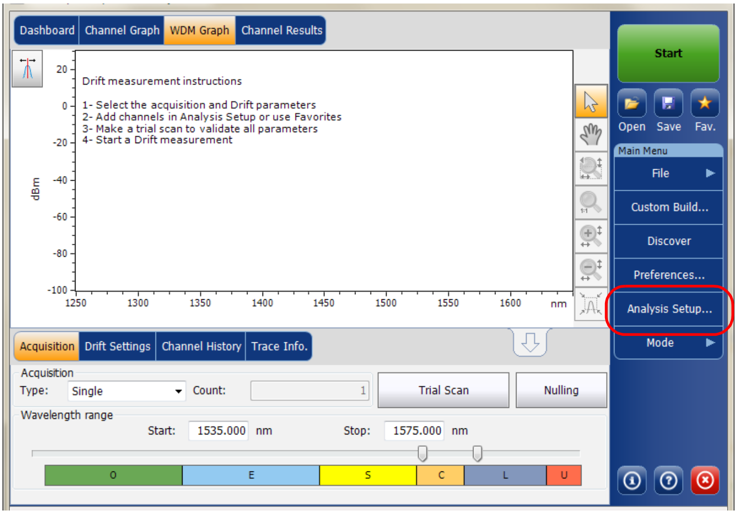
Note: *A warning message will be displayed if any channels are overlapping, but the analysis can still be performed on overlapping channels. If any duplicate channels are added, a confirmation message will be displayed to overwrite the existing channels with the duplicate channels.*

6. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

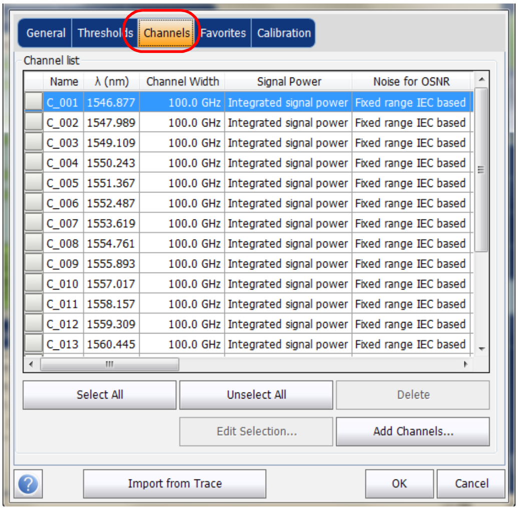
Note: *The application displays a message if more than 1000 channels are added. You can exit the **Analysis Setup** window only after deleting the extra channels from the channel list. You can delete the channels manually as required.*

To edit the parameters of a specific channel:

1. From the **Main Menu**, press **Analysis Setup**.



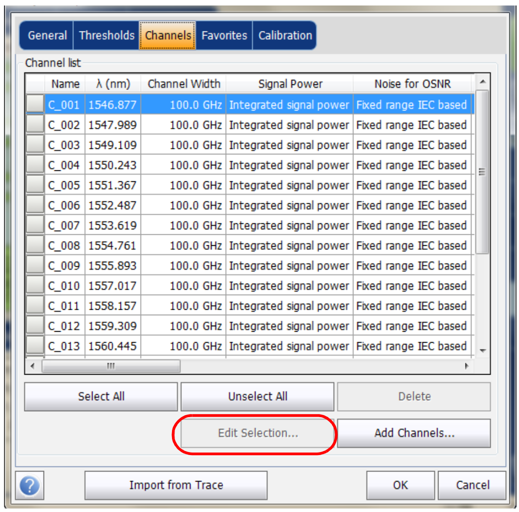
2. Select the **Channels** tab.



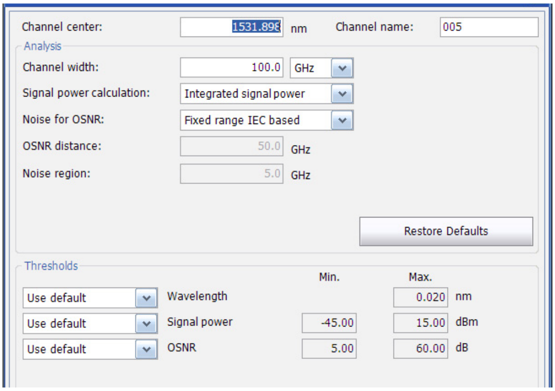
3. Select the channel or channels to be modified in the channel list.

If you want the changes to be applied to all of your channels, press **Select All**. Channels can be selected one by one or all together. You can press **Unselect All** to clear all channel selections. To delete the selected channels, press **Delete**.

4. Press **Edit Selection**.



5. Modify the settings as needed. For more information about the settings, see Managing Channels *on page 123*. If you leave a box empty, it will remain as it was before your changes. Modify appropriate settings.



6. Press **OK** to return to the **Channels** tab, which now contains the modified settings.

7. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Setting Up Acquisition Parameters

Before performing your test, you must set the acquisition type and parameters from the **Acquisition** tab and other parameters from the **Drift Settings** tab.

There are three types of acquisitions in Drift mode: single, averaging and InBand.

➤ Single: Spectral measurement is performed once. The results are displayed according to this measurement.

➤ Averaging: Spectral measurements are performed based on the number of scans that you have entered for this parameter. The trace will be displayed after each acquisition and averaged with the previous traces.

➤ InBand: The InBand type acquisition will perform a series of scans in different polarization conditions in order to enable the InBand OSNR calculation.

Note: *The InBand option is available only if the module supports it.*

Before performing measurements on an optical spectrum, you must select the wavelength/frequency range to use. You can perform the scan on the full range, on spectral bands, or select a custom range.

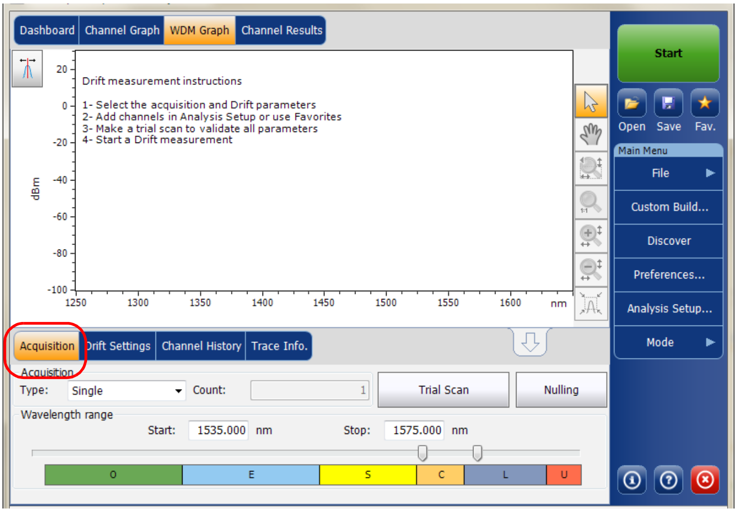
Note: *The shorter the wavelength or frequency range, the faster the acquisition.*

You can configure the delay, sampling and total duration for a drift measurement. You can also configure the drift files name and select a location where it should be saved.

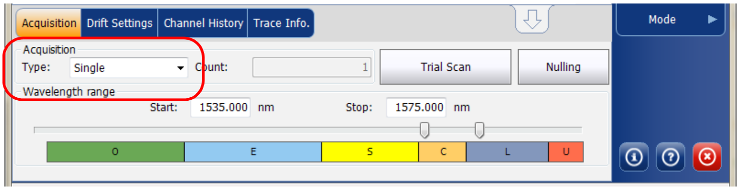
The application allows you to perform a trial scan while setting up the drift measurement.

To set parameters in the Acquisition tab:

1. From the main window, select the **Acquisition** tab.



2. Select the acquisition type.

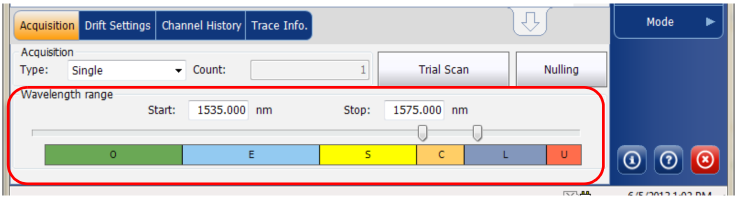


3. If you are performing an averaging type acquisition, enter the number of scans the unit will perform.

If you are performing an InBand type acquisition, either enter the number of scans or select a predefined number of scans the unit will perform.

Note: *You cannot modify the number of scans count value if you are performing a single acquisition.*

4. Select the wavelength range for your acquisition.



You can select the wavelength range by entering the start and stop values or by selecting a range on the double slider.

To select the wavelength range using the double slider, move the left and right handles on the double slider or simply click on any band.

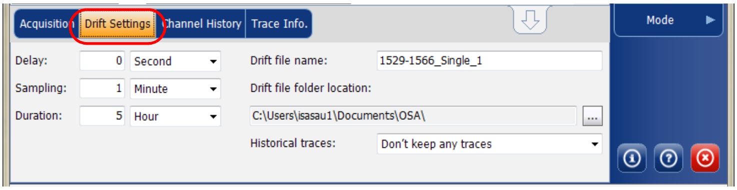
Note: *You can select more than one adjoining ranges to include in your range, for example, S + C.*

The wavelength range covered within these bands of the spectra are listed below.

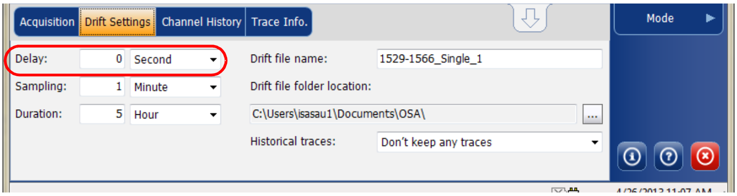
- O band (original): 1255 to 1365 nm
- E band (extended): 1355 to 1465 nm
- S band (short wavelengths): 1455 to 1535 nm
- C band (conventional “erbium window”): 1525 to 1570 nm
- L band (long wavelengths): 1560 to 1630 nm
- U band (ultralong wavelengths): 1620 to 1650 nm.

To set parameters in the Drift Settings tab:

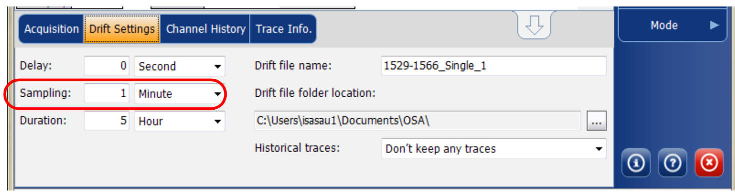
1. From the main window, select the **Drift Settings** tab.



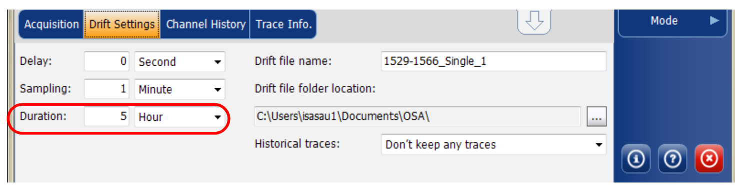
2. Set a delay unit and count before taking the first acquisition in a drift measurement. The application will wait for this time before taking the first acquisition of a drift measurement.



3. Select a sampling unit and enter a sampling count to configure a time that should be elapsed between the start of each acquisition during a drift measurement.

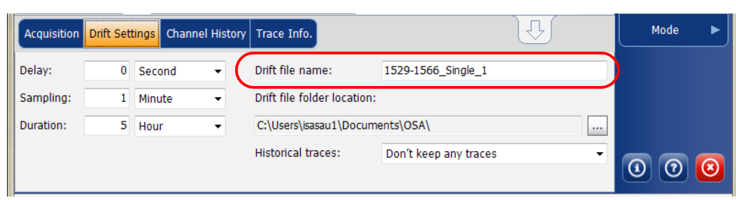


4. Select a duration unit and enter a duration count to configure the total duration of a drift measurement.

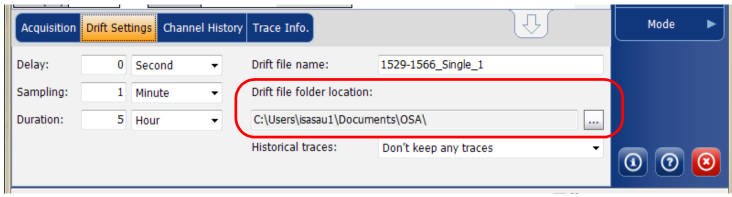


5. Enter a drift file name that should be used to save the drift file.

Note: *This is not available in offline mode.*



6. Select a location where the drift file should be saved.



7. Select whether you want to keep all of the historical traces in the subfolder, keep only the significant ones, or keep none. The historical traces are stored in separate *.osawdm files.

   A significant event is when

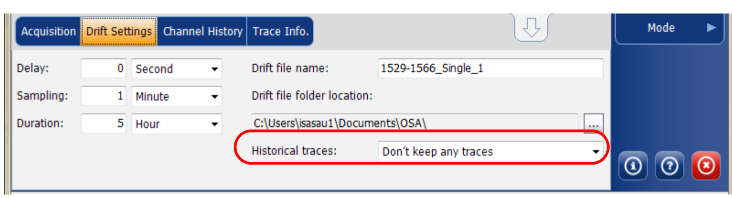
   ➤ a value from a given channel has crossed its threshold (going from pass to fail).

   ➤ there is no signal power in a given channel.

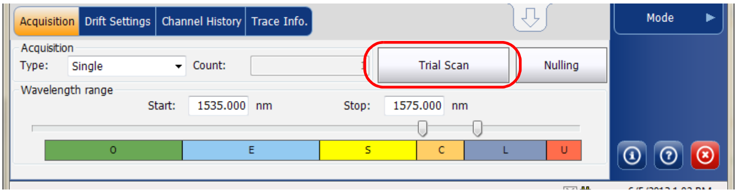
   These historical files are stored in a dedicated folder having the same name as the associated drift measurement file name.

Note: *You can have a maximum of 3 significant traces per channel.*

Note: *This option is not available in offline mode.*



8. To test your parameters, return to the **Acquisition** tab. Press **Trial Scan** to perform a trial acquisition.



When a trial acquisition is running, the **Start** button is disabled. You are notified that the acquisition is in progress in the status bar.

The trial scan is performed using the analysis setup parameters. When the acquisition is complete, the resulting acquisition is displayed in the **WDM Graph** tab and **Channel Results** tab. The **Channel History** tab displays results as if only time 0:00 was available. The other drift mode tabs are empty (**Dashboard**, **Channel Graph**).

Building a Custom Drift Measurement

You can build a drift measurement using a WDM measurement you already have as a reference. The selected channels and thresholds can be imported from the analysis setup or the reference measurement.

A custom drift measurement is particularly useful for offline processing of your data over time and comparing result variations.

The WDM measurements you add must meet specific criteria to be included in the custom build. The table below describes those compatibility criteria.

Note: *Files that are not compatible will automatically be rejected from the custom build measurement.*

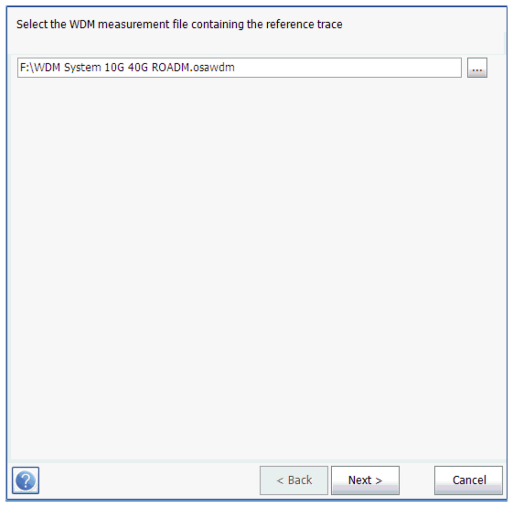
Criteria	Test	Compatibility Status
Acquisition type	Target WDM measurement acquisition type differs from drift reference trace acquisition type	Compatible with warnings
Acquisition number of scans	Target WDM measurement acquisition number of scans differs from drift reference trace acquisition number of scans.	Compatible with warnings
Spectral range	➤ Target WDM measurement acquisition spectral range only partially overlaps spectral range of drift reference trace. ➤ There is no overlap between target WDM measurement spectral range and drift reference trace spectral range.	➤ Compatible with warnings ➤ Incompatible

Criteria	Test	Compatibility Status
Acquisition start time	➤ Target WDM measurement acquisition start time is identical to another WDM measurement (including the drift reference trace) acquisition time. ➤ Target WDM measurement acquisition start time overlaps with another WDM measurement (including the drift reference trace) acquisition time range.	➤ Compatible with warnings ➤ Incompatible
Calibration type (user/factory)	Target WDM measurement instrument’s calibration type differs from drift reference trace instrument’s calibration type.	Compatible with warnings
Calibration date	Target WDM measurement instrument’s calibration date differs from drift reference trace instrument’s calibration date	Compatible with warnings
Instrument’s model	Target WDM measurement instrument’s model differs from drift reference trace instrument’s model	Compatible with warnings
Instrument’s serial number	Target WDM measurement instrument’s serial number differs from drift reference trace instrument’s serial number	Compatible with warnings
Instrument’s RBW	Target WDM measurement instrument’s RBW differs from drift reference trace instrument’s RBW	Compatible with warnings

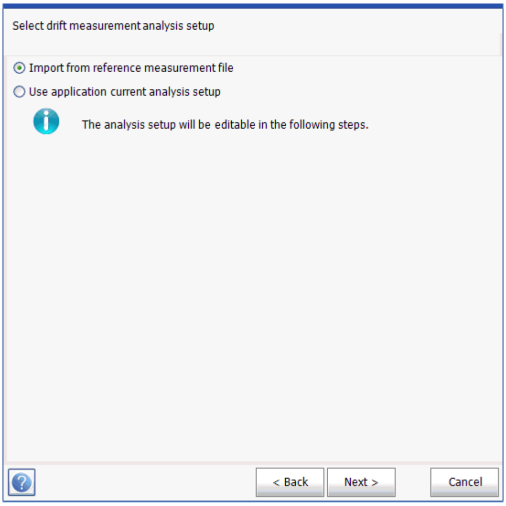
Criteria	Test	Compatibility Status
Power offset	Target WDM measurement power offset differs from drift reference trace power offset	Compatible with warnings
Wavelength offset	Target WDM measurement wavelength offset differs from drift reference trace wavelength offset	Compatible with warnings
Noise measurement	Target WDM measurement acquired trace data does not support configured noise measurement analysis parameter. (This criteria is specific for In-Band noise measurement against IEC acquired data)	Compatible with warnings

To build a custom drift measurement:

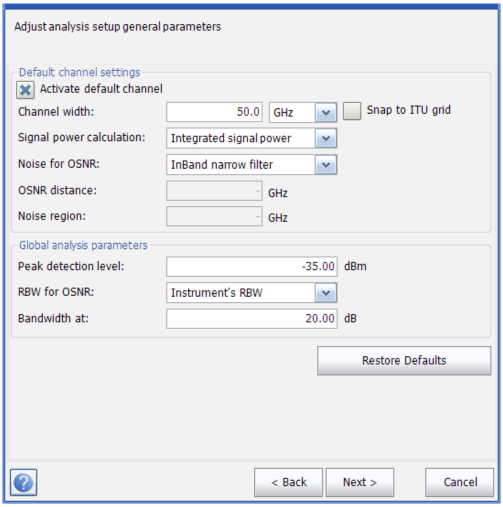
1. If you have not done so already, select the Drift test mode.
2. From the main window, select **Custom Build**.
3. Select the reference trace you want to use to build the measurement, then click **Next**.



4. Select whether you want to import the analysis setup from the selected reference file, or use the settings currently set in your application, then click **Next**.

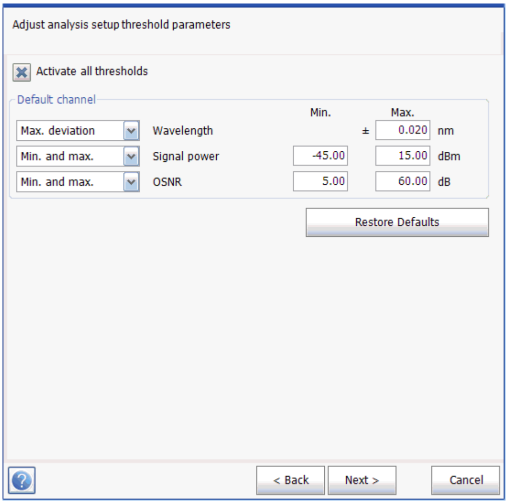


5. Enter, or review if they were imported, the general details for your measurement. See *Defining General Settings* on page 109 for details on each item.

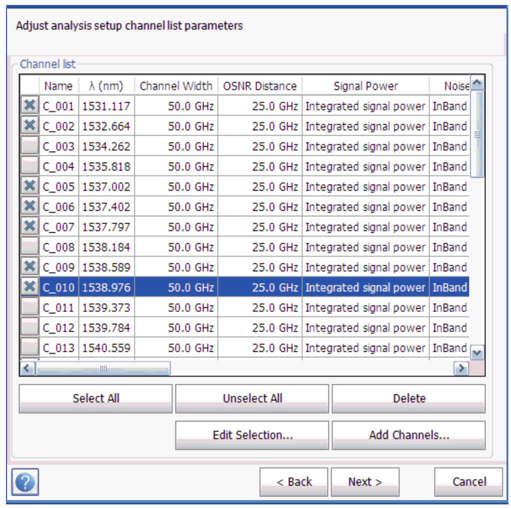


6. Click **Next**.

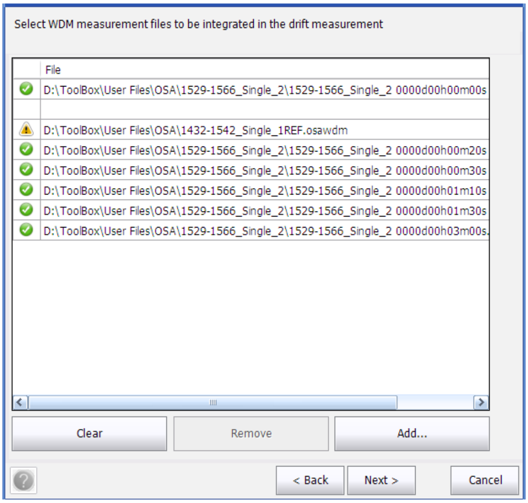
7. If desired, adjust the threshold settings for your measurement. For details on each item, see *Defining Default Channel Thresholds* on page 117. When you are done, click **Next**.



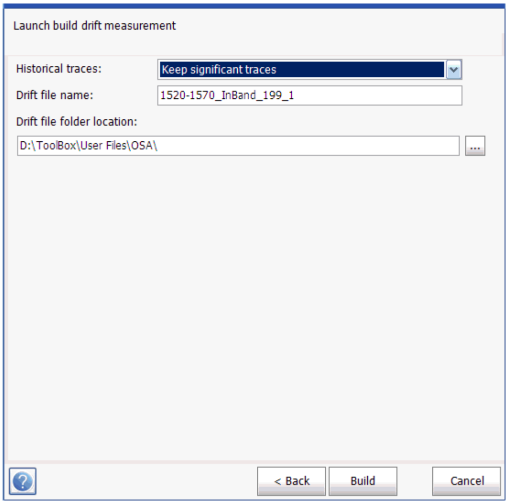
8. Select which channels are to be included in the drift measurement. For details on each item, see *Managing Channels* on page 123. When you are done, click **Next**.



9. Add one or more measurement files at this point, then click **Next**.



10. Before starting the measurement process, you can select what to do with the historical traces (keep them all, keep only the significant ones, or keep none), set the drift file name and its location.



11. Once you are ready, click **Build**.

Once the process is complete, you can navigate through the results of the built drift.

6 Setting Up the Instrument in DFB Mode

Before performing a spectral analysis in the DFB mode, you must set up your OSA module and the test application with the appropriate parameters, as explained in this chapter.

Select the DFB test mode as explained in *Selecting a Test Mode* on page 12 before setting up the DFB test parameters.

➤ The *preferences* are the result displayed in the graph and tables, as well as the job information and related comments saved with each file.

➤ The *acquisition parameters* include the type of measurement you want to perform and the wavelength range.

See *Defining Preferences* on page 150 and *Setting Up Acquisition Parameters* on page 160 for more details.

Defining Preferences

The preferences window allows you to set general information and comments on trace and set display parameters.

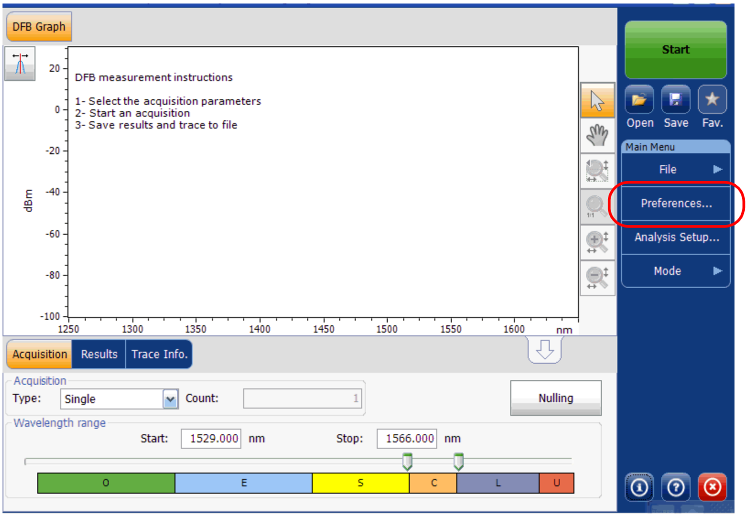
Note: *In offline mode, only the **Display** tab is available.*

Defining Trace Information

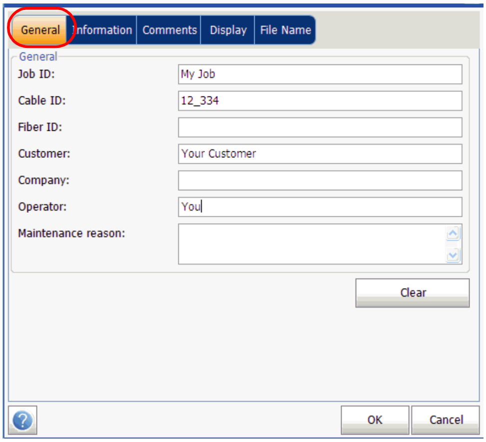
The trace information relates to the description of the job to be done, cable and job IDs, and any relevant information about what is being tested.

To enter general information:

1. From the **Main Menu**, press **Preferences**.



2. Select the **General** tab.



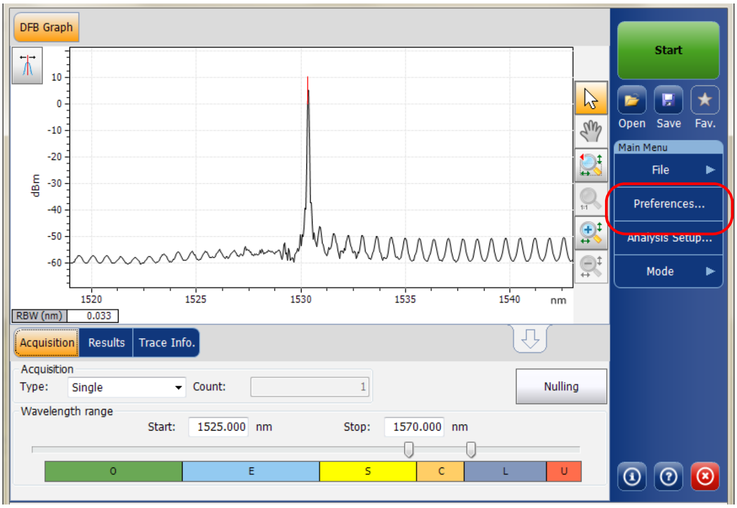
3. Define the general parameters as needed.

4. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

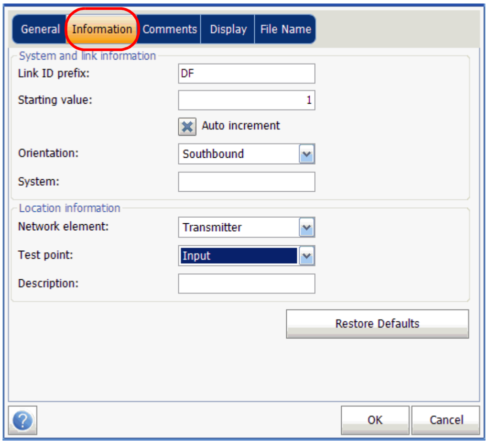
Press **Clear** to clear all the changes made in the **General** tab.

To enter link and location information:

1. From the **Main Menu**, press **Preferences**.



2. Select the **Information** tab.



3. Under **System and link information**, define the following parameters as needed:

➤ Link ID prefix: prefix value for the link ID. You can enter any alphanumeric value.

➤ Starting value: suffix increment starting value for the link ID.

This value is incremented each time a new file is saved provided the **Auto Increment** option is selected.

IMPORTANT

If the Auto Increment option is not selected, you have to manually change the file name when saving the trace file, otherwise the application will overwrite the previously saved file.

➤ Orientation: orientation of the link.

➤ System: information about the system under test.

4. Under **Location Information**, define the following parameters as needed:

➤ Network element: type of network element.

➤ Test point: where the test is performed on the link.

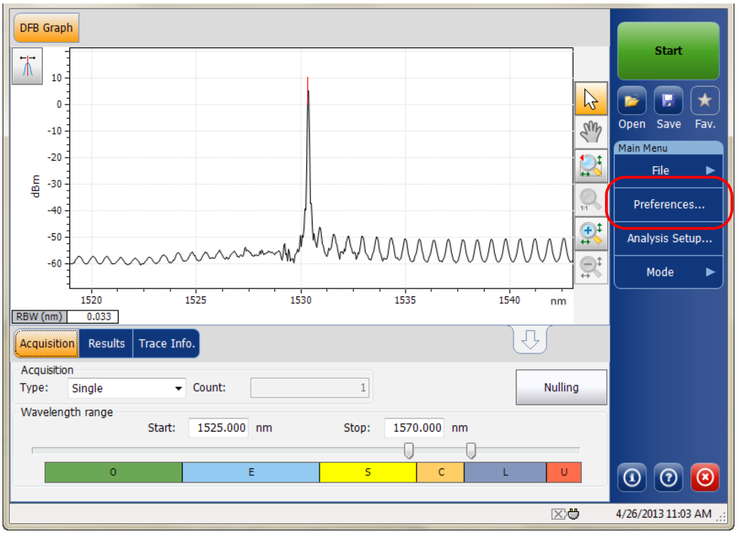
➤ Description: Enter the description of location if required.

5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

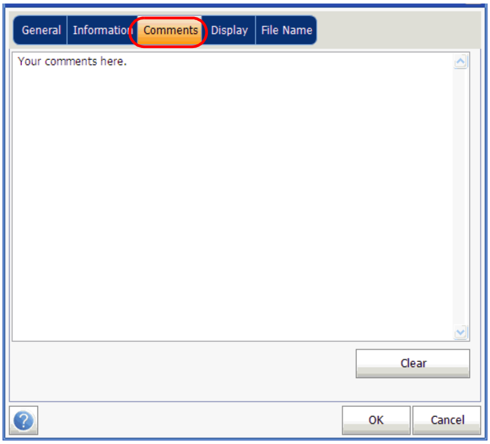
Press **Restore Defaults** to remove all the changes and apply the default values.

To enter comments:

1. From the **Main Menu**, press **Preferences**.



2. Select the **Comments** tab.



3. Enter your comments for the current trace.
4. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

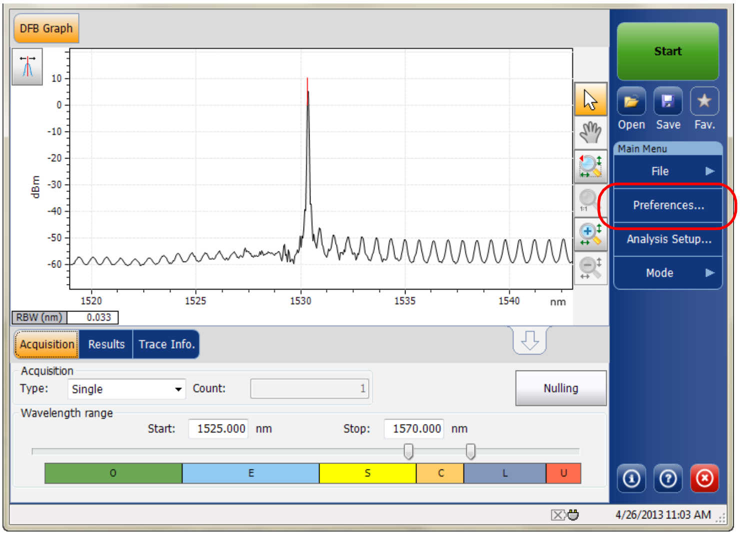
Press **Clear** to clear all the changes made in the **Comments** tab.

Defining Display Parameters

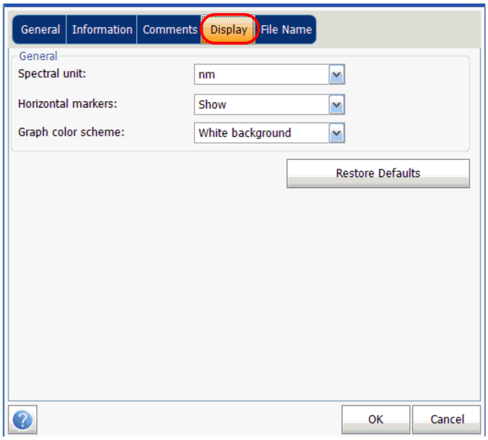
The application allows you to set display settings for the acquisition trace. You can set the spectral unit for the trace and the results table.

To define display parameters:

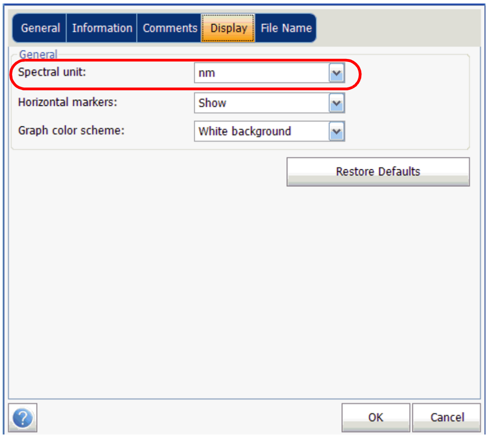
1. From the **Main Menu**, press **Preferences**.



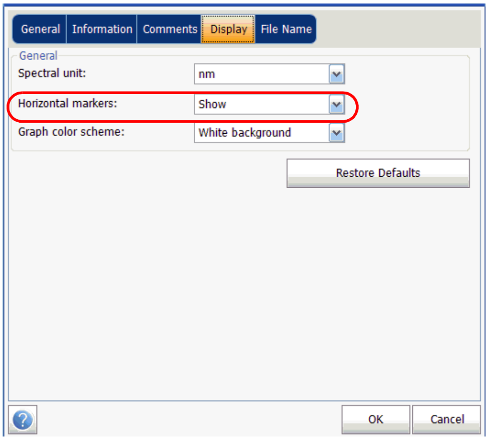
2. Select the **Display** tab.



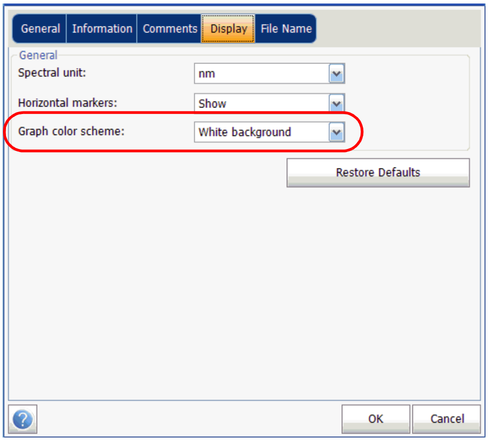
3. Select the spectral unit you want to work with, either nm or THz.



4. Select whether you want to show the horizontal markers or the integrated power in the marker toolbar.



5. Select the background color scheme for the graph as desired.



6. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Press **Restore Defaults** to remove all the changes and apply the default values.

Setting Up Acquisition Parameters

Before performing your test, you must set the acquisition type and parameters.

There are three types of acquisitions in DFB mode:

➤ Single: Spectral measurement is performed once. The results are displayed according to this measurement.

➤ Averaging: Spectral measurements are performed based on the number of scans that you have entered for this parameter. The trace will be displayed after each acquisition and averaged with the previous traces.

➤ Real-Time: In real-time acquisition, spectral measurements are performed continuously until you press **Stop**. No averaging is done for spectral measurements. The graph and results are refreshed after each acquisition.

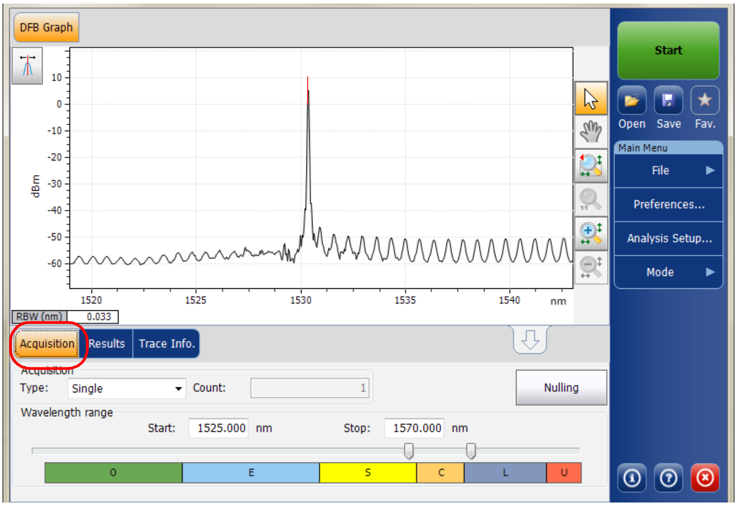
Before performing measurements on an optical spectrum, you must select the wavelength/frequency range to use. You can perform the scan on the full range, on spectral bands, or select a custom range.

Note: *The shorter the wavelength or frequency range, the faster the acquisition.*

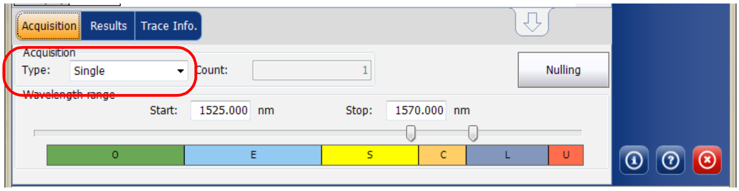
Note: *The **Acquisition** tab is not available in offline mode.*

To set parameters in the Acquisition tab:

1. From the main window, select the **Acquisition** tab.



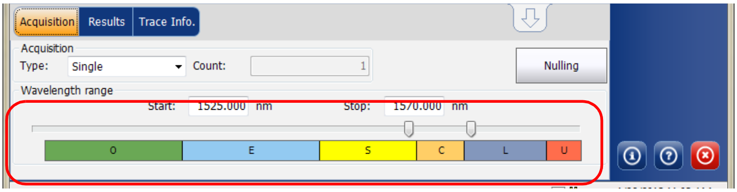
2. Select the acquisition type.



3. If you are performing an averaging-type acquisition, enter the number of scans the unit will perform.

Note: *You cannot modify the number of scans count value if you are performing a single or real-time acquisition.*

4. Select the wavelength range for your acquisition.



You can select the wavelength range by entering the start and stop values or by selecting a range on the double slider.

To select the wavelength range using the double slider, move the left and right handles on the double slider or simply click on any band.

Note: *You can select more than one adjoining ranges to include in your range, for example, S + C.*

The wavelength range covered within these bands of the spectra are listed below.

- O band (original): 1255 to 1365 nm
- E band (extended): 1355 to 1465 nm
- S band (short wavelengths): 1455 to 1535 nm
- C band (conventional “erbium window”): 1525 to 1570 nm
- L band (long wavelengths): 1560 to 1630 nm
- U band (ultralong wavelengths): 1620 to 1650 nm.

7 Setting Up the Instrument in FP Mode

Before performing a spectral analysis in the FP mode, you must set up your OSA module and the test application with the appropriate parameters, as explained in this chapter.

Select the FP test mode as explained in *Selecting a Test Mode* on page 12 before setting up the FP test parameters.

➤ The *preferences* are the result displayed in the graph and tables, as well as the job information and related comments saved with each file.

➤ The *acquisition parameters* include the measurement you want to perform and the wavelength range.

See *Defining Preferences* on page 164 and *Setting Up Acquisition Parameters* on page 173 for more details.

Defining Preferences

The preferences window allows you to set general information and comments on trace and set display parameters.

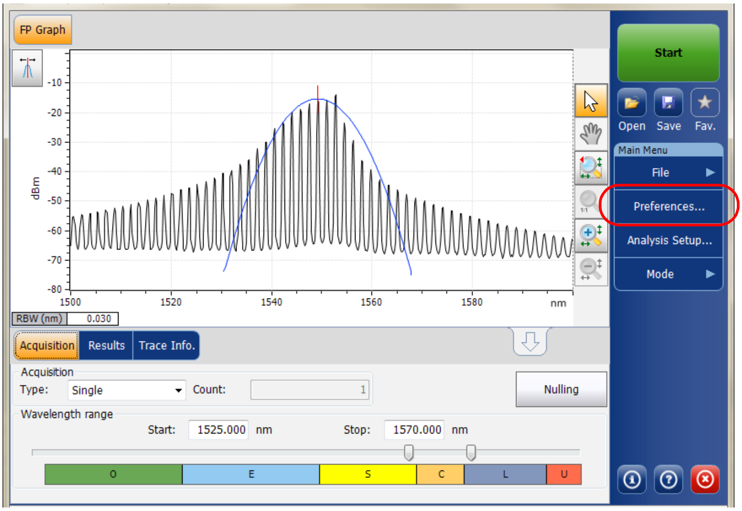
Note: *In offline more, only the* ***Display*** *tab is available.*

Defining Trace Information

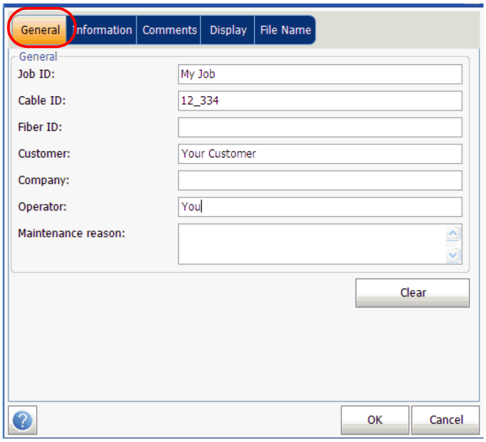
The trace information relates to the description of the job to be done, cable and job IDs, and any relevant information about what is being tested.

To enter general information:

1. From the **Main Menu**, press **Preferences**.



2. Select the **General** tab.



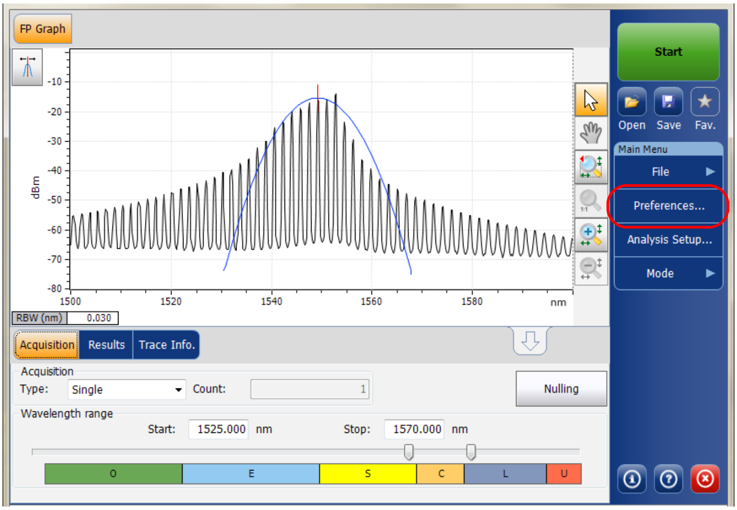
3. Define the general parameters as needed.

4. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

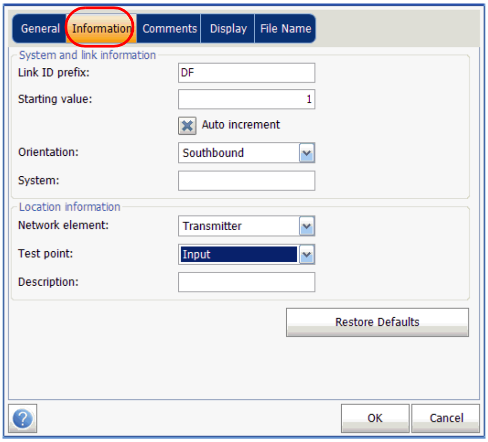
Press **Clear** to clear all the changes made in the **General** tab.

To enter link and location information:

1. From the **Main Menu**, press **Preferences**.



2. Select the **Information** tab.



3. Under **System and link information**, define the following parameters as needed:

➤ Link ID prefix: prefix value for the link ID. You can enter any alphanumeric value.

➤ Starting value: suffix increment starting value for the link ID.

This value is incremented each time a new file is saved provided the **Auto Increment** option is selected.

IMPORTANT

If the Auto Increment option is not selected, you have to manually change the file name when saving the trace file, otherwise the application will overwrite the previously saved file.

➤ Orientation: orientation of the link.

➤ System: information about the system under test.

4. Under **Location Information**, define the following parameters as needed:

➤ Network element: type of network element.

➤ Test point: where the test is performed on the link.

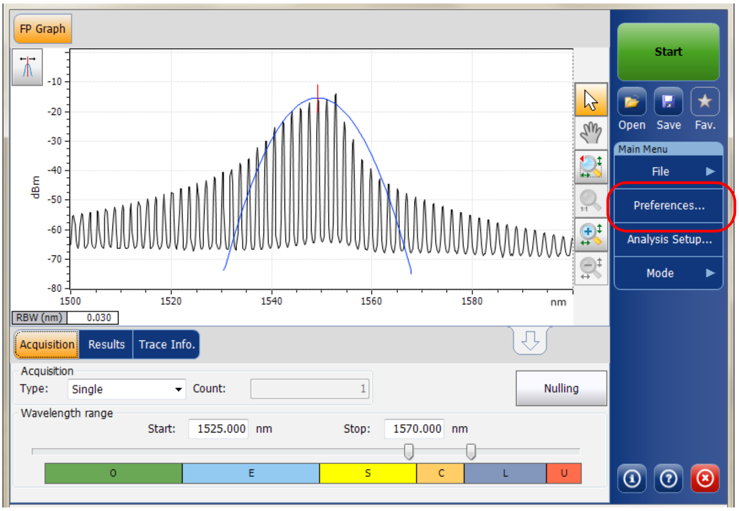
➤ Description: Enter the description of location if required.

5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

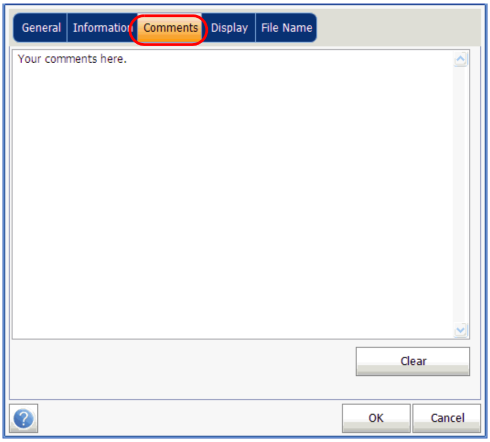
Press **Restore Defaults** to remove all the changes and apply the default values.

To enter comments:

1. From the **Main Menu**, press **Preferences**.



2. Select the **Comments** tab.



3. Enter your comments for the current trace.

4. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

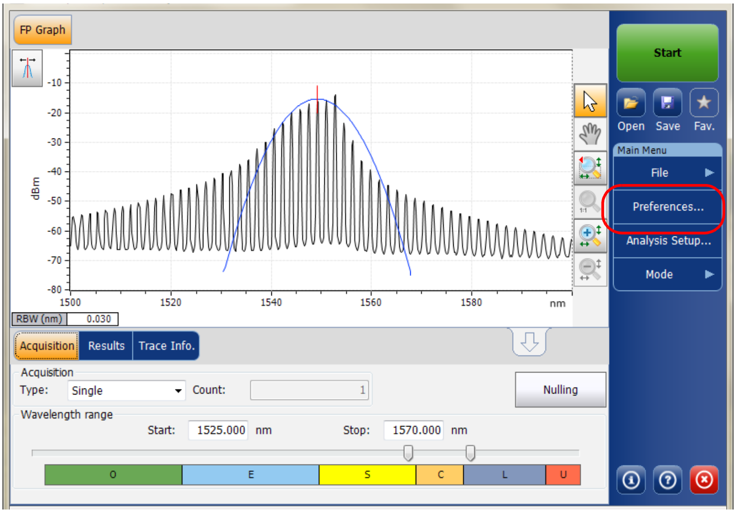
Press **Clear** to clear all the changes made in the **Comments** tab.

Defining Display Parameters

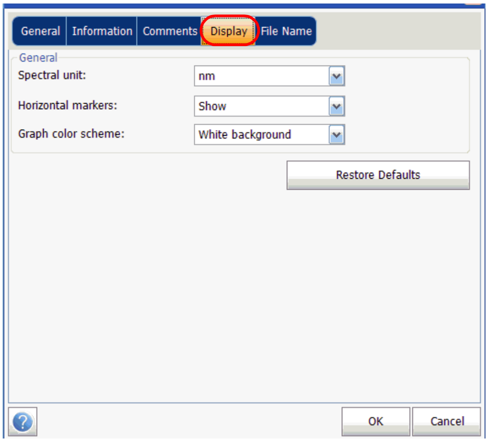
The application allows you to set display settings for the acquisition trace. You can set the spectral unit for the trace and the results table.

To define display parameters:

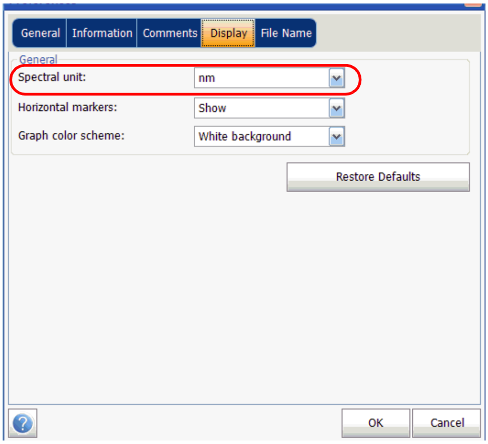
1. From the **Main Menu**, press **Preferences**.



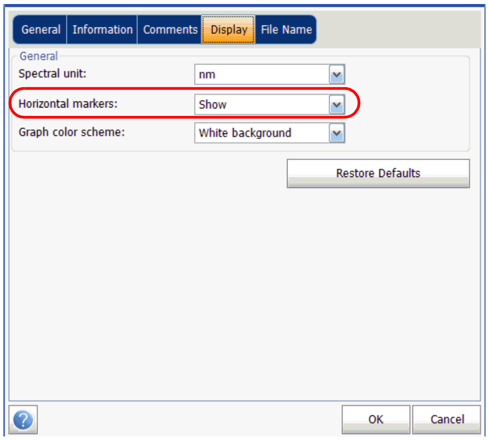
2. Select the **Display** tab.



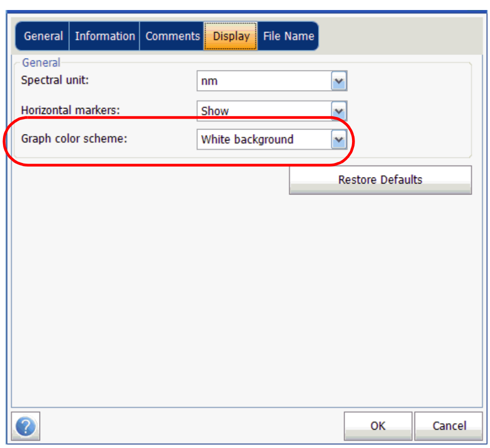
3. Select the spectral unit you want to work with, either nm or THz.



4. Select whether you want to show the horizontal markers or the integrated power trace in the marker toolbar.



5. Select the background color scheme for the graph as desired.



6. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Press **Restore Defaults** to remove all the changes and apply the default values.

Setting Up Acquisition Parameters

Before performing your test, you must set the acquisition type and parameters.

There are three types of acquisitions in FP mode:

- Single: Spectral measurement is performed once. The results are displayed according to this measurement.
- Averaging: Spectral measurements are performed based on the number of scans that you have entered for this parameter. The trace will be displayed after each acquisition and averaged with the previous traces.
- Real-Time: In real-time acquisition, spectral measurements are performed continuously until you press **Stop**. No averaging is done for spectral measurements. The graph and results are refreshed after each acquisition.

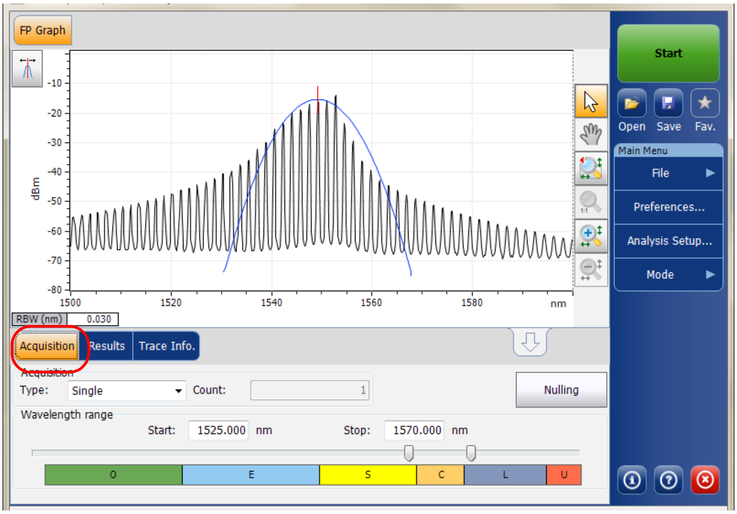
Before performing measurements on an optical spectrum, you must select the wavelength/frequency range to use. You can perform the scan on the full range, on spectral bands, or select a custom range.

Note: *The shorter the wavelength or frequency range, the faster the acquisition.*

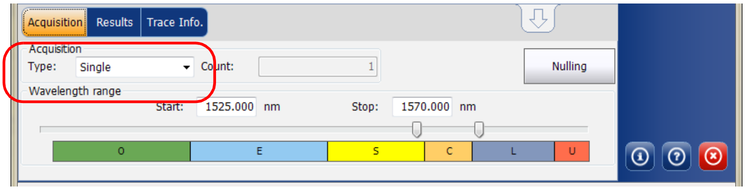
Note: *The **Acquisition** tab is not available in offline mode.*

To set parameters in the Acquisition tab:

1. From the main window, select the **Acquisition** tab.



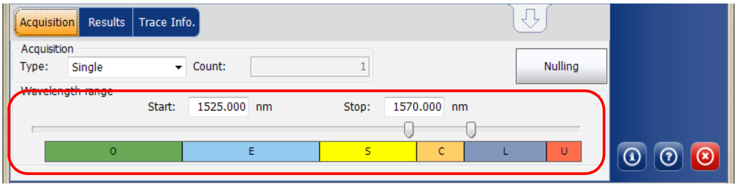
2. Select the acquisition type.



3. If you are performing an averaging type acquisition, enter the number of scans the unit will perform.

Note: *You cannot modify the number of scans count value if you are performing a single or real-time acquisition.*

4. Select the wavelength range for your acquisition.



You can select the wavelength range by entering the start and stop values or by selecting a range on the double slider.

To select the wavelength range using the double slider, move the left and right handles on the double slider or simply click on any band.

Note: *You can select more than one adjoining ranges to include in your range, for example, S + C.*

The wavelength range covered within these bands of the spectra are listed below.

- O band (original): 1255 to 1365 nm
- E band (extended): 1355 to 1465 nm
- S band (short wavelengths): 1455 to 1535 nm
- C band (conventional “erbium window”): 1525 to 1570 nm
- L band (long wavelengths): 1560 to 1630 nm
- U band (ultralong wavelengths): 1620 to 1650 nm.

8 Setting Up the Instrument in Spectral Transmittance Mode

Before performing a spectral analysis in the Spectral Transmittance mode, you must set up your OSA module and the test application with the appropriate parameters, as explained in this chapter.

Select the Spectral Transmittance test mode as explained in *Selecting a Test Mode* on page 12 before setting up the test parameters.

