GUVA-S12SD

Genuine UV Technology genUV

UV Index or UV Lamp Monitoring

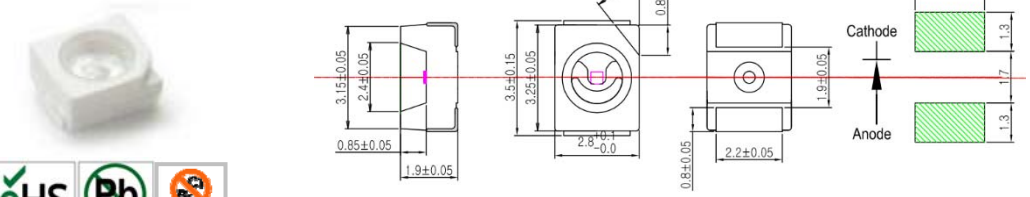
➢ Features

- Gallium Nitride Based Material
- Schottky Type Photodiode
- Photovoltaic Mode Operation
- Good Visible Blindness
- High Responsivity & Low Dark Current
- Chip Size : 0.4㎜ × 0.4㎜ (Active Area : 0.076㎟)
- SMD Type (Si Encapsulant)

➢ Applications

- UV Index Monitoring on Portable Device (Mobile Phone..)
- UV-A Lamp Monitoring
- UV LED Monitoring (< 360nm)
- UV Curing

➢ Package Dimension



RoHS COMPLIANT · Pb-Free · Br Cl FREE

➢ Absolute Maximum Rating

Parameter	Symbol	Min.	Max.	Unit	Remark
Storage Temperature	T_{st}	-40	90	℃	
Operating Temperature	T_{op}	-30	85	℃	
Reverse Voltage	$V_{r,\ max.}$		5	V	Ir=1 ㎂
Forward Current	$I_{f,max.}$		1	㎃	
Soldering Temperature	T_{sol}		260	℃	within 10 sec.

➢Electro-Optical Characteristics (at 25℃, RT)

Parameter	Min.	Typ.	Max.	Unit
Dark Current (Vr=1V)			1	nA
Photo Current (1 ㎽/㎠ of UVA lamp)	101	113	125	nA
Photo Current (1 UVI, offset 83nA)		21		nA
Peak Responsivity (352nm)		0.14		A/W
Spectral Detection Range	240		370	㎚
Viewing Angle		100		°
Temperature Coefficient		0.08		%/℃
Bias Capacitance (@Vr = 0V)		~ 100		pF
Shunt resistance		~ Middle x 10^10		Ω
Series resistance		~ Low x 10^2		Ω

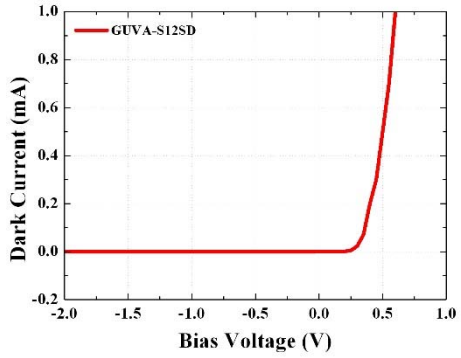
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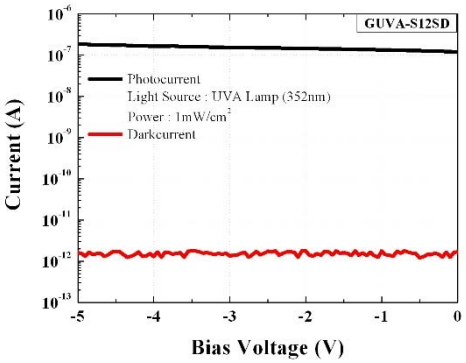
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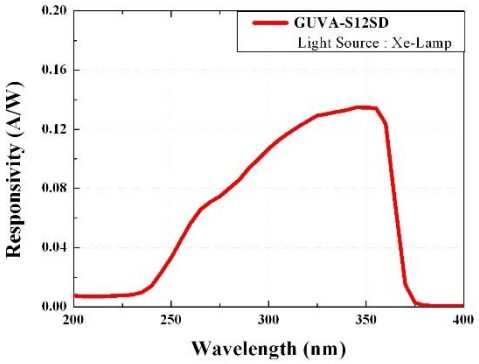
➢ Characteristic Curve

