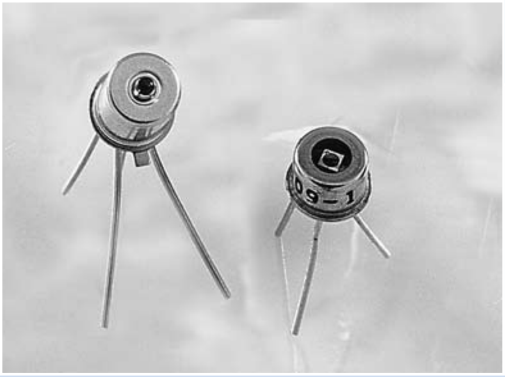
High Speed Silicon Photodiodes

High Speed Silicon Series

OSI Optoelectronics High Speed Silicon series are small area devices optimized for fast response time or High bandwith applications. The BPX-65 complements the rest of the high speed group with an industry standard.

The spectral range for these devices goes from 350 nm to 1100 nm. The responsivity and response time are optimized such that the HR series exhibit a peak responsivity of 0.50 A/W at 800 nm and typical response times of a few hundred pico seconds at -5V.

Note that for all high-speed photodetectors, a reverse bias is required to achieve the fastest response times. However, the reverse bias should be limited to maximum reverse voltage specified to avoid damage to the detector. Output signals can be measured directly with an oscilloscope or coupled to high frequency amplifiers as shown in figure 10 of the Photodiode Characteristics section of the catalog. All parts in the High-Speed silicon series are available with a flat window or ball lens (L).



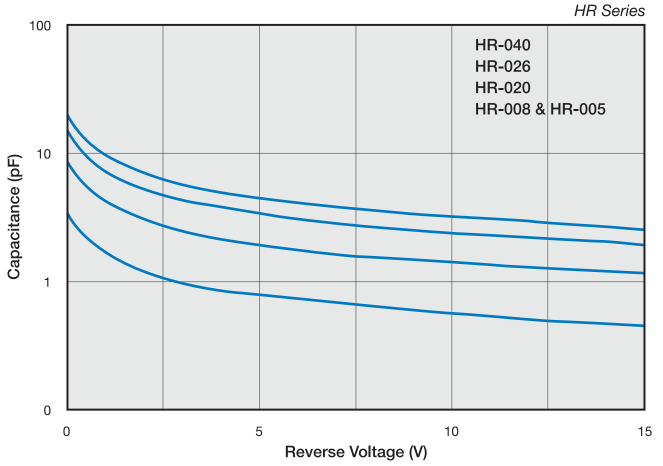
APPLICATIONS

- Video Systems
- Computers and Peripherals
- Industrial Control
- Guidance Systems
- Laser Monitoring

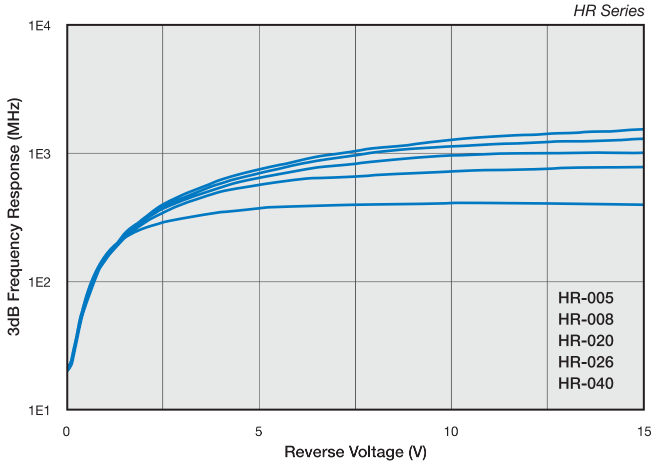
FEATURES

- Low Dark Current
- Low Capacitance
- TO-46 Package
- w/Lensed Cap
- Sub ns Response

