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

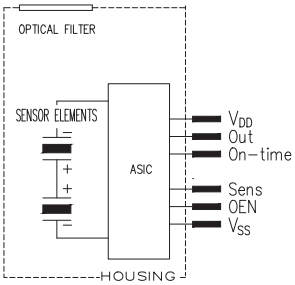
- TO-5 metal housing
- All electronics included
- Dual-Element: PYD 1096
- Quad-Element: PYQ 1046

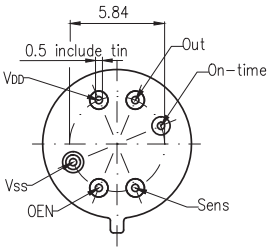
Product Description

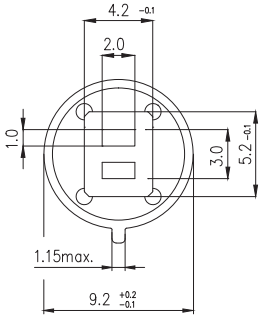
The "Smart" DigiPyro® Family provides for a complete motion detector solution, with all electronic circuitry built into the detector housing. Only power supply and power-switching components need to be added to make the entire motion switch, a timer is included. The series has versions which can include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

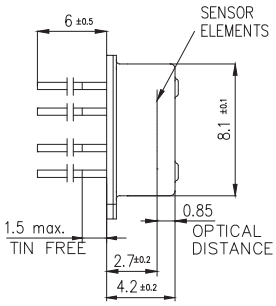
Both PYD 1096 and PYQ 1046 DigiPyro® models offer the complete setting features of time, sensitivity, and light-level. For the light-level input, a Photocell is to be connected externally. Please refer to the application notes on this product.

PYD 1096

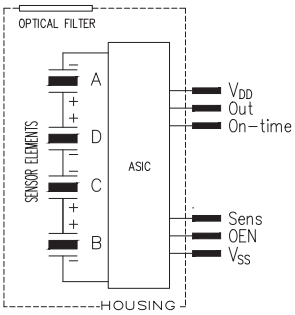


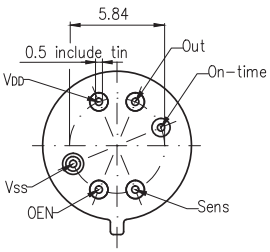


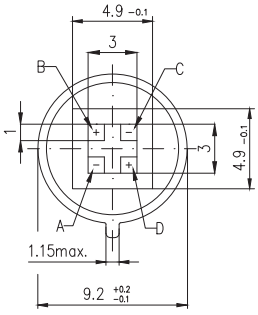


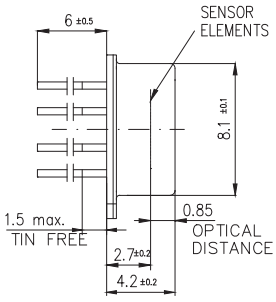


PYQ 1046





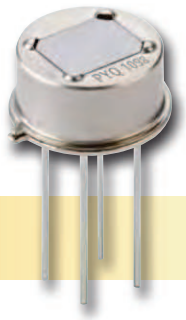




PYD 1096 and PYQ 1046					
Parameter	Symbol	PYD 1096	PYQ 1046	Unit	Remarks
Responsivity, min.	R_{min}	3.3	5.4	kV/W	f = 1Hz
Responsivity, typ.	R	4.0	6.5	kV/W	f = 1Hz
Match, max.	M_{max}	10	10	%	
Field of View, horizontal	FoV	100°	119°		unobstructed
Field of View, vertical		100°	119°		unobstructed
Operating 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

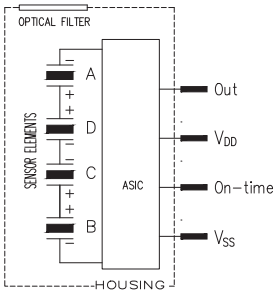
Features and Benefits

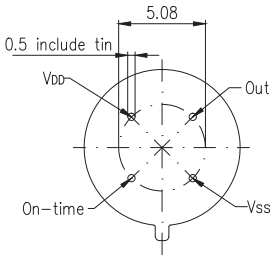
- TO-5 metal housing
- All electronics included
- Dual-Element: PYD 1098
- Quad-Element: PYQ 1048

