

N7742C and N7743C

Optical Power Meters

General Information

With the new N7742C and N7743C, Keysight extends the functionality of the popular N774-C optical power meter family. These new instruments offer models for wider wavelength range, higher power levels, analog feedback and finer granularity of port count, while keeping the speed and logging performance of the well established N7744C and N7745C.



Optional extended wavelength range

In addition to the standard operating wavelength range of 1250 nm to 1650 nm for both N7742C and N7743C (options #200, #400), this can be extended down to 800 nm with options #210 and #410.

Analog output port perfect for automated alignment

All N7742C and N7743C optical power meters provide an analog voltage output that can be used as feedback for automated alignment applications. The voltage on each channel's analog output port is configurable to be linearly or logarithmically proportional to the optical power level. The new logarithmic mode is very helpful for tracking the signal level over a wide dynamic range, like during probe adjustment.



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!

N7743C High-Power Optical Power Meter



For measuring optical power levels above +10 dBm, the N7743C is a good fit to devices like transmitter lasers, with +20 dBm maximum input power. The dark noise level is less than 30 pW, providing over 90 dB dynamic range. This provides an intermediate performance alternative to the remote heads, like the 81626C or 81628C that cover still higher power levels.

Two and four port with user-exchangeable connector receptacles

Both, N7742C and N7743C are available with two (option #200, #210) or four power sensor channels (option #400, #410). The connector style can be configured individually for each port by choosing from a range of user-exchangeable N7742-I connector interfaces.



Members of a growing family

The N7742C and N7743C 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, and fast power range switching help avoid unnecessary delays in the measurement process as well as in post-processing.

Key Benefits

High-speed measurement data acquisition for swept-wavelength and transient measurements

- Short minimum averaging time of 1 μ s and up to 250 kHz bandwidth
- Data acquisition with up to 1 Million samples per second and per port
- Memory for 1 M samples/port plus 1 M/port buffer for continuous logging with up to 3x faster data transfer
- Frequency response matched to averaging time and stable dark-current zeroing provide high dynamic range without distorting filter shapes at high sweep speed

Ideal for automated and semi-automated alignment applications

- Analog output port with linear or logarithmic feedback signal
- Standard BNC connector with 0 V to 2 V output

Flexibility

- Connector adapters support FC, SC, LC, and ST connectors and are individually configurable
- 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 platform

Fast swept-wavelength measurements with high dynamic range

For lower port counts, the new N7742C and N7743C are alternative offers for 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. Accelerated concurrent power ranging and bi-directional wavelength sweeping enable high-throughput testing and fast update rates in alignment and adjustment processes. 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.

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 (characteristics)

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.

Optical Power Meter Key Specifications

	N7742C, N7743C
Sensor element	InGaAs
Number of ports	2 (Options 200, 210) 4 (Options 400, 410)
Operating wavelength range	1250 nm to 1650 nm (Options 200, 400) 800 nm to 1650 nm (Options 210, 410)
Maximum safe input power	+16 dBm (N7742C) +23 dBm (N7743C)
Power range	-80 dBm to +10 dBm (N7742C) -70 dBm to +20 dBm (N7743C)
Analog output	0 V to 2 V in to open, 600 Ω typical output impedance, max input voltage ± 10 V
Data logging capability	2 buffers per port, each with capacity for 1 M measurement points
Averaging time	1 μ s to 10 s
Applicable fiber type	Standard SM and MM ≤ 62.5 μ m core diameter, NA ≤ 0.24

