# Thermopile Detector
# TPD 1T 0226 IRA / 3136

Revision - Date: 2021/12/20

## Features and Benefits

- TO5 metal housing
- Thermistor included
- Integrated optics

## Applications

- Non-contact temperature measurements
- Thermometry

## 1 General Characteristics

**Table 1: Absolute Maximum Ratings**

| Parameter | Symbol | Min. | Max. | Unit | Remarks / Conditions |
|---|---|---|---|---|---|
| Operating Temperature | $T_o$ | -20 | 100 | °C | The electrical parameters may vary from specified values in accordance with their temperature dependence. |
| Storage Temperature | $T_s$ | -40 | 100 | °C | |

## 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 |
|---|---|
| Sensor Package | TO5 |
| Leads | (3 isolated + 1 ground) pins |
| Optics | Internal Reflector Optics |
| Temperature Reference | Thermistor 100 kΩ |
| Device Marking | XL + Device number + 4 digits date code YYWW |

## 2.2 Electrical Characteristics

### Table 3: Thermopile Detector Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remarks / Conditions |
|---|---|---|---|---|---|---|
| **Thermopile Characteristics** | | | | | | |
| Sensitive Area | A | - | 0.5 | - | $mm^2$ | Absorber area |
| Thermopile Resistance | $R_{TP}$ | 50 | 70 | 100 | kΩ | |
| Responsivity | R | - | 45 | - | V/W | Tobj = 500K, 1Hz, without filter |
| Sensitivity of TP | $S_{25/40}$ | 45 | 65 | 85 | µV/K | Tobj = 40°C, Tamb = 25°C |
| Sensitivity of TP | $S_{25/100}$ | 70 | 100 | 130 | µV/K | Tobj = 100°C, Tamb = 25°C |
| Noise Voltage | $V_N$ | 29 | 35 | 40 | nV/√Hz | Tamb = 25°C |
| Time Constant | τ | - | 22 | - | ms | |
| Temperature Coefficient of Resistance | $TC_{RTP}$ | - | 0.03 | - | %/K | |
| Temperature Coefficient of Responsivity | $TC_R$ | - | -0.05 | - | %/K | |
| **Reference Temperature Sensor** | | | | | | |
| Thermistor Base Resistance | $R_N$ | 95 | 100 | 105 | kΩ | Tamb = 25°C |
| Thermistor BETA -Value | $\beta_N$ | | 3964 | | K | Defined at 25°C / 100°C |
| Thermistor BETA –Value Tolerance | | -0.3 | | +0.3 | % | |

### Table 4: 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 |
| **25** | **95000** | **100000** | **105000** | 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 5: Optical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Remarks / Conditions |
|---|---|---|---|---|---|---|
| Field of View | FoV | - | 15 | 20 | Degree | At 50% intensity points |
| Optical Axis | | -2 | 0 | 2 | Degree | |
| Average Filter Transmittance | $T_A$ | 70 | > 75 | - | % | Wavelength Range from 7.5 µm to 13.5 µm |
| Average Filter Transmittance | $T_A$ | - | - | < 0.5 | % | Wavelength Range < 5 µm |
| Cut on Wavelength | λ (5 %) | 5.2 | 5.5 | 5.8 | µm | At 25°C |

