

Pyroelectric infrared sensors

SPS Series standard specifications & dimensions

Element type		Single	Dual	Dual
Model (Plating code omitted)		SPS134BA	SPS127BA	SPS421BA
Voltage sensitivity R _v		1800 V/W	2000 V/W	2200 V/W
Equivalent noise input NEP		$9.8 \times 10^{-10} \text{ W} / \sqrt{\text{Hz}}$	$7 \times 10^{-10} \text{ W} / \sqrt{\text{Hz}}$	$8.7 \times 10^{-10} \text{ W} / \sqrt{\text{Hz}}$
Detectability D*		$1.5 \times 10^8 \text{ cm} \sqrt{\text{Hz}} / \text{W}$	$2.0 \times 10^8 \text{ cm} \sqrt{\text{Hz}} / \text{W}$	$1.7 \times 10^8 \text{ cm} \sqrt{\text{Hz}} / \text{W}$
Output balance		—	max. 10%	max. 10%
Noise	25±3℃	Max. 170 mVp-p	Max. 150 mVp-p	Max. 170 mVp-p
	50℃	max. 500 mVo-p	max. 500 mVo-p	max. 500 mVo-p
Source voltage		0.38 ~1.3 V	0.38 ~1.3 V	0.3 ~1.7 V
Window materials		Silicon 7 μ m cut-on filter	Silicon 7 μ m cut-on filter	Silicon 7 μ m cut-on filter
Response wavelength		7 ~20 μ m	7 ~20 μ m	7 ~20 μ m
IR receiving electrode		φ16 mm	1.0×2.0 (×2) mm	1.0×2.0 (×2) mm
Supply voltage		2.0 ~10 V	2.2 ~10 V	1.7 ~15 V
Operating temperature		−20 ~70 ℃	−20 ~70 ℃	−20 ~70 ℃
Storage temperature		−40 ~80 ℃	−40 ~80 ℃	−30 ~80 ℃
Equivalent circuit				
View angle				
Package & element dimensions				

■ Measurement conditions

- Voltage sensitivity 500K, 1Hz (Blackbody temperature, Chopping frequency)
- Detectability 500K, 1Hz, 0.3 Hz (Blackbody temperature, Chopping frequency, Δf)
- Equivalent noise input 500K, 1Hz, 0.3 Hz (Blackbody temperature, Chopping frequency, Δf)

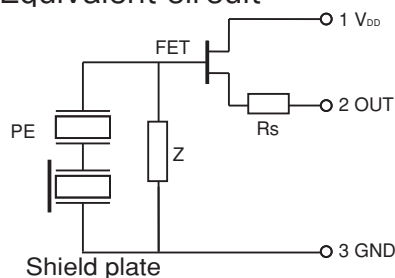
Sensors for flame detection [Temperature compensation type infrared sensors]

Pyroelectric infrared sensor SPS532CA and SPS532FA of the temperature compensation is ideal for flame detection and gas detection. In the TO-5 of hermetic seal has become a package encapsulating an inert gas. Thereby it has realized the high reliability and high durability.

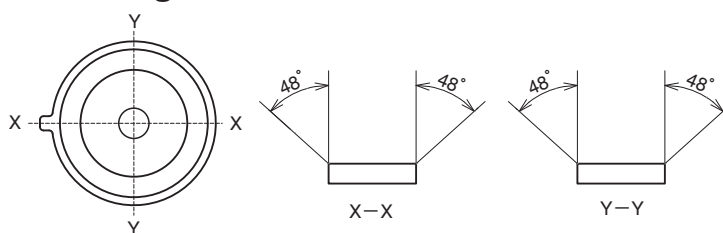
■ Specifications & characteristics

Model	SPS532CA	SPS532FA	Measurement conditions
IR receiving electrode	ϕ 1.6 mm	ϕ 1.6 mm	—
Signal output	tep. 4.2 mVp-p	tep. 1.0 mVp-p	500K、1 Hz
Noise	Max. 170 mVp-p	Max. 170 mVp-p	25 °C、×5000
Source voltage	0.38 ~ 1.3 V		25 °C
Power-supply voltage	2.0 ~ 10 V		—
Load resistance	10 ~ 1000 k Ω		—
Operating temperature	-20 ~ 70 °C		—
Storage temperature	-40 ~ 80 °C		—

