HAMAMATSU

PHOTON IS OUR BUSINESS

Metal package photomultiplier tube R9880U series

Features

- Compact and light weight
- Fast time response
- Effective area Φ 8.0 mm
- Various types of photocathodes

Applications

- Fluorescence measurement
- Radiation measurement
- Scanning electron microscope
- LiDAR
- Portable analyser

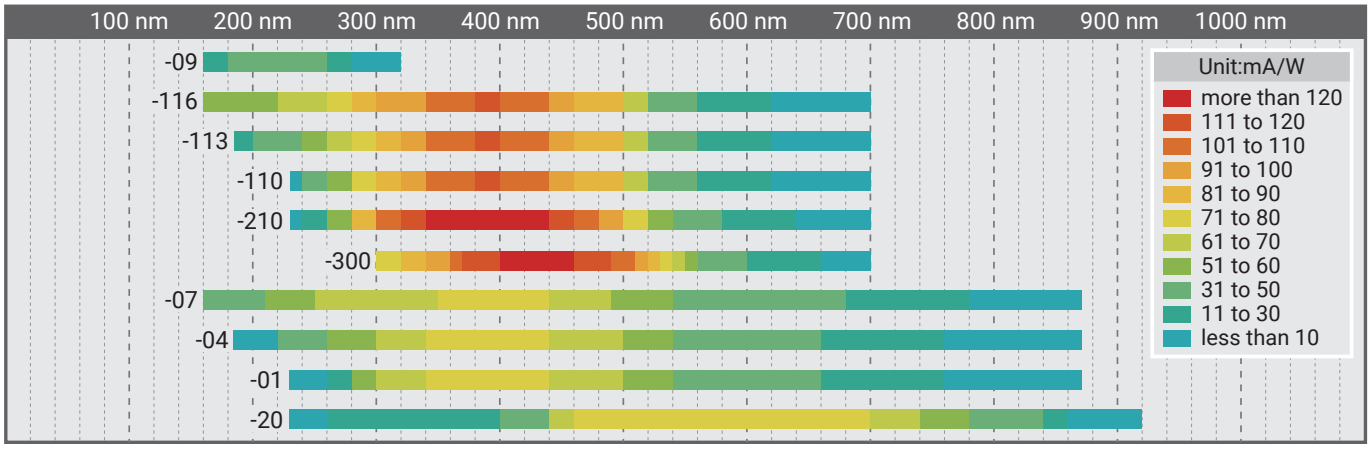
Product specifications

Product variations

Parameter		-09	-116	-113	-110	-210	-300	-07	-04	-01	-20	Unit
Photocathode ①		Cs-Te	SBA			UBA	EGBA	MA			ERMA	–
Spectral	Range	160 to 320	160 to 700	185 to 700	230 to 700		300 to 700	160 to 870	185 to 870	230 to 870	230 to 920	nm
response	Peak	240	400				450	400			630	nm
Window material		Quartz		UV	Borosilicate			Quartz	UV	Borosilicate		–

①Photocathode materials
SBA: Super bialkali, UBA: Ultra bialkali, EGBA: Extended green bialkali, MA: Multialkali, ERMA: Extended red multialkali

Spectral response range chart



Cs-Te photocathode type

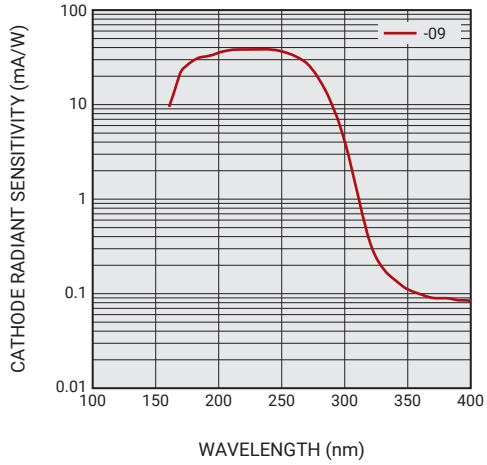
Specifications

(at +25 °C)

