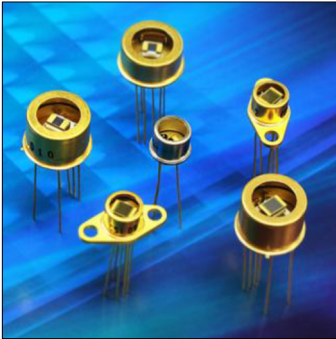


## IR Detectors – A Series High Sensitivity Lead Sulfide (PbS) Single Channel Uncooled and Cooled Devices



### KEY FEATURES

- Highest Sensitivity in 1-3 Micron Region
- Provides High Signal to Noise Performance for Wide Measurement Dynamic Range
- High Durability Ensures Long Operation in the Field
- Minimizes Maintenance and Repair Costs
- Multiple Flat Panel, Cooled, and Uncooled Package Options

The A Series single channel infrared detectors integrates PbS technology with proven manufacturing processes to provide the highest sensitivity detectors across the spectral range from one to three microns. In addition, the product line minimizes maintenance costs and provides dependable operation with industry leading quality, durability, and reliability.

Many of today's demanding applications including industrial, environmental, and medical uses require a high level of performance. The A Series IR Detectors provide a higher level of sensitivity in a tighter spectral band meeting the challenge to detect trace elements, gases, fire, flame, and emissions.

Available in a variety of standard configurations, customers can choose from an assortment of options including, element size, cooling alternatives and package size to suit numerous system and application requirements. Cooled units provide additional sensitivity for very low-level signal detection and enhanced stability for environments where temperatures are in constant flux.

Opto Diode has been manufacturing and selling high performance PbS and PbSe infrared detectors for over 25 years. Having established a reputation for highly controlled manufacturing processes, customers can rely on consistent, repeatable performance and superior customer service. Opto Diode works with customers from prototype to production to help deliver valuable instruments. Custom requirements can be addressed by contacting the Opto Diode sales team.

### Applications

- Gas analysis
  - Medical
  - Industrial
- Emissions monitoring
- Spectroscopy
- Process control systems
- Thermal imaging
- Flame Monitoring and Detection

