

# Thermopile Detector

## TPiD 1T 0122B / 3367

Revision - Date: 2021/12/20



### Features and Benefits

- TO46 isothermal metal housing
- Thermistor included
- High signal to noise ratio

### Applications

- General purpose thermometry

## 1 General Characteristics

**Table 1: Absolute Maximum Ratings**

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
T <sub>A</sub>	Ambient Temperature Range	-20		100	°C	Operation
T <sub>A</sub>	Ambient Temperature Range	-40		100	°C	Storage

## 2 Type Characteristics

### 2.1 Design Characteristics

The detector fully complies with the European RoHS environmental directives against the use of hazardous materials in electrical and electronic equipment.

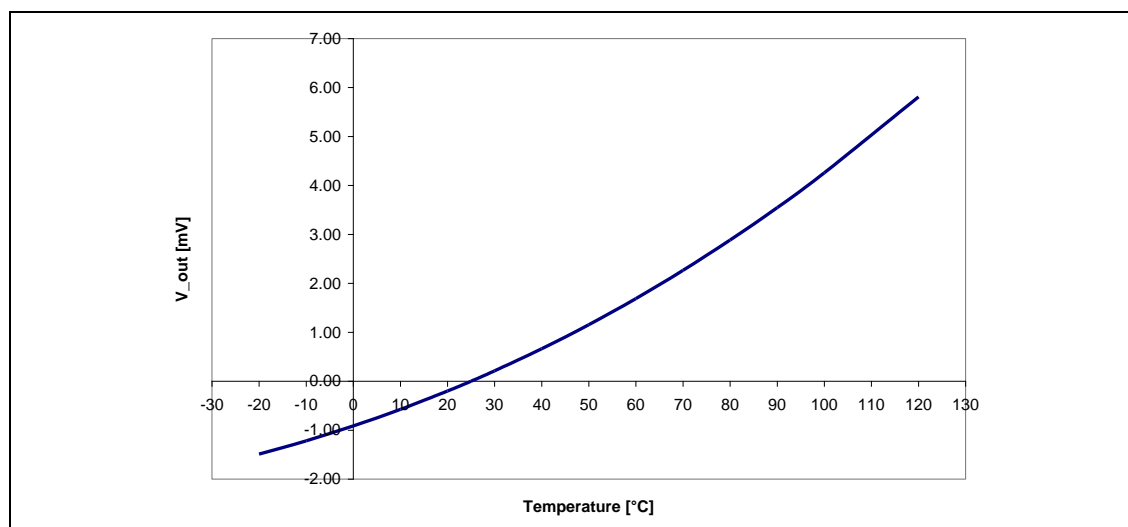
**Table 2: Design Characteristics**

Parameter	Description
Leads	(3 isolated + 1 ground) pins
Filter type	Si-based interference longpass filter
Temperature reference	Thermistor 100 kΩ
Device marking	Device number + 4 digits date code YYWW

## 2.2 Electrical Characteristics

**Table 3: Thermopile Detector Characteristics**

Symbol	Parameter	Value	Unit	Conditions
A	Sensitive Area	0.2	mm <sup>2</sup>	Absorber area
R <sub>TP</sub>	Thermopile Resistance	85...135	kΩ	25 °C
R	Responsivity	92	V/W	500 K, 1Hz, without filter
S <sub>40</sub>	Sensitivity (T <sub>det</sub> 25 °C / T <sub>obj</sub> 40 °C)	44	μV/K	With standard filter (LWP, cut-on 5.5 μm)
S <sub>100</sub>	Sensitivity (T <sub>det</sub> 25 °C / T <sub>obj</sub> 100 °C)	58	μV/K	With standard filter (LWP, cut-on 5.5 μm)
t	Time Constant	15	ms	
V <sub>N</sub>	Noise Voltage	42	nV/√Hz	25 °C
D*	Specific Detectivity	1.0	10 <sup>8</sup> cm√Hz/W	25 °C
TC <sub>RTP</sub>	Temperature Coefficient of Resistance	0.03	%/K	
TC <sub>R</sub>	Temperature Coefficient of Responsivity	-0.05	%/K	
R <sub>25</sub>	Thermistor Base Resistance	100 ± 5	kΩ	T <sub>amb</sub> = 25°C
β	Thermistor BETA -Value	3964	K	Defined at 25°C / 100°C
β	Thermistor BETA -Value Tolerance	± 0.3	%	



