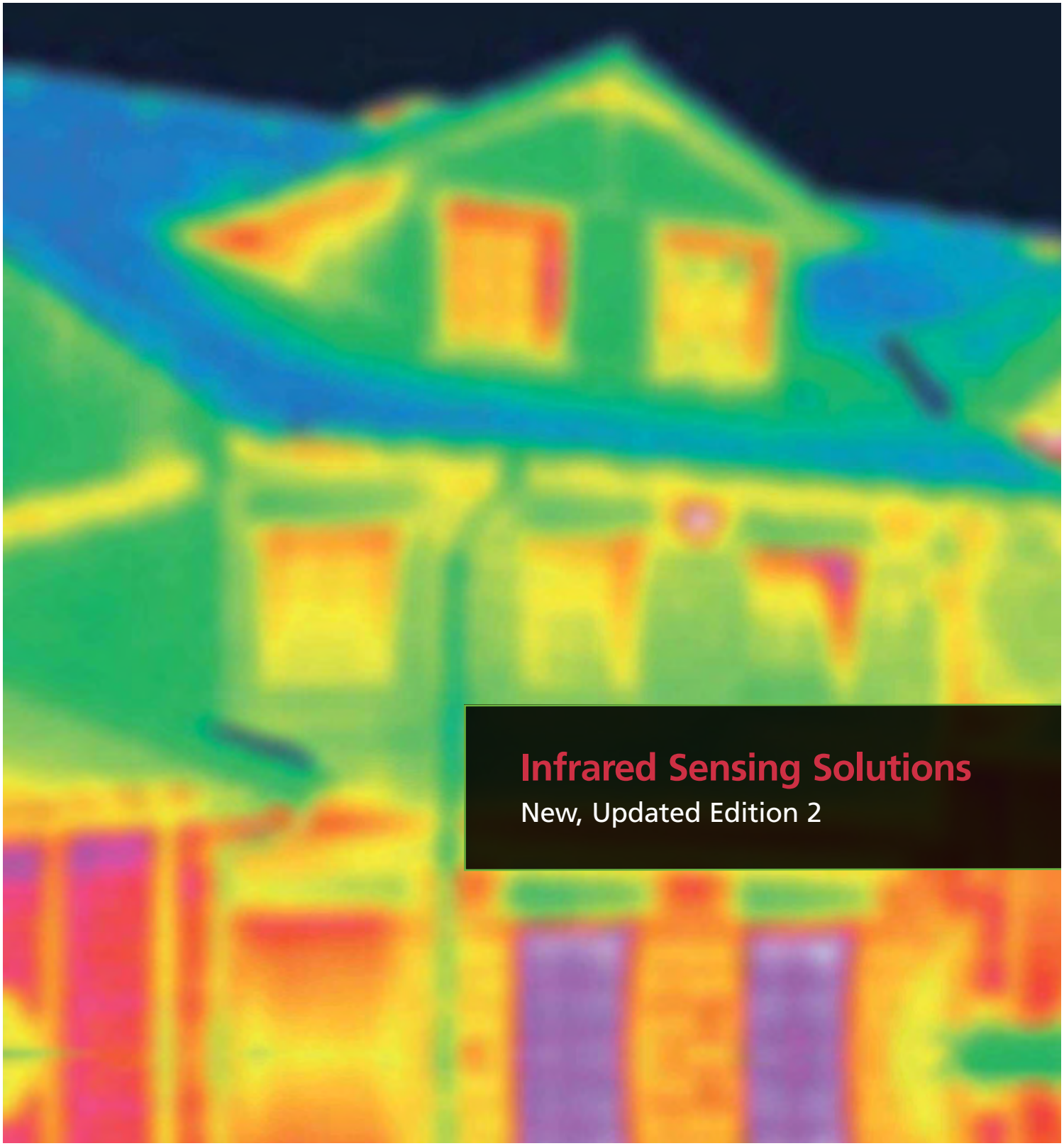
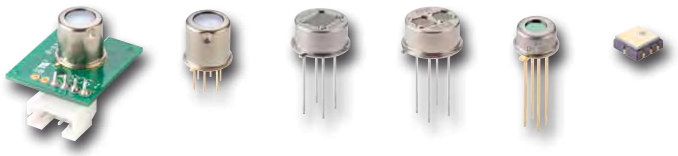


Infrared Sensing Solutions

New, Updated Edition 2



For Motion and Presence Detection,
Temperature Sensing, Gas Detection
and Energy Conservation.

EXCELITAS®
TECHNOLOGIES

Infrared Sensing Technologies

For Your Cutting-edge Applications.

Excelitas' infrared sensing technologies are playing a vital role in creating a healthier, cleaner and safer tomorrow. Excelitas has gained worldwide recognition for the design and production of high-performance pyroelectric detectors, thermopile detectors and sensor modules which – every day – contribute to safeguarding homes, saving energy, and providing comfort. From motion and presence detection to gas detection, thermometry and indoor climate control applications, Excelitas' IR sensing technologies and growing IR product range are meeting your challenges. We are sensing what you need for your cutting-edge applications.

Sensing what you need – from motion sensors for secure homes to gas detection systems, indoor climate control systems and ear thermometers.

Our Infrared Sensing Solutions provide:

- Excellent performance
- Strong reliability
- Innovative features

We support our products with:

- Applications – expertise
- Suitable features and functions
- Special optical filters for gas sensing

WORLDWIDE COMMITMENT TO YOUR CHALLENGES

You can depend on Excelitas' world-class global network of production, R&D, and distribution centers including Montreal, Canada; Wiesbaden, Germany; Singapore; Batam, Indonesia; and Shenzhen, China. We have customer service hubs on each continent to ensure just-in-time delivery. We believe in forging a collaborative partnership in which we are communicating proactively with you and refining our forecasts of your requirements to better serve you.

We have the detection technologies and capabilities needed to enhance and accelerate your OEM designs. Our R&D groups are focusing on new products and capabilities for your new and emerging applications. We pride ourselves on deep applications expertise to respond to and anticipate your detection requirements. Feel confident that you can discuss your requirements with our engineers. We thrive on addressing your challenges and will always try to provide you with sincere assistance based on our know-how and experience.

UNPARALLELED QUALITY

The consistent quality of our products is the foundation for which we build our relationship with you. The global adoption of our detectors in a host of consumer products as well as medical, industrial and commercial applications is testimony to our quality commitment and to your confidence in us.

We implement cutting-edge quality assurance system and measures; SPC and reliability testing are standard procedures at Excelitas. Of course, everything begins with the quality of our raw materials. Inspection procedures transcend all processes and conclude with 100% final inspection for all major parameters. We maintain our certification to major quality and environmental standards, which are subject to regular audits. All of our factories have received certifications for ISO 9001, OHSAS 18001, NLF/ILO-OSH 2001.

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Superior sensing innovations for improving daily life

1 2

Home Appliances Applications
Our infrared components are enabling healthier and safer food processing using a variety of home appliances including microwave ovens, induction heater (IH) cooktops, toasters, refrigerators, and exhaust hoods.

3 4 5 6

Indoor Home Comfort and Security

Our Infrared Detectors monitor presence, switch lights, control air conditioning systems and trigger intrusion alarms, contributing both to more secure homes and to energy savings.

7

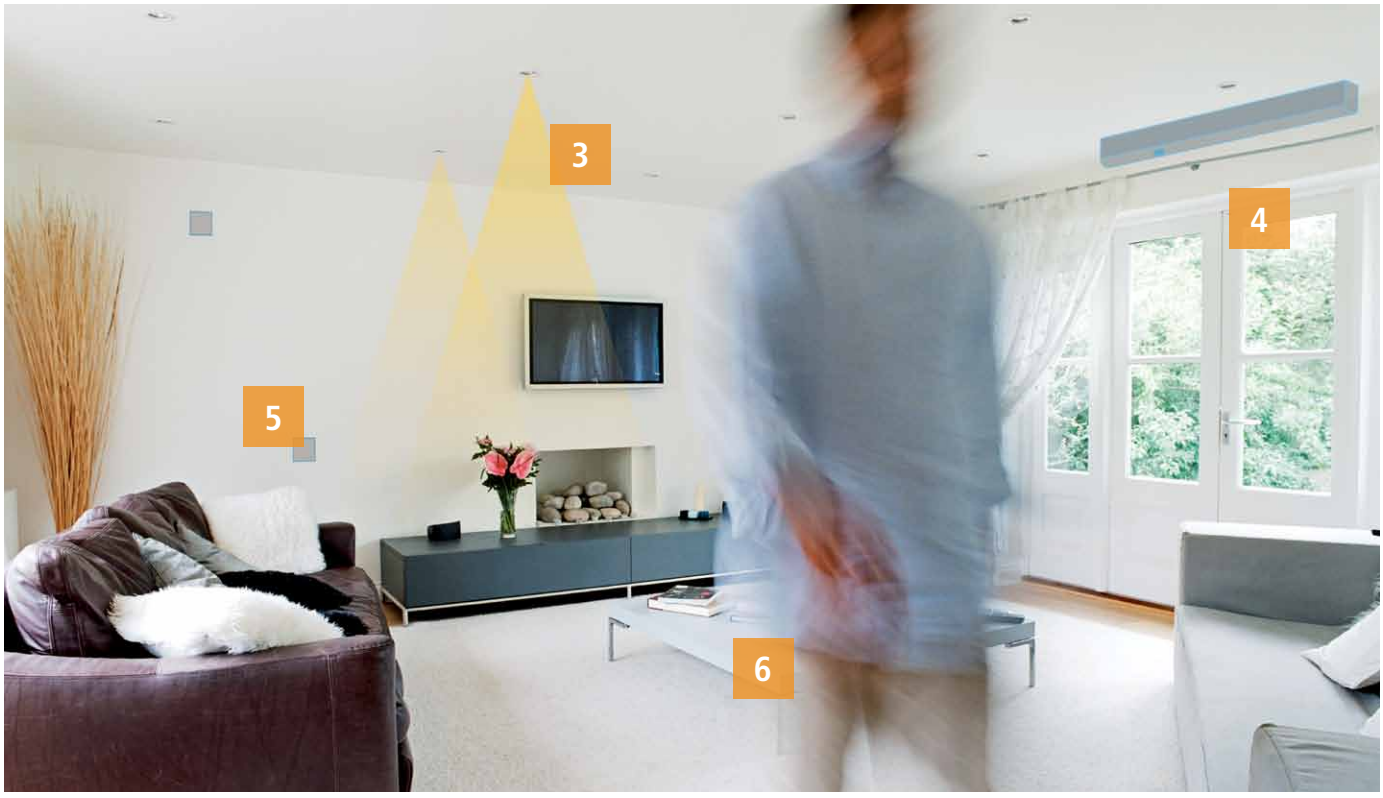
Thermometry for Healthier Families

Excelitas' Infrared Detectors are used in popular ear thermometers and forehead thermometry. Our products are also used in pyrometry and in non-contact temperature measurement systems to instantly determine temperatures at a distance.

8

Energy Conservation and Safety

A great deal of energy is consumed in public buildings, parking lots and public spaces. Excelitas' Infrared Detectors for presence detection are not only making environments safer and more secure, but they are also contributing to reducing carbon dioxide emissions and lowering energy consumption.



Selection Guide – Infrared Sensors

Application	Model	Requirements	Feature	Comments	Page
Simple Motion Detection	PYD 1096	All-in-One Electronics	Dual-Element	Smart DigiPyro®	12
Simple Motion Detection	PYQ 1046	All-in-One Electronics	Quad-element, Time & light level settings	Smart DigiPyro®	12
Simple Motion Detection	PYD 1098	All-in-One Electronics	Dual-Element	Smart DigiPyro®	13
Simple Motion Detection	PYQ 1048	All-in-One Electronics	Four-Element	Smart DigiPyro®	13
Intrusion Alarm	LHI 968	RF Immunity	Dual-Element	Analog, Standard	14
Intrusion Alarm	PYD 1398	White Light Immune (WLI)	Dual-Element	Analog	14
Intrusion Alarm	LHI 1148	Dual channel	Four-Element	Analog	15
Intrusion Alarm	PYD 1798	EMI-protected	High-End, Dual-Element	DigiPyro®	21
All Motion Detection	PYD 1788	RF Immunity	Dual-Element	DigiPyro®	21
Intrusion Alarm	PYQ 2898	Four Element - "Quad"	(2+1) Channel incl.Tref	DigiPyro®	22
Motion Detection	LHI 778	Low cost	Dual-Element	Analog	16
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Motion Detection	PYD 1388	RF Immunity	Dual-Element	Analog	16
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Presence Detection	PYQ 1398		Four-Element, single channel	Analog, Standard	18
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Thermometry, Ear	TPiD 1T 0222B	Excellent Thermal Shock Performance; Higher S/N	Round Aperture, Thermistor	Thermopile, ISOthermal	33
Thermometry, Ear	TPiD 1T 0622B	Excellent Thermal Shock Performance, Higher S/N	Round Aperture, Thermistor	Thermopile, ISOthermal	33
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Thermometry, Non-contact Temperature Measurement	TPiD 1S 0122 FM	SMD Housing	Small SMD Housing	Thermopile, ISOthermal	34
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Non-contact Temperature Measurement	TPiS 0133 FM	Integrated Signal Processing, SMD Housing, narrow spot size	SMD Housing	Thermopile, Fully Calibrated	35
Non-contact Temperature Measurement	TPiS 1T 1252B	Digital Signal Output	Digital 16-bit Output	DigiPile™ ; ISOthermal	36
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Non-contact Temperature Measurement	TPiS 1T 1256 L5.5	Digital Signal Output	Digital 16-bit Output	DigiPile™ ; ISOthermal	36
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Non-contact Temperature Measurement	TPiM 1T 0136 L5.5	Integrated Signal Processing	Thermopile Detector mounted on pcb with connector; Integral Optics	Module; ISOthermal; Fully Calibrated	40, 41
Non-contact Temperature Measurement	TPiM 1T 0134 P(x) M(y)	Integrated Signal Processing	Thermopile Detector mounted on pcb with connector; Integral Optics	Module; ISOthermal; Fully Calibrated	40, 41
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High Temperature Monitoring	TpiL 16T 3446 L3.9	High Temp. Output	pcb with connector, Integral Optics	CoolEye™; 16 - pixels; Fully Calibrated	42, 43
Presence Detection	TpiA 16T 4146 L3.9	Spatial Array	pcb with connector, Integral optics	CoolEye™; 16- pixels; Fully Calibrated	42, 43
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Infrared Basics

Infrared Basics

All solid bodies, when having temperatures above the absolute zero (-273°C), emit electromagnetic waves. The range of longer wavelengths beyond the visual spectrum is referenced as infrared radiation. The scientist, Wilhelm Wien (1864-1928), has described the relation between a solid body's temperature and its emitting peak wave length by following equation:

$\lambda_{max} = 2898 / T$

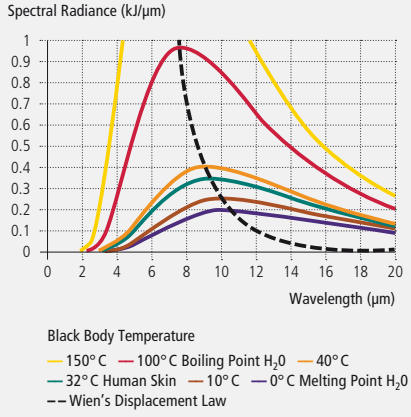
T = Temperature in K (Kelvin)

λ = Wavelength in µm

Using this law, we can calculate the specific peak emission wavelength of any material or body. A human body, with a surface temperature of approx. 35°C or 308 K, gives a peak wavelength of 9.4 µm; a cat of 38°C temperature gives 9.3 µm. According to Max Planck (1858 – 1947), the intensity curve of all emitted wavelengths for a solid body is rather broad. For our example above, this means that we cannot distinguish a human being from a cat on the basis of their infrared spectrum. For various temperatures of an ideal black body radiator, the intensity curves of radiated energy versus wavelength are shown below.

Figure 1

Radiated Energy vs. Wavelength



A hot body of 2000 K emits a lot of energy, some in the visible light range, some in the infrared (it glows red or white-hot). A body of 500 K emits radiation in the invisible part of the spectrum, the infrared range, which we can feel, but cannot see.

Infrared Detectors

With detectors for the infrared spectrum there are two major classes based on their physical principles: Photon Detectors and Thermal Detectors. Photon Detectors convert radiation directly into electrons whereas Thermal Detectors receive radiation, transfer it, raising temperature of the sensing material, which changes its electrical property in response to the temperature rise. Photon Detectors, such as Photodiodes and Phototransistors, range from visible to near infrared; Thermal Detectors have a broad response from below visible light up to over 100 µm. Fitted with special infrared windows as spectral filters, IR Detectors work in the mid to far infrared range without ambient, visible light interference.

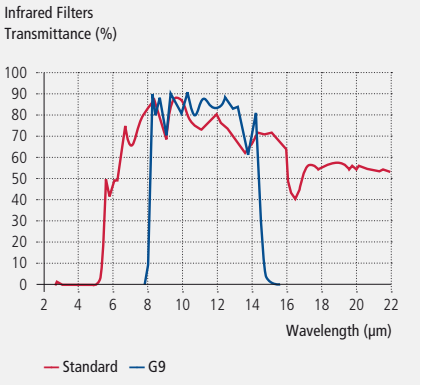
Filters for Infrared Sensors

The spectral sensitivity range of the detectors is defined by a filter window. Common applications in infrared reference wavelengths from 2 to 20 µm. Infrared windows for pyrometric applications are defined for the atmospheric window 5-14 µm, which is our standard filter window. Long range pyrometers apply a sharp cut-on/cut-off window of 9-14µm (G9) as per Fig.2.

For the special application of Gas Sensing by infrared absorption, we offer narrow band filters to detect specific gas absorption lines. The appropriate narrow band optical filters enable detection of Carbon Monoxide, Carbon Dioxide, Natural Gas and other environmental gases, as well as some technical gases.

Figure 2

Broad Band Filters



In Fig.2 we show the graph for standard infrared window and the pyrometric window "G9". As to narrow band Infrared filters, the range of available filters and specifications is given in Table 1 below:

Table 1

Narrow Band Filters

Filter Type	Application	CWL	HPB
G1	CO	4.64 µm	180 nm
G2	CO2	4.26 µm	180 nm
G2.2	CO2	4.43 µm	60 nm
G2.5	CO2	4.33 µm	160 nm
G2.6	N2O	4.53 µm	85 nm
G3	CO+CO2	4.48 µm	620 nm
G4	NO	5.3 µm	180 nm
G5	HC	3.35 µm-3.4 µm	190 nm
G5.1	HC	3.46 µm	163 nm
G5.2	HC	3.28-3.31 µm	160 nm
G5.3	HC	3.09 µm	160 nm
G5.5	HC	3.32-3.34 µm	160 nm
G5.6	HC	3.42 µm-3.451 µm	160 nm
G5.7	HC	3.30-3.32 µm	160 nm
G5.9	HC	3.375 µm-3.4 µm	190 nm
G7.1	R12	11.3 µm	200 nm
G7.2	R134a	10.27 µm	210 nm
G7.3		12.4 µm	180 nm
G20	Reference	3.95 µm	90 nm

Optical Properties

With respect to the optical parameters of Detectors and Sensors, there are some interesting parameters to be mentioned: the optical bandwidth, transmission and blocking characteristics of the optical filter and, as a major selection criterion, the sensor field of view, and performance of the detector within the field of view. The corresponding charts are given for the various sensors and models.

Pyroelectric Effect

Since ancient times, the pyroelectric effect has been known as a property of ferroelectric materials. It is based on a specific behavior of dielectric materials, the phenomenon of a permanent electrical polarization. When changing temperature of such materials, this polarization will increase, or decrease, so we observe a charge displacement.

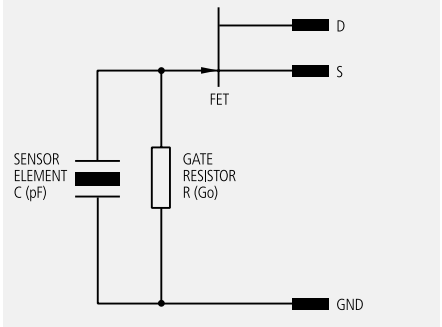
This pyroelectric effect is the basic principle for detectors that can recognize temperature variations. The characteristic value for the permanent polarization, called pyroelectric coefficient, disappears above the Curie point. The Curie temperature limits the operation temperature range for such detectors. Pyroelectric Detectors do not require cooling.

Detector Design

Within our detectors, a thin slice of pyroelectric material is fitted with electrodes to form a capacitor. Incoming radiation will generate extremely low levels of thermal energy, so the pyroelectric current flow is rather small. It needs a circuit to convert this small current into a convenient signal. The traditional analog detectors apply a high ohmic resistor and a special low-leakage current FET to transform the high impedance of the detector material to a common output resistance. The pyroelectric element's capacitance and the high gate resistance of the FET form a RC circuit, as shown in Figure 3, with a time constant of approx. 1 s., which makes the detector suitable for very low frequencies.

Figure 3

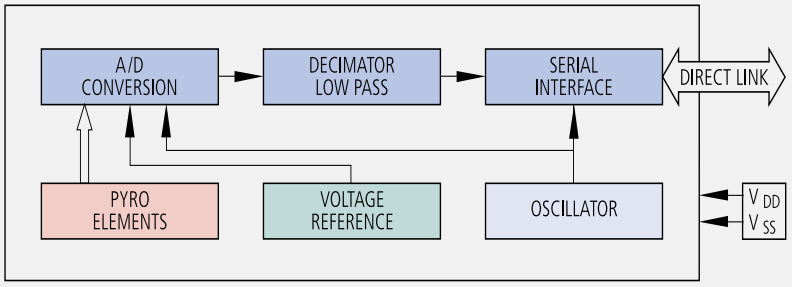
Electrical Configuration



Excelitas is the first to have introduced digital technology to Pyroelectric Detectors with its DigiPyro® Family. Here, a special ADC circuit provides amplification, A/D conversion and interfacing to the outside electronics.

