LabMax-Pro SSIM

Laser Power and Energy Meter

LabMax-Pro SSIM Laser Power and Energy Meter

Features
- Laser power and energy meter
- Compatible with PowerMax-Pro and PM Model thermopiles
- High speed sampling for laser pulse analysis
- USB and RS-232 interfaces
- Windows PC application
- Direct host commands support OEM integration
- Windows 7 and 8 compatible (32 and 64-bit)

The LabMax-Pro represents the next generation of Coherent's groundbreaking LabMax line. This power meter combines the power and versatility of the LabMax, with two new higher speed sampling modes when used with PowerMax-Pro technology. High speed mode increases the continuous sampling rate to 20 kHz, enabling analysis of laser pulse trains common in medical and microwelding applications. Snapshot mode provides burst sampling at a rate of 625 kHz, enabling users to view and analyze the temporal pulse trace of modulated lasers common in various commercial cutting, engraving and drilling applications.

In the traditional 10 Hz sampling mode, PowerMax-Pro sensors provide an instant power reading, much like a photodiode but at very high powers. Legacy thermopiles are also compatible with the 10 Hz sampling mode, just like in past meters.

The product includes a new Windows-based PC application that enables a wide range of analysis functions including statistics and histogram, trending, tuning, data logging, as well as a new ability to zoom in on detailed pulse shapes and pulse bursts using PowerMax-Pro technology. The software interface allows for flexible sizing of informational panes within the application, in which contents are auto-sized dynamically as the panes are adjusted, allowing the user to size the information of greatest importance.

Data is analyzed on the PC through USB or RS-232 interfaces through the Windows PC application, or directly through host commands. Since the LabMax-Pro interfaces via USB and utilizes Windows, the LabMax-Pro can be interfaced to tablets that operate on the Windows 8 platform. This unique capability gives users flexibility to display data and allow state-of-the-art color and touch screen displays.

In addition to PC interfacing, LabMax-Pro SSIM also includes an analog output with user-selectable voltages of 0 to 1V, 2V, or 4V. Triggering can be achieved with an external trigger input or an internal trigger that is user adjustable.

The meter is configured as a module for direct PC control and is compatible with PM model thermopiles and PowerMax-Pro sensors.

A sensor is just part of a measurement system, and can only deliver high quality data if it is matched with electronics to properly acquire, condition and process the raw signal from the sensor. Coherent has developed the LabMax-Pro SSIM laser power meter specifically to fully capitalize on the inherent capabilities of PowerMax-Pro sensors.

To minimize user cost and maximize flexibility, the LabMax-Pro is packaged as a Smart Sensor Interface Module (SSIM) that interfaces with a host computer through either USB or RS-232. LabMax-Pro PC, a new Windows PC application, then enables instrument control and displays measurement results, including laser tuning and pulse shape visualization, on a host computer. The software also performs a wide range

LabMax-Pro SSIM
Laser Measurement System

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of analysis functions such as live statistics, histograms, trending and data logging. In addition, a complete set of host commands can be sent through either the USB or RS-232 interface which is particularly useful for embedded applications.

High Speed Sampling for Pulse Visualization
The standard operating mode of the LabMax-Pro SSIM utilizes a typical 10 Hz sampling rate. At this data rate, it allows PowerMax-Pro sensors to provide an instant power reading, much like a photodiode, but, of course, taking advantage of the sensor's ability to directly read very high powers. High volume processes that use high repetition rate or quasi-CW lasers, such as picosecond and femtosecond lasers, can benefit significantly from fast power measurements. Time currently spent monitoring the process with thermopiles can be spent processing parts, and with such rapid measurements, the process can be monitored more frequently. Instead of spending up to a minute or more taking a reading, the measurement can be performed in less than a second with PowerMax-Pro technology, enabling throughput improvement with very little engineering investment.

The standard operating mode is best used to measure the power of CW lasers, or the average power of high repetition rates lasers. Two High Speed sampling modes have been implemented in the meter electronics and software to fully exploit the rapid response speed of PowerMax-Pro sensors

for measuring modulated lasers operating between these two extremes. These modes enable advanced analysis of high power, modulated lasers in a way that has never been possible before.

The first High Speed mode utilizes a continuous data sampling rate of 20 kHz, allowing pulse shape analysis of modulated lasers with repetition rates of up to 2 kHz. These types of pulse trains are common in many laser-based medical treatments and some materials processing applications such as micro welding.