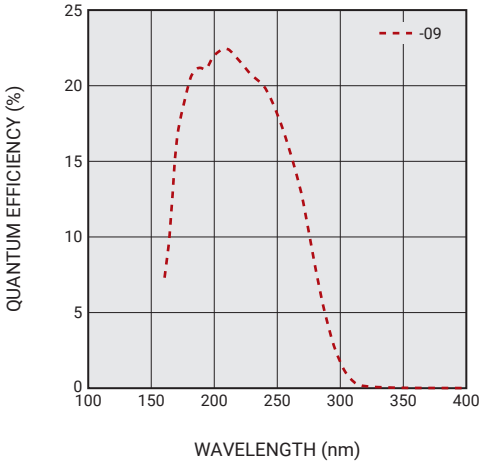
Parameter				-09	Unit
Photocathode				Cs-Te	–
Spectral response	Range			160 to 320	nm
	Peak			240	nm
Window material				Quartz	–
Dynode	Structure			Metal channel	–
	Stages			10	–
Maximum ratings	Supply voltage between anode and cathode			1100	V
	Average anode output current in total ①			0.01	mA
Cathode	Radiant sensitivity	at peak wavelength	Typ.	38.5	mA/W
		at 254 nm	Typ.	35	
Anode ②	Radiant sensitivity	at peak wavelength	Typ.	7.7×10^4	A/W
		at 254 nm	Typ.	7.0×10^4	
	Gain		Typ.	2.0×10^6	–
	Dark current ③		Typ.	0.1	nA
			Max.	1	
	Time response	Rise time	Typ.	0.57	ns
		Transit time	Typ.	2.7	
		T.T.S.	Typ.	0.2	
Operating ambient temperature				-30 to +50	°C
Storage temperature				-30 to +50	°C

①Averaged over any interval of 30 s maximum.
②Measured with the supply voltage, and voltage distribution ratio shown in P5 "Voltage distribution ratio and supply voltage"
③After 30 min storage in darkness.

Cathode radiant sensitivity

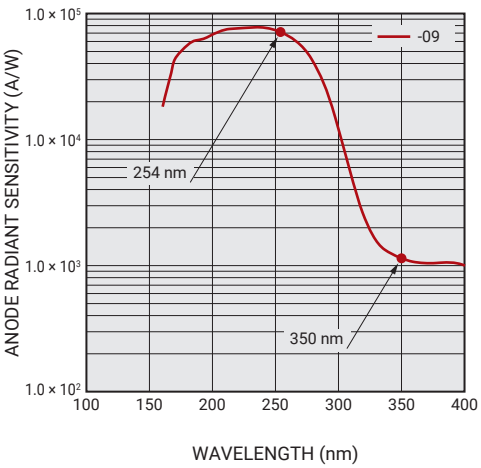


Quantum efficiency



Solar blind characteristics

Anode radiant sensitivity



The R9880U-09 has solar-blind characteristics.

$$\frac{\text{Anode radiant sensitivity at 350 nm}}{\text{Anode radiant sensitivity at 254 nm}} = 1/40 \text{ or less}$$

* Please refer to the graph of anode radiant sensitivity.

Bialkali photocathode type

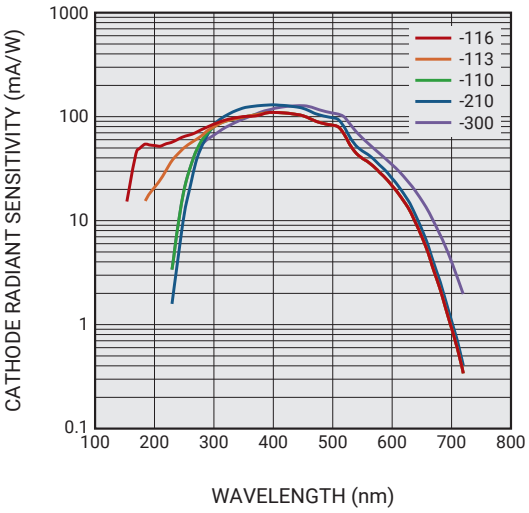
Specifications

(at +25 °C)

