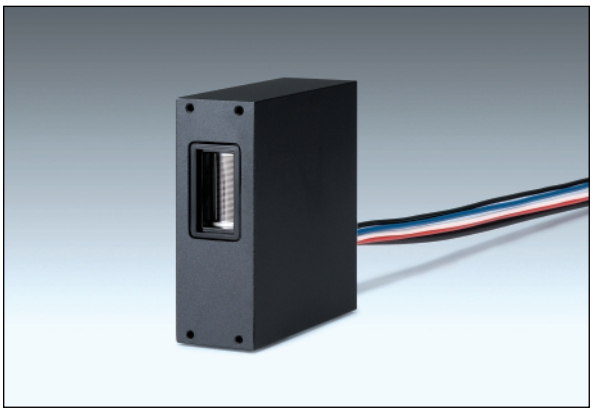
HAMAMATSU

PHOTON IS OUR BUSINESS

# PHOTOSENSOR MODULES
# H13320 SERIES

## OVERVIEW

The H13320 series photosensor modules contain a high-voltage power supply circuit and a 13-mm (1/2") diameter side-on photomultiplier tube in a compact aluminum housing. Its photocathode has a reflection mode that delivers high quantum efficiency at wavelengths above 600 nm, an adequate gain of up to $10^7$ and fast time response.
These modules are suitable for integration to portable devices because they are low power consumption and can be operated by dry battery.

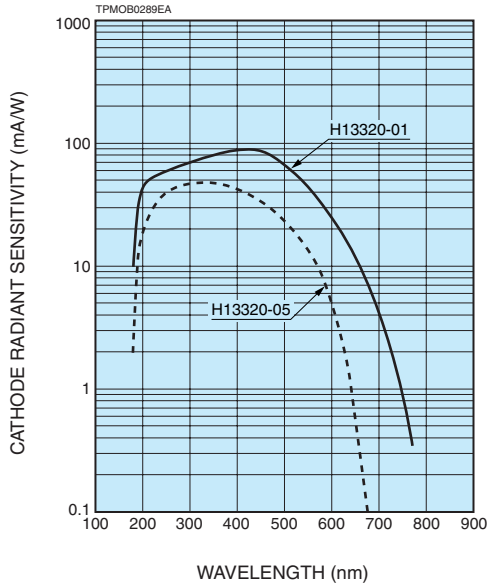


## PRODUCT VARIATIONS

| Type No. | Spectral response | Photocathode | Window material | Features |
|---|---|---|---|---|
| H13320-01 | 185 nm to 750 nm | Bialkali | UV glass | High sensitivity in UV to visible range |
| H13320-02 | 185 nm to 900 nm | Multialkali | UV glass | For general applications in UV to near IR range |
| H13320-03 | 185 nm to 900 nm | Multialkali | UV glass | High sensitivity in UV to near IR range |
| H13320-13 | 185 nm to 900 nm | Multialkali | UV glass | High sensitivity in UV to near IR range,<br>Higher sensitivity in near IR range than -03 |
| H13320-04 | 185 nm to 830 nm | Multialkali | UV glass | Low dark current. For UV to near IR range |
| H13320-05 | 185 nm to 650 nm | Bialkali | UV glass | For general applications in UV to visible range |

This product can't be used at vacuum environment or reduced pressure environment. Please pay attention when the H13320 series is used for measuring the light below 190 nm.

