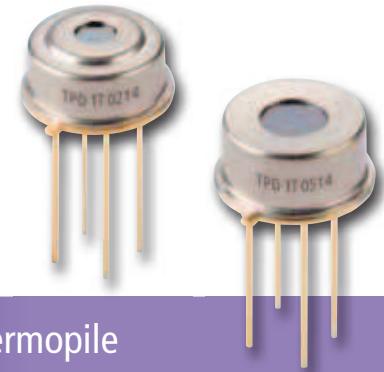


THERMOPILE DETECTORS FOR MEASUREMENT



TPD 1T 0224, TPD 1T 0524, TPD 1T 0624 – General-Purpose Thermopile

Applications

- Non-contact temperature measurements
- Pyrometry

Features and Benefits

- TO-39 metal housing
- Thermistor included

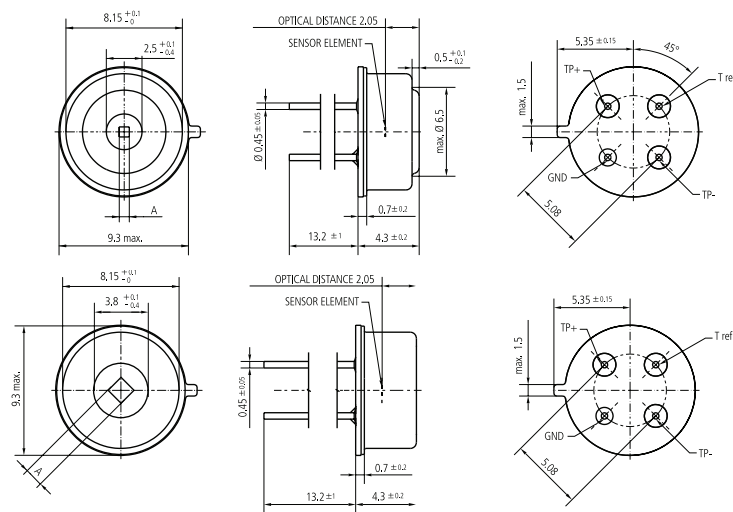
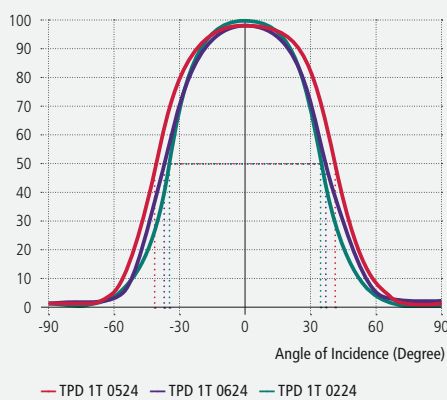
Product Description

This is our general-purpose range of thermopile detectors in TO-39 type housings with a round window, which also serves as an aperture. All feature a specially-designed element configuration, each one with a different size of absorbing area.

The TPD 1T 0224 provides the smallest absorbing area, the TPD 1T 0524 offers a strong signal at low sensor resistance with a large absorbing area. The TPD 1T 0624 represents a lower-cost compromise. All types are equipped as standard with an internal thermistor as temperature reference for thermopile temperature compensation.

Field of View

Relative Responsivity (%)



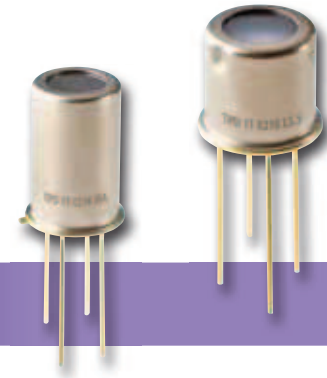
TPD 1T 0224 and
TPD 1T 0624

TPD 1T 0524

TPD 1T 0224, TPD 1T 0524, TPD 1T 0624 – General-Purpose Thermopile

Parameter	Symbol	0224	0524	0624	Unit	Remark
Sensitive area	A	0.7 x 0.7	1.25 x 1.25	1.2 x 1.2	mm	Absorber area
Sensitive area	A	0.5	1.6	1.4	mm ²	Absorber area
Thermopile resistance	R _{TP}	50 ... 100	25 ... 70	50 ... 110	kΩ	25° C
Responsivity	R	45	28	33	V/W	500° / 1Hz/ without IR-filter
Sensitivity (T _{det} 25° C / T _{obj} 40° C)	S ₄₀	50	110	92	μV/K	With standard filter (LWP, cut-on 5.5 μm)
Sensitivity (T _{det} 25° C / T _{obj} 100° C)	S ₁₀₀	65	150	120	μV/K	With standard filter (LWP, cut-on 5.5 μm)
Time constant	t	22	35	27	ms	
Noise voltage	V _N	35	29	36	nV / √Hz	25° C
Specific detectivity	D*	0.9	1.2	1.1	10 ⁸ cm / Hz / W	25° C
Temp. coefficient of resistance	TC _{RTP}	0.03	0.03	0.03	% / K	
Temp. coefficient of responsivity	TC _R	-0.05	-0.05	-0.05	% / K	
Field of view	FoV	70	84	76	Degrees	At 50 % intensity points
Thermistor resistance (25° C)	R ₂₅	100	100	100	kΩ	25° C
Thermistor BETA-value	β	3964	3964	3964	K	Defined at 25° C / 100° C

