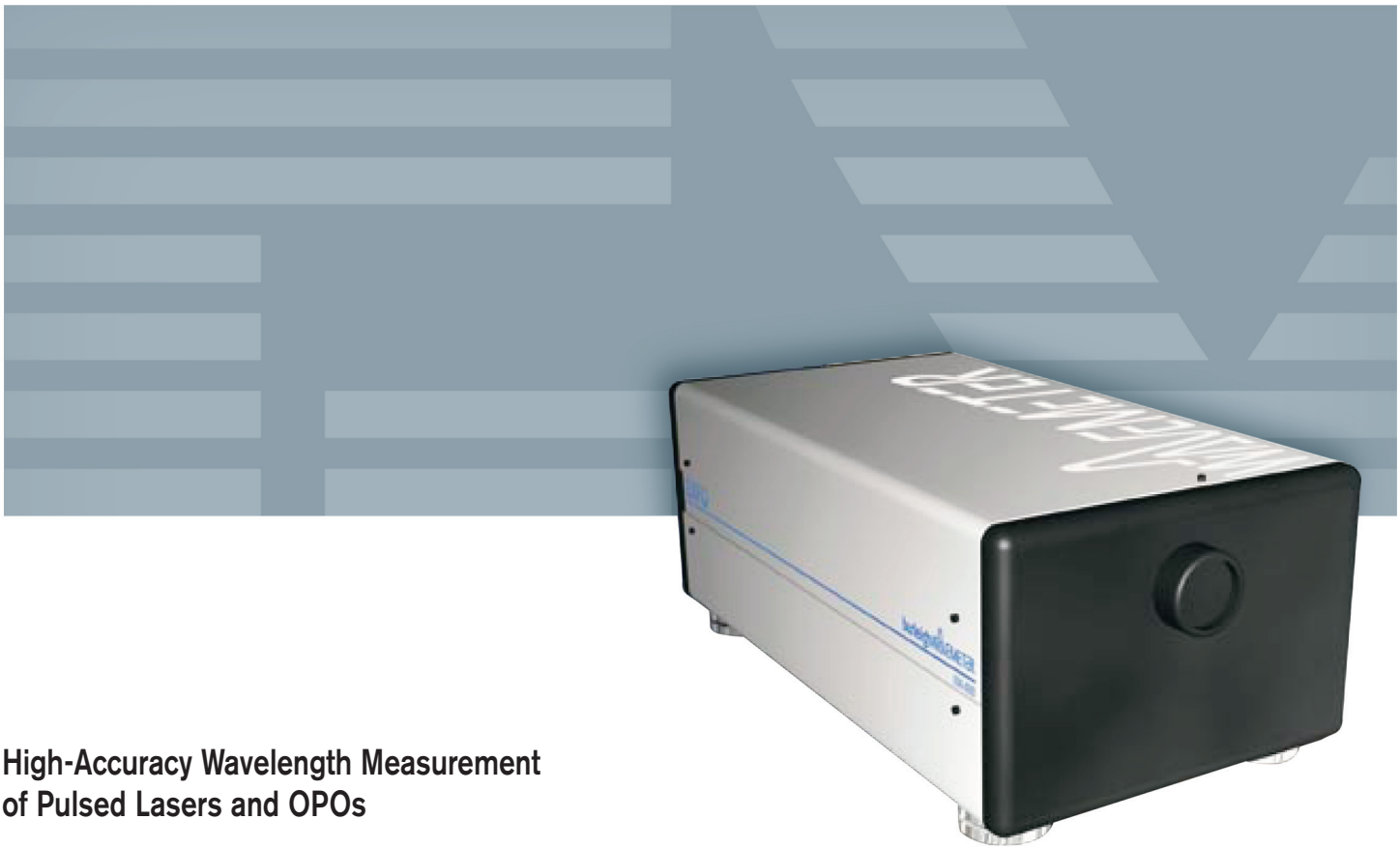
# PULSED LASER WAVELENGTH METER

# 4550

WA-4550 Wavemeter

R&D AND MANUFACTURING



## High-Accuracy Wavelength Measurement of Pulsed Lasers and OPOs

- Real-time laser wavelength verification ensures the most meaningful experimental results
- Highest guaranteed absolute wavelength accuracy of ± 0.02 $cm^{-1}$
- Continuous calibration with built-in wavelength standard
- Single-pulse spectral analysis to a resolution of 1.5 GHz
- Wide range of operation from 400 to 1100 nm