Figure 1: Typical spectral response



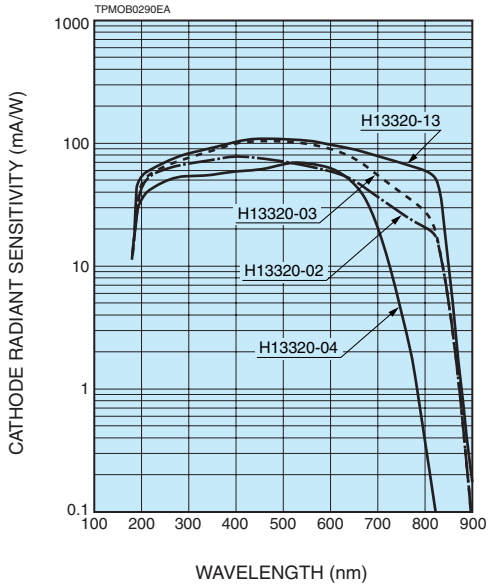
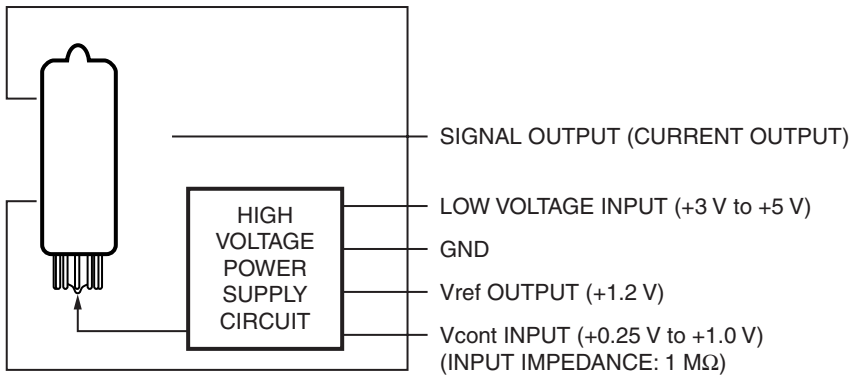



Figure 2: Schematic diagram



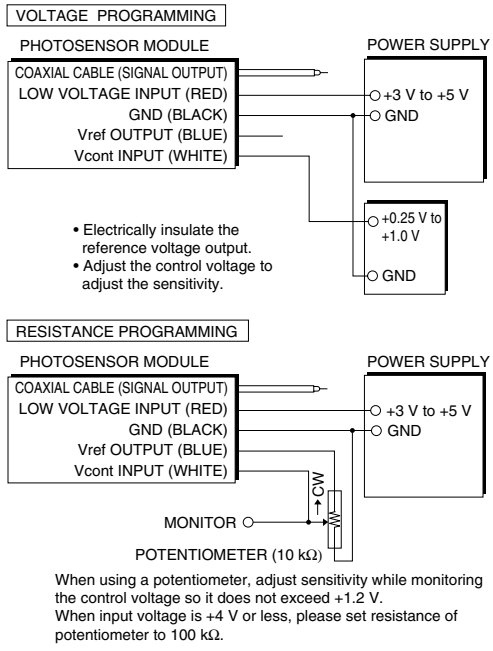

# SPECIFICATIONS

(at +25 °C)

| Parameter | | | H13320 Series | | | | | | Unit |
|---|---|---|---|---|---|---|---|---|---|
| Suffix | | | -01 | -02 | -03 | -13 | -04 | -05 | — |
| Input voltage | | | +2.8 to +5.5 | | | | | | V |
| Max. input voltage | | | +5.5 | | | | | | V |
| Max. input current *1 | | | 2.7 | | | | | | mA |
| Max. output signal current *2 | | | 10 | | | | | | μA |
| Max. control voltage | | | +1.2 (Input impedance: 1 MΩ) | | | | | | V |
| Recommended control voltage adjustment range | | | +0.25 to +1.0 (Input impedance: 1 MΩ) | | | | | | V |
| Effective area | | | 3.7 × 13.0 | | | | | | mm |
| Peak sensitivity wavelength | | | 420 | 400 | 450 | 450 | 530 | 340 | nm |
| Cathode | Luminous sensitivity | Min. | 80 | 200 | 350 | 620 | 140 | 20 | μA/lm |
| | | Typ. | 120 | 300 | 500 | 650 | 200 | 40 | |
| | Blue sensitivity index (CS 5-58) | Typ. | 10 | — | — | 15 | — | 5 | — |
| | Red / White ratio | Typ. | — | 0.3 | 0.4 | 0.43 | 0.15 | — | — |
| | Radiant sensitivity *3 | Typ. | 90 | 77 | 105 | 109 | 70 | 48 | mA/W |
| Anode | Luminous sensitivity *2 | Min. | 100 | 400 | 1000 | 400 | 300 | 50 | A/lm |
| | | Typ. | 700 | 1200 | 2000 | 2600 | 700 | 300 | |
| | Radiant sensitivity *2 *3 | Typ. | $5.2 \times 10^5$ | $3.1 \times 10^5$ | $4.2 \times 10^5$ | $4.3 \times 10^5$ | $2.5 \times 10^5$ | $3.6 \times 10^5$ | A/W |
| | Dark current *2 *4 | Typ. | 1 | 1 | 2 | 3 | 0.1 | 0.5 | nA |
| | | Max. | 10 | 10 | 10 | 10 | 1 | 5 | |
| Rise time *2 | | Typ. | 1.4 | | | | | | ns |
| Ripple noise *2 *5 (peak to peak) | | Max. | 0.5 | | | | | | mV |
| Settling time *6 | | Max. | 14 | | | | | | s |
| Operating ambient temperature *7 | | | +5 to +50 | | | | | | °C |
| Storage temperature *7 | | | -20 to +50 | | | | | | °C |
| Weight | | | 104 | | | | | | g |