THERMOPILE DETECTORS WITH INTEGRAL OPTICS



TPD 1T 0226 IRA, TPD 1T 0226 L5.5 – Thermopile

Applications

- Non-contact temperature measurements
- Thermometry

Features and Benefits

- TO-type metal housing
- Optics included
- Thermistor included

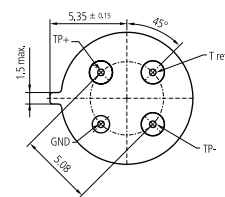
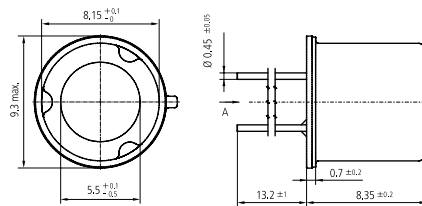
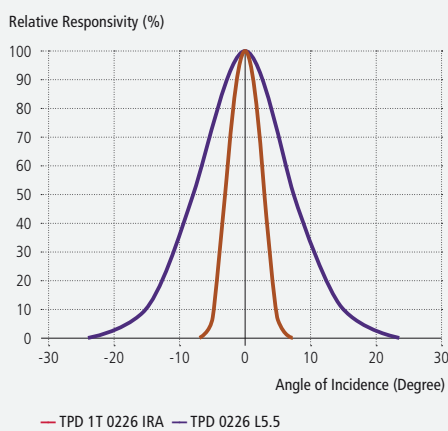
Product Description

The -IRA type thermopile is specially suited with an internal reflector that reduces the field of view and offers a smaller measurement “target” spot than conventional detectors without optics. Due to the reflector, the housing size is taller than other types, although the housing has the same diameter as a standard TO-39 / TO-5 housing.

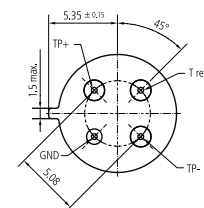
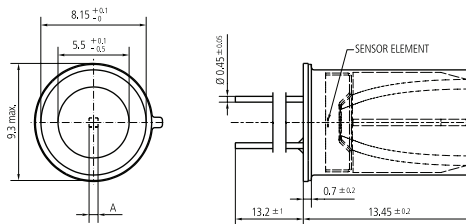
The TPD 1T 0226 L5.5 offers similar benefits as the -IRA type, but has an internal lens to reduce the housing’s height. The field of view of this type is sharper than for the IRA type.

Both series are equipped as standard with an internal thermistor as temperature reference for thermopile temperature compensation.

Field of View



TPD 1T 0226 L5.5

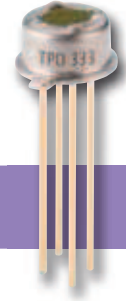


TPD 1T 0226 IRA

TPD 1T 0226 IRA, TPD 1T 0226 L5.5 – Thermopile

Parameter	Symbol	0226 L5.5	0226 IRA	Unit	Remark
Sensitive area	A	0.7 x 0.7	0.7 x 0.7	mm	Absorber area
Sensitive area	A	0.5	0.5	mm ²	Absorber area
Thermopile resistance	R _{TP}	50 ... 100	50 ... 100	kΩ	25° C
Responsivity	R	45	45	V/W	500° / 1Hz/ without IR-filter
Sensitivity (T _{det} 25° C / T _{obj} 40° C)	S ₄₀	-	-	μV/K	With standard filter (LWP, cut-on 5.5 μm)
Sensitivity (T _{det} 25° C / T _{obj} 100° C)	S ₁₀₀	-	-	μV/K	With standard filter (LWP, cut-on 5.5 μm)
Time constant	t	22	22	ms	
Noise voltage	V _N	35	35	nV / √Hz	25° C
Specific detectivity	D*	0.9	0.9	10 ⁹ cm√Hz / W	25° C
Temp. coefficient of resistance	TC _{RTP}	0.03	0.03	% / K	
Temp. coefficient of responsivity	TC _R	-0.05	-0.05	% / K	
Field of view	FoV	7	15	Degrees	At 50 % intensity points
Thermistor resistance (25° C)	R ₂₅	100	100	kΩ	25° C
Thermistor BETA-value	β	3964	3964	K	Defined at 25° C / 100° C