# Ensure Experimental Confidence

There's no better way to confirm the absolute wavelength of a pulsed laser than with EXFO's WA-4550 Wavemeter® Pulsed Laser Wavelength Meter. It provides the most accurate wavelength measurement of pulsed lasers and optical parametric oscillators (OPOs). Whether your research involves high-resolution laser spectroscopy, reaction dynamics, photochemistry or optical remote sensing, the WA-4550 ensures the most meaningful experimental results with continuous, real-time wavelength verification. What's more, it's easy to operate and can be integrated directly into your experiment for automatic wavelength reporting and control.

## The Wavemeter Advantage

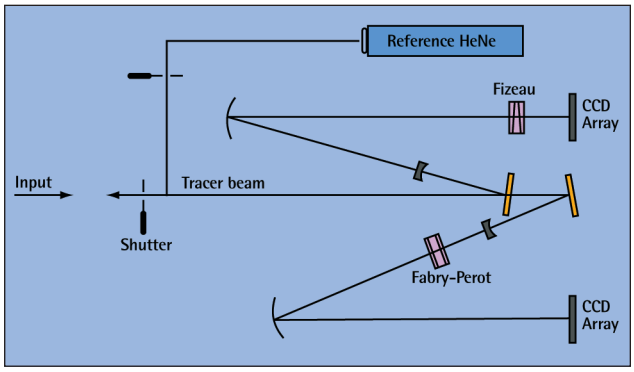
EXFO's employs proven Wavemeter technology to measure the absolute wavelength of pulsed lasers and OPOs operating from 400 to 1100 nm to an accuracy of ± 0.02 $cm^{-1}$. This measurement accuracy is guaranteed because the WA-4550 is continuously calibrated with a built-in wavelength standard and EXFO's unique know-how takes into account all factors that can affect the measurement of absolute wavelength.

## Advanced Wavemeter Design

To measure the wavelength of pulsed lasers, the WA-4550 uses two fixed air-gap etalons to generate spatial interference patterns, which are compared to the patterns generated with a built-in reference HeNe laser. The spacing and positions of the interference fringes can be used to accurately determine the wavelength of the laser under test.

A collimated laser beam is passed through a wedged-mirror Fizeau etalon to form an interference pattern with a fringe spacing that is proportional to laser wavelength. This etalon must be relatively thin, which limits the accuracy of this wavelength calculation. For higher accuracy measurements, a thicker parallel mirror Fabry-Perot etalon is used. It is illuminated with a diverging laser beam, producing a characteristic "bulls-eye" concentric ring interference pattern.

The interference patterns generated by the two etalons are imaged on two CCD arrays, which transfer the raw data to a computer for processing. Absolute laser wavelength is computed in a stepwise fashion, using the result from the low-resolution measurement of the Fizeau etalon to obtain a high-accuracy wavelength reading from the Fabry-Perot etalon.




*The WA-4550 offers continuous calibration with an internal HeNe reference laser.*

## Convenient Operation

As with all of EXFO's Wavemeter systems, the WA-4550 Pulsed Laser Wavelength Meter is easy to use. It interfaces directly to your computer via USB, and is controlled by the special Windows-based software provided.

Alignment of your pulsed laser to the WA-4550 is straightforward because the built-in HeNe reference laser is emitted from the input aperture as a weak visible tracer beam. The laser under test is superimposed onto this tracer beam, and then alignment is optimized using the visual display of the signals from both etalons.

The WA-4550 runs asynchronously by using internal pulsed detection to automatically trigger data collection. The system can measure the wavelength of every pulse from a laser operating at repetition rates of up to 20 Hz. At greater repetition rates, the WA-4550 integrates all pulses arriving within a 50-millisecond measurement window. Alternatively, an external trigger can be used to capture individual pulses.