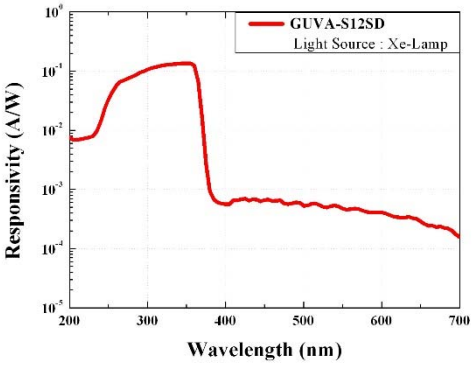
▪ I-V Curve



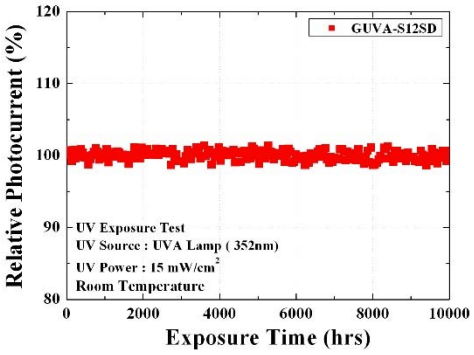


▪ Responsivity Curve

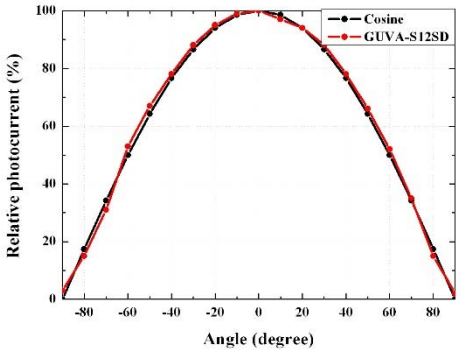




▪ Reliability due to UV Exposure



▪ Angular Response



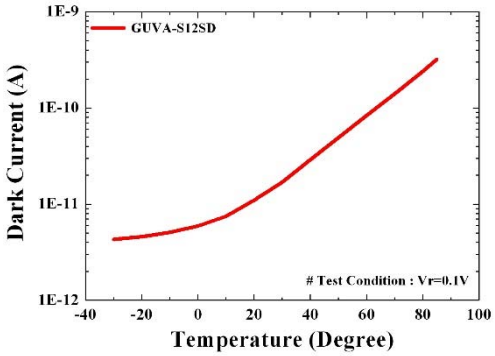
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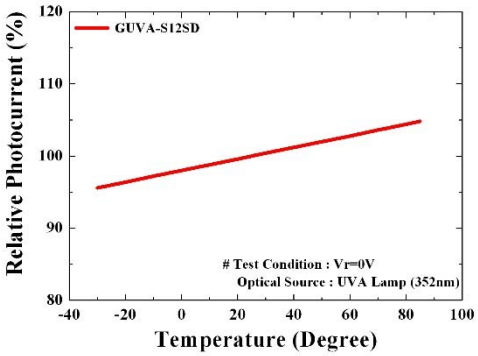
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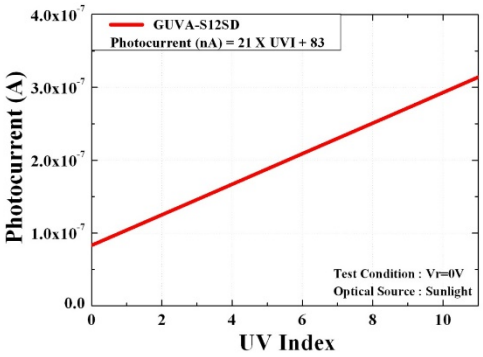
➢ Characteristic Curve

▪ Temperature Dependence (Dark Current & Photo Current)

