Product Specification

Infrared Thermopile Module TSEM01-L

Version 1.0

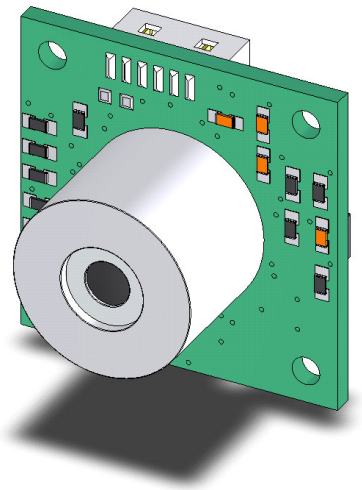


Table of Content

1 History

Ver.	Document name	Date	Purpose	Author
0.1	TSEM01-L_Specification_V1_0_20070213.doc	13.02.2007	Creation	M. Basel

2 General Information

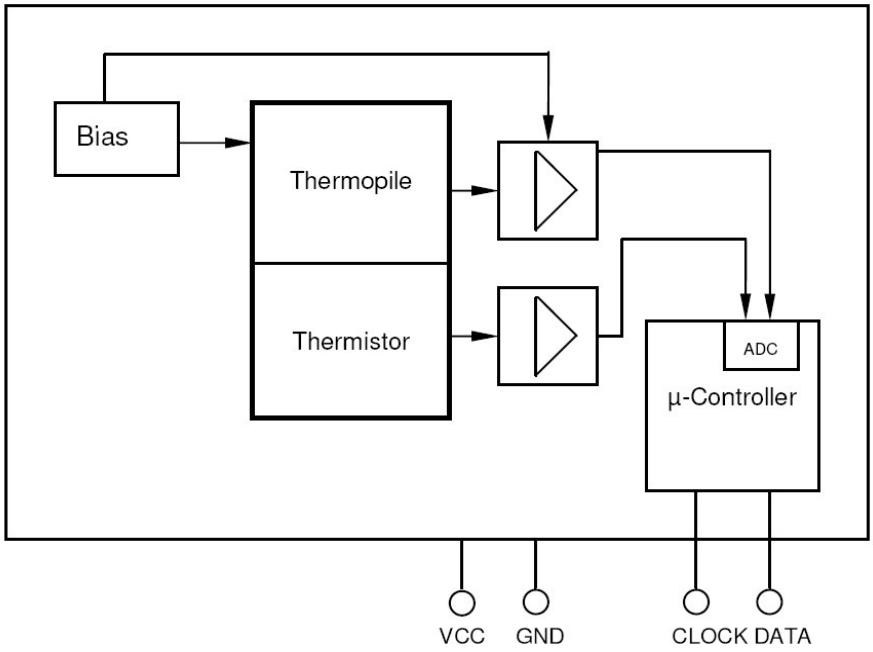
TSEM01-L is a contact less temperature measuring system for OEM use based on the detection of infrared radiation.

TSEM01L is equipped with an infrared sensor (Thermopile) in front. In this version a single Element Thermopile Sensor is used. It has to be pointed at the target object.

- The basic working principle is:
- Collection of infrared radiation by an optics
- Detection of collected infrared radiation with a Thermopile sensor
- Further analogue signal processing
- Calculation of ambient and object temperature using a microcontroller
- Providing the ambient and objects temperature at digital output (I2C-Slave Operation)

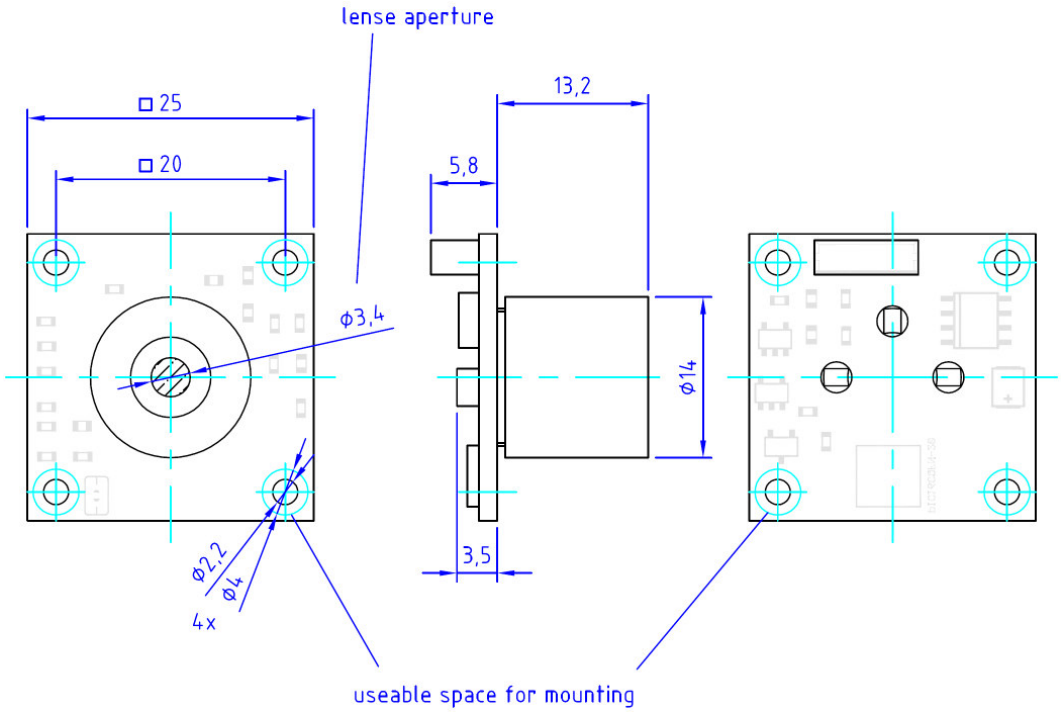
The main fields of applications are temperature measuring in industrial applications i.e. at moving or inaccessible parts.

