User Guide

MaxTester DSL

FTTx Test Set

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Telecom Test and Measurement

EXFO

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Units of Measurement

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

Version number 4.0.0

Contents

Certification Information

FCC Information

Electronic test equipment is exempt from Part 15 compliance (FCC) in the United States. However, compliance verification tests are systematically performed on most EXFO equipment.

CE Information

Electronic test equipment is subject to the EMC Directive in the European Union. The EN61326 standard prescribes both emission and immunity requirements for laboratory, measurement, and control equipment. This unit has undergone extensive testing according to the European Union Directive and Standards.

EXFO CE **DECLARATION OF CONFORMITY**

Application of Council Directive(s):	2006/95/EC - The Low Voltage Directive 2004/108/EC - The EMC Directive 2006/66/EC - The Battery Directive 93/68/EEC - CE Marking And their amendments
Manufacturer's Name:	EXFO Inc.
Manufacturer's Address:	400 Godin Avenue Quebec, Quebec Canada, G1M 2K2 (418) 683-0211
Equipment Type/Environment:	Test & Measurement / Industrial
Trade Name/Model No.:	MaxTester DSL / MAX-630 series

Standard(s) to which Conformity is Declared:

EN 61010-1:2001 Edition 2.0	**Safety Requirements for Electrical Equipment for Measurement, Control, and Laboratory Use, Part 1: General Requirements.**
EN 61326-1:2006	**Electrical Equipment for Measurement, Control and Laboratory Use - EMC Requirements – Part 1: General requirements**
EN 60825-1:2007 Edition 2.0	**Safety of laser products – Part 1: Equipment classification, requirements, and user's guide**
EN 60950-1:2006+A1:2010	**Information Technology Equipment, Safety - Part 1: General Requirements.**

I, the undersigned, hereby declare that the equipment specified above conforms to the above Directive and Standards.

Manufacturer
Signature:

Full Name: Stephen Bull, E. Eng
Position: Vice-President Research and Development
Address: 400 Godin Avenue, Quebec (Quebec), Canada, G1M 2K2
Date: January 11, 2011

MAX-630-1VER

1 Introducing the MaxTester DSL Test Set

The MaxTester DSL is a handheld device designed for testing ADSL2+ and VDSL2 services between the service provider and the subscriber premises. In addition, the dual Ethernet ports of the MaxTester DSL allow it to be used inside the home to test all the way to the end point of the service.

Product Description

The MaxTester DSL Test Set case is an aluminum enclosure with rubber over mold, which makes it ideal for field use. Its display is a back-lit LCD featuring 800 x 480 resolution. A membrane keypad mounted on the face of the unit features a 14-button keypad used to operate the test set. The following describes the features of the MaxTester DSL.

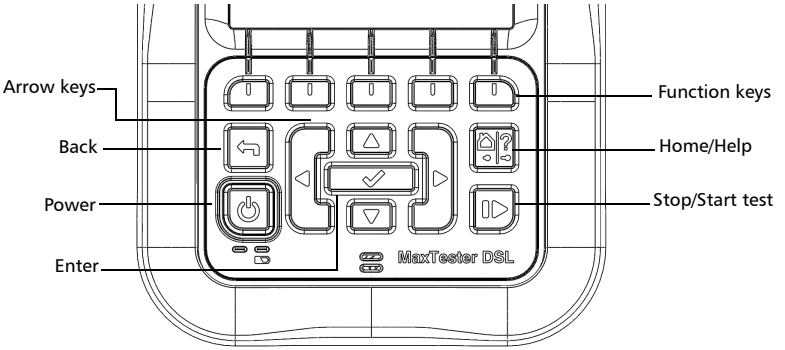
Key Features and Benefits

- Rugged and weatherproof handheld unit
- Broadcom chipset
- IP login
- User-defined automatic testing
- Dual Ethernet ports
- Modem replacement
- Battery powered

Typical Applications

- ADSL2+ testing with optional VDSL2 for hybrid networks
- Optional Web Browser, IPTV analysis, and data tests including Ping, FTP and Traceroute testing
- Ethernet testing for qualifying FTTx service at the customer premises
- Configurable pass/fail results for automated testing

Keypad



- **Power**: The button on the lower left side of the unit is used to power the unit on and off.
- **Arrow Keys** navigate the screen to access and modify parameters.
- **Function Keys** activate the corresponding on-screen function button.

Battery

The MaxTester DSL is equipped with a Lithium-ion battery.

WARNING

- **Recharge the battery using only the MaxTester and with the battery properly installed in the unit.**
- **Never open the battery back panel of the MaxTester without reading the *Replacing the Battery* section in this chapter.**

When fully charged, the battery should provide between 3 and 10 hours of power depending on different factors such as: type of tests performed, display backlight level, and connected accessories.

To maximize battery power of the MaxTester DSL:

1. Lower the display backlight level using the application found in **Display and Language** in the **System** settings, when the MaxTester DSL is used under low to medium light conditions.
2. Disconnect any unused USB or SD accessories.
3. Quit any running tests when the MaxTester is not in use.
4. Whenever possible, put the MaxTester DSL in suspend mode by pressing ⏻ for less than 1 second,
5. When not in use, turn the unit off by pressing ⏻ for at least 4 seconds.

If the battery capacity remains low or outside the previously stated values, it should be replaced. This could occur after 3 years depending on the usage.

Battery Calibration

In order to optimize the battery gas gauge accuracy, a battery calibration procedure is accessible in the System menu under Power. See the *Setting Up the MaxTester DSL Test Set* chapter. Going through this procedure may be necessary when first using the MaxTester or after time depending on the number of charging cycles the battery has undergone. It will optimize the gas gauge accuracy and not affect the MaxTester's battery capacity.

Replacing the Battery

WARNING

Only use an EXFO battery. Batteries from other suppliers could result in serious damage to the MaxTester or personal injuries. See the *Troubleshooting* chapter for information on contacting EXFO.

Battery replacement should only be done by a qualified technician with the appropriate tools on an electronic bench or similar environment.

To replace the battery:

1. Remove all 4 screws of the battery back panel using a 1.5 mm Allen key. Put aside the screws and the panel keeping the inside foam seal clean. (See the *Back* diagram under the *Using the MaxTester DSL* section in this chapter.)
2. Pull out the old battery using your fingers. Flipping the unit, battery-side down, will ease removal. Do not use tools in order to prevent damage to the battery envelope. Pull out the electrical connector. Put aside the old battery.
3. Remove the new battery from its package. Keep the package for future use. Plug in the electrical connector ensuring the pins are correctly aligned. Place the new battery in the MaxTester.
4. Inspect the inside rib around the MaxTester battery compartment to make sure it is free from any debris. Remove any debris using a dry cloth. Replace the battery back panel. Replace the 4 screws with a moderate torque so the foam seal is evenly compressed without damaging the screws.

Disposing of the Battery

Place the old battery in the replacement battery packaging. Properly dispose it according to your local facilities for battery recycling.

Caring for the MaxTester DSL

The MaxTester DSL has been designed to be a rugged and lightweight piece of test equipment. However, the unit should be kept away from extremes of heat, cold, moisture, and dust. Failure to do this may shorten the life of the instrument.

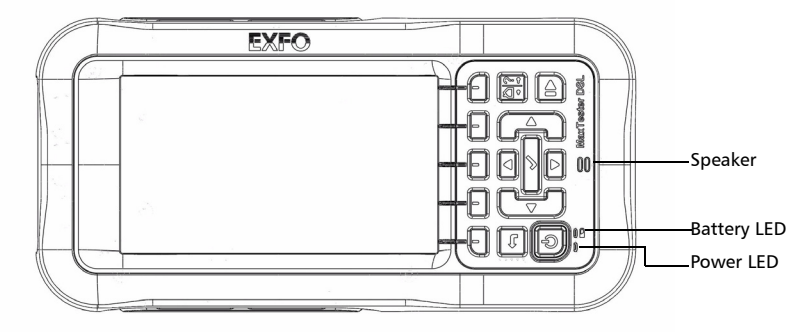
The MaxTester DSL LCD display should only be cleaned using a soft, lint-free cloth and an anti-static cleaning solution. Ordinary detergents and other cleaning solutions may cloud or scratch the surface and should be avoided.

Using the MaxTester DSL

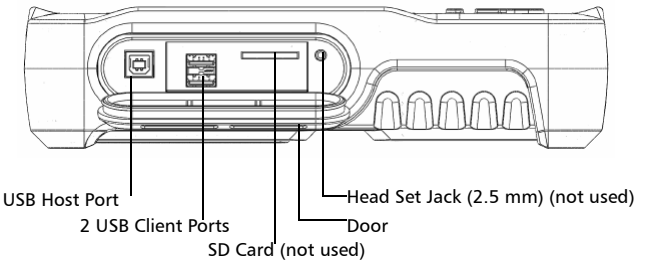
The MaxTester DSL is rated IP54 which means that it is not affected by dust or water splashing against the enclosure from any direction. This protection is only valid when both side doors are properly closed. If the equipment is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.

