

# DEVICE SPECIFICATION FOR PYRO-ELECTRIC IR-DETECTOR

Customer :  
Type : PYD 1096  
Part no. : 3526  
No. of samples:

Dual element detector, serial opposed format, two elements based on pyroceramic. The signal is digitised using Sigma-Delta and DSP techniques and processed to achieve a switching signal. On-time, sensitivity and ambient light control inputs are provided.

This specification is provided by

**Excelitas Technologies GmbH & Co. KG, Wiesbaden.**

It covers the complete technical data of a pyro-electric IR detector. In case of samples attached to this paper, these have been taken randomly from normal production output. All detectors have met the requirements of Excelitas test-specifications and passed outgoing inspection.

**We kindly ask for approval with the return of a signed copy.**

Checked:

Date: 26.04.2016

Customer approval:

Date:

## Electrical Configuration:

Dual element detector, serial opposed format, two elements based on pyroceramic. The signal is digitised using Sigma-Delta and DSP techniques and processed to achieve a switching signal. On-time, sensitivity and ambient light control inputs are provided.

The ASIC contains an on-chip low-power oscillator, an analogue-to-digital converter a temperature sensing element and a D/A converter to set on-time. The block diagram is shown below.

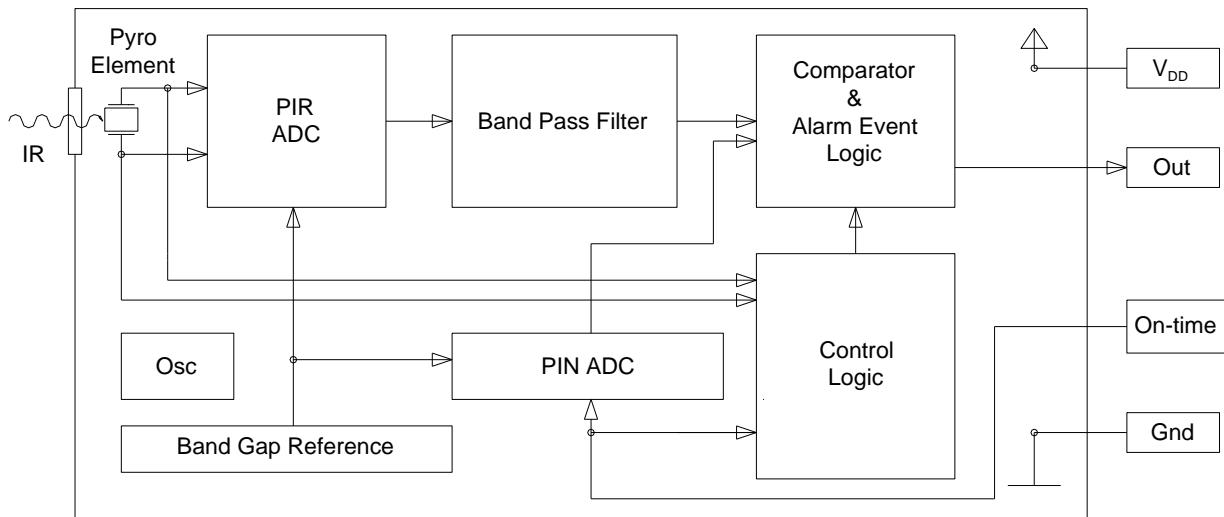


Fig. 1: Block diagram

## Electrical Data:

Unless specified differently all data refers to 25°C.

