Technology Support on the Leading Edge

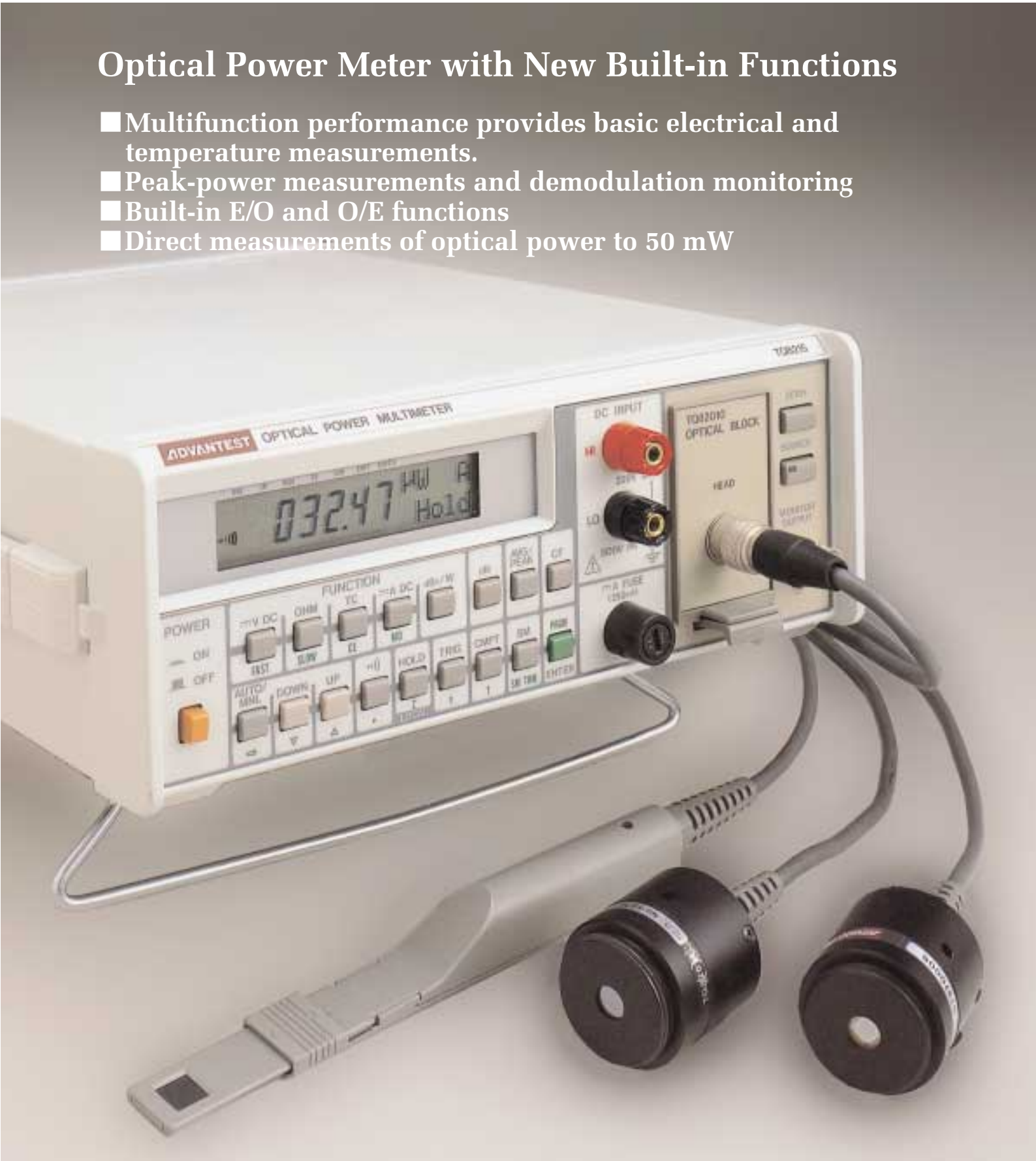
ADVANTEST

ADVANTEST CORPORATION

TQ8215
Optical Power Multimeter

Optical Power Meter with New Built-in Functions

- Multifunction performance provides basic electrical and temperature measurements.
- Peak-power measurements and demodulation monitoring
- Built-in E/O and O/E functions
- Direct measurements of optical power to 50 mW