## IR Detectors – A Series

### High Sensitivity Lead Sulfide (PbS) Single Channel Uncooled and Cooled Devices

#### A Series Specifications

Model #	Part #	Description - Size	Package Type	Active Element Area (mm <sup>2</sup> )	Element Operating Temp. (°C)	Peak Sensitivity Wavelength $\lambda_p$ (μm)		D* $\lambda_p$ , 650 Hz, 1 Hz (cm HZ <sup>1/2</sup> W <sup>-1</sup> )		Responsivity <sup>1</sup> $\lambda_p$ , 650 Hz, 25-50 V/mm (V/W)	Resistance (MΩ)	Time Constant (μsec)	Window Type		Absolute Ratings Storage & Operating Temperature (°C) <sup>2,3</sup>
						Min.	Typ.	Min.	Typ.				Min.	Range	
<b>AP Series - Uncooled PbS Packaged IR Detectors</b>				<b>Typ.</b>	<b>Ambient 23</b>	<b>Min.</b>	<b>Typ.</b>	<b>Min.</b>	<b>Typ.</b>	<b>Min.</b>	<b>Range</b>	<b>Typ.</b>	<b>Max.</b>		<b>Range</b>
AP-15G	40725	1 mm x 1 mm	TO5	1	+23	2.2	2.4	8x10 <sup>10</sup>	1x10 <sup>11</sup>	5.3x10 <sup>5</sup>	0.5-2.0	200	400	Glass Molded Lens <sup>4</sup>	-40 to +65
AP-25G	40370	2 mm x 2 mm	TO5	4	+23	2.2	2.4	8x10 <sup>10</sup>	1x10 <sup>11</sup>	2.7x10 <sup>5</sup>	0.5-2.0	200	400	Glass Molded Lens <sup>4</sup>	-40 to +65
AP-35	40363	3 mm x 3 mm	TO5	9	+23	2.2	2.4	8x10 <sup>10</sup>	1x10 <sup>11</sup>	1.7x10 <sup>5</sup>	0.5-2.0	200	400	Glass Molded Lens <sup>4</sup>	-40 to +65
AP-20505	40009	2 mm x 5 mm	TO5	10	+23	2.2	2.4	7x10 <sup>10</sup>	-	8.0x10 <sup>4</sup>	0.5-2.0	200	400	Flat Glass <sup>4</sup>	-40 to +65
AP-58E	40736	5 mm x 5 mm	TO8	25	+23	2.2	2.4	7x10 <sup>10</sup>	-	1.1x10 <sup>5</sup>	0.5-2.0	200	400	Flat Si	-40 to +65
AP-68	40368	6 mm x 6 mm	TO8	36	+23	2.2	2.4	7x10 <sup>10</sup>	-	9.0x10 <sup>4</sup>	0.5-2.0	200	400	Flat Si	-40 to +65
<b>AF Series - Uncooled Flat Plate IR Detectors</b>				<b>Typ.</b>	<b>Ambient 23</b>	<b>Min.</b>	<b>Typ.</b>	<b>Min.</b>	<b>Typ.</b>	<b>Min.</b>	<b>Range</b>	<b>Typ.</b>	<b>Max.</b>		<b>Range</b>
AF-1E	40188	1 mm x 1 mm	Flat Plate	1	+23	2.2	2.4	8x10 <sup>10</sup>	1x10 <sup>11</sup>	1.3x10 <sup>6</sup>	0.5-2.0	200	400	Flat Quartz	-40 to +65
AF-2E	40207	2 mm x 2 mm	Flat Plate	4	+23	2.2	2.4	5x10 <sup>10</sup>	1x10 <sup>11</sup>	5.0x10 <sup>5</sup>	0.5-2.0	200	400	Flat Quartz	-40 to +65
AF-4E	40204	4 mm x 4 mm	Flat Plate	16	+23	2.2	2.4	8x10 <sup>10</sup>	1x10 <sup>11</sup>	1.3x10 <sup>5</sup>	0.5-2.0	200	400	Flat Quartz	-40 to +65
AF-6E	40205	6 mm x 6 mm	Flat Plate	36	+23	2.2	2.4	8x10 <sup>10</sup>	1x10 <sup>11</sup>	1.0x10 <sup>5</sup>	0.5-2.0	200	400	Flat Quartz	-40 to +65
AF-10E	40644	10 mm x 10 mm	Flat Plate	100	+23	2.2	2.4	8x10 <sup>10</sup>	1x10 <sup>11</sup>	3.0x10 <sup>4</sup>	0.5-2.0	200	400	Flat Quartz	-40 to +65
<b>AT1 Series - One Stage Cooled PbS Packaged IR Detectors</b>				<b>Typ.</b>	<b>Ambient 25</b>	<b>Min.</b>	<b>Typ.</b>	<b>Min.</b>	<b>Typ.</b>	<b>Min.</b>	<b>Range</b>	<b>Typ.</b>	<b>Max.</b>		<b>Range</b>
AT1-27TE	40373	2 mm x 2 mm	TO37	4	-25	2.4	2.5	1x10 <sup>11</sup>	1.5x10 <sup>11</sup>	6.3x10 <sup>5</sup>	1.5-10.0	800	1600	Flat Sapphire	-40 to +85
AT1-37T	40147	3 mm x 3 mm	TO37	9	-25	2.4	2.5	1x10 <sup>11</sup>	1.5x10 <sup>11</sup>	4.2x10 <sup>5</sup>	1.5-10.0	800	1600	Flat Sapphire	-40 to +85
<b>AT2 Series - Two Stage Cooled PbS Packaged IR Detectors</b>				<b>Typ.</b>	<b>Ambient 25</b>	<b>Min.</b>	<b>Typ.</b>	<b>Min.</b>	<b>Typ.</b>	<b>Min.</b>	<b>Range</b>	<b>Typ.</b>	<b>Max.</b>		<b>Range</b>
AT2-28TE	40028	2 mm x 2 mm	TO8	4	-35	2.5	2.6	1.5x10 <sup>11</sup>	2.5x10 <sup>11</sup>	6.6x10 <sup>5</sup>	2.5-15.0	1250	2500	Flat Sapphire	-40 to +85
AT2-37T	40193	3 mm x 3 mm	TO37	9	-35	2.5	2.6	1.5x10 <sup>11</sup>	2.5x10 <sup>11</sup>	4.3x10 <sup>5</sup>	2.5-15.0	1250	2500	Flat Sapphire	-40 to +85
AT2S-38T	40029	3 mm x 3 mm	TO8	9	-45	2.6	2.7	2x10 <sup>11</sup>	3x10 <sup>11</sup>	4.3x10 <sup>5</sup>	3.0-20.0	1750	3500	Flat Sapphire	-40 to +85

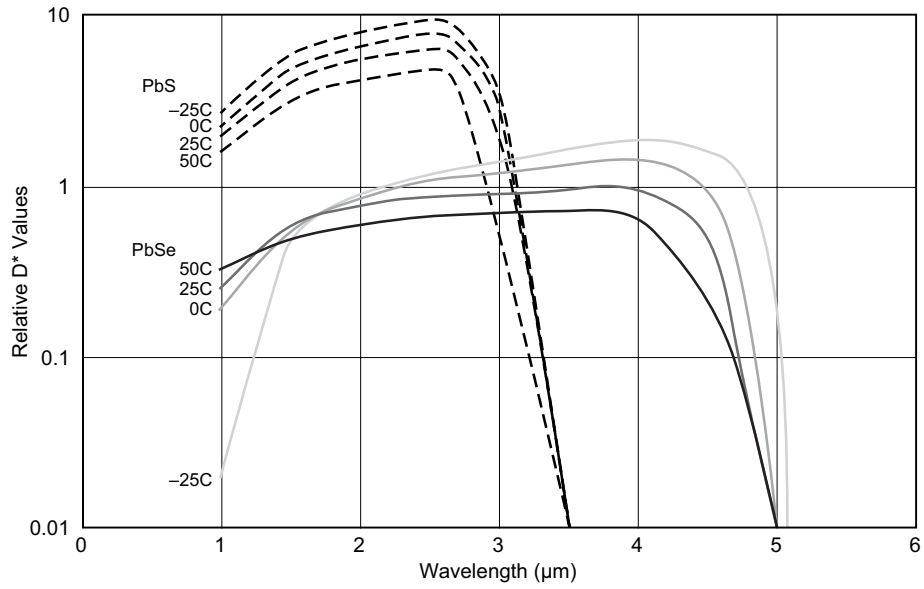
<sup>1</sup> Specifications apply at a bias voltage of 50 V/mm directly across the detector with a 1 MΩ load resistor in series. Except 40009 uses a 0.5 MΩ load.

