

Pyroelectric Infrared Sensors



Dual Type Pyroelectric Infrared Sensor IRA-E700 Series

Pyroelectric infrared sensors, IRA series, exhibit high sensitivity and reliable performance made possible by Murata's ceramic technology and Hybrid IC technique expertise developed over many years. IRA-E700 series realizes cost benefits and higher performance with a new infrared sensor element of improved material parameters and fabrication. IRA-E700 series is available in two types. IRA-E710ST0 has enhanced immunity to RFI (Radio Frequency Interference).

■ Features

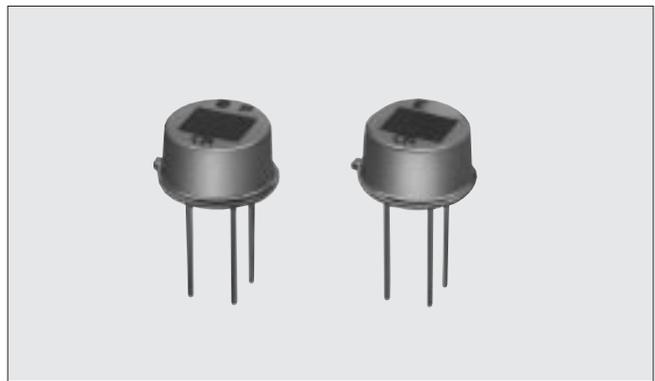
1. High sensitivity and excellent S/N ratio
2. High stability to the temperature change
3. Slight movement can be detectable.
4. High immunity to the external noise (Vibration, RFI etc.)
5. Custom design is available.
6. Higher in cost-performance

■ Applications

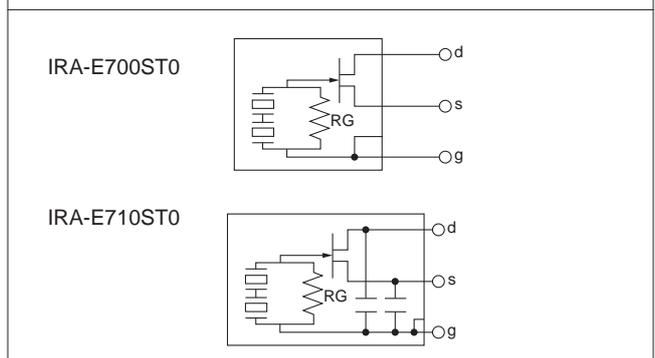
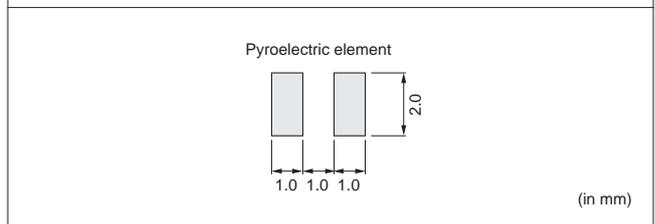
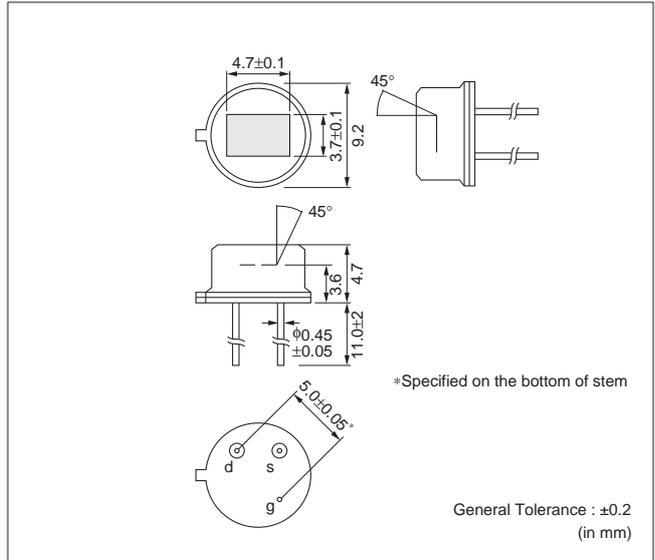
1. Security
2. Lighting appliances
3. Household or other appliances

■ Rating (25°C)

Part Number	IRA-E700ST0	IRA-E710ST0
Responsivity (500K, 1Hz, 1Hz)	4.3mV _{pp} (Typ.)	
Field of View	$\theta_1 = \theta_2 = 45^\circ$	
Optical Filter	5μm long-pass	
Electrode	(2.0×1.0mm)×2	
Supply Voltage	2 to 15V	
Operating Temperature	-40 to 70°C	
Storage Temperature	-40 to 85°C	



■ Dimensions & Circuit Diagrams



Pyroelectric Infrared Sensors



Quad Type Pyroelectric Infrared Sensor IRA-E900 Series

Pyroelectric infrared sensors, IRA series, exhibit high sensitivity and reliable performance made possible by Murata's ceramic technology and Hybrid IC technique expertise developed over many years. IRA-E900 series realizes cost benefits and higher performance with a new infrared sensor element of improved material parameters and fabrication. IRA-E900 series is available in two types. IRA-E910ST1 has enhanced immunity to RFI (Radio Frequency Interference).