The MaxTester DSL is equipped with a series of interfaces shown in the following views:

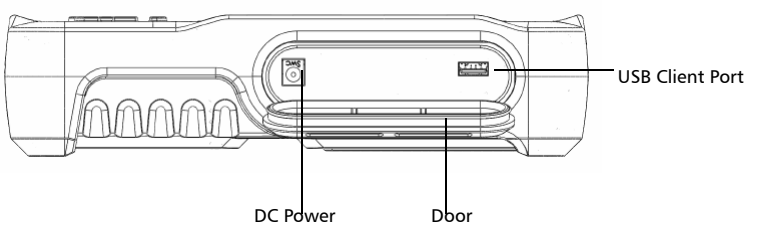
➤ Front



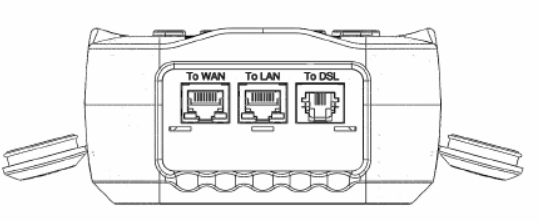
➤ Left



➤ Right

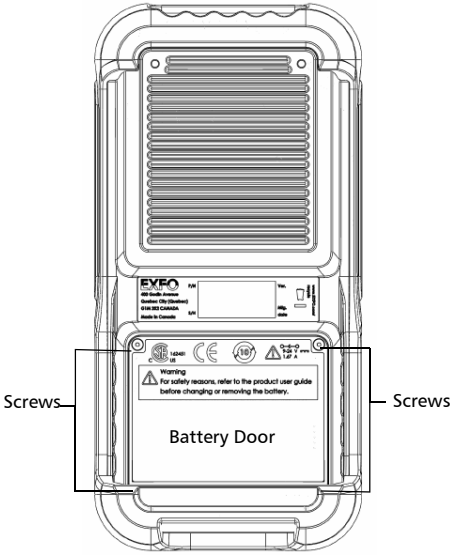


➤ Top



Note: *When connecting a DSL cable to the WAN port, use the RJ-45 plug end of the 26AWG cable provided with the unit. There is a 1500V maximum transient voltage on telecom ports. Basic insulation is needed for external telecom circuits.*

➤ Back



➤ LED Legend

Power State	Power Source	Power LED	Charger State	Battery Level	Battery LED
			ERROR	NA	RED
			CHARGING	NA	GREEN BLINKING
	DC	SOLID GREEN	CHARGED	FULL	SOLID GREEN
				<10%	RED BLINKING
				≥10%-<25%	YELLOW BLINKING
				≥25%-<75%	YELLOW
ON	BATTERY	SOLID YELLOW	NA	≥75%	SOLID GREEN
	DC	GREEN BLINKING	NA	NA	BLACK
STANDBY	BATTERY	YELLOW BLINKING	NA	NA	BLACK
OFF	NA	BLACK	NA	NA	BLACK

The MaxTester DSL enclosure may become warm during normal use.

Conventions

Before using the product described in this manual, 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

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.

The AC adapter/charger provided with this unit (40 W/24 V) is specifically designed to work with your MaxTester.

WARNING

- **Use the AC/DC adapter/charger indoors only.**
- **Use only with a Class II AC/DC adapter, power limited output.**
- **On the AC/DC adapter, replacing detachable mains supply cords with inadequately rated cords, may result in overheating of the cord and create a fire risk.**
- **The adapter shall have the appropriate safety mark (e.g. UL, CSA, TUV, CE, etc.) that is acceptable to the authorities in the country where the equipment is to be used.**

CAUTION

When using the MaxTester while connected to the AC/DC adapter/charger, make sure you do not position the equipment so that it is difficult to disconnect the adapter/charger from the AC mains.

WARNING

Use only accessories that meet EXFO specifications.

Equipment Ratings	
Temperature ➤ Operation ➤ Storage	 0 °C to 40 °C (32 °F to 104 °F) -20 °C to 60 °C (-4 °F to 140 °F)
Relative humidity (unit)	5 % to 95 % non-condensing
Maximum operation altitude	3000 m (9843 ft)
Pollution degree	2(unit used inside; connected to AC mains or powered by batteries)[a] 3 (unit used outside; powered by batteries)[b]
Overvoltage category	II
Power supply rating	100 V to 240 Vac[c] at 0.7 A (50 Hz/60 Hz) 9-24 Vdc at 1.67 A

a. Use the external power supply indoors only.
b. Equipment should be normally protected against exposure to direct sunlight, precipitations and full wind pressure.
c. Not exceeding ± 10 % of the nominal voltage.

3 Getting Started with the MaxTester DSL Test Set

Turning the Unit On/Off

When you turn the unit on, you may use it immediately under normal conditions. When the unit is turned off, it keeps the following parameters in its internal memory:

- Test parameters
- User-defined thresholds
- Regional, LCD, and energy-saving settings
- Saved test results

There are two ways to turn off the MaxTester DSL Test Set

- *Suspend*: the next time you turn your unit on, you will quickly return to your work environment.
- *Shutdown*: completely cuts power to the unit; the unit will perform a complete restart routine the next time you use it. You should perform a shutdown if you do not intend to use your unit for a week or more.

To turn the unit on:
Press ⏻ and hold for ½ to 1 second to start. The unit initializes for a few seconds and displays the Home pane.

To enter suspend mode:
Hold down the ⏻ key until the suspend notification sound plays, about 1 second. The MaxTester will stay in suspend mode for 2 hours. After which it will automatically shutdown. This prevents complete battery discharge and ensures maximum battery performance.

To perform a shutdown:
Hold down the ⏻ key for about 4 seconds. The shutdown process starts.

Note: *In both previous cases, if the power adapter is plugged in, the unit will enter a charge mode instead of suspending or shutting down.*

Using Menus and Keypad

You can access various tools from the keypad or menu. Menu options may differ depending on your unit configuration.

Home menu is where you can access either the various elements for your unit or the system itself.

- To navigate through the items, use the arrow keys.
- To confirm a choice or enter a menu, press  .
- To cancel an action or return to the previous item or pane, press  .
- To return to the home pane, press  .

Note: *Pressing*  *while a test is running will do nothing. The test can not be running in order to return to the main menu screen.*

Note: *You can also select an option directly by pressing the function keys corresponding to the on-screen buttons at the bottom of the screen.*

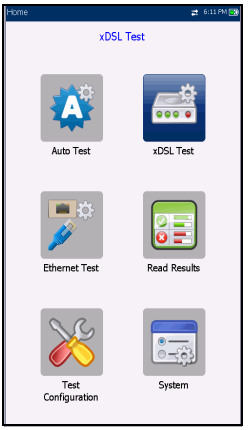
Using Online Help

Online help is available at any time. Most test operations pause while you view help, but will resume automatically when you exit help.

To access help about the current function at any time:
Press and hold the **?** key.

4 Setting Up the MaxTester DSL Test Set

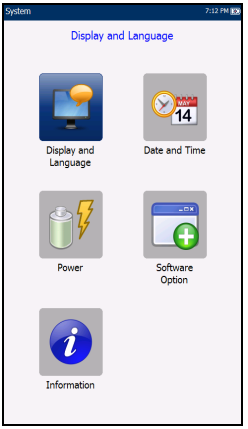
Main Menu Page - Home



Home presents the main menu page which allows you to navigate to each icon using the up/down left/right arrow keys on the keypad. Press ✔ to bring up the sub-menu of the selected icon:

- For **Auto**, **xDSL**, or **Ethernet Test**, the test will start and the screen control will navigate to the **Result Summary** page.
- **Read Results** opens the **Read Results** page of the previously saved tests.
- **Test Configuration** provides the utilities to setup test parameters.
- **System** allows you to set the parameters of the unit.

System Settings



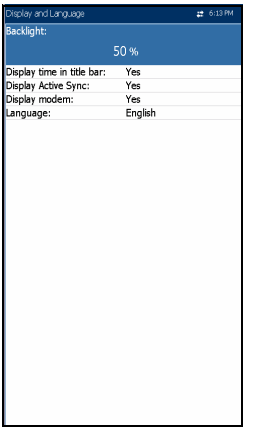
System presents a menu of items to setup the unit.

- **Display & Language** provides the setup for backlight, information on the title bar, and language choice.
- **Date & Time** sets the date and time and format.
- **Power** displays the battery status and power scheme.
- **Software Options** allows you to enable/disable purchased feature options.
- **Information** shows unit details pertaining to hardware/software/product info.

To navigate between the system settings:

1. Press the up/down left/right arrow keys on the keypad to select an icon.
2. Press ✔ to confirm your selection.

Display and Language



To fit your work environment, you may adjust the LCD brightness, and display the time, Active Sync and power status.

Note: *The LCD backlight consumes battery power; more brightness, more power consumption.*

This is also where you can change the display language. The values are kept in memory when you turn the unit off.

To adjust the display settings:

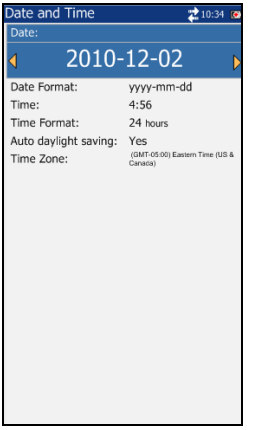
1. Press , select **System**, and then **Display & Language**.
2. Use the up/down arrow keys to select the setting to change.
3. Press to select it.

   ➤ You can switch between preset brightness levels in the **Backlight** item. Press to confirm.

   ➤ Enable or disable the time, Active Sync, and modem power status, then confirm the choice with the key.

   ➤ Use the up/down arrow keys to navigate between the available languages, then press to select it. You will be prompted to restart your unit.