MINIATURE THERMOPILE DETECTORS FOR GAS SENSING AND MEASUREMENT



TPD 0223, TPD 0623 Thermopile

Applications

- Non-contact temperature measurements
- IR based gas sensors

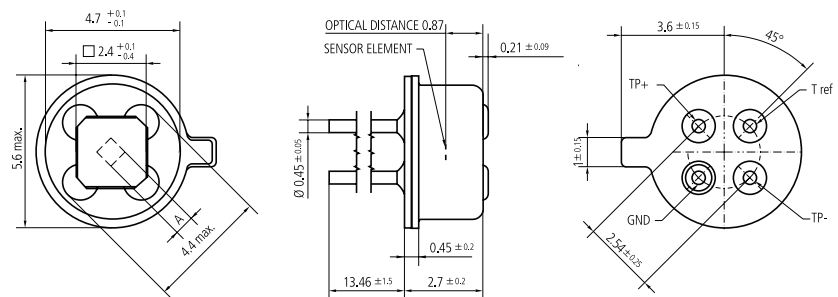
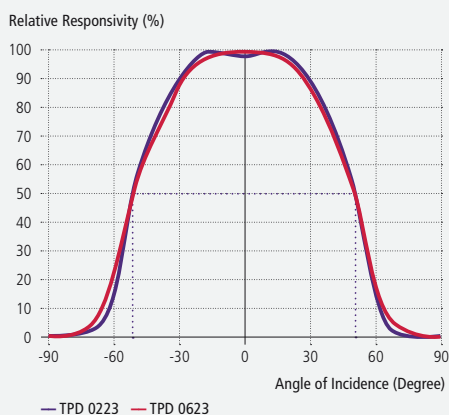
Features and Benefits

- TO-46 metal housing
- Square window
- Optical filter options
- Thermistor included

Product Description

This is our range of general-purpose miniature thermopile detectors in 4.7 mm diameter TO-46 type housings. Both feature a specially-designed element configuration, each one with a different size of absorbing area. The window is available as standard infrared or as narrow band pass filter for gas sensing applications. The TPD0223 provides the smallest absorbing area, the TPD 0623 is a larger design offering strong signals. Both types are equipped as standard with an internal thermistor as temperature reference for thermopile temperature compensation.

Field of View



TPD 0223, TPD 0623 Thermopile

Parameter	Symbol	0223	0623	Unit	Remark
Sensitive area	A	0.7 x 0.7	1.2 x 1.2	mm	Absorber area
Sensitive area	A	0.5	1.4	mm ²	Absorber area
Thermopile resistance	R _{TP}	50 ... 100	50 ... 110	kΩ	25° C
Responsivity	R	45	33	V/W	500° / 1Hz/ without IR-filter
Sensitivity (T _{det} 25° C / T _{obj} 40° C)	S ₄₀	88	133	μV/K	With standard filter (LWP, cut-on 5.5 μm)
Sensitivity (T _{det} 25° C / T _{obj} 100° C)	S ₁₀₀	116	177	μV/K	With standard filter (LWP, cut-on 5.5 μm)
Time constant	t	22	27	ms	
Noise voltage	V _N	35	36	nV / √Hz	25° C
Specific detectivity	D*	0.9	1.1	10 ⁸ cm ² /Hz / W	25° C
Temp. coefficient of resistance	TC _{RTP}	0.03	0.03	% / K	
Temp. coefficient of responsivity	TC _R	-0.05	-0.05	% / K	
Field of view	FoV	104	104	Degrees	At 50% intensity points
Thermistor resistance (25° C)	R ₂₅	100	100	kΩ	25° C
Thermistor BETA-value	β	3964	3964	K	Defined at 25° C / 100° C

ISOTHERMAL MINIATURE THERMOPILE DETECTORS FOR EAR THERMOMETRY



TPiD 012B, TPiD 022B Thermopile

Applications

- Ear thermometry
- General purpose thermometry

Features and Benefits

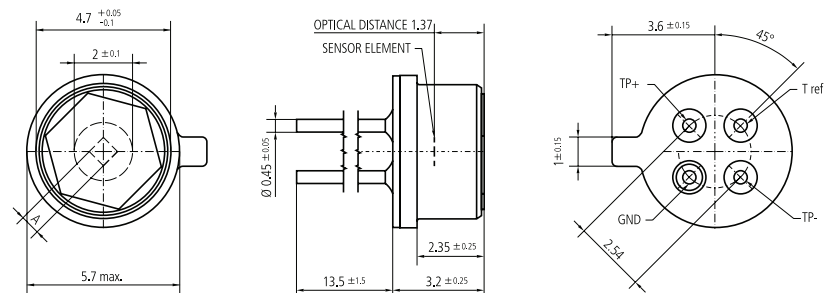
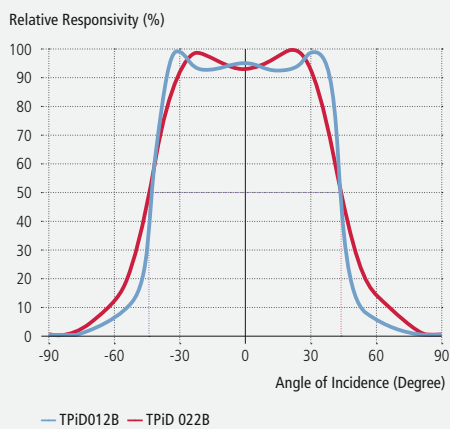
- Miniature TO-type metal housing
- Light collecting aperture
- Thermistor included

Product Description

Excelitas offers ear thermometry thermopiles referenced as ISOthermal detector range. The patented designs provide a superior performance of thermopiles under thermal shock conditions.

