

N7747C and N7748C

High-Sensitivity Optical Power Meters

Introduction

The 2-port N7747C and 4-port N7748C optical power meters provide the highest accuracy and sensitivity performance in compact front-panel sensor instruments. These are successors and direct replacements for the N7747A and N7748A and continue the optical performance level of the 81634B modules.



Web user interface but no LAN?

Connect instrument and PC via USB. The instrument shows up as a new drive: double-click the shortcut on that drive. This lets any modern browser open a connection to the instrument: the graphical user interface appears. It's as simple as that!

The N774-C Family's Deepest Dynamic Range

With actively cooled InGaAs detectors and optimized high-performance analog electronics, these instruments provide the lowest level of noise and drift to provide a very low and stable zero-signal level. The very high linearity and low polarization dependence give peak accuracy over the full power range.

Analog output port perfect for automated alignment

The highest sensitivity and the analog voltage output make a powerful combination for use in operations for probe and fiber alignment and other optimization routines, where a very weak initial signal level must be detected and then tracked in real-time to increase the signal level over orders of magnitude. The voltage on each channel's analog output port represents the optical power level.

Two and four port with user-exchangeable connector receptacles

N7747C is equipped with two power sensor channels, N7748C provides four power sensor channels. Each port accepts one of the proven 81000xl connector interfaces to adapt to common fiber-optic connector standards.

Members of a growing family

The N7747C and N7748C benefit from the N77-C's family-wide, common trigger concept, and a modern, browser-accessible user interface, that makes it convenient to configure the instrument's functionality. High-speed measurement data acquisition, faster data interfaces, the use of dual-ported RAM for uninterrupted simultaneous measurement and readout help avoid unnecessary delays in the measurement process as well as in post-processing.

Fast swept-wavelength measurements with high dynamic range

For the measurement of devices with very high isolation or very low PDL, the new N7747C and N7748C are alternatives to the N7744C and N7745C multiport power meters in swept-wavelength applications: Controlled by the photonic application software suite they can perform spectral measurements of insertion loss and polarization dependent loss when combined with Keysight tunable lasers and a polarization synthesizer. Use of multiple power ranges and bi-directional wavelength sweeping provide fast measurements with dynamic range beyond 80 dB. The photonic application software suite has a measurement engine for IL and PDL that can combine the sweeps of up to 3 tunable laser wavelength ranges. See the photonic application software suite brochure for details.

www.keysight.com/find/n7700

Key benefits

Highest accuracy and sensitivity for single measurements and optical power logging

- -110 to +10 dBm power range with very low noise and drift
- In-range linearity below ± 0.005 dB for highest IL measurement accuracy
- Very low polarization dependence for great stability and PDL accuracy
- Memory for 1 M samples/port plus 1 M/port buffer for continuous logging
- Averaging times from 25 μ s to 10 s per sample

Ideal for automated and semi-automated alignment applications

- Analog output with linear feedback for alignment
- Standard BNC connector with 0 to 2 V output

Flexibility

- 81000xl connector interfaces support a wide range of common fiber-optic connectors
- The instrument can be controlled via LAN and USB
- The comprehensive hardware and trigger concept along with its large memory storage gives the flexibility to adapt the power meter to many test needs
- The instrument programming code is compatible to the Lightwave solution



Figure 1. Exchangeable 81000xl connector interfaces

Definitions

Generally, all specifications are valid at the stated operating and measurement conditions and settings, with uninterrupted line voltage.

Specifications (guaranteed)

Describes warranted product performance that is valid under the specified conditions. Specifications include guard bands to account for the expected statistical performance distribution, measurement uncertainties changes in performance due to environmental changes and aging of components.

Typical values (characteristic)

Characteristics describe the product performance that is usually met but not guaranteed. Typical values are based on data from a representative set of instruments.

General characteristics

Give additional information for using the instrument. These are general descriptive terms that do not imply a level of performance.

Technical specifications

Optical power meter specifications

	N7747C	N7748C
Number of ports	2	4
Sensor element	InGaAs	
Operating wavelength range	800 nm to 1700 nm	
Specification wavelength range	1000 nm to 1630 nm (if not stated differently)	
Power range	−110 dBm to +10 dBm	
Maximum safe input power	+16 dBm	
Averaging time	25 μ s to 10 s	
Applicable fiber type	Standard SM and MM $\leq$ 100 μ m core diameter, NA $\leq$ 0.3	
Uncertainty at reference conditions ¹	$\pm$ 2.5%	
Total uncertainty ^{2,3}	$\pm$ 4.5%	
Linearity ^{3,6,9}	< $\pm$ 0.015 dB (at 23 °C $\pm$ 5 °C; typical if power range is set to +10 dBm)	
	< $\pm$ 0.030 dB (in operating temperature range)	
	< $\pm$ 0.005 dB (at fixed power range $\geq$ −20 dBm, within 10 dB below range setting)	
Polarization dependent responsivity ⁴	< $\pm$ 0.005 dB	
Spectral ripple (due to interference) ⁵	< $\pm$ 0.005 dB	
Drift ⁷	< $\pm$ 0.05 pW	
Noise peak-to-peak (dark) ⁷	< 0.08 pW	
Frequency response	3-dB cut-off frequency, typical, also for analog output	
+10 dBm to −30 dBm ranges	5 kHz	
−30 dBm to −40 dBm ranges	4 kHz	
−40 dBm to −70 dBm ranges	0.3 kHz	
Return loss ⁸	> 55 dB	

1. Reference conditions:

Fiber 50 μ m graded-index, NA = 0.2.

