OptoTest

Test Solutions for Fiber Optics

OP710

Multichannel Optical Power Meter

Instruction Manual

*Opto***Test** Corp. 4750 Calle Quetzal Camarillo California (805) 987 1700 sales@optotest.com

Contacting OptoTest Corporation

Telephone: (805) 987 1700, 8 a.m. to 5 p.m. Pacific Standard Time

Web site: www.optotest.com

E-mail: sales@optotest.com

Mail: OptoTest Corp.
4750 Calle Quetzal
Camarillo, CA 93012

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MnOP710-RevA3

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Overview

The OP710 offers an economical approach for optical power measurement applications where multiple channels are needed. Unlike other systems this instrument is built up with individual power meters allowing for unparalleled simultaneous data acquisition over all channels with a sampling rate of up to 10 samples per second.

The OP710 is available starting at 4 channels up to 24 channels and can be configured for a variety of detector and connector interfaces. With the rack mount option multiple instruments can be combined and configured for even higher channel count.

Available detector options:

IN	fixed InGaAs detector, FC, ST or SC
IN1	1mm InGaAs detector with 5/8” Adapter
IN3	3mm InGaAs detector with 5/8” Adapter
IN5	5mm InGaAs detector with 5/8” Adapter
IN10	10mm InGaAs detector with 5/8” Adapter
SI	fixed Silicon detector, FC or ST
SI3	3mm Silicon detector with 5/8” Adapter

Initial Preparation

Unpacking and Inspection

The unit was carefully inspected, mechanically, electrically and optically before shipment. When received, the shipping carton should contain the items listed in *Standard Contents*. Account for and inspect each item. In the event of a damaged instrument, write or call OptoTest Corp, California. Please retain the shipping container in case re-shipment is required for any reason.

Damaged In Shipment

All instruments are shipped F.O.B. Thousand Oaks when ordered from OptoTest. If you receive a damaged instrument you should:

1. Report the damage to your shipper immediately.
2. Inform OptoTest Corporation.
3. Save all shipping cartons.

Failure to follow this procedure may affect your claim for compensation.

Standard Contents

1. Model OP710 Multichannel Optical Power Meter
2. Power Cord (U.S. Shipments only)
3. USB A-B cable
4. Certificate of Calibration and if requested the Metrology Report
5. Instruction Manual(s)
6. CD with applicable software and documentation
7. Rackmount kit (optional)

Specifications

OP710-IN and OP710-IN1

	Specifications	
Models	OP710-XX-IN	OP710-XX-INyy
Number of Channels	4 to 24	4 to 24
Sensor type	fixed 0.3mm InGaAs with lens	1mm InGaAs
Dynamic range	+3 to –80dBm	+6 to –80dBm
Calibration Wavelengths	850/980/1300/1310/1480/1550/1625nm(1)	
Wavelength dependency	*see Spectral Responsivity*	
Linearity **Deviation ± 0.1 dB** **Deviation ± 0.05 dB** **Deviation ± 0.1 dB**	-3dBm to – 65dBm(2) (3)	-65dBm to -72dBm +0dBm to –65dBm(2) (3) +0dBm to +3dBm
Calibration traceability	U.S. N.I.S.T.	
Absolute accuracy	±0.25 dB at calibration conditions for all NIST traceable wavelengths	
Stability(2)	< ±0.02 dB (3dBm to –65dBm) < ±0.1dB (-65dBm to –80dBm)	
Resolution	0.001 dB Linear: 0.001nW, µW, mW (4)	
Recommended calibration period	18 months	
Settling time (auto-range from dark to max. power.)	0.2 seconds (0dBm to –80dBm)	
Number of readings/sec. (in remote mode)	≥ 10 readings per second	
Channel Performance	Internal sampling interval approx. 35msec	
Measurement modes	dBm, dB, Watt(4)	
Optical connector interface	fixed FC/PC	universal adapter
Fiber Compatibility	up to 62.5/125 MM	up to 100/140
Power Supply	90VAC .. 264VAC 47Hz to 63Hz 0.7Arms(115VAC) 0.4Arms(230VAC) Fuse: T1A, 250V	
Warm-up time	5-15 minutes	
Environmental: **Operating temp.** **Storage temp:** **Humidity**	 -℃ to +50℃ -15℃ to +70℃ 0 - 95% RH (non-condensing)	
Dimensions	19” Rack Standard (16.8 x 3.8 x 10 in.)	
Shipping dimensions	14” x 12” x 21”	
Weight	6lbs	
Shipping weight	12lbs	

