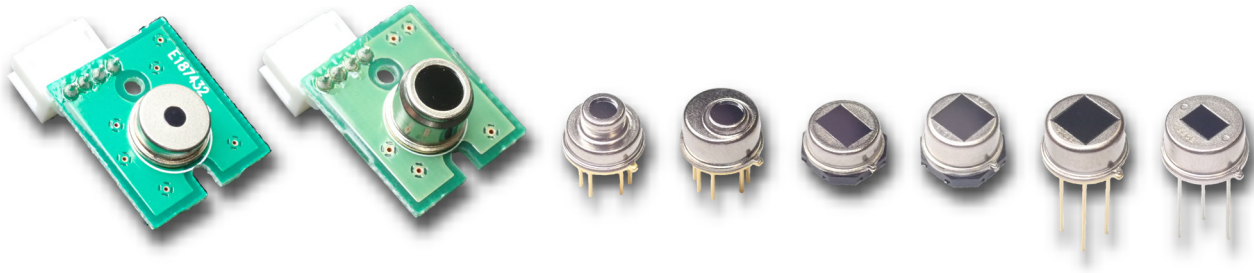


# PYROELECTRIC IR SENSOR THERMOPILE SENSOR



We Make Good World with Sensor



# Application Guide

## Pyroelectric IR sensor

The pyroelectric infrared sensor is an infrared sensor that applies the pyroelectric effect of ferroelectric ceramic. It can detect human body movement and so on with sensing temperature changes.



### Lighting

Automatic switch control.  
Energy saving, Comfort & Convenience.



### Security

Security & Safety.



### Air-conditioner

Comfort & Energy saving.



### IP camera IoT

Camera control. Energy saving & battery life extension. Security, Surveillance & Pet monitor.



### Toilet

Automatic toilet lid open and close. Comfort, Convenience & Cleanliness.



### TV

Automatic display control.  
Energy saving & comfort.

# Thermopile sensor Thermopile sensor unit

Thermopile sensor is an infrared sensor that applies the Seebeck effect. With detecting absolute thermal amount of the object, it measures temperature without contact.



**Printer**

Temperature monitor of inside parts. Printing quality and efficiency improvement.



**Automotive**

Temperature measurement of seat space, passenger, heat generation parts and etc..  
Comfort and safety improvement.



**Microwave oven**

Food temperature measurement. Heat control to preset temperature.



**Air-conditioner**

Temperature monitor of floor and human body. Comfortability control & energy saving control.



**IH cooker**

Temperature monitor of pot bottom. Automatic control of cooking temperature.



**Ear thermometer**

Quick measure of body temperature.

Thermopile sensors

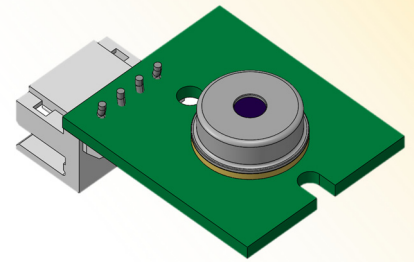
	Application					Object (Target temperatur e)	Part number	Number of element	FOV [°]		Shape	Output method	Feature	Data sheet	
	Air-conditioner	Microwave oven	IH cooker	Printer	Ear thermometer				Non-contact thermometer	X-axis					Y-axis
1	○					Floor temperature (-20~60℃)	TSUP-A3D01S-FB-50-60	1	90	90	Unit with connector	SMBus	* Wide-angle detection	5	
2	○					Floor temperature (-20~60℃)	TSUP-A1D08A-BU-50-60	8 (8x1)	44	5	Unit with connector	SMBus		7	
3	○					Floor temperature (-20~60℃)	TSUP-A1D16B-AU-50-60	16 (4x4)	88	88	Unit with connector	SMBus		8	
4	○					Food (-20~120℃)	TSUP-A1D01S-AU-50-120	1	22	22	Unit with connector	SMBus		9	
5	○					Food (-20~120℃)	TSUP-A1D08A-BU-50-120	8 (8x1)	44	5	Unit with connector	SMBus		11	
6	○					Food (-20~120℃)	TSUP-A1D16B-AU-50-120	16 (4x4)	88	88	Unit with connector	SMBus		12	
7			○			Thermal roller	TSUP-A3D01S-CU-50-300	1	12	12	Unit with connector	SMBus	* Focused detection	13	
8			○			Thermal roller	TSUP-A3A01S-CU-33-300	1	12	12	Unit with connector	analog	* Focused detection	14	

# Thermopile sensor unit

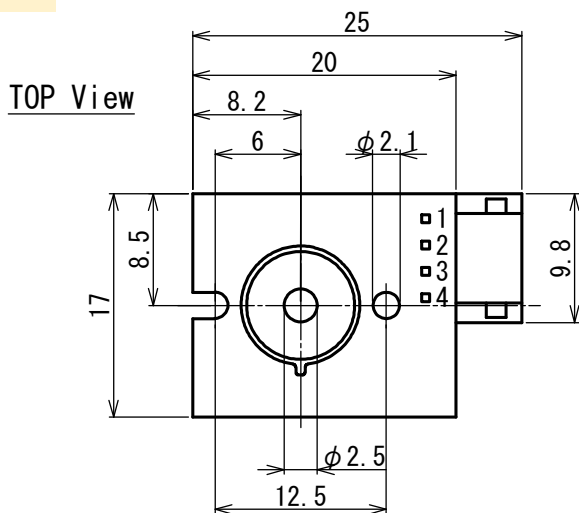
## TSUP-A3D01S-FB-50-60

- Applications Air-conditioner  
(Floor temperature monitor)  
Target temperature -20~60°C

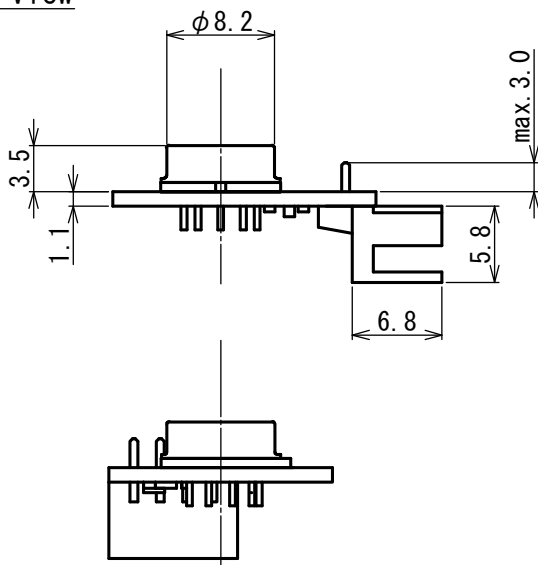
- Feature Thermopile sensor Unit (I2C output)  
Wide-angle detection  
(Single element)



