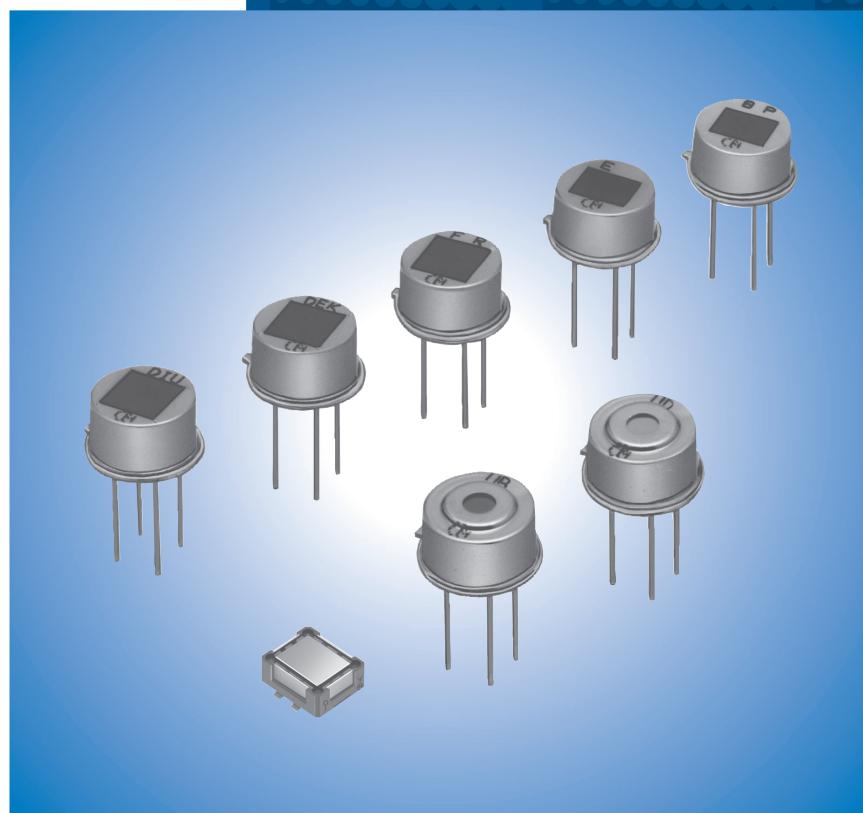


# Pyroelectric Infrared Sensors



**muRata**

Innovator  
in Electronics

Murata  
Manufacturing Co., Ltd.

Cat.No.S21E-6

### **for EU RoHS Compliant**

- All the products on this catalog are complied with EU RoHS.
- EU RoHS is "the European Directive 2002/95/EC on the Restriction of the Use of Certain Hazardous Substances in Electrical and Electronic Equipment".
- For more details, please refer to our website 'Murata's Approach for EU RoHS' (<http://www.murata.com/info/rohs.html>).

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1

2

3

## ● Part Numbering

### Pyroelectric Infrared Sensor

(Part Number) **IR S- A200ST 01 -R1**  
① ② ③ ④ ⑤

- ① Product ID
- ② Type
- ③ Characteristics
- ④ Individual Specification Code

\* Part Number shows only an example which might be different from actual part number.

\* "③Characteristics" and "④Individual Specification Code" might have different digit number from actual Part Number.

# Pyroelectric Infrared Sensors for Reflow Soldering

**muRata**

## SMD-Dual Type Pyroelectric Infrared Sensor IRS-A200ST01 Series

SMD type Pyroelectric infrared sensors, IRS series, exhibit high sensitivity and reliable performance made possible by Murata's ceramic technology and packaging technology developed over many years.

IRS-A200ST01 series realizes cost benefits and higher performance with a new improved material of infrared ceramics.

### ■ Features

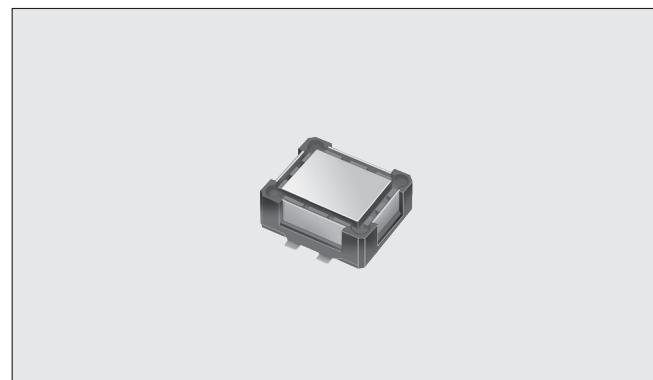
1. High sensitivity and excellent S/N ratio
2. High stability to temperature changes
3. 240°C peak Reflow soldering is available.
4. High immunity to external noise (Vibration, RFI etc.)
5. Higher in cost-performance