(1) NIST traceable calibration at -10dBm, continuous wave
(2) Within specified ambient environmental temperature of 20°C to 25°C, stable within +/- 2°C
(3) Measured at wavelength of 1480nm
(4) mW display for special order units only

OP710-SI and OP710-SI3

	Specifications	
Models	OP710-XX-SI	OP710-XX-IN3
Number of Channels	4 to 24	4 to 24
Sensor type	fixed 0.3mm Silicon with lens	3mm Silicon
Dynamic range	+3 to – 60dBm	+6 to – 65dBm
Calibration Wavelengths	650/850/980[1]	
Wavelength dependency	*see Spectral Responsivity*	
Linearity	0dBm to – 50dBm[2] [3]	0dBm to -50dBm[2] [3]
Calibration traceability	U.S. N.I.S.T.	
Absolute accuracy	±0.25 dB at calibration conditions for all NIST traceable wavelengths	
Stability[2]	< ±0.02 dB (3dBm to –65dBm) < ±0.1dB (-65dBm to –dBm)	
Resolution	0.001 dB Linear: 0.001nW, µW, mW [4]	
Recommended calibration period	18 months	
Settling time (auto-range from dark to max. power.)	0.2 seconds (0dBm to –65dBm)	
Number of readings/sec. (in remote mode)	≥ 10 readings per second	
Channel Performance	Internal sampling interval approx. 35msec	
Measurement modes	dBm, dB, Watt[4]	
Optical connector interface	fixed FC/PC	universal adapter
Fiber Compatibility	up to 62.5/125 MM N.A. up to	up to
Power Supply	90VAC .. 264VAC 47Hz to 63Hz 0.7Arms(115VAC) 0.4Arms(230VAC) Fuse: T1A, 250V	
Warm-up time	5-15 minutes	
Environmental: **Operating temp.** **Storage temp:** **Humidity**	 -℃ to +50℃ -15℃ to +70℃ 0 - 95% RH (non-condensing)	
Dimensions	19” Rack Standard (16.8 x 3.8 x 10 in.)	
Shipping dimensions	14” x 12” x 21”	
Weight	6lbs	
Shipping weight	12lbs	

[1] NIST traceable calibration at -10dBm, continuous wave
[2] Within specified ambient environmental temperature of 20°C to 25°C, stable within +/- 2°C
[3] Measured at wavelength of 1480nm
[4] mW display for special order units only

Definition of Specifications

Dynamic Range

The dynamic range spans from the maximal power level the instrument can measure without major saturation to the detector to the minimal power level where the thermal noise of the detector becomes greater than the current produced by the incident light. For accurate power measurements it is NOT recommended to measure power levels at either end of the dynamic range. (see Linearity)

Linearity

Photodetectors are, by nature, very linear over a wide range of optical input powers, but the power meter electronics can affect the overall system linearity. The power meter linearity is characterized and specified to know the measurement accuracy and linearity over the full dynamic range. For accurate insertion loss measurements only power levels that fall within the range with the best linearity (+/-0.05dB) should be measured.

Calibration Wavelength

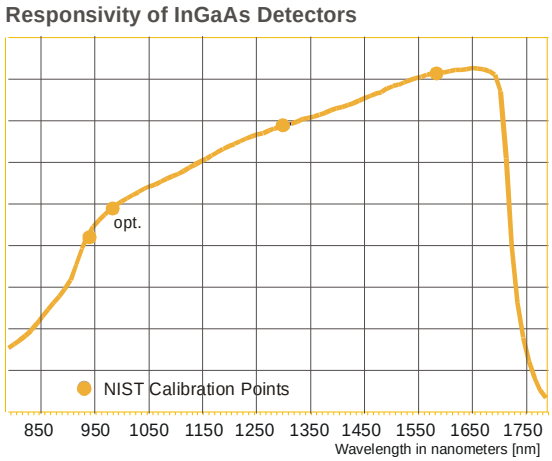
The calibration wavelengths are the *nominal* wavelengths of the instrument is calibration points. The exact wavelength of each particular calibration is stated in the *certificate of calibration.*