3 Function Block Diagram

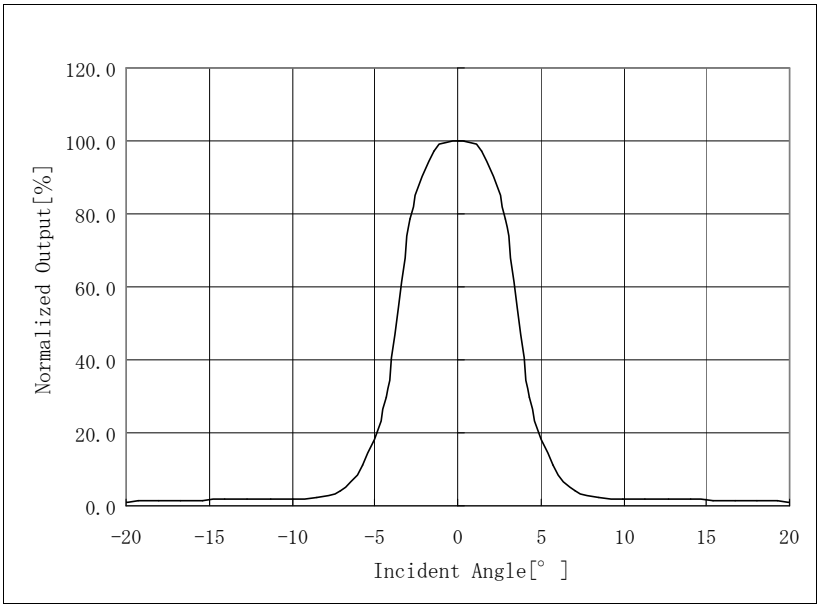


4 Mechanical Requirements

The mechanical dimensions of the board are shown in figure below.
The board is made of FR4-Epoxy with a thickness of 1.5 +/-0.15 mm.



5 Sensor Field of View

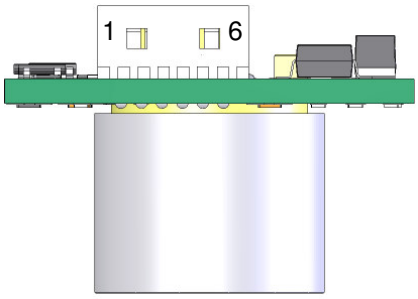


6 Terminals

Following Connector has to be used: Molex, 1.25mm Pitch, wire to board header (6 pins), series 53047

- Manufacturer identification: 51021-0600
- Farnell Ordering Number: 889490
- DigiKey Ordering Number: WM1725-ND

Pin	Name	Description	Type
1	+VS	Supply Voltage	Supply
2	GND	Ground potential	Supply
3	NC		
4	SCL	I^2C like Clock	Input
5	NC		
6	SDA	I^2C like Data	Input / Output



7 Absolute Maximum Ratings

CAUTION: Exceeding these values may destroy this part!

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply Voltage	Vcc	Measured versus GND	0		5.5	V
Storage temperature	Tstor		-40		105	℃

8 Operating Conditions

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Supply voltage	Vcc	Measured versus GND	4.75		5.25	V
Ambient temperature	Tamb		0		85	℃
Emission Coefficient	ε		0.1			1

9 Electrical Requirements

If not otherwise noted, 25℃ ambient temperature, 5V supply voltage and object with ε =0.98 were applied.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Lens Type		Si-Lens focal length app. 5.5 mm				
Field of View				7.3		°
Spectral Sensitivity			5		15	µm
Object Temperature Range	Tobj		0		150	℃
Supply Current		Full ambient temp. range, typical		6		mA
Digital Output Clock Rate		7 Bit address	10	100	300	kHz
Data Output Rate	Fout			10		Hz
Accuracy of Target Temp.	Acc25	Tamb = 25℃		2		% FS
Accuracy of Target Temp.	AccT	Full ambient temp. range		3		% FS
Resolution Digital				0.1		℃

10 I2C-like Interface

10.1 General Description

TSEM01L is always operating in pure slave modus of a two wire interface similar to I2C

The typical baud rate of this device is 100kBit/s. The rate can be raised up to 300kBit/s. The supported address length is seven bits. Addresses with a length of 10 bits are not supported. The standard address is 160d. Every transfer has to be initiated by a start sequence and terminated by a stop sequence. The master device can only send one data byte during one transmission. The TSEM01L will send reply data every time data was received. The reply data can be used to verify correct reception.

