

LOW-LIGHT-LEVEL MEASUREMENT OF NIR

NIR (NEAR INFRARED: 1.4 μm /1.7 μm) PHOTOMULTIPLIER TUBES R5509-43/R5509-73

and EXCLUSIVE COOLERS

OVER VIEW

Hamamatsu near infrared photomultiplier tubes (NIR-PMT) R5509-43 and -73 have photocathodes with extended spectral response ranges to 1.4 μm or 1.7 μm where beyond 1.1 μm have been the limit of conventional photocathodes.

The R5509-43 is recommended for detection up to 1.35 μm , while the R5509-73 is up to 1.7 μm .



TPMHF0464

FEATURES

- **High sensitivity enables accurate PL (Photoluminescence) measurement with a low excitation power that could not be obtained with a strong excitation.**

High gain and low noise improve the detection limit.

- **Flat response from visible to near IR minimizes spectral sensitivity correction.**

The spectral response covers a wide range from 0.3 μm to 1.4 μm or 1.7 μm .

- **Photoluminescence from a room temperature sample can be measured.**

High sensitivity enables weak light emission measurement.

- **Time resolved measurement in near IR is realized.**

Fast time response (Rise time): 3 ns.

SPECIFICATIONS

● GENERAL

Parameter		R5509-43	R5509-73	Unit
Spectral Response		300 to 1400	300 to 1700	nm
Photocathode	Material	InP / InGaAsP	InP / InGaAs	—
	Minimum Effective Area	3 × 8		mm
Window	Material	Borosilicate glass		—
	Secondary Emitting Surface	Cu-BeO		—
Dynode	Structure	Line focused		—
	Number of Stage	10		—
Socket		C9940-01, -02		—
Operating Temperature		-90 to -70		°C
Recommended Operating Temperature		-80		°C
Storage Temperature		-90 to +50		°C

● MAXIMUM RATING (Absolute maximum values)

Parameter		Value	Unit
Supply Voltage	Between Anode and Cathode	-1750	V
Average Anode Current		2	μA

● CHARACTERISTICS (at -80 °C, supply voltage: -1500 V)

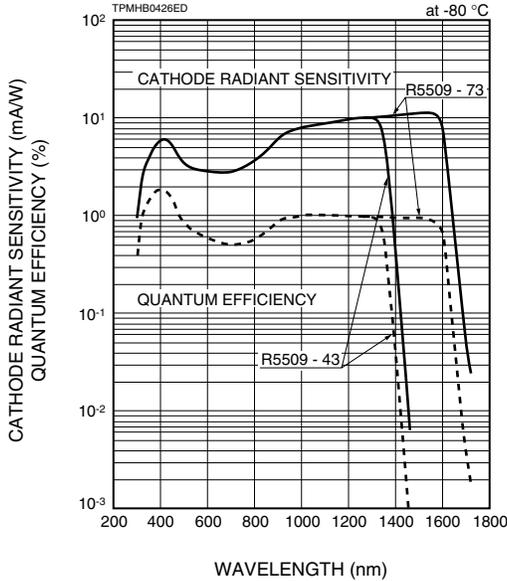
Parameter		R5509-43			R5509-73			Unit
		Min.	Typ.	Max.	Min.	Typ.	Max.	
Cathode Sensitivity	Quantum Efficiency ^(a)	0.48	—	—	0.29	—	—	%
	Radiant ^(a)	5	—	—	3.5	—	—	mA/W
Anode Sensitivity	Radiant ^(a)	1000	—	—	700	—	—	A/W
Gain		2×10^5	1×10^6	—	2×10^5	1×10^6	—	—
Anode Dark Current ^(b)		—	4	10	—	40	100	nA
Anode Dark Counts ^(b)		—	1.6×10^4	—	—	1.6×10^5	—	s ⁻¹
Time Response	Anode Pulse Rise Time	—	3	—	—	3	—	ns
	Electron Transit Time	—	23	—	—	23	—	ns
	Transit Time Spread	—	1.5	—	—	1.5	—	ns

NOTE: ^(a)at 1300 nm (R5509-43), at 1500 nm (R5509-73) ^(b)After 30 minutes storage in darkness

The dedicated coolers C9940-01 and C9940-02 are shipped after adjusting the voltage divider circuit to provide the optimum voltage distribution ratio that best matches the PMT.

