



## Product Specification for Reference Only

Issued Date: 11 March, 2003 \_\_\_\_\_

Rev.: \_\_\_\_\_

Part Description: Pyroelectric Infrared Sensor \_\_\_\_\_

MURATA Part No.: IRA-E712ST3 \_\_\_\_\_

The product specification in this sheet is for reference only.  
The contents of this specification are subject to change.

You are requested to receive the latest specification and to return one copy of the specification to us with your receipt signature before going into mass production.

Product engineering section  
Sensor module department  
Circuit module products division  
Murata MFG. Co., Ltd.

**1. Scope**

This product specification is applied to dual element type pyroelectric infrared sensor IRA-E712ST3 used to detect infrared rays.

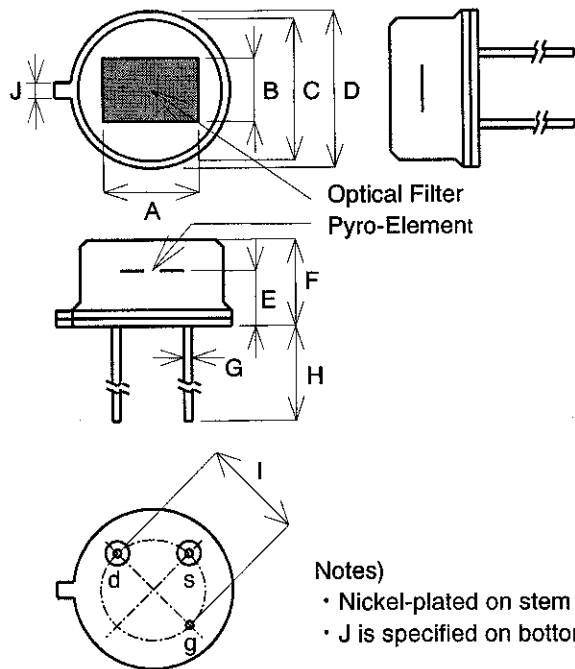
Please contact us when using this products for any other applications than described in the above.

**2. Murata Part Number**

IRA-E712ST3

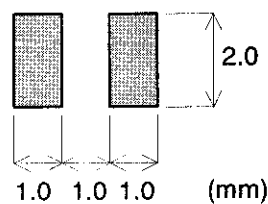
**3. Outline Drawing and Dimensions**

3-1 Outline Dimensions



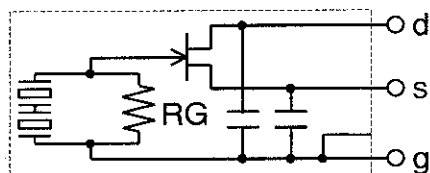
Symbol	Dimension
A	4.7±0.1mm
B	3.7±0.1mm
C	8.2±0.1mm
D	9.2±0.2mm
E	3.6±0.2mm
F	5.1±0.2mm
G	0.45±0.05mm
H	11±2mm
I	5.08±0.05mm
J	1.5mm Max.

3-2 Pyroelectric Element



Symbol	Description
d (Drain)	Supply voltage
s (Source)	Output
g (Ground)	Ground

3-3 Equivalent Circuit



**4. Numbering**

**4-1 Model Name**

First and second letters in EP indicate P/N IRA-E712ST3.

**4-2 Production Month**

Printed on the top of sensor in EIAJ code.

Year	Month	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
2003		a	b	c̄	d	e	f	g	h	j	k	l	m
2004		n	p	q	r	s	t	u	v	w	x	y	z
2005		A	B	C	D	E	F	G	H	J	K	L	M
2006		N	P	Q	R	S	T	U	V	W	X	Y	Z
2007		a	b	c̄	d	e	f	g	h	j	k	l	m

e.g.) Printing on the top of sensor which made in November 2006 : EPY  
®

**5. Ratings and Characteristics (25°C, 50%RH)**

**5-1 Responsivity (Rv)**

	Min.	Typ.
Responsivity (Rv)	3.6mVpp	4.3mVpp

Responsivity is measured with following system.