## Display Results in Different Formats

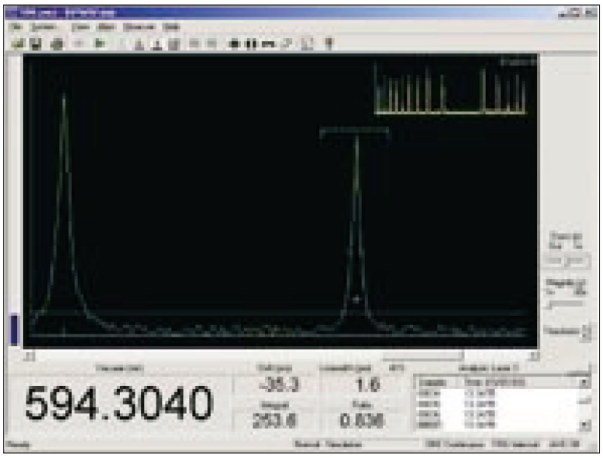
The measurements provided by the WA-4550 can be displayed in two convenient formats:

- The spectrum display (right) shows the interference fringe pattern generated by both the Fizeau and Fabry-Perot etalons along with the measured wavelength (nm) or wavenumber ($cm^{-1}$). This display is useful when you want to qualitatively view the spectral characteristics of your laser as you measure the wavelength real-time.
- If a display of the wavelength measurement is sufficient, the report display provides this information in an easy-to-read format, with figures large enough to be seen from across a room.


*The WA-4550 spectrum display shows the spectrum generated by either individual etalons or both etalons simultaneously, as well as the measured wavelength, wavelength shift and linewidth.*

## Detailed Spectral Analysis

The WA-4550 Wavemeter Pulsed Laser Wavelength Meter has the unique capability of measuring the spectral characteristics of individual laser pulses or an average of laser pulses (right). Software tools allow for analysis of accumulated or previously saved data, including measurement of the frequency shift, linewidth and intensity of the spectra.




*From the interference fringe pattern of the Fabry-Perot etalon, bandwidth and longitudinal mode structure of the laser under test can be measured to a spectral resolution as high as 1.5 GHz (0.05 $cm^{-1}$).*

## SPECIFICATIONS

| | |
|---|---|
| **Wavelength** | |
| Range | 400 nm to 1100 nm |
| Absolute accuracy | ± 0.02 $cm^{-1}$, ± 0.001 nm at 700 nm |
| Display resolution | |
| Fizeau etalon | 0.1 $cm^{-1}$, 0.01 nm |
| Fabry-Perot etalon | 0.01 $cm^{-1}$, 0.0001 nm |
| **Spectral resolution** | |
| Fizeau etalon | 75 GHz |
| Fabry-Perot etalon | 1.5 GHz |
| **Optical input signal** | |
| Maximum bandwidth | |
| Fizeau etalon | 450 GHz |
| Fabry-Perot etalon | 9 GHz |
| Minimum input | |
| Energy | 1 µJ pulsed |
| Power | 10 µW CW |
| Maximum input | |
| Energy | 1 mJ pulsed |
| Power | 10 mW CW |
| **Measurement rate** | |
| Maximum repetition rate* | 20 Hz |
| **Inputs/outputs** | |
| Optical input | Collimated beam, 1 mm diameter aperture |
| Beam height | 165 mm ± 6 mm adjustable |
| Instrument interface | USB |

### GENERAL SPECIFICATIONS

| | |
|---|---|
| **Computer requirements** | |
| Hardware /Software | Windows 2000 or XP, Pentium III processor, 733MHz, 256MB RAM, USB 1.1 /2.0 (minimum) |
| **Warm-up** | |
| Nominal time | 5 minutes |
| **Dimensions and weight** | |
| Dimensions (H x W x D) | 27 cm x 20 cm x 42 cm (10 5/8 in x 7 7/8 in x 16 1/2 in) |
| **Power requirements** | |
| Voltage and frequency | 100 to 240 VAC, 50/60 Hz |

* In order to measure the wavelength of every laser pulse. For repetition rates greater than 20 Hz, all pulses arriving within a 50-millisecond measurement window are integrated.

## ORDERING INFORMATION

**WA-4550**

**Model**

WA-4550 = Pulsed Laser Wavelength meters

Example: WA-4550

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