Figure 4

DigiPyro®



Detector Construction

The pyroelectric material is placed on a special pc-board which provides thermal and mechanical isolation for the delicate pyroelectric material and provides space for the gate resistor and the FET. The connections are made either by wire bonding or conductive bonding. The whole pc-board is placed onto a TO header and closed with a TO cap, which has the relevant optical filter window. The window possesses a special infrared transmission characteristic, selected for the detector application.

Pyro Characteristics

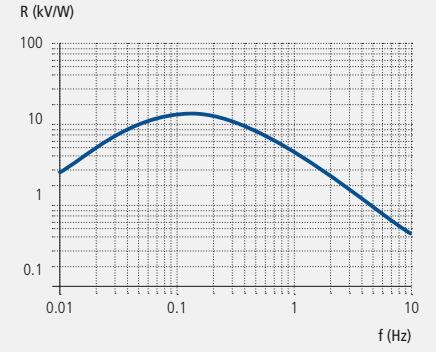
The most important electrical data of the IR-Sensor are its responsivity, balance and noise. Sometimes it is also useful to refer to NEP or D*.

Responsivity

The responsivity shows bandpass characteristics with a maximum at approx. 0.1 Hz radiation modulation. A typical curve, "responsivity versus frequency," is indicated as Figure 5. Responsivity is measured in V/W by means of a defined black body radiator. Responsivity refers to the active sensor area and is usually tested at 1 Hz modulation frequency unless specified differently.

Figure 5

Transfer Function



Balance

The balance of a dual element detector indicates the common mode rejection, also called matching, between the two elements. It is an important value for the performance of dual element detectors, applied in motion applications, as it is a measure for distinction between moving and fixed objects. It can be specified either in V/W or in % of Responsivity.

Noise

The noise of the sensor consists of three parts: The basic thermal noise of the sensing material, the (Johnson) noise of the high ohmic resistor and the input noise of the FET. The total output of these three parts is rather stable for temperatures below 40°C. Above this temperature, noise increases exponentially with temperature, as can be observed with typical active electronic components. Noise is given in µV peak-to-peak or zero-peak. Similar to the dependence of responsivity on frequency, the noise values decrease with frequency from approx. 0.15 Hz to 50 Hz.

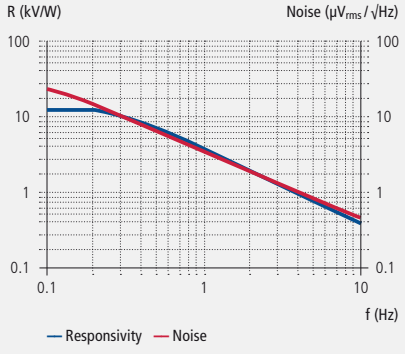
NEP, D*

The NEP value is a form of signal-to-noise ratio. The NEP value specifies the minimum radiation power that can be detected by the sensor, resulting in an output that just exceeds the noise. NEP refers to RMS values of signal and noise and in addition to the electrical bandwidth. The lower the NEP, the better the sensor is.

Sometimes also used for comparison of sensors, the Specific Detectivity (D*) allows the characterization of sensing materials. It is defined as reciprocal of NEP referring to the sensor area. Details of these parameters as function of the electrical frequency are given in Figure 6 below.

Figure 6

Responsivity, Noise vs. Frequency



Operating conditions

The storage and operating temperature range of the detectors is specified from -40°C up to +85°C. It needs to be noted that technical data usually reference room temperature and may vary within the specified temperature range.

Digital Pyrodetectors – a New Family

Pyroelectric detectors are AC type devices and give signals upon change of received infrared radiation. Until today, all available detectors were analog, i.e. they provided an analog signal output. Excelitas is the first to introduce a family of detectors which differ from previous generations by offering a digital signal output.

With the DigiPyro® Family, Excelitas is offering digital detectors for many applications and configurations.

1.1 Integrated Electronics

The DigiPyro® series integrates the first stages of circuitry into the detector housing: Amplification of the signal, then the A/D conversion, which needs a voltage reference. Following an internal 10 Hz electrical low pass filter, the serial interface provides for the "Direct Link" communication which is a one wire bidirectional communication feature. The whole concept runs by its own internal oscillator, which determines the speed of the internal process. The "Direct Link" feature enables the user to have the host μC request the information and its resolution, so the host controls the communication speed.

1.2 From Analog to Digital

The DigiPyro® series is the first pyroelectric detector family to display information in Bit form, as opposed to mV signals of analogue detectors. To give a measure for comparison of traditional detectors to digital versions, the rule of thumb for signal levels versus Bit information can be used:

- Resolution: 1 LSB ≙ 6.5 μV
- Range: 0 to 16383 Count=± 53.6 mV
- DC Offset 8192 Count ≙ 53.6 mV
- Noise: 6 Count ≙ 39 μV (with band-pass)

In typical motion electronics, the expected signal voltages range from 100 μV to 500 mV, so the digital signal may range up to 100 Bit-count. In Gas Detection, the output range of analog detectors is up to 2 mV, so the digital output may range up to 20 Bit-count. The dynamic range of the digital detector is wider than these mentioned levels and covers many other applications.

1.3 Digital Zero Signal Line

As the pyroelectric effect generates positive and negative signal amplitudes, the detector circuitry needs an electrical offset to be able to process such signals. In all analog circuitry this value is the offset voltage, which is usually subtracted after the first amplifier stage.

With DigiPyro® models, the amplification is included already, and the internal voltage reference provides for the required offset. For the user, this offset appears as a digital zero line at about 8000 bit-count, and it may vary in series from one part to the next. To recognize the zero line of the individual detector, the user may either use a digital band-pass or subtract the measured offset from the signal.

1.4 The Host Needs to Filter The Signal

The DigiPyro® does not include any processing intelligence inside. Unlike most analog pyrodetectors, the DigiPyro® uses a direct communication with the hosting microcontroller without any analog hardware filtering (only the previously mentioned low-pass filter). Thus, it becomes necessary to implement all necessary filtering by software filters within the hosting microprocessor of the unit.

Applications for Pyroelectric Detectors

Pyroelectric detectors had originally been designed as single element types for non-contact temperature measurement. During further research, Dual-Element types were developed with multi-facet mirrors or Fresnel lenses, entering the field of motion detection, starting as passive intrusion alarms (Burglar Alarm, PIR), followed by automatic light switches and security lights and lamps. The same concept is also being applied with some automatic door openers.

Today, the environment and its protection is one of our most serious global concerns. Features and instrumentation are required to measure and monitor all kinds of gases in our environment. One of the methods applied is the NDIR technique, a principle of measuring gas concentration by its absorption properties in the infrared range. Our detectors and sensors are a vital part of making our environment safer.

Most PIR motion detecting devices have been designed around Dual-Element types, while more advanced units apply Four-Element, "Quad" type configurations.

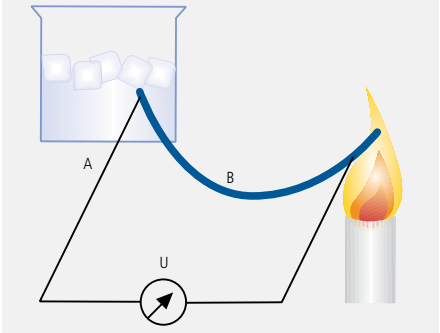
For Gas Sensing, single element with narrowband filters is applied in a single or dual-channel configuration.

The Thermoelectric Effect

The thermoelectric effect today is known as reverse to the Peltier–or Seebeck–effect. By applying a temperature difference to two junctions of two dissimilar materials A and B, a voltage U, which is proportional to the temperature difference, is observed.

Figure 7

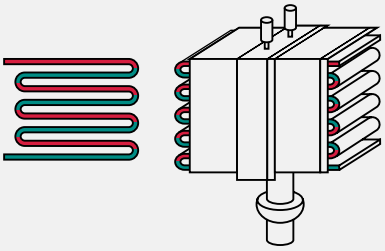
The Seebeck Effect



Leopoldo Nobili (1784 - 1835) first used the thermoelectric effect for IR radiation measurement using a “pile” of Bismuth and Antimony contacts. This is shown in Figure 8, below.

Figure 8

Nobili’s Thermopile



The measure of this effect is called the thermoelectric- or Seebeck- coefficient. For most conducting materials, this coefficient is rather low; only few semi-conductors possess rather high coefficients. Since the voltage of a single thermoelectric cell is very low, lots of such cells arranged in a series connection achieve a larger signal, making a “pile” of thermo-elements.

Excelitas Thermopile Design

Our thermopile sensors are based on the technology of silicon micromachining. The central part of a silicon chip is removed by an etching process, leaving on top only a 1 µm thin sandwich layer (membrane) of SiO_2/Si_3N_4, which has low thermal conductivity. Thin conductors of two different thermoelectric materials (to form thermocouples) are deposited onto this membrane. Both conductors have alternatively junctions in the center of the membrane (hot junctions) and on the bulky part of the silicon substrate (cold junctions). A special IR-absorption layer covers the hot junctions, creating the sensor’s sensitive area.
When exposed to infrared radiation, the absorbed energy leads to a temperature difference between “hot” and “cold” contacts. According to the thermoelectric coefficient of the thermocouples, a signal voltage is generated.

The Thermopile Construction

The sensor chip is mounted in good thermal contact onto a TO header. A transistor cap with infrared filter seals the sensor chip from the environment.

Excelitas’ product portfolio includes detectors of various sizes, housings and infrared windows, and integrated sensors which include electronics that provide temperature compensation and calibration to a certain measurement range.

Excelitas offers unique constructions to deal with thermal shock, referenced as ISOthermal types.

Advantages

Thermopile detectors do not require any mechanical chopper to sense infrared and, thus, they offer simpler design possibilities for infrared measurements.

Thermopile Characteristics

The most important properties of the thermopile sensor are its responsivity, noise, field of view, response time, and for calibrated sensors, the temperature range.

Responsivity

The responsivity shows low pass characteristics with a cut off at approx. 30 Hz. Responsivity is measured in Volts per Watt by means of a defined black body radiator. Responsivity data is usually quoted with respect to the active detector area, and is given without the infrared filter. The data shows a responsivity value, tested at 1 Hz electrical frequency.

Noise

The noise of the detector is dominated by the Johnson noise due to the resistance of the thermopile. Noise is given as RMS value in nV/√Hz.

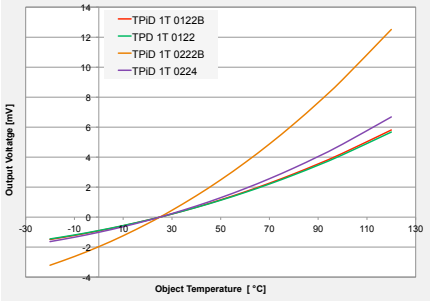
Sensitivity

The data tables also mention sensitivity, as a characteristic output voltage versus target temperature at 25°C environment temperature.

The data is given with standard IR filter as per Figure 2. Two are given: S(25/40) is 25°C environment, 40°C Black Body target, and S(25/100), which is 25°C environment, 100°C Black Body target. Sensitivity depends on the field of view of the detector construction. An example is shown below for selected TPS series thermopiles.

Figure 9

Sensitivity vs. Target Temperature



Thermistor Is Included

As a temperature reference, the thermopile detectors include a Thermistor, which senses the internal temperature.

For exact measurements, the temperature of the detector housing (cold thermopile contacts) must be known. A 100 kOhm thermistor inside the detector housing serves as the ambient temperature reference (standard version); a 30 kOhm thermistor option is also available.

The dependence of the resistance on temperature can be approximated by the following equation:

$$R_T = R_R \cdot e^{B \cdot \left(\frac{1}{T} - \frac{1}{T_R}\right)}$$

R_T	NTC resistance in Ω at temperature T in K
R_R	NTC resistance in Ω at rated temperature TR in K
T	Temperature in K
T_R	Rated temperature in K
B	B value, material-specific constant of NTC thermistor
e	Euler number (e = 2.71828)

The actual characteristic of an NTC thermistor can be roughly described by the exponential relationship. This approach, however, is only suitable for describing a restricted range around the rated temperature or resistance with sufficient accuracy.

For practical applications, a more precise description of the real R/T curve is required. Either more complicated approaches (e.g. the Steinhart-Hart equation) are used or the resistance/temperature relationship is given in tabulated form.

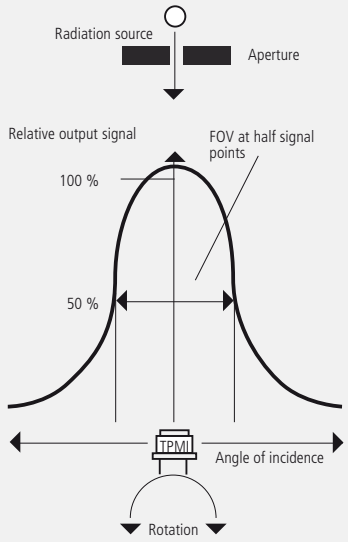
The Field of View

The most common application for thermopile detectors is in non-contact temperature sensing. All target points within the Field of View will contribute to the measurement signal. To meet requirements of different applications, Excelitas offers a broad range of sensors with different windows and optics.

The Field of View data describe the dependence of signal from incident angles.

Figure 10

Field of View



The TPMI® family is available with different options on optical cap assemblies. We provide housing with aperture opening and filter window only, or with an infrared lens or also with integral mirror.

Such optical features define the viewing angle or as per definition the Field of View (FOV) of the sensor.

The FOV is defined as the difference of the incidence angles that allow the sensor to receive 50 % relative output signal, see also figure shown here, which is a sketch of a testing principle.

	Symbol	Parameter	Min	Typ	Max	Unit
Lens Type (L5.5)						
	FOV	Field of view		7	12	°
	OA	Optical axis		0	±3.5	°
	D:S	Distance to spot size ratio		8:1		
Integral Reflector Type (IRA)						
	FOV	Field of view		15	20	°
	OA	Optical axis		0	±2	°
Standard Aperture Type						
	FOV	Field of view		70	80	°
	OA	Optical axis		0	±10	°

Temperature Range

Excelitas offers sensors which include pre-amplification, ambient temperature compensation, and calibration within a specific temperature range.

Thermopile Arrays

In addition to its range of thermopile detectors and sensors, Excelitas offers line arrays and spatial arrays based on thermopile technology.

Applications for Thermopile Sensors

Thermopile sensors have been designed for non-contact temperature measurement. The signal of the sensor follows the radiation energy received by the sensor. This enables the measurement of surface temperatures without contact.

In many industrial process control units, thermopile sensors are used to monitor temperature without contact, or to serve as an overheating protection feature. The thermopile technology is also suited for use in home appliances such as in monitoring food during defrosting, warming, or cooking.

As with our pyrodetectors, thermopile detectors with specific filter windows are used as sensing components to help improve daily life.

Smart Detectors

With All Electronics Included…To Make It Simple

PYD 1096 – Dual-Element, "Smart" DigiPyro®
PYQ 1046 – Quad-Element, "Smart" DigiPyro®

Applications

- Simple Motion Switches
- Automatic Light Switching
- Wall Switch

Features and Benefits

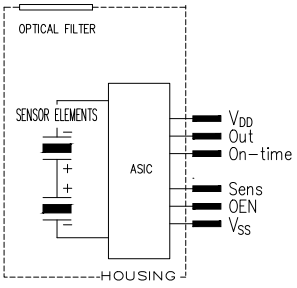
- TO-5 metal housing
- All electronics included
- Dual-Element: PYD 1096
- Quad-Element: PYQ 1046

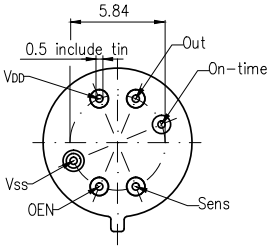
Product Description

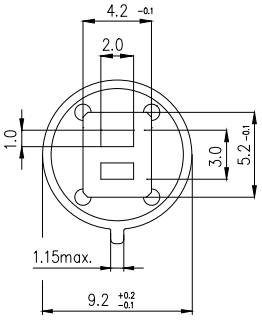
The "Smart" DigiPyro® Family provides for a complete motion detector solution, with all electronic circuitry built into the detector housing. Only power supply and power-switching components need to be added to make the entire motion switch, a timer is included. The series has versions which can include ambient light-level and sensitivity adjustments.

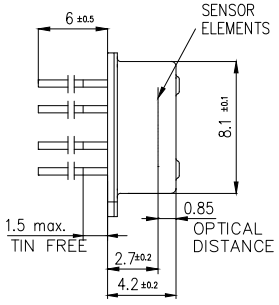
Both PYD 1096 and PYQ 1046 DigiPyro® models offer the complete setting features of time, sensitivity, and light-level. For the light-level input, a Photocell is to be connected externally. Please refer to the application notes on this product.

PYD 1096

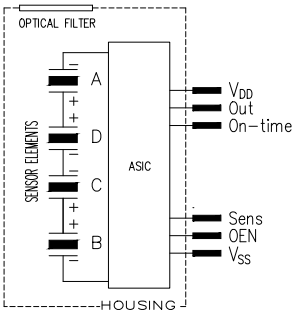


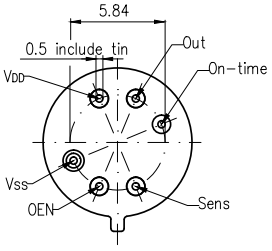


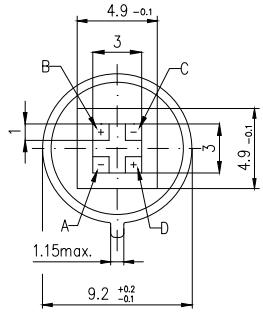


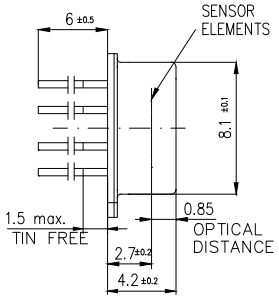


PYQ 1046







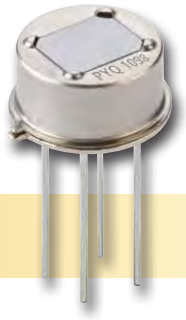


PYD 1096 and PYQ 1046

Parameter	Symbol	PYD 1096	PYQ 1046	Unit	Remarks
Responsivity, min.	R_{min}	3.3	5.4	kV/W	f = 1Hz
Responsivity, typ.	R	4.0	6.5	kV/W	f = 1Hz
Match, max.	M_{max}	10	10	%	
Field of View, horizontal	FoV	100°	119°		unobstructed
Field of View, vertical		100°	119°		unobstructed
Operating Voltage	V_{DD}	2,7...3,3	2,7...3,3	V	
Supply Current	I_{DDmax}	15	15	µA	V_{DD} < VR, Outputs unloaded
Sensitivity Threshold		120	120…530	µVp	
Noise, max.		50	100	$µV_{pp}$	0,4…10Hz/20°C
On-Time		2…4194	2…4194	s	
OEN (ambient light control)		n. a.	Low<0.2*V_{DD}; High>0.8V_{DD}	V	
Output Driving Current		1	1	µA	
Filter, Signal Processing					
Digital Filter, cut on		0.4	0.4	Hz	
Digital Filter, cut off		7	7	Hz	

Smart Detectors

With All Electronics Included…To Make It Simple



PYD 1098 – Dual-Element, "Smart" DigiPyro®
PYQ 1048 – Four-Element, "Smart" DigiPyro®

Applications

- Simple Motion Switches
- Automatic Light Switch
- Wall Switch

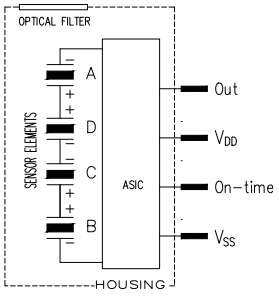
Features and Benefits

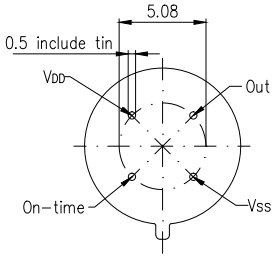
- TO-5 metal housing
- All electronics included
- Dual-Element: PYD 1098
- Quad-Element: PYQ 1048

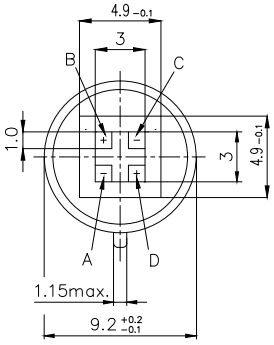
Product Description

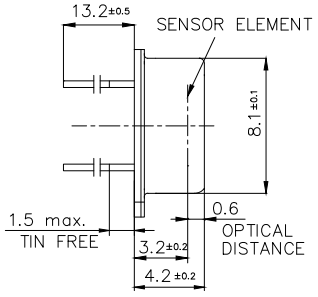
The "Smart" DigiPyro® Family offers a complete motion detector solution, with all electronic circuitry built into the detector housing. Only power supply and power-switching components need to be added to make the entire motion switch; a timer is included. The PYD 1098 and PYQ 1048 models are simplified versions of the PYD 1096 and PYQ 1046, offering only time-adjust input.
Two versions are offered: PYD 1098 Dual-Element configuration, and the PYQ 1048 Quad-Element with 4 square elements and a square window, for more uniform and higher spatial resolution. Parameters such as sensitivity and light-level are internally set to default values and disabled.

