



PYD 1588 • PYD 1598 • PYD 2592

Dual-Element, Low-Power DigiPyro®

This series is designed with the utmost features of a digital Dual Element Pyro. In TO-5 housing this family is offered with two different window sizes. With its significant reduction of current requirements, this family provides wide range of operation voltage from 1.8V to 3.3V supply at a low current consumption in all operation modes.

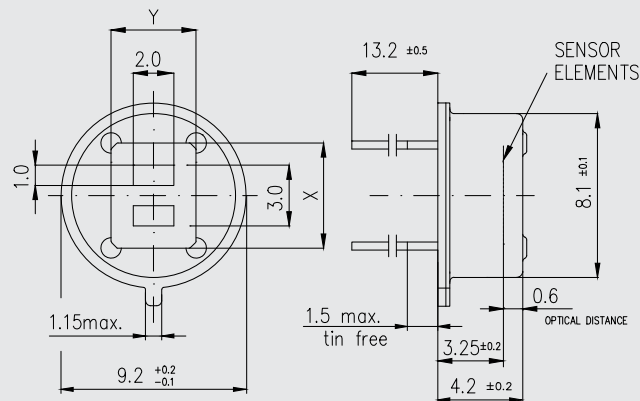
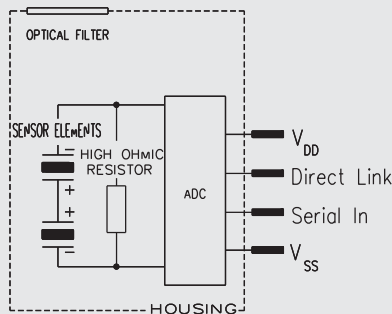
The internal electronic circuitry of PYD 1588 and PYD1598 enable the user to select and set individual functions. The output signals are communicated in one digital bit stream of 14 bit via a single wire "Direct Link" connection to a suitable host microprocessor. A similar single wire connection with separate input pin allows the settings of functional parameters such as sensitivity, bandpass selection, pulse count and wake up function. This Pyro provides the full functionality of a complete PIR sensing device when all following circuitry is in sleep mode.

The DigiPyro PYD 1588 is provided with standard size window, while PYD 1598 with its larger filter window offers better White-Light-Immunity (WLI) performance and Field of View.

The DigiPyro PYD 2592 represents the new SMD version of this design, equipped with the standard Dual Element configuration. It is provided in Excelitas' new 5x7 low profile SMD housing. (Refer to SMD package drawing on page 16.)

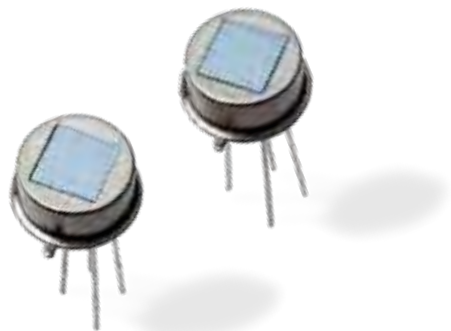
Features and Benefits

- Wake up/Sleep operation
- Sensitivity setting
- Bandpass selection
- Window time
- Digital Direct Link
- Ideal for battery operated devices



PYD 1588 - PYD 1598 - PYD 2592

| Parameter | Symbol | PYD 1588 | PYD 1598 | PYD 2592 | Unit | Remarks |
|---------------------------|-------------|-----------|-----------|-----------|---------------|---------------------------|
| Responsivity, min. | R_{min} | 3.3 | 3.3 | 3.0 | kV/W | f = 1 Hz |
| Responsivity, typ. | R | 4.0 | 4.0 | 3.7 | kV/W | f = 1 Hz |
| Match, max. | M_{max} | 10 | 10 | 10 | % | |
| Noise, max. | N_{max} | 78 | 78 | 90 | μV_{pp} | 0.4...10Hz/20°C |
| Noise, typ. | N | 20 | 20 | 30 | μV_{pp} | 0.4...10Hz/20°C |
| Operating Voltage | | 1.8...3.6 | 1.8...3.6 | 1.8...3.6 | V | |
| Supply Current | I_{DDmax} | 3.5 | 3.5 | 3.5 | μA | $V_{DD} = 3.3V$, no load |
| Field of View, horizontal | FoV | 115 | 130 | 147 | ° | unobstructed, typ. |
| Field of View, vertical | | 107 | 130 | 130 | ° | unobstructed, typ. |
| Filter Size | X/Y | 4.6 / 3.4 | 5.2 / 4.2 | 5.5 / 3.7 | mm | |
| ADC Data | | | | | | |
| Resolution | | 14 | 14 | 14 | bit | typ. |
| Sensitivity | | 6.5 | 6.5 | 6.5 | $\mu V/count$ | typ. |
| Offset | | 8000 | 8000 | 8000 | bitcount | typ. |