Ambient temperature (23 $\pm$ 5) °C.

Power level: −20 dBm to 0 dBm, continuous wave (CW).

At day of calibration (add $\pm$ 0.3% for aging over one year; add $\pm$ 0.6% for aging over two years).

Spectral width of source < 10 nm full width half maximum (FWHM).

Wavelength setting of power sensor corresponds to source wavelength $\pm$ 0.4 nm..

2. Operating conditions:

Fiber $\leq$ 50 μ m, NA $\leq$ 0.2.

Connectors with 2.5 mm ferrule with flat face (fiber tip offset not more than 0.3 mm from 2.5 mm cross-section) with straight or angled polish.

Within one year of calibration; add $\pm$ 0.3% for second year.

Spectral width < 10 nm FWHM.

3. Excluding noise and offset drift

4. All states of polarization at constant wavelength (1550 nm $\pm$ 30 nm) and constant power, straight connector,

T = (23 $\pm$ 5) °C. For angled connector (8°) add $\pm$ 0.01 dB typ.

5. Test conditions: wavelength 1550 nm $\pm$ 30 nm, fixed state of polarization, constant power, temperature (23 $\pm$ 5) °C, linewidth of source $\geq$ 100 MHz, angled connector 8°.

6. Power range −90 dBm to +10 dBm.

7. Averaging time 1 s, T = (23 $\pm$ 5) °C, Δ T $\pm$ 1 K, observation time 300 s, relative humidity < 60%.

8. Wavelength 1310 nm $\pm$ 30 nm and 1550 nm $\pm$ 30 nm, standard single mode fiber, angled connector 8°, T = (23 $\pm$ 5) °C.

9. For input power < −70 dBm add as dB: $\pm$ 10 log (1 + 0.04 pW / Power in pW).

General specifications

	N7747C	N7748C
Line power	AC 100 V to 240 V $\pm$ 10%, 50/60 Hz, 60 VA max.	
Analog output	0 V to 2 V in to open, 600 Ω typical output impedance, max input voltage $\pm$ 10 V	
Data logging capability	2 buffers per port, each with capacity for 1 M measurement points	
Operating temperature	+5 °C to +40 °C	
Operating humidity	$\leq$ 80%, non-condensing	
Storage temperature	-40 °C to +70 °C	
Max. operating altitude	2000 m	
Pollution protection	Designed for pollution degree 2	
Warm-up time	20 minutes	
Recommended recalibration period	2 years	
Dimensions	420 mm $\times$ 212 mm $\times$ 43 mm (excluding front and back rubber cushions and connectors)	
Weight	3.5 kg (7 lbs)	4 kg (8 lbs)

User interface

	N7747C, N7748C
LAN Access (1 Gbit/s): HTTP VXI-11 SCPI-telnet SCPI-raw	IPv4 and IPv6 Socket connection: http://<ip_address> or http://<host_name> port 111 (IPv4 only) port 5024 port 5025
USB Access (USB 2.0)	Remote NDIS (virtual Ethernet link over USB); USB Mass Storage functions (read-only)

Ordering information

Product/Option	Description
N7747C-STD	High-Sensitivity Optical Power Meter, 2 channels
N7748C-STD	High-Sensitivity Optical Power Meter, 4 channels
Product/Option	Connector interfaces
81000xyl	One connector interface is required per input port. For details, please refer to the Lightwave Solution Platform Configuration Guide, page 16
81000BI	Bare fiber connectivity set for optical sensors. For details, please refer to the Lightwave Solution Platform Configuration Guide, page 15
Product/Option	Recommended accessories
N7799C-1CM	Rack Mount Kit for 2 half-width instruments, 1 Rack Height Unit. Includes low profile rails, fitted to Keysight System II racks with 24-inch-spaced mounts. Requires Filler Kit N7799C-0CM for mounting single instrument
N7799C-0CM	Filler Kit for N7799C-1CM. Required for single half-width instrument; includes front panel and base plate
N7799C-DOC	Documentation of N77-C Platform, Physical Medium

For more information

For more insights on optical test products, check the following links:

Optical test instruments: www.keysight.com/find/oct

Optical signal conditioning products: www.keysight.com/find/voa

Optical multiport power meters: www.keysight.com/find/MPPM

Polarization solutions: www.keysight.com/find/pol

Tunable laser sources: www.keysight.com/find/tls

Keysight photonic discussion forum: community.keysight.com