Tab. 1: Electrical data

Parameter	Symbol	Min.	Typ.	Max.	Unit	Remarks
Operating Voltage	$V_{DD}$	2.7	3.0	3.3	V	
Supply Current	$I_{DD}$			15	$\mu A$	Outputs unloaded
Output Driver Current	$I_{Out}$	-1		+1	$\mu A$	Driver Stage required
Output Driver Voltage	$V_{out, High}$			$> V_{DD}-1V$	V	$V_{out, Low} < 1V$
Input Voltages	$V_{in}$	0		1	$V_{DD}$	Adjustment for Sensitivity and On-time between 0V and $0.25 * V_{DD}$
Input Leakage Current	$I_{in}$	-1		1	$\mu A$	for Sensitivity, On-time, and OEN
OEN Input Low	$V_{OEN, Low}$			0.20	$V_{DD}$	for Ambient-Light-Level Sensor, output disabled
OEN Input High	$V_{OEN, High}$	0.80			$V_{DD}$	for Ambient-Light-Level Sensor, output enabled
On-Time Span	$t_{Otime}$	2		4194	s	Steps: 2s, 4s, 6s, 8s, 16s, 33s, 49s, 66s, 131s, 262s, 393s, 524s, 1049s, 2097s, 3146s, 4194s
Adjustment Steps	$V_{Otime}$	1/128		31/128	$V_{DD}$	upper Voltage Limit for Step n: $(2n-1)/128 * V_{DD}$ ; $n \in \{1, 2, \dots, 16\}$
Sensitivity Threshold	$V_{Threshold}$	120		530	$\mu Vp$	$V_{Threshold} = V_{sens} / V_{DD} * 1640 \mu Vp + 120 \mu Vp$ ; (standard setting : $0.06 * V_{DD} \cong 218 \mu Vp$ )
BPF Cut-On Frequency	$f_{on}$		0.4		Hz	
BPF Cut-Off Frequency	$f_{off}$		7		Hz	
Internal Clock Frequency	$f_{CLK}$		64		kHz	
Operating Temperature	$T_o$	-40		85	°C	The electrical parameters may vary from specified values according to their temperature dependence.
Storage Temperature	$T_s$	-40		85	°C	Avoid storage in humid environment.

**Responsivity:** min.: 3.3 kV/W typ.: 4.0kV/W  
 Responsivity shown for reference, within a spectral range 7 - 14 μm and an IR signal at 1Hz.

**Match:** max.: 10 %  
 Electrical balance (match) is defined up as a relative responsivity when both elements exposed to radiation. A percent value is calculated as

$$\frac{100 \times s_m}{s} \quad s_m: \text{signal (match), } s: \text{signal of left or right element.}$$

**Noise:** max.:50 μV<sub>pp</sub> typ.: 20μV<sub>pp</sub>

**Typical Responsivity vs. Frequency**

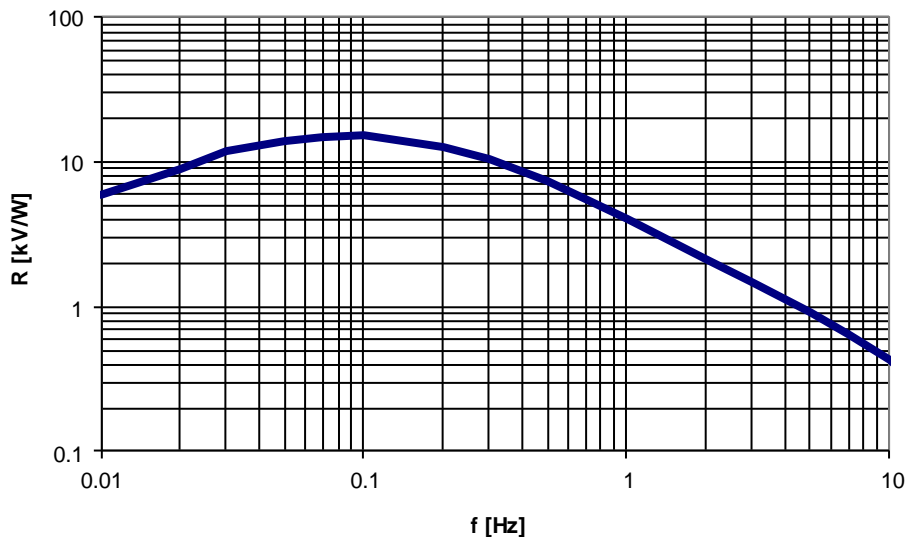


Fig. 2: Frequency response

**Spectral range:**

The spectral range of the detector is determined by the built-in filter (window).

