

# SMPX140 Series of Hybrid Detectors

The SMPX140 series is a range of hybrid opto-electronic components incorporating a 15mm<sup>2</sup> PIN photodiode, operational amplifier and transimpedance circuitry. The photodiode is operated at zero bias for best linearity and lowest dark current.

## Features

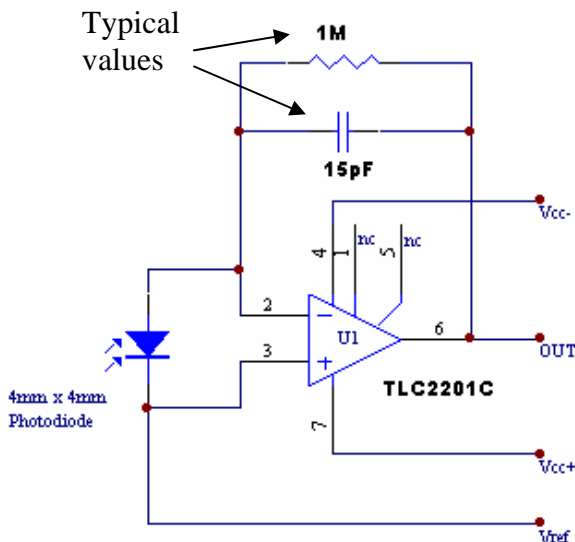
Incorporation of the photodiode and amplifier into a welded metal can (with or without the optional electrostatic screening mesh) minimises noise pickup, leakage current errors and stray capacitance normally associated with discrete designs.

Various optical filters can be incorporated inside the package to pass selected regions of the ultra-violet to infra-red spectrum. The optical filters can be ionically coloured glass or vapour-deposited dielectric layers on a glass substrate. For more details of the filter permutations, contact Semelab Plc.

- • Gain, bandwidth and filter can be specified to suit application
- • High Sensitivity
- • Photodiode size: 4 x 4 mm
- • Integral optical filter option
- • Low input bias current: 1 pa (typ) @ 25°C
- • Low amplifier input offset voltage: 500µV (max) @ 25°C
- • Low noise voltage: < 12nv/√hz @ 1 KHz
- • Supply voltages: ± 5v to ± 8v
- • Wide intrinsic bandwidth: > 2MHz (typ )
- • High transimpedance gain possible: 47MΩ max.
- • EMI screening mesh available



## Circuit Schematic SMPX140 Series



## Applications

- Medical instruments
- Document verification
- Laboratory instrumentation
- Position and proximity detectors
- Photographic analysers
- Smoke detectors
- Fibre-optic detectors

NB: SMPX140 series max supply voltage: ±8V

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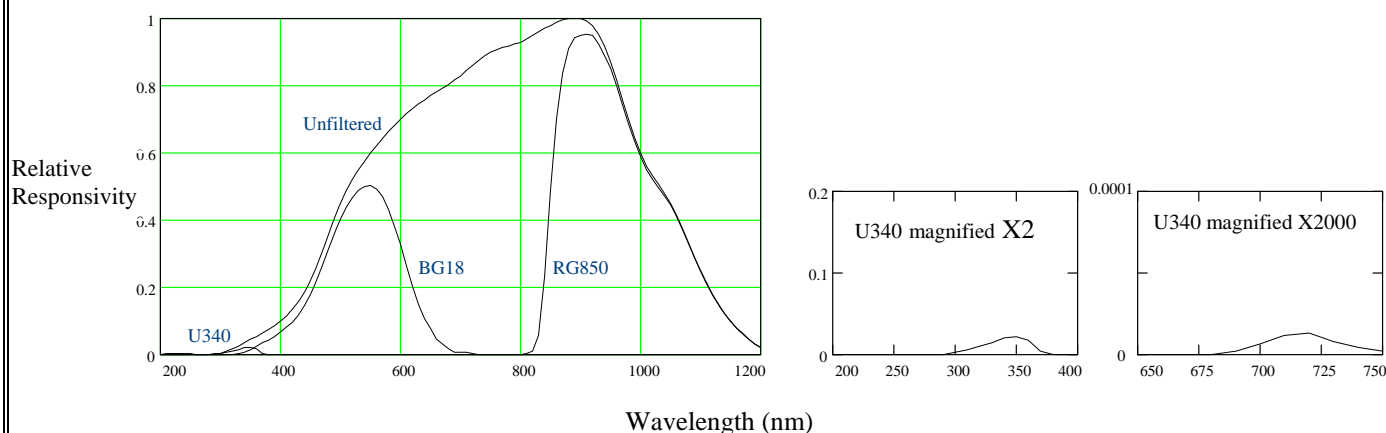
## Specifications