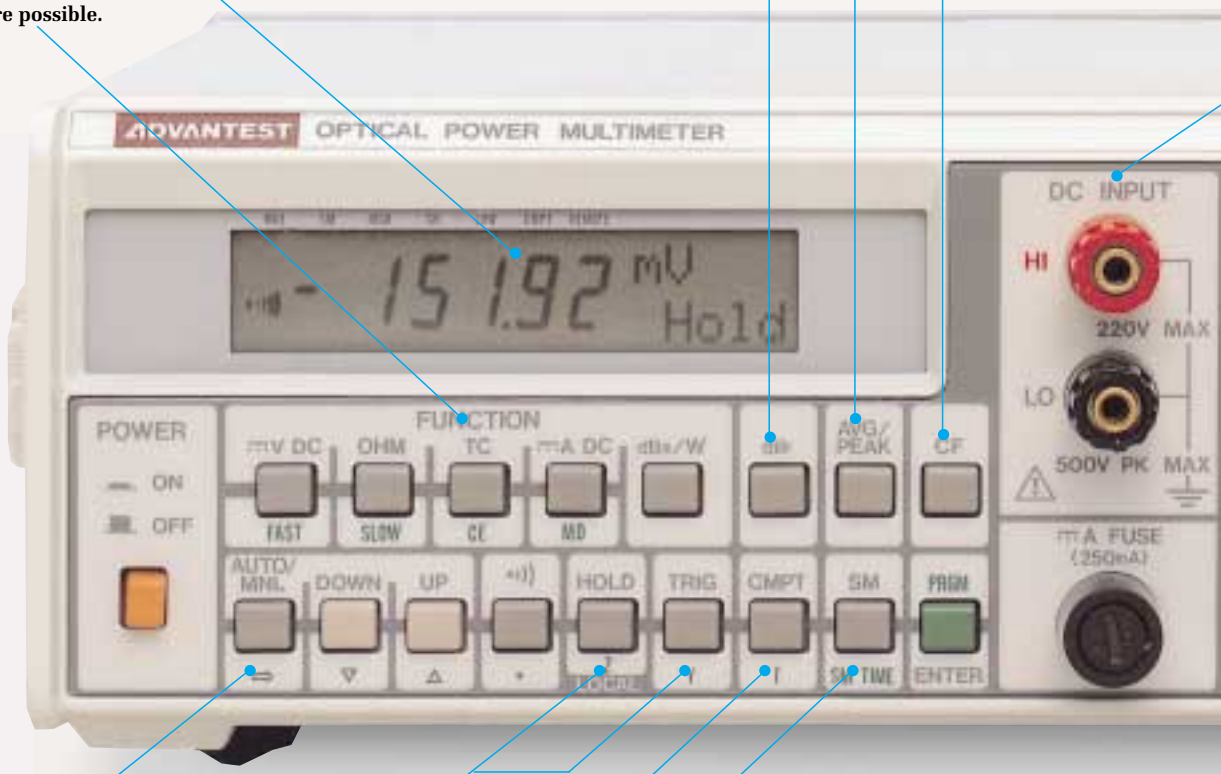


Versatile Optical Power Meter Providing

The TQ8215 general-purpose optical power meter is the product of ADVANTEST's expertise in measurement technology.
It provides peak-power measurement, demodulation functions, an analog monitor function and direct measurement to 50 mW-in short, a host of capabilities not found on previously available optical power meters.
A single TQ8215 is capable of temperature, DC voltage, DC current and resistance measurements, making the TQ8215 a versatile addition to your measurement system or as a general-purpose instrument.

The ADVANTEST design team took the required precautions in designing the TQ8215 and carefully selecting optical components to ensure excellent linearity and temperature stability. The TQ8215 can be used with a silicon photodiode sensor for beam-power measurements at short wavelengths and a germanium or InCaAs photodiode for long wavelengths.
By adding a GPIB interface unit, it is possible to use the TQ8215 as a component in an optical measurement system. The use of a battery unit enables easy operation outdoors as well.

- Wavelength sensitivity compensation
- Average power and peak power measurements
- 4½-digits wide dynamic range
- Optical power relative value measurement (dBr)
- In addition to optical power, temperature, DC voltage/current and resistance measurements are possible.