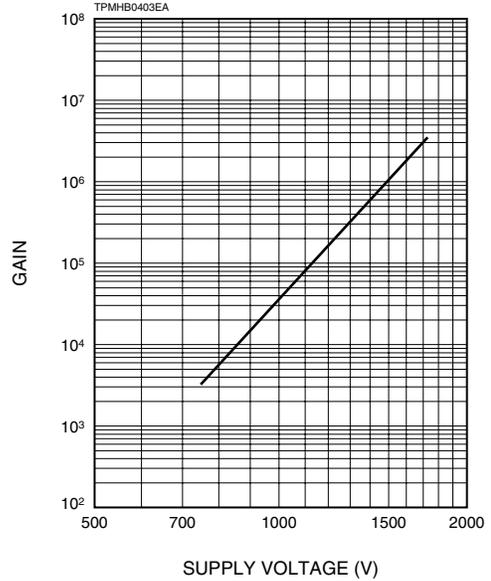
CHARACTERISTICS FIGURES

●Spectral Response

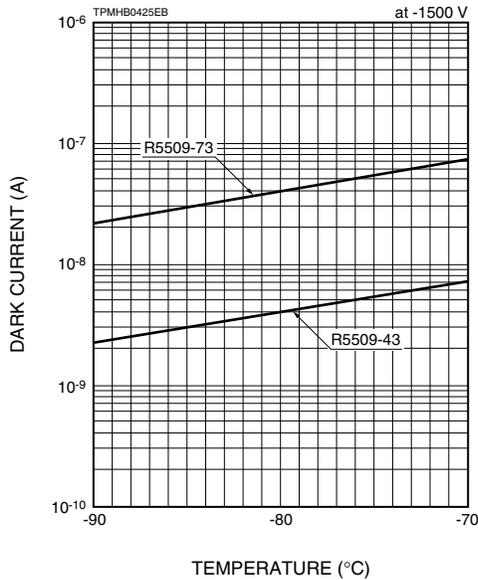


* Spectral response characteristics when used with the dedicated cooler

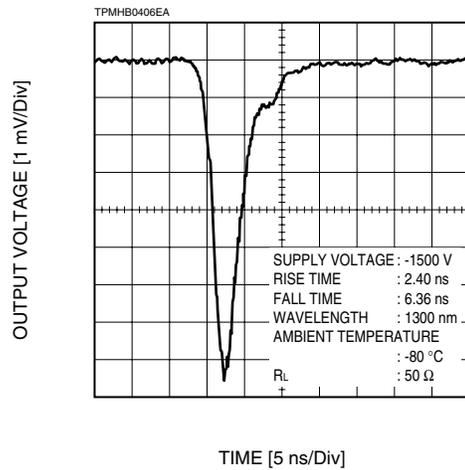
●Typical Gain (R5509-43, -73)



●Temperature Characteristics of Dark Current (After 30 minutes storage in darkness)

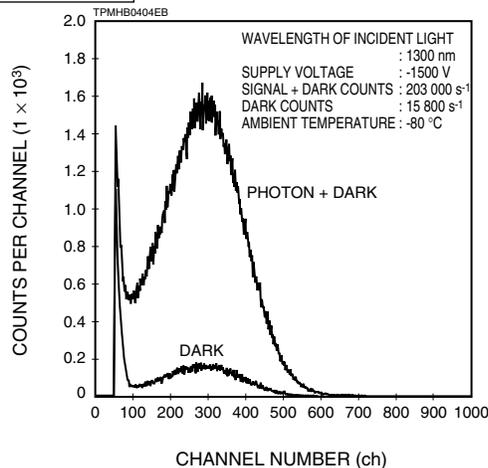


●Output Waveform (R5509-43)

