

## UV Enhanced Series

### Inversion Layers and Planar Diffused Silicon Photodiodes

#### Features

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

#### Applications

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

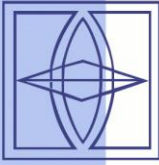
OSI Optoelectronics offers two distinct families of UV enhanced silicon photodiodes. Inversion channel series and planar diffused series. Both families of devices are especially designed for low noise detection in the UV region of electromagnetic spectrum.

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



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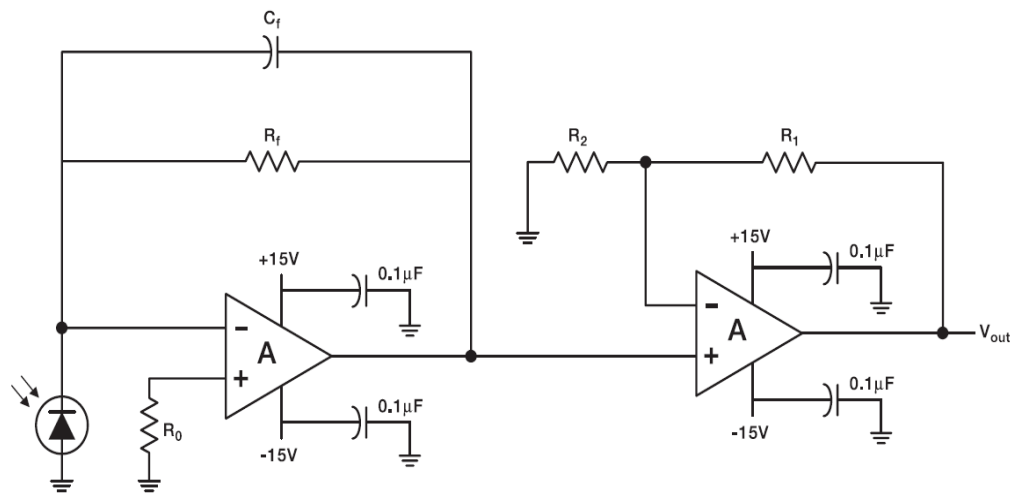
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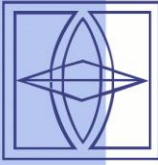
response time. These devices exhibit linearity of photocurrent up to higher light input power compared to inversion layer devices.

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.



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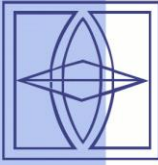
## Inversion Layer UV Enhanced Photodiodes

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/ $\sqrt{\text{Hz}}$ )
	Area (mm <sup>2</sup> )	Dimensions (mm)	254nm		0V	-10mV		0V, 254nm
			Min	Typ	Max	Min	Typ	Typ
<b>'UV Enhanced' Series, Inversion Layer, Metal Package **</b>								
UV-001	0.8	1.0 $\phi$	0.09	0.14	60	250	500	6.4 e -14
UV-005	5.1	2.54 $\phi$			300	80	200	1.0 e -13
UV-015	15	3.05 x 3.81			800	30	100	1.4 e -13
UV-20	20	5.08 $\phi$			1000	25	50	2.0 e -13
UV-35	35	6.60 x 5.33			1600	20	30	1.7 e -13
UV-50	50	7.87 $\phi$			2500	10	20	2.6 e -13
UV-50L^A								
UV-100	100	11.28 $\phi$			4500	5	10	4.5 e -13
UV-100L								
<b>'UV Enhanced' Series, Inversion Layer, Plastic Package **</b>								
FIL-UV005	5.1	2.54 $\phi$	0.09	0.14	300	50	100	9.2 e -14
FIL-UV20	20	5.08 $\phi$			1000	20	50	1.3 e -13
UV-35P	35	6.60 x 5.33			1600	15	30	1.7 e -13
FIL-UV50	50	7.87 $\phi$			2500	10	20	2.1 e -13
FIL-UV100	100	11.28 $\phi$			4500	5	10	2.9 e -13