The TPiD 012B is the low cost version, whereas the TPiD 022B provides higher signal. The physical dimensions of the two ISO thermal sensors are equivalent to our TO-46 sensor housings and include a special aperture. Both types are equipped with an internal thermistor as temperature reference for thermopile temperature compensation to further improve accuracy.

Field of View

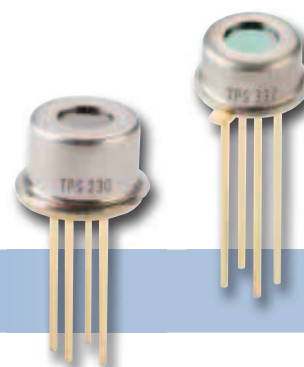


TPiD 012B, TPiD 022B Thermopile

Parameter	Symbol	TPiD 012B	TPiD 022B	Unit	Remark
Sensitive area	A	Ø 0.5	0.7 x 0.7	mm	Absorber area
Sensitive area	A	0.2	0.5	mm ²	Absorber area
Thermopile resistance	R _{TP}	85 ... 135	50 ... 100	kΩ	25° C
Responsivity	R	92	60	V/W	500° / 1Hz/ without IR-filter
Sensitivity (T _{det} 25° C / T _{obj} 40° C)	S ₄₀	44	95	µV/K	With standard filter (LWP, cut-on 5.5 µm)
Sensitivity (T _{det} 25° C / T _{obj} 100° C)	S ₁₀₀	58	125	µV/K	With standard filter (LWP, cut-on 5.5 µm)
Time constant	t	15	22	ms	
Noise voltage	V _N	42	35	nV/√Hz	25° C
Specific detectivity	D*	1.0	1.2	10 ⁸ cm ² /Hz / W	25° C
Temp. coefficient of resistance	TC _{RTP}	0.03	0.03	% / K	
Temp. coefficient of responsivity	TC _R	-0.05	-0.05	% / K	
Field of view	FoV	90	90	Degrees	At 50 % intensity points
Thermistor resistance (25° C)	R ₂₅	100	100	kΩ	25° C
Thermistor BETA-value	β	3964	3964	K	Defined at 25° C / 100° C

ISOTHERMAL MINIATURE THERMOPILE DETECTORS FOR INFANT EAR THERMOMETRY

THERMOPILE DETECTORS FOR THERMOMETRY ■



TPD 0120, TPD 0122 Thermopile

Applications

- Ear thermometry
- General purpose thermometry

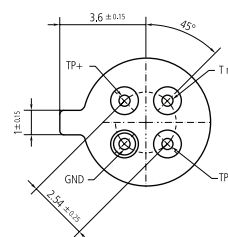
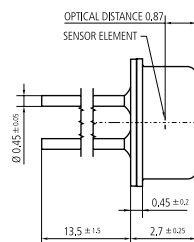
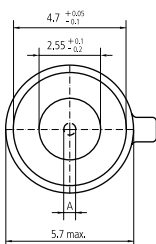
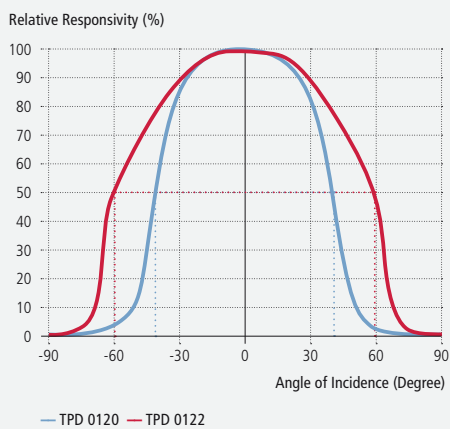
Features and Benefits

- Miniature TO-type metal housing
- Thermistor included

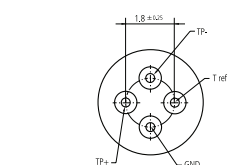
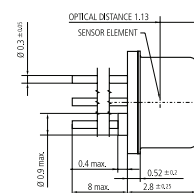
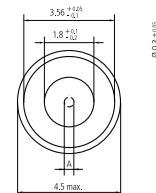
Product Description

This is our range of miniature thermopile detectors tailored for infant ear thermometers. The TPD 0120 is the smallest detector in a 3.56 mm diameter TO-41 housing, the TPD 0122 is featured in a 4.7 mm diameter TO-46 type housing with a round window, which also serves as an aperture. Both types are equipped as standard with an internal thermistor as temperature reference for thermopile temperature compensation.