PYQ 1048

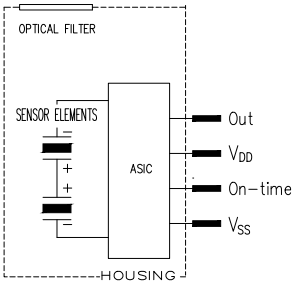


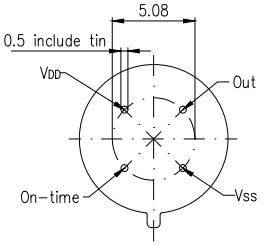


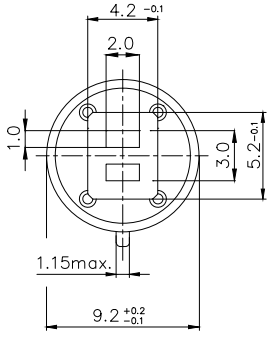


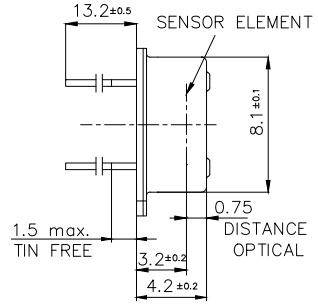


PYD 1098









PYQ 1048 and PYD 1098					
Parameter	**Symbol**	**PYQ 1048**	**PYD 1098**	**Unit**	**Remarks**
Responsivity, min.	R_{min}	5.4	3.3	kV/W	f = 1Hz
Responsivity, typ.	R	6.5	4.0	kV/W	f = 1Hz
Match, max.	M_{max}	10	10	%	
Field of View, horizontal	FoV	119°	100°		unobstructed
Field of View, vertical		119°	100°		unobstructed
Operating Voltage	V_{DD}	2,7...3,3	2,7...3,3	V	
Supply Current	I_{DDmax}	15	15	µA	V_{DD} < VR, Outputs unloaded
Sensitivity Threshold		120	120	µVp	
Noise, max.		100	50	$µV_{pp}$	0,4…10Hz/20°C
On-Time		2…4194	2…4194	s	
OEN (ambient light control)		n. a.	n. a.	V	
Output Driving Current		1	1	µA	
Filter, Signal Processing					
Digital Filter, cut on		0.4	0.4	Hz	
Digital Filter, cut off		7	7	Hz	

Pyroelectric, Dual-Element Detectors

For Intrusion Alarms

LHi 968, PYD 1398 – High-End Pyro

Applications

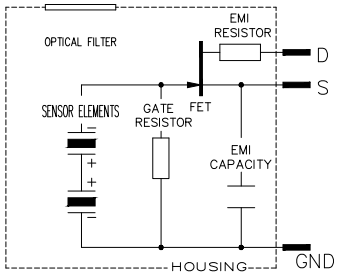
- Intrusion Alarms
- High-end Motion Sensors

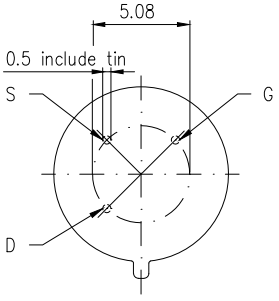
Features and Benefits

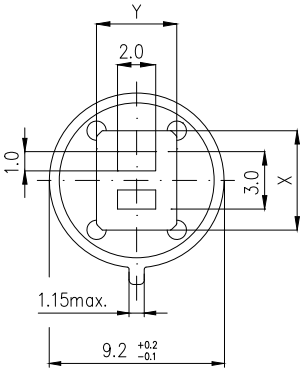
- TO-5 metal housing
- Different window sizes
- Improved EMI protection
- Reduced White Light Immunity (WLI)

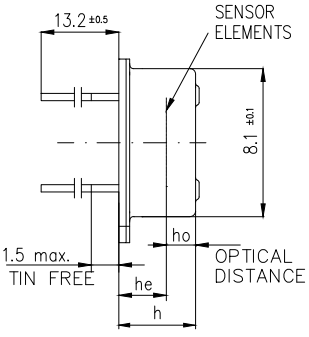
Product Description

The Analog LHi 968 Series with Dual-Element configuration is a performance-proven, top-of-the-line product for use in high-end applications. The LHi 968 design provides for a reduced sensitivity to EMI and excellent White Light Immunity (WLI). The PYD 1398 offers a higher level of RF immunity and grading for lower white light sensitivity is available as an option.



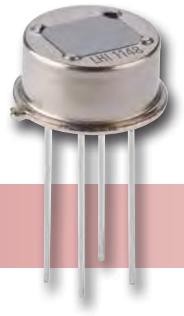






LHi 968 and PYD 1398					
Parameter	Symbol	LHi 968	PYD 1398	Unit	Remarks
Responsivity, min.	R_{min}	3.30	3.30	kV/W	f = 1 Hz
Responsivity, typ.	R	4.0	4.0	kV/W	f = 1 Hz
Match, max.	M_{max}	10	10	%	
Noise, max.	N_{max}	50	50	μV_{pp}	0,4…10Hz/20°C
Noise, typ.	N	20	20	μV_{pp}	0,4…10Hz/20°C
spec. Detectivity	D*	19	19	107cm*√Hz/W	1Hz/ 1Hz BW/20°C
Field of View, horizontal	FoV	100	100		unobstructed
Field of View, vertical		100	100		unobstructed
Source Voltage		0,2 … 1,5	0,2 … 1,5	V	47 KΩ, 20°C
Operating Voltage		2,0…10	2,0…10	V	47 KΩ, 20°C
EMI performance		**	**		
White Light performance		**	***		
Height	h	4.2	4.2	mm	
Optical Element Location	he /ho	2.6 / 0,95	2.6 / 0,95	mm	
Filter Size	X/Y	5,2 / 4,2	5,2 / 4,2	mm	

Pyroelectric, Four-Element Detectors
For Intrusion Alarms

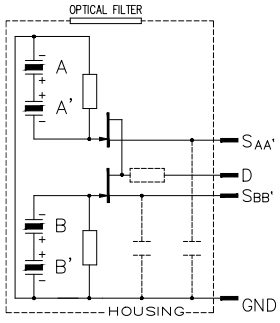


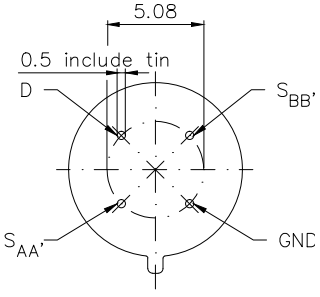
LHi 1148 – High-End, Dual-Channel Pyrodetectors

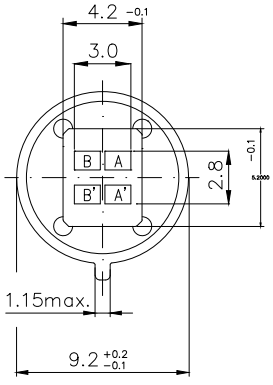
Applications
- Intrusion Alarms
- Dual-Channel Systems
- High-end Motion Sensors

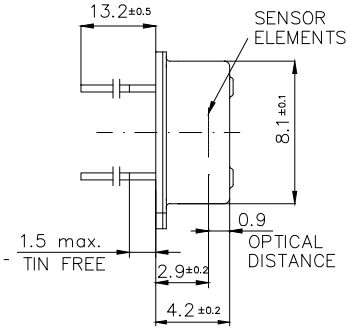
Features and Benefits
- TO-5 metal housing
- Dual-Channel
- Optional Reverse/equal polarity
- Optional element configurations
- RF protection option

Product Description
The LHi 1148 Series with its Four-Element, "Quad" configuration offers two independent Dual-Element signals with opposite polarity. This enables separate signal processing options for the two channels to reduce common-mode RF influence and thermal effects.
For Ceiling-mount applications, we offer - as an option - a similar version, with the Dual-Element pairs arranged in a diagonal, geometrical arrangement and with a square-type window. This enables presence detection without any preference to direction. The series includes various options for element spacing.









LHi 1148

Parameter	Symbol	LHi 1148	Unit	Remarks
Responsivity, min.	R_{min}	4.30	kV/W	f = 1 Hz
Responsivity, typ.	R	5.9	kV/W	f = 1 Hz
Match, max.	M_{max}	15	%	
Noise, max.	N_{max}	75	μV_{pp}	0,4…10Hz/20°C
Noise, typ.	N	30	μV_{pp}	0,4…10Hz/20°C
spec. Detectivity	D*	16	10^7cm*√Hz/W	1Hz/ 1Hz BW/20°C
Field of View, horizontal	FoV	110°		unobstructed
Field of View, vertical		70°		unobstructed
Source Voltage		0,2 … 1,5	V	47 KΩ, 20°C
Operating Voltage		2,0…10	V	47 KΩ, 20°C
EMI performance				

Pyroelectric, Dual-Element Detectors
For Motion Sensing

LHi 778 – Low-Cost Pyro
LHi 878, PYD 1388 – Standard Pyro

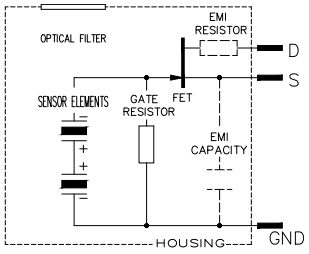
Applications
- Auto Light Switch
- Wall Switch
- Auto Lamps

Features and Benefits
- TO-5 metal housing
- Different window sizes
- Additional EMI protection with PYD 1388

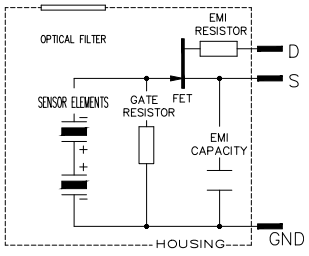
Product Description

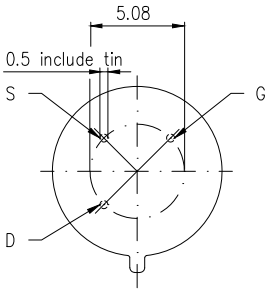
This Dual-Element Detector Family offers standard TO-5 housings with different window sizes. Whereas the LHi 778 is designed to meet low cost needs and has a small optical window, the LHi 878 offers a standard window size. The PYD 1388 has the same dimensions and provides for additional EMI protection.

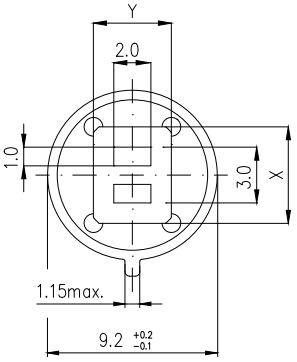
LHi 778, 878

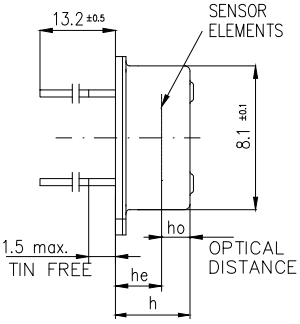


PYD 1388









LHi 778, LHi 878 and PYD 1388

Parameter	Symbol	LHi 778	LHi 878	PYD 1388	Unit	Remarks
Responsivity, min.	R_{min}	3.30	3.30	3.30	kV/W	f = 1 Hz
Responsivity, typ.	R	4.2	4.2	4.2	kV/W	f = 1 Hz
Match, max.	M_{max}	10	10	10	%	
Noise, max.	N_{max}	50	50	50	μV_{pp}	0.4…10 Hz/20°C
Noise, typ.	N	35	25	20	μV_{pp}	0.4…10 Hz/20°C
Field of View, horizontal	FoV	71°	95°	95°		unobstructed
Field of View, vertical		71°	87°	87°		unobstructed
Source Voltage		0,2 … 1,5	0,2 … 1,5	0,2 … 1,5		47 KO, 20°C
Operating Voltage		2,0…10	2,0…10	2,0…10	V	47 KO, 20°C
EMI performance			*	*	V	
Height	h	4.2	4.2	4.2	mm	
Optical Element Location	he /ho	3,2 / 0,75	3,2 / 0,75	3,2 / 0,75	mm	
Filter Size	X/Y	4/3	4,6 / 3,4	4,6 / 3,4	mm	

Pyroelectric, Dual-Element Detectors
For Motion Sensing

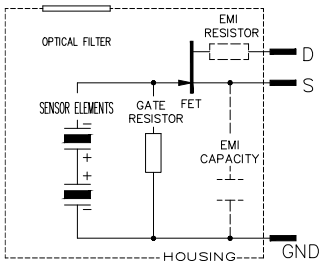
LHi 874, LHi 944, PYD 1394 – Low-Profile Pyro

Applications
- Automatic Light Switching
- Wall Switch
- Auto Lamps with 180° FOV

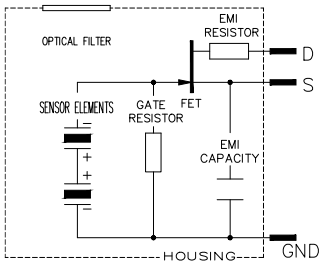
Features and Benefits
- TO-39 metal housing
- Different window sizes
- EMI protection with the PYD 1394

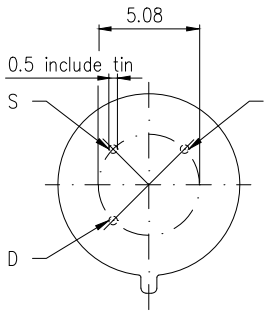
Product Description
These Low-Profile TO-39 detectors are very well suited for use as two detectors arranged at an angle so as to enable a 180 degree view. The LHi 874 offers a standard window size, whereas the LHi 944 model offers a large window with greater Field Of View. The PYD 1394 has same dimensions and provides for additional EMI protection.

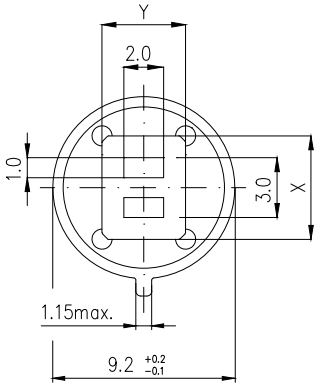
LHi 874, 944

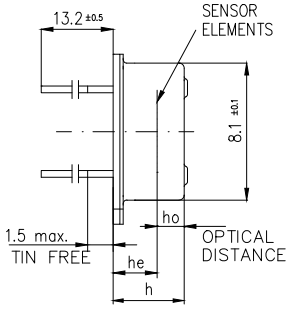


PYD 1394









LHi 874, LHi 944 and PYD 1394

Parameter	Symbol	LHi 874	LHi 944	PYD 1394	Unit	Remarks
Responsivity, min.	R_{min}	3.30	3.30	3.30	kV/W	f = 1 Hz
Responsivity, typ.	R	4.2	4.2	4.2	kV/W	f = 1 Hz
Match, max.	M_{max}	10	10	10	%	
Noise, max.	N_{max}	50	50	50	μV_{pp}	0.4…10 Hz/20°C
Noise, typ.	N	25	25	25	μV_{pp}	0.4…10 Hz/20°C
spec. Detectivity	D*				10^7cm*√Hz/W	1 Hz/ 1 Hz BW
Field of View, horizontal	FoV	95°	110°	110°		unobstructed
Field of View, vertical		87°	110°	110°		unobstructed
Source Voltage		0,2 … 1,5	0,2 … 1,5	0,2 … 1,5	V	47 KO, 20°C
Operating Voltage		2,0…10	2,0…10	2,0…10	V	47 KO, 20°C
EMI performance		*	*	**		
Height	h	3.2	3.2	3.2	mm	
Optical Element Location	he /ho	2,2 / 0,75	2,2 / 0,75	2,2 / 0,75	mm	
Filter Size	X/Y	4,6 / 3,4	5,2 / 4,2	5,2 / 4,2	mm	

Pyroelectric Four-Element Detectors

For Ceiling-Mount

LHi 1128, PYQ 1398, PYQ 1348 – Single-Output "Quad" Pyro

Applications

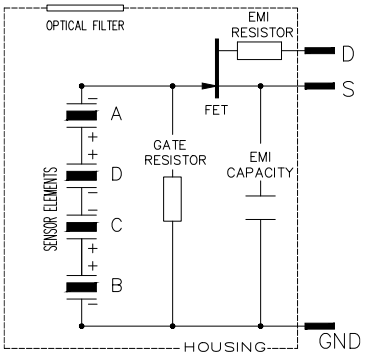
- Ceiling-Mount Alarms
- Ceiling-Mount Light Switches

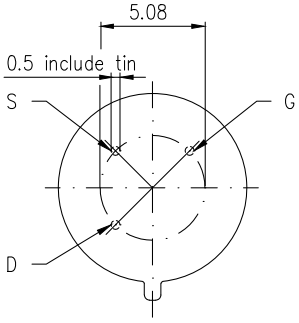
Features and Benefits

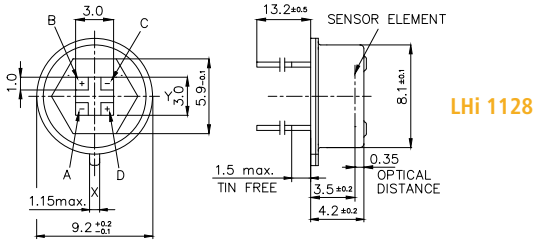
- TO-5 metal housing
- Different window sizes
- Single Channel output

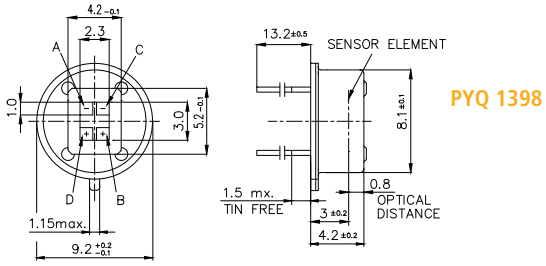
Product Description

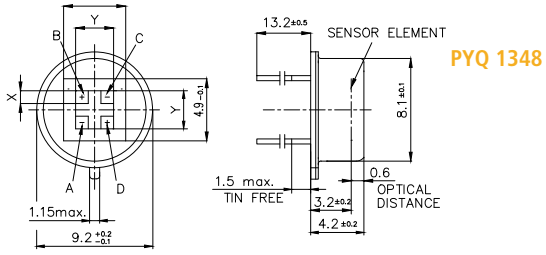
In this series of four-element "Quad" Detectors, all four elements are connected to one common output. This configuration enables specific applications in ceiling-mount locations, when applied with suitable lens or mirror optics designs. Two different window options are provided: a large window or standard, rectangular window size. Various element polarities are available upon request. For better EMI protection, the built-in capacitor option is available. For small Fresnel lens applications, a smaller element configuration is provided.











LHi 1128, PYQ 1398 and PYQ 1348

Parameter	Symbol	LHi 1128	PYQ 1398	PYQ 1348	Option	Unit	Remarks
Responsivity, min.	R_{min}	5.40	5.40	5.40		kV/W	f = 1 Hz
Responsivity, typ.	R	6.5	6.5	6.5		kV/W	f = 1 Hz
Match, max.	M_{max}	10	10	10		%	
Noise, max.	N_{max}	100	100	100		μV_{pp}	0,4…10Hz/20°C
Noise, typ.	N	30	30	30		μV_{pp}	0,4…10Hz/20°C
spec. Detectivity	D*	8	8	8		107cm*√Hz/W	1Hz/ 1Hz BW
Field of View, horizontal	FoV	156°					unobstructed
Field of View, vertical		125°					unobstructed
Source Voltage		0,2 … 1,5	0,2 … 1,5	0,2 … 1,5	0,2 … 1,5	V	47 KO, 20°C
Operating Voltage		2,0…10	2,0…10	2,0…10	2,0…10	V	47 KO, 20°C
EMI performance		**	**	**			
Element size/spacing		1/1/1	1/1/1	1/1/1	0,8/0,8/0,8		
Height	h	4.2	4.2	4.2	4.2	mm	
Optical Element Location	he /ho	3,2 / 0,35	3,0 / 0,8	3,0 / 0,8	3,0 / 0,8	mm	
Filter Size	X/Y	hexagonal	5,2 / 4,2	Square	Square	mm	

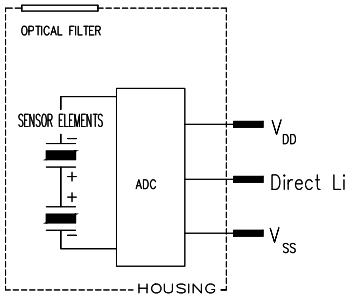
Miniaturized, Dual-Element Pyrodetectors
For Motion Sensing

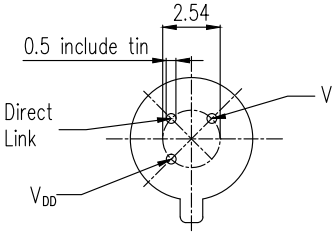
PYD 5731 – DigiPyro® in TO-46 Housing

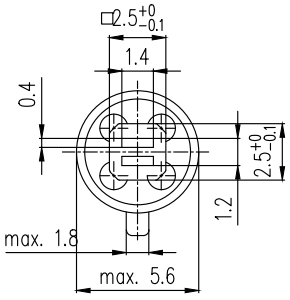
Applications
- Automatic Light Switching
- Wall Switches

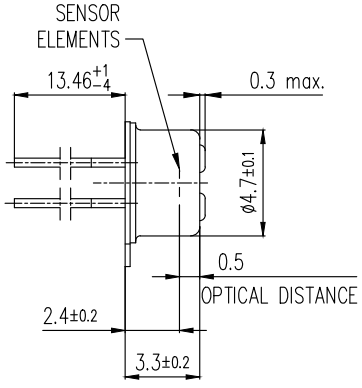
Features and Benefits
- TO-46 metal housing
- Temperature reference output included
- DigiPyro® with "Direct Link" Interface

Product Description
This pyrodetector features a miniaturized, Dual-Element Pyro in a TO-46 housing. With the PYD 5731, Excelitas extends the growing DigiPyro® Family to miniaturized detector designs. The PYD 5731 offers the same "Direct Link" interface as the regular PYD 1798 DigPyro® for output of the Dual-Element pyro and an additional temperature reference output.
The small housing, in combination with a reduced element size and spacing, will enable customers to reduce the size of their optics and design smaller motion detection units.





