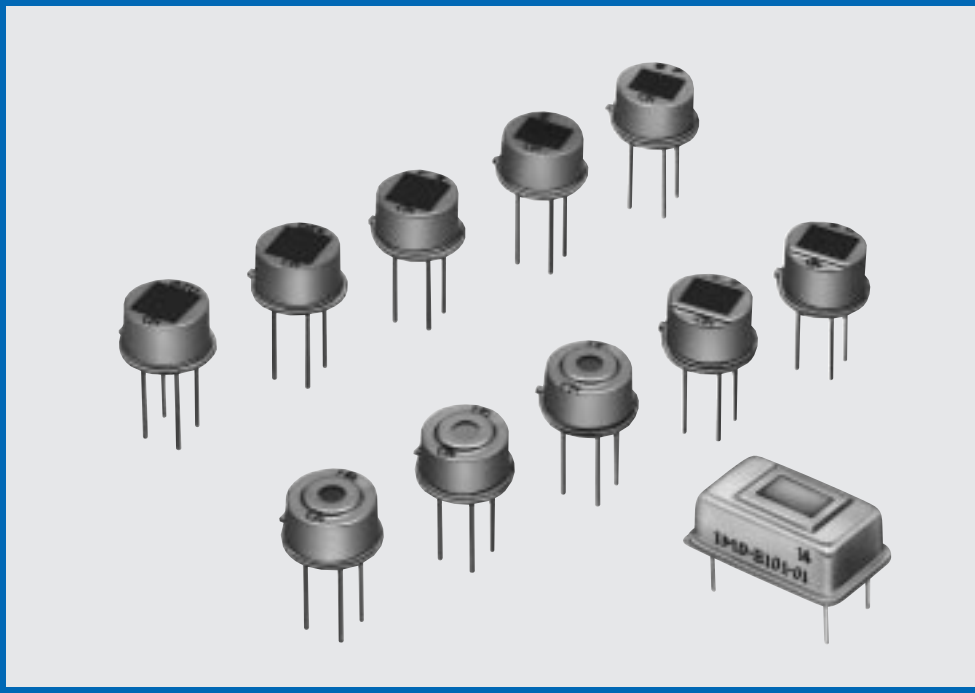
PYROELECTRIC INFRARED SENSOR & SENSOR MODULE

PYROELECTRIC INFRARED SENSOR & SENSOR MODULE



muRata Innovator in Electronics

Murata
Manufacturing Co., Ltd.

Cat.No.S21E-2

CONTENTS

■NOTICE

1. Caution in design

1) Please make sure that your product has been evaluated and confirmed against your specifications when our product is mounted to your product.
2) Be sure to provide an appropriate fail-safe function on your product to prevent a second damage that may be caused by the abnormal function or the failure of our product.
3) In the case of outdoor use, suitable optical filter and water and humidity proof structure should be applied.
4) To prevent failure or malfunction, please use a stabilized power supply.
5) Please avoid using the sensor in the following conditions because it may cause failure or malfunction.
   a) in such a fluid as water, alcohol etc. corrosive gas (SO_2, Cl_2, NO_X etc.) or sea breeze.
   b) in high humidity.
   c) in a place exposed directly to sun light or headlight of automobile.
   d) in a place exposed to rapid ambient temperature change.
   e) in a place exposed directly to blow from air-conditioner or heater.
   f) in a place exposed to strong vibration.
   g) in a place exposed to strong electromagnetic field.
   h) in such a place where infrared ray is shaded.
   i) in any other place similar to the above (a) through (h).

2. Caution in mounting

1) Soldering
   i) Hand soldering should be applied.

   ii) Soldering should be done quickly as following.

Temperature of soldering iron : 350˚C	
Distance from can case	Period of time
1—3mm	Within 3seconds per point
Over 3mm	Within 10seconds per point

   iii) Soldering flux should be water-soluble flux and not contain more than 0.2wt% chlorine.
   Soldering flux should be removed after soldering.
2) Cleaning
   Brush cleaning should be applied.

3. Caution in handling and storage

1) Optical filter of sensor should not be scratched or soiled.
2) Strong shock should be avoided.
3) Electrostatics and strong electromagnetic field should be avoided.
4) Sensor should be kept on conductive sponge.
5) High temperature, high humidity, fluid as water or alcohol etc., corrosive gas (SO_2, Cl_2, NO_X etc.) and sea breeze should be avoided.

■ISO CERTIFICATION

Manufacturing plants of these products in this catalog have obtained the ISO9000 quality system certificate.

Plant	Certified Date	Organization	Registration No.	Applied Standard
Togi denshi kogyo	Nov.25.'92	RCJ*	RCJ-92M-09	ISO9002

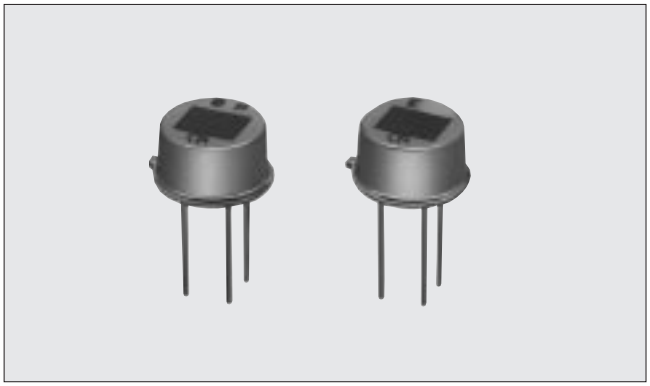
*RCJ : Reliability Center for Electronic Component of Japan