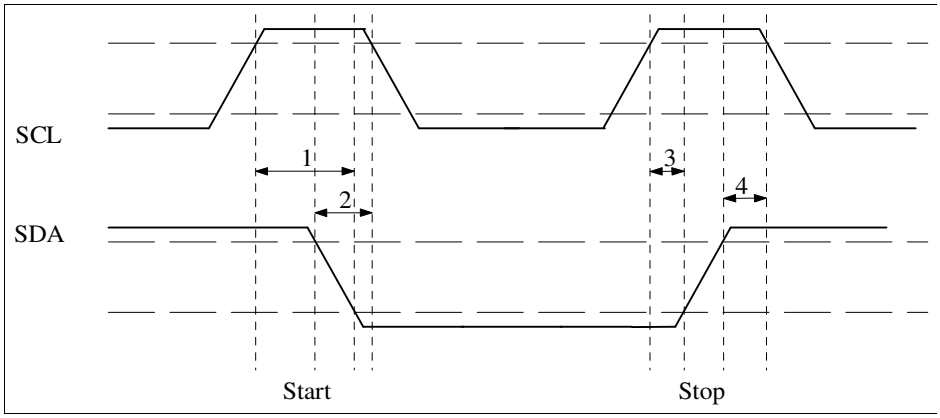
10.2 Physical Interface Parameters

Parameter	Min	Typical	Max	Unit
Baudrate	10	100	300	kBit/s
Address length	---	7	---	Bit
Address (standard)	---	160	---	---
Input High Level	0,7 VDD	---	---	V
Input Low Level	---	---	0,3 VDD	V
Output High Level	VDD – 0,7	---	---	V
Output Low Level	---	---	0,6	V

10.3 Timing Parameters

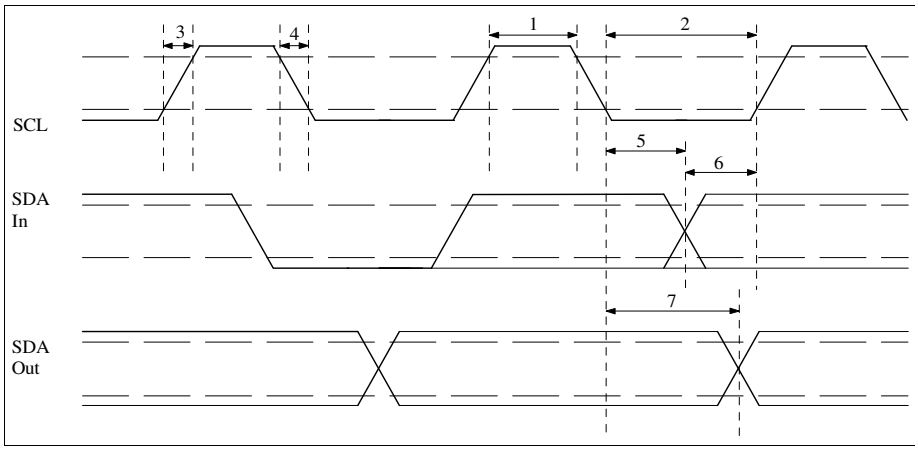
10.3.1 Start/Stop

No.	Parameter	Description	Min	Typ	Max	Unit
1	TSU:STA	Start Setup Time	4700	---	---	ns
2	THD:STA	Start Hold Time	4000	---	---	ns
3	TSU:STO	Stop Setup Time	4700	---	---	ns
4	THD:STO	Stop Hold Time	4000	---	---	ns



10.3.2 Data

No	Parameter	Description	Min	Max	Unit
1	THIGH	Clock High Time	4.0	---	µs
2	TLOW	Clock Low Time	4.7	---	µs
3	TR	SDA & SCL Rise Time	---	1000	ns
4	TF	SDA & SCL Fall Time	---	300	ns
5	THD:DAT	Data Input Hold Time	0	---	ns
6	TSU:DAT	Data Input Setup Time	250	---	ns
7	TAA	Output Valid From Clock	---	3500	ns
8	TBUF	Bus Free Time	4.7	---	µs



11 EMC

Due to the use of these module for OEM application no CE declaration can be given.

Especially line coupled disturbances like surge, burst, HF etc. can not be filtered on the module due to the low board area and low price feature. On the board is no protection circuit against reverse polarity or over voltage implemented.

The module will be designed using capacitors for blocking and ground plane areas in order to prevent wireless coupled disturbances as good as possible.

12 Additional Information

Manufacturer company:	HL-Planartechnik GmbH Hauert 13 D-44227 Dortmund
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