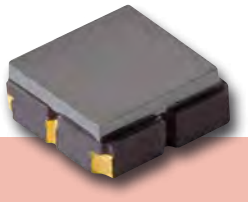




PYD 5731				
Main Parameter	**Symbol**	**PYD 5731**	**Unit**	**Remarks**
Responsivity, min.	R_{min}	4.0	kV/W	f = 1 Hz
Responsivity, typ.	R_{typ}	6.0	kV/W	f = 1 Hz
Match, max.	M_{max}	10	%	
Noise, max.	n_{max}	120	μV_{pp}	0,4…10Hz/ 20°C
Noise, typ.	n_{typ}	50	μV_{pp}	0,4…10Hz/ 20°C
Field of View, horizontal	FoV	62°		unobstr.
Field of View, vertical		88°		unobstr.
Operating Voltage	V_{DD}	2,7…3,6	V	
Supply Current	I_{DD} / I_{DDmax}	10 / 15	µA	V_{DD} = 3,3V
Digital Data				
Serial Interface update time	t_{REP}	2 / 13	ms	speed / interrupt
ADC Resolution		14	Bits	max. Count = 2^{14}-1
Output Data Format		2 x 14	Bits	
ADC Sensitivity		6…7	µV/count	
ADC Output Offset		7000…9200	counts	
ADC Output Offset	typ.	8192	counts	
Temperature Reference				
Gain (Temperature)		80	Counts/K	-20°C to +80°C
Linearity		-5…+5	%	-20°C to +80°C
Filter				
Digital Filter Cut off		10	Hz	1) s.ApplicationNote

SMD Dual-Element Pyro And DigiPyro®

For Simple Motion Sensing



PYD 5190 – Small, Dual-Element Pyro, in SMD
PYD 5790 – Small, Dual-Element DigiPyro® in SMD

Applications

- Energy Conservation in Televisions, Monitors, Laptops and Tablets.
- Power On/Off in Mobile Phones

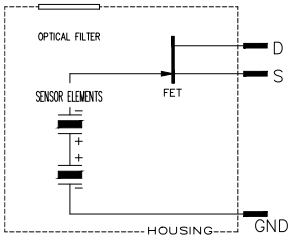
Features and Benefits

- SMD housing
- Analog FET output
- DigiPyro® with "Direct Link" Interface

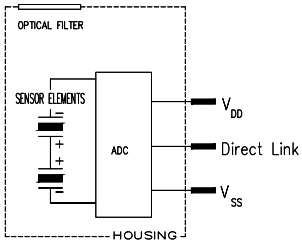
Product Description

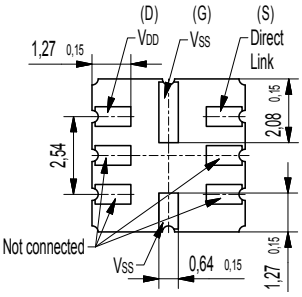
The PYD 5190 Pyrodetector features a tiny, Dual-Element Pyro in SMD form. With the PYD 5790, Excelitas extends the growing DigiPyro® Family to the SMD form factor. Both models are fit with small pyroelectric elements, 0.7x1.5 mm in size. The SMD line is not designed as a 1-to-1 replacement for TO housing versions.
Whereas the PYD 5190 offers standard FET analog output, the PYD 5790 model offers the same "Direct Link" interface as Excelitas' PYD 1798 DigPyro®.
The small dimensions of the SMD housing, in combination with a reduced element size and spacing, will enable customers to reduce the optical footprint, and design smaller motion detection units for newer, energy-conserving Consumer Electronic applications.

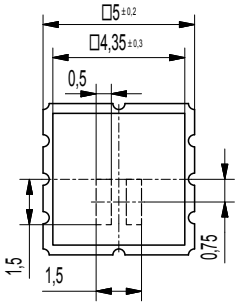
PYD 5190

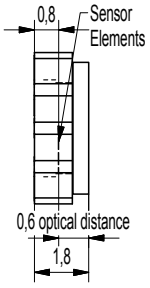


PYD 5790









PYD 5190 and PYD 5790					
Main Parameter	**Symbol**	**PYD 5790**	**PYD 5190**	**Unit**	**Remarks**
Responsivity, min.	R_{min}	7.5	6.5	kV/W	f = 1 Hz
Responsivity, typ.	R	10	8.5	kV/W	f = 1 Hz
Match, max.	M_{max}	10	10	%	
Noise	N_{max}	150	150	μV_{pp}	0,4…10Hz/20°C
	N_{typ}	60	60		
Field of View, horizontal	FoV	133°			unobstr.
Field of View, vertical		(79+33)°	133°		non symmetric, unobstr.
			(79+33)°		
Source voltage		-	0,2 … 1,5		47 KO, 20°C
Operating Voltage	V_{DD}	2,7…3,6	2,0…10	V	20°C
Supply Current	I_{DD}	10		µA	V_{DD} = 3,3V
	I_{DDmax}	15		µA	V_{DD} = 3,3V
Digital Data					
Serial Interface Update Time	t_{REP}	2	-	ms	speed / interrupt
ADC Resolution		14	-	Bits	max. Count = 2^{14}-1
Output Data Format		2x14	-	Bits	
ADC Sensitivity		6-7	-	µV/count	
ADC Output Offset		6500 - 9800	-	counts	
ADC Output Offset, typ.		8192	-	counts	
Temperature Reference					
Gain (Temperature)		80	-	Counts/K	-20°C to +80°C
Linearity		-5…+5	-	%	-20°C to +80°C
Filter, Signal Processing			-		
Digital Filter, cut off		10	-	Hz	

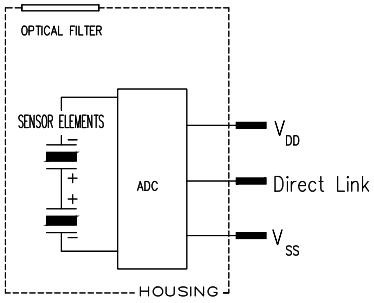
Digital, Dual-Element Pyros
For Motion Sensing

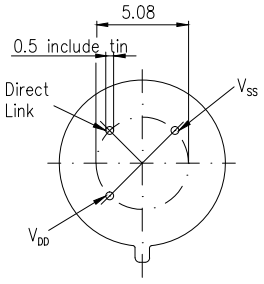
PYD 1788, PYD 1798 – DigiPyro®

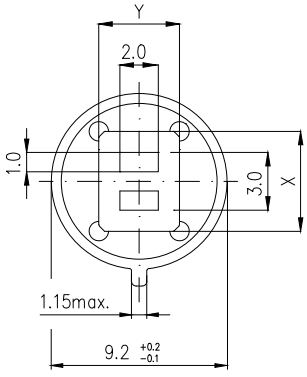
Applications
- Passive Intrusion Alarms
- Automatic Light Switching
- Automatic Lamps

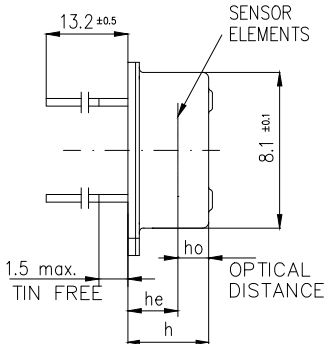
Features and Benefits
- TO-5 metal housing
- Digital "Direct Link"
- Different window sizes
- Excellent EMI protection

Product Description
The DigiPyro® detector range in TO-5 housings includes several Dual-Element models with different window sizes. The element configurations are identical, along with their internal electronic circuits. The PYD 1788 is a lower-cost version with standard window, while the PYD 1798 model offers better White Light Immunity (WLI) performance and Field of View. Both the PYD 1788 and PYD 1798 models include a built-in temperature reference. The Output signals are communicated in one digital bit stream of 2x14 bit, output via a single wire "Direct Link" connection to a suitable host microprocessor.









PYD 1798 and PYD 1788					
Parameter	**Symbol**	**PYD 1798**	**PYD 1788**	**Unit**	**Remarks**
Responsivity, min.	R_{min}	3.3	3.3	kV/W	f = 1 Hz
Responsivity, typ.	R	4	4	kV/W	f = 1 Hz
Match, max.	M_{max}	10	10	%	
Noise	N, N_{max}	78/20	78/20	μV_{pp}	
Field of View, vertical	FoV	110°	95°		unobstructed
Field of View, horizontal	FoV	110°	90°		unobstructed
WLI		***	**		PKI tester
Height	h	4.2	4.2	mm	
Optical Element Location	he/ho	3,1 / 0,7	3,1 / 0,7	mm	
Filter Size	X / Y	5,2 / 4,2	4,6 / 3,4	mm	
Digital Data					
Operating Voltage	V_{DD}	2,7…3,6	2,7…3,6	V	
Supply Current	I_{DD}	10	10	µA	V_{DD}=3,3V
	I_{DDmax}	15	15	µA	V_{DD}=3,3V
Serial Interface Update Time	t_{REP}	2 / 13	2 / 13	ms	speed / interrupt
ADC Resolution		14	14	Bits	
Output Data Format		2 x 14	2 x 14	Bits	MSB first
ADC Sensitivity		6…7	6…7	µV/count	
ADC Output Offset		7000…9200	7000…9200	counts	
ADC Output Offset, typ.		8192	8192	counts	

Digital, Pyroelectric Four-Element Detectors

For Motion Sensing

PYQ 2898 – DigiPyro® (2+1) Channel

Applications

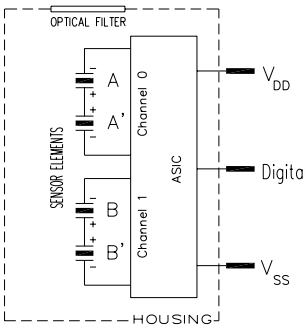
- Passive Intrusion Alarms
- High-End Motion Sensing
- Ceiling-Mount Sensors

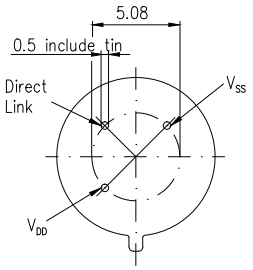
Features and Benefits

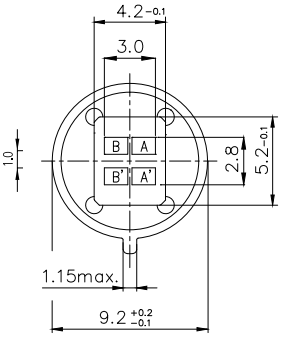
- Digital "Direct Link"
- Different window sizes
- Different Element configurations
- Excellent EMI protection

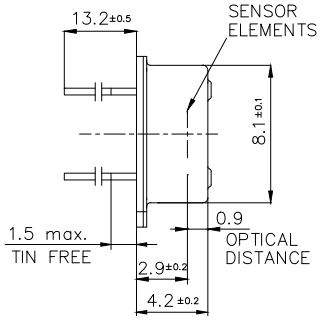
Product Description

This design of DigiPyro® detectors in TO-5 housings includes the serial 2+1 signal output, which provide two signal outputs of the 2-element pairs and, additionally, the output of the temperature reference. All 3 channels are part of one 42-bit digital bit stream, output via a single wire "Direct Link" connection to a suitable host microprocessor.









PYQ 2898			
Main Parameter	**PYQ 2898**	**Unit**	**Remarks**
Responsivity, min.	3.5	kV/W	f = 1 Hz
Responsivity, typ.	4.5	kV/W	f = 1 Hz
Match, max.	10	%	
Field of View, horizontal	96°		unobstr.
Field of View, vertical	56°		unobstr.
Operating Voltage	2,7…3,6	V	
Supply Current	10	µA	V_{DD} = 3,3V
	15	µA	V_{DD} = 3,3V
Digital Data			
Serial Interface Update Time	2 / 14	ms	speed / interrupt
ADC Resolution	14	Bits	max. Count = 2^{14}-1
Output Data Format	3 x 14	Bits	
ADC Sensitivity	6,1…7	µV/count	
ADC Output Offset	7000…9200	counts	
ADC Output Offset, typ.	8192	counts	
Noise, max. / typ.	80 / 30	μV_{pp}	0,4…10Hz/20°C
Temperature Reference			
Gain (Temperature)	80	Counts/K	-20°C to +80°C
Linearity	-5…+5	%	-20°C to +80°C
Filter, Signal Processing			
Digital Filter, cut off	8	Hz	

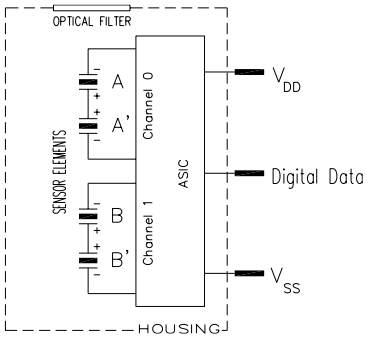
Digital, Pyroelectric Four-Element Detectors
For Motion Sensing

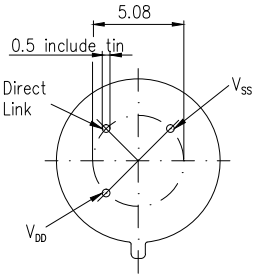
PYQ 5868, PYQ 5848 – DigiPyro® (2+1) Channel

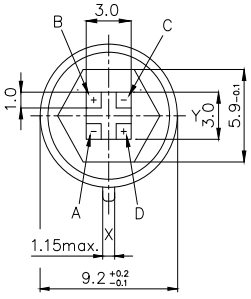
Applications
- Passive Intrusion Alarms
- High-End Motion Sensing
- Ceiling-Mount Sensors

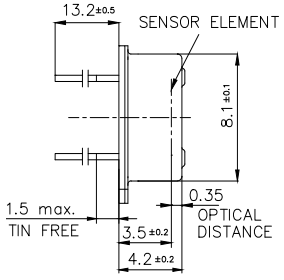
Features and Benefits
- Digital "Direct Link"
- Different window sizes
- Different Element configurations
- Excellent EMI protection

Product Description
The PYQ 5868 with "Quad" configuration provides two independent Dual-Element signals in a diagonal geometric arrangement. For Ceiling-mount applications with suitable ceiling-mount design optics, this enables separate signal processing for the two channels to provide signal levels independent of movement direction. Due to its larger window, the PYQ 5868 model offers a wide Field of View.

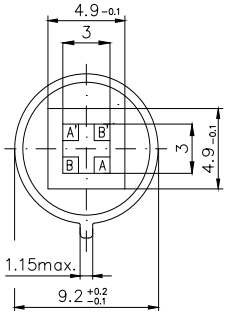


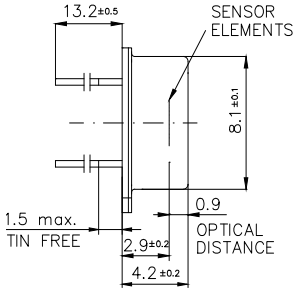






PYQ 5868





PYQ 5848

PYQ 5848 and PYQ 5868				
Main Parameter	**PYQ 5848**	**PYQ 5868**	**Unit**	**Remarks**
Responsivity, min.	6,0	6,0	kV/W	f = 1 Hz
Responsivity, typ.	8,0	8,0	kV/W	f = 1 Hz
Match, max.	10	10	%	
Field of View, horizontal	110°	110°		unobstr.
Field of View, vertical	110°	110°		unobstr.
Operating Voltage	2,7…3,6	2,7…3,6	V	
Supply Current	10	10	µA	V_{DD} = 3,3V
	15	15	µA	V_{DD} = 3,3V
Digital Data				
Serial Interface Update Time	2 / 14	2 / 14	ms	speed / interrupt
ADC Resolution	14	14	Bits	max. Count = 2^{14}-1
Output Data Format	3 x 14	3 x 14	Bits	
ADC Sensitivity	6,1…7	6,1…7	µV/count	
ADC Output Offset	7000…9200	7000…9200	counts	
ADC Output Offset, typ.	8192	8192	counts	
Noise, max. / typ.	100 / 40	100 / 40	μV_{pp}	0,4…10Hz/20°C
Temperature Reference				
Gain (Temperature)	80	80	Counts/K	-20°C to +80°C
Linearity	-5…+5	-5…+5	%	-20°C to +80°C
Filter, Signal Processing				
Digital Filter, cut off	8	8	Hz	

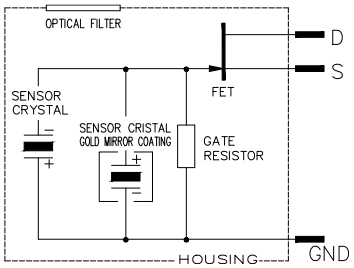
Single-Element Pyro Detectors
For Gas Monitoring

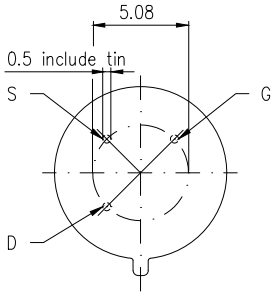
LHi 807, PYS 4198 – High-Sensitivity Pyros

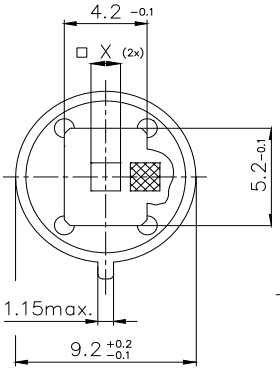
Applications
- Gas Sensing and Monitoring

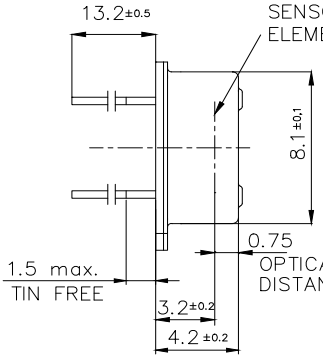
Features and Benefits
- TO-5 metal housing
- Selection of narrow band Filters
- Thermal Compensation

Product Description
The LHi 807 TC series has become a standard solution for gas-sensing applications. It is available with a range of narrow band filters, as specified on page 4 of this brochure, for various gas species. The LHi 807 is usually supplied with temperature compensation by a separate “blind” sensing element.
Similar features and benefits are included with the PYS 4198, which has a large element size of 2x2 to offer more signal for non-focused optical systems. It is offered with the thermal compensation element to compensate for thermal effects caused by temperature changes of the housing.









LHI 807 TC and PYS 4198 TC

Parameter	Symbol	LHI 807 TC	PYS 4198 TC	Unit	Remarks
Responsivity, min.	R_{min}	2.2	1.2	kV/W	f = 1 Hz
Responsivity, typ.	R	3.5	2.0	kV/W	f = 1 Hz
Match, max.	M_{max}	-	-	%	
Noise, max.	N_{max}	50	50	μV_{pp}	0,4…10Hz/20°C
Noise, typ.	N	15	10	μV_{pp}	0,4…10Hz/20°C
spec. Detectivity	D*	17		107cm*√Hz/W	1Hz/ 1Hz BW
Field of View, horizontal	FoV	135°	130°		unobstructed
Field of View, vertical		122°	105°		unobstructed
Source Voltage		0,2 … 1,5	0,2 … 1,5	V	47 KO, 20°C
Height	h	4.2	4.2	mm	
Optical Element Location	he /ho	3,2 / 0,75	2,9 / 1,1	mm	
Filter Size	X/Y	5,2 / 4,2	5,2 / 4,2	mm	

Pyrodetectors

For Gas Monitoring And Measuring

PYS 3228, PYS 3428 – Dual-Channel Pyros

Applications

- Gas Sensing and Monitoring

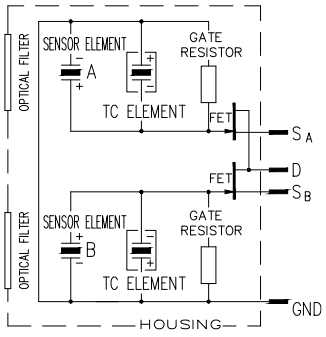
Features and Benefits

- TO-5 metal housing
- Dual Channel Output
- Each Channel with individual Filter Window
- Selection of narrow band pass filters
- Thermal Compensation option

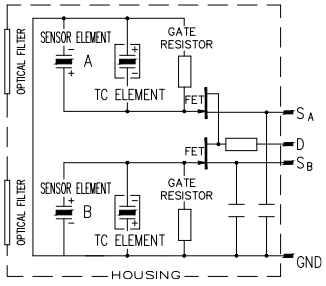
Product Description

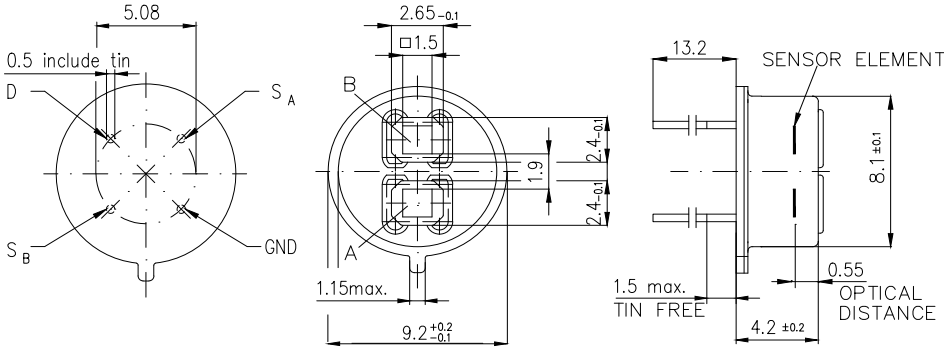
As the successor to the LHi 814 series, the PYS 3x28 Dual-Channel detectors have become standard for gas sensing applications, with two, individual 1.5 x 1.5 elements, and with additional temperature compensation. They are available with a range of narrow band pass filters, as specified on page 4, in combination with a reference filter. The same features are included with the PYS 3428, which offers additional EMI protection by internal capacitors.

