

■ 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.

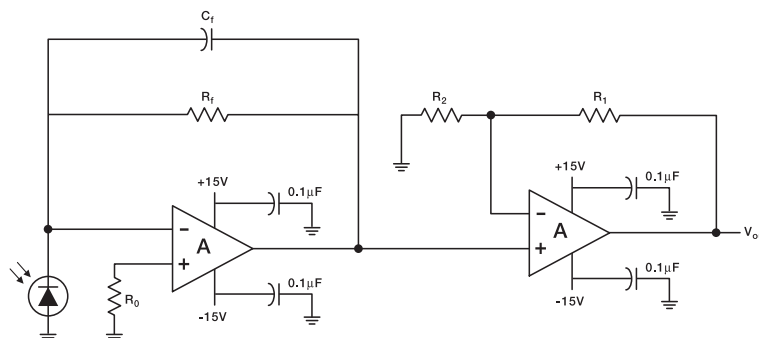


■ APPLICATIONS

- 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°C

Model Number	Active Area		Responsiv-ity (A/W)		Capacitance (pF)	Shunt Resistance (MΩ)		NEP (W/√Hz)	Reverse Voltage (V)	Rise Time (μs)	Operating Current (mA)	Temp.* Range (°C)		Package Style ¶
	Area (mm²)	Dimensions (mm)	254 nm		0 V	-10 mV		0V 254 nm		0 V 254 nm 50 Ω	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 ϕ	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 ϕ			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 ϕ			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	6 / TO-8							
UV-50	50	7.87 ϕ			2500	10	20	2.6 e-13		3.5											
UV-50L ‡																					
UV-100	100	11.28 ϕ			4500	5	10	4.5 e-13		5.9				11 / BNC							
UV-100L																					

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

FIL-UV005	5.1	2.54 φ	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 φ			1000	20	50	1.3 e-13		2.0				
UV-35P	35	6.60 x 5.33			1600	15	30	1.7 e-13		3.0				
FIL-UV50	50	7.87 φ			2500	10	20	2.1 e-13		3.5				
FIL-UV100	100	11.28 φ			4500	5	10	2.9 e-13		5.9				

Model Number	Active Area		Responsiv-ity (A/W)		Capacitance (pF)	Shunt Resistance (GΩ)		NEP (W/√Hz)	Reverse Voltage (V)	Rise Time (μs)	Dark Current (pA)	Temp.* Range (°C)		Package Style ¶
	Area (mm²)	Dimensions (mm)	254 nm		0 V	-10 mV		0V 254 nm		0 V 254 nm 1kΩ	Vr=10mV	Operating	Storage	
			min.	typ.	max.	min.	typ.	typ.		typ.	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	0.5	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	0.5	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

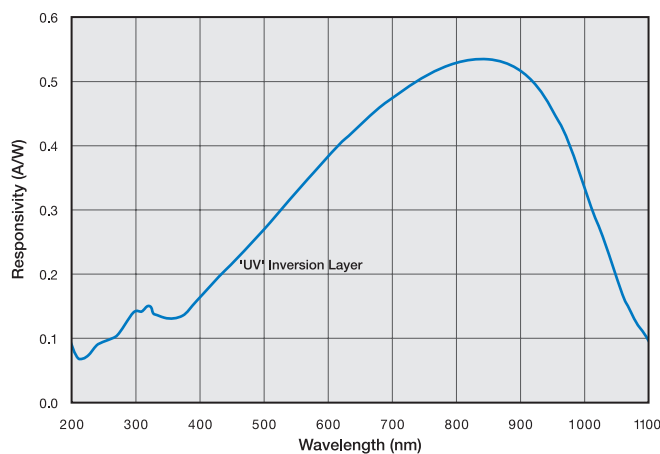
‡ The 'I' or 'L' suffix on the model number is indicative of the photodiode chip being isolated from the package by an additional pin connected to the case.

§ 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.