### Dimensions

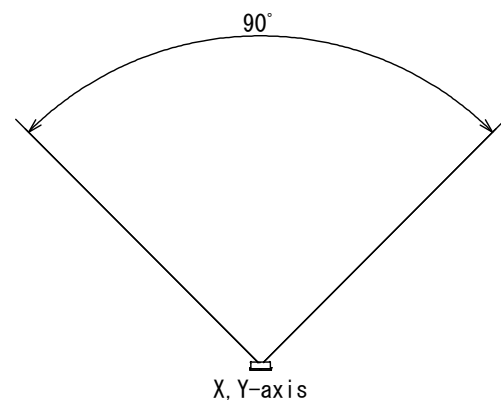


### SIDE View

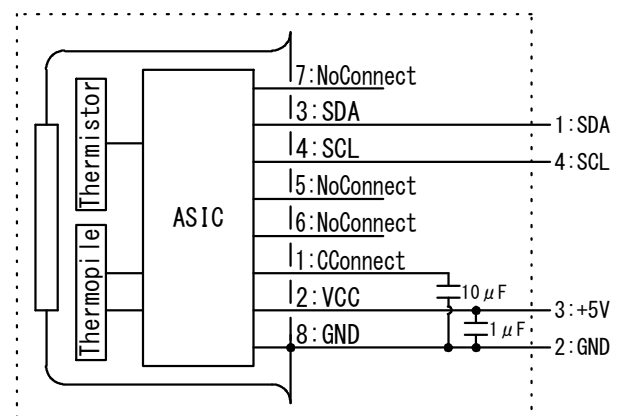


Tolerance with no specified : +/- 0.2

### FOV



### Circuit diagram



### ■ Main Parameter

Parameter	Condition	Spec.			Unit
		Min.	Typ.	Max.	
Operating Voltage		4.5	5	5.5	V
Detection Temperature		-20		400	°C
Operating Temperature		-20		100	°C
Storage Temperature		-30		105	°C
Accuracy		-2		+2	°C
Time Constant				200	msec.

Analog

Amp build-in  
ASIC build-in

SMD

Air-conditioner

Microwave  
oven

Ih cooker

Printer

Ear  
thermometer

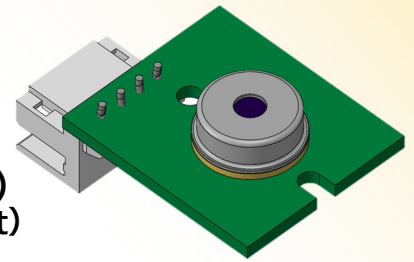
Non-contact  
thermometer

# Thermopile sensor unit

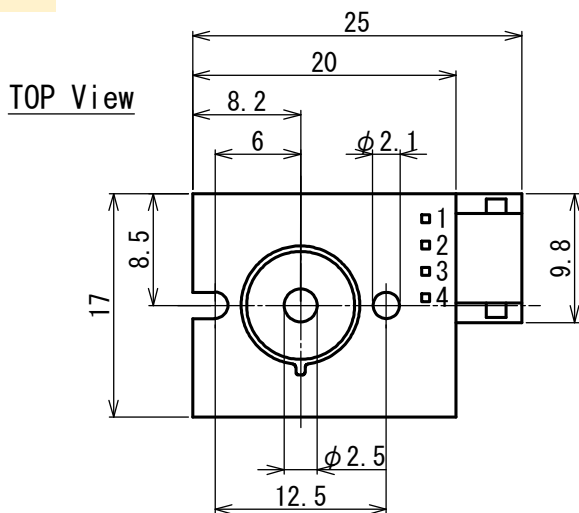
## TSUP-A3A01S-FB-33-60

- Applications Air-conditioner  
(Floor temperature monitor)  
Target temperature -20~60°C

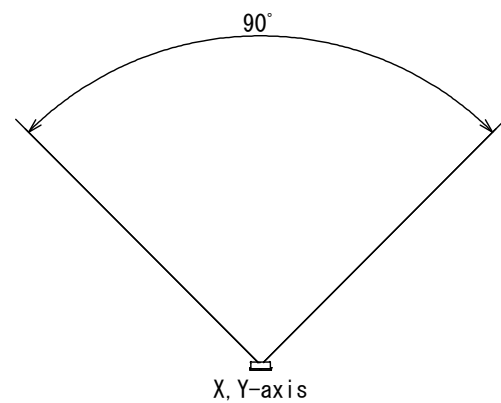
- Feature Thermopile sensor Unit (Analog output)  
Wide-angle detection (Single element)



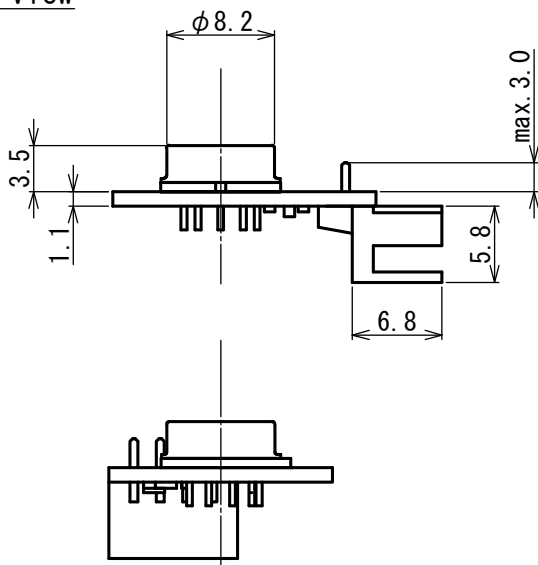
### Dimensions



### FOV

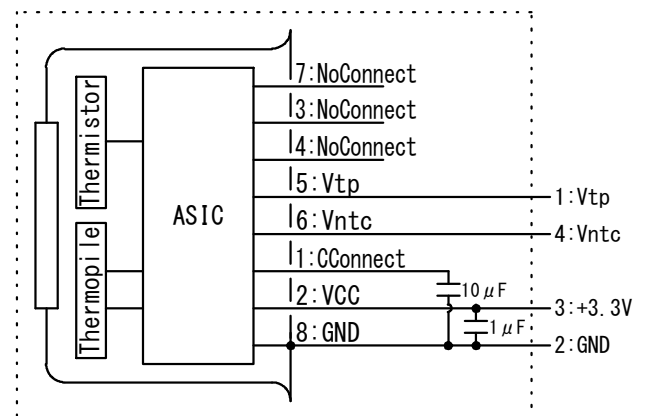


### SIDE View



Tolerance with no specified : +/- 0.2

### Circuit diagram



### ■ Main Parameter

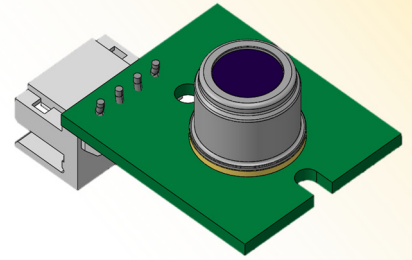
Parameter	Condition	Spec.			Unit
		Min.	Typ.	Max.	
Operating Voltage		3	3.3	3.6	V
Detection Temperature		-20		60	°C
Operating Temperature		-20		100	°C
Storage Temperature		-30		105	°C
Accuracy		-2		+2	°C
Time Constant				200	msec.