- Easy-to-use autoranging
- Measurement results can be held and manual triggering is possible.
- Measurement results can be scaled or compared.
- Smoothing function provided for stable measurements.

Temperature Measurements and DMM Functions

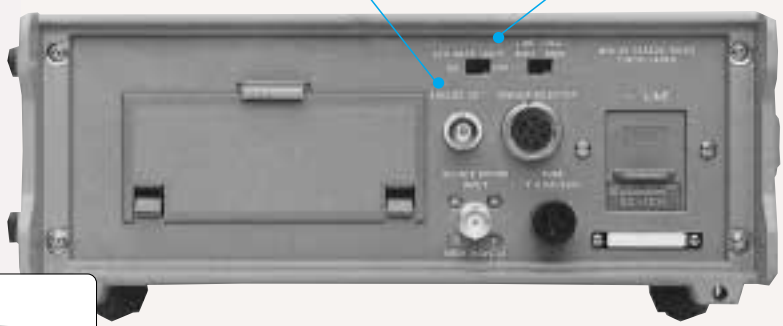
●Long-wavelength (TQ82015/Q82018A) and short-wavelength (Q82014A) sensors or a slim-line sensor (Q82017A for short wavelengths) can be connected. In addition, the Q82021A optical sensor block can be replaced by the TQ82010.

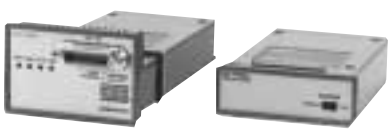
●Input terminals for temperature, DC voltage/current and resistance measurements

●Monitoring of the demodulated signal (when using the Q82021A) at peak power measurements, an analog output of the input signal at average-value measurements.

●Any three digits of the displayed measured value can be D/A converted for output.

●LCD back-lighting can be selected.





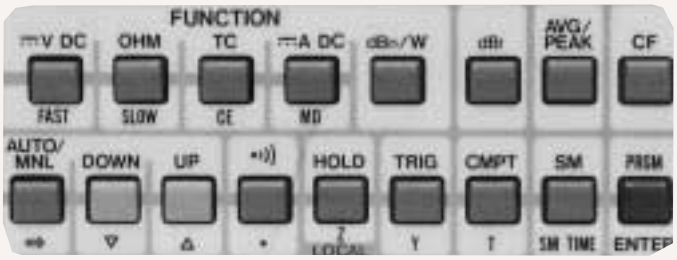
●TQ13216
GPIB Adaptor Unit

●TR15802
Battery Unit

●GPIB and battery units can be installed.

Full Complement of Functions Handles a Wide

Multifunction performance with temperature measurement and sampling up to 10 times



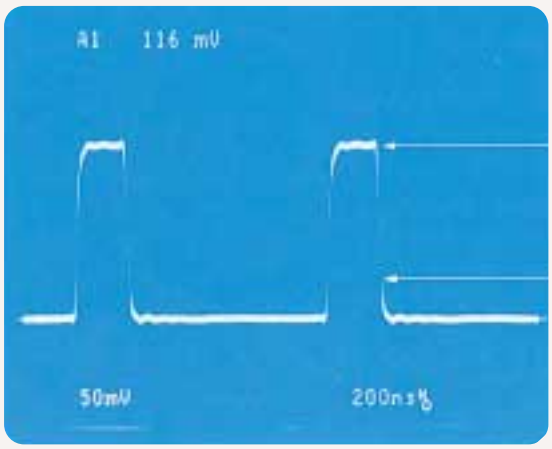
The TQ8215, in addition to optical power measurements, provides temperature measurement, DC voltage measurement, DC current measurement and resistance measurement functions in a single instrument, making it a highly versatile optical power multimeter. The temperature measurement function, in particular, is a great convenience in measurements on such devices as laser diodes. The sampling rate of ten samples per second enable the TQ8215 to serve as a component in an optical power measuring system or other multipurpose systems requiring the optical power measurement capability.

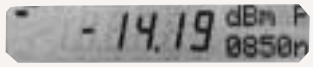
Wide dynamic range measurements

For linear (W) measurements, the TQ8215 provides the 4 ½-digits display, enabling measurements with a dynamic range heretofore impossible in this class of instrument.