PYROELECTRIC INFRARED SENSOR

Pyroelectric Infrared Sensor **IRA-E700** Series

High Quality Dual Infrared Sensor

Pyroelectric infrared sensor, 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 realize 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

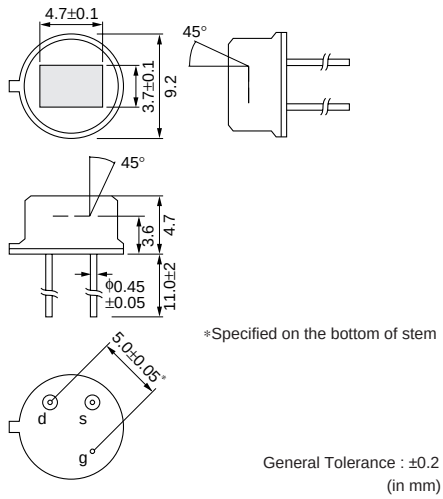
- Security
- Lighting appliances
- Household or other appliances

■RATING (25˚C)

IRA-E700ST1, IRA-E710ST1

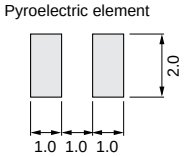
Sensitivity (500K, 1Hz, 1Hz)	4.3mV$_{p-p}$ (Typ.)
Wave length Range	5—14μm
Field of View	$\theta_1=\theta_2=45°$
Optical Filter	5μm long-pass Silicon
Electrode	(2.0×1.0mm)×2
Supply Voltage	2—15V
Operating Temperature	−40 to +70℃
Storage Temperature	−40 to +85℃

■DIMENSIONS & CIRCUIT DIAGRAMS



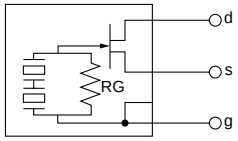
*Specified on the bottom of stem

General Tolerance : ±0.2
(in mm)

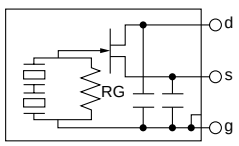


(in mm)

IRA-E700ST0



IRA-E710ST0

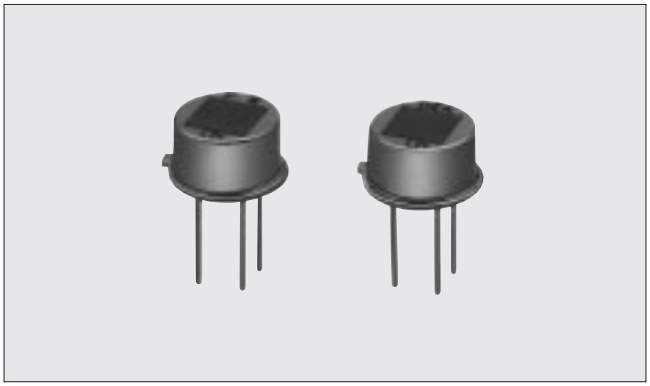


PYROELECTRIC INFRARED SENSOR

Pyroelectric Infrared Sensor **IRA-E900** Series

High Quality Quad Type Infrared Sensor

Pyroelectric infrared sensor, 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 realize 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

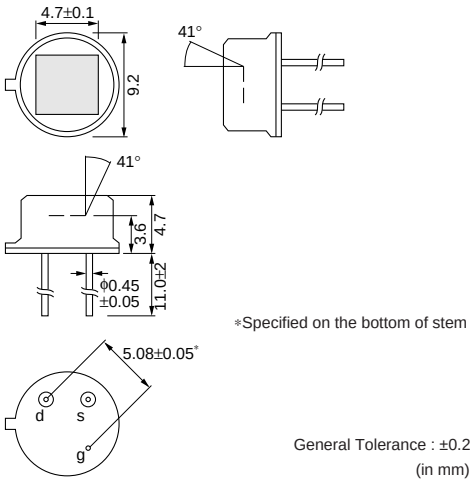
- Security
- Lighting appliances
- Household or other appliances

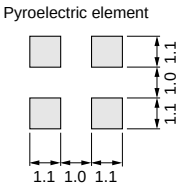
■RATING (25˚C)

IRA-E900ST1, IRA-E910ST1

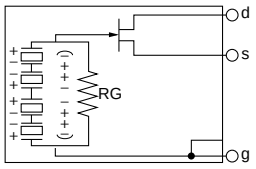
Sensitivity (500K, 1Hz, 1Hz)	3.3mV$_{p-p}$ (Typ.)
Wave length Range	5—14μm
Field of View	$\theta_1=\theta_2=41°$
Optical Filter	5μm long-pass Silicon
Electrode	(1.1×1.1mm)×4
Supply Voltage	3—15V
Operating Temperature	−25 to +55℃
Storage Temperature	−40 to +85℃

■DIMENSIONS & CIRCUIT DIAGRAMS

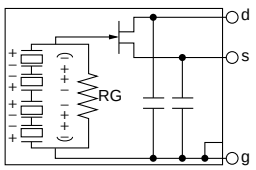




IRA-E900ST1



IRA-E910ST1

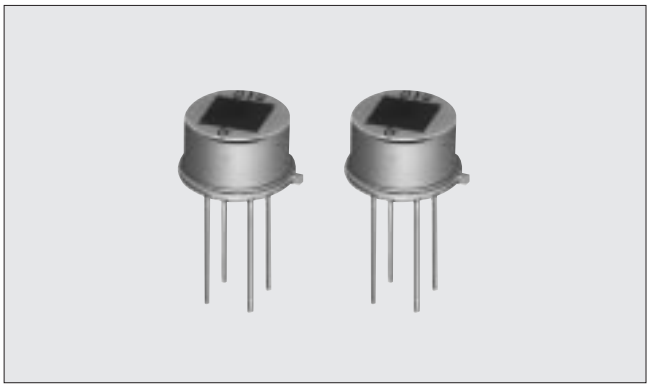


PYROELECTRIC INFRARED SENSOR

Pyroelectric Infrared Sensor **IRA-E940** Series

High Quality Quad Type Infrared Sensor

Pyroelectric infrared sensor, 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 human body more correct 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.