Date and Time



When saving results, the unit also saves the corresponding date and time.

You can enter the date according to the following formats:

➤ yyyy-mm-dd

➤ dd-mm-yyyy

➤ mm-dd-yyyy

The time can be set according to the 12- or 24-hour formats.

You can also modify the time zone and enable an option so that your unit automatically adjusts the time for the daylight saving period.

To set the date and time:

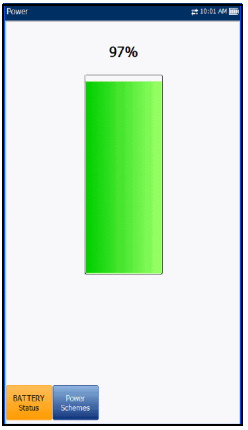
1. Press , select **System**, and then **Date & Time**.
2. Use the arrows to select any of the date or time settings.
3. Press to enable the modification controls.

   ➤ For the date and time, an edit screen is displayed with descriptive function keys. Use the arrow keys to modify the number values, then press to confirm the change and go back to the previous screen.

   Press to go back to the previous screen without saving the new value.

➤ For the time format, auto daylight saving and time zone values, use the arrow keys to select the desired value, then press ✔ to confirm the change.

Power - Battery Status

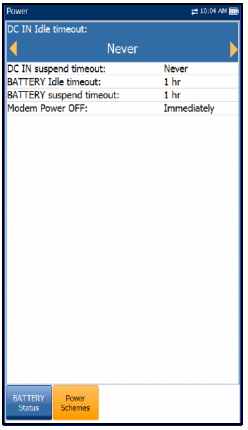


The **BATTERY Status** pane indicates the current power level for the battery.

Note: *The battery level might not display after a system upgrade but will become available again after the next full charge.*

Power Schemes

You can set your unit to automatically switch to suspend mode independently for the battery or AC power modes. This is useful for example if you want to save battery power but do not want to be hindered by unwanted switches between modes when using AC power.



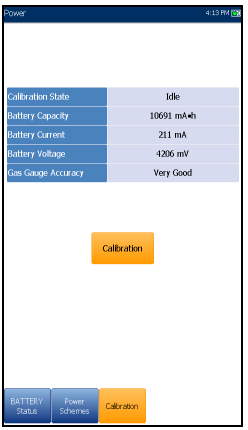
- ➤ Power off completely shuts down the unit's power.
- ➤ Power suspend puts the unit in sleep mode; you can wake up the system by pressing ⏻ power on/off button.
- ➤ **Modem power off**:
  - ➤ **Immediately** for when an xDSL test is completed or stopped. In this mode, the modem is powered on when xDSL test starts.
  - ➤ Timeout value powers off the modem within a defined period after an xDSL test is completed or stopped.

To change the power management settings:

1. Press ⌂, select **System**, and then **Power**.
2. Select the **Power Schemes** tab.
3. Under DC In or Battery, use the arrow keys to select power off on system idle or suspend timeout modes, then press ✔ to view the list of available choices.
4. Select a new value, then press ✔ to confirm the choice. Repeat for the other modes as needed.

Power - Calibration

The **Calibration** tab allows you to optimize the battery gas gauge accuracy.



- **Calibration State**:
  - **Completed** displays after the calibration procedure has been started and the DC plug was not removed before the end was reached.
  - **In Progress** displays when the calibration procedure has been started but has not yet reached the end.
  - **Aborted** displays when the calibration procedure has been started but the DC plug was removed before the end.
  - **Idle** displays after the next MaxTester cold boot.
- **Gas Gauge Accuracy** indicates the estimated battery gas gauge accuracy.
  - Below 10 % accuracy error is **Very Good**.
  - Between 10 % and 20 % accuracy error is **Good**.
  - Over 20 % accuracy error is **Poor** and a gas gauge calibration is needed in order to get optimal accuracy.

The following on-screen messages may appear:

- **Calibration Completed** is displayed after the procedure has been started and successfully completed.
- **Calibration In Progress** is displayed when the procedure has been started and not yet completed.
- **Calibration Aborted** is displayed when the procedure has been started but the DC plug was removed or a power failure occurred before the end, or if you terminate the calibration.

To start the gas gauge calibration:

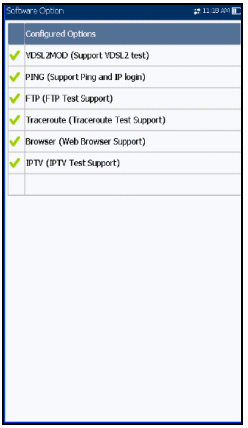
1. Select the **Calibration** button. Completion time is up to 20 hours depending on the MaxTester's initial battery level and current power consumption.
2. Make sure the DC plug always stays connected and the unit is not turned off until completion. Failing to do so will abort the procedure and previous calibration parameters will be kept.

Note: *No other activity can be performed on the unit during calibration.*

Note: *Going through this calibration does not affect the MaxTester's battery capacity.*

Software Option

This screen lists all the **Configured Options** which are present on the unit.

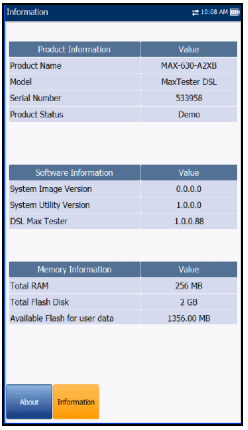


Information - About EXFO

The **About** tab contains contact information should you require technical assistance.

MaxTester DSL Information

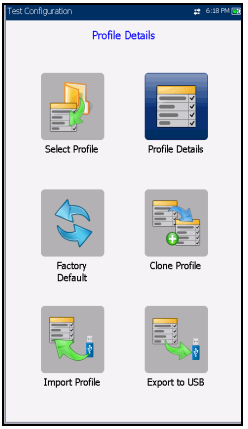
The **Information** tab displays information about the product, software, and memory installed on the device.



5 Configuring the MaxTester DSL Test Set

Test Configuration

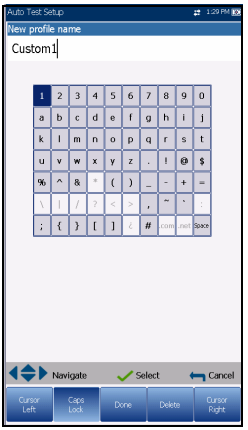
The MaxTester DSL supports 3 types of test applications: Auto Test, xDSL Test, and Ethernet Test. Configuration parameters for all 3 test applications are saved into a test configuration profile. A default profile is provided with a predefined set of parameters for all test applications.



- **Select Profile** lists saved available profiles. The current active profile is shown in the upper information header. At power up, settings are read from the last loaded profile.
- **Profile Details** lists the 3 types of tests for configuration:
  - **Auto Test Setup**
  - **xDSL Test Setup**
  - **Ethernet Test Setup**
- **Factory Default** resets system profiles to factory default settings. Currently selected profiles, other than system profiles, are not affected.
- **Clone Profile** allows you to create a new profile by copying all parameters from the currently loaded profile.
- **Import Profile** allows you to copy all profiles from external USB key to the unit.
- **Export to USB** allows you to copy all profiles to USB key.

Setup Profile Name

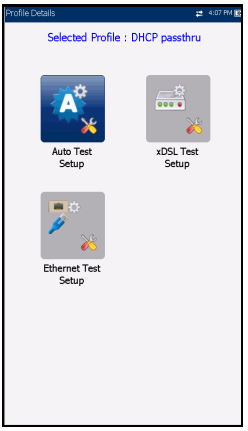
This alphanumeric editor screen allows you to change parameter values and save changes to a new profile.



To use the editor screen:

1. Press the up/down left/right arrows to navigate the on-screen keyboard.
2. Press ✔ to confirm the selection.

Profile Details Menu

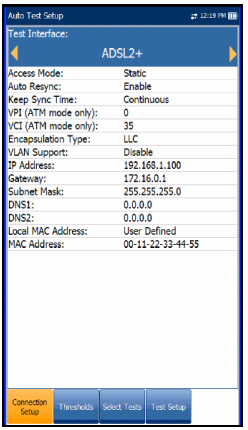


You can view any of your saved profiles on the MaxTester DSL from the Profile Details menu by selecting the desired test setup icon. This sub-menu displays an icon for each test: Auto Test, xDSL, and Ethernet.

To select a test:

1. Press the up/down left/right navigation keys to select the desired icon.
2. Press ✔ to display the test profile details.

Connection Setup



The **Connection Setup** tab allows you to configure the following option setup fields:

- **Test Interface** is either
  - **ADSL2+** - configured as multi mode (G.992.1/2/3/5 T1.413, ANSI,) or
  - **VDSL2** - only available if the VDSL2 **Software Option** is activated. VDSL2 configuration allows fallback to ADSL.
  - **Ethernet**
- **Access Mode** options are dependent on the **Test Interface** selection:
  - If ADSL2+ - then Sync only, Bridged (not in Auto Test), DHCP, Static, PPPoE, PPPoA, IPoA
  - If VDSL2 - then Sync only, Bridged (not in Auto Test), DHCP, Static, PPPoE

    For xDSL, default is **Bridged**.
  - For Ethernet - DHCP, Static, PPPoE, Bridged.
- **Auto Resync** allows you to **Enable** the SyncLossCounter as the Pass/Fail criteria. When SyncLossCounter+1 is reached, the test will have fail status.