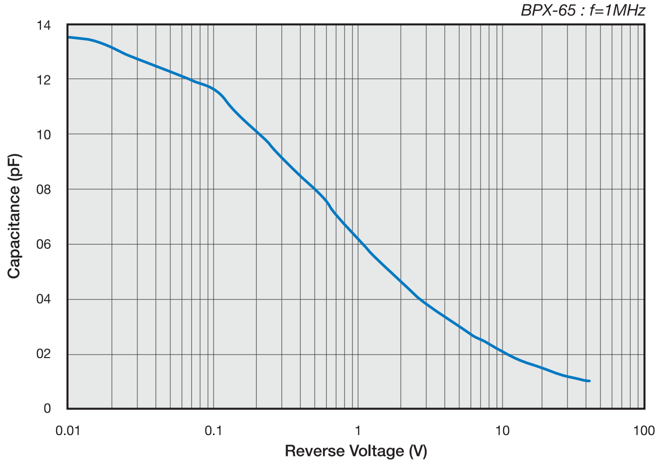
Typical Capacitance vs. Reverse Bias



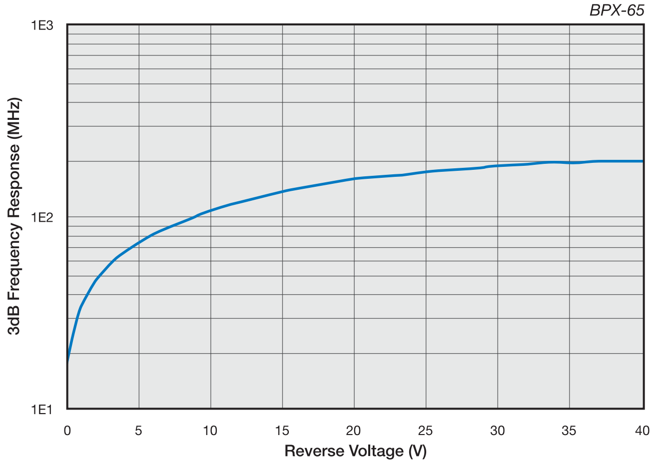
Typical Frequency Response vs. Reverse Bias



Typical Capacitance vs. Reverse Bias



Typical Frequency Response vs. Reverse Bias



High Speed Silicon Series

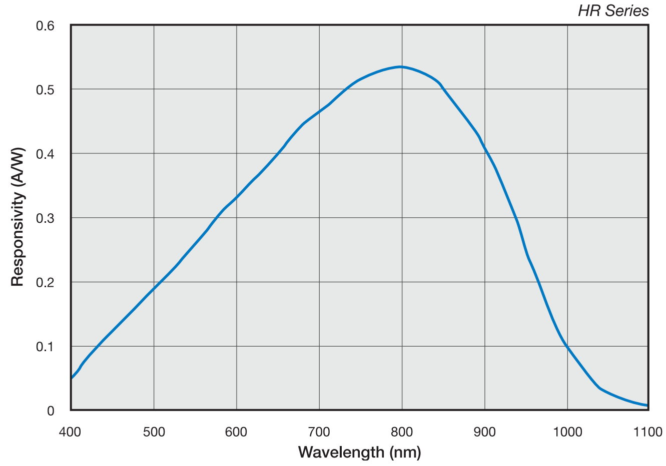
Typical Electro-Optical Specifications at T_A=23°C

Model Number	Active Area		Peak Wavelength (nm)	Responsivity (A/W)		Capacitance (pF) ‡	Dark Current (nA) ‡		NEP (W/√Hz)	Reverse Voltage (V)	Rise Time § (ns) ‡	Temp.** Range (˚C)		Package Style ¶
	Area (mm^2)	Dimensions (mm)		830 nm					830 nm		830 nm 50 Ω	Operating	Storage	
				min.	typ.	typ.	typ.	max.	typ.	max.	typ.			
High Responsivity Series (V_{BIAS}=-5 V)														
PIN-HR005 **PIN-HR005L***	0.01	0.127 ϕ	800	0.45*	0.50*	0.8	0.03	0.8	5.0 e-15	15	0.60	-25 ~ +85	-40 ~ +100	9 / TO-18 16 / TO-18 (L - Ball Lens Cap)
PIN-HR008 **PIN-HR008L***	0.04	0.203 sq				0.8	0.03	0.8	5.0 e-15		0.60			
PIN-HR020 **PIN-HR020L***	0.20	0.508 ϕ				1.8	0.06	1.0	7.1 e-15		0.80			
PIN-HR026 **PIN-HR026L***	0.34	0.660 ϕ				2.6	0.1	1.5	1.0 e-14		0.90			
PIN-HR040 **PIN-HR040L***	0.77	0.991 ϕ				4.9	0.3	2.0	1.9 e-14		1.0			
BPX-65 (V_{BIAS}=-20 V)														
BPX-65	1.0	1.0 sq	900	0.45	0.5	3.0	0.5	5.0	2.3 e-14	50	2.0			7 / TO-18