■ Features

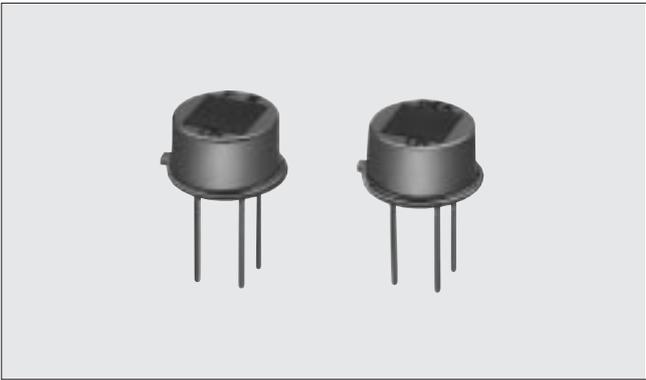
1. High sensitivity and excellent S/N ratio
2. High stability to the temperature change
3. Slight movement can be detectable.
4. Non directional sensing with wide F.O.V.
5. High immunity to the external noise (Vibration, RFI etc.)
6. Custom design is available.
7. Higher in cost-performance

■ Applications

1. Security
2. Lighting appliances
3. Household or other appliances

■ Rating (25°C)

Part Number	IRA-E900ST1	IRA-E910ST1
Responsivity (500K, 1Hz, 1Hz)	3.3mV _{pp} (Typ.)	
Field of View	$\theta_1 = \theta_2 = 41^\circ$	
Optical Filter	5μm long-pass	
Electrode	(1.1×1.1mm)×4	
Supply Voltage	3 to 15V	
Operating Temperature	-25 to 55°C	
Storage Temperature	-40 to 85°C	



■ Dimensions & Circuit Diagrams

Technical drawings showing dimensions and circuit diagrams for IRA-E900ST1 and IRA-E910ST1 sensors.

Dimensions (in mm):

- Top view: 4.7±0.1 (width), 9.2 (height)
- Side view: 41° (view angle), 4.7 (total height), 3.6 (height to top of stem), 0.45±0.05 (stem diameter), 11.0±0.2 (total length)
- Bottom view: 5.08±0.05 (width), 9 (height)
- Pyroelectric element: 1.1 (width), 1.1 (height), 1.1 (width), 1.1 (height)

General Tolerance : ±0.2 (in mm)

*Specified on the bottom of stem

Circuit Diagrams:

- IRA-E900ST1: Shows a pyroelectric element connected to a resistor (RG) and a transistor circuit. Terminals are labeled d, s, and g.
- IRA-E910ST1: Shows a pyroelectric element connected to a resistor (RG) and a transistor circuit with a capacitor. Terminals are labeled d, s, and g.

Pyroelectric Infrared Sensors



Quad Type Pyroelectric Infrared Sensor IRA-E940ST1 Series

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Pyroelectric infrared sensors, IRA series, exhibit high sensitivity and reliable performance made possible by Murata's ceramic technology and Hybrid IC technique expertise developed over many years. IRA-E940ST1 realizes cost benefits and higher performance with a new infrared sensor element of improved material parameters and fabrication. IRA-E940ST1 which has quad elements and 2 outputs will detect the human body more correctly with OR/AND logic circuit.

■ Features

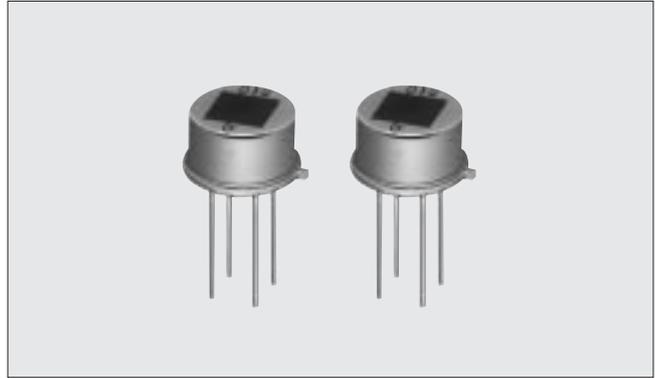
1. High sensitivity and excellent S/N ratio
2. High stability to the temperature change
3. High immunity to the external noise (Vibration, RFI etc.)
4. Higher in cost-performance
5. Custom design is available.

■ Applications

1. Security
2. Lighting appliances
3. Household or other appliances

■ Rating (25°C)

Part Number	IRA-E940ST1
Responsivity (500K, 1Hz, 1Hz)	3.3mV _{pp} (Typ.)
Field of View	$\theta_1=55^\circ, \theta_2=50^\circ$
Optical Filter	5 μ m long-pass
Electrode	(1.35X1.0mm)X4
Supply Voltage	2 to 15V
Operating Temperature	-25 to 55°C
Storage Temperature	-40 to 85°C



■ Dimensions & Circuit Diagrams

Technical drawings of the IRA-E940ST1 sensor showing dimensions and circuit diagrams.

Top view dimensions: 4.7±0.1 mm diameter, 9.2 mm diameter for the base, 4.7 mm height.

Side view dimensions: 55° angle, 3.6 mm height, 4.7 mm total height, 0.45 mm diameter for the stem, ±0.05 mm tolerance for the stem diameter, 1.0±0.2 mm diameter for the base.

Bottom view dimensions: 5.08±0.05" diameter, pins labeled s1, d, g, s2.

*Specified on the bottom of stem

General Tolerance : ±0.2 (in mm)

Pyroelectric element diagram showing four elements with dimensions: 1.35 mm width, 0.3 mm gap, 1.35 mm width, 1.0 mm gap, 0.8 mm gap, 1.0 mm gap.

Circuit diagram showing the sensor element connected to a network of resistors (RG) and capacitors, with output terminals d, s1, g, and s2.



Pyroelectric Infrared Sensors



Temperature Compensation Single Type Pyroelectric Infrared Sensor IRA-E420 Series

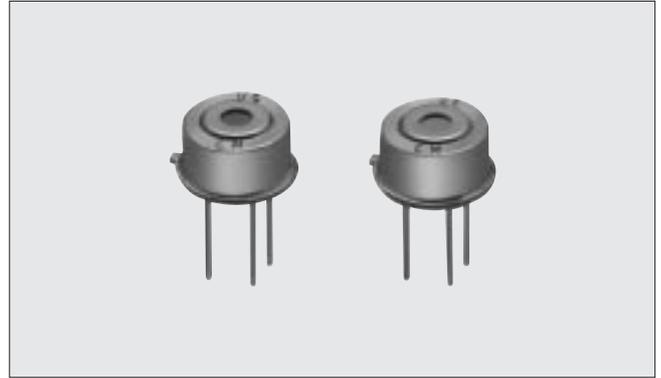
Single type pyroelectric infrared sensors IRA-E420 series, have a temperature compensation element. They are suitable for flame detection and gas detection.