Ideal peak power measurement and demodulation monitor functions for use in optical equipment

Previously available power meters provided only CW light measurement capabilities. The TQ8215, however, with its peak-hold function, is able to measure the peak power of a modulated light beam. This eliminates the usual procedure of inputting a waveform having a 50% duty cycle and then calculating the peak power, In addition, a demodulation monitor (provided by using an oscilloscope with the TQ8215) can be implemented, an extremely useful capability in making writing power measurement and away from observation on optomagnetic disks and in making power measurements on laser beam printers (when using the Q82021A)





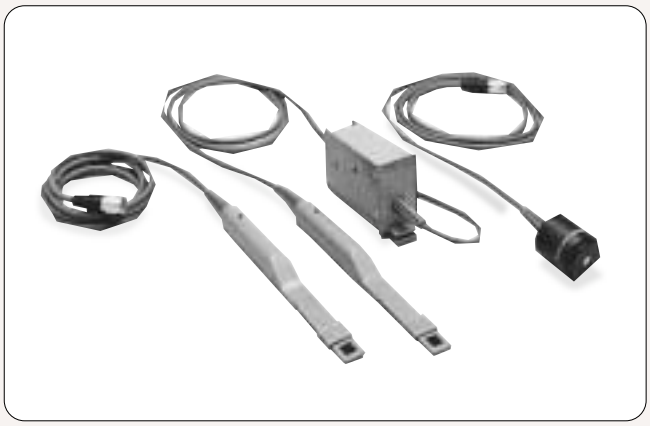
Peak power

Average power

◀ Demodulated waveform monitor

Direct measurements up to 50 mW ideal for laser diode measurements

The TQ8215 can measure directly up to 50 mW, without requiring an attenuator. This enables high-accuracy power measurements on laser diodes used in such devices as optical disk equipment.



Range of Applications

Excellent linearity

ADVANTEST's unique measuring instrument technology has been applied in achieving measurements with extremely low error, even when the range or temperature changes.

Analog output tracking the input signal

An analog output is made of the D/A conversion of any three digits of the measurement results. In addition, for average-power measurement, an analog monitor output is provided which tracks the input signal. This monitor output can be connected to such devices as analog recorders to facilitate I-L measurements on light-emitting elements.

Smoothing function of ensure stable measurements and a versatile range of calculation functions

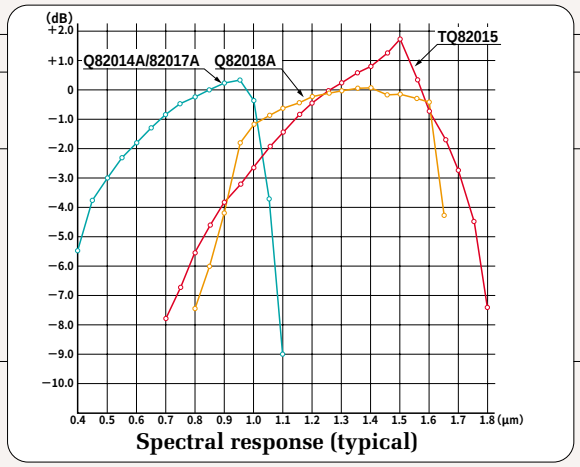
A comparison display, scaling, percentage deviation, averaging and maximum/minimum-value display functions are provided for enhanced versatility.