  If Auto Resync is disabled, any time the test loses sync, the result status will be fail and the test will stop automatically.
- **Keep Sync Time** is either
  - **Continuous** - the test runs until you manually stop it, or
  - set to a time period. Default is 5 minutes.
- **VLAN Support** enables the unit to analyze and pass WAN tagged ethernet frames through the virtual local area network (VLAN).

- **VLAN ID** is a virtual local area network (VLAN) tag ranging from 0 through 4094. The entry is available only when **VLAN Support** is **Enable**.
- **Vendor ID** is the name of the unit. This entry is available only when **Access Mode** is **DHCP**.
- **VPI (ATM mode only)** is the virtual path identifier (VPI) ranging from 0 through 255 for the downstream channel.
- **VCI (ATM mode only)** is the virtual circuit identifier (VCI) ranging from 32 through 65535 for the downstream channel.
- **Encapsulation Type** depends on the network configuration and sets the ATM to either **LLC** also known as LLC-SNAP (logical link control-sub network address protocol) or **VC_MUX** (virtual channel multiplex).
- **Local Mac Address** is the *internal* MAC address of the unit: either **MaxTester** or **User Defined**.
- **Mac Address** is a specific MAC address, in a hexadecimal format, if **User Defined** was selected for the previous parameter. This entry is available only when **Access Mode** is **DHCP**, **Static** for ADSL2+.
- **Static IP** is the address of the current location assigned by the service provider. This entry is available only if **Obtain IP** is set to **Static**.

The following parameters are available only when **Access Mode** is **PPPoE** or **PPPoA**.

- **Login Name** is your user ID.
- **Password** is your password.
- **Obtain IP** is either **Dynamic** where the access concentrator or broadband remote access server assigns a temporary IP address to the unit, or **Static** where you enter the IP address of the unit.
- **WAN Login Timeout** is a numeric setup field.

The following parameters are available only when **Access Mode** is **IPoA** or **Static**.

- **IP Address** is the address for the unit that is actively connected to your network or the internet at the time of login.
- **Gateway** is the IP address of the default gateway.
- **Subnet Mask** is the network address used to identify if the IP address is within the same wide area network.
- **DNS1** is the address of the primary domain name server to be used by the unit. If DNS is unavailable, enter 0.0.0.0.
- **DNS2** is the address of the secondary domain name server to be used by the unit. If DNS is unavailable, enter 0.0.0.0.

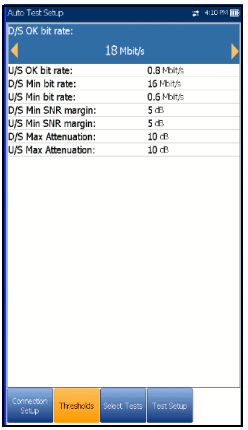
The following parameters are available only when **Test Interface** is **Ethernet.**

- **WAN/LAN Link Speed** is a choice between AUTO (negotiated during the link establishment), 100 or 10 Mbit/s.
- **WAN/LAN Connect Mode** is Full or Half Duplex, when **Link Speed** is set to either 100 or 10 Mbit/s.

To configure options in the setup fields:

1. Press the up/down arrows to select the desired parameter.
2. Press the left/right arrow keys to view and select the options.
3. If you make any changes to the parameter values, press the on-screen function keys to save or cancel your input.

Thresholds



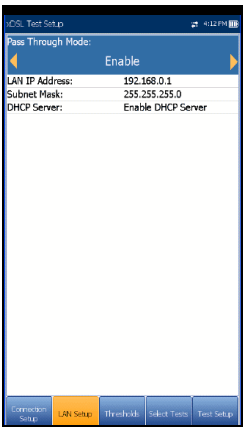
The **Thresholds** tab defines DSL parameter criteria. For **D/S** (downstream) and **U/S** (upstream) data rates, there are OK and Min (minimum) bit rates defined to indicate unacceptable, marginal, and acceptable rates.

- **D/S** and **U/S OK bit rate** (Kbit/s):
  - for ADSL - value limited to D/S 30 Mbit/s, U/S 2 Mbit/s.
  - for VDSL - D/S to 100 Mbit/s, U/S to 50 MBit/s.
- **D/S** and **U/S Min SNR margin** (dB) - values range from 0 to 63.5. Default is 5.
- **D/S** and **U/S Max Attenuation** (dB) - values range from 0 to 128. Default is 10.

To set threshold values:

1. Press the up/down arrows to select the desired parameter.
2. Press the left/right arrow keys to view and select the options.
3. If you make any changes to the parameter values, press the on-screen function keys to save or cancel your input.

LAN Setup



The **LAN Setup** tab is available only in xDSL test setup and when the **Access Mode** set in **Connection Setup** is *not* Sync Only. **LAN Setup** allows you to configure the parameters required when working in **Pass Through Mode**, and the LAN (local area network) is connected to the external device which supports 10/100 Ethernet.

This tab is not available in Auto Test Setup.

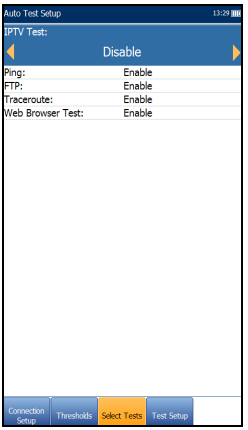
- **Pass Through Mode** - Enable or Disable.
- **LAN IP Address** is the local network IP address of the unit.
- **Subnet Mask** is the network address mask used to identify if the IP address is within the same local area network.

- **DHCP Server** enables the dynamic host configuration protocol (DHCP) mode for the LAN side of the connection.
- **Platform Ip Address** displays the IP address of the unit's platform when the **DHCP Server** is disabled.

To configure LAN setup values:

1. Press the up/down arrows to select the desired parameter.
2. Press the left/right arrow keys to view and select the options.
3. If you make any changes to the parameter values, press the on-screen function keys to save or cancel your input.

Select Tests



The **Select Tests** page allows you to **Enable**/**Disable** the following optional sub-tests, within the 3 types of test applications.

- **IPTV Test** - when enabled, all other sub-tests are automatically disabled.
- **Ping** is also known as ICMP echo request and determines network connectivity and accessibility.
- **FTP** test verifies the file transfer speed of the file download and upload.
- **Traceroute** is a complement tool of the Ping test to determine why a destination cannot be reached, or where the internet is broken.
- **Web Browser Tes**t can only be started when a WAN connection (either through xDSL or Ethernet) has been established.

When enabled, the sub-tests' test pages are available in the results pages.

When highlighted, the sub-tests' setup contents are shown on the **Test Setup** tab.

Note: ***Select Tests*** *and* ***Test Setup*** *tabs are not available in* ***Sync Only*** *and* ***Bridged Access Modes****.*

To select sub-tests:

1. Press the up/down arrows to highlight the desired test.
2. Press the left/right arrow keys to toggle between **Enable**/**Disable**.

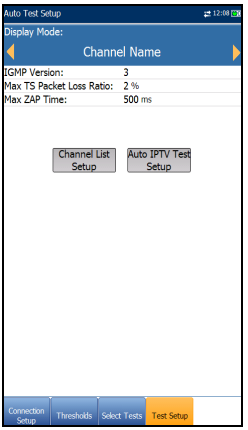
   OR
3. Press ✔ on any value to open the list box to toggle between **Enable**/**Disable**.

Test Setup

The **Test Setup** tab allows you to configure values for the optional sub-tests within the 3 types of test applications. You must highlight the sub-test on the **Select Tests** page in order to display the sub-test's parameters on the **Test Setup** page.

IPTV Test Setup

IPTV test supports STB (set-top box) emulation mode over xDSL and Ethernet interfaces enabling the MaxTester to join and leave multicast IPTV streams. The following parameters can be configured from the **Test Setup** tab:



- **Display Mode** is either the **Channel Name** or **#** used for displaying channel information in the result pages.
- **IGMP Version** is a value of either **2** or **3** used to send IGMP join/leave messages.

Note: *If you change the **IGMP Version** from the default of 2 to 3, you must reboot your unit.*

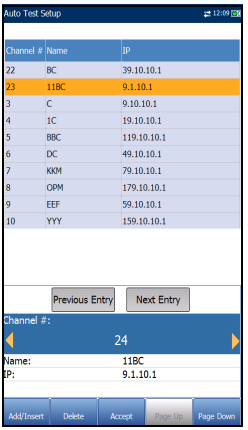
- **Max TS Packet Loss Ratio** is an editable percentage, ranging from 1 to 50, used to qualify if the IPTV stream is stable.
- **Max ZAP Time** is an editable value ranging from 0 to 10,000 that measures the channel switch time in ms.
- **Channel List Setup** button accesses the page to configure parameters for channel analysis.
- **Auto IPTV Test Setup** button accesses the setup page to automatically run an IPTV test. This function is only available in **Auto Test Setup** application.

To configure test setup values:

1. Press the up/down arrow keys to select the desired parameter.
2. Press the left/right arrow keys to view and select the options.

   OR
3. Press ✔ on a value to open a list box of options or the alphanumeric editor screen and use the navigation keys to scroll through.
4. Press ✔ to confirm the value.
5. If you make any changes to the parameter values, press the on-screen function keys to save or cancel your input.

Channel List Setup



The **Channel List Setup** page in the IPTV test setup provides a tool for you to create an alias table. It allows you to join/leave an IPTV stream using a symbolic name or TV channel number instead of the IP address. Maximum entries in the table are 100, divided into pages.