Optical Power Meter Specifications

N7742C, N7743C	Options 200, 400	Options 210, 410
Operating wavelength range	1250 nm to 1650 nm	800 nm to 1650 nm
Specification wavelength range (if not stated differently)	1250 nm to 1625 nm	1250 nm to 1625 nm 808 nm ± 10 nm 852 nm ± 10 nm 940 nm ± 10 nm 1064 nm ± 10 nm
Uncertainty at reference conditions ^{1, 3}	± 2.5%	± 2.5% (1250 nm to 1625 nm); typical ± 2.5% (852/ 940/ 1064 nm); typical ± 3.0% (808 nm)
Total uncertainty ^{2, 5, 6}	± 4.5%	± 4.5% (1250 nm to 1625 nm); typical ± 4.5% (852/ 940/ 1064 nm); typical ± 5.0% (808 nm)
Polarization dependent responsivity ^{3, 7}	< ± 0.015 dB (1520 nm to 1580 nm); Typical < ± 0.01 dB (1250 nm to 1580 nm)	< ± 0.015 dB (1520 nm to 1580 nm); typical < ± 0.01 dB (1250 nm to 1580 nm); typical < ± 0.015 dB (1064 nm); typical < ± 0.025 dB (940 nm); typical < ± 0.04 dB (852 nm)
Spectral ripple (due to interference) ⁹	< ± 0.01 dB (1520 nm to 1625 nm); typical < ± 0.01 dB (1250 nm to 1520 nm)	< ± 0.01 dB (1520 nm to 1625 nm); typical < ± 0.01 dB (1250 nm to 1520 nm); typical < ± 0.015 dBm (1064 nm); typical < ± 0.015 dB (940 nm); typical < ± 0.020 dB (852 nm)
Relative port to port uncertainty ^{1, 3, 4, 10}	Typical ± 0.05 dB	
Return loss ⁸	> 50 dB (1520 nm to 1580 nm) Typical > 57 dB (1280 nm to 1580 nm)	

- Reference conditions:
Single mode fiber SMF 9 μm.
Power level: -20 dBm to 0 dBm.
On day of calibration (add ± 0.3% for aging over one year; add ± 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 ± 0.4 nm.
- Operating conditions:
Single mode fiber SMF. For multimode fiber, typical.
Within one year of calibration; add ± 0.3% for second year.
Spectral width < 10 nm FWHM.
Wavelength setting of power sensor corresponds to source wavelength ± 0.4 nm.
- Ambient temperature (23 ± 5) °C.
- Temperature constant within ± 1 K after zeroing. Relative humidity ≤ 60%.
- Excluding noise and offset drift.
- Power range -60 dBm to +10 dBm for N7742C, -50 dBm to +20 dBm for N7743C.
- Straight connector, SMF.
- Connector 8° angled, ceramic ferrule, SMF.
- For constant state of polarization, source linewidth < 100 MHz, angled connector 8°. Add ± 0.01 dB typical within specification wavelength range for straight connector with ceramic ferrule.
- Same 2-detector block, same wavelength.

		N7742C		
Power range	–80 dBm to +10 dBm			
Maximum safe input power	+16 dBm			
Linearity ^{3, 4}	± 0.02 dB ± 3 pW at (23 ± 5) °C ± 0.04 dB ± 5 pW over operating temperature range			
Drift ²	± 3.5 pW			
Noise peak-to-peak (dark) ^{1, 2}	< 3 pW (1 s averaging time, 300 s observation time)			
Noise 2σ ¹ (100,000 samples)	Averaging time: 1 μs	25 μs	1 ms	
PM range	Typical	Typical	Typical	
–30 dBm	< 0.1 nW	< 0.025 nW	< 0.005 nW	
–20 dBm	< 1.5 nW	< 0.15 nW	< 0.02 nW	
–10 dBm	< 6 nW	< 0.5 nW	< 0.08 nW	
0 dBm	< 60 nW	< 4 nW	< 0.8 nW	
+10 dBm	< 600 nW	< 40 nW	< 8 nW	
Dynamic range ^{1, 2} (logging mode)	Averaging time: 1 μs	25 μs	1 ms	
PM range	Typical	Typical	Typical	
–30 dBm	> 43 dB	> 48 dB	> 56 dB	
–20 dBm	> 43 dB	> 53 dB	> 61 dB	
–10 dBm	> 46 dB	> 57 dB	> 62 dB	
0 dBm	> 46 dB	> 57 dB	> 63 dB	
+10 dBm	> 43 dB	> 54 dB	> 59 dB	
Port separation ^{2, 3}	> 85 dB (CW, one neighbor port with 0 dBm)			
Port separation, dynamic ^{2, 3, 5}	Typical > 70 dB (one neighbor port with 0 dBm in 0 dBm power meter range)			
Frequency response	3 dB cutoff frequency at 1 μs averaging time, typical			
–30 dBm range	10 kHz			
–20 dBm range	130 kHz			
–10 to +10 dBm range	250 kHz			

1. Ambient temperature (23 ± 5) °C.
2. Temperature constant within ±1 K after zeroing. Relative humidity ≤ 60%.
3. Excluding noise and offset drift.
4. Power range –60 dBm to +10 dBm.
5. With analog output turned off.