Full-remote GPIB operation and battery units available as accessories

Wavelength response compensation function

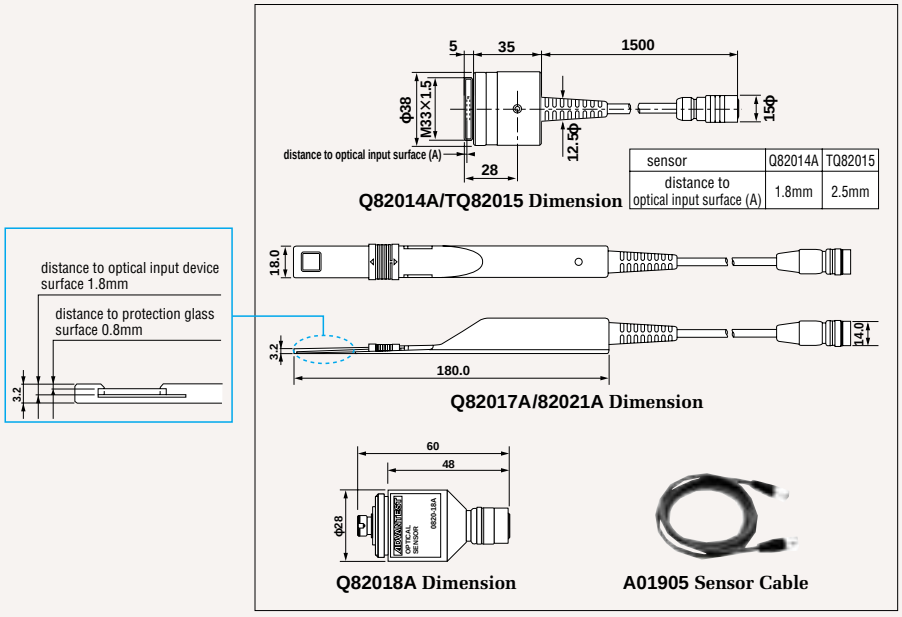
The TQ8215 provides automatic compensation for sensor response, using internally stored compensation values which depend upon the set frequency. The compensation values can be input from the front panel.

Backlighting can be selected when required



Spectral response (typical)

Optical sensor Dimension



Specifications

Optical Sensors and Sensor Blocks (Option)

Model	Q82014A		TQ82015		Q82017A		Q82018A	
Wavelength range	0.4 µm to 1.1µm		0.8µm to 1.6 µm		0.4 µm to 1.1µm		0.8 µm to 1.65µm	
Photoreceptor element	Si photodiode		Ge photodiode		Si photodiode		InGaAs PIN photodiode	
Photoreceptor area	Approx. 8mmΦ		Approx. 5mmΦ		Approx. 10 × 10mm□		—	
Unit of measurement	dBm	W	dBm	W	dBm	W	dBm	W
*1 Power range	−60dBm to + 17dBm	1nW to 50mW	−40dBm to + 10dBm	0.1 µW to 10mW	−60dBm to + 17dBm	1nW to 50mW	−60dBm to 0dBm	1nW to 1mW
Measurement ranges	8 ranges in 10dB steps		5 ranges in 10dB steps		8 ranges in 10dB steps		6 ranges in 10dB steps	
Measurement accuracy	±0.25dB at 0.85µm, −20dBm	±5% at 0.85µm, 10µW	±0.25dB at 1.30 µm, −20dBm	±5% at 1.30 µm, 10µW	±0.25dB at 0.85µm, −20dBm	±5% at 0.85µm, 10µW	±0.25dB at 1.30 µm, −20dBm	±5% at 1.30 µm, 10µW
Resolution	0.01dB	0.1% to 0.005% (0.3% to 0.015% in 20mW and 200mW ranges)	0.01dB	0.1% to 0.005% (0.3% to 0.015% in 20mW ranges)	0.01dB	0.1% to 0.005% (0.3% to 0.015% in 20mW and 200mW ranges)	0.01dB	0.1% to 0.005%

Model		Q82021A	
Wavelength range		0.4µ to 1.1µm	
Photoreceptor element		Si photodiode	
Input connector or aperture		Approx. 10 × 10mm□	
Unit of measurement		dBm	W
Average power	Power range	−60dBm to + 17dBm	1nW to 50mW
	Measurement ranges	8 ranges in 10 dB steps	
	Measurement accuracy	±0.25dB at 0.85µm, −20dB	±5% at 0.85µm, 10µW
	Resolution	0.01dB	0.1% to 0.005% (0.3% to 0.015% in 20mW and 200mW ranges)
Peak power	Ranges	+13dBm	20mW
	Power range	+10dBm to 0dBm	10mW to 1mW
	Measurement accuracy	±1.5dB	±30%
	Minimum pulse width	50ns	
	Minimum repeating frequency	100Hz	

Monitor characteristics (in peak power measurement)

Model		Q82021A
Ranges		20mW (+13dBm)
Sensitivity		50mV/mW
Light input range	Maximum *2	10mW (+10dBm)
	Minimum *2	0.2mW (−7dBm)
Demodulation band (at 100kHz)		$^{+1}_{-1}$dBopt $^{+1}_{-3}$dBopt DC to 30MHz to 50MHz
Output impedance		50Ω ±5Ω (BNC connector)

*1 Maximum level is when the entire sensor surface is illuminated. *2 The maximum limit is the maximum at which the response is linear. The minimum limit is the rms signal level at which the noise peak-to-peak value is the same (TSS sensitivity).