*1: Input voltage = +5 V, Control voltage = +1.0 V, Dark current output
*2: Control voltage = +1.0 V
*3: Measured at the peak sensitivity wavelength
*4: After 30 minutes storage in darkness
*5: Cable RG-174/U, Cable length 450 mm, Load resistance = 1 MΩ, Load capacitance = 22 pF
*6: The time required for the output to reach a stable level following a change in the control voltage from +1.0 V to +0.5 V.
*7: No condensation

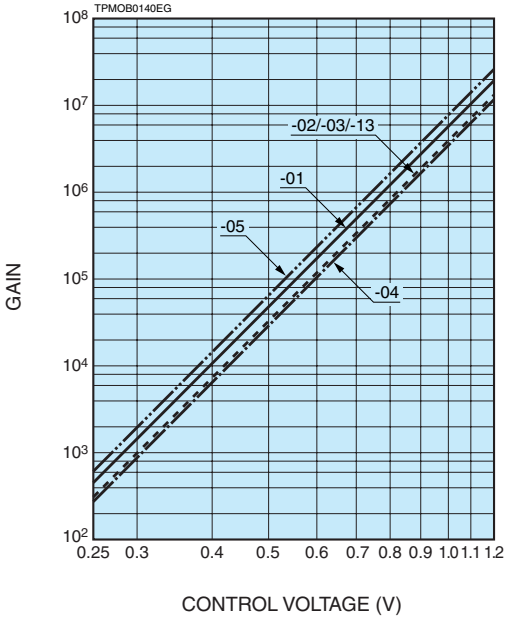
## Figure 3: Sensitivity adjustment method



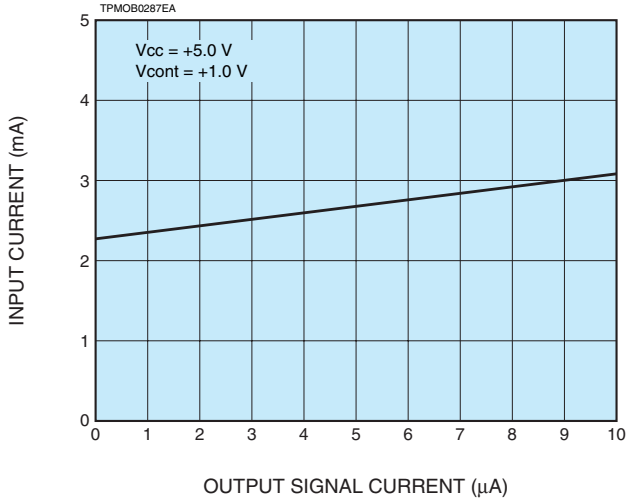

When using a potentiometer, adjust sensitivity while monitoring the control voltage so it does not exceed +1.2 V.
When input voltage is +4 V or less, please set resistance of potentiometer to 100 kΩ.