### ■ Applications

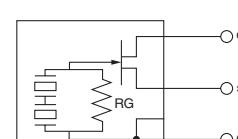
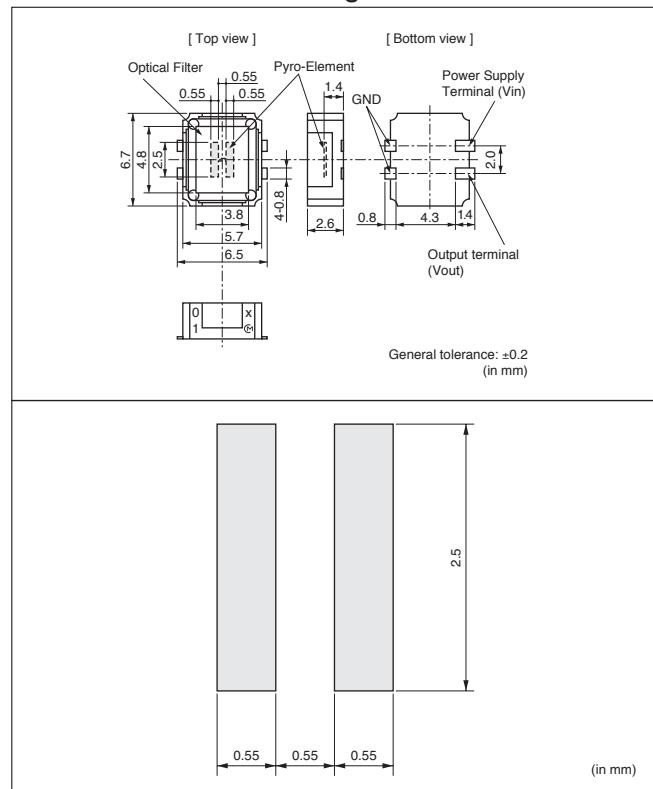
1. Security
2. Lighting appliances
3. Household or other appliances

### ■ Rating (25°C)

Part Number	IRS-A200ST01
Responsivity (500K, 1Hz, 1Hz)	3.8mV <sub>p-p</sub> (Typ.)
Field of View	±50°
Optical Filter	5μm long-pass
Electrode	(2.5×0.55mm)×2
Supply Voltage	2 to 15V
Operating Temperature	-40 to 70°C
Storage Temperature	-40 to 85°C



### ■ Dimensions & Circuit Diagrams



# Pyroelectric Infrared Sensors

**muRata**

## Dual Type Pyroelectric Infrared Sensor IRA-E700 Series

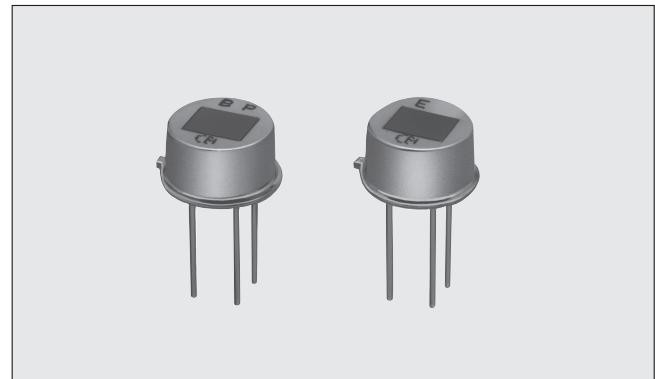
2

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 temperature changes
3. Slight movement can be detectable.
4. High immunity to external noise (Vibration, RFI etc.)
5. Custom design is available.
6. Higher in cost-performance

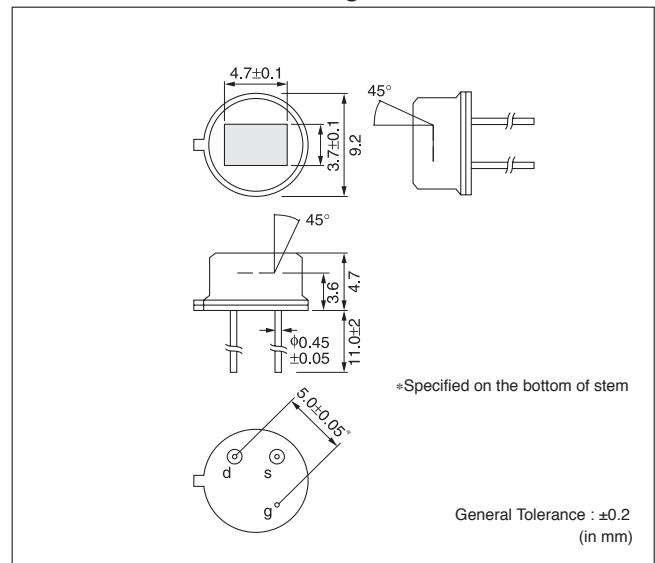
### ■ Applications

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

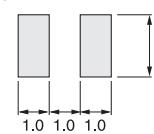
### ■ Rating (25°C)

Part Number	IRA-E700ST0	IRA-E710ST0
Responsivity (500K, 1Hz, 1Hz)	4.3mV <sub>p-p</sub> (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

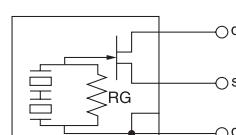


Pyroelectric element

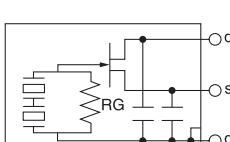


(in mm)

IRA-E700ST0



IRA-E710ST0



# Pyroelectric Infrared Sensors

**muRata**

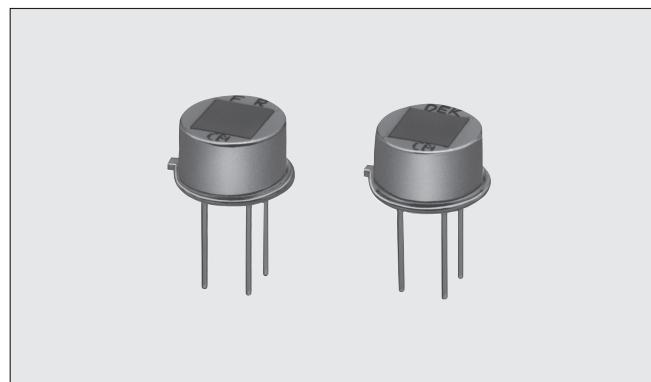
## Quad Type Pyroelectric Infrared Sensor IRA-E900 Series

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).