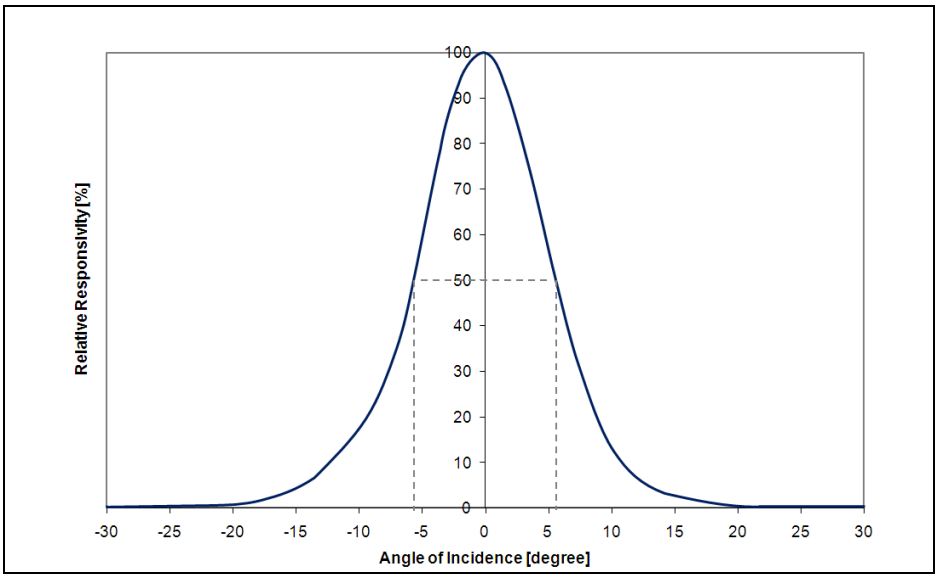


**Figure 1 Field of View Curve**

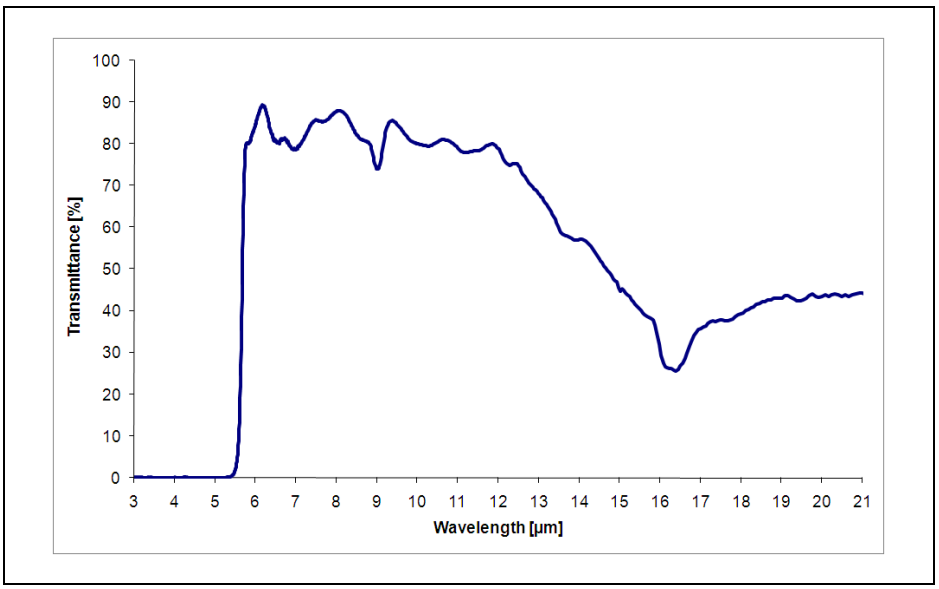


**Figure 2 Typical Filter Transmission Curve**

## 2.4 Mechanical Drawing

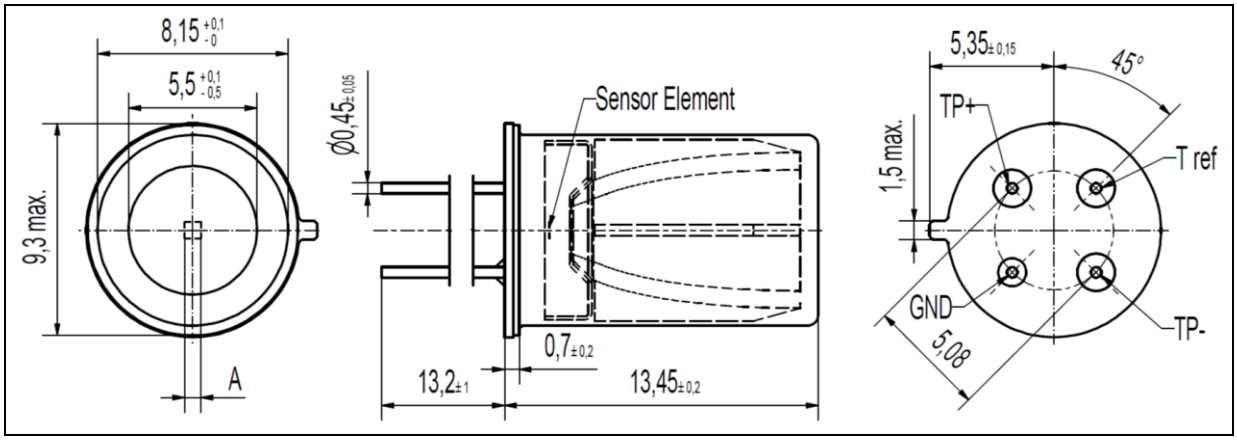


**Figure 3 Mechanical Drawing of the TPD 1T 0226 IRA (Drawing No.: 2/71837-0)**

## 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

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