

# Ten Thousand Series Photodetector Range

## Shortform Catalogue

### General Description

IPL designs and manufactures a wide range of silicon photodetectors of both standard and custom design. Used in a wide range of applications from low cost commercial to military and aerospace, they can detect and monitor electromagnetic radiation from ultra-violet through visible to near infra-red. Detectors for Beta and Gamma radiation can also be supplied.

The Ten Thousand Series is an established standard range of fully passivated silicon n-type, 'p' diffusion into 'n' substrate, photodiodes. They range from single high speed and high sensitivity PIN photodiodes, through position sensors and arrays, to analogue and pulse detection hybrids. Supplied in industry standard packages, they are available with various windows offering specific peak wavelength response and improved signal to noise ratios.

### Product Types and Applications

#### PIN Photodiodes (IPL10020 - IPL10070)

Discrete, planar devices for applications including simple position sensing, light intensity monitoring, light differential measurement, beam interrupt detection, and radiation emission monitoring.

#### Fibre Optic Interface (IPL10020BT)

Modified TO18 case with bead lens allows interface with industry standard SMA connectors, giving high coupling efficiency and permitting an increase in fibre misalignment tolerance. Ideally suitable for short haul and LAN systems.

#### Position Sensors (IPL10120, IPL10130)

With resolution capability better than 1 micron, applications include edge tracking, light spot positioning, and laser beam alignment and tracking.

#### High Quality Calibrated (IPL10040DHC)

An NPL calibrated device for very precise light intensity measurement.

#### Arrays (IPL10220 series)

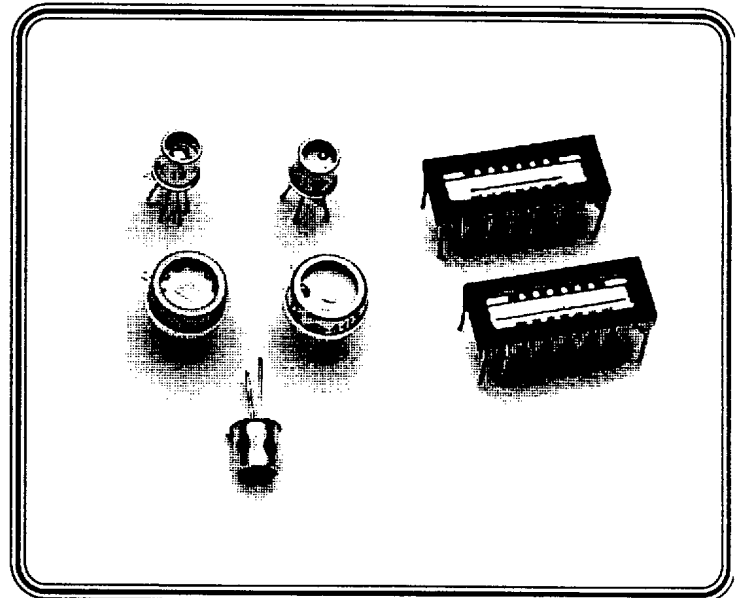
Common cathode PIN photodiode arrays for applications including linear position sensing, wide aperture detection, and edge and hole detection in strip materials.

#### Hybrid Sensors (IPL10530 series)

Positive going outputs for increasing light level, giving TTL or CMOS compatibility. Dual or single rail operation. All devices have analogue outputs, with the exception of the IPL10530C family which are high frequency pulse detectors. Hybrid design offers excellent electrical noise immunity. This makes these devices particularly valuable for monitoring low level signals in situations where the signal to noise ratio using a standard photodiode is unacceptable.

### Custom Devices

In addition to the Ten Thousand Series IPL supplies custom designed sensors. These are based on either standard detector chips or custom designed chips. A wide range of packaging techniques are available, including simple plastic mouldings, chip and wire hybrids, and surface mount assemblies. IPL can also design and supply detector signal processing electronics.



### Packaging

Industry standard packages are used and a range of window types are available. Standard options on windows include plain glass, optically flat glass, and near IR and eye response filtered glass. In addition the smaller devices are available in lensed packages which offer an improved gain and signal to noise ratio of around x10. Narrow band pass filters are also available.

### Absolute Maximum Ratings

Operating temperature range:  $-40^{\circ}\text{C}$  to  $+70^{\circ}\text{C}$   
Storage temperature range:  $-45^{\circ}\text{C}$  to  $+100^{\circ}\text{C}$   
Temperature coefficient of responsivity:  $+0.35\%$  per  $^{\circ}\text{C}$   
Temperature coefficient of dark current: x2 per  $8^{\circ}\text{C}$  rise  
Reverse breakdown voltage: 60V (not applicable to 10530 series)

### Product Coding

Each device in the Ten Thousand Series has a unique code defining the detector chip, product type, package and window.

The first five digits after the 'IPL' identifier defines the product series and detector size.

