

Thermopile Detector

TPD 1T 0122 / 3214

Revision - Date: 2011/06/06



Features and Benefits

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

Applications

- Ear thermometry
- General purpose thermometry

1 General Characteristics

Table 1: Absolute Maximum Ratings

| Symbol | Parameter | Min | Typ | Max | Unit | Conditions |
|----------------|---------------------------|-----|-----|-----|------|------------|
| T _A | Ambient Temperature Range | -20 | | 100 | °C | Operation |
| T _A | 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 ² | Absorber area |
| R _{TP} | Thermopile Resistance | 85...135 | kΩ | 25 °C |
| R | Responsivity | 77 | V/W | 500 K, 1Hz, without filter |
| S ₄₀ | Sensitivity (T _{det} 25 °C / T _{obj} 40 °C) | 43 | μV/K | With standard filter (LWP, cut-on 5.5 μm) |
| S ₁₀₀ | Sensitivity (T _{det} 25 °C / T _{obj} 100 °C) | 56 | μV/K | With standard filter (LWP, cut-on 5.5 μm) |
| t | Time Constant | 15 | ms | |
| V _N | Noise Voltage | 42 | nV/√Hz | 25 °C |
| D* | Specific Detectivity | 0.8 | 10 ⁸ cm√Hz/W | 25 °C |
| TC _{RTP} | Temperature Coefficient of Resistance | 0.03 | %/K | |
| TC _R | Temperature Coefficient of Responsivity | -0.05 | %/K | |
| R ₂₅ | Thermistor Base Resistance | 100 ± 5 | kΩ | T _{amb} = 25 °C |
| β | Thermistor BETA -Value | 3964 | K | Defined at 25 °C / 100 °C |
| β | Thermistor BETA -Value Tolerance | ± 0.3 | % | |

Table 4: Tabulated Thermistor Data

| Temp. | R _{min1} | R _{min2} | R _{nom} | R _{max2} | R _{max1} | Temp. | R _{min1} | R _{min2} | R _{nom} | R _{max2} | R _{max1} |
|-------|-------------------|-------------------|------------------|-------------------|-------------------|-------|-------------------|-------------------|------------------|-------------------|-------------------|
| °C | Ω | Ω | Ω | Ω | Ω | °C | Ω | Ω | Ω | Ω | Ω |
| -20 | 862756 | 909418 | 915479 | 921581 | 968201 | 45 | 41833 | 44067 | 44175 | 44283 | 46516 |
| -15 | 655207 | 690548 | 694575 | 698625 | 733944 | 50 | 34541 | 36387 | 36497 | 36608 | 38453 |
| -10 | 501697 | 528693 | 531349 | 534018 | 561001 | 55 | 28662 | 30195 | 30303 | 30412 | 31944 |
| -5 | 387196 | 407985 | 409715 | 411452 | 432234 | 60 | 23898 | 25176 | 25280 | 25385 | 26663 |
| 0 | 301098 | 317232 | 318336 | 319444 | 335574 | 65 | 20017 | 21089 | 21187 | 21286 | 22357 |
| 5 | 235852 | 248468 | 249149 | 249832 | 262445 | 70 | 16842 | 17744 | 17836 | 17928 | 18830 |
| 10 | 186038 | 195972 | 196369 | 196767 | 206701 | 75 | 14231 | 14994 | 15079 | 15165 | 15927 |
| 15 | 147731 | 155608 | 155815 | 156022 | 163900 | 80 | 12075 | 12721 | 12800 | 12879 | 13526 |
| 20 | 118070 | 124357 | 124439 | 124521 | 130808 | 85 | 10286 | 10838 | 10910 | 10983 | 11534 |
| 25 | 95000 | 100000 | 100000 | 100000 | 105000 | 90 | 8796 | 9268 | 9334 | 9401 | 9872 |
| 30 | 76707 | 80791 | 80843 | 80895 | 84978 | 95 | 7550 | 7956 | 8016 | 8077 | 8481 |
| 35 | 62328 | 65649 | 65732 | 65815 | 69137 | 100 | 6504 | 6853 | 6908 | 6964 | 7313 |
| 40 | 50926 | 53643 | 53743 | 53843 | 56559 | 105 | 5623 | 5925 | 5975 | 6026 | 6327 |

R_{min1} : Minimum Thermistor Resistance resulting from the Total Tolerance
 R_{min2} : Minimum Thermistor Resistance resulting from the BETA-Tolerance
 R_{nom} : Typical Thermistor Resistance
 R_{max1} : Maximum Thermistor Resistance resulting from the Total Tolerance
 R_{max2} : Maximum Thermistor Resistance resulting from the BETA-Tolerance

2.3 Optical Characteristics

Table 5: Optical Characteristics

| Symbol | Parameter | Min | Typ | Max | Unit | Conditions |
|--------|---------------|-----|-----|--------|--------|-------------------------|
| | Field of View | | 120 | | degree | At 50% intensity points |
| | Optical Axis | | 0 | +/- 10 | degree | |

