

## UV Enhanced Series

### Inversion Layers and Planar Diffused Silicon Photodiodes

OSI Optoelectronics offers two distinct families of UV enhanced silicon photodiodes. Inversion channel series and planar diffused series. Both families of devices are especially designed for low noise detection in the UV region of electromagnetic spectrum.

Inversion layer structure UV enhanced photodiodes exhibit 100% internal quantum efficiency and are well suited for low intensity light measurements. They have high shunt resistance, low noise and high breakdown voltages. The response uniformity across the surface and quantum efficiency improves with 5 to 10 volts applied reverse bias. In photovoltaic mode (unbiased), the capacitance is higher than diffused devices but decreases rapidly with an applied reverse bias. Photocurrent non-linearity sets in at lower photocurrents for inversion layer devices compared to the diffused ones. Below 700nm, their responsivities vary little with temperature.

Planar diffused structure (UV-D Series) UV enhanced photodiodes show significant advantages over inversion layer devices, such as lower capacitance and higher response time. These devices exhibit linearity of photocurrent up to higher light input power compared to inversion layer devices.

They have relatively lower responsivities and quantum efficiencies compared to inversion layer devices. There are two types of planar diffused UV enhanced photodiodes available: UVD and UVE. Both series have almost similar electro-optical characteristics, except in the UVE series, where the near IR responses of the devices are suppressed. This is especially desirable if blocking the near IR region of the spectrum is necessary. UVD devices peak at 970 nm and UVE devices at 720 nm (see graph). Both series may be biased for lower capacitance, faster response and wider dynamic range. Or they may be operated in the photovoltaic (unbiased) mode for applications requiring low drift with temperature variations. The UVE devices have a higher shunt resistance than their counterparts of UVD devices, but have a higher capacitance.

These detectors are ideal for coupling to an OP-AMP in the current mode configuration as shown below.

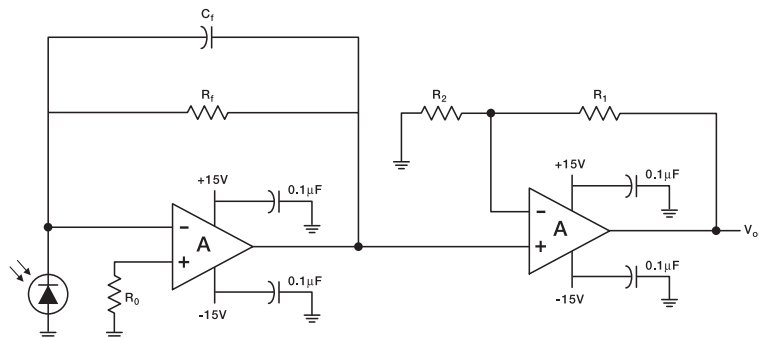


#### APPLICATIONS

- Pollution Monitoring
- Medical Instrumentation
- UV Exposure Meters
- Spectroscopy
- Water Purification
- Fluorescence

#### FEATURES

- Inversion series:
  - 100% Internal QE
- Ultra High  $R_{SH}$
- Planar Diffused Series:
  - IR Suppressed
  - High Speed Response
  - High Stability
- Excellent UV response



# Inversion Layer UV Enhanced Photodiodes

Typical Electro-Optical Specifications at  $T_A=23^\circ\text{C}$

Model Number	Active Area		Responsivity (A/W)		Capacitance (pF)	Shunt Resistance ( $M\Omega$ )		NEP (W/ $\sqrt{\text{Hz}}$ )	Reverse Voltage (V)	Rise Time ( $\mu\text{s}$ )	Operating Current (mA)	Temp.* Range ( $^\circ\text{C}$ )		Package Style ¶
	Area (mm <sup>2</sup> )	Dimensions (mm)	254 nm		0 V	-10 mV		0V 254 nm		0 V 254 nm 50 $\Omega$	0 V	Operating	Storage	
			min.	typ.	max.	min.	typ.	typ.		max.	typ.			