➤ The *preferences* are the result displayed in the graph and tables, as well as the job information and related comments saved with each file.

➤ The *analysis parameters* include the channel details, the nominal wavelength or frequency and the input and output offset values.

➤ The *acquisition parameters* include the type of measurement you want to perform and the wavelength range.

See *Defining Preferences* on page 178 , *Setting Up Spectral Transmittance Analysis Parameters* on page 187 and *Setting Up Acquisition Parameters* on page 195 for more details.

Defining Preferences

The preferences window allows you to set general information and comments on trace and set display parameters.

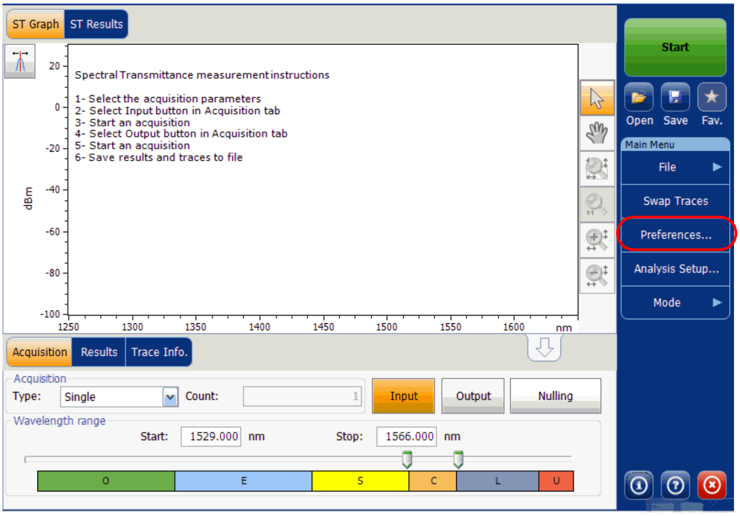
Note: *In offline mode, only the **Display** tab is available.*

Defining Trace Information

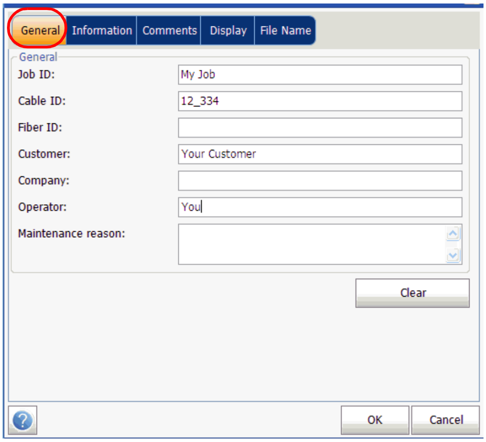
The trace information relates to the description of the job to be done, cable and job IDs, and any relevant information about what is being tested.

To enter general information:

1. From the **Main Menu**, press **Preferences**.



2. Select the **General** tab.



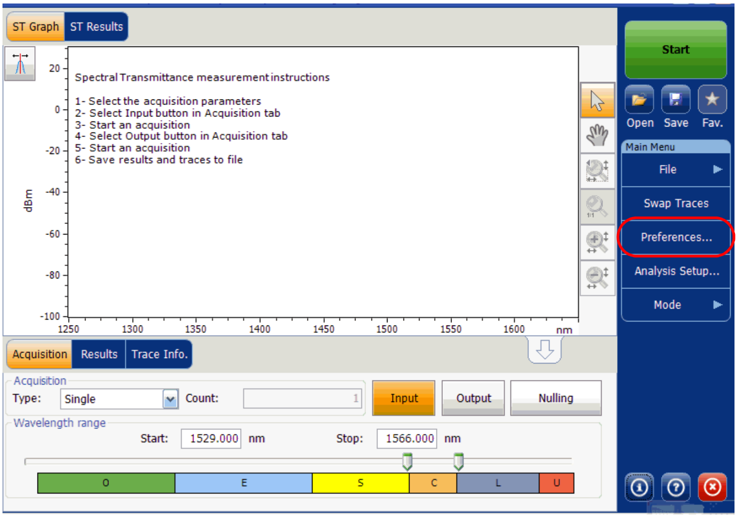
3. Define the general parameters as needed.

4. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

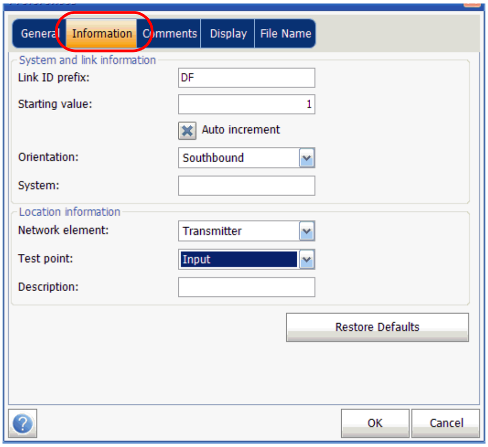
Press **Clear** to clear all the changes made in the **General** tab.

To enter link and location information:

1. From the **Main Menu**, press **Preferences**.



2. Select the **Information** tab.



3. Under **System and link information**, define the following parameters as needed:

- ➤ Link ID prefix: prefix value for the link ID. You can enter any alphanumeric value.
- ➤ Starting value: suffix increment starting value for the link ID.

  This value is incremented each time a new file is saved provided the **Auto Increment** option is selected.

IMPORTANT

If the Auto Increment option is not selected, you have to manually change the file name when saving the trace file, otherwise the application will overwrite the previously saved file.

- ➤ Orientation: orientation of the link.
- ➤ System: information on the system under test.

4. Under **Location Information**, define the following parameters as needed:

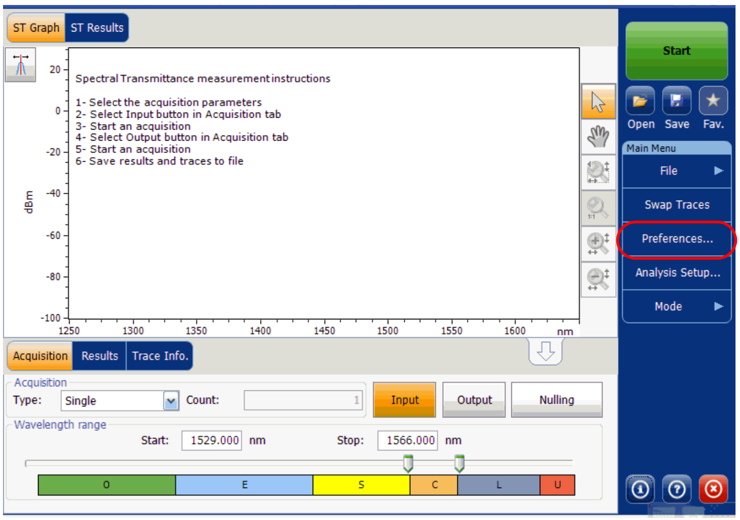
- ➤ Network element: network element type.
- ➤ Test point: where the test is performed on the link.
- ➤ Description: a description of the location, if required.

5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

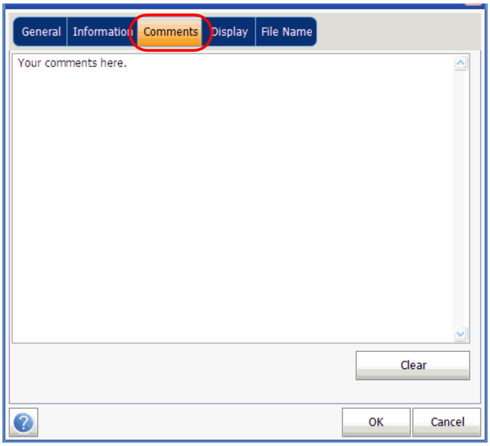
Press **Restore Defaults** to remove all the changes and apply the default values.

To enter comments:

1. From the **Main Menu**, press **Preferences**.



2. Select the **Comments** tab.



3. Enter your comments for the current trace.

4. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

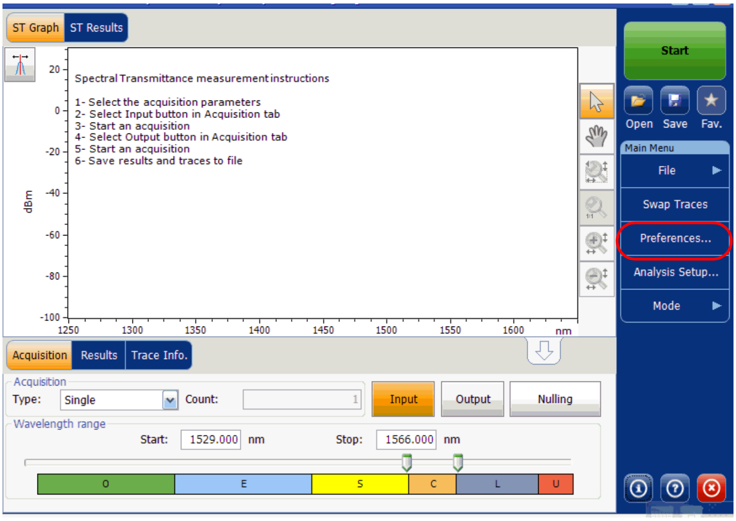
Press **Clear** to clear all the changes made in the **Comments** tab.

Defining Display Parameters

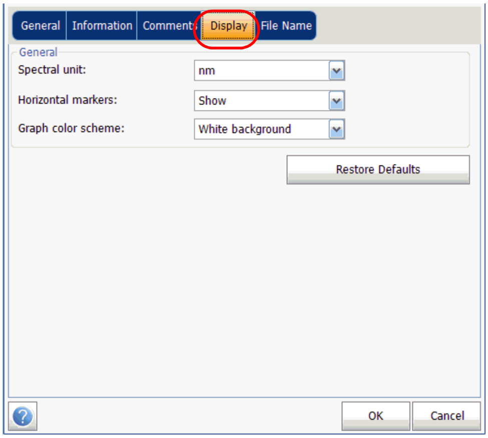
The application allows you to set display settings for the acquisition trace. You can set the spectral unit for the trace and the results table.

To define display parameters:

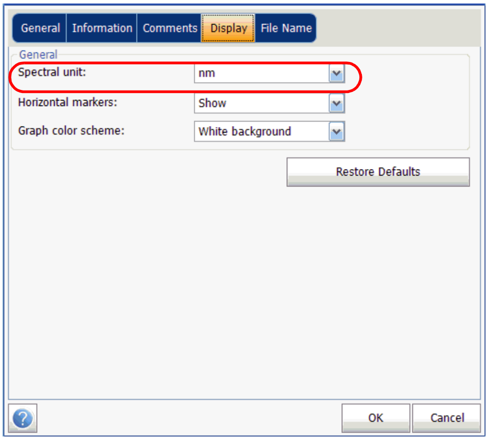
1. From the **Main Menu**, press **Preferences**.



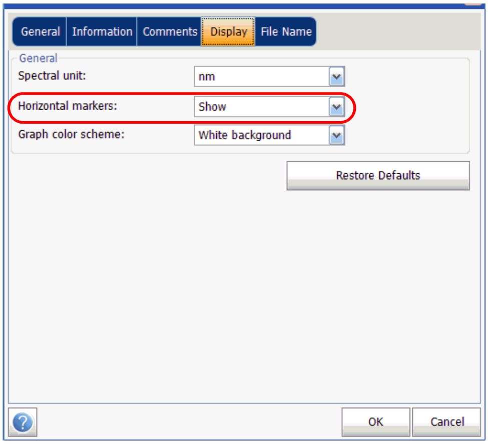
2. Select the **Display** tab.



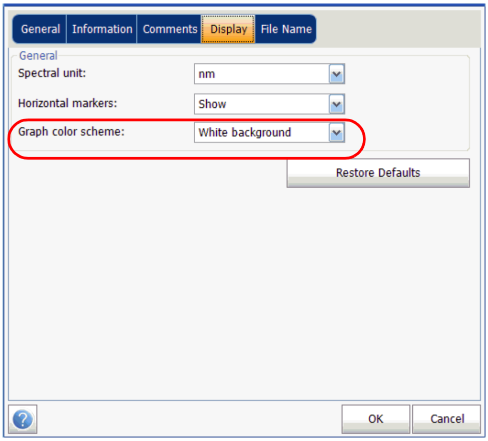
3. Select the spectral unit you want to work with, either nm or THz.



4. Select whether you want to show the horizontal markers or the integrated power and the Δ trace in the marker toolbar.



5. Select the background color scheme for the graph as desired.



6. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Press **Restore Defaults** to remove all the changes and apply the default values.

Setting Up Spectral Transmittance Analysis Parameters

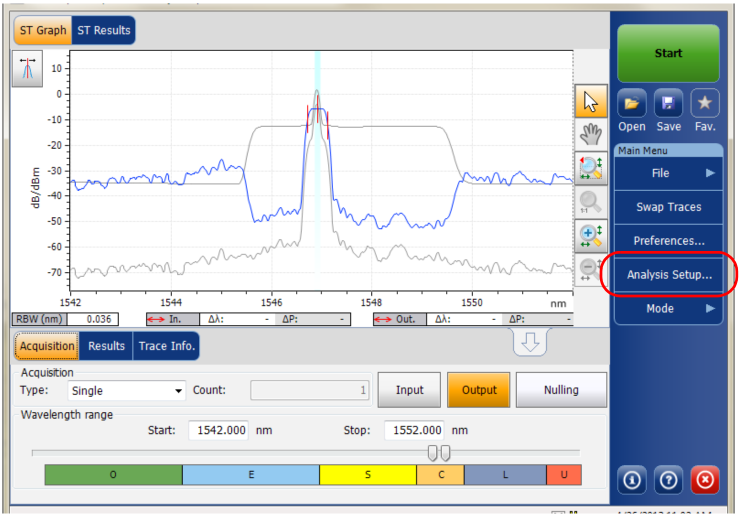
This section presents the various analysis settings for the application. These settings are applied on subsequent acquisitions/re-analyses.

Note: *When you change the analysis setup parameters, the new settings are active as soon as you confirm your choice. The current trace is re-analyzed, and the analysis setup parameters will be applied to the global results and channel results for the following acquisitions.*

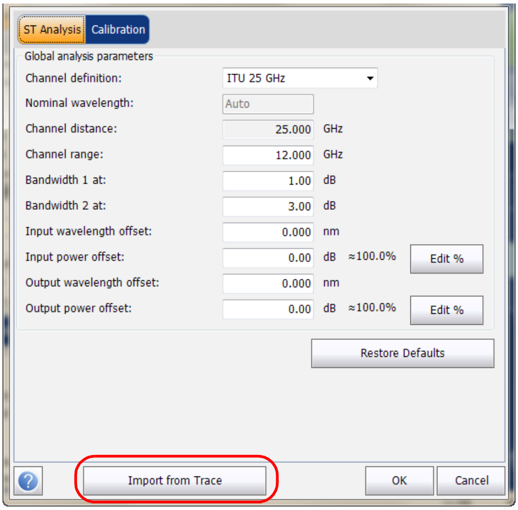
You can either set each parameter individually, or use parameters from the current trace and import them.

To import the parameters from the current trace:

1. Make sure that you have a trace on-screen.
2. From the **Main Menu**, press **Analysis Setup**.



3. From any tab, press **Import from Trace**.



4. Press **OK** to confirm the changes.

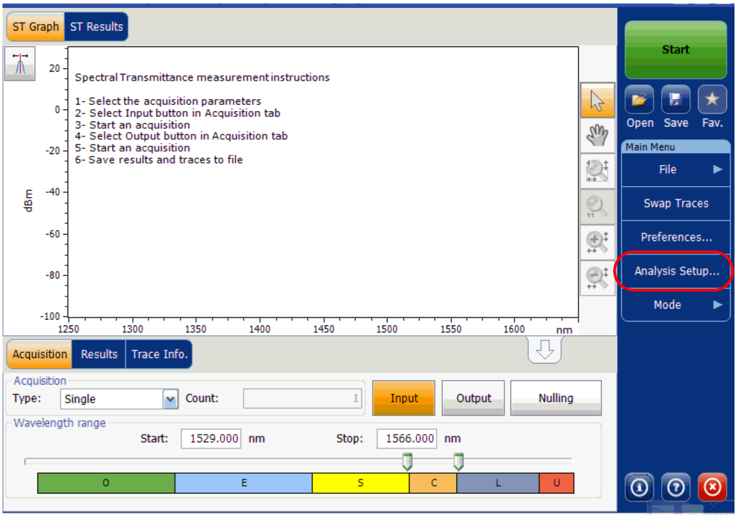
Defining ST Analysis Settings

The global analysis parameters for spectral transmittance acquisitions affect the calculation of the results.

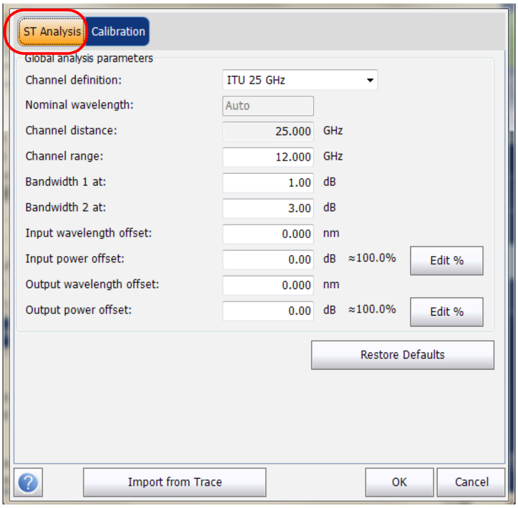
Note: *When you change the analysis setup parameters, the new settings are active as soon as you confirm your choice. The current trace is re-analyzed, and the analysis setup parameters will be applied to the ST results for the following acquisitions.*

To define ST analysis parameters:

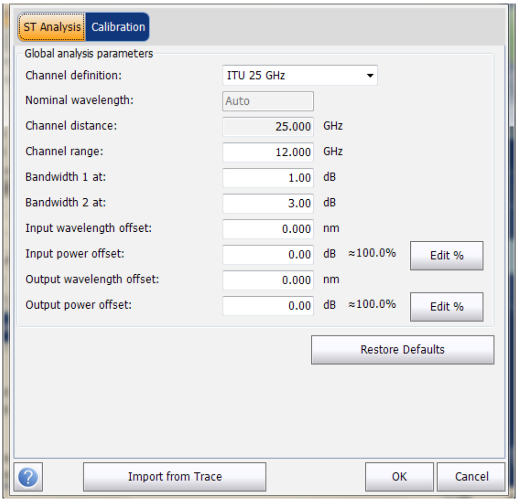
1. From the **Main Menu**, press **Analysis Setup**.



2. Select the **ST Analysis** tab.



3. Under **Global analysis parameters**, define the following parameters as needed:



➤ Channel definition: indicates the limit inside which the power values will be considered in the channel.

Centred on max peak: Channel is centered on the lowest insertion loss peak.

ITU Grid: Select the nearest ITU channel from the peak with lowest insertion loss.

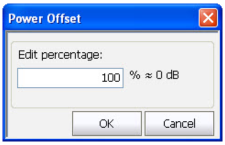
CWDM: Select the nearest CWDM channel from the peak with lowest insertion loss.

Custom: Channel is centered on value specified by the user.

➤ Nominal wavelength or frequency (nm or Thz): indicates a single value that represent the channels center wavelength (in nm) or frequency (in THz). This field is editable only when Channel definition is selected as Custom.

- Channel distance (GHz or nm): indicates distance between the channels. The value of channel distance will be set depending on the selection made for the channel definition option. The channel distance box will be enabled only when the channel center wavelength option is set to custom.
- Channel range (GHz or nm): indicates the limit inside which the power values will be considered in the channel. Integrated power is calculated on channel width.
- Bandwidth 1 at (dB): Set the power level used, relative to the channel peak power, to compute the bandwidth.
- Bandwidth 2 at (dB): Set the power level used, relative to the channel peak power, to compute the bandwidth.
- Input wavelength offset (nm): indicates the offset value applied on the input wavelength. This does not replace a calibration performed at EXFO, but it can help you temporarily sharpen the specifications if you have determined that, for example, your modules are used beyond the normal allowed use. Entering a value in THz is not possible. When an offset is applied, it is indicated at the bottom of the graph (λ ↔).
- Input power offset (dB): indicates the offset value applied on the input power. This does not replace a calibration performed at EXFO, but it can help you achieve the specifications if you have determined that, for example, your modules are used beyond the normal allowed use. When an offset is applied, it is indicated at the bottom of the graph (P ↔).

  To edit the power offset value as a tap percentage, press the **Edit %** button.

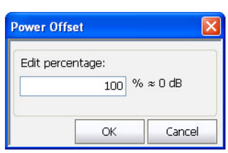


The percentage value entered in **Edit percentage** will be converted to a corresponding value in dB.

➤ Output wavelength offset (nm): indicates the offset value applied on the output wavelength. This does not replace a calibration performed at EXFO, but it can help you temporarily sharpen the specifications if you have determined that, for example, your modules are used beyond the normal allowed use. Entering a value in THz is not possible. When an offset is applied, it is indicated at the bottom of the graph (λ ↔)

➤ Output power offset (dB): indicates the offset value applied on the output power. This does not replace a calibration performed at EXFO, but it can help you achieve the specifications if you have determined that, for example, your modules are used beyond the normal allowed use. When an offset is applied, it is indicated at the bottom of the graph (P ↔).

To edit the power offset value as a tap percentage, press the **Edit %** button.



The percentage value entered in **Edit percentage** will be converted to a corresponding value in dB.

4. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Press **Restore Defaults** to remove all the changes and apply the default values.

Setting Up Acquisition Parameters

Before performing your test, you must set the acquisition type and parameters.

There are three types of acquisitions in Spectral Transmittance mode: single, averaging and real-time.

- Single: Spectral measurement is performed once. The results are displayed according to this measurement.
- Averaging: Spectral measurements are performed based on the number of scans that you have entered for this parameter. The trace will be displayed after each acquisition and averaged with the previous traces.
- Real-Time: In real-time acquisition, spectral measurements are performed continuously until you press **Stop**. No averaging is done for spectral measurements. The graph and results are refreshed after each acquisition.

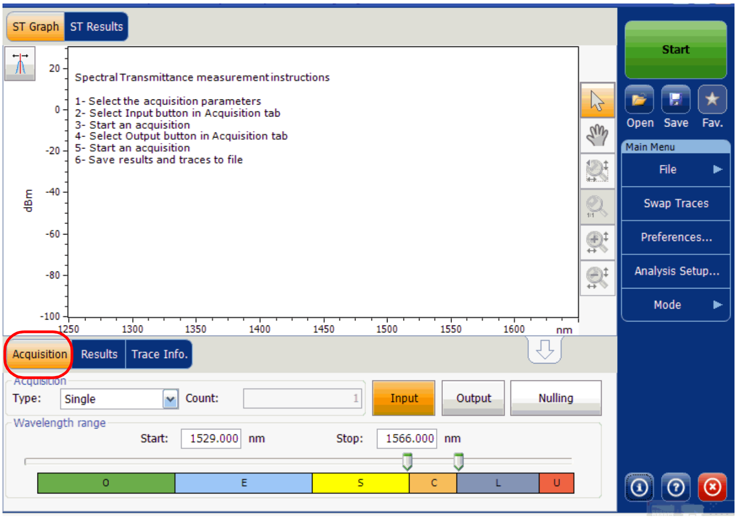
Before performing measurements on an optical spectrum, you must select the wavelength/frequency range to use. You can perform the scan on the full range, on spectral bands, or select a custom range.

Note: *The shorter the wavelength or frequency range, the faster the acquisition.*

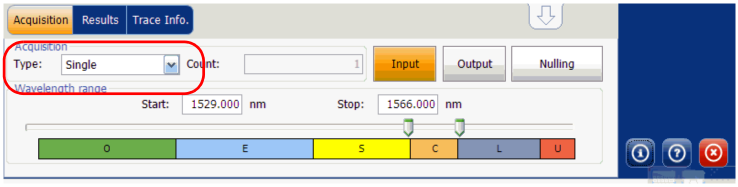
Note: *The **Acquisition** tab is not available in offline mode.*

To set parameters in the Acquisition tab:

1. From the main window, select the **Acquisition** tab.



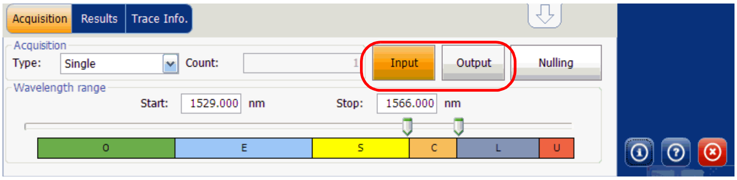
2. Select the acquisition type.



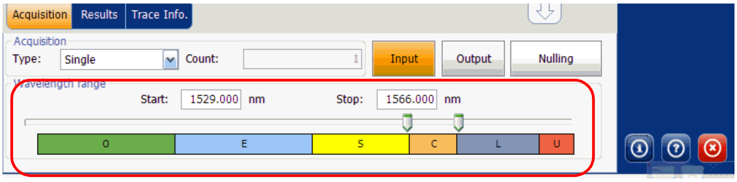
3. If you are performing an averaging type acquisition, enter the number of scans the unit will perform.

Note: *You cannot modify the number of scans count value if you are performing a single or real-time acquisition.*

4. Press **Input** or **Output** to specify which position to use to store the next acquisition.



5. Select the wavelength range for your acquisition.



You can select the wavelength range by entering the start and stop values or by selecting a range on the double slider.

To select the wavelength range using the double slider, move the left and right handles on the double slider or simply click on any band.

Note: *You can select more than one adjoining ranges to include in your range, for example, S + C.*

The wavelength range covered within these bands of the spectra are listed below.

- O band (original): 1255 to 1365 nm
- E band (extended): 1355 to 1465 nm
- S band (short wavelengths): 1455 to 1535 nm
- C band (conventional “erbium window”): 1525 to 1570 nm
- L band (long wavelengths): 1560 to 1630 nm
- U band (ultralong wavelengths): 1620 to 1650 nm.

9 Setting Up the Instrument in EDFA Mode

Before performing a spectral analysis in the EDFA mode, you must set up your OSA module and the test application with the appropriate parameters, as explained in this chapter.

Select the EDFA test mode as explained in *Selecting a Test Mode* on page 12 before setting up the EDFA test parameters.

➤ The *preferences* are the result displayed in the graph and tables, as well as the job information and related comments saved with each file.

➤ The *analysis parameters* include the channel list details, and allows you to configure global analysis parameters.

➤ The *acquisition parameters* include the type of measurement you want to perform and the wavelength range.

See *Defining Preferences* on page 201, *Setting Up EDFA Analysis Parameters* on page 215 and *Setting Up Acquisition Parameters* on page 232 for more details.

You can set up your unit in different manners depending on your testing needs.

➤ The preferred way is to use the complete analysis setup parameters and complete the information in all tables, as explained in *Setting Up EDFA Analysis Parameters* on page 215. This setup will be used for the next acquisition.

➤ The most efficient way to setup the instrument is to use one of the favorites configurations, uploading a pre-customized acquisition and analysis setup configuration. The operator in the field only has to press the  button, select the appropriate configuration and press **Start**. As an example, a pre-customized configuration could be: “32 channels DWDM 50GHz”; “Toronto-Montreal CWDM” or “Vendor ABC DWDM ROADM 40Gb”. This is explained in *Managing Favorites* on page 250.

➤ You can also import the setup from the current trace. This method will take the data and channel information from the current trace and apply them in the corresponding tabs. For more information, see *Setting Up EDFA Analysis Parameters* on page 215.

Defining Preferences

The preferences window allows you to set general information and comments on trace, set display parameters and customize the EDFA results table.

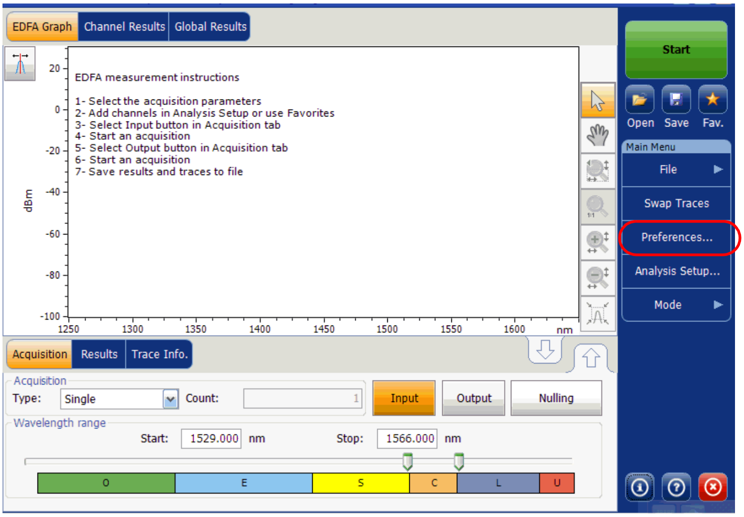
Note: *Only the **Display** and **EDFA** tabs are available in offline mode.*

Defining Trace Information

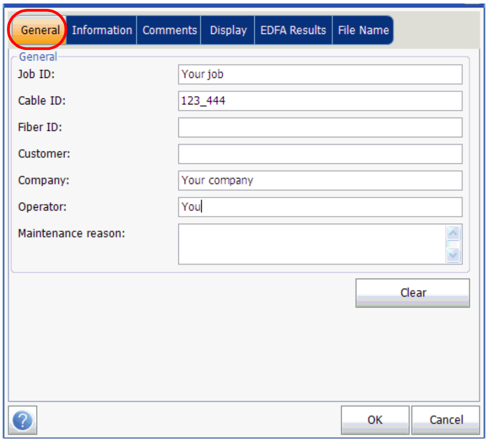
The trace information relates to the description of the job to be done, cable and job IDs, and any relevant information about what is being tested.

To enter general information:

1. From the **Main Menu**, press **Preferences**.



2. Select the **General** tab.



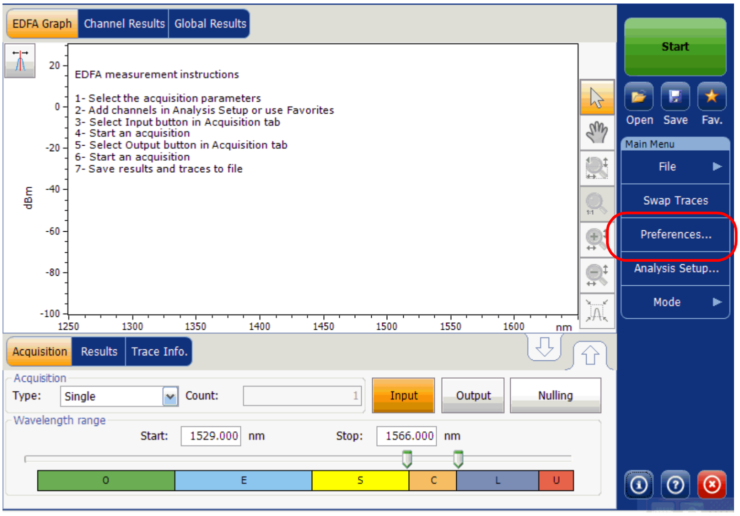
3. Define the general parameters as needed.

4. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

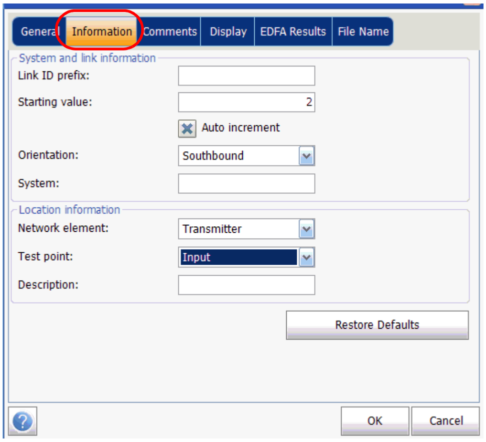
Press **Clear** to clear all the changes made in the **General** tab.

To enter link and location information:

1. From the **Main Menu**, press **Preferences**.



2. Select the **Information** tab.



3. Under **System and link information**, define the following parameters as needed:

➤ Link ID prefix: prefix value for the link ID. You can enter any alphanumeric value.

➤ Starting value: suffix increment starting value for the link ID.

This value is incremented each time a new file is saved provided the **Auto Increment** option is selected.

IMPORTANT

When the Auto Increment option is not selected, while saving the trace file, you have to manually change the file name, else the application will overwrite the previously saved files every time you save a new trace.

➤ Orientation: orientation of the link.

➤ System: information about the system under test.

4. Under **Location Information**, define the following parameters as needed:

➤ Network element: type of network element.

➤ Test point: where the test is performed on the link

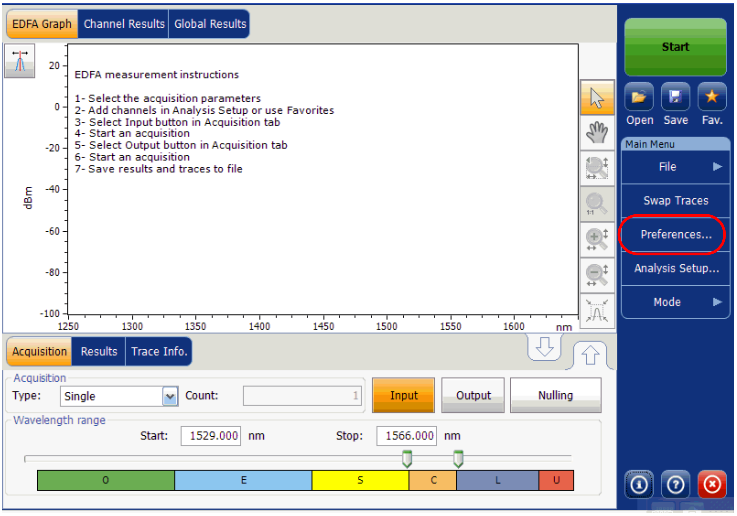
➤ Description: Enter the description of location if required.

5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

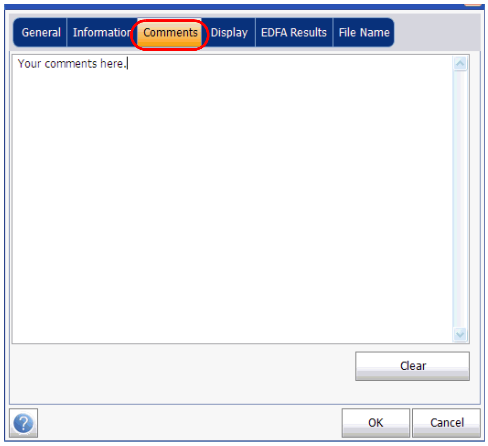
Press **Restore Defaults** to remove all the changes and apply the default values.

To enter comments:

1. From the **Main Menu**, press **Preferences**.



2. Select the **Comments** tab.



3. Enter your comments for the current trace.

4. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

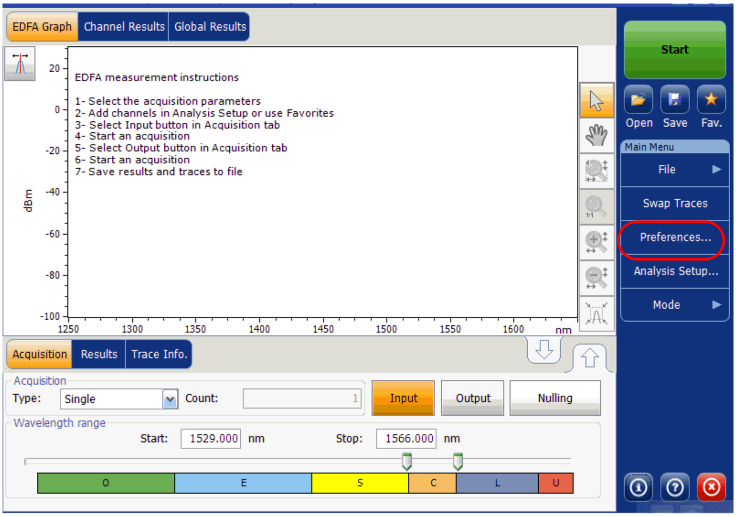
Press **Clear** to clear all the changes made in the **Comments** tab.

Defining Display Parameters

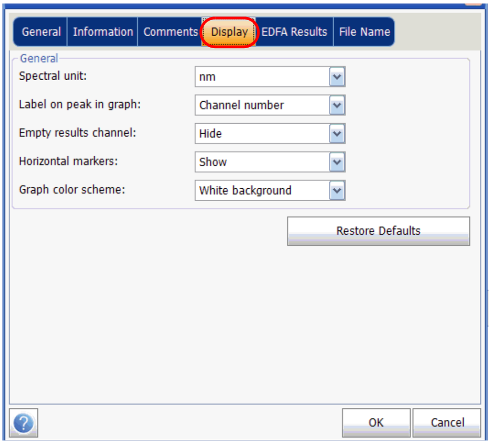
The application allows you to set display settings for the acquisition trace. You can set the spectral unit for the trace and the results table. You can also select the label that should appear on the peaks of the trace.

To define display parameters:

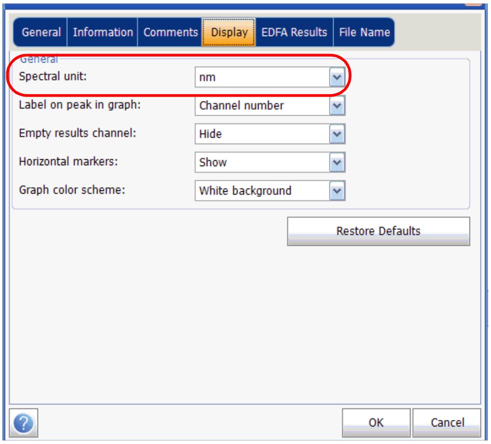
1. From the **Main Menu**, press **Preferences**.



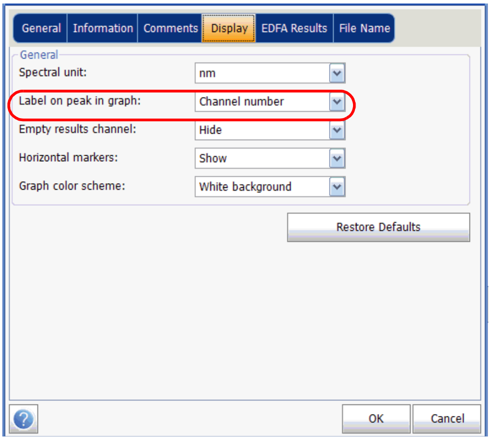
2. Select the **Display** tab.



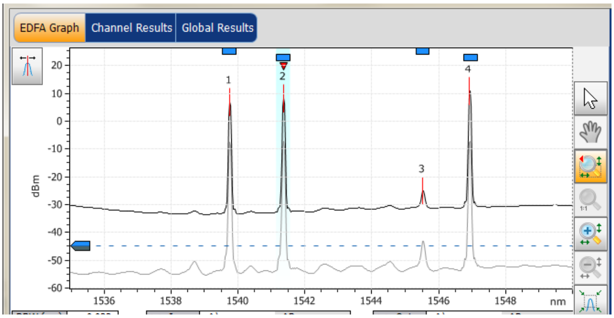
3. Select the spectral unit you want to work with, either nm or THz.



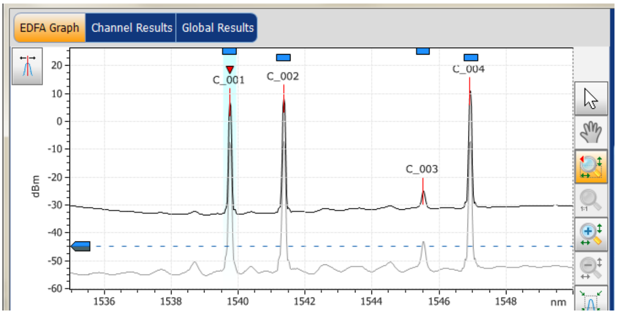
4. Select the label that will appear on the peaks in the graph, either the channel name, its number, or nothing.



Note: *The channel name and channel number cannot be shown at the same time.*

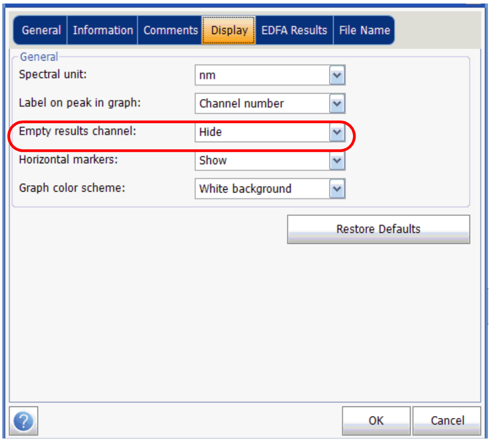


Channel numbers

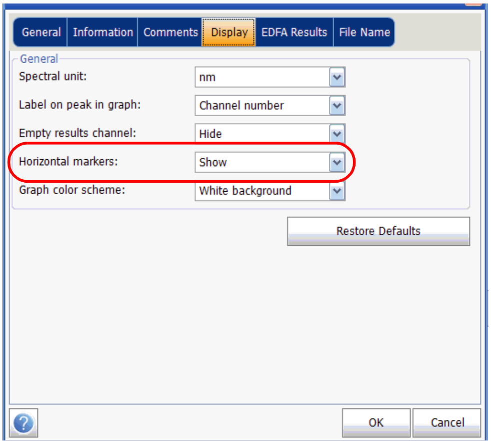


Defined channel names

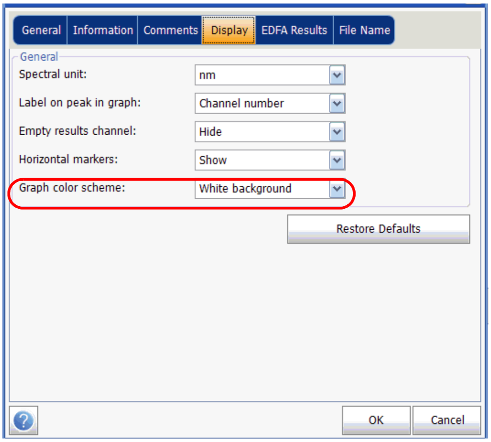
5. Select whether you want to display the empty channels from the channel list in the **Results** tab.



6. Select whether you want to show the horizontal markers or the integrated power and the Δ trace in the marker toolbar.



7. Select the background color scheme for the graph as desired.



8. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

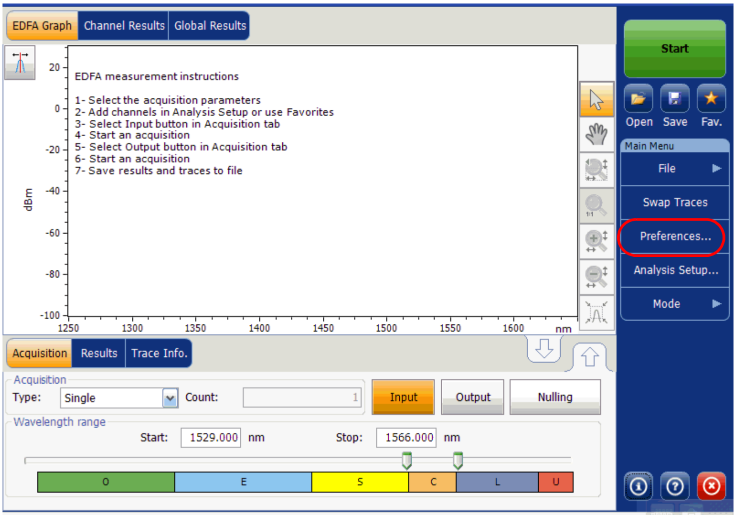
Press **Restore Defaults** to remove all the changes and apply the default values.

Customizing EDFA Results Table

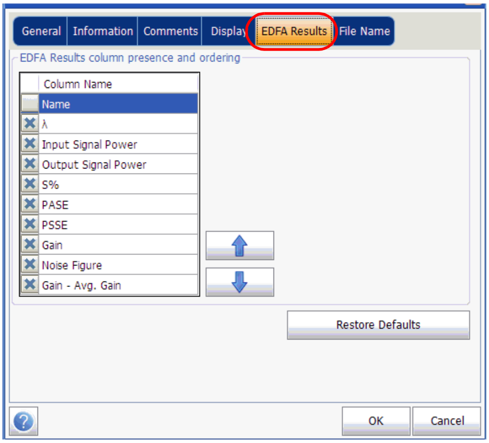
It is possible to select which results you would like to be displayed in the **Results** tab of your EDFA tests.

To customize the results table:

1. From the **Main Menu**, press **Preferences**.



2. Select the **EDFA Results** tab.



3. Select which parameters you want to display in the **Results** tab from the list of available choices:

- Name: name of channel.
- Center wavelength/frequency: spectral center-of-mass for the peak in that channel.
- Input Signal Power: signal power for the selected channel (excludes noise).
- Output Signal Power: signal power for the selected channel (excludes noise).
- S %: current output power according to the measured output power (Output Signal Power / [Output Signal Power + PASE]).
- PASE: power of the spontaneous emission amplified by EDFA.
- PSSE: power of the spontaneous emission of the source.
- Gain: gain (Output Signal Power - Input Signal Power) for the selected channel.

- ➤ Noise Figure: EDFA's noise figure measured for the selected channel.
- ➤ Gain - Avg. Gain: selected channel gain minus the average of all channel gains.

4. Press the up or down arrows to change the order in which the columns will appear in the **Results** tab.
5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Press **Restore Defaults** to remove all the changes and apply the default values.

Setting Up EDFA Analysis Parameters

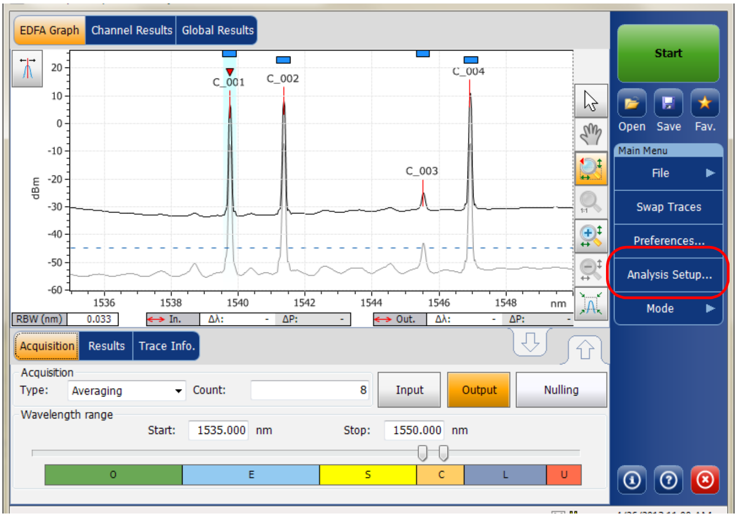
This section presents the various analysis settings for the application, particularly the channel list and settings. You can set the channel list, channel parameters, manage favorite configurations and perform user calibration.

Note: *When you change the analysis setup parameters, the new settings are active as soon as you confirm your choice. The current trace is re-analyzed, and the analysis setup parameters will be applied to the global results and channel results for the following acquisitions.*

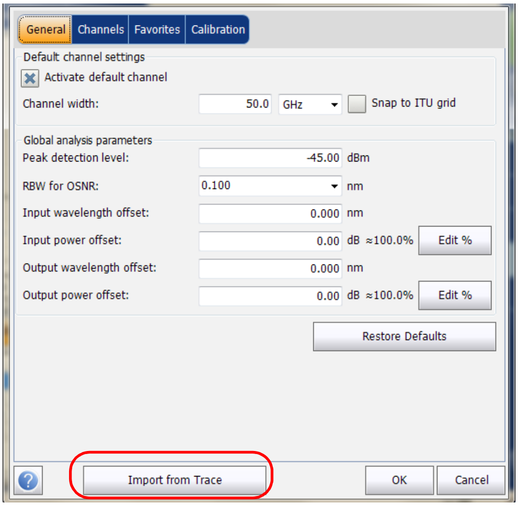
You can either set each parameter individually, or use parameters from the current trace and import them.

To import the parameters from the current trace:

1. Make sure that you have a trace on-screen.
2. From the **Main Menu**, press **Analysis Setup**.



3. From any tab, press **Import from Trace**.



4. Press **OK** to confirm the changes.

Defining General Settings

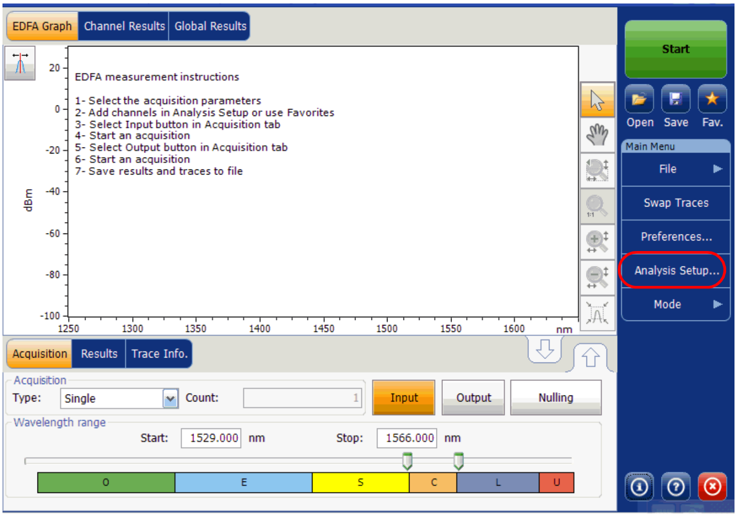
The general analysis parameters for EDFA acquisitions affect the calculation of the results. Any change you make to the settings affect future traces, or you can apply them to the active trace when reanalyzing it.

IMPORTANT

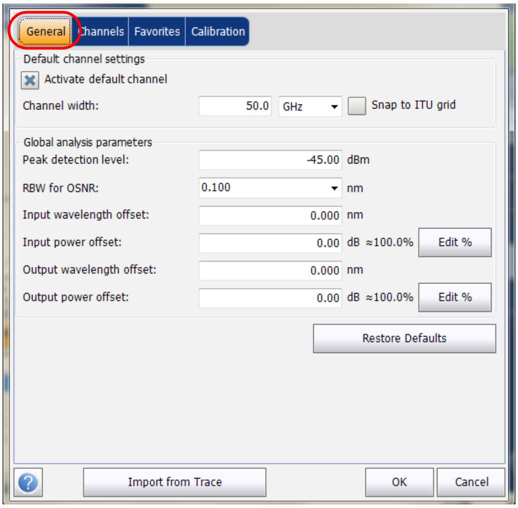
In the General tab, you can set the default channel parameters. Any channel found during an acquisition that is not defined in the channel list will be analyzed according to the default channel settings.

To define general settings:

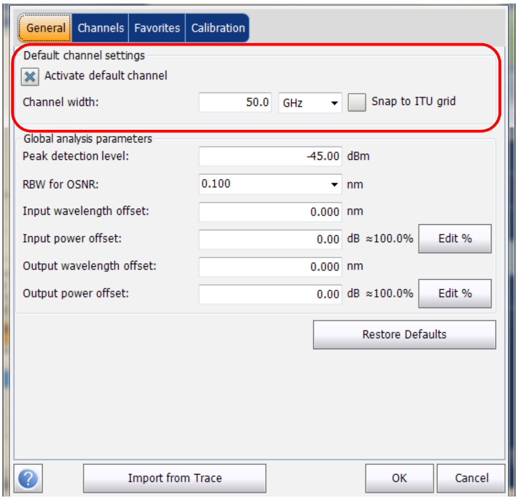
1. From the **Main Menu**, press **Analysis Setup**.



2. Select the **General** tab.



3. Under **Default channel settings**, define the following parameters as needed:



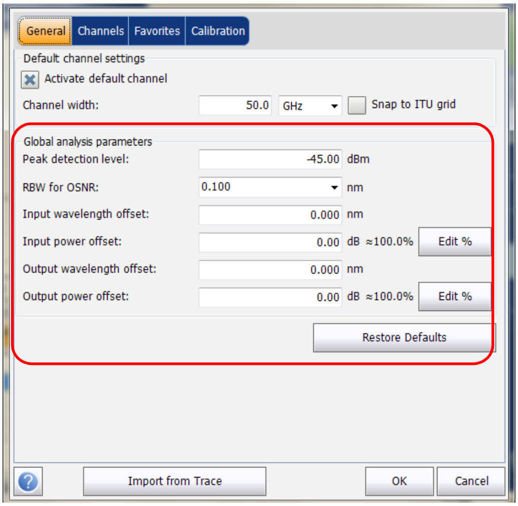
➤ Clear the **Activate default channel** selection, to use the currently defined channel for analysis. This reduces the analysis time by eliminating the peak detection over the complete spectral range. The peaks outside the defined channel list will not be analyzed.

➤ Channel width (GHz or nm): indicates the limit inside which the power values will be considered in the channel.

For default channels, the channel width that sets the limits of the channel, should be the same as the channel distance or smaller (channel distance is defined while creating a channel list). If the channel width is not compatible with the channel spacing, either a single peak may be found for two distinct channels and two analysis would be performed and displayed for that peak, or, it is possible that two peaks may be found within the same channel and be considered as one multi-peak signal. With this result, you can use markers to find the spacing between adjacent channels or to find the channel width.

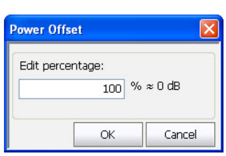
➤ Snap to ITU Grid: When selected, each detected peak will be defined by the nearest ITU channel. The ITU grid is based on the selected channel width.

4. Under **Global analysis parameters**, define the following parameters as needed:



- Peak detection level (dBm): minimum power level from where the peak can be considered as a signal.
- RBW for OSNR (nm): indicates the resolution bandwidth selected for the OSNR calculation. This parameter is generally set to 0.1 nm to allow for a common basis of comparison between different OSAs having different effective resolutions. The instrument's RBW value is written below the graph. This parameter does not actually have an effect on the acquisition, but is only a normalization factor used to provide the OSNR value in a standardized manner.
- Input wavelength offset (nm): offset value applied on the input wavelength. This does not replace a calibration performed at EXFO, but it can help you temporarily sharpen the specifications if you have determined that, for example, your modules are used beyond the normal allowed. Entering a value in THz is not possible. When an offset is applied, it is indicated at the bottom of the graph (λ ↔).
- Input power offset (dB): offset value applied on the input power. This does not replace a calibration performed at EXFO, but it can help you achieve the specifications if you have determined that, for example, your modules are used beyond the normal allowed. When an offset is applied, it is indicated at the bottom of the graph (P ↔).

  To edit the power offset value as a tap percentage, press the **Edit %** button.

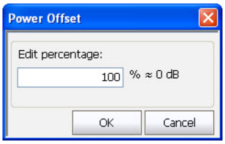
  

  The percentage value entered in **Edit percentage** will be converted to a corresponding equivalent value in dB.

- Output wavelength offset (nm): offset value applied on the output wavelength. This does not replace a calibration performed at EXFO, but it can help you temporarily sharpen the specifications if you have determined that, for example, your modules are used beyond the normal allowed. Entering a value in THz is not possible. When an offset is applied, it is indicated at the bottom of the graph (λ ↔).

- Output power offset (dB): offset value applied on the output power. This does not replace a calibration performed at EXFO, but it can help you achieve the specifications if you have determined that, for example, your modules are used beyond the normal allowed. When an offset is applied, it is indicated at the bottom of the graph (P ↔).

  To edit the power offset value as a tap percentage, press the **Edit %** button.

  The percentage value entered in **Edit percentage** will be converted to a corresponding equivalent value in dB.

5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Press **Restore Defaults** to remove all the changes and apply the default values.

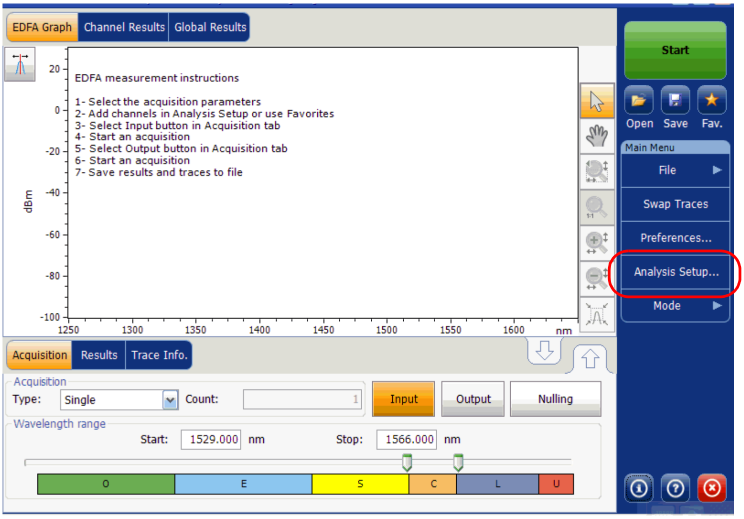
Managing Channels

Testing DWDM systems involves characterizing multiple signals in a link. The application allows you to define channels using a channel editor or quickly generate them from the current data. You can also rapidly create a list of equally spaced channels. Once a channel list is created, you can modify it as needed. You can edit the analysis parameters for one channel or multiple channels.

