

## Soft X-Ray, Deep UV Enhanced Series

### Inversion Layer Silicon Photodiodes

OSI Optoelectronics' 1990 R&D 100 award winning X-UV detector series are a unique class of silicon photodiodes designed for additional sensitivity in the X-Ray region of the electromagnetic spectrum without use of any scintillator crystals or screens. Over a wide range of sensitivity from 200 nm to 0.07 nm (6 eV to 17,600 eV), one electron-hole pair is created per 3.63eV of incident energy which corresponds to extremely high stable quantum efficiencies predicted by  $E_{ph}/3.63eV$  (See graph below). For measurement of radiation energies above 17.6 keV, refer to the "Fully Depleted High Speed and High Energy Radiation Detectors" section.

A reverse bias can be applied to reduce the capacitance and increase speed of response. In the unbiased mode, these detectors can be used for applications requiring low noise and low drift. These detectors are also excellent choices for detecting light wavelengths between 350 to 1100 nm.

The detectors can be coupled to a charge sensitive preamplifier or low-noise op-amp as shown in the circuit on the opposite page.



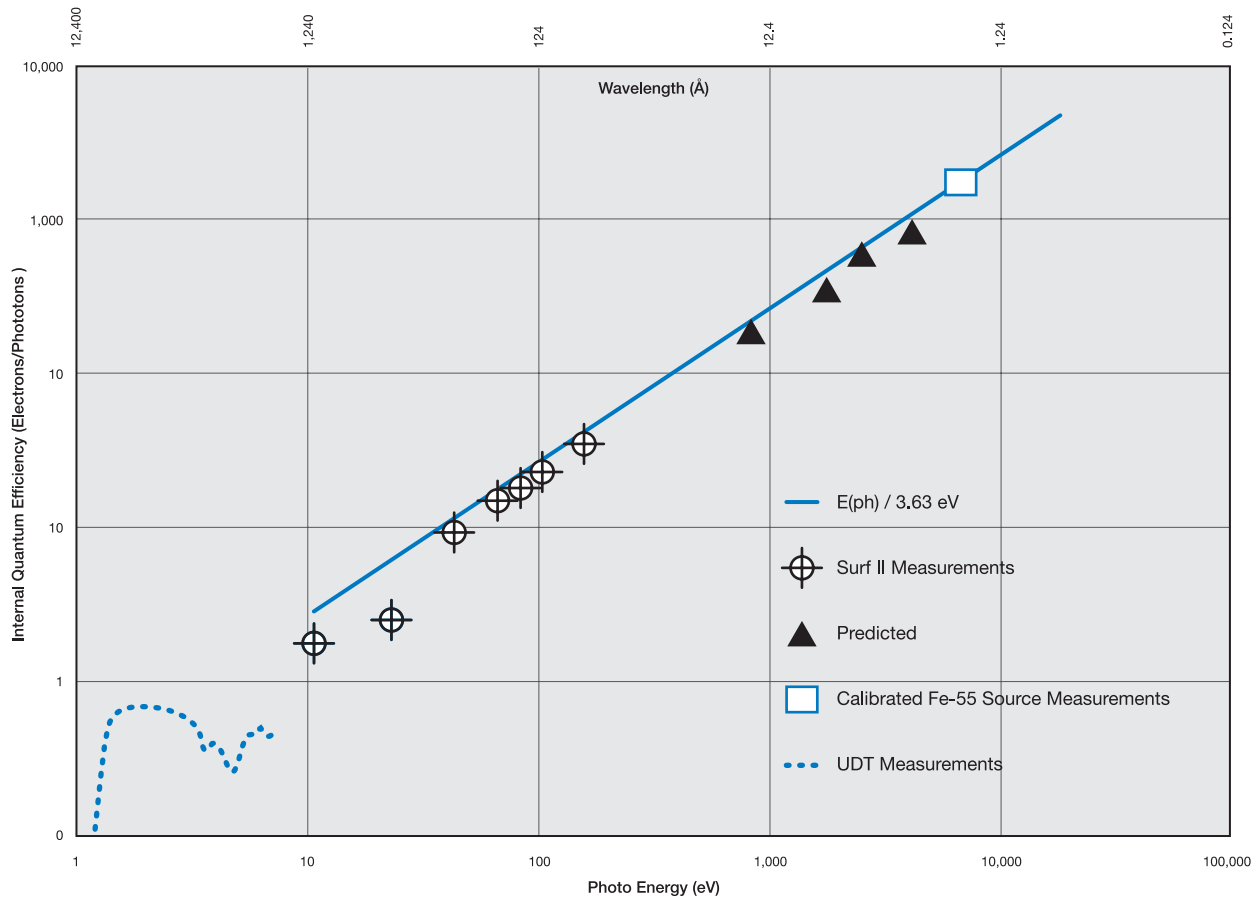
#### APPLICATIONS

- Electron Detection
- Medical Instrumentation
- Dosimetry
- Radiation Monitoring
- X-ray Spectroscopy
- Charged Particle Detection

#### FEATURES

- Direct Detection
- No Bias Needed
- High Quantum Efficiency
- Low Noise
- High Vacuum Compatible
- Cryogenically Compatible
- 0.070 nm to 1100 nm Wavelength Range

### Typical Quantum Efficiency



# Soft X-Ray, Far UV Enhanced Photodiodes

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

Model Number	Active Area		Capacitance (nF)		Shunt Resistance (M $\Omega$ )		NEP (W/ $\mu\text{Hz}$ )		Temp. Range* ( $^\circ\text{C}$ )		Package Style ¶