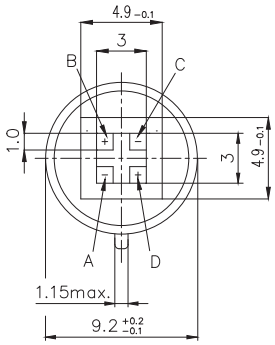
Product Description

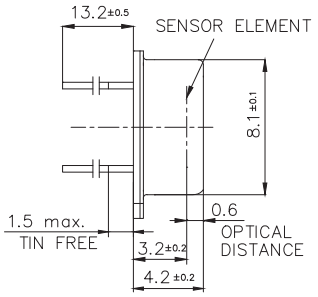
The "Smart" DigiPyro® Family offers a complete motion detector solution, with all electronic circuitry built into the detector housing. Only power supply and power-switching components need to be added to make the entire motion switch; a timer is included. The PYD 1098 and PYQ 1048 models are simplified 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

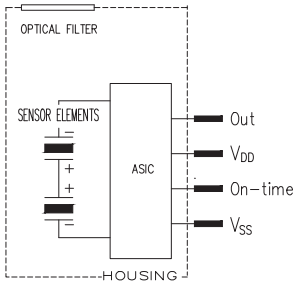


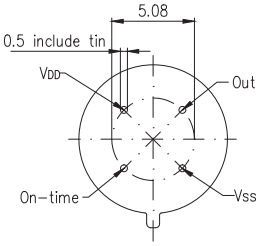


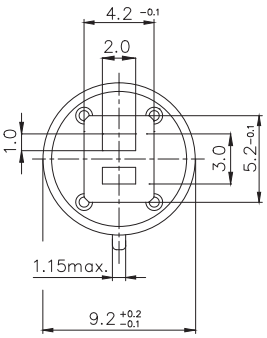


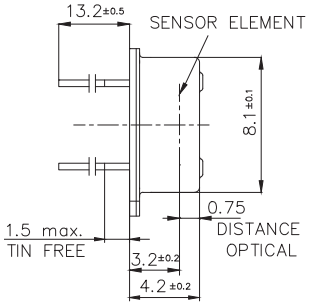


PYD 1098









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

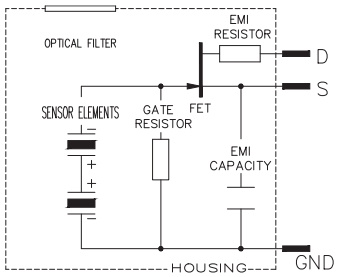
- Intrusion Alarms
- High-end Motion Sensors

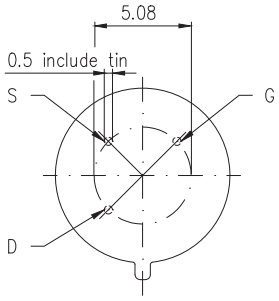
Features and Benefits

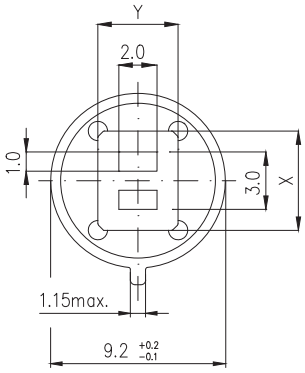
- TO-5 metal housing
- Different window sizes
- Improved EMI protection
- Reduced White Light Immunity (WLI)

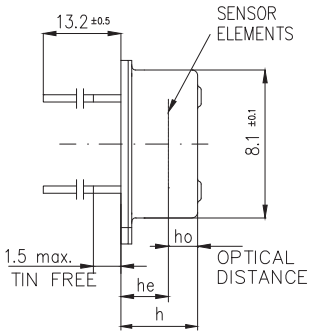
Product Description

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.