3

### ■ Features

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

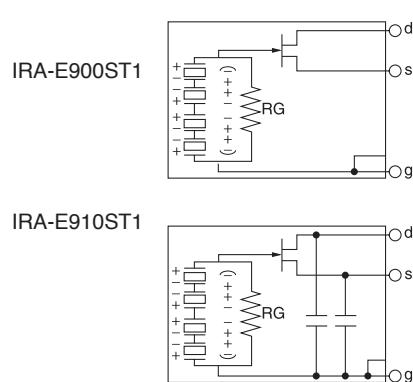
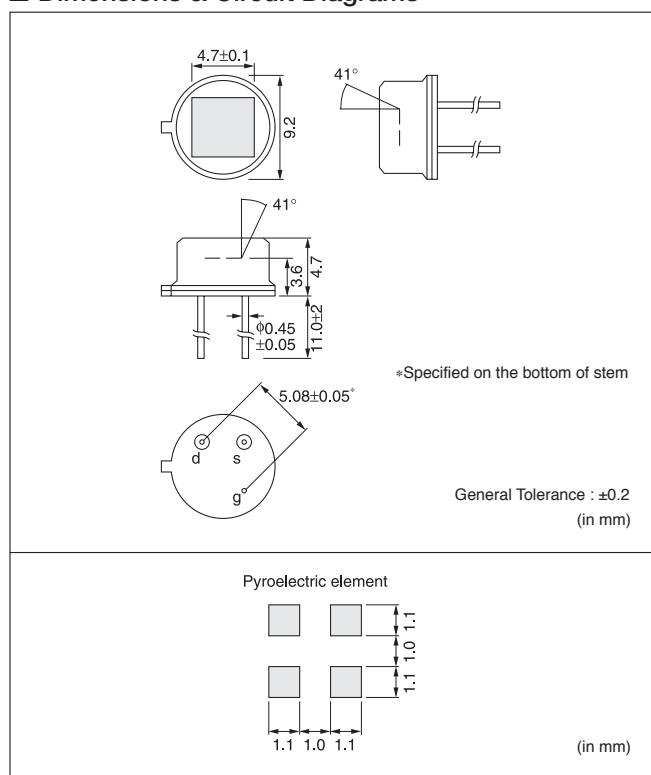
### ■ Applications

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

### ■ Rating (25°C)

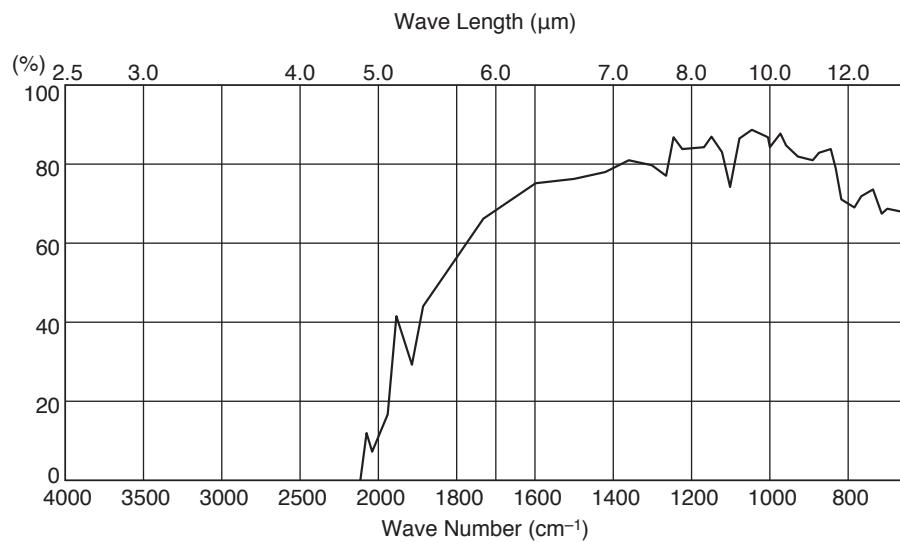
Part Number	IRA-E900ST1	IRA-E910ST1
Responsivity (500K, 1Hz, 1Hz)	3.3mV <sub>p-p</sub> (Typ.)	
Field of View	$\theta_1=\theta_2=41^\circ$	
Optical Filter	5μm long-pass	
Electrode	(1.1×1.1mm)×4	
Supply Voltage	3 to 15V	
Operating Temperature	-25 to 55°C	
Storage Temperature	-40 to 85°C	

