

Application Note

UV-C Sensor (Peak Responsivity : 265nm, Detection Range : 220nm~280nm)

Abstract

UV-C sensor is Aluminium Gallium Nitride-based materials with Schottky Photodiode.
UV-C sensors detect a UVC wavelength(220nm~280nm) and used in sterilization lamp monitoring

1. Package Type

- The durability of the package should be good in order to detect UVC wavelength.
- According to the package type, UV sensors can be used selectively with applications.

Package Type	Picture of products	Viewing angle(°)	Applications
SMD 3535		150	Compact equipment, mobile phone, wide Viewing angle sensing
TO-46		60	Metal material of TO-CAN type and general applications
TO-39		60	
TO-5		100	

Fig. 1 Package Type

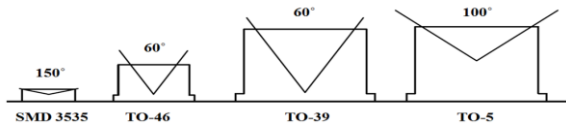


Fig. 2 Viewing angle in accordance with the package type

2. Type of UV chips

- The larger the chip size the higher output value(Photo current).

Output Value	Standard Chip	Large Chip	Ultra Large Chip
Picture of UV chip			
Chip Size (mm)	0.4 × 0.4	1.4 × 1.4	3.4 × 3.4
Active area (mm)	0.076	1.536	6.894
Photo current	34nA	0.55µA	3.25µA

Fig. 3 Type of UV chips
※ Optical source : 1mW/m², 254nm UVC Lamp

3. Dark current

- The small electric current that flows through UV sensor when no photons are entering the device.

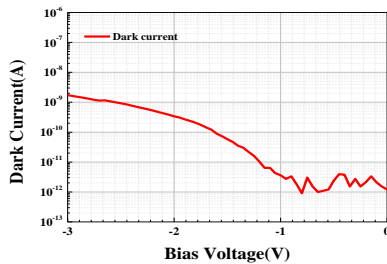


Fig. 4 Dark current of UVC sensor (Log scale)

Parameter	Max.	Unit	Test Conditions
Dark current	1	nA	V _r = 0.1V

4. Responsivity

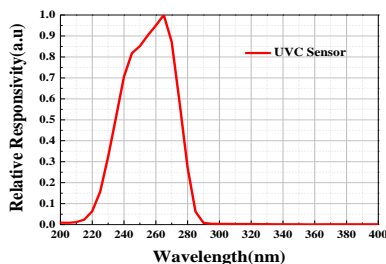


Fig. 5 Relative Responsivity

Parameter	UVC Sensor
Peak Wavelength(nm)	265
Spectral Detection Range(nm)	220~280
Material of window	Quartz glass

5. Classification by output value

- UV Sensor output values have two ways, as current or voltage for the UV response.
- GH series are voltage output component, and the Op-Amp is mounted therein.

Output value	Current Output	Voltage Output
Model	GD series (SMD, TO-CAN PKG)	GH series
Feature	Current Output	Amplified Voltage Output
Direction of electrode and Pin information	 	
Structure		

Fig. 6 Classification by output value

6. Application circuit

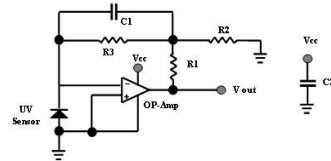


Fig. 7 Application circuit

Part No.	Model and Value	Function	Remark
UV Sensor	UVC Sensor	UV Sensing	Anode connects to ground
Op-Amp	MCP6241 (V _{cc} = 1.8 ~5.5V) LMC6081 (V _{cc} = 4.5 ~ 15V) OPA237 (V _{cc} = 2.7 ~36V)	Amplification	Input Offset Current < 1nA
Capacitor (C1)	1nA	Decreasing input noise	Decrease the value for fast response (e.g. 100pF) Increase the value for reducing errors (e.g. 10nF)
Capacitor (C2)	0.1µF	Stabilization of power	Internal voltage of capacitor > V _{cc}
Resistor (R1, 2, 3)	R1=0Q, R2=X, R3=7.5MΩ	Decide the output voltage	Gain : R3 × (1+R1/R2)

7. Application of the UV lamps

Internal pressure	Type of lamp	Applications	Available product
Low Pressure UV Lamp (Under 1kg/cm ²)	Cleaning Lamp	Surface cleaning (LCD, PDP, OLED, Optic glass, Lead frame, acrylic)	All UVC Sensors
	Organic matter decomposition Lamp	decomposing TOC and COD in water	
Middle Pressure UV Lamp (2~3kg/cm ²)	sterilization UV Lamp	Sterilizing water and air	All UVC Sensors (Using Diffuser)
	Medium Pressure Mercury Lamp	Coating, Ink curing	
	Iron Iodide Metal Halide Lamp	Coating, Ink and adhesive curing	
High Pressure UV Lamp (Under 5~10kg/cm ²)	Ga Iodide Metal Halide Lamp	Film processing, Shadow mask, etching	All UVC Sensors (Using Diffuser)
	Short Arc High Pressure Mercury Xe Lamp	Spot UV analyzer, UV stepper	

8. Products Table

OUTPUT	Model No.	Package Type	Chip Size (mm)	The minimum detectable quantity of light	Output Value**	
Current	GUVC-S10GD	SMD 3535	0.4 × 0.4	0.1µW/m ²	39nA	
	GUVC-T10GD	TO-46	0.4 × 0.4		34nA	
	GUVC-T11GD*	TO-46	0.4 × 0.4			
	GUVC-T10GD-L	TO-46	1.4 × 1.4		0.01µW/m ²	0.55µA
	GUVC-T20GD-U	TO-39	3.4 × 3.4		0.001µW/m ²	3.25µA
Voltage	GUVC-T21GH	TO-5	0.4 × 0.4	0.1µW/m ²	0.355V	

* GUVC-T11GD and GUVC-T10GD are same package type. But direction of electrode is opposite.

** Optical source power : 1mW/m², 254nm UVC Lamp

*** The maximum detectable quantity of light : 100mW/m² (Please contact us when optical source power is over 100mW/m².)

9. Caution

- ESD (Electro-Static Discharge)
 - ESD and surge voltage can cause damage to UV sensor.
 - It is recommended that using antistatic wrist strap or antistatic gloves when handling the UV sensors.
- Preventing moisture penetration
 - If moisture is absorbed into the inside of the device, occur expansion and vaporization during the soldering process. This phenomenon can give damaged to optical properties and appearance of UV sensors.
 - UV sensors are packaged in aluminium moisture barrier bags and put in silica gel.
- Etc.
 - If not insulated the cap of TO-CAN package type, it's cause malfunction to the device.
 - Storage conditions : Temperature 5~30°C, please keeping the condition of moisture is less than RH 65%.
 - Soldering Conditions : Max. 260°C (Temperature), Max. 10sec. (Time)