- The channel list displays 3 editable parameters:
  - **Channel #** is a numeric value from **1** to **9999**.
  - Channel **Name** is a 24-character alphanumeric field.
  - **IP** address is a numeric value.
- **Previous/Next Entry** buttons highlight the previous/next entry in the table (up/down direction). When the highlight reaches the first/last entry of the alias table page, the button(s) is disabled.
- On-screen function buttons:
  - **Add/Insert** adds currently edited channel info into the alias table below the highlighted entry and moves the highlight to the newly added entry. If the page is full, the bottom entry moves to the next page. Selecting the highlight placement allows you add and group entries with similar parameters.
  - **Delete** removes the highlighted entry in the alias table. If the deleted entry was also present in the **IPTV Channel Analysis** list or **Join/leave Test** list in **Auto IPTV Test Setup** page, it will also be removed from those lists.
  - **Accept** replaces the edited value for the current highlighted entry. Use this function for modification purposes.
  - **Page Up/Down** display the previous/next page(s) of the alias table. If current page is the first/last page, the button(s) are disabled.

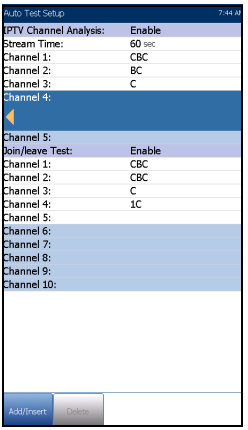
To setup the channel list:

1. Press the up/down, right/left keys to select the desired channel parameter.
2. Use the on-screen function buttons to create or edit the channel list.

   OR

3. Use the navigation keys to select the **Previous/Next Entry** button(s) and press ✔ to select the entry to be highlighted and edited.

Auto IPTV Test Setup



The **Auto IPTV Test Setup** page in the IPTV test setup allows you to define 2 types of IPTV tests to run automatically:

- **IPTV Channel Analysis** - **Enable** to add channels for analysis. If disabled, channel analysis in auto test is not performed.
  - **Stream Time** defines the length of time, from 1 to 60 s, to keep the channel stream(s) for analysis.
  - **Channel 1-5** allows you to define up to 5 IPTV channels for concurrent analysis.
- **Join/leave Test** - **Enable** to define a list of channels to sequentially join and leave. If disabled, no test is performed.
  - **Channel 1-10** allows you to define a list of up to 10 channels.
- On-screen function buttons:
  - **Add/Insert** is available only when a blank entry is highlighted. When the button is pressed, the first available channel from the alias **Channel List** is automatically added to this list of channels. Upon highlighting another blank entry, the next channel from the alias table is added, and so on.
  - **Delete** removes the selected channel from the list.

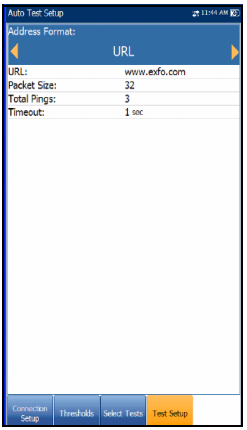
You can **Enable** either one or both, but you cannot **Disable** both of them at same time. If both tests are enabled, **Join/leave Test** runs first.

To configure test setup values:

1. Press the up/down arrow keys to select the desired parameter.
2. Press the left/right arrow keys to view and select the options.

   OR
3. Press ✓ on a value to open a list box of options or the alphanumeric editor screen and use the navigation keys to scroll through.
4. Press ✓ to confirm the value.

Ping Test Setup



The **Test Setup** tab is available only if **Access Mode** is *not* Sync only.

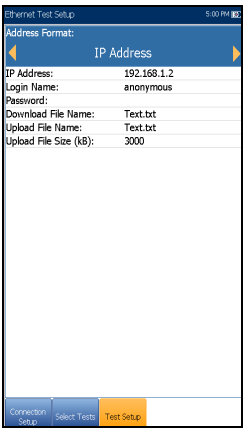
- **Address Format** is URL, IP Address or Gateway.
- **URL/IP Address** lists either the URL or IP Address where the unit pings.
- **Packet Size** is a value from 32 through 1200 of the number of bytes sent in one packet. The default value is 32.
- **Total Pings** is the total number of Ping packets to send out from1 through 99. The default value is 3.
- **Timeout** is the time in seconds from 1 through 10, that the unit will wait for a response back from the destination device.

To configure test setup values:

1. Press the up/down arrow keys to select the desired parameter.
2. Press the left/right arrow keys to view and select the options.

   OR
3. Press ✔ on a value to open a list box of options or the alphanumeric editor screen and use the navigation keys to scroll through.
4. Press ✔ to confirm the value.
5. If you make any changes to the parameter values, press the on-screen function keys to save or cancel your input.

FTP Test Setup



The FTP test verifies the file transfer speed of the file download and upload. The FTP **Test Setup** tab allows you to configure the following parameters:

- **Address Format** is URL or IP Address.
- **FTP Server Address** lists either the URL or IP Address.
- **Login Name/Password** is your user ID and password.
- **Download File Name** is the filename requested for downloading, maximum 128 characters.
- **Upload File Name** is the filename used for uploading, maximum 128 characters.
- **Upload File Size (kB)** is the number of bytes or size of the file to be uploaded to the server.
- **File Upload/Download** - Enable/Disable options available only in Auto Test Setup. **Enable** to perform the upload/download operation automatically.

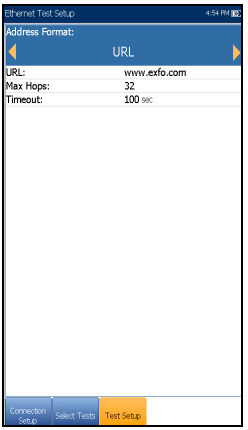
To configure test setup values:

1. Press the up/down arrow keys to select the desired parameter.
2. Press the left/right arrow keys to view and select the options.

   OR
3. Press ✔ on a value to open a list box of options or the alphanumeric editor screen and use the navigation keys to scroll through.
4. Press ✔ to confirm the value.
5. If you make any changes to the parameter values, press the on-screen function keys to save or cancel your input.

Traceroute Test Setup

The Traceroute **Test Setup** tab allows you the configure the following parameters:



- **Address Format** is URL or IP Address.
- **Destination Address** is the destination IP or URL address.
- **Max Hops** specifies the maximum number of hops (1 to 32) used in attempting to reach the destination address.
- **Timeout** is the time in seconds from 1 to 10, that the unit will wait for a response back from the destination device.

To configure test setup values:

1. Press the up/down arrow keys to select the desired parameter.
2. Press the left/right arrow keys to view and select the options.

   OR
3. Press ✔ on a value to open a list box of options or the alphanumeric editor screen and use the navigation keys to scroll through.
4. Press ✔ to confirm the value.
5. If you make any changes to the parameter values, press the on-screen function keys to save or cancel your input.

Web Browser Test Setup

The **Test Setup** page for the Web browser content is displayed when the **Web Browser Test** is highlighted on the previous **Select Tests** tab. Here you can edit the **Bookmarks** and **Home URL**.

➤ **Bookmarks** lists 9 entries. The default is http://.

The Bookmarks list is shared by all 3 tests (Auto Test, xDSL and Ethernet tests). If the list is changed in one test, the changes are reflected in the other two.

➤ **Home URL** acts as the Home URL for the Web browser test page when launched. It is independent among the 3 types of test applications.

➤ **Copy to Home URL** allows you to set a highlighted URL as the **Home URL**.

To configure the Web browser setup:

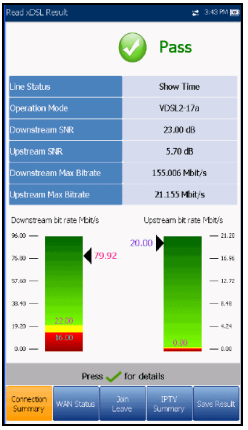
1. Press the up/down arrows to highlight the desired entry in the list.
2. Press ✔ to access the edit screen.
3. If you make any changes to the test values, press the on-screen function keys to save or cancel your input.

6 MaxTester DSL Test Results

The MaxTester DSL is designed to make xDSL turn-up easy. The unit will emulate an ATU-R to the point that it can handshake and connect with an ATU-C and report the upstream and downstream parameters. Simply connect to the line, turn on the MaxTester DSL, and select a test to run. Results obtained include upstream and downstream throughput and noise margin.

xDSL Connection Summary

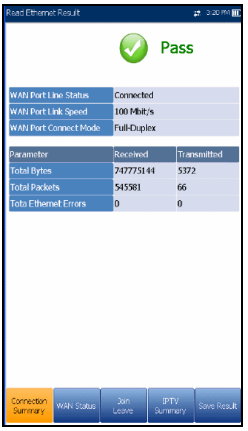
The **Connection Summary** tab allows you to view the pass/fail status and details of the test results.