- Substrate:** Silicon, multilayer coated
- Cut – on:** 5.5 ± 0.3 μm
- Transmission:** T > 77% average between 7 μm and 14 μm
- Blocking:** T < 0.1% for λ < 5 μm

### **Physical Configuration:**

**Housing:** TO- 5 metal housing with infrared transparent window

**Element size:** 2 x 1, see also drawing: 2/71814

**Connections:** Refer to drawing: 2/71814

### **Field of View**

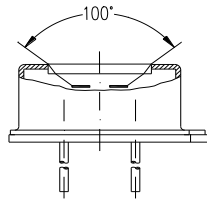


Fig. 3: Field of View

**Operating temperature:** -40°C to +85°C

The electrical parameters may vary from specified values accordance with their temperature dependence.

**Storage temperature:** -40°C to +85°C

Avoid storage under high humid environment.

**Microphonic noise:** max: 30  $\mu\text{V}_{\text{rms}}$  /g

**Excelitas** IR-detectors covered herein have passed qualification test for microphonic noise in x-y-z axis, exciting frequencies from 5Hz to 2kHz.

**Humidity:**

The IR-detector shall not increase noise or decrease responsivity when exposed to 95% R.H. at 30°C. Operation below dew point might affect performance.

**Hermetic seal:**

This IR-detector is sealed to pass a He-leakage test with maximum leak rate of  $10^{-8}$  mbar·l·s<sup>-1</sup>.

**Quality:**

**Excelitas Technologies** is a **QS 9000** certified manufacturer with established SPC and TQM. Detector out-going inspections include functional tests for Responsivity, Noise, Gross leak (Mil Std 883 method 1014C1). Individual data are not stored, statistical details can be disclosed on request.

### **Handling:**

Handle the detectors as ESD sensitive devices and protect them from electrostatic discharges. Working areas should be conductive and grounded. When handling detectors, operators shall be grounded. Avoid mechanical stress on the housing and especially on the leads. Be careful when cutting or bending leads to avoid damage. Do not bend leads less than 5 mm from their base. Do not drop detectors on the floor. Avoid touching the detector window. To clean windows, only use ethyl alcohol with a cotton swab when necessary. Do not expose detector to aggressive detergents such as Freon, trichloroethylene, etc.

### **Soldering conditions:**

For the soldering of the detectors within PCBs, the typically applied and recommended process is wave soldering. The soldering temperature should not exceed 285° C with a maximum exposure time of 5 seconds. During the automatic wave solder process we strongly advise to restrict preheating when the detector is directly exposed to the radiation of such heaters. In this case, the detector should be protected from the heat.

Manual soldering is also possible when maintaining similar temperature profiles. Reflow soldering is not possible due to the high temperature profiles of the process.

### **Product Safety & RoHS:**

Modern high-tech materials are applied in the production of our pyro-electric detectors. Some of these materials are sensitive to high temperature exposure or to specific forms of stress. Our parts are compliant with environmental regulations as can be reviewed on the Excelitas website. We recommend to always check your local regulations. Disposal shall only be carried out in accordance with the latest legislation and directives. In Europe, WEEE directives must be followed.

The leads of these detectors have been pre-tinned with lead free tin process and may be applied through lead-free solder processes. As such the detectors will enable the design of RoHS compliant products.