General Optical Measurement Specifications

Absolute Accuracy of A/D converter: ±0.1%(included sensor measurement accuracy)

dBr Function: Measured value relative to a measured reference value

AVR/PEAK function: Available in the Q82021A

AVG measures average power.

PEAK measures peak power and enables waveform monitoring.

CF (calibration factor) setting to compensate for sensor sensitivity:

Mode 1 (CFnm): An internal calibration factor (standard data) is applied automatically according to the wavelength.

The calibration factor is in dB for dBm measurement, and is a linear factor for watt measurement.

Mode 2 (CFMPY····· CF multiply): The calibration factor can be set manually from the front panel. The calibration factor is in dB for dBm measurement, and is a linear factor for Watt measurement. It is backed up when power is off.

DC Voltage Measurement

Ranges	19.999mV	199.99mV	1999.9mV	19.999V	199.99V
Resolution	1µV	10µV	100 µV	1mV	10mV
Measurement accuracy(*)	±0.06%±8d	±0.06%±3d	±0.06%±2d		
Input impedance	1000MΩ or greater			10MΩ ±1%	
Maximum allowable input voltage	220VDC, 220VACrms continuously				

* Measurement accuracy is indicated as ± percentage of reading ± digits. Accuracy is guaranteed for six months at 23°C ±5°C, 85% RH.

Resistance Measurement

Ranges	199.99Ω	1999.9Ω	19.999kΩ	199.99kΩ	1999.9kΩ
Resolution	10mΩ	100mΩ	1Ω	10Ω	100Ω
Current applied for measurement	1mA		100µA	10µA	1µA
Measurement voltage	0.2V	2V			
Measurement accuracy(*)	±0.06%±14d	±0.06%±2d			±0.12%±6d

* Measurement accuracy is indicated as ± percentage of reading ± digits. Accuracy is guaranteed for six months at 23°C ±5°C and 85% RH with zero adjustment.

Temperature Measurement

Thermocouple type(*1)	Measurement range	Resolution	Measurement accuracy(*2)
T(CC)	−270°C to −250°C	0.1°C	±0.06% of rdg±5°C
	−250°C to −180°C		±0.06% of rdg±2°C
	−180°C to +400°C		±0.06% of rdg±0.5°C
J(IC)	−210°C to 0°C	0.1°C	±0.06% of rdg±1°C
	0°C to +1200°C		±0.06% of rdg±0.5°C
E(CRC)	−270°C to −250°C	0.1°C	±0.06% of rdg±3°C
	−250°C to −200°C		±0.06% of rdg±1°C
	−200°C to +1000°C		±0.06% of rdg±0.5°C
K(CA)	−270°C to −250°C	0.1°C	±0.06% of rdg±5°C
	−250°C to −200°C		±0.06% of rdg±1.5°C
	−200°C to +1372°C		±0.06% of rdg±0.5°C
S(PR10)	−50°C to 0°C	0.1°C	±0.06% of rdg±4°C
	0°C to +1769°C		±0.06% of rdg±1.5°C
R(PR13)	−50°C to 0°C	0.1°C	±0.06% of rdg±4°C
	0°C to +350°C		±0.06% of rdg±2°C
	+350°C to +1769°C		±0.06% of rdg±1°C
B(PR30)	+100°C to +500°C	0.1°C	±0.06% of rdg±6°C
	+500°C to +1820°C		±0.06% of rdg±2°C

*1 T, J, E, K, S, R and B are calibrated according to Japanese Industrial Standard (JIS) C1602-1981.
*2 This accuracy is guaranteed for six months at 23°C ±5°C, 85% RH. It does not include the accuracy tolerance of the reference contact compensation.