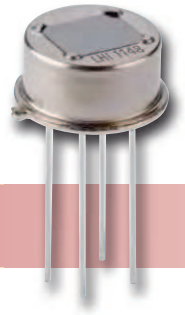




LHi 968 and PYD 1398					
Parameter	Symbol	LHi 968	PYD 1398	Unit	Remarks
Responsivity, min.	R_{min}	3.30	3.30	kV/W	f = 1 Hz
Responsivity, typ.	R	4.0	4.0	kV/W	f = 1 Hz
Match, max.	M_{max}	10	10	%	
Noise, max.	N_{max}	50	50	μV_{pp}	0,4…10Hz/20°C
Noise, typ.	N	20	20	μV_{pp}	0,4…10Hz/20°C
spec. Detectivity	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

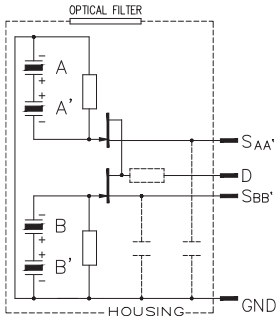
Features and Benefits

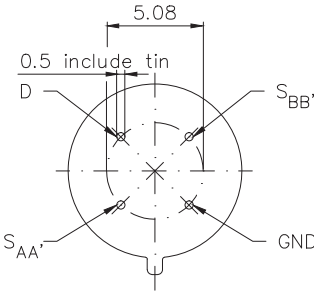
- TO-5 metal housing
- Dual-Channel
- Optional Reverse/equal polarity
- Optional element configurations
- RF protection option

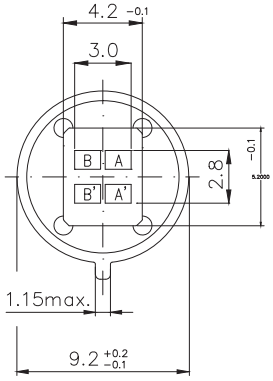
Product Description

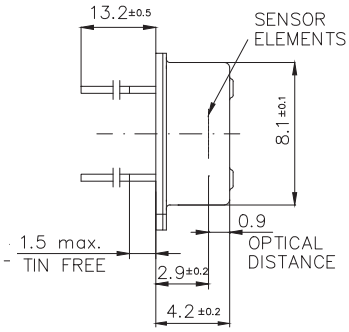
The LHi 1148 Series with its Four-Element, "Quad" configuration offers two independent Dual-Element signals with opposite polarity. This enables separate signal processing options for the two channels to reduce common-mode RF influence and thermal effects.

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

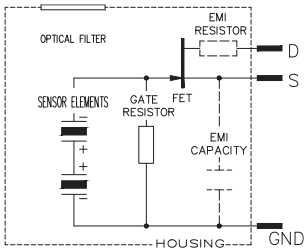
LHi 778 – Low-Cost Pyro
LHi 878, PYD 1388 – Standard Pyro

Applications
- Auto Light Switch
- Wall Switch
- Auto Lamps

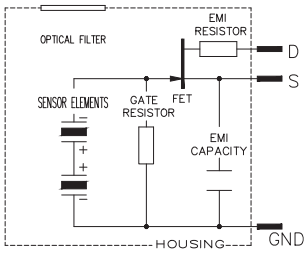
Features and Benefits
- TO-5 metal housing
- Different window sizes
- Additional EMI protection with PYD 1388

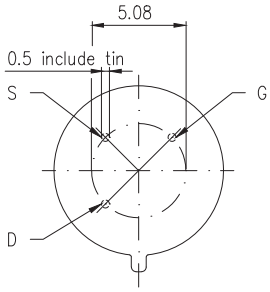
Product Description
This Dual-Element Detector Family offers standard TO-5 housings with different window sizes. Whereas the LHi 778 is designed to meet low cost needs and has a small optical window, the LHi 878 offers a standard window size. The PYD 1388 has the same dimensions and provides for additional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

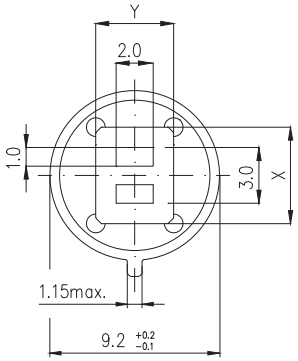
LHi 778, 878

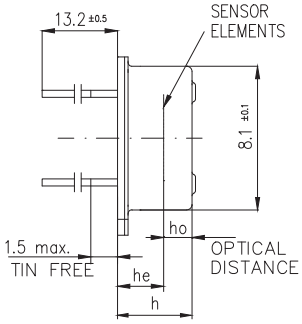


PYD 1388









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

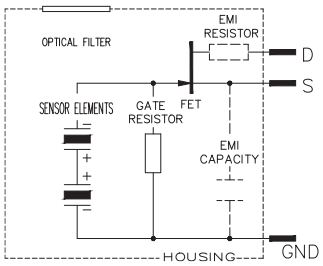
LHi 874, LHi 944, PYD 1394 – Low-Profile Pyro