PYS 3228



PYS 3428





PYS 3228 and PYS 3428

Parameter	Symbol	PYS 3228	PYS 3428	Unit	Remarks
Operation Voltage	V_{DD}	2-12	2-12	V	
Responsivity, min.	R_{min}	2.2	3.5	kV/W	f = 1 Hz
Responsivity, typ.	R	3.5	5.0	kV/W	f = 1 Hz
Match, max.	M_{max}	-	-	%	
Noise, max.	N_{max}	50	50	μV_{pp}	0,4…10Hz/20°C
Noise, typ.	N	15	20	μV_{pp}	0,4…10Hz/20°C
spec. Detectivity	D*			107cm*√Hz/W	1Hz/ 1Hz BW
Field of View, horizontal	FoV	77	77		unobstructed
Field of View, vertical					unobstructed
Source Voltage			0,2…1,5	V	47 KO, 20°C
EMI Performance			***		
Height	h	4.2	4.2	mm	
Optical Element Location	he /ho	/ 0,55	/ 0,55	mm	
Filter Size	X/Y	2,65 / 2,4	2,65 / 2,4	mm	

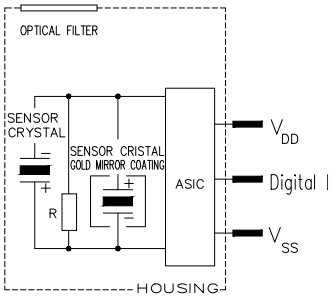
Single-Element Pyro Detectors
For Gas Monitoring And Measuring

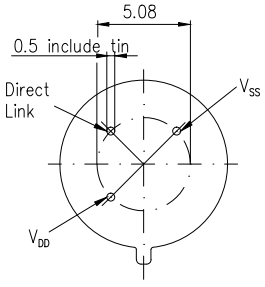
PYS 3798 – (1+1) Channel DigiPyro®

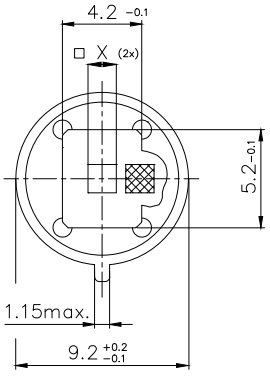
Applications
- Gas Sensing and Monitoring

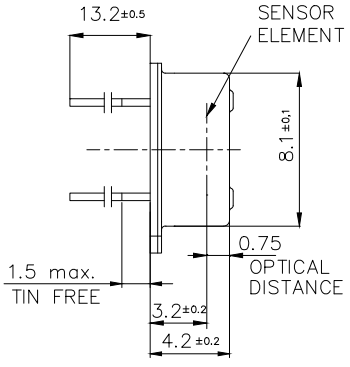
Features and Benefits
- Digital Output
- Internal Temperature reference
- TO-5 metal housing
- Selection of narrow band pass filters

Product Description
Excelitas has extended its growing family of DigiPyro® detectors to applications in gas sensing. The PYS 3798 is the digital equivalent to the LHi 807. The PYS 3798 additionally includes the temperature reference as a separate output. The two signals are presented in one 28-bit digital bit stream, communicated via a single wire "Direct Link" interface, to a suitable host microprocessor.









PYS 3798				
Parameter	**Symbol**	**PYS 3798**	**Unit**	**Remarks**
Responsivity, min.	R_{min}	2.2	kV/W	f = 1 Hz
Responsivity, typ.	R	3.5	kV/W	f = 1 Hz
Match, max.	M_{max}	-	%	
Field of View, horizontal	FoV	135°		unobstructed
Field of View, vertical	FoV	122°		unobstructed
Operating Voltage	V_{DD}		V	
Supply Current	I_{DD}	10	µA	V_{DD} = 3,3V
	I_{DDmax}	15	µA	V_{DD} = 3,3V
Digital Data				
Serial Interface Update Time	t_{REP}	13	ms	speed / interrupt
ADC Resolution		14	Bits	max. Count = 2^{14}-1
Output Data Format		2 x 14	Bits	
ADC Sensitivity		6…7	µV/count	
ADC Output Offset		7000…9200	counts	
ADC Output Offset, typ.		8192	counts	
Noise, max.		80	$µV_{pp}$	0,4…10Hz/20°C
Temperature Reference				
Gain (Temperature)		80	Counts/K	-20°C to +80°C
Linearity		-5…+5	%	-20°C to +80°C
Filter, Signal Processing				
Digital Filter, cut off		8	Hz	

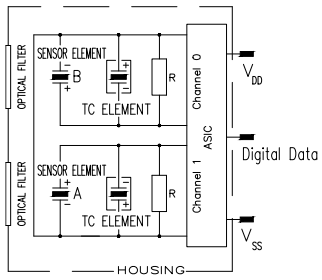
Pyrodetectors
For Gas Monitoring And Measuring

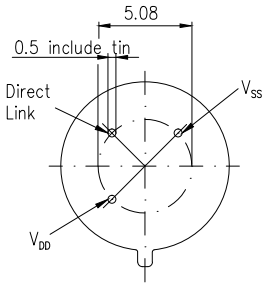
PYS 3828 – (2+1) Channel DigiPyro®

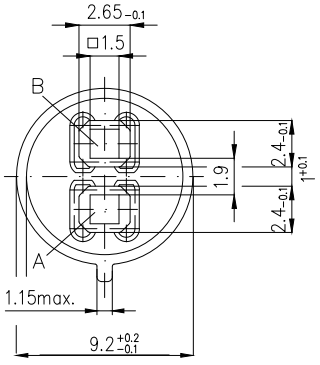
Applications
- Gas Sensing and Monitoring

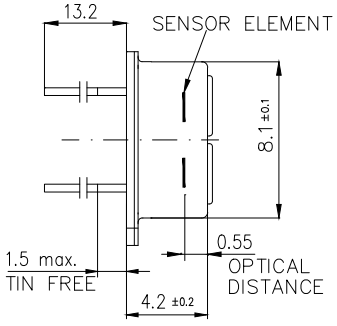
Features and Benefits
- Digital Output
- Two optical channels
- Temperature. reference channel
- Temperature-compensated elements
- Selection of narrow band pass filters
- TO-5 metal housing

Product Description
Excelitas has extended its family of DigiPyro® detectors to applications in gas sensing. This series includes a special Triple-Channel version in which two channels with individual optical (narrow band) windows and an additional temperature reference signal are provided. All three channels are output in one 42-bit digital bit stream, communicated via a single wire "Direct Link" interface, to a suitable host microprocessor.





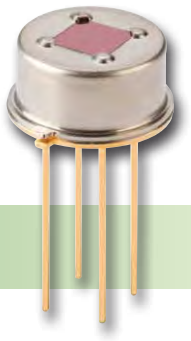




PYS 3828				
Parameter	**Symbol**	**PYS 3828**	**Unit**	**Remarks**
Responsivity, min.	R_{min}	3.3	kV/W	f = 1 Hz
Responsivity, typ.	R	4	kV/W	f = 1 Hz
Match, max.	M_{max}	10	%	
Field of View, horizontal	FoV	70°		unobstructed
Field of View, vertical	FoV	85°		unobstructed
Operating Voltage	V_{DD}	2,7…3,6	V	
Supply Current	I_{DD}	12	µA	V_{DD} = 3,3V
	I_{DDmax}	15	µA	V_{DD} = 3,3V
Digital Data				
Serial Interface Update Time	t_{REP}	2 / 14	ms	speed / interrupt
ADC Resolution		14	Bits	max. Count = 214-1
Output Data Format		3 x 14	Bits	
ADC Sensitivity		6,1…7	µV/count	
ADC Output Offset		7000…9200	counts	
ADC Output Offset, typ.		8192	counts	
Noise, max.		80	$µV_{pp}$	0,4…10Hz/20°C
Temperature Reference				
Gain (Temperature)		80	Counts/K	-20°C to +80°C
Linearity		-5…+5	%	-20°C to +80°C
Filter, Signal Processing				
Digital Filter, cut off		8	Hz	

Thermopile Detectors

For Measurement And Gas Sensing



TPiD 1T 0625 – High-Sensitivity Thermopiles

Applications

- Pyrometers
- Gas Sensing and Monitoring

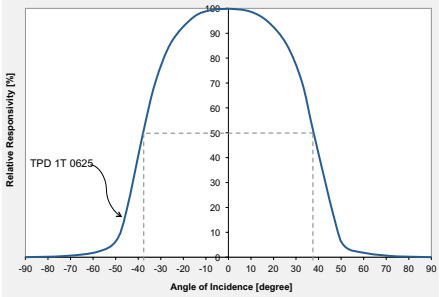
Features and Benefits

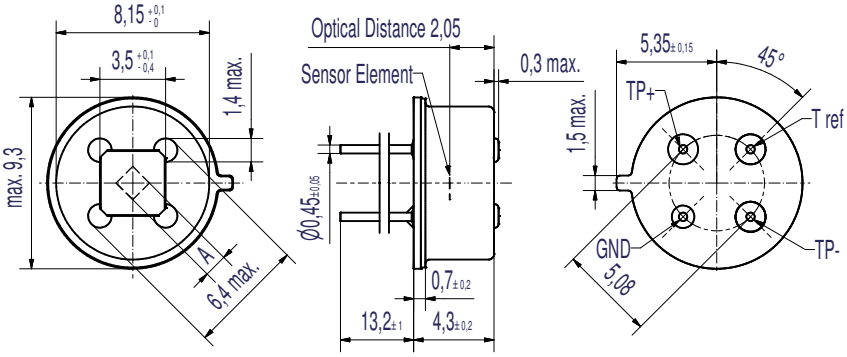
- High Sensitivity
- TO-5 metal housing
- Thermistor included
- Narrow band pass filter options

Product Description

This thermopile detector is specially designed for high signal output levels. It is equipped with an internal Thermistor, serving as a temperature reference for thermopile temperature compensation. The detector is offered in a TO-5 housing with square size window. It can be obtained with either standard IR window or optionally with narrow band pass filter window G1…G5, as per page 5 of this brochure. With the narrow band pass filters, these detectors are an excellent choice for gas monitoring and detection applications.

Field of View

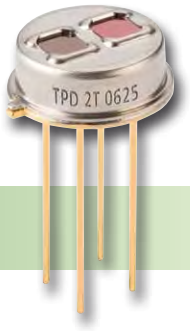




TPiD 1T 0625

Parameter	Symbol	TPiD 1T 0625	Unit	Remarks
Sensitive Area	A	1.2 x 1.2	mm	Absorber Area
Sensitive Area	A	1.4	mm^2	Absorber Area
Thermopile Resistance	R_{TP}	50…110	kΩ	25°C
Responsivity	R	33	V/W	500°/ 1Hz/ Without IR-filter
Time Costant	t	27	ms	
Noise Voltage	V_n	36	$_nV/\sqrt{Hz}$	25°C
Specific Detectivity	D*	1.1	10^8 $cm\sqrt{Hz}/W$	25°C
Temp. Coefficient of Resistance	TC_{RTP}	0,03	%/K	
Temp. Coefficient of Responsivity	TC_R	-0,05	%/K	
Field of view	FoV	76	Degrees	at 50% intensity points
Thermistor resistance (25°C)	R_{25}	100	kΩ	25 °C
Thermistor BETA-value	β	3964	K	defined at 25 °C / 100 °C

Thermopile Detectors
For Measurement And Gas Sensing



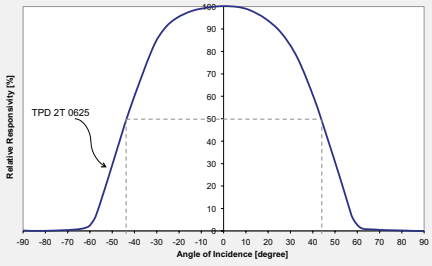
TPD 2T 0625 – Dual-Channel Thermopile

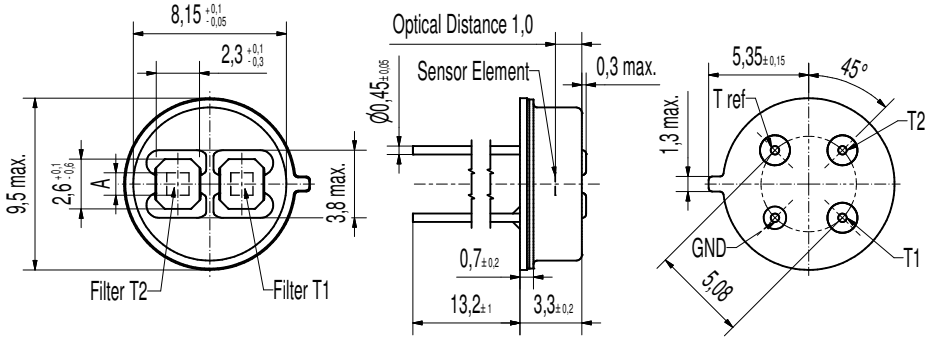
Applications
- Gas Sensing and Monitoring

Features and Benefits
- High Sensitivity
- TO-5 metal housing
- Thermistor included
- 2 narrow band pass filters

Product Description
This specially-designed thermopile detector offers Dual-Channel performance in a TO-39 housing with two individual optical windows. Typically one window is fitted with a reference filter G20, whereas the other window is fitted with a narrow band pass filter selected for a specific gas (see page 5 of this brochure for available selection). The TPD 2T 0625 is also equipped standard, with an internal Thermistor as a temperature reference for thermopile temperature compensation.

Field of View

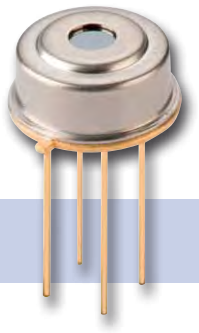




TPD 2T 0625

Parameter	Symbol	TPiD 2T 0625	Unit	Remarks
Sensitive Area	A	1.2 x 1.2	mm	Absorber Area
Sensitive Area	A	1.40	mm2	Absorber Area
Thermopile Resistance	R_{TP}	50…110	kΩ	25°C
Responsivity	R	33	V/W	500°/ 1Hz/ Without IR-filter
		-	µV/K	
		-	µV/K	
Time Costant	t	27	ms	
Noise Voltage	V_n	36	$_nV/\sqrt{Hz}$	25°C
Specific Detectivity	D*	1.1	10^8 cm$\sqrt{Hz}$/W	25°C
Temp. Coefficient of Resistance	TC_{RTP}	0,03	%/K	
Temp. Coefficient of Responsivity	TC_R	-0,05	%/K	
Field of view	FoV	87	Degrees	at 50% intensity points
Thermistor resistance (25°C)	R_{25}	100	kΩ	25 °C
Thermistor BETA-value	β	3964	K	defined at 25 °C / 100 °C

ISOthermal Detectors
For Measurement



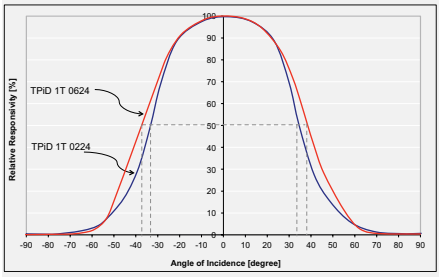
TPiD 1T 0224, TPiD 1T 0624 – Thermopile Detectors

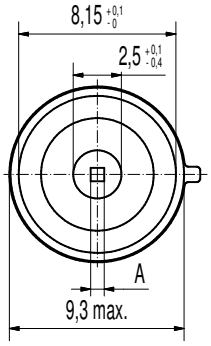
Applications
- Non-contact Temperature measurements
- Pyrometry

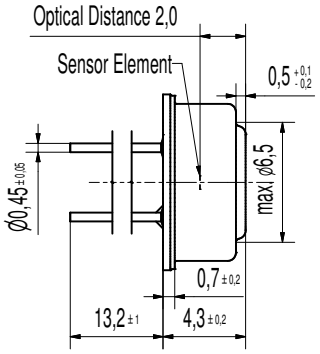
Features and Benefits
- ISOthermal performance
- TO-5 metal housing
- Thermistor included

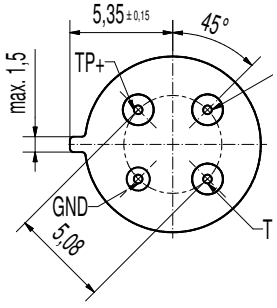
Product Description
Excelitas has now extended its range of ISOthermal Thermopile Detectors in TO-5 type housings with this series. The patent-protected ISOthermal feature provides improved system performance when subjected to thermal shock conditions.
Both models are provided with a round window, which also serves as an aperture. Each features a specially-designed element configuration with a different size absorbing area. The TPiD 1T 0224 provides the smaller absorbing area, while the TPiD 1T 0624 model offers the larger absorbing sensor area. Both types are equipped - standard - with an internal Thermistor as a temperature reference for thermopile temperature compensation.

Field of View









TPiD 1T 0224 and TPiD 1T 0624

Parameter	Symbol	TPiD 1T 0224	TPiD 1T 0624	Unit	Remark
Sensitive Area	A	0.7 x 0.7	1.2 x 1.2	mm	Absorber Area
Sensitive Area	A	0.5	1.4	mm2	Absorber Area
Thermopile Resistance	R_{TP}	50…100	50…110	kΩ	25°C
Responsivity	R	45	33	V/W	500°/ 1Hz/ Without IR-filter
Sensitivity (Tdet 25 °C / T_{obj} 40 °C)	S_{40}	50	92		With standard filter (LWP, cut-on 5.5 µm)
Sensitivity (T_{det} 25 °C / T_{obj} 100 °C)	S_{100}	65	120		With standard filter (LWP, cut-on 5.5 µm)
Time Costant	t	22	27	ms	
Noise Voltage	V_n	35	36	$_nV/\sqrt{Hz}$	25°C
Specific Detectivity	D*	0.9	1.1	10^8 cm$\sqrt{Hz/W}$	25°C
Temp. Coefficient of Resistance	TC_{RTP}	0,03	0,03	%/K	
Temp. Coefficient of Responsivity	TC_R	-0,05	-0,05	%/K	
Field of view	FoV	70	76	Degrees	at 50% intensity points
Thermistor resistance (25°C)	R_{25}	100	100	kΩ	25 °C
Thermistor BETA-value	β	3964	3964	K	defined at 25 °C / 100 °C

Thermopile Detectors
With Integral Optics

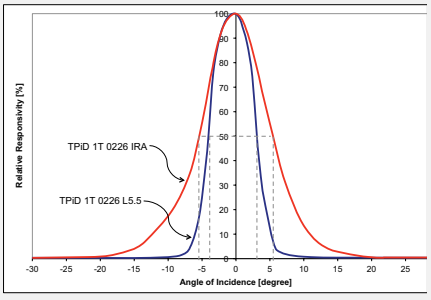
TPD 1T 0226 IRA, TPiD 1T 0226 L5.5 – High-Performance Thermopiles

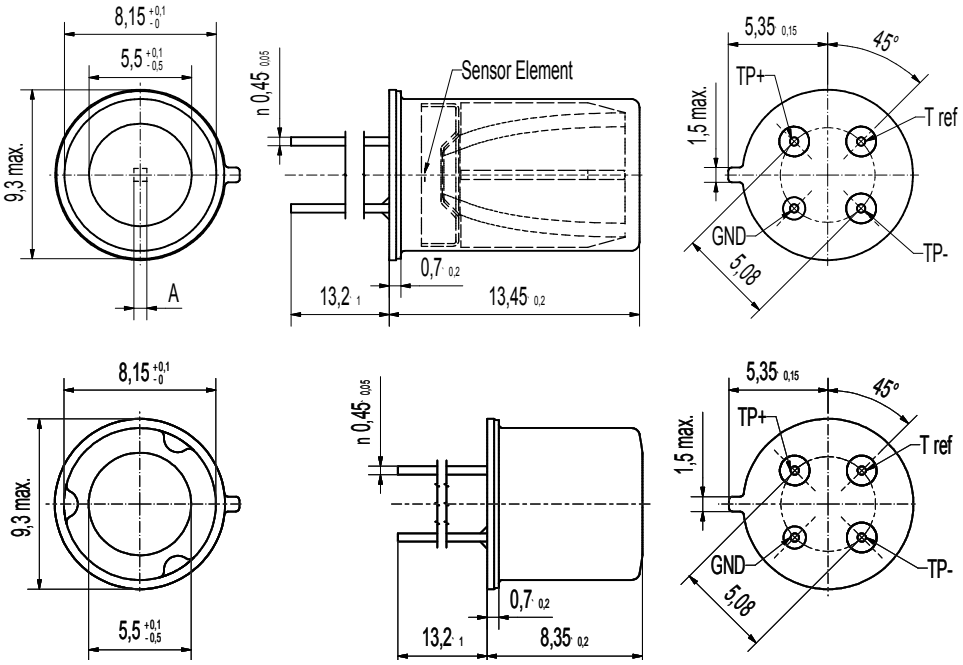
Applications
- Non-contact Temperature measurements
- Thermometry

Features and Benefits
- TO-type metal housing
- Optics included
- Thermistor included

Product Description
The -IRA type thermopile is specially suited with an internal reflector that reduces the field of view and offers a smaller measurement "target" spot than conventional detectors without optics. Due to the reflector, the housing size is taller than other types, although the housing has the same diameter as a standard TO-5 housing. The TPiD 1T 0224 L5.5 provides the ISOthermal performance feature and integral optics. A built-in internal lens provides a field of view slightly sharper than the -IRA type. All versions are equipped - standard - with an internal Thermistor as a temperature reference for thermopile temperature compensation.

