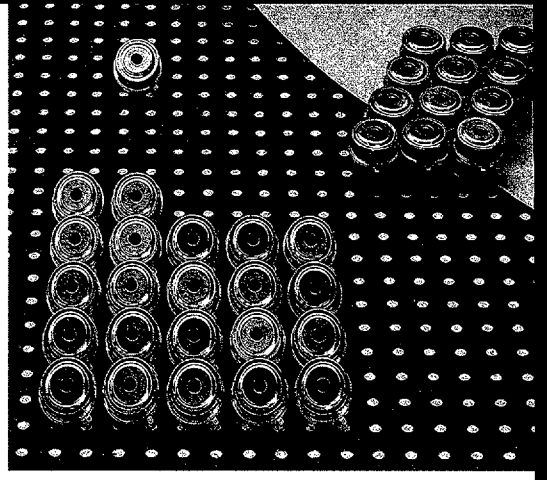
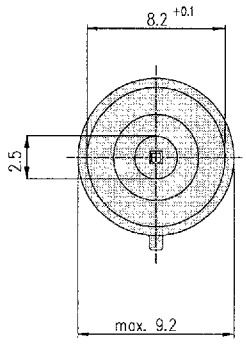
THERMOPILE SENSORS

TPS 424/434

