SENSOR SOLUTIONS

Product Specification

# DigiPile Thermopile Sensor TPiS 1T 1252B / 5058

Revision - Date: 2016/09/01

## Introduction

The DigiPile TPiS 1T 1252B is one sensor out of a new family of digital thermopile infrared sensors, brought to you from Excelitas Technologies.

It combines the time-proven MEMS state-of-the art sensing element with a fully integrated A/D converter and an integrated ambient temperature sensor.

An internal clock and control unit enables the TPiS 1T 1252B digital output detector to open a dialog with any outside micro-processor without additional components.

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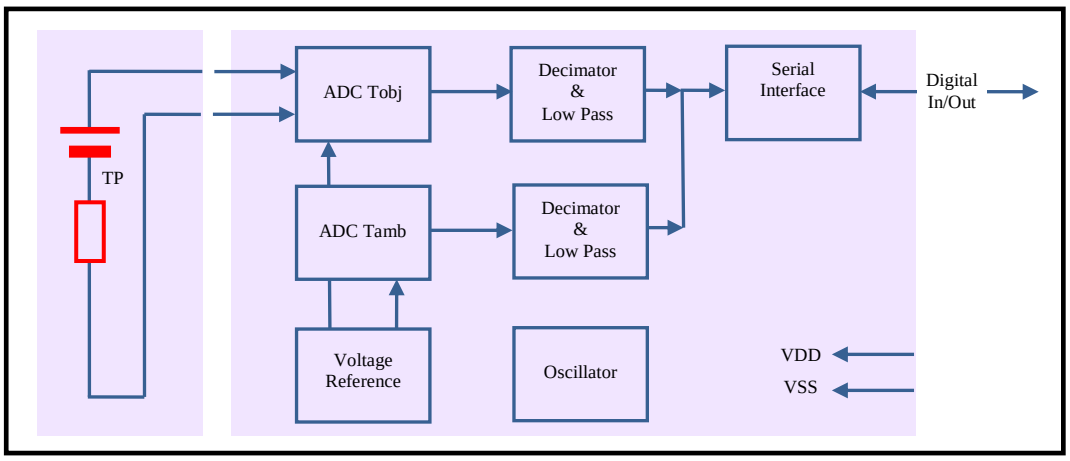
The move from analogue to digital enables the DigiPile to deliver a number of advantages like cost and space savings from fewer components (no external low offset / low noise amplifier is needed), significantly reduced susceptibility against environmental influences like e.g humidity.

The DigiPile TPiS 1T 1252B is offered in an isothermal 3-pin TO46 housing with special aperture optics.




## Features and Benefits

- Digital Output Sensor
- 17 Bit Tobj Output “direct link”
- 14 Bit Tamb Output “direct link”
- Operating voltage down to 2.4V
- Low current consumption
- Isothermal sensor housing

## Applications

- Ear thermometry
- General purpose thermometry

EXCELITAS TECHNOLOGIES

# 1 Technical Data

| Parameter | Symbol | Min | Typ | Max | Unit | Remarks / Conditions |
|---|---|---|---|---|---|---|
| **Operating Conditions** | | | | | | |
| Operating Voltage | $V_{DD}$ | 2.4 | 3.3 | 3.6 | V | |
| Supply Current | $I_{DD}$ | | 11 | 15 | µA | $V_{DD}$ = 3.3 V |
| Operating Temperature | $T_o$ | -20 | | 70 | °C | The electrical parameters may vary from specified values accordance with their temperature dependence. |
| Storage Temperature | $T_s$ | -40 | | 100 | °C | Avoid storage in humid environment. |
| **Thermopile Characteristics** | | | | | | |
| Sensitive Area | A | | 0.26 | | $mm^2$ | Absorber 0.51 x 0.51 $mm^2$ |
| Sensitivity of TP | Δcounts / ΔT | | 290 | | counts/K | Tobj = 313K = 40°C, Tamb = 298K = 25°C |
| Sensitivity of TP | Δcounts / ΔT | 320 | 370 | 450 | counts/K | Tobj = 373K = 100°C, Tamb = 298K = 25°C |
| Noise of TP | | | 8 | 28 | counts | Tobj = 313K (=40°C), Tamb = 298K (=25°C) |
| Time Constant | τ | | 45 | | ms | |
| **Ambient Temperature sensor Characteristics** | | | | | | |
| Sensitivity of Tamb | | | 90 | | counts/K | Linear for Tamb from 0°C to 90°C |
| Linearity | | -5 | | +5 | % | 0°C to 90°C |
| Count @ Tamb = 25°C | | 7000 | 8200 | 9400 | counts | |
| Noise of ambient sensor | | | 5 | 16 | counts | Tamb = 298K (=25°C) |
| **Optical Characteristics** | | | | | | |
| Field of View | | | 84 | | Degree | At 50% intensity points |
| Optical Axis | | | 0 | +/- 10 | Degree | |
| Average Filter Transmittance | TA | 75 | > 77 | | % | Wavelength Range from 7.5 µm to 13.5 µm |
| Average Filter Transmittance | TA | | | < 0.5 | % | Wavelength Range < 5 µm |
| Cut on Wavelength | λ (5 %) | 5.2 | 5.5 | 5.8 | µm | At 25°C |
| **Electrical Characteristics** | | | | | | |
| ADC Resolution Tobj | | | 17 | | Bits | Max Count = $2^{17}$ |
| ADC Resolution Tamb | | | 14 | | Bits | Max Count = $2^{14}$ |
| ADC Sensitivity of Tobj | | 0.7 | 0.8 | 0.9 | µV/count | |
| ADC Offset Tobj | | 64000 | 64500 | 65000 | counts | |
| Input Low Voltage | $V_{IL}$ | | | 0.2 $V_{DD}$ | V | |
| Input High Voltage | $V_{IH}$ | 0.8 $V_{DD}$ | | | V | |
| Pull Down Current | | | 200 | | µA | Direct link pin to $V_{DD}$ |
| Pull Up / Down Current | | | 130 | | µA | Direct link pin to $V_{SS}$ |
| LPF Cut-Off Frequency | | | 8 | | Hz | |