Field of View



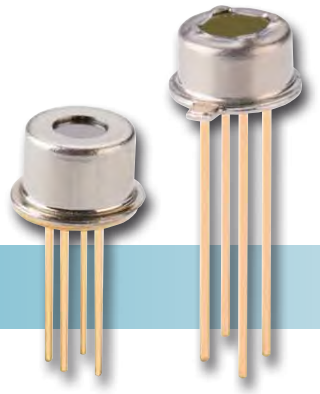


TPiD 1T 0226 L5.5 and TPD 0226 IRA

Parameter	Symbol	TPD 0226 IRA	TPiD 1T 0226 L5.5	Unit	Remarks
Sensitive Area	A	0.7 x 0.7	0.7 x 0.7	mm	Absorber Area
Sensitive Area	A	0.5	0.5	mm2	Absorber Area
Thermopile Resistance	R_{TP}	50…100	50…100	kΩ	25°C
Responsivity	R	45	45	V/W	500°/ 1Hz/ Without IR-filter
Time Costant	t	22	22	ms	
Noise Voltage	Vn	35	35	nV/√Hz	25°C
Specific Detectivity	D*	0.9	0.9	10^8 cm√Hz/W	25°C
Temp. Coefficient of Resistance	TC_{RTP}	0,03	0,03	%/K	
Temp. Coefficient of Responsivity	TC_R	-0,05	-0,05	%/K	
Field of view	FoV	15	7	Degrees	at 50% intensity points
Thermistor resistance (25°C)	R_{25}	100	100	kΩ	25 °C
Thermistor BETA-value	β	3964	3964	K	defined at 25 °C / 100 °C

Miniature Thermopile Detectors

For Gas Sensing And Measurement



TPD 1T 0223, TPD 1T 0122, TPD 1T 0623 Thermopile Detector

Applications

- Non-contact Temperature measurements
- IR-based Gas Sensors

Features and Benefits

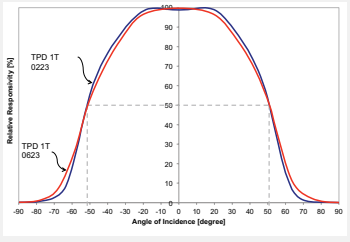
- TO-46 metal housing
- Square window
- Optical Filter options
- Thermistor included

Product Description

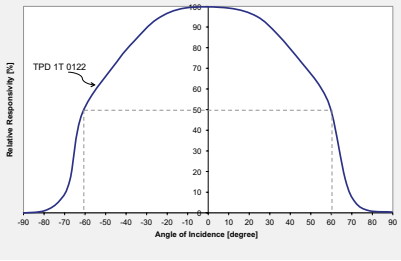
This is our range of general-purpose, Miniature Thermopile Detectors in 4.7 mm diameter TO-46 type housings, featuring a specially-designed element configuration, each with a different size absorbing area. The window is available as standard infrared or with an optional narrow band pass filter, as per page 5 for gas sensing applications. Standard window size is round or square. With the narrowband filters, a square window is provided.

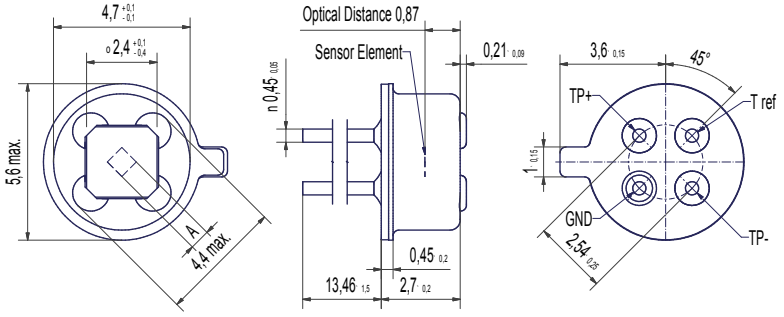
The TPD 1T 0223 and TPD 1T 0122 provide the smallest absorbing areas, while the TPD 1T 0623 model is a larger design offering strong signals. All models are equipped - standard - with an internal Thermistor as a temperature reference for thermopile temperature compensation.

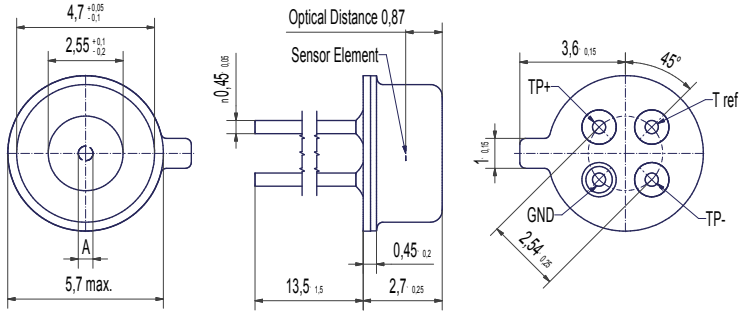
Field of View TPD 1T 0223, TPD 1T 0623



Field of View TPD 1T 0122





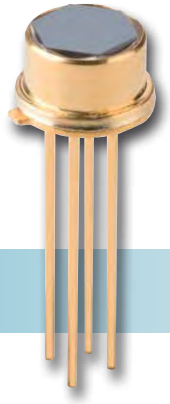


TPD 1T 0223, TPD 1T 0623 and TPD 0122

Parameter	Symbol	TPD 1T 0223	TPD 1T 0623	TPD 0122	Remarks
Sensitive Area	A	0.7 x 0.7	1.2 x 1.2	Ø 0.5	Absorber Area
Sensitive Area	A	0.5	1.4	0.2	Absorber Area
Thermopile Resistance	R_{TP}	50…100	50…110	85…135	25°C
Responsivity	R	45	33	77	500°/ 1Hz/ Without IR-filter
Sensitivity (T_{det} 25 °C / T_{obj} 40 °C)	S_{40}	88	133	43	With standard filter (LWP, cut-on 5.5 µm)
Sensitivity (T_{det} 25 °C / T_{obj} 100 °C)	S_{100}	116	177	56	With standard filter (LWP, cut-on 5.5 µm)
Time Costant	t	22	27	15	
Noise Voltage	V_n	35	36	42	25°C
Specific Detectivity	D*	0.9	1.1	0.8	25°C
Temp. Coefficient of Resistance	TC_{RTP}	0,03	0,03	0,03	
Temp. Coefficient of Responsivity	TC_R	-0,05	-0,05	-0,05	
Field of view	FoV	104	104	120	at 50% intensity points
Thermistor resistance (25°C)	R_{25}	100	100	100	25 °C
Thermistor BETA-value	β	3964	3964	3964	defined at 25 °C / 100 °C

ISOthermal, Miniature Thermopile Detectors

For Ear Thermometry



TPiD 1T 0122B, TPiD 1T 0222B, TPiD 1T 0622B Thermopile Detector

Applications

- Ear Thermometry
- General purpose Thermometry

Features and Benefits

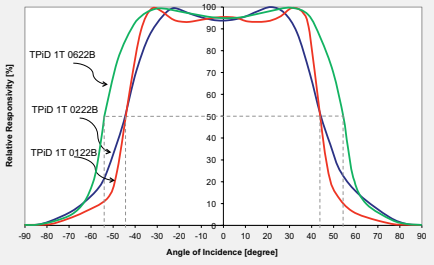
- ISOthermal performance
- Miniature, TO-type metal housing
- Light collecting aperature
- Thermistor included

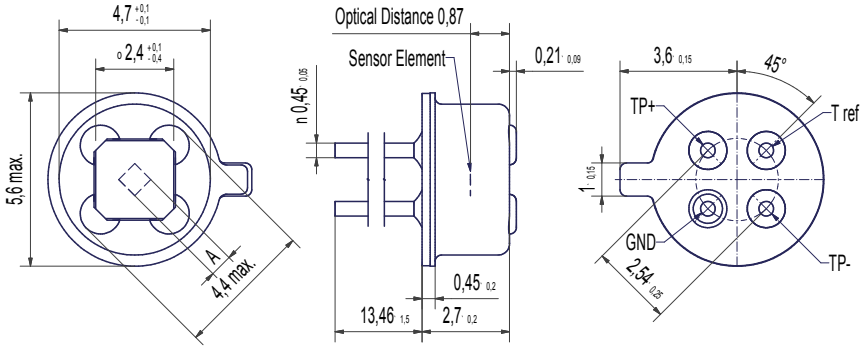
Product Description

As the optimum choice for Ear Thermometry, Excelitas offers thermopile detectors, referenced as ISOthermal detectors. The patented designs provide for superior thermopile performance under thermal shock conditions, and thereby are best suited for ear thermometry.

The range consists of the TPiD 1T 0122B as our low-cost version, with the other versions providing higher signals, either because of high sensitivity element designs or larger element area. The physical dimensions of the ISOthermal sensors are equivalent to our TO-46 sensor housings and include a special aperture. All models are equipped with an internal Thermistor as a temperature reference for thermopile temperature compensation to further improve accuracy.

Field of View

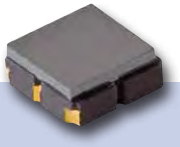




TPiD 0122B, TPiD 0222B and TPiD 0622B					
Parameter	Symbol	TPiD 0122B	TPiD 0222B	TPiD 0622B	Remarks
Sensitive Area	A	Ø 0.5	0.7 x 0.7	1.2 x 1.2	Absorber Area
Sensitive Area	A	0.2	0.5	1.4	Absorber Area
Thermopile Resistance	R_{TP}	85…135	50…100	50…110	25°C
Responsivity	R	92	60	33	500°/ 1Hz/ Without IR-filter
Sensitivity (T_{det} 25 °C / T_{obj} 40 °C)	S_{40}	44	95	126	With standard filter (LWP, cut-on 5.5 µm)
Sensitivity (T_{det} 25 °C / T_{obj} 100 °C)	S_{100}	58	125	140	With standard filter (LWP, cut-on 5.5 µm)
Time Costant	t	15	22	27	
Noise Voltage	V_n	42	35	36	25°C
Specific Detectivity	D*	1.0	1.2	1.1	25°C
Temp. Coefficient of Resistance	TC_{RTP}	0,03	0,03	0,03	
Temp. Coefficient of Responsivity	TC_R	-0,05	-0,05	-0,05	
Field of view	FoV	90	90	110	at 50% intensity points
Thermistor resistance (25°C)	R_{25}	100	100	100	25 °C
Thermistor BETA-value	β	3964	3964	4097	defined at 25 °C / 100 °C

SMD Miniature Thermopile Detectors

For Various Applications



TPiD 1S 0122, TPiD 1S 0122 FM Thermopiles

Applications

- Forehead Thermometry
- General, Non-contact Temperature Sensing
- Small space applications

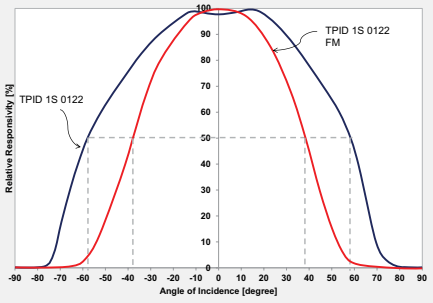
Features and Benefits

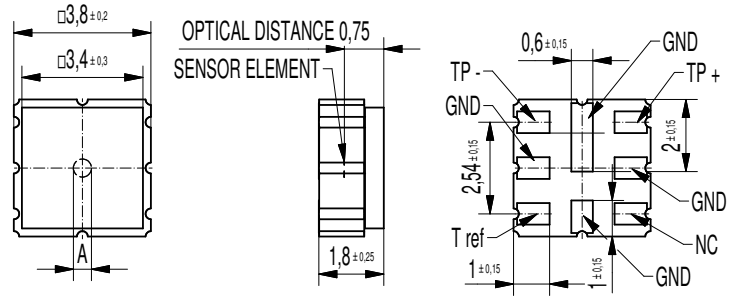
- Miniature SMD housing
- Flat housing
- Thermistor included
- "Tape & Reel" Packaging

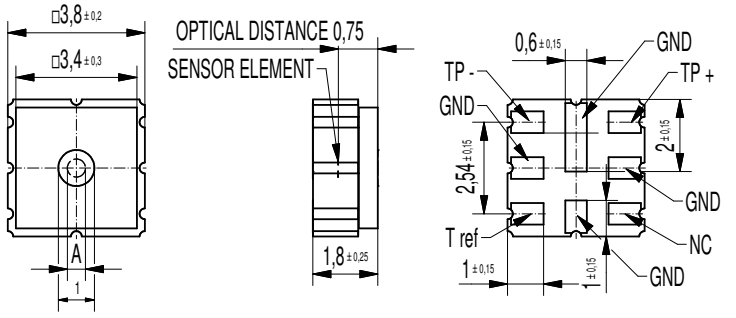
Product Description

Excelitas now offers Thermopile Detectors in compact SMD housings. This enables standard SMT assembly processes and provides for small dimensions. The SMD thermopile models feature our unique, patented ISOthermal performance for delivering excellent performance under thermal shock conditions. These detectors are equipped with an internal Thermistor as a temperature reference for thermopile temperature compensation. The range includes a model which has an aperture to reduce the field of view. All of Excelitas' SMD parts are supplied in volume, in "Tape and Reel" packaging.

Field of View TPiD 1S 0122, TPiD 1S 0122





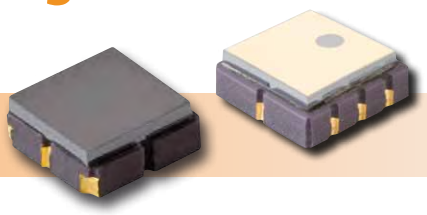


TPiD 1S 0122, TPiD 1S 0122 FM

Parameter	Symbol	TPiD 1S 0122	TPiD 1S 0122 FM	Unit	Remark
Sensitive Area	A	Ø 0.5	Ø 0.5	mm	Absorber Area
Sensitive Area	A	0.196349541	0.196349541	mm2	Absorber Area
Thermopile Resistance	R_{TP}	85…135	85…135	kΩ	25°C
Responsivity	R	77	77	V/W	500°/ 1Hz/ Without IR-filter
Sensitivity (T_{det} 25 °C / T_{obj} 40 °C)	S_{40}	46	-	µV/K	With standard filter (LWP, cut-on 5.5 µm)
Sensitivity (T_{det} 25 °C / T_{obj} 100 °C)	S_{100}	60	-	µV/K	With standard filter (LWP, cut-on 5.5 µm)
Time Costant	t	15	15	ms	
Noise Voltage	V_n	42.4762689	42.4762689	nV/√Hz	25°C
Specific Detectivity	D*	0.8	0.8	108 cm√Hz/W	25°C
Temp. Coefficient of Resistance	TC_{RTP}	0,03	0,03	%/K	
Temp. Coefficient of Responsivity	TC_R	-0,05	-0,05	%/K	
Field of view	FoV	115	75	Degrees	at 50% intensity points
Thermistor resistance (25°C)	R_{25}	100	100	kΩ	25 °C
Thermistor BETA-value	β	4097	4097	K	defined at 25 °C / 100 °C

SMD Sensor With Integrated Processing

For Non-Contact Temperature Measurement



TPiS 1S 0133, TPiS 1S 0133 FM, TPiS 1S 1133 - Thermopile Sensors

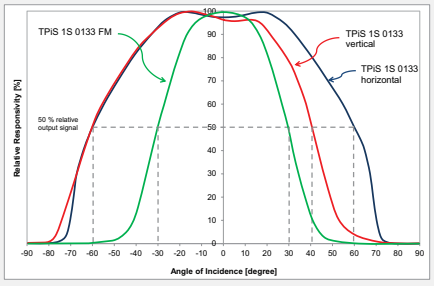
Applications

- General purpose Temperature Monitoring

Features and Benefits

- SMD Housing
- ISOthermal Performance
- Internal Signal Processing
- Factory calibrated
- Available in "Tape and Reel"

Field of View



For the various object temperature ranges we offer following pre-calibrated Sensors:

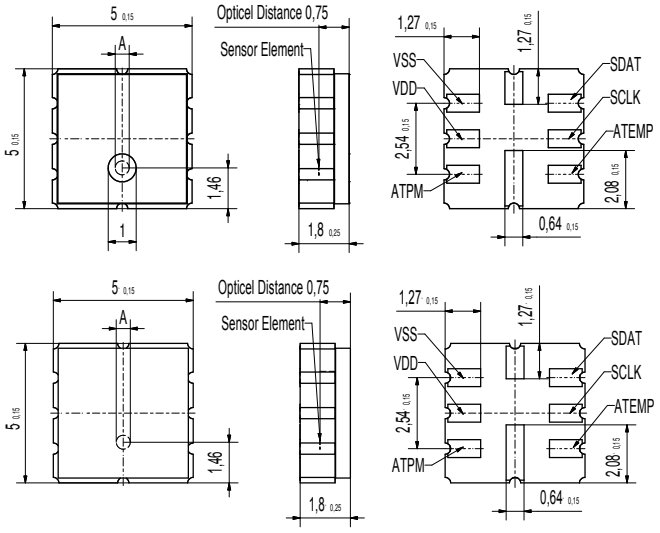
-20...60°C: TPiS 1S 0133 OAA060
-20...120°C: TPiS 1S 0133 OAA120
-20...60°C: TPiS 1S 0133 FM OAA060
-20...120°C: TPiS 1S 0133 FM OAA120

A temperature reference output is included. Upon request, other object temperature ranges can be provided. The sensors can also be supplied as "OBA" versions, without internal temperature compensation.

Product Description

Excelitas now offers the proven concept of TPMI® in SMD housing. It senses the thermal radiation emitted by objects and converts this to an analog voltage. The product is fully factory-calibrated for an accurate signal output over a specified temperature range and includes optional temperature compensation. The internal signal processing, with 8-bit resolution of the control registers and the E2PROM technology, allows for calibration, as per customer requirements. Please specify the correct temperature range needed, when ordering.

The standard configuration offers a wide field of view. For more narrow spot size requirements, we offer the TPiS 1S 0133 FM version with reduced optical Field of View, defined by an optical aperture in the window. By integrating the thermopile and electronic circuit into an industry-standard SMD housing, the TPiS 1S 0133 enables fully-automated "pick and place" and soldering processes associated with the SMD technology.

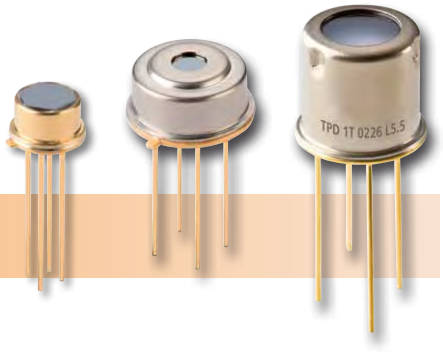


TPiS 1S 0133 and TPiS 1S 0133 FM

Parameter	Symbol	TPiS 1S 0133	TPiS 1S 0133 FM	Unit	Remark
Output Voltage Swing	V_O	0,25...(V_{DD}- 0,25)	0,25...(V_{DD}- 0,25)	V	
Resistive Output Load	R_L	50	50	kW	min.
Object Temp Accuracy		1.5	1.5	K	+ / -
Response Time	t_{resp}	100	100	ms	typ.
Sensitive area	A	Ø 0.5	Ø 0.5	mm	TPiS 1S 01
Field of View	FoV	120	60	°	TPiS 1S 01
Distance to Spot size ratio					
Sensitive area	A				
Field of View	FoV				
Distance to Spot size ratio					
Supply Voltage	V_{DD}	4,5....5,5	4,5....5,5	V	
Supply Current	I_{DD}	1.5	1.5	mA	typ. ; RL > 1MW
Operating Temp range		-25....+100	-25....+100	°C	
Storage Temp range		-40....+100	-40....+100	°C	
ESD tolerance		2.5	2.5	kV	human body model
Soldering Temp		Refer to Page 46 (handling and precautions).		Hz	

DigiPile™ – Thermopile Sensors

For Non-Contact Temperature Measurement



DigiPile™ - TPiS 1T 1252B, TPiS 1T 1256 L5.5, TPS 1T 1254 - Thermopile Sensors with Digital Output

Applications

- Ear Thermometry
- Non-contact Thermometry

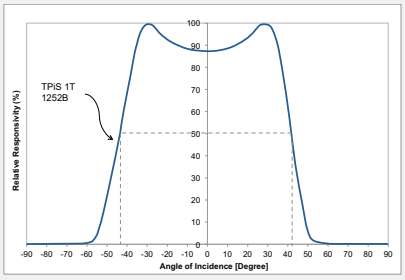
Features and Benefits

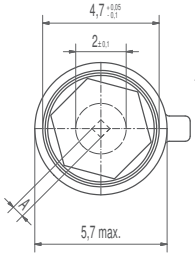
- Digital output
- ISOthermal performance
- Miniature, TO-type metal housing
- Temperature reference output included

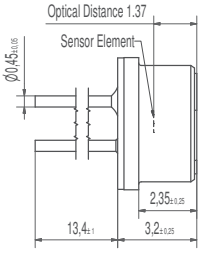
Product Description

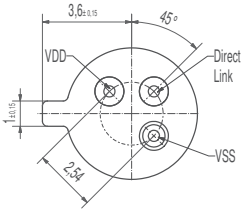
As a part of Excelitas' continuing focus on innovation and digitization, the new DigiPile™ provides for a thermopile with digital, 16-bit output. The complete range of detectors is offered with patent-protected ISOthermal performance. Within the bit stream, the thermopile signal is followed by another signal, given by an internal temperature reference diode. With the digital output, low electric disturbance interference is achieved. Features of the DigiPile™ enable optimum Ear Thermometry designs.