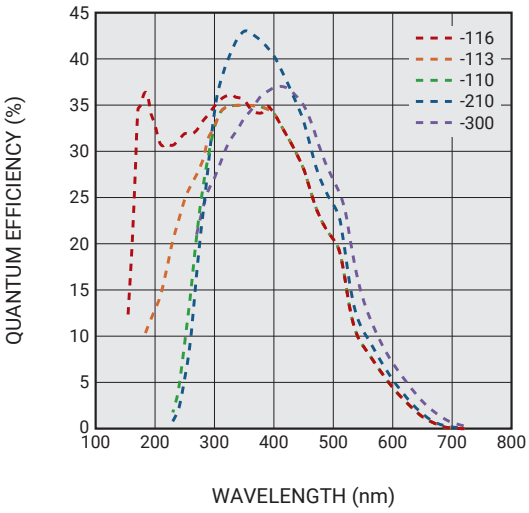
Parameter				-116	-113	-110	-210	-300	Unit
Photocathode				Super bialkali			Ultra bialkali	Extended green bialkali	–
Spectral response	Range			160 to 700	185 to 700	230 to 700	230 to 700	300 to 700	nm
	Peak			400				450	nm
Window material				Quartz	UV	Borosilicate			–
Dynode	Structure			Metal channel					–
	Stages			10					–
Maximum ratings	Supply voltage between anode and cathode			1100					V
	Average anode output current in total ①			0.1					mA
Cathode	Luminous sensitivity		Min.	80			100	120	μA/lm
			Typ.	105			135	145	
	Blue sensitivity index		Typ.	13.5			15.5	12.5	–
	Radiant sensitivity ②		Typ.	110			130	108	mA/W
Anode ③	Luminous sensitivity		Min.	80			100	120	A/lm
			Typ.	210			270	290	
	Gain		Typ.	2.0×10^6					–
	Dark current ④		Typ.	1					nA
			Max.	10					
	Time response	Rise time	Typ.	0.57					ns
		Transit time	Typ.	2.7					
		T.T.S.	Typ.	0.2					
Operating ambient temperature				-30 to +50					°C
Storage temperature				-30 to +50					°C

①Averaged over any interval of 30 s maximum.
②Measured at peak wavelength.
③Measured with the supply voltage, and voltage distribution ratio shown in P5 "Voltage distribution ratio and supply voltage"
④After 30 min storage in darkness.

Cathode radiant sensitivity



Quantum efficiency



Multialkali photocathode type

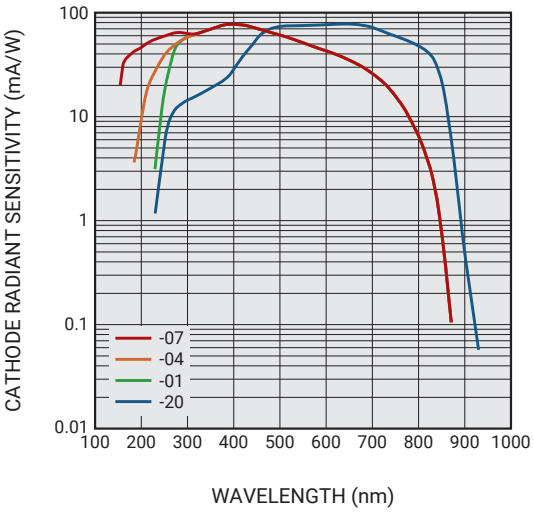
Specifications

(at +25 °C)