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

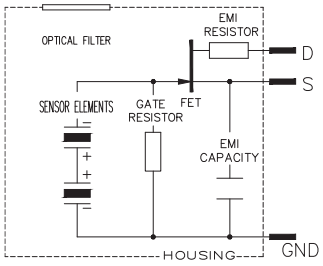
Features and Benefits
- TO-39 metal housing
- Different window sizes
- EMI protection with the PYD 1394

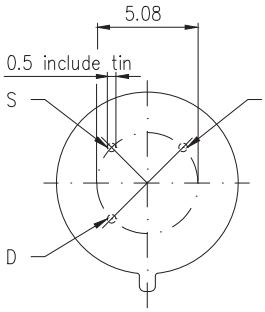
Product Description
These Low-Profile TO-39 detectors are very well suited for use as two detectors arranged at an angle so as to enable a 180 degree view. The LHi 874 offers a standard window size, whereas the LHi 944 model offers a large window with greater Field Of View. The PYD 1394 has same dimensions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

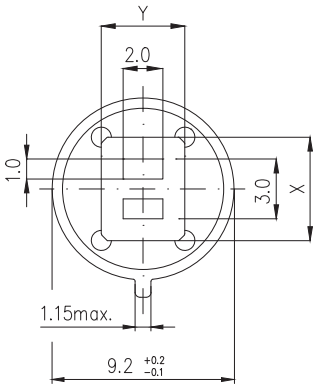
LHi 874, 944

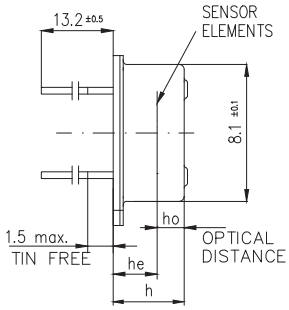


PYD 1394









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	

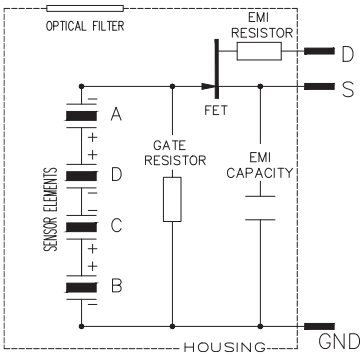
Pyroelectric Four-Element Detectors
For Ceiling-Mount

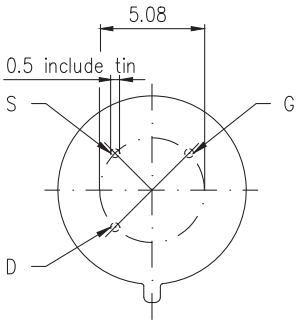
LHi 1128, PYQ 1398, PYQ 1348 – Single-Output "Quad" Pyro

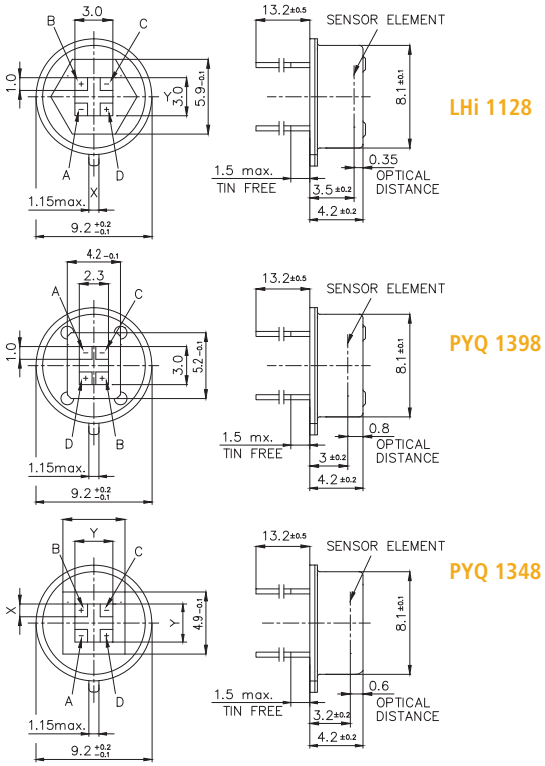
Applications
- Ceiling-Mount Alarms
- Ceiling-Mount Light Switches