Model Number	Reverse Voltage (V)	Rise Time ( $\mu\text{s}$ )	Operating Current (mA)	Temp.* Range ( $^\circ\text{C}$ )		Package Style	
		0V, 254nm, 50 $\Omega$	0V	Operating	Storage		
		Typ	Typ				
<b>'UV Enhanced' Series, Inversion Layer, Metal Package **</b>							
UV-001	5	0.2	0.1	-20 ~ +60	-55 ~ +80	5/ TO-5	
UV-005		0.9					
UV-015		2.0					
UV-20		2.0					
UV-35		3.0		-10 ~ +60	-20 ~ +70	11/ BNC	
UV-50		3.5				10/ Lo-Prof	
UV-50L^A		5.9				11/ BNC	
UV-100						10/ Lo-Prof	
UV-100L							
<b>'UV Enhanced' Series, Inversion Layer, Plastic Package **</b>							
FIL-UV005	5	0.9	0.1	-10 ~ +60	-20 ~ +70	14/ Plastic	
FIL-UV20		2.0					
UV-35P		3.0					25/ Plastic
FIL-UV50		3.5					
FIL-UV100		5.9					15/ Plastic

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Model Number	Active Area		Responsivity (A/W)		Capacitance (pF)	Shunt Resistance (GΩ)		NEP (W/√Hz)
	Area (mm <sup>2</sup> )	Dimensions (mm)	254nm		0V	-10mV		0V, 254nm
			Min	Typ	Max	Min	Typ	Typ
<b>'7' Series, Super UV</b>								
OSD1.2-7U	1.2	1.1 sq	0.08	0.10	40	0.5	5.0	1.5 e -14
OSD1.2-7Q			0.10	0.12				
OSD5.8-7U	5.8	2.4 sq	0.08	0.10	180	3.0	3.0	2.0 e -14
OSD5.8-7Q			0.10	0.12				
OSD35-7Q	33.6	5.8 sq	0.10	0.12	1000	0.1	0.5	6.0 e -14
OSD35-7CO			0.11	0.13				

Model Number	Reverse Voltage (V)	Rise Time (μs)	Dark Current (pA)	Temp.* Range (°C)		Package Style
		0V, 254nm, 1kΩ	Vr = 10mV	Operating	Storage	
<b>'7' Series, Super UV</b>						
OSD1.2-7U	5	0.1	2	-25 ~ +70	-40 ~ +100	7/ TO-18
OSD1.2-7Q		0.4	3			5/ TO-5
OSD5.8-7U						
OSD5.8-7Q						
OSD35-7Q		2.0	20			3/ TO-8
OSD35-7CO	25/ Ceramic					

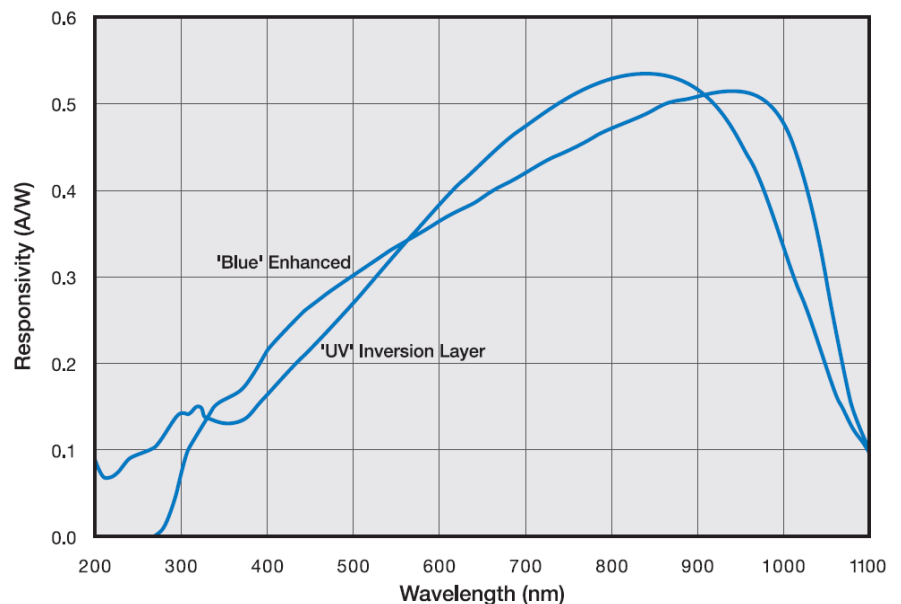
\* Non-condensing temperature and storage range, non-condensing environment.