In all devices, apart from the IPL10530 series, the sixth character defines the package type and the seventh character the window type.

For the IPL10220 series the subsequent digits define the number of diodes in the array.

For the IPL10530 series the sixth character defines the frequency response characteristics of the device, the seventh character the package type, and the eighth character the window type.

Whatever your optoelectronic sensor requirements, contact IPL.



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## IPL10020 - IPL10070 - PIN Photodiodes

Device Code	Package		Peak Responsivity		Response Curve (Fig. 1)	Photodiode Dimensions		Dark Current nA (VR=1V)	Capacitance pF (VR=0V)	Response Time nS at $\lambda=850\text{nm}$ (VR=10V RL=100R)			
	Outline (fig.)	Type	A/W	$\lambda$ nm		Chip Outline mm x mm	Active Area mm <sup>2</sup>						
IPL10020BW	1	TO18	0.6	900	1	1.0 x 1.0	0.66	0.1	9	4			
IPL10020BL	2												
IPL10020BT	3												
IPL10020BH	4												
IPL10020BE	1		0.3	580	2								
IPL10020BF	2												
IPL10020BR	1										0.45	940	3
IPL10020BS	2												
IPL10020DW	5	TO39	0.6	900	1								
IPL10020DE			0.3	580	2								
IPL10020DR			0.45	940	3								
IPL10030BW	1	TO18	0.6	900	1	1.5 x 1.5	1.75	0.25	21	7			
IPL10030BL	2												
IPL10030BH	4												
IPL10030BE	1												
IPL10030BF	2		0.3	580	2								
IPL10030BR	1										0.45	940	3
IPL10030BS	2												
IPL10030DW	5										TO39	0.6	900
IPL10030DE		0.3	580	2									
IPL10030DR		0.45	940	3									
IPL10040DW	5	TO39	0.6	900	1	2.5 x 2.5	5.5	0.7	56	10			
IPL10040DL	6												
IPL10040DH	7												
IPL10040DE	5										0.3	580	2
IPL10040DF													
IPL10040DR			0.45	940	3								
IPL10040DS													

IPL PIN photodiodes are normally supplied with the device cathode connected to the case.

All the above devices can be supplied with isolated anode and cathode by adding suffix 'I' to the device code; eg. IPL10020BWI

IPL10050CW	8	TO8	0.6	900	1	7.0 x 7.0	41.3	4	325	25
IPL10050CH	9		0.3	540	2					
IPL10050CE	8		0.45	940	3					
IPL10050CR										
IPL10060CW	8	TO8	0.6	900	1	9.0 x 9.0	78.5	9	735	100
IPL10060CH	9		0.3	540	2					
IPL10060CE	8		0.45	940	3					
IPL10060CR										
IPL10070DW	5	TO39	0.6	940	1	0.7 x 4.7	1.77	0.25	21	23
IPL10070DH	7		0.3	540	2					
IPL10070DE	5		0.45	940	3					
IPL10070DR										

## IPL10120 - Monolithic Two Element Annular Photodiode

IPL10120AW	10	TO5	0.6	900	1	1.9mm dia. overall	1.37 per element	0.2 per element	100 per element	25 per element			
IPL10120AH	11												
IPL10120AE	10										0.3	540	2
IPL10120AR											0.45	940	3

## IPL10130 - Monolithic Four Element Quadrant Photodiode

IPL10130AW	12	TO5	0.6	900	1	1.9mm dia. overall	0.66 per quadrant	0.1 per quadrant	45 per quadrant	15 per quadrant			
IPL10130AH	13												
IPL10130AE	12										0.3	540	2
IPL10130AR											0.45	940	3

## IPL10040 - High Quality NPL Calibrated PIN Photodiode

IPL10040DHC	7	TO39	0.6	900	1	2.5 x 2.5	5.5	0.7	56	10
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**IPL10220 Series - Monolithic PIN Photodiode Arrays**

Device Code	Package		Peak Responsivity per diode A/W at $\lambda$ nm		Response Curve (Fig. 1)	Number of diodes	Pitch of diodes mm	Active Area of each diode mm <sup>2</sup>	Dark Current per diode nA (VR=1V)	Capacitance per diode pF (VR=0V)	Response Time per diode nS (VR=10V RL=100R)
	Outline (fig.)	Type									
IPL10220AW4	16	TO5	0.6	900	1	4	1.0	0.66	0.1	9	4
IPL10220AE4			0.3	580	2						
IPL10220AR4			0.45	940	3						
IPL10220AH4	17		0.6	900	1						
IPL10220NW8	18	16 pin	0.6	900	1	8	1.0	0.66	0.1	9	4
IPL10220NW14	19	DIL				14					
IPL10220NW16	20	24 pin				16					
IPL10220NW22	21	DIL				22					