■ Features

1. High stability against abrupt ambient temperature change
2. High immunity to the external noise (Vibration, RFI etc.)
3. Custom design is available with varying optical filter.

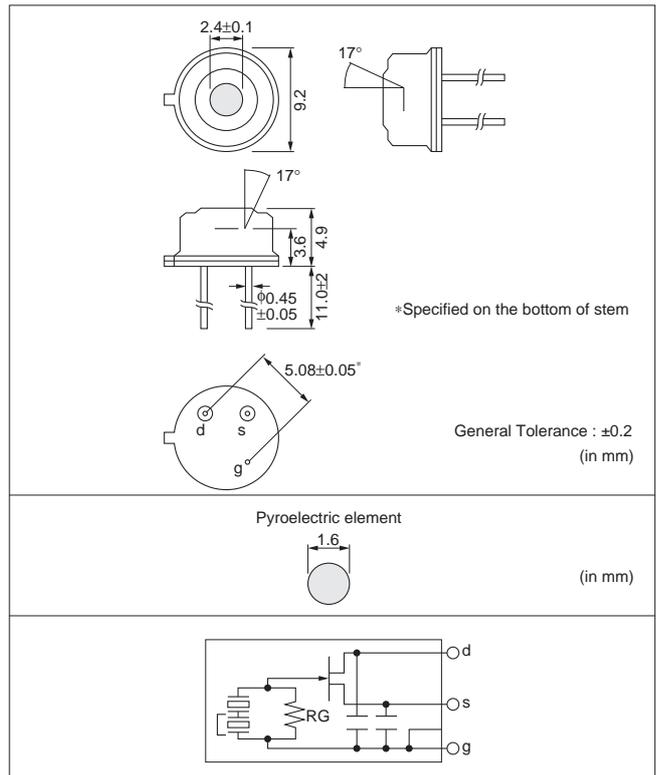
■ Applications

Part Number	Optical Filter	Applications
IRA-E420S1	Silicon	1-15 μ m infrared detection
IRA-E420QW1	4.3 μ m band-pass	Flame detection



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■ Dimensions & Circuit Diagrams



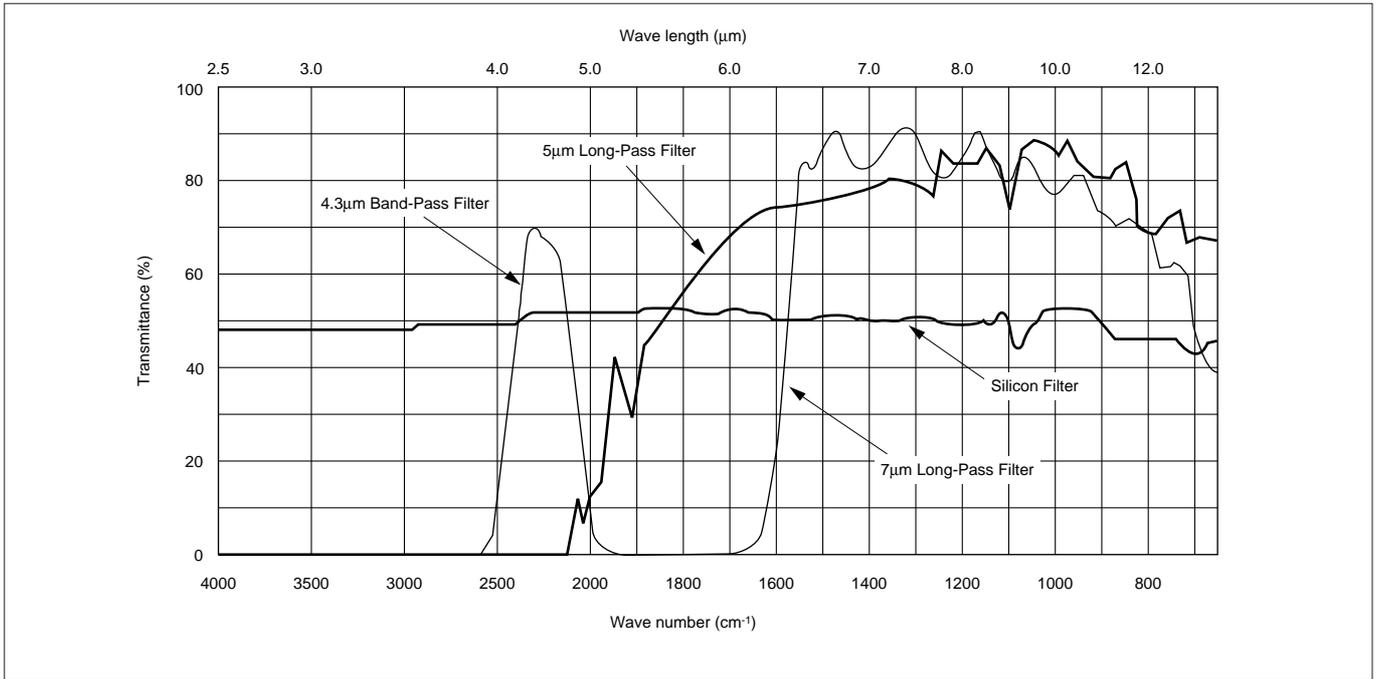
■ Rating (25°C)

Part Number	IRA-E420S1	IRA-E420QW1
Responsivity (500K, 1Hz, 1Hz)	3.4mV _{pp} (Typ.)	1.3mV _{pp} (Typ.)*
Field of View	$\theta_1 = \theta_2 = 17^\circ$	
Optical Filter	Silicon	4.3 μ m band-pass
Electrode	$\phi 1.6$ mm	
Supply Voltage	3 to 15V	
Operating Temperature	-25 to 70°C	-25 to 55°C
Storage Temperature	-30 to 100°C	