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	

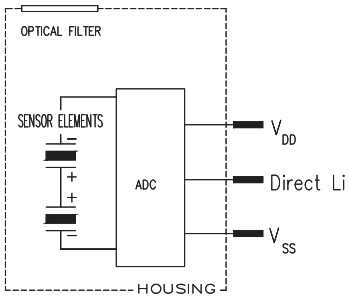
Miniaturized, Dual-Element Pyrodetectors
For Motion Sensing

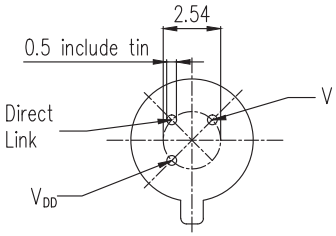
PYD 5731 – DigiPyro® in TO-46 Housing

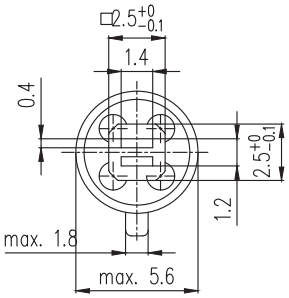
Applications
- Automatic Light Switching
- Wall Switches

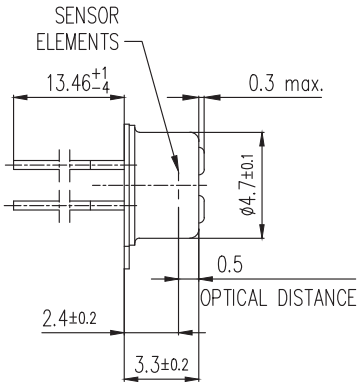
Features and Benefits
- TO-46 metal housing
- Temperature reference output included
- DigiPyro® with "Direct Link" Interface

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.





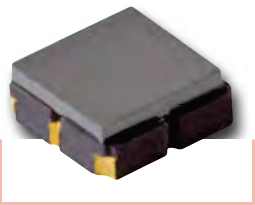




PYD 5731				
Main Parameter	**Symbol**	**PYD 5731**	**Unit**	**Remarks**
Responsivity, min.	R_{min}	4.0	kV/W	f = 1 Hz
Responsivity, typ.	R_{typ}	6.0	kV/W	f = 1 Hz
Match, max.	M_{max}	10	%	
Noise, max.	n_{max}	120	μV_{pp}	0,4…10Hz/ 20°C
Noise, typ.	n_{typ}	50	μV_{pp}	0,4…10Hz/ 20°C
Field of View, horizontal	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

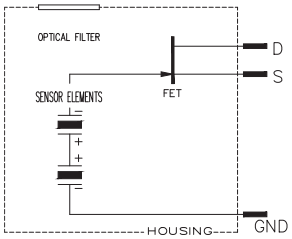
Features and Benefits

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

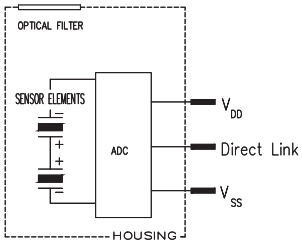
Product Description

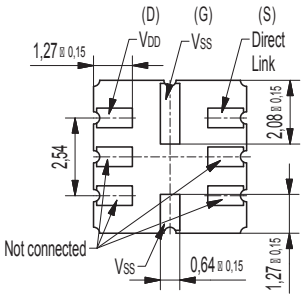
The PYD 5190 Pyrodetector features a tiny, Dual-Element Pyro in SMD form. With the PYD 5790, Excelitas extends the growing DigiPyro® Family to the SMD form factor. Both models are fit with small pyroelectric elements, 0.7x1.5 mm in size. The SMD line is not designed as a 1-to-1 replacement for TO housing 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.