<sup>2</sup> Specifications apply at maximum cooling with a heat sink at +25 °C. Typical cooler power at max cooling: AT1 0.8 V @ 1.5 A, AT2 0.8 V 1.2 A, AT2S 1.9 V @ 1.2 A.

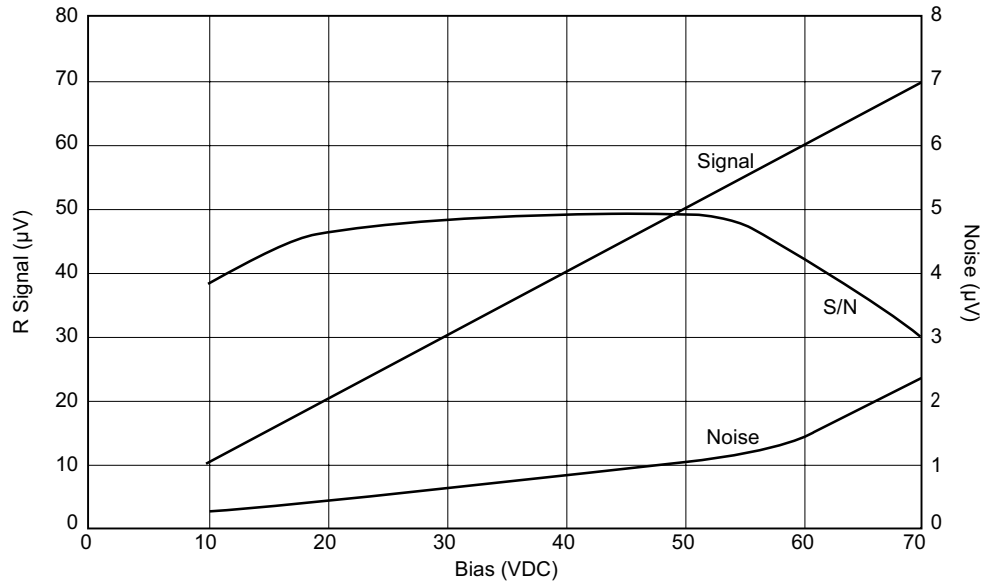
<sup>3</sup> Max rated element temperature is 65 °C.

<sup>4</sup> Borosilicate glass.