# Thermopile sensor unit

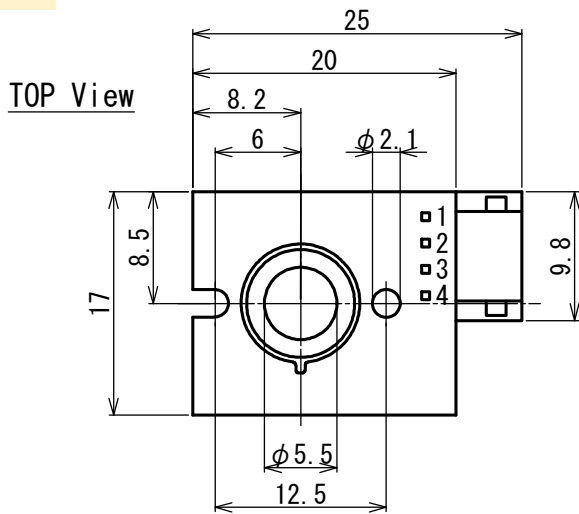
## TSUP-A1D08A-BU-50-60

- Applications Air-conditioner  
(Floor temperature monitor)  
Target temperature -20~60°C

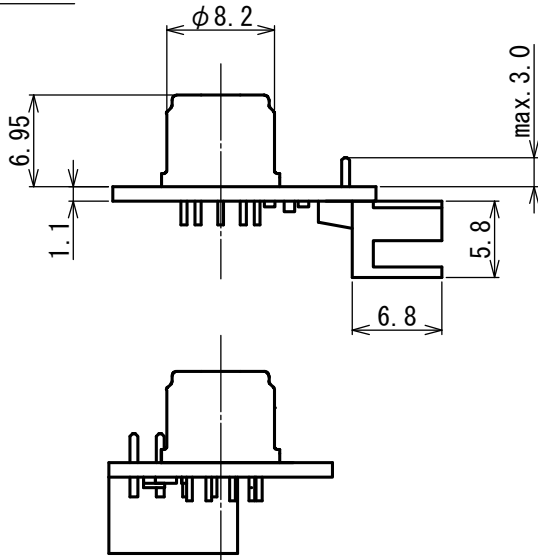
- Feature Thermopile sensor Unit (I2C output)  
8 array element



### Dimensions

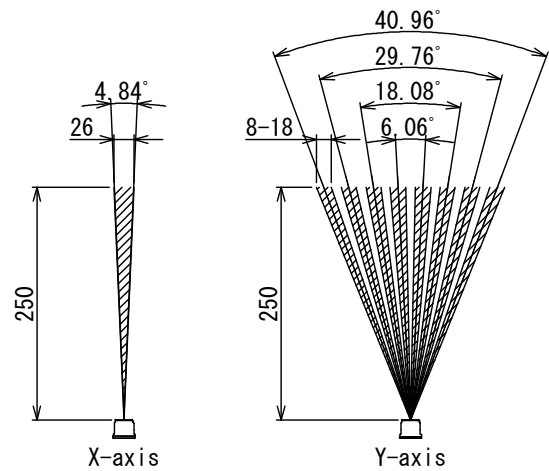


### SIDE View

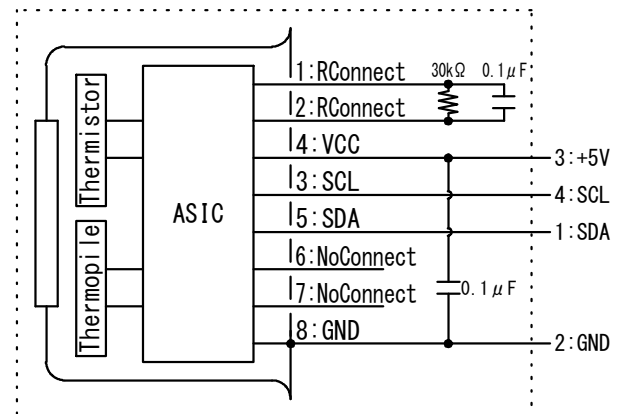


Tolerance with no specified : +/- 0.2

### FOV



### Circuit diagram



### ■ Main Parameter

Parameter	Condition	Spec.			Unit
		Min.	Typ.	Max.	
Operating Voltage		4.5	5	5.5	V
Detection Temperature		-20		60	°C
Operating Temperature		-20		100	°C
Storage Temperature		-30		105	°C
Accuracy		-2		+2	°C
Time Constant				200	msec.

Analog

Amp build-in  
ASIC build-in

SMD

Air-conditioner

Microwave  
oven

Ih cooker

Printer

Ear  
thermometer

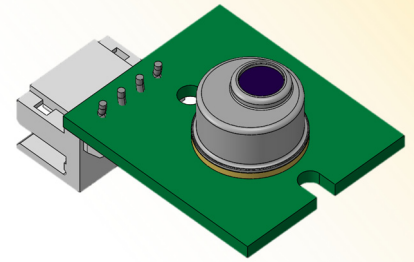
Non-contact  
thermometer

# Thermopile sensor unit

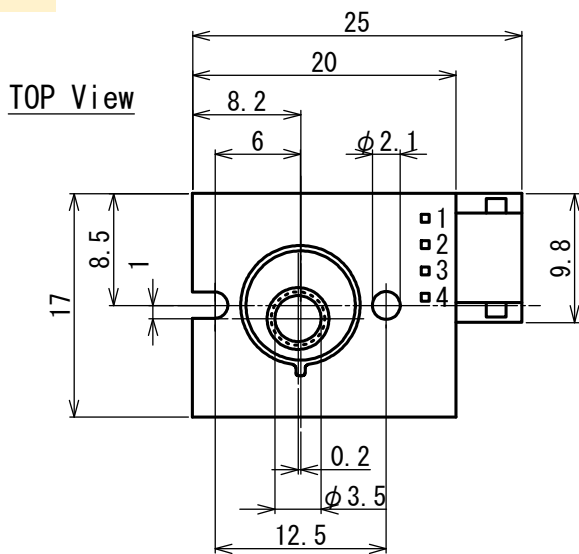
## TSUP-A1D16B-AU-50-60

- Applications Air-conditioner  
(Floor temperature monitor)  
Target temperature -20~60°C

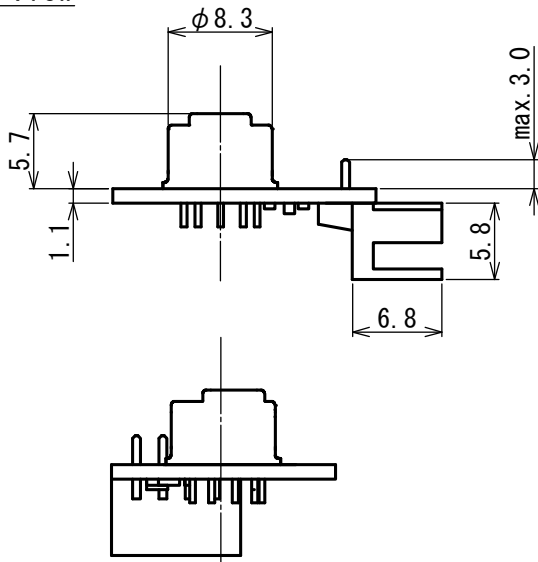
- Feature Thermopile sensor Unit (I2C output)  
4 x 4 square element