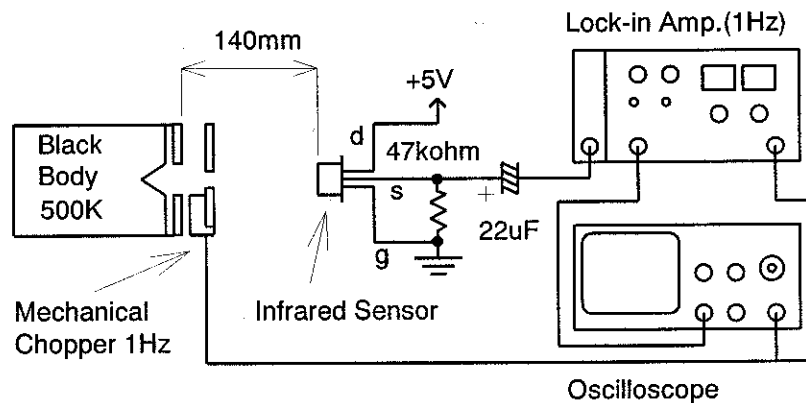


Figure 1. Test system of responsivity

**5-2 Balance of Responsivity**

Balance	10% Max.
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$$\text{Balance(\%)} = |(Rr - Ri) / (Rr + Ri)| \times 100$$

Rr : Response from right element

Ri : Response from left element

5-3 White Noise Level

White Noise	200mVpp Max.
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Conditions for measurement

- Test circuit : With the circuit shown in figure2.
- Measure Point : Across OUT and GND.
- Record : With Pen-recorder.
- Environment : In the electrically and optically shielded box kept at 25°C.

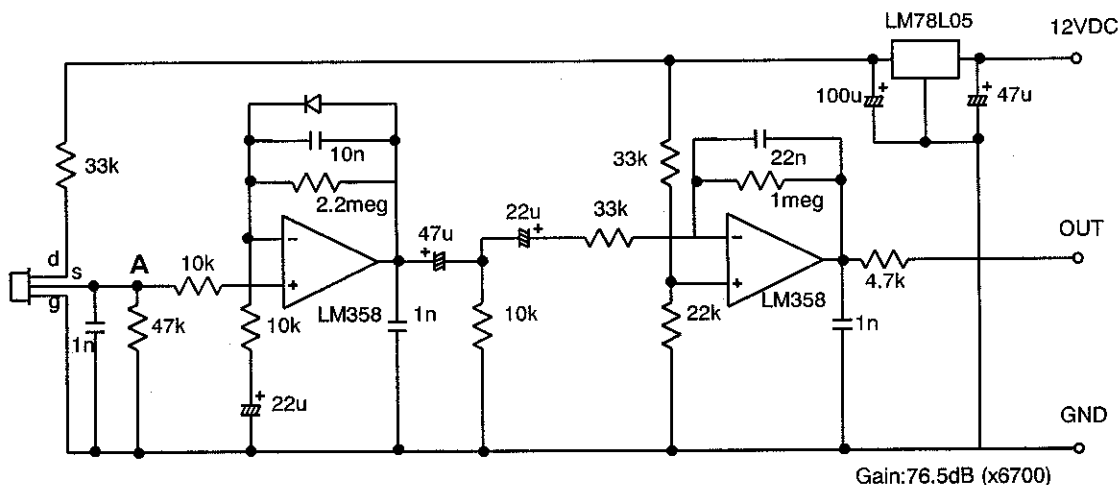


Figure 2. Test circuit

5-4 Source Voltage

Source voltage(Vs)	0.2 to 2.5 V
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Conditions for measurement

- Test circuit : With the circuit shown in figure2.
- Measure Point : Across A and GND.
- Environment : In the electrically and optically shielded and temperature controlled box.