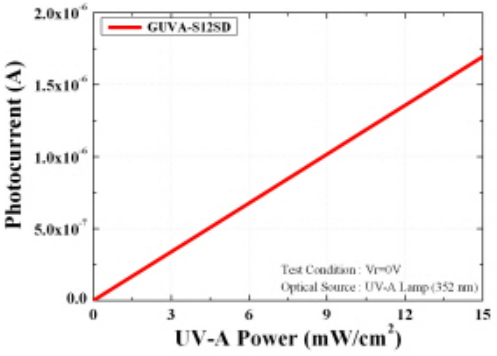




▪ Photocurrent along UV Index



▪ Photocurrent along UVA Power



GUVA-S12SD

UV Index or UV Lamp Monitoring

➢ Application Circuit

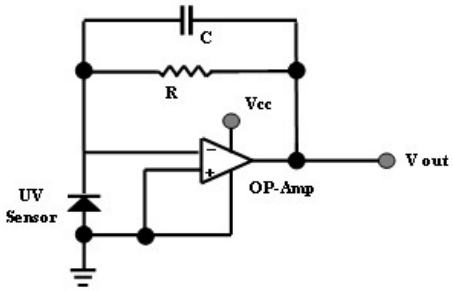
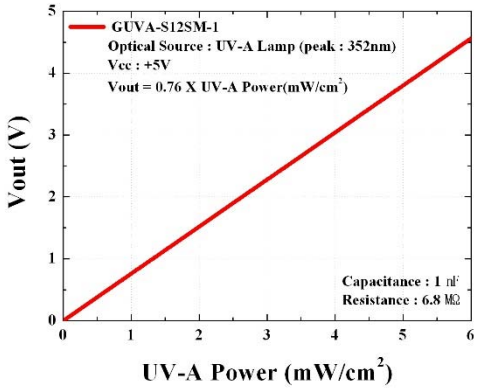
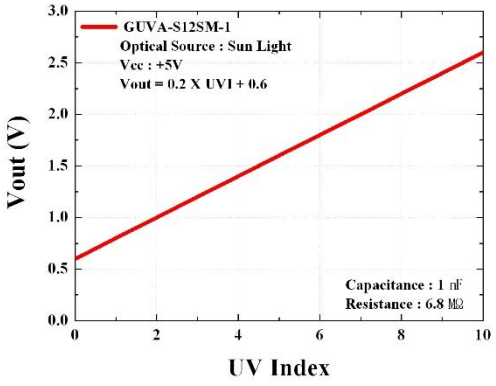


Fig. 1. Application Circuit (Basic)

Name	Part No.	Function	Model or Value	Remark
OP-Amp	OP-Amp	Amplification	MCP6241 (Microchip Technology)	Vcc : 1.8 ~ 5.5V
Capacitor	C	Decreasing the Input Noise	1 nF	Capacitor Controls Response Time
Resistor	R	Gain Control	6.8 MΩ	Gain : R

* Output Voltage = Gain × Photo Current





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Application Note

UV-A Sensor (Peak Responsivity : 355nm, Detection Range : 220nm~370nm)

Abstract

UV-A Sensor is Gallium Nitride-based materials with Schottky Photodiode.
UV-A sensors detect a UVA wavelength(220nm~370nm) and used in UVA lamp monitoring.
UV-A sensors detect UV Index under sun light.

1. Package Type

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

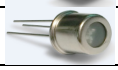
Package Type	Picture of products	Detection Range	Viewing angle(°)	Applications
COB 2418		240nm~370nm	120	Compact equipment, mobile phone, wide Viewing angle sensing
SMD 3528			100	
TO-46		220nm~370nm	60	Metal material of TO-CAN type and general applications
TO-39			60	
TO-5			100	

Fig. 1 Package Type

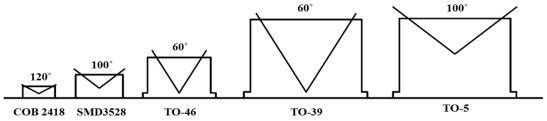


Fig. 2 Viewing angle in accordance with the package type

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 (㎟)	0.4 × 0.4	1.4 × 1.4	3.4 × 3.4
Active area (㎟)	0.076	1.536	6.894
Photo current	161nA	3.1μA	15.6μA
	※ Optical source : 1㎽/㎠, 352nm UVC Lamp		

Fig. 3 Type of UV chips

3. Dark current

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

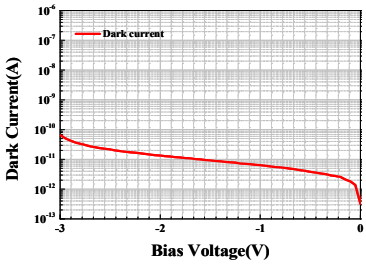


Fig. 4 Dark current of UVA sensor (Log scale)