### Dimensions

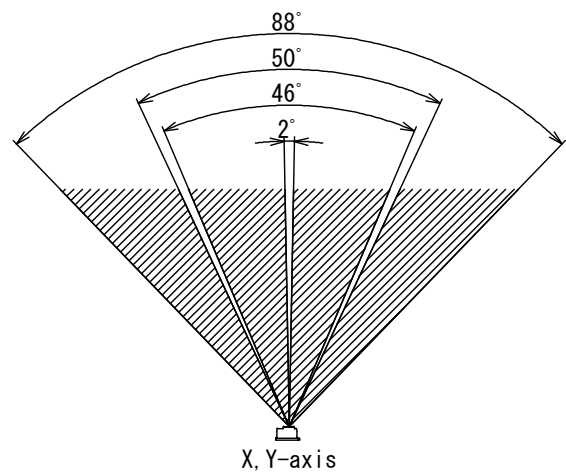


### SIDE View

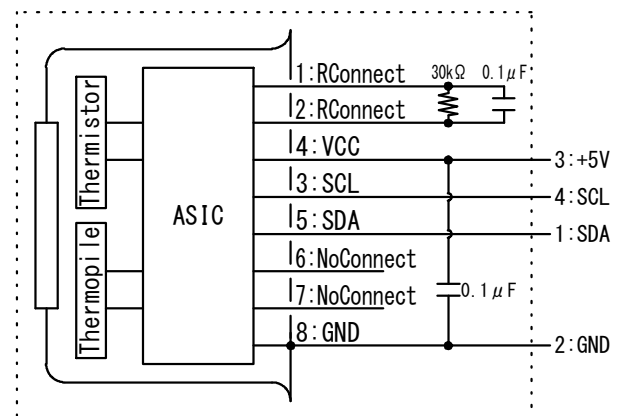


Tolerance with no specified : +/- 0.2

### FOV



### Circuit diagram



### ■ Main Parameter

Parameter	Condition	Spec.			Unit
		Min.	Typ.	Max.	
Operating Voltage		4.5	5	5.5	V
Detection Temperature		-20		60	°C
Operating Temperature		-20		100	°C
Storage Temperature		-30		105	°C
Accuracy		-2		+2	°C
Time Constant				200	msec.

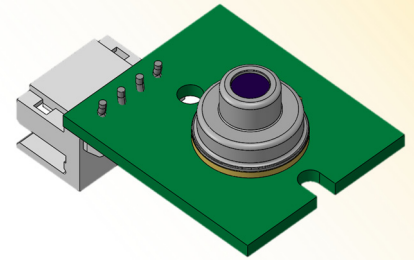


# Thermopile sensor unit

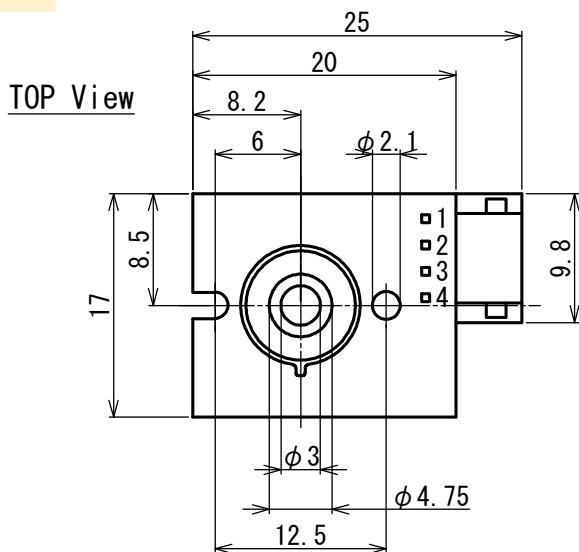
## TSUP-A3D01S-AU-50-120

- Applications Microwave oven  
(Food temperature detection)  
Target temperature -20~120°C

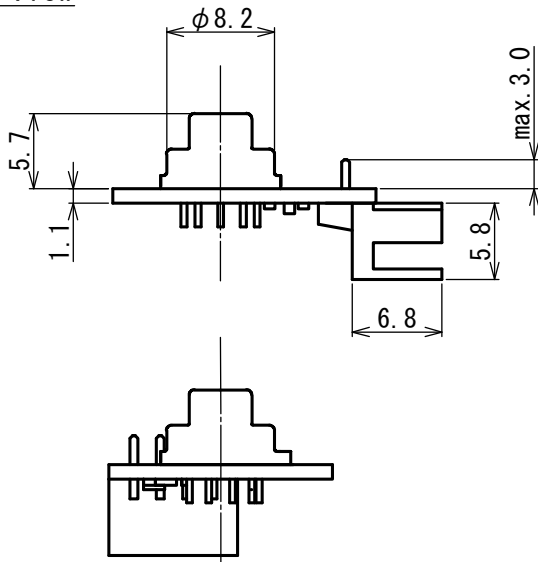
- Feature Thermopile sensor Unit (I2C output)  
Single element



### Dimensions

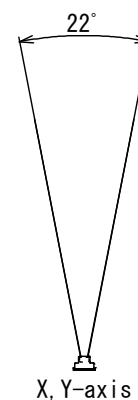


### SIDE View

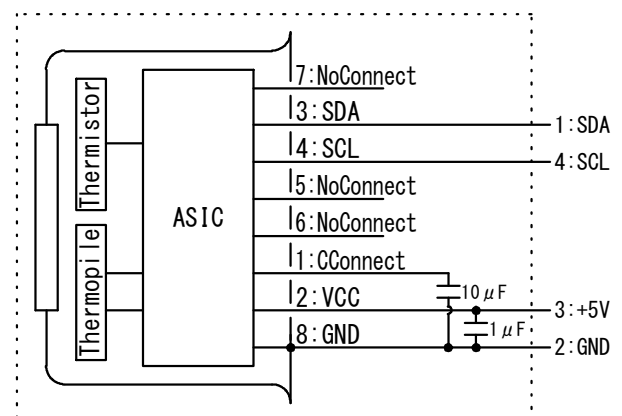


Tolerance with no specified : +/- 0.2

### FOV



### Circuit diagram



### ■ Main Parameter

Parameter	Condition	Spec.			Unit
		Min.	Typ.	Max.	
Operating Voltage		4.5	5	5.5	V
Detection Temperature		-20		400	°C
Operating Temperature		-20		100	°C
Storage Temperature		-30		105	°C
Accuracy		-2		+2	°C
Time Constant				200	msec.

Analog

Amp build-in  
ASIC build-in

SMD

Air-conditioner

Microwave oven

Ih cooker

Printer

Ear thermometer

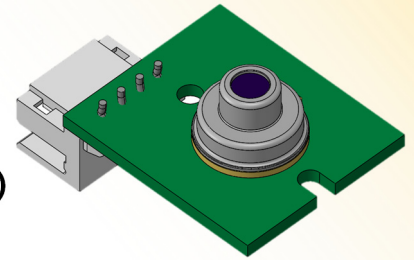
Non-contact thermometer

# Thermopile sensor unit

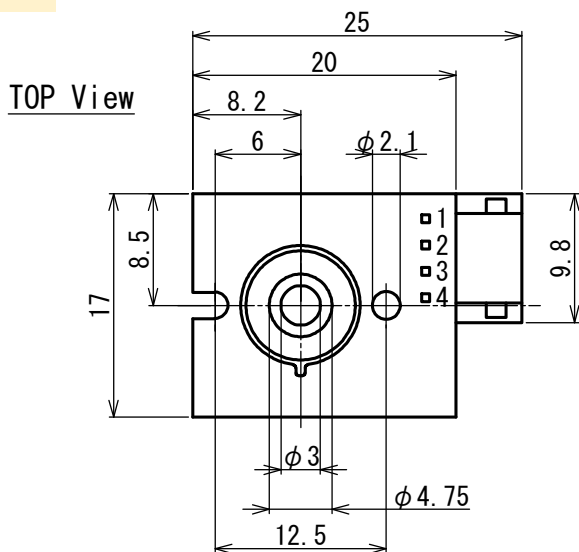
## TSUP-A3A01S-AU-33-120

- Applications Microwave oven  
(Food temperature detection)  
Target temperature -20~120°C