Field of View TPiS 1T 1252B

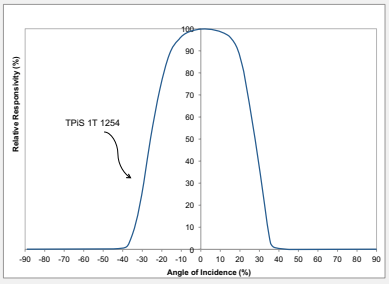


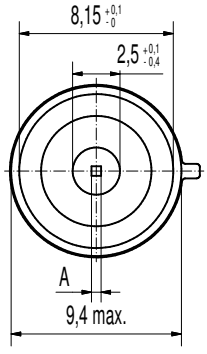


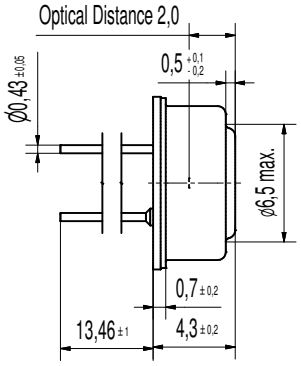


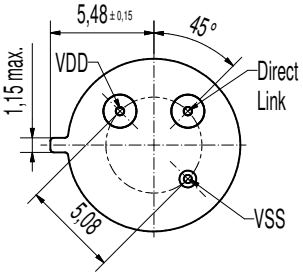


Field of View TPiS 1T 1254

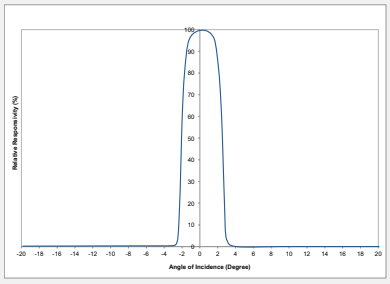


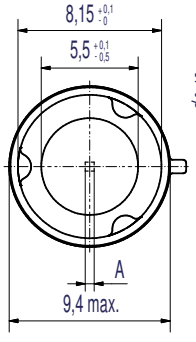


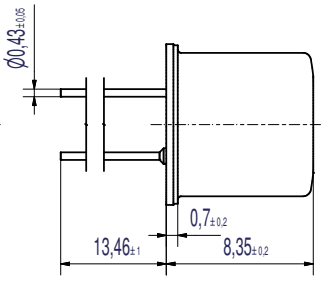


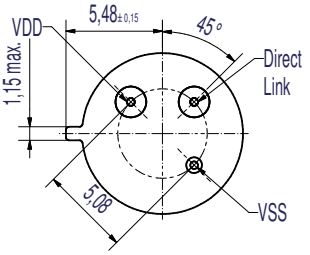


Field of View TPS 1T 1256



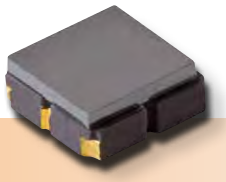






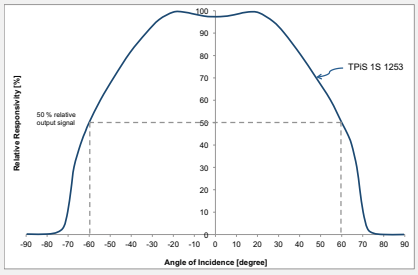
SMD DigiPile™ – Thermopile Sensors

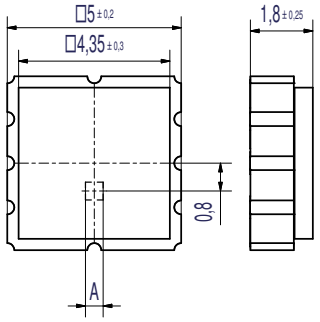
For Non-Contact Temperature Measurement

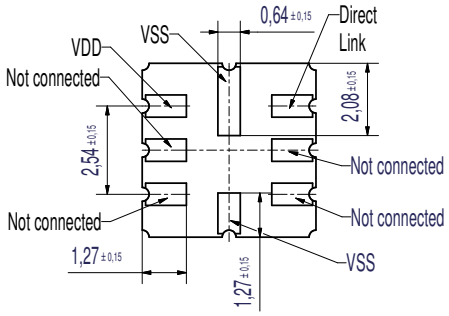


DigiPile™ in SMD - TPiS 1S 1253 - Thermopile Sensor with Digital Output

Field of View TPiS 1S 1253





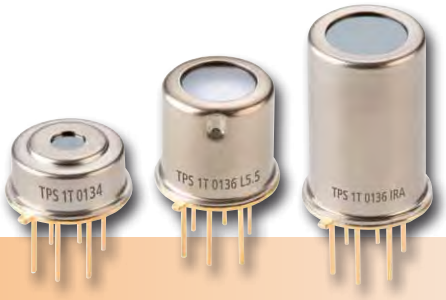


DigiPile™ - TPiS 1T 1252B, TPiS 1T 1256 L5.5, TPS 1T 1254, TPiS 1S 1253

Parameter	Symbol	TPiD 1T 1252B	TPiD 1T 1254	TPiD 1T 1256 L5.5	TPiD 1T 1253	Unit	Remarks / Conditions
Operating Conditions							
Operating Voltage	V_{DD}	2,4…3,6	2,4…3,6	2,4…3,6	2,4…3,6	V	
Supply Current	I_{DD}	11…15	11…15	11…15	11…15	µA	V_{DD} = 3.3 V
Operating Temperature	T_o	-20…70	-20…70	-20…70	-20…70	°C	" parameters may vary from specified values with temperature dependence."
Storage Temperature	T_s	-40…100	-40…100	-40…100	-40…100	°C	Avoid storage in humid environment.
Thermopile Characteristics							
Sensitive Area	A	0,51 x 0,51	0,51 x 0,51	0,51 x 0,51	0,51 x 0,51	mm2	Absorber area
Sensitivity of TP	Dcounts / ΔT	290	150	67	350	counts/K	Tobj = 313K = 40°C, Tamb = 298K = 25°C
		400	200	85	450	counts/K	Tobj = 313K = 100°C, Tamb = 298K = 25°C
Noise of TP		8	8	8	8	counts	Tobj = 313K (=40°C), Tamb = 298K (=25°C)
Time Constant	t	45	45	45	45	ms	
Ambient Temperature sensor							
Sensitivity of Tamb		90	90	90	90	counts/K	Linear for Tamb from 0°C to 90°C
Count @ Tamb = 25°C		7000…9400	7000…9400	7000…9400	7000…9400	counts	Range
Optical Characteristics							
Field of View		84	56	5	120	Degree	At 50% intensity points
Optical Axis		+/- 10	+/- 10	+/- 2	+/- 10	Degree	
Electrical Characteristics							
ADC Resolution Tobj		17	17	17	17	Bits	Max Count = 217
ADC Resolution Tamb		14	14	14	14	Bits	Max Count = 214
ADC Sensitivity of Tobj		0,7…0,9	0,7…0,9	0,7…0,9	0,7…0,9	µV/count	
ADC Offset Tobj		64000…65000	64000…65000	64000…65000	64000…65000	counts	Range
Input Low Voltage	V_{IL}	0.2 V_{DD}	0.2 V_{DD}	0.2 V_{DD}	0.2 V_{DD}	V	
Input High Voltage	V_{IH}	0.8 V_{DD}	0.8 V_{DD}	0.8 V_{DD}	0.8 V_{DD}	V	
Pull Down Current		200	200	200	200	µA	Direct link pin to V_{DD}
Pull Up / Down Current		130	130	130	130	µA	Direct link pin to V_{SS}
LPF Cut-Off Frequency		8	8	8	8	Hz	

ISOthermal Thermopile Sensors

With Integrated Processing And Optics For Non-Contact Temperature Measurement



TPiS 1T 0134, TPiS 1T 0136 L5.5, TPS 1T 0136 IRA – Calibrated Thermopile Sensors (TPMI® Family)

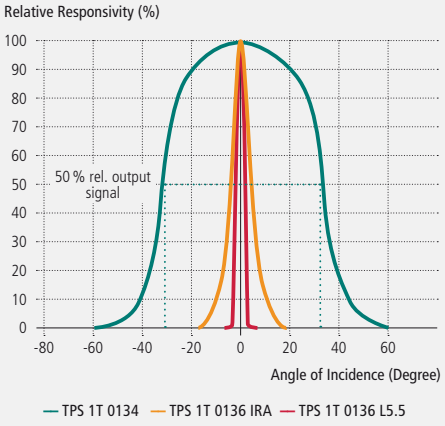
Applications

- General-purpose Temperature Monitoring

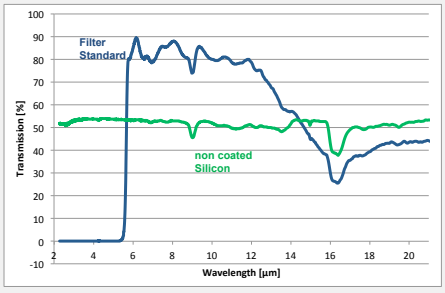
Features and Benefits

- Internal Signal Processing
- Factory-calibrated
- Optics available
- Ambient temperature Compensation

Field of View



Filter



Product Description

This series includes the proven TPMI® concept in TO-5 housings. It senses the thermal radiation emitted by objects and converts this to an analog voltage. The product is fully factory-calibrated for an accurate signal output over a specified temperature range, and includes optional temperature compensation. The internal signal processing, with 8-bit resolution of the control registers and the E2PROM technology, allows for calibration, as per customer requirements.

The unique and patented ISOthermal construction offers substantially better performance of the entire sensor under transient thermal conditions. The temperature accuracy of the fully-adjustable integrated circuit outperforms discrete solutions. With the integration of thermopile and electronic circuits in compact TO-5 type metal housing, the TPiS is robust and insensitive to environmental influences like leakage currents on the parent pcb, relative humidity, or electromagnetic interference.

For amplification of the highly sensitive thermopile signal, a high resolution, programmable low-noise amplifier is provided. An adjustable, high-precision ambient temperature sensor, followed by a signal processor, offers accurate compensation signals with polynomial characteristics perfectly matching the thermopile output so as to achieve an output signal which is closely linear with object temperature. Adding these signals will result in an ambient independent object temperature signal over a large temperature range. This range can be adapted and scaled to customer requirements by means of the flexible offset and post-gain adjustment.

For defined spot size requirements, we offer sensors with defined Field of View, obtained by apertures, internal lenses or integrated mirrors. The TPMI® Sensor Family includes the integrated ambient temperature compensation and the calibration to a certain temperature range.

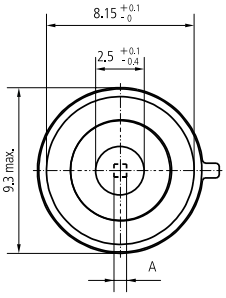
When ordering, please specify the correct temperature range needed. Excelitas offers the following pre-calibrated Sensors:

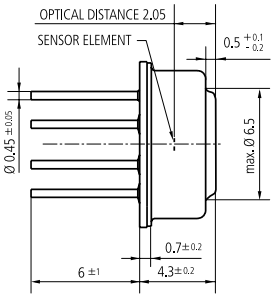
-20...60°C: TPiS 1T 0134 OAA060
20...120°C: TPiS 1T 0134 OAA120
-20...120°C: TPiS 1T 0136 L5.5 OAA120
-20...250°C: TPS 1T 0136 IRA OAA250

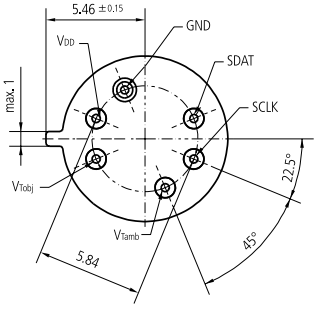
IRA= internal reflector L5.5 = 5.5mm focal length lens.

A temperature reference output is included. Upon request, other object temperature ranges can be provided. The sensors con also be supplied as “OBA” versions without internal temperature compensation.

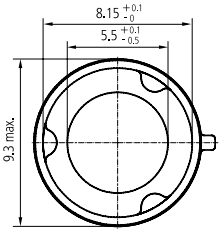
TPS 1T 0134

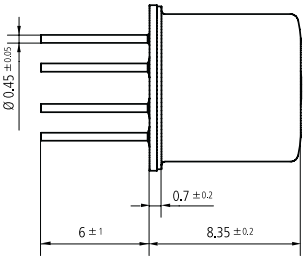


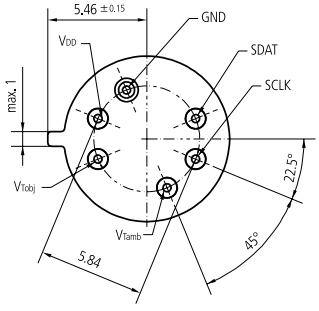




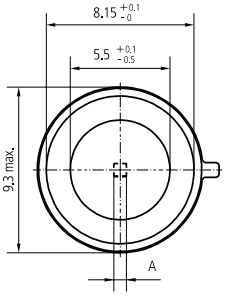
TPS 1T 0136 L5.5

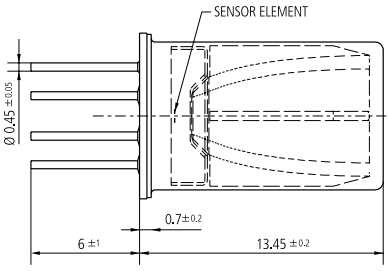


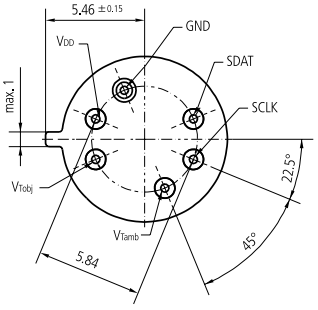




TPS 1T 0136 IRA







TPiS 1T 0134, TPiS 1T 0136 L5.5 and TPiS 1T 0136 IRA

Parameter	Symbol	TPiS 1T 0134	TPiS 1T 0136 L5.5	TPiS 1T 0136 IRA	Unit	Remark
Output Voltage Swing	V_O	0,25...(V_{DD}- 0,25)	0,25...(V_{DD}- 0,25)	0,25...(V_{DD}- 0,25)	V	
Resistive Output Load	R_L	50	50	50	kW	min.
Object Temp Accuracy		1.5	1.5	1.5	K	+ / -
Response Time	t	100	100	100	ms	typ.
Sensitive area	A	Ø 0.5	Ø 0.5	Ø 0.5	mm	TPiS 1T 01
Field of View	FoV	67	4.5	11	°	TPiS 1T 01
Distance to Spot size ratio		-	11:1	-		TPiS 1T 01
Sensitive area	A	0.7 x 0.7	0.7 x 0.7	0.7 x 0.7	mm2	TPiS 1T 02
Field of View	FoV	70	7	15	°	TPiS 1T 02
Distance to Spot size ratio		-	8:1	-		TPiS 1T 02
Supply Voltage	V_{DD}	4,5....5,5	4,5....5,5	4,5....5,5	V	
Supply Current	I_{DD}	1.5	1.5	1.5	mA	typ. ; RL > 1MW
Operating Temp range		-25....+100	-25....+100	-25....+100	°C	
Storage Temp range		-40....+100	-40....+100	-40....+100	°C	
ESD tolerance		2.5	2.5	2.5	kV	human body model
Soldering Temp		300	300	300	°C	max , 10 s

Thermopile Modules With Integrated Processing And Optics

For Temperature Measurement

TPiM 1T 0136 L5.5, TPiM 1T 0134 M(y) – Thermopile Module with TPMI®

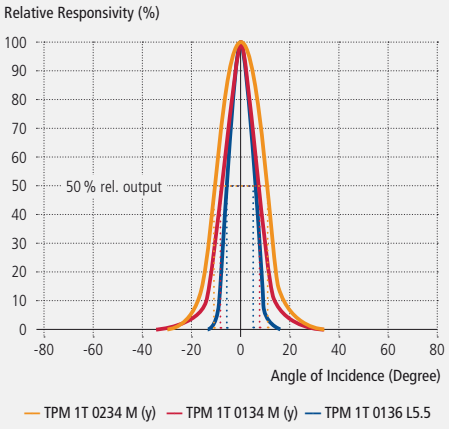
Applications

- Industrial Temperature monitoring
- Pyrometry

Features and Benefits

- Internal Signal Processing
- Factory-calibrated
- Lens or Mirror Optics
- Ambient temperature compensation
- ISOthermal performance

Field of View



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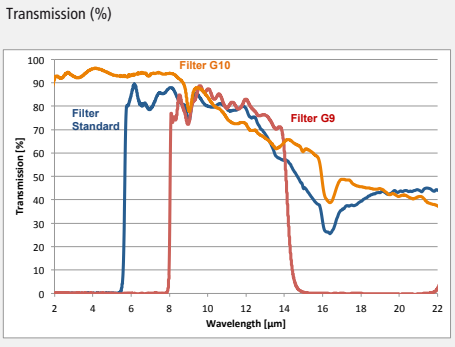


Product Description

The Module range consists of a thermopile sensor (See page 38), mounted on a pcb with connector. The pcb can also provide for optional features such as voltage regulation and a noise-reduction filter. The Module also features ISOthermal performance and includes the integrated temperature compensation for a defined temperature environment, and the calibration to a certain object temperature range. Modules cannot be programmed at factory or individually at the customer site. When ordering, please specify the correct ambient and object temperature ranges needed.

For defined spot size requirements, we offer sensors with a Field of View defined by optical apertures, internal lenses, or external mirror optics. The lens module is provided with a very small pcb. The mirror version has a longer size pcb and allows different orientations for the Mirror, M(y). A protective external filter may be supplied with the mirror module. For the various object temperature ranges, Excelitas offers the following pre-calibrated Modules:

External Mirror types

-20...60°C: TPiM 1T 0134 OAA060 P) M(y)
-20...140°C: TPiM 1T 0134 OAA140 P) M(y)
-20...250°C: TPiM 1T 0134 OAA250 P M(y)
-20...180°C: TPiM 1T 0134 OAA180 P M(y)

Mirrors in different viewing orientations M(y); y = L (left) / y = F (front) / y = R (right).

Integral Lens types

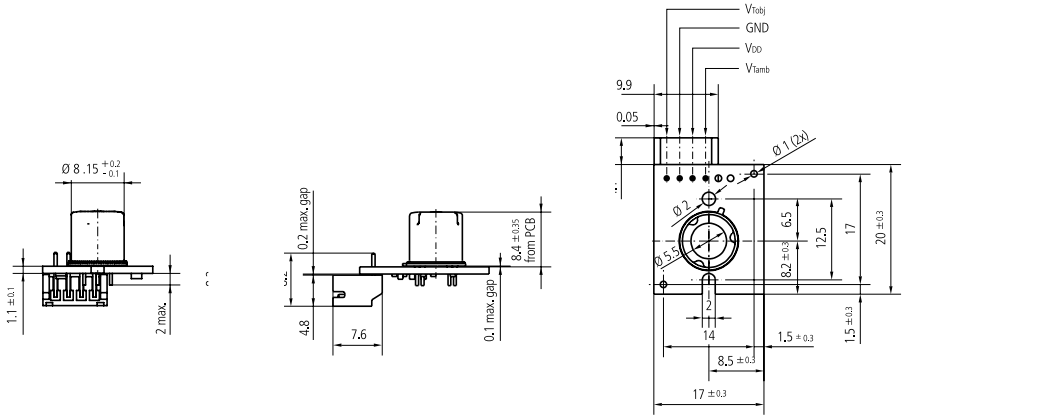
-20...60°C: TPiM 1T 0234 L5.5 OAA060 P7
-20...120°C: TPiM 1T 0134 L5.5 OAA120 P7
-20...180°C: TPiM 1T 0134 L5.5 OAA180 P7
-20...250°C: TPiM 1T 0134 L5.5 OAA250 P7

A temperature reference output is included. Upon request, the modules can be supplied as “OBA” versions, which are calibrated but without internal temperature compensation. In this case the customer will do the temperature compensation externally with the use of the supplied reference output. The temperature accuracy of the fully-adjustable integrated circuit outperforms discrete solutions. With the integration of Thermopile and electronic circuits in compact TO-5 type metal housing, the TPiS is robust and insensitive to environmental influences like leakage currents on the parent PCB, relative humidity, or electromagnetic interference.

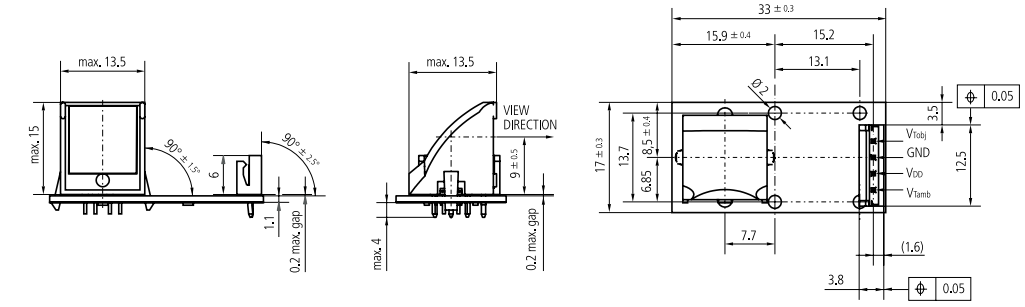
For amplification of the highly sensitive thermopile signal, a high resolution, programmable low-noise amplifier is provided. An adjustable, high-precision ambient temperature sensor, followed by a signal processor, offers accurate compensation signals with polynomial characteristics perfectly matching the thermopile output so as to achieve an output signal which is closely linear with object temperature. Adding these signals will result in an ambient independent object temperature signal over a large temperature range. This range can be adapted and scaled to customer requirements by means of the flexible offset and post-gain adjustment.

For defined spot size requirements, we offer sensors with defined Field of View, obtained by apertures, internal lenses or integrated mirrors. The TPMI® Sensor Family includes the integrated ambient temperature compensation and the calibration to a certain temperature range.