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

4. Responsivity

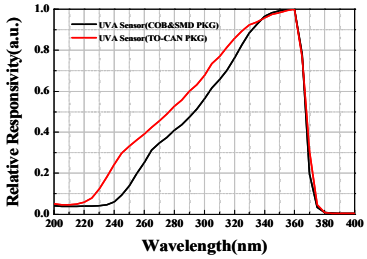


Fig. 5 Relative Responsivity

Parameter	COB & SMD PKG	TO CAN PKG
Peak Wavelength(nm)	355	355
Spectral Detection Range(nm)	240~370	220~370
Material of window	Si Encapsulant	Quartz glass

- The reason of difference of responsivity curve and detection area is the difference in material window of UV sensors.

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.

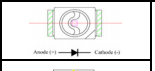
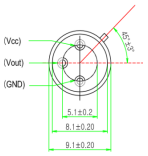
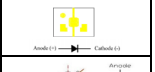
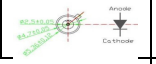
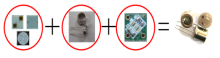
Output value	Current Output		Voltage Output
Model	SD, GD series (SMD, TO-CAN PKG)		GH series
Feature	Current Output		Amplified Voltage Output
Direction of electrode and Pin information	SMD PKG		
	COB PKG		
	TO-CAN		
Structure	 Chip Case UV sensor of current output		 Chip Case PCB UV sensor of voltage output

Fig. 6 Classification by output value

6. Application circuit

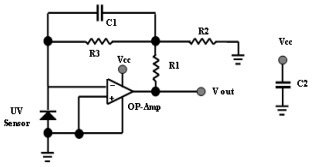


Fig. 7 Application circuit

Part No.	Model and Value	Function	Remark
UV Sensor	UVA Sensor	UV Sensing	Anode connects to ground
Op-Amp	MCP6241 (Vcc = 1.8 ~5.5V) LMC6081 (Vcc = 4.5 ~ 15V) OPA237 (Vcc = 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 > Vcc
Resister (R1, 2, 3)	R1=0Ω, R2=X, R3=6.8MΩ	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/㎠)	Cleaning Lamp	Surface cleaning (LCD, PDP, OLED, Optic glass, Lead frame, acrylic)	All UVA Sensors
	Organic matter decomposition Lamp	decomposing TOC and COD in water	
	sterilization UV Lamp	Sterilizing water and air	
Middle Pressure UV Lamp (2~3kg/㎠)	Medium Pressure Mercury Lamp	Coating, Ink curing	TO-CAN Package Type UVA Sensors (Using Diffuser)
	Iron Iodide Metal Halide Lamp	Coating, Ink and adhesive curing	
	Ga Iodide Metal Halide Lamp	Film processing, Shadow mask, etching	
High Pressure UV Lamp (Under 5~10kg/㎠)	Short Arc High Pressure Mercury Xe Lamp	Spot UV analysor, UV stepper	

8. Products Table

OUTPUT	Model No.	PKG Type	Chip Size (㎟)	The minimum detectable quantity of light	Output Value**
Current	GUVA-C22SD	COB 2418	0.4 × 0.4	0.1μW/㎠	113nA
	GUVA-S12SD	SMD 3528			
	GUVA-T11GD	TO-46			161nA
	GUVA-T13GD*	TO-46			
	GUVA-T31GD	TO-46 (3 Leads)			
	GUVA-T11GD-L	TO-46	1.4 × 1.4	0.01μW/㎠	3.1μA
	GUVA-T21GD-U	TO-39	3.4 × 3.4	0.001μW/㎠	15.6μA
Voltage	GUVA-T21GH	TO-5	0.4 × 0.4	0.1μW/㎠	1.88V

* GUVA-T13GD and GUVA-T11GD are same package type. But direction of electrode is opposite.
** Optical source power : 1㎽/㎠, 352nm UVA Lamp
*** The maximum detectable quantity of light : 100㎽/㎠ (Please contact us when optical source power is over 100㎽/㎠.)

9. Caution

1) 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 handing the UV sensors.

2) 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.

3) Etc.
- If not insulated the cap of TO-CAN package type, it's cause malfunction to the device.
- Storage conditions : Temperature 5~30℃, please keeping the condition of moisture is less than RH 65%.
- Soldering Conditions : Max. 260℃ (Temperature), Max. 10sec. (Time)