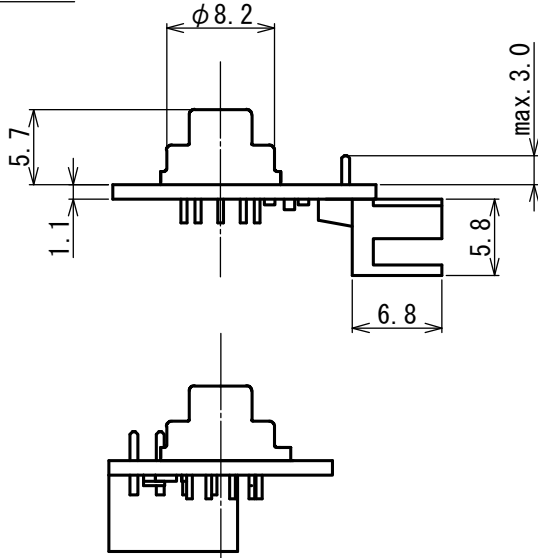
- Feature Thermopile sensor Unit (Analog output)  
Single element



### Dimensions

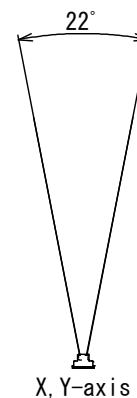


### SIDE View

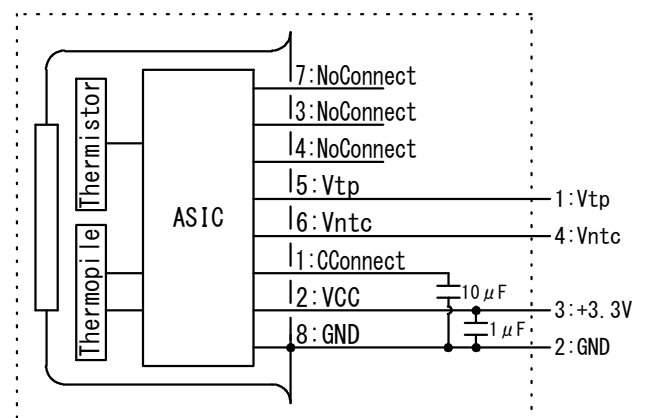


Tolerance with no specified : +/- 0.2

### FOV



### Circuit diagram



### ■ Main Parameter

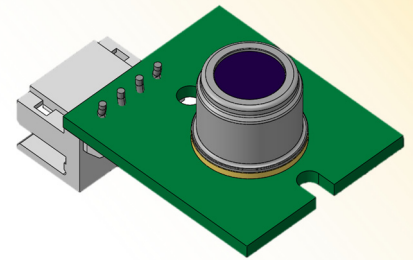
Parameter	Condition	Spec.			Unit
		Min.	Typ.	Max.	
Operating Voltage		3	3.3	3.6	V
Detection Temperature		-20		120	°C
Operating Temperature		-20		100	°C
Storage Temperature		-30		105	°C
Accuracy		-2		+2	°C
Time Constant				200	msec.

# Thermopile sensor unit

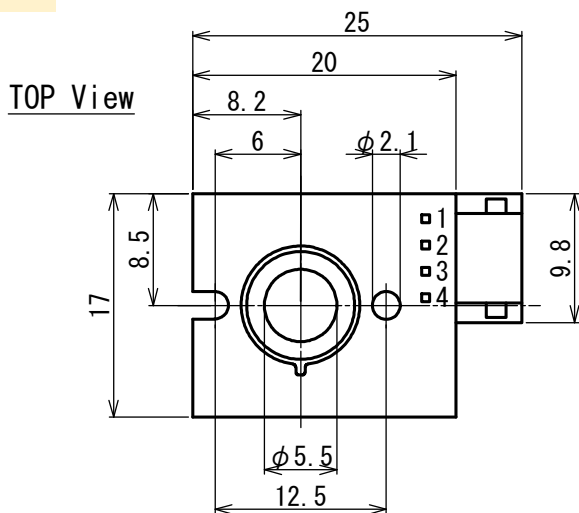
## TSUP-A1D08A-BU-50-120

- Applications Microwave oven  
(Food temperature detection)  
Target temperature -20~120°C

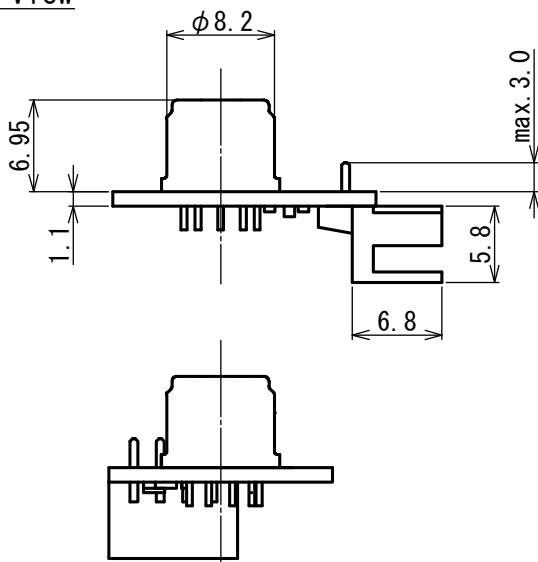
- Feature Thermopile sensor Unit (I2C output)  
8 array element



### Dimensions

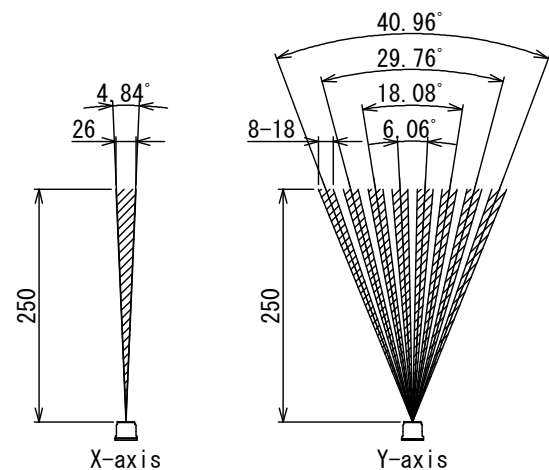


### SIDE View

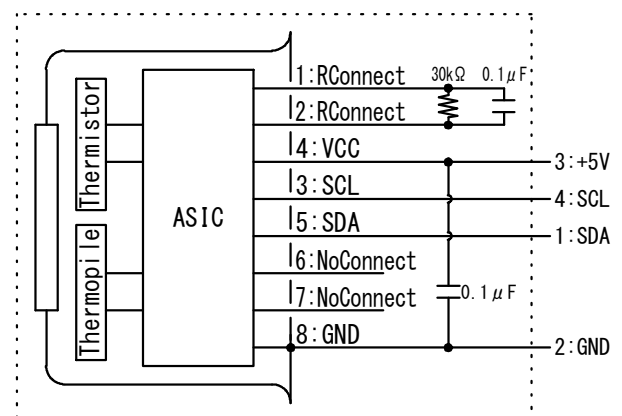


Tolerance with no specified : +/- 0.2

### FOV



### Circuit diagram



### ■ Main Parameter

Parameter	Condition	Spec.			Unit
		Min.	Typ.	Max.	
Operating Voltage		4.5	5	5.5	V
Detection Temperature		-20		120	°C
Operating Temperature		-20		100	°C
Storage Temperature		-30		105	°C
Accuracy		-2		+2	°C
Time Constant				200	msec.