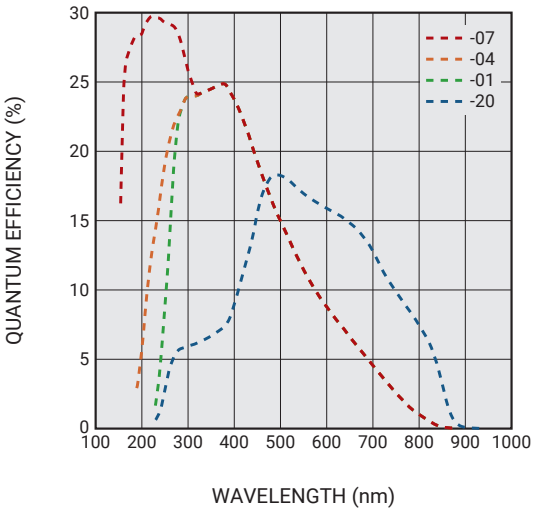
Parameter				-07	-04	-01	-20	Unit
Photocathode				Multialkali			Extended red multialkali	–
Spectral response	Range			160 to 870	185 to 870	230 to 870	230 to 920	nm
	Peak			400			630	nm
Window material				Quartz	UV	Borosilicate		–
Dynode	Structure			Metal channel				–
	Stages			10				–
Maximum ratings	Supply voltage between anode and cathode			1100				V
	Average anode output current in total ①			0.1				mA
Cathode	Luminous sensitivity		Min.	100			350	μA/lm
			Typ.	200			500	
	Red / White ratio		Typ.	0.2			0.45	–
	Radiant sensitivity ②		Typ.	77			78	mA/W
Anode ③	Luminous sensitivity		Min.	100			350	A/lm
			Typ.	400			1000	
	Gain		Typ.	2.0×10^6				–
	Dark current ④		Typ.	1			10	nA
			Max.	10			100	
	Time response	Rise time	Typ.	0.57				ns
		Transit time	Typ.	2.7				
		T.T.S.	Typ.	0.2				
Operating ambient temperature				-30 to +50				°C
Storage temperature				-30 to +50				°C

①Averaged over any interval of 30 s maximum.
②Measured at peak wavelength.
③Measured with the supply voltage, and voltage distribution ratio shown in P5 "Voltage distribution ratio and supply voltage"
④After 30 min storage in darkness.