Field of View



TPD 232



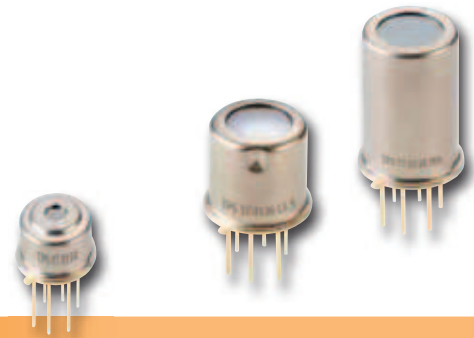
TPD 230

TPD 0120, TPD 0122 Thermopile

Parameter	Symbol	0120	0122	Unit	Remark
Sensitive area	A	Ø 0.5	Ø 0.5	mm	Absorber area
Sensitive area	A	0.2	0.2	mm ²	Absorber area
Thermopile resistance	R _{TP}	85 ... 135	85 ... 135	kΩ	25° C
Responsivity	R	77	77	V/W	500° / 1Hz / without IR-filter
Sensitivity (T _{det} 25° C / T _{obj} 40° C)	S ₄₀	30	43	μV/K	With standard filter (LWP, cut-on 5.5 μm)
Sensitivity (T _{det} 25° C / T _{obj} 100° C)	S ₁₀₀	39	56	μV/K	With standard filter (LWP, cut-on 5.5 μm)
Time constant	t	15	15	ms	
Noise voltage	V _N	42	42	nV / √Hz	25° C
Specific detectivity	D*	0.8	0.8	10 ⁹ cm·√Hz / W	25° C
Temp. coefficient of resistance	TC _{RTP}	0.03	0.03	% / K	
Temp. coefficient of responsivity	TC _R	-0.05	-0.05	% / K	
Field of view	FoV	82	120	Degrees	At 50 % intensity points
Thermistor resistance (25° C)	R ₂₅	100	100	kΩ	25° C
Thermistor BETA-value	β	3964	3964	K	Defined at 25° C / 100° C

THERMOPILE SENSOR WITH INTEGRATED PROCESSING FOR NON-CONTACT TEMPERATURE MEASUREMENT

THERMOPILE SENSORS AND MODULES ■



TPS 1T 0134 ,TPS 1T 0136 L5.5, TPS 1T 0136 IRA Thermopile Sensor (TPMI® Family)

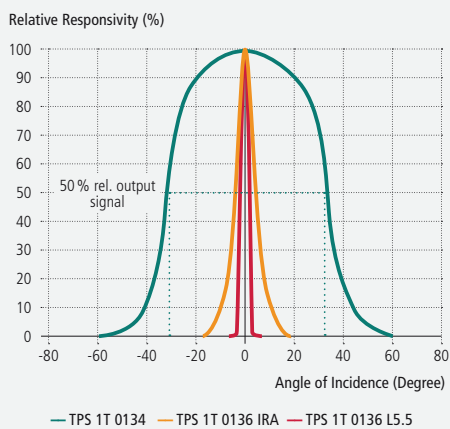
Target Applications

- General purpose temperature monitoring

Features and Benefits

- Internal signal processing
- Factory calibrated
- Optics available
- Ambient temperature compensation

Field of View



Filter



Product Description

The TPS family, as a recent upgrade to our original and popular TPMI® thermopiles, senses the thermal radiation emitted by objects and converts this to an analog voltage. It is fully factory-calibrated for accurate signal output over a specific temperature range. Further, customers may program the unit individually via the serial interface. The internal digital signal processing and 8 bit resolution of the control registers and the E2PROM technology allow for adjustment and changing of the configuration to customer requirements.

The temperature accuracy of the fully adjustable integrated circuit outperforms discrete solutions. With the integration of thermopile and electronic circuits in compact TO-39 housing, the TPS is robust and insensitive to environmental influences like leakage currents on the parent PCB, relative humidity or electromagnetic interference.

The TPMI® sensor family includes the integrated ambient temperature compensation and the calibration to a certain temperature range. Customer specific modifications are possible. Thus, when ordering, the correct temperature range needs to be specified.

For requirements of defined spot sizes, we offer sensors with defined field of view obtained by apertures, internal lenses or integrated mirrors.

For amplification of the highly sensitive thermopile signal a high resolution programmable low noise amplifier is provided. An adjustable high precision ambient temperature sensor followed by a signal processor offers accurate compensation signals with polynomial characteristics perfectly matching the thermopile output to achieve an output signal which is closely linear with object temperature. Adding these signals will result in an ambient independent object temperature signal over a large temperature range. This range can be adapted and scaled to customer requirements by means of the flexible offset and post gain adjustment.