5-5 Warm-up Time

Warm-up time	30sec. Max.
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Conditions for measurement

- Test circuit : With the circuit shown in figure2.
  - Environment : In the electrically and optically shielded box kept at 25°C.
- Warm-up time is defined as time for Source Voltage to reach to specified value from turning on.

5-6 Supply Voltage Range  
2.0 to 15.0 VDC

5-7 Recommendable Rs Value  
 $47k\Omega \leq R_s \leq 200k\Omega$   
Resistance Rs is inserted across terminal-S and GND.

5-8 Field of View

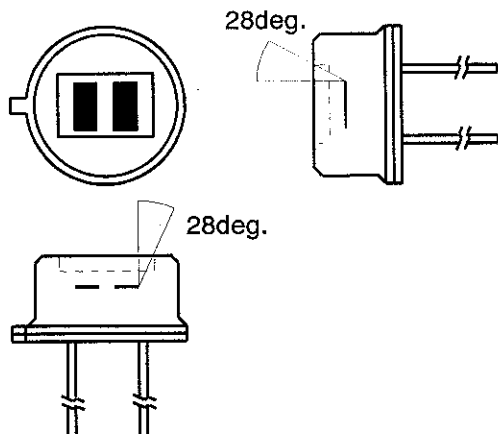


Figure3. Field of View

5-9 Optical Filter

Transmittance : See the graph shown in figure4.  
Material : Single crystal silicon  
Thickness :  $0.50 \pm 0.05\text{mm}$

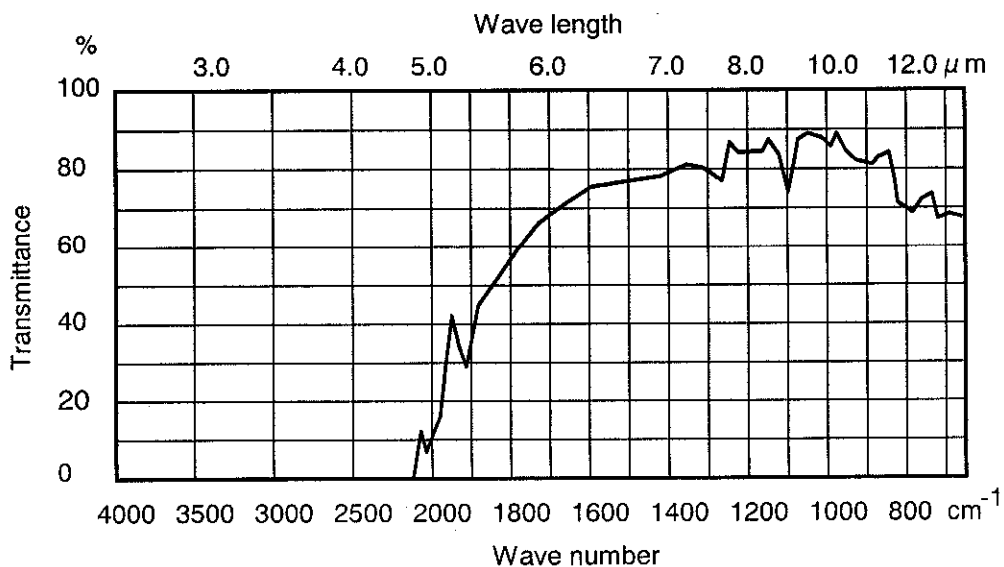


Figure4. Transmittance of optical filter (example)

**6. Operating Temperature**

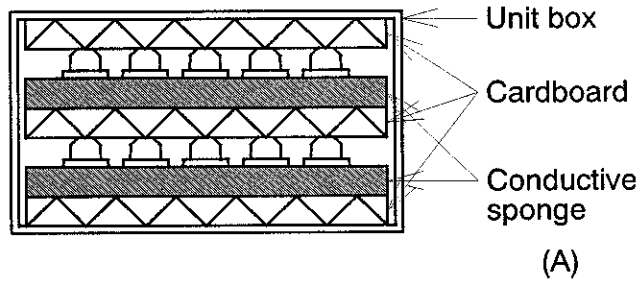
-40 to 70 °C

**7. Storage Temperature**

-40 to 85 °C

**8. Package and Marking**

100 pieces sensors are packed in a unit box as shown in (A).  
Marking is on the box as per (B).