**Figure 1 Typical output voltage versus object temperature with detector at 25°C.**

**Table 4: Typical numerical data of Thermopile output voltage (detector at 25 °C)**

Object Temp. °C	-20	-10	0	10	20	25	30	40	50	60	70	80	90	100	120
V <sub>out</sub> mV	-1.49	-1.22	-0.91	-0.58	-0.20	0.00	0.21	0.66	1.15	1.69	2.26	2.88	3.55	4.26	5.81

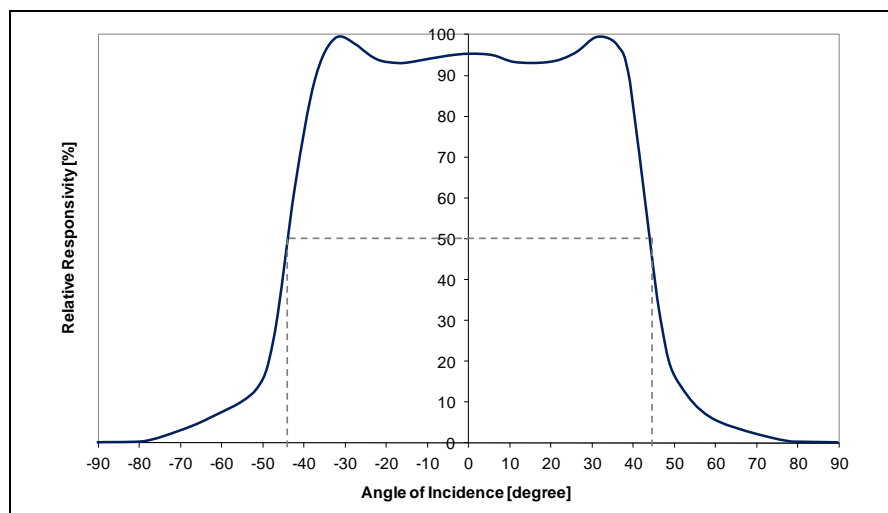
**Table 5: Tabulated Thermistor Data**

Temp.	R Min	R Nom	R Max	Temp.	R Min	R Nom	R Max
°C	Ω	Ω	Ω	°C	Ω	Ω	Ω
-20	862756	921515	980460	50	34479	36451	38453
-15	655207	697928	740660	55	28615	30266	31944
-10	501697	533200	564640	60	23864	25252	26663
-5	387196	410735	434183	65	19994	21166	22357
0	301098	318896	336599	70	16827	17820	18830
5	235852	249430	262916	75	14221	15067	15927
10	186038	196504	206890	80	12068	12791	13526
15	147731	155875	163950	85	10286	10905	11534
20	118070	124460	130808	90	8796	9332	9872
<b>25</b>	<b>95000</b>	<b>100000</b>	<b>105000</b>	95	7550	8016	8481
30	76707	80830	84978	100	6504	6909	7314
35	62325	65710	69137	105	5623	5975	6327
40	50902	53713	56559	110	4877	5183	5492
45	41790	44136	46516	115	4242	4510	4783

## 2.3 Optical Characteristics

**Table 6: Optical Characteristics**

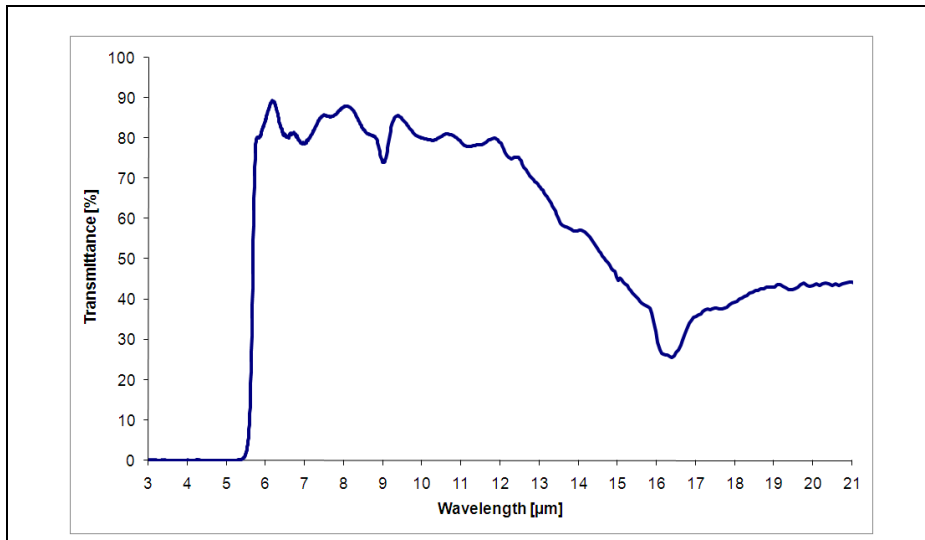
Symbol	Parameter	Min	Typ	Max	Unit	Conditions
	Field of View		90		degree	At 50% intensity points
	Optical Axis		0	+/- 10	degree	