The two configurable comparators within the TPS can be used to allow the sensor to function as a temperature-dependent switch. Threshold temperatures and the amount of hysteresis for both comparators are freely programmable.

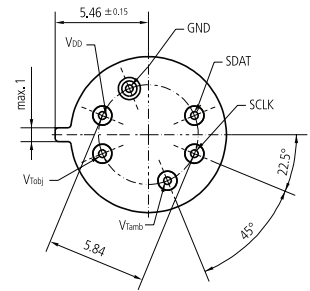
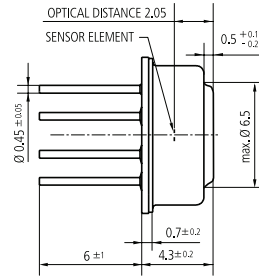
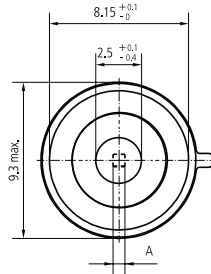
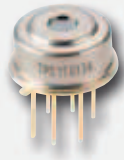
For the various object temperature ranges we offer the following pre-calibrated sensors:

- -20 ... 60° C: TPS 1T 0134 OAA060
- -20 ... 60° C: TPS 1T 0236 IRA OAA060
- -20 ... 120° C: TPS 1T 0136 L5.5 OAA060
- -20 ... 60° C: TPS 1T 0136 L5.5 OAA120
- -20 ... 120° C: TPS 1T 0136 L5.5 OAA120
- -20 ... 250° C: TPS 1T 0136 IRA OAA250

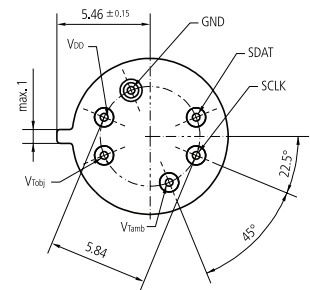
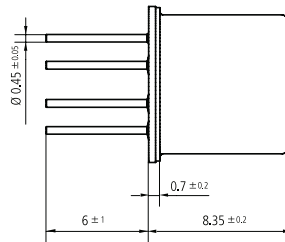
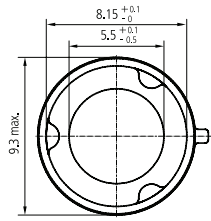
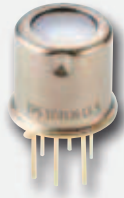
IRA = internal reflector. L5.5 = 5.5 mm focal length lens.

A temperature reference output is included. On request other object temperature ranges can be provided. The sensors can also be supplied as an "OBA" version without internal temperature compensation.

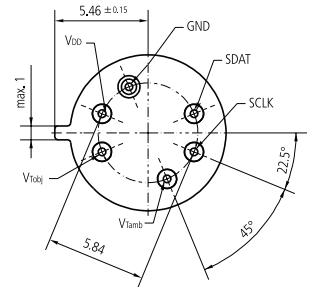
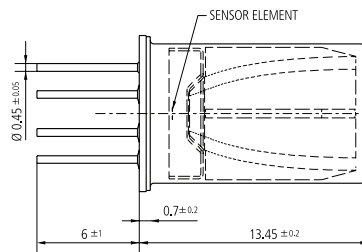
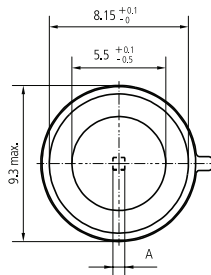
TPS 1T 0134



TPS 1T 0136 L5.5



TPS 1T 0136 IRA

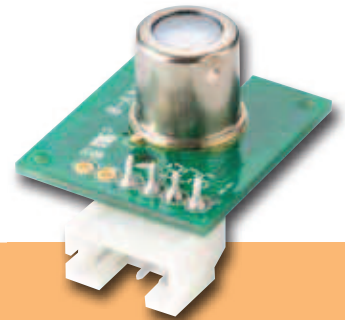


TPS 1T 0134 ,TPS 1T 0136 L5.5, TPS 1T 0136 IRA Thermopile Sensor (TPMI® Family)