Cathode radiant sensitivity

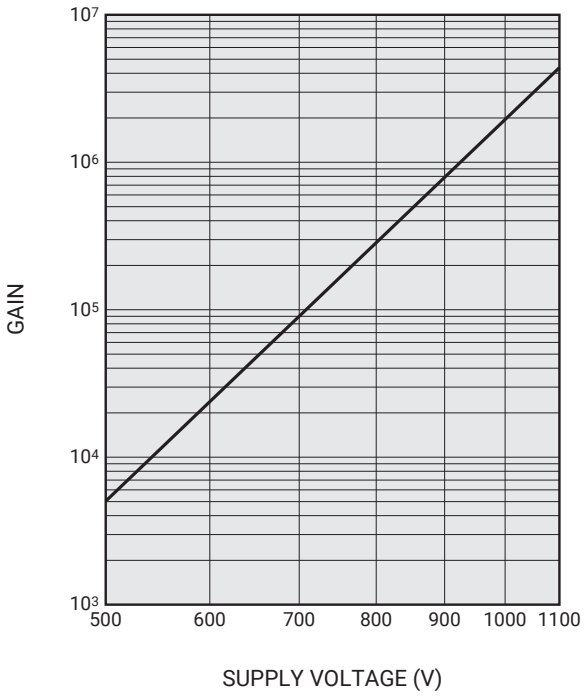


Quantum efficiency

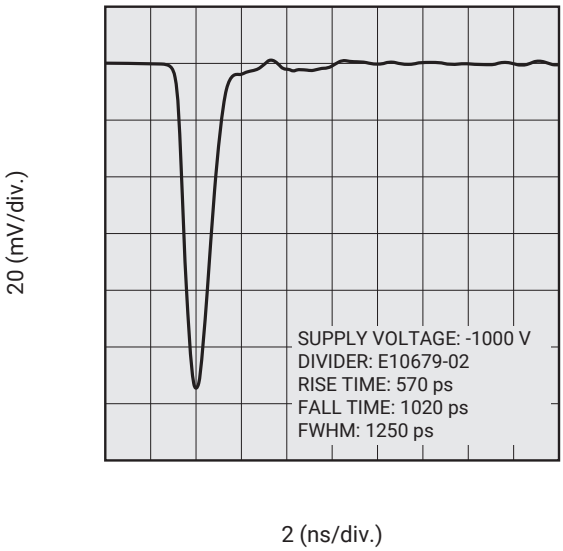


Characteristics

Typical gain

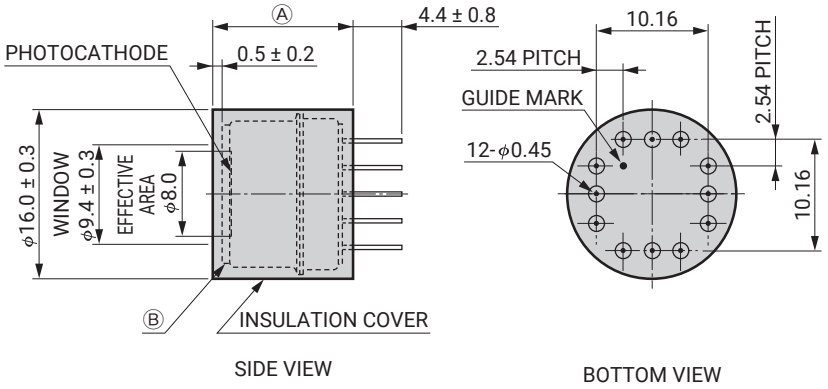


Output waveform

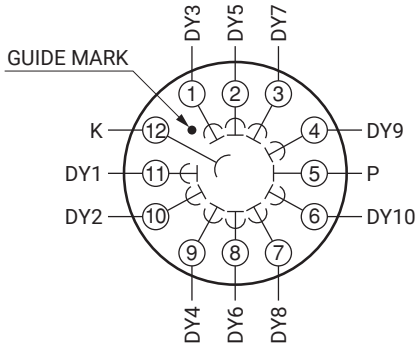


Dimensional outline and basing diagram

Dimensional outline (Unit:mm)



Basing diagram



Suffix	Ⓐ	Ⓑ (Window thickness)
-01/-04/-20/-110/-113/-210/-300	12.4 ±0.4	0.8
-07/-09/-116	13.1 ±0.4	1.2

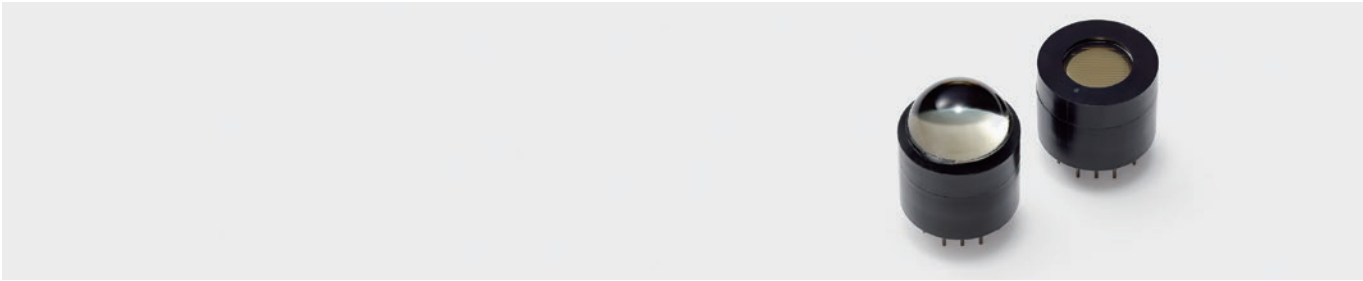
Voltage distribution ratio and supply voltage

Electrodes	K	Dy1	Dy2	Dy3	Dy4	Dy5	Dy6	Dy7	Dy8	Dy9	Dy10	P
Distribution ratio	1	1	1	1	1	1	1	1	1	1	1	0.5