The second High Speed mode is called "Snapshot Mode," which provides burst sampling at a rate of 625 kHz for a period of time up to 384 milliseconds. This is fast enough to enable visualization of the pulse shape of the modulated lasers common in various commercial cutting, engraving and drilling applications, as well as long pulses and pulse trains used in aesthetic medical applications. This type of temporal visualization offers new insight into the true performance of the laser previously masked by slow thermopiles. This new informationIt provides developers with more repeatable methods to transfer processes from engineering to manufacturing and to control and monitor the process once it's up and running. Many thermal-based materials processing applications can be better controlled with this information, leading to faster processing with higher yield; at the same time, the quality of laser produced features can be enhanced.

The following figures demonstrate the data quality and high pulse shape fidelity that can be achieved:

Modulated 10.6 μm CO$_2$ Laser
- 10 μs PW
- 10 kHz PRF
- 10% Duty Cycle
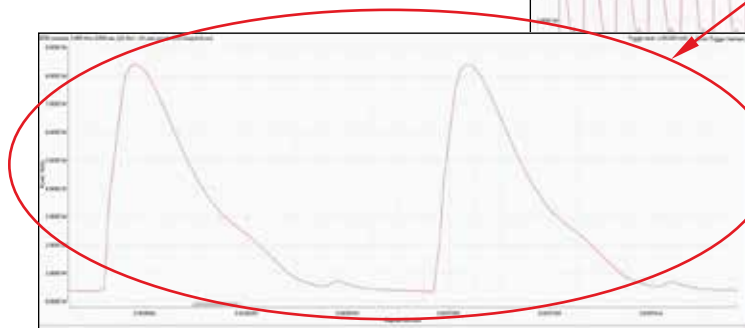
The new LabMax-Pro offers a "Snapshot Mode" which enables visualization of pulses as short as 10 μs and at high duty cycles

POWER & ENERGY

Power & Energy Meters

USB/RS Power Sensors

DB-25 Power Sensors

USB/RS Energy Sensors

DB-25 Energy Sensors
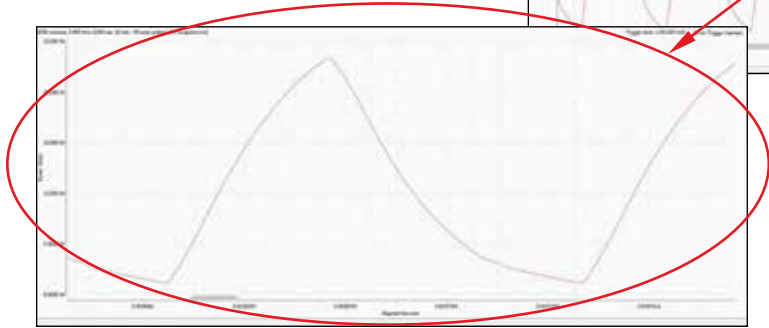
Custom & OEM

BEAM DIAGNOSTICS

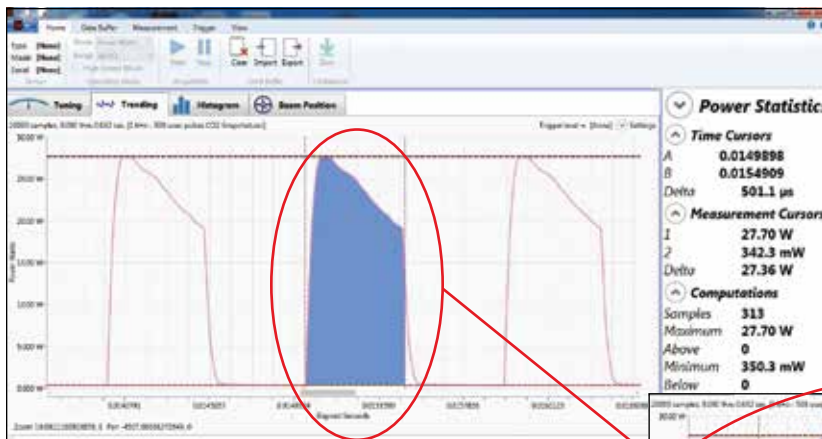CALIBRATION & SERVICE

Laser Cross-Reference Index

Model Name Index

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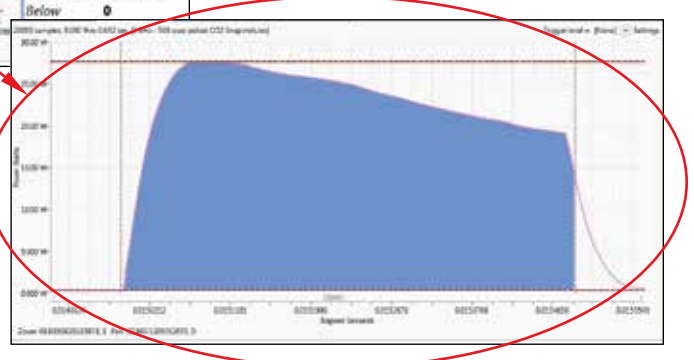**Modulated 10.6 μm CO_2 Laser**
- 50 μs PW
- 8 kHz PRF
- 40% Duty Cycle