* 700K, 5Hz, 1Hz

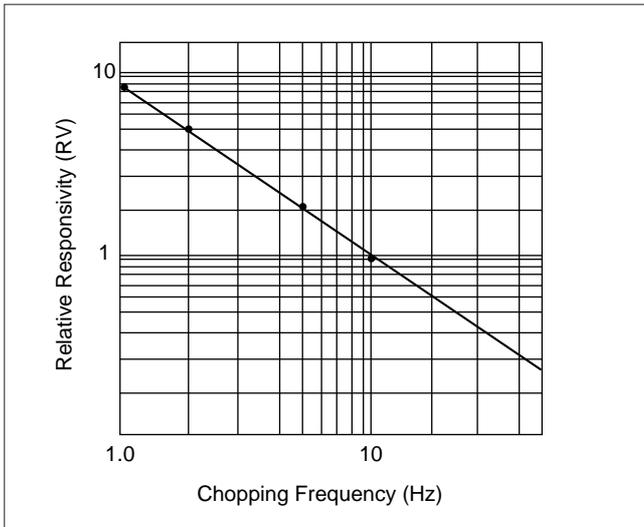
Pyroelectric Infrared Sensor IRA Series Characteristics Data

■ Spectral Response of Window Materials



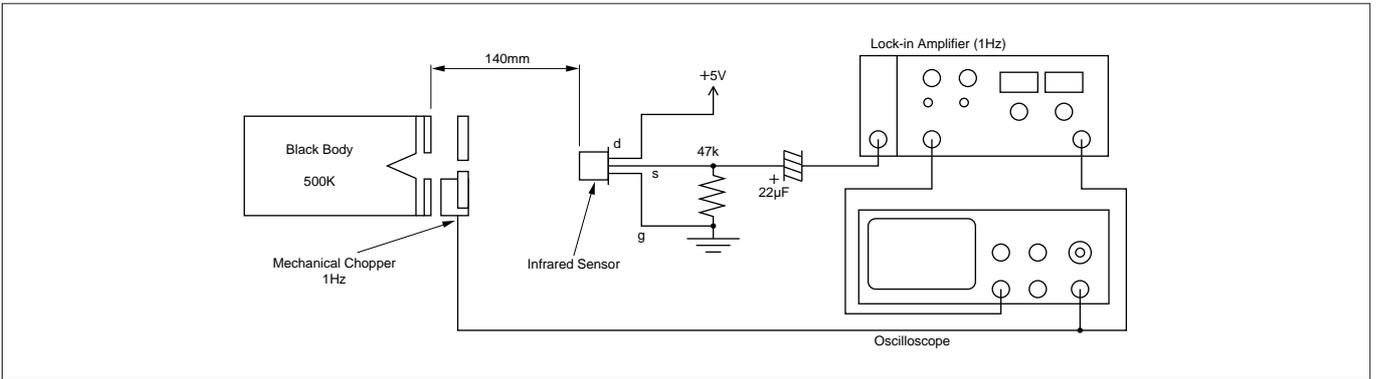
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■ Frequency Characteristics