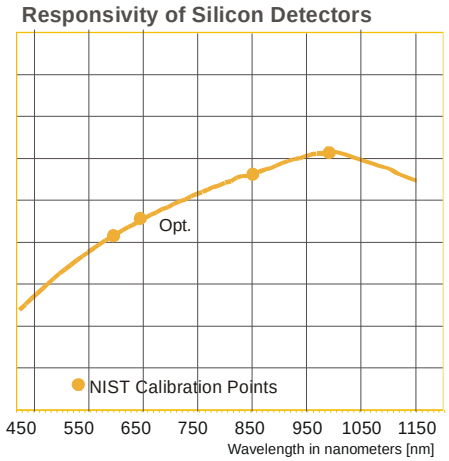
Calibration Traceability

The detector's absolute calibration data is directly traceable to N.I.S.T. at the specified calibration wavelength and the specified power level, usually -10dBm.

Spectral Responsivity

Depending on the detector type, InGaAs (Indium Gallium Arsenide) or Silicon the spectral responsivity, the efficiency of the detector to convert optical power into electrical current changes with wavelength.





Absolute Accuracy

The absolute accuracy specification includes the total measurement uncertainties involved in the calibration process including the transfer of the absolute power standard from N.I.S.T.

Number of readings/sec

Although the USB interface can handle a data rate of up to 12 mbit/sec the instrument responds to request for measurement data not faster than this parameter.

Channel Performance

The power meter circuit converts and digitizes the optical power level with the given sampling interval. Changes in light levels such as modulation will be averaged within that sampling interval.

Warm-up Time

The optical power meters in general do net need any warm-up time unless the instrument has to acclimate to a changing environment. In order to calibrate the instrument or to perform stable measurement the instrument should be acclimated for 15 minutes for each 5ºC of temperature differential. For example if the instrument was stored at 18ºC and brought into an environment of 28ºC the instrument should allowed to warm-up for 30 minutes.

Recommended Recalibration Period

This is the recommended time period for re-calibration, in order to maintain accuracy specifications. The recommendation is made based on statistics on detector aging; however it is up to the metrology policies and procedures within each company to define the calibration cycles on optical power meters.

Fiber Compatibility

The amount of aerial coverage of the detector, the portion of the light emitted from the fiber being measured, depends on the mechanical features of the optical interface, the active area of the detector and the numerical aperture (NA) of the fiber. I fiber with a large NA, for example 100/140 multimode fiber, might not under fill a small area detector hence the absolute power reading will be less than actual.

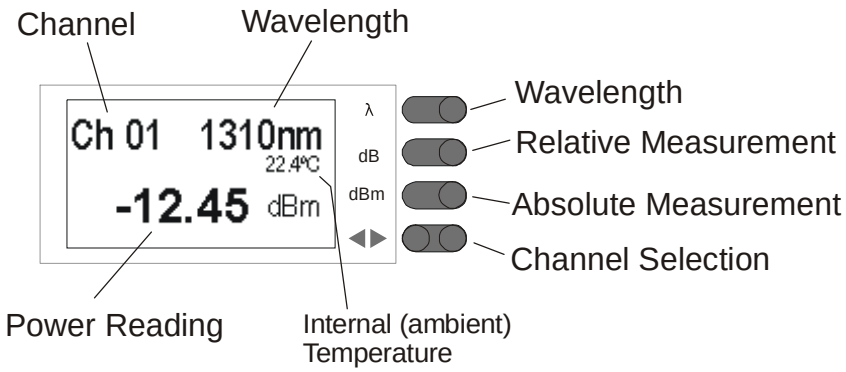
Environmental

Operating Temperature: This is the temperature range in which the OP710 will conform to the specifications after the specified warm up time.