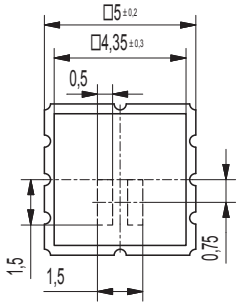
PYD 5190

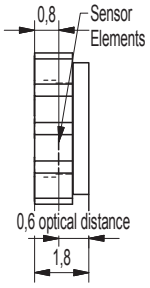


PYD 5790





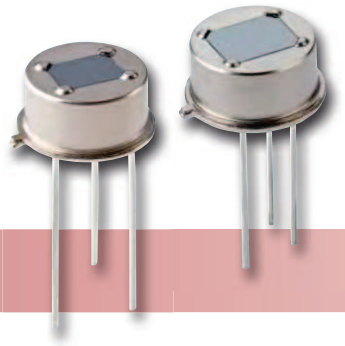




PYD 5190 and PYD 5790

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° (79+33)°		non symmetric, unobstr.
Source voltage		-	0,2 … 1,5		47 KΩ, 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

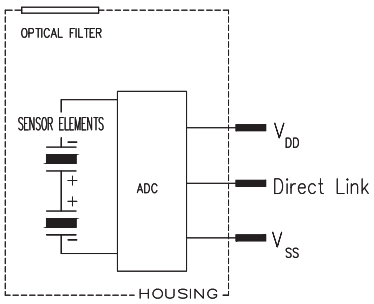


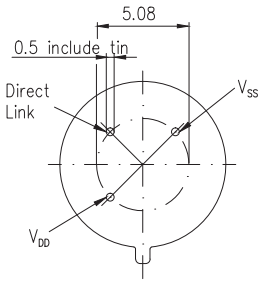
PYD 1788, PYD 1798 – DigiPyro®

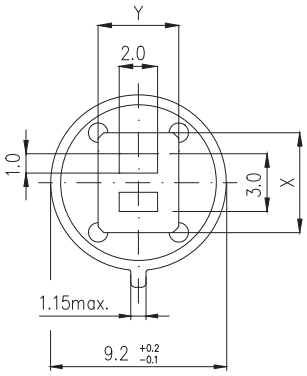
Applications
- Passive Intrusion Alarms
- Automatic Light Switching
- Automatic Lamps

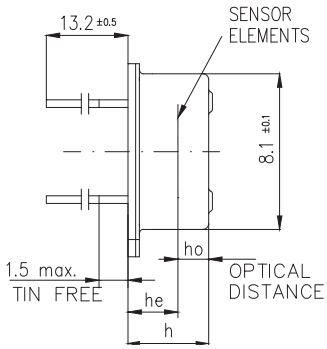
Features and Benefits
- TO-5 metal housing
- Digital "Direct Link"
- Different window sizes
- Excellent EMI protection

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.

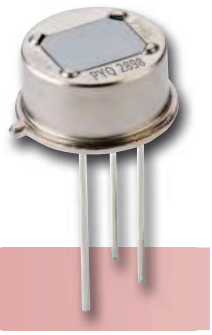








PYD 1798 and PYD 1788					
Parameter	Symbol	PYD 1798	PYD 1788	Unit	Remarks
Responsivity, min.	R_{min}	3.3	3.3	kV/W	f = 1 Hz
Responsivity, typ.	R	4	4	kV/W	f = 1 Hz
Match, max.	M_{max}	10	10	%	
Noise	N, N_{max}	78/20	78/20	μV_{pp}	
Field of View, vertical	FoV	110°	95°		unobstructed
Field of View, horizontal	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	



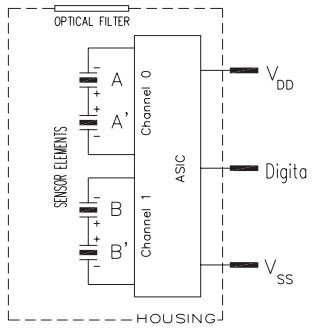
Digital, Pyroelectric Four-Element Detectors
For Motion Sensing