## 'UV Enhanced' Series, Inversion Layer, Metal Package §

UV-001	0.8	1.0 $\phi$	0.09	0.14	60	250	500	6.4 e-14	5	0.2	0.1	-20 ~ +60	-55 ~ +80	5 / TO-5
UV-005	5.1	2.54 $\phi$			300	80	200	1.0 e-13		0.9				
UV-015	15	3.05 x 3.81			800	30	100	1.4 e-13		2.0				
UV-20	20	5.08 $\phi$			1000	25	50	2.0 e-13		2.0				
UV-35	35	6.60 x 5.33			1600	20	30	1.7 e-13		3.0		-10 ~ +60	-20 ~ +70	
UV-50	50	7.87 $\phi$			2500	10	20	2.6 e-13		3.5				
UV-50L †					100	11.28 $\phi$	4500	5		10		4.5 e-13	5.9	
UV-100	11 / BNC													
UV-100L	10 / Lo-Prof													

## 'UV Enhanced' Series, Inversion Layer, Plastic Package §

FIL-UV005	5.1	2.54 $\phi$	0.09	0.14	300	50	100	9.2 e-14	5	0.9	0.1	-10 ~ +60	-20 ~ +70	14 / Plastic
FIL-UV20	20	5.08 $\phi$			1000	20	50	1.3 e-13		2.0				25 / Plastic
UV-35P	35	6.60 x 5.33			1600	15	30	1.7 e-13		3.0				15 / Plastic
FIL-UV50	50	7.87 $\phi$			2500	10	20	2.1 e-13		3.5				
FIL-UV100	100	11.28 $\phi$			4500	5	10	2.9 e-13		5.9				

Model Number	Active Area		Responsivity (A/W)		Capacitance (pF)	Shunt Resistance ( $G\Omega$ )		NEP (W/ $\sqrt{\text{Hz}}$ )	Reverse Voltage (V)	Rise Time ( $\mu\text{s}$ )	Dark Current (pA)	Temp.* Range ( $^\circ\text{C}$ )		Package Style ¶
	Area (mm <sup>2</sup> )	Dimensions (mm)	254 nm		0 V	-10 mV		0V 254 nm		0 V 254 nm 1k $\Omega$	Vr=10mV	Operating	Storage	
			min.	typ.	max.	min.	typ.	typ.		max.	typ.			

## '7' Series, Super UV

OSD1.2-7U	1.2	1.1 sq	0.08	0.10	40	0.5	5.0	1.5 e-14	5	0.1	2	-25 ~ +70	-40 ~ +100	7 / TO-18
OSD1.2-7Q	1.2	1.1 sq	0.10	0.12	40	0.5	5.0	1.5 e-14		0.1	2			7 / TO-18
OSD5.8-7U	5.8	2.4 sq	0.08	0.10	180	3.0	3.0	2.0 e-14		0.4	3			5 / TO-5
OSD5.8-7Q	5.8	2.4 sq	0.10	0.12	180	3.0	3.0	2.0 e-14		0.4	3			5 / TO-5
OSD35-7Q	33.6	5.8 sq	0.10	0.12	1000	0.1	0.5	6.0 e-14		2.0	20			3 / TO-8
OSD35-7CO	33.6	5.8 sq	0.11	0.13	1000	0.1	0.5	6.0 e-14		2.0	20			25 / Ceramic

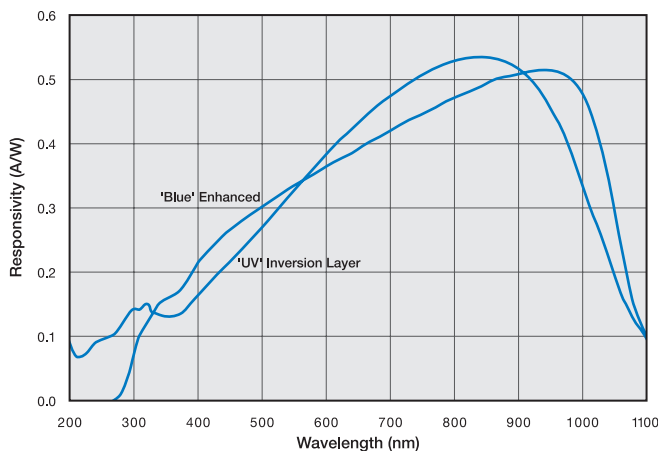
† The 'l' or 'L' suffix on the model number is indicative of the photodiode chip being isolated from the package by an additional pin connected to the case.

§ The photodiode chips in "FIL" series are isolated in a low profile plastic package. They have a large field of view as well as in line pins.

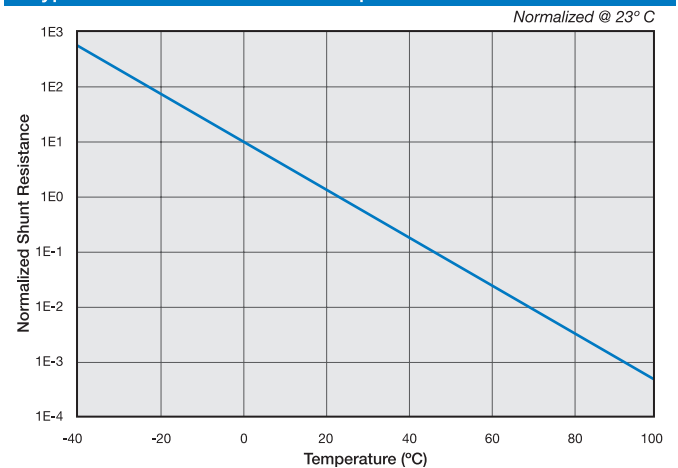
¶ For mechanical drawings please refer to pages 58 thru 69.