Analog

Amp build-in  
ASIC build-in

SMD

Air-conditioner

Microwave oven

Ih cooker

Printer

Ear thermometer

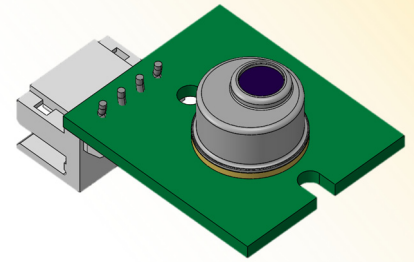
Non-contact thermometer

# Thermopile sensor unit

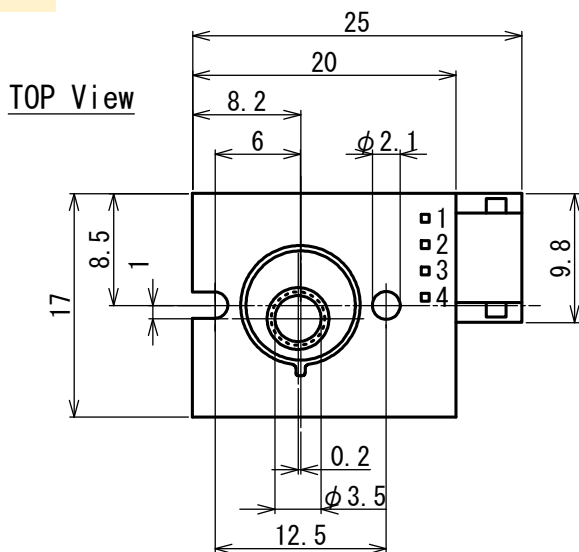
## TSUP-A1D16B-AU-50-120

- Applications Microwave oven  
(Food temperature detection)  
Target temperature -20~120°C

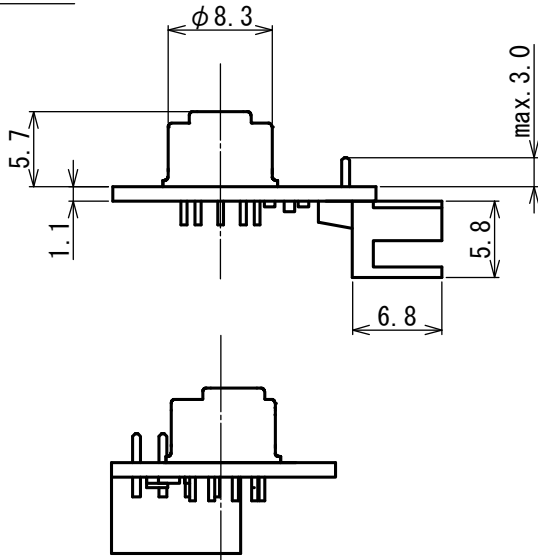
- Feature Thermopile sensor Unit (I2C output)  
4 x 4 square element



### Dimensions

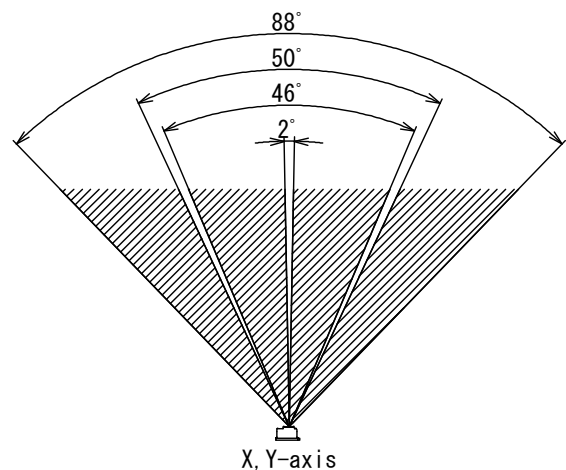


### SIDE View

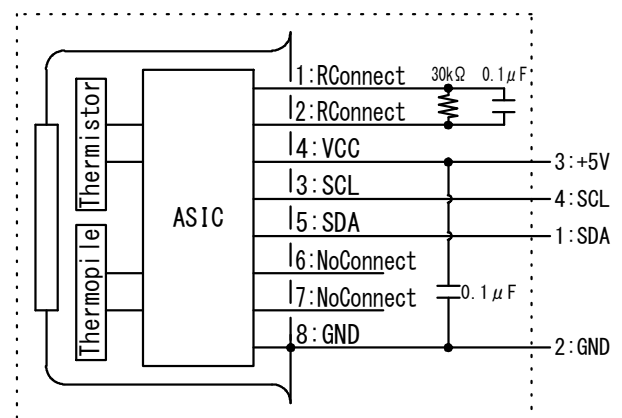


Tolerance with no specified : +/- 0.2

### FOV



### Circuit diagram



### ■ Main Parameter

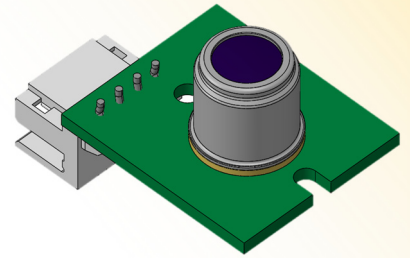
Parameter	Condition	Spec.			Unit
		Min.	Typ.	Max.	
Operating Voltage		4.5	5	5.5	V
Detection Temperature		-20		120	°C
Operating Temperature		-20		100	°C
Storage Temperature		-30		105	°C
Accuracy		-2		+2	°C
Time Constant				200	msec.

# Thermopile sensor unit

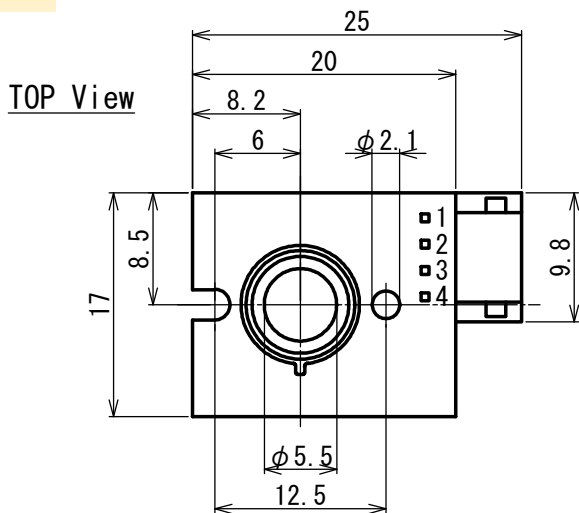
## TSUP-A3D01S-CU-50-300

- Applications IH Cooker(Pot surface temperature detection)  
Target temperature -20~300°C

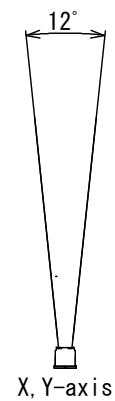
- Feature Thermopile sensor Unit (I2C output)  
Focused detection (Single element)