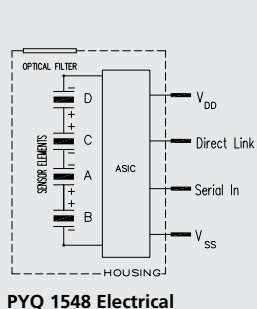
PYQ 1548

Quad-Element Low Power DigiPyro®

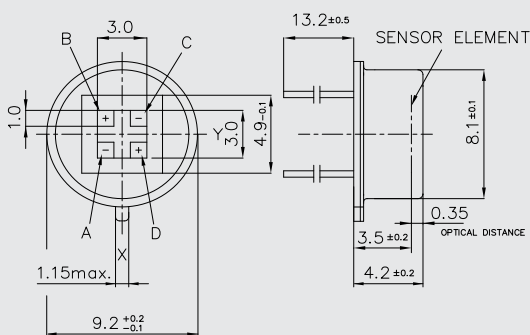
This Quad-Element DigiPyro configures all four elements combined to one output with exceptional energy-efficiency. The user selects and sets individual functions. A single-wire connection with separate input pin allows setting of sensitivity, bandpass selection, pulse count and wake up. This provides full functionality of a complete PIR sensing device when all following circuitry is in sleep mode.

Features and Benefits

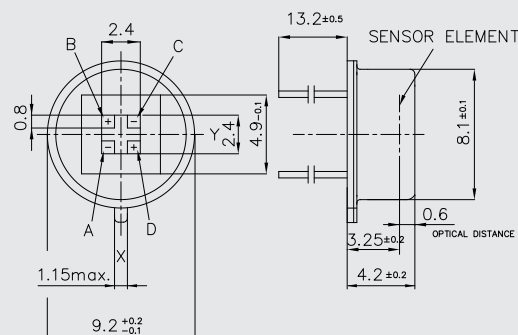
- TO-5 metal housing
- Equal element spacing
- Digital output via direct link
- Designed for ceiling-mount applications



PYQ 1548 Electrical



PYQ 1548 Housing



PYQ 1548 Small Housing

PYQ 1548

| Parameter | Symbol | PYQ 1548 | PYQ 1548 Small | Unit | Remarks |
|---------------------------|--------------------|-----------|----------------|------------------|---------------------------------|
| Responsivity, min. | R _{min} | 5.4 | 8.4 | kV/W | f = 1 Hz |
| Responsivity, typ. | R | 6.5 | 10.2 | kV/W | f = 1 Hz |
| Match, max. | M _{max} | 10 | 10 | % | |
| Noise, max. | N _{max} | 160 | 200 | µV _{pp} | 0.4...10Hz/20°C |
| Noise, typ. | N | 40 | 60 | µV _{pp} | 0.4...10Hz/20°C |
| Operating Voltage | | 1.8...3.6 | 1.8...3.6 | V | |
| Supply Current | I _{DDmax} | 3.5 | 3.5 | µA | V _{DD} = 3.3V, no load |
| Field of View, horizontal | FoV | 119 | 140 | ° | unobstructed, typ. |
| Field of View, vertical | | 119 | 140 | ° | unobstructed, typ. |
| Filter Size | X/Y | 4.9 / 4.9 | 4.9 / 4.9 | mm | |
| ADC Data | | | | | |
| Resolution | | 15 | 15 | bit | typ. |
| Sensitivity | | 6.5 | 6.5 | µV/count | typ. |
| Offset | | 8000 | 8000 | bitcount | typ. |

Handling

Infrared Sensors are Optical devices and require careful handling in production. As to mechanical recommendations:

- Avoid dropping the devices on the production flow.
- Avoid physical force to detector leads, do not bend leads unless necessary.
- Ensure leads are not damaged when manipulating them.

Electrostatic discharges may destroy the detectors. It is recommended to apply the standard precautions for ESD sensitive devices to prevent potential damage.

The detector windows are optical filters with multi-layer coatings.

- Avoid touching the detector window. To clean windows, use only ethyl alcohol with a cotton swab.
- Do not expose Detectors to chemical fluids such as Freon, Trichloroethylene and other aggressive detergents.

Environmental Conditions

With the construction of metal can and spectral window inserted into the can by a special durable epoxy, the detectors are sealed and tested for long-term enclosure. The detector will pass He-leakage test with maximum leakage rate specification of 5×10^{-8} mbar ls-1. Detectors shall not increase noise or change responsivity when exposed to maximum of 95% relative humidity at 30°C.

- Avoid long-term storage at high humidity with high temperatures.

As IR detectors are optical sensors, avoid condensation effects on the detector. Operation below dew points may affect the performance.

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 JEDEC (see table). For detailed information please contact Excelitas.

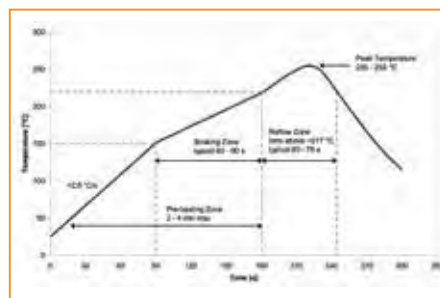
Quality and Reliability Standards

Excelitas strives to meet applicable quality and reliability standards. We are certified ISO 9001:2015 and operate at established SPC and TQM. We are proud to operate under Environmental Management System according to ISO 14001:2015 and the Occupational Safety and Health Management System according to OHSAS 18001: 2007.