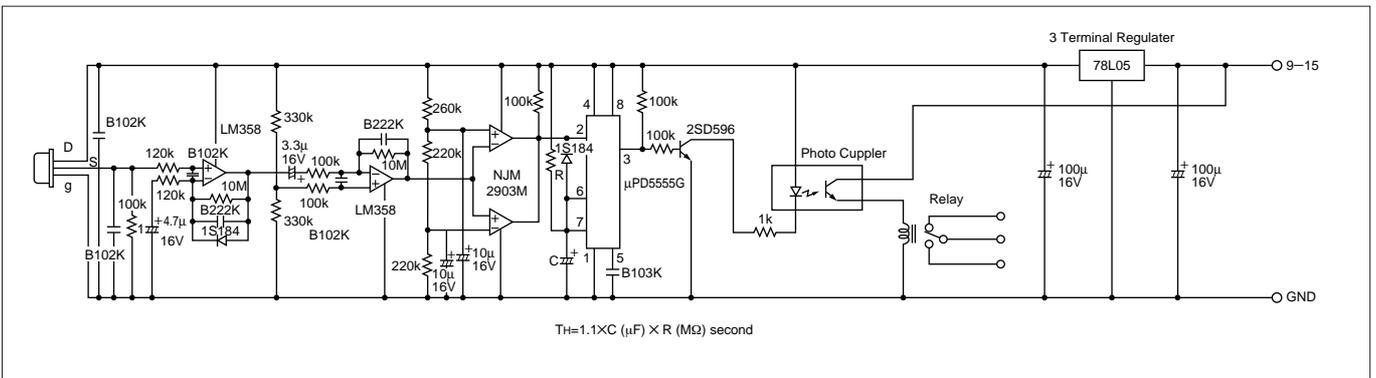


Pyroelectric Infrared Sensor IRA Series Characteristics Data

■ Test Method of Sensitivity



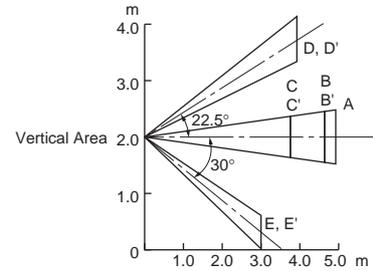
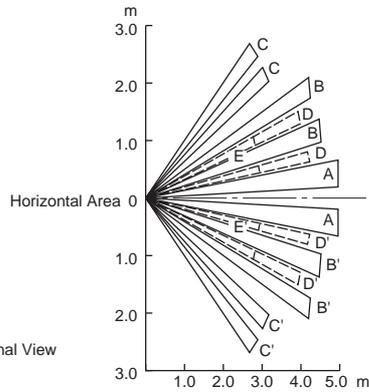
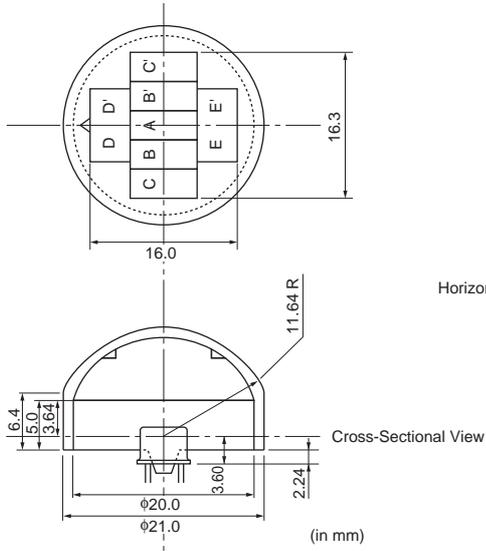
■ Typical Application Circuit (Human detection)



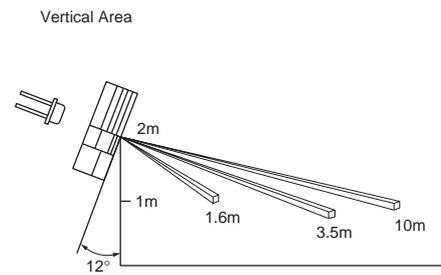
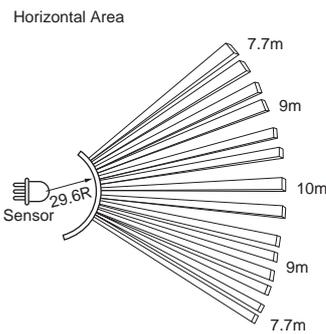
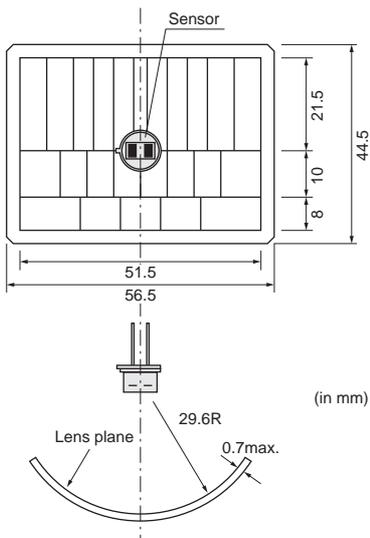
Pyroelectric Infrared Sensor IRA Series Characteristics Data

■ Fresnel Lens for Human Body Detection

PPGI0601



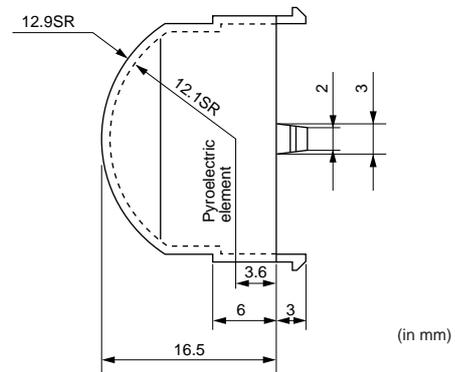
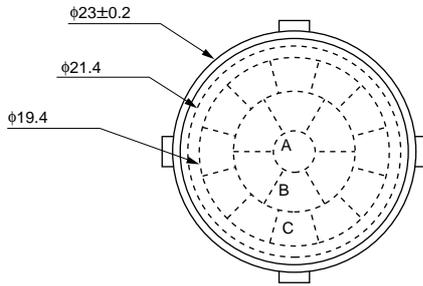
PPGI0902



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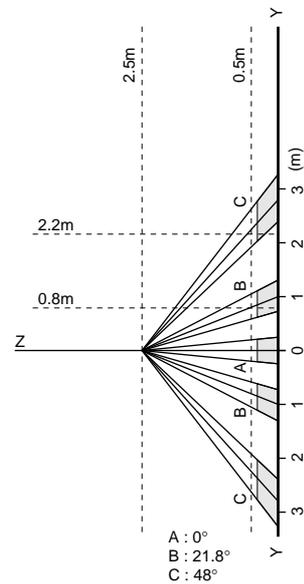
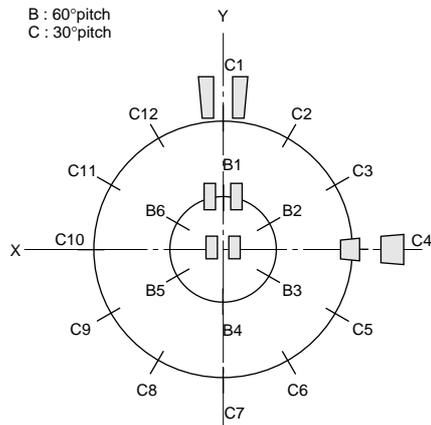
Pyroelectric Infrared Sensor IRA Series Characteristics Data

PPGI0626



Detection area on the floor

B : 60°pitch
C : 30°pitch



A : 0°
B : 21.8°
C : 48°

Freshel lens are available upon request.

Pyroelectric Infrared Sensor IRA Series Characteristics Data

■ Reliability Test

IRA-E700 series, IRA-E900 series

Item	Test Conditions	Criteria	
High Temperature	100°C for 500 hrs.	After test completion, leave for three hours in normal humidity temperature conditions, and then measure. 1. External appearance: No significant damage. 2. Sensitivity: Tolerance within 20% deviation from original value. 3. Noise: Maximum tolerance +100mV of original value	
Low Temperature	-40°C for 500 hrs.		
Humidity	60°C, 95% RH for 500 hrs.		
Heat Cycle	20 times of following cycle. -25°C, 30min.↔Room temp., 30min.↕ ↑Room temp., 30min.↔55°C, 30min.		
Vibration	Apply vibration of amplitude of 1.5mm with 10 to 55Hz band to each of 3 perpendicular directions for 60min.		
Shock	Apply shock of 100G sinewave by standard shock tester to each of 3 perpendicular directions.		
Soldering Heat	Immerse up to 3.0mm from can case in solder bath of 260±5°C for 10±1 s.		
Hermetic Sealing	Conform to MIL-STD-202F chapter 112D, condition D. Immerse in fluorocarbon bath (FC-40) of 125±5°C for 20 s.		No generation of bubbles.
Solderability	Conform to MIL-STD-202F chapter 208B. Immerse in rosin flux and Immerse up to 2.0 to 2.5mm from can case in solder bath of 230±5°C for 5±0.5 s.		More than 95% of the terminal should be covered by solder.