**Detector Spectral Response**



**S/N vs Bias Voltage**

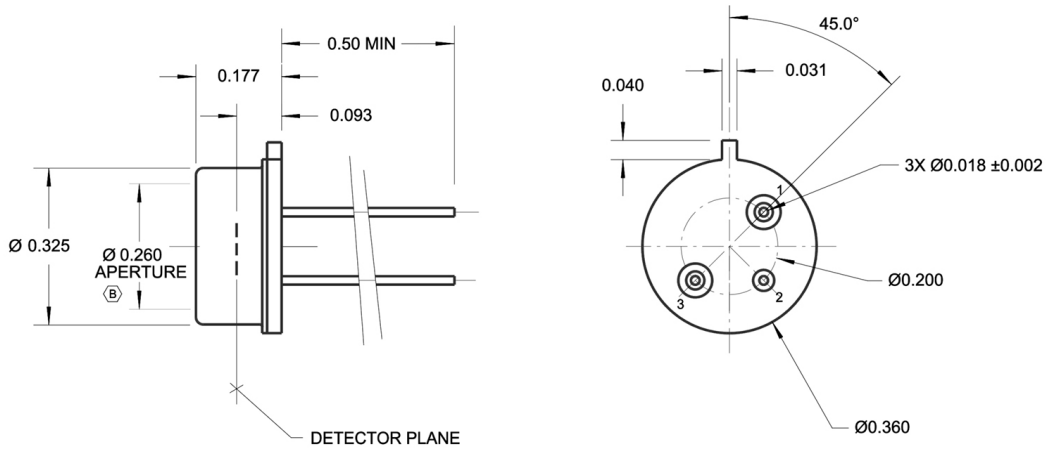


**TO5 Packages**

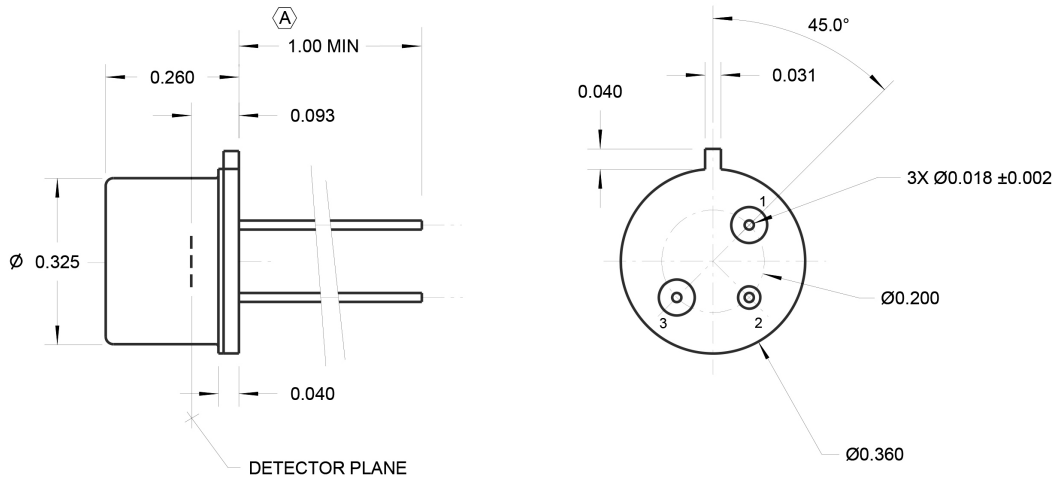
**Package and Pin Out Information**

Pin No.	Function	Color
1	Detector	Bare
2	Case Gnd	Bare
3	Detector	Bare

**40370**



**40363**

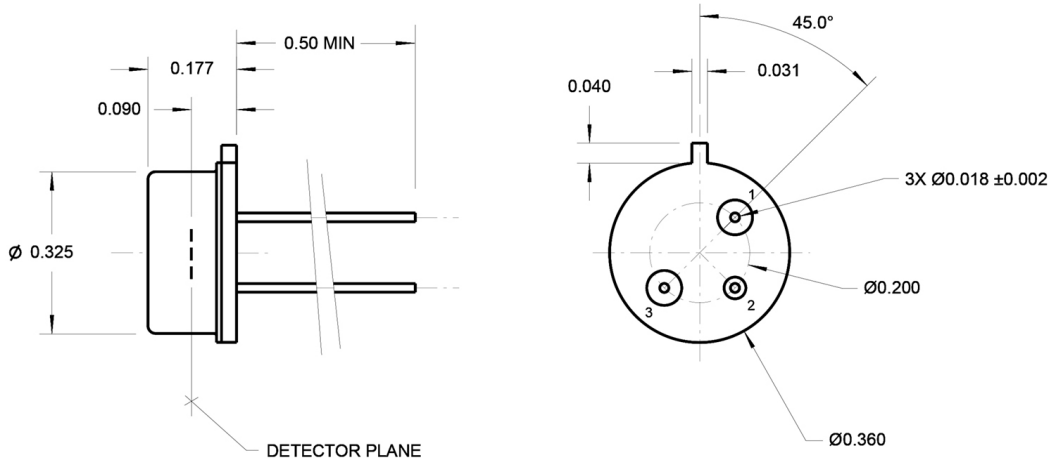


# IR Detectors – A Series

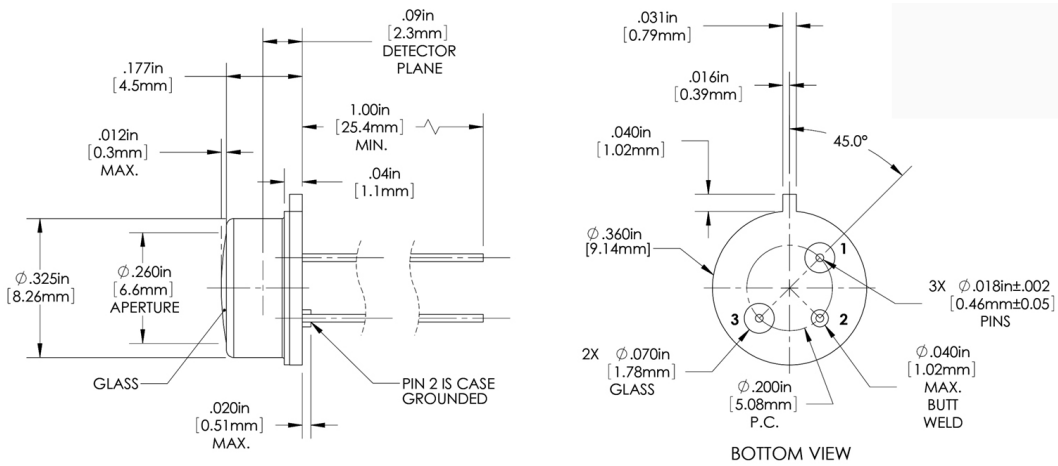
## High Sensitivity Lead Sulfide (PbS) Single Channel