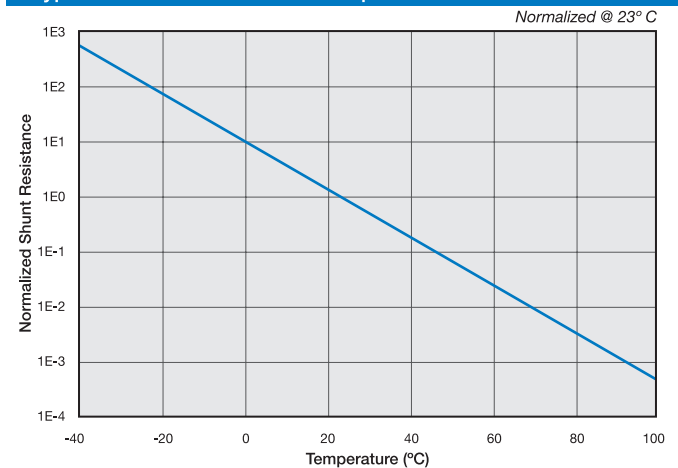
¶ For mechanical drawings refer to pages 58 thru 69.

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

■ Typical Spectral Response



■ Typical Shunt Resistance vs. Temperature



Planar Diffused UV Enhanced Photodiodes

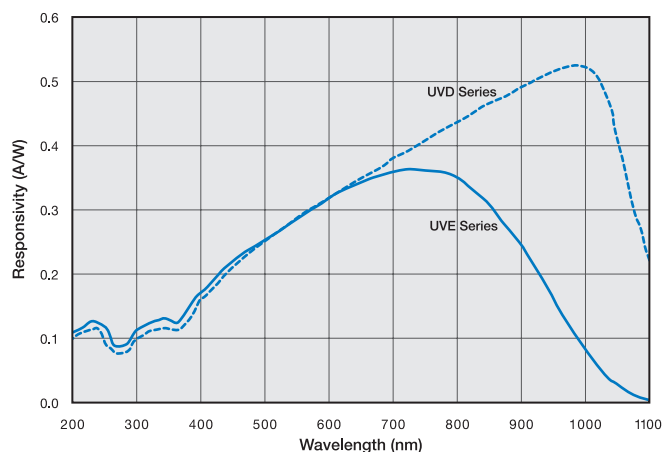
Typical Electro-Optical Specifications at $T_A=23^{\circ}\text{C}$

Model Number	Active Area		Peak Wavelength λ_p (nm)	Responsivity (A/W)			Capacitance (pF)	Shunt Resistance (G Ω)		NEP (W/ $\sqrt{\text{Hz}}$)	Reverse Voltage (V)	Rise Time (μs)	Temp.* Range ($^{\circ}\text{C}$)		Package Style ¶
	Area (mm ²)	Dimension (mm)		254 nm	633 nm	930 nm	0 V	-10 mV		0V 254 nm		0 V 254 nm 50 Ω	Operating	Storage	
				typ.	typ.	typ.	typ.	min.	typ.	typ.		max.			
'UVD' Series Planar Diffused, Metal Package															
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			5 / TO-5
UV-035D	34	5.8 sq					550	0.10	0.50	5.6 e -14		0.40			6 / TO-8
'UVD' Series Planar Diffused, Ceramic Package															
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			
'UVE' Series Planar Diffused, Metal Package															
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			5 / TO-5
UV-035E	34	5.8 sq					1000	0.20	1	4.1 e -14		0.80			6 / TO-8
'UVE' Series Planar Diffused, Ceramic Package															
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			

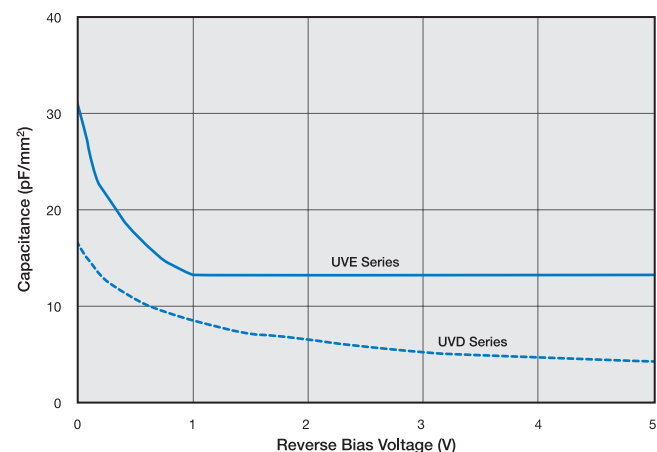
¶ For mechanical specifications please refer to pages 58 thru 69.