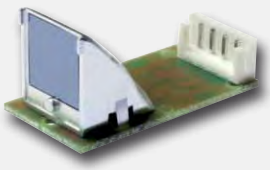
TPM 1T 0136 L5.5

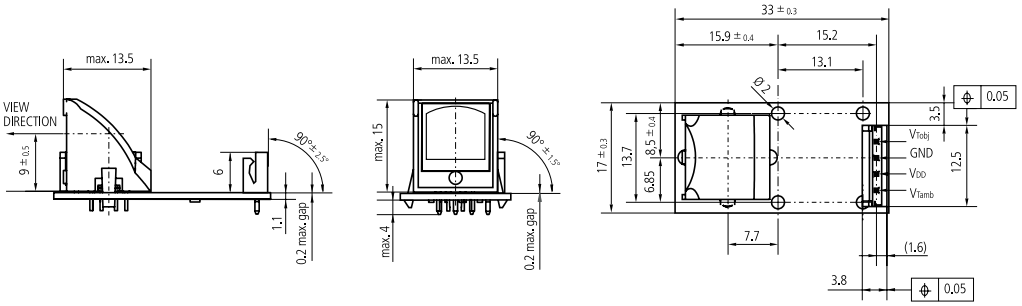


TPM 1T 0134 P6 M(y)



TPM 1T 0134 P9 M(y)





When ordering, please specify the correct temperature range needed. Excelitas offers the following pre-calibrated sensors:

-20...60°C: TPiS 1T 0134 OAA060
-20...120°C: TPiS 1T 0134 OAA120
-20...120°C: TPiS 1T 0136 L5.5 OAA120
-20...250°C: TPS 1T 0136 IRA OAA250

IRA= internal reflector L5.5 = 5.5mm focal length lens.

The sensors can also be supplied as “OBA” versions without internal temperature compensation.

TPiM 1T 0136 L5.5, TPiM 1T 0134 P6 M(y) and TPiM 1T 0139 P9 M(y)

Parameter	Symbol	TPiM 1T 0136 L5.5	TPiM 1T 0134 P6 M(y)	TPiM 1T 0134 P9 M(y)	Unit	Remark
Output Voltage Swing	V_O	0,25...(Vdd- 0,25)	0,25...(Vdd- 0,25)	0,25...(Vdd- 0,25)	V	
Resistive Output Load	R_L	50	50	50	kW	min.
Object Temp Accuracy		1.5	1.5	1.5	K	+ / -
Response Time	t_{resp}	100	100	100	ms	typ.
Field of View	FoV	4.5	5.5	5.5	°	TPiS 1T 01
Distance to Spot size ratio		11:1	-	-		TPiS 1T 01
Field of View	FoV	7	7	7	°	TPiS 1T 02
Distance to Spot size ratio		8:1	-	-		TPiS 1T 02
Supply Voltage	V_{DD}	4,5....5,5	4,5....5,5	4,5....15*	V	*= voltage regulator
Supply Current	I_{DD}	1.5	1.5	1.7	mA	typ. ; RL > 1MW
Operating Temp range		-25....+100	-25....+100	-25....+100	°C	
Storage Temp range		-40....+100	-40....+100	-40....+100	°C	
ESD tolerance		2.5	2.5	2.5	kV	human body model

CoolEye™ - Digital Array Modules
With Integral Optics

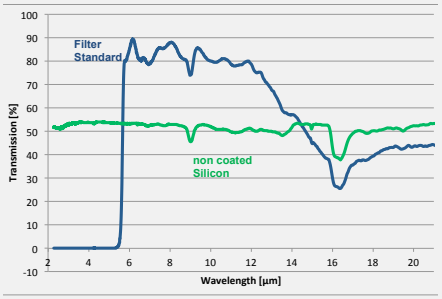
TPiL 08T 2246 L3.9, TPiL 16T 3446 L3.9 – Thermopile Line
TPiA 16T 4146 L3.9 – Thermopile Array

Applications
- Presence Detection
- Non-contact Temperature Measurement
- Temperature-dependent Switch for Alarm or Thermostatic applications.
- Household Appliances such as Microwave Ovens

Features and Benefits
- Digital SMBus interface
- Factory Calibration
- Temperature Signal
- Ambient temperature output signal
- Programmable emissivity
- Noise reduction filter

Product Description
With the CoolEye™ Family, Excelitas offers thermopile arrays in multiple configurations. All arrays are module types, with a pcb that provides the communication interface and a 6-pin connector. For Line Arrays, we offer 8-Elements and 16-Elements, with 3.9 mm focus integral lens. The spatial design provides for 4x4 elements.
All parts of the CoolEye™ Family employ the patented, ISOthermal concept and offer uniquely high-performance under thermal shock conditions.
The Thermopile Line or Array Modules consist of a 1x8, 1x16 or 4x4-element thermopile chip connected to an integrated multiplexing and signal conditioning circuit, E2PROM and microcontroller with integrated A/D converter for signal processing and interfacing. The sensor is equipped with an internal reference temperature sensor for correct target temperature determination.
The temperature accuracy achieved by digital signal processing, in combination with the numeric ambient temperature compensation algorithm, outperforms any discrete solution. The ISOthermal Sensor Module provides a digital output signal by SM Bus which represents real temperature data for each pixel. Customer-specific modifications are possible.

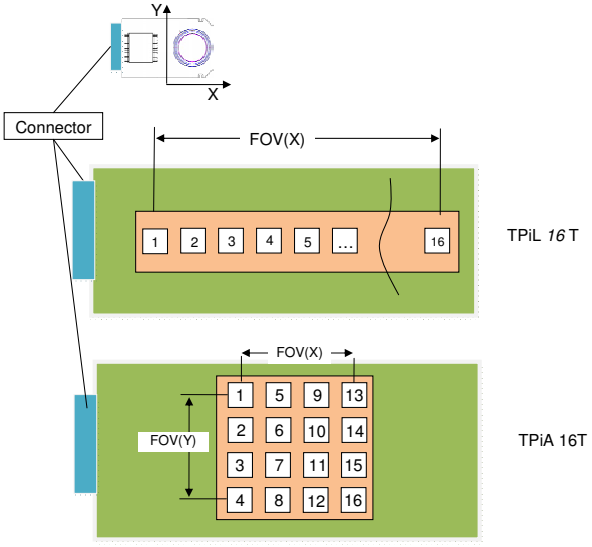
Filter



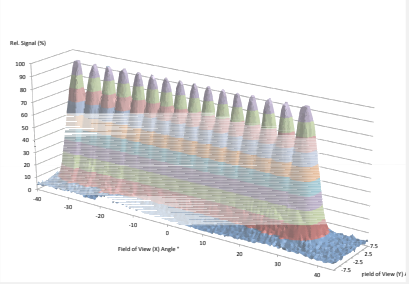
For the various object temperature ranges we offer following pre-calibrated Modules:

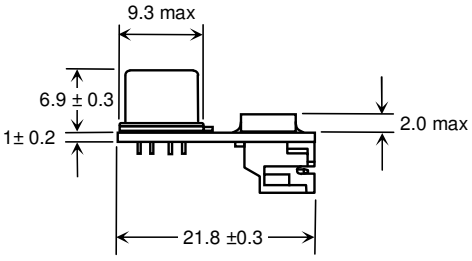
0...60°C: TPiL 08T 2246 L3.9 OAA060
0...60°C: TPiL 16T 3446 L3.9 OAA060
0...60°C: TPiA 16T 4146 L3.9 OAA060

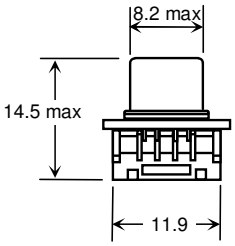
A temperature reference output is included. Upon request, the Modules can be supplied as an "OBA" version, which is calibrated but without internal temperature compensation. In this case, the customer will do the temperature compensation externally, with the use of the supplied reference output.



Field of View TPiL 08

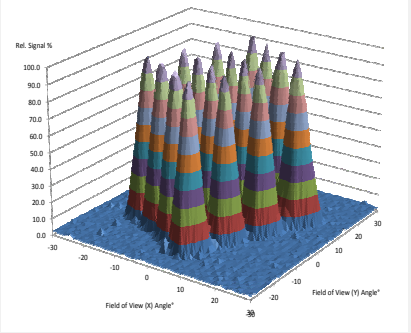


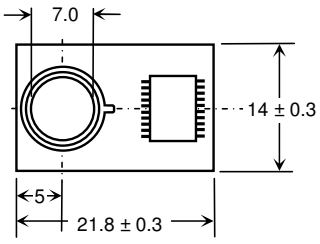


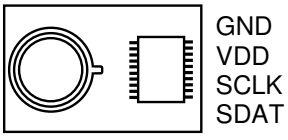


JST S 4B-PH SM4TB

Field of View TPiL 16T



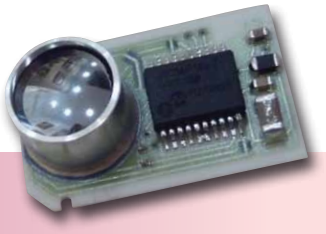




TPiL 08T 2246 L3.9, TPiL 16T 3446 L3.9, TPiA 16T 4146 L3.9

Parameter	Symbol	TPiL 08 T	TPiL 16T	TPiA 16 T	Unit	Remark
Storage Temperature Range		-40 …. +100	-40 …. +100	-40 …. +100	°C	
Operating Temperature Range		-25 …. +100	-25 …. +100	-25 …. +100	°C	
Supply Voltage	V_{DD}	4.5 …. 5.5	4.5 …. 5.5	4.5 …. 5.5	V	
Supply Current	I_{DD}	5	5	5	mA	typ.
Field of View X / L3.9	FOV_X	50	62	30	°	refer to FOV definitions
Field of View Y / L3.9	FOV_Y	NA	NA	20	°	refer to FOV definitions
Digital Interface Type		SMBus	SMBus	SMBus		
Object Temperature Accuracy		±1.5			°C	for calibration conditions
Temperature Sensing Range		0….60	100….250	0….60	°C	
Signal Refresh Time	t_{PXrefr}	250	400	400	ms	all pixels and ambient temperature

CoolEye™ –
Digital Line Array Module, 32 Pixels



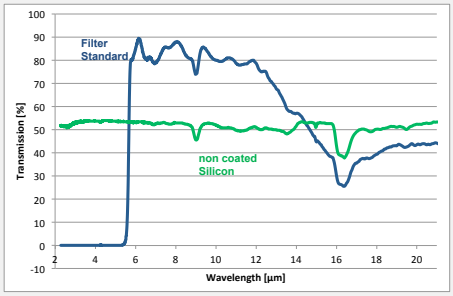
TPiL 32T 3346 L4.7 – Thermopile Line Array

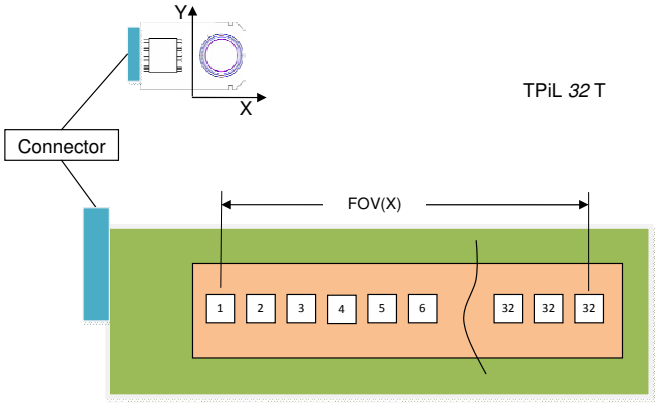
Applications
- Presence Detection
- Energy Conservation for Smart Home concepts
- Safety and High-end Alarm Applications

Features and Benefits
- Digital SM Bus interface
- Factory Calibration
- Temperature Reference Signal
- Ambient temperature output signal

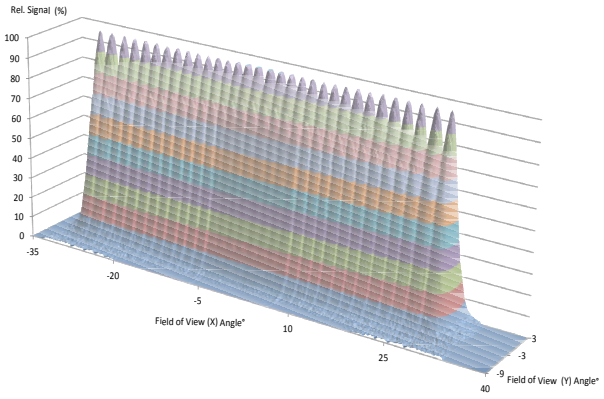
Product Description
With this new member of the CoolEye™ Family, Excelitas provides a major step forward in low resolution image sensing. The new line array offers 32 pixels in line, built- in TO-5 type housing with ISOthermal performance, and an integrated lens. The 32 pixels are connected to integrated multiplexing and signal conditioning circuits. The Thermopile Line Array Module provides a pcb which includes the array sensor, E2PROM and microcontroller with A/D converter for signal processing, and interfacing Digital SM Bus and a connector. The Array Sensor is equipped with an internal reference temperature sensor for correct target temperature determination. The temperature accuracy achieved by digital signal processing, in combination with the numeric ambient temperature compensation algorithm, outperforms any discrete solution. The ISOthermal Sensor Module provides a digital output signal by SM Bus which represents real temperature data for each pixel. Customer specific modifications are possible.
The calibrated temperature range of this new model will be 0…60°C: TPiL 32T 3346 L4.7 OAA060
A temperature reference output is included with associated temperature compensation of the module. This CoolEye™ Module may also be supplied as an "OBA060" version, calibrated to the referenced temperature range, but allowing the customer to perform ambient temperature compensation in his circuitry by applying the temperature reference signal.

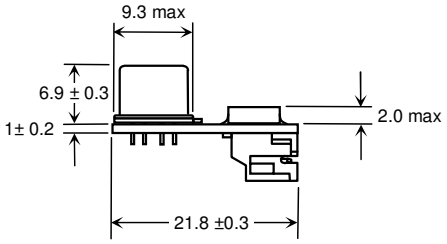
Filter

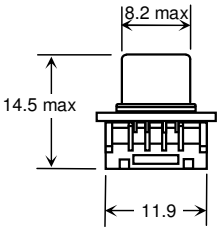




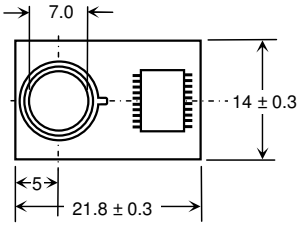
Field of View TPiL 32T

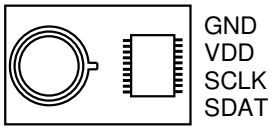






JST S 4B-PH SM4TB





TPiL 32T 3346 L4.7

Parameter	Symbol	TPiL 32 T	Unit	Remarks
Storage Temperature Range		-40 …. +100	°C	
Operating Temperature Range		-25 …. +100	°C	
Supply Voltage	V_{DD}	4.5 …. 5.5	V	
Supply Current	I_{DD}	5	mA	typ.
Field of View X / L4.7	FOV_X	59	°	refer to FOV definitions
Field of View Y / L4.7	FOV_Y	NA	°	refer to FOV definitions
Digital Interface Type		SMBus		
Object Temperature Accuracy		±1.5	°C	for calibration conditions
Temperature Sensing Range		0….60	°C	
Signal Refresh Time	t_{PXrefr}	380	ms	all pixels and ambient temperature

Handling and Precautions

Humidity
All our IR-detectors shall not increase noise or decrease responsivity when exposed to <=95 % R.H. at 30° C. Operation below dew point (i.e. with condensation) might affect performance.

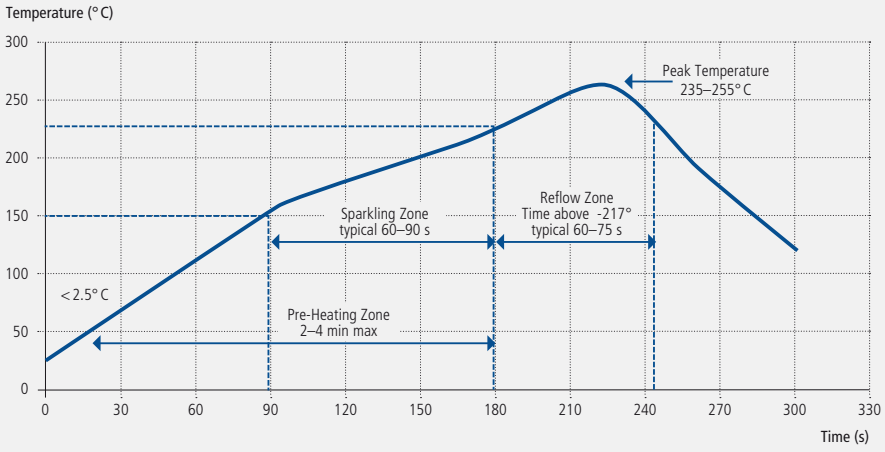
Hermetic seal
All our IR-detectors are sealed to pass a He-leakage test with maximum leak rate of 5 x 10-8 mbar.l.s-1.

Quality
Excelitas is an ISO 9001-certified manufacturer with established SPC and TQM. Detector outgoing inspections include the parameters Responsivity, Match, Offset, Noise, Gross leak (MIL Std 883 method 1014C1). Individual data are not stored, statistical details can be disclosed on request.

Handling
Electrostatic charges may destroy the detector. We recommend applying precautions necessary for ESD devices to avoid damages. Do not apply physical force to detector leads. Do not expose detector to aggressive detergents such as freon, trichloroethylene, etc.

Soldering conditions
Hand soldering and standard wave soldering process may be applied. Avoid heat exposure to the top and the window of the detector. Reflow soldering is not recommended for all TO-housing types. Our new SMD types are designed for reflow-soldering in accordance with general practices for SMD.

Typical Lead Free Reflow Profile



Reliability Standards

International Electrotechnical Commission (IEC) Standards	
IEC 60068-2-1	Environmental testing – Part 2: Tests. Tests A: Cold
IEC 60068-2-2	Environmental testing - Part 2: Tests. Tests B: Dry heat
IEC 60068-2-78	Environmental testing - Part 2-78: Tests - Test Cab: Damp heat, steady state
IEC 60068-2-14	Environmental testing - Part 2: Tests. Test N: Change of temperature
Joint Electron Devices Engineering (JEDEC) Standards	
JESD-22	Series test methods
US Military (MIL) Standards	
MIL-STD-883	Test methods and procedures for microelectronics

Reliability Standards
Excelitas' continuous reliability qualification and monitoring program ensures that all outgoing products meet quality and reliability standards. Tests are performed according to approved semiconductor device standards, such as IEC, MIL, and JDEC (see table). For detailed information please contact Excelitas.

New Models and Nomenclature

Thermopiles

Comparison Table

	Model	Prior Name	Comments	Page
Detectors				
	TPD 1T 0625	TPS 735	Identical	28
	TPD 2T 0625	TPS 2734	Identical	29
	TPiD 1T 0224	TPS 334	Now - ISOthermal	30
	TPiD 1T 0624	TPS 734	Now - ISOthermal	30
	TPiD 1T 0226 L5.5	TPS 336 L5.5	Now - ISOthermal	31
	TPD 1T 0226 IRA	TPS 336 IRA	Identical	31
	TPD 1T 0223	TPS 333	Identical	32
	TPD 1T 0623	TPS 733	Identical	32
	TPiD 1T 0122 B	TPS 23 B	Identical	33
	TPiD 1T 0222 B	TPS 33 B	Identical	33
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	TPiS 1T 125…	New	DigiPile™	36
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	TPiS 1T 013…	a2TPMI	Calibrated Sensor	38
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CoolEye™ Arrays			Now - ISOthermal	
	TPiL 8T 2246	dTPLM 08A	Now - ISOthermal	42
	TPiL 16T 4146	dTPLM 16A	Now - ISOthermal	42
	TPiA 16T 3446	dTPAM 16A	Now - ISOthermal	42
	TPiL 32T 3346	New	Now - ISOthermal	44

Pyrodetectors

Recommendations

	Model	Features	Comments	Market/ Applications	Page
"Smart" DigiPyro®					
	PYD 1096	Dual-Element	All-In-One Electronics	Simple Switches	12
	PYQ 1046	Quad-Element	All-In-One Electronics	Simple Switches	12
	PYD 1098	Dual-Element	All-In-One Electronics	Simple Alarms	13
	PYQ 1048	Quad-Element	All-In-One Electronics	Simple Alarms	13
High-end Detectors					
	LHi 968	Dual-Element	Analog, Standard	Alarm Applications	14
	PYD 1398	Dual-Element	Improved version	Alarm Applications	14
	LHi 1148	Quad-Element	Analog	Alarm Applications	15
	PYD 5190	Dual-Element	New - In SMD	Consumer Electronics Applications	20
DigiPyro®					
	PYD 5790	Dual-Element	New - Digital, In SMD	Consumer Electronics Applications	20
	PYD 1798	Dual-Element		Alarm Applications	21
	PYD 1788	Dual-Element	Standard	Light Switches	21
	PYQ 2898	Quad-Element		Alarm Applications	22
	PYQ 5848	Quad-Element	Ceiling-mount configuration	Light Switches	23
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	PYS 3828	2x Single Element	(2+1) Channel	Gas Monitoring	27
Low Cost					
	LHi 778	Dual-Element	Low Cost	Light Switches	16

About Excelitas Technologies

Excelitas Technologies is a global technology leader focused on delivering innovative, customized solutions to meet the detection, lighting, and advanced electronic systems needs of OEM customers.

From safety and security applications to industrial, consumer, medical, analytical instrumentation, clinical diagnostics, and aerospace and defense applications, Excelitas Technologies is committed to enabling our customers' success in their end-markets.

Excelitas Technologies has approximately 3,000 employees in North America, Europe and Asia, serving customers across the world.

detection.na@excelitas.com
detection.la@excelitas.com
detection.europe@excelitas.com
detection.asia@excelitas.com

www.excelitas.com/Detection

Excelitas Technologies
22001 Dumberry Road
Vaudreuil-Dorion, Quebec
Canada J7V 8P7
Telephone: (+1) 450.424.3300
Toll-free: (+1) 800.775.6786
Fax: (+1) 450.424.3345

Excelitas Technologies GmbH & Co. KG
Wenzel-Jaksch-Str. 31
D-65199 Wiesbaden
Germany
Telephone: (+49) 611 492 430
Fax: (+49) 611 492 165

Excelitas Technologies
47 Ayer Rajah Crescent #06-12
Singapore 139947
Telephone: (+65) 6775-2022
Fax: (+65) 6775-1008

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