

# Thermopile detectors



## T11361 series

### High-sensitivity thermopile detectors with thermistor For gas density measurements

The T11361 series is a family of thermopile detectors equipped with an internal thermistor for compensating for output variations caused by changes in the ambient temperature. The T11361-01 is suited for gas density measurements or the like. It uses a TO-18 package with a window having high transmittance in the 3 to 5  $\mu\text{m}$  spectral band. By attaching an external band-pass filter to the thermopile detector, customers can apply it to various types of gas density measurements. The T11361-05 employs a 4.3  $\mu\text{m}$  band-pass filter and is suitable for CO<sub>2</sub> density measurements.

#### Features

- Spectral response: 3 to 5  $\mu\text{m}$  (T11361-01), 4.3  $\mu\text{m}$  (T11361-05)
- TO-18 package
- High sensitivity
- Built-in thermistor

#### Applications

- Gas density measurement and the like (T11361-01)
- CO<sub>2</sub> density measurement (T11361-05)

#### Absolute maximum ratings

Parameter	Symbol	T11361-01	T11361-05	Unit
Operating temperature	T <sub>opr</sub>	-30 to +85	-10 to +80	°C
Storage temperature	T <sub>stg</sub>	-40 to +100	-20 to +85	°C
Thermistor power dissipation	P <sub>th</sub>	0.2		mW

Note: Exceeding the absolute maximum ratings even momentarily may cause a drop in product quality. Always be sure to use the product within the absolute maximum ratings.

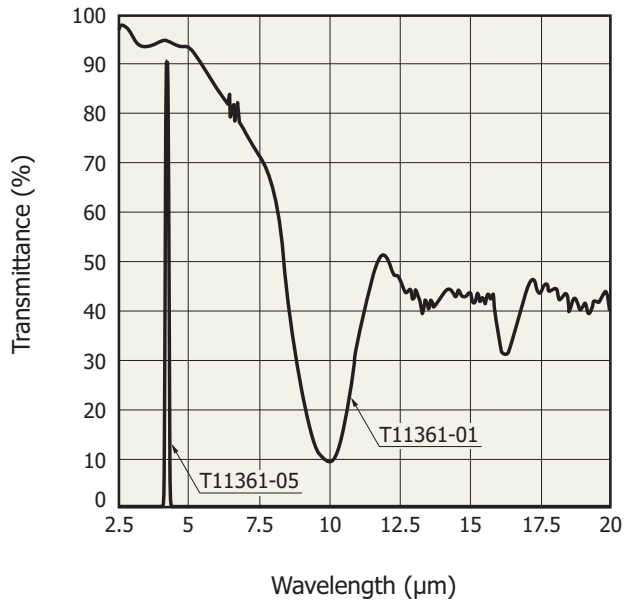
#### Structure

Parameter	Symbol	Condition	T11361-01	T11361-05	Unit
Photosensitive area	A		1.2 × 1.2		mm
Package	-		TO-18		-
Window material	-		AR coating Si with 3 to 5 $\mu\text{m}$ high-transmittance	4.3 $\mu\text{m}$ band-pass filter	-

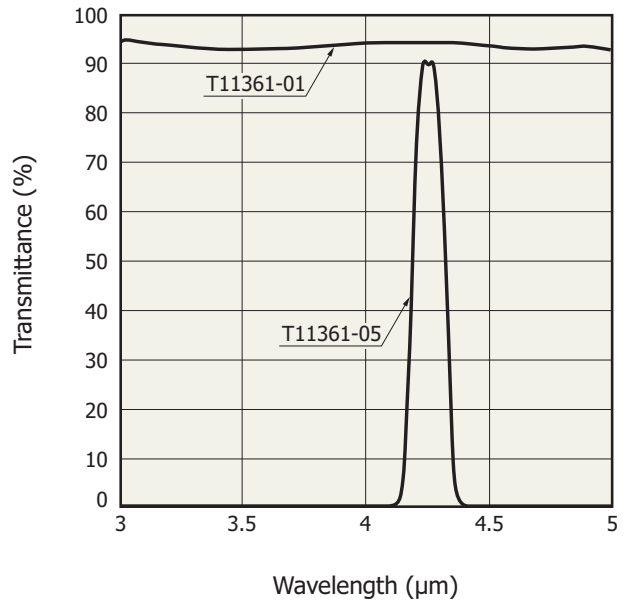
#### Electrical and optical characteristics (T<sub>a</sub>=25 °C)

Parameter	Symbol	Condition	T11361-01			T11361-05			Unit
			Min.	Typ.	Max.	Min.	Typ.	Max.	
Spectral response	$\lambda$		-	3 to 5	-	-	4.3	-	$\mu\text{m}$
Photosensitivity	S	1 Hz, 500 K	40	50	60	40	50	60	V/W
Element resistance	R <sub>e</sub>		100	125	150	100	125	150	k $\Omega$
Noise voltage	V <sub>n</sub>	Johnson noise	-	45	50	-	45	50	nV/Hz <sup>1/2</sup>
Noise equivalent power	NEP		-	0.9	1.3	-	0.9	1.3	nW/Hz <sup>1/2</sup>
Detectivity	D*		0.9 × 10 <sup>8</sup>	1.3 × 10 <sup>8</sup>	-	0.9 × 10 <sup>8</sup>	1.3 × 10 <sup>8</sup>	-	cm·Hz <sup>1/2</sup> /W
Rise time	t <sub>r</sub>	0 to 63%	-	20	30	-	20	30	ms
Temperature coefficient of element resistance	TCR		-	±0.1	-	-	±0.1	-	%/°C
Field of view	FOV	Photosensitivity 50%	-	90	-	-	90	-	degrees
Thermistor resistance	R <sub>th</sub>		9	10	11	9	10	11	k $\Omega$
Constant B	B	25/75 °C	3800	3900	4000	3800	3900	4000	K