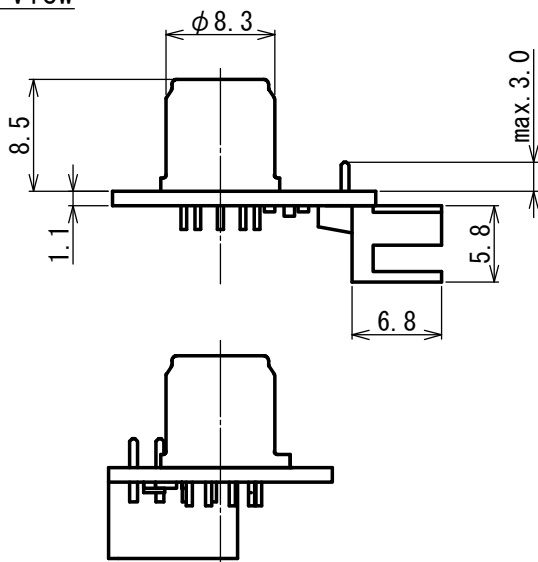
### Dimensions



### FOV

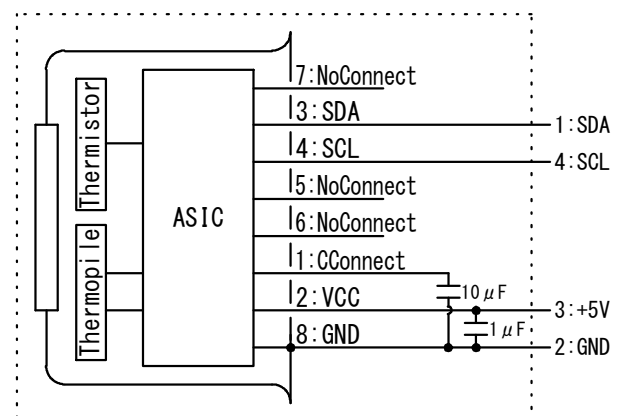


### SIDE View



Tolerance with no specified : +/- 0.2

### Circuit diagram



### ■ Main Parameter

Parameter	Condition	Spec.			Unit
		Min.	Typ.	Max.	
Operating Voltage		4.5	5	5.5	V
Detection Temperature		-20		400	°C
Operating Temperature		-20		100	°C
Storage Temperature		-30		105	°C
Accuracy		-3		+3	°C
Time Constant				200	msec.

Analog

Amp build-in  
ASIC build-in

SMD

Air-conditioner

Microwave oven

Ih cooker

Printer

Ear thermometer

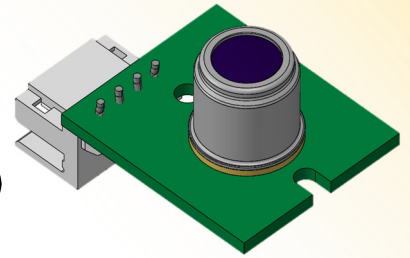
Non-contact thermometer

# Thermopile sensor unit

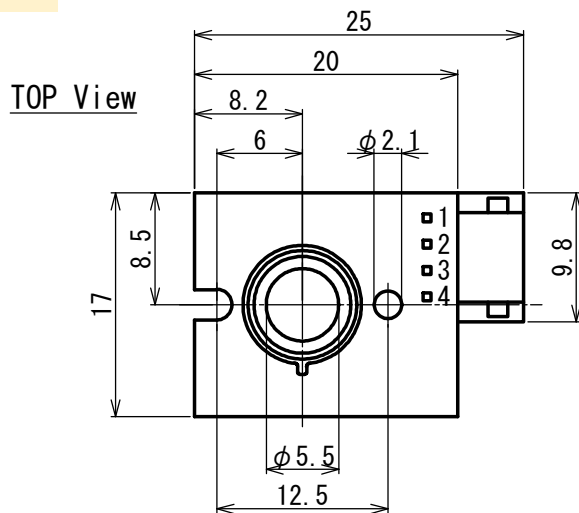
## TSUP-A3A01S-CU-33-300

- Applications IH Cooker(Pot surface temperature detection)  
Target temperature -20~300°C

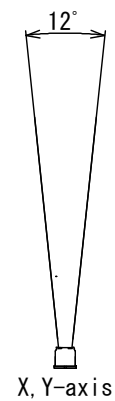
- Feature Thermopile sensor Unit (Analog output)  
Focused detection (Single element)



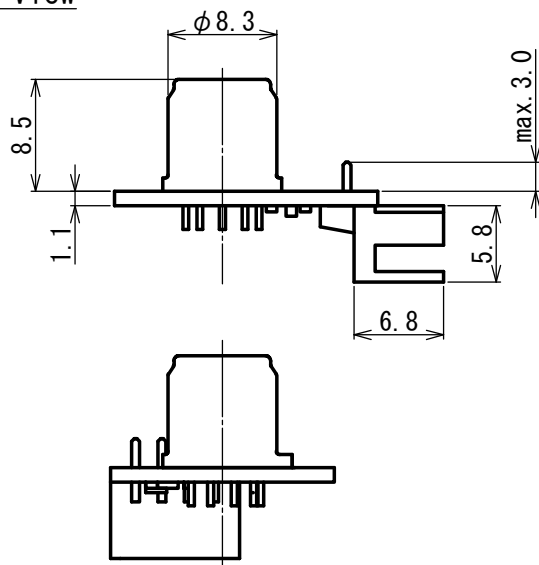
### Dimensions



### FOV

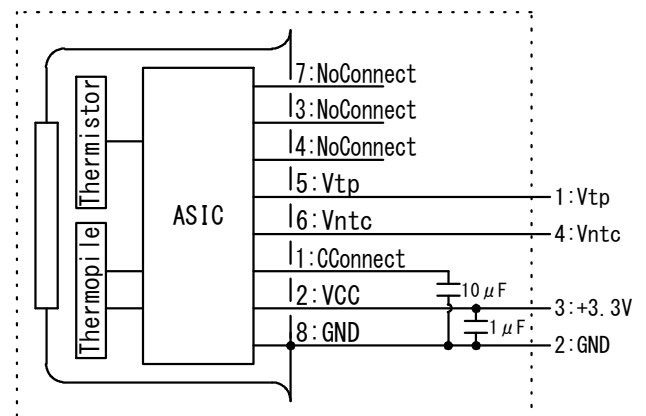


### SIDE View



Tolerance with no specified : +/- 0.2

### Circuit diagram



### ■ Main Parameter

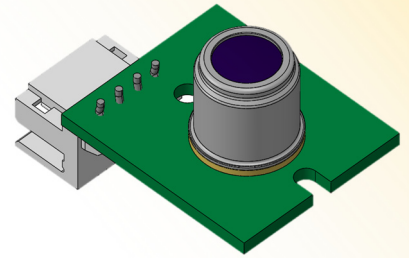
Parameter	Condition	Spec.			Unit
		Min.	Typ.	Max.	
Operating Voltage		3	3.3	3.6	V
Detection Temperature		-20		300	°C
Operating Temperature		-20		100	°C
Storage Temperature		-30		105	°C
Accuracy		-3		+3	°C
Time Constant				200	msec.