### ■ Dimensions & Circuit Diagrams

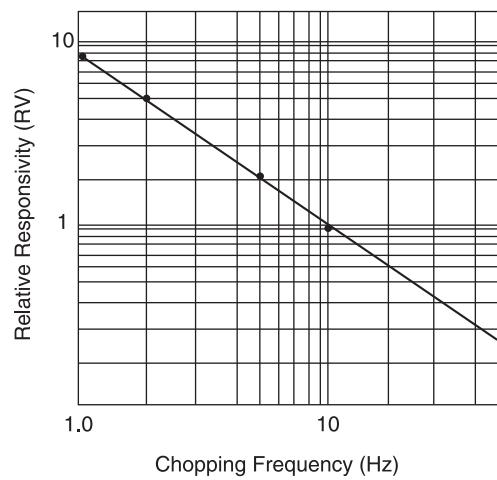


## Pyroelectric Infrared Sensor IRA/IRS Series Characteristics Data

### ■ Spectral Response of Window Materials

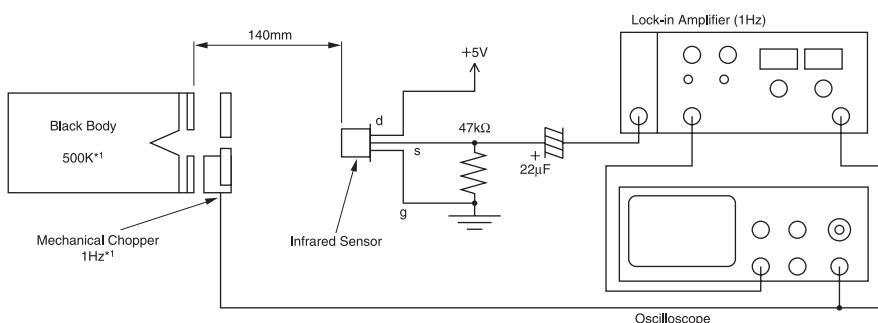


### ■ Frequency Characteristics



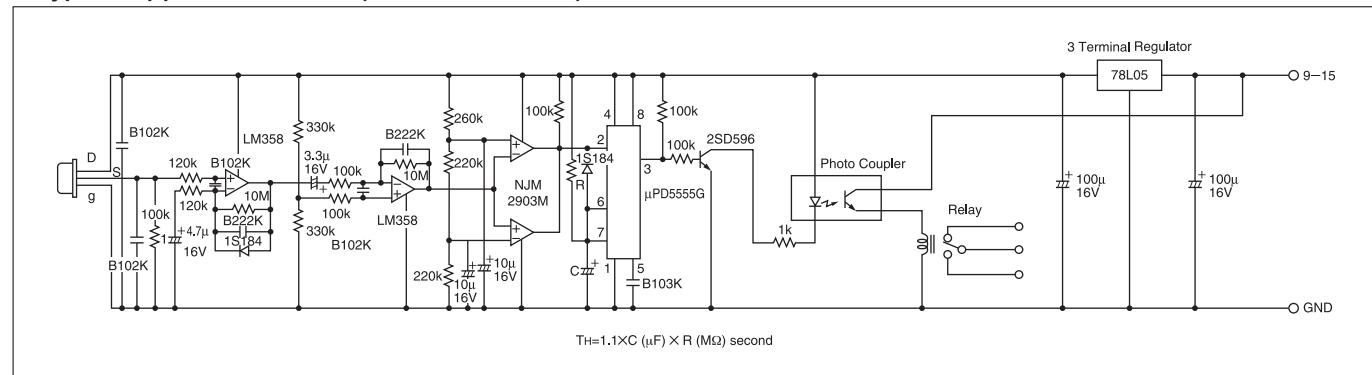
## Pyroelectric Infrared Sensor IRA/IRS Series Characteristics Data

### ■ Test Method of Sensitivity



	Black Body	Mechanical Chopper
*1 IRA-E420QW1	700K	5Hz
IRA-E420SW1	400K	2.5Hz
IRA-E700/E900 Series IRS-A200ST01 Series	500K	1Hz

### ■ Typical Application Circuit (Human Detection)



## Pyroelectric Infrared Sensor IRA/IRS Series Characteristics Data

### ■ Reliability Test

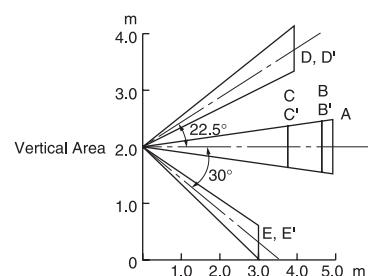
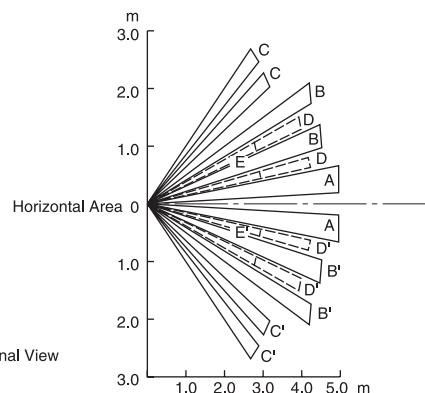
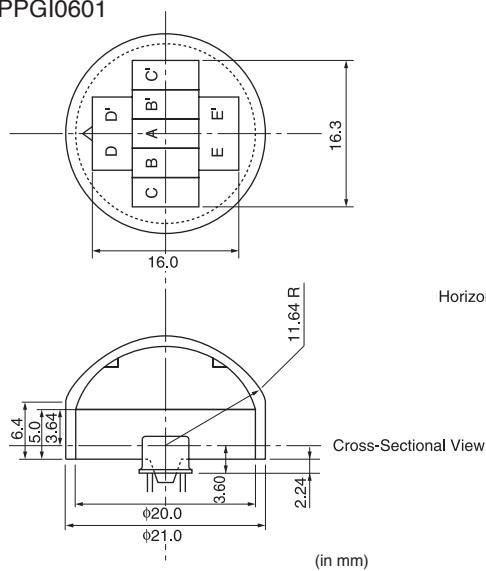
IRS-A200ST01 series, IRA-E700 series, IRA-E900 series