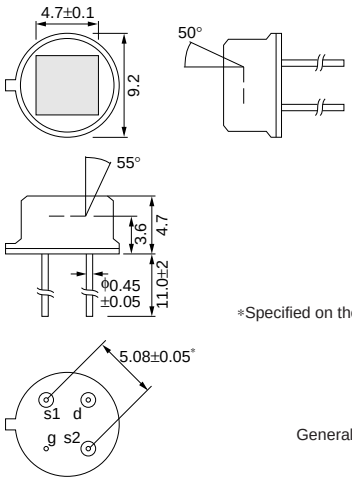
■APPLICATIONS

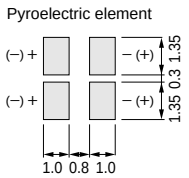
- Security
- Lighting appliances
- Household or other appliances

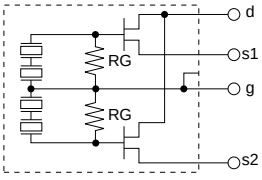
■RATING (25˚C)

Sensitivity (500K, 1Hz, 1Hz)	3.3mV$_{p-p}$ (Typ.)
Wave length Range	5—14μm
Field of View	θ_1=55°, θ_2=50°
Optical Filter	5μm long-pass Silicon
Electrode	(1.35×1.0mm)×4
Supply Voltage	2—15V
Operating Temperature	−25 to +55℃
Storage Temperature	−40 to +85℃

■DIMENSIONS & CIRCUIT DIAGRAMS





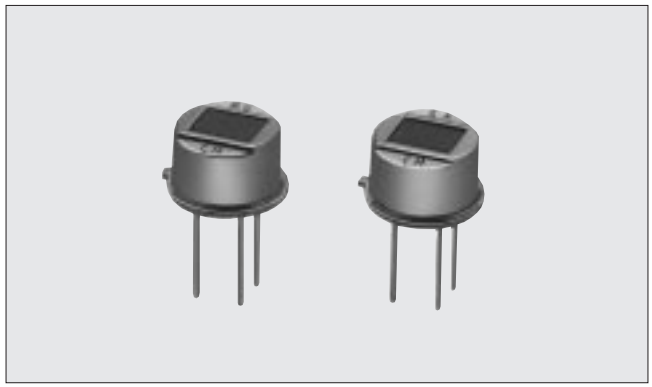


PYROELECTRIC INFRARED SENSOR

Pyroelectric Infrared Sensor **IRA-E500** Series

High Quality Dual Type Infrared Sensor

Pyroelectric infrared sensor, IRA-E500 series have dual sensing patterns.
The E500 series are available in two types with improved immunity to RFI and light.



■FEATURES

1. High immunity to the external light.
2. High immunity to the radio frequency interference.
3. Two type of optical filter are available for varying applications.

■APPLICATIONS

- Security
- Lighting appliances
- Household or other appliances

■RATING (25˚C)

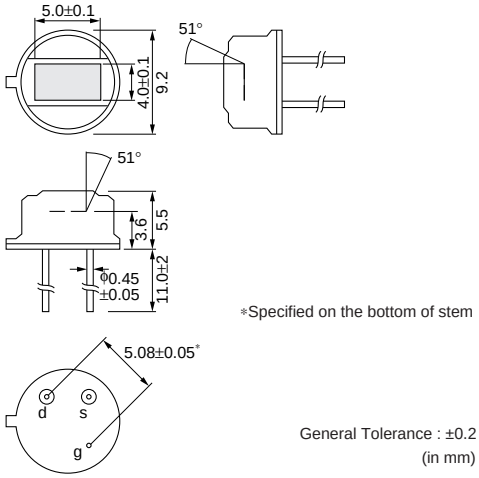
IRA-E500SZ0

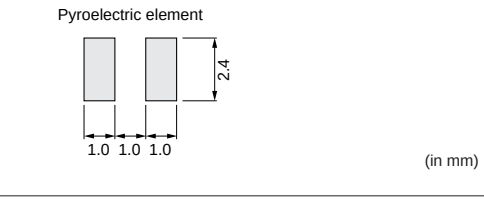
Sensitivity (500K, 1Hz, 1Hz)	3.2mV$_{p-p}$ (Typ.)
Wave length Range	7—14μm
Field of View	$\theta_1=\theta_2=51°$
Optical Filter	7μm long-pass silicon
Electrode	(2.4×1.0mm)×2
Supply Voltage	3—15V
Operating Temperature	−25 to +55℃
Storage Temperature	−30 to +100℃

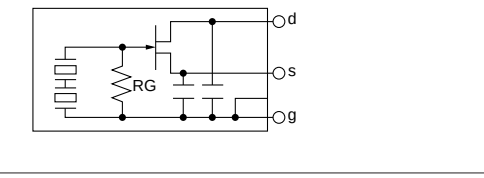
IRA-E500ST0

Sensitivity (500K, 1Hz, 1Hz)	3.9mV$_{p-p}$ (Typ.)
Wave length Range	7—14μm
Field of View	$\theta_1=\theta_2=51°$
Optical Filter	5μm long-pass silicon
Electrode	(2.4×1.0mm)×2
Supply Voltage	3—15V
Operating Temperature	−25 to +55℃
Storage Temperature	−30 to +100℃