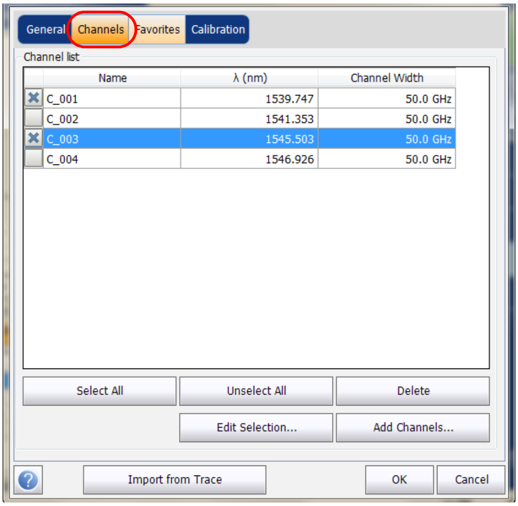
While creating the channel list, some channels may overlap. When the channel widths are specified in nm, two channels are considered to be overlapping when more than 1.2 GHz of frequency range is common between the two channels.

To add a channel list:

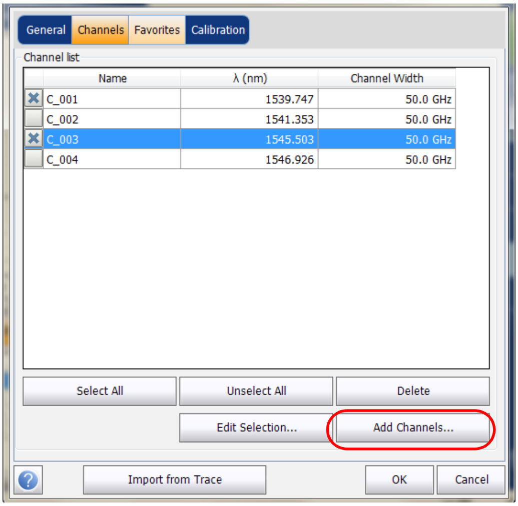
1. From the **Main Menu**, press **Analysis Setup**.



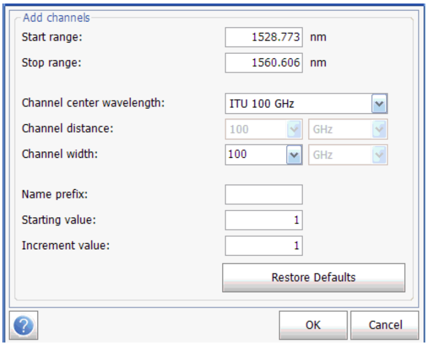
2. Select the **Channels** tab.



3. By default, the channel list is empty. Press **Add Channels**.



4. Enter values in the boxes as explained below:



➤ Start range (nm or THz): starting range of the channel list.

➤ Stop range (nm or Thz): ending range of the channel list.

➤ Channel center wavelength/frequency: spectral center-of-mass for the peak in that channel.

Note: *When using the custom channel center wavelength option, the first channel will be centered at the start range, and the list will be created using channel distance and channel width.*

➤ Channel distance (nm or GHz): distance between the channels. The value of channel distance will be set depending on the selection made for the channel center wavelength option. The channel distance box will be enabled only when the channel center wavelength option is set to custom.

➤ Channel width (nm or GHz): limit inside which the power values will be considered in the channel. Integrated power is calculated on channel width.

- Name prefix: adds prefix to the channel names.
- Starting Value: sets the increment starting value for the channel name in the channel list.
- Increment value: sets the increment value for the channel name in the channel list.

5. Press **OK** to return to the **Channels** window, which now lists the added channels.

Note: *When new channels are added, the Use Default thresholds will be applied to the channel parameters.*

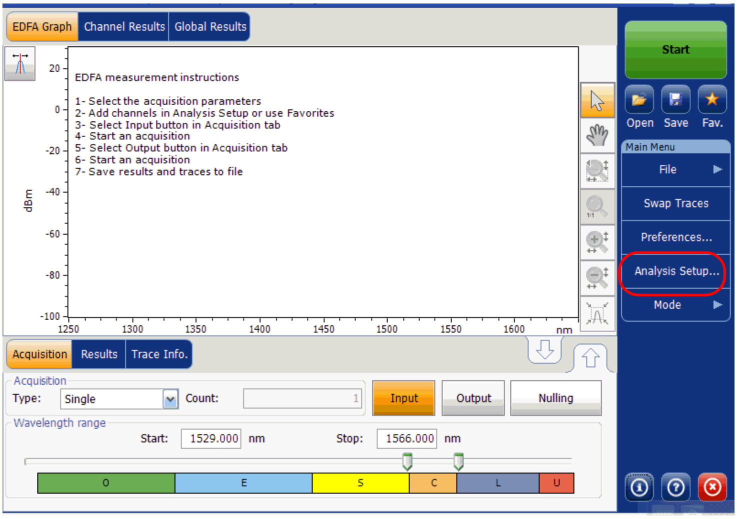
Note: *A warning message will be displayed if any channels are overlapping, but the analysis can still be performed on overlapping channels. If any duplicate channels are added, a confirmation message will be displayed to overwrite the existing channels with the duplicate channels.*

6. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

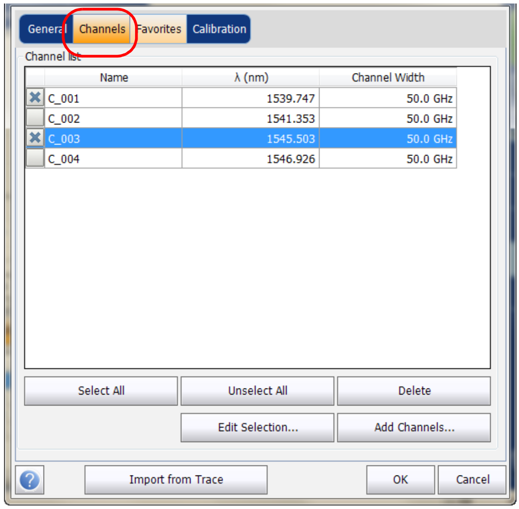
Note: *The application displays a message if more than 1000 channels are added. You can exit the **Analysis Setup** window only after deleting the extra channels from the channel list. You can delete the channels manually as required.*

To edit the parameters of a specific channel:

1. From the **Main Menu**, press **Analysis Setup**.



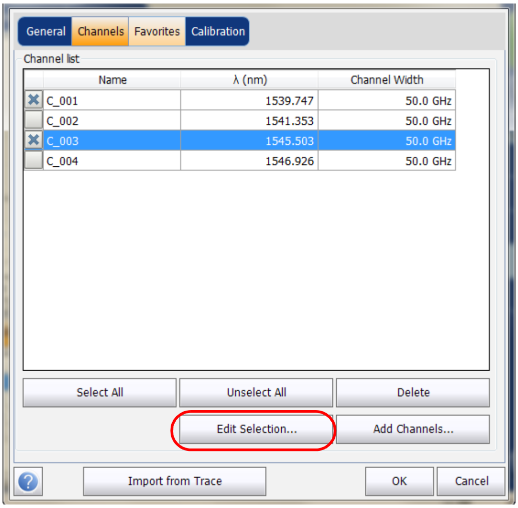
2. Select the **Channels** tab.



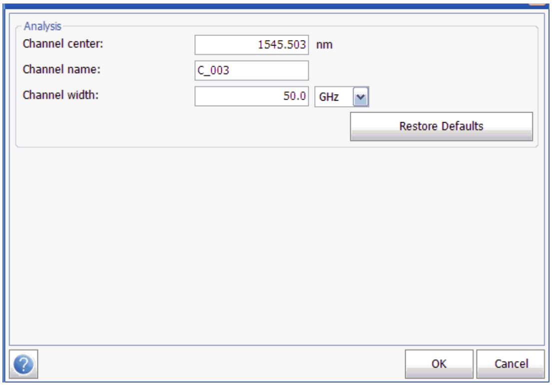
3. Select the channel or channels to be modified in the channel list.

If you want the changes to be applied to all of your channels, press **Select All**. Channels can be selected one by one or all together. You can press **Unselect All** to clear all channel selections. To delete the selected channels, press **Delete**.

4. Press **Edit Selection**.



5. Modify the settings as needed. For more information about the settings, see Managing Channels *on page 224*. If you leave a box empty, it will remain as it was before your changes.



6. Press **OK** to return to the **Channels** tab, which now contains the modified settings.

7. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Setting Up Acquisition Parameters

Before performing your test, you must set the acquisition type and parameters.

There are three types of acquisitions in EDFA mode: single, averaging and real-time.

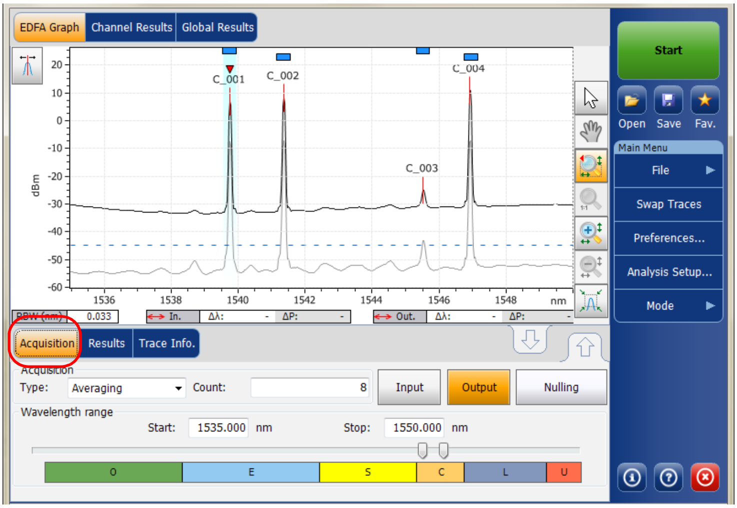
- Single: Spectral measurement is performed once. The results are displayed according to this measurement.
- Averaging: Spectral measurements are performed based on the number of scans that you have entered for this parameter. The trace will be displayed after each acquisition and averaged with the previous traces.
- Real-Time: In real-time acquisition, spectral measurements are performed continuously until you press **Stop**. No averaging is done for spectral measurements. The graph and results are refreshed after each acquisition.

Before performing measurements on an optical spectrum, you must select the wavelength/frequency range to use. You can perform the scan on the full range, on spectral bands, or select a custom range.

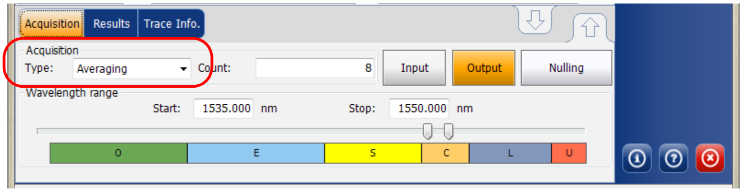
Note: *The shorter the wavelength or frequency range, the faster the acquisition.*

To set parameters in the Acquisition tab:

1. From the main window, select the **Acquisition** tab.



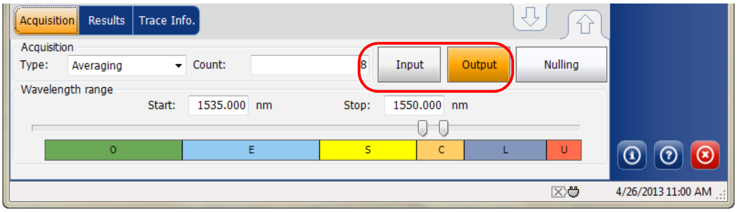
2. Select the acquisition type.



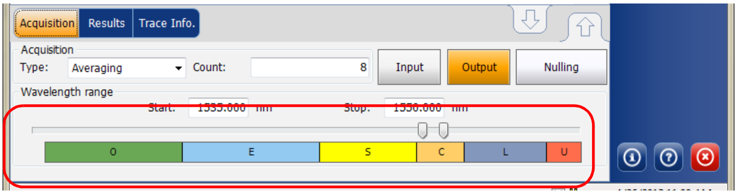
3. If you are performing an averaging type acquisition, enter the number of scans the unit will perform.

Note: *You cannot modify the number of scans count value if you are performing a single or real-time acquisition.*

4. Press **Input** or **Output** to specify which position to use to store the next acquisition.



5. Select the wavelength range for your acquisition.



You can select the wavelength range by entering the start and stop values or by selecting a range on the double slider.

To select the wavelength range using the double slider, move the left and right handles on the double slider or simply click on any band.

Note: *You can select more than one adjoining ranges to include in your range, for example, S + C.*

The wavelength range covered within these bands of the spectra are listed below.

➤ O band (original): 1255 to 1365 nm

➤ E band (extended): 1355 to 1465 nm

➤ S band (short wavelengths): 1455 to 1535 nm

➤ C band (conventional “erbium window”): 1525 to 1570 nm

➤ L band (long wavelengths): 1560 to 1630 nm

➤ U band (ultralong wavelengths): 1620 to 1650 nm.

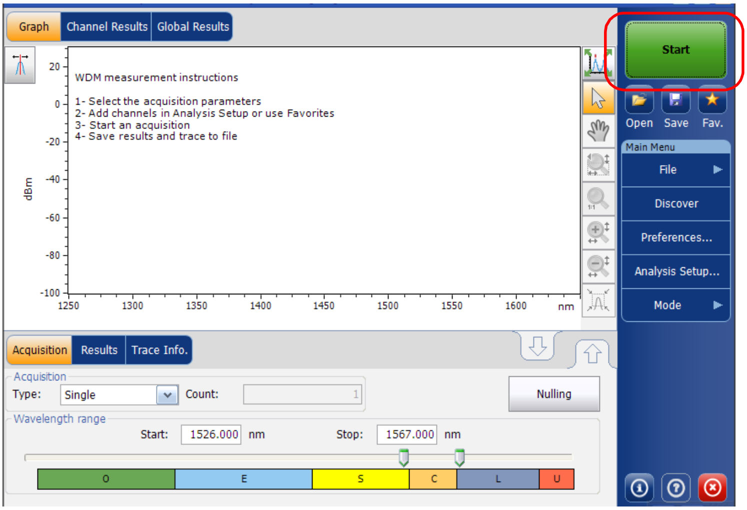
10 Starting a Measurement

Before starting a measurement you must select and configure a test mode. You will find the instructions to select a test mode in *Selecting a Test Mode* on page 12. For instructions on configuring various test modes, see their respective sections.

Note: *You cannot start a measurement in offline mode.*

To start the measurement:

From the main window, Press **Start**. The button will turn into a **Stop** button.



You are notified that the acquisition is in progress in the status bar.

When the acquisition is complete, the corresponding trace or traces, plus result data, trace information and pass-fail statuses, if activated, appear.

11 Managing Files and Test Configurations

Using the Discover Feature

The Discover feature allows you to start a measurement procedure to automatically build an analysis setup (scan range, channel list, analysis parameters, etc.) based on the signal being detected on the input port of the module.

Note: *The Discover features is available on the WDM and Drift test modes only.*

The procedure starts with a full range single scan (1250 nm to 1650 nm) to determine signal spectral range. It is followed by a second scan to establish the analysis parameters by locating the various peaks from the incoming signal.

When the discover process is successful, the application displays the results and graph for the detected channels and the newly discovered analysis parameters are applied automatically to the analysis setup.

Note: *If no signal is detected with the first scan, then the graph shows the full range scan and ends the discover procedure. The application analysis parameters remain unchanged.*

Discover analysis parameters are established as follows:

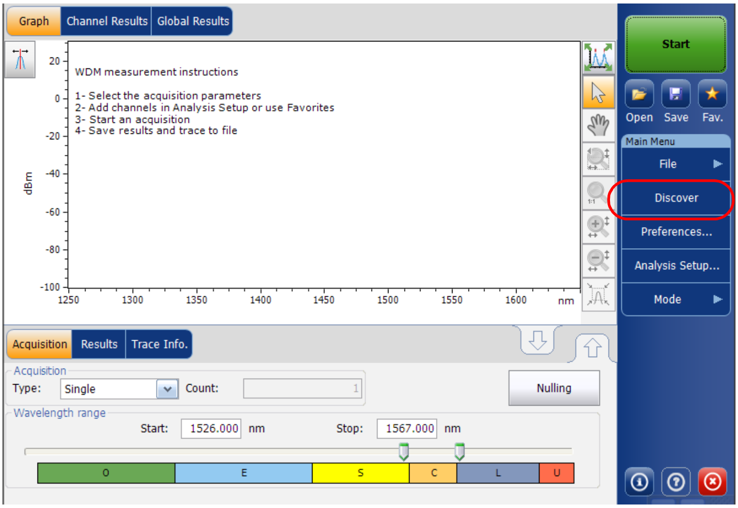
- ➤ The acquisition spectral range is set at 5 nm before the first detected signal peak, and 5 nm after the last detected signal peak (respecting spectral range limits).
- ➤ A channel list is created based on detected signal peaks; default settings are applied for all channel parameters.
- ➤ The center wavelength of each channel is aligned with an ITU grid (200, 100, 50 or 25 GHz for DWDM).
- ➤ The channel width is determined using the overlap criteria; if two channels overlap by more than 0.001 nm or 0.001 GHz, then their widths are reduced to the lower width. If the width of two channels is at 25 GHz and they still overlap, then the width is not reduced and the application considers it as a multi-peak signal (like recent modulation formats for 10 Gb/s or 40 Gb/s) and sets the width of the channel to 50 GHz.

Note: *One of the limitations of using the Discover feature is that the channels are discovered based on the ITU-Grid. All detected peaks will be aligned with an ITU-channel; the channel width and distance are computed and fit in one of the ITU grids (25, 50, 100 or 200 GHz). If your channel is not based on the ITU grid, the results may not be correct. In this case, you can use the default channel definition or create a new channel list.*

To start an automatic setup measurement:

Note: *You cannot do a setup measurement in offline mode.*

From the **Main Menu**, press **Discover**. The **Start** button turns into a **Stop** button and the first scan of the discover starts.



Note: *If you already have an active trace on screen that was modified, you will be prompted to save it. Any reference trace will be cleared.*

You are notified that the discover acquisition is in progress in the status bar.

When the automatic setup measurement is complete, you can start using these newly detected parameters. Simply press **Start** to perform another measurement with the newly found settings.

Managing Measurement Files

The application allows you to manage the measurement files for all test modes. You can save files for future reference, open files to continue a test, or clear them to make room on your unit.

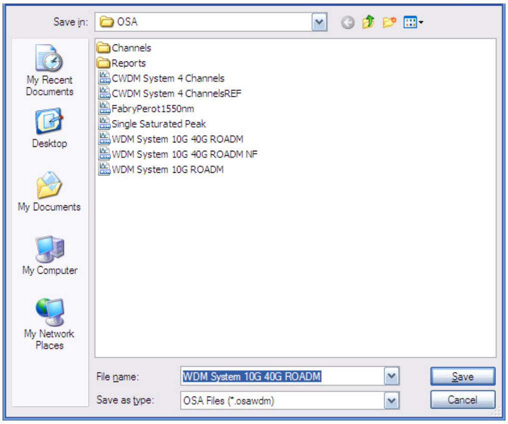
Note: *You can also open files from one type of test into another type of test (for example, open a WDM trace while in EDFA test mode) for specific test needs, see* Opening Files in Other Test Modes *on page 246* *for more information.*

To save files:

1. From the **Main Menu**, Press **File**, and then press **Save As**.

   OR

   From the main window, press .



2. If desired, change the location and file name.
3. Press **Save** to save the trace, else press **Cancel** to exit the window.

Note: *Once a trace is overwritten, you cannot access it anymore.*

Note: *You cannot save a reference trace.*

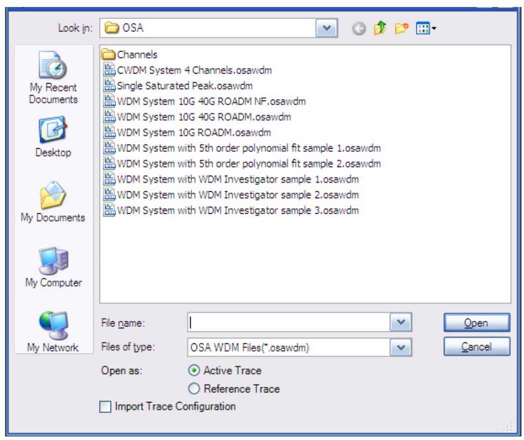
To open a file:

1. From the **Main Menu**, Press **File**, and then press **Open**.

   OR

   From the main window, press .

2. If you had already acquired (but not saved) a trace, a warning window appears, asking you if you want to save the current trace. Press **Yes** to save the trace. Once the trace is saved, you can open a new trace. Press **No** to display the new trace without saving the previously acquired one. Press **Cancel** to return to the previous window.



3. Scroll through the list and select a trace to open.
4. Select the trace type the file will be loaded into:
   - ➤ In WDM mode, two choices are available: Active Trace and Reference Trace.
   - ➤ In Spectral Transmittance and EDFA modes, when opening an OSA WDM file, two choices are available: Input Trace and Output Trace.

Note: *This option is not available in Drift, DFB and FP modes.*

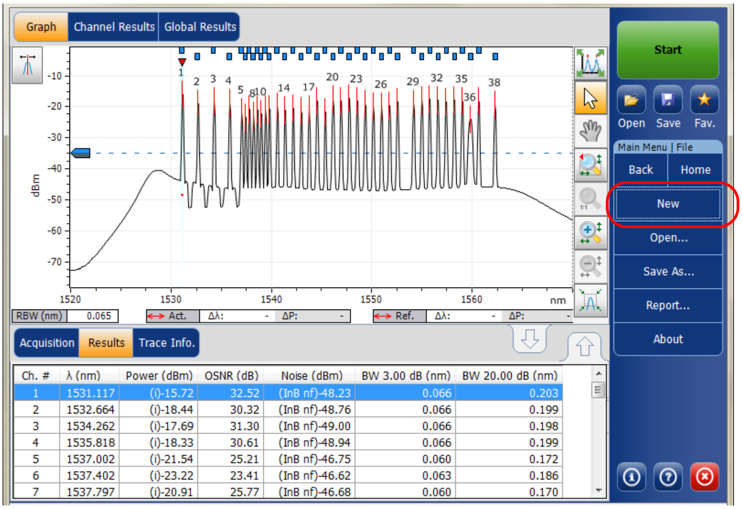
If you are in WDM, Drift, EDFA or ST modes, you can select whether you want to also import the trace configuration and overwrite the current analysis setup and acquisition context at the same time that you open the file. The file type must be the same for the configuration importation to be valid. If you have selected to open a reference trace, the importation is done automatically.

Note: *If you open an active trace and a reference trace is already present, the current analysis setup will be applied to the active trace. If you open a reference trace its analysis setup will replace the current analysis setup.*

5. Press **Open** to open the file. The trace appears in the **Graph** tab. All the values in the main window will also be updated from the file.

To clear a file:

1. From the **Main Menu**, Press **File**.
2. Press **New**.



3. If you had already acquired (but not saved) a trace, a warning window appears, asking you if you want to save the current trace. Press **Yes** to save the trace. Once the trace is saved, you can make room for a new trace. Press **No** to create a new trace without saving the previously acquired one. Press **Cancel** to return to the previous window.

Note: *In WDM mode, any reference trace will be cleared at this point.*

Opening Files in Other Test Modes

Sometimes, you will need to open a file of a specific test mode while being in a different test mode. Depending on the type of file and the mode you selected, your unit will react differently.

Opening Other Test Mode Files in WDM Mode

Your application allows you to open different file types in WDM mode.

While loading a spectral transmittance (.osast) file, the application will re-analyze the newly imported data using the current WDM analysis setup.

While loading a legacy (.osw /.osm) file, the application will import only the raw trace data and acquisition conditions (date, acquisition type, averaging count and wavelength range). All results will be re-analyzed using the current WDM analysis setup.

While loading an EDFA (.osaedfa) file, the application will re-analyze the newly imported data using a temporary setup built from the retrieved channel list, retrieved default channel settings and blanks filled using the current WDM analysis setup.

While loading a spectral transmittance or EDFA file, the application imports trace data as follows:

- If an Input trace is present in the file, it is imported as the WDM reference trace.
- If an Output trace is present in the file, it is imported as the WDM active trace.

Opening Other Test Mode Files in DFB Mode

Your application allows you to open WDM file type in DFB mode.

While loading a WDM (.osawdm) file, the application will re-analyze the newly imported data using the DFB analysis setup and imports the following data from the selected trace:

- Raw trace data
- Trace information
- Trace identification

Opening Other Test Mode Files in FP Mode

Your application allows you to open WDM file type in FP mode.

While loading a WDM (.osawdm) file in the FP mode, the application will re-analyze the newly imported data using the FP analysis setup and imports the following data from the selected trace:

- Raw trace data
- Trace information
- Trace identification

Opening Other Test Mode Files in ST Mode

Your application allows you to open WDM file type in spectral transmittance mode.

While loading a WDM (.osawdm) file, the application behaves as if a new acquisition is requested. This means that the application does not change the modified state of the current measurement while loading a WDM file.

Before loading a WDM file, the application allows you to select in which trace you want to import the WDM file. Select **Input Trace**, or **Output Trace** as required. Once you have selected the file, the application imports the following data in the selected trace.

- Raw trace data
- Trace information
- Trace identification

Opening Other Test Mode Files in EDFA Mode

Your application allows you to open WDM file type in EDFA mode.

While loading a WDM (.osawdm) file, the application behaves as if a new acquisition is requested. This means that the application does not change the modified state of the current measurement while loading a WDM file.

Before loading a WDM file, the application allows you to select in which trace you want to import the WDM file. Select **Input Trace**, or **Output Trace** as required. Once you have selected the file, the application imports the following data in the selected trace.

- Raw trace data
- Trace information
- Trace identification

Managing Favorites

Favorites are configuration files that contain all of the parameters from the **Analysis Setup** tab and **Acquisition** tab. When you often use the same settings, you can save them as a favorite, then recall them for future acquisitions.

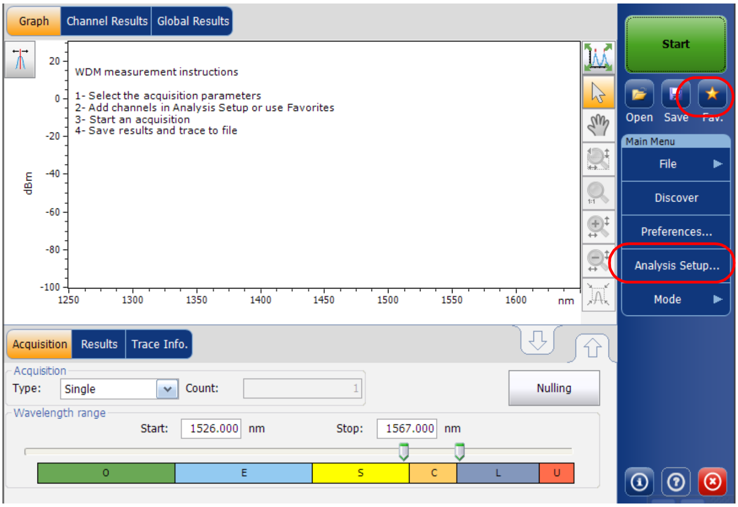
Note: *The Favorites feature is available for the WDM, Drift and EDFA test modes.*

To load a test configuration:

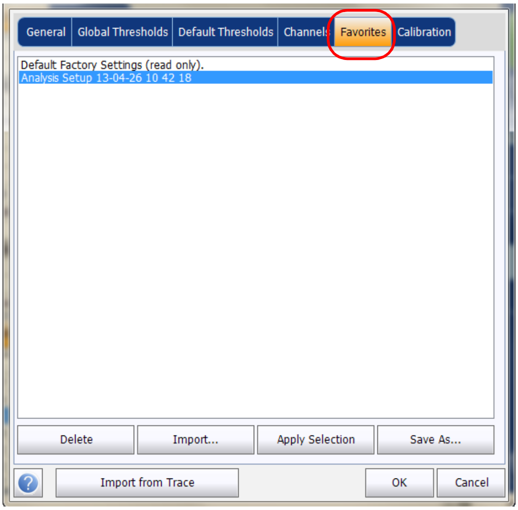
1. From the **Main Menu**, press **Analysis Setup**.

OR

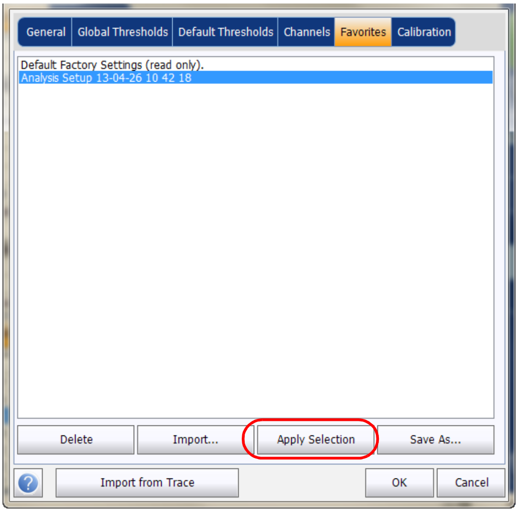
From the main window, press .



2. Select the **Favorites** tab.



3. To apply the settings from a favorite file to the current analysis setup, select a file from the favorites list and press **Apply Selection**. This button will be enabled only when a file is selected from the favorites list. When you press **Apply Selection**, the contents of the file are loaded in the other tabs of this window.



4. Press **OK** to proceed with the loaded configuration and close the window, or press **Cancel** to exit without saving.

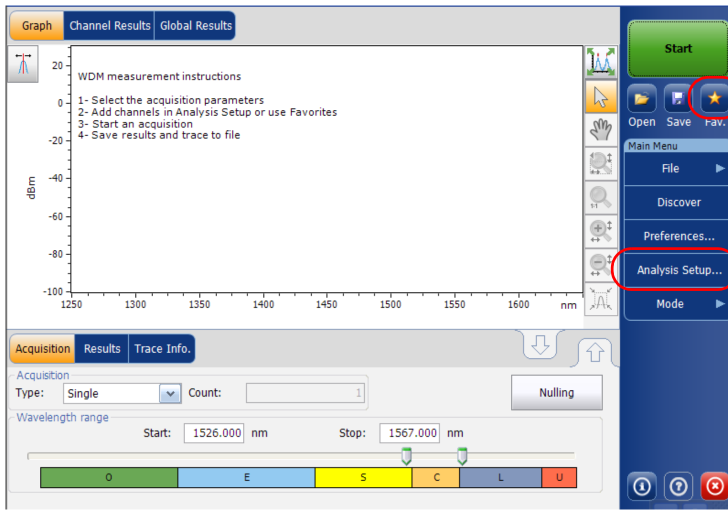
Note: *Pressing **OK** automatically starts the reanalysis process if a measurement file was already present.*

To save a test configuration:

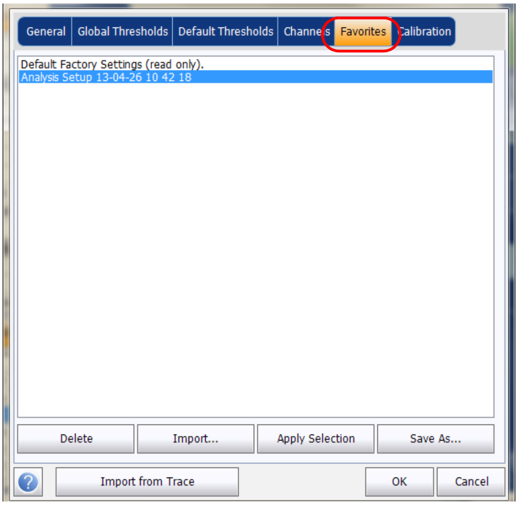
1. From the **Main Menu**, press **Analysis Setup**.

OR

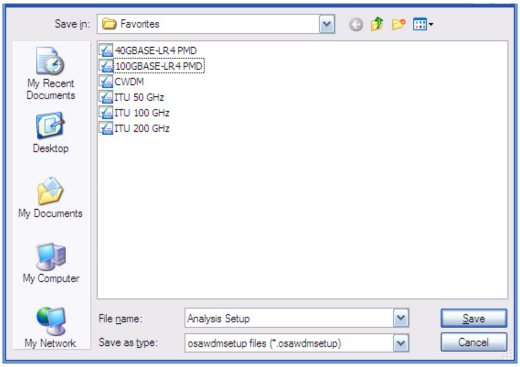
From the main window, press .



2. Select the **Favorites** tab.



3. To save an analysis setup to a file, press **Save As**. The default folder where the file will be saved is the Favorites folder. You should use this folder unless you want to transfer a copy on an external storing device such as a USB stick.



4. In the **Save As** window, enter a file name and press **Save**. The file will be added to the favorites list in the **Analysis Setup – Favorites** tab.

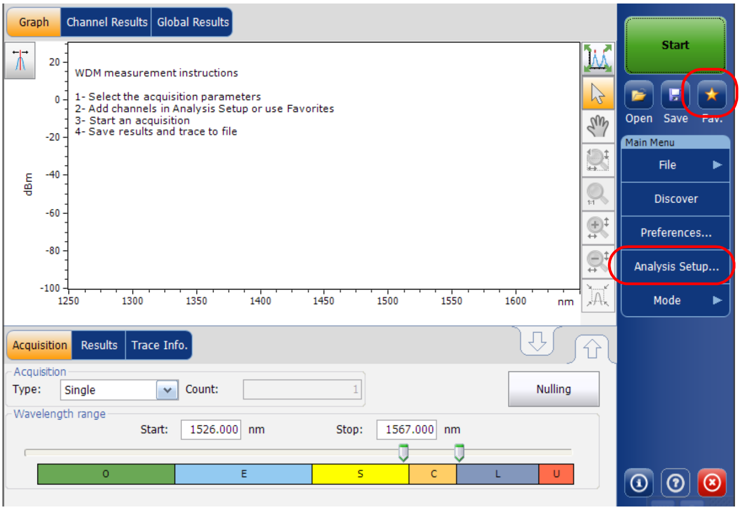
5. Press **Save** to save the configuration and close the window, or press **Cancel** to exit without saving.

To import a test configuration:

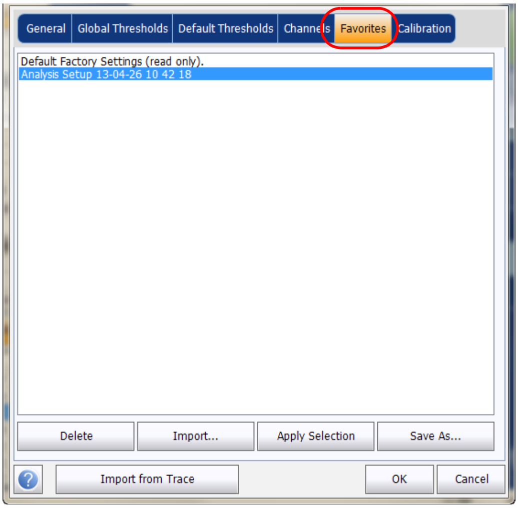
1. From the **Main Menu**, press **Analysis Setup**.

   OR

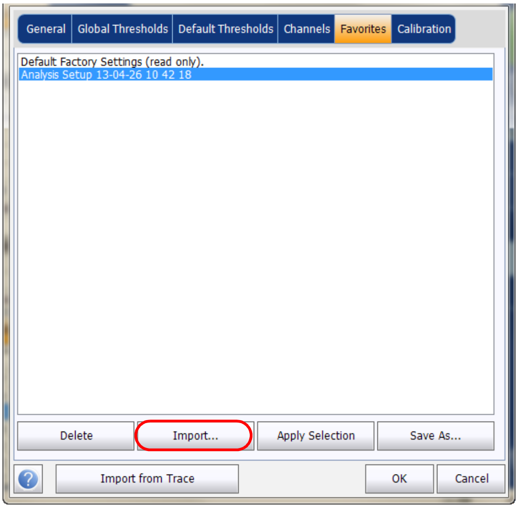
   From the main window, press .



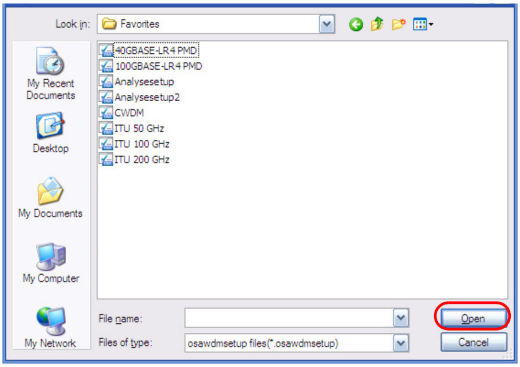
2. Select the **Favorites** tab.



3. Press **Import** to import an analysis setup from a file.



4. From the Import window, select the file you want to import and press **Open**. The file will be added to the favorites list in the **Analysis Setup – Favorites** tab.



5. Press **OK** to load the configuration and close the window, or press **Cancel** to exit without saving.

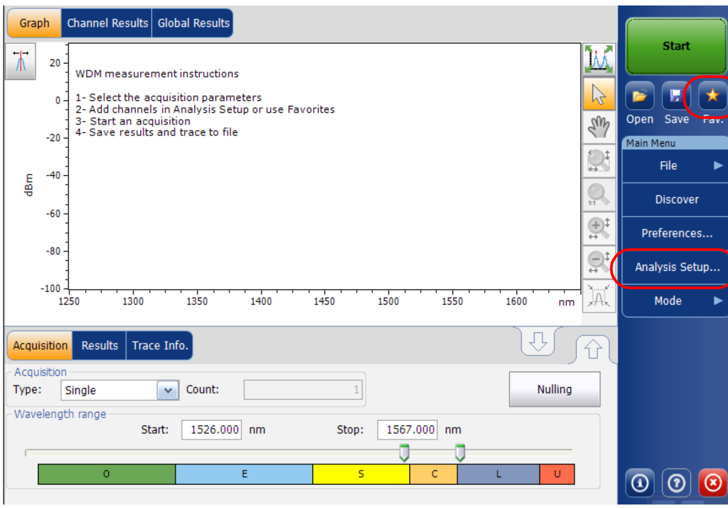
Note: *To load this newly imported test configuration, you must select it from the favorites list and press **Apply Selection**.*

To delete a test configuration:

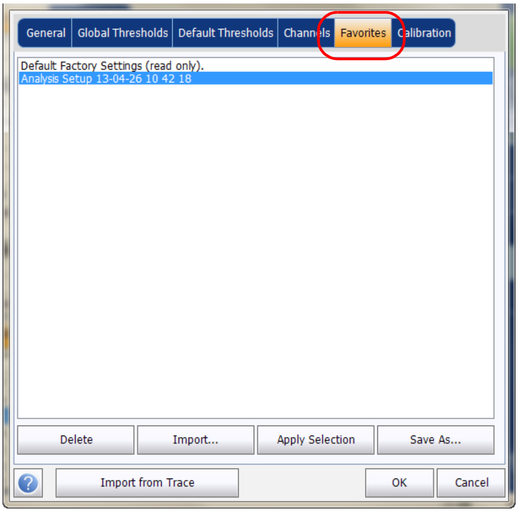
1. From the **Main Menu**, press **Analysis Setup**.

   OR

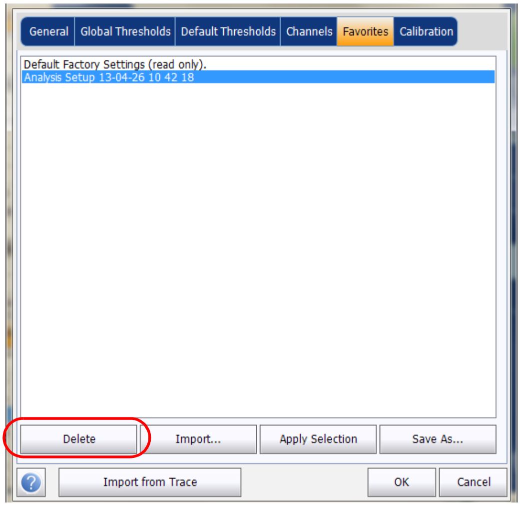
   From the main window, press .



2. Select the **Favorites** tab.



3. To delete a configuration file from the favorites list, select it and press **Delete**. Press **Yes** to confirm your choice.



Importing a Configuration from the Current Trace

In WDM, Drift, EDFA and ST modes, you can import the analysis and channel configuration from the measurement file currently on-screen. See the corresponding test mode for details.

Using a Restore Point

When you modify the analysis setup and press **OK**, a restore point is created. This can be useful when you want to revert to the values you had prior to changing a test configuration.

You can keep up to three restore points during a working session, but they are cleared when you start a new session, or if you change the test mode.

12 Managing Results

Each test mode has its own results tabs, where you can view the trace details, channel results and global results for all measured channels.

You can use zoom options on the trace, configure markers to view the power values for specific wavelengths, and view trace information.

You can also manage trace files and generate reports for all test modes.

Note: *When a power result is flagged using an asterisk (*), it means that the detector is saturated. When the optical power on the detector is too high, the detector gets saturated and the returned value is probably incorrect.*

Note: *When an OSNR or a noise result is flagged using a question mark (?), it means that the quality of the result is insufficient to make a valid calculation. This indication can be produced when analyzing an InBand/i-InBand measurement, or when computing noise through polynomial fit . This indication can arise in the following situations:*

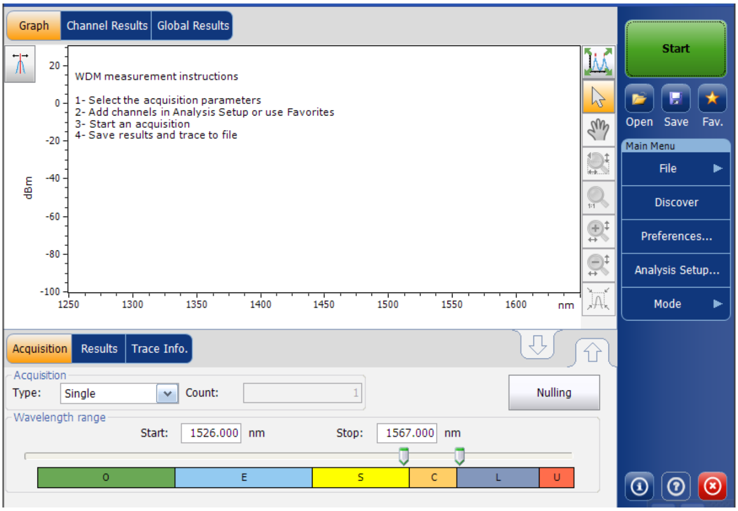
- InBand/*i*-InBand averaging was made using a very few scans (1 or 2 for example). Usually produced when the operator presses the **Stop** button before the end of the InBand/*i*-InBand acquisition.
- The data in the measured channel is subjected to fast polarization scrambling, or is a polarization multiplexed signal.
- One channel might have a misfit with the current state of the polarization scrambler inside the module. This can be corrected by moving the fiber at the entrance of the module.
- The polarization scrambler inside the module could be defective. If you suspect this option please contact EXFO technical support for a more complete diagnosis.
- Polynomial fit coefficient correlation is questionable.

Managing WDM Test Results

The application allows you to view and manage your WDM test results. You can view the graph of your acquisition, results for a single channel, global results and information about the trace.

Graph Tab

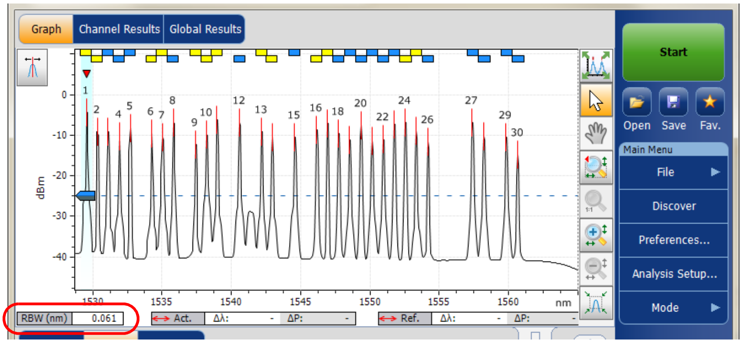
The **Graph** tab allows you to view the spectrum of the active and reference traces. This graph represents the optical power against wavelength or frequency.



When the acquisition is taken (see *Starting a Measurement* on page 237 for details on how to perform a test), the active trace will be displayed in the tab with information along the following axis values:

➤ X axis: wavelength in nm or frequency in THz.

➤ Y axis: optical power expressed in dBm, as measured in the optical resolution bandwidth (RBW) of the OSA. This reference RBW is shown at the bottom of the graph.



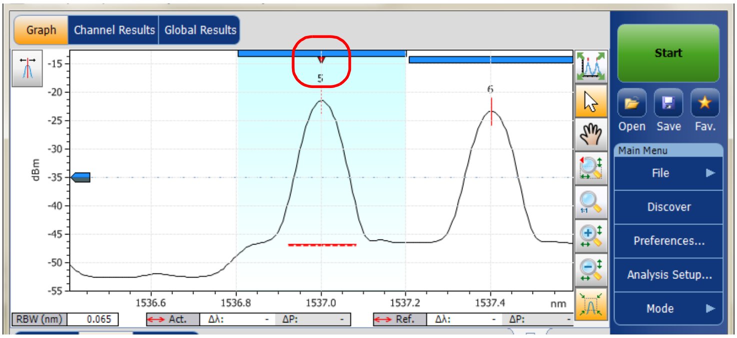
If the current active trace was previously saved, the application will display the file name of the current trace in the title bar.

The graph will display peak indicators for all the channels found by the application with a red vertical line over the peaks to indicate the peak position.

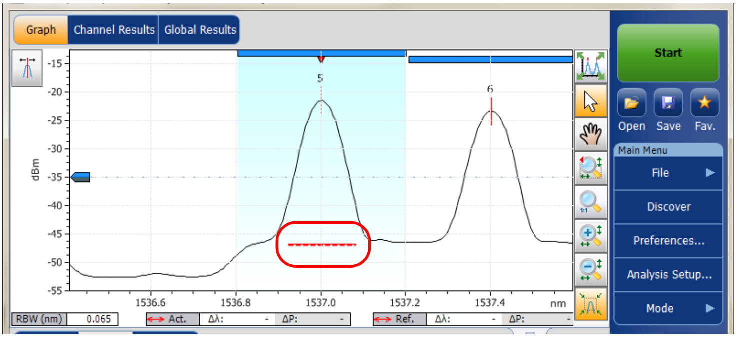
A blue horizontal bar ( ) will be displayed on the top of a channel if it does not overlap with another channel. If the channel overlaps with another channel, the horizontal bar will be yellow ( ).

The selected peak indicator, a small red inverted triangle (▼) points down at the top of the currently selected channel peak. In the graph zone, you can change the selected peak by clicking inside the peak limits of the desired channel. Peak selection in the graph is synchronized with the channel selection in lower tab results list; changing the selection in the graph modifies the selection in the list and vice-versa.

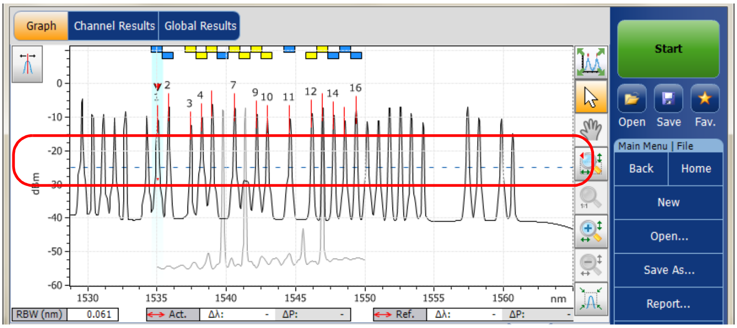
Note: *This is valid only for channels in the list for which a signal is detected. If you select a channel that has no signal, no peak is selected in the graph.*



The noise level for a channel is indicated by a dotted line under the selected peak. The width of the noise level indicator is set according to the current Noise for OSNR setting. The width of the noise level indicator depends on the noise associated with the OSNR setting (from the largest to the narrowest): IEC, InB, InB nf and fit.

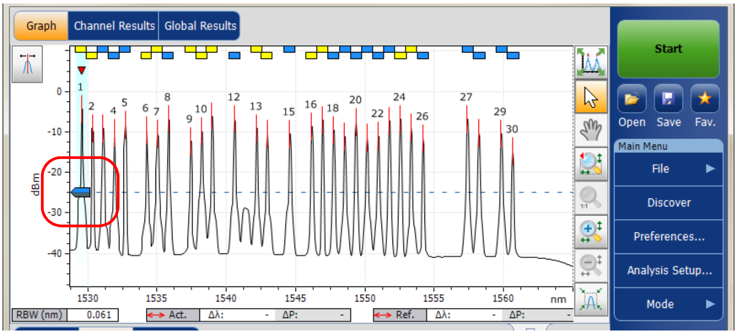


A dotted line across the full spectral width corresponds to the peak detection level indicator. This line indicates the minimum power level (dBm) from where a peak can be considered as a valid signal.



A peak detection level cursor is available in the graph when the **Results** tab is selected. The cursor is positioned along the Y-axis in accordance with the application's peak detection level global analysis parameter.

You can move the cursor to modify the peak detection level for the current measurement.Each time the cursor is moved, the trace(s) is/are fully analyzed again using the application analysis setup.



Note: *If you select another tab than* ***Results****, the cursor disappears, but you can still see the peak detection level indicator line.*

Note: *If there is a reference trace, it appears in gray in the graph.*

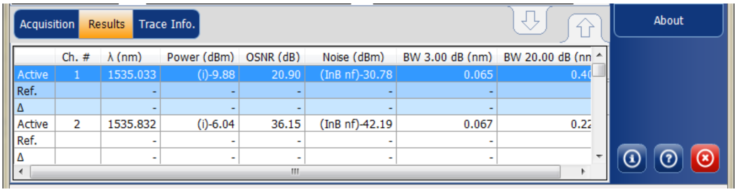
Note: *For more information on these, see* Managing Markers *on page 311 and* Using Zoom Controls *on page 309.*

Results Tab

In the **Results** tab, each channel will be represented for both the active and reference traces, with the delta between both results. Only the results for the channels within the scan range will be analyzed. The pass ( )/fail ( ) verdict for thresholds are also displayed; if the verdict is fail for any parameter, its value will appear in red.

To view results:

From the main window, select the **Results** tab.



Note: *For details on filtering displayed channel results, see* Defining Display Parameters *on page 42*

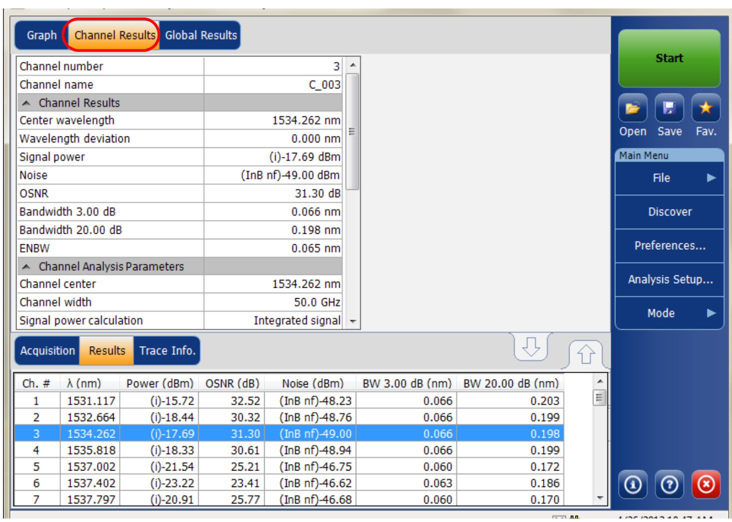
For details on each result type, see Customizing WDM Results Table *on page 49*.

Channel Results Tab

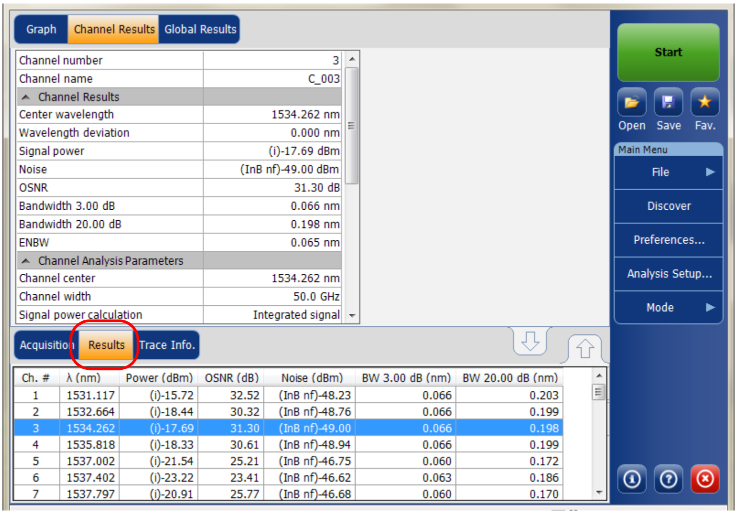
The application allows you to view the complete information about the parameters measured for the selected channel. This is also where the pass/fail verdict for thresholds are displayed. If the verdict is fail for any parameter, its value will appear in red. If the verdict is pass, its value will appear in green.

To view channel results:

1. From the main window, select **Channel Results** tab.



2. Select a row from the **Results** tab to view the results for this channel.



Note: *Values displayed in the* ***Channel Result*** *tabs are those of the active trace only.*

Note: *For details on each result type, see* Customizing WDM Results Table *on page 49 and* Defining General Settings *on page 54.*

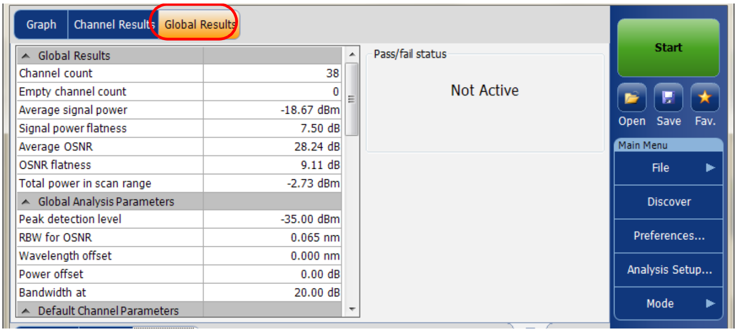
Note: *The wavelength/frequency deviation is the difference between the channel center wavelength/frequency and the measured signal center wavelength/frequency.*

Global Results Tab

The application allows you to view the global results of the current measurement. The pass/fail verdict for thresholds are displayed in the **Global Results** tab. If the verdict is fail for any parameter, its value appears in red. If the verdict is pass, its value appears in green.

To view global results:

From the main window, select the **Global Results** tab.



Results and analysis parameters global to all channels will be displayed. For more information on each item, see *Defining Global Thresholds* on page 62 and *Defining General Settings* on page 54.

In addition, you can view the global pass/fail status, provided the thresholds are activated in the **Global Result Thresholds** tab in the **Analysis Setup** window. If the thresholds are enabled, the **Global pass/fail status** pane will display a Pass or Fail status based on the global results, or **Not Active** if the thresholds are disabled.

Note: *Values displayed in the **Global Results** tab are indicated for the active trace only.*

WDM Investigator Tab

The WDM Investigator tab presents information allowing you to do massive network prevention and maintenance. With the WDM Investigator dashboard, an OSA can identify several types of impairments on a per-channel basis, which gives visibility into a WDM network. In addition, the WDM Investigator dashboard provides useful information on the channel characteristics.

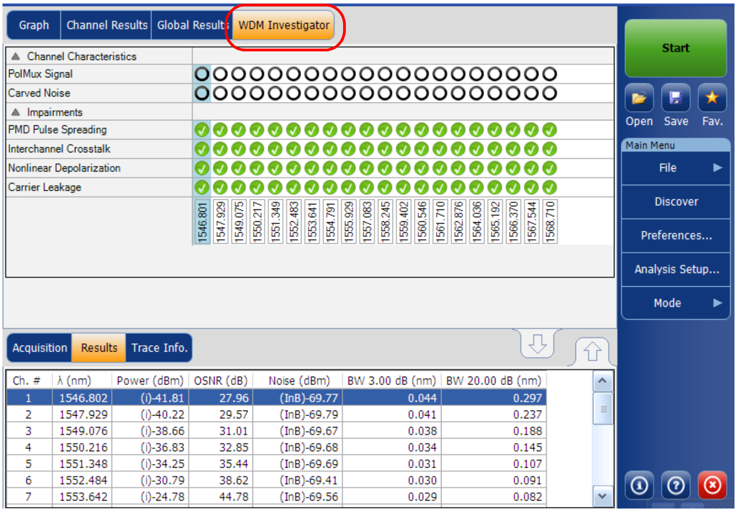
Note: *If your measurement file contains diagnostic information, the latter will be stored in the file when you save it. It will be possible to view the diagnostic information later with the OSA application (the WDM Investigator (Inv) option is not required to view the stored file). You can also view the same information with the offline application.*

Channel diagnostics and the WDM Investigator tab are only available for the active trace, if the two conditions below are met:

- ➤ The measurement under analysis was performed on an OSA module onto which the WDM Investigator (Inv) software option is activated.
- ➤ Diagnostics are computed only for channels analyzed with the i-InBand noise for OSNR.

