TSEV01C01C10

THERMOPILE SENSOR MODULE

Product Description

TSEV01C01C10 is a contact-less temperature measuring system for OEM use based on the detection of infrared radiation. TSEV01C01C10 is equipped with an infrared sensor (Thermopile) in front. The Thermopile Sensor has to be pointed at the target object of interest.

- Detection of infrared radiation with a Thermopile sensor, which turns incoming radiation to an analogue voltage
- Determination of sensor temperature using a thermistor
- Calculation of ambient and object temperature using a processing unit
- Providing the ambient and objects temperature via I^2C bus

The TSEV01C01C10 is suitable for a wide range of application where non-contact temperature measurement is required.

Features

- 0°C … +300°C measurement range
- Small field of view
- 4V … 16V supply voltage range
- Up to 1.5% accuracy
- I^2C Interface
- 2mA current consumption

Applications

- Contactless temperature measurement
- Climate control
- Industrial process control
- Household applications

ABSOLUTE MAXIMUM RATINGS

Absolute maximum ratings are limiting values of permitted operation and should never be exceeded under the worst possible conditions either initially or consequently. If exceeded by even the smallest amount, instantaneous catastrophic failure can occur. Even if the device continues to operate satisfactorily, its life may be considerably shortened.

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Supply voltage	V_{DD}	---	-0.3	---	+16	V
Operating temperature	T_{op}	---	-10		85	°C
Storage temperature	T_{stor}	dry	-10	---	+85	°C
Humidity	Hum	---	Non condensing			---

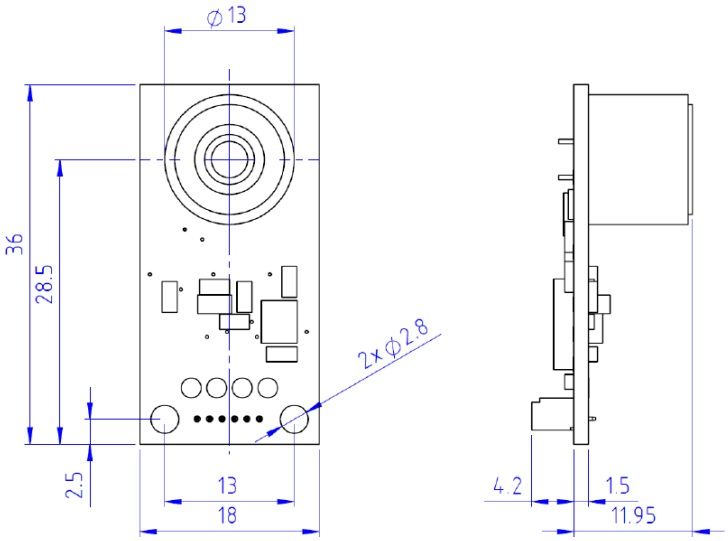
OPERATING CONDITIONS

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

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Operating supply voltage	V_{DD}	stabilized	4	5	16	V
Emission Coefficient	E	---	0.95	---	---	
Object Temperature Range	T_{obj}	---	0	---	+300	°C
Ambient Temperature Range	T_{amb}	---	0	---	+100	°C
Resolution	Res	---	---	---	0.1	°C
Field of View	FOV_{10}	Total FOV at 10% signal level	---	14	---	°
Field of View	FOV_{50}	Total FOV at 50% signal level	---	10	---	°
Supply Current	I	Full ambient temp. range, no output load	---	2	---	mA
I2C Baudrate	F_{I2C}	---	10	---	100	kHz
Data Output Rate	F_{out}	---	---	1	---	Hz
Standard Start-Up Time	t_{Start}	---	---	---	3	s
Accuracy tolerance when 10°C < T_{amb} < 40°C and after 3 minutes stabilization time	ΔT	170°C < Tobject < 190°C	---	±1.5[1)]	---	%FS
		Outside above range	---	±2.5[1)]	---	%FS

[1)] Valid for a distance of 100mm and black body size of 150mm x 150mm.