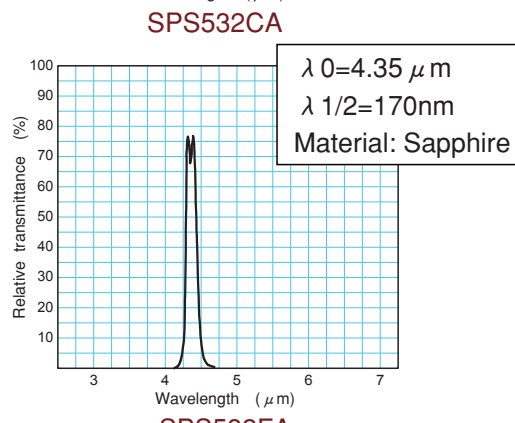
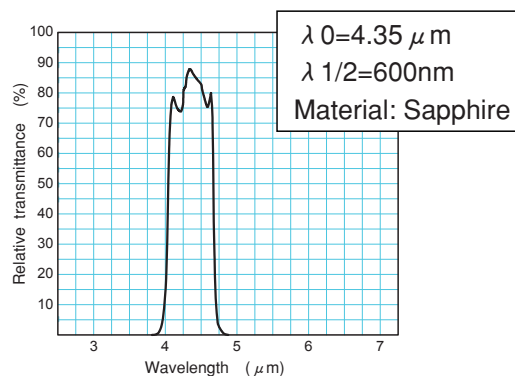
■ Equivalent circuit



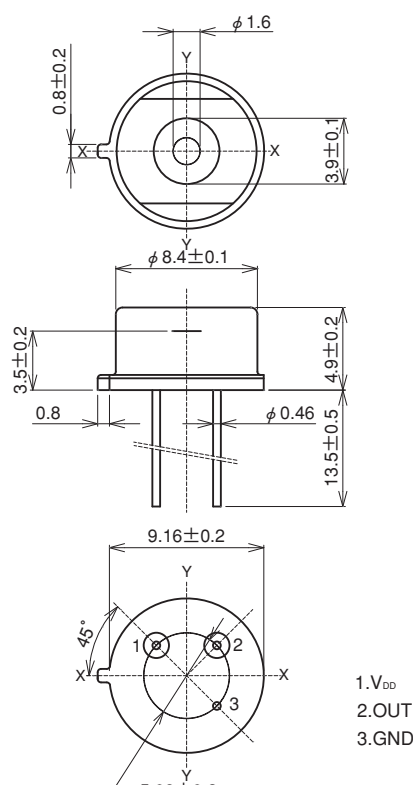
■ View angle



■ Window transmittance



■ Outside dimensions (Unit : mm)



Pyroelectric infrared sensors

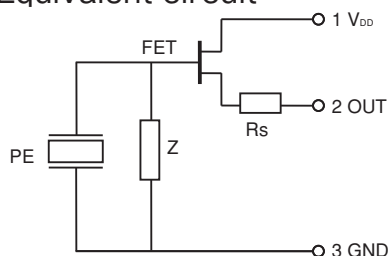
Sensors for gas analysis & measurement [Single-type infrared sensors]

Pyroelectric infrared sensor SPS512CA and SPS512GA of the single-type is, ideal for gas analysis and measurement by NDIR (Non-Dispersive Infrared Ray). It can also be used as a flame detection sensor. In the TO-5 of hermetic seal has become a package encapsulating an inert gas. Thereby it has realized the high reliability and high durability.

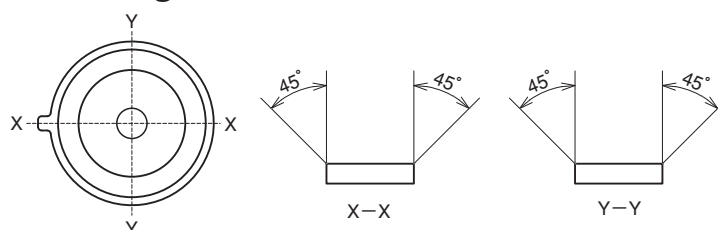
Specifications and characteristics

Model	SPS512CA	SPS512GA	Measurement conditions
IR receiving electrode	$\phi 1.7 \text{ mm}$	$\phi 1.7 \text{ mm}$	—
Signal output	tep. 5.4 mVp-p	tep. 1.0 mVp-p	500K、1 Hz
Noise	Max. 200 mVp-p	Max. 200 mVp-p	25 °C、×5000
Source voltage	0.38 ~ 1.3 V		25 °C
Power-supply voltage	2.0 ~ 10 V		—
Load resistance	10 ~ 1000 k Ω		—
Operating temperature	-20 ~ 70 °C		—
Storage temperature	-40 ~ 80 °C		—