Storage Temperature: This is the temperature range at which the instrument can be stored with the power off, without any damage or any loss of specification to the instrument. It is required that the instrument be brought back to within the operating temperature range before it is turned on.

Humidity: The relative non-condensing humidity levels allowed in the operating temperature range.

Frontpanel Operation



Wavelength

The wavelength button toggles through the available calibration wavelength. Typically for power meters with InGaAs this is 850nm, 980nm, 1300nm, 1310nm, 1480nm, and 1550nm.

Relative Measurement

The **dB** button switches the power meter into relative measurement mode. At the same time it stores the current absolute power reading as the reference. The reference power is displayed above the relative power reading (see illustration of Display). If the instrument is already in relative measurement mode pressing the **dB** button stores the current power level as the new reference.

For each wavelength and for each channel a reference reading can be stored.

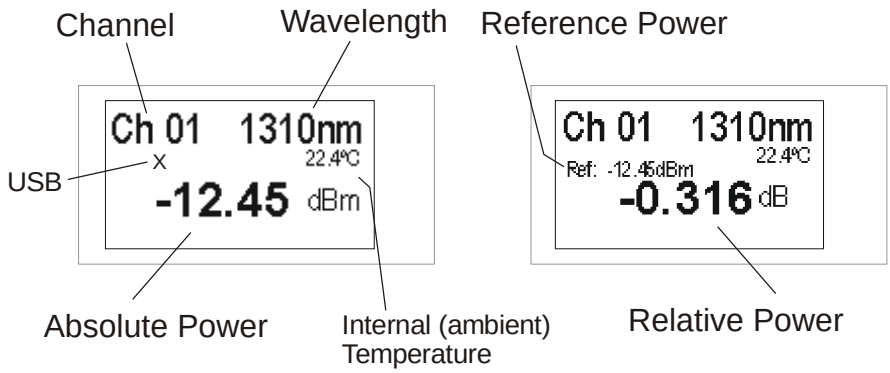
Absolute Measurement

The **dBm** button switches the power meter into absolute measurement mode.

Channel Selection

By pressing the right button the instrument display switches to the next channel, it will stop at the last channel. Similarly the left button switches the instrument to the previous channel. Each channel retains the calibration wavelength, absolute or relative measurement mode and the corresponding reference power levels.

Display



Channel Display

Shows the current selected channel.

Wavelength

Displays the currently selected calibration wavelength.

Absolute Power

The absolute power is displayed in dBm.

Relative Power

The relative power is displayed in dB. It is the difference between the reference power and the measured absolute power.

Internal Temperature

The internal, ambient temperature is displayed in either ºF (Fahrenheit) or ºC (Celsius), that selection is performed with a USB command.

USB

When communicating with the instrument the USB activity is displayed as one character, usually the ASCII representation of the data byte sent.

USB Control of the OP710

The OP710 is controlled via the USB bus. Following commands are available via the OP710.DLL to communicate with the instrument through a program.

Command Summary

NOTE: For a detailed and complete description of the OP710.DLL function calls please consult the OP710.DLL Description on the Applications and Driver CD or visit the support section of www.optotest.com.

InitDLL	Initializes the OP710.DLL
GetDLLStatus	Returns the status of the last library call.
GetUSBDeviceCount	Returns the number of OptoTest devices connected to the USB bus.
GetTemperature	Returns the ambient temperature I either Celsius or Fahrenheit
SetActiveChannel	Switches the instrument to the selected channel
ReadPower	Returns the power reading of the currently selected channel.
GetChannelBuffer	Scans and uploads all active channels of the instrument at once.
SetWavelenght	Sets the calibration wavelength.
Backlight	Lights or dims the backlight of the instrument.

Warranty Information

OptoTest Corp. warrants this product to be free from defects in material and workmanship for a period of 1 (one) year from date of shipment. During the warranty period we will, at our option, either repair or replace any product that proves to be defective. To exercise this warranty contact OptoTest Corp. Headquarters. You will be given prompt assistance and return instructions. Repairs will be made and the instrument returned, transportation prepaid. Repaired products are warranted for the balance of the original warranty period, or at least 90 days.

NOTE: Do not send instruments for any reason without contacting OptoTest headquarters first.