Item	Test Conditions	Criteria
High Temperature	100°C for 500 hrs.	
Low Temperature	-40°C for 500 hrs.	
Humidity	60°C, 95% RH for 500 hrs.	
Heat Cycle	20 times of following cycle. -25°C, 30 min. ⇨ Room temp., 30 min. ↓ ↑ Room temp., 30 min. ⇨ 55°C, 30 min.	1. External appearance: No significant damage 2. Sensitivity: Tolerance within 20% deviation from original value 3. Noise: Maximum tolerance +100mV of original value
Vibration	Apply vibration of amplitude of 1.5mm with 10 to 55Hz band to each of 3 perpendicular directions for 60 min.	
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

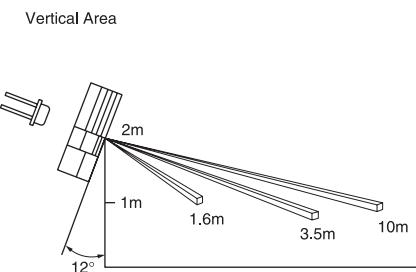
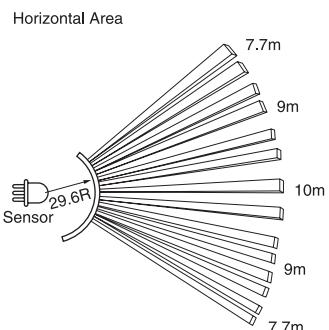
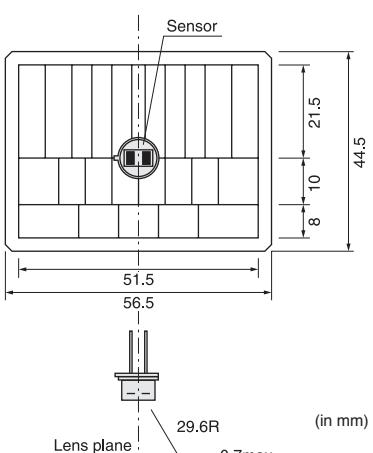
# Pyroelectric Infrared Sensors/Fresnel Lens

**muRata**

PPGI0601



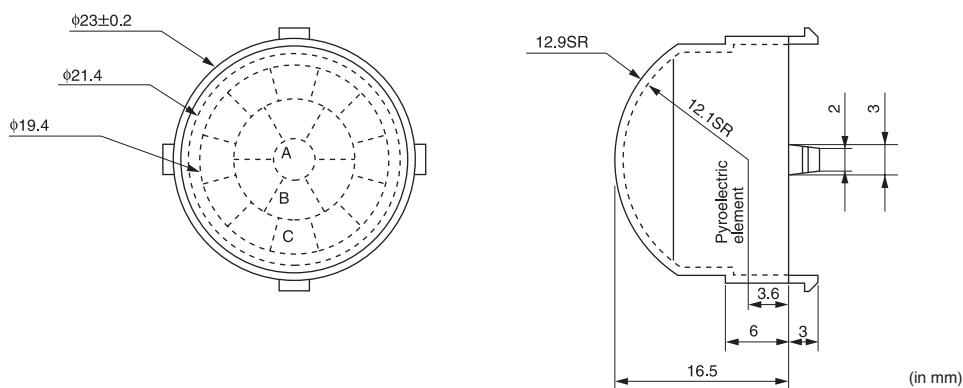
PPGI0902



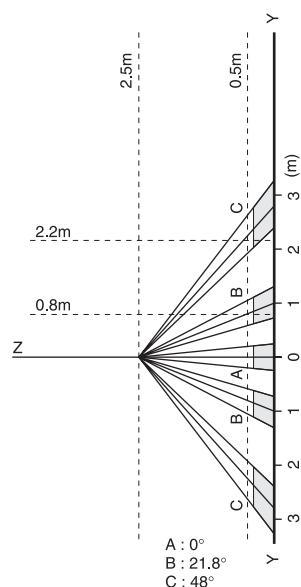
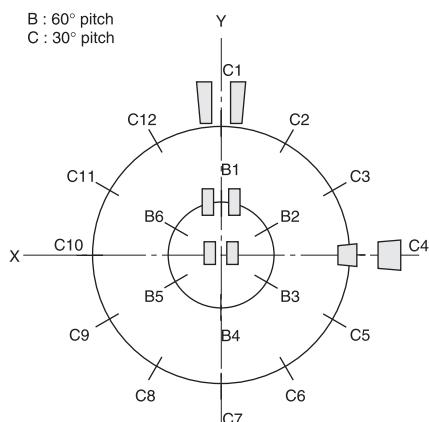
# Pyroelectric Infrared Sensors/Fresnel Lens