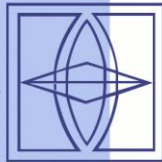
\*\* The photodiode chips in "FIL" series are isolated in a low profile plastic package. They have a large field of view as well as in line pins.

^ The "I" 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.

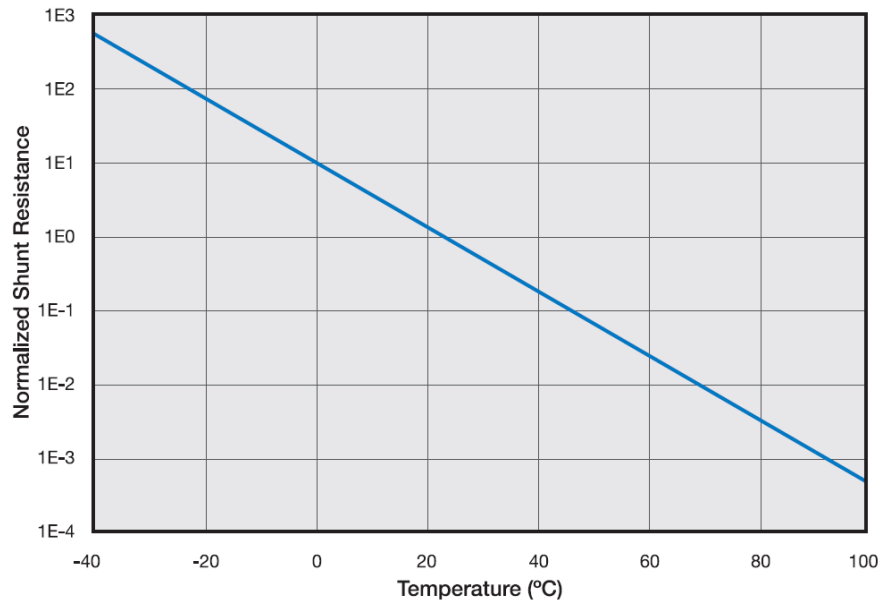
For mechanical drawings please refer to "Mechanical Drawings".

### Typical Spectral Response





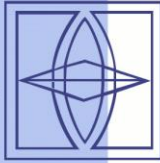
## Typical Shunt Resistance vs. Temperature (normalized @ 23°C)