■DIMENSIONS & CIRCUIT DIAGRAMS





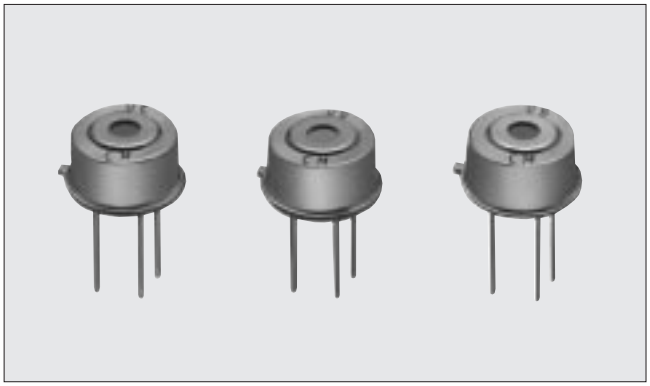


PYROELECTRIC INFRARED SENSOR

Pyroelectric Infrared Sensor **IRA-E410** Series

Temperature Compensation Single Type Infrared Sensor

Single type pyroelectric infrared sensor IRA-E410 seires has a temperature compensation element.
They are suitable for flame detection and remote temperature measurement.



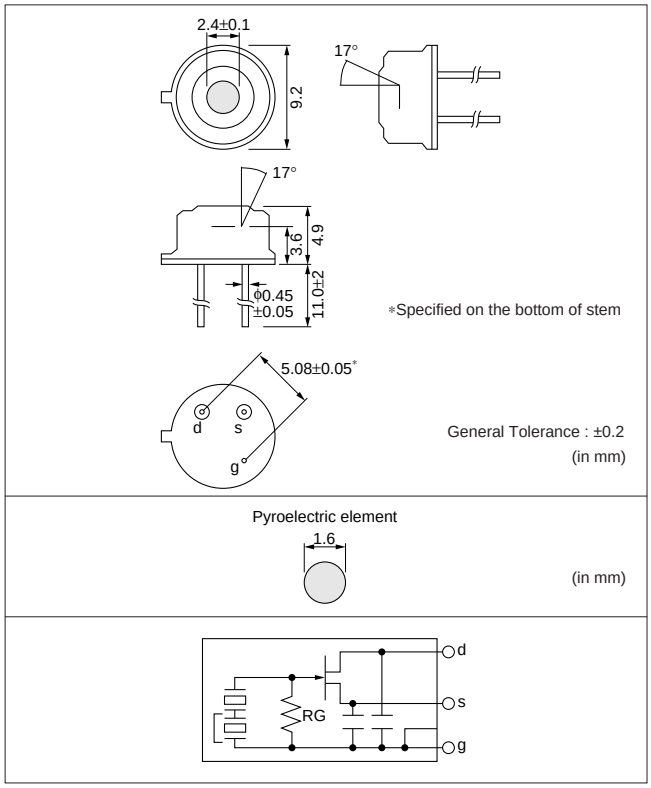
■FEATURES

1. High stability against abrupt ambient temperature change.
2. High immunity to the radio frequency interference.
3. Three type of optical filter are available for varying applications.
4. Custom design is available with varying optical filter.

■APPLICATIONS

Part Number	Optical Filter	Applications
IRA-E410S1	Silicon	Temperature measurement
IRA-E410ST1	5μm long-pass filter	Human body detection
IRA-E410QW1	4.3μm band-pass filter	Flame detection

■DIMENSIONS & CIRCUIT DIAGRAMS



■RATING (25˚C)

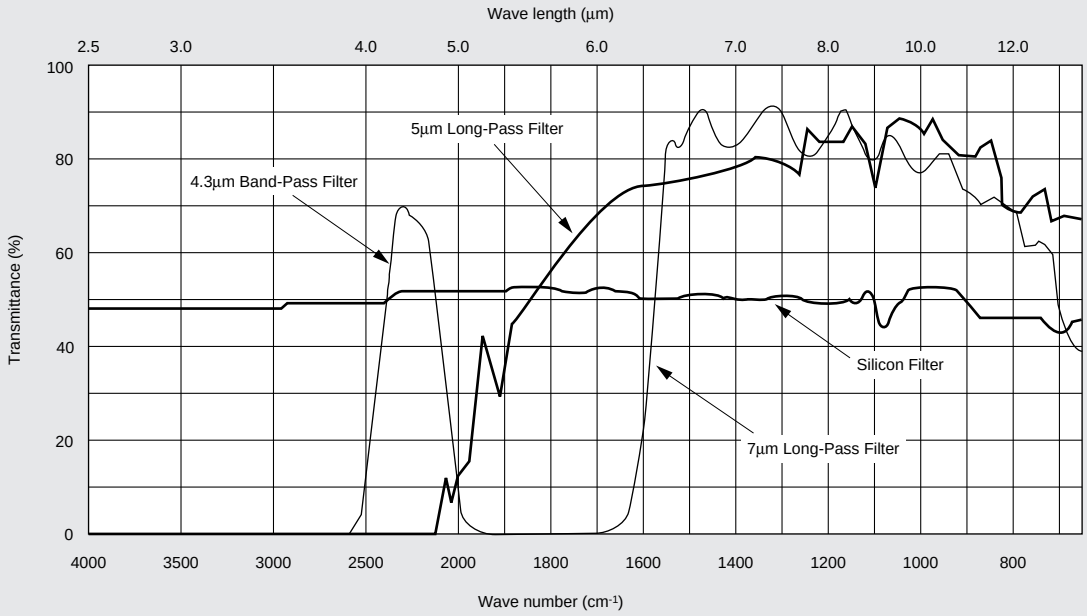
Item	IRA-E410S1	IRA-E410ST1	IRA-E410QW1
Sensitivity (500K, 1Hz, 1Hz)	3.0mV$_{p-p}$ (Typ.)	3.3mV$_{p-p}$ (Typ.)	1.3mV$_{p-p}$ (Typ.)*
Wave length Range	1—20μm	5—14μm	4.3μm
Field of View	$\theta_1=\theta_2=17°$		
Optical Filter	Silicon	5μm long-pass silicon	4.3μm band-pass silicon
Electrode	ϕ1.6mm		
Supply Voltage	3—15V		
Operating Temperature	−25 to +55℃		
Storage Temperature	−30 to +100℃		