**muRata**

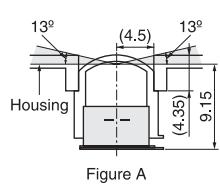
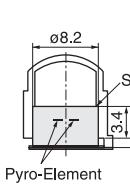
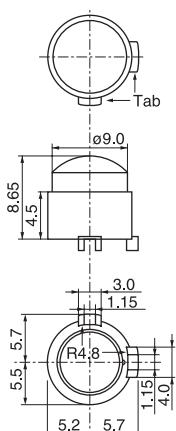
PPGI0626



Detection area on the floor

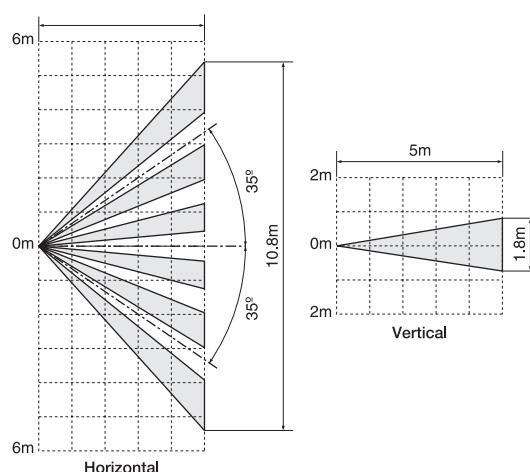


IML-0635



- 1) Insert a sensor into Fresnel lens like each tab is overlapped. (In case there are two tabs on Fresnel lens, the field of view is determined by your choice (TabA or B on Fresnel lens). Please see following page(s) for more details to see which characteristic of field of view is preferable for your application.)
- 2) Push the sensor into Fresnel lens until the top face of sensor reaches to the stopper inside Fresnel lens.
- 3) Please prepare a housing yourself that is put onto Fresnel lens as shown in FigureA. The hatching area shown in Figure A, must be obscured by the housing in order to prevent mis-detection. Unless otherwise unexpected infrared ray comes though the hatching area.

(in mm)  
 General tolerance : ±0.2



\*Assembled with Murata sensor IRA-E700 series

# Pyroelectric Infrared Sensors/Fresnel Lens

**muRata**

IML-0636

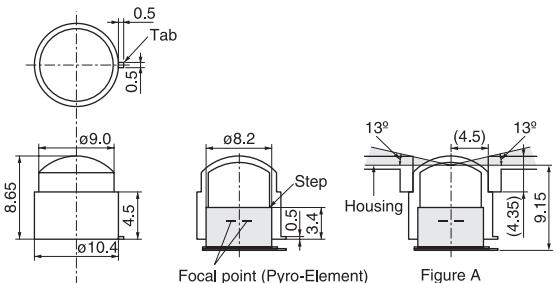
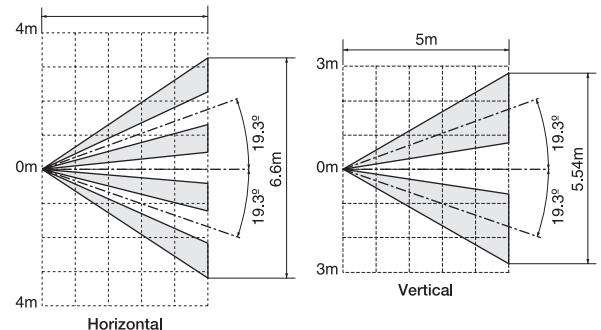


Figure A

- 1) Insert a sensor into Fresnel lens like each tab is overlapped.  
(In case there are two tabs on Fresnel lens, the field of view is determined by your choice (TabA or B on Fresnel lens).  
Please see following page(s) for more details to see which characteristic of field of view is preferable for your application.)
- 2) Push the sensor into Fresnel lens until the top face of sensor reaches to the stopper inside Fresnel lens.
- 3) Please prepare a housing yourself that is put onto Fresnel lens as shown in FigureA. The hatching area shown in Figure A, must be obscured by the housing in order to prevent mis-detection. Unless otherwise unexpected infrared ray comes though the hatching area.

(in mm)  
General tolerance :  $\pm 0.2$



\*Assembled with Murata sensor IRA-E700 series

IML-0637

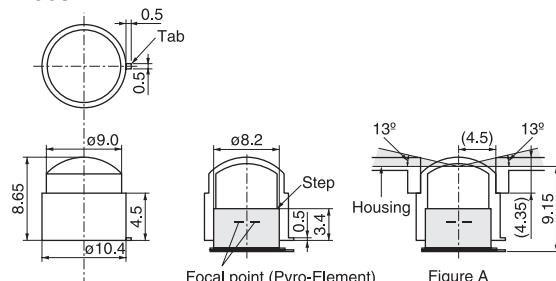
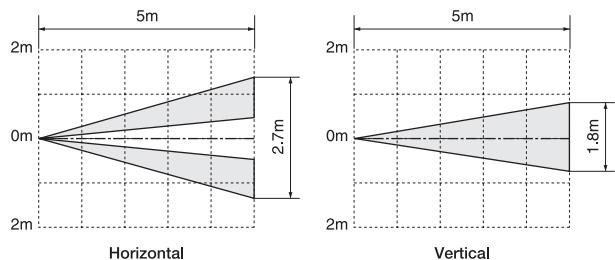


Figure A

- 1) Insert a sensor into Fresnel lens like each tab is overlapped.  
(In case there are two tabs on Fresnel lens, the field of view is determined by your choice (TabA or B on Fresnel lens).  
Please see following page(s) for more details to see which characteristic of field of view is preferable for your application.)
- 2) Push the sensor into Fresnel lens until the top face of sensor reaches to the stopper inside Fresnel lens.
- 3) Please prepare a housing yourself that is put onto Fresnel lens as shown in FigureA. The hatching area shown in Figure A, must be obscured by the housing in order to prevent mis-detection. Unless otherwise unexpected infrared ray comes though the hatching area.