# 2 Filter Characteristics

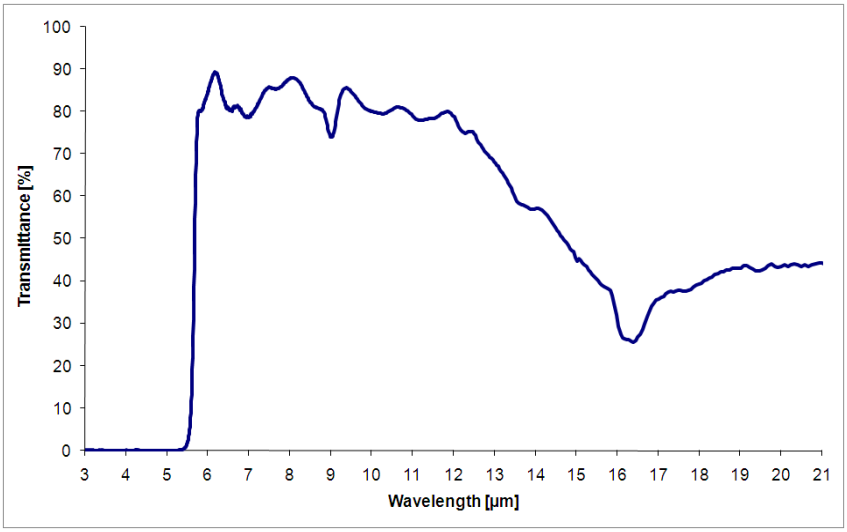



**Figure 1**
Typical filter transmission curve

## 3 Physical Configuration

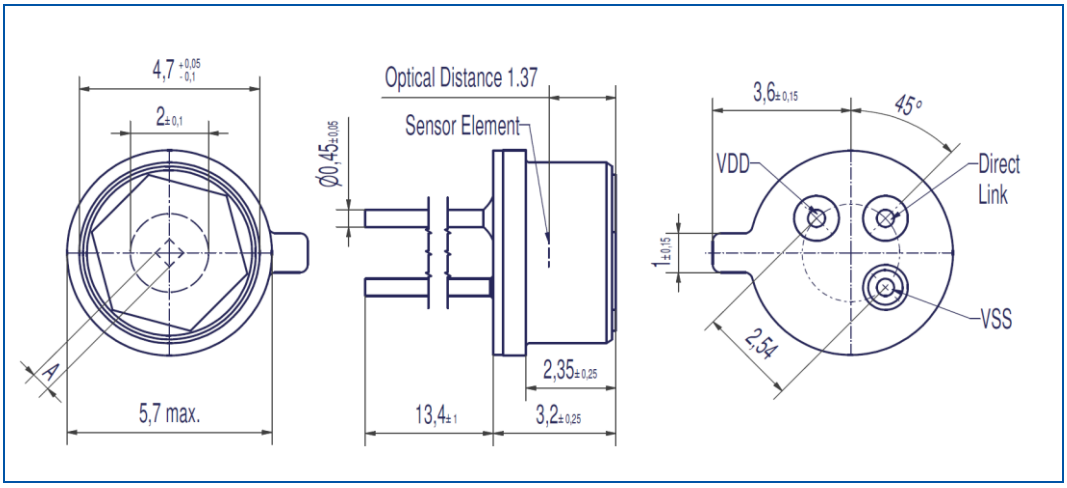



**Figure 2**
PIN Layout.
All dimensions are in mm.

Housing: Isothermal TO46 metal housing with IR transmissive filter

## 4 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.

## 5 Quality Statement

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

### 5.1 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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