Unit of measurement: °C, °F or K (selectable)
Reference contact compensation:
Internal Compensation accuracy is ±1.6°C (This value should be added to the measurement accuracy value.)
External Freezing point of water 0°C (273.2K), boiling point of liquid nitrogen −195.9°C (77.3K), boiling point of liquid helium −269.0°C (4.2K), or any temperature T°C set by the user.

DC Current Measurement

Range: 200mA
Resolution: 10μA
Measurement accuracy: ±0.6% of reading ±3 digits (guaranteed for six months at 23°C±5°C, 85% RH)
Input impedance: 3Ωmax
Maximum allowable input current: 0.25A (fuse protected)

Calculation Functions

Scaling: $R=\frac{X-Z}{Y}$

Percent deviation: $R=\frac{X-Z}{Y}\times 100(\%)$

Comparator: R(Hi) : X>Y
R(Lo) : X<Z
R(Go) : Y≧X≧Z

R: Result of calculation
X: Measured value
Y: Constant (value set from the front panel, or a measured value)
Z: Constant (value set from the front panel, or a measured value)

Average (*): R (Ave): $R=X/Y=\overline{X}$
Maximum (*): R (Max)
Minimum (*): R (Min)
} Average, maximum, and minimum over a span of Y measurements

* When Y is 1 to 100, the result is displayed with data and analog output every Y measurements. When Y is 101 or greater, the average for each 100-measurement span is output, but maximum and minimum are for the time since the setting was made.

Other Functions

Filter function: Digital smoothing is performed. The smoothing count can be set anywhere from 2 to 100.
Analog output: D-A converted output is isolated from the measurement system.
Output data Measured value, calculation results, recorder calibration output (0V,1V)
Converted output 3 digits, 000 to 999 (0V to 0.999V)
Digit selection 19999, 19999, 19999, or 19999
Output offset 50% offset may be selected.
Output with offset 500→0V,000→0.5V,499→0.999V
Connector BNC, floating

General Specifications

Excessive input: OVER is displayed if the input exceeds the measurement limit.
Low battery indicator: BATT is displayed if the battery or AC supply voltage falls below the necessary level.
Range switching: Automatic or manual
Measurement speeds:
FAST 10 to 12 times/s (DC voltage, DC current, or temperature measurement)
5 to 6 times/s (resistance measurement)
9 to 12 times/s (optical power measurement)
SLOW 1/2, 1/5, 1/10, 1/20, 1/50 or 1/100 of the FAST speed (selectable)
Ambient conditions: 0°C to 40°C, maximum 85% RH
Power requirements: 100VAC, 50/60Hz, or TR15802 battery unit
Options: Specify when ordering.

Option No.	Standard	32	42	44
Supply voltage (V)	90 to 110	103 to 132	198 to 242	207 to 250

Power Consumption:
TQ8215+TQ82010: 13VA max
With TQ13216: Additional 1.5VA (Approx.)
Other configurations: Same as TQ8215+TQ82010
Dimensions: Approx. 240(W)×88(H)×310(D)mm
Weight: 3.7kg max

