HAMAMATSU

FLAME SENSOR
UVTRON®

UVTRON is an ultraviolet ON / OFF sensor tube that uses the photoelectric effect of metal and gas multiplication effect of electric current by means of discharge. It has a very narrow range of sensitivity from 185 nm to 300 nm and is completely insensitive to visible light. Because it used the discharge phenomenon, its sensitive is high and an adequate output voltage is obtained, making it possible to design a high-sensitivity, quick response ultraviolet detection with simple circuitry.

The UVTRON reliably detects faint ultraviolet emissions from flames, making it ideal for applications such as fire alarms, arson surveillance, and burner combustion monitor devices. The UVTRON can also detect discharges such as corona discharges from high-voltage power transmission lines.

FEATURES

- **Capability of Detecting Very Weak Ultraviolet Rays (from 1 pW)**
- **Solar Blind Characteristics (Not Sensitive to Visible and Infrared Light)**
- **High Reliability and long service life (10 000 hours of Continual Discharge Operation)**
- **High Speed Response (A Few Milliseconds)**
- **Low Current Operation**
- **Compact and Lightweight**

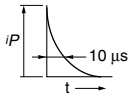
APPLICATIONS

- **Combustion Monitoring Apparatus for Gas and Oil Burner**
- **Fire Alarm Apparatus**
- **Arson Watch Monitors**
- **Photoelectronic Counter**
- **Detection of Ultraviolet Ray Leakage**
- **Detection of Discharge Phenomenon**

Type No.	Dimen-sional Outline	Electrode Material	Weight (g)	Spectral Response (nm) / Symbol (Fig. 2)	Maximum Rating: Supply Voltage (V dc)	Maximum Rating: Average Discharge Current (mA) Ⓐ	Maximum Rating: Peak Current (mA) Ⓑ	Maximum Rating: Operation Ambient Temperature (°C)
R244	❶	Ni	3	185 to 260 / A	575	3	50	-20 to +125
R259	❶	Ni	3	185 to 260 / A	420	3	50	-20 to +125
R1753-01	❷	Ni	4	185 to 260 / A	420	3	50	-20 to +125
R2868	❸	Ni	1.5	185 to 260 / A	400	1	30	-20 to +60
R9454	❹	Ni	1.5	185 to 260 / A	500	1	30	-20 to +60
R9533	❺	Ni	2.5	185 to 260 / A	400	1	30	-20 to +125
R259-01	❶	Mo	3	185 to 300 / B	420	5	100	-20 to +125
R1868	❻	W	4	185 to 280 / C	425 (300Ⓖ)	10	200	-20 to +125

Ⓐ Even at these current values, the electrodes are not consumed immediately, but the service life is noticeably reduced. Use the tube within the recommended current values.

Ⓑ This is the maximum momentary current that can be handled if its full width at half maximum is less than 10 µs.



Ⓒ These are representative values for a wavelength of 200 nm and a light input of 10 pW/cm^2. Think of these values as relative sensitivity values. In actual use, the sensitivity will vary with the wavelength of the ultraviolet radiation and the drive circuitry employed.

Ⓓ Measured under room illuminations (approximately 500 lux) and recommended operating conditions. Note that these values will increase somewhat in outdoor uses due to the effect of sunlight.

Ⓔ This is the service life under the recommend operating conditions. Since high ambient temperatures will reduce the service life, when using the tube in a high-temperature application, such as a burner monitor, consider using air-cooling.

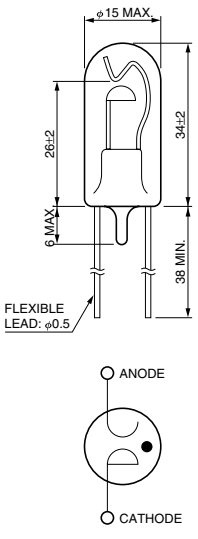
Ⓕ When configuring the tube with an external quenching circuit, use circuit constants so that the quenching time becomes longer than these values listed. When using a pulse driven circuit using CR, if the applied voltage is in the recommended range, the quenching time tq can be calculated with the following formula. (Refer to the diagram of the recommended operating circuit.)

$$tq \simeq 0.5 \times C_1 \cdot R_1$$

Ⓖ The RMS voltage when pulsating current is supplied.