Parameter	Symbol	TPS 1T 0134	TPS 1T 0136 L5.5	TPS 1T 0136 IRA	Unit	Remark
Output voltage swing	V_O	0.25 ... ($V_{DD} - 0.25$)	0.25 ... ($V_{DD} - 0.25$)	0.25 ... ($V_{DD} - 0.25$)	V	
Resistive output load	R_L	50	50	50	k Ω	min.
Object temp. accuracy		1.5	1.5	1.5	K	+/-
Response time	t_{resp}	100	100	100	ms	typ.
Sensitive area	A	$\varnothing 0.5$	$\varnothing 0.5$	$\varnothing 0.5$	mm	TPS 1T 01
Field of view	FoV	67	4.5	11	°	TPS 1T 01
Distance to spot size ratio		-	11:1	-		TPS 1T 01
Sensitive area	A	0.7 x 0.7	0.7 x 0.7	0.7 x 0.7	mm ²	TPS 1T 02
Field of view	FoV	70	7	15	°	TPS 1T 02
Distance to spot size ratio		-	8:1	-		TPS 1T 02
Supply voltage	V_{DD}	4.5 ... 5.5	4.5 ... 5.5	4.5 ... 5.5	V	
Supply current	I_{DD}	1.5	1.5	1.5	mA	typ. ; $R_L > 1 M\Omega$
Operating temp. range		-25 ... +100	-25 ... +100	-25 ... +100	°C	
Storage temp. range		-40 ... +100	-40 ... +100	-40 ... +100	°C	
ESD tolerance		2.5	2.5	2.5	kV	Human body model
Soldering temp.		300	300	300	°C	max, 10 s

THERMOPILE MODULE WITH INTEGRATED PROCESSING FOR TEMPERATURE MEASUREMENT

TPM 1T 0136 L5.5, TPM 1T 0134 M(y) – Thermopile Module (TPMI®)



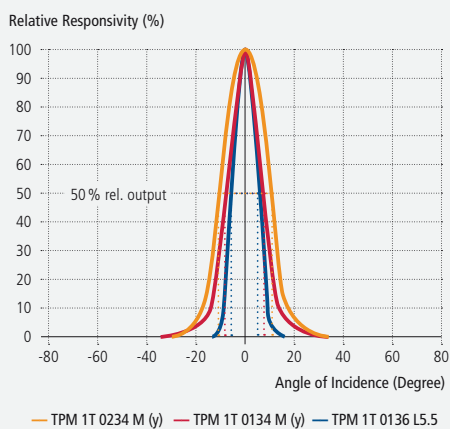
Target Applications

- General purpose temperature monitoring

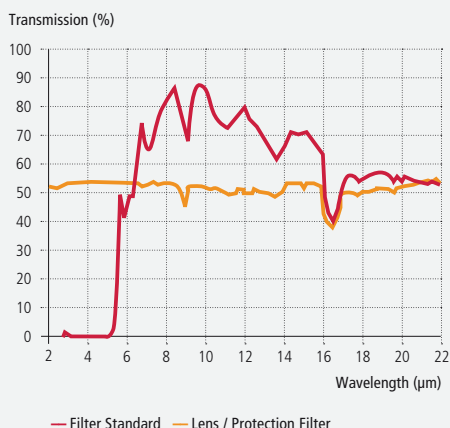
Features and Benefits

- Internal signal processing
- Factory calibrated
- Lens or mirror optics
- Ambient temperature compensation

Field of View



Filter



Product Description

The module range of Excelitas consists of a thermopile sensor mounted on a PCB with a connector. The PCB can also provide for optional features such as voltage regulation and a noise-reduction filter.

The module includes the integrated temperature compensation for a defined temperature environment and the calibration to a certain object temperature range. Modules cannot be programmed individually at the customer site. Thus, when ordering, the correct ambient and object temperature ranges need to be specified.

For requirements of defined spot sizes, we offer sensors with a field of view defined by optical apertures, internal lenses or external mirror optics. The mirror orientation M(y) can be specified and a protective external filter may be supplied with the module.

The module types are available with different versions of pcb P(x). For the external mirror version, we supply the mirror in different viewing orientations M(y); y = L (left) / y = F (front) / y = R (right). Customization: As the modules are always calibrated to target temperature range customized versions are available.

For the various object temperature ranges we offer the following pre-calibrated modules:

External mirror types

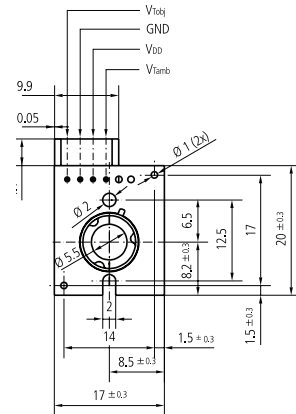
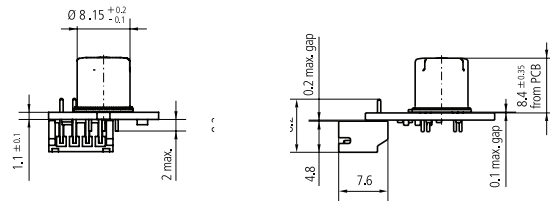
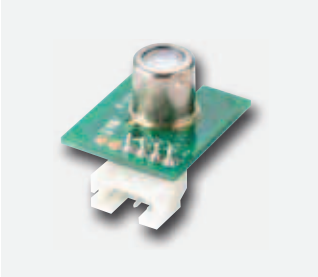
- -20 ... 60° C: TPM 1T 0234 OAA060 P(x) M(y)
- -20 ... 140° C: TPM 1T 0134 OAA140 P(x) M(y)
- -20 ... 250° C: TPM 1T 0134 OAA250 P(x) M(y)
- -20 ... 180° C: TPM 1T 0134 OAA180 P(x) M(y)