To view the WDM Investigator diagnostics:

From the main window, select the **WDM Investigator** tab.



Ch. #	λ (nm)	Power (dBm)	OSNR (dB)	Noise (dBm)	BW 3.00 dB (nm)	BW 20.00 dB (nm)
1	1546.802	(i)-41.81	27.96	(InB)-69.77	0.044	0.297
2	1547.929	(i)-40.22	29.57	(InB)-69.79	0.041	0.237
3	1549.076	(i)-38.66	31.01	(InB)-69.67	0.038	0.188
4	1550.216	(i)-36.83	32.85	(InB)-69.68	0.034	0.145
5	1551.348	(i)-34.25	35.44	(InB)-69.69	0.031	0.107
6	1552.484	(i)-30.79	38.62	(InB)-69.41	0.030	0.091
7	1553.642	(i)-24.78	44.78	(InB)-69.56	0.029	0.082

As you change the channel selection in the WDM Investigator tab, the selected row in the Results tab list will move accordingly to indicate the corresponding channel analysis results.

The WDM Investigator diagnostics are divided into two types: channel characteristics (informative) and impairments (qualitative). Both the channel characteristics and the impairment identification help to pinpoint the exact failure affecting a channel, which reduce test time and help prevent future failures.

There are two channel characteristic types:

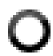
➤ Pol-Mux signal: This specific kind of channel characteristic determines if the signal is polarization multiplexed. Pol-Mux signals appear unpolarized (minimal polarization extinction) at the end of an i-InBand acquisition.

Note: *When a signal is identified as Pol-Mux, no further diagnostics are provided.*

Note: *This information is available for polarized signals only.*

- Carved noise: When the ASE noise is filtered so that the noise level affecting the peak at the center is higher than the noise level at either channel edge, this usually indicates the presence of filters/ROADMs on the link.

  Four levels of information are given for channel characteristics diagnostics.

Symbol	Meaning
	Not present
	Present
	Inconclusive
No symbol (blank)	Not analyzed (empty channel)

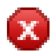
Impairment diagnostics check for the presence of several types of impairments and give an assessment of their severity. There are four impairment types:

- PMD Pulse Spreading: This impairment shows the presence of Polarization Mode Dispersion (PMD) in a channel. When PMD is present on the path of the signal, depending on the polarization axis of the signal injected, the signal may suffer from pulse spreading which, in turn, leads to polarization dependent spectral deformations. These deformations can be analyzed to determine how much polarization pulse broadening the signal has experienced during the measurement.

- Interchannel Crosstalk: In densely-filled channel plans, neighboring channels may have a non-negligible portion of their spectrum that extends within the channel bandpass of a given signal.
- Non Linear Depolarization: Fast changing power levels in multichannel systems (10 G and 40 G) may induced local polarization dependent changes in the refraction index of the fiber. This, sometimes, leads to inter-channel nonlinear effects (for example cross-phase modulation) which, in turn, lead to partial depolarization of neighboring channels.
- Carrier leakage: In a phase-modulated transmission, a CW carrier wave is modulated using external modulators which are generally polarization dependent. When the CW source polarization axis is not optimally aligned with the modulator, a portion of the CW signal passes through unmodulated and gets transmitted as such along the path. When this CW residual signal is present, it may be detected as carrier leakage using advanced polarization analysis to provide a useful diagnostic.

The symbols that are used to illustrate the diagnostics are the same, regardless of the type of impairment. The global diagnostic status is shown in the status bar at the bottom of the window according to the severity displayed in the table below. The most severe status takes precedence over the others for all tested channels.

Five statuses are provided for impairments diagnostics. The symbols are presented from the most severe to the least severe.

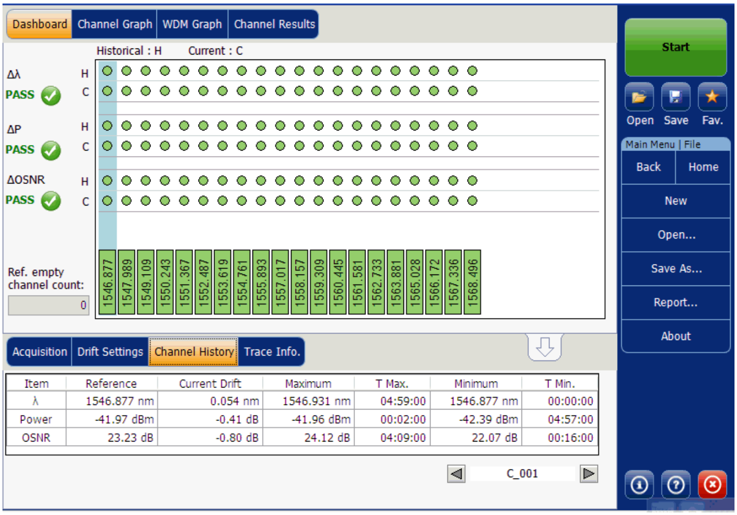
Symbol	Meaning
	Risk
	Warning
	Inconclusive
	OK
No symbol (blank)	Not analyzed (empty channel)

Managing Drift Test Results

The application allows you to view and manage your drift test results. You can view the dashboard, channel graph and WDM graph of your drift acquisition, channel history results for a single channel and information about the trace.

Dashboard Tab

The dashboard allows you to view at-a-glance the pass/fail status of each parameter for each channel that is measured during a drift measurement. When there is no measurement, the dashboard is blank.



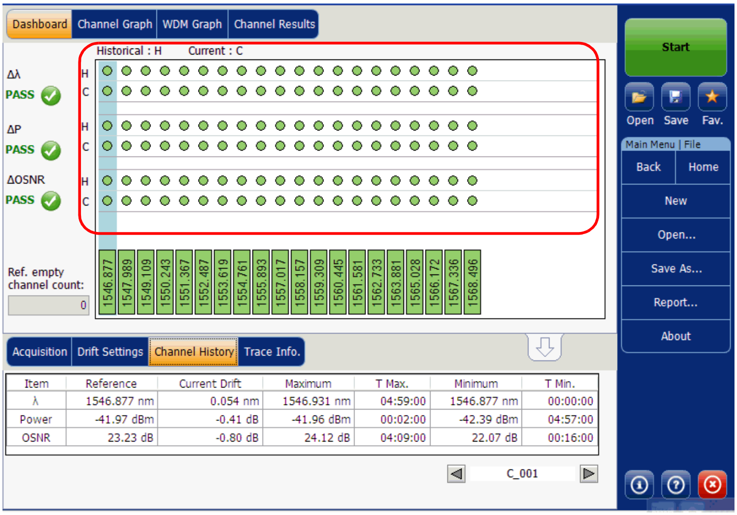
You can select a channel directly from the dashboard or from the **Channel History** tab. For each channel, the dashboard displays the pass/fail status for each of the following parameters:

➤ Central wavelength/frequency

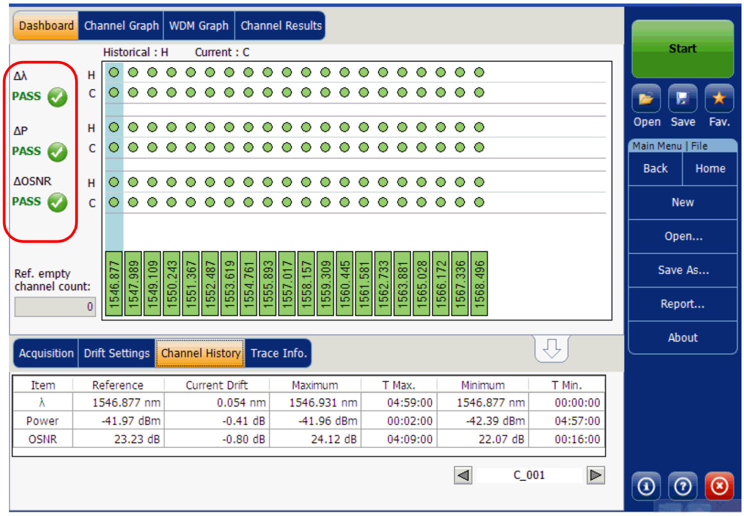
➤ Signal power

➤ OSNR

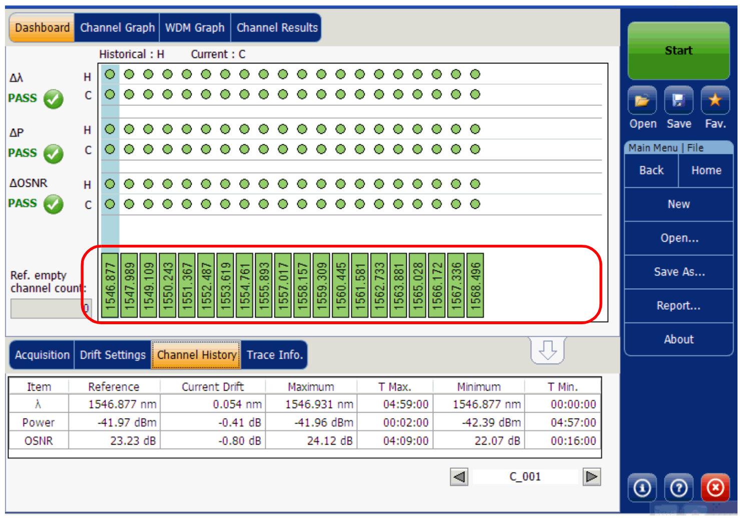
Both the current pass/fail status (last completed acquisition) and the historical pass/fail status are displayed in the dashboard. The historical pass/fail status will be set to Fail as soon as one occurrence of fail has occurred in the past or in the current acquisition.



The dashboard shows a global status (all channels) for each parameter. This global status is set to Fail if at least one channel has a failed historical status for that given parameter, otherwise the global status is set to Pass.



The dashboard displays a channel status (all parameters) for a given channel. This channel status is set to Fail as soon as one of the parameters has a failed historical status for that given channel, otherwise the channel status is set to Pass.



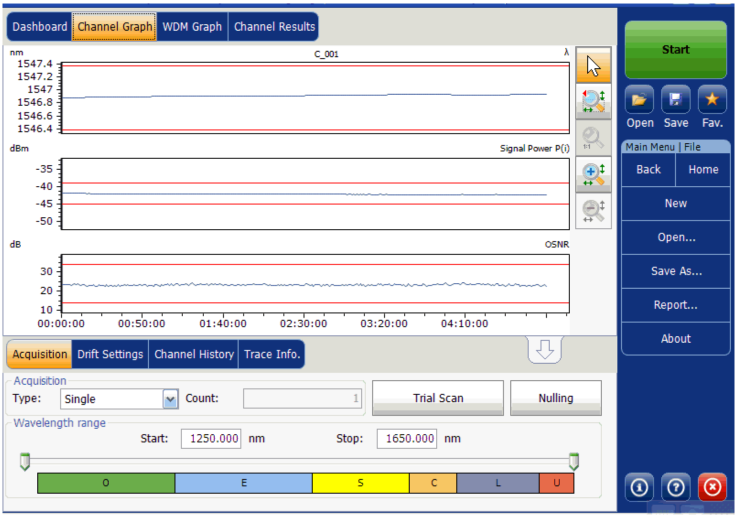
Channel Graph Tab

The **Channel Graph** tab displays three different graphs for the selected channel. You can select which graphs you want to display from the **Drift Results** tab in the **Preferences** Window. The three graphs are X-Y plots of:

➤ Spectral position (center of mass of wavelength or frequency) of the channel over time

➤ Signal power of the channel over time

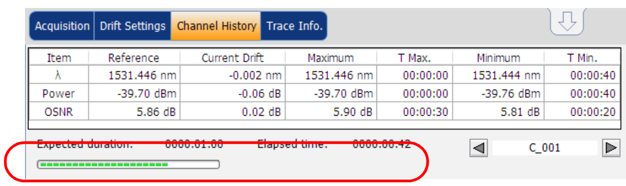
➤ OSNR of the channel over time



Channel History Tab

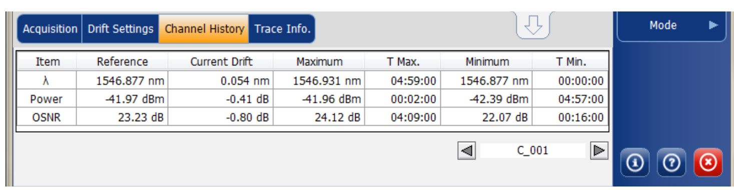
The channel history table shows channel results for the active trace. The result is displayed for the selected channel only. The pass/fail verdict for thresholds are also displayed in the results table. If the verdict is fail for any parameter, its value will appear in red.

The application displays the progress of the measurement in the status bar, while the acquisition is taken. The Elapsed time and Expected duration for the measurement to stop is displayed in the **Channel History** tab.



To view channel history results:

From the main window, select the **Channel History** tab.



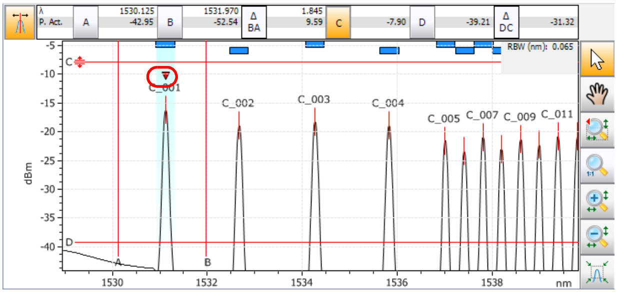
Results for the following parameters related to the selected channel are displayed in the **Channel History** table:

- Spectral position (center of mass of wavelength or frequency) of the channel against time (nm or THz)
- Signal power of the channel against time (dBM)
- OSNR of the channel against time (dB)

For each of the above parameters, the following results are displayed:

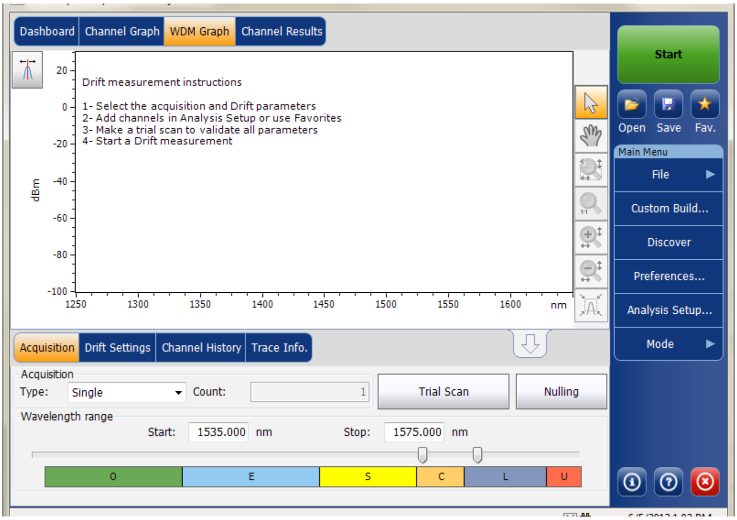
- Reference: channel reference values for the current drift acquired during the initial acquisition.
- Current Drift: current drift values, that is, the current deviation from the channel's reference for the drift's latest acquisition.
- Maximum: maximum values reached during the drift.
- T Max.: time of the drift at which the channel was at its maximum value. Displayed time is relative to the time at the start of the drift measurement.
- Minimum: minimum values reached during the drift.
- T Min.: time of the drift at which the channel was at its minimum value. Displayed time is relative to the time at the start of the drift measurement.

A small red marker ( ) will point down at the peak in the **WDM Graph** tab when you select a channel in the **Channel History** tab. The red marker will move accordingly to indicate the corresponding peak on the graph, with a focus on the selected channel.



WDM Graph Tab

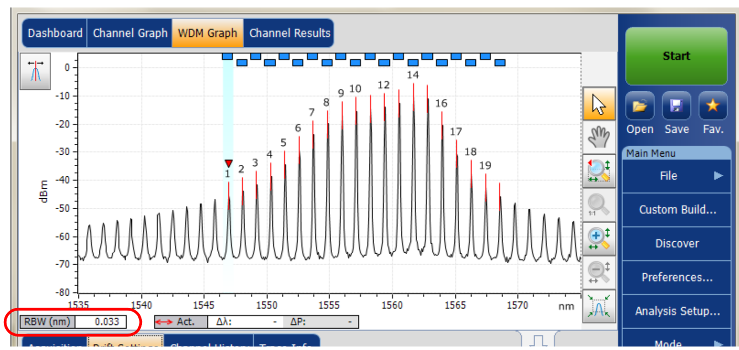
The **WDM Graph** tab allows you to view the spectrum of the active trace for the last WDM acquisition in your drift measurement. This graph represents the optical power versus wavelength or frequency.



When the acquisition is taken (see *Starting a Measurement* on page 237 for details on how to perform a test), the active trace will be displayed in the tab with information along the following axis values:

➤ X axis: wavelength in nm or frequency in THz.

➤ Y axis: optical power expressed in dBm, as measured in the optical resolution bandwidth (RBW) of the OSA. This reference RBW is shown at the bottom of the graph.



The graph will display peak indicators for all the channels found by the application with a red vertical line over the peaks to indicate the peak position.

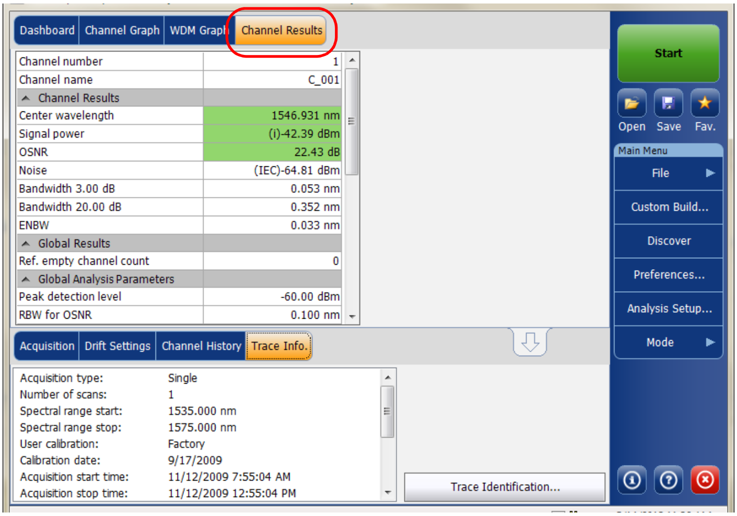
A blue horizontal bar ( ) will be displayed on the top of a channel if it does not overlap with another channel. If the channel overlaps with another channel, the horizontal bar will be yellow ( ).

Channel Results Tab

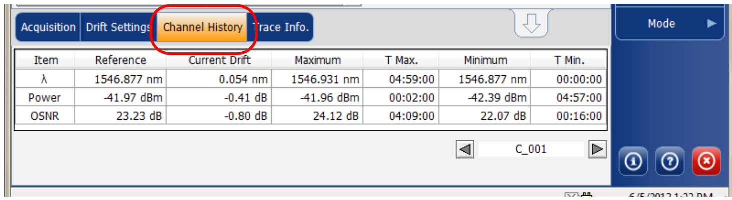
When you select a channel in the **Channel History** tab, the **Channel Results** tab will show complete information about the parameters measured for the selected channel. The pass/fail verdict for thresholds are also displayed in the **Channel Results** tab. If the verdict is fail for any parameter, its value appears in red. If the verdict is pass, its value appears in green.

To view channel results:

1. From the main window, select **Channel Results** tab.



2. Select a channel from the **Channel History** tab to view the channel results for the selected channel.



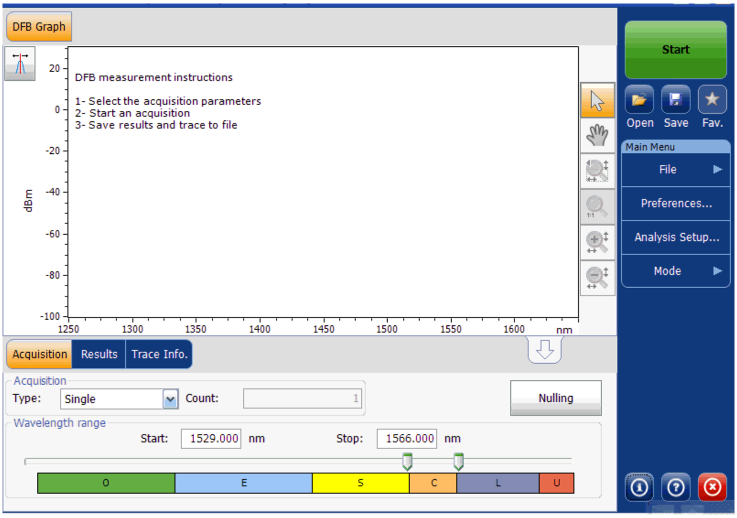
Note: *For details on each item, see* Customizing WDM Results Table *on page 49 and* Defining General Settings *on page 54.*

Managing DFB Test Results

The application allows you to view and manage your DFB test results. You can view the graph and results for your DFB laser source.

DFB Graph Tab

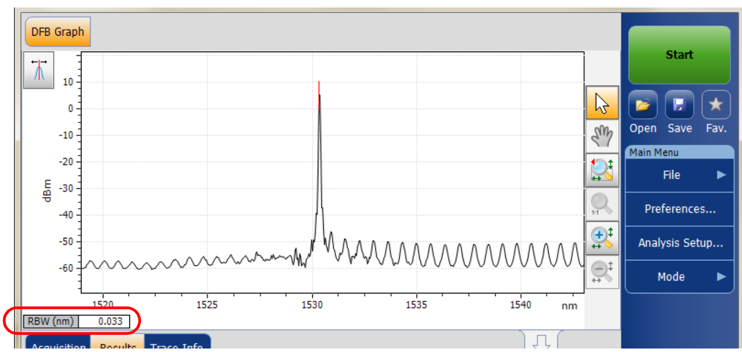
The **DFB Graph** tab allows you to view the spectrum of a DFB laser source. This graph represents the optical power against wavelength or frequency.



When the acquisition is taken (see *Starting a Measurement* on page 237 for details on how to perform a test), the active trace will be displayed in the tab with information along the following axis values:

➤ X axis: wavelength in nm or frequency in THz.

➤ Y axis: optical power expressed in dBm, as measured in the optical resolution bandwidth (RBW) of the OSA. This reference RBW is shown at the bottom of the graph.



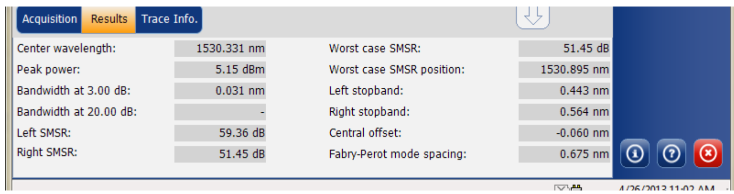
If the current trace was previously saved, the graph will display the file name of the current trace in the title bar.

Results Tab

You can view the analysis of the DFB laser source from the **Results** tab.

To view results:

From the main window, select the **Results** tab.



The following information related to the DFB measurement is displayed in the **Results** table:

- Center wavelength/frequency: spectral center-of-mass for the peak.
- Peak power (dBm): peak signal power.
- Bandwidth 3.00 dB: bandwidth measured by taking the width of a signal at 50 % linear power of the peak or -3 dB from the peak.
- Bandwidth 20.00 dB: bandwidth measured by taking the width of a signal at 1 % linear power of the peak or -20 dB from the peak.
- Left SMSR: Left side-mode suppression ratio. It is the power difference between the main mode and the most powerful outstanding side-mode on the left.
- Right SMSR: Right side-mode suppression ratio. It is the power difference between the main mode and the most powerful outstanding side-mode on the right.

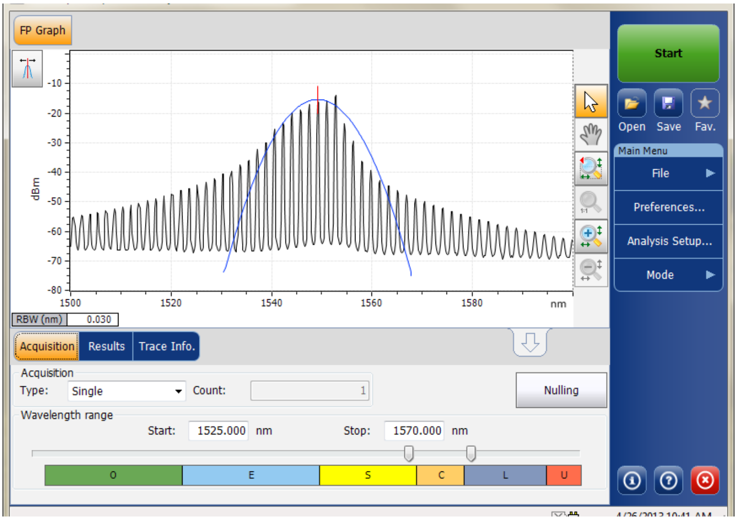
- Worst case SMSR: power difference between the main mode and the side-mode with the highest power.
- Worst case SMSR position: spectral position of the worst SMSR.
- Left stopband: spectral position difference between the main mode and the closest side-mode on the left.
- Right stopband: spectral position difference between the main mode and the closest side-mode on the right.
- Central offset: spectral position of the main mode minus the mean of the spectral positions of the first adjacent left and right side-modes.
- Fabry-Perot mode spacing: average estimated spectral spacing between adjacent Fabry-Perot modes of the DFB.

Managing FP Test Results

The application allows you to view and manage your FP test results. You can view the graph and results for your FP laser source.

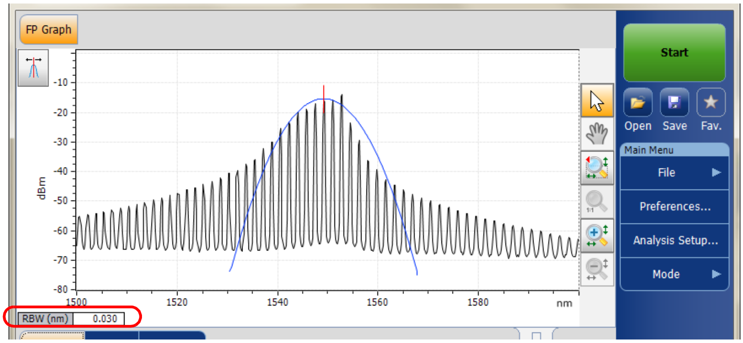
FP Graph Tab

The **FP Graph** tab allows you to view the spectrum of a FP laser source. This graph represents the optical power against wavelength or frequency.



When the acquisition is taken (see *Starting a Measurement* on page 237 for details on how to perform a test), the active trace will be displayed in the tab with information along the following axis values:

- X axis: wavelength in nm or frequency in THz.
- Y axis: optical power expressed in dBm, as measured in the optical resolution bandwidth (RBW) of the OSA. This reference RBW is shown at the bottom of the graph.



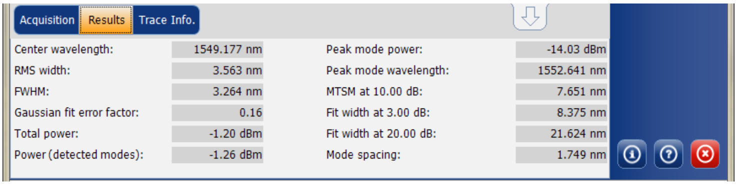
If the current trace was previously saved, the graph will display the file name of the current trace in the title bar.

Results Tab

You can view the analysis of the FP laser source from the **Results** tab.

To view results:

From the main window, select the **Results** tab.



The following information related to the FP measurement is displayed in the **Results** table:

➤ Center wavelength/frequency: spectral center-of-mass for the peak.

➤ RMS width: indicates the second moment of the spectral distribution.

➤ FWHM: indicates the full width at the half-maximum position.

➤ Gaussian fit error factor: indicates the normalized RMS error factor in the Gaussian fit.

➤ Total power (dBm): indicates the integrated power of the acquisition window.

➤ Power (detected modes) (dBm): indicates the integrated power from the starting point of the first mode to the ending point of the last mode.

➤ Peak mode power (dBm): indicates the power of the peak mode of the Fabry-Perot laser.

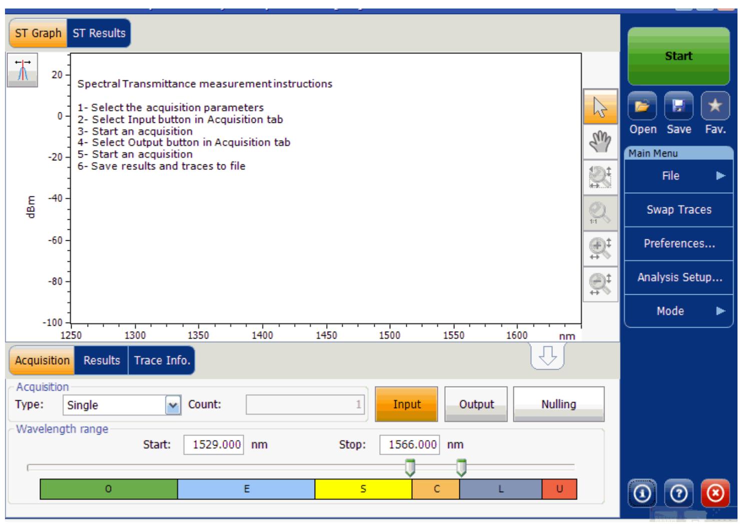
- Peak mode wavelength/frequency: indicates the wavelength/frequency of the peak mode of the Fabry-Perot laser.
- MTSM at 10.00 dB: indicates the maximum wavelength difference between the peak power mode and the last mode with amplitude that is one tenth (10 dB down) of the peak mode amplitude.
- Fit width at 3.00 dB: indicates the spectral width of the Gaussian fit at 3 dB.
- Fit width at 20.00 dB: indicates the spectral width of the Gaussian fit at 20 dB.
- Mode spacing: average estimated spectral spacing between adjacent Fabry-Perot modes of the FP.

Managing Spectral Transmittance Test Results

The application allows you to view and manage your spectral transmittance test results. You can view the graph of your acquisition, results for a single channel, global results and information about the trace.

ST Graph Tab

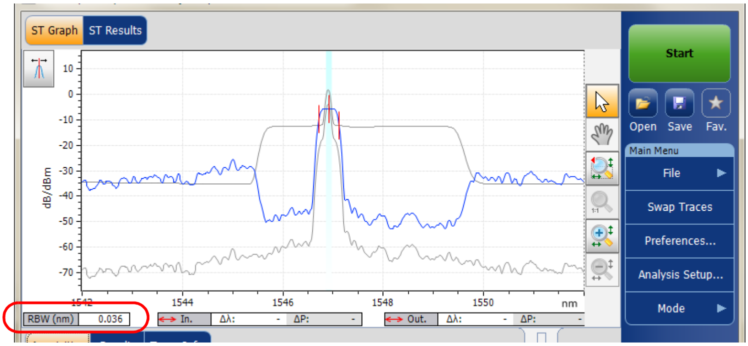
The **ST Graph** tab allows you to view the spectrum of the input trace, the output trace and the calculated ST trace. This graph represents the optical power against wavelength or frequency.



When the acquisition is taken (see *Starting a Measurement* on page 237 for details on how to perform a test), the active trace will be displayed in the tab with information along the following axis values:

➤ X axis: wavelength in nm or frequency in THz.

➤ Y axis: optical power expressed in dBm, as measured in the optical resolution bandwidth (RBW) of the OSA. This reference RBW is shown at the bottom of the graph.



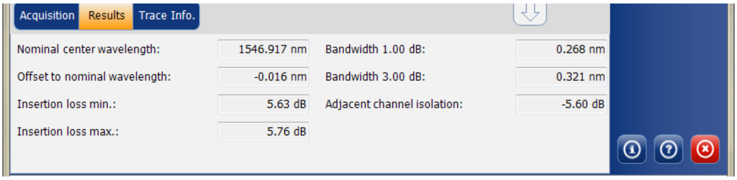
If the current trace was previously saved, the graph will display the file name of the current trace in the title bar.

Results Tab

The results table shows the spectral transmittance results for the active trace. Results for only the channels within the scan range will be displayed.

To view results:

From the main window, select the **Results** tab.



The following results related to the channels are displayed:

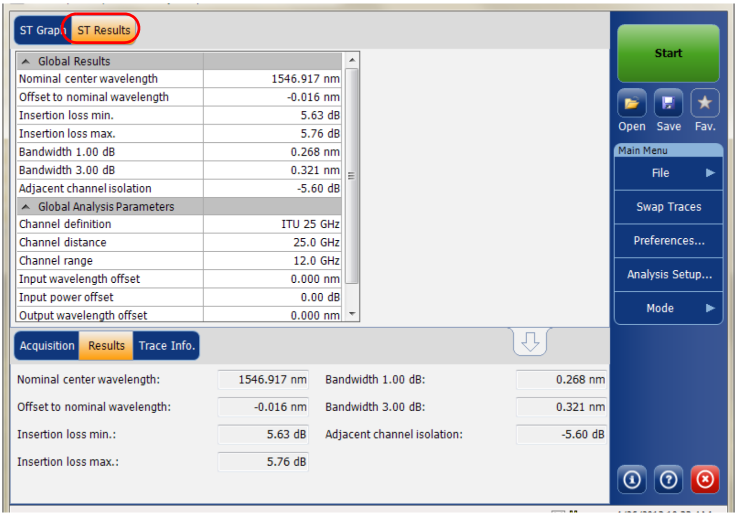
- Nominal center wavelength or frequency: single value representing the channels center wavelength (in nm) or frequency (in THz).
- Offset to nominal wavelength or frequency: offset value applied to the nominal wavelength (nm) or frequency (THz).
- Insertion loss min: minimum difference between a reference power level and the measured power level (in dB).
- Insertion loss max: maximum difference between a reference power level and the measured power level (in dB).
- Bandwidth x at (dB): bandwidth measured by taking the width of a signal at x dB from the peak.
- Bandwidth y at (dB): bandwidth measured by taking the width of a signal at y dB from the peak.
- Adjacent channel isolation: isolation (in dB) taken at the channel distance on the left or right of the nominal wavelength. The worst value between the left and right isolation is kept.

ST Results Tab

The **ST Results** tab will show complete information about the spectral transmittance parameters and the global analysis parameters.

To view ST results:

From the main window, select **ST Results** tab.



Note: *For details on each item, see* Results Tab *on page 297 and* Defining ST Analysis Settings *on page 190.*

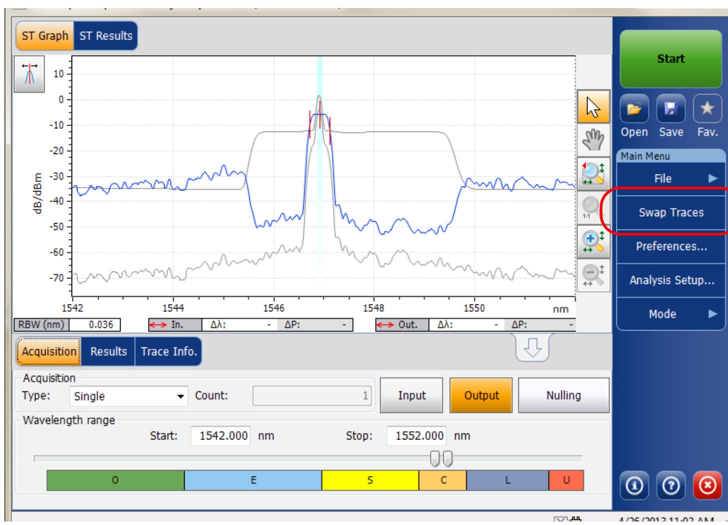
Swapping Spectral Transmittance Traces

The Swap Trace feature allows you to swap spectral transmittance input and output traces. With this feature, the input trace is replaced with the output trace and vice versa. All results are recalculated.

Note: *The swap trace feature will not be available if there are no traces in the application.*

To swap spectral transmittance traces:

From the **Main Menu**, press **Swap Traces**.



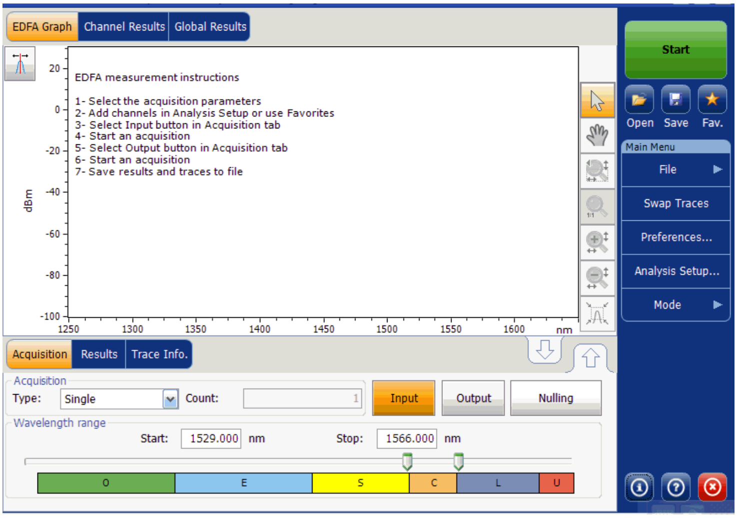
All the parameters in the application will be updated according to the modified traces.

Managing EDFA Test Results

The application allows you to view and manage your EDFA test results. You can view the graph of your acquisition, results for a single channel, global results and information about the trace.

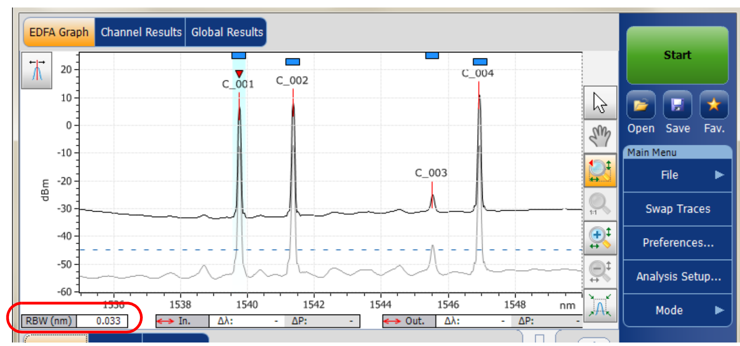
EDFA Graph Tab

The **EDFA Graph** tab allows you to view the spectrum of the input trace and the output trace. This graph represents the optical power against wavelength or frequency.



When the acquisition is taken (see *Starting a Measurement* on page 237 for details on how to perform a test), the trace will be displayed in the **EDFA Graph** tab with information along the following axis values:

- X axis: wavelength in nm or frequency in THz
- Y axis: optical power expressed in dBm, as measured in the optical resolution bandwidth (RBW) of the OSA. This reference RBW is shown in the graph.



If the current trace was previously saved, the graph will display the file name of the current trace in the title bar.

The graph will display peak indicators for all the channels found by the application with a red vertical line over the peaks to indicate the peak position.

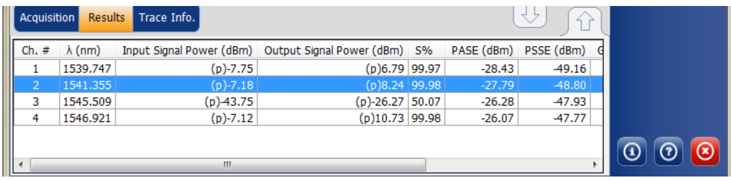
A blue horizontal bar ( ) will be displayed on the top of a channel if it does not overlap with another channel. If the channel overlaps with another channel, the horizontal bar will be yellow ( ).

Results Tab

The results table shows channel results for both the input or output traces. The results for only the channels within the scan range will be displayed.

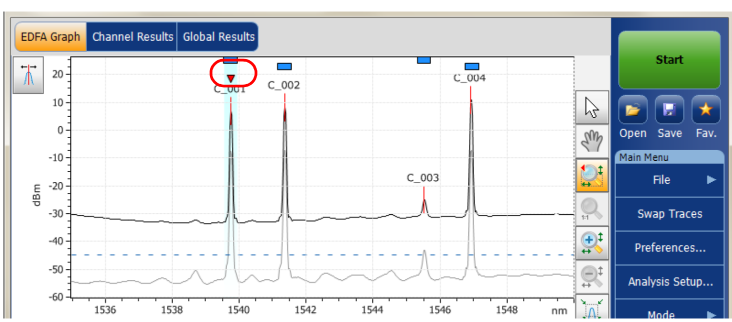
To view results:

From the main window, select the **Results** tab.



For information on each item, see *Customizing EDFA Results Table* on page 213.

A small red marker ( ) will point down at the peak in the **EDFA Graph** tab when you select a row in the **Results** tab. The red marker will move accordingly to indicate the corresponding peak on the graph, with a focus on the selected channel.

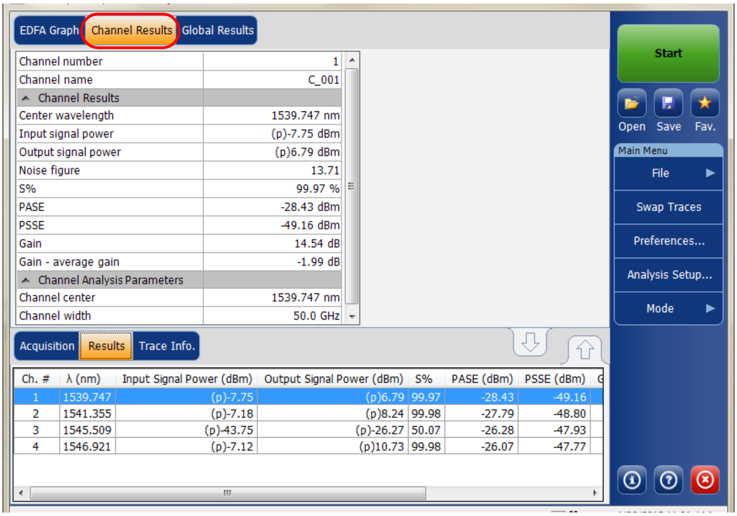


Channel Results Tab

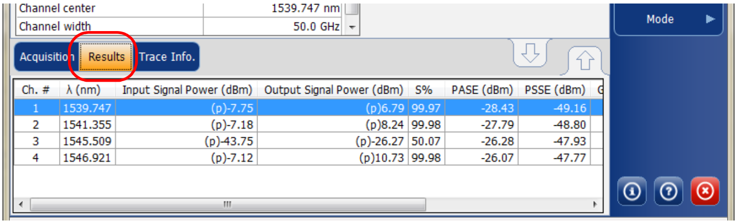
When you select a row from the **Results** tab, the **Channel Results** tab will show complete information about the parameters measured for the selected channel.

To view channel results:

1. From the main window, select **Channel Results** tab.



2. Select a row from the **Results** tab to view the channel results for the selected channel.



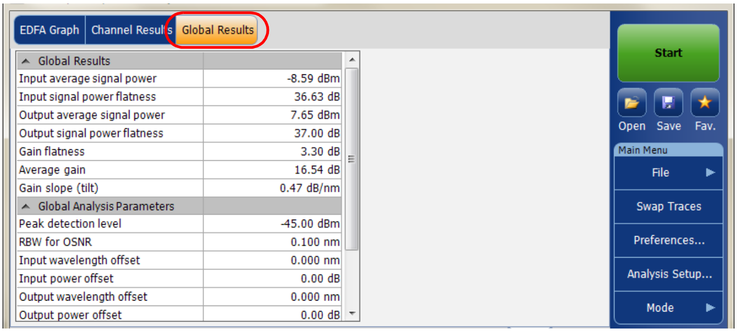
For details on each item, see *Customizing EDFA Results Table* on page 213.

Global Results Tab

The application allows you to view the global results of the current measurement.

To view global results:

From the main window, select the **Global Results** tab.



Results for the following parameters for all the channels will be displayed:

➤ Input average signal power: sum of the signal powers of all the peaks detected in the current acquisition, divided by the total number of peaks.

➤ Input signal power flatness: difference between the maximum and minimum signal power values of the detected peaks, in dB.

➤ Output average signal power: sum of the signal powers of all the peaks detected in the current acquisition, divided by the total number of peaks.

➤ Output signal power flatness: difference between the maximum and minimum signal power values of the detected peaks, in dB.

➤ Gain flatness: difference between the maximum and minimum gain values of the detected channels, in dB.

➤ Average gain: sum of the gain of all detected channels in the current measurement, divided by the total number of channels.

➤ Gain slope (tilt): slope of the linear fit on the gain values of the detected channels.

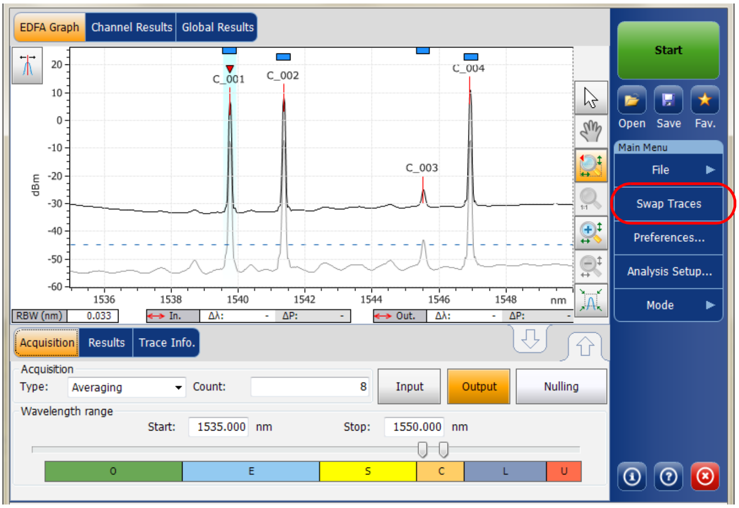
Swapping EDFA Traces

The Swap Trace feature allows you to swap EDFA input and output traces. With this feature, the input trace is replaced with the output trace and vice versa. All results are recalculated.

Note: *Swap Trace feature will not be available if there are no traces in the application.*

To swap EDFA traces:

From the **Main Menu**, press **Swap Traces**.



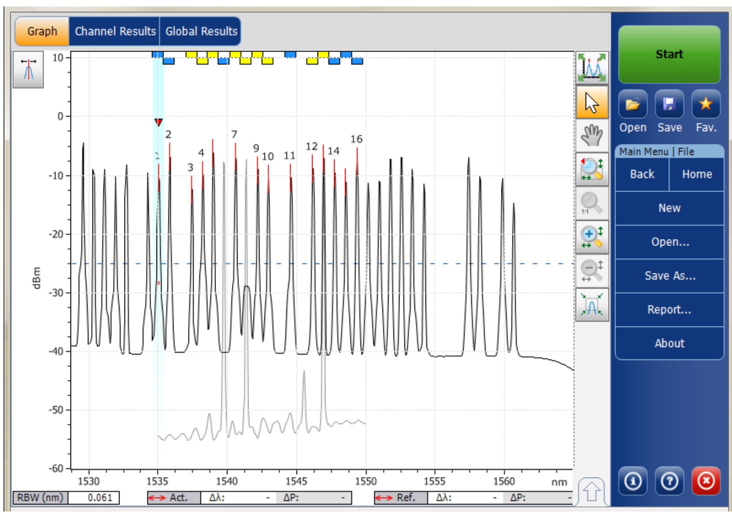
All the parameters in the application will be updated according to the modified traces.

Adjusting the Display Size

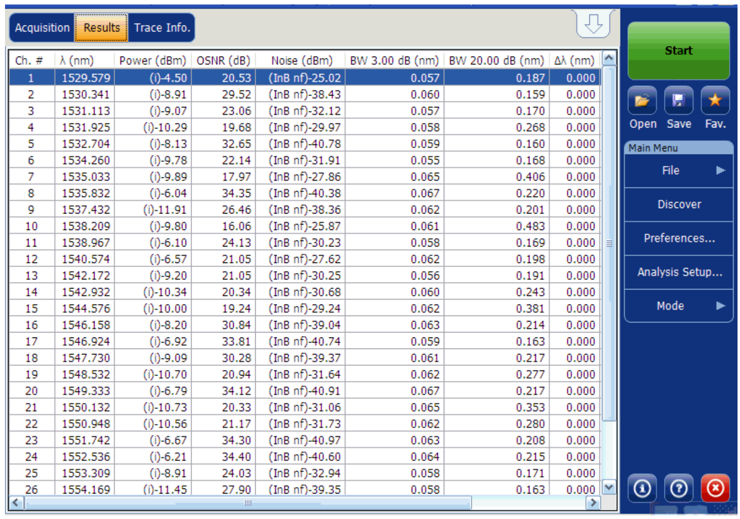
Your application allows you to toggle the view of your main window. You can change the view of the upper and lower tabs from the normal view to 100 % upper tabs or 100 % lower tabs view.

To adjust the display size:

For 100 % upper tabs view, press .



For 100 % lower tabs view, press .



Viewing WDM Graph in Full-Screen Mode

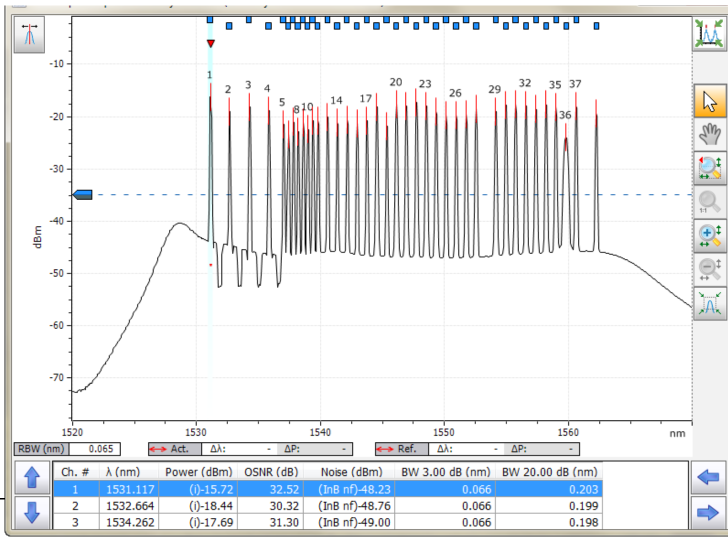
The full-screen mode allows you to see the WDM graph, including the markers, using the whole screen of your unit. It also displays three lines of results.

If you have only an active trace, the results show three channels. If you have an active trace and a reference channel, you will see the results for one channel.

To display the trace in full-screen mode:

Use the button located on the upper right-hand section of the graph.

To change channels



To view other channel results

Using Zoom Controls

Use the zoom controls to change the scale of the trace display.

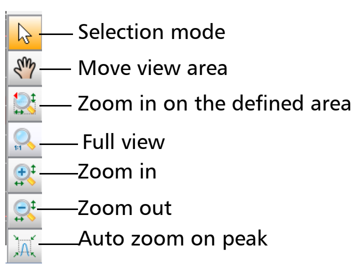
You can zoom in on or out of the graph using the corresponding buttons or let the application automatically adjust the zoom on the currently selected peak from the results table.

You can quickly zoom in on or out of a selected peak.

You can also return to the original graph value.

The application provides an automatic zoom on peak feature. When this feature is activated and you press on a row in the peak results grid, the graph will zoom and tab to show that peak covering 33 % of the graph canvas. By default, this option is deactivated.

Note: *You cannot select channels on the graph when the markers are displayed.*



Note: *You can only move the markers with the*  *button.*

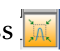
To view specific portions of the graph:

➤ You can define which portion of the graph will be visible by pressing  and dragging the graph with the stylus or your finger.

➤ You can also zoom in on a specific area by pressing  and defining the zoom area with the stylus or your finger (a rectangle with dotted lines will appear to help you define the area). Once you release the stylus, the application automatically zooms in on the graph.

➤ You can zoom in or out on the center of the portion of the graph that is displayed by using, respectively,  or  . The application automatically adjusts the zoom by 50 % and 100 % respectively.

To automatically zoom in on the selected peak:

Select the peak on the graph or in the table results and press .

To revert to the complete graph view:

Press .

Managing Markers

You can use markers to perform manual measurements and verification directly on the trace. All test modes feature two vertical markers and two horizontal markers. The vertical markers are used to indicate the power level on the trace at the wavelength or frequency it is positioned, and the horizontal markers are used for indicating power at the level they are. You can measure actual power and wavelength values of any point on the trace using the vertical markers.

Note: *Horizontal markers will be displayed only if the markers are activated in the* ***Preferences*** *tab of the related test mode.*

Each marker is identified by a letter: A and B are for vertical markers, and C and D for horizontal markers.

The application allows you to fix the distance between the markers. When this feature is activated, while moving any one marker, both markers will move at the same rate and distance.

Markers A and B in the marker toolbar act as toggle buttons to enable selection. When a marker is activated, the color of the button changes to orange and the selected marker displays a double arrow at the base of the marker in the graph tab, which means that the marker can be moved.

At this point, if you select the other vertical marker in the graph tab, the selection of the toggle switches to this marker. However, if you select the other marker button from the marker toolbar, both markers will be selected and the distance between both will be locked.

Note: *If you select a vertical marker while the horizontal markers are active, the selection will toggle to the other type of marker and vice versa.*

Note: *If you zoom into the graph, or pan within it, the markers remain in their set positions.*

You can also use the automated marker positioning to place the markers around a specific channel peak. The positions are set from the results grid, according to the following by default:

- A: set at the peak wavelength "λ Peak(nm)" or frequency "*f* peak(Thz)".
- B: set at the wavelength/frequency which corresponds to a 3 dB drop from the peak maximum power (Signal power "p" without subtracting the noise).
- C: set at the peak power (λ Peak).
- D: set at 3 dB below marker C.

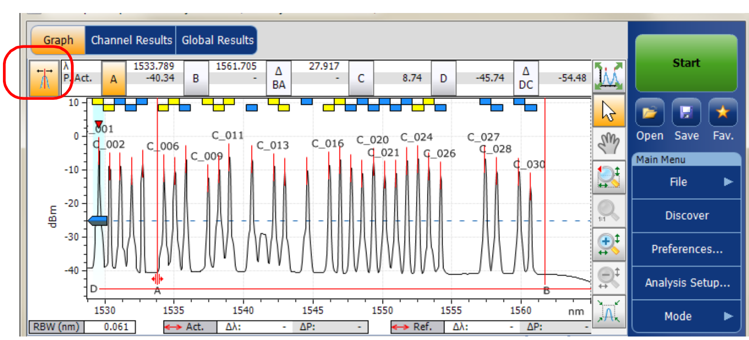
If you move one of the markers, these new settings are kept for the next use of the automated markers until you reset them or select another zoom feature.

If the channel you select does not display a signal, the markers remain in the position that they were before.

In the case of the WDM and Drift modes, the markers are placed on the active trace. In the case of EDFA testing, the markers will be on the output trace.

To display the marker toolbar:

Press the  button on the top left-hand corner of the display.

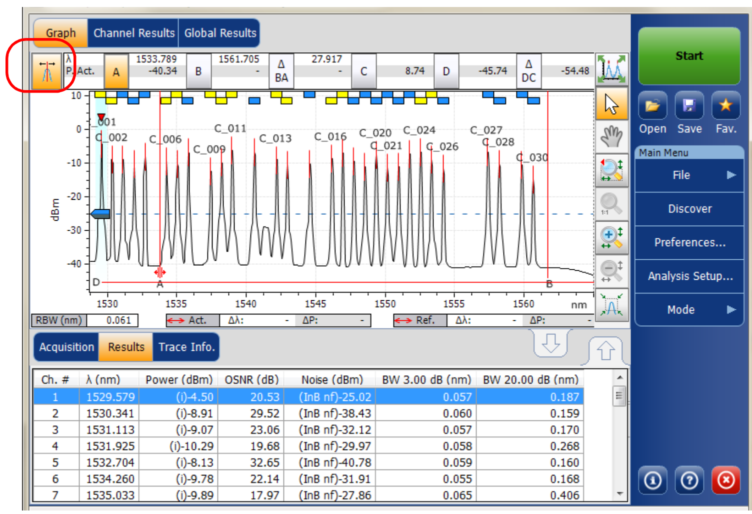


To display the automated markers:

Press the button. The focus will be done on the currently selected channel in the **Results** tab.

To manually enter a marker position value:

1. If you have not done so already, press the button on the top left-hand corner of the display to make the marker toolbar appear.