IRA-E712ST3	
Inspection lot No.	100pcs

(B)

**9. Reliability**

Judgment criteria for 9-1 to 9-7.

After each one of the test, the sensor is kept for three hours at room temperature, then it is evaluated with the following criteria.

Items	Judgment criteria
External appearance	No significant damage
Responsivity	Within $\pm 20\%$ shift from initial value
White noise	within initial value +100mV
Source voltage	within rated value

**9-1 High temperature**

100°C for 500hours

**9-2 Low temperature**

-40°C for 500hours

**10-3 Humidity**

60°C, 95%RH for 500hours

**9-4 Heat cycle**

20 times of the following cycle

-25°C, 30min.⇒ Room temp. 30min.⇒ 55°C, 30min.⇒ Room temp.

**9-5 Vibration**

Apply vibration of amplitude of 1.5mm with 10 to 55Hz bands to each of 3 perpendicular directions (x, y, z) for an hour.

**9-6 Shock**

Apply shock of 100G sinewave by standard shock tester to each 3 perpendicular directions (x, y, z). (1G=9.8m/s<sup>2</sup>)

**9-7 Soldering heat**

Immerse up to 3mm from the bottom of stem in solder bath of 260±5°C for 10±1sec..

**9-8 Hermetic sealing**

Conform to MIL-STD-202F chapter 112D, condition D.

Immerse in fluorocarbon bath (FC-40) of 125±5°C for 20sec..

There should be no generation of bubbles.

**9-9 Solderability**

Conform to MIL-STD-202F chapter 208B.

Immerse in rosin flux and immerse up to 2.0 to 2.5mm from the bottom of stem in solder bath of 230±5°C for 5±0.5sec..

More than 95% of the terminal surface should be covered by solder.

## 10. ⚠ Caution

### 10-1 Limitation of Applications

Please contact us before using our for the applications listed below which require especially high reliability for the prevention of defects which might directly cause damage to the third party's life, body or property.

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

### 10-2 Fail-safe

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.

## 11. Caution in use

### 11-1 Notice in design

- 1) In the case of outdoor use, suitable optical filter and water and humidity proof structure should be applied.
- 2) To prevent failure or malfunction, Please use a stabilized power supply.
- 3) 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<sub>2</sub>, Cl<sub>2</sub>, NO<sub>x</sub> etc.) or sea breeze.
  - b) In high humidity.
  - c) In a place exposed directly to sunlight 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).



**11-2 Notice 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<sub>2</sub>, Cl<sub>2</sub>, NO<sub>x</sub> etc.) and sea breeze should be avoided.

**11-3 Notice in mounting**
**1) Soldering**

- i) Hand soldering should be applied.
- ii) Soldering should be done quickly as following.

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

- iii) Soldering flux should be rosin flux and not contain more than 0.2wt % chlorine.

**2) Cleaning**

Soldering flux should be removed after soldering.

Soldering flux may cause malfunction or degradation of character unless sufficiently cleaned.

**12. ⚠Note**

- 1) Please make sure that your product has been evaluated in view of your specifications with our product being mounted to your product.
- 2) You are requested not to use our product deviating from the agreed specifications.
- 3) We consider it not to appropriate to include any terms and conditions with regard to the business transaction in the product specifications, drawings or other technical documents. Therefore, if your technical documents as above include such terms and conditions such as warranty clause, product liability clause, or intellectual property infringement liability clause, they will be deemed to be invalid.

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