### Uncooled and Cooled Devices

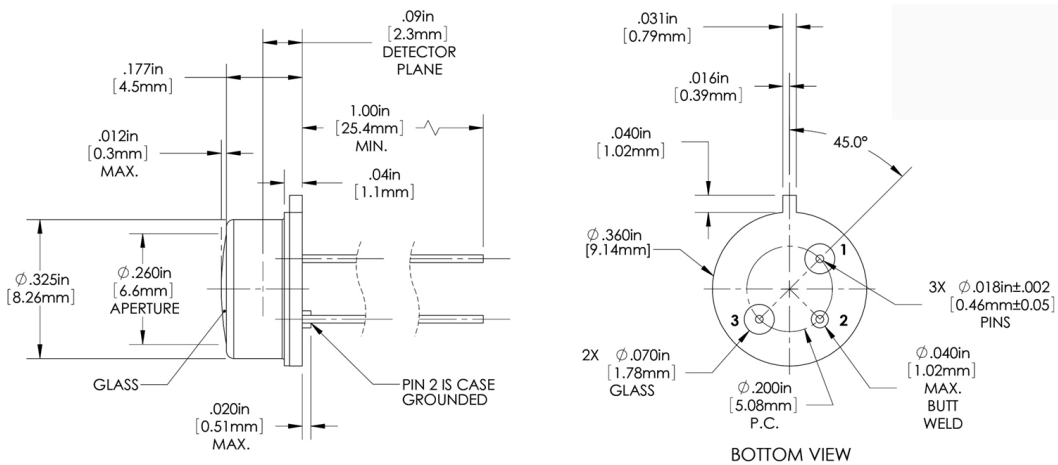
40009



40725



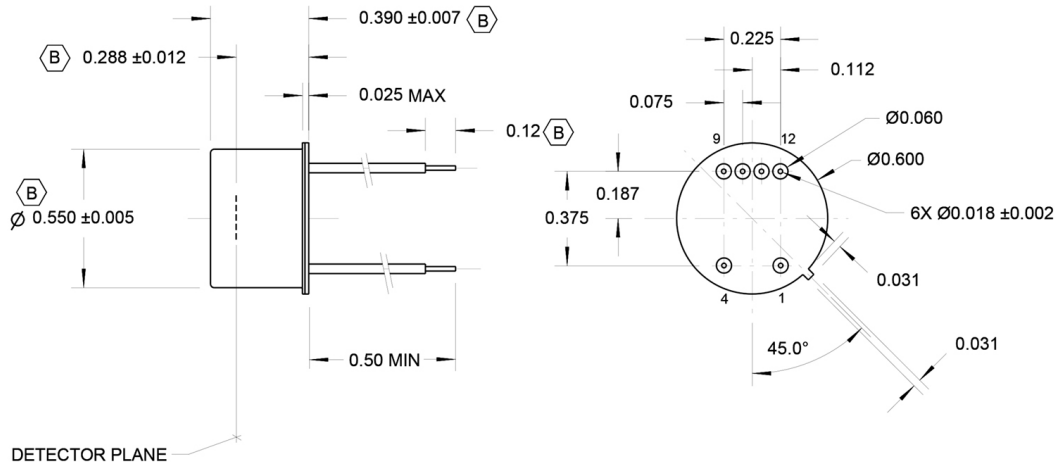
40029



**TO8 Packages**

**40029**

Pin No.	Function	Color
1	Cooler (-)	Black
4	Cooler (+)	Red
9	Detector	White
10	Thermistor	Yellow
11	Thermistor	Yellow
12	Detector	White

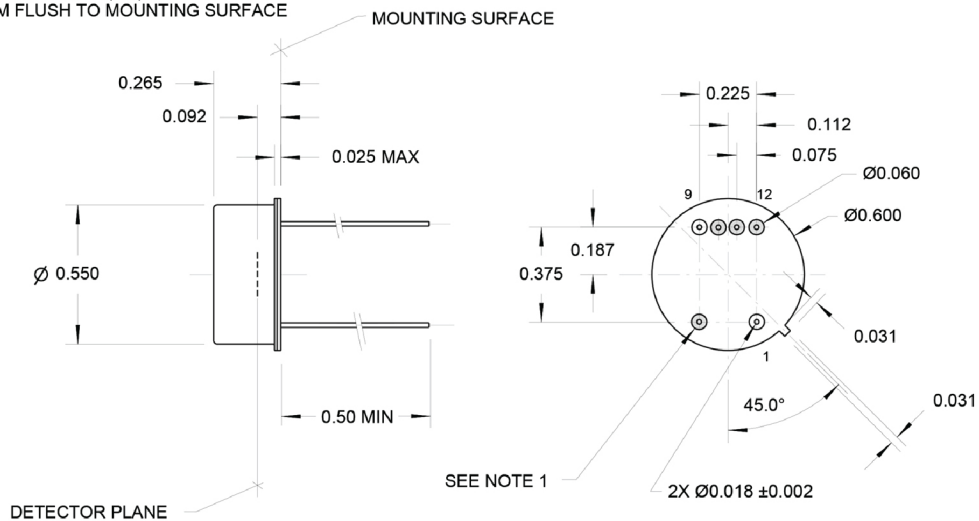


**40368**

Pin No.	Function	Color
1	Detector	Bare
9	Detector	Bare
12	Gnd (Case)	Bare

NOTES:

- PIN POSITIONS 4, 10, & 11 NOT USED  
 TRIM FLUSH TO MOUNTING SURFACE



# IR Detectors – A Series

## High Sensitivity Lead Sulfide (PbS) Single Channel

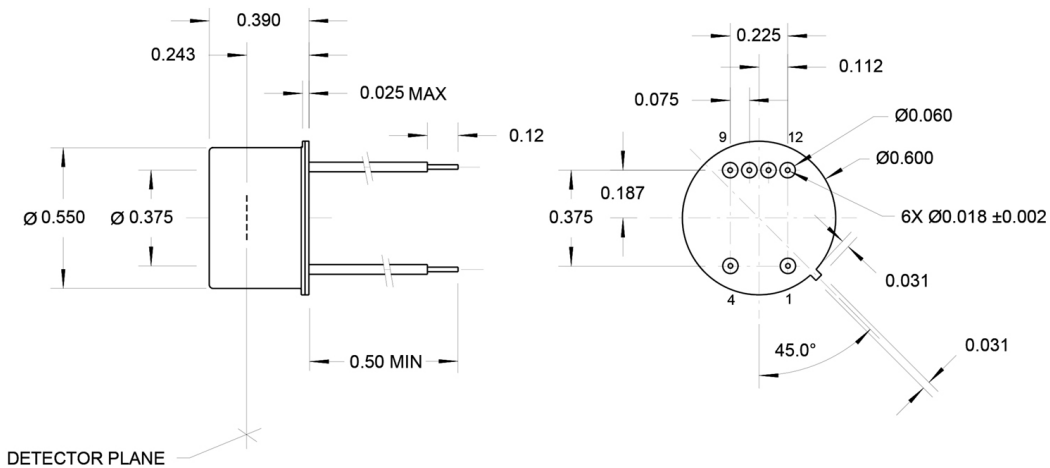
### Uncooled and Cooled Devices

40028

Pin No.	Function	Color
1	Cooler (-)	Black
4	Cooler (+)	Red
9	Detector	White
10	Thermistor	Yellow
11	Thermistor	Yellow
12	Detector	White

NOTES:

- OPTICAL WINDOW TO BE SOLDER SEALED INTO UNIT.

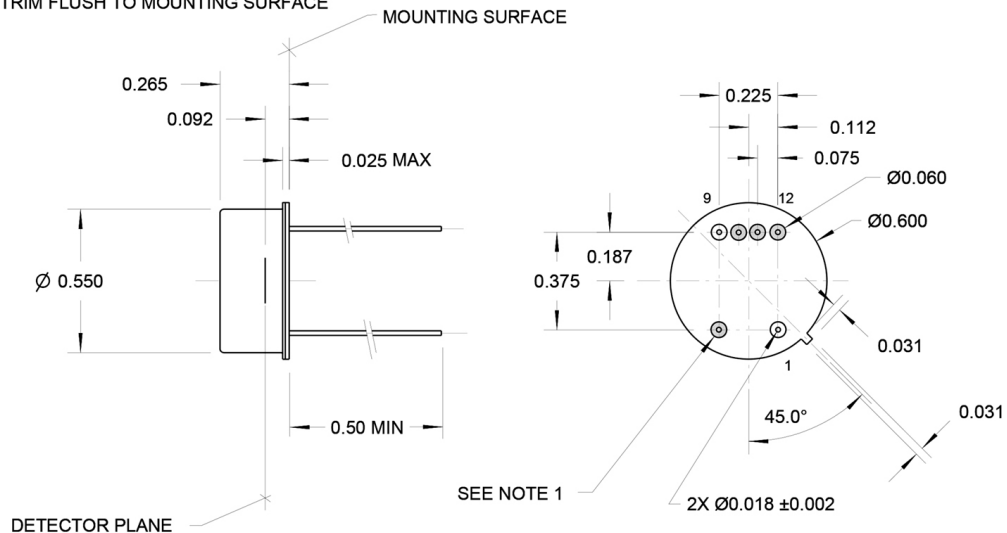


40736

Pin No.	Function	Color
1	Detector	Bare
9	Detector	Bare

NOTES:

- PIN POSITIONS 4, 10, 11, & 12 NOT USED  
 TRIM FLUSH TO MOUNTING SURFACE



# IR Detectors – A Series

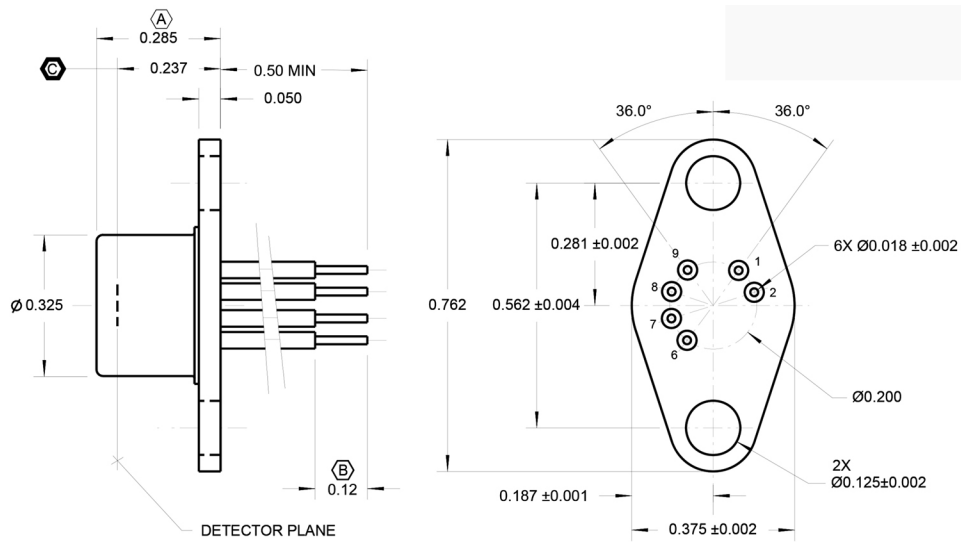
## High Sensitivity Lead Sulfide (PbS) Single Channel

### Uncooled and Cooled Devices

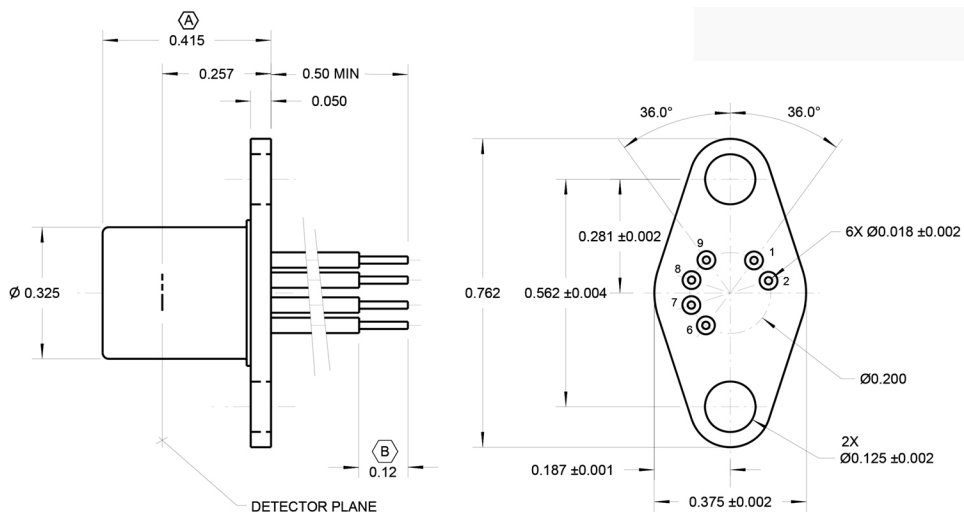
#### TO37 Packages

Pin No.	Function	Color
1	Thermistor	Yellow
2	Thermistor	Yellow
6	Detector	White
7	Detector	White
8	Cooler (-)	Black
9	Cooler (+)	Red