## Planar Diffused UV Enhanced Photodiodes

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

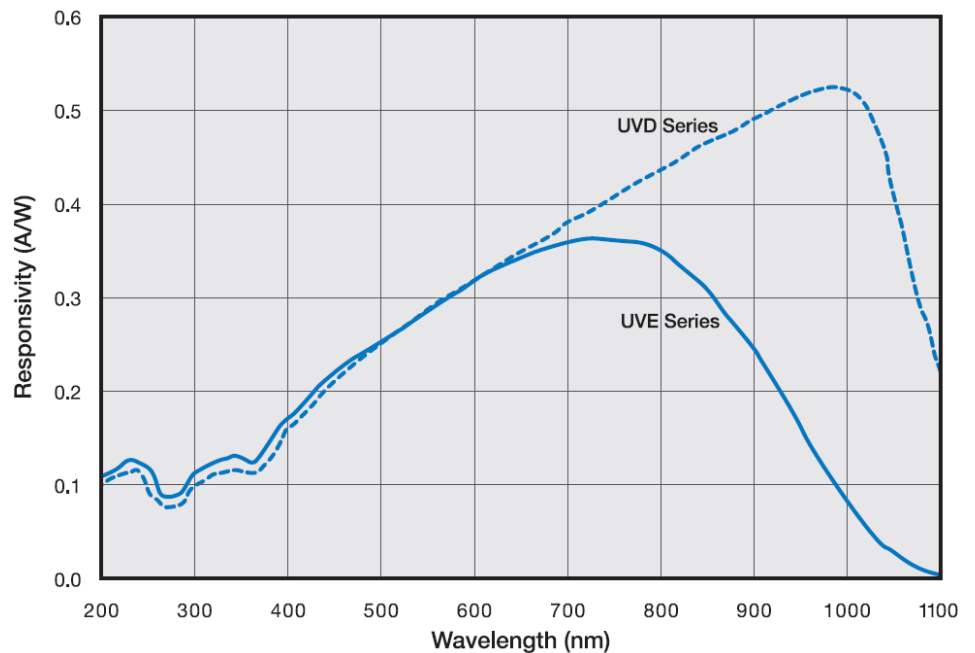
Model Number	Active Area		Peak Wavelength $\lambda_p$ (nm)	Responsivity (A/W)			Capacitance (pF)	Shunt Resistance (G $\Omega$ )	
	Area (mm <sup>2</sup> )	Dimensions (mm)		Typ			0V	-10mV	
				254 nm	633 nm	930 nm	Typ	Min	Typ
<b>`UVD` Series Planar Diffused, Metal Package</b>									
UV-005D	5.7	2.4 sq	970	0.10	0.33	0.50	100	0.30	4
UV-013D	13	3.6 sq					225	0.20	2
UV-035D	34	5.8 sq					550	0.10	0.50
<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
UV-035DC	34	5.8 sq					550	0.10	0.5
UV-100DC	100	10 sq					1750	0.04	0.20
<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
UV-013E	13	3.6 sq					400	0.40	5
UV-035E	34	5.8 sq					1000	0.20	1
<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
UV-035EC	34	5.8 sq					1000	0.20	1
UV-100EC	100	10 sq					2500	0.10	0.50



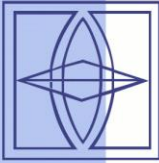
Model Number	NEP (W/ $\sqrt{\text{Hz}}$ )	Reverse Voltage (V)	Rise Time ( $\mu\text{s}$ )	Temp. Range* ( $^{\circ}\text{C}$ )		Package Style
	0V, 254nm		0V, 254nm, 50 $\Omega$	Operating	Storage	
	Typ		Max			
<b>`UVD` Series Planar Diffused, Metal Package</b>						
UV-005D	2.0 e -14	5	0.10	-20 ~ +60	-55 ~ +80	5/ TO-5
UV-013D	2.8 e -14		0.20			6/ TO-8
UV-035D	5.6 e -14		0.40			
<b>`UVD` Series Planar Diffused, Ceramic Package</b>						
UV-005DC	2.0 e -14	5	0.10	-20 ~ +60	-20 ~ +80	25/ Ceramic
UV-035DC	5.6 e -14		0.20			
UV-100DC	9.1 e -14		1.00			
<b>`UVE` Series Planar Diffused, Metal Package</b>						
UV-005E	1.3 e -14	5	0.15	-20 ~ +60	-55 ~ +80	5/ TO-5
UV-013E	1.8 e -14		0.30			6/ TO-8
UV-035E	4.1 e -14		0.80			
<b>`UVE` Series Planar Diffused, Ceramic Package</b>						
UV-005EC	1.3 e -15	5	0.15	-20 ~ +60	-20 ~ +80	25/ Ceramic
UV-035EC	4.1 e -14		0.80			
UV-100EC	5.8 e -14		1.00			

\* Non-condensing temperature and storage range, non-condensing environment.  
For mechanical drawings please refer to "Mechanical Drawings".

## Typical Spectral Response



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### Typical Capacitance vs. Reverse Bias