Pulse shape visualization obtained with a PowerMax-Pro sensor and LabMax-Pro electronics and software

Modulated 10.6 μm CO_2 Laser
- 500 μs PW
- 1 kHz PRF
- 50% Duty Cycle

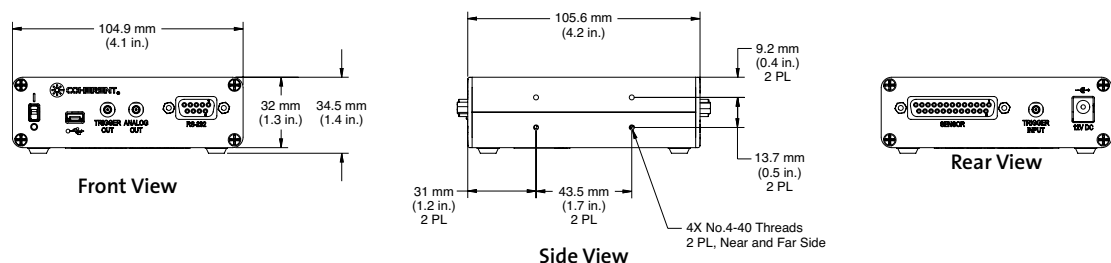Pulse shape visualization obtained with a PowerMax-Pro sensor and LabMax-Pro electronics and software

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Device Specifications

Model	LabMax-Pro SSIM
Measurement Resolution (%)(full-scale)	
at 10 Hz speed	0.1
at 20 KHz high speed	0.2
Sensor Compatibility	PM Model Thermopile; PowerMax-Pro; LM Model Thermopile, OP-2 & LM-2 Optical, DB-25 EnergyMax pyroelectric
Measurement Range	Sensor dependent (reference sensor specifications)
Accuracy (%)	
Digital Meter	±1
System	Meter + sensor
Analog Output	±1
Calibration Uncertainty (%)(k=2)	±1
Power Sampling Rate (Hz)	
Thermopile	10
PowerMax-Pro - Low Speed	10
PowerMax-Pro - High Speed	20,000
PowerMax-Pro - Snapshot Mode	625,000
Pyroelectric	10,000
LM-2/OP-2 Optical	10
Analog Output (VDC)	0 to 1, 2, or 4.096 (selectable)
Analog Output Resolution (mV)	1
Analog Output Update Rate (kHz)	19
Measurement Analysis	Trending, tuning, histogram, data logging, statistics (min., max., mean, range, std. dev., dose, stability), pulse shape (with PowerMax-Pro in High Speed and Snapshot mode), long pulse Joules with thermopiles
Computer Interface	USB and RS-232
Pulse Triggering	Internal and External
Temperature	
Operating Range	5 to 40°C (41 to 104°F)
Storage Range	-20 to 70°C (-68 to 158°F)
Instrument Power (external supply)	90 to 260 VAC, 50/60 Hz
Compliance	CE, RoHS, WEEE
Dimensions	105 x 105 x 32 mm (4.1 x 4.1 x 1.3 in.)
Weight	0.3 kg (0.6 lbs.)
Front Panel	Power switch USB hi-speed port (mini B connector) Trigger output (SMB connector) Analog output (SMB connector) RS-232 port (DB-9F connector)
Rear Panel	DB-25 sensor port External trigger input (SMB connector, 3 to 5 Vin, 2 to 10 mA, 50 ohm AC, 300 ohm DC impedance) Power jack (12VDC - center positive)
Part Number[1,2]	1268881

[1] Meter supplied with AC power adapter, power cord, USB cable, trigger cable, software and driver CD, and certificate of calibration.

[2] OEM mounting and stacking hardware kit (Part Number 1268401) is available for purchase as an optional accessory.

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Front View — 104.9 mm (4.1 in.), 32 mm (1.3 in.), 34.5 mm (1.4 in.)

Side View — 105.6 mm (4.2 in.), 9.2 mm (0.4 in.) 2 PL, 13.7 mm (0.5 in.) 2 PL, 31 mm (1.2 in.) 2 PL, 43.5 mm (1.7 in.) 2 PL, 4X No.4-40 Threads 2 PL, Near and Far Side

Rear View