Supply voltage: -1000 V, K: Cathode, Dy: Dynode, P: Anode

Related products

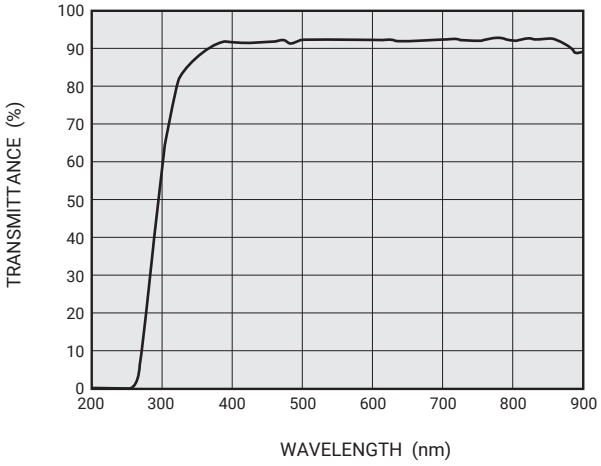
Metal package photomultiplier tube with lens R12828-01/-20/-110/-210



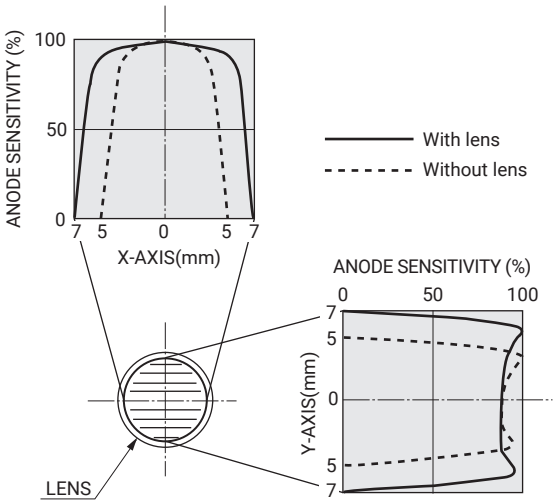
Left: R12828 series, Right: R9880U series

This product is a type with a hemispherical lens attached to the R9880U series. The attachment of the hemispherical lens is only applicable to the models with borosilicate glass. The lens window type doubles the effective input area to 12 mm in diameter.

Transmittance of lens

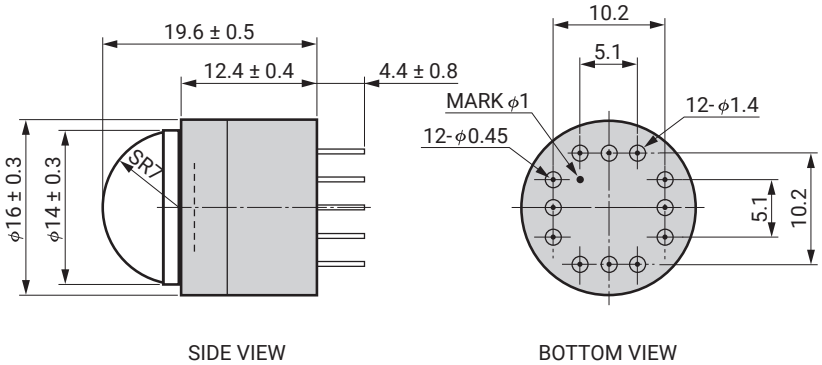


Effective area with lens

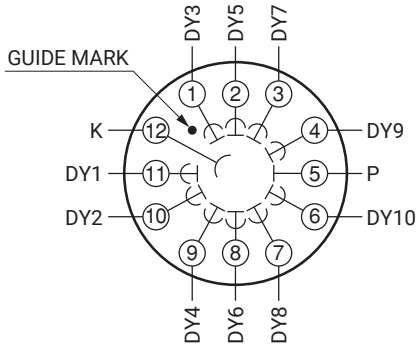


● Measurement conditions
Wavelength: 400 nm
Supply voltage: -1000 V
A 1 mm diameter spot light (parallel light) is scanned at the center of the photocathode in X and Y directions.