- **Line Status** displays the status of the line under test during negotiation with the DSLAM. The value changes from Idle /Activate /Handshake /Training /Showtime for ADSL2+ or VDSL2 mode.
- **Operation Mode** is the xDSL mode of operation as negotiated between the unit and the DSLAM.
- **Downstream/Upstream SNR** is a value ranging from 0 through 63.5 for the minimum SNR (signal-to-noise ratio) margin.
- **Downstream/Upstream Max Bitrate** displays the D/S (downstream) and U/S (upstream) maximum attainable bit rates that the circuit can handle as determined by the remote terminal and CO during the training phase. Values can be greater than the actual bit rate.
- Downstream/Upstream actual bit rates are displayed by graphic bars and the current actual values appear as numbers.
  - Downstream bit rate value is shown in yellow region if it is greater than Min threshold and less than OK threshold.
  - Upstream bit rate value is shown in yellow region if it is greater than Min threshold and less than OK threshold.
  - Downstream bit rate value is shown in red region if it is less than Min threshold.
  - Upstream bit rate value is shown in red region if it is less than Min threshold.

Ethernet Connection Summary

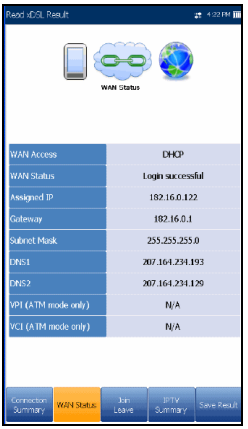
When set up over Ethernet, the available test results are the following:



- **WAN/LAN Port Line Status** displays either Connected or Disconnected for the particular line connection under test.
- **WAN/LAN Port LinkSpeed** is a choice between AUTO (negotiated during the link establishment), 100 or 10 Mbps.
- **WAN/LAN Port ConnectMode** is **Full-Duplex** or **Half-Duplex**, when Link Speed is set to either 100 or 10 Mbps.
- The total number of **Received** and **Transmitted Bytes**, **Packets**, and **Ethernet Errors** are also displayed during the test.

WAN Status

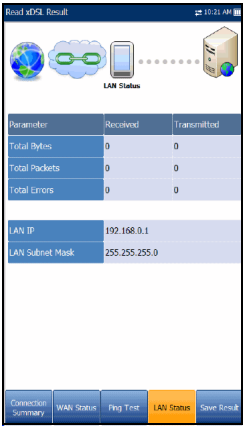
The **WAN Status** tab allows you to view the status of the connection between the WAN port of the unit and the ISP.



- **WAN Access** specifies the encapsulation method used by the network and consists of the following types:
  - **PPPoE** is point-to-point protocol over Ethernet.
  - **PPPoA** is point-to-point protocol over ATM.
  - **DHCP** is Dynamic Host Control Protocol which is used to dynamically assign an IP address for the client node on the network.
  - **Static IP** is the current location assigned by the service provider or user.
  - **IPoA** stands for classical Internet Protocol over ATM.
- **WAN Status** value changes as per current WAN Status.
- **Assigned IP** displays IP address information assigned to the unit that is connected to the network.
- **Gateway** is the IP address of the default gateway.
- **Subnet Mask** is the network address used to identify if the IP address is within the same WAN.
- **DNS1** is the address of the primary domain name server to be used by the unit.
- **DNS2** is the address of the secondary domain name server to be used by the unit.
- **VPI** is the virtual path identifier value. Not available in PTM mode.
- **VCI** is the virtual circuit identifier value. Not available in PTM mode.

LAN Status

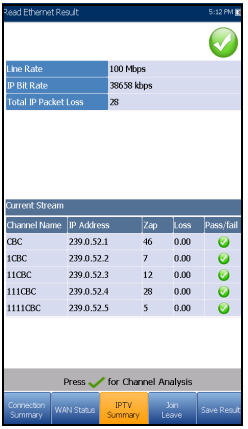
The **LAN Status** tab allows you to view the customer information configured for the LAN (local area network).



- **LAN IP** is the local network IP address of the unit.
- **LAN Subnet Mask** is the network address mask used to identify if the IP address is within the same local area network.
- The total number of **Received** and **Transmitted Bytes**, **Packets**, and **Errors** are also displayed during the test.

IPTV Summary

The **IPTV Summary** tab allows you to view the pass/fail status and test results of the IPTV streams and actions (Join/Leave).

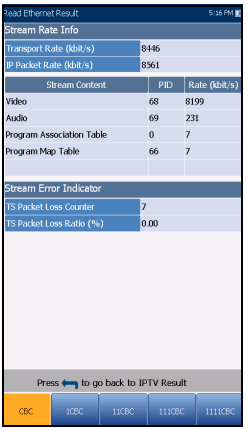


- **Line Rate** is the actual rate achieved by the circuit, in Mbps.
- **IP Bit Rate** is the IP data rate for the IPTV service, including all channels detected.
- **Total IP Packet Loss** is the total number of packets lost, with errors, or out of sequence, during the test period.
- **Current Stream** lists a maximum of 5 live channel streams by name and **IP Address**.
  - **Zap** is the time in ms, required for a channel change or join, and is one of the key factors to be considered when evaluating the IPTV quality of service (QoS).
  - **Loss** is the percentage of IP packet loss during the last one-second period.

To view the **Channel Analysis**, press ✔ from the **IPTV Summary** tab.

Channel Analysis

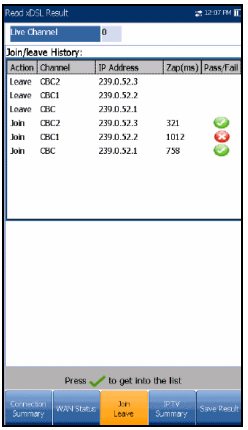
The Channel Analysis function provides a separate tab for every live stream channel. Each channel displays the following information:



- **Stream Rate Info**
  - **Transport Rate (kbit/s)**
  - **IP Packet Rate (kbit/s)**
- **Stream Content** lists the statistical information about the **Video**, **Audio** and **Program Association/Map Table**(s) content for each MPEG video analyzed stream.
  - **PID** is a unique integer value or packet identifier (PID) that indicates the type of data that is stored in the packet payload of the video stream.
  - **Rate (kbit/s)** is the rate calculated of a given stream content.
- **Stream Error Indicator**
  - **TS Packet Loss Counter** is the number of packets lost, with errors, or out of sequence, during the test period in the transport stream.
  - **TS Packet Loss Ratio (%)** is the percentage of IP packet loss during a one second period in the transport stream.

Join Leave

The **Join Leave** tab displays a list of IPTV channels from the alias table, their activity (measured Zap time), and pass/fail status. Upon successful WAN connection, the **Join/Leave Channel** lists and **Join** and **Leave** buttons are shown.



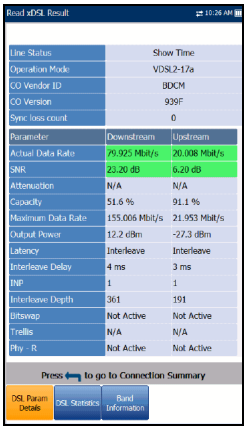
Note: *Join and Leave buttons are not shown in Auto Test since join and leave are automatically executed.*

To join/leave channels:

1. Press **Join** to have the STB send an IGMP report with the multicast IP address.
2. Press **Leave** to inform the network to stop sending the current stream.

DSL Parameter Details

The **DSL Param Details** tab displays the **Downstream** and **Upstream** parameter results configured in the xDSL tests.

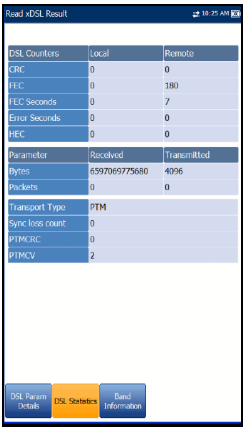


- **Line Status** displays the status of the line under test during negotiation with the DSLAM. The value changes from Idle /Activate /Handshake /Training /Show Time for ADSL2+ or VDSL2 mode.
- **Operation Mode** is the DSL mode of operation as negotiated between the unit and the DSLAM.
- **CO Vendor ID** is a unique 4-digit alphanumeric identifier of the DSL chipset manufacturer used on the CO (central office) side.
- **CO Version** is the version number of the unique alphanumeric identifier of the DSL chipset used on the CO side.
- **Sync loss count** is the number of times the unit lost synchronization.
- Parameters - Downstream/Upstream
  - **Actual Data Rate** displays the values at which the unit and CO are connected, as negotiated during the training phase. The values should represent what the CO was set to, unless the DSL link is being subjected to high levels of noise/crosstalk, and are typically what the DSLAM has been set to, whether interleaved or fast.
  - **SNR** is the signal-to-noise ratio margin measured on the line.
  - **Attenuation** is line attenuation measured during the training phase.
  - **Capacity** is the capacity of the line as a ratio of achieved bit rate over the maximum attainable bit rate presented as a percentage (%). A high value could mean that the link is nearing its maximum capabilities while a low value could mean the link is being under utilized (sometimes intentionally – verify your local DSLAM setup).
  - **Maximum Data Rate** displays the maximum attainable bit rates that the circuit can handle as determined by the remote terminal and CO during the training phase. Values can be greater than the actual bit rate.
  - **Output Power** is the current transmit power level that is a measure of the aggregated transmit power.
  - **Latency** is the path type, **Fast** or **Interleave**, set by the service provider at the CO. The use of the interleaved path means greater delay in the delivery of data but it is less susceptible to noise or crosstalk due to increased Reed-Solomon coding and FEC (forward error checking). The use of the fast path means little or no delay in the delivery of data but it is more susceptible to noise and crosstalk.
  - **Interleave Delay** defines the mapping (relative spacing) between subsequent input bytes at the interleave input and their placement in the bit stream at the interleave output.
  - **INP** is the level of impulse noise protection.