IRA-E420 series

Item	Test Conditions	Criteria	
High Temperature	100°C for 500 hrs.	After test completion, leave for three hours in normal humidity temperature conditions, and then measure. 1. External appearance: No significant damage. 2. Sensitivity: Tolerance within 20% deviation from original value. 3. Noise: Maximum tolerance +100mV of original value	
Low Temperature	-30°C for 500 hrs.		
Humidity	60°C, 95% RH for 500 hrs.		
Heat Cycle	20 times of following cycle. -25°C, 30min.↔Room temp., 30min.↕ ↑Room temp., 30min.↔55°C, 30min.		
Vibration	Apply vibration of amplitude of 1.5mm with 10 to 55Hz band to each of 3 perpendicular directions for 60min.		
Shock	Apply shock of 100G sinewave by standard shock tester to each of 3 perpendicular directions.		
Soldering Heat	Immerse up to 3.0mm from can case in solder bath of 260±5°C for 10±1 s.		
Hermetic Sealing	Conform to MIL-STD-202F chapter 112D, condition D. Immerse in fluorocarbon bath (FC-40) of 125±5°C for 20 s.		No generation of bubbles.
Solderability	Conform to MIL-STD-202F chapter 208B. Immerse in rosin flux and Immerse up to 2.0 to 2.5mm from can case in solder bath of 230±5°C for 5±0.5 s.		More than 95% of the terminal should be covered by solder.

Pyroelectric Infrared Sensor Modules



Pyroelectric Infrared Sensor Module **IMD** Series

Newly Developed Modules with Lower Power Consumption and Extra Features.

The IMD Series is comprised of an amplifier and high performance infrared sensor modules in compact, hermetically sealed metal can packages. Power consumption of the module is very low and a Fresnel lens is included in the module. Analog & Digital Output Model (IMD-B101-01) and Digital Output & Brightness Sensor (CdS) Input Model (IMD-B102-01) are available for different applications.

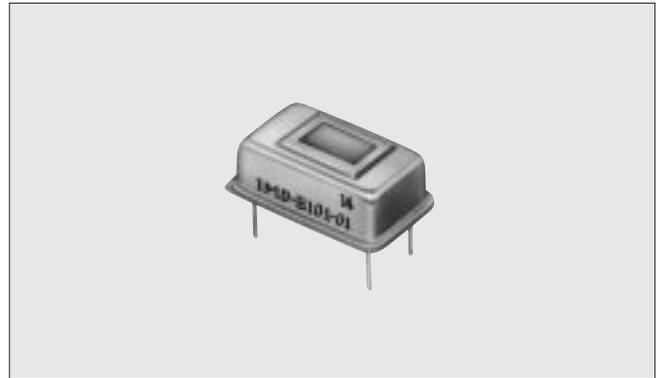
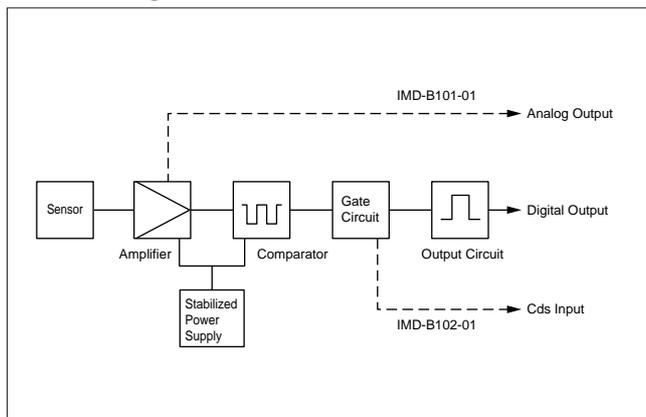
■ Features

1. With the fresnel lens, the sensor is able to detect the human body at a distance of 5m through angles of 119°×38° (Max.)
2. The modules have a compact size of 20.3×12.6×7.8mm.
3. The modules incorporate an amplifier and a single processing circuit.
4. They have outstanding reliability and EMI characteristics.
5. They have low power consumption.

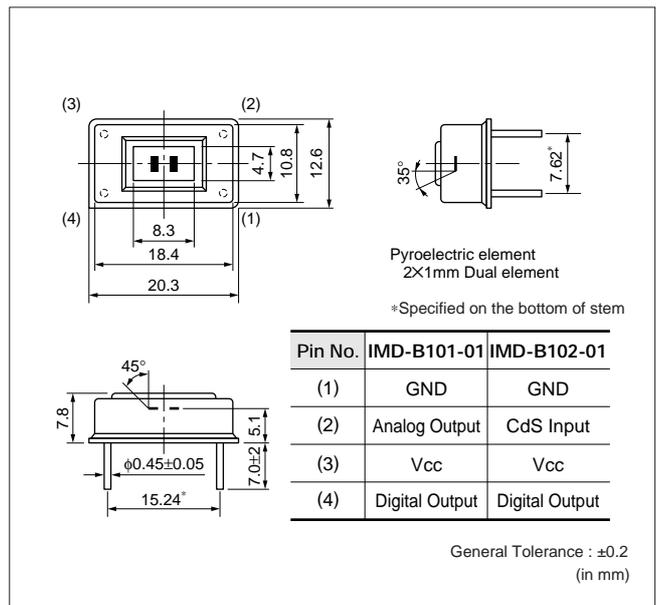
■ Applications

1. Automatic light switches
2. On/off controls for household appliances, industrial equipment and office equipment
3. Amusement devices (Games, Toys, etc.)