### **Marking:**

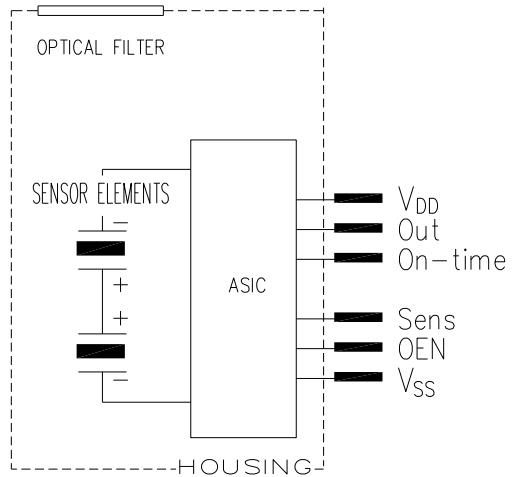
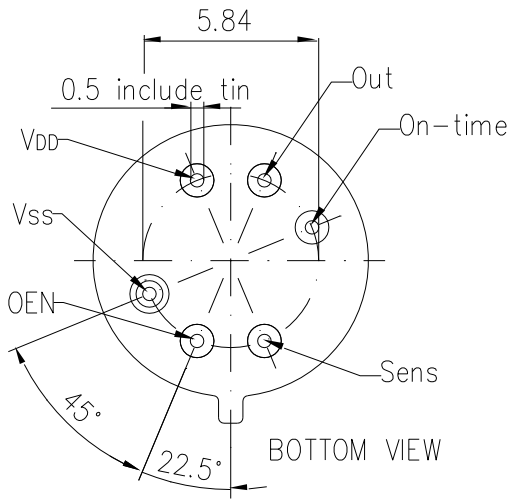
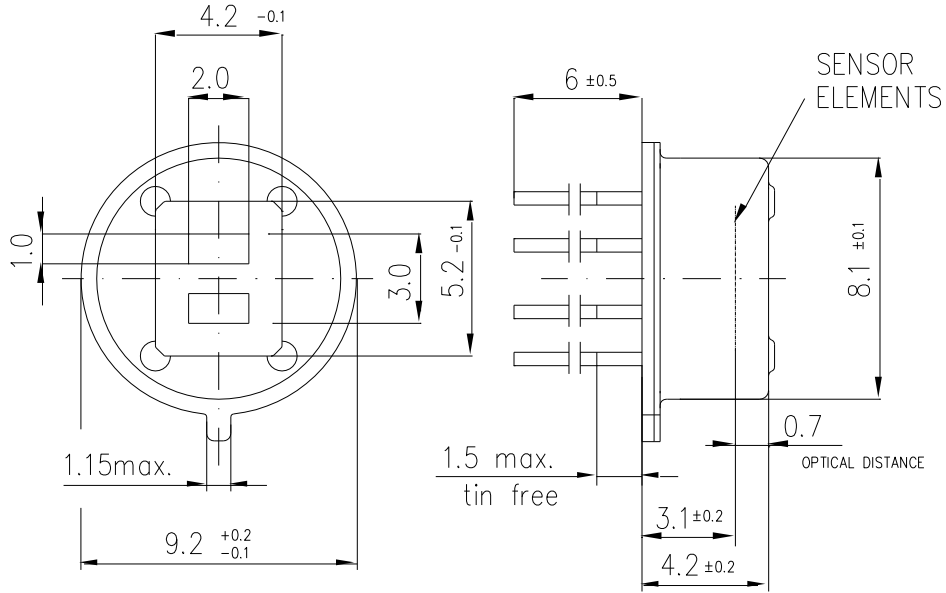
The marking of the detector includes the principal type plus a 4 digit number that represents the Excelitas storage and specification number (3XXX) and a date code, consisting of years and week detail. The marking is on the top or side of the detector.

### **Performance Advice**

Before taking a measurement, during testing, and / or operation the unit has to become thermally stable due to its nature as a thermal detector and the high sensitivity of the device.

All data are specified at room temperature. When operating at other temperatures within the specified operating range, parameters may vary. The detectors might operate outside the quoted range but may have degraded performance.

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				Allgemeintoleranzen GENERAL TOLERANCES	Werkstückkanten/EDGES OF WORKING-PARTS ACC. DIN 6784	Form- u. Lagetoleranzen GEOMETRICAL TOLERANCES
				Datum DATE	Name NAME	
				Gez. DRAWN BY	19.03.2009 Tkocz	
				Gepr. CHECKED BY	11.12.2012	
				Maßstab SCALE	Benennung/TITLE	
				5:1	ELEMENTORIENTATION AND CONNECTIONS PYD 1096	
						Ersatz für/REPLACEMENT FOR
						Ersetzt durch/REPLACED BY
Index NO.	Änderung REVISION	Datum DATE	Name NAME			

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