

DigiPile

Thermopile Sensor TPiS 1T 1252

Preliminary Revision - Date: 2011/06/06



Preliminary

Introduction

The DigiPile TPiS 1T 1252 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 1252 digital output detector to open a dialog with any outside micro-processor without additional components.

The move from analog 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.

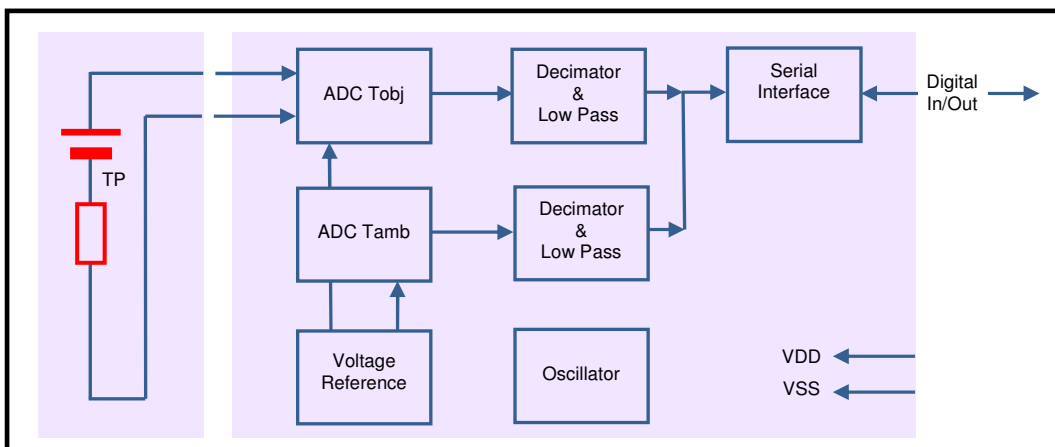
The DigiPile TPiS 1T 1252 is offered in an isothermal 3-pin TO46 housing with special aperture optics.

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

- Non-contact temperature measurements
- Thermometry



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	$^{\circ}C$	The electrical parameters may vary from specified values accordance with their temperature dependence.
Storage Temperature	T_s	-40		100	$^{\circ}C$	Avoid storage in humid environment.
Thermopile Characteristics						
Sensitive Area	A		0.26		mm^2	Absorber $0.51 \times 0.51 mm^2$
Sensitivity of TP	$\Delta counts / \Delta T$		290		counts/K	$T_{obj} = 313K = 40^{\circ}C$, $T_{amb} = 298K = 25^{\circ}C$
Sensitivity of TP	$\Delta counts / \Delta T$		400		counts/K	$T_{obj} = 373K = 100^{\circ}C$, $T_{amb} = 298K = 25^{\circ}C$
Noise of TP			8		counts	$T_{obj} = 313K (=40^{\circ}C)$, $T_{amb} = 298K (=25^{\circ}C)$
Time Constant	τ		45		ms	
Ambient Temperature sensor Characteristics						
Sensitivity of T_{amb}			90		counts/K	Linear for T_{amb} from $0^{\circ}C$ to $90^{\circ}C$
Count @ $T_{amb} = 25^{\circ}C$			7800		counts	
Optical Characteristics						
Field of View			84		Degree	At 50% intensity points
Optical Axis			0	+/- 10	Degree	
Electrical Characteristics						
ADC Resolution T_{obj}			17		Bits	Max Count = 2^{17}
ADC Resolution T_{amb}			14		Bits	Max Count = 2^{14}
ADC Sensitivity of T_{obj}		0.7	0.8	0.9	$\mu V/count$	
ADC Offset T_{obj}			64500		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

Cut-on wavelength (CWL)	5.5 μm
Cut-on tolerance range	$\pm 0.3 \mu m$
Average Transmittance from 7.5 μm to 13.5 μm	> 70 %
Average Transmittance from visual to 5 μm	< 0.5 %
Substrate material	Silicon

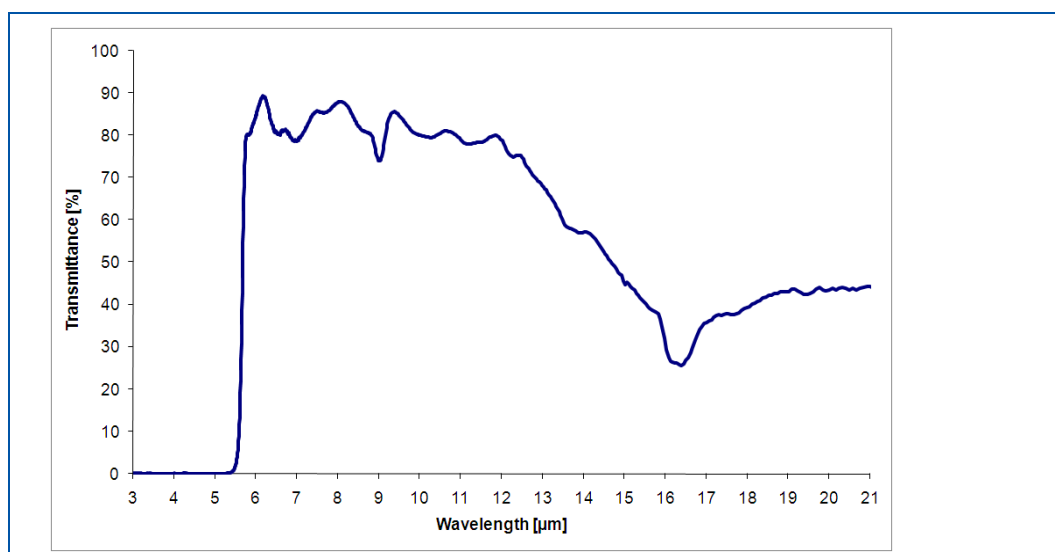


Figure 1
Typical filter
transmission curve

3 Physical Configuration

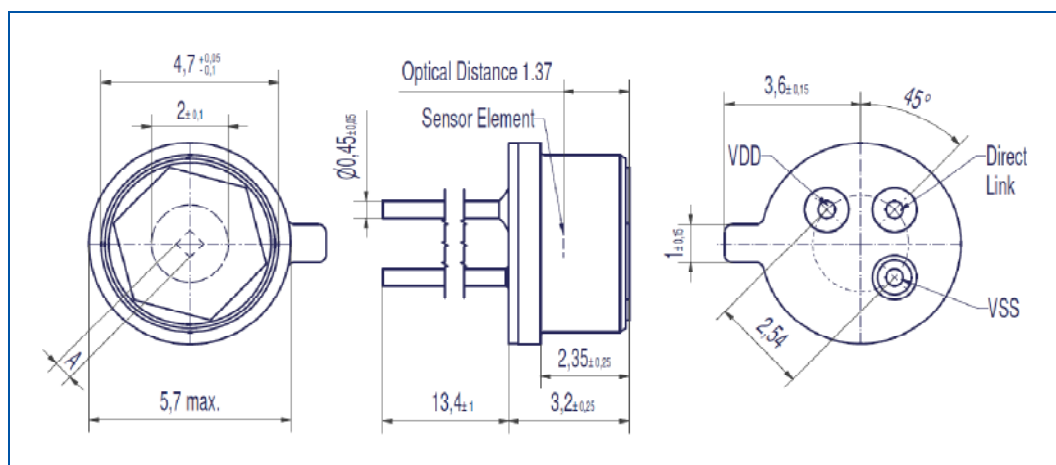


Figure 2

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 to 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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