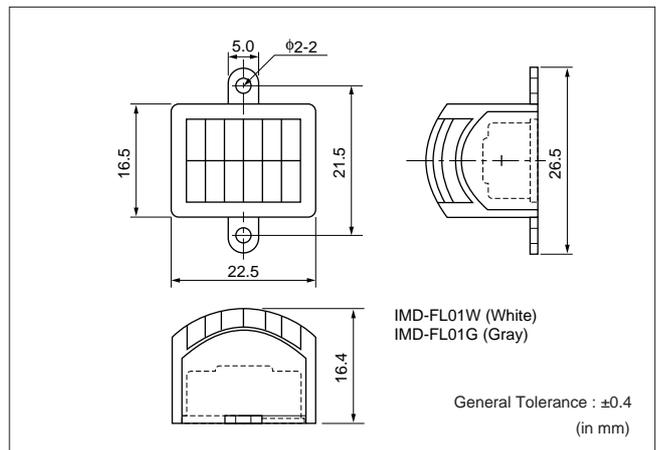
■ Block Diagram



■ Dimensions



■ Fresnel Lens



Pyroelectric Infrared Sensor Module IMD Series

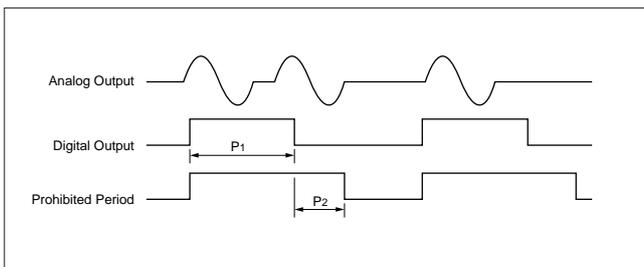
Max. Rating (25°C)

Max. Supply Voltage	5.5V
Operating Temp. Range	-10 to +50°C (Without condensation)
Storage Temp. Range	-20 to +60°C

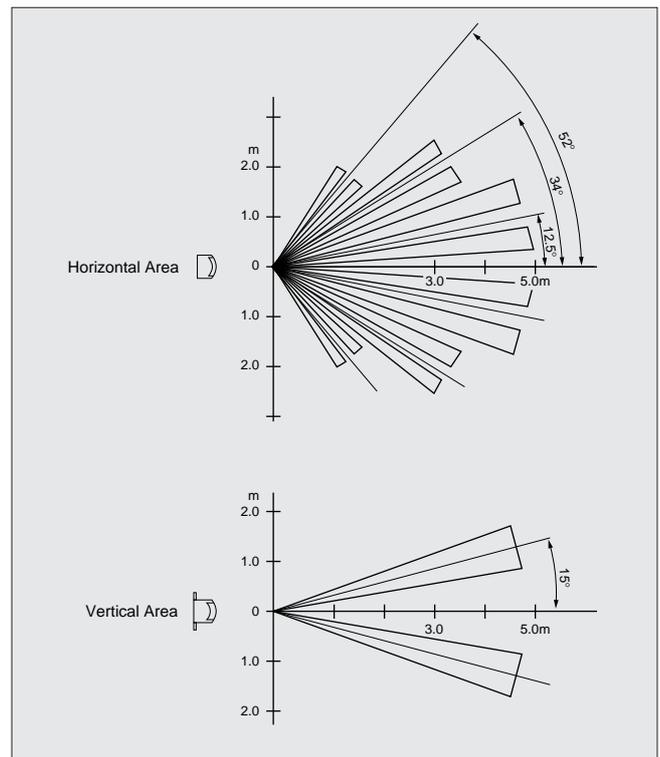
Rating (25°C)

Items		
Supply Voltage		2.6–5.5V
Current Consumption	Ready Period	30–60μA
	Active Period	50–120μA
Output Terminal		C-MOS
Output Current		1mA
Output Pulse Width (P1)		1.0–3.0s
Prohibited Time (P2)		<3.0s
Wave Length Range		5–14μm
Detection Length	Without Lens	1m
	With IMD-FL01W/G	5m
Detection Range		119°×38° (Max.)

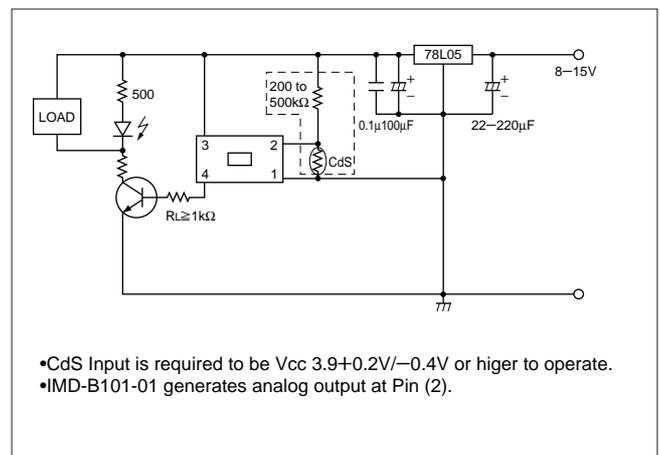
Timing Chart (IMD-B101-01)



Detection Area (With Fresnel Lens)



Typical Application (IMD-B102-01)