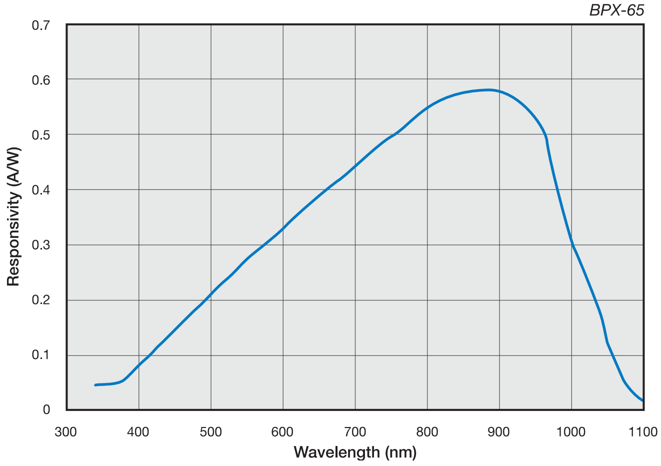
Model Number	Active Area		Peak Wavelength (nm)	Responsivity (A/W)		Capacitance (pF) ‡	Dark Current (nA) ‡		NEP (W/√Hz)	Reverse Voltage (V)	Rise Time § (ns) ‡	Temp.** Range (˚C)		Package Style ¶
	Area (mm^2)	Dimensions (mm)		900 nm					900 nm		820 nm	Operating	Storage	
				min.	typ.	typ.	typ.	max.	typ.	max.	typ.			
BPX-65R (V_{BIAS}=-20 V)														
BPX-65R	1.0	1.0 sq	850	0.52	0.55	3.5	1.0	5.0	3.3 e-14	30	3.5	-40 ~ +80	-55 ~ +100	4 / TO-18

¶ For mechanical drawing, please refer to pages 58 thru 69.
* Responsivities are measured for Flat window devices. L- Refers to devices with a Ball-type lens cap.
Chip centering is within +/- 0.005” wrt OD of the Header.
** Non-Condensing temperature and Storage Range, Non-Condensing Environment.
Cathode on BPX-65R is connected to the case.

Typical Spectral Response



Typical Spectral Response



Photodiode Care and Handling Instructions

AVOID DIRECT LIGHT

Since the spectral response of silicon photodiode includes the visible light region, care must be taken to avoid photodiode exposure to high ambient light levels, particularly from tungsten sources or sunlight. During shipment from OSI Optoelectronics, your photodiodes are packaged in opaque, padded containers to avoid ambient light exposure and damage due to shock from dropping or jarring.

AVOID SHARP PHYSICAL SHOCK

Photodiodes can be rendered inoperable if dropped or sharply jarred. The wire bonds are delicate and can become separated from the photodiode's bonding pads when the detector is dropped or otherwise receives a sharp physical blow.

CLEAN WINDOWS WITH OPTICAL GRADE CLOTH / TISSUE

Most windows on OSI Optoelectronics photodiodes are either silicon or quartz. They should be cleaned with isopropyl alcohol and a soft (optical grade) pad.

OBSERVE STORAGE TEMPERATURES AND HUMIDITY LEVELS

Photodiode exposure to extreme high or low storage temperatures can affect the subsequent performance of a silicon photodiode. Storage temperature guidelines are presented in the photodiode performance specifications of this catalog. Please maintain a non-condensing environment for optimum performance and lifetime.

OBSERVE ELECTROSTATIC DISCHARGE (ESD) PRECAUTIONS

OSI Optoelectronics photodiodes, especially with IC devices (e.g. Photops) are considered ESD sensitive. The photodiodes are shipped in ESD protective packaging. When unpacking and using these products, anti-ESD precautions should be observed.

DO NOT EXPOSE PHOTODIODES TO HARSH CHEMICALS

Photodiode packages and/or operation may be impaired if exposed to CHLOROTHENE, THINNER, ACETONE, or TRICHLOROETHYLENE.