TPMOC0265EA

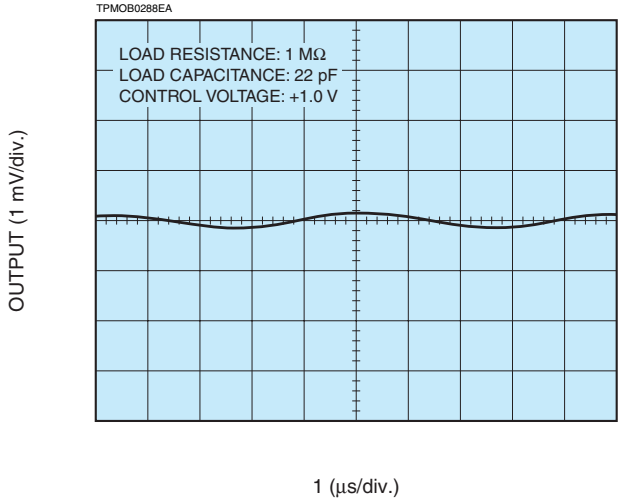
## Figure 4: Gain



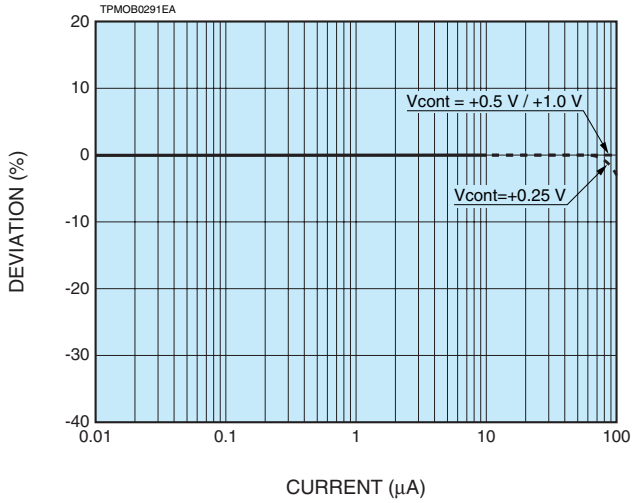

## Figure 5: Output signal current vs. input current




## Figure 6: Ripple noise




## Figure 7: DC linearity




## Figure 8: Pulse linearity

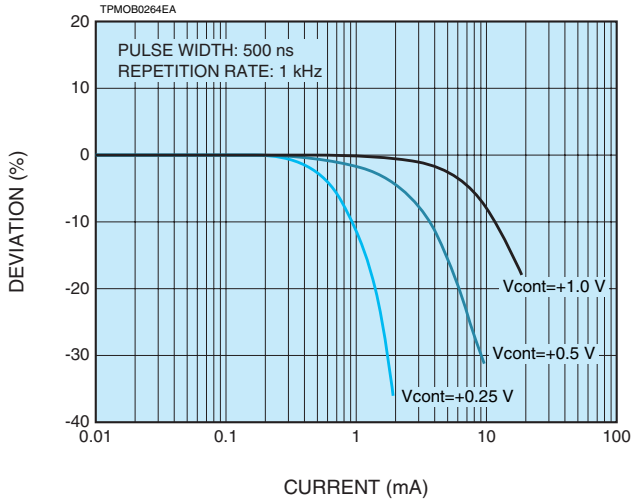
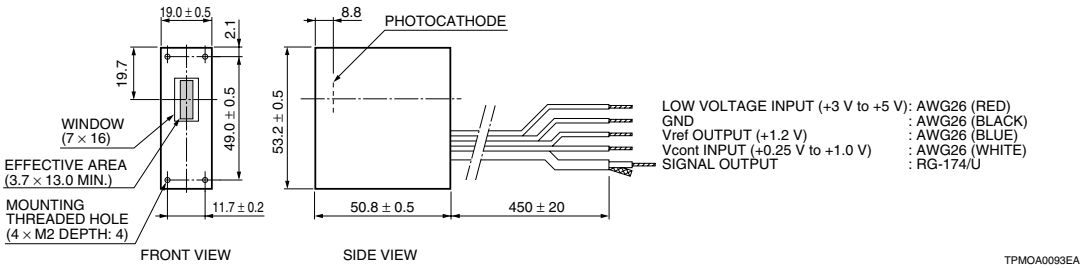
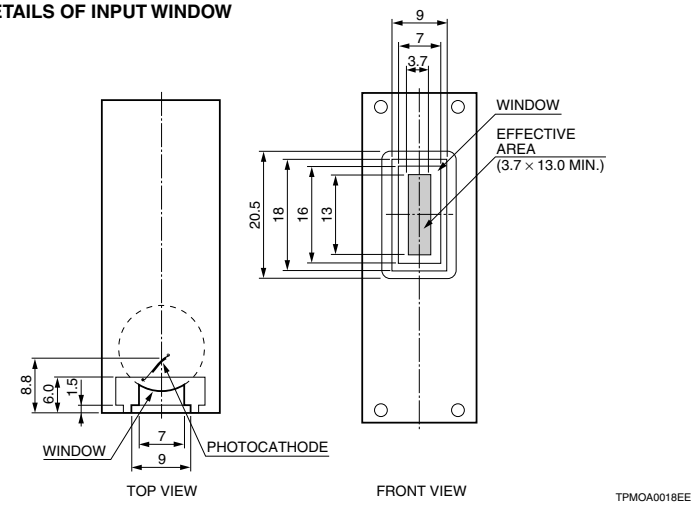