MECHANICAL DIMENSIONS

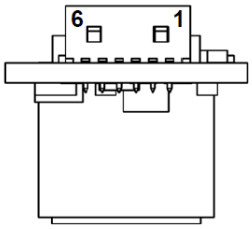


Units: mm

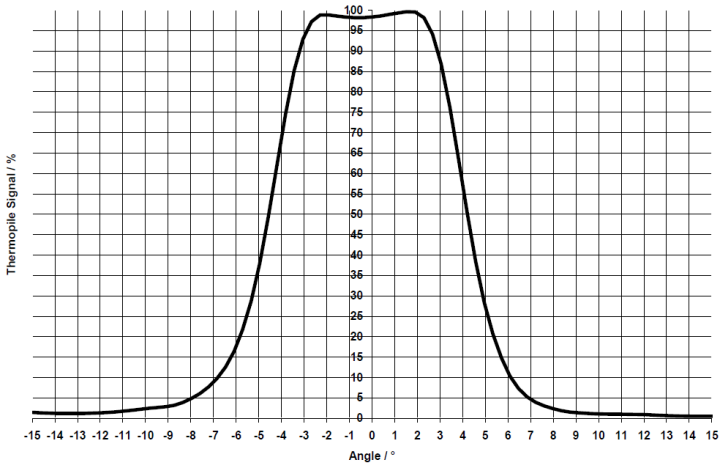
TERMINALS

Mating Connector: Molex 51021-0600

Pin	Name	Description	Type
1	NC	---	---
2	NC	---	---
3	SDA	I^2C Data (3.6V)	Interface
4	SCL	I^2C Clock (3.6V)	Interface
5	GND	Ground	Supply
6	V_{CC}	Supply Voltage (5V)	Supply

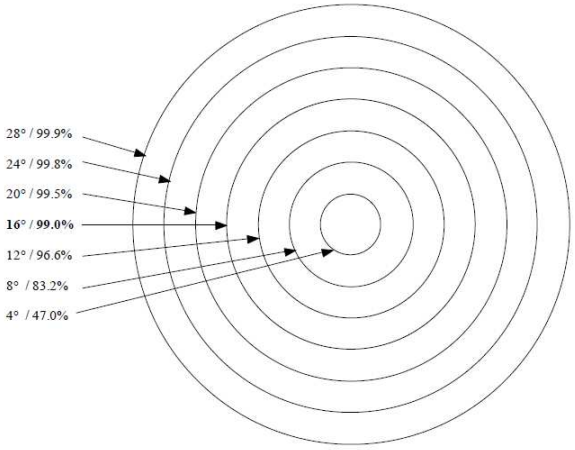


FIELD OF VIEW



SIGNAL DISTRIBUTION

The non-ideal filter characteristics have to been considered for the correct measurement distance with respect to the measurement object surface size. To achieve most accurate measurement results, measurement object should at least cover 99% of the sensors field of view.



I2C INTERFACE

The typical baud rate of this device is 100kBit/s. The supported address length is seven bits. The I^2C slave address is 54h. Pull-up resistors of 10kOhm are provided on the board.

PHYSICAL INTERFACE PARAMETERS

Parameter	Symbol	Condition	Min	Typ
Baudrate	10	---	100	kBit/s
Address length	---	7	---	Bit
Address (standard)	---	54h	---	---
Input High Level	2	---	3.6	V
Input Low Level	---	---	1	V
Output High Level	2.5	---	---	V
Output Low Level	---	---	1	V

I²C COMMAND REFERENCE

AMBIENT AND OBJECT MEASUREMENT

Please refer following table for I²C commands to read object temperature and ambient temperature. Both values are transmitted in hundredth of degrees.

Command	Description	Reply	Bytes
0xB6	Read object temperature	Object temperature in hundredth of degree	2
0xB5	Read ambient temperature	Ambient temperature in hundredth of degree	2

EXAMPLE OF TEMPERATURE CALCULATION

Send command (read object temp.): 0xB6
Return values i.e.: Byte(0) = 0x0E, Byte(1) = 0xAA
Temperature calculation: T_{obj} = (256 * Byte(0) + Byte(1)) / 100 = (256 * 14 + 170) / 100 = 37,54°C

OUT OF RANGE INDICATION

In case of ambient or object temperature over exceeding specified temperature ranges temperature outputs showing following data:

Command	Description	Reply	Bytes
0xB6	Object temperature > 300°C	0xFFF0	2
0xB6	Object temperature < 0°C	0xFFF1	2
0xB5	Ambient temperature > 100°C	0xFFFF	2
0xB5	Ambient temperature < 0°C	0xF000	2

READING TEMPERATURE

I.e. object temperature.

WRITE SEQUENCE

Data	Direction
Start, Address (Write 0x54), Command (0xB6), Stop	Master → Slave

READ SEQUENCE

Data	Direction
Start, Address (Read 0x55)	Master → Slave
Read data (high byte of temperature)	Master ← Slave
Read data (low byte of temperature)	Master ← Slave
Stop	Master → Slave

ORDER INFORMATION

Further customer specific adaptations are available on request. Please refer to the table below for part name, description and order information.

Part Number	Part Desription	Comment
G-TPMO-026	TSEV01C01C10	Thermopile Module, I^2C Interface, 0°C … +300°C

EMC

Due to the use of these modules for OEM application no CE declaration is done. Especially line coupled disturbances like surge, burst, HF etc. cannot be removed by the module due to the small board area and low price feature. There 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.

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