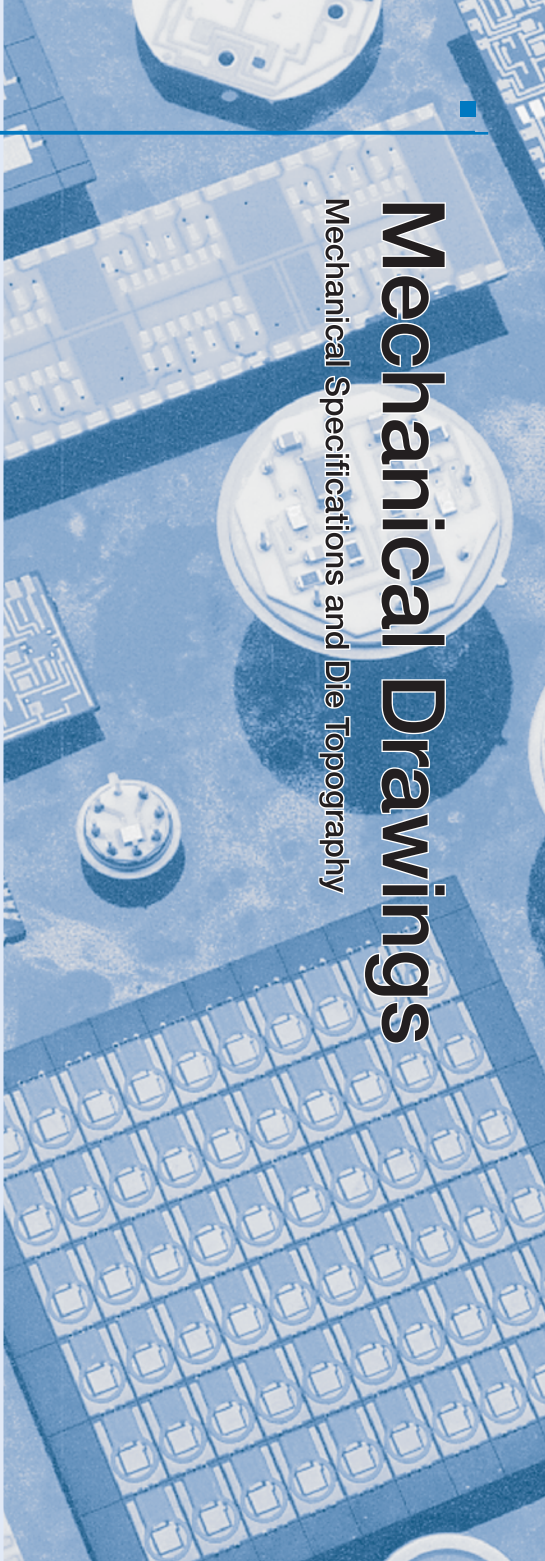
INSTALL WITH CARE

Most photodiodes in this catalog are provided with wire or pin leads for installation in circuit boards or sockets. Observe the soldering temperatures and conditions specified below:

Soldering Iron:	Soldering 30 W or less Temperature at tip of iron 300°C or lower.	
Dip Soldering:	Bath Temperature:	260±5°C.
	Immersion Time:	within 5 Sec.
	Soldering Time:	within 3 Sec.
Vapor Phase Soldering:	DO NOT USE	
Reflow Soldering:	DO NOT USE	

Photodiodes in plastic packages should be given special care. Clear plastic packages are more sensitive to environmental stress than those of black plastic. Storing devices in high humidity can present problems when soldering. Since the rapid heating during soldering stresses the wire bonds and can cause wire to bonding pad separation, it is recommended that devices in plastic packages to be baked for 24 hours at 85°C.

The leads on the photodiode **SHOULD NOT BE FORMED**. If your application requires lead spacing modification, please contact OSI Optoelectronics Applications group at (310)978-0516 before forming a product's leads. Product warranties could be voided.



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. = Filed 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"

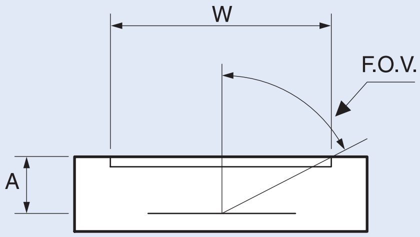
5. Windows

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.



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

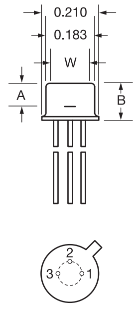
Mechanical Specifications

All units in inches. Pinouts are bottom view.