Dimensional outline (Unit:mm)



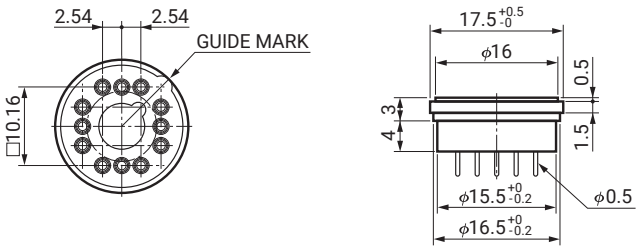
Basing diagram



Related products

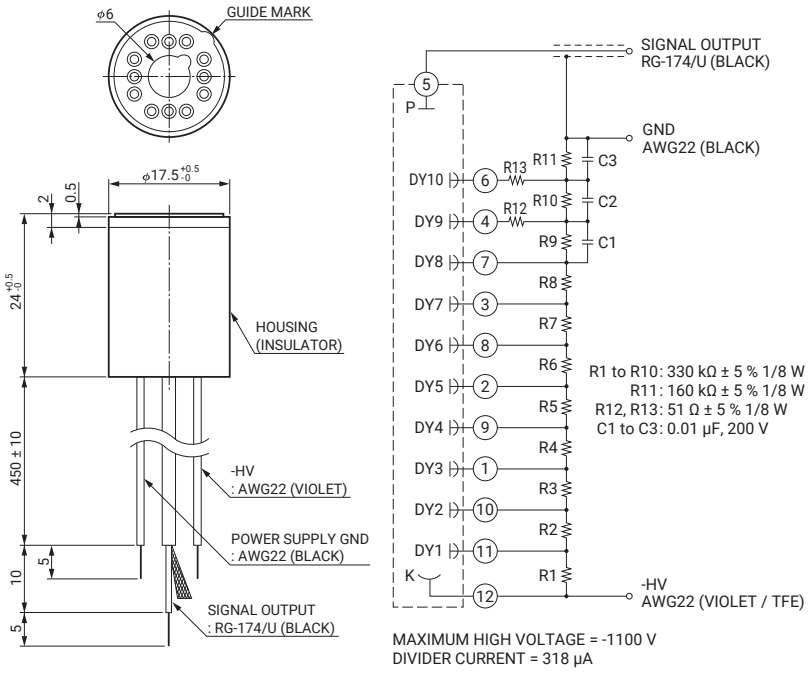
Socket E678-12-01

Dimensional outline (Unit:mm)



D type socket assembly E10679-02

Dimensional outline and circuit diagram (Unit:mm)



● Related socket assembly series

D type

Type No.	Notes
E10679-02	Cable output
E10679-03	SHV / BNC connector
E10679-51	Pin output
E13643	All stage active divider, Cable output

DA type (Model with built-in amplifier)

Type No.	Output type	Frequency bandwidth
C16138-01	Pin	DC to 200 kHz
C16138-02		DC to 2 MHz
C16138-03		DC to 20 MHz

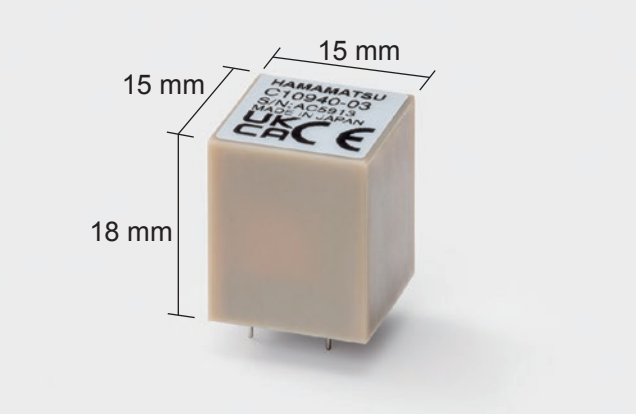
Related products

High voltage power supply module C10940 series

Compact and lightweight high voltage power supply module

The C10940 series is an on-board type high voltage power supply module, especially designed for photomultiplier tubes. It is a compact and lightweight high voltage power supply module, useful for designing small circuits.