All devices employing PCB assemblies are manufactured according IPC-A-610 class 2 guidelines.

Excelitas Thermal Infrared Sensor product line is certified for ANSI/ESD S.20:2014.

In case of questions please feel free to contact us for the latest update on our current certificates and forms. Our continuous qualification and reliability program ensures that all products meet the specified performance criteria.



As to outgoing inspection, all devices have to pass 100% testing of major parameters and gross leak in acc. to MIL Std. 883 m 1014C1. Due to high-volume production individual data are not protocolled or stored, statistical data are kept for reference.

Soldering of SMD Devices

The TPiD 1S and TPiS 1S series are lead-free components and fully comply with the RoHS regulations, especially with existing roadmaps of lead-free soldering. Reflow soldering is recommended. A typical lead free reflow profile is shown in figure 4. Specific reflow soldering parameters depend on the solder alloy used.

The device meets MSL1 at 245 °C according to JEDEC standard.

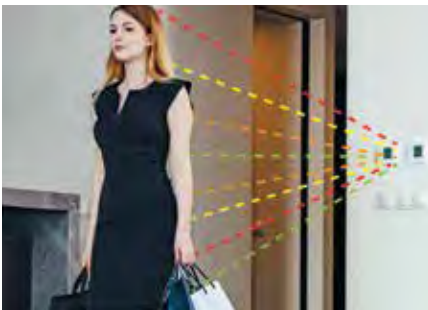
Soldering Conditions

For the soldering of the detectors within PCBs, the typically applied and recommended process is wave soldering. During the automatic wave solder process we strongly advise to restrict preheating to avoid heat exposure through the detector window, if necessary apply a protection cap. When the detector is directly exposed to the radiation of such heaters the detector shall be protected from that heat. Manual soldering is also possible when maintaining similar temperature profiles.

Reflow soldering is not possible for TO housing versions of our detectors. For our range of SMD housing detectors please reference the recommended solder profile.

From Analog to Digital

Excelitas Technologies was the first to introduce a digital interface to pyroelectric sensors. The DigiPyro® family features a highly sensitive ADC input stage, which does not require further amplification. This allows for the lowest supply currents and is therefore ideal for energy efficient, battery operated applications. Selecting a digital sensor in a TO-can will significantly expedite your design process and lower the susceptibility to EMI. This is particularly important when you design a device with wireless communication features. Excelitas offers several digital solutions meeting various requirements.

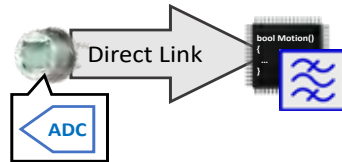


DigiPyro

The simplest DigiPyro solution consists of a high-resolution ADC within the component housing. The data is transferred digitally through the proprietary direct link interface to the host system. In addition, an internal temperature reference channel is implemented in order to monitor component temperature changes. Excelitas offers one-channel (PYx x7xx series) and two-channel (PYx x8xx) solutions. While one-channel is optimal for dual-element sensors, two-channels allow for differential signal analysis with four-channel detectors.

Typically, a digital band-pass filter is applied on the host system's analysis code prior to the search for user defined motion criteria.

Direct Link Interface

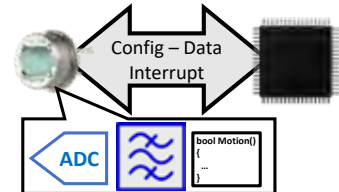


The Direct Link Interface was specially designed for pyroelectric sensors. This one wire interface does not require any external clock since communication speed is controlled by the host system. Either the host system or the sensor can initiate the transmission of data packages. Only one pin is required allowing for extremely compact metal can designs. Since the component drains very little current through the internal ASIC, the disturbance to the heat sensitive pyro-electric material is minimized.

Low-Power DigiPyro

In addition to the digitization stage, the Low Power DigiPyro Series (PYx x5xx and PYx x9xx) also contain an internal band-pass filter as well as a motion detection unit. After power-up, the host system configures the sensor and waits for an interrupt signal by the sensor.

The host system can adjust, via band-pass properties, the threshold which the amplitude has to cross, define the number of threshold crossings, the window time and a dead time to suppress immediate re-triggering.



While the PYx x5xx feature lowest possible power consumption with one PIR channel, PYx x9xx Series have two separately configurable PIR motion detection channels. This allows for differential signal analysis and improved signal-to-noise performance.

The optimal choice of parameters depends on the application and the selected lens. To determine those, the raw data can be accessed and analyzed.

The low power DigiPyro series are the optimal choice for battery-operated systems since the host system can be put to sleep while the sensor is continuously monitoring motion of people.

Distributor



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Contact us