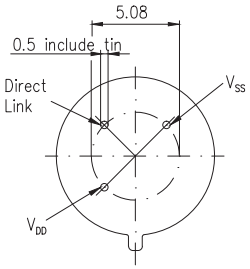
PYQ 2898 – DigiPyro® (2+1) Channel

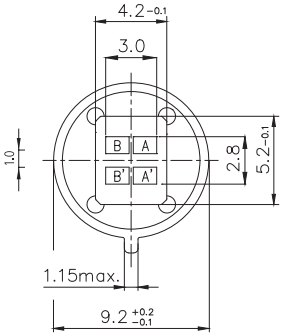
Applications
- Passive Intrusion Alarms
- High-End Motion Sensing
- Ceiling-Mount Sensors

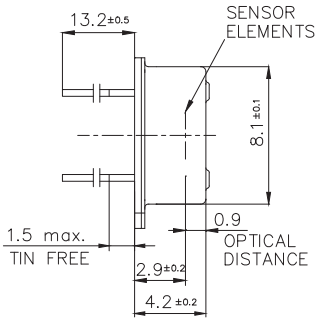
Features and Benefits
- Digital "Direct Link"
- Different window sizes
- Different Element configurations
- Excellent EMI protection

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.



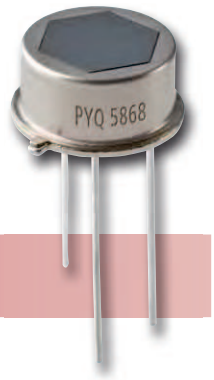






PYQ 2898			
Main Parameter	**PYQ 2898**	**Unit**	**Remarks**
Responsivity, min.	3.5	kV/W	f = 1 Hz
Responsivity, typ.	4.5	kV/W	f = 1 Hz
Match, max.	10	%	
Field of View, horizontal	96°		unobstr.
Field of View, vertical	56°		unobstr.
Operating Voltage	2,7…3,6	V	
Supply Current	10	µA	V_{DD} = 3,3V
	15	µA	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

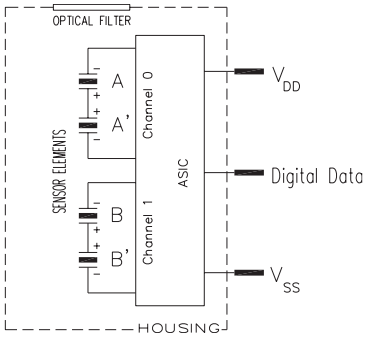


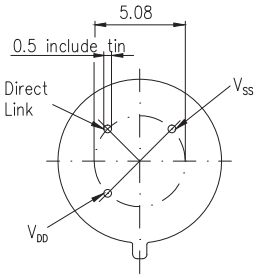
PYQ 5868, PYQ 5848 – DigiPyro® (2+1) Channel

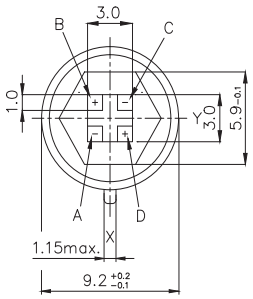
Applications
- Passive Intrusion Alarms
- High-End Motion Sensing
- Ceiling-Mount Sensors

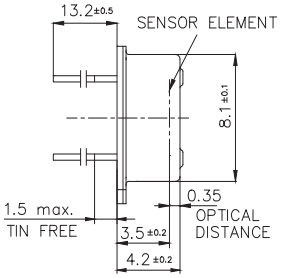
Features and Benefits
- Digital "Direct Link"
- Different window sizes
- Different Element configurations
- Excellent EMI protection

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.

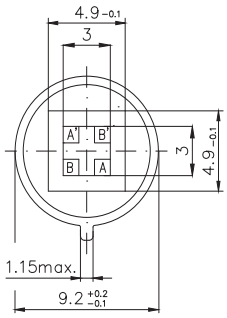


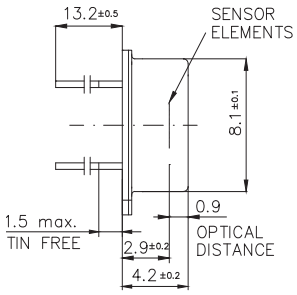






PYQ 5868





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	