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

Typical Spectral Response



Typical Capacitance vs. Reverse Bias



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: $0.XX \pm 0.01$ "

$0.XXX \pm 0.005$ "

Chip Centering: ± 0.010 "

Dimension 'A': ± 0.015 "

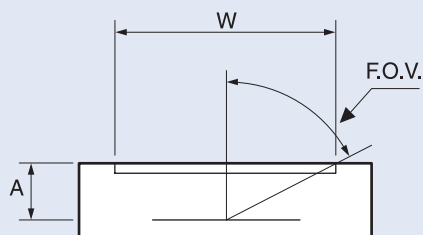
5. Windows

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

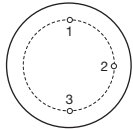
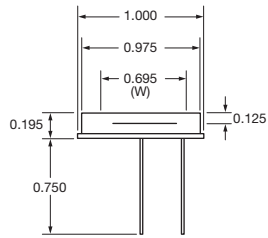
www.osioptoelectronics.com

Mechanical Specifications

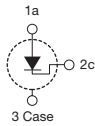
All units in inches. Pinouts are bottom view.

1 TO-18		2 TO-5		3 TO-8																																			
<table><tr><th>P/N</th><th>A</th><th>B</th><th>W</th></tr><tr><td>PIN-020A</td><td>0.075</td><td>0.200</td><td>0.155</td></tr><tr><td>PIN-040A</td><td>0.075</td><td>0.200</td><td>0.155</td></tr></table>		P/N	A	B	W	PIN-020A	0.075	0.200	0.155	PIN-040A	0.075	0.200	0.155	<table><tr><th>P/N</th><th>A</th><th>B</th><th>W</th></tr><tr><td>All Others</td><td>0.094</td><td>0.180</td><td>0.240</td></tr><tr><td>CD-25T</td><td>0.050</td><td>0.130</td><td>0.23</td></tr></table>		P/N	A	B	W	All Others	0.094	0.180	0.240	CD-25T	0.050	0.130	0.23	<table><tr><th>P/N</th><th>A</th></tr><tr><td>PIN-6DI/6DPI</td><td>0.115</td></tr><tr><td>PIN-44DI/44DPI</td><td>0.125</td></tr><tr><td>OSD35-0</td><td>0.130</td></tr><tr><td>OSD35-7Q</td><td>0.130 Quartz Window</td></tr></table>		P/N	A	PIN-6DI/6DPI	0.115	PIN-44DI/44DPI	0.125	OSD35-0	0.130	OSD35-7Q	0.130 Quartz Window
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4 TO-18		5 TO-5		6 TO-8																																			
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7 TO-18		8 TO-18		9 TO-18																																			
<table><tr><th>P/N</th><th>A</th><th>B</th></tr><tr><td>PIN-3CD / 3CDP</td><td>0.087</td><td>0.146</td></tr><tr><td>BPX-65</td><td>0.075</td><td>0.200</td></tr><tr><td>OSD-Prefix Devices</td><td>0.080</td><td>0.200</td></tr></table> Quartz Window: OSD1.2-7Q UV Transmissive Window: OSD1.2-7U		P/N	A	B	PIN-3CD / 3CDP	0.087	0.146	BPX-65	0.075	0.200	OSD-Prefix Devices	0.080	0.200																										
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10 Low Profile

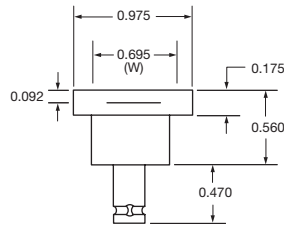


Pin Circle Dia.=.73



Products:
PIN-10DI
PIN-10DPI
PIN-10DPI/SB
UV-50L
UV-100L

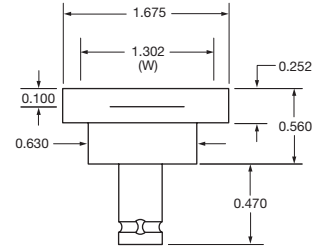
11 BNC



Outer Contact — Anode	PIN-10D, PIN-10DP, PIN-10DP/SB
Outer Contact — Cathode	UV-50, UV-100