* 700K,5Hz,1Hz

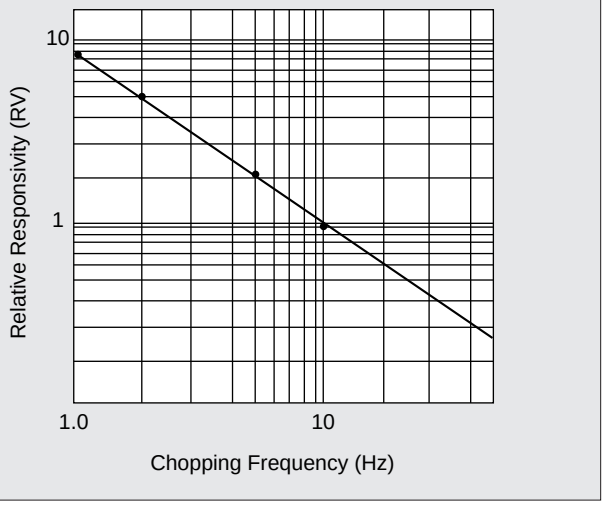
PYROELECTRIC INFRARED SENSOR

Pyroelectric Infrared Sensor **IRA** Series

■SPECTRAL RESPONSE OF WINDOW MATERIALS



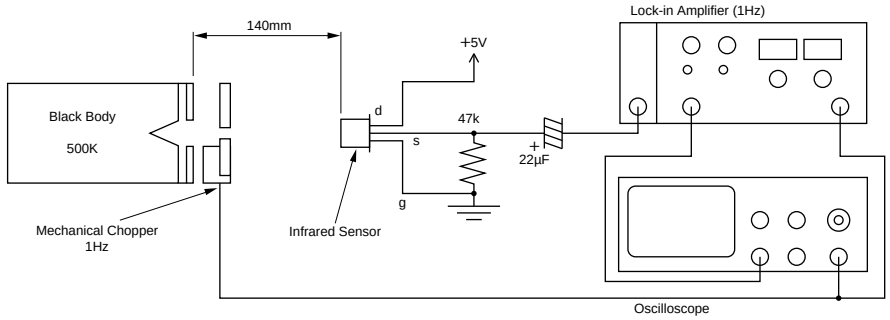
■FREQUENCY CHARACTERISTICS



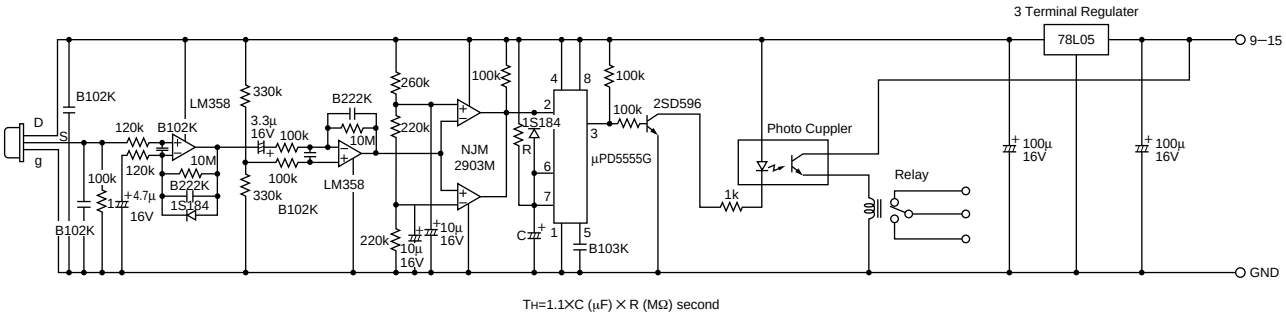
PYROELECTRIC INFRARED SENSOR

Pyroelectric Infrared Sensor **IRA** Series

■TEST METHOD OF SENSITIVITY



■TYPICAL APPLICATION CIRCUIT (Human detection)