(Typical at 25°C unless otherwise stated)

### Photodiode

Parameter	Conditions	Value	Units
Responsivity (see chart)	350nm	>0.12	A/W
	900nm	0.55	A/W
Active area		15	mm <sup>2</sup>
Dark Current	Vr = 1V bias	250 (typ)	pA
vs. temperature		doubles every 8°C	
Capacitance	0V bias	170 (typ)	pF

**Spectral Responsivity of SMPX140 devices with and without integral optical filters**



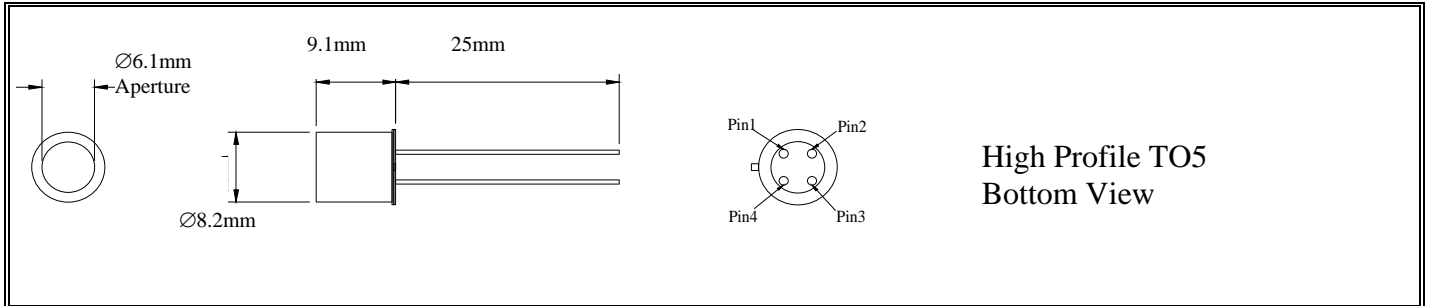
### Amplifier

Parameter	Conditions	Value	Units
Input Offset Voltage	V <sub>o</sub> = 0, R <sub>s</sub> = 50Ω	100 (typ)	μV
Input Bias Current	V <sub>o</sub> = 0	1 (typ)	pA
Unity Gain Bandwidth		2	MHz
Supply Current	V <sub>o</sub> = 0, no load	1.1 (typ)	mA
Input Noise Voltage	R <sub>s</sub> = 20Ω, f = 1KHz	8	nV/√Hz
Input Noise Current	R <sub>s</sub> = 20Ω, f = 1KHz	0.6	fA/√Hz

Amplifiers parameters quoted at ±5V

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## Mechanical Details



N.B. all dimensions are nominal, Consult Semelab Plc. for tolerance information.

## Connections:

- Pin 1: Vref (typically 0V)
- Pin 2: OUT
- Pin 3: Vcc+ (positive supply voltage)
- Pin 4: Vcc- (negative supply voltage)

**Note: Max supply voltage: ± 8V**

## Options

Hybrid Photodiode Selection Table

Part Number	Photodiode Size (mm)	Filter
<b>SMPX144</b>	4x4	Standard Glass
<b>SMPX145</b>	4x4	BG18 Filter
<b>SMPX146</b>	4x4	RG850 Filter
<b>SMPX147</b>	4x4	U340 Filter
<b>SMPX149</b>	4x4	U400 Filter