Reliability Test

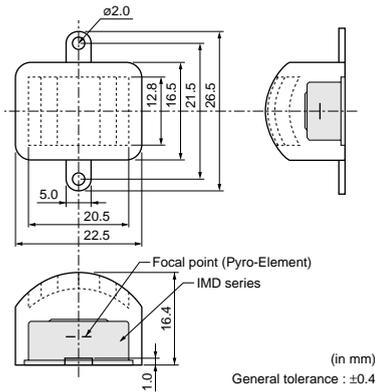
Item	Test Conditions	Criteria
High Temperature	60°C for 500 hrs.	After test completion, leave for three hours in normal humidity temperature conditions, and then measure. 1. External appearance: No significant damage. 2. Sensitivity: Min. 70% of original value. 3. Current consumption: Within rated value.
Low Temperature	-20°C for 500 hrs.	
Humidity	60°C, 95% RH for 150 hrs.	
Heat Cycle	20 times of following cycle. -20°C, 30min. ⇄ Room temp., 30min ↓ ↑ Room temp., 30min. ⇄ 60°C, 30min.	
Vibration	Apply vibration of amplitude of 1.5mm with 10 to 55Hz band to each of 3 perpendicular directions for 2 hrs.	
Shock	Apply shock of 30G sinewave by standard shock tester to each of 3 perpendicular directions for 5 times.	
Soldering Heat	Immerse up to 3.0mm from can case in solder bath of 260±5°C for 10±1 s.	
Hermetic Sealing	Conform to MIL-STD-202F chapter 112D, condition D. Immerse in fluorocarbon bath (FC-40) of 125±5°C for 20 s.	No generation of bubbles.

Pyroelectric Infrared Sensors

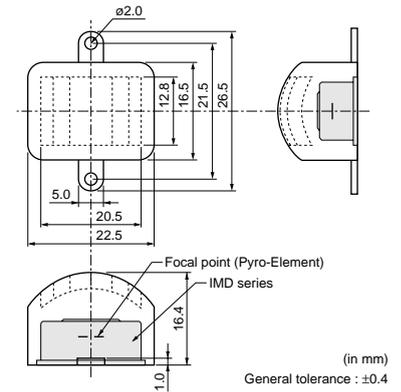
Fresnel Lens



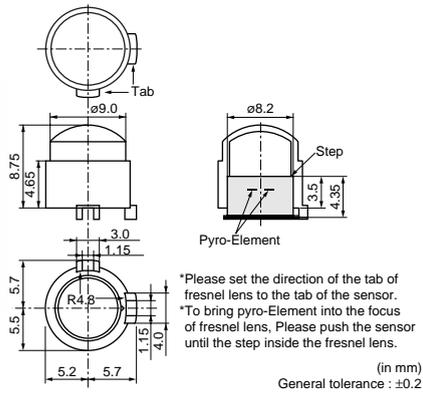
IMD-FL01G



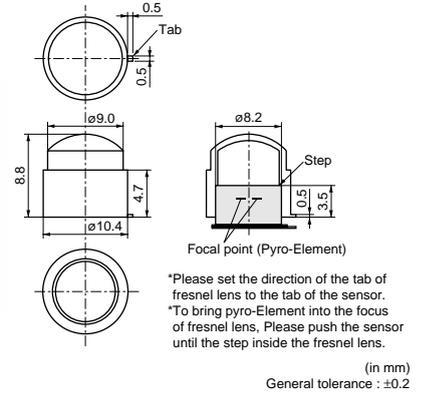
IMD-FL01W



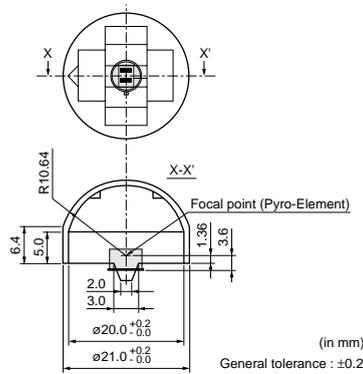
**IML-0635
IML-0638**



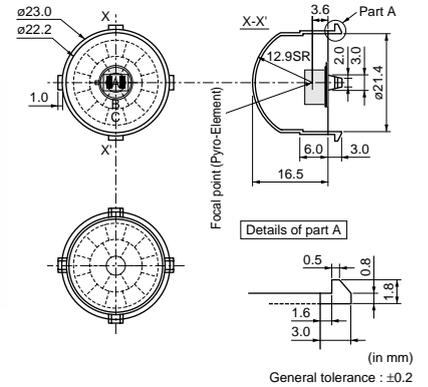
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IML-0637**



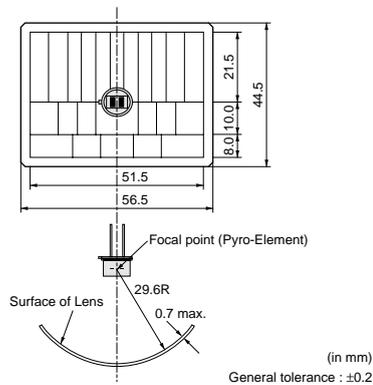
PPGI0601



PPGI0626



PPGI0902



Note • This catalog has only typical specifications because there is no space for detailed specifications. Therefore, please approve our product specifications or transact the approval sheet for product specifications before ordering. Especially, please read rating and **CAUTION** (for storage, operating, rating, soldering, mounting and handling) in them to prevent smoking and/or burning, etc.
• You are able to read a detailed specifications in the website (<http://search.murata.co.jp/>) before to require our product specifications or to transact the approval sheet for product specifications.

Part Number	Material	Color	Operating Temperature Range (°C)
IMD-FL01G	High density polyethylene	Dark Gray	-20 to 60
IMD-FL01W	High density polyethylene	Natural(White)	-20 to 60
IML-0635	High density polyethylene	Natural(White)	-25 to 55
IML-0636	High density polyethylene	Natural(White)	-25 to 55
IML-0637	High density polyethylene	Natural(White)	-25 to 55
IML-0638	High density polyethylene	Natural(White)	-25 to 55
PPGI0601	High density polyethylene	Natural(White)	-25 to 55
PPGI0626	High density polyethylene	Natural(White)	-25 to 55
PPGI0902	High density polyethylene	Natural(White)	-20 to 60