**IPL10530 Series - Hybrid Analogue Output and Pulse Photodetectors**

Device Code	Package		Peak Responsivity $\lambda$ nm	Response Curve (Fig. 1)	Active Diode Area mm <sup>2</sup>	Supply Voltage Range V	Output Voltage at Peak Responsivity mV/ $\mu$ W/cm <sup>2</sup>	Dark Level Noise mV	Output Offset mV max.	Frequency Response KHz	
	Outline (fig.)	Type								-3dB	-6dB
IPL10530AAW	14	TO5	900	1	1.75	Dual Rail $\pm 2$ to 18 or Single Rail 4 to 36	8.6	0.3	$\pm 5$	200	300
IPL10530AAL	15						86				
IPL10530AAE	14		4.3								
IPL10530AAF	15		43								
IPL10530AAR	14		6.4								
IPL10530AAS	15		64								
IPL10530BAW	14		900	1			32	0.6	$\pm 10$	0.6	0.9
IPL10530BAL	15		320								
IPL10530BAE	14		16								
IPL10530BAF	15		160								
IPL10530BAR	14		940	3			24	0.75	65	100	
IPL10530BAS	15		240								
IPL10530DAW	14		86								
IPL10530DAL	15		860								
IPL10530DAE	14		580	2			43	0.65	$\pm 10$	80	120
IPL10530DAF	15		430								
IPL10530DAR	14	64									
IPL10530DAS	15	640									
IPL10530CAW	14	900	1	64	Dual Rail $\pm 2$ to 18 or Single Rail 4 to 36	480	0.65	$\pm 10$	80	120	
IPL10530CAL	15	640									
IPL10530CAE	14	32									
IPL10530CAF	15	320									
IPL10530CAR	14	48									
IPL10530CAS	15	940	3	480						Pulse detection	

**IPL10000 Series - Special Filter Products**

Many of the above devices can be supplied with narrow band pass filters giving half power point width of around  $\pm 10$ nm. Please contact IPL for further details.

**IPL10000 Series - General Device Characteristics**

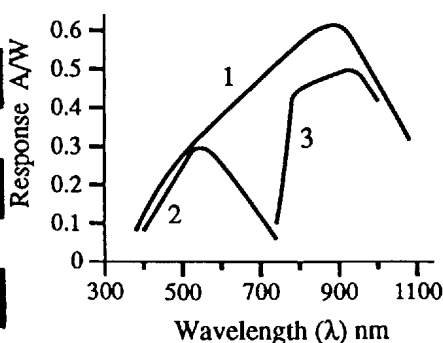


Fig. 1 Spectral Response

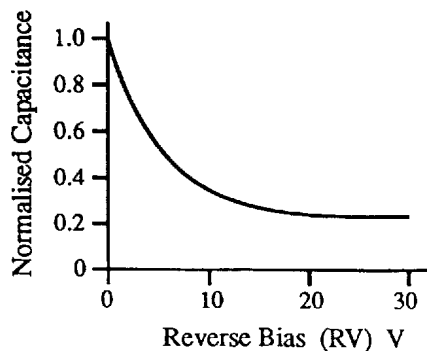


Fig. 2 Normalised Capacitance vs Reverse Bias

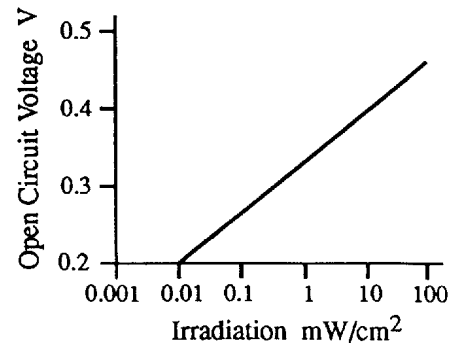


Fig. 3 Open Circuit Voltage vs Irradiation

# IPL10000 Series Photodetectors - Package Outlines and Pinouts

1. Standard TO18	2. Lensed TO18	3. Bead Lens TO18	4. Optical Flat TO18	Pinout - TO18
5. Standard TO39	6. Lensed TO39	7. Optical Flat TO39	Pinout - TO39	Pinout - TO18 / TO39 Isolated Anode & Cathode
8. Standard TO8	9. Optical Flat TO8	10. IPL10120 - Standard	11. IPL10120 - Optical Flat	12. IPL10130 - Standard
13. IPL10130 - Optical Flat	14. IPL10530 - Standard	15. IPL10530 - Lensed	16. IPL10220-4 - Standard	17. IPL10220-4 - Optical Flat
18. IPL10220-8 - 16 DIL	19. IPL10220-14 - 16 DIL	20. IPL10220-16 - 24 DIL	21. IPL10220-22 - 24 DIL	<p>All characteristics are typical values at 22°C. IPL reserve the right to change the products shown on this chart in the interests of improved specification. No responsibility is assumed for the use of information contained herein, nor for any infringement of patent or rights of others which may result from such use. No licence is granted by implication or otherwise under any patent or patent right of Integrated Photomatrix Limited or others.</p>