



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 Speed Response (A Few Milliseconds)
- Low Current Operation
- Compact and Lightweight

APPLICATIONS

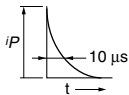
- Combustion Monitoring Apparatus for Gas and Oil Burner
- Fire Alarm Apparatus
- Arson Watch Monitors
- Photoelectronic Counter
- Detection of Ultraviolet Ray Leakage
- Detection of Discharge Phenomenon

FLAME SENSOR UVTRON®

Parameter		R244	R259	R1753-01	R2868	R9454	R9533	R1868	R259-01	Unit	
Dimensional Outline		①	①	②	③	④	⑤	⑥	①	—	
Electrode Material		Ni						W	Mo	—	
Weight		3	3	4	1.5	1.5	2.5	4	3	g	
Spectral Response / Symbol (Fig. 1)		185 to 260 / A						185 to 280 / B	185 to 300 / C	nm	
Maximum Rating	Supply Voltage (DC)	575	420	420	400	500	400	425 (300 [Ⓒ])	420	V	
	Average Discharge Current [Ⓐ]	3			1			10	5	mA	
	Peak Current [Ⓑ]	50			30			200	100	mA	
	Operation Ambient Temperature	-20 / +125			-20 / +60			-20 / +125			°C
Characteristics (at 25 °C)	Discharge Starting Voltage (DC) Max.	440	260	260	280	360	280	240 (170 [Ⓒ])	260	V	
	Discharge Sustaining Voltage (DC) Typ.	330	220	185	240	300	230	170	200	V	
	Sensitivity [Ⓒ] Typ.	480	600	10000	5000	4000	10000	1500	200	min ⁻¹	
	Background [Ⓓ] Max.	5			10						min ⁻¹
	Average Life [Ⓔ]	10000									h
Recommended Operating Parameters	Supply Voltage (DC)	500 ± 50	325 ± 25	325 ± 25	325 ± 25	400 ± 25	350 ± 25	310 ± 30 (220 ± 20 [Ⓒ])	325 ± 25	V	
	Average Discharge Current	0.3						2	0.5	mA	
	Quenching Time [Ⓕ] Min.	3	1	2	2	2	1	2	1	ms	
Suitable Socket (Sold Separately) (Fig. 3)		—	—	E678-9C	—	—	E678-8F	E678-9C	—	—	

Ⓐ 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/cm². 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. The UVtron is covered by a warranty for a period of one year after delivery.

Ⓕ 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 t_q can be calculated with the following formula. (Refer to the diagram of the recommended operating circuit.)

$$t_q \approx 0.5 \times C1 \cdot R1$$

Ⓒ The RMS voltage when pulsating current is supplied.

Figure 1: Spectral Response

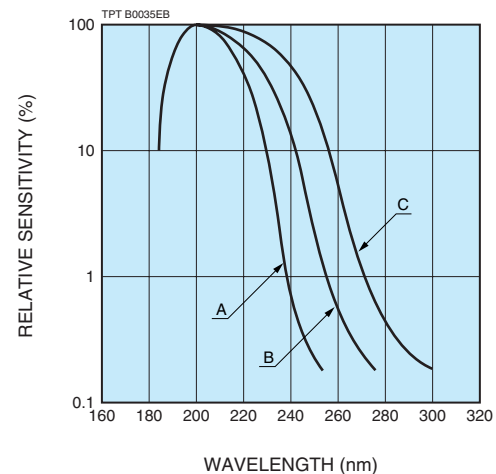


Figure 2: Dimensional Outline (Unit: mm)