**Spectral transmittance of window material (typical example)**

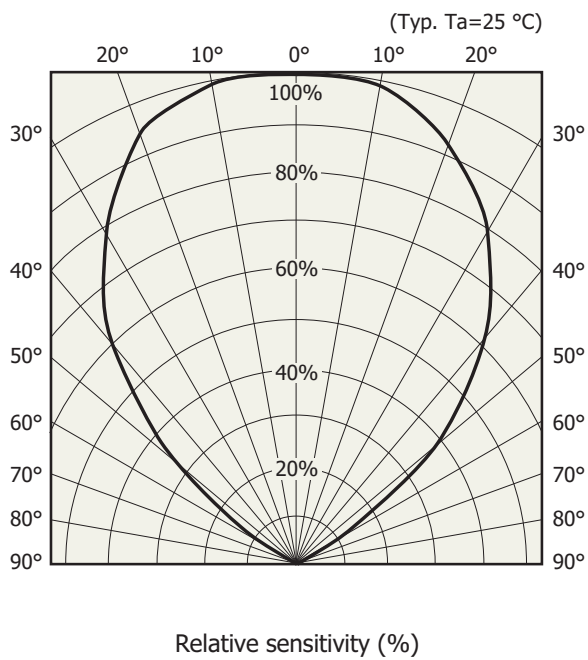


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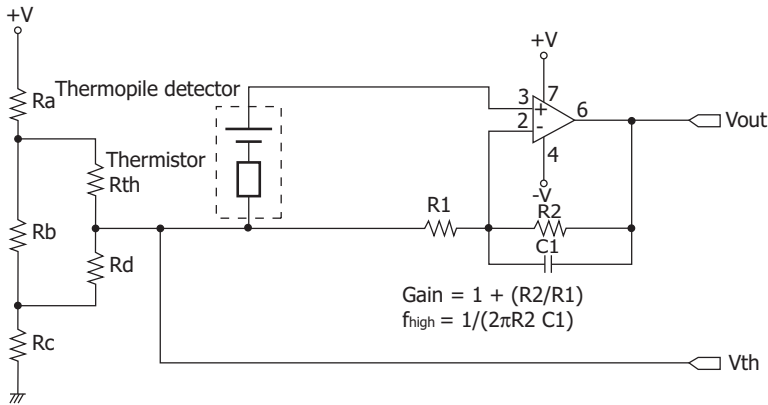
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**Directivity**



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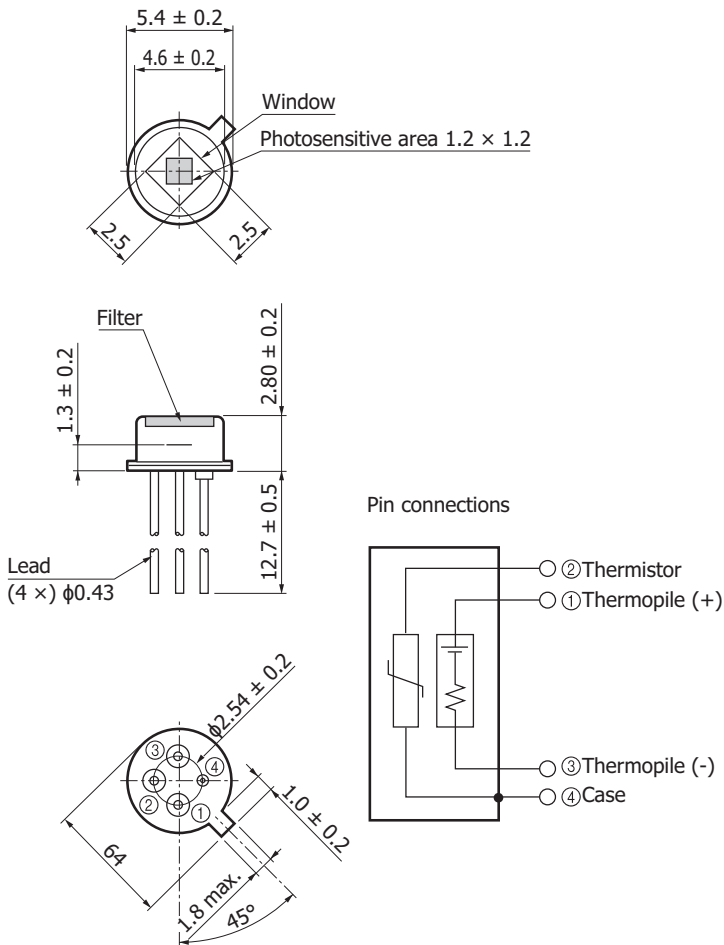
**Operating circuit**



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Note: For details on how to determine Ra, Rb, Rc, and Rd, see "(2) Circuit using thermistor" in "Single/dual/quad element types" in "1-4 How to use" in "1. Thermopile detectors" in chapter 7, "Thermal detectors," of the Opto-semiconductor Handbook (released in November 2013).

**Dimensional outline (unit: mm)**



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### ⚠ Precautions (T11361-05)

The T11361-05 band-pass filter has a second order transmission at 10  $\mu\text{m}$  or higher. If this causes an unwanted effect, install a sapphire glass or the like in front of the light input window to cut the long wavelengths.

### ⚠ Related information

[www.hamamatsu.com/sp/ssd/doc\\_en.html](http://www.hamamatsu.com/sp/ssd/doc_en.html)

#### ■ Precautions

- Disclaimer
- Metal, ceramic, plastic package product

Information described in this material is current as of March, 2015.

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