- **Interleave Depth** defines the number of bits (or bytes) in each block of data.
- **Bitswap** specifies the status of the bit swapping mechanism - Active, Not Active or Unknown - swapping bits from tone m to tone n to prevent modem retraining.
- **Trellis** or Trellis Coded Modulation (TCM) is a type of convolutional code which utilizes parity bits on each symbol within a continuous data stream. When the line is connected, Trellis displays either **On** or **Off**.
- **Phy-R** is Broadcom proprietary Physical Layer Retransmit technology which is used to overcome impulse noise.

DSL Statistics

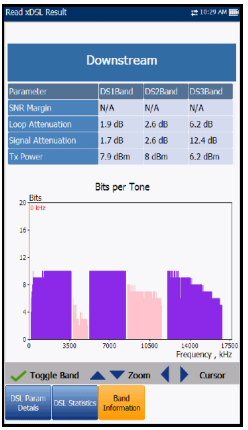
The **DSL Statistics** tab allows you to view transfer mode statistics and DSL counters.



- **DSL Counters** lists the **Local** and **Remote** results for the following counters:
  - **CRC** is the cyclical redundancy check Interleaved/Fast counter.
  - **FEC** is the Reed Solomon forward error correction.
  - **FEC Seconds** is the number of seconds when FEC is detected.
  - **Error Seconds** is the number of seconds when code violation is detected.
  - **HEC** is the header error check (HEC) Interleaved/Fast counter. Available only in ATM connection mode.
- Parameter - Received/Transmitted
  - **Bytes** records the number of active (non-idle) PTM/ATM cells or frames on a channel.
  - **Packets** displays the number of packets.
- **Transport Type** options include PTM (packet transfer mode) and ATM (asynchronous transfer mode).
- **Sync Loss Count** is the number of times the unit lost synchronization.
- **PTMCRC** is the number of CRC (cyclical redundancy check) errors of the PTM.
- **PTMCV** is the number of CV (code violation) errors of the PTM.

Band Info

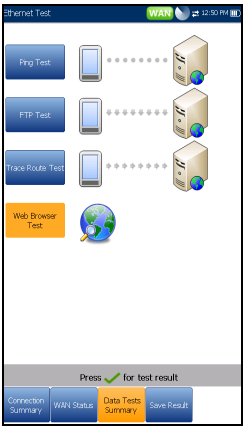
The **Band Info** tab allows you to view a list of individual upstream or downstream band parameter details.



- **Band** contains Upstream (US) and Downstream (DS) parameters.
  - ADSL lists only 1 of each.
  - VDSL lists US0 to 3 and DS1 to 3 possible bands, depending on the band plan,
- Parameter - Downstream/Upstream
  - **SNR Margin** is the measured current signal-to-noise ratio margin across all active sub-carriers, as an amount of increased noise relative to the measured noise power that the system would be able to tolerate. Only a value of 6 or above is able to support a bit error rate of 10^{-7}.
  - **Loop Attenuation** is the current reduction of the line and is measured only once during training.
  - **Signal Attenuation** is the current reduction of the signal and is measured periodically when the line is connected.
  - **Tx Power** is the upstream/downstream transmitting power for the selected band.
  - **Output Power** is the current transmit power level that is a measure of the aggregated transmit power.

Data Tests Summary

The **Data Tests Summary** tab displays the pass/fail status of the selected data tests enabled in the connection setup. A successful WAN connection must be established in order to view the detailed results.

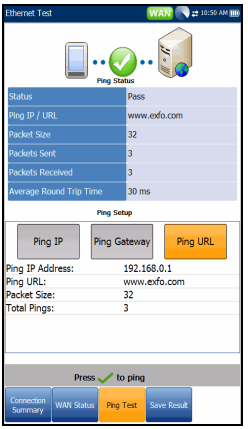


To view individual data test results:

1. Press the up/down navigation keys to select the desired test.
2. Press ✔ to display the test result details.

Ping Test

The **Ping Test** tab allows you to view the Pass/Fail summary status of either a Ping Address or Ping Gateway.

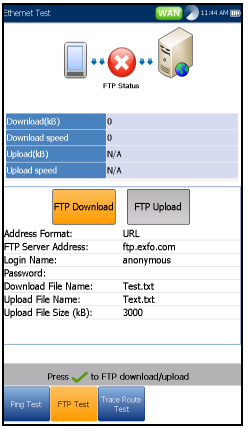


- **Status** is the status of the Ping test performed.
- **Ping IP/URL** is the IP Address or domain name of the destination being pinged.
- **Packet Size** is the number of bytes sent in one packet.
- **Packets Sent** is the number of packets sent.
- **Packets Received** is the number of packets received.
- **Average Round Trip Time** is the duration in milliseconds (ms) it took the data to reach the destination device and come back.
- **Ping IP Address** is the destination IP address.
- **Ping URL** is the destination URL address.
- **Packet Size** is the number of bytes sent in one packet ranging from 32 through 1200 (default is 32 bytes).
- **Total Pings** is the total number of Ping requests to be sent.

FTP Test

The **FTP Test** tab displays the FTP download and upload results configured in the connection setup, and a pass/fail summary status of whether or not the file transfer protocol (FTP) was completed successfully or not.

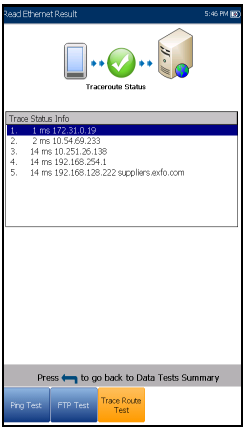
Except for Auto Test, FTP parameters can be reconfigured and have information updated from this tab by using the on-screen **FTP Download/Upload** buttons.



Traceroute Test

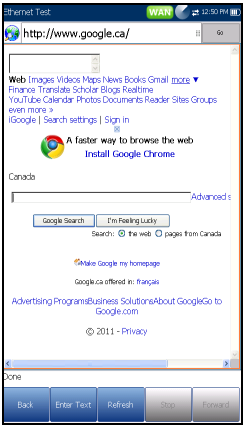
The **Trace Route Test** tab allows you to view the pass/fail status of the IP packet sent to a specified IP destination, and the path and time taken to do so.

Except for Auto Test, Traceroute parameters can be reconfigured and have information updated from this tab by using the on-screen **Trace URL** or **Trace IP** buttons.



Web Browser

The Web browser results screen is available only if the software option is enabled. Web browser results screen contains the following functions:



- URL Box displays the current Web address to be connected.
- The **Go** button launches the specified URL or reloads the previous Web page.
- On-screen function keys:
  - **Back** retrieves the previous Web page (if available). If no Web page was previously browsed, this key is disabled.
  - **Enter Text** opens the editor screen allowing you to type an entry.
  - **Bookmarks** opens the **Bookmarks** page allowing you to select a URL from the list or save the current URL to **Bookmarks**. You must press to enable the **Bookmarks** key.
  - **Refresh** reloads the current Web page.
  - **STOP** halts loading the Web page. If the Web page has already loaded, the key is disabled.
  - **Forward** takes you to the next Web page (if available). If no Web page was browsed after the current page, this key will be disabled.

To edit the Web address:

1. Press to highlight the URL box.
2. Press to bring up the edit screen and modify the Web address. The edited URL can be used to browse the Web page temporarily but it will not be saved as the **Home URL**.

To navigate the Web browser page:

1. Use the keypad arrow keys to move the on-screen cursor. When the cursor reaches the edge of the viewing area, the Web browser page scrolls up/down/left/right. The cursor turns into a text edit tool when scrolling over an editable field or a hand tool when hovering near a hyperlink.
2. Press to launch the desired outcomes.
3. Press to load the **Home URL** page.
4. Press to exit from the Web browser test.

Bookmarks

The Bookmarks page allows you to select from a list of URLs or save the current one.

- **URL** box shows the current URL in the Web browser page.
- On-screen function keys:
  - **Add to Bookmarks** copies the current URL to the **Bookmarks** list above the highlight. When the list reaches the maximum 9 URLs, the key is disabled.
  - **Select** copies the highlighted URL to the **URL** box.
  - **GO** saves the bookmarks and starts the Web connection using the address in **URL** box.

Press to exit from the **Bookmarks** page avoiding all actions and return to the Web browser page.

7 Saving and Reading Test Results

Save Results

You can save a snapshot of test results into a result file during or after a test performed with the MaxTester DSL. Each Auto Test, xDSL, and Ethernet test includes a **Save Results** tab to do so.

When a test is completed or stopped, a **Confirm Save Results** dialogue box pops up. Selecting **Yes** displays the **Save Results** screen where the following information can be entered:

- **File Name** opens an editor screen where you can enter a desired file name.
- **Save** button saves the results in binary format for the test executed.
- **Export Format** generates results of a pre-executed test in the following formats:
  - binary
  - HTML
  - XML
- **Export File Name** opens an editor screen where you can enter a desired export file name.
- **Export** button sends the results, in the selected format, to a USB key. If more than one USB key is attached to the device, you'll be asked to select one from a list of all USB keys attached to the unit.