	Area (mm $^2$ )	Dimension (mm)	0 V		-10 mV		0V 200 nm		Operating	Storage	
			typ.	max.	min.	typ.	typ.	max.			
<b>'XUV' Series Metal Package</b>											
XUV-005	5	2.57 $\phi$	0.3	0.5	200	2000	2.9 e -15	9.1 e -15	-20 ~ +60	-20 ~ +80	22 / TO-5
XUV-020	20	5.00 $\phi$	1.2	1.6	50	500	5.8 e -15	1.8 e -14			23 / TO-8
XUV-035	35	6.78 x 5.59	2	3	30	300	7.4 e -15	2.3 e -14			
XUV-100	100	11.33 $\phi$	6	8	10	100	1.3 e -14	4.1 e -14			28 / BNC
<b>'XUV' Series Ceramic Package</b>											
XUV-50C	50	8.02 $\phi$	2	3	20	200	9.1 e -15	2.9 e -14	-20 ~ +60	-20 ~ +80	25 / Ceramic
XUV-100C	100	10.00 sq	6	8	10	100	1.3 e -14	4.1 e -14			

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

All XUV devices are supplied with removable windows.

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

In this circuit example, the pre-amplifier is a FET input op-amp or a commercial charge sensitive preamplifier. They can be followed by one or more amplification stages, if necessary. The counting efficiency is directly proportional to the incident radiation power. The reverse bias voltage must be selected so that the best signal-to-noise ratio is achieved.

For low noise applications, all components should be enclosed in a metal box. Also, the bias supply should be either simple batteries or a very low ripple DC supply.

Amplifier: OPA-637, OPA-27 or similar

$R_F$  : 10 M $\Omega$  to 10 G $\Omega$

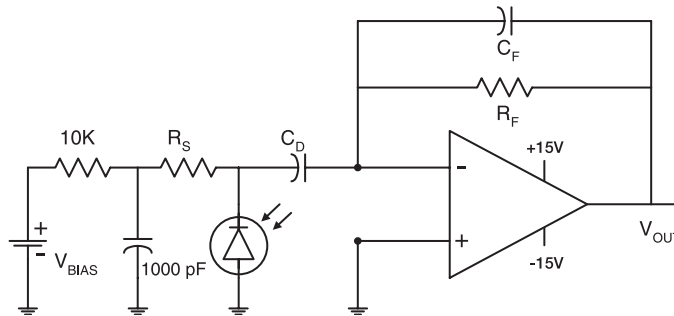
$R_S$  : 1 M $\Omega$ ; Smaller for High Counting Rates

$C_F$ : 1pF

$C_D$  : 1pF to 10  $\mu\text{F}$

OUTPUT  $V_{OUT} = Q / C_F$

Where Q is the Charge Created By One Photon or One Particle



## 1. Parameter Definitions:

A = Distance from top of chip to top of glass.

a = Photodiode Anode.