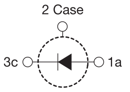
1 TO-18

Products:

PIN-020A
PIN-040A
PIN-040-DP/SB



Pin Circle Dia.=0.100

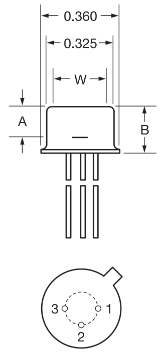


P/N	A	B	W
PIN-020A	0.075	0.200	0.155
PIN-040A	0.075	0.200	0.155

2 TO-5

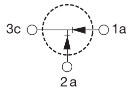
Products:

PIN-5DI
PIN-5DPI
PIN-13DI
PIN-13DPI
PIN-5-YAG
CD-25T

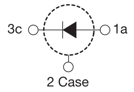


Pin Circle Dia.=0.200

CD-25T



All Others

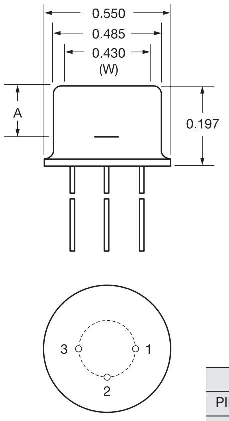


P/N	A	B	W
All Others	0.094	0.180	0.240
CD-25T	0.050	0.130	0.23

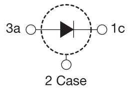
3 TO-8

Products:

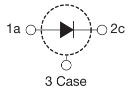
PIN-6DI
PIN-6DPI
PIN-44DI
PIN-44DPI
OSD35-0
OSD35-7Q



Pin Circle Dia.=0.295



PIN-6DI, PIN-6DPI



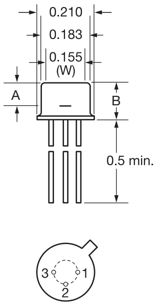
PIN-44DI, PIN-44DPI, OSD35-0, OSD35-7Q

P/N	A
PIN-6DI/6DPI	0.115
PIN-44DI/44DPI	0.125
OSD35-0	0.130
OSD35-7Q	0.130 Quartz Window

4 TO-18

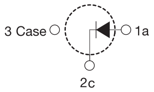
Products:

PIN-2DI
PIN-2DPI
PIN-3CDP
PIN-3CDPI
BPX-65R

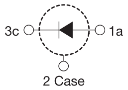


Pin Circle Dia.=0.100

BPX-65R



All Others

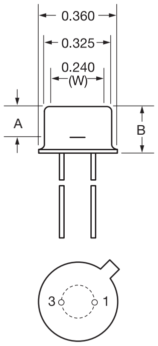


P/N	A	B
BPX-65R	0.070	0.200
All Others	0.090	0.150

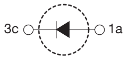
5 TO-5

Products:

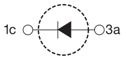
PIN-5D
PIN-5DP
PIN-5DP/SB
PIN-13D
PIN-13DP
PIN-005E-550F
UV-001
UV-005
UV-005D
UV-005E
UV-013D
UV-013E
UV-015
OSD-5-0
OSD15-0
OSD5-5T
OSD15-5T
OSD5.8-7Q
OSD5.8-7U



Pin Circle Dia.=0.200



PIN-5D, PIN-5DP, PIN-5DP/SB, PIN-13D, PIN-13DP, PIN-005E-550F UV-005D, UV-005E, UV-013D, UV-013 15OSD-5-0, OSD15-0, OSD5-5T, OSD15-5T OSD5.8-7Q, OSD5.8-7U



UV-001, UV-005, UV-015

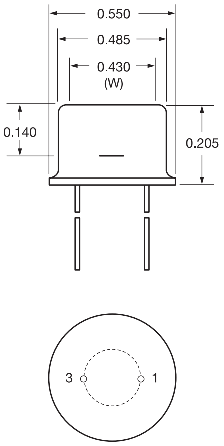
P/N	A	B
OSD-Prefix Devices	0.050	0.130
All Others	0.102	0.180

Quartz Window: OSD5.8-7Q
UV Transmissive Window: OSD5.8-7U

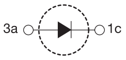
6 TO-8

Products:

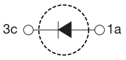
PIN-6D
PIN-6DP
PIN-44D
PIN-44DP
UV-020
UV-035D
UV-035E
UV-035



Pin Circle Dia.=0.295



PIN-6D, PIN-6DP, PIN-44D, PIN-44DP UV-020, UV-035D, UV-035E

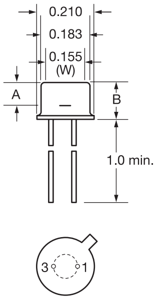


UV-035

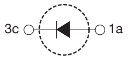
7 TO-18

Products:

PIN-3CD
PIN-3CDP
BPX-65
OSD1-0
OSD1-5T
OSD3-5T
OSD1.2-7Q
OSD1.2-7U



Pin Circle Dia.=0.100



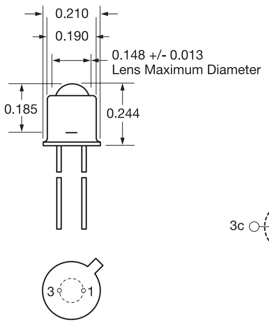
P/N	A	B
PIN-3CD / 3CDP	0.087	0.146
BPX-65	0.075	0.200
OSD-Prefix Devices	0.080	0.200

Quartz Window: OSD1.2-7Q
UV Transmissive Window: OSD1.2-7U

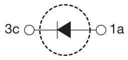
8 TO-18

Products:

PIN-125DPL



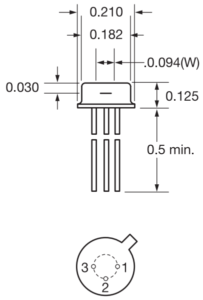
Pin Circle Dia.=0.100



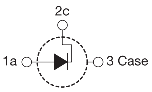
9 TO-18

Products:

PIN-HR005
PIN-HR008
PIN-HR020
PIN-HR026
PIN-HR040



Pin Circle Dia.=0.100

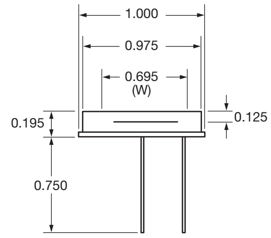


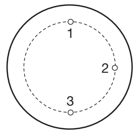
All units in inches. Pinouts are bottom view.

10 Low Profile

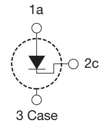
Products:

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





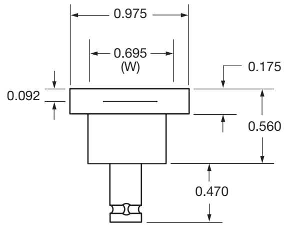
Pin Circle Dia.=0.73



11 BNC

Products:

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

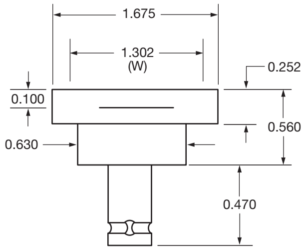


Outer Contact — Anode	PIN-10D, PIN-10DP, PIN-10DP/SB
Outer Contact — Cathode	UV-50, UV-100

12 BNC

Products:

PIN-25D
PIN-25DP

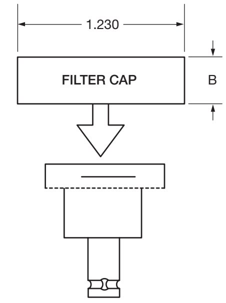


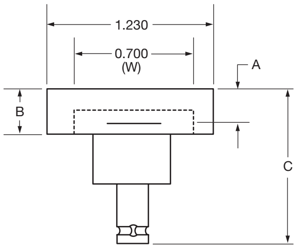
Outer Contact — Anode

13 Special BNC

Products:

PIN-10AP
PIN-10DF





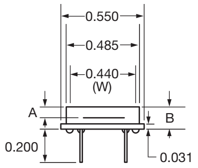
Dimensions

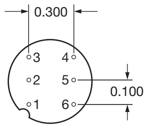
P/N	A	B	C
PIN-10DF	0.217	0.330	1.020
PIN-10AP	0.386	0.550	1.415

14 Special Plastic

Products:

FIL-5C
FIL-20C
FIL-UV20
FIL-C4DG





Dimensions

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

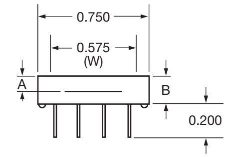
Pinouts

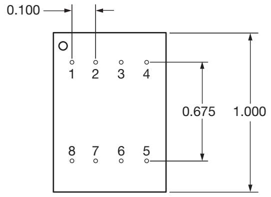
P/N	1	2	3	4	5	6
FIL-5C FIL-20C FIL-UV005	a	-	c	a	-	c
FIL-UV20	c	-	a	c	-	a
FIL-C4DG	c	a	c	c	a	c

15 Special Plastic

Products:

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





Dimensions

P/N	A	B
FIL-44C FIL-100C	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	8
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	c

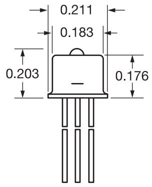
Mechanical Specifications

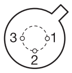
All units in inches. Pinouts are bottom view.

16 TO-18 Lensed Cap

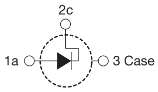
Products:

PIN-HR005L
PIN-HR008L
PIN-HR020L
PIN-HR026L
PIN-HR040L





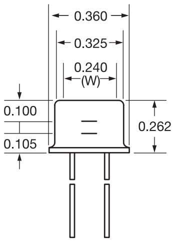
Pin Circle Dia.=0.100

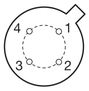


17 TO-5

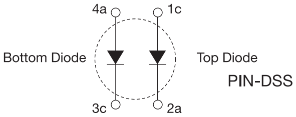
Products:

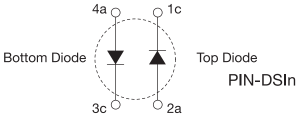
PIN-DSS
PIN-DSIn





Pin Circle Dia.=0.220

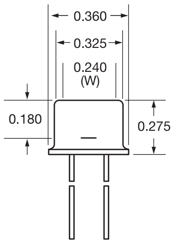


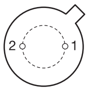


18 TO-5

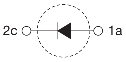
Products:

PIN-005D-245F





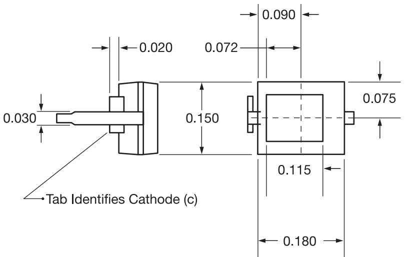
Pin Circle Dia.=0.215

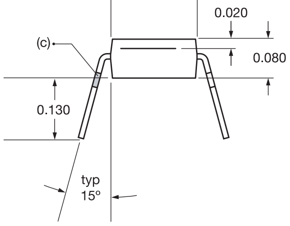


19 Plastic Mold

Products:

BPW34
BPW34B

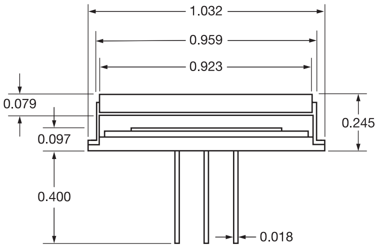


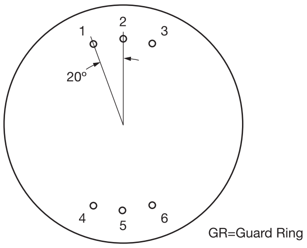


20 Special Metal

Products:

SPOT-15-YAG
SPOT-9-YAG
PIN-100-YAG





Pin Circle Dia.=0.750

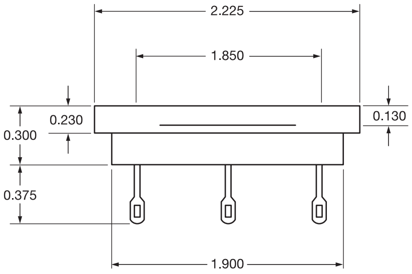
Pinouts

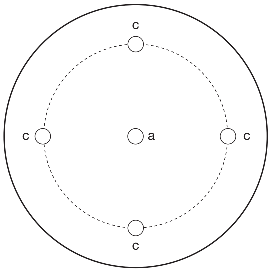
P/N	1	2	3	4	5	6
SPOT-15-YAG	C1	GR	C4	C2	A	C3
SPOT-9-YAG	C1	GR	C4	C2	A	C3
PIN-100-YAG	--	C	--	--	A	--

21 Special Metal

Products:

SC-50D





Pin Circle Dia.=1.110