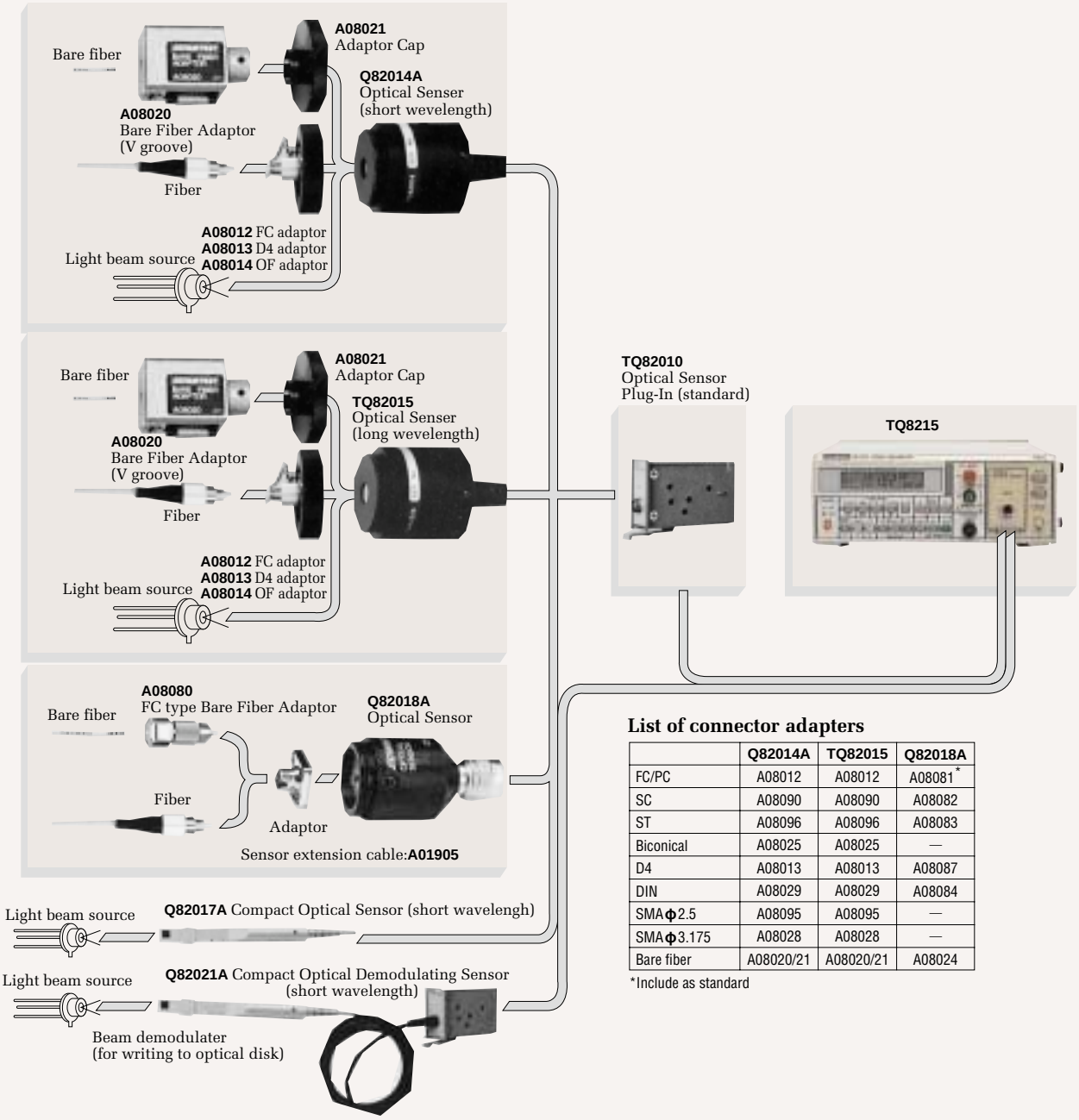
Standard Accessories

Description	Model	Quantity
Power cable	A01402	1
Input cable	A01007	1
Optical sensor block	TQ82010	

Separately Sold Accessories

TR15802 Battery Unit
Internal battery: 4V to 6V NiCd rechargeable battery
Continuous operation: 2.0 hours min. (with Q82014A) (at 23°C ±5°C)
Charging time: 15 hours after the CHARGE switch is set to FULL
Charging power: Supplied from the TQ8215 mainframe
Weight: 370g max

TQ13216 GPIB Adaptor Unit
Electrical specifications: Conform to IEEE 488-1978 and IEC 625-1
Mechanical specifications: Conform to IEEE 488-1978 (24-pin Amphenol-type connector)
Interface functions: SH1, AH1, T5, L4, SR1, RL1, PP0, DC1, DT1, C0, E2



List of connector adapters

	Q82014A	TQ82015	Q82018A
FC/PC	A08012	A08012	A08081*
SC	A08090	A08090	A08082
ST	A08096	A08096	A08083
Biconical	A08025	A08025	—
D4	A08013	A08013	A08087
DIN	A08029	A08029	A08084
SMAϕ2.5	A08095	A08095	—
SMAϕ3.175	A08028	A08028	—
Bare fiber	A08020/21	A08020/21	A08024

*Include as standard

Technology Support on the Leading Edge

ADVANTEST®

Please be sure to read the product manual thoroughly before use.

Your Local Representative

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