B = Distance from top of glass to bottom of case.

c = Photodiode Cathode

(Note: cathode is common to case in metal package products unless otherwise noted).

W = Window Diameter.

F.O.V. = Field of View (see definition below).

## 2. Dimensions are in inches (1 inch = 25.4 mm).

## 3. Pin diameters are 0.018 ± 0.002" unless otherwise specified.

## 4. Tolerances (unless otherwise noted)

General: 0.XX ±0.01"

0.XXX ±0.005"

Chip Centering: ±0.010"

Dimension 'A': ±0.015"

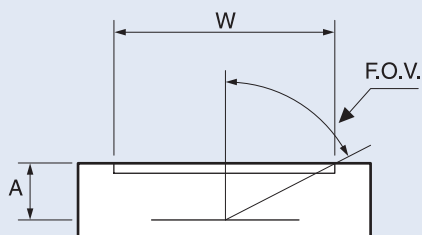
## 5. Windows

All '**UV**' Enhanced products are provided with QUARTZ glass windows, 0.027 ± 0.002" thick.

All '**XUV**' products are provided with removable windows.

All '**DLS**' PSD products are provided with A/R coated glass windows.

All '**FIL**' photoconductive and photovoltaic products are epoxy filled instead of glass windows.



$$F.O.V. = \tan^{-1} \left( \frac{W}{2A} \right)$$



For Further Assistance  
Please Call One of Our Experienced  
Sales and Applications Engineers

**310-978-0516**



- Or -  
On the Internet at

[www.osioptoelectronics.com](http://www.osioptoelectronics.com)

All units in inches. Pinouts are bottom view.

**22 TO-5**

Products:  
XUV-005

Pin Circle Dia.=0.200

**23 TO-8**

Products:  
XUV-020  
XUV-035

Pin Circle Dia.=0.295

**24 TO-8**

Products:  
PIN-DSIn-TEC

Pinout	
1	TEC (-)
2	Thermistor
3	Thermistor
4	TEC (+)
5	Bottom InGaAs, Cathode
6	Bottom InGaAs, Anode
7	Top Silicon, Anode
8	Top Silicon, Cathode

**25 Special Ceramic / Plastic**

Products:  
RD-100  
RD-100A  
UV-35P  
UV-005EC  
UV-035EC  
UV-100EC  
UV-005DC  
UV-035DC  
UV-100DC  
XUV-50C  
XUV-100C  
OSD35-7CO  
OSD35-LR-A  
OSD35-LR-D

P/N	Dimensions			
	A	B	C	D
UV-005EC	0.400	0.350	0.030	0.280
UV-035EC	0.400	0.350	0.030	0.290
UV-100EC	0.650	0.590	0.048	0.500
UV-005DC	0.400	0.350	0.030	0.280
UV-035DC	0.400	0.350	0.030	0.290
UV-100DC	0.650	0.590	0.053	0.500
XUV-50C	0.650	0.590	0.027	0.490
XUV-100C	0.650	0.590	0.027	0.490
RD-100	0.650	0.590	0.027	0.490
RD-100A	0.650	0.590	0.027	0.490
UV-35P	0.390	0.345	0.050	0.275
OSD35-7CO	0.390	0.350	---	0.290
OSD35-LR-A	0.390	0.350	---	0.290
OSD35-LR-D	0.390	0.350	---	0.290

Note: OSD35-prefix packages come with 0.31" (min.) leads

**26 TO-8**

Products:  
PIN-RD07  
PIN-RD15

Pin Circle Dia.=0.295

**27 Special Plastic**

Products:  
PIN-220D  
PIN-220DP  
PIN-220DP/SB

Pin Diameter=0.040

**28 BNC**

Products:  
XUV-100

BNC Connector  
Outer Contact = Cathode