		N7743C		
Power range	-70 dBm to +20 dBm			
Maximum safe input power	+23 dBm			
Linearity ^{3, 4, 5}	± 0.04 dB ± 30 pW at (23 ± 5) °C ± 0.15 dB ± 50 pW over operating temperature range			
Drift ²	± 45 pW			
Noise peak-to-peak (dark) ^{1, 2}	< 30 pW (1 s averaging time, 300 s observation time)			
Noise 2σ ¹ (100,000 samples)	Averaging time: 1 μs	25 μs	1 ms	
PM range	Typical	Typical	Typical	
-20 dBm	< 1.2 nW	< 0.3 nW	< 0.05 nW	
-10 dBm	< 15 nW	< 1.5 nW	< 0.2 nW	
0 dBm	< 60 nW	< 5 nW	< 0.8 nW	
+10 dBm	< 600 nW	< 40 nW	< 8 nW	
+20 dBm	< 6000 nW	< 400 nW	< 80 nW	
Dynamic range ^{1, 2} (logging mode)	Averaging time: 1 μs	25 μs	1 ms	
PM range	Typical	Typical	Typical	
-20 dBm	> 41 dB	> 47 dB	> 55 dB	
-10 dBm	> 42 dB	> 52 dB	> 60 dB	
0 dBm	> 46 dB	> 56 dB	> 62 dB	
+10 dBm	> 47 dB	> 57 dB	> 63 dB	
+20 dBm	> 44 dB	> 55 dB	> 60 dB	
Port separation ^{2, 3, 6}	> 85 dB (CW, one neighbor port with +10 dBm)			
Port separation, dynamic ^{2, 3}	Typical > 70 dB (one neighbor port with +10 dBm in +10 dBm power meter range)			
Frequency response	3 dB cutoff frequency at 1 μs averaging time, typical			
-20 dBm range	10 kHz			
-10 dBm range	130 kHz			
0 to +20 dBm range	250 kHz			

1. Ambient temperature (23 ± 5) °C.
2. Temperature constant within ±1 K after zeroing. Relative humidity ≤ 60%.
3. Excluding noise and offset drift.
4. Power range -50 dBm to +20 dBm.
5. For input power >10 mW: add typical ± 0.0016 dB/mW. In case of decreasing power, allow time for stabilization of the reading (about 5 s per dB change). In case of decreasing power by more than 50 dB, allow recovery time of 3 minutes.
6. With analog output turned off.

General Specifications

Line power	AC 100 V to 240 V \pm 10%, 50/60 Hz, 60 VA max.
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
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 kg (6 lbs)
User Interface	N7742C, N7743C
LAN Access (1 Gbit/s): HTTP Telnet VXI-11 SCPI-telnet SCPI-raw	IPv4 and IPv6 Socket connection: http://<ip_address> or http://<host_name> port 23 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

Option	Description
N7742C-200	Optical Multiport Power Meter, 2 channels, standard wavelength range
N7742C-210	Optical Multiport Power Meter, 2 channels, extended wavelength range
N7742C-400	Optical Multiport Power Meter, 4 channels, standard wavelength range
N7742C-410	Optical Multiport Power Meter, 4 channels, extended wavelength range
N7743C-200	Optical Multiport Power Meter, high power, 2 channels, standard wavel. range
N7743C-210	Optical Multiport Power Meter, high power, 2 channels, extended wavel. range
N7743C-400	Optical Multiport Power Meter, high power, 4 channels, standard wavel. range
N7743C-410	Optical Multiport Power Meter, high power, 4 channels, extended wavel. range

Product/Option	Recommended Accessories
N7742FI	FC single connector interface for N7742C, N7743C
N7742KI	SC single connector interface for N7742C, N7743C
N7742LI	LC single connector interface for N7742C, N7743C
N7742VI	ST single connector interface for N7742C, N7743C
N7799C-1CM	Rack Mount Kit for 2 half-width instruments, 1 Rack Height Unit, including low profile rails. 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

Optical Instruments Online Information

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

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

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

Keysight photonic discussion forum: community.keysight.com

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