Integral lens types

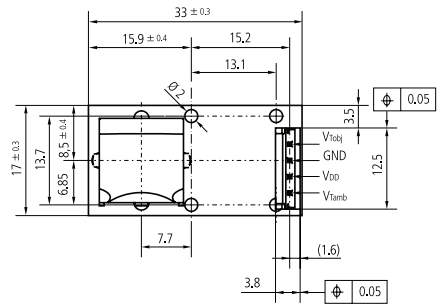
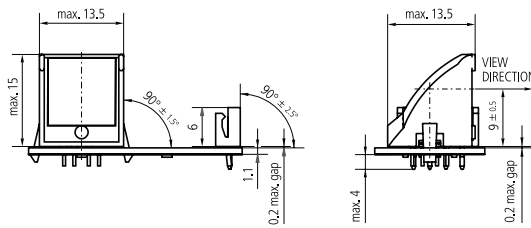
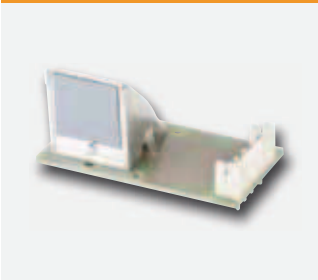
- -20 ... 60° C: TPM 1T 0236 L5.5 OAA060 P7
- -20 ... 120° C: TPM 1T 0136 L5.5 OAA120 P7
- -20 ... 180° C: TPM 1T 0136 L5.5 OAA180 P7
- -20 ... 250° C: TPM 1T 0136 L5.5 OAA250 P7
- -20 ... 300° C: TPM 1T 0136 L5.5 OAA300 P7

A temperature reference output is included. On request the modules can be supplied as an "OBA" version, which is calibrated but without internal temperature compensation. In this case the customer will do the temperature compensation externally with the use of the supplied reference output.

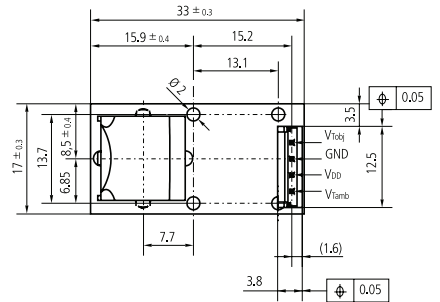
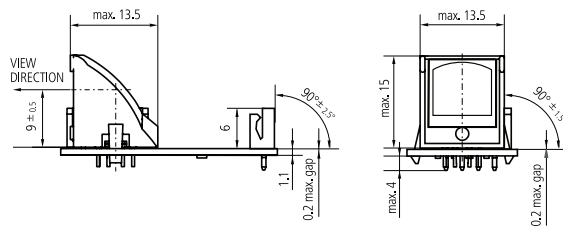
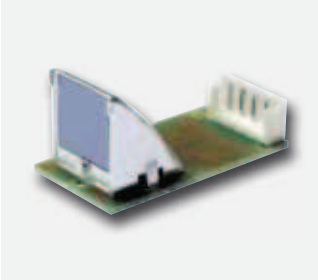
TPM 1T 0136 L5.5



TPM 1T 0134 P6 M(y)



TPM 1T 0134 P9 M(y)



TPM 1T 0136 L5.5, TPM 1T 0134 M(y) – Thermopile Module (TPMI®)

Parameter	Symbol	TPM 1T 0136 L5.5	TPM 1T 0134 P6 M(y)	TPM 1T 0134 P9 M(y)	Unit	Remark
Output voltage swing	V_O	0.25 ... ($V_{DD} - 0.25$)	0.25 ... ($V_{DD} - 0.25$)	0.25 ... ($V_{DD} - 0.25$)	V	
Resistive output load	R_L	50	50	50	k Ω	min.
Object temp. accuracy		1.5	1.5	1.5	K	+ / -
Response time	t_{resp}	100	100	100	ms	typ.
Field of view		4.5	5.5	5.5	°	TPIS 1T 01
Distance to spot size ratio		11:1	-	-		TPIS 1T 01
Field of view	FoV	7	7	7	°	TPIS 1T 02
Distance to spot size ratio		8:1	-	-		TPIS 1T 02
Supply voltage	V_{DD}	4.5 ... 5.5	4.5 ... 5.5	4.5 ... 15*	V	* = Voltage regulator
Supply current	I_{DD}	1.5	1.5	1.7	mA	typ. ; $R_L > 1 M\Omega$
Operating temp. range		-25 ... +100	-25 ... +100	-25 ... +100	°C	
Storage temp. range		-40 ... +100	-40 ... +100	-40 ... +100	°C	
ESD tolerance		2.5	2.5	2.5	kV	Human body model