(in mm)  
General tolerance :  $\pm 0.2$



\*Assembled with Murata sensor IRA-E700 series

IML-0638

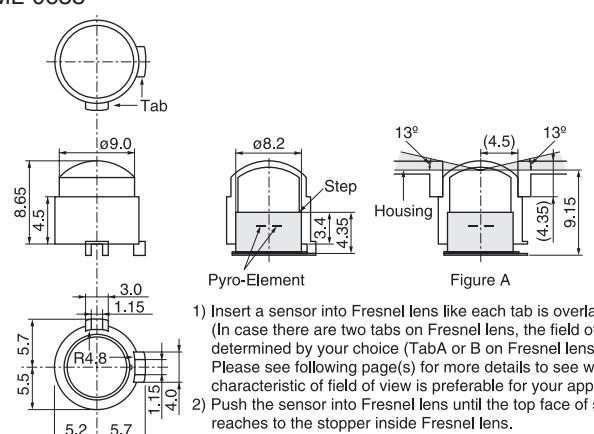
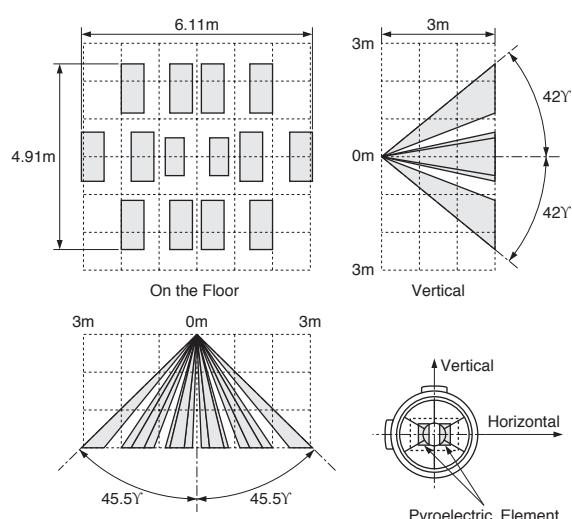


Figure A

- 1) Insert a sensor into Fresnel lens like each tab is overlapped.  
(In case there are two tabs on Fresnel lens, the field of view is determined by your choice (TabA or B on Fresnel lens).  
Please see following page(s) for more details to see which characteristic of field of view is preferable for your application.)
- 2) Push the sensor into Fresnel lens until the top face of sensor reaches to the stopper inside Fresnel lens.
- 3) Please prepare a housing yourself that is put onto Fresnel lens as shown in FigureA. The hatching area shown in Figure A, must be obscured by the housing in order to prevent mis-detection. Unless otherwise unexpected infrared ray comes though the hatching area.

(in mm)  
General tolerance :  $\pm 0.2$



Assembled with Murata sensor IRA-E700 Series.

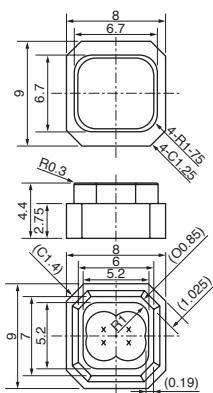
Fresnel lens are available upon request.

**muRata**

# **Pyroelectric Infrared Sensors/Fresnel Lens**

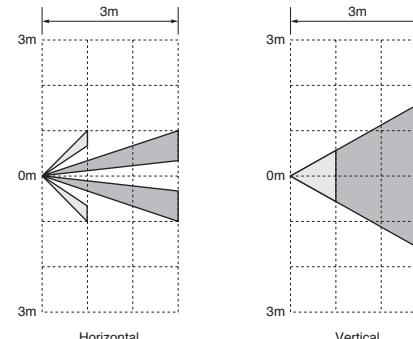
*muRata*

IML-0642



- 1) Insert a sensor into Fresnel lens like each tab is overlapped.  
(In case there are two tabs in Fresnel lens, the field of view is determined by your choice (TabA or B on Fresnel lens).  
Please see following page(s) for more details to see which characteristic of field of view is preferable for your application.)
  - 2) Push the sensor into Fresnel lens until the top face of sensor reaches to the stopper inside Fresnel lens.
  - 3) Please prepare a housing yourself that is put onto Fresnel lens as shown in FigureA. The hatching area shown in Figure A, must be obscured by the housing in order to prevent mis-detection. Unless otherwise unexpected infrared ray comes through the hatching area.