# Thermopile sensor unit

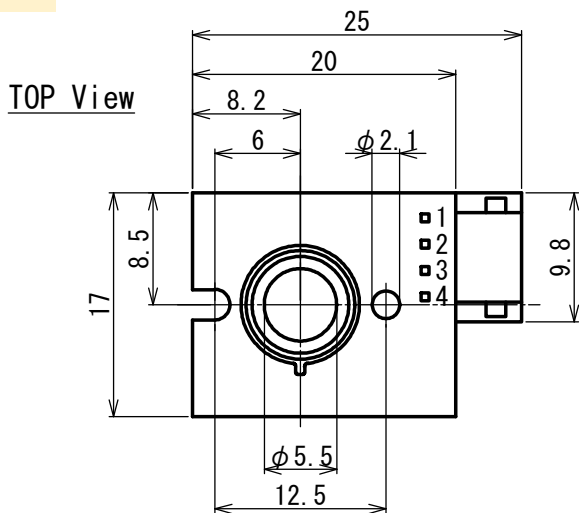
## TSUP-A3D01S-CU-50-300

■ Applications **Printer**  
(Thermal roller temperature detection)

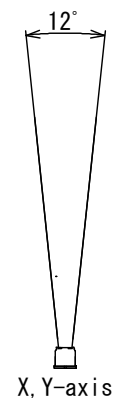
■ Feature **Thermopile sensor Unit (I2C output)**  
**Focused detection (Single element)**



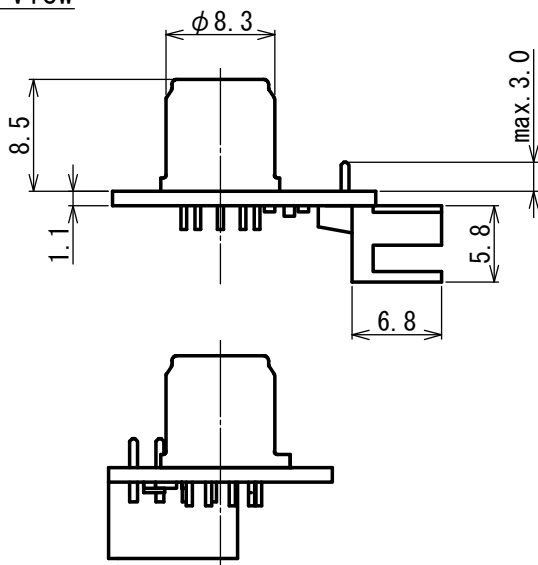
### Dimensions



### FOV

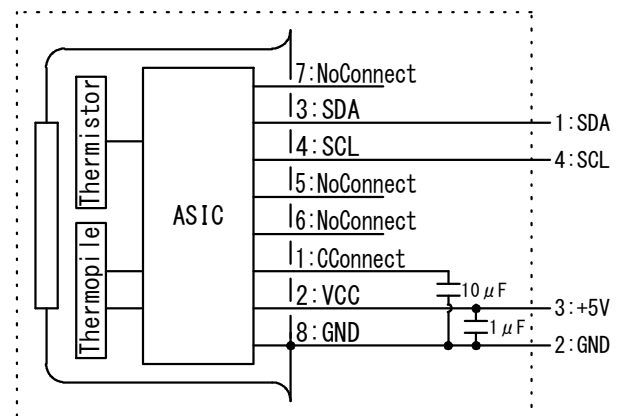


### SIDE View



Tolerance with no specified : +/- 0.2

### Circuit diagram



### ■ Main Parameter

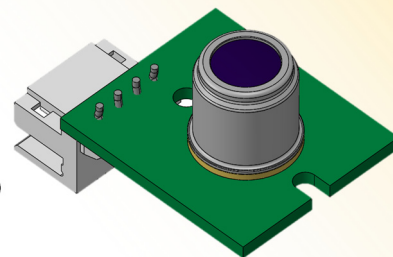
Parameter	Condition	Spec.			Unit
		Min.	Typ.	Max.	
Operating Voltage		4.5	5	5.5	V
Detection Temperature		-20		400	°C
Operating Temperature		-20		100	°C
Storage Temperature		-30		105	°C
Accuracy		-3		+3	°C
Time Constant				200	msec.

# Thermopile sensor unit

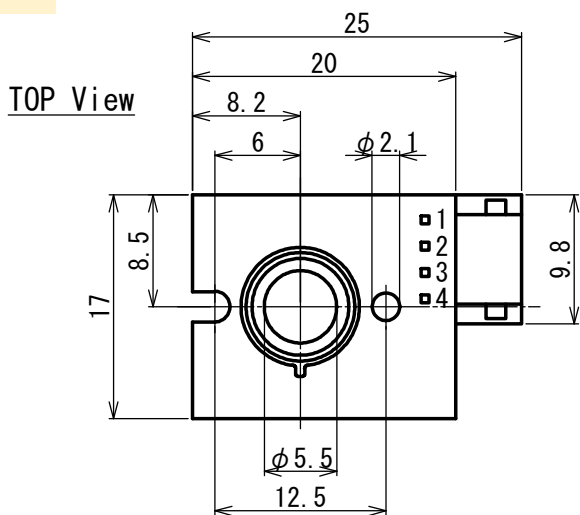
## TSUP-A3A01S-CU-33-300

■ Applications **Printer**  
(Thermal roller temperature detection)

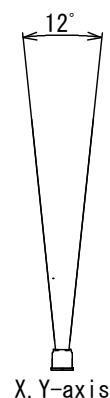
■ Feature **Thermopile sensor Unit (Analog output)**  
**Focused detection (Single element)**



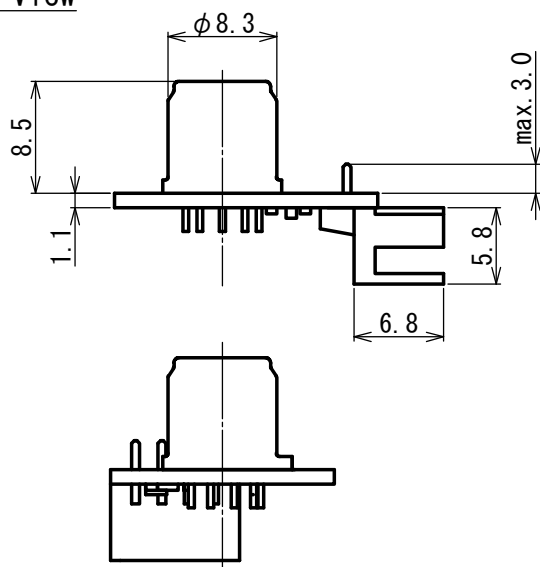
### Dimensions



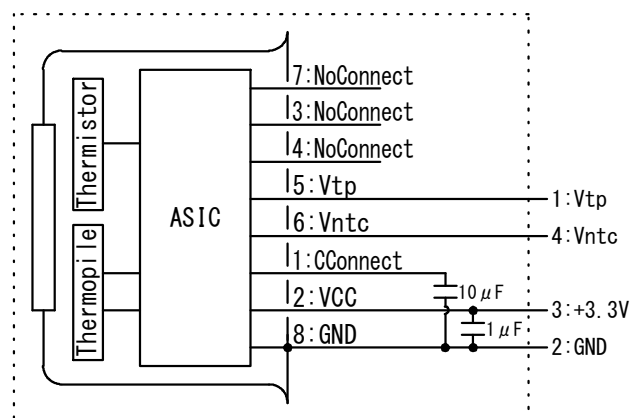
### FOV



### SIDE View



### Circuit diagram



Tolerance with no specified : +/- 0.2

### ■ Main Parameter

Parameter	Condition	Spec.			Unit
		Min.	Typ.	Max.	
Operating Voltage		3	3.3	3.6	V
Detection Temperature		-20		300	°C
Operating Temperature		-20		100	°C
Storage Temperature		-30		105	°C
Accuracy		-3		+3	°C
Time Constant				200	msec.



1. Design restrictions/precautions

These sensors are designed for indoor use. If used for outdoor applications, please be sure to apply proper supplementary optical filter, drip-proof and anti-dew construction.

In cases where secondary accidents caused by operation failure or malfunction of the sensor could be expected, please include a fail safe function into the design.

2. Remarks

These sensors are not suitable for applications that require extremely high reliability, such as related to human life (life supporting devices and etc.).

These sensors must not be used for products that are prohibited to manufacture, use and sell by Japanese domestic and foreign laws and orders.

The contents described in this catalog are as of January 2021.

The described contents may be changed or suspended without notice.

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