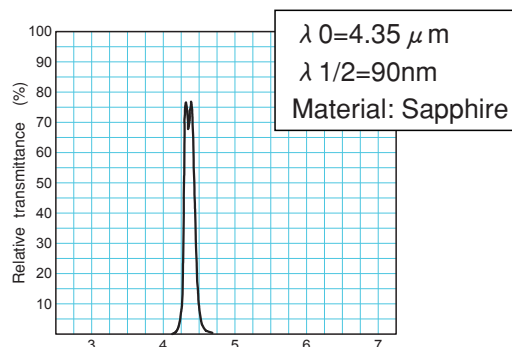
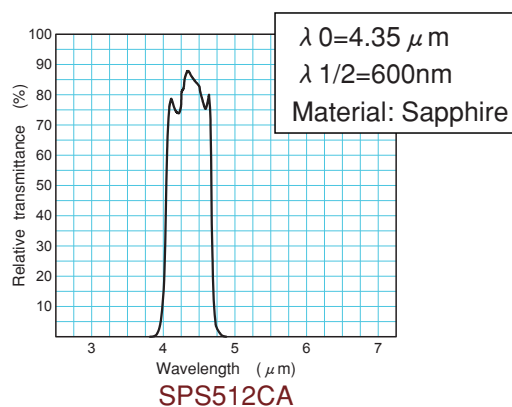
Equivalent circuit



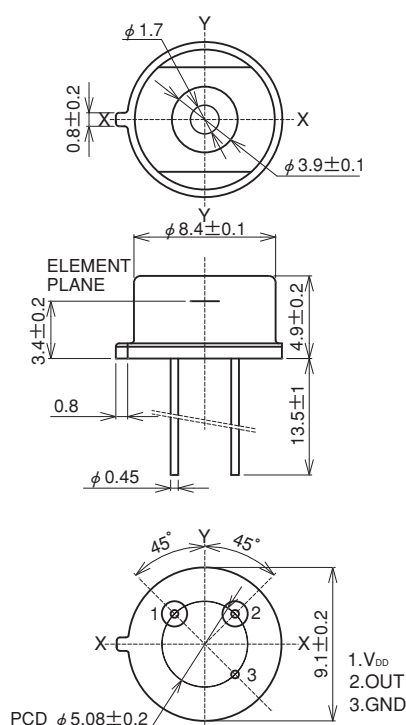
View angle



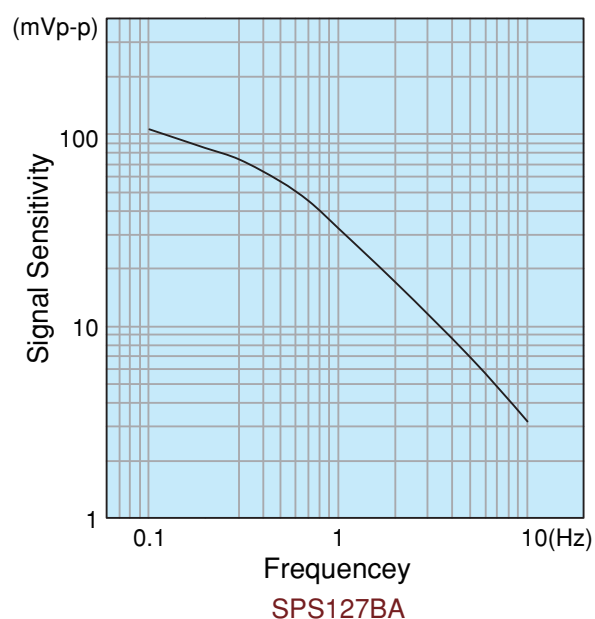
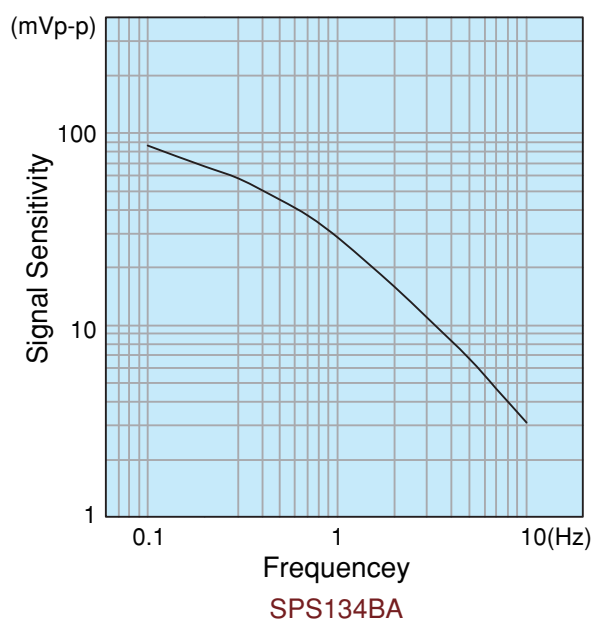
Window transmittance