2. Set the marker by entering precise values in the box corresponding to it or by dragging it on-screen.

As markers A and B appear on the graph, the following values will be displayed in the marker toolbar.

➤ power values corresponding to the wavelength position of both markers (in the case of WDM, the active and reference values are displayed; in the case of spectral transmittance and EDFA, the input and output values are displayed).

➤ wavelength or frequency difference between the markers (A-B)

➤ power difference in dB between the markers

- integrated power between the markers in dBm (when horizontal markers are hidden)
- for WDM, spectral transmittance and EDFA modes, power difference between the traces (active against reference or input against output) for both markers in dB (when horizontal markers are hidden).

As markers C and D appear on the graph, the power difference between the markers (C-D) related to the horizontal markers will be displayed in the marker toolbar.

You can also move the markers directly on the graph tab. Drag the marker to the desired area in the display. You will notice that the corresponding box in the marker toolbar changes according to the marker's position. If you want to set a precise value for the marker, simply enter it in the box.

Note: *After using the zoom tools in the graph tab, you can only move the markers again on the graph after deactivating the zoom. Pressing the arrow in the zoom tools section will deactivate the zoom function.*

Note: *Markers A and B cannot cross. Displacing a marker over the second one will cause both markers to move together.*

Managing Trace Information

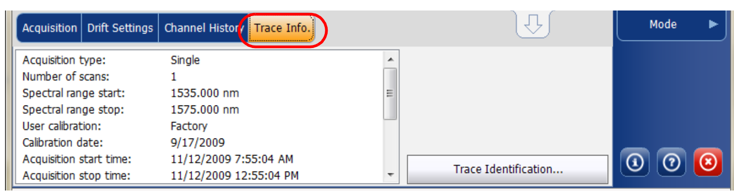
After acquiring a trace, you might want to view details about the acquisition. The **Trace Info.** tab shows information related to acquisition parameters and conditions. You can also edit information about the tested fiber and job or add comments. This information is saved along with the trace.

Note: *Trace information is available for both active and reference traces, but you can edit only the trace information pertaining to the active trace.*

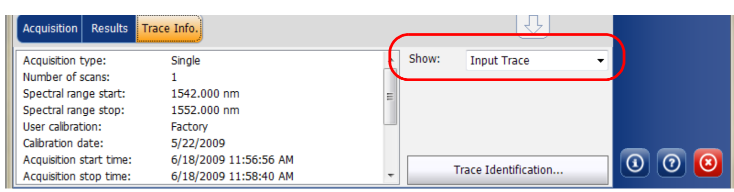
Note: *If you want to apply the settings of the* ***Trace Identification*** *window to the* ***Preferences*** *tab, select the* ***Use as template*** *option and press* ***OK****.*

To view trace information parameters:

1. From the main window, select the **Trace Info.** tab.

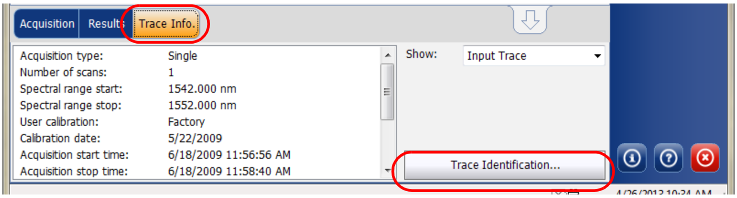


2. For some test types (WDM if there is a reference trace, spectral transmittance and EDFA), select which trace you want to view.



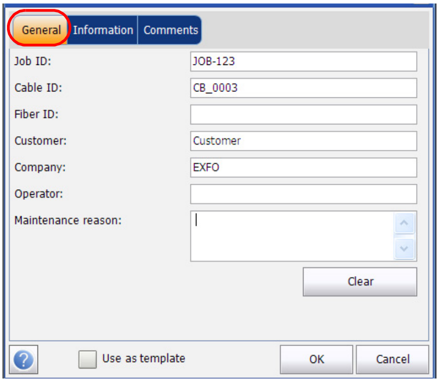
To edit general information:

1. From the main window, select the **Trace Info.** tab.
2. Press **Trace Identification**.



Note: *Trace identification is not available for the WDM reference trace.*

3. Select the **General** tab.

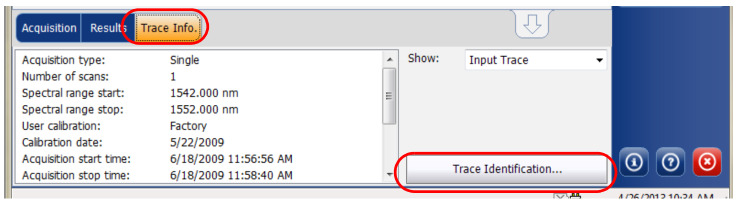


4. Edit the general information as required.
5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

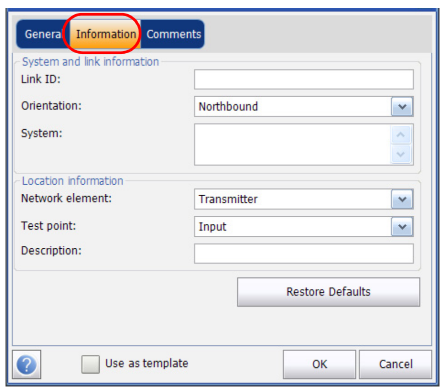
Press **Clear** to clear all the changes made in the **General** tab.

To edit trace information:

1. From the main window, select the **Trace Info.** tab.
2. Press **Trace Identification**.



3. Select the **Information** tab.

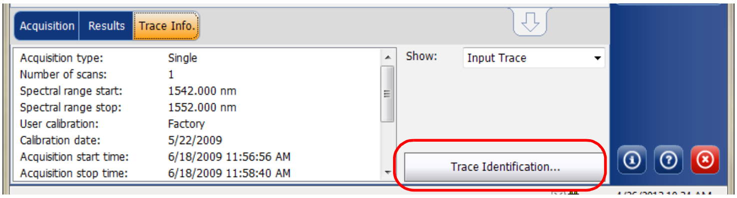


4. Edit the information as required.
5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

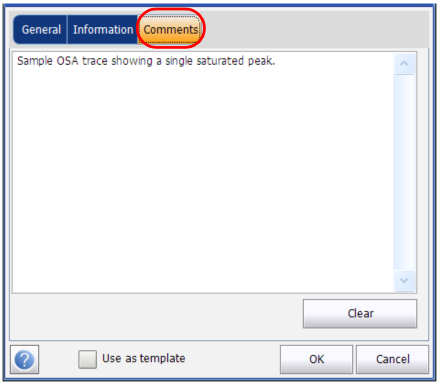
Press **Restore Defaults** to remove all the changes and apply the default values.

To edit comments:

1. From the main window, select the **Trace Info.** tab.
2. Press **Trace Identification**.



3. Select the **Comments** tab.



4. Edit comments in the **Comments** window for the current trace.
5. Press **OK** to save the changes and close the window, or press **Cancel** to exit without saving.

Press **Clear** to clear all the changes made in the **Comments** tab.

Generating Reports

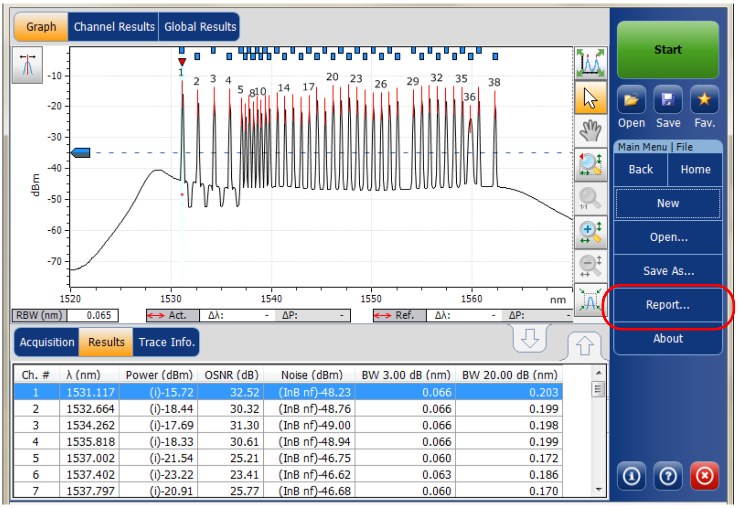
After performing any acquisition, you can generate a report for the current acquisition and save it in .html, PDF or .txt format depending on the supported file type for your test mode. The report file will include trace information, acquisition conditions and other results and details specific to each test mode.

Note: *Empty channels that are shown on screen are included in the report files.*

Note: *The .txt format report type is only available for the WDM and Drift modes.*

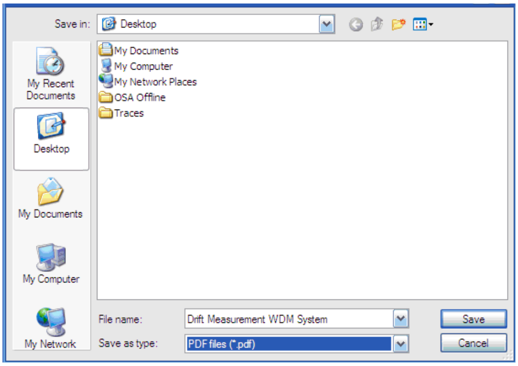
To generate a report:

1. From the **Main Menu**, select **File**.
2. Press **Report**.



3. In the **Save As** window, enter a file name.

4. From the **Save as type** list, select the format for your report.



5. Press **Save**. The report will be added to the **Reports** folder. You can change the location where you want to save the report as desired.

13 Maintenance

To help ensure long, trouble-free operation:

➤ Always inspect fiber-optic connectors before using them and clean them if necessary.

➤ Keep the unit free of dust.

➤ Clean the unit casing and front panel with a cloth slightly dampened with water.

➤ Store unit at room temperature in a clean and dry area. Keep the unit out of direct sunlight.

➤ Avoid high humidity or significant temperature fluctuations.

➤ Avoid unnecessary shocks and vibrations.

➤ If any liquids are spilled on or into the unit, turn off the power immediately, disconnect from any external power source, remove the batteries and let the unit dry completely.

WARNING

The use of controls, adjustments and procedures, namely for operation and maintenance, other than those specified herein may result in hazardous radiation exposure or impair the protection provided by this unit.

Cleaning EUI Connectors

Regular cleaning of EUI connectors will help maintain optimum performance. There is no need to disassemble the unit.

IMPORTANT

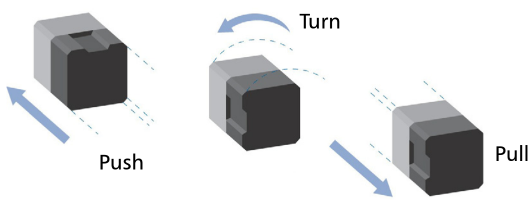
If any damage occurs to internal connectors, the module casing will have to be opened and a new calibration will be required.

WARNING

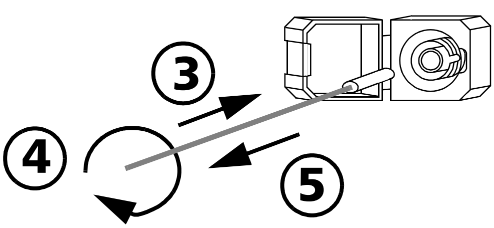
Looking into the optical connector while the light source is active WILL result in permanent eye damage. EXFO strongly recommends to TURN OFF the unit before proceeding with the cleaning procedure.

To clean EUI connectors:

1. Remove the EUI from the instrument to expose the connector baseplate and ferrule.



2. Moisten a 2.5 mm cleaning tip with *one drop* of isopropyl alcohol (alcohol may leave traces if used abundantly).
3. Slowly insert the cleaning tip into the EUI adapter until it comes out on the other side (a slow clockwise rotating movement may help).



4. Gently turn the cleaning tip one full turn, then continue to turn as you withdraw it.
5. Repeat steps 3 to 4 with a dry cleaning tip.

Note: *Make sure you don't touch the soft end of the cleaning tip.*

6. Clean the ferrule in the connector port as follows:

6a. Deposit *one drop* of isopropyl alcohol on a lint-free wiping cloth.

IMPORTANT

Isopropyl alcohol may leave residues if used abundantly or left to evaporate (about 10 seconds).

Avoid contact between the tip of the bottle and the wiping cloth, and dry the surface quickly.

6b. Gently wipe the connector and ferrule.

6c. With a dry lint-free wiping cloth, gently wipe the same surfaces to ensure that the connector and ferrule are perfectly dry.

6d. Verify connector surface with a portable fiber-optic microscope (for example, EXFO’s FOMS) or fiber inspection probe (for example, EXFO’s FIP).

7. Put the EUI back onto the instrument (push and turn clockwise).

8. Throw out cleaning tips and wiping cloths after one use.

Recalibrating the Unit

EXFO manufacturing and service center calibrations are based on the ISO/IEC 17025 standard (*General Requirements for the Competence of Testing and Calibration Laboratories*). This standard states that calibration documents must not contain a calibration interval and that the user is responsible for determining the re-calibration date according to the actual use of the instrument.

The validity of specifications depends on operating conditions. For example, the calibration validity period can be longer or shorter depending on the intensity of use, environmental conditions and unit maintenance, as well as the specific requirements for your application. All of these elements must be taken into consideration when determining the appropriate calibration interval of this particular EXFO unit.

Under normal use, the recommended interval for your FTB-5240S/S-P/BP Optical Spectrum Analyzer is: one year.

For newly delivered units, EXFO has determined that the storage of this product for up to six months between calibration and shipment does not affect its performance (EXFO Policy PL-03).

To help you with calibration follow-up, EXFO provides a special calibration label that complies with the ISO/IEC 17025 standard and indicates the unit calibration date and provides space to indicate the due date. Unless you have already established a specific calibration interval based on your own empirical data and requirements, EXFO would recommend that the next calibration date be established according to the following equation:

Next calibration date = Date of first usage (if less than six months after the calibration date) + Recommended calibration period (one year)

To ensure that your unit conforms to the published specifications, calibration may be carried out at an EXFO service center or, depending on the product, at one of EXFO's certified service centers. Calibrations at EXFO are performed using standards traceable to national metrology institutes.

Note: *You may have purchased a FlexCare plan that covers calibrations. See the Service and Repairs section of this user documentation for more information on how to contact the service centers and to see if your plan qualifies.*

Recycling and Disposal (Applies to European Union Only)

For complete recycling/disposal information as per European Directive WEEE 2012/19/UE, visit the EXFO Web site at www.exfo.com/recycle.

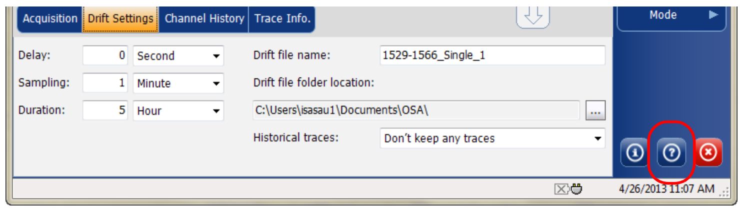
14 Troubleshooting

Viewing Online Documentation

In addition to the online help available from the application, you will also find a printable PDF version on your installation DVD.

To access online help:

At the bottom of the **Main Menu**, tap .



Contacting the Technical Support Group

To obtain after-sales service or technical support for this product, contact EXFO at one of the following numbers. The Technical Support Group is available to take your calls from Monday to Friday, 8:00 a.m. to 7:00 p.m. (Eastern Time in North America).

Technical Support Group
400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

1 866 683-0155 (USA and Canada)
Tel.: 1 418 683-5498
Fax: 1 418 683-9224
support@exfo.com

For detailed information about technical support, and for a list of other worldwide locations, visit the EXFO Web site at www.exfo.com.

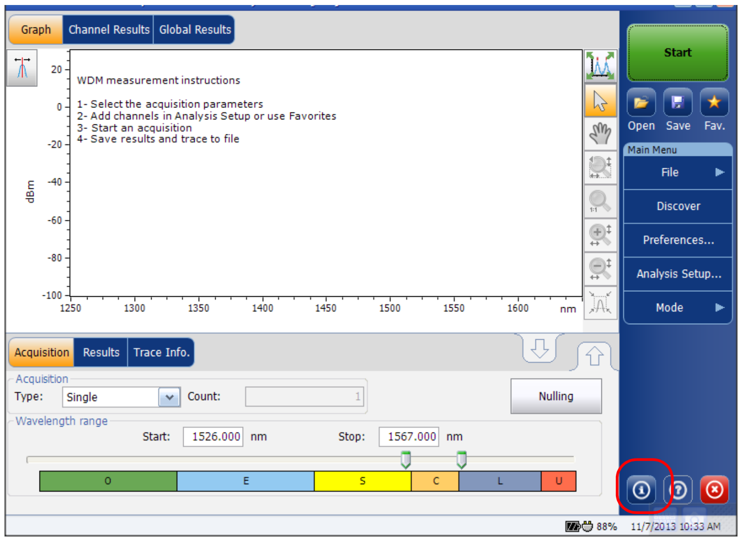
If you have comments or suggestions about this user documentation, you can send them to customer.feedback.manual@exfo.com.

To accelerate the process, please have information such as the name and the serial number (see the product identification label), as well as a description of your problem, close at hand.

You may also be requested to provide software and module version numbers. This information, as well as technical support contact information, can be found in the **About** window.

To view the information about the product:

From the **Main Menu**, press .



Transportation

Maintain a temperature range within specifications when transporting the unit. Transportation damage can occur from improper handling. The following steps are recommended to minimize the possibility of damage:

- Pack the unit in its original packing material when shipping.
- Avoid high humidity or large temperature fluctuations.
- Keep the unit out of direct sunlight.
- Avoid unnecessary shocks and vibrations.

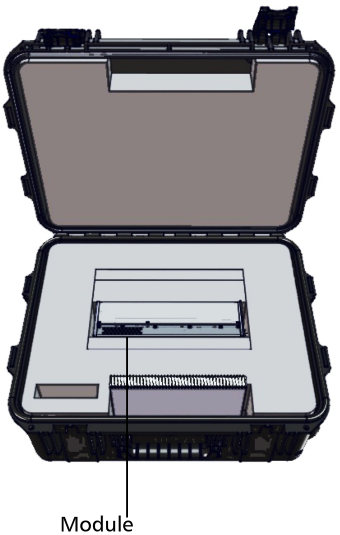
IMPORTANT

Keep this information close at hand, as it contains important details about your product.

CAUTION

- **Always use the GP-10-055 case when transporting the FTB-5240S module, and the GP-10-091 case when transporting the FTB-5240BP module. EXFO does not recommend transporting the modules in a platform and/or in a case other than the one designed for your specific module.**
- **Handle the case with care when transporting the module.**
- **Please follow these guidelines. Modules damaged from rough handling during transport or shipment are not covered by any EXFO warranty.**

The following images show the GP-10-055 and the GP-10-091 cases with their respective modules inside.



GP-10-091 case

GP-10-055 case

15 Warranty

General Information

EXFO Inc. (EXFO) warrants this equipment against defects in material and workmanship for a period of one year from the date of original shipment. EXFO also warrants that this equipment will meet applicable specifications under normal use.

During the warranty period, EXFO will, at its discretion, repair, replace, or issue credit for any defective product, as well as verify and adjust the product free of charge should the equipment need to be repaired or if the original calibration is erroneous. If the equipment is sent back for verification of calibration during the warranty period and found to meet all published specifications, EXFO will charge standard calibration fees.

IMPORTANT

The warranty can become null and void if:

- **unit has been tampered with, repaired, or worked upon by unauthorized individuals or non-EXFO personnel.**
- **warranty sticker has been removed.**
- **case screws, other than those specified in this guide, have been removed.**
- **case has been opened, other than as explained in this guide.**
- **unit serial number has been altered, erased, or removed.**
- **unit has been misused, neglected, or damaged by accident.**

THIS WARRANTY IS IN LIEU OF ALL OTHER WARRANTIES EXPRESSED, IMPLIED, OR STATUTORY, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE. IN NO EVENT SHALL EXFO BE LIABLE FOR SPECIAL, INCIDENTAL, OR CONSEQUENTIAL DAMAGES.

Liability

EXFO shall not be liable for damages resulting from the use of the product, nor shall be responsible for any failure in the performance of other items to which the product is connected or the operation of any system of which the product may be a part.

EXFO shall not be liable for damages resulting from improper usage or unauthorized modification of the product, its accompanying accessories and software.

Exclusions

EXFO reserves the right to make changes in the design or construction of any of its products at any time without incurring obligation to make any changes whatsoever on units purchased. Accessories, including but not limited to fuses, pilot lamps, batteries and universal interfaces (EUI) used with EXFO products are not covered by this warranty.

This warranty excludes failure resulting from: improper use or installation, normal wear and tear, accident, abuse, neglect, fire, water, lightning or other acts of nature, causes external to the product or other factors beyond the control of EXFO.

IMPORTANT

In the case of products equipped with optical connectors, EXFO will charge a fee for replacing connectors that were damaged due to misuse or bad cleaning.

Certification

EXFO certifies that this equipment met its published specifications at the time of shipment from the factory.

Service and Repairs

EXFO commits to providing product service and repair for five years following the date of purchase.

To send any equipment for service or repair:

1. Call one of EXFO's authorized service centers (see *EXFO Service Centers Worldwide* on page 337). Support personnel will determine if the equipment requires service, repair, or calibration.
2. If equipment must be returned to EXFO or an authorized service center, support personnel will issue a Return Merchandise Authorization (RMA) number and provide an address for return.
3. If possible, back up your data before sending the unit for repair.
4. Pack the equipment in its original shipping material. Be sure to include a statement or report fully detailing the defect and the conditions under which it was observed.
5. Return the equipment, prepaid, to the address given to you by support personnel. Be sure to write the RMA number on the shipping slip. *EXFO will refuse and return any package that does not bear an RMA number.*

Note: *A test setup fee will apply to any returned unit that, after test, is found to meet the applicable specifications.*

After repair, the equipment will be returned with a repair report. If the equipment is not under warranty, you will be invoiced for the cost appearing on this report. EXFO will pay return-to-customer shipping costs for equipment under warranty. Shipping insurance is at your expense.

Routine recalibration is not included in any of the warranty plans. Since calibrations/verifications are not covered by the basic or extended warranties, you may elect to purchase FlexCare Calibration/Verification Packages for a definite period of time. Contact an authorized service center (see *EXFO Service Centers Worldwide* on page 337).

EXFO Service Centers Worldwide

If your product requires servicing, contact your nearest authorized service center.

EXFO Headquarters Service Center
400 Godin Avenue
Quebec (Quebec) G1M 2K2
CANADA

1 866 683-0155 (USA and Canada)
Tel.: 1 418 683-5498
Fax: 1 418 683-9224
support@exfo.com

EXFO Europe Service Center
Winchester House, School Lane
Chandlers Ford, Hampshire S053 4DG
ENGLAND

Tel.: +44 2380 246800
Fax: +44 2380 246801
support.europe@exfo.com

EXFO Telecom Equipment (Shenzhen) Ltd.
3rd Floor, Building 10,
Yu Sheng Industrial Park (Gu Shu Crossing), No. 467,
National Highway 107,
Xixiang, Bao An District,
Shenzhen, China, 518126

Tel: +86 (755) 2955 3100
Fax: +86 (755) 2955 3101
support.asia@exfo.com

A Technical Specifications

IMPORTANT

The following technical specifications can change without notice. The information presented in this section is provided as a reference only. To obtain this product's most recent technical specifications, visit the EXFO Web site at *www.exfo.com*.

SPECTRAL MEASUREMENT	FTB-5240S and FTB-5240S-P	FTB-5240BP
Wavelength range (nm)	1250 to 1650	1250 to 1650
Wavelength uncertainty (nm) [b]	±0.05 ±0.01 [c, d]	±0.03 ±0.01 [c, d]
Reference	Internal [e]	Internal
Resolution bandwidth (FWHM) (nm) [f]	0.065 [b, d]	0.033 [b, d]
Wavelength linearity (nm)	±0.01 [b, d]	±0.01 [b, d]
Wavelength repeatability 2σ (nm)	±0.003 [g]	±0.002 [g]

POWER MEASUREMENT	FTB-5240S and FTB-5240S-P	FTB-5240BP	HPW Option
Dynamic range (dBm) (per channel) [b]	−80 [h] to +18	−80 [h] to +18	−70 [h] to +23
Maximum total safe power (dBm)	+23	+23	+29
Absolute power uncertainty (dB) [i]	±0.5	±0.5	±0.5
Power repeatability 2σ (dB) [d, g]	±0.05	±0.04	±0.05

OPTICAL MEASUREMENT	FTB-5240S and FTB-5240S-P	FTB-5240BP	HPW Option
Optical rejection ratio at 1550 nm (dB) at 0.2 nm (25 GHz) at 0.4 nm (50 GHz)	 35 (40 typical) 45 (50 typical)	 45 (50 typical) 50 (55 typical)	 35 (40 typical) 45 (50 typical)
Channel spacing	25 to 200 GHz CWDM	12.5 to 200 GHz CWDM	25 to 200 GHz CWDM
PDL at 1550 nm (dB)	±0.08 [d]	±0.06 [d]	
ORL (dB)	≥40	≥40	
Measurement time (s) [d, j] (includes scanning, analysis and display)	<1 (with the FTB-500 Platform)	<1 (with the FTB-500 Platform)	

IN-BAND OSNR MEASUREMENT [d, k]

	FTB-5240S-P only	FTB-5240BP
OSNR dynamic range (dB)	>35 [l]	>35 [l]
OSNR measurement uncertainty (dB)	±0.5 [m]	±0.5 [m]
Repeatability (dB)	±0.2 [n]	±0.2 [n]
Data signals	Up to 100 Gbit/s [o]	Up to 100 Gbit/s [o]
Measurement time (s) [d, j] (includes scanning, analysis and display)	<6 (eight scans)	<6 (eight scans)
Analysis modes	WDM, EDFA, drift, spectral transmittance, DFB, BP	WDM, EDFA, drift, spectral transmittance, DFB

POL-MUX OSNR MEASUREMENT

	Commissioning assistant
Modulation formats	Any, including Pol-Mux formats DP-QPSK and DP-BPSK
Data signals	Up to 400 Gbit/s
Measurements time [d, p]	1 minute and 20 seconds (100 scans) for trace with all channels on. <5 seconds for traces with a single channel off.

Notes

a. All specifications are for a temperature of 23 °C ± 2 °C with an FC/UPC connector unless otherwise specified, after warm-up.
b. From 1520 to 1610 nm.
c. After user calibration in the same test session within 10 nm from each calibration point.
d. Typical.
e. Integrated and wavelength-independent self-adjustment.
f. Full width at half maximum.
g. Over one minute in continuous acquisition mode.
j. 45 nm span, full resolution, 20 peak analysis.
k. In-band OSNR measurement performed with 64 scans.
l. For an optical noise level of > −60 dBm.
m. With PMD ≤15 ps and no crosstalk, uncertainty specification is valid for OSNR ≤ 25 dB. With PMD ≤15 ps and crosstalk, uncertainty specification is valid for OSNR ≤ 20 dB.
n. Repeatability specification is valid for OSNR ≤ 25 dB.
o. Except for Pol-Mux and fast polarization scrambled signals.
p. 1525 nm to 1570 nm.

GENERAL SPECIFICATIONS

Temperature	operating storage	0 °C to 40 °C (32 °F to 104 °F) −20 °C to 50 °C (−4 °F to 120 °F)
Relative humidity		0 % to 95 % noncondensing
Battery life (hours)		5 (with the FTB-500 Platform)
Connectors		EI (EXFO UPC Universal Interface) EA (EXFO APC Universal Interface)
Size (H x W x D)	FTB-5240S module FTB-5240BP module	96 mm x 51 mm x 260 mm (3 ¾ in x 2 in x 10 ¼ in) 96 mm x 76 mm x 260 mm (3 ¾ in x 3 in x 10 ¼ in)
Weight	FTB-5240S module FTB-5240BP module	1. 5 kg (3.3 lb) 1.7 kg (3.8 lb)

SELECTION GUIDE

OSA Module	CWDM	DWDM (100 GHz spacing)	DWDM (50 GHz spacing)	ROADM + 40 Gbit/s network
FTB-5240S	X	X	X	
FTB-5240S-P	X	X	X	X
FTB-5240BP	X	X	X	X

B SCPI Command Reference

This appendix presents detailed information on the commands and queries supplied with your FTB-5240S/S-P/BP Optical Spectrum Analyzer.

IMPORTANT

Since the FTB-500 can house many instruments, you must explicitly specify which instrument you want to remotely control.

You must add the following mnemonic *at the beginning of any command or query* that you send to an instrument:

LINStrument<LogicalInstrumentPos>:

where *<LogicalInstrumentPos>* corresponds to the identification number of the instrument.

FTB-500 backplane identification number

1Y

Instrument slot number:
4-slot backplane: 0 to 3;
8-slot backplane: 0 to 7

For information on modifying unit identification, refer to your platform user guide.

Quick Reference Command Tree

<table>
<tr><th colspan="7">Command</th><th>Parameter(s)</th><th>P.</th></tr>
<tr><td>ABORt</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>349</td></tr>
<tr><td>CALCulate[1..n]</td><td>[WDM]</td><td>BANDwidth[1|2]|BWIDth[1|2]</td><td>RelativeLEVel</td><td></td><td></td><td></td><td><PowerLevel[<wsp>DB|W/W|PCT]>|MAXimum|MINimum|DEFault</td><td>350</td></tr>
<tr><td></td><td></td><td></td><td>RelativeLEVel?</td><td></td><td></td><td></td><td>[MAXimum|MINimum|DEFault]</td><td>352</td></tr>
<tr><td></td><td></td><td>CHANnel</td><td>AUTO</td><td></td><td></td><td></td><td><Auto></td><td>354</td></tr>
<tr><td></td><td></td><td></td><td>AUTO?</td><td></td><td></td><td></td><td></td><td>355</td></tr>
<tr><td></td><td></td><td></td><td>AUTO</td><td>CENTer</td><td>ITUGrid</td><td></td><td><Auto></td><td>356</td></tr>
</table>

Command							Parameter(s)	P.
					ITUGrid?			358
				NOISe	AUTO		<Auto>	359
					AUTO?			361
					DISTance	FREQuency	<Distance[<wsp>HZ]>|MAXimum|MINimum|DEFault	362
					DISTance	FREQuency?	[MAXimum|MINimum|DEFault]	364
					DISTance	[WAVelength]	<Distance[<wsp>M]>|MAXimum|MINimum|DEFault	366
					DISTance	[WAVelength]?	[MAXimum|MINimum|DEFault]	368
					WIDTh	FREQency	<Width[<wsp>HZ]>|MAXimum|MINimum|DEFault	370
					WIDTh	FREQency?	[MAXimum|MINimum|DEFault]	372
					WIDTh	[WAVelength]	<Width[<wsp>M]>|MAXimum|MINimum|DEFault	374
					WIDTh	[WAVelength]?	[MAXimum|MINimum|DEFault]	377
					TYPE		IEC|INBand|INBandNarrowfilter|POLYnomial5	379
					TYPE?			381
				SIGnalPower	TYPE		IPOWer|PPOWer|TPOWer	383
					TYPE?			385
				WIDTh	FREQuency		<Width[<wsp>HZ]>|MAXimum|MINimum|DEFault	387
					FREQuency?		[MAXimum|MINimum|DEFault]	389
					[WAVelength]		<Width[<wsp>M]>|MAXimum|MINimum|DEFault	391
					[WAVelength]?		[MAXimum|MINimum|DEFault]	393
			CATalog?					395

Command							Parameter(s)	P.
			COUNt?					397
			[DEFine]				<Name>,<Define[<wsp>M|HZ]>|MAXimum|MINimum	398
			[DEFine]?				<Name>	401
			DELete	[NAME]			<Name>	403
				ALL				404
			CENTer	FREQuency			<Center[<wsp>HZ]>|MAXimum|MINimum|DEFault	405
				FREQuency?			[MAXimum|MINimum|DEFault]	407
				[WAVelength]			<Center[<wsp>M]>|MAXimum|MINimum|DEFault	409
				[WAVelength]?			[MAXimum|MINimum|DEFault]	411
			WIDTh	FREQuency			<Width[<wsp>HZ]>|MAXimum|MINimum|DEFault	413
				FREQuency?			[MAXimum|MINimum|DEFault]	415
				[WAVelength]			<Width[<wsp>M]>|MAXimum|MINimum|DEFault	417
				[WAVelength]?			[MAXimum|MINimum|DEFault]	419
			NOISe	AUTO			<Auto>	421
				AUTO?				423
				DISTance	FREQuency		<Distance[<wsp>HZ]>|MAXimum|MINimum|DEFault	425
					FREQuency?		[MAXimum|MINimum|DEFault]	427
					[WAVelength]		<Distance[<wsp>M]>|MAXimum|MINimum|DEFault	429
					[WAVelength]?		[MAXimum|MINimum|DEFault]	431

Command							Parameter(s)	P.
				WIDTh	FREQuency		<Width[<wsp>HZ]>|MAXimum|MINimum|DEFault	433
					FREQuency?		[MAXimum|MINimum|DEFault]	435
					[WAVelength]		<Width[<wsp>M]>|MAXimum|MINimum|DEFault	437
					[WAVelength]?		[MAXimum|MINimum|DEFault]	440
				TYPE			IEC|INBand|INBandNarrowfilter|POLYnomial5	442
				TYPE?				444
			NSELect				<Select>|MAXimum|MINimum	446
			NSELect?					448
			SELect				<Select>	449
			SELect?					450
			SIGnalPower	TYPE			IPOWer|PPOWer|TPOWer	451
				TYPE?				453
		DATA	CHANnel	BANDwidth[1|2]|BWIDth[1|2]	FREQuency?			455
					RelativeLEVel?			457
					[WAVelength]?			459
				CATalog?				461
				COUNt?				463
				CENTer	FREQuency?			465
					[WAVelength]?			467
				CenterMASs	FREQuency?			469
					[WAVelength]?			471
				CenterPEAk	FREQuency?			473

Command							Parameter(s)	P.
					[WAVelength]?			475
				ENBW?				477
				NOISe?				479
				NOISe	AUTO?			481
					TYPE?			483
				OSNR?				485
				NSELect			<Select>|MAXimum|MINimum	487
				NSELect?				489
				SELect			<Select>	490
				SELect?				491
				SIGnalPower?				493
				SIGnalPower	TYPE?			495
				STATus	QUEStionable	BIT<9|10|11>		497
			OSNR	FLATness?				498
				MEAN?				499
			SIGnalPower	FLATness?				500
				MEAN?				501
			TPOWer?					502
		OSNR	BANDwidth|BWIDth	[RESolution]			<Resolution[<wsp>M]>|MAXimum|MINimum|DEFault	503
				[RESolution]?			[MAXimum|MINimum|DEFault]	505
				[RESolution]	AUTO		<Auto>	507
					AUTO?			509
		STATe					<Auto>	510

<table>
<tr><th colspan="7">Command</th><th>Parameter(s)</th><th>P.</th></tr>
<tr><td></td><td></td><td>STATe?</td><td></td><td></td><td></td><td></td><td></td><td>511</td></tr>
<tr><td></td><td></td><td>THReshold</td><td></td><td></td><td></td><td></td><td><Threshold[<wsp>DBM|W]>|MAXimum|MINimum|DEFault</td><td>512</td></tr>
<tr><td></td><td></td><td>THReshold?</td><td></td><td></td><td></td><td></td><td>[MAXimum|MINimum|DEFault]</td><td>514</td></tr>
<tr><td>CALibration[1..n]</td><td>DATE?</td><td></td><td></td><td></td><td></td><td></td><td></td><td>516</td></tr>
<tr><td></td><td>POWer</td><td>DATE?</td><td></td><td></td><td></td><td></td><td></td><td>517</td></tr>
<tr><td></td><td>WAVelength</td><td>DATE?</td><td></td><td></td><td></td><td></td><td></td><td>518</td></tr>
<tr><td></td><td>ZERO</td><td>[AUTO]</td><td></td><td></td><td></td><td></td><td><Auto>|ON|OFF|ONCE</td><td>519</td></tr>
<tr><td></td><td></td><td>[AUTO]?</td><td></td><td></td><td></td><td></td><td></td><td>521</td></tr>
<tr><td>INITiate</td><td>CONTinuous</td><td></td><td></td><td></td><td></td><td></td><td><Continuous></td><td>522</td></tr>
<tr><td></td><td>CONTinuous?</td><td></td><td></td><td></td><td></td><td></td><td></td><td>525</td></tr>
<tr><td></td><td>[IMMediate]</td><td></td><td></td><td></td><td></td><td></td><td></td><td>526</td></tr>
<tr><td>MEMory</td><td>TABLe</td><td>DATA?</td><td></td><td></td><td></td><td></td><td><TableName></td><td>528</td></tr>
<tr><td></td><td></td><td>DEFine</td><td></td><td></td><td></td><td></td><td><ColumnName></td><td>530</td></tr>
<tr><td></td><td></td><td>DEFine?</td><td></td><td></td><td></td><td></td><td></td><td>532</td></tr>
<tr><td></td><td></td><td>SELect</td><td></td><td></td><td></td><td></td><td><TableName></td><td>533</td></tr>
<tr><td></td><td></td><td>SELect?</td><td></td><td></td><td></td><td></td><td></td><td>534</td></tr>
<tr><td></td><td></td><td>POINt?</td><td></td><td></td><td></td><td></td><td><TableName></td><td>535</td></tr>
<tr><td>MMEMory</td><td>STORe</td><td>MEASurement</td><td>[WDM]</td><td></td><td></td><td></td><td><FileName></td><td>536</td></tr>
<tr><td>SENSe[1..n]</td><td>AVERage</td><td>COUNt</td><td></td><td></td><td></td><td></td><td><Count>|MAXimum|MINimum|DEFault</td><td>538</td></tr>
<tr><td></td><td></td><td>COUNt?</td><td></td><td></td><td></td><td></td><td>[MAXimum|MINimum|DEFault]</td><td>540</td></tr>
<tr><td></td><td></td><td>STATe</td><td></td><td></td><td></td><td></td><td><State></td><td>542</td></tr>
</table>

<table>
<tr><th colspan="7">Command</th><th>Parameter(s)</th><th>P.</th></tr>
<tr><td></td><td></td><td>STATe?</td><td></td><td></td><td></td><td></td><td></td><td>543</td></tr>
<tr><td></td><td></td><td>TYPE</td><td></td><td></td><td></td><td></td><td>SCALar|PolarizationMinMaxHold</td><td>544</td></tr>
<tr><td></td><td></td><td>TYPE?</td><td></td><td></td><td></td><td></td><td></td><td>546</td></tr>
<tr><td></td><td>CORRection</td><td>OFFSet</td><td>[MAGNitude]</td><td></td><td></td><td></td><td><Offset[<wsp>DB|W/W|PCT]>|MAXimum|MINimum|DEFault</td><td>547</td></tr>
<tr><td></td><td></td><td></td><td>[MAGNitude]?</td><td></td><td></td><td></td><td>[MAXimum|MINimum|DEFault]</td><td>549</td></tr>
<tr><td></td><td>FREQuency</td><td>STARt</td><td></td><td></td><td></td><td></td><td><Start[<wsp>HZ]>|MAXimum|MINimum|DEFault</td><td>551</td></tr>
<tr><td></td><td></td><td>STARt?</td><td></td><td></td><td></td><td></td><td>[MAXimum|MINimum|DEFault]</td><td>553</td></tr>
<tr><td></td><td></td><td>STOP</td><td></td><td></td><td></td><td></td><td><Stop[<wsp>HZ]>|MAXimum|MINimum|DEFault</td><td>555</td></tr>
<tr><td></td><td></td><td>STOP?</td><td></td><td></td><td></td><td></td><td>[MAXimum|MINimum|DEFault]</td><td>557</td></tr>
<tr><td></td><td>[WAVelength]</td><td>OFFSet</td><td></td><td></td><td></td><td></td><td><Offset[<wsp>M]>|MAXimum|MINimum|DEFault</td><td>559</td></tr>
<tr><td></td><td></td><td>OFFSet?</td><td></td><td></td><td></td><td></td><td>[MAXimum|MINimum|DEFault]</td><td>561</td></tr>
<tr><td></td><td></td><td>STARt</td><td></td><td></td><td></td><td></td><td><Start[<wsp>M]>|MAXimum|MINimum|DEFault</td><td>563</td></tr>
<tr><td></td><td></td><td>STARt?</td><td></td><td></td><td></td><td></td><td>[MAXimum|MINimum|DEFault]</td><td>565</td></tr>
<tr><td></td><td></td><td>STOP</td><td></td><td></td><td></td><td></td><td><Stop[<wsp>M]>|MAXimum|MINimum|DEFault</td><td>567</td></tr>
<tr><td></td><td></td><td>STOP?</td><td></td><td></td><td></td><td></td><td>[MAXimum|MINimum|DEFault]</td><td>569</td></tr>
<tr><td>SNUMber?</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>571</td></tr>
<tr><td>STATus?</td><td></td><td></td><td></td><td></td><td></td><td></td><td></td><td>572</td></tr>
<tr><td>STATus</td><td>OPERation</td><td>BIT<8|9></td><td>CONDition?</td><td></td><td></td><td></td><td></td><td>573</td></tr>
<tr><td>TRACe</td><td>BANDwidth|BWIDth</td><td>RESolution?</td><td></td><td></td><td></td><td></td><td><TraceName></td><td>575</td></tr>
<tr><td></td><td>[DATA]</td><td>X</td><td>STARt</td><td>[WAVElength]?</td><td></td><td></td><td><TraceName></td><td>576</td></tr>
</table>

Command							Parameter(s)	P.
			STOP	[WAVElength]?			<TraceName>	578
		[Y]	[WAVElength]?				<TraceName>	580
	FEED	CONTrol					<TraceName>,ALWays|NEXT|NEVer	583
		CONTrol?					<TraceName>	585
	POINts?						<TraceName>	587
TRIGger[1..n]	[SEQuence]	SOURce					IMMediate|TIMer	589
		SOURce?						590
UNIT[1..n]	POWer						DBM|W	591
	POWer?							593
	RATio						DB|W/W|PCT	594
	RATio?							595
	SPECtrum						M|HZ	596
	SPECtrum?							597

Product-Specific Commands—Description

:ABORt

Description	This command resets the trigger system and places all trigger sequences in the IDLE state. Any trace acquisition that is in progress is aborted as quickly as possible. The command is not completed until the trigger sequence is in the IDLE state. This command is an event and has no associated *RST condition or query form.
Syntax	:ABORt
Parameter(s)	None
Example(s)	ABOR
Notes	A call to ABORt only returns once acquisition is completely stopped and instrument is ready for new commands. For this reason, execution of this command may take a few seconds. For a continuously initiated acquisition (INIT:CONT ON), calling ABORt will automatically set it to OFF.
See Also	:INITiate[:IMMediate] :INITiate:CONTinuous :STATus :STATus:OPERation:BIT<8|9>:CONDition?

:CALCulate[1..n][:WDM]: BANDwidth[1|2]|BWIDth[1|2]: RelativeLEVel

Description	This command sets WDM analysis bandwidth position for all channels to a specific value. Bandwidth position value is the power level relative to peak maximum where signal bandwidth of a channel is computed. At *RST, this value is set to 3.0 dB for bandwidth1 and 20.0 dB for bandwidth2.
Syntax	:CALCulate[1..n][:WDM]:BANDwidth[1|2]|BWIDth[1|2]:RelativeLEVel<wsp><PowerLevel[<wsp>DB|W/W|PCT]>|MAXimum|MINimum|DEFault
Parameter(s)	*PowerLevel:* The program data syntax for <PowerLevel> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> elements are: DB|W/W|PCT. The <PowerLevel> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value.

:CALCulate[1..n][:WDM]:BANDwidth[1|2]|BWIDth[1|2]:RelativeLEVel

DEFault allows the instrument to select a value for the <PowerLevel> parameter.

The <PowerLevel> parameter corresponds to a valid bandwidth position value.

The CALCulate[1..n]:BANDwidth? MIN and CALCulate[1..n]:BANDwidth? MAX queries can be used to determine valid bandwidth position range.

Example(s)

UNIT:RAT DB
CALC:BWID2:RLEV 10.55 DB
CALC:BWID2:RLEV? Returns: 1.055000E+001
CALC:WDM:BAND2:RLEV DEF
CALC:WDM:BAND2:RLEV? Returns: 2.000000E+001

Notes

Bandwidth1 position cannot be changed: it is always set at 3.0 dB.

See Also

:CALCulate[1..n][:WDM]:BWIDth[1|2]|BANDwidth[1|2]:RelativeLEVel?
:CALCulate[1..n][:WDM]:OSNR:BWIDth|BANDwidth[:RESolution]
:CALCulate[1..n][:WDM]:OSNR:BWIDth|BANDwidth[:RESolution]:AUTO

:CALCulate[1..n][:WDM]:THReshold

:CALCulate[1..n][:WDM]: BANDwidth[1|2]|BWIDth[1|2]: RelativeLEVel?

Description	This query returns a value indicating either the current or the minimum/maximum channel bandwidth position setting for WDM analysis. At *RST, this value is set to 3.0 dB for bandwidth1 and 20.0 dB for bandwidth2.
Syntax	:CALCulate[1..n][:WDM]:BANDwidth[1|2]|BWIDth[1|2]:RelativeLEVel?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<PowerLevel>

:CALCulate[1..n][:WDM]:BANDwidth[1|2]|BWIDth[1|2]:RelativeLEVel?

Response(s)	*PowerLevel:* The response data syntax for <PowerLevel> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <PowerLevel> response corresponds to either the current or the MINimum/MAXimum bandwidth position value.
Example(s)	UNIT:RAT DB CALC:BAND2:RLEV? MAX Returns: bandwidth2 position maximum valid value. CALC:BAND2:RLEV 5.00 DB CALC:WDM:BWID2:RLEV? Returns: 5.000000E+000 CALC:WDM:BWID1:RLEV? Returns: 3.000000E+000
See Also	:CALCulate[1..n][:WDM]:BWIDth[1|2]|BANDwidth[1|2]:RelativeLEVel

:CALCulate[1..n][:WDM]:CHANnel:AUTO

Description	This command controls the state of the WDM analysis default channel (enabled or diabled). At *RST, the state of the default channel is set to on (enabled).
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO<wsp> <Auto>
Parameter(s)	*Auto:* The program data syntax for <Auto> is defined as a <Boolean Program Data> element. The <Auto> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0. The <Auto> parameter corresponds to the new state of the default channel. 0 or OFF: disable default channel. 1 or ON: enable default channel.
Example(s)	CALC:WDM:CHAN:AUTO ON CALC:WDM:CHAN:AUTO? Returns: 1 (default channel is enabled)
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO? :CALCulate[1..n][:WDM]:CHANnel:CATalog? :CALCulate[1..n][:WDM]:CHANnel[:DEFine] :CALCulate[1..n][:WDM]:DATA:CHANnel:CATalo g?

:CALCulate[1..n][:WDM]:CHANnel:AUTO?

Description	This query indicates if WDM analysis default channel has been enabled or not. At *RST, the state of the default channel is set to on (enabled).
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO?
Parameter(s)	None
Response Syntax	<Auto>
Response(s)	*Auto:* The response data syntax for <Auto> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <Auto> response corresponds to the state of the default channel. 0: default channel is disabled. 1: default channel is enabled.
Example(s)	CALC:CHAN:AUTO OFF CALC:CHAN:AUTO? Returns: 0 (default channel is disabled)
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO

:CALCulate[1..n][:WDM]:CHANnel:AUTO:CENTer:ITUGrid

Description	This command controls activation of snap center on ITU grid for WDM analysis default channel. At *RST, snap center on ITU grid is set to off (disabled).
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:CENTer :ITUGrid<wsp><Auto>
Parameter(s)	*Auto:* The program data syntax for <Auto> is defined as a <Boolean Program Data> element. The <Auto> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0. The <Auto> parameter corresponds to the new state of the snap center on ITU grid. 0 or OFF: disable default channel snap center on ITU grid. 1 or ON: enable default channel snap center on ITU grid. Snap default channel center on ITU grid enable state

:CALCulate[1..n][:WDM]:CHANnel:AUTO:CENTer:ITUGrid

Example(s)	CALC:WDM:CHAN:AUTO:WIDT:FREQ 50.0 GHZ CALC:WDM:CHAN:AUTO:CENT:ITUG ON CALC:WDM:CHAN:AUTO:CENT:ITUG? Returns: 1 (snap ITU grid enabled) CALC:CHAN:AUTO:WIDT 10.0 NM CALC:CHAN:AUTO:CENT:ITUG? Returns: 0 (snap ITU grid disabled)
Notes	Snap center on ITU grid may be enabled only if default channel width is set to 25.0 GHz, 50.0 GHz, 100.0 GHz, 200.0 GHz or 20.0 nm.
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:CENTer:ITUGrid? :CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh :CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh:FREQuency

:CALCulate[1..n][:WDM]:CHANnel:AUTO:CENTer:ITUGrid?

Description	This query indicates if snap center on ITU grid for WDM analysis default channel has been enabled or not. At *RST, snap center on ITU grid is set to off (disabled).
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:CENTer :ITUGrid?
Parameter(s)	None
Response Syntax	<Auto>
Response(s)	*Auto:* The response data syntax for <Auto> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <Auto> response corresponds to the state of the snap center on ITU grid. 0: snap center on ITU grid is disabled. 1: snap center on ITU grid is enabled.
Example(s)	CALC:CHAN:AUTO:CENT:ITUG OFF CALC:CHAN:AUTO:CENT:ITUG? Returns: 0 (snap ITU grid disabled)
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:CENTer :ITUGrid

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:AUTO

Description	This command controls activation of i-InBand noise measurement for WDM analysis default channel. At *RST, auto noise is set to off (disabled).
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:AUTO<wsp><Auto>
Parameter(s)	*Auto:* The program data syntax for <Auto> is defined as a <Boolean Program Data> element. The <Auto> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0. The <Auto> parameter corresponds to the new state of auto noise measurement. 0 or OFF: disable default channel auto noise. 1 or ON: enable default channel auto noise.

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:AUTO

Example(s)	CALC:WDM:CHAN:AUTO:NOIS:AUTO ON CALC:WDM:CHAN:AUTO:NOIS:AUTO? Returns 1 (auto noise enabled)
Notes	Auto noise is available only if software option "InB" is active. Auto noise is computed only if analysed trace was acquired using PMMH averaging type.
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:AUTO? :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE :CALCulate[1..n][:WDM]:CHANnel:NOISe:AUTO :SENSe[1..n]:AVERage:TYPE

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:AUTO?

Description	This query indicates if i-InBand auto noise measurement for WDM analysis of the default channel has been enabled or not. At *RST, auto noise measurement is set to off (disabled).
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:AUTO?
Parameter(s)	None
Response Syntax	<Auto>
Response(s)	*Auto:* The response data syntax for <Auto> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <Auto> response corresponds to the state of the auto noise measurement. 0: auto noise measurement is disabled. 1: auto noise measurement is enabled.
Example(s)	CALC:CHAN:AUTO:NOIS:AUTO OFF CALC:CHAN:AUTO:NOIS:AUTO? Returns 0 (auto noise disabled)
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:AUTO

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:FREQuency

Description	This command sets the frequency distance from peak to center of noise region for noise measurement of the WDM analysis default channel. At *RST, default channel noise measurement distance is set to 100.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance<wsp><Distance[<wsp>HZ]>|MAXimum|MINimum|DEFault
Parameter(s)	*Distance:* The program data syntax for <Distance> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is HZ. The <Distance> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value.

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:FREQuency

	DEFault allows the instrument to select a value for the <Distance> parameter. The <Distance> parameter corresponds to a valid distance in hertz from peak to center of noise region. The CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:FREQuency? MIN and CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:FREQuency? MAX queries can be used to determine valid distance values.
Example(s)	CALC:WDM:CHAN:AUTO:NOIS:TYPE POLY5 CALC:WDM:CHAN:AUTO:NOIS:DIST:FREQ 100.0 GHZ CALC:WDM:CHAN:AUTO:NOIS:DIST:FREQ? Returns 1.000000E+011
Notes	Custom noise measurement distance is applied only if selected noise type is POLYnomial5.
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:FREQuency? :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:FREQuency :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE :CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance:FREQuency

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:FREQuency?

Description	This query returns the frequency distance from peak to center of noise region for noise measurement of the WDM analysis default channel. At *RST, default channel noise measurement distance is set to 100.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:FREQuency?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Distance>

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:FREQuency?

Response(s)	*Distance:* The response data syntax for <Distance> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Distance> response corresponds to either the current or the MINimum/MAXimum noise distance frequency in hertz.
Example(s)	CALC:WDM:CHAN:AUTO:NOIS:DIST:FREQ 80.0 GHZ CALC:WDM:CHAN:AUTO:NOIS:DIST:FREQ? Returns 8.000000E+010
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:FREQuency :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:FREQuency? :CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance:FREQuency?

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:[WAVelength]

Description

This command sets the wavelength distance from peak to center of noise region for noise measurement of the WDM analysis default channel.

At *RST, default channel noise measurement distance is set to 100.0 GHz.

Syntax

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:[WAVelength]<wsp><Distance[<wsp>M]>|MAXimum|MINimum|DEFault

Parameter(s)

Distance:

The program data syntax for <Distance> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is M. The <Distance> special forms MINimum, MAXimum and DEFault are accepted on input.

MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:[WAVelength]

DEFault allows the instrument to select a value for the <Distance> parameter.

The <Distance> parameter corresponds to a valid distance in meter from peak to center of noise region.

The CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance[:WAVelength]? MIN and CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance[:WAVelength]? MAX queries can be used to determine valid distance values.

Example(s)

CALC:WDM:CHAN:AUTO:NOIS:TYPE POLY5
CALC:WDM:CHAN:AUTO:NOIS:DIST:WAV 40.0 NM
CALC:WDM:CHAN:AUTO:NOIS:DIST:WAV?
Returns 4.000000E-008

Notes

Custom noise measurement distance is applied only if selected noise type is POLYnomial5.

See Also

:CALCulate[1..n][:WDM]:CHANnel:AUTO
:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:FREQuency
:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance[:WAVelength]?

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh[:WAVelength]
:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE
:CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance[:WAVelength]

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance[WAVelength]?

Description	This query returns the wavelength distance from peak to center of noise region for noise measurement of the WDM analysis default channel. At *RST, default channel noise measurement distance is set to 100.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:[WAVelength]?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Distance>

:CALCulate[1..n][:WDM]:CHANnel:AUTO: NOISe:DISTance[WAVelength]?

Response(s)	*Distance:* The response data syntax for <Distance> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Distance> response corresponds to either the current or the MINimum/MAXimum noise distance wavelength in meter.
Example(s)	CALC:WDM:CHAN:AUTO:NOIS:DIST:WAV DEF CALC:WDM:CHAN:AUTO:NOIS:DIST:WAV? Returns 2.000000E-008
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:FREQuency :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh[:WAVelength]? :CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance[:WAVelength]?

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:FREQuency

Description	This command sets the frequency width of the noise measurement region of the WDM analysis default channel. At *RST, the width of the default channel noise measurement region is set to 100.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh<wsp><Width[<wsp>HZ]>|MAXimum|MINimum|DEFault
Parameter(s)	*Width:* The program data syntax for <Width> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is HZ. The <Width> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value.

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:FREQuency

DEFault allows the instrument to select a value for the <Width> parameter.

The <Width> parameter corresponds to a valid width in hertz for the noise measurement region.

The CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:FREQuency? MIN and CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:FREQuency? MAX queries can be used to determine valid width values.

Example(s)

CALC:WDM:CHAN:AUTO:NOIS:TYPE POLY5
CALC:WDM:CHAN:AUTO:NOIS:WIDTh:FREQ 100.0 GHZ
CALC:WDM:CHAN:AUTO:NOIS:WIDTh:FREQ?
Returns 1.000000E+011

Notes

Custom width for noise measurement region is applied only if selected noise type is POLYnomial5.

See Also

:CALCulate[1..n][:WDM]:CHANnel:AUTO
:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh[:WAVelength]
:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:FREQuency?

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:FREQuency
:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE
:CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh:FREQuency

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:FREQuency?

Description	This query returns the frequency width of the noise measurement region of the WDM analysis default channel. At *RST, the width of the default channel noise measurement region is set to 100.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:FREQuency?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Width>

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:FREQuency?

Response(s)	*Width:* The response data syntax for <Width> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Width> response corresponds to either the current or the MINimum/MAXimum frequency width of the noise measurement region in hertz.
Example(s)	CALC:WDM:CHAN:AUTO:NOIS:WIDTh:FREQ 65.0 GHZ CALC:WDM:CHAN:AUTO:NOIS:WIDTh:FREQ? Returns 6.500000E+010
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:FREQuency :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:FREQuency? :CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh:FREQuency?