- Compact and light weight
- High reliability
- High conversion efficiency

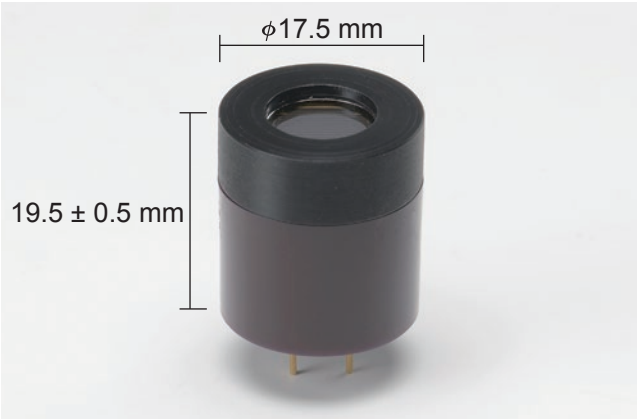


Photomultiplier tube assembly H13175U series

Compact and lightweight assembly type with internal voltage divider circuit

The assembly type contains a voltage divider circuit, but does not include a high-voltage power supply circuit and is smaller and lighter than other PMT modules.
If you design your own power supply circuits, the assembly type is a good choice that offers greater flexibility in equipment design compared to other PMT modules.

- Compact and lightweight



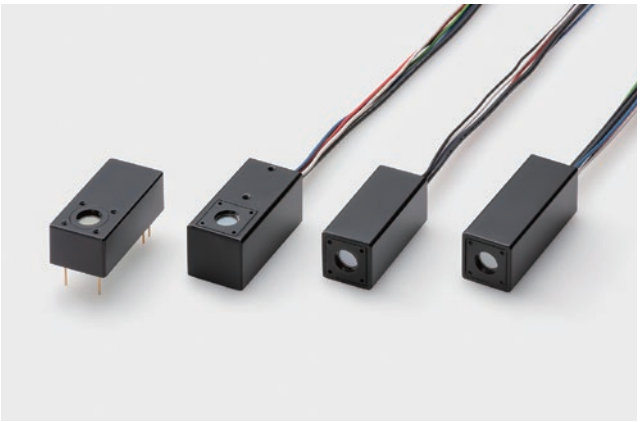
Related products

Photomultiplier tube modules

Integration of photomultiplier tube, voltage divider circuit, and high voltage power supply

PMT modules are comprised of a photomultiplier tube to convert light into electrical signals, a high-voltage power supply circuit, and a voltage divider circuit to distribute the optimum voltage to each dynode. All components are assembled into a single compact case.

- Low voltage operation
- A wide lineup of products



Photon counting head

Integration of photomultiplier tube, photon counting circuit, and high voltage power supply

The photon counting head is a device consisting of a metal package photomultiplier tube, along with a high-speed photon counting circuit and a high-voltage power supply circuit.
The high voltage power supply for photomultiplier tube and the discrimination level are preset to optimum values, allowing photon counting measurement by just connecting a low voltage input.

- Single photon detection
- Low voltage operation
- A wide lineup of products

MEMO

Warning: high voltage

The metal package photomultiplier tubes are operated by applying a high voltage. Use extreme caution to avoid electrical shock and damage to the peripheral equipment and be sure to provide adequate safety measures as needed. As safety measures, an insulation cover is fitted to the metal package which is electrically connected to the photocathode. When operated with the cathode at a high voltage (anode ground scheme), the metal package will be at this same high voltage level. Removing the insulation cover is extremely dangerous, so never attempt to remove it from the package.

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Cat. No. TPMH1321E08
JAN. 2026 IP
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