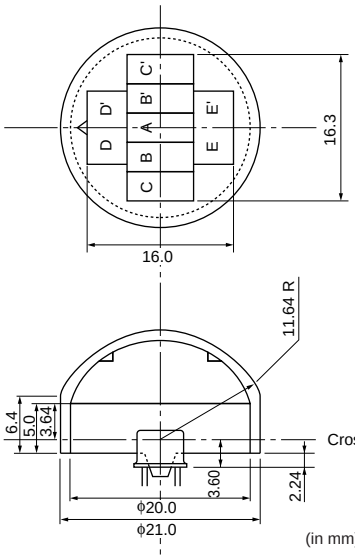


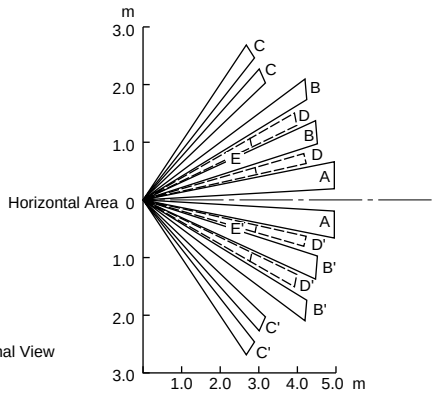
PYROELECTRIC INFRARED SENSOR

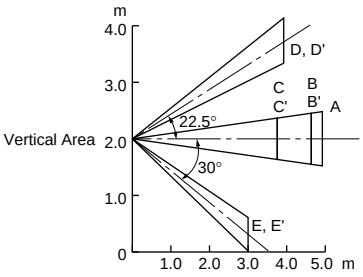
Pyroelectric Infrared Sensor **IRA** Series

■FRESNEL LENS FOR HUMAN BODY DETECTION

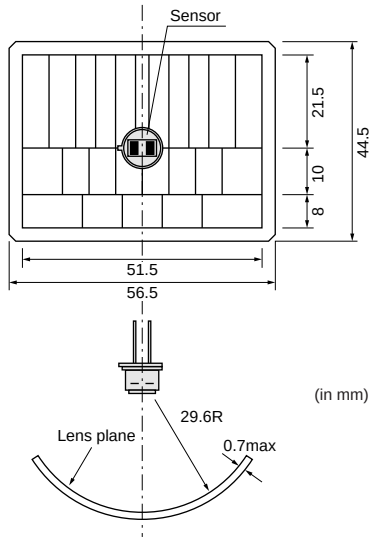
PPGI0601

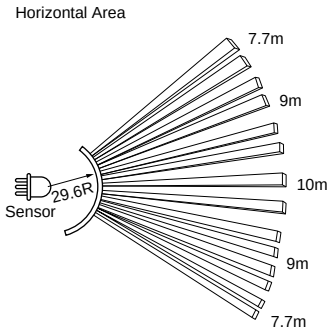


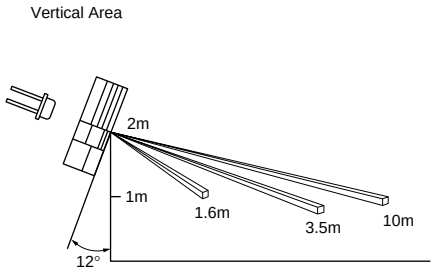




PPGI0902



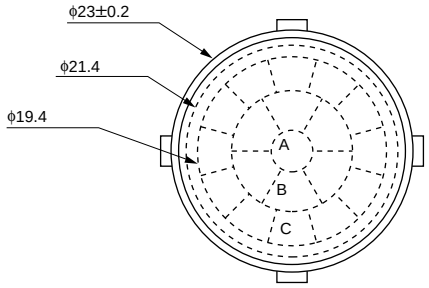


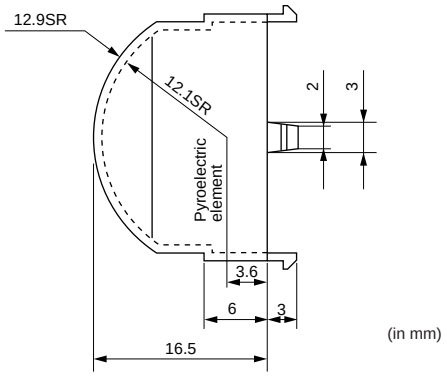


PYROELECTRIC INFRARED SENSOR

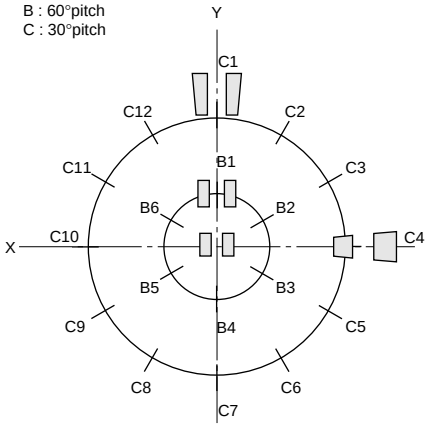
Pyroelectric Infrared Sensor **IRA** Series

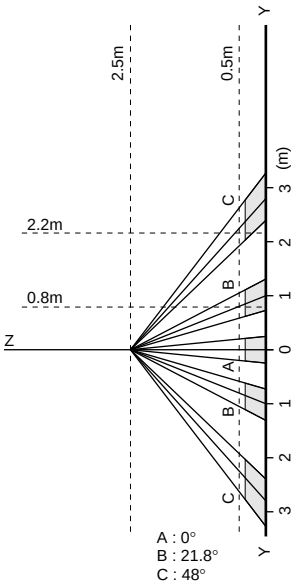
PPGI0626





Detection area on the floor





Freshel lens are available upon request.