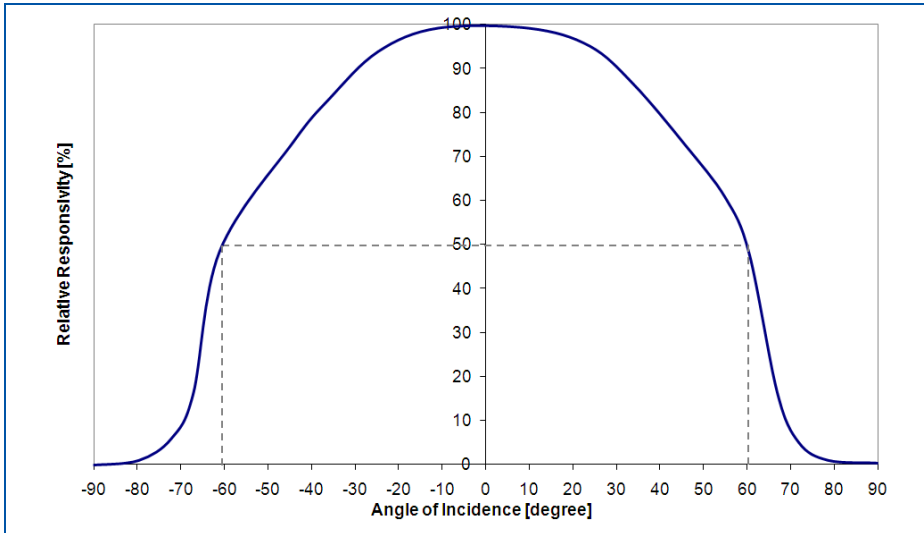


Figure 1 Field of View Curve

Table 6: Filter Parameters

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

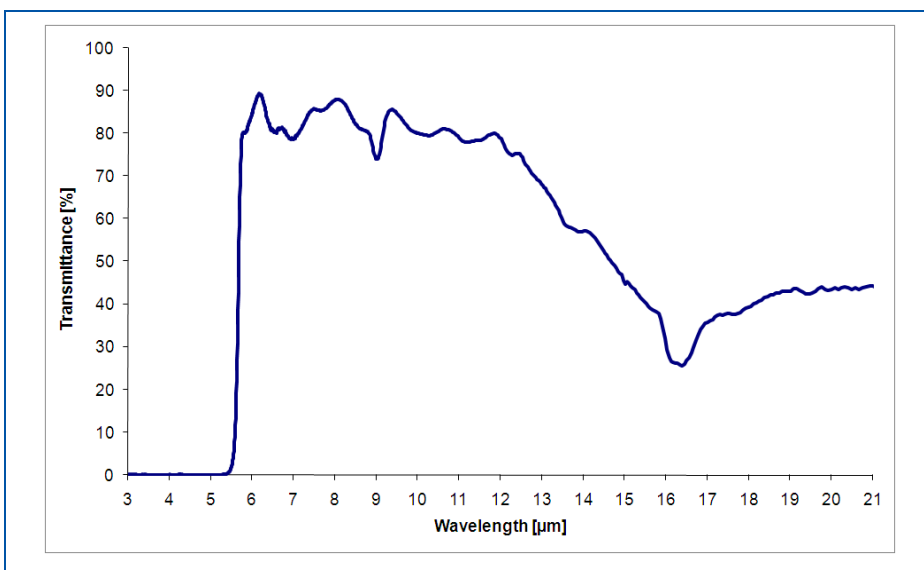


Figure 2 Typical Transmission Curve

2.4 Mechanical Drawing

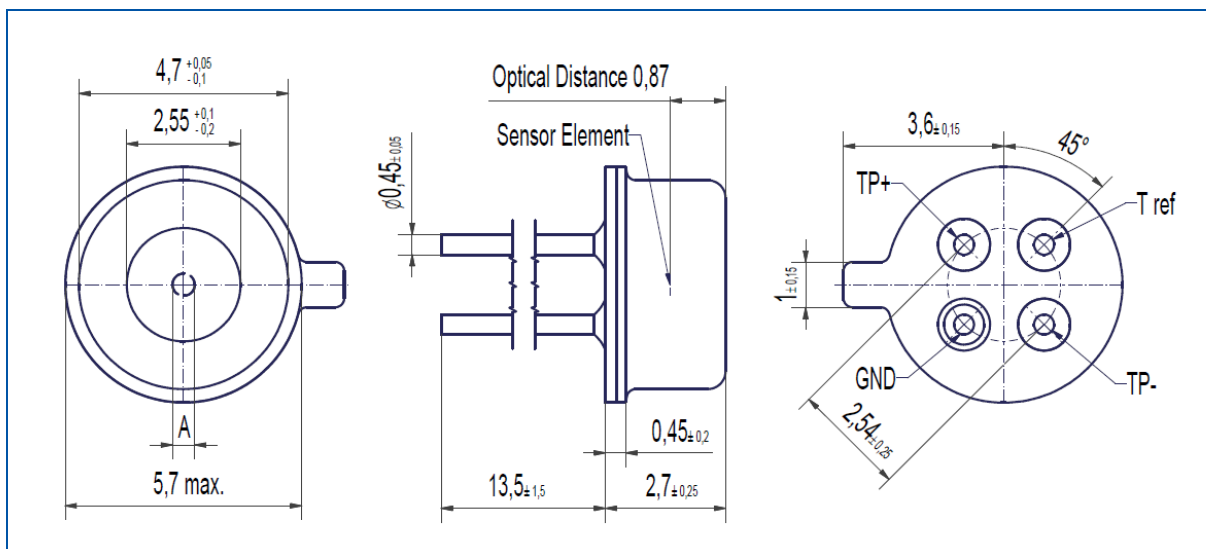


Figure 3 Mechanical Drawing of the TPD 1T 0122 (Drawing No.: 2/71827-0)

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 IPC-A-610 guidelines.

3.1 Liability Policy

The contents of this document are subject to change without notice and customers should consult with Excelitas Technologies sales representatives before ordering. Customers considering the use of Excelitas Technologies thermopile devices in applications where failure may cause personal injury or property damage, or where extremely high levels of reliability are demanded, are requested to discuss their concerns with Excelitas Technologies sales representatives before such use. The Company's responsibility for damages will be limited to the repair or replacement of defective product. As with any semiconductor device, thermopile sensors or modules have a certain inherent rate of failure. To protect against injury, damage or loss from such failures, customers are advised to incorporate appropriate safety design measures into their product.

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