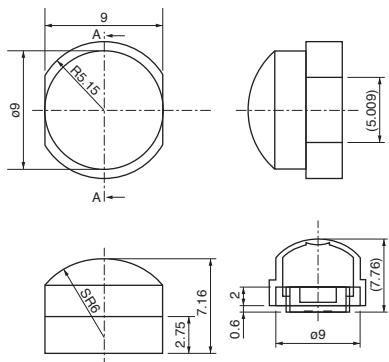
(in mm)  
General tolerance :  $\pm 0.2$



## Horizontal

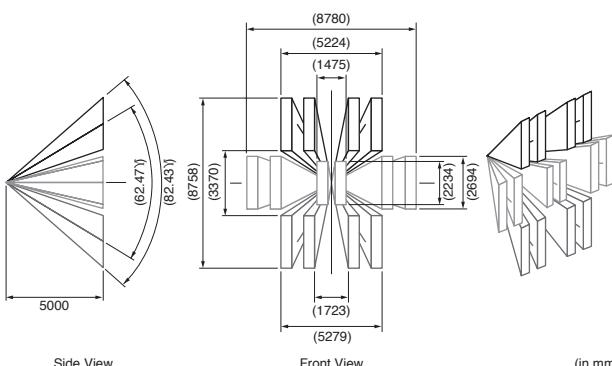
Vertica

IML-0658



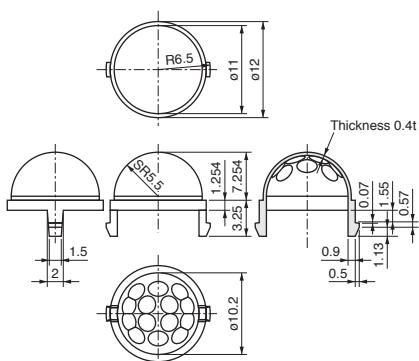
- 1) Insert a sensor into Fresnel lens like each tab is overlapped. (In case there are two tabs on Fresnel lens, the field of view is determined by your choice (TabA or B on Fresnel lens). Please see following page(s) for more details to see which characteristic of field of view is preferable for your application.)
  - 2) Push the sensor into Fresnel lens until the top face of sensor reaches to the stopper inside Fresnel lens.
  - 3) Please prepare a housing yourself that is put onto Fresnel lens as shown in FigureA. The hatching area shown in Figure A, must be obscured by the housing in order to prevent mis-detection. Unless otherwise unexpected infrared ray comes through the hatching area.

(in mm)  
General tolerance :  $\pm 0.2$



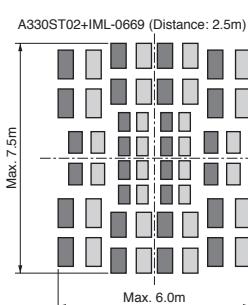
(in mm)

IML-0669

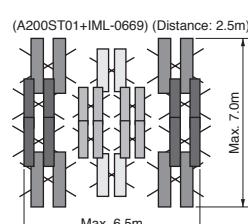


- 1) Insert a sensor into Fresnel lens like each tab is overlapped.  
(In case there are two tabs on Fresnel lens, the field of view is determined by your choice (TabA or B on Fresnel lens).  
Please see following page(s) for more details to see which characteristic of field of view is preferable for your application.)
  - 2) Push the sensor into Fresnel lens until the top face of sensor reaches to the stopper inside Fresnel lens.
  - 3) Please prepare a housing yourself that is put onto Fresnel lens as shown in FigureA. The hatching area shown in Figure A, must be obscured by the housing in order to prevent mis-detection. Unless otherwise unexpected infrared ray comes through the hatching area.

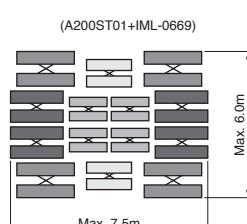
(in mm)  
General tolerance :  $\pm 0.2$



Assessee JML-2020 (Distance 8.5m)



(ASSOCIATION OF 2000) (B) 1 - 2.5 -



(Accepted: July 2000)

Fresnel lens are available upon request

## Notice

### ■ Notice

#### 1. Caution (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 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 ( $\text{SO}_2$ ,  $\text{Cl}_2$ ,  $\text{NO}_x$  etc.) or sea breeze
  - (b) in high humidity
  - (c) in a place exposed directly to sunlight or headlights of automobile
  - (d) in a place exposed to rapid ambient temperature change
  - (e) in a place exposed directly to an air-conditioner or heat vent
  - (f) strong vibrations
  - (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 (Mounting)

- (1) Soldering
  - (a) Hand soldering should be applied.
  - (b) Soldering should be done quickly as following.

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

- (c) Soldering flux should be rosin flux and not contain more than 0.2wt% chlorine.  
Soldering flux should be removed after soldering.

#### (2) Cleaning

Soldering flux should be removed after soldering.  
Soldering flux may cause malfunction or degradation of character unless sufficiently cleaned.

#### 3. Caution (Handling and Storage)

- (1) The optical filter of the sensor should not be scratched or soiled.
- (2) Strong shock should be avoided.
- (3) Electrostatics and strong electromagnetic field should be avoided.
- (4) The sensor should be kept on conductive sponge.
- (5) High temperature, high humidity, fluid such as water or alcohol etc., corrosive gas ( $\text{SO}_2$ ,  $\text{Cl}_2$ ,  $\text{NO}_x$  etc.) and sea breeze should be avoided.

**⚠Note:**

1. Export Control  
<For customers outside Japan>  
No Murata products should be used or sold, through any channels, for use in the design, development, production, utilization, maintenance or operation of, or otherwise contribution to (1) any weapons (Weapons of Mass Destruction [nuclear, chemical or biological weapons or missiles] or conventional weapons) or (2) goods or systems specially designed or intended for military end-use or utilization by military end-users.  
<For customers in Japan>  
For products which are controlled items subject to the "Foreign Exchange and Foreign Trade Law" of Japan, the export license specified by the law is required for export.
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