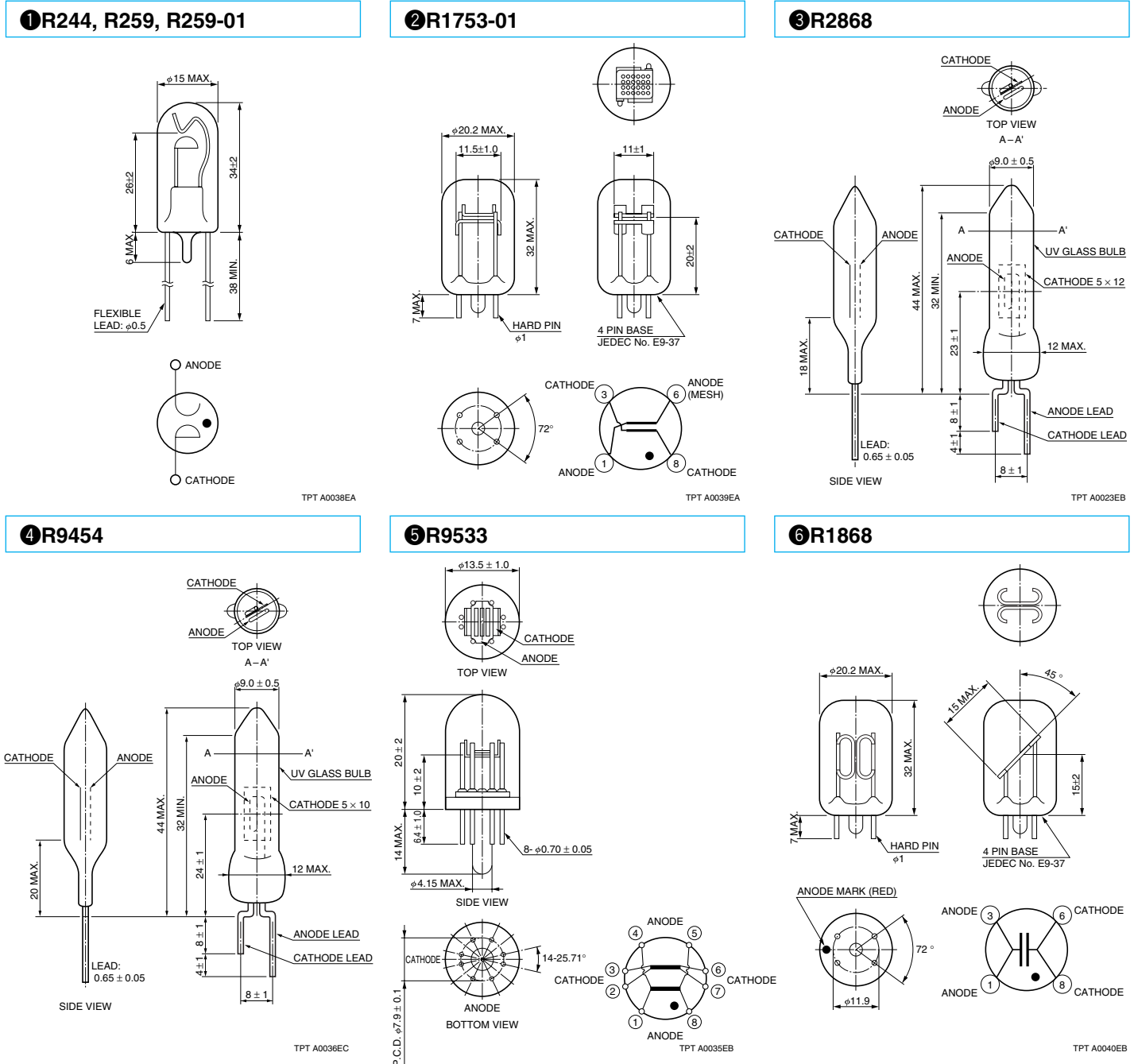


Figure 3: Suitable Sockets (Unit: mm) **Sold Separately**

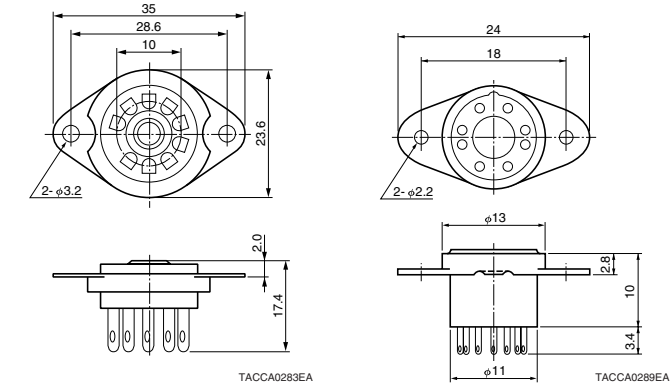
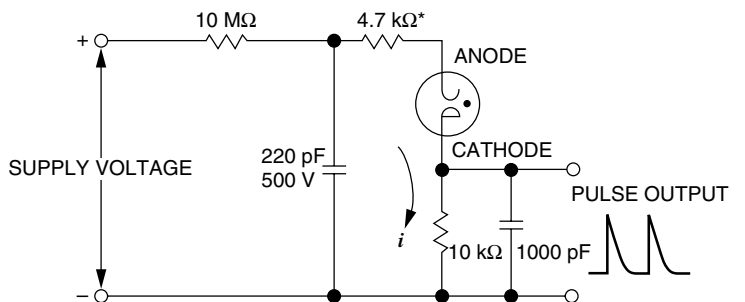


Figure 4: Recommended Driver Circuits



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

FLAME SENSOR UVTRON®

■ 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/s², 10 Hz to 2000 Hz; other types: 1.5 mm peak to peak, 100 m/s², 10 Hz to 500 Hz) and IEC 60068-2-27 (shock test - R9454, R9533: 10000 m/s², 1 ms; other types: 1000 m/s², 11 ms). However if 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.

RELATED PRODUCTS

UVTRON® DRIVING CIRCUIT C10423, C10807 (Sold Separately)

The C10423, C10807 are compact drive circuits. Since the high-voltage power supply and signal processing circuit are mounted on the same printed circuit board, the C10423 operates as a flame sensor by just supplying a DC voltage (12 V to 24 V) and connecting an UVTRON®. Please use C10423 with R9454, C10807 with R9533. Please note that the R9533 lead pins cannot be soldered directly to the C10807. A dedicated socket (E678-8F) must be used to make the connection. For more details, refer to the driving circuit catalog.



▲ C10807

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