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:[WAVelength]

Description

This command sets the wavelength width of the noise measurement region of the WDM analysis default channel.

At *RST, the width of the default channel noise measurement region is set to 100.0 GHz.

Syntax

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:[WAVelength]<wsp><Width[<wsp>M]>|MAXimum|MINimum|DEFault

Parameter(s)

Width:

The program data syntax for <Width> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is M. The <Width> special forms MINimum, MAXimum and DEFault are accepted on input.

MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:[WAVelength]

	DEFault allows the instrument to select a value for the <Width> parameter. The <Width> parameter corresponds to a valid width in meter for the noise measurement region. The CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh[:WAVelength]? MIN and CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh[:WAVelength]? MAX queries can be used to determine valid width values.
Example(s)	CALC:WDM:CHAN:AUTO:NOIS:TYPE POLY5 CALC:WDM:CHAN:AUTO:NOIS:WIDTh:WAV 12.5 NM CALC:WDM:CHAN:AUTO:NOIS:WIDTh:WAV? Returns 1.250000E-008

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:[WAVelength]

Notes	Custom width for noise measurement region is applied only if selected noise type is POLYnomial5.
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:FREQuency :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh[:WAVelength]? :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE :CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength]

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh[WAVelength]?

Description	This query returns the wavelength width of the noise measurement region of the WDM analysis default channel. At *RST, the width of the default channel noise measurement region is set to 100.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh[WAVelength]?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Width>

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh[WAVelength]?

Response(s)	*Width:* The response data syntax for <Width> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Width> response corresponds to either the current or the MINimum/MAXimum wavelength width of the noise measurement region in meter.
Example(s)	CALC:WDM:CHAN:AUTO:NOIS:WIDTh:WAV DEF CALC:WDM:CHAN:AUTO:NOIS:WIDTh:WAV? Returns 2.000000E-008
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:FREQuency :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance[:WAVelength]? :CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength]?

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE

Description	This command selects WDM analysis default channel's noise measurement type. At *RST, the noise type is set to IEC.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE<wsp>IEC|INBand|INBandNarrowfilter|POLYnomial5
Parameter(s)	*Type:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: IEC|INBand|INBandNarrowfilter|POLYnomial5. The parameter corresponds to the newly selected noise type. IEC: selects IEC noise type. INBand: selects InBand noise type. INBandNarrowfilter: selects InBand narrow filter noise type. POLYnomial5: selects 5th order polynomial fit noise type.
Example(s)	CALC:WDM:CHAN:AUTO:NOIS:AUTO OFF CALC:WDM:CHAN:AUTO:NOIS:TYPE IEC CALC:WDM:CHAN:AUTO:NOIS:TYPE? Returns IEC

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE

Notes	INBand and INBandNarrowfilter noise types are available only if software option "InB" is active. INBand and INBandNarrowfilter noise types are computed only if analysed trace was acquired using PMMH averaging type. If auto noise measurement is active, specific noise type setting has no effect.
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:FREQuency :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:FREQuency :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE? :CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE :SENSe[1..n]:AVERage:TYPE

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE?

Description	This query returns the selected WDM analysis default channel's noise measurement type. At *RST, the noise type is set to IEC.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE?
Parameter(s)	None
Response Syntax	<Type>
Response(s)	*Type:* The response data syntax for <Type> is defined as a <CHARACTER RESPONSE DATA> element. The <Type> response corresponds to the selected noise type. IEC: IEC noise type is selected. INBAND: InBand noise type is selected. INBANDNARROWFILTER: InBand narrow filter noise type is selected. POLYNOMIAL5: 5th order polynomial fit noise type is selected.

:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE?

Example(s)	CALC:CHAN:AUTO:NOIS:AUTO OFF CALC:CHAN:AUTO:NOIS:TYPE INB CALC:CHAN:AUTO:NOIS:TYPE? Returns INBAND
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:FREQuency? :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance[:WAVelength]? :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:FREQuency? :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh[:WAVelength]? :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE :CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE?

:CALCulate[1..n][:WDM]:CHANnel:AUTO:SIGnalPower:TYPE

Description	This command selects WDM analysis default channel's signal power measurement type. At *RST, the signal power type is set to IPOWer (integrated power).
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:SIGnal Power:TYPE<wsp>IPOWer|PPOWer|TPOWer
Parameter(s)	*Type:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: IPOWer|PPOWer|TPOWer. The parameter corresponds to the newly selected signal power type. IPOWer: selects integrated signal power type. PPOWer: selects peak signal power type. TPOWer: selects channel total power type.

:CALCulate[1..n][:WDM]:CHANnel:AUTO:SIGnalPower:TYPE

Example(s)	CALC:WDM:CHAN:AUTO:SIGP:TYPE TPOW CALC:WDM:CHAN:AUTO:SIGP:TYPE? Returns TPOWER
Notes	Noise and OSNR measurements are not computed if signal power type is set to channel total power (TPOWer).
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:SIGnalPower:TYPE? :CALCulate[1..n][:WDM]:CHANnel:SIGnalPower:TYPE :CALCulate[1..n][:WDM]:DATA:CHANnel:SIGnalPower?

:CALCulate[1..n][:WDM]:CHANnel:AUTO:SIGnalPower:TYPE?

Description	This query returns the selected WDM analysis default channel's signal power measurement type. At *RST, the signal power type is set to IPOWer (integrated power).
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:SIGnalPower:TYPE?
Parameter(s)	None
Response Syntax	<Type>
Response(s)	*Type:* The response data syntax for <Type> is defined as a <CHARACTER RESPONSE DATA> element. The <Type> response corresponds to the selected signal power type.

:CALCulate[1..n][:WDM]:CHANnel:AUTO:SIGnalPower:TYPE?

	IPOWER: integrated signal power type is selected. PPOWER: peak signal power type is selected. TPOWER: channel total power type is selected.
Example(s)	CALC:CHAN:AUTO:SIGP:TYPE IPOW CALC:CHAN:AUTO:SIGP:TYPE? Returns IPOWER
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:SIGnalPower:TYPE :CALCulate[1..n][:WDM]:CHANnel:SIGnalPower:TYPE :CALCulate[1..n][:WDM]:DATA:CHANnel:SIGnalPower?

:CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh:FREQuency

Description	This command sets the frequency width of the WDM analysis default channel. At *RST, default channel width is set to 50.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh:FREQuency<wsp><Width[<wsp>HZ]>|MAXimum|MINimum|DEFault
Parameter(s)	*Width:* The program data syntax for <Width> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is HZ. The <Width> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value.

:CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh:FREQuency

	DEFault allows the instrument to select a value for the <Width> parameter. The <Width> parameter corresponds to a valid channel width in hertz. The CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh:FREQuency? MIN and CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh:FREQuency? MAX queries can be used to determine valid channel frequency width.
Example(s)	CALC:WDM:CHAN:AUTO:WIDT:FREQ 25.0 GHZ CALC:WDM:CHAN:AUTO:WIDT:FREQ? Returns 2.500000E+010
Notes	Automatically set default channel snap center on ITU grid to off if channel width is not 25.0 GHz, 50.0 GHz, 100.0 GHz or 200.0 GHz.
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh:FREQuency? :CALCulate[1..n][:WDM]:CHANnel:WIDTh:FREQuency

:CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh:FREQuency?

Description	This query returns the frequency width of the WDM analysis default channel. At *RST, default channel width is set to 50.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh:FREQuency?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Width>

:CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh:FREQuency?

Response(s)	*Width:* The response data syntax for <Width> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Width> response corresponds to either the current or the MINimum/MAXimum channel frequency width in hertz.
Example(s)	CALC:CHAN:AUTO:WIDT:FREQ 75.0 GHZ CALC:CHAN:AUTO:WIDT:FREQ? Returns 7.500000E+010
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh:FREQuency :CALCulate[1..n][:WDM]:CHANnel:WIDTh:FREQuency

:CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh[:WAVelength]

Description	This command sets the wavelength width of the WDM analysis default channel. At *RST, default channel width is set to 50.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh[:WAVelength]<wsp><Width[<wsp>M]>|MAXimum|MINimum|DEFault
Parameter(s)	*Width:* The program data syntax for <Width> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is M. The <Width> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value.

:CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh[:WAVelength]

	DEFault allows the instrument to select a value for the <Width> parameter. The <Width> parameter corresponds to a valid channel width in meter. The CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh[:WAVelength]? MIN and CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh[:WAVelength]? MAX queries can be used to determine valid channel wavelength width.
Example(s)	CALC:WDM:CHAN:AUTO:WIDT:WAV 12.5 NM CALC:WDM:CHAN:AUTO:WIDT:WAV? Returns 1.250000E-008
Notes	Automatically set default channel snap center on ITU grid to off if channel width is not 20.0 nm.
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh:FREQuency :CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh[:WAVelength]? :CALCulate[1..n][:WDM]:CHANnel:WIDTh[:WAVelength]

:CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh[:WAVelength]?

Description	This query returns the wavelength width of the WDM analysis default channel. At *RST, default channel width is set to 50.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh [:WAVelength]?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Width>

:CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh[:WAVelength]?

Response(s)	*Width:* The response data syntax for <Width> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Width> response corresponds to either the current or the MINimum/MAXimum channel wavelength width in meter.
Example(s)	CALC:CHAN:AUTO:WIDT:WAV DEF CALC:CHAN:AUTO:WIDT:WAV? Returns 2.000000E-008
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh:FREQuency :CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:WIDTh[:WAVelength]

:CALCulate[1..n][:WDM]:CHANnel:CATalog?

Description	This query returns a comma-separated list of strings which contains the names of all user defined channels for WDM analysis. At *RST, a single null string is returned: channel list is empty.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:CATalog?
Parameter(s)	None
Response Syntax	<Catalog>
Response(s)	*Catalog:* The response data syntax for <Catalog> is defined as a <STRING RESPONSE DATA> element. The <Catalog> response corresponds to the list of defined channels name. If no channel names are defined, a single null string is returned.
Example(s)	CALC:WDM:CHAN:DEL:ALL CALC:WDM:CHAN:CAT? Returns "" (empty channel list) CALC:WDM:CHAN:DEF "C_1530", 1530.000 NM CALC:WDM:CHAN:DEF "C_1550", 1550.000 NM

:CALCulate[1..n][:WDM]:CHANnel:CATalog?

	CALC:WDM:CHAN:DEF "C_1570", 1570.000 NM CALC:WDM:CHAN:CAT? Returns "C_1530,C_1550,C_1570"
Notes	The channel list is sorted into ascending order according to channel center wavelength.
See Also	:CALCulate[1..n][:WDM]:CHANnel:COUNt? :CALCulate[1..n][:WDM]:CHANnel[:DEFine] :CALCulate[1..n][:WDM]:DATA:CHANnel:CATalog?

:CALCulate[1..n][:WDM]:CHANnel:COUNt?

Description	This query returns the number of user defined channels for WDM analysis. At *RST, the number of channels is 0.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:COUNt?
Parameter(s)	None
Response Syntax	<Count>
Response(s)	*Count:* The response data syntax for <Count> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <Count> response corresponds to the number of items in the list of user defined channels.
Example(s)	CALC:CHAN:DEL:ALL CALC:CHAN:DEF "C_1530", 1530.000 NM CALC:CHAN:DEF "C_1570", 1570.000 NM CALC:CHAN:COUN? Returns 2
See Also	:CALCulate[1..n][:WDM]:CHANnel:CATalog? :CALCulate[1..n][:WDM]:CHANnel[:DEFine] :CALCulate[1..n][:WDM]:CHANnel:DELete[:NAME] :CALCulate[1..n][:WDM]:CHANnel:DELete:ALL :CALCulate[1..n][:WDM]:DATA:CHANnel:COUNt?

:CALCulate[1..n][:WDM]:CHANnel[:DEFine]

Description This command allocates and initializes a new WDM analysis channel setup.

*RST has no effect on this command.

Syntax :CALCulate[1..n][:WDM]:CHANnel[:DEFine]<wsp><Name>,<Define[<wsp>M|HZ]>|MAXimum|MINimum

Parameter(s)

➤ *Name:*

The program data syntax for <Name> is defined as a <STRING PROGRAM DATA> element.

The <Name> parameter corresponds to the name of the new channel setup to create. The channel name cannot be empty.

Each channel name must be unique: it is not possible to define two channels with the same name.

➤ *Define:*

The program data syntax for <Define> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> elements are: M|HZ. The <Define> special forms MINimum and MAXimum are accepted on input.

:CALCulate[1..n][:WDM]:CHANnel [:DEFine]

MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.

The <Define> parameter corresponds to a valid channel center value.

The CALCulate[1..n][:WDM]:CHANnel:CENTer? MIN and CALCulate[1..n][:WDM]:CHANnel:CENTer? MAX queries can be used to determine valid center range.

Example(s)

CALC:CHAN:DEL:ALL
CALC:CHAN:DEF "ITU_22",192.1750 THZ
CALC:CHAN:SEL "ITU_22"
CALC:CHAN:WIDT:FREQ 200.0 GHZ
CALC:CHAN:SIGP:TYPE PPOW
CALC:CHAN:DEF "CWDM_14",1490.000 NM

CALC:CHAN:SEL "CWDM_14"
CALC:CHAN:WIDT 10.0 NM
CALC:WDM:CHAN:CAT? Returns "CWDM_14,ITU_22"

:CALCulate[1..n][:WDM]:CHANnel[:DEFine]

Notes	Analysis parameters of newly created channels are always set to their respective default value. The channel list is sorted into ascending order according to channel center wavelength.
See Also	:CALCulate[1..n][:WDM]:CHANnel:CATalog? :CALCulate[1..n][:WDM]:CHANnel[:DEFine]? :CALCulate[1..n][:WDM]:CHANnel:DELete[:NAME] :CALCulate[1..n][:WDM]:CHANnel:DELete:ALL :CALCulate[1..n][:WDM]:CHANnel:SELect :UNIT[1..n]:SPECtrum

:CALCulate[1..n][:WDM]:CHANnel [:DEFine]?

Description	This query requests the instrument to return the definition of the specified WDM channel analysis setup. *RST has no effect on this command.
Syntax	:CALCulate[1..n][:WDM]:CHANnel[:DEFine]?<wsp><Name>
Parameter(s)	*Name:* The program data syntax for <Name> is defined as a <STRING PROGRAM DATA> element. The <Name> parameter corresponds to the name of the channel setup definition to request.
Response Syntax	<Define>

:CALCulate[1..n][:WDM]:CHANnel [:DEFine]?

Response(s)	*Define:* The response data syntax for <Define> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Define> response corresponds to the channel center for the specified <Name>.
Example(s)	CALC:WDM:CHAN:DEF "ITU_1490",1490.000 NM UNIT:SPEC M CALC:WDM:CHAN:DEF? "ITU_1490" Returns 1.490000E–006 UNIT:SPEC HZ CALC:CHAN? "ITU_1490" Returns 2.012030E+014
See Also	:CALCulate[1..n][:WDM]:CHANnel:CATalog? :CALCulate[1..n][:WDM]:CHANnel[:DEFine] :CALCulate[1..n][:WDM]:CHANnel:DELete[:NAME] :CALCulate[1..n][:WDM]:CHANnel:DELete:ALL :UNIT[1..n]:SPECtrum

:CALCulate[1..n][:WDM]:CHANnel:DELete[:NAME]

Description

This command causes the specified WDM channel analysis setup to be deleted from the channel list.

This command is an action and has no associated *RST condition or query form.

Syntax

:CALCulate[1..n][:WDM]:CHANnel:DELete[:NAME]<wsp><Name>

Parameter(s)

Name:

The program data syntax for <Name> is defined as a <STRING PROGRAM DATA> element.

The <Name> parameter corresponds to the name of the channel setup to delete. The channel name cannot be empty.

Example(s)

CALC:WDM:CHAN:DEL:ALL
CALC:WDM:CHAN:DEF "C1",1510.000 NM
CALC:WDM:CHAN:DEF "C2",1520.000 NM
CALC:WDM:CHAN:CAT? Returns "C1,C2"
CALC:WDM:CHAN:DEL:NAME "C1"

CALC:WDM:CHAN:CAT? Returns "C2"

Notes

If a channel with the specified <Name> does not exists no error is generated.

See Also

:CALCulate[1..n][:WDM]:CHANnel:CATalog?
:CALCulate[1..n][:WDM]:CHANnel[:DEFine]
:CALCulate[1..n][:WDM]:CHANnel:DELete:ALL

:CALCulate[1..n][:WDM]:CHANnel:DELete:ALL

Description	This command causes all WDM channels analysis setup to be deleted from the channel list. This command is an action and has no associated *RST condition or query form.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:DELete:ALL
Parameter(s)	None
Example(s)	CALC:CHAN:DEL:ALL CALC:CHAN:CAT? Returns "" (channel setup list empty) CALC:CHAN:DEF "C3",1530.000 NM CALC:CHAN:DEF "C4",1540.000 NM CALC:CHAN:CAT? Returns "C3,C4" (two channels in the list) CALC:CHAN:DEL:ALL CALC:CHAN:CAT? Returns ""
See Also	:CALCulate[1..n][:WDM]:CHANnel:CATalog? :CALCulate[1..n][:WDM]:CHANnel[:DEFine] :CALCulate[1..n][:WDM]:CHANnel:DELete[:NAME]

:CALCulate[1..n][:WDM]:CHANnel:CENTer:FREQuency

Description	This command sets the nominal center frequency of the selected WDM analysis channel. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:CENTer:FREQuency<wsp><Center[<wsp>HZ]>|MAXimum|MINimum|DEFault
Parameter(s)	*Center:* The program data syntax for <Center> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is HZ. The <Center> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value.

:CALCulate[1..n][:WDM]:CHANnel:CENTer:FREQuency

	DEFault allows the instrument to select a value for the <Center> parameter. The <Center> parameter corresponds to a valid channel center frequency in hertz. The CALCulate[1..n][:WDM]:CHANnel:CENTer:FREQuency? MIN and CALCulate[1..n][:WDM]:CHANnel:CENTer:FREQuency? MAX queries can be used to determine valid channel center frequency range.
Example(s)	CALC:WDM:CHAN:DEF "ITU_22",192.1750 THZ CALC:WDM:CHAN:SEL "ITU_22" CALC:WDM:CHAN:CENT:FREQ? Returns 1.921750E+014 CALC:WDM:CHAN:CENT:FREQ 193.4145 THZ CALC:WDM:CHAN:CENT:FREQ? Returns 1.934145E+014
See Also	:CALCulate[1..n][:WDM]:CHANnel[:DEFine] :CALCulate[1..n][:WDM]:CHANnel:CENTer:FREQuency? :CALCulate[1..n][:WDM]:CHANnel:CENTer[:WAVElength] :CALCulate[1..n][:WDM]:CHANnel:SELect

:CALCulate[1..n][:WDM]:CHANnel:CENTer:FREQuency?

Description	This query returns the nominal center frequency of the selected WDM analysis channel. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:CENTer:FREQ uency?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Center>

:CALCulate[1..n][:WDM]:CHANnel:CENTer:FREQuency?

Response(s)	*Center:* The response data syntax for <Center> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Center> response corresponds to either the current or the MINimum/MAXimum channel center frequency in hertz.
Example(s)	CALC:CHAN:DEF "ITU_22",192.1750 THZ CALC:CHAN:SEL "ITU_22" CALC:CHAN:CENT:FREQ? Returns 1.921750E+014
See Also	:CALCulate[1..n][:WDM]:CHANnel[:DEFine] :CALCulate[1..n][:WDM]:CHANnel:CENTer:FREQuency :CALCulate[1..n][:WDM]:CHANnel:CENTer[:WAVelength]? :CALCulate[1..n][:WDM]:CHANnel:SELect

:CALCulate[1..n][:WDM]:CHANnel:CENTer[:WAVelength]

Description	This command sets the nominal center wavelength of the selected WDM analysis channel. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:CENTer[:WAVelength]<wsp><Center[<wsp>M]>|MAXimum|MINimum|DEFault
Parameter(s)	*Center:* The program data syntax for <Center> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is M. The <Center> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value.

:CALCulate[1..n][:WDM]:CHANnel:CENTer[:WAVelength]

	DEFault allows the instrument to select a value for the <Center> parameter. The <Center> parameter corresponds to a valid channel center wavelength in meter. The CALCulate[1..n][:WDM]:CHANnel:CENTer[:WAVelength]? MIN and CALCulate[1..n][:WDM]:CHANnel:CENTer[:WAVelength]? MAX queries can be used to determine valid channel center wavelength range.
Example(s)	CALC:WDM:CHAN:DEF "CWDM_7",1450.0 NM CALC:WDM:CHAN:SEL "CWDM_7" CALC:WDM:CHAN:CENT:WAV? Returns 1.45000E-006 CALC:WDM:CHAN:CENT:WAV 1445.0 NM CALC:WDM:CHAN:CENT:WAV? Returns 1.44500E-006
See Also	:CALCulate[1..n][:WDM]:CHANnel[:DEFine] :CALCulate[1..n][:WDM]:CHANnel:CENTer[:WAVelength]? :CALCulate[1..n][:WDM]:CHANnel:CENTer:FREQuency :CALCulate[1..n][:WDM]:CHANnel:SELect

:CALCulate[1..n][:WDM]:CHANnel:CENTer[:WAVelength]?

Description	This query returns the nominal center wavelength of the selected WDM analysis channel. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:CENTer[:WAVelength]?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Center>

:CALCulate[1..n][:WDM]:CHANnel:CENTer[:WAVelength]?

Response(s)	*Center:* The response data syntax for <Center> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Center> response corresponds to either the current or the MINimum/MAXimum channel center wavelength in meter.
Example(s)	CALC:CHAN:DEF "CWDM_7",1450.0 NM CALC:CHAN:SEL "CWDM_7" CALC:CHAN:CENT:WAV? Returns 1.45000E-006
See Also	:CALCulate[1..n][:WDM]:CHANnel[:DEFine] :CALCulate[1..n][:WDM]:CHANnel:CENTer[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:CENTer:FREQuency? :CALCulate[1..n][:WDM]:CHANnel:SELect

:CALCulate[1..n][:WDM]:CHANnel:WIDTh:FREQuency

Description	This command sets the frequency width of the selected WDM analysis channel. At *RST, this value is not available. At CALCulate[1..n][:WDM]:CHANnel[:DEFine], this value is set to 50.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:WIDTh:FREQuency<wsp><Width[<wsp>HZ]>|MAXimum|MINimum|DEFault
Parameter(s)	*Width:* The program data syntax for <Width> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is HZ. The <Width> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value.

:CALCulate[1..n][:WDM]:CHANnel:WIDTh:FREQuency

	DEFault allows the instrument to select a value for the <Width> parameter. The <Width> parameter corresponds to a valid channel width in hertz. The CALCulate[1..n][:WDM]:CHANnel:WIDTh:FREQuency? MIN and CALCulate[1..n][:WDM]:CHANnel:WIDTh:FREQuency? MAX queries can be used to determine valid channel frequency width.
Example(s)	CALC:WDM:CHAN:DEF "ITU_22",192.1750 THZ CALC:WDM:CHAN:SEL "ITU_22" CALC:WDM:CHAN:WIDT:FREQ 200.0 GHZ CALC:WDM:CHAN:WIDT:FREQ? Returns 2.000000E+011
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh:FREQuency :CALCulate[1..n][:WDM]:CHANnel:WIDTh[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:WIDTh:FREQuency? :CALCulate[1..n][:WDM]:CHANnel:SELect

:CALCulate[1..n][:WDM]:CHANnel:WIDTh:FREQuency?

Description	This query returns the frequency width of the selected WDM analysis channel. At *RST, this value is not available. At CALCulate[1..n][:WDM]:CHANnel[:DEFine], this value is set to 50.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:WIDTh:FREQuency?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Width>

:CALCulate[1..n][:WDM]:CHANnel: WIDTh:FREQuency?

Response(s)	*Width:* The response data syntax for <Width> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Width> response corresponds to either the current or the MINimum/MAXimum channel frequency width in hertz.
Example(s)	CALC:CHAN:DEF "C_23",195.0 THZ CALC:CHAN:SEL "C_23" CALC:CHAN:WIDT:FREQ DEF CALC:CHAN:WIDT:FREQ? Returns 5.000000E+010
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh:FREQuency :CALCulate[1..n][:WDM]:CHANnel:WIDTh[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:WIDTh:FREQuency :CALCulate[1..n][:WDM]:CHANnel:SELect

:CALCulate[1..n][:WDM]:CHANnel:WIDTh[:WAVelength]

Description

This command sets the wavelength width of the selected WDM analysis channel.

At *RST, this value is not available.
At CALCulate[1..n][:WDM]:CHANnel[:DEFine], this value is set to 50.0 GHz.

Syntax

:CALCulate[1..n][:WDM]:CHANnel:WIDTh[:WAVelength]<wsp><Width[<wsp>M]>|MAXimum|MINimum|DEFault

Parameter(s)

Width:

The program data syntax for <Width> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is M. The <Width> special forms MINimum, MAXimum and DEFault are accepted on input.

MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.

:CALCulate[1..n][:WDM]:CHANnel: WIDTh[:WAVelength]

DEFault allows the instrument to select a value for the <Width> parameter.

The <Width> parameter corresponds to a valid channel width in meter.

The CALCulate[1..n][:WDM]:CHANnel:WIDTh[:WAVelength]? MIN and CALCulate[1..n][:WDM]:CHANnel:WIDTh[:WAVelength]? MAX queries can be used to determine valid channel wavelength width.

Example(s)

CALC:WDM:CHAN:DEF "CWDM_3",1410.0 NM
CALC:WDM:CHAN:SEL "CWDM_3"
CALC:WDM:CHAN:WIDT:WAV 10.0 NM
CALC:WDM:CHAN:WIDT:WAV? Returns 1.000000E-008

See Also

:CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh[:WAVelength]
:CALCulate[1..n][:WDM]:CHANnel:WIDTh:FREQuency
:CALCulate[1..n][:WDM]:CHANnel:WIDTh[:WAVelength]?
:CALCulate[1..n][:WDM]:CHANnel:SELect

:CALCulate[1..n][:WDM]:CHANnel: WIDTh[:WAVelength]?

Description	This query returns the wavelength width of the selected WDM analysis channel. At *RST, this value is not available. At CALCulate[1..n][:WDM]:CHANnel[:DEFine], this value is set to 50.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:WIDTh[:WAVelength]?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Width>

:CALCulate[1..n][:WDM]:CHANnel:WIDTh[:WAVelength]?

Response(s)	*Width:* The response data syntax for <Width> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Width> response corresponds to either the current or the MINimum/MAXimum channel wavelength width in meter.
Example(s)	CALC:CHAN:DEF "CWDM_5",1430.0 NM CALC:CHAN:SEL "CWDM_5" CALC:CHAN:WIDT:WAV DEF CALC:CHAN:WIDT:WAV? Returns 2.000000E-008
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO:WIDTh[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:WIDTh:FREQuency :CALCulate[1..n][:WDM]:CHANnel:WIDTh[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:SELect

:CALCulate[1..n][:WDM]:CHANnel:NOISe:AUTO

Description	This command controls activation of i-InBand noise measurement for WDM analysis of the selected channel. At *RST, this value is not available. At CALCulate[1..n][:WDM]:CHANnel[:DEFine], this value is set to off (disabled).
Syntax	:CALCulate[1..n][:WDM]:CHANnel:NOISe:AUTO <wsp><Auto>
Parameter(s)	*Auto:* The program data syntax for <Auto> is defined as a <Boolean Program Data> element. The <Auto> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0. The <Auto> parameter corresponds to the new state of auto noise measurement. 0 or OFF: disable selected channel auto noise. 1 or ON: enable selected channel auto noise.

:CALCulate[1..n][:WDM]:CHANnel:NOISe:AUTO

Example(s)	CALC:WDM:CHAN:DEF "C_001",192.1750 THZ CALC:WDM:CHAN:SEL "C_001" CALC:WDM:CHAN:NOIS:AUTO ON CALC:WDM:CHAN:NOIS:AUTO? Returns 1 (auto noise enabled)
Notes	Auto noise is available only if software option "InB" is active. Auto noise is computed only if analysed trace was acquired using PMMH averaging type.
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:AUTO :CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE :CALCulate[1..n][:WDM]:CHANnel:NOISe:AUTO? :CALCulate[1..n][:WDM]:CHANnel:SELect :SENSe[1..n]:AVERage:TYPE

:CALCulate[1..n][:WDM]:CHANnel:NOISe:AUTO?

Description

This query indicates if i-InBand auto noise measurement for WDM analysis of the selected channel has been enabled or not.

At *RST, this value is not available.
At CALCulate[1..n][:WDM]:CHANnel[:DEFine], this value is set to off (disabled).

Syntax

:CALCulate[1..n][:WDM]:CHANnel:NOISe:AUTO?

Parameter(s)

None

Response Syntax

<Auto>

Response(s)

Auto:

The response data syntax for <Auto> is defined as a <NR1 NUMERIC RESPONSE DATA> element.

The <Auto> response corresponds to the state of the auto noise measurement.

:CALCulate[1..n][:WDM]:CHANnel:NOISe:AUTO?

	0: auto noise measurement is disabled. 1: auto noise measurement is enabled.
Example(s)	CALC:CHAN:DEF "ITU_1550",1550.0 NM CALC:CHAN:SEL "ITU_1550" CALC:CHAN:NOIS:AUTO OFF CALC:CHAN:NOIS:AUTO? Returns 0 (auto noise disabled)
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:AUTO :CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE :CALCulate[1..n][:WDM]:CHANnel:NOISe:AUTO :CALCulate[1..n][:WDM]:CHANnel:SELect

:CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance:FREQuency

Description

This command sets the frequency distance from peak to center of noise region for noise measurement of the selected WDM analysis channel.

At *RST, this value is not available.
At CALCulate[1..n][:WDM]:CHANnel[:DEFine], noise measurement distance is set to 100.0 GHz.

Syntax

:CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance:FREQuency<wsp><Distance[<wsp>HZ]>|MAXimum|MINimum|DEFault

Parameter(s)

Distance:

The program data syntax for <Distance> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is HZ. The <Distance> special forms MINimum, MAXimum and DEFault are accepted on input.

MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.

:CALCulate[1..n][:WDM]:CHANnel: NOISe:DISTance:FREQuency

DEFault allows the instrument to select a value for the <Distance> parameter.

The <Distance> parameter corresponds to a valid distance in hertz from peak to center of noise region.

The CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance:FREQuency? MIN and CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance:FREQuency? MAX queries can be used to determine valid distance values.

Example(s)

CALC:WDM:CHAN:DEF "C_23",195.0 THZ
CALC:WDM:CHAN:SEL "C_23"
CALC:WDM:CHAN:NOIS:TYPE POLY5
CALC:WDM:CHAN:NOIS:DIST:FREQ 125.0 GHZ
CALC:WDM:CHAN:NOIS:DIST:FREQ? Returns 1.250000E+011

Notes

Custom noise measurement distance is applied only if selected noise type is POLYnomial5.

See Also

:CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance[:WAVelength]
:CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance:FREQuency?
:CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh:FREQuency

:CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE
:CALCulate[1..n][:WDM]:CHANnel:SELect
:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:FREQuency

:CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance:FREQuency?

Description	This query returns the frequency distance from peak to center of noise region for noise measurement of the selected WDM analysis channel. At *RST, this value is not available. At CALCulate[1..n][:WDM]:CHANnel[:DEFine], noise measurement distance is set to 100.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance:FREQuency?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Distance>

:CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance:FREQuency?

Response(s)	*Distance:* The response data syntax for <Distance> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Distance> response corresponds to either the current or the MINimum/MAXimum noise distance frequency in hertz.
Example(s)	CALC:CHAN:DEF "ITU_1550",1550.0 NM CALC:CHAN:SEL "ITU_1550" CALC:CHAN:NOIS:DIST:FREQ? Returns 1.000000E+011
See Also	:CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance[:WAVelength]? :CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance:FREQuency :CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh:FREQuency? :CALCulate[1..n][:WDM]:CHANnel:SELect :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance:FREQuency?

:CALCulate[1..n][:WDM]:CHANNel: NOISe:DISTance[:WAVelength]

Description	This command sets the wavelength distance from peak to center of noise region for noise measurement of the selected WDM analysis channel. At *RST, this value is not available. At CALCulate[1..n][:WDM]:CHANNel[:DEFine], channel noise measurement distance is set to 100.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANNel:NOISe:DISTance[:WAVelength]<wsp><Distance[<wsp>M]> |MAXimum|MINimum|DEFault
Parameter(s)	*Distance:* The program data syntax for <Distance> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is M. The <Distance> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value.

:CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance[:WAVelength]

	DEFault allows the instrument to select a value for the <Distance> parameter. The <Distance> parameter corresponds to a valid distance in meter from peak to center of noise region. The CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance[:WAVelength]? MIN and CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance[:WAVelength]? MAX queries can be used to determine valid distance values.
Example(s)	CALC:WDM:CHAN:DEF "CWDM_3",1410.0 NM CALC:WDM:CHAN:SEL "CWDM_3" CALC:WDM:CHAN:NOIS:TYPE POLY5 CALC:WDM:CHAN:NOIS:DIST:WAV 40.0 NM CALC:WDM:CHAN:NOIS:DIST:WAV? Returns 4.000000E-008
Notes	Custom noise measurement distance is applied only if selected noise type is POLYnomial5.
See Also	:CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance:FREQuency :CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance[:WAVelength]? :CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE :CALCulate[1..n][:WDM]:CHANnel:SELect :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance[:WAVelength]

:CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance[:WAVelength]?

Description	This query returns the wavelength distance from peak to center of noise region for noise measurement of the selected WDM analysis channel. At *RST, this value is not available. At CALCulate[1..n][:WDM]:CHANnel[:DEFine], noise measurement distance is set to 100.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance[:WAVelength]?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Distance>

:CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance[:WAVelength]?

Response(s)	*Distance:* The response data syntax for <Distance> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Distance> response corresponds to either the current or the MINimum/MAXimum noise distance wavelength in meter.
Example(s)	CALC:WDM:CHAN:NOIS:DIST:WAV DEF CALC:WDM:CHAN:NOIS:DIST:WAV? Returns 2.000000E-008
See Also	:CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance:FREQuency? :CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength]? :CALCulate[1..n][:WDM]:CHANnel:SELect :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:DISTance[:WAVelength]?

:CALCulate[1..n][:WDM]:CHANNel:NOISe:WIDTh:FREQuency

Description	This command sets the frequency width of the noise measurement region of the selected WDM analysis channel. At *RST, this value is not available. At CALCulate[1..n][:WDM]:CHANNel[:DEFine], width of the noise measurement region is set to 100.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANNel:NOISe:WIDTh:FREQuency<wsp><Width[<wsp>HZ]>|MAXimum|MINimum|DEFault
Parameter(s)	*Width:* The program data syntax for <Width> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is HZ. The <Width> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value.

:CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh:FREQuency

DEFault allows the instrument to select a value for the <Width> parameter.

The <Width> parameter corresponds to a valid width in hertz for the noise measurement region.

The CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh:FREQuency? MIN and CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh:FREQuency? MAX queries can be used to determine valid width values.

Example(s)

CALC:WDM:CHAN:DEF "ITU_22",192.1750 THZ
CALC:WDM:CHAN:SEL "ITU_22"
CALC:WDM:CHAN:NOIS:TYPE POLY5
CALC:WDM:CHAN:NOIS:WIDTh:FREQ 75.0 GHZ
CALC:WDM:CHAN:NOIS:WIDTh:FREQ? Returns 7.500000E+010

Notes

Custom width for noise measurement region is applied only if selected noise type is POLYnomial5.

See Also

:CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength]
:CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh:FREQuency?
:CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance:FREQuency

:CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE
:CALCulate[1..n][:WDM]:CHANnel:SELect
:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:FREQuency

:CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh:FREQuency?

Description	This query returns the frequency width of the noise measurement region of the selected WDM analysis channel. At *RST, this value is not available. At CALCulate[1..n][:WDM]:CHANnel[:DEFine], width of the noise measurement region is set to 100.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh:FREQuency?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Width>

:CALCulate[1..n][:WDM]:CHANnel: NOISe:WIDTh:FREQuency?

Response(s)	*Width:* The response data syntax for <Width> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Width> response corresponds to either the current or the MINimum/MAXimum frequency width of the noise measurement region in hertz.
Example(s)	CALC:WDM:CHAN:DEF "CWDM_7",1450.0 NM CALC:WDM:CHAN:SEL "CWDM_7" CALC:WDM:CHAN:NOIS:WIDTh:FREQ 65.0 GHZ CALC:WDM:CHAN:NOIS:WIDTh:FREQ? Returns 6.500000E+010
See Also	:CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh:FREQuency :CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance:FREQuency? :CALCulate[1..n][:WDM]:CHANnel:SELect :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh:FREQuency?

:CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength]

Description	This command sets the wavelength width of the noise measurement region of the selected WDM analysis channel. At *RST, this value is not available. At CALCulate[1..n][:WDM]:CHANnel[:DEFine], width of the noise measurement region is set to 100.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength]<wsp><Width[<wsp>M]>|MAXimum|MINimum|DEFault
Parameter(s)	*Width:* The program data syntax for <Width> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is M. The <Width> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value.

:CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength]

	DEFault allows the instrument to select a value for the <Width> parameter. The <Width> parameter corresponds to a valid width in meter for the noise measurement region. The CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength]? MIN and CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength]? MAX queries can be used to determine valid width values.
Example(s)	CALC:WDM:CHAN:DEF "ITU_22",192.1750 THZ CALC:WDM:CHAN:SEL "ITU_22" CALC:WDM:CHAN:NOIS:TYPE POLY5 CALC:WDM:CHAN:NOIS:WIDTh:WAV 12.5 NM CALC:WDM:CHAN:NOIS:WIDTh:WAV? Returns 1.250000E-008

:CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength]

Notes	Custom width for noise measurement region is applied only if selected noise type is POLYnomial5.
See Also	:CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh:FREQuency :CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength]? :CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE :CALCulate[1..n][:WDM]:CHANnel:SELect :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh[:WAVelength]

:CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength]?

Description	This query returns the wavelength width of the noise measurement region of the selected WDM analysis channel. At *RST, this value is not available. At CALCulate[1..n][:WDM]:CHANnel[:DEFine], width of the noise measurement region is set to 100.0 GHz.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength]?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Width>

:CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength]?

Response(s)	*Width:* The response data syntax for <Width> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Width> response corresponds to either the current or the MINimum/MAXimum wavelength width of the noise measurement region in meter.
Example(s)	CALC:WDM:CHAN:AUTO:NOIS:WIDTh:WAV DEF CALC:WDM:CHAN:AUTO:NOIS:WIDTh:WAV? Returns 2.000000E-008
See Also	:CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh:FREQuency :CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance[:WAVelength]? :CALCulate[1..n][:WDM]:CHANnel:SELect :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:WIDTh[:WAVelength]?

:CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE

Description	This command selects noise measurement type for WDM analysis of the selected channel. At *RST, this value is not available. At CALCulate[1..n][:WDM]:CHANnel[:DEFine], this value is set to IEC.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE <wsp>IEC|INBand|INBandNarrowfilter
Parameter(s)	*Type:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: IEC|INBand|INBandNarrowfilter. The parameter corresponds to the newly selected noise type. IEC: selects IEC noise type. INBand: selects InBand noise type. INBandNarrowfilter: selects InBand narrow filter noise type. POLYnomial5: selects 5th order polynomial fit noise type.

:CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE

Example(s)	CALC:WDM:CHAN:DEF "C_001", 1290.000 NM CALC:WDM:CHAN:SEL "C_001" CALC:WDM:CHAN:NOIS:AUTO OFF CALC:WDM:CHAN:NOIS:TYPE INBN CALC:WDM:CHAN:NOIS:TYPE? Returns INBANDNARROWFILTER
Notes	INBand and INBandNarrowfilter noise types are available only if software option "InB" is active. INBand and INBandNarrowfilter noise types are computed only if analysed trace was acquired using PMMH averaging type. If auto noise measurement is active, specific noise type setting has no effect.
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE :CALCulate[1..n][:WDM]:CHANnel:NOISe:AUTO :CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE? :CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance:FREQuency :CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh:FREQuency :CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength] :CALCulate[1..n][:WDM]:CHANnel:SELect :SENSe[1..n]:AVERage:TYPE

:CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE?

Description	This query returns the selected WDM analysis noise measurement type for the selected channel. At *RST, this value is not available. At CALCulate[1..n][:WDM]:CHANnel[:DEFine], this value is set to IEC.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE?
Parameter(s)	None
Response Syntax	<Type>
Response(s)	*Type:* The response data syntax for <Type> is defined as a <CHARACTER RESPONSE DATA> element. The <Type> response corresponds to the selected noise type. IEC: IEC noise type is selected. INBAND: InBand noise type is selected. INBANDNARROWFILTER: InBand narrow filter noise type is selected. POLYnomial5: selects 5th order polynomial fit noise type.

:CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE?

Example(s)	CALC:CHAN:DEF "C_001", 1290.000 NM CALC:CHAN:SEL "C_001" CALC:CHAN:NOIS:AUTO OFF CALC:CHAN:NOIS:TYPE IEC CALC:CHAN:NOIS:TYPE? Returns IEC
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE :CALCulate[1..n][:WDM]:CHANnel:NOISe:AUTO :CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE :CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance:FREQuency? :CALCulate[1..n][:WDM]:CHANnel:NOISe:DISTance[:WAVelength]? :CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh:FREQuency? :CALCulate[1..n][:WDM]:CHANnel:NOISe:WIDTh[:WAVelength]? :CALCulate[1..n][:WDM]:CHANnel:SELect

:CALCulate[1..n][:WDM]:CHANnel:NSELect

Description	This command sets the one-based index of the selected WDM channel analysis setup. At *RST, there is no selection: index is set to 0.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:NSELect<wsp><Select>|MAXimum|MINimum
Parameter(s)	*Select:* The program data syntax for <Select> is defined as a <numeric_value> element. The <Select> special forms MINimum and MAXimum are accepted on input.

:CALCulate[1..n][:WDM]:CHANnel:NSELect

MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.

The <Select> parameter corresponds to a valid channel setup index to select. The channel index cannot be zero.

The CALCulate[1..n][:WDM]:CHANnel:COUNt? query can be used to determine valid index range.

Example(s)

CALC:WDM:CHAN:DEL:ALL
CALC:WDM:CHAN:DEF "C_001",1525.000 NM
CALC:WDM:CHAN:NSEL 1
CALC:WDM:CHAN:SEL? Returns "C_001"

See Also

:CALCulate[1..n][:WDM]:CHANnel:COUNt?
:CALCulate[1..n][:WDM]:CHANnel[:DEFine]
:CALCulate[1..n][:WDM]:CHANnel:NSELect?
:CALCulate[1..n][:WDM]:CHANnel:SELect
:CALCulate[1..n][:WDM]:DATA:CHANnel:NSELect

:CALCulate[1..n][:WDM]:CHANnel:NSELect?

Description	This query returns the one-based index of the selected WDM channel analysis setup. At *RST, there is no selection: index is set to 0.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:NSELect?
Parameter(s)	None
Response Syntax	<Select>
Response(s)	*Select:* The response data syntax for <Select> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <Select> response corresponds to the index of the selected channel setup. Zero is returned if no channel has been selected.
Example(s)	CALC:CHAN:DEL:ALL CALC:CHAN:DEF "ITU_1550",1550.000 NM CALC:CHAN:SEL "ITU_1550" CALC:CHAN:NSEL? Returns 1 CALC:CHAN:DELete:NAME "ITU_1550" CALC:CHAN:NSEL? Returns 0 (no selection)
See Also	:CALCulate[1..n][:WDM]:CHANnel[:DEFine] :CALCulate[1..n][:WDM]:CHANnel:NSELect :CALCulate[1..n][:WDM]:CHANnel:SELect? :CALCulate[1..n][:WDM]:DATA:CHANnel:NSELect

:CALCulate[1..n][:WDM]:CHANnel:SELect

Description	This command sets the name of the selected WDM channel analysis setup. At *RST, there is no selection: a single null string is returned.
Syntax	:CALCulate[1..n][:WDM]:CHANnel:SELect<wsp><Select>
Parameter(s)	*Select:* The program data syntax for <Select> is defined as a <STRING PROGRAM DATA> element. The <Select> parameter corresponds to the name of the channel setup to select. The channel name cannot be empty.
Example(s)	CALC:WDM:CHAN:DEF "C_001",1525.000 NM CALC:WDM:CHAN:SEL "C_001" CALC:WDM:CHAN:SEL? Returns "C_001"
See Also	:CALCulate[1..n][:WDM]:CHANnel:CATalog? :CALCulate[1..n][:WDM]:CHANnel[:DEFine] :CALCulate[1..n][:WDM]:CHANnel:SELect? :CALCulate[1..n][:WDM]:CHANnel:NSELect :CALCulate[1..n][:WDM]:DATA:CHANnel:SELect

:CALCulate[1..n][:WDM]:CHANnel: SELect?

Description

This query returns the name of the selected WDM channel analysis setup.

At *RST, there is no selection: a single null string is returned.

Syntax

:CALCulate[1..n][:WDM]:CHANnel:SELect?

Parameter(s)

None

Response Syntax

<Select>

Response(s)

Select:

The response data syntax for <Select> is defined as a <STRING RESPONSE DATA> element.

The <Select> response corresponds to the name of the selected channel setup. A single null string is returned if no channel has been selected.

Example(s)

CALC:CHAN:DEF "ITU_1550",1550.000 NM
CALC:CHAN:SEL "ITU_1550"
CALC:CHAN:SEL? Returns "ITU_1550"
CALC:CHAN:DELete:NAME "ITU_1550"
CALC:CHAN:SEL? Returns "" (no selection)

See Also

:CALCulate[1..n][:WDM]:CHANnel:CATalog?
:CALCulate[1..n][:WDM]:CHANnel[:DEFine]
:CALCulate[1..n][:WDM]:CHANnel:SELect
:CALCulate[1..n][:WDM]:CHANnel:NSELect?
:CALCulate[1..n][:WDM]:DATA:CHANnel:SELect

:CALCulate[1..n][:WDM]:CHANnel:SIGnalPower:TYPE

Description	This command selects signal power measurement type for WDM analysis of the selected channel. At *RST, this value is not available. At CALCulate[1..n][:WDM]:CHANnel[:DEFine], this value is set to IPOWer (integrated power).
Syntax	:CALCulate[1..n][:WDM]:CHANnel:SIGnalPower:TYPE<wsp>IPOWer|PPOWer|TPOWer
Parameter(s)	*Type:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: IPOWer|PPOWer|TPOWer. The parameter corresponds to the newly selected signal power type. IPOWer: selects integrated signal power type. PPOWer: selects peak signal power type. TPOWer: selects channel total power type.

:CALCulate[1..n][:WDM]:CHANnel:SIGnalPower:TYPE

Example(s)	CALC:WDM:CHAN:DEF "ITU_1550", 1550.000 NM CALC:WDM:CHAN:SEL "ITU_1550" CALC:WDM:CHAN:SIGP:TYPE IPOW CALC:WDM:CHAN:SIGP:TYPE? Returns IPOWER
Notes	Noise and OSNR measurements are not computed for the selected channel if signal power type is set to channel total power (TPOWer).
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO:SIGnal Power:TYPE :CALCulate[1..n][:WDM]:CHANnel:SIGnalPower: TYPE? :CALCulate[1..n][:WDM]:CHANnel:SELect :CALCulate[1..n][:WDM]:DATA:CHANnel:SIGnalP ower?

:CALCulate[1..n][:WDM]:CHANnel:SIGnalPower:TYPE?

Description

This query returns the selected WDM analysis signal power measurement type for the selected channel.

At *RST, this value is not available.

At CALCulate[1..n][:WDM]:CHANnel[:DEFine], this value is set to IPOWer (integrated power).

Syntax

:CALCulate[1..n][:WDM]:CHANnel:SIGnalPower:TYPE?

Parameter(s)

None

Response Syntax

<Type>

Response(s)

Type:

The response data syntax for <Type> is defined as a <CHARACTER RESPONSE DATA> element.

The <Type> response corresponds to the selected signal power type.

:CALCulate[1..n][:WDM]:CHANnel:SIGnalPower:TYPE?

	IPOWER: integrated signal power type is selected. PPOWER: peak signal power type is selected. TPOWER: channel total power type is selected.
Example(s)	CALC:CHAN:DEF "ITU_1550", 1550.000 NM CALC:CHAN:SEL "ITU_1550" CALC:CHAN:SIGP:TYPE PPOW CALC:CHAN:SIGP:TYPE? Returns PPOWER
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO:SIGnalPower:TYPE :CALCulate[1..n][:WDM]:CHANnel:SIGnalPower:TYPE :CALCulate[1..n][:WDM]:CHANnel:SELect :CALCulate[1..n][:WDM]:DATA:CHANnel:SIGnalPower?

:CALCulate[1..n][:WDM]:DATA:CHANnel:BANDwidth[1|2]|BWIDth[1|2]:FREQuency?

Description	This query returns computed WDM analysis result for frequency bandwidth of the selected channel. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:BANDwidth[1|2]|BWIDth[1|2]:FREQuency?
Parameter(s)	None
Response Syntax	<Bandwidth>
Response(s)	*Bandwidth:* The response data syntax for <Bandwidth> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Bandwidth> response corresponds to the computed frequency bandwidth in hertz.
Example(s)	CALC:CHAN:DEL:ALL CALC:CHAN:DEF "C_5", 190.8291 THZ CALC:BAND2:RLEV 5.0 DB <Do measurement> CALC:DATA:CHAN:SEL "C_5" CALC:DATA:CHAN:BAND1:FREQ? Returns 5.700000E+009 CALC:DATA:CHAN:BAND2:FREQ? Returns 1.330000E+010

:CALCulate[1..n][:WDM]:DATA:CHANnel:BANDwidth[1|2]|BWIDth[1|2]:FREQuency?

Notes	Special NAN (not a number) value -2251799813685248 is returned if analysis result could not be computed.
See Also	:CALCulate[1..n][:WDM]:DATA:CHANnel:BWIDth[1|2]|BANDwidth[1|2]:RelativeLEVel? :CALCulate[1..n][:WDM]:DATA:CHANnel:BWIDth[1|2]|BANDwidth[1|2]:[:WAVelength]? :CALCulate[1..n][:WDM]:DATA:CHANnel:SELect :CALCulate[1..n][:WDM]:DATA:CHANnel::STATus:QUEStionable:BIT<9|10|11>:CONDition?

:CALCulate[1..n][:WDM]:DATA:CHANnel: BANDwidth[1|2]|BWIDth[1|2]: RelativeLEVel?

Description	This query indicates the bandwidth position setting used for WDM analysis of the selected channel result. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:BANDwidth[1|2]|BWIDth[1|2]:RelativeLEVel?
Parameter(s)	None
Response Syntax	<PowerLevel>
Response(s)	*PowerLevel:* The response data syntax for <PowerLevel> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <PowerLevel> response corresponds to the bandwidth position.
Example(s)	CALC:CHAN:DEL:ALL CALC:WDM:CHAN:DEF "C_014", 1536.000 NM CALC:WDM:BAND2:RLEV 12.5 DB <Do measurement> UNIT:RAT DB CALC:WDM:DATA:CHAN:SEL "C_014"

:CALCulate[1..n][:WDM]:DATA:CHANnel:BANDwidth[1|2]|BWIDth[1|2]:RelativeLEVel?

CALC:WDM:DATA:CHAN:BAND2:RLEV? Returns 1.250000E+001

See Also

:CALCulate[1..n][:WDM]:CHANnel:BWIDth[1|2]|BANDwidth[1|2]:RelativeLEVel
:CALCulate[1..n][:WDM]:DATA:CHANnel:BWIDth[1|2]|BANDwidth[1|2]:FREQuency?

:CALCulate[1..n][:WDM]:DATA:CHANnel:BWIDth[1|2]|BANDwidth[1|2]:[:WAVelength]?
:CALCulate[1..n][:WDM]:DATA:CHANnel:SELect

:CALCulate[1..n][:WDM]:DATA:CHANnel:BANDwidth[1|2]|BWIDth[1|2][:WAVelength]?

Description

This query returns computed WDM analysis result for wavelength bandwidth of the selected channel.

At *RST, this value is not available.

Syntax

:CALCulate[1..n][:WDM]:DATA:CHANnel:BANDwidth[1|2]|BWIDth[1|2][:WAVelength]?

Parameter(s)

None

Response Syntax

<Bandwidth>

Response(s)

Bandwidth:

The response data syntax for <Bandwidth> is defined as a <NR3 NUMERIC RESPONSE DATA> element.

The <Bandwidth> response corresponds to the computed wavelength bandwidth in meter.

Example(s)

CALC:CHAN:DEL:ALL
CALC:CHAN:DEF "CWDM_16", 1550.000 NM
CALC:BAND2:RLEV 10.0 DB
<Do measurement>
CALC:DATA:CHAN:SEL "CWDM_16"
CALC:DATA:CHAN:BAND1:WAV? Returns 3.000000E-011

CALC:DATA:CHAN:BAND2:WAV? Returns 5.400000E-011

:CALCulate[1..n][:WDM]:DATA:CHANnel:BANDwidth[1|2]|BWIDth[1|2][:WAVelength]?

Notes	Special NAN (not a number) value -2251799813685248 is returned if analysis result could not be computed.
See Also	:CALCulate[1..n][:WDM]:DATA:CHANnel:BWIDth[1|2]|BANDwidth[1|2]:RelativeLEVel? :CALCulate[1..n][:WDM]:DATA:CHANnel:BWIDth[1|2]|BANDwidth[1|2]:FREQuency? :CALCulate[1..n][:WDM]:DATA:CHANnel:SELect :CALCulate[1..n][:WDM]:DATA:CHANnel::STATus:QUEStionable:BIT<9|10|11>:CONDition?

:CALCulate[1..n][:WDM]:DATA:CHANnel:CATalog?

Description	This query returns a comma-separated list of strings which contains the names of all WDM analysis channels results. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:CATalo g?
Parameter(s)	None
Response Syntax	<Catalog>
Response(s)	*Catalog:* The response data syntax for <Catalog> is defined as a <STRING RESPONSE DATA> element. The <Catalog> response corresponds to the list of channels results name. The <Catalog> contains the names for all user defined channels as well as new channels automatically created based on the default channel. If channel results list is empty, a single null string is returned.
Example(s)	CALC:WDM:CHAN:AUTO ON CALC:WDM:CHAN:DEL:ALL CALC:WDM:CHAN:DEF "C_1530", 1530.000 NM CALC:WDM:CHAN:DEF "C_1550", 1550.000 NM CALC:WDM:CHAN:DEF "C_1570", 1570.000 NM

:CALCulate[1..n][:WDM]:DATA:CHANnel:CATalog?

	CALC:WDM:CHAN:CAT? Returns "C_1530,C_1550,C_1570" <Do measurement> CALC:WDM:DATA:CHAN:CAT? Returns "C_001,C_1530,C_1550,C_002,C_1570"
Notes	The channel results list is sorted into ascending order according to channel center wavelength.
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel[:DEFine] :CALCulate[1..n][:WDM]:CHANnel:CATalog? :CALCulate[1..n][:WDM]:DATA:CHANnel:COUNt?

:CALCulate[1..n][:WDM]:DATA:CHANnel:COUNt?

Description	This query returns the number of WDM analysis channel results. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:COUNt?
Parameter(s)	None
Response Syntax	<Count>

:CALCulate[1..n][:WDM]:DATA:CHANnel:COUNt?

Response(s)	*Count:* The response data syntax for <Count> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <Count> response corresponds to the number of items in the list of channel results. The <Count> value is the sum of the number of user defined channels with the number of new channels automatically created based on the default channel.
Example(s)	CALC:WDM:CHAN:AUTO OFF CALC:WDM:CHAN:DEL:ALL CALC:WDM:CHAN:DEF "C_1550", 1550.000 NM CALC:WDM:CHAN:DEF "C_1570", 1570.000 NM <Do measurement> CALC:WDM:DATA:CHAN:COUN? Returns 2
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO :CALCulate[1..n][:WDM]:CHANnel:COUNt? :CALCulate[1..n][:WDM]:CHANnel[:DEFine] :CALCulate[1..n][:WDM]:DATA:CHANnel:CATalo g?

:CALCulate[1..n][:WDM]:DATA:CHANnel:CENTer:FREQuency?

Description	This query indicates the nominal center frequency used for WDM analysis of the selected channel result. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:CENTer :FREQuency?
Parameter(s)	None
Response Syntax	<Center>
Response(s)	*Center:* The response data syntax for <Center> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Center> response corresponds to the nominal channel center frequency in hertz.