\* Non-Condensing temperature and Storage Range, Non-Condensing Environment.

### Typical Spectral Response



### Typical Shunt Resistance vs. Temperature



# Planar Diffused UV Enhanced Photodiodes

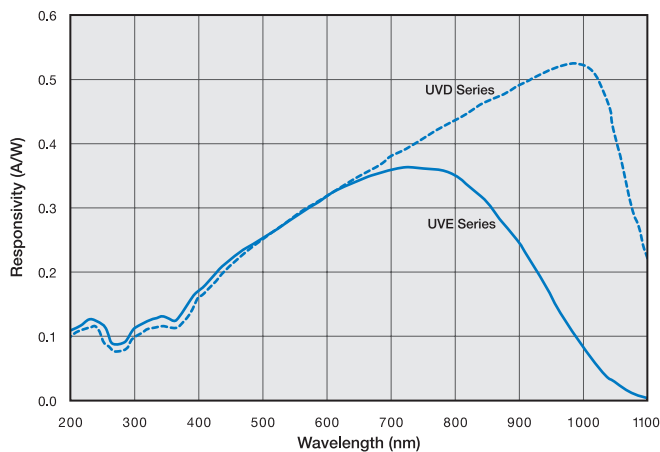
Typical Electro-Optical Specifications at  $T_A=23^\circ\text{C}$

Model Number	Active Area		Peak Wavelength $\lambda_p$ (nm)	Responsivity (A/W)			Capacitance (pF)		Shunt Resistance ( $G\Omega$ )		NEP ( $\text{W}/\sqrt{\text{Hz}}$ )	Reverse Voltage (V)	Rise Time ( $\mu\text{s}$ )	Temp.* Range ( $^\circ\text{C}$ )		Package Style ¶
	Area ( $\text{mm}^2$ )	Dimension (mm)		254 nm	633 nm	930 nm	0 V	-10 mV		0V 254 nm	0 V 254 nm 50 $\Omega$		Operating	Storage		
				typ.	typ.	typ.	typ.	min.	typ.	typ.	max.				typ.	
<b>'UVD' Series Planar Diffused, Metal Package</b>																
UV-005D	5.7	2.4 sq	970	0.10	0.33	0.50	100	0.30	4	2.0 e -14	5	0.10	-20 ~ +60	-55 ~ +80	5 / TO-5	
UV-013D	13	3.6 sq					225	0.20	2	2.8 e -14		0.20				
UV-035D	34	5.8 sq					550	0.10	0.50	5.6 e -14		0.40				6 / TO-8
<b>'UVD' Series Planar Diffused, Ceramic Package</b>																
UV-005DC	5.7	2.4 sq	970	0.10	0.33	0.50	100	0.30	4	2.0 e -14	5	0.10	-20 ~ +60	-20 ~ +80	25 / Ceramic	
UV-035DC	34	5.8 sq					550	0.10	0.5	5.6 e -14		0.20				
UV-100DC	100	10 sq					1750	0.04	0.20	9.1 e -14		1.00				
<b>'UVE' Series Planar Diffused, Metal Package</b>																
UV-005E	5.7	2.4 sq	720	0.10	0.33	0.17	200	0.50	10	1.3 e -14	5	0.15	-20 ~ +60	-55 ~ +80	5 / TO-5	
UV-013E	13	3.6 sq					400	0.40	5	1.8 e -14		0.30				
UV-035E	34	5.8 sq					1000	0.20	1	4.1 e -14		0.80				6 / TO-8
<b>'UVE' Series Planar Diffused, Ceramic Package</b>																
UV-005EC	5.7	2.4 sq	720	0.10	0.33	0.17	200	0.50	10	1.3 e -15	5	0.15	-20 ~ +60	-20 ~ +80	25 / Ceramic	
UV-035EC	34	5.8 sq					1000	0.20	1	4.1 e -14		0.80				
UV-100EC	100	10 sq					2500	0.10	0.50	5.8 e -14		1.00				

¶ For mechanical specifications please refer to pages 58 thru 69.

\* Non-Condensing temperature and Storage Range, Non-Condensing Environment.

## Typical Spectral Response



## Typical Capacitance vs. Reverse Bias