#### 40147, 40373



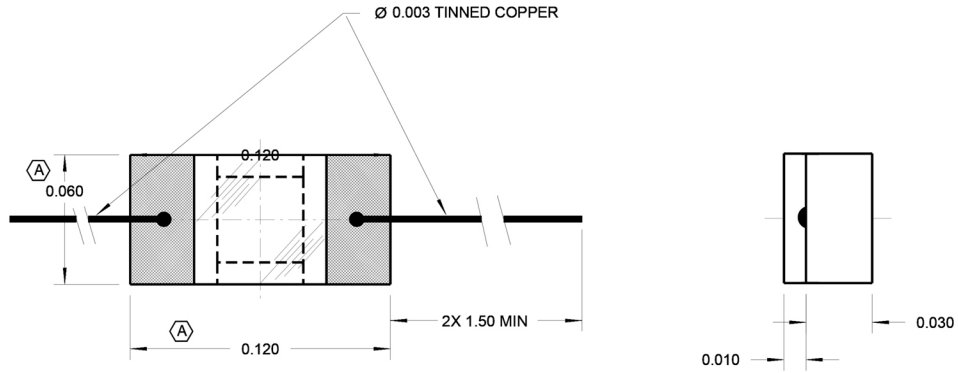
#### 40193



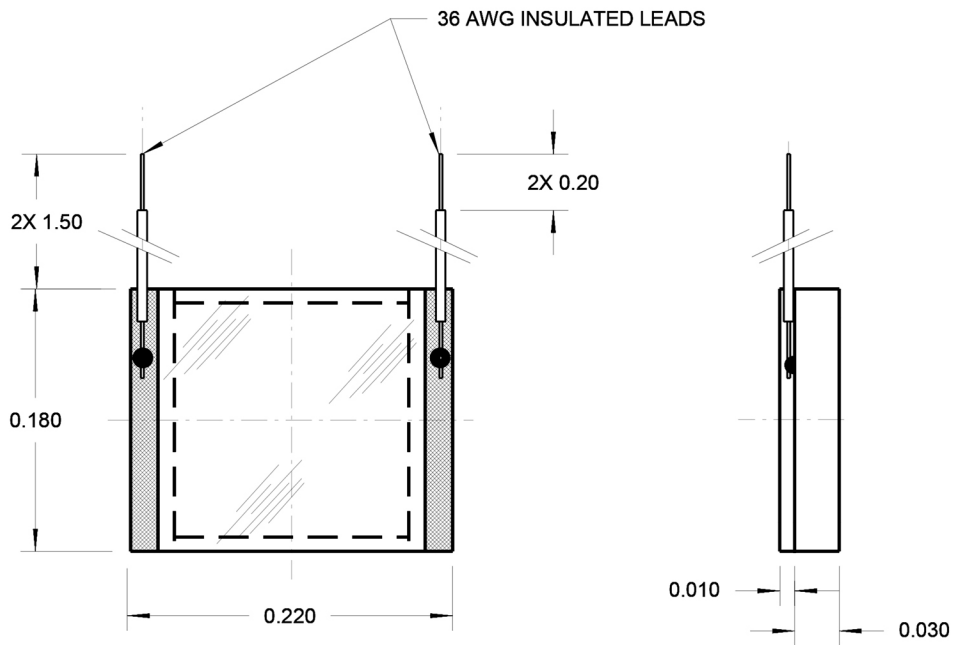


**Flatplate**

**40188**



**40204**

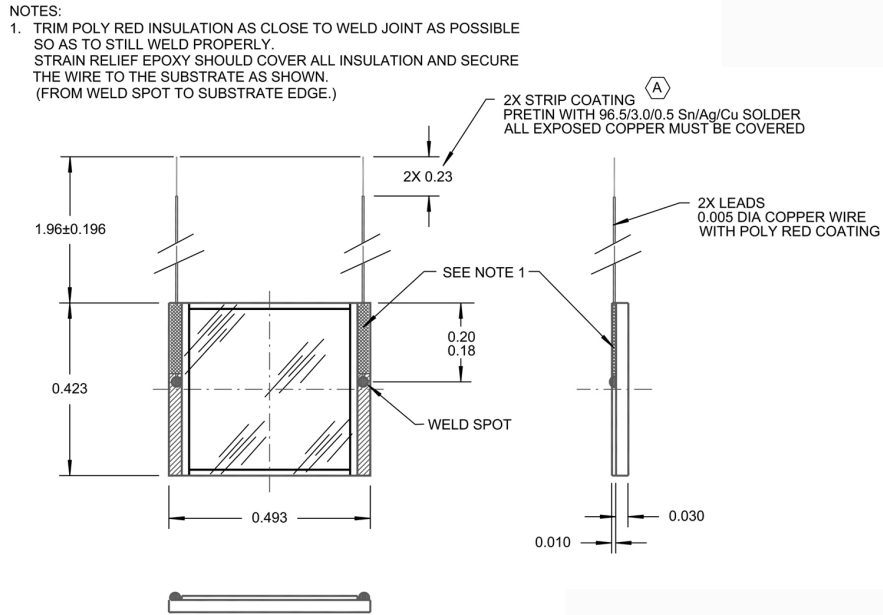


# IR Detectors – A Series

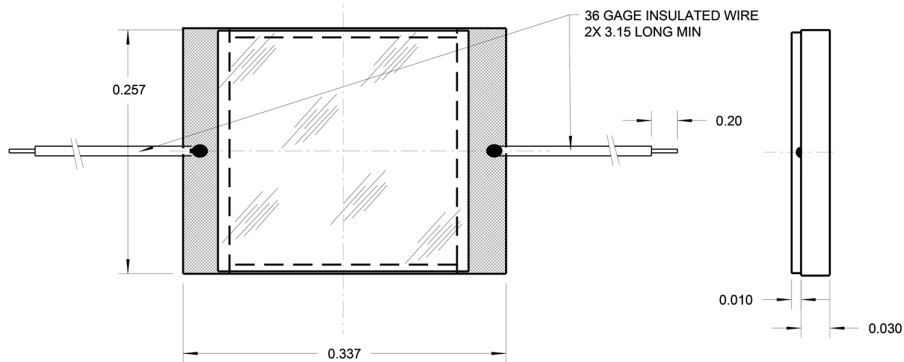
## High Sensitivity Lead Sulfide (PbS) Single Channel

### Uncooled and Cooled Devices

40644



40205



40207

## IR Detectors – A Series High Sensitivity Lead Sulfide (PbS) Single Channel Uncooled and Cooled Devices

**NOTES:**

1. STORE IN A CLEAN DRY ENVIRONMENT, SUCH AS A NITROGEN CABINET. DETECTOR DOES NOT HAVE A PASSIVATION COATING OR A PROTECTIVE COVER GLASS. DO NOT EXPOSE TO ACIDS/ALKALINES OR THEIR FUMES AS PERMANENT DAMAGE TO THE DETECTOR WILL OCCUR.