Figure 1: Dimensional Outline (Unit: mm)

❶R244, R259, R259-01



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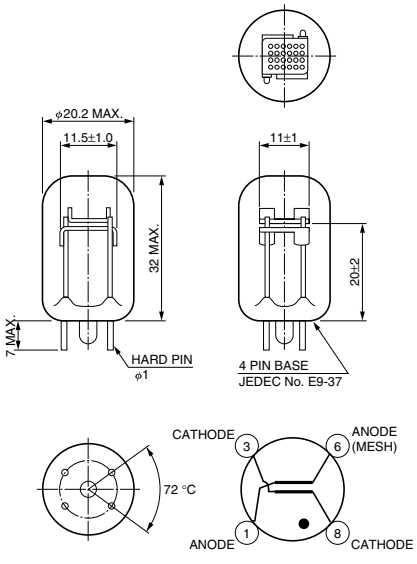
❷R1753-01



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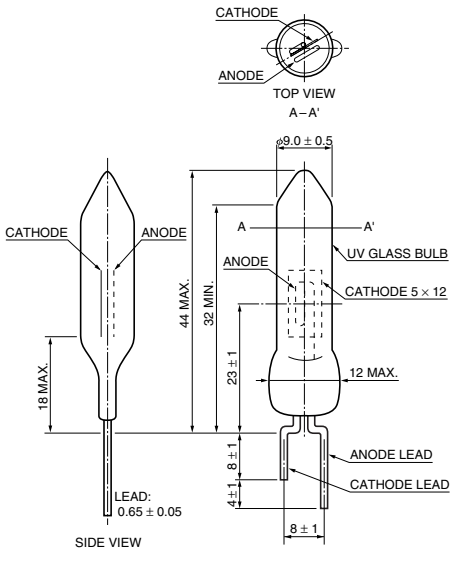
❸R2868



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Characteristics (at 25 °C)					Recommended Operating Parameters			Suitable Socket (Sold Separately) (Fig. 3)	Type No.
Discharge Starting Voltage Max. (V dc)	Discharge Sustaining Voltage Typ. (V dc)	Sensitivity Ⓒ Typ. (min^{-1})	Background Ⓓ Max. (min^{-1})	Average Life Ⓔ Typ. (hours)	Supply Voltage (V dc)	Average Discharge Current (mA)	Quenching Ⓕ Time Min. (ms)		
440	330	480	5	10000	500±50	0.3	3	—	**R244**
260	220	600	5	10000	325±25	0.3	1	—	**R259**
260	185	10000	5	10000	325±25	0.3	2	E678-9C	**R1753-01**
280	240	5000	10	10000	325±25	0.3	2	—	**R2868**
360	300	4000	10	10000	400±25	0.3	2	—	**R9454**
280	230	10000	10	10000	350±25	0.3	1	E678-8F	**R9533**
260	200	200	10	10000	325±25	0.5	1	—	**R259-01**
240 (170Ⓖ)	170	1500	10	10000	310±30 (220±20Ⓖ)	2	2	E678-9C	**R1868**

Figure 2: Spectral Response

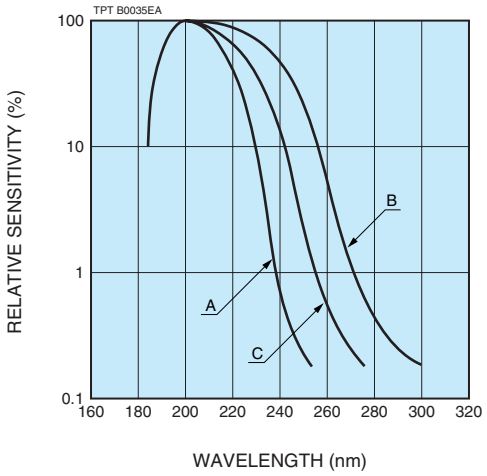
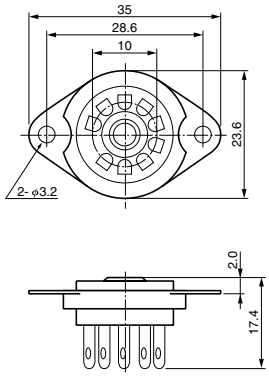


Figure 3: Suitable Sockets (Unit: mm) Sold Separately

E678-9C



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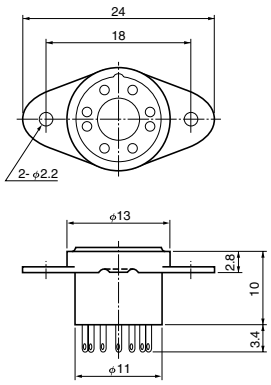
E678-8F



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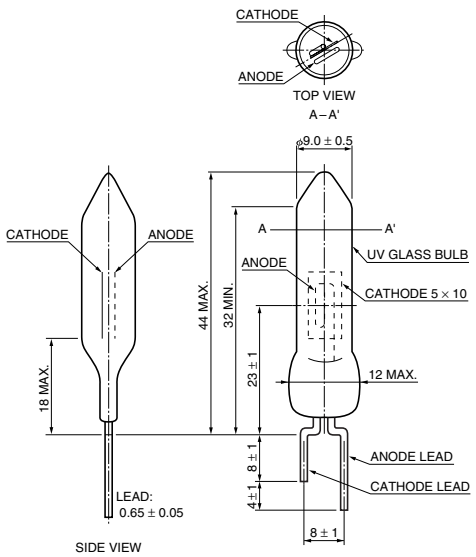
❹R9454