Products:
PIN-10D
PIN-10DP
PIN-10DP/SB
UV-50
UV-100

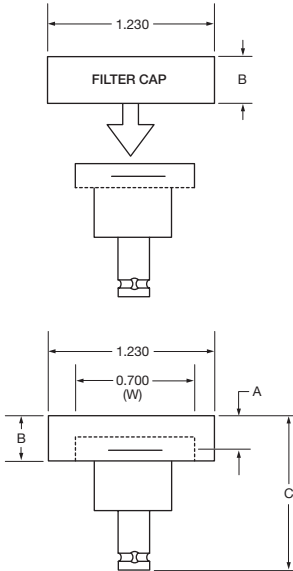
12 BNC



Outer Contact — Anode

Products:
PIN-25D
PIN-25DP

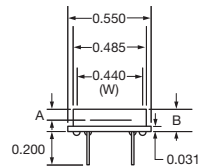
13 Special BNC



Dimensions			
P/N	A	B	C
PIN-10DF	0.217	0.330	1.020
PIN-10AP	0.386	0.550	1.415

Products:
PIN-10AP
PIN-10DF

14 Special Plastic

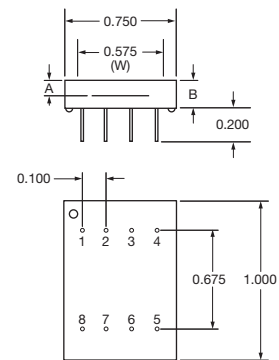


Dimensions		
P/N	A	B
FIL-5C FIL-20C FIL-UV20 FIL-C4DG	0.060	0.130
FIL-UV005 FIL-UV20 FIL-C4DG	0.087	0.152

Pinouts						
P/N	1	2	3	4	5	6
FIL-5C FIL-20C FIL-UV005	a	-	c	a	-	c
FIL-UV20	c	-	a	c	-	a
FIL-C4DG	c	a	c	c	a	c

Products:
FIL-5C
FIL-20C
FIL-UV20
FIL-C4DG

15 Special Plastic



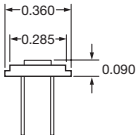
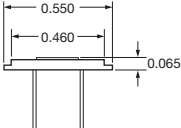
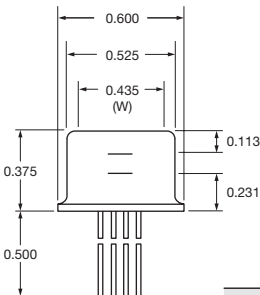
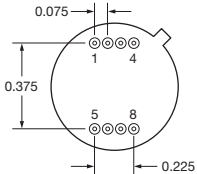
Dimensions		
P/N	A	B
FIL-44C FIL-100C FIL-UV50 FIL-UV100 FIL-C10DG	0.052	0.130
FIL-UV50 FIL-UV100	0.090	0.155
FIL-C10DG	0.082	0.155

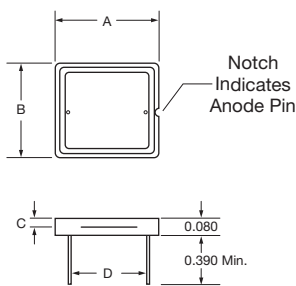
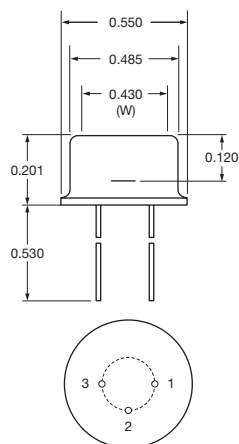
Pinouts							
P/N	1	2	3	4	5	6	7
FIL-44C FIL-100C	a	-	-	c	a	-	c
FIL-UV50 FIL-UV100	c	-	-	a	c	-	a
FIL-C10DG	c	a	a	c	c	a	a