Figure 9: Dimensional outlines (Unit: mm)




**DETAILS OF INPUT WINDOW**




## RELATED PRODUCT

### POWER SUPPLY FOR PHOTOMULTIPLIER TUBE MODULES C10709

The C10709 is the power supply for photomultiplier tube modules which has 5 V input voltage.
This unit can provide both the driving voltage and the control voltage. This feature enables users to operate the modules easily.


| Parameter | | Description / Value | Unit |
|---|---|---|---|
| Output voltage | | ±5 | V |
| Output current | Max. | 2.0 (+5 V), 0.2 (-5 V) | A |
| Control voltage Ⓐ (variable voltage range) | | +0.25 to +1.8 | V |
| Terminal connection method | | Binding post | — |
| Input voltage | | AC100 to AC240 | V |
| Operating ambient temperature | | +5 to +50 | °C |
| Dimensions (W × H × D) Ⓑ | | 147 × 61 × 200 | mm |
| Weight | | Approx. 1.2 | kg |

**NOTE:** ⒶAdjust within the recommended control voltage range for the photomultiplier tube module being used.
ⒷExcluding protuberance

**HAMAMATSU PHOTONICS K.K.** www.hamamatsu.com

**HAMAMATSU PHOTONICS K.K., Electron Tube Division**
**314-5, Shimokanzo, Iwata City, Shizuoka Pref., 438-0193, Japan, Telephone: (81)539/62-5248, Fax: (81)539/62-2205**

**U.S.A.:** Hamamatsu Corporation: 360 Foothill Road, Bridgewater. N.J. 08807-0910, U.S.A., Telephone: (1)908-231-0960, Fax: (1)908-231-1218 E-mail: usa@hamamatsu.com
**Germany:** Hamamatsu Photonics Deutschland GmbH: Arzbergerstr. 10, D-82211 Herrsching am Ammersee, Germany, Telephone: (49)8152-375-0, Fax: (49)8152-2658 E-mail: info@hamamatsu.de
**France:** Hamamatsu Photonics France S.A.R.L.: 19, Rue du Saule Trapu, Parc du Moulin de Massy, 91882 Massy Cedex, France, Telephone: (33)1 69 53 71 00, Fax: (33)1 69 53 71 10 E-mail: infos@hamamatsu.fr
**United Kingdom:** Hamamatsu Photonics UK Limited: 2 Howard Court, 10 Tewin Road, Welwyn Garden City, Hertfordshire AL7 1BW, United Kingdom, Telephone: (44)1707-294888, Fax: (44)1707-325777 E-mail: info@hamamatsu.co.uk
**North Europe:** Hamamatsu Photonics Norden AB: Torshamnsgatan 35 SE-164 40 Kista, Sweden, Telephone: (46)8-509-031-00, Fax: (46)8-509-031-01 E-mail: info@hamamatsu.se
**Italy:** Hamamatsu Photonics Italia S.r.l.: Strada della Moia, 1 int. 6, 20020 Arese (Milano), Italy, Telephone: (39)02-93581733, Fax: (39)02-93581741 E-mail: info@hamamatsu.it
**China:** Hamamatsu Photonics (China) Co., Ltd.: B1201 Jiaming Center, No.27 Dongsanhuan Beilu, Chaoyang District, Beijing 100020, China, Telephone: (86)10-6586-6006, Fax: (86)10-6586-2866 E-mail: hpc@hamamatsu.com.cn

TPMO1072E01
FEB. 2016 IP