**Figure 2 Field of View Curve**

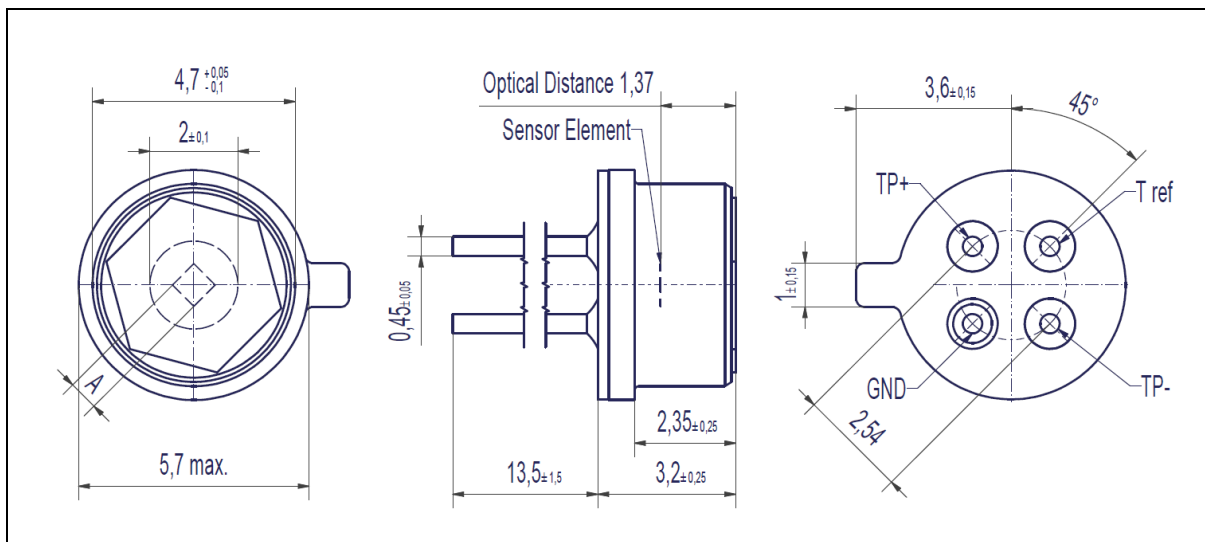
**Table 7: Filter Parameters**

Symbol	Parameter	Min	Typ	Max	Unit	Conditions
T <sub>A</sub>	Average Transmittance	70	> 77		%	Wavelength Range from 7.5 μm to 13.5 μm
T <sub>A</sub>	Average Transmittance			< 0.5	%	Wavelength Range < 5 μm
λ (5 %)	Cut on Wavelength	5.2	5.5	5.8	μm	At 25°C



**Figure 3 Typical Transmission Curve**

## 2.4 Mechanical Drawing



**Figure 4 Mechanical Drawing of the TPD 1T 012B (Drawing No.: 2/71828)**

## 2.5 Handling Requirements

Stresses above the absolute maximum ratings may cause damages to the device. Do not expose the detector to aggressive detergents such as Freon, Trichloroethylene, etc. Windows may be cleaned with alcohol and cotton swab. Hand soldering and wave soldering may be applied by a maximum temperature of 260°C for a dwell time less than 10 s. Avoid heat exposure to the top and the window of the detector. Reflow soldering is not recommended.

## 3 Quality Statement

Excelitas Technologies is an ISO 9001 certified manufacturer. All devices employing PCB assemblies are manufactured according to IPC-A-610 guidelines.

### 3.1 Liability Policy

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