:CALCulate[1..n][:WDM]:DATA:CHANnel:CENTer:FREQuency?

Example(s)	CALC:CHAN:DEL:ALL CALC:CHAN:DEF "ITU_32", 212.0000 THZ <Do measurement> CALC:DATA:CHAN:SEL "ITU_32" CALC:DATA:CHAN:CENT:FREQ? Returns 2.120000E+014
See Also	:CALCulate[1..n][:WDM]:CHANnel[:DEFine] :CALCulate[1..n][:WDM]:DATA:CHANnel:CenterMASs:FREQuency? :CALCulate[1..n][:WDM]:DATA:CHANnel:CenterPEAk:FREQuency? :CALCulate[1..n][:WDM]:DATA:CHANnel:CENTer[:WAVelength]? :CALCulate[1..n][:WDM]:DATA:CHANnel:SELect

:CALCulate[1..n][:WDM]:DATA:CHANnel:CENTer[:WAVelength]?

Description	This query indicates the nominal center wavelength used for WDM analysis of the selected channel result. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:CENTer[:WAVelength]?
Parameter(s)	None
Response Syntax	<Center>
Response(s)	*Center:* The response data syntax for <Center> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Center> response corresponds to the nominal channel center wavelength in meter.

:CALCulate[1..n][:WDM]:DATA:CHANnel:CENTer[:WAVelength]?

Example(s)	CALC:WDM:CHAN:DEL:ALL CALC:WDM:CHAN:DEF "C_003", 1401.500 NM <Do measurement> CALC:WDM:DATA:CHAN:SEL "C_003" CALC:WDM:DATA:CHAN:CENT:WAV? Returns 1.401500E-006
See Also	:CALCulate[1..n][:WDM]:CHANnel[:DEFine] :CALCulate[1..n][:WDM]:DATA:CHANnel:Center MASs[:WAVelength]? :CALCulate[1..n][:WDM]:DATA:CHANnel:Center PEAk[:WAVelength]? :CALCulate[1..n][:WDM]:DATA:CHANnel:CENTer:FREQuency? :CALCulate[1..n][:WDM]:DATA:CHANnel:SELect

:CALCulate[1..n][:WDM]:DATA:CHANnel:CenterMASs:FREQuency?

Description	This query returns computed WDM analysis result for center of mass frequency of the selected channel. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:CenterMASs:FREQuency?
Parameter(s)	None
Response Syntax	<Center>
Response(s)	*Center:* The response data syntax for <Center> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Center> response corresponds to the computed center of mass frequency in hertz.
Example(s)	CALC:CHAN:DEL:ALL CALC:CHAN:DEF "ITU_14", 201.9873 THZ <Do measurement> CALC:DATA:CHAN:SEL "ITU_14" CALC:DATA:CHAN:CMAS:FREQ? Returns 2.020066E+014

:CALCulate[1..n][:WDM]:DATA:CHANnel:CenterMASs:FREQuency?

Notes	Special NAN (not a number) value -2251799813685248 is returned if analysis result could not be computed.
See Also	:CALCulate[1..n][:WDM]:DATA:CHANnel:CENTer:FREQuency? :CALCulate[1..n][:WDM]:DATA:CHANnel:CenterPEAk:FREQuency? :CALCulate[1..n][:WDM]:DATA:CHANnel:CenterMASs[:WAVeength]? :CALCulate[1..n][:WDM]:DATA:CHANnel:SELect :CALCulate[1..n][:WDM]:DATA:CHANnel::STATus:QUEStionable:BIT<9|10|11>:CONDition?

:CALCulate[1..n][:WDM]:DATA:CHANnel:CenterMASs[:WAVelength]?

Description	This query returns computed WDM analysis result for center of mass wavelength of the selected channel. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:Center MASs[:WAVelength]?
Parameter(s)	None
Response Syntax	<Center>
Response(s)	*Center:* The response data syntax for <Center> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Center> response corresponds to the computed center of mass wavelength in meter.
Example(s)	CALC:WDM:CHAN:DEL:ALL CALC:WDM:CHAN:DEF "C_2", 1287.000 NM <Do measurement> CALC:WDM:DATA:CHAN:SEL "C_2" CALC:WDM:DATA:CHAN:CMAS:WAV? Returns 1.286971E-006

:CALCulate[1..n][:WDM]:DATA:CHANnel:CenterMASs[:WAVelength]?

Notes	Special NAN (not a number) value -2251799813685248 is returned if analysis result could not be computed.
See Also	:CALCulate[1..n][:WDM]:DATA:CHANnel:CENTer[:WAVelength]? :CALCulate[1..n][:WDM]:DATA:CHANnel:CenterPEAk[:WAVelength]? :CALCulate[1..n][:WDM]:DATA:CHANnel:CenterMASs:FREQuency? :CALCulate[1..n][:WDM]:DATA:CHANnel:SELect :CALCulate[1..n][:WDM]:DATA:CHANnel::STATus:QUEStionable:BIT<9|10|11>:CONDition?

:CALCulate[1..n][:WDM]:DATA:CHANnel:CenterPEAk:FREQuency?

Description	This query returns computed WDM analysis result for peak center frequency of the selected channel. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:CenterPEAk:FREQuency?
Parameter(s)	None
Response Syntax	<Center>
Response(s)	*Center:* The response data syntax for <Center> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Center> response corresponds to the computed peak center frequency in hertz.
Example(s)	CALC:CHAN:DEL:ALL CALC:CHAN:DEF "ITU_08", 196.4327 THZ <Do measurement> CALC:DATA:CHAN:SEL "ITU_08" CALC:DATA:CHAN:CPEA:FREQ? Returns 1.964293E+014

:CALCulate[1..n][:WDM]:DATA:CHANnel:CenterPEAk:FREQuency?

Notes	Special NAN (not a number) value -2251799813685248 is returned if analysis result could not be computed.
See Also	:CALCulate[1..n][:WDM]:DATA:CHANnel:CENTer:FREQuency? :CALCulate[1..n][:WDM]:DATA:CHANnel:CenterMASs:FREQuency? :CALCulate[1..n][:WDM]:DATA:CHANnel:CenterPEAk[:WAVelength]? :CALCulate[1..n][:WDM]:DATA:CHANnel:SELect :CALCulate[1..n][:WDM]:DATA:CHANnel::STATus:QUEStionable:BIT<9|10|11>:CONDition?

:CALCulate[1..n][:WDM]:DATA:CHANnel:CenterPEAk[:WAVelength]?

Description	This query returns computed WDM analysis result for peak center wavelength of the selected channel. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:Center PEAk[:WAVelength]?
Parameter(s)	None
Response Syntax	<Center>
Response(s)	*Center:* The response data syntax for <Center> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Center> response corresponds to the computed peak center wavelength in meter.
Example(s)	CALC:CHAN:DEL:ALL CALC:CHAN:DEF "CWDM_05", 1529.000 NM <Do measurement> CALC:DATA:CHAN:SEL "CWDM_05" CALC:DATA:CHAN:CPEA:WAV? Returns 1.529568E-006

:CALCulate[1..n][:WDM]:DATA:CHANnel:CenterPEAk[:WAVelength]?

Notes	Special NAN (not a number) value -2251799813685248 is returned if analysis result could not be computed.
See Also	:CALCulate[1..n][:WDM]:DATA:CHANnel:CENTer[:WAVelength]? :CALCulate[1..n][:WDM]:DATA:CHANnel:CenterMASs[:WAVelength]? :CALCulate[1..n][:WDM]:DATA:CHANnel:CenterPEAk:FREQuency? :CALCulate[1..n][:WDM]:DATA:CHANnel:SELect :CALCulate[1..n][:WDM]:DATA:CHANnel::STATus:QUEStionable:BIT<9|10|11>:CONDition?

:CALCulate[1..n][:WDM]:DATA:CHANnel:ENBW?

Description	This query returns equivalent noise bandwidth of the selected channel. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:ENBW?
Parameter(s)	None
Response Syntax	<ENBW>
Response(s)	*ENBW:* The response data syntax for <ENBW> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <ENBW> response corresponds to the computed equivalent noise bandwidth of the channel. The returned value is expressed in meter.
Example(s)	CALC:CHAN:DEL:ALL CALC:CHAN:DEF "CWDM_03", 1615.000 NM CALC:CHAN:SEL "CWDM_03" CALC:CHAN:SIGP:TYPE IPOW CALC:CHAN:NOIS:AUTO OFF CALC:CHAN:NOIS:TYPE IEC <Do measurement>

:CALCulate[1..n][:WDM]:DATA:CHANnel:ENBW?

	CALC:DATA:CHAN:SEL "CWDM_03" CALC:DATA:CHAN:ENBW? Returns 6.1937000E-011
Notes	Special NAN (not a number) value -2251799813685248 is returned if analysis result could not be computed.
See Also	:CALCulate[1..n][:WDM]:DATA:CHANnel:SELect :TRACe:BANDwidth|BWIDth:RESolution?

:CALCulate[1..n][:WDM]:DATA:CHANnel:NOISe?

Description	This query returns computed WDM analysis result for noise power level of the selected channel. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:NOISe?
Parameter(s)	None
Response Syntax	<Noise>
Response(s)	*Noise:* The response data syntax for <Noise> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Noise> response corresponds to the computed noise power level.
Example(s)	CALC:CHAN:DEL:ALL CALC:CHAN:DEF "CWDM_03", 1615.000 NM CALC:CHAN:SEL "CWDM_03" CALC:CHAN:SIGP:TYPE IPOW CALC:CHAN:NOIS:AUTO OFF CALC:CHAN:NOIS:TYPE IEC <Do measurement>

:CALCulate[1..n][:WDM]:DATA:CHANnel:NOISe?

	CALC:DATA:CHAN:SEL "CWDM_03" UNIT:POW DBM CALC:DATA:CHAN:NOIS? Returns -5.417000E+001
Notes	Special NAN (not a number) value -2251799813685248 is returned if analysis result could not be computed.
See Also	:CALCulate[1..n][:WDM]:DATA:CHANnel:NOISe:AUTO? :CALCulate[1..n][:WDM]:DATA:CHANnel:NOISe:TYPE? :CALCulate[1..n][:WDM]:DATA:CHANnel:SELect :CALCulate[1..n][:WDM]:DATA:CHANnel::STATus:QUEStionable:BIT<9|10|11>:CONDition?

:CALCulate[1..n][:WDM]:DATA:CHANnel:NOISe:AUTO?

Description	This query indicates if the selected WDM channel result was computed using i-InBand auto noise measurement. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:NOISe:AUTO?
Parameter(s)	None
Response Syntax	<Auto>
Response(s)	*Auto:* The response data syntax for <Auto> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <Auto> response corresponds to the state of the auto noise measurement. 0: auto noise measurement is disabled. 1: auto noise measurement is enabled.

:CALCulate[1..n][:WDM]:DATA:CHANnel:NOISe:AUTO?

Example(s)	CALC:WDM:CHAN:DEL:ALL CALC:WDM:CHAN:DEF "C_001", 1528.000 NM CALC:WDM:CHAN:SEL "C_001" CALC:WDM:CHAN:NOIS:AUTO OFF <Do measurement> CALC:WDM:DATA:CHAN:SEL "C_001" CALC:WDM:DATA:CHAN:NOIS:AUTO? Returns 0 (auto noise disabled)
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:AUTO :CALCulate[1..n][:WDM]:CHANnel:NOISe:AUTO :CALCulate[1..n][:WDM]:DATA:CHANnel:NOISe? :CALCulate[1..n][:WDM]:DATA:CHANnel:NOISe:TYPE? :CALCulate[1..n][:WDM]:DATA:CHANnel:SELect

:CALCulate[1..n][:WDM]:DATA:CHANnel:NOISe:TYPE?

Description	This query indicates the noise measurement type used for WDM analysis of the selected channel result. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:NOISe:TYPE?
Parameter(s)	None
Response Syntax	<Type>
Response(s)	*Type:* The response data syntax for <Type> is defined as a <CHARACTER RESPONSE DATA> element. The <Type> response corresponds to the selected noise type. IEC: IEC noise type is selected.

:CALCulate[1..n][:WDM]:DATA:CHANnel:NOISe:TYPE?

	INBAND: InBand noise type is selected. INBANDNARROWFILTER: InBand narrow filter noise type is selected. POLYNOMIAL5: 5th order polynomial fit noise type is selected.
Example(s)	CALC:WDM:CHAN:DEL:ALL CALC:WDM:CHAN:DEF "ITU_011", 201.4670 THZ CALC:WDM:CHAN:SEL "ITU_011" CALC:WDM:CHAN:NOIS:AUTO ON <Do measurement> CALC:WDM:DATA:CHAN:SEL "ITU_011" CALC:WDM:DATA:CHAN:NOIS:TYPE? Returns INBAND or INBANDNARROWFILTER
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE :CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE :CALCulate[1..n][:WDM]:DATA:CHANnel:NOISe? :CALCulate[1..n][:WDM]:DATA:CHANnel:NOISe:AUTO? :CALCulate[1..n][:WDM]:DATA:CHANnel:SELect

:CALCulate[1..n][:WDM]:DATA:CHANnel:OSNR?

Description	This query returns computed WDM analysis result for signal-to-noise ratio of the selected channel. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:OSNR?
Parameter(s)	None
Response Syntax	<Osnr>
Response(s)	*Osnr:* The response data syntax for <Osnr> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Osnr> response corresponds to the computed signal-to-noise ratio.
Example(s)	CALC:CHAN:DEL:ALL CALC:CHAN:DEF "ITU_017", 203.8950 THZ CALC:CHAN:SEL "ITU_017" CALC:CHAN:SIGP:TYPE IPOW CALC:CHAN:NOIS:AUTO OFF CALC:CHAN:NOIS:TYPE IEC <Do measurement>

:CALCulate[1..n][:WDM]:DATA:CHANnel:OSNR?

	CALC:DATA:CHAN:SEL "ITU_017" UNIT:RAT DB CALC:DATA:CHAN:OSNR? Returns 1.955000E+001
Notes	Special NAN (not a number) value -2251799813685248 is returned if analysis result could not be computed.
See Also	:CALCulate[1..n][:WDM]:DATA:CHANnel:NOISe? :CALCulate[1..n][:WDM]:DATA:CHANnel:SELect :CALCulate[1..n][:WDM]:DATA:CHANnel:SIGnalPower? :CALCulate[1..n][:WDM]:DATA:CHANnel::STATus:QUEStionable:BIT<9|10|11>:CONDition?

:CALCulate[1..n][:WDM]:DATA:CHANnel:NSELect

Description	This command sets the one-based index of the selected WDM channel result. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:NSELect<wsp><Select>|MAXimum|MINimum
Parameter(s)	*Select:* The program data syntax for <Select> is defined as a <numeric_value> element. The <Select> special forms MINimum and MAXimum are accepted on input.

:CALCulate[1..n][:WDM]:DATA:CHANnel:NSELect

MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.

The <Select> parameter corresponds to a valid channel result index to select. The channel index cannot be zero.

The CALCulate[1..n][:WDM]:DATA:CHANnel:COUNt? query can be used to determine valid index range.

Example(s)

CALC:WDM:CHAN:DEL:ALL
CALC:WDM:CHAN:DEF "C_007", 1380.000 NM
<Do measurement>
CALC:WDM:DATA:CHAN:NSEL 1

See Also

:CALCulate[1..n][:WDM]:CHANnel:NSELect
:CALCulate[1..n][:WDM]:DATA:CHANnel:COUNt?
:CALCulate[1..n][:WDM]:DATA:CHANnel:NSELect?
:CALCulate[1..n][:WDM]:DATA:CHANnel:SELect

:CALCulate[1..n][:WDM]:DATA:CHANnel:NSELect?

Description	This query returns the one-based index of the selected WDM channel result. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:NSELect?
Parameter(s)	None
Response Syntax	<Select>
Response(s)	*Select:* The response data syntax for <Select> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <Select> response corresponds to the index of the selected channel result. Zero is returned if no channel has been selected.
Example(s)	CALC:WDM:CHAN:DEL:ALL CALC:WDM:CHAN:DEF "C_001", 1300.000 NM <Do measurement> CALC:WDM:DATA:CHAN:NSEL? Returns 0 (no selection) CALC:WDM:DATA:CHAN:NSEL 1 CALC:WDM:DATA:CHAN:NSEL? Returns 1
See Also	:CALCulate[1..n][:WDM]:CHANnel:NSELect? :CALCulate[1..n][:WDM]:DATA:CHANnel:NSELect :CALCulate[1..n][:WDM]:DATA:CHANnel:SELect?

:CALCulate[1..n][:WDM]:DATA:CHANnel:SELect

Description	This command sets the name of the selected WDM channel result. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:SELect <wsp><Select>
Parameter(s)	*Select:* The program data syntax for <Select> is defined as a <STRING PROGRAM DATA> element. The <Select> parameter corresponds to the name of the channel result to select. The channel name cannot be empty.
Example(s)	CALC:WDM:CHAN:DEL:ALL CALC:WDM:CHAN:DEF "C_007", 1380.000 NM <Do measurement> CALC:WDM:DATA:CHAN:SEL "C_001"
See Also	:CALCulate[1..n][:WDM]:CHANnel:SELect :CALCulate[1..n][:WDM]:DATA:CHANnel:CATalog? :CALCulate[1..n][:WDM]:DATA:CHANnel:NSELect :CALCulate[1..n][:WDM]:DATA:CHANnel:SELect?

:CALCulate[1..n][:WDM]:DATA:CHANnel:SELect?

Description	This query returns the name of the selected WDM channel result. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:SELect?
Parameter(s)	None
Response Syntax	<Select>
Response(s)	*Select:* The response data syntax for <Select> is defined as a <STRING RESPONSE DATA> element.

:CALCulate[1..n][:WDM]:DATA:CHANnel:SELect?

The <Select> response corresponds to the name of the selected channel result. A single null string is returned if no channel has been selected.

Example(s)	CALC:WDM:CHAN:DEL:ALL CALC:WDM:CHAN:DEF "C_001", 1300.000 NM <Do measurement> CALC:WDM:DATA:CHAN:SEL? Returns "" (no selection) CALC:WDM:DATA:CHAN:SEL "C_001" CALC:WDM:DATA:CHAN:SEL? Returns "C_001"
See Also	:CALCulate[1..n][:WDM]:CHANnel:SELect :CALCulate[1..n][:WDM]:DATA:CHANnel:CATalog? :CALCulate[1..n][:WDM]:DATA:CHANnel:NSELect? :CALCulate[1..n][:WDM]:DATA:CHANnel:SELect

:CALCulate[1..n][:WDM]:DATA:CHANnel:SIGnalPower?

Description	This query returns computed WDM analysis result for signal power level of the selected channel. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:SIGnalPower?
Parameter(s)	None
Response Syntax	<Signal>

:CALCulate[1..n][:WDM]:DATA:CHANnel:SIGnalPower?

Response(s)

Signal:

The response data syntax for <Signal> is defined as a <NR3 NUMERIC RESPONSE DATA> element.

The <Signal> response corresponds to the computed signal power level.

Example(s)

CALC:CHAN:DEL:ALL
CALC:CHAN:DEF "ITU_019", 229.7860 THZ
CALC:CHAN:SEL "ITU_019"
CALC:CHAN:SIGP:TYPE TPOW
<Do measurement>
CALC:DATA:CHAN:SEL "ITU_019"
UNIT:POW DBM
CALC:DATA:CHAN:SIGP? Returns -3.430000E+000

See Also

:CALCulate[1..n][:WDM]:CHANnel:AUTO:SIGnalPower:TYPE
:CALCulate[1..n][:WDM]:CHANnel:SIGnalPower:TYPE
:CALCulate[1..n][:WDM]:DATA:CHANnel:SIGnalPower:TYPE?
:CALCulate[1..n][:WDM]:DATA:CHANnel:SELect
:CALCulate[1..n][:WDM]:DATA:CHANnel::STATus:QUEStionable:BIT<9|10|11>:CONDition?

:CALCulate[1..n][:WDM]:DATA:CHANnel:SIGnalPower:TYPE?

Description	This query indicates the signal power measurement type used for WDM analysis of the selected channel result. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:SIGnalPower:TYPE?
Parameter(s)	None
Response Syntax	<Type>
Response(s)	*Type:* The response data syntax for <Type> is defined as a <CHARACTER RESPONSE DATA> element. The <Type> response corresponds to the selected signal power type.

:CALCulate[1..n][:WDM]:DATA:CHANnel:SIGnalPower:TYPE?

	IPOWER: integrated signal power type is selected. PPOWER: peak signal power type is selected. TPOWER: channel total power type is selected.
Example(s)	CALC:CHAN:DEL:ALL CALC:CHAN:DEF "ITU_011", 192.5520 THZ CALC:CHAN:SEL "ITU_011" CALC:CHAN:SIGP:TYPE PPOW <Do measurement> CALC:DATA:CHAN:SEL "ITU_011" CALC:DATA:CHAN:SIGP:TYPE? Returns PPOWER
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO:SIGnalPower:TYPE :CALCulate[1..n][:WDM]:CHANnel:SIGnalPower:TYPE :CALCulate[1..n][:WDM]:DATA:CHANnel:SELect :CALCulate[1..n][:WDM]:DATA:CHANnel:SIGnalPower?

:CALCulate[1..n][:WDM]:DATA:CHANnel:STATus:QUEStionable:BIT<9|10|11>

Description	This query returns the state of a specific bit from the questionable status of the selected WDM channel result. The <n>, ("bit <n>") indicates for which bit the information must be retrieved. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:CHANnel:STATus:QUEStionable
Parameter(s)	None
Response Syntax	
Response(s)	*Condition:*
Example(s)	CALC:WDM:CHAN:DEL:ALL CALC:WDM:CHAN:DEF "CWDM_06", 1400.000 NM <Do measurement> CALC:WDM:DATA:CHAN:SEL "CWDM_06" CALC:WDM:DATA:CHAN:STAT:QUES:BIT10:COND?
See Also	:CALCulate[1..n][:WDM]:DATA:CHANnel:SELect

:CALCulate[1..n][:WDM]:DATA:OSNR:FLATness?

Description	This query returns computed WDM analysis global result for signal-to-noise ratio flatness. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:OSNR:FLATness?
Parameter(s)	None
Response Syntax	<Flatness>
Response(s)	*Flatness:* The response data syntax for <Flatness> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Flatness> response corresponds to the computed signal-to-noise ratio flatness.
Example(s)	<Do measurement> UNIT:RAT DB CALC:DATA:OSNR:FLAT? Returns 2.992000E+001
Notes	Special NAN (not a number) value -2251799813685248 is returned if analysis result could not be computed.
See Also	:CALCulate[1..n][:WDM]:DATA:OSNR:MEAN? :CALCulate[1..n][:WDM]:DATA:SIGnalPower:FLATness? :CALCulate[1..n][:WDM]:DATA:SIGnalPower:MEAN? :CALCulate[1..n][:WDM]:DATA:TPOWer?

:CALCulate[1..n][:WDM]:DATA:OSNR:MEAN?

Description	This query returns computed WDM analysis global result for mean signal-to-noise ratio. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:OSNR:MEAN?
Parameter(s)	None
Response Syntax	<Mean>
Response(s)	*Mean:* The response data syntax for <Mean> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Mean> response corresponds to the computed mean signal-to-noise ratio.
Example(s)	<Do measurement> UNIT:RAT DB CALC:WDM:DATA:OSNR:MEAN? Returns 4.471000E+001
Notes	Special NAN (not a number) value -2251799813685248 is returned if analysis result could not be computed.
See Also	:CALCulate[1..n][:WDM]:DATA:OSNR:FLATness? :CALCulate[1..n][:WDM]:DATA:SIGnalPower:FLATness? :CALCulate[1..n][:WDM]:DATA:SIGnalPower:MEAN? :CALCulate[1..n][:WDM]:DATA:TPOWer?

:CALCulate[1..n][:WDM]:DATA:SIGnalPower:FLATness?

Description	This query returns computed WDM analysis global result for signal power flatness. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:SIGnalPower:FLATness?
Parameter(s)	None
Response Syntax	<Flatness>
Response(s)	*Flatness:* The response data syntax for <Flatness> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Flatness> response corresponds to the computed signal power flatness.
Example(s)	<Do measurement> UNIT:RAT DB CALC:DATA:SIGP:FLAT? Returns 3.118000E+001
Notes	Special NAN (not a number) value -2251799813685248 is returned if analysis result could not be computed.
See Also	:CALCulate[1..n][:WDM]:DATA:OSNR:FLATness? :CALCulate[1..n][:WDM]:DATA:OSNR:MEAN? :CALCulate[1..n][:WDM]:DATA:SIGnalPower:MEAN? :CALCulate[1..n][:WDM]:DATA:TPOWer?

:CALCulate[1..n][:WDM]:DATA:SIGnalPower:MEAN?

Description	This query returns computed WDM analysis global result for signal mean power. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:SIGnalPower:MEAN?
Parameter(s)	None
Response Syntax	<Mean>
Response(s)	*Mean:* The response data syntax for <Mean> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Mean> response corresponds to the computed mean signal power.
Example(s)	<Do measurement> UNIT:POW DBM CALC:WDM:DATA:SIGP:MEAN? Returns -8.200000E+000
Notes	Special NAN (not a number) value -2251799813685248 is returned if analysis result could not be computed.
See Also	:CALCulate[1..n][:WDM]:DATA:OSNR:FLATness? :CALCulate[1..n][:WDM]:DATA:OSNR:MEAN? :CALCulate[1..n][:WDM]:DATA:SIGnalPower:FLATness? :CALCulate[1..n][:WDM]:DATA:TPOWer?

:CALCulate[1..n][:WDM]:DATA:TPOWer?

Description	This query returns computed WDM analysis global result for analyzed trace total power. At *RST, this value is not available.
Syntax	:CALCulate[1..n][:WDM]:DATA:TPOWer?
Parameter(s)	None
Response Syntax	<Power>
Response(s)	*Power:* The response data syntax for <Power> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Power> response corresponds to the computed total power of the trace.
Example(s)	<Do measurement> UNIT:POW DBM CALC:DATA:TPOW? Returns -3.420000E+000
Notes	Special NAN (not a number) value -2251799813685248 is returned if analysis result could not be computed.
See Also	:CALCulate[1..n][:WDM]:DATA:OSNR:FLATness? :CALCulate[1..n][:WDM]:DATA:OSNR:MEAN? :CALCulate[1..n][:WDM]:DATA:SIGnalPower:FLATness? :CALCulate[1..n][:WDM]:DATA:SIGnalPower:MEAN?

:CALCulate[1..n][:WDM]:OSNR:BANDwidth|BWIDth[:RESolution]

Description	This command sets custom resolution bandwidth value for WDM analysis OSNR calculation. At *RST, this value is set to 0.100 nm.
Syntax	:CALCulate[1..n][:WDM]:OSNR:BANDwidth|BWIDth[:RESolution]<wsp><Resolution[<wsp>M]>|MAXimum|MINimum|DEFault
Parameter(s)	*Resolution:* The program data syntax for <Resolution> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is M. The <Resolution> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value.

:CALCulate[1..n][:WDM]:OSNR:BANDwidth|BWIDth[:RESolution]

	DEFault allows the instrument to select a value for the <Resolution> parameter. The <Resolution> parameter corresponds to the custom resolution bandwidth in meter. The CALCulate[1..n][:WDM]:OSNR:BANDwidth[RESolution]? MIN and CALCulate[1..n][:WDM]:OSNR:BANDwidth[RESolution]? MAX queries can be used to determine valid resolution bandwidth range.
Example(s)	CALC:WDM:OSNR:BAND:RES:AUTO OFF CALC:WDM:OSNR:BAND:RES 0.065 NM CALC:WDM:OSNR:BAND:RES? Returns 6.500000E-011
See Also	:CALCulate[1..n][:WDM]:BWIDth[1|2]|BANDwidth[1|2]:RelativeLEVel :CALCulate[1..n][:WDM]:OSNR:BWIDth|BANDwidth[:RESolution]? :CALCulate[1..n][:WDM]:OSNR:BWIDth|BANDwidth[:RESolution]:AUTO :CALCulate[1..n][:WDM]:THReshold

:CALCulate[1..n][:WDM]:OSNR:BANDwidth|BWIDth[:RESolution]?

Description	This query returns a value indicating either the current or the minimum/maximum resolution bandwidth value for WDM analysis OSNR calculation. At *RST, this value is set to 0.100 nm.
Syntax	:CALCulate[1..n][:WDM]:OSNR:BANDwidth|BWIDth[:RESolution]?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Resolution>

:CALCulate[1..n][:WDM]:OSNR:BANDwidth|BWIDth[:RESolution]?

Response(s)	*Resolution:* The response data syntax for <Resolution> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Resolution> response corresponds to either the current or the MINimum/MAXimum resolution bandwidth value for OSNR calculation.
Example(s)	CALC:WDM:OSNR:BAND:RES:AUTO OFF CALC:WDM:OSNR:BAND:RES 0.065 NM CALC:WDM:OSNR:BAND:RES? Returns 6.500000E-011
See Also	:CALCulate[1..n][:WDM]:OSNR:BWIDth|BANDwidth[:RESolution]:AUTO :CALCulate[1..n][:WDM]:OSNR:BWIDth|BANDwidth[:RESolution]

:CALCulate[1..n][:WDM]:OSNR:BANDwidth|BWIDth[:RESolution]:AUTO

Description	This command controls activation of WDM analysis OSNR calculation using auto resolution bandwidth for all channels. At *RST, auto resolution bandwidth is set to off (disabled).
Syntax	:CALCulate[1..n][:WDM]:OSNR:BANDwidth|BWIDth[:RESolution]:AUTO<wsp><Auto>
Parameter(s)	*Auto:* The program data syntax for <Auto> is defined as a <Boolean Program Data> element. The <Auto> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0.

:CALCulate[1..n][:WDM]:OSNR: BANDwidth|BWIDth[:RESolution]:AUTO

	The <Auto> parameter corresponds to the new state of auto resolution bandwidth for OSNR calculation. 0 or OFF: custom resolution bandwidth value is used. 1 or ON: instruments resolution bandwidth is used.
Example(s)	CALC:WDM:OSNR:BAND:RES:AUTO ON CALC:WDM:OSNR:BAND:RES:AUTO? Returns 1 (instrument's RBW enabled) CALC:WDM:OSNR:BAND:RES 0.100 NM CALC:WDM:OSNR:BAND:RES:AUTO OFF CALC:WDM:OSNR:BAND:RES:AUTO? Returns 0 (RBW 0.100 nm enabled)
See Also	:CALCulate[1..n][:WDM]:BWIDth[1|2]|BANDwidth[1|2]:RelativeLEVel :CALCulate[1..n][:WDM]:OSNR:BWIDth|BANDwidth[:RESolution] :CALCulate[1..n][:WDM]:OSNR:BWIDth|BANDwidth[:RESolution]:AUTO? :CALCulate[1..n][:WDM]:THReshold

:CALCulate[1..n][:WDM]:OSNR: BANDwidth|BWIDth[:RESolution]:AUTO?

Description	This query indicates if WDM analysis OSNR calculation using auto resolution bandwidth has been enabled or not for all channels. At *RST, auto resolution bandwidth is set to off (disabled).
Syntax	:CALCulate[1..n][:WDM]:OSNR:BANDwidth|BWIDth[:RESolution]:AUTO?
Parameter(s)	None
Response Syntax	<Auto>
Response(s)	*Auto:* The response data syntax for <Auto> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <Auto> response corresponds to the state of the auto resolution bandwidth for OSNR calculation. 0: custom resolution bandwidth value is used. 1: instruments resolution bandwidth is used.
Example(s)	CALC:OSNR:BAND:RES:AUTO ON CALC:OSNR:BAND:RES:AUTO? Returns 1 (instrument's RBW enabled)
See Also	:CALCulate[1..n][:WDM]:OSNR:BWIDth|BANDwidth[:RESolution] :CALCulate[1..n][:WDM]:OSNR:BWIDth|BANDwidth[:RESolution]:AUTO

:CALCulate[1..n][:WDM]:STATe

Description

This command controls activation of WDM analysis.

At *RST, WDM analysis is set to on (enabled).

Syntax

:CALCulate[1..n][:WDM]:STATe<wsp><Auto>

Parameter(s)

Auto:

The program data syntax for <Auto> is defined as a <Boolean Program Data> element. The <Auto> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0.

The <Auto> parameter corresponds to the new state of WDM analysis.

0 or OFF: WDM analysis is disabled.
1 or ON: WDM analysis is enabled.

Example(s)

CALC:WDM:STAT ON
CALC:WDM:STAT? Returns 1 (WDM analysis enabled)

Notes

WDM analysis cannot be disabled: OFF (0) value is valid for queries only.

It is possible to query acquired trace data only if active measurement analysis mode is WDM.

See Also

:CALCulate[1..n][:WDM]:STATe?
:INITiate[:IMMediate]
:INITiate:CONTinuous
:TRACe:FEED:CONTrol

:CALCulate[1..n][:WDM]:STATe?

Description	This query indicates if WDM analysis has been enabled or not. At *RST, WDM analysis is set to on (enabled).
Syntax	:CALCulate[1..n][:WDM]:STATe?
Parameter(s)	None
Response Syntax	<Auto>
Response(s)	*Auto:* The response data syntax for <Auto> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <Auto> response corresponds to the state of the WDM analysis. 0: WDM analysis is enabled. 1: WDM analysis is disabled.
Example(s)	CALC:STAT? Returns 0 if application mode is not WDM CALC:STAT ON CALC:STAT? Returns 1 (WDM analysis enabled)
See Also	:CALCulate[1..n][:WDM]:STATe

:CALCulate[1..n][:WDM]:THReshold

Description

This command sets WDM analysis absolute power threshold for peak detection.

At *RST, this value is set to -45.0 dBm.

Syntax

:CALCulate[1..n][:WDM]:THReshold<wsp><Threshold[<wsp>DBM|W]>|MAXimum|MINimum|DEFault

Parameter(s)

Threshold:

The program data syntax for <Threshold> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> elements are: DBM|W. The <Threshold> special forms MINimum, MAXimum and DEFault are accepted on input.

MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.

:CALCulate[1..n][:WDM]:THReshold

	DEFault allows the instrument to select a value for the <Threshold> parameter. The <Threshold> parameter corresponds to the peak detection power level. The CALCulate[1..n][:WDM]:THReshold? MIN and CALCulate[1..n][:WDM]:THReshold? MAX queries can be used to determine valid power range.
Example(s)	CALC:WDM:THR -30.00 DBM UNIT:POW DBM CALC:WDM:THR? Returns -3.000000E+001
See Also	:CALCulate[1..n][:WDM]:BWIDth[1|2]|BANDwidth[1|2]:RelativeLEVel :CALCulate[1..n][:WDM]:OSNR:BWIDth|BANDwidth[:RESolution] :CALCulate[1..n][:WDM]:OSNR:BWIDth|BANDwidth[:RESolution]:AUTO :CALCulate[1..n][:WDM]:THReshold?

:CALCulate[1..n][:WDM]:THReshold?

Description	This query returns a value indicating either the current or the minimum/maximum WDM analysis absolute power threshold for peak detection. At *RST, this value is set to -45.0 dBm.
Syntax	:CALCulate[1..n][:WDM]:THReshold?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Threshold>

:CALCulate[1..n][:WDM]:THReshold?

Response(s)	*Threshold:* The response data syntax for <Threshold> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Threshold> response corresponds to either the current or the MINimum/MAXimum peak detection power level value.
Example(s)	CALC:THR 1.00 UW UNIT:POW W CALC:THR? Returns 1.000000E-006
See Also	:CALCulate[1..n][:WDM]:THReshold

:CALibration[1..n]:DATE?

Description	This query returns the date of the most recent factory calibration. This command has no associated *RST condition.
Syntax	:CALibration[1..n]:DATE?
Parameter(s)	None
Response Syntax	<Date>
Response(s)	*Date:* The response data syntax for <Date> is defined as a <STRING RESPONSE DATA> element. The <Date> response corresponds to the date of the most recent factory calibration. Date format is yyyy,mm,dd where: yyyy: is the year. mm: is the month in the range 1 to 12. dd: is the day in the range 1 to 31.
Example(s)	CAL:DATE? Returns "2011,05,27"
See Also	:CALibration:POWer:DATE? :CALibration:WAVelength:DATE?

:CALibration[1..n]:POWer:DATE?

Description	This query returns the date of the most recent user power calibration. This command has no associated *RST condition.
Syntax	:CALibration[1..n]:POWer:DATE?
Parameter(s)	None
Response Syntax	<Date>
Response(s)	*Date:* The response data syntax for <Date> is defined as a <STRING RESPONSE DATA> element. The <Date> response corresponds to the date of the most recent user power calibration. Date format is yyyy,mm,dd where: yyyy: is the year. mm: is the month in the range 1 to 12. dd: is the day in the range 1 to 31.
Example(s)	CAL:POW:DATE? Returns "2011,07,15"
See Also	:CALibration:DATE? :CALibration:WAVelength:DATE?

:CALibration[1..n]:WAVelength:DATE?

Description	This query returns the date of the most recent user wavelength calibration. This command has no associated *RST condition.
Syntax	:CALibration[1..n]:WAVelength:DATE?
Parameter(s)	None
Response Syntax	<Date>
Response(s)	*Date:* The response data syntax for <Date> is defined as a <STRING RESPONSE DATA> element. The <Date> response corresponds to the date of the most recent user wavelength calibration. Date format is yyyy,mm,dd where: yyyy: is the year. mm: is the month in the range 1 to 12. dd: is the day in the range 1 to 31.
Example(s)	CAL:WAV:DATE? Returns "2011,12,08"
See Also	:CALibration:DATE? :CALibration:POWer:DATE?

:CALibration[1..n]:ZERO[:AUTO]

Description	This command sets whether or not the instrument should perform auto zero calibration (nulling) at device-dependent intervals without user intervention. At *RST, auto zero calibration is set to on (enabled).
Syntax	:CALibration[1..n]:ZERO[:AUTO]<wsp><Auto>|ON|OFF|ONCE
Parameter(s)	*Auto:* The program data syntax for <Auto> is defined as a <Boolean Program Data>|<CHARACTER PROGRAM DATA> element. The <Auto> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0. The parameter corresponds to the new state of auto zero calibration. 0 or OFF: disable auto zero calibration. 1 or ON: enable auto zero calibration. ONCE: launch a one time zero calibration. This parameter has no effet on current ON/OFF state of auto zero calibration.

:CALibration[1..n]:ZERO[:AUTO]

Example(s)	STAT? Must return READY CAL:ZERO:AUTO ONCE STAT:OPER:BIT9:COND? Keep resending this query as long as the operation is not complete (returned value is not 0). CAL:ZERO:AUTO? Returns 1 (auto zero still enabled)
Notes	Zero calibration operation takes up to 5 seconds to complete. Auto zero calibration cannot be disabled: OFF (0) value is valid for queries only.
See Also	:CALibration:ZERO:AUTO? :STATus? :STATus:OPERation:BIT<8|9>:CONDition?

:CALibration[1..n]:ZERO[:AUTO]?

Description	This query indicates whether or not the instrument performs auto zero calibration (nulling) at device-dependent intervals without user intervention. At *RST, auto zero calibration is set to on (enabled).
Syntax	:CALibration[1..n]:ZERO[:AUTO]?
Parameter(s)	None
Response Syntax	<Auto>
Response(s)	*Auto:* The response data syntax for <Auto> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <Auto> response corresponds to the state of the auto zero calibration. 0: auto zero is disabled. 1: auto zero is enabled.
Example(s)	CAL:ZERO? Returns 1 (auto zero enabled)
See Also	:CALibration:ZERO:AUTO

:INITiate:CONTinuous

Description	This command is used to select whether the trigger system is continuously initiated or not. The trigger system is used to control trace acquisition. At *RST, this value is set to off (disabled).
Syntax	:INITiate:CONTinuous<wsp><Continuous>
Parameter(s)	*Continuous:* The program data syntax for <Continuous> is defined as a <Boolean Program Data> element. The <Continuous> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0. The <Continuous> parameter corresponds to the new state of the trigger system continuous cycle. 0 or OFF: disable continuous cycle: trigger system returns to idle. 1 or ON: enable continuous cycle.

:INITiate:CONTinuous

With <Continuous> set to OFF, the trigger system remain in idle state until <Continuous> is set to ON or INITiate:IMMediate command is received. With <Continuous> set to ON, the trigger system leave idle state and continue cycling until <Continuous> set to OFF or ABORt command is received.

When <Continuous> is set to OFF, the current trigger cycle is completed before returning to idle state: current acquisition continue until finished.

Example(s)

```
CALC:WDM:CHAN:DEL:ALL
CALC:WDM:CHAN:AUTO ON
CALC:WDM:CHAN:AUTO:NOIS:AUTO OFF
CALC:WDM:CHAN:AUTO:NOIS:TYPE IEC
CALC:WDM:STATe ON
TRACe:FEED:CONTrol "TRC1", ALW
SENS:AVER:STAT OFF
```

:INITiate:CONTinuous

SENS:WAV:STAR 1525.000 NM
SENS:WAV:STOP 1570.000 NM
TRIG:SEQ:SOUR IMM
STAT? Poll until returned state is READY
INIT:CONT ON
INIT:CONT? Returns 1 (trigger system continuously initiated)
...
INIT:CONT OFF
STAT:OPER:BIT8:COND? Poll until returned state is 0

Notes

The trigger system leaves IDLE state to perform acquisition only if the instrument is in READY status.

Trace averaging is not supported by the trigger system when continuously initiated.

Continuous acquisition does not support InBand noise analysis: acquired trace is always analysed using IEC noise measurement.

See Also

:ABORt
:CALCulate[1..n][:WDM]:STATe
:INITiate[:IMMediate]
:INITiate:CONTinuous?
:SENSe[1..n]:AVERage:STATe
:STATus?
:STATus:OPERation:BIT<8|9>:CONDition?
:TRACe:FEED:CONTrol
:TRIGger[1..n][:SEQuence]:SOURce

:INITiate:CONTinuous?

Description	This query indicates if the trigger system is continuously initiated or not. At *RST, this value is set to off (disabled).
Syntax	:INITiate:CONTinuous?
Parameter(s)	None
Response Syntax	<Continuous>
Response(s)	*Continuous:* The response data syntax for <Continuous> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <Continuous> response corresponds to the state of the trigger system continuous cycle. 0: continuous cycle is disabled. 1: continuous cycle is enabled.
Example(s)	INIT:CONT ON INIT:CONT? Returns 1 (trigger system continuously initiated)
Notes	An acquisition may still be in progress even if INIT:CONT? returns 0. The command STAT:OPER:BIT8:COND? shall be used to test acquisition completion.
See Also	:INITiate[:IMMediate] :INITiate:CONTinuous :STATus? :STATus:OPERation:BIT<8|9>:CONDition?

:INITiate[:IMMediate]

Description	This command completes one full trigger system cycle, returning to IDLE on completion. This command is an event and has no associated *RST condition or query form.
Syntax	:INITiate[:IMMediate]
Parameter(s)	None
Example(s)	CALC:WDM:CHAN:DEL:ALL CALC:WDM:CHAN:AUTO ON CALC:WDM:CHAN:AUTO:NOIS:AUTO OFF CALC:WDM:CHAN:AUTO:NOIS:TYPE IEC CALC:WDM:STATe ON TRACe:FEED:CONTrol "TRC1", ALW SENS:AVER:STAT ON SENS:AVER:TYPE SCAL

:INITiate[:IMMediate]

	SENS:AVER:COUN 8 SENS:WAV:STAR 1525.000 NM SENS:WAV:STOP 1570.000 NM TRIG:SEQ:SOUR IMM STAT? Poll until returned state is READY INIT:IMM STAT:OPER:BIT8:COND? Poll until returned state is 0
Notes	The trigger system leaves IDLE state to perform acquisition only if the instrument is in READY status. This command is used to start single, averaging, InBand or i-InBand acquisitions.
See Also	:ABORt :CALCulate[1..n][:WDM]:STATe :INITiate:CONTinuous :SENSe[1..n]:AVERage:STATe? :STATus? :STATus:OPERation:BIT<8|9>:CONDition? :TRACe:FEED:CONTrol :TRIGger[1..n][:SEQuence]:SOURce

:MEMory:TABLe:DATA?

Description	This query returns the channel results in a "row-column" format for the specified table. The list of column is specified using the :MEMory:TABLe:DEFine command. The number of rows is available using :MEMory:TABLe:POINt? command. This query has no associated *RST condition.
Syntax	:MEMory:TABLe:DATA?<wsp><TableName>
Parameter(s)	*TableName:* The program data syntax for <TableName> is defined as a <STRING PROGRAM DATA> element. The <TableName> parameter corresponds to the name of the table to select.
Response Syntax	<Table>
Response(s)	*Table:* The response data syntax for <Table> is defined as a <DEFINITE LENGTH ARBITRARY BLOCK RESPONSE DATA> element. The <Table> response contains an array of channel results. Each string line corresponds to a row in the table. Each row is composed of column where the entries are specified in the :MEMory:TABLe:DEFine command. The column order is preserved. Unrecognized column definition will produce empty result.

:MEMory:TABLe:DATA?

Example(s)	<Do measurement> MEM:TABL:SEL "WDM:CHANNEL" MEM:TABL:DEF "NAME,CMAS:WAV" MEM:TABL:POIN? "WDM:CHANNEL" returns 2 MEM:TABL:DATA? "WDM:CHANNEL" returns #248"C_001,1.55236113E-006","C_002,1.55672735 7E-006"
Notes	The only valid table name is "WDM:Channel". Table data is available only if trace analysis was performed.
See Also	:MEMory:TABLe:DEFine :MEMory:TABLe:POINt?

:MEMory:TABLe:DEFine

Description	This command sets the column content and order for the table response. The table to define must first be selected using the :MEMory:TABLe:SELect command. At *RST, this value is set to as empty column list for every table.
Syntax	:MEMory:TABLe:DEFine<wsp><ColumnName>
Parameter(s)	*ColumnName:* The program data syntax for <ColumnName> is defined as a <STRING PROGRAM DATA> element.

:MEMory:TABLe:DEFine

Parameter(s)	The <ColumnName> contains a comma separated list of the name of the column to include in the table. The column order is preserved. Unrecognized column definition will produce empty result. Duplicates are allowed. The possible entries in this list are any of the following elements: BAND1:FREQ, BAND1:RLEV, BAND1:WAV, BAND2:FREQ, BAND2:RLEV, BAND2:WAV, BWID1:FREQ, BWID1:RLEV, BWID1:WAV, BWID2:FREQ, BWID2:RLEV, BWID2:WAV, CENT:FREQ, CENT:WAV, CMAS:FREQ, CMAS:WAV, CPEA:FREQ, CPEA:WAV, ENBW, NAME, NOIS, NOIS:TYPE, OSNR, SIGP, SIGP:TYPE, STAT:QUES:BIT9:COND, STAT:QUES:BIT10:COND, STAT:QUES:BIT11:COND, WIDT:FREQ or WIDT:WAV. Consult the :CALCulate:WDM:DATA:CHANnel command tree to get a description of the return value for the previous elements. Only short form is accepted.
Example(s)	<Do measurement> MEM:TABL:SEL "WDM:CHANNEL" MEM:TABL:DEF "NAME,CMAS:WAV" MEM:TABL:POIN? "WDM:CHANNEL" returns 2 MEM:TABL:DATA? "WDM:CHANNEL" returns #248"C_001,1.55236113E-006","C_002,1.55672735 7E-006"
Notes	The only valid table name is "WDM:Channel".
See Also	:MEMory:TABLe:DATA? :MEMory:TABLe:DEFine? :MEMory:TABLe:SELect

:MEMory:TABLe:DEFine?

Description	This query returns the column content and order for the specified table. The table to get the definition from must first be selected using the :MEMory:TABLe:SELect command. This query has no associated *RST condition.
Syntax	:MEMory:TABLe:DEFine?
Parameter(s)	None
Response Syntax	<ColumnName>
Response(s)	*ColumnName:* The response data syntax for <ColumnName> is defined as a <STRING RESPONSE DATA> element. The <ColumnName> contains a comma separated list of the name of the column currently defined for the selected table. The column order is preserved.
Example(s)	MEM:TABL:SEL "WDM:CHANNEL" MEM:TABL:DEF "NAME,CMAS:WAV" MEM:TABL:DEF? returns "NAME,CMAS:WAV"
Notes	The only valid table name is "WDM:Channel".
See Also	:MEMory:TABLe:DATA? :MEMory:TABLe:DEFine :MEMory:TABLe:SELect

:MEMory:TABLe:SELect

Description	This command selects the table to define. At *RST, there is no selection: a single null string is returned.
Syntax	:MEMory:TABLe:SELect<wsp><TableName>
Parameter(s)	*TableName:* The program data syntax for <TableName> is defined as a <STRING PROGRAM DATA> element. The <TableName> parameter corresponds to the name of the table to select.
Example(s)	<Do measurement> MEM:TABL:SEL "WDM:CHANNEL" MEM:TABL:DEF "NAME,CMAS:WAV" MEM:TABL:POIN? "WDM:CHANNEL" returns 2 MEM:TABL:DATA? "WDM:CHANNEL" returns #248"C_001,1.55236113E-006","C_002,1.556727357E-006"
Notes	The only valid table name is "WDM:Channel".
See Also	:MEMory:TABLe:DEFine :MEMory:TABLe:DEFine? :MEMory:TABLe:SELect?

:MEMory:TABLe:SELect?

Description	This query returns the name of the currently selected table. At *RST, there is no selection: a single null string is returned.
Syntax	:MEMory:TABLe:SELect?
Parameter(s)	None
Response Syntax	<TableName>
Response(s)	*TableName:* The response data syntax for <TableName> is defined as a <STRING RESPONSE DATA> element. The <TableName> response corresponds to the name of the currently selected table.
Example(s)	MEM:TABL:SEL "WDM:CHANNEL" MEM:TABL:DEF "NAME,CMAS:WAV" MEM:TABL:SEL? returns "WDM:CHANNEL"
Notes	The only valid table name is "WDM:Channel".
See Also	:MEMory:TABLe:DEFine :MEMory:TABLe:DEFine? :MEMory:TABLe:SELect

:MEMory:TABLe:POINt?

Description	This query returns the number of rows in the table. This query has no associated *RST condition.
Syntax	:MEMory:TABLe:POINt?<wsp><TableName>
Parameter(s)	*TableName:* The program data syntax for <TableName> is defined as a <STRING PROGRAM DATA> element. The <TableName> parameter corresponds to the name of the table to select.
Response Syntax	<Point>
Response(s)	*Point:* The response data syntax for <Point> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <Point> response corresponds to the number of rows of the specified table.
Example(s)	<Do measurement> MEM:TABL:SEL "WDM:CHANNEL" MEM:TABL:DEF "NAME,CMAS:WAV" MEM:TABL:POIN? "WDM:CHANNEL" returns 6
Notes	The only valid table name is "WDM:Channel".
See Also	:CALCulate[1..n][:WDM]:DATA:CHANnel:COUNt? :MEMory:TABLe:DATA?

:MMEMory:STORe:MEASurement[:WDM]

Description	This command transfers the current WDM measurement results and analysed trace from instrument's internal memory to mass storage memory at the specified location. This command is an event and does not have a query form or a *RST condition.
Syntax	:MMEMory:STORe:MEASurement[:WDM]<wsp> <FileName>
Parameter(s)	*FileName:* The program data syntax for <FileName> is defined as a <STRING PROGRAM DATA> element. The <FileName> parameter is a quoted string containing the name of the file used to store measurement data. If destination directory name is not specified in the <FileName> parameter then default user file directory is used. WDM file extension is appended if file extension is not specified or is invalid for the measurement type.

:MMEMory:STORe:MEASurement[:WDM]

Example(s)	MMEM:STOR:MEAS:WDM "C:OSATestResults_8.osawdm"
Notes	If a file with the specified <FileName> already exists, the instrument does not generate error and the file is overwritten.
See Also	:CALCulate[1..n][:WDM]:STATe :INITiate[:IMMediate] :INITiate:CONTinuous?

:SENSe[1..n]:AVERage:COUNt

Description	This command sets the number of acquired traces to combine for averaging to a specific value. At *RST, averaging count is set to 8.
Syntax	:SENSe[1..n]:AVERage:COUNt<wsp><Count>|MAXimum|MINimum|DEFault
Parameter(s)	*Count:* The program data syntax for <Count> is defined as a <numeric_value> element. The <Count> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value. DEFault allows the instrument to select a value for the <Count> parameter. The <Count> parameter corresponds to a valid averaging count value. The SENSe[1..n]:AVERage:COUNt? MIN and SENSe[1..n]:AVERage:COUNt? MAX queries can be used to determine valid count range.

:SENSe[1..n]:AVERage:COUNt

Example(s)	SENS:AVER:STAT ON SENS:AVER:TYPE SCAL SENS:AVER:COUN? MIN Returns 2 SENS:AVER:COUN? MAX Returns 9999 SENS:AVER:COUN 20 SENS:AVER:COUN? Returns 20
Notes	If averaging type is set to PMMH and auto noise measurement is active then specific averaging count setting has no effect. It is automatically determined by the instrument.
See Also	:INITiate[:IMMediate] :INITiate:CONTinuous :SENSe[1..n]:AVERage:STATe :SENSe[1..n]:AVERage:TYPE :SENSe[1..n]:AVERage:COUNt?

:SENSe[1..n]:AVERage:COUNt?

Description	This query returns a value indicating either the current or the minimum/maximum number of acquired traces to combine for averaging. At *RST, averaging count is set to 8.
Syntax	:SENSe[1..n]:AVERage:COUNt?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Count>

:SENSe[1..n]:AVERage:COUNt?

Response(s)	*Count:* The response data syntax for <Count> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <Count> response corresponds to either the current or the MINimum/MAXimum averaging count value.
Example(s)	SENS:AVER:COUN 100 SENS:AVER:COUN? Returns 100
See Also	:SENSe[1..n]:AVERage:STATe :SENSe[1..n]:AVERage:TYPE :SENSe[1..n]:AVERage:COUNt

:SENSe[1..n]:AVERage:STATe

Description	This command controls activation of acquired trace averaging. At *RST, averaging is set to off (disabled).
Syntax	:SENSe[1..n]:AVERage:STATe<wsp><State>
Parameter(s)	*State:* The program data syntax for <State> is defined as a <Boolean Program Data> element. The <State> special forms ON and OFF are accepted on input for increased readability. ON corresponds to 1 and OFF corresponds to 0. The <State> parameter corresponds to the new state of trace averaging. 0 or OFF: disable averaging. 1 or ON: enable averaging.
Example(s)	SENS:AVER:STAT OFF SENS:AVER:STAT? Returns 0 (averaging is disabled)
Notes	Trace averaging is not supported by the trigger system when continuously initiated (INIT:CONT ON).
See Also	:INITiate[:IMMediate] :INITiate:CONTinuous :SENSe[1..n]:AVERage:COUNt :SENSe[1..n]:AVERage:TYPE :SENSe[1..n]:AVERage:STATe?

:SENSe[1..n]:AVERage:STATe?

Description	This query indicates if acquired trace averaging has been enabled or not. At *RST, averaging is set to off (disabled).
Syntax	:SENSe[1..n]:AVERage:STATe?
Parameter(s)	None
Response Syntax	<State>
Response(s)	*State:* The response data syntax for <State> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <State> response corresponds to the activation state of trace averaging. 0: trace averaging is disabled. 1: trace averaging is enabled.
Example(s)	SENS:AVER:STAT ON SENS:AVER:STAT? Returns 1 (averaging is enabled)
See Also	:SENSe[1..n]:AVERage:COUNt :SENSe[1..n]:AVERage:TYPE :SENSe[1..n]:AVERage:STATe

:SENSe[1..n]:AVERage:TYPE

Description	This command selects the acquired trace averaging type. At *RST, averaging is set to SCALar.
Syntax	:SENSe[1..n]:AVERage:TYPE<wsp>SCALar|PolarizationMinMaxHold
Parameter(s)	*Type:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: SCALar|PolarizationMinMaxHold. The parameter corresponds to the newly selected trace averaging type. SCALar: selects scalar averaging type. PolarizationMinMaxHold: selects averaging type for InBand noise measurement.
Example(s)	SENS:AVER:TYPE SCAL SENS:AVER:TYPE? Returns SCALAR

:SENSe[1..n]:AVERage:TYPE

Notes	PMMH averaging type is available only if software option "InB" is active.
See Also	:CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:AUTO :CALCulate[1..n][:WDM]:CHANnel:AUTO:NOISe:TYPE :CALCulate[1..n][:WDM]:CHANnel:NOISe:AUTO :CALCulate[1..n][:WDM]:CHANnel:NOISe:TYPE :INITiate[:IMMediate] :INITiate:CONTinuous :SENSe[1..n]:AVERage:COUNt :SENSe[1..n]:AVERage:STATe :SENSe[1..n]:AVERage:TYPE?