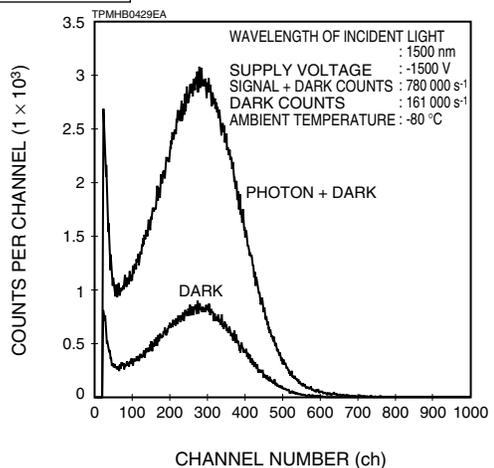


●Single Photoelectron Pulse Height Distribution (PHD)

R5509-43



R5509-73

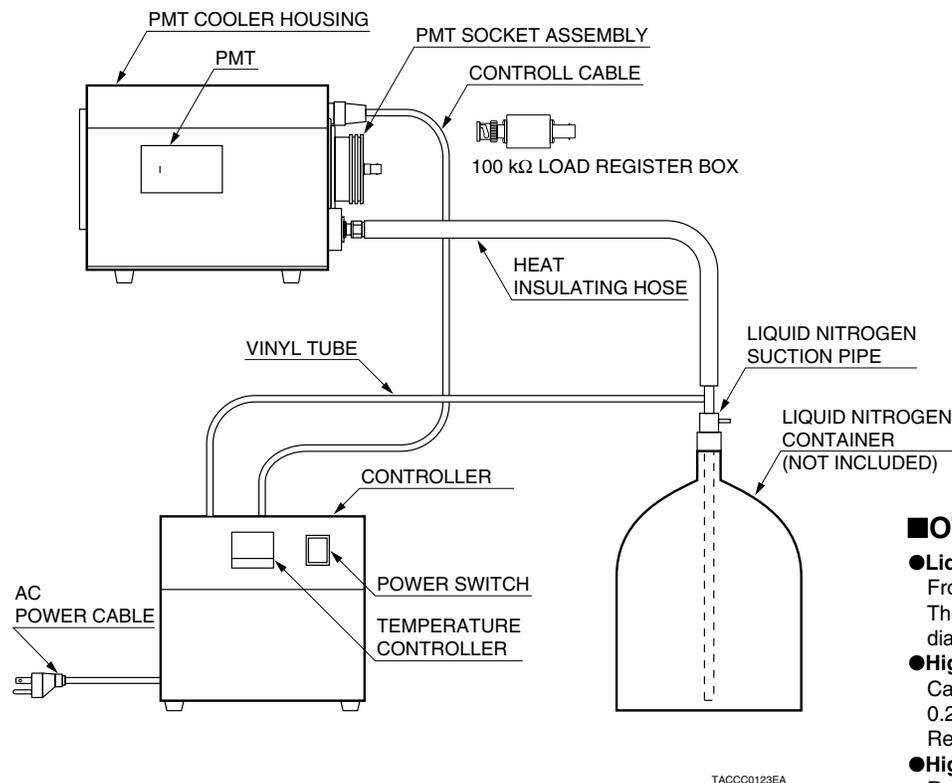


RELATED PRODUCTS

Exclusive coolers C9940-01, C9940-02

SYSTEM CONFIGURATION

PMT housing, Controller, Liquid nitrogen suction pipe, Heat insulating hose, PMT socket assembly, Controller cable, Vinyl tube, 100 k Ω load resistor box.
(Liquid nitrogen container is not included in C9940-01/-02)



OTHER ACCESSORIES REQUIRED

- **Liquid nitrogen container**
From 10 L to 25 L capacity
The opening of the container should allow the 15 mm diameter liquid nitrogen suction pipe to be inserted.
- **High voltage power supply**
Capable to provide stable output of -1500 V, 0.2 mA
Recommended : C4840
- **High voltage cable with an SHV-P connector**
Recommended : E1168-17
- **Signal COAX cable with a BNC-P connector**
Recommended : E1168-05

* Peripheral equipments such as the relay optics for connecting a monochromator (A8996) can be provided.
For photon counting, preamplifier unit, photon counting unit and photon counting board or counter are necessary.
Please consult with Hamamatsu for assistance.

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