Note: *If the test is still running (not completed or stopped), only the first two fields are available and the results are saved to binary format.*

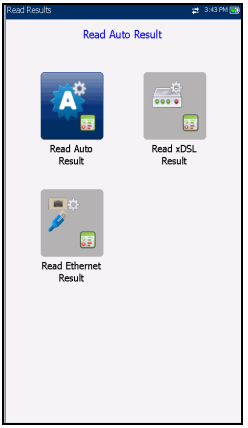
To save or export results:

1. Press the up/down arrows to select the desired parameter.
2. Press the left/right arrow keys to view and select the options,

   Or
3. Press ✔ to open the on-screen keyboard. to enter or edit a **File Name**.
4. Press the up/down left/right arrows to navigate the on-screen keyboard.
5. Select the desired function key to complete your selection.
6. Select **Save** or **Export** buttons and press ✔ to confirm your selection.

Read Results Menu

You can view any of your saved results with the MaxTester DSL from the Main Menu and selecting the Read Results icon. The sub-menu displays an icon for each test: Auto Test, xDSL, and Ethernet.



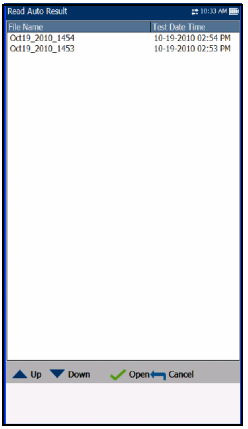
To select a test:

1. Press the up/down left/right navigation keys to select the desired icon.
2. Press ✔ to display a list of the saved test results.

Read Results

Based on the selected value for the test type, the list of result files is displayed by **File Name** and test date and time. The format of **Test Date Time** is per the selection in System settings.

When a file in the list is selected and enter key is pressed, it will read the file and display the result on the GUI.



To recall any of the saved data:

1. Press ⌂ and select **Read Results**.
2. Select one of the Read test Results icons.
3. Select a file in the list using the up/down arrow keys.
4. Press ✔ to open the file and display the results.

8 Maintenance

General Maintenance

To help ensure long, trouble-free operation:

- 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 and let the unit dry completely.

Recycling and Disposal (Applies to European Union Only)

Recycle or dispose of your product (including electric and electronic accessories) properly, in accordance with local regulations. Do not dispose of it in ordinary garbage receptacles.

This equipment was sold after August 13, 2005 (as identified by the black rectangle).

- Unless otherwise noted in a separate agreement between EXFO and a customer, distributor or commercial partner, EXFO will cover costs related to the collection, treatment, recovery and disposal of end-of-lifecycle waste generated by electronic equipment introduced after August 13, 2005 to an European Union member state with legislation regarding Directive 2002/96/EC.
- Except for reasons of safety or environmental benefit, equipment manufactured by EXFO, under its brand name, is generally designed to facilitate dismantling and reclamation.

For complete recycling/disposal procedures and contact information, visit the EXFO Web site at www.exfo.com/recycle.

9 Troubleshooting

Contacting the Technical Support Group

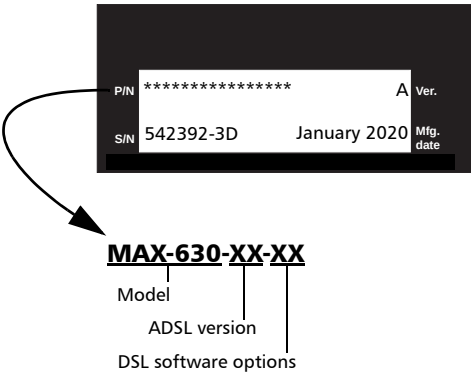
To obtain after-sales service or technical support for this product, contact EXFO at one of the following numbers. The Technical Support Group is available to take your calls from Monday to Friday, 8:00 a.m. to 7:00 p.m. (Eastern Time in North America).

For detailed information about technical support, visit the EXFO Web site at www.exfo.com.

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

To accelerate the process, please have information such as the name and the serial number (see the product identification label—an example is shown below), as well as a description of your problem, close at hand.



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.

10 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.

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 45).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 aReturn 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 anRMA 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 45).

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
quebec.service@exfo.com

EXFO Europe Service Center
Omega Enterprise Park, Electron Way
Chandlers Ford, Hampshire S053 4SE
ENGLAND

Tel.: +44 2380 246810
Fax: +44 2380 246801
europe.service@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
beijing.service@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.

SPECIFICATIONS	
DSL INTERFACE	
Chipset	Broadcom
Standards Compliance VDSL2 ADSL1/2/2+	ITU-T G.993.2 Annex A version (over POTS): ITU-T G.992.5 (ADSL2+), ITU-T G.992.3 (ADSL2), ITU-T G.992.1 (G.DMT) and ANSI T1.413 Issue 2 Annex B version (over ISDN): ITU-T G.992.5 (ADSL2+), ITU-T G.992.3 (ADSL2), ITU-T G.992.1 (G.DMT) Annex L (RE-ADSL) and Annex M (optional) also supported
DSL measurements (upstream and downstream)	Maximum attainable bit rates Actual achieved bit rates Latency mode: fast, interleaved Capacity (%) Signal-to-noise ratio (SNR) margin Output power Attenuation Carrier load (bits/bin) Interleave depth Interleave delay Trellis coding Bit swapping
Miscellaneous functions	PhyR™ and INP support Nitro™ support FEC, CRC, HEC counters Loss of sync counter VDSL2 per band information
DATA TESTING	
Interfaces supported	VDSL2 ADSL1/2/2+ Ethernet 10/100
Encapsulation methods	PPPoE (RFC 2516), RFC 2684 supporting bridged Ethernet (IPoE), IPoA (RFC 1577), PPPoA/LLC and PPPoA/VC-MUX (RFC 2364)
Operating modes	DSL Terminate Modem Replacement (DSL to Ethernet) Pass Through Ethernet Terminate Ethernet/Ethernet Pass Through
Login format	Username and password using PAP/CHAP
IP connectivity support	DNS, DHCP client/server, NAT, VLAN
IP ping	Pings another device on the network Ping destination: gateway, IP address or URL Number of pings: 1 to 99 Packet size: 32 to 1200 bytes (32 is default) Timeout: 1 to 10 seconds Results: packets sent/received, average round-trip delay (ms)

SPECIFICATIONS (continued)

Traceroute	Determines the path used to reach a device on the network Timeout: In seconds, default is 1 s, maximum is 10 s Packet size: 32 bytes Number of hops: 1 to 32 (default is 30) Results: Indicate IP address of hop and round-trip time in milliseconds (ms)
FTP speed test	Displays speed to upload and/or download a file Address: IP or URL Protocol: FTP Results: Time, kB transferred, speed in kbit/s
WEB BROWSER	
Internet live feed	Browses to websites over xDSL or Ethernet interfaces; user-definable bookmarks
IPTV TESTING	
Interfaces supported	VDSL2, ADSL1/2/2+, Ethernet 10/100
Supported video standards	MPEG2, MPEG4 part 2 and 10 (H.264/AVC), WM9
Operating modes	DSL Terminate Ethernet Terminate
IPTV parameters/functionality	IGMP join/leave requests with STB emulation Automatic tests to join/leave and analyze up to five simultaneous streams Programmable channel list for storage of commonly used channels Bandwidth usage per channel IGMP packet and rate information per line and channel Multicast/unicast RTP/UDP IP stream support
Key IP video QoS parameters	Packet loss, zap time, PID statistics
Graphical results	Transport stream packet loss histogram Pass/fail indication for each stream

GENERAL SPECIFICATIONS	
Display	TFT LCD with backlight 152 mm (6 in) diagonal 800 x 480 resolution, WVGA
Size (H x W x D)	254 mm x 124 mm x 62 mm (10 in x 4 $^{7}/_{8}$ in x 2 $^{7}/_{16}$ in)
Weight (with battery)	1.5 kg (3.3 lb)
Temperature range operating storage	 0 °C to 40 °C (32 °F to 104 °F) –20 °C to 60 °C (–4 °F to 140 °F)
Humidity	5 % to 95 % relative, non-condensing
Shock	1 m (39 in) drop per GR-196-CORE
Water/dust ingress	Designed to comply with IP54
Altitude	3000 m (9842 ft)
Input power	9 V to 24 V DC up to 1.67 A, minimum 15 W
Battery	Internal rechargeable Lithium, with battery-state and level indications through the software
Test connections	RJ-11 for ADSL2+/VDSL2 RJ-45 for Ethernet 10/100 WAN RJ-45 for Ethernet 10/100 LAN
Connectivity	USB 2.0 ports Three clients: Type A connectors One host: Type B connector
Results storage	1.2 GB internal memory
Languages	English, French, Spanish, Chinese (Simplified)
CE and CSA marked	

STANDARD ACCESSORIES
Test cable: RJ-11 to RJ-11 and telco clip with bed of nails (ACC-RJ11-TC), or RJ-11 to RJ-11 and 4 mm plugs with crocodile clips (ACC-RJ11-4MM)
Certificate of compliance
AC adapter (GP-2146)
Soft carrying case (GP-10-061)

OPTIONAL ACCESSORIES
RJ-45 Ethernet cable (ACC-RJRJ-UTP)
USB host/client cable (GP-2053)
12 V vehicle charger (CL4-CAR)
Form fitting, protective soft glove with shoulder strap (ACC-GLOVE)

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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:1060868

www.EXFO.com · info@exfo.com

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EXFO AMERICA	3701 Plano Parkway, Suite 160	Plano TX, 75075 USA Tel.: 1 972 907-1505 · Fax: 1 972 836-0164
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