:SENSe[1..n]:AVERage:TYPE?

Description	This query returns the selected averaging type for trace acquisition. At *RST, averaging is set to SCALar.
Syntax	:SENSe[1..n]:AVERage:TYPE?
Parameter(s)	None
Response Syntax	<Type>
Response(s)	*Type:* The response data syntax for <Type> is defined as a <CHARACTER RESPONSE DATA> element. The <Type> response corresponds to the selected averaging type. SCALAR: scalar averaging type is selected. POLARIZATIONMINMAXHOLD: averaging type for InBand noise measurement is selected.
Example(s)	SENS:AVER:TYPE PMMH SENS:AVER:TYPE? POLARIZATIONMINMAXHOLD
See Also	:SENSe[1..n]:AVERage:COUNt :SENSe[1..n]:AVERage:TYPE :SENSe[1..n]:AVERage:STATe

:SENSe[1..n]:CORRection:OFFSet [:MAGNitude]

Description	This command sets the power offset that is added to every point measured by the instrument. At *RST, this value is set to 0.0 dB.
Syntax	:SENSe[1..n]:CORRection:OFFSet[:MAGNitude] <wsp><Offset[<wsp>DB|W/W|PCT]>|MAXimum|MINimum|DEFault
Parameter(s)	*Offset:* The program data syntax for <Offset> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> elements are: DB|W/W|PCT. The <Offset> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value.

:SENSe[1..n]:CORRection:OFFSet [:MAGNitude]

DEFault allows the instrument to select a value for the <Offset> parameter.

The <Offset> parameter corresponds to a valid power offset value.

The SENSe[1..n]:CORRection:OFFSet[:MAGNitude]? MIN and SENSe[1..n]:CORRection:OFFSet[:MAGNitude]? MAX queries can be used to determine valid power offset range.

Example(s)

SENS:CORR:OFFS:MAGN 0.5 DB
UNIT:RAT DB
SENS:CORR:OFFS:MAGN? Returns 5.000000E-001

See Also

:SENSe[1..n]:WAVelength:OFFSet
:SENSe[1..n]:CORRection:OFFSet[:MAGNitude]?

:SENSe[1..n]:CORRection:OFFSet[:MAGNitude]?

Description	This query returns a value indicating either the current or the minimum/maximum power offset. At *RST, this value is set to 0.0 dB.
Syntax	:SENSe[1..n]:CORRection:OFFSet[:MAGNitude]?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Offset>

:SENSe[1..n]:CORRection:OFFSet [:MAGNitude]?

Response(s)	*Offset:* The response data syntax for <Offset> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Offset> response corresponds to either the current or the MINimum/MAXimum instrument power offset.
Example(s)	SENS:CORR:OFFS:MAGN 0.5 DB UNIT:RAT DB SENS:CORR:OFFS:MAGN? Returns 5.000000E-001
See Also	:SENSe[1..n]:WAVelength:OFFSet :SENSe[1..n]:CORRection:OFFSet[:MAGNitude]

:SENSe[1..n]:FREQuency:STARt

Description	This command sets instrument sweep start frequency. At *RST, this value is set to 190.9506 THz.
Syntax	:SENSe[1..n]:FREQuency:STARt<wsp><Start[<wsp>HZ]>|MAXimum|MINimum|DEFault
Parameter(s)	*Start:* The program data syntax for <Start> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is HZ. The <Start> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value. DEFault allows the instrument to select a value for the <Start> parameter. The <Start> parameter corresponds to a valid sweep start frequency value. The SENSe[1..n]:FREQuency:STARt? MIN and SENSe[1..n]:FREQuency:STARt? MAX queries can be used to determine valid sweep start frequency range.

:SENSe[1..n]:FREQuency:STARt

Example(s)	SENS:FREQ:STAR 197.5 THZ SENS:FREQ:STAR? Returns 1.975000E+014
Notes	Minimum instrument sweep range is 5.0 nm. Upon changing STARt frequency, if necessary, STOP frequency will be automatically ajusted in accordance with minimum sweep range.
See Also	:SENSe[1..n]:FREQuency:STOP :SENSe[1..n]:FREQuency:STARt? :SENSe[1..n][:WAVelength]:OFFSet :SENSe[1..n][:WAVelength]:STARt

:SENSe[1..n]:FREQuency:STARt?

Description	This query returns a value indicating either the current or the minimum/maximum instrument sweep start frequency. At *RST, this value is set to 190.9506 THz.
Syntax	:SENSe[1..n]:FREQuency:STARt?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Start>

:SENSe[1..n]:FREQuency:STARt?

Response(s)	*Start:* The response data syntax for <Start> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Start> response corresponds to either the current or the MINimum/MAXimum instrument sweep start frequency.
Example(s)	SENS:FREQ:STAR 197.5 THZ SENS:FREQ:STAR? Returns 1.975000E+014
See Also	:SENSe[1..n]:FREQuency:STOP :SENSe[1..n]:FREQuency:STARt :SENSe[1..n][:WAVelength]:OFFSet :SENSe[1..n][:WAVelength]:STARt?

:SENSe[1..n]:FREQuency:STOP

Description	This command sets instrument sweep stop frequency. At *RST, this value is set to 196.5852 THz.
Syntax	:SENSe[1..n]:FREQuency:STOP<wsp><Stop[<wsp>HZ]>|MAXimum|MINimum|DEFault
Parameter(s)	*Stop:* The program data syntax for <Stop> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is HZ. The <Stop> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value. DEFault allows the instrument to select a value for the <Stop> parameter. The <Stop> parameter corresponds to a valid sweep stop frequency value. The SENSe[1..n]:FREQuency:STOP? MIN and SENSe[1..n]:FREQuency:STOP? MAX queries can be used to determine valid sweep stop frequency range.

:SENSe[1..n]:FREQuency:STOP

Example(s)	SENS:FREQ:STOP 220.0 THZ SENS:FREQ:STOP? Returns 2.200000E+014
Notes	Minimum instrument sweep range is 5.0 nm. Upon changing STOP frequency, if necessary, STARt frequency will be automatically ajusted in accordance with minimum sweep range.
See Also	:SENSe[1..n]:FREQuency:STARt :SENSe[1..n]:FREQuency:STOP? :SENSe[1..n][:WAVelength]:OFFSet :SENSe[1..n][:WAVelength]:STOP

:SENSe[1..n]:FREQuency:STOP?

Description	This query returns a value indicating either the current or the minimum/maximum instrument sweep stop frequency. At *RST, this value is set to 196.5852 THz.
Syntax	:SENSe[1..n]:FREQuency:STOP?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Stop>

:SENSe[1..n]:FREQuency:STOP?

Response(s)	*Stop:* The response data syntax for <Stop> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Stop> response corresponds to either the current or the MINimum/MAXimum instrument sweep stop frequency.
Example(s)	SENS:FREQ:STOP 220.0 THZ SENS:FREQ:STOP? Returns 2.200000E+014
See Also	:SENSe[1..n]:FREQuency:STARt :SENSe[1..n]:FREQuency:STOP :SENSe[1..n][:WAVelength]:OFFSet :SENSe[1..n][:WAVelength]:STOP?

:SENSe[1..n][:WAVelength]:OFFSet

Description	This command sets the wavelength offset that is added to every point measured by the instrument. At *RST, this value is set to 0.0 nm.
Syntax	:SENSe[1..n][:WAVelength]:OFFSet<wsp><Offset[<wsp>M]>|MAXimum|MINimum|DEFault
Parameter(s)	*Offset:* The program data syntax for <Offset> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is M. The <Offset> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value.

:SENSe[1..n][:WAVelength]:OFFSet

	DEFault allows the instrument to select a value for the <Offset> parameter. The <Offset> parameter corresponds to a valid wavelength offset value. The SENSe[1..n][:WAVelength]:OFFSet? MIN and SENSe[1..n][:WAVelength]:OFFSet? MAX queries can be used to determine valid wavelength offset range.
Example(s)	SENS:WAV:OFFS 0.01 NM SENS:WAV:OFFS? Returns 1.000000E-011
See Also	:SENSe[1..n]:CORRection:OFFSet[:MAGNitude] :SENSe[1..n][:WAVelength]:OFFSet?

:SENSe[1..n][:WAVelength]:OFFSet?

Description	This query returns a value indicating either the current or the minimum/maximum instrument wavelength offset. At *RST, this value is set to 0.0 nm.
Syntax	:SENSe[1..n][:WAVelength]:OFFSet?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Offset>

	:SENSe[1..n][:WAVelength]:OFFSet?
Response(s)	*Offset:* The response data syntax for <Offset> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Offset> response corresponds to either the current or the MINimum/MAXimum instrument wavelength offset.
Example(s)	SENS:WAV:OFFS 0.01 NM SENS:WAV:OFFS? Returns 1.000000E-011
See Also	:SENSe[1..n]:CORRection:OFFSet[:MAGNitude] :SENSe[1..n][:WAVelength]:OFFSet

:SENSe[1..n][:WAVelength]:STARt

Description

This command sets instrument sweep stop wavelength.

At *RST, this value is set to 1525.0 nm.

Syntax

:SENSe[1..n][:WAVelength]:STARt<wsp><Start[<wsp>M]>|MAXimum|MINimum|DEFault

Parameter(s)

Start:

The program data syntax for <Start> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is M. The <Start> special forms MINimum, MAXimum and DEFault are accepted on input.

MINimum allows to set the instrument to the smallest supported value.
MAXimum allows to set the instrument to the greatest supported value.

DEFault allows the instrument to select a value for the <Start> parameter.

The <Start> parameter corresponds to a valid sweep start wavelength value.

The SENSe[1..n][:WAVelength]:STARt? MIN and SENSe[1..n][:WAVelength]:STARt? MAX queries can be used to determine valid sweep start wavelength range.

	:SENSe[1..n][:WAVelength]:STARt
Example(s)	SENS:WAV:STAR 1460.0 NM SENS:WAV:STAR? Returns 1.46000E-006
Notes	Minimum instrument sweep range is 5.0 nm. Upon changing STARt wavelength, if necessary, STOP wavelength will be automatically ajusted in accordance with minimum sweep range.
See Also	:SENSe[1..n][:WAVelength]:OFFSet :SENSe[1..n][:WAVelength]:STOP :SENSe[1..n][:WAVelength]:STARt? :SENSe[1..n]:FREQuency:STARt

:SENSe[1..n][:WAVelength]:STARt?

Description	This query returns a value indicating either the current or the minimum/maximum instrument sweep start wavelength. At *RST, this value is set to 1525.0 nm.
Syntax	:SENSe[1..n][:WAVelength]:STARt?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Start>

:SENSe[1..n][:WAVelength]:STARt?

Response(s)	*Start:* The response data syntax for <Start> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Start> response corresponds to either the current or the MINimum/MAXimum instrument sweep start wavelength.
Example(s)	SENS:STAR 1460.0 NM SENS:STAR? Returns 1.46000E-006
See Also	:SENSe[1..n][:WAVelength]:OFFSet :SENSe[1..n][:WAVelength]:STOP :SENSe[1..n][:WAVelength]:STARt :SENSe[1..n]:FREQuency:STARt?

:SENSe[1..n][:WAVelength]:STOP

Description	This command sets instrument sweep stop wavelength. At *RST, this value is set to 1570.0 nm.
Syntax	:SENSe[1..n][:WAVelength]:STOP<wsp><Stop[<wsp>M]>|MAXimum|MINimum|DEFault
Parameter(s)	*Stop:* The program data syntax for <Stop> is defined as a <numeric_value> element followed by an optional <SUFFIX PROGRAM DATA> element. The allowed <SUFFIX PROGRAM DATA> element is M. The <Stop> special forms MINimum, MAXimum and DEFault are accepted on input. MINimum allows to set the instrument to the smallest supported value. MAXimum allows to set the instrument to the greatest supported value. DEFault allows the instrument to select a value for the <Stop> parameter. The <Stop> parameter corresponds to a valid sweep stop wavelength value. The SENSe[1..n][:WAVelength]:STOP? MIN and SENSe[1..n][:WAVelength]:STOP? MAX queries can be used to determine valid sweep stop wavelength range.

:SENSe[1..n][:WAVelength]:STOP

Example(s)	SENS:WAV:STOP 1525.0 NM SENS:WAV:STOP? Returns 1.525000E-006
Notes	Minimum instrument sweep range is 5.0 nm. Upon changing STOP wavelength, if necessary, STARt wavelength will be automatically ajusted in accordance with minimum sweep range.
See Also	:SENSe[1..n][:WAVelength]:OFFSet :SENSe[1..n][:WAVelength]:STARt :SENSe[1..n][:WAVelength]:STOP? :SENSe[1..n]:FREQuency:STOP

:SENSe[1..n][:WAVelength]:STOP?

Description	This query returns a value indicating either the current or the minimum/maximum instrument sweep stop wavelength. At *RST, this value is set to 1570.0 nm.
Syntax	:SENSe[1..n][:WAVelength]:STOP?[<wsp>MAXimum|MINimum|DEFault]
Parameter(s)	*Parameter 1:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: MAXimum|MINimum|DEFault. MINimum is used to retrieve the instrument's smallest supported value. MAXimum is used to retrieve the instrument's greatest supported value. DEFault is used to retrieve the instrument's default value.
Response Syntax	<Stop>

:SENSe[1..n][:WAVelength]:STOP?

Response(s)	*Stop:* The response data syntax for <Stop> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Stop> response corresponds to either the current or the MINimum/MAXimum instrument sweep stop wavelength.
Example(s)	SENS:STOP 1525.0 NM SENS:STOP? Returns 1.525000E-006
See Also	:SENSe[1..n][:WAVelength]:OFFSet :SENSe[1..n][:WAVelength]:STARt :SENSe[1..n][:WAVelength]:STOP :SENSe[1..n]:FREQuency:STOP?

:SNUMber?

Description	This query returns the serial number of the instrument. This command has no associated *RST condition.
Syntax	:SNUMber?
Parameter(s)	None
Response Syntax	<SerialNumber>
Response(s)	*SerialNumber:* The response data syntax for <SerialNumber> is defined as a <STRING RESPONSE DATA> element. The <SerialNumber> response represents a string containing the instruments serial number.
Example(s)	SNUM? Returns "123456-AB"

:STATus?

Description	This query returns a value indicating the global status of the instrument. This command has no associated *RST condition.
Syntax	:STATus?
Parameter(s)	None
Response Syntax	<Status>
Response(s)	*Status:* The response data syntax for <Status> is defined as a <CHARACTER RESPONSE DATA> element. The <Status> response represents the instrument state, where: UNINITIALIZED means the instrument has not been initialized yet. INITINPROGRESS means the instruments initialization is in progress. READY means the instrument is ready. BUSY means the instrument is busy. DISCONNECTED means the instrument is disconnected. DEFECTIVE means the instrument is defective.
Example(s)	STAT?
See Also	:CALibration:ZERO:AUTO? :INITiate[:IMMediate] :INITiate:CONTinuous? :STATus:OPERation:BIT<8|9>:CONDition?

:STATus:OPERation:BIT<8|9>: CONDition?

Description

This query returns the state of a specific bit in the OPERation register set. The <

At *RST, the value is 0.

Syntax

:STATus:OPERation:BIT<8|9>:CONDition?

Parameter(s)

None

Response Syntax

<Condition>

Response(s)

Condition:

The response data syntax for <Condition> is defined as a <NR1 NUMERIC RESPONSE DATA> element.

:STATus:OPERation:BIT<8|9>: CONDition?

The <Condition> response represents the current operation condition of the instrument. The meaning of the response depends on the value returned for bit <n>.

bit <8>: When the returned value is 1, the instrument is performing a measurement (trigger system INITiated).

bit <9>: When the returned value is 1, the instrument is performing an offset nulling and/or a wavelength referencing (CALibration:ZERO:AUTO?).

Example(s)

STAT? Must return READY
CAL:ZERO:AUTO ONCE
STAT:OPER:BIT9:COND? Keep resending this query as long as the operation is not complete (returned value is not 0).

See Also

:CALibration:ZERO:AUTO?
:INITiate[:IMMediate]
:INITiate:CONTinuous?
:STATus?

:TRACe:BANDwidth|BWIDth:RESolution?

Description	This query returns the resolution bandwidth of the wavelength range for the specified trace. This query has no associated *RST condition.
Syntax	:TRACe:BANDwidth|BWIDth:RESolution?<wsp> <TraceName>
Parameter(s)	*TraceName:* The program data syntax for <TraceName> is defined as a <STRING PROGRAM DATA> element. The <TraceName> parameter corresponds to the name of the trace to select.
Response Syntax	<RBW>
Response(s)	*RBW:* The response data syntax for <RBW> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <RBW> response corresponds to the resolution bandwidth of the current wavelength range of the trace expressed in meter.
Example(s)	<Do measurement> TRAC:BAND:RES? "TRC1" Returns 6.2015E-011
Notes	The only valid trace name is "TRC1". Trace data is available only if trace analysis was performed.
See Also	:CALCulate[1..n][:WDM]:DATA:CHANnel:ENBW?

:TRACe[:DATA]:X:STARt[:WAVElength]?

Description	This query returns the X magnitude of the first point for the specified trace. This query has no associated *RST condition.
Syntax	:TRACe[:DATA]:X:STARt[:WAVElength]?<wsp> <TraceName>
Parameter(s)	*TraceName:* The program data syntax for <TraceName> is defined as a <STRING PROGRAM DATA> element. The <TraceName> parameter corresponds to the name of the trace to select.
Response Syntax	<Start>
Response(s)	*Start:* The response data syntax for <Start> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Start> response corresponds to the X-axis wavelength of the first point of the trace expressed in meter.

:TRACe[:DATA]:X:STARt[:WAVElength]?

Example(s)	<Do measurement> TRAC:DATA:X:STAR? "TRC1" Returns 1.525002E-006
Notes	The only valid trace name is "TRC1". Trace data is available only if trace analysis was performed.
See Also	:TRACe[:DATA]:X:STOP[:WAVelength]? :TRACe[:DATA][:Y][:WAVelength]? :TRACe:FEED:CONTrol? :TRACe:POINts?

:TRACe[:DATA]:X:STOP[:WAVElength]?

Description	This query returns the X magnitude of the last point for the specified trace. This query has no associated *RST condition.
Syntax	:TRACe[:DATA]:X:STOP[:WAVElength]?<wsp><TraceName>
Parameter(s)	*TraceName:* The program data syntax for <TraceName> is defined as a <STRING PROGRAM DATA> element. The <TraceName> parameter corresponds to the name of the trace to select.
Response Syntax	<Stop>
Response(s)	*Stop:* The response data syntax for <Stop> is defined as a <NR3 NUMERIC RESPONSE DATA> element. The <Stop> response corresponds to the X-axis wavelength of the last point of the trace expressed in meter.

:TRACe[:DATA]:X:STOP[:WAVElength]?

Example(s)	<Do measurement> TRAC:DATA:X:STOP? "TRC1" Returns 1.570006E-006
Notes	The only valid trace name is "TRC1". Trace data is available only if trace analysis was performed.
See Also	:TRACe[:DATA]:X:STARt[:WAVelength]? :TRACe[:DATA][:Y][:WAVelength]? :TRACe:FEED:CONTrol? :TRACe:POINts?

:TRACe[:DATA][:Y][:WAVElength]?

Description	This query returns all the points Y magnitude for the specified trace, according to the format determined by commands in the FORMat subsystem. This query has no associated *RST condition.
Syntax	:TRACe[:DATA][:Y][:WAVElength]?<wsp><TraceName>
Parameter(s)	*TraceName:* The program data syntax for <TraceName> is defined as a <STRING PROGRAM DATA> element. The <TraceName> parameter corresponds to the name of the trace to select.
Response Syntax	<Data>
Response(s)	*Data:* The response data syntax for <Data> is defined as a <DEFINITE LENGTH ARBITRARY BLOCK RESPONSE DATA> element.

:TRACe[:DATA][:Y][:WAVElength]?

The <Data> response corresponds to the Y-axis values vector of the trace. Returned values are evenly spaced relative to the X-axis expressed in meter.

X-axis wavelength interval between each Y value is determined as follow:

interval = (stop - start) / (count - 1)   where:

start = TRACe[:DATA]:X:STARt[:WAVelength]?

stop = TRACe[:DATA]:X:STOP[:WAVelength]?
count = TRACe:POINts?

The points unit is determined by the trace definition context. When trace data represents absolute power, returned values are in dBm. When trace data represents relative power, returned values are in dB.

Example(s)

<Do measurement>
FORMat:DATA ASC
TRAC:DATA? "TRC1" Returns
-5.246202E+001,-5.246195E+001,-5.246181E+001
,...
FORMat:DATA PACK
TRAC:DATA? "TRC1" Returns binary data

:TRACe[:DATA][:Y][:WAVElength]?

Notes	The only valid trace name is "TRC1". Trace data is available only if trace analysis was performed. The platform global FORMat:DATA PACK command may be used to set trace data transfer in compressed binary format. At *RST, ASCii is selected as the default data format type.
See Also	:TRACe[:DATA]:X:STARt[:WAVelength]? :TRACe[:DATA]:X:STOP[:WAVelength]? :TRACe:FEED:CONTrol? :TRACe:POINts?

:TRACe:FEED:CONTrol

Description	This command sets how often the specified trace accepts new data. At *RST, feed control is set to ALWays.
Syntax	:TRACe:FEED:CONTrol<wsp><TraceName>,ALWays|NEXT|NEVer
Parameter(s)	➤ *TraceName:* The program data syntax for <TraceName> is defined as a <STRING PROGRAM DATA> element. The <TraceName> parameter corresponds to the name of the trace to select. ➤ *Control:* The program data syntax for the second parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: ALWays|NEXT|NEVer. This parameter corresponds to the newly selected trace feed control mode. ALWays: specified trace is updated whenever new data is available. Existing data automatically update the trace.

:TRACe:FEED:CONTrol

	NEXT: is a one-shot feed, specified trace will wait for new data, such as an new acquistion, and ignores any existing data. CONTrol switch to NEVer once trace data has been updated. NEVer: the specified trace is never updated.
Example(s)	TRAC:FEED:CONT "TRC1", ALW TRAC:FEED:CONT? "TRC1" Returns ALWAYS
Notes	The only valid trace name is "TRC1".
See Also	:INITiate[:IMMediate] :INITiate:CONTinuous :TRACe:FEED:CONTrol?

:TRACe:FEED:CONTrol?

Description	This query returns how often the specified trace accepts new data. At *RST, feed control is set to ALWays.
Syntax	:TRACe:FEED:CONTrol?<wsp><TraceName>
Parameter(s)	*TraceName:* The program data syntax for <TraceName> is defined as a <STRING PROGRAM DATA> element. The <TraceName> parameter corresponds to the name of the trace to select.
Response Syntax	<Control>
Response(s)	*Control:* The response data syntax for <Control> is defined as a <CHARACTER RESPONSE DATA> element. The <Control> response corresponds to the selected trace feed control mode. ALWAYS: specified trace is updated whenever data is available. NEXT: specified trace is waiting for new data to get updated once. NEVer: specified trace is never updated.

:TRACe:FEED:CONTrol?

Example(s)	TRAC:FEED:CONT "TRC1", NEXT TRAC:FEED:CONT? "TRC1" Returns NEXT or NEVER
Notes	The only valid trace name is "TRC1".
See Also	:INITiate[:IMMediate] :INITiate:CONTinuous :TRACe:FEED:CONTrol

:TRACe:POINts?

Description	This query returns the number of measurement data points in the specified trace. This command has no associated *RST condition.
Syntax	:TRACe:POINts?<wsp><TraceName>
Parameter(s)	*TraceName:* The program data syntax for <TraceName> is defined as a <STRING PROGRAM DATA> element. The <TraceName> parameter corresponds to the name of the trace to select.
Response Syntax	<Points>
Response(s)	*Points:* The response data syntax for <Points> is defined as a <NR1 NUMERIC RESPONSE DATA> element. The <Points> response corresponds to the number of points in the specified trace.

	:TRACe:POINts?
Example(s)	TRAC:POIN? "TRC1" Returns 8000
Notes	The only valid trace name is "TRC1". Trace data is available only if trace analysis was performed.
See Also	:TRACe[:DATA]:X:STARt[:WAVElength]? :TRACe[:DATA]:X:STOP[:WAVElength]? :TRACe[:DATA][:Y][:WAVElength]?

:TRIGger[1..n][:SEQuence]:SOURce

Description	This command selects the source for the trigger system event detector. At *RST, the source is set to IMMediate.
Syntax	:TRIGger[1..n][:SEQuence]:SOURce<wsp>IMMediate|TIMer
Parameter(s)	*Source:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: IMMediate|TIMer. The parameter corresponds to the newly selected trigger event source. IMMediate: No waiting for an event occurs. TIMer: The source signal comes from a periodic timer.
Example(s)	TRIG:SEQ:SOUR IMM TRIG:SEQ:SOUR? Returns IMMEDIATE
Notes	The TIMer trigger event source is valid for queries only. It is used internally during drift acquisition.
See Also	:INITiate[:IMMediate] :INITiate:CONTinuous :TRIGger[1..n][:SEQuence]:SOURce?

:TRIGger[1..n][:SEQuence]:SOURce?

Description	This query returns the selected the source for the trigger system event detector. At *RST, the source is set to IMMediate.
Syntax	:TRIGger[1..n][:SEQuence]:SOURce?
Parameter(s)	None
Response Syntax	<Source>
Response(s)	*Source:* The response data syntax for <Source> is defined as a <CHARACTER RESPONSE DATA> element. The <Source> response corresponds to the selected trigger event source. IMMediate: No waiting for an event occurs. TIMer: The source signal comes from a periodic timer.
Example(s)	TRIG:SOUR IMM TRIG:SOUR? Returns IMMEDIATE
See Also	:INITiate[:IMMediate] :INITiate:CONTinuous :TRIGger[1..n][:SEQuence]:SOURce

:UNIT[1..n]:POWer

Description	This command selects a default unit for commands which program absolute power. At *RST, default absolute power unit is set to DBM.
Syntax	:UNIT[1..n]:POWer<wsp>DBM|W
Parameter(s)	*Unit:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: DBM|W. The parameter corresponds to the newly selected default absolute power unit. DBM: selects dBm power unit. W: selects watt power unit.

:UNIT[1..n]:POWer

Example(s)	CALC:WDM:THR -30.00 DBM UNIT:POW DBM UNIT:POW? Returns DBM CALC:WDM:THR? Returns -3.000000E+001 UNIT:POW W UNIT:POW? Returns W CALC:WDM:THR? Returns 1.000000E-006
Notes	Changing default relative power unit (UNIT:RATio) also sets the default absolute power unit to the corresponding setting.
See Also	:UNIT[1..n]:POWer? :UNIT[1..n]:RATio :UNIT[1..n]:SPECtrum

:UNIT[1..n]:POWer?

Description	This query returns the selected default unit for commands which program absolute power. At *RST, default absolute power unit is set to DBM.
Syntax	:UNIT[1..n]:POWer?
Parameter(s)	None
Response Syntax	<Unit>
Response(s)	*Unit:* The response data syntax for <Unit> is defined as a <CHARACTER RESPONSE DATA> element. The response corresponds to the selected default absolute power unit. DBM: dBm power unit is selected. W: watt power unit is selected.
Example(s)	UNIT:POW DBM UNIT:POW? Returns DBM
See Also	:UNIT[1..n]:POWer :UNIT[1..n]:RATio :UNIT[1..n]:SPECtrum

:UNIT[1..n]:RATio

Description	This command selects a default unit for commands which program relative power. At *RST, default relative power unit is set to DB.
Syntax	:UNIT[1..n]:RATio<wsp>DB|W/W|PCT
Parameter(s)	*Unit:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: DB|W/W|PCT. The parameter corresponds to the newly selected default relative power unit. DB: selects dB power unit. W/W: selects watt ratio power unit. PCT: selects percent power unit
Example(s)	UNIT:POW W UNIT:POW? Returns W UNIT:RAT DB UNIT:RAT? Returns DB UNIT:POW? Returns DBM
Notes	Changing default relative power unit also sets the default absolute power unit (UNIT:POWer) to the corresponding setting.
See Also	:UNIT[1..n]:POWer :UNIT[1..n]:SPECtrum :UNIT[1..n]:RATio?

:UNIT[1..n]:RATio?

Description	This query returns the selected default unit for commands which program relative power. At *RST, default relative power unit is set to DB.
Syntax	:UNIT[1..n]:RATio?
Parameter(s)	None
Response Syntax	<Unit>
Response(s)	*Unit:* The response data syntax for <Unit> is defined as a <CHARACTER RESPONSE DATA> element. The response corresponds to the selected default relative power unit. DB: dB power unit is selected. W/W: watt ratio power unit is selected. %: percent power unit is selected.
Example(s)	UNIT:RAT W/W UNIT:RAT? Returns W/W
See Also	:UNIT[1..n]:POWer :UNIT[1..n]:SPECtrum :UNIT[1..n]:RATio

:UNIT[1..n]:SPECtrum

Description	This command selects a default unit for commands which program spectrum. At *RST, default spectrum unit is set to M (meter).
Syntax	:UNIT[1..n]:SPECtrum<wsp>M|HZ
Parameter(s)	*Unit:* The program data syntax for the first parameter is defined as a <CHARACTER PROGRAM DATA> element. The allowed <CHARACTER PROGRAM DATA> elements for this parameter are: M|HZ. The parameter corresponds to the newly selected default spectrum unit. M: selects meter unit. HZ: selects hertz unit.
Example(s)	UNIT:SPEC M UNIT:SPEC? Returns M
See Also	:UNIT[1..n]:POWer :UNIT[1..n]:RATio :UNIT[1..n]:SPECtrum?

:UNIT[1..n]:SPECtrum?

Description	This query returns the selected default unit for commands which program spectrum. At *RST, default spectrum unit is set to M (meter).
Syntax	:UNIT[1..n]:SPECtrum?
Parameter(s)	None
Response Syntax	<Unit>
Response(s)	*Unit:* The response data syntax for <Unit> is defined as a <CHARACTER RESPONSE DATA> element. The response corresponds to the selected default spectrum unit. M: meter unit is selected. HZ: hertz unit is selected.
Example(s)	UNIT:SPEC HZ UNIT:SPEC? Returns HZ
See Also	:UNIT[1..n]:POWer :UNIT[1..n]:RATio :UNIT[1..n]:SPECtrum

Examples on Using the SCPI Commands

Here are a few examples on using the SCPI commands sequences. The left column of the table indicates the command and its position in the sequence, and the right indicates relevant comments about it.

When the command is in bold characters, it is specific to the example; the other commands are there to ensure that the sequence is performed smoothly.

Performing an Offset Nulling and Wavelength Referencing

Command Sequence	Comments
STAT?	Test instrument state is idle. Poll STAT? until the returned state is READY.
CAL:ZERO:AUTO ONCE	Start nulling and referencing. ***Note:*** *this command will take up to 5 seconds to complete.*
STAT:OPER:BIT9:COND?	Wait for the nulling to be completed. Poll bit 9 until the returned value is 0.

Performing a Single Acquisition

Command Sequence	Comments
<Add commands to configure analysis parameters>	
SENS:CORR:OFFS:MAGN 5.0 DB	Set power offset.
SENS:WAV:OFFS 0.065 NM	Set wavelength offset.
SENS:WAV:STAR 1525.000 NM	Set sweep wavelength range: 1525.000 nm to 1570.000 nm.
SENS:WAV:STOP 1570.000 NM	""
SENS:AVER:STAT OFF	Disable trace averaging.
TRIG:SEQ:SOUR IMM	Set sweep trigger event source to immediate.
STAT?	Test instrument state is idle. Poll STAT? until the returned state is READY.
INIT:IMM	Start sweep acquisition.
STAT:OPER:BIT8:COND?	Wait for the acquisition to be completed. Poll bit 8 until the returned value is 0.
<Add commands to retrieve analysis results>	

Performing an Averaging Acquisition

Command Sequence	Comments
<Add commands to configure analysis parameters>	
SENS:CORR:OFFS:MAGN 5.0 DB	Set power offset.
SENS:WAV:OFFS 0.0 NM	Disable wavelength offset.
SENS:WAV:STAR MIN	Set sweep full spectral range using wavelength commands.
SENS:WAV:STOP MAX	""
SENS:AVER:STAT ON	Enable trace averaging.
SENS:AVER:TYPE SCAL	Select SCALAR averaging type.
SENS:AVER:COUN 8	Set the number of sweep to average at 8.
TRIG:SEQ:SOUR IMM	Set sweep trigger event source to immediate.
STAT?	Test instrument state is idle. Poll STAT? until the returned state is READY.
INIT:IMM	Start sweep acquisition.
STAT:OPER:BIT8:COND?	Wait for the acquisition to be completed. Poll bit 8 until the returned value is 0.
<Add commands to retrieve analysis results>	

Performing an Averaging Acquisition for InBand Noise Analysis

Command Sequence	Comments
<Add commands to configure analysis parameters>	
SENS:CORR:OFFS:MAGN 0.0 DB	Disable power offset.
SENS:WAV:OFFS -0.127 NM	Set wavelength offset.
SENS:WAV:STAR 1525.000 NM	Set sweep spectral range: 1525.000 nm to 1570.000 nm.
SENS:WAV:STOP 1570.000 NM	""
SENS:AVER:STAT ON	Enable trace averaging.
SENS:AVER:TYPE PMMH	Select specific trace averaging for InBand noise measurement.
SENS:AVER:COUN 300	Set the number of sweep to average at 300.
TRIG:SEQ:SOUR IMM	Set sweep trigger event source to immediate.
STAT?	Test instrument state is idle. Poll STAT? until the returned state is READY.
INIT:IMM	Start sweep acquisition.
STAT:OPER:BIT8:COND?	Wait for the acquisition to be completed. Poll bit 8 until the returned value is 0.
<Add commands to retrieve analysis results>	

Performing a Continuous Acquisition

Command Sequence	Comments
<Add commands to configure analysis parameters>	
SENS:CORR:OFFS:MAGN 0.0 DB	Disable power offset.
SENS:WAV:OFFS 0.0 NM	Disable wavelength offset.
SENS:FREQ:STAR 190.9506 THZ	Set sweep frequency range.
SENS:FREQ:STOP 196.5852 THZ	""
SENS:AVER:STAT OFF	Disable trace averaging.
TRIG:SEQ:SOUR IMM	Set sweep trigger event source to immediate.
STAT?	Test instrument state is idle. Poll STAT? until the returned state is READY.
INIT:CONT ON	Start sweep acquisition loop.
...	
INIT:CONT OFF	Stop sweep acquisition loop.
STAT:OPER:BIT8:COND?	Wait for the acquisition to be completed. Poll bit 8 until the returned value is 0.
<Add commands to retrieve analysis results>	

Cancelling the Current Acquisition Sequence

Command Sequence	Comments
SENS:AVER:STAT ON	
SENS:AVER:TYPE SCAL	
SENS:AVER:COUN 500	
TRIG:SEQ:SOUR IMM	
STAT?	
INIT:IMM	Start averaging acquisition.
ABOR	Stop acquisition.

Configuring the Analysis Setup for the Next Acquisition Sequence (WDM)

Command Sequence	Comments
CALC:WDM:STAT ON	Activate WDM analysis.
TRAC:FEED:CONT "TRC1", ALW	Set trace data refresh mode to ALWays. When a new sensed trace is available, it is automatically transferred in the WDM calculate block for analysis.
<Add commands to set global parameters>	See *Modifying Global Analysis Parameters (WDM)* on page 606.
<Add commands to configure channel list>	See *Creating a Channel List Based on the Default Channel (WDM)* on page 604 and *Creating a Channel List Based on Specific Channels (WDM)* on page 605.

Creating a Channel List Based on the Default Channel (WDM)

Command Sequence	Comments
CALC:WDM:CHAN:DEL:ALL	Clear current channel list.
CALC:WDM:CHAN:AUTO ON	Activate default channel.
<Add commands to set default channel parameters>	See *Modifying Default Channel Analysis Parameters (WDM)* on page 607.

Creating a Channel List Based on Specific Channels (WDM)

Command Sequence	Comments
CALC:WDM:CHAN:AUTO OFF	Disable default channel.
CALC:WDM:CHAN:DEL:ALL	Clear current channel list.
CALC:WDM:CHAN:DEF "CWDM_1470",1470.0 NM	Add a new channel named "CWDM_1470" with nominal central wavelength at 1470.0 nm. All others parameters for this new channel are set to their default values.
CALC:WDM:CHAN:SEL "CWDM_1470"	Select channel "CWDM_1470".
<Add commands to modify channel parameters>	See *Modifying Selected Channel Analysis Parameters (WDM)* on page 608.
CALC:WDM:CHAN:DEF "CWDM_1530",1530.0 NM	Add a new channel named "CWDM_1530" with a nominal central wavelength at 1530.0 nm. All others parameters for this new channel are set to their default value.
CALC:WDM:CHAN:SEL "CWDM_1530"	Select channel "CWDM_1530".
<Add commands to modify channel parameters>	See *Modifying Selected Channel Analysis Parameters (WDM)* on page 608.
CALC:WDM:CHAN:DEF "CWDM_1550",1550.0 NM	Add a new channel named "CWDM_1550" with a nominal central wavelength at 1550.0 nm. All others parameters for this new channel are set to their default value.
CALC:WDM:CHAN:SEL "CWDM_1550"	Select channel "CWDM_1550".
<Add commands to modify channel parameters>	See *Modifying Selected Channel Analysis Parameters (WDM)* on page 608.

Modifying Global Analysis Parameters (WDM)

Command Sequence	Comments
CALC:WDM:THR -45.00 DBM	Set channel peak detection level.
CALC:WDM:OSNR:BAND:RES:AUTO OFF	Select between the instrument's native or custom resolution bandwidth for OSNR computing.
CALC:WDM:OSNR:BAND:RES 0.100 NM	Set the custom resolution bandwidth for OSNR.
CALC:WDM:BAND2:RLEV 20.0 DB	Set the user defined bandwidth position for all channels.

Modifying Default Channel Analysis Parameters (WDM)

Command Sequence	Comments
CALC:WDM:CHAN:AUTO:WIDT:FREQ 50.0 GHZ	Set channel width.
CALC:WDM:CHAN:AUTO:CENT:ITUG ON	Optional: enable "snap ITU grid" for channel width of: 25, 50, 100 or 200 GHz or 20 nm.
CALC:WDM:CHAN:AUTO:SIGP:TYPE IPOW	Set channel signal power type.
CALC:WDM:CHAN:AUTO:NOIS:AUTO OFF	Select between auto (i-InBand) and custom noise measurement.
CALC:WDM:CHAN:AUTO:NOIS:TYPE POLY5	Select the noise type for custom noise measurement.
CALC:WDM:CHAN:AUTO:NOIS:DIST:FREQ 57.5 GHZ	Set custom OSNR distance for 5th order polynomial fit noise measurement. ***Note:*** *No need to send this command for IEC, INBand or INBandNarrowfilter noise types.*
CALC:WDM:CHAN:AUTO:NOIS:WIDT:FREQ 65.0 GHZ	Set custom noise region for 5th order polynomial fit noise measurement. ***Note:*** *No need to send this command for IEC, INBand or INBandNarrowfilter noise types.*

Modifying Selected Channel Analysis Parameters (WDM)

Command Sequence	Comments
CALC:WDM:CHAN:CENT:WAV 1490.0 NM	Set channel center wavelength.
CALC:WDM:CHAN:WIDT:WAV 0.8 NM	Set channel width.
CALC:WDM:CHAN:SIGP:TYPE IPOW	Set channel signal power type.
CALC:WDM:CHAN:NOIS:AUTO OFF	Select between auto (*i*-InBand) and custom noise measurement.
CALC:WDM:CHAN:NOIS:TYPE POLY5	Select the noise type for custom noise measurement.
CALC:WDM:CHAN:AUTO:NOIS:DIST:WAV 0.55 NM	Set custom OSNR distance for 5th order polynomial fit noise measurement. ***Note:*** *No need to send this command for IEC, INBand or INBandNarrowfilter noise types.*
CALC:WDM:CHAN:AUTO:NOIS:WIDT:WAV 0.3 NM	Set custom noise region for 5th order polynomial fit noise measurement. ***Note:*** *No need to send this command for IEC, INBand or INBandNarrowfilter noise types.*

Retrieving Analysis Results (WDM)

Command Sequence	Comments
UNIT:POW DBM	Set the default unit for absolute power value queries.
UNIT:RAT DB	Set the default unit for relative power value queries.
UNIT:SPEC M	Set the default unit for spectrum value queries.
<Add commands to query analyzed trace data>	See *Retrieving Analyzed Trace Data (WDM)* on page 610.
<Add commands to query global results>	See *Retrieving Global Results (WDM)* on page 610.
CALC:WDM:DATA:CHAN:CAT? **or** **CALC:WDM:DATA:CHAN:COUN?**	Optional: Query channel results identifier list or channel count. Necessary only when querying results for channels automatically created based on the default channel. ***Note:*** *It is also possible to query the full channel results table. See* Retrieving Channel Results Table (WDM) *on page 612.*
CALC:WDM:DATA:CHAN:SEL "C_001" **or** **CALC:WDM:DATA:CHAN:NSEL 1**	Select first channel result to process using specific channel identifier or one-based channel result index.
<Add commands to query channel results>	See *Retrieving Selected Channel Results (WDM)* on page 611.
CALC:WDM:DATA:CHAN:SEL "C_002" **or** **CALC:WDM:DATA:CHAN:NSEL 2**	Select the next channel result to process using specific channel identifier or one-based channel result index.
<Add commands to query channel results>	See *Retrieving Selected Channel Results (WDM)* on page 611.

Command Sequence	Comments
...	...
CALC:WDM:DATA:CHAN:SEL "C_010" **or** **CALC:WDM:DATA:CHAN:NSEL 10**	Select the last channel result to process using specific channel identifier or one-based channel result index.
<Add commands to query channel results>	See *Retrieving Selected Channel Results (WDM)* on page 611.

Retrieving Analyzed Trace Data (WDM)

Command Sequence	Comments
TRAC:POIN? "TRC1"	Query the number of points in the trace.
TRAC:DATA:Y:WAV? "TRC1"	Query the trace power sample vector.
TRAC:DATA:X:STAR:WAV? "TRC1"	Query the minimum wavelength of the trace.
TRAC:DATA:X:STOP:WAV? "TRC1"	Query the maximum wavelength of the trace.

Retrieving Global Results (WDM)

Command Sequence	Comments
CALC:WDM:DATA:SIGP:MEAN?	Query the computed average signal power.
CALC:WDM:DATA:SIGP:FLAT?	Query the computed signal power flatness.
CALC:WDM:DATA:OSNR:MEAN?	Query the computed average OSNR.
CALC:WDM:DATA:OSNR:FLAT?	Query the computed OSNR flatness.
CALC:WDM:DATA:TPOW?	Query the computed trace total power.

Retrieving Selected Channel Results (WDM)

Command Sequence	Comments
CALC:WDM:DATA:CHAN:STAT:QUES:BIT9:COND?	Check for channel signal saturation.
CALC:WDM:DATA:CHAN:STAT:QUES:BIT10:COND?	Check if the channel was detected; signal is present.
CALC:WDM:DATA:CHAN:STAT:QUES:BIT11:COND?	Optional: for InBand noise measurement, check if there is sufficient discrimination for OSNR calculation.
CALC:WDM:DATA:CHAN:CENT:WAV?	Optional: Query configured channel center wavelength.
CALC:WDM:DATA:CHAN:CMAS:WAV?	Query computed channel center of mass wavelength.
CALC:WDM:DATA:CHAN:CPEA:WAV?	Query computed channel peak center wavelength.
CALC:WDM:DATA:CHAN:SIGP:TYPE?	Optional: Query computed signal power type.
CALC:WDM:DATA:CHAN:SIGP?	Query computed channel signal power.
CALC:WDM:DATA:CHAN:NOIS:AUTO?	Optional: Query auto noise (*i*-InBand) active.
CALC:WDM:DATA:CHAN:NOIS:TYPE?	Optional: Query computed noise measurement type.
CALC:WDM:DATA:CHAN:NOIS?	Query computed channel noise level.
CALC:WDM:DATA:CHAN:OSNR?	Query computed channel signal to noise ratio.
CALC:WDM:DATA:CHAN:BAND1:RLEV?	Optional: Query bandwidth position 1.
CALC:WDM:DATA:CHAN:BAND1:WAV?	Query computed channel bandwidth at position 1.
CALC:WDM:DATA:CHAN:BAND2:RLEV?	Optional: Query bandwidth position 2.

Command Sequence	Comments
CALC:WDM:DATA:CHAN:BAND2:WAV?	Query computed channel bandwidth at position 2.

Retrieving Channel Results Table (WDM)

Command Sequence	Comments
MEM:TABL:SEL "WDM:CHANNEL"	Select the WDM analysis channel results table to define.
MEM:TABL:DEF "NAME,CMAS:WAV"	Set the list of channel results (columns) to be returned.
MEM:TABL:POIN? "WDM:CHANNEL"	Optional: Query the number of channel results (rows) in the table.
MEM:TABL:DATA? "WDM:CHANNEL"	Query the WDM analysis channel results table.

Performing an *i*-InBand Acquisition (WDM)

Command Sequence	Comments
<Add commands to configure WDM analysis parameters>	See *Configuring the Analysis Setup for the Next Acquisition Sequence (WDM)* on page 603.
CALC:WDM:CHAN:AUTO:NOIS:AUTO ON	Optional: if the default channel is active, then set auto noise to enabled.
CALC:WDM:CHAN:SEL "C_001"	
CALC:WDM:CHAN:NOIS:AUTO ON	Set the selected channel auto noise to enabled.
CALC:WDM:CHAN:SEL "C_002"	
CALC:WDM:CHAN:NOIS:AUTO ON	Set the selected channel auto noise to enabled.
CALC:WDM:CHAN:SEL "C_003"	
CALC:WDM:CHAN:NOIS:AUTO ON	Set the selected channel auto noise to enabled.
SENS:CORR:OFFS:MAGN 0.0 DB	Disable power offset.
SENS:WAV:OFFS 0.0 NM	Disable spectral offset.
SENS:WAV:STAR 1525.000 NM	Set sweep spectral range: 1525.000 nm to 1570.000 nm.
SENS:WAV:STOP 1570.000 NM	""
SENS:AVER:STAT ON	Enable trace averaging.
SENS:AVER:TYPE PMMH	Select the averaging type for InBand noise measurement. The number of scans for averaging will be automatically determined.
TRIG:SEQ:SOUR IMM	Set the sweep trigger event source to immediate.
STAT?	Test instrument state is idle. Poll STAT? until the returned state is READY.
INIT:IMM	Start sweep acquisition.

Command Sequence	Comments
STAT:OPER:BIT8:COND?	Wait for the acquisition to be completed. Poll bit 8 until the returned value is 0.
<Add commands to retrieve analysis results>	See *Retrieving Analysis Results (WDM)* on page 609.

Performing a Custom InBand Acquisition (WDM)

Command Sequence	Comments
<Add commands to configure Wdm analysis parameters>	See *Configuring the Analysis Setup for the Next Acquisition Sequence (WDM)* on page 603.
CALC:WDM:CHAN:AUTO:NOIS:AUTO OFF	Optional: if the default channel is active then set auto noise to disabled.
CALC:WDM:CHAN:AUTO:NOIS:TYPE INB	Optional: if the default channel is active then set the specific InBand noise measurement type.
CALC:WDM:CHAN:SEL "C_001"	
CALC:WDM:CHAN:NOIS:AUTO OFF	Set the selected channel auto noise to disabled.
CALC:WDM:CHAN:NOIS:TYPE INB	Set the selected channel specific InBand noise measurement type.
CALC:WDM:CHAN:SEL "C_002"	
CALC:WDM:CHAN:NOIS:AUTO OFF	Set the selected channel auto noise to disabled.
CALC:WDM:CHAN:NOIS:TYPE INBN	Set selected channel specific InBand noise measurement type
CALC:WDM:CHAN:SEL "C_003"	
CALC:WDM:CHAN:NOIS:AUTO OFF	Set the selected channel auto noise to disabled.

Command Sequence	Comments
CALC:WDM:CHAN:NOIS:TYPE INBN	Set the selected channel specific InBand noise measurement type.
SENS:CORR:OFFS:MAGN 0.0 DB	Disable the power offset.
SENS:WAV:OFFS 0.0 NM	Disable the spectral offset.
SENS:WAV:STAR 1525.000 NM	Set sweep spectral range: 1525.000 nm to 1570.000 nm.
SENS:WAV:STOP 1570.000 NM	""
SENS:AVER:STAT ON	Enable trace averaging.
SENS:AVER:TYPE PMMH	Select the averaging type for InBand noise measurement.
SENS:AVER:COUN 300	Set the number of sweeps to average.
TRIG:SEQ:SOUR IMM	Set the sweep trigger event source to immediate.
STAT?	Test instrument state is idle. Poll STAT? until the returned state is READY.
INIT:IMM	Start sweep acquisition.
STAT:OPER:BIT8:COND?	Wait for acquisition to be completed. Poll bit 8 until the returned value is 0.
<Add commands to retrieve analysis results>	See *Retrieving Analysis Results (WDM)* on page 609.

Performing a Continuous Acquisition with Synchronized Intermediate Results Query (WDM)

Command Sequence	Comments
<Add commands to configure Wdm analysis parameters>	See *Configuring the Analysis Setup for the Next Acquisition Sequence (WDM)* on page 603.
TRAC:FEED:CONT "TRC1", NEXT	Disable continuous refresh of WDM analysis active trace; set feed control for "one-shot" refresh.
SENS:CORR:OFFS:MAGN 0.0 DB	Disable power offset.
SENS:WAV:OFFS 0.0 NM	Disable wavelength offset.
SENS:FREQ:STAR 190.9506 THZ	Set sweep frequency range.
SENS:FREQ:STOP 196.5852 THZ	""
SENS:AVER:STAT OFF	Enable trace averaging.
TRIG:SEQ:SOUR IMM	Set sweep trigger event source to immediate.
STAT?	Test instrument state is idle. Poll STAT? until the returned state is READY.
INIT:CONT ON	Start sweep acquisition loop.
TRAC:FEED:CONT? "TRC1"	Wait for the first trace refresh to be done. Poll WDM analysis trace feed until the returned value is NEVER.
<Add commands to retrieve analysis results>	See *Retrieving Analysis Results (WDM)* on page 609.
TRAC:FEED:CONT "TRC1", NEXT	Reactivate WDM analysis trace feed control for another "one-shot" refresh.
TRAC:FEED:CONT? "TRC1"	Wait for trace refresh done. Poll trace feed until the returned value is NEVER.
<Add commands to retrieve analysis results>	See *Retrieving Analysis Results (WDM)* on page 609.

Command Sequence	Comments
TRAC:FEED:CONT "TRC1", NEXT	Reactivate WDM analysis trace feed control for another "one-shot" refresh.
TRAC:FEED:CONT? "TRC1"	Wait for trace refresh to be done. Poll trace feed until the returned value is NEVER.
<Add commands to retrieve analysis results>	See *Retrieving Analysis Results (WDM)* on page 609.
...	Continue intermediate results queries as necessary.
TRAC:FEED:CONT "TRC1", ALW	Ready to stop acquisition, set the WDM analysis trace feed to ALWays to make sure that the last acquired trace is analyzed and updated results are available once the acquisition loop is completed.
INIT:CONT OFF	Stop sweep acquisition loop.
STAT:OPER:BIT8:COND?	Wait for the measurement to be completed. Poll bit 8 until the returned value is 0.
<Add commands to retrieve analysis results>	See *Retrieving Analysis Results (WDM)* on page 609.

C Formulas Used with Your Optical Spectrum Analyzer

The following formulas are used in the various tests available with your OSA module.

EDFA Noise Figure Calculation

The EDFA noise figure is calculated using the following equation:

$$\text{EDFA noise figure} = \frac{P_{ASE} - GP_{SSE}}{Gh\nu B} + \frac{1}{G}$$

Where

P_{ASE} is the power of the spontaneous emission amplified by the EDFA,

P_{SSE} is the power of the spontaneous emission of the source,

G is the gain at this channel's wavelength,

h is Plank's constant (6,6256 x 10^{-34} $J \cdot s$),

ν is the frequency of the channel, and

B is the noise equivalent bandwidth, as calibrated at this channel's wavelength.

Central Wavelength Calculation (Spectral Transmittance)

The central wavelength is calculated using the following equation:

$$a = \frac{\lambda_R + \lambda_L}{2}$$

Where

a is the central wavelength,

λ_R is the wavelength on the right at which the power is 3 dB below the power at the nominal wavelength, and

λ_L is the wavelength on the left at which the power is 3 dB below the power at the nominal wavelength.

Bandwidth Calculation (Spectral Transmittance)

Bandwidth is calculated using the following equation:

$$b = 2*\mathrm{Min}\{(\lambda_N - \lambda_{XdBLeft}), (\lambda_{XdBRight} - \lambda_N)\}$$

Where

b is the bandwidth at X dB,

λ_N is the nominal wavelength,

$\lambda_{XdBLeft}$ is the wavelength on the left at which the power is X dB below the power at the nominal wavelength.

$\lambda_{XdbRight}$ is the wavelength on the right at which the power is X dB below the power at the nominal wavelength.

Index

U

V

W

Z

NOTICE
通告

CHINESE REGULATION ON RESTRICTION OF HAZARDOUS SUBSTANCES
中国关于危害物质限制的规定

NAMES AND CONTENTS OF THE TOXIC OR HAZARDOUS SUBSTANCES OR ELEMENTS CONTAINED IN THIS EXFO PRODUCT
包含在本 EXFO 产品中的有毒有害物质或元素的名称和含量

O	Indicates that this toxic or hazardous substance contained in all of the homogeneous materials for this part is below the limit requirement in SJ/T11363-2006 表示该有毒有害物质在该部件所有均质材料中的含量均在 SJ/T11363-2006 标准规定的限量要求以下。
X	Indicates that this toxic or hazardous substance contained in at least one of the homogeneous materials used for this part is above the limit requirement in SJ/T11363-2006 表示该有毒有害物质至少在该部件的某一均质材料中的含量超出 SJ/T11363-2006 标准规定的限量要求。

Part Name 部件名称	Toxic or hazardous Substances and Elements 有毒有害物质和元素					
	Lead 铅 (Pb)	Mercury 汞 (Hg)	Cadmium 隔 (Cd)	Hexavalent Chromium 六价铬 (Cr VI)	Polybrominated biphenyls 多溴联苯 (PBB)	Polybrominated diphenyl ethers 多溴二苯醚 (PBDE)
Enclosure 外壳	O	O	O	O	O	O
Electronic and electrical sub-assembly 电子和电子组件	X	O	X	O	X	X
Optical sub-assembly[a] 光学组件[a]	X	O	O	O	O	O
Mechanical sub-assembly[a] 机械组件[a]	O	O	O	O	O	O

a. If applicable.
如果适用。

MARKING REQUIREMENTS
标注要求

Product 产品	Environmental protection use period (years) 环境保护使用期限 (年)	Logo 标志
This Exfo product 本 EXFO 产品	10	
Battery[a] 电池 [a]	5	

a. If applicable.
如果适用。

P/N: 1066199

www.EXFO.com · info@exfo.com

CORPORATE HEADQUARTERS	400 Godin Avenue	Quebec (Quebec) G1M 2K2 CANADA Tel.: 1 418 683-0211 · Fax: 1 418 683-2170
EXFO AMERICA	3400 Waterview Parkway Suite 100	Richardson, TX 75080 USA Tel.: 1 972-761-927 · Fax: 1 972-761-9067
EXFO EUROPE	Winchester House, School Lane	Chandlers Ford, Hampshire S053 4DG ENGLAND Tel.: +44 2380 246 800 · Fax: +44 2380 246 801
EXFO ASIA-PACIFIC	62 Ubi Road 1, #09-01/02 Oxley Bizhub 2	SINGAPORE 408734 Tel.: +65 6333 8241 · Fax: +65 6333 8242
EXFO CHINA	Beijing Global Trade Center, Tower C, Room 1207, 36 North Third Ring Road East, Dongcheng District	Beijing 100013 P. R. CHINA Tel.: +86 (10) 5825 7755 · Fax: +86 (10) 5825 7722
EXFO SERVICE ASSURANCE	270 Billerica Road	Chelmsford MA, 01824 USA Tel.: 1 978 367-5600 · Fax: 1 978 367-5700
EXFO FINLAND	Elektroniikkatie 2	FI-90590 Oulu, FINLAND Tel.: +358 (0) 403 010 300 · Fax: +358 (0) 8 564 5203
TOLL-FREE	(USA and Canada)	1 800 663-3936

Printed in Canada (2014-03)

ISO 9001

EXPERTISE REACHING OUT