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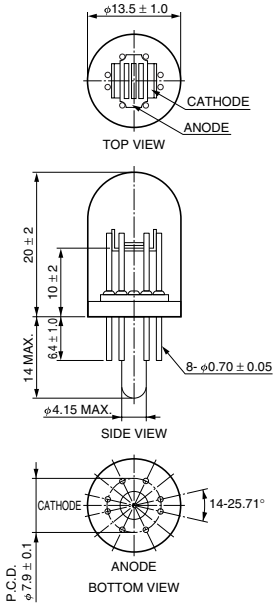
❺R9533



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❻R1868

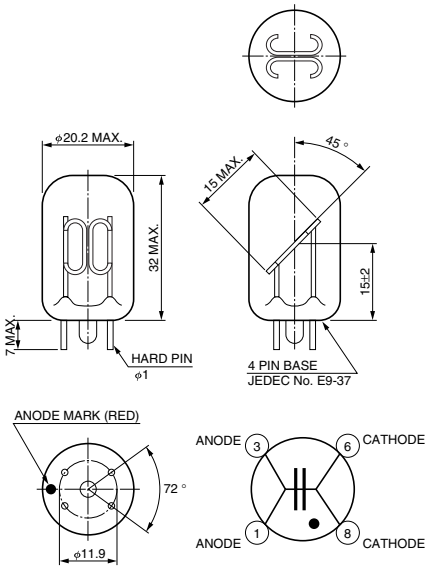

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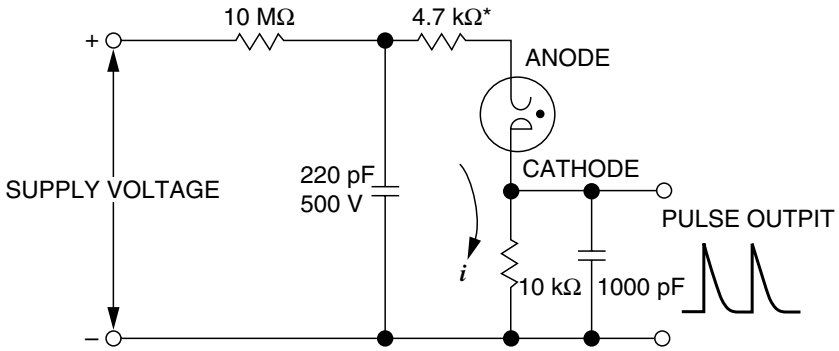
Figure 4: Recommended Driver Circuits



* This 4.7 kΩ resistor must be connected within 2.5 cm from the tip of the UVTRON anode lead.

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■PRECAUTIONS FOR USING THE UVTRON

●UVTRON light emission

When the UVTRON discharges, it emits ultraviolet radiation. If a number of UVTRON are used in close proximity, they must be arranged so that they will not interfere with each other optically.

●Humidity

Humidity around the leads for the UVTRON generates leak current, dropping the anode voltage, and stopping the tube from operating. In particular, if dirt, dust etc. get on the leads, that makes it easier for humidity to be absorbed, so keep the area around the leads clean.

●Dirt on the window

Since the UVTRON operates at high voltage, static electricity causes dust to build up on the surface of the glass bulb. This invites lowering of the ultraviolet transmissivity and sensitivity of the UVTRON, so periodic maintenance, such as wiping off with gauze dipped in alcohol, is necessary.

●Soldering

For mounting the UVTRON on a printed circuit board, solder it quickly (350 °C for less than 5 seconds). If the leads are heated excessively, the glass can crack or the characteristics of the UVTRON deteriorate. After soldering, wipe away the solder flux with alcohol or a similar agent. If the leads are left dirty, current leak due to humidity will lower the voltage applied to the UVTRON socket available from HAMAMATSU.

●Vibration and shock

UVTRONs have passed vibration and shock tests in compliance with IEC 60068-2-6 (sinusoidal vibration test - R9454, R9533: 3.0 mm peak to peak, 200 m/s^2, 10 Hz to 2000 Hz; other types: 1.5 mm peak to peak, 100 m/s^2, 10 Hz to 500 Hz) and IEC 60068-2-27 (shock test - R9454, R9533: 10000 m/s^2, 1 ms; other types: 1000 m/s^2, 11 ms). However Cif subjected to strong mechanical shocks such as drop impacts, the glass envelope may crack or internal electrodes may deform resulting in poor electrical characteristics. So use extreme caution when handling the UVTRON. If the leads are machined or cut with a wire cutter, the internal electrodes may be subjected to vibrations or shocks greater than the above tests, resulting in poor electrical characteristics as in the case where they are subjected to drop impacts.

●Polarity

Connect the UVTRON with correct polarity. Reverse polarity connection will cause malfunction or breakdown.

■WARRANTY

The UVTRON is covered by a warranty for a period of one year after delivery. The warranty is limited to replacement of any defective tube due to defects traceable to the manufacturer.

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TPT 1021E03
DEC. 2008 IP