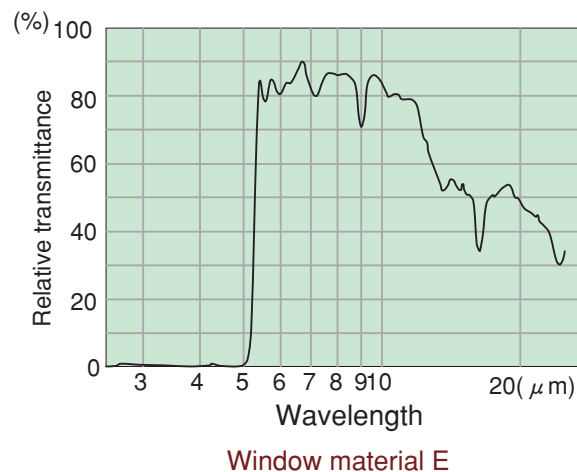
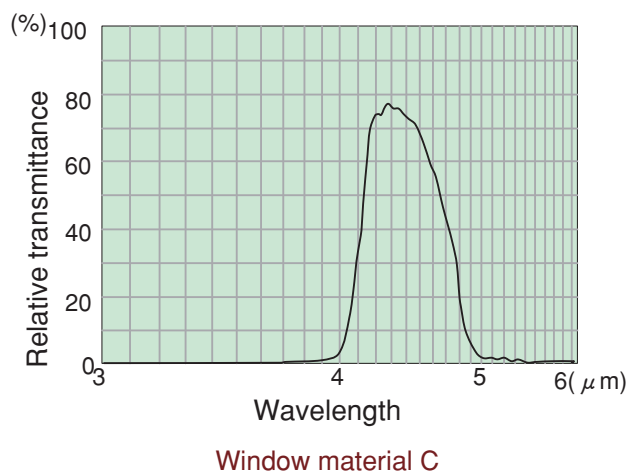
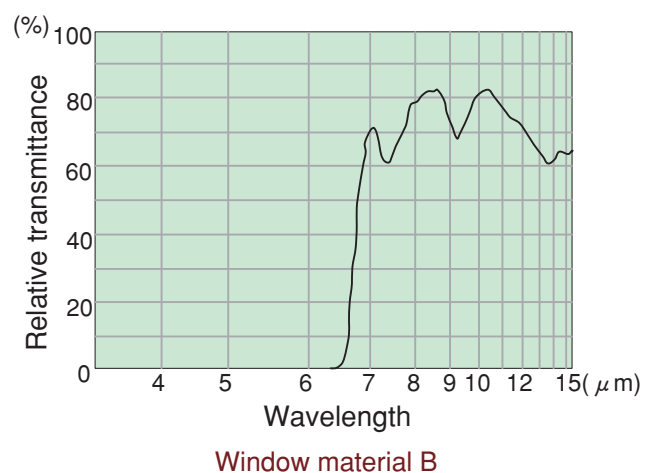
Outside dimensions (Unit : mm)