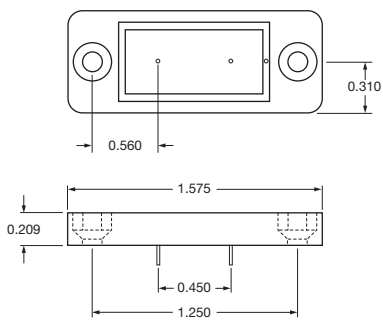
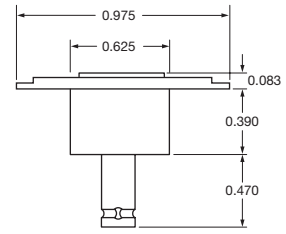
Products:
FIL-44C
FIL-100C
FIL-UV50
FIL-UV100
FIL-C10DG

Mechanical Specifications

All units in inches. Pinouts are bottom view.

22 TO-5		23 TO-8		24 TO-8																	
Products:		Products:		Products:																	
XUV-005		XUV-020 XUV-035		PIN-DSIn-TEC																	
																					
Pin Circle Dia.=0.200		Pin Circle Dia.=0.295		Pinout <table><tr><td>1</td><td>TEC (-)</td></tr><tr><td>2</td><td>Thermistor</td></tr><tr><td>3</td><td>Thermistor</td></tr><tr><td>4</td><td>TEC (+)</td></tr><tr><td>5</td><td>Bottom InGaAs, Cathode</td></tr><tr><td>6</td><td>Bottom InGaAs, Anode</td></tr><tr><td>7</td><td>Top Silicon, Anode</td></tr><tr><td>8</td><td>Top Silicon, Cathode</td></tr></table>		1	TEC (-)	2	Thermistor	3	Thermistor	4	TEC (+)	5	Bottom InGaAs, Cathode	6	Bottom InGaAs, Anode	7	Top Silicon, Anode	8	Top Silicon, Cathode
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7	Top Silicon, Anode																				
8	Top Silicon, Cathode																				
																					

25 Special Ceramic / Plastic		26 TO-8																																																																																
		Products:	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	PIN-RD07 PIN-RD15																																																																															
<table><tr><th rowspan="2">P/N</th><th colspan="4">Dimensions</th></tr><tr><th>A</th><th>B</th><th>C</th><th>D</th></tr><tr><td>UV-005EC</td><td>0.400</td><td>0.350</td><td>0.030</td><td>0.280</td></tr><tr><td>UV-035EC</td><td>0.400</td><td>0.350</td><td>0.030</td><td>0.290</td></tr><tr><td>UV-100EC</td><td>0.650</td><td>0.590</td><td>0.048</td><td>0.500</td></tr><tr><td>UV-005DC</td><td>0.400</td><td>0.350</td><td>0.030</td><td>0.280</td></tr><tr><td>UV-035DC</td><td>0.400</td><td>0.350</td><td>0.030</td><td>0.290</td></tr><tr><td>UV-100DC</td><td>0.650</td><td>0.590</td><td>0.053</td><td>0.500</td></tr><tr><td>XUV-50C</td><td>0.650</td><td>0.590</td><td>0.027</td><td>0.490</td></tr><tr><td>XUV-100C</td><td>0.650</td><td>0.590</td><td>0.027</td><td>0.490</td></tr><tr><td>RD-100</td><td>0.650</td><td>0.590</td><td>0.027</td><td>0.490</td></tr><tr><td>RD-100A</td><td>0.650</td><td>0.590</td><td>0.027</td><td>0.490</td></tr><tr><td>UV-35P</td><td>0.390</td><td>0.345</td><td>0.050</td><td>0.275</td></tr><tr><td>OSD35-7CO</td><td>0.390</td><td>0.350</td><td>---</td><td>0.290</td></tr><tr><td>OSD35-LR-A</td><td>0.390</td><td>0.350</td><td>---</td><td>0.290</td></tr><tr><td>OSD35-LR-D</td><td>0.390</td><td>0.350</td><td>---</td><td>0.290</td></tr></table>		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		
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Note: OSD35-prefix packages come with 0.31" (min.) leads		Pin Circle Dia.=0.295																																																																																

27 Special Plastic	Products:	28 BNC	Products:
	PIN-220D PIN-220DP PIN-220DP/SB		XUV-100
  Pin Diameter=0.040		 BNC Connector Outer Contact = Cathode	