PYROELECTRIC INFRARED SENSOR

Pyroelectric Infrared Sensor **IRA** Series

■RELIABILITY TEST

IRA-E700 series, IRA-E900 series

Test Items	Test Conditions	Criteria
High Temperature	100℃ for 500 hours	After completion of testing, leave for three hours normal humidity condition temperature, 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℃ for 500 hours	
Humidity	60℃, 95% RH for 500 hours	
Heat Cycle	20 times of following cycle. −25℃, 30min.⇨Room temp., 30min⇩ ⇧Room temp., 30min.⇦55℃, 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℃ for 10±1sec.	
Hermetic Sealing	Conform to MIL-STD-202F chapter 112D, condition D. Immerse in fluorocarbon bath (FC-40) of 125±5℃ for 20sec.	No generation of bubbles.
Solderability	Conform to MIL-STD-202F chapter 208B. Immerse in rosin flax and Immerse up to 2.0 to 2.5mm from can case in solder bath of 230±5℃ for 5±0.5sec.	More than 95% of the terminal should be covered by solder.

IRA-E410 series, IRA-E500 series

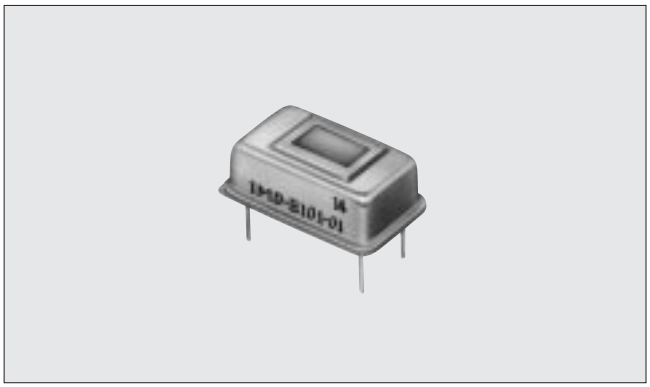
Test Items	Test Conditions	Criteria
High Temperature	100℃ for 500 hours	After completion of testing, leave for three hours normal humidity condition temperature, and then measure. 1. External appearance: No significant damage. 2. Sensitivity: Tolerance within 20% deviation from original value. 3. Noise: Maximum tolerance +100mV of original value
Low Temperature	−30℃ for 500 hours	
Humidity	60℃, 95% RH for 500 hours	
Heat Cycle	20 times of following cycle. −25℃, 30min.⇨Room temp., 30min⇩ ⇧Room temp., 30min.⇦55℃, 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±1sec.	
Hermetic Sealing	Conform to MIL-STD-202F chapter 112D, condition D. Immerse in fluorocarbon bath (FC-40) of 125±5℃ for 20sec.	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℃ for 5±0.5sec.	More than 95% of the terminal should be covered by solder.

PYROELECTRIC INFRARED SENSOR MODULE

Pyroelectric Infrared Sensor Module **IMD** Series

Newly Developed Module with Lower Power Consumption and Extra Features.

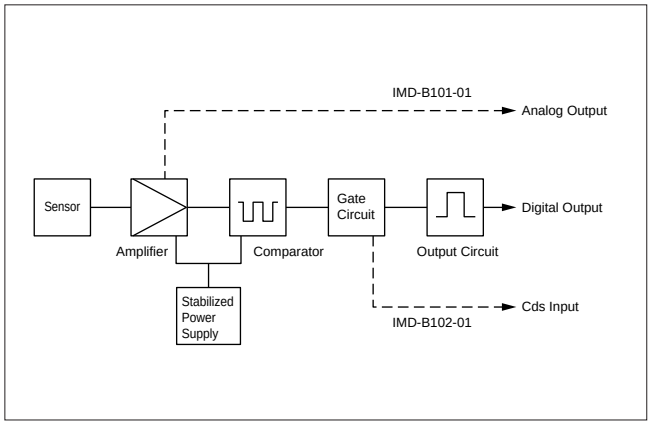
The IMD Series comprises a amplifier, high performance infrared sensor modules in compact, hermetically sealed, metal can packages.
The modules exhibit extremely low power consumption and an exclusive fresnel lens is also preparation.
Two models are available for different applications:
1. Analog & Digital Output Model (IMD-B101-01)
2. Digital Output & Brightness Sensor (CdS) Input Model (IMD-B102-01)



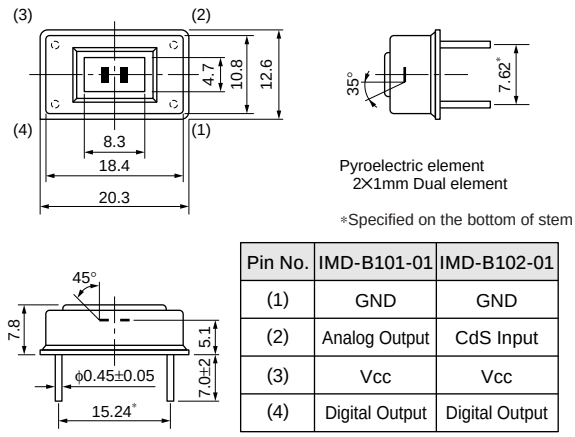
■FEATURES
1. With the fresnel lens, the sensor is able to detect the human body at a distance of 5m through angles of 119°×38°.
2. The modules have a compact size (20.3×12.6×7.8mm).
3. The modules incorporate an amplifier and a single processing circuit.
4. The have outstanding reliability and EMI characteristics.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

■APPLICATIONS
- Automatic light switches.
- On/off controls for household appliances, industrial equipment and office equipment.
- Amusement devices (Games, Toys, etc.)

■BLOCK DIAGRAM



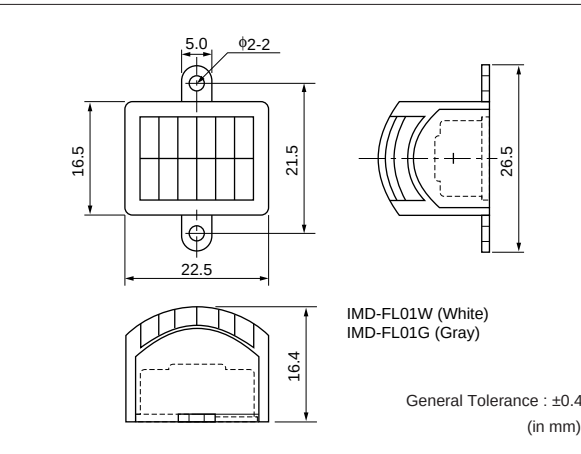
■DIMENSIONS



Pin No.	IMD-B101-01	IMD-B102-01
(1)	GND	GND
(2)	Analog Output	CdS Input
(3)	Vcc	Vcc
(4)	Digital Output	Digital Output

General Tolerance : ±0.2
(in mm)

■FRESNEL LENS



PYROELECTRIC INFRARED SENSOR MODULE

Pyroelectric Infrared Sensor Module **IMD** Series

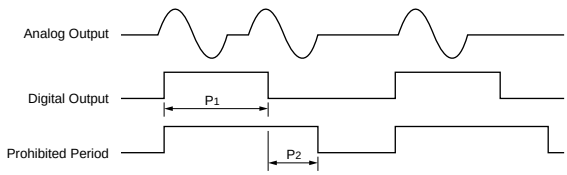
■MAX. RATING (25˚C)

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

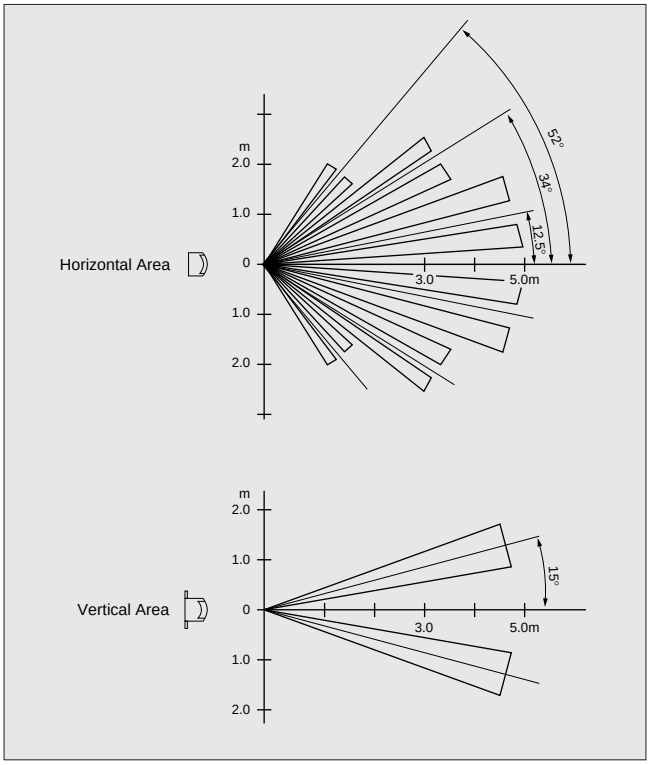
■RATING (25˚C)

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°
Weight		4.1g

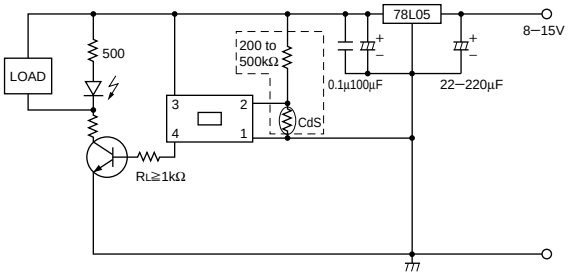
■TIMING CHART (IMD-B101-01)



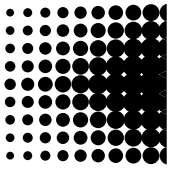
■DETECTION AREA (With Fresnel Lens)



■TYPICAL APPLICATION (IMD-B102-01)



•CdS Input is required to be Vcc 3.9+0.2V/−0.4V or higer to operate
•IMD-B101-01 generates analog output at Pin (2).



PYROELECTRIC INFRARED SENSOR MODULE

Pyroelectric Infrared Sensor Module **IMD** Series

■RELIABILITY TEST

Test Items	Test Conditions	Criteria
High Temperature	60℃ for 500 hours	After completion of testing, leave for three hours normal humidity condition temperature, 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℃ for 500 hours	
Humidity	60℃, 95% RH for 150 hours	
Heat Cycle	20 times of following cycle. −20℃, 30min.⇨Room temp., 30min⇩ ⇧Room temp., 30min.⇦60℃, 30min.	
Vibration	Apply vibration of amplitude of 1.5mm with 10 to 55Hz band to each of 3 perpendicular directions for 2 hours.	
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℃ for 10±1sec.	
Hermetic Sealing	Conform to MIL-STD-202F chapter 112D, condition D. Immerse in fluorocarbon bath (FC-40) of 125±5℃ for 20sec.	No generation of bubbles.

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   ③ Undersea equipment
   ④ Medical equipment
   ⑤ Transportation equipment (vehicles, trains, ships,etc.)
   ⑥ Traffic signal equipment
   ⑦ Disaster prevention / crime prevention equipment
   ⑧ Data-processing equipment
   ⑨ Application of similar complexity and/or reliability requirements to the applications listed in the above
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