SPS series frequency characteristics



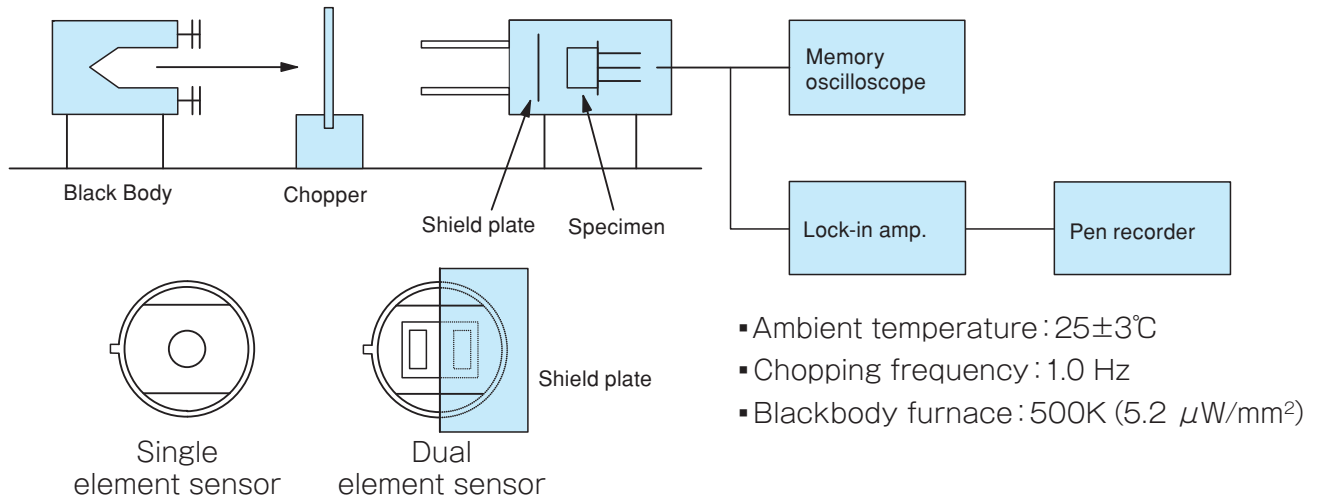
SPS series window material transmission characteristics



Pyroelectric infrared sensors

Electrical characteristics and measuring method

■ Sensitivity measurement



Note) sensitivity balance of dual elements type, the sensitivity of each element (signal output voltage) is measured and calculated by the following formula.

$$\text{EM (\%)} = \frac{|V_a - V_b|}{V_a + V_b} \times 100$$

V_a : Sensitivity of "a" side (mVp-p)

V_b : Sensitivity of "b" side (mVp-p)

■ Noise measurement

Using the circuit of FIG 1, make the measurement at a temperature condition of FIG 3 by the apparatus of FIG 2.

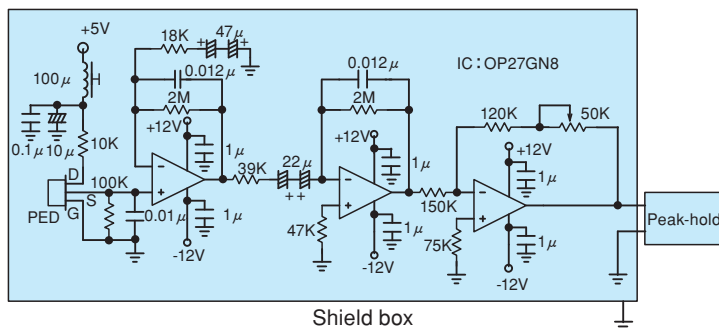


FIG 1-1 : Amplifier circuit

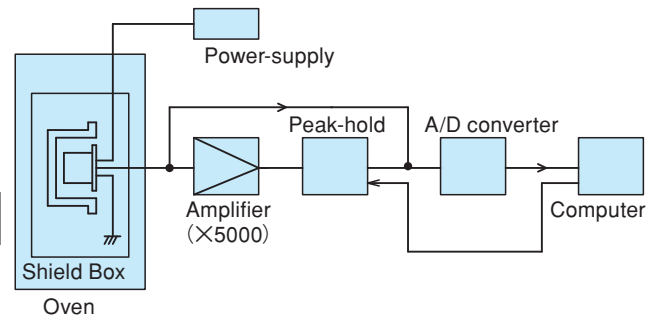
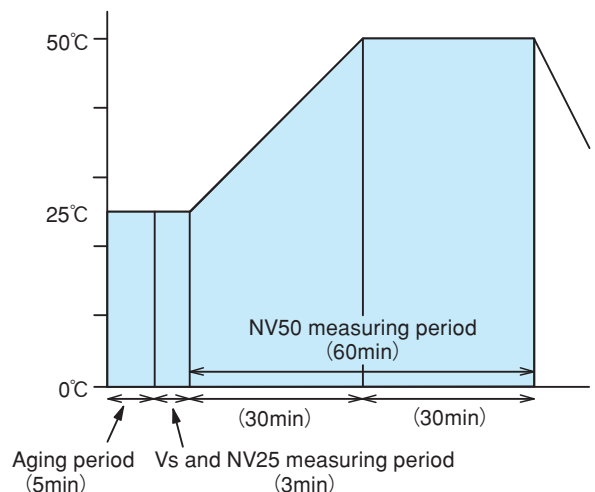
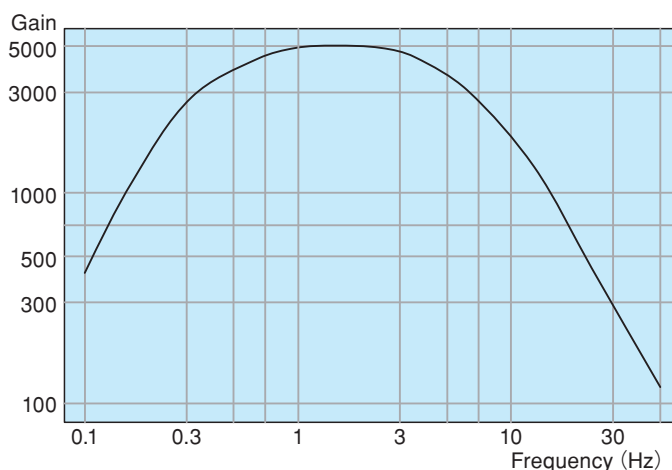
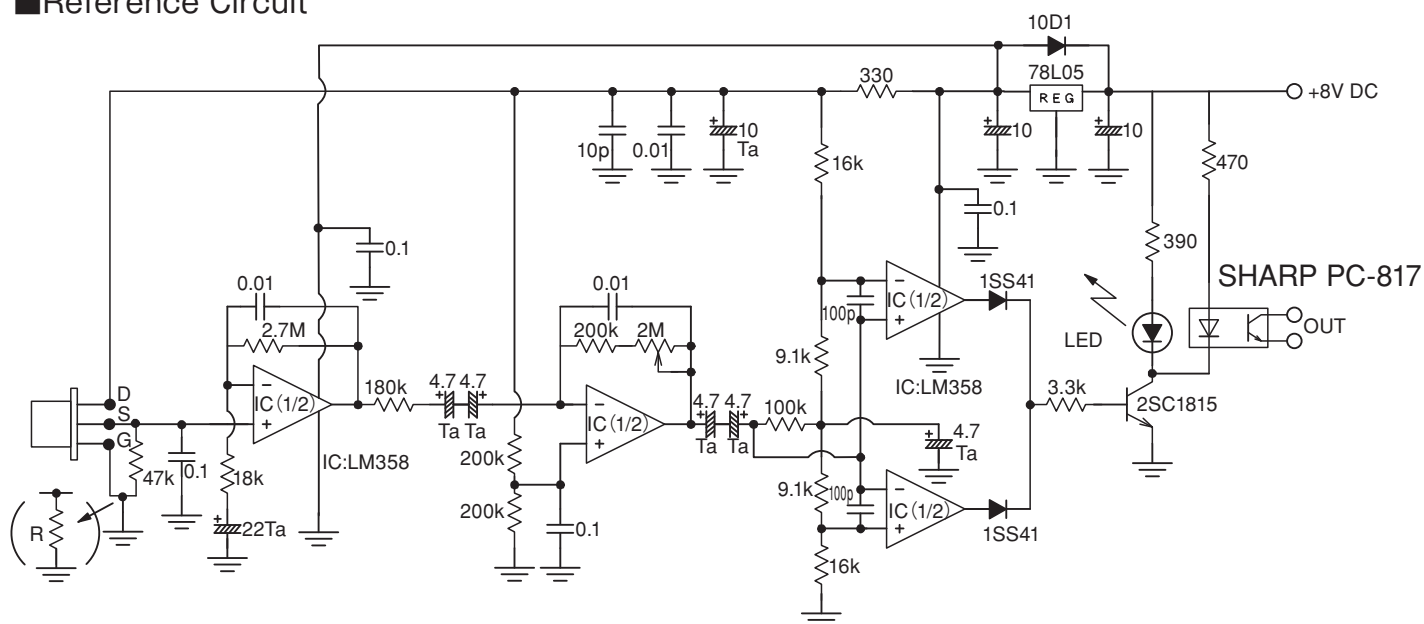


FIG 2 : Noise measuring equipment



Examples of the application circuit

■ Reference Circuit



Sensor tests under various conditions

Test items	Test conditions	Requirements for passing
High-temperature & high-humidity bias test	85°C、85%RH、5 V、500 h	Change in sensitivity $\leq \pm 20\%$
Low-temperature storage test	-40°C、1000 h	Change in sensitivity $\leq \pm 20\%$
Thermal shock test	-30°C(30min) ~70°C(30min) 10 cycles	Change in sensitivity $\leq \pm 20\%$
Vibration test	10~50 Hz (Sweep period 1 min.) Amplitude 1.5 mm Directions 3 (X.Y.Z) 2h	Change in sensitivity $\leq \pm 20\%$
Solder heat resistance test	260°C、1.5 mm from header、10s	Change in sensitivity $\leq \pm 20\%$
Confidentiality test	80°C、5 cm、1 min. (Immersed depth) Flourinert FC-40	No occurrence of bubbles

Pyroelectric infrared sensors

Fresnel lens [I]

Material : Polyethylene

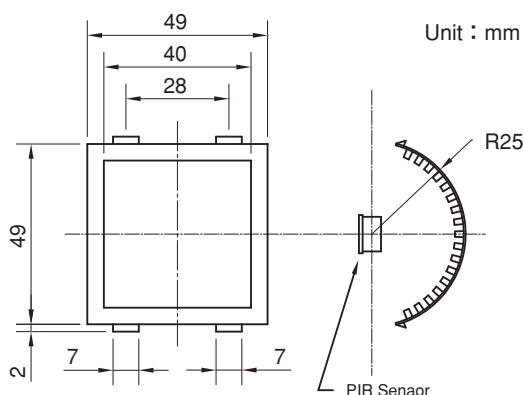
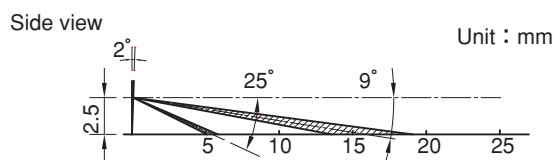


FIG 1 Physical dimensions (Model : J-013 & J-014)



Top view

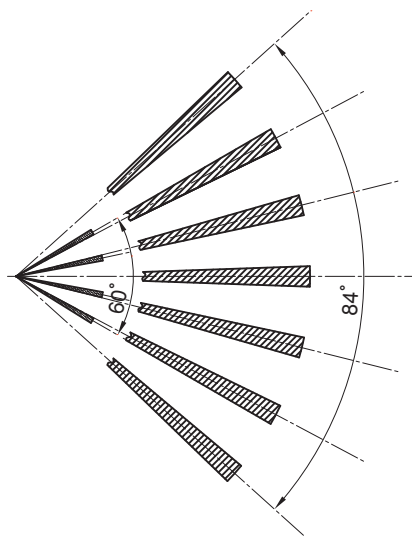
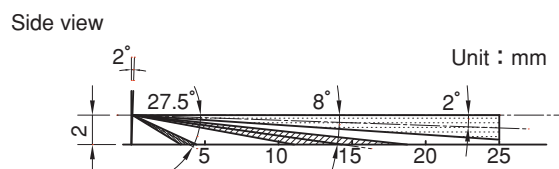


FIG 2 Field of view (Model : J-013)



Top view

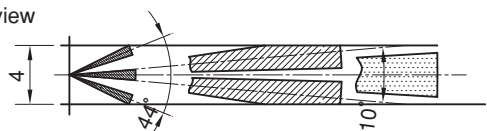


FIG 3 Field of view (Model : J-014)

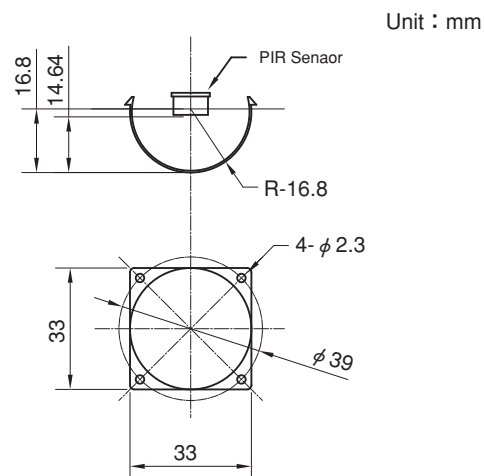
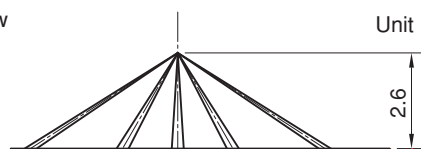


FIG 4 Physical dimensions (Model : J-027 & J-029)

Side view



Top view

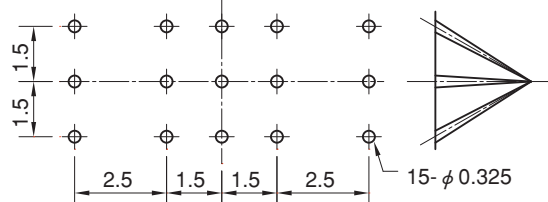
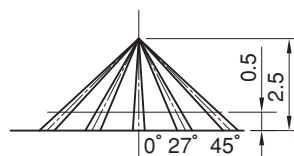


FIG 5 Field of view (Model : J-027)

Side view



Top view

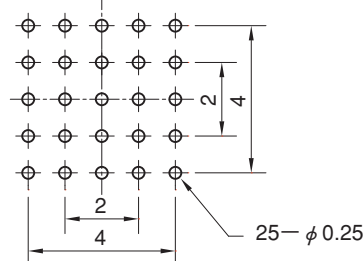
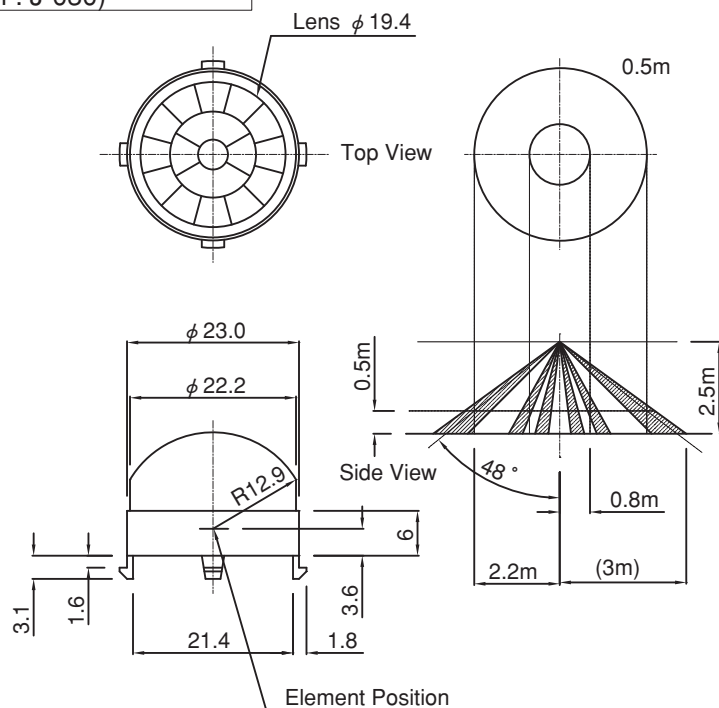


FIG 6 Field of view (Model : J-029)

Fresnel lens [II]

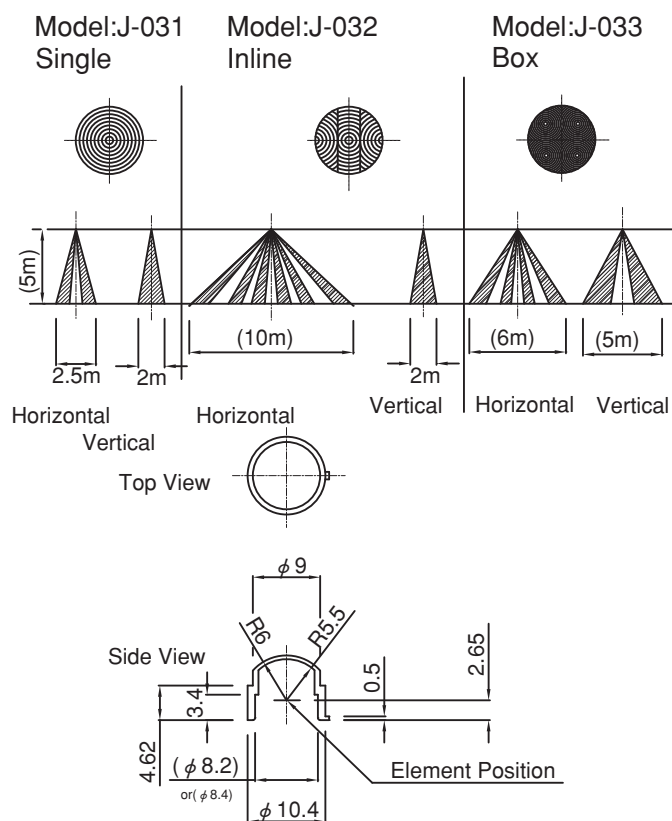
Material : Polyethylene

FIG 7 (Model : J-030)



Unit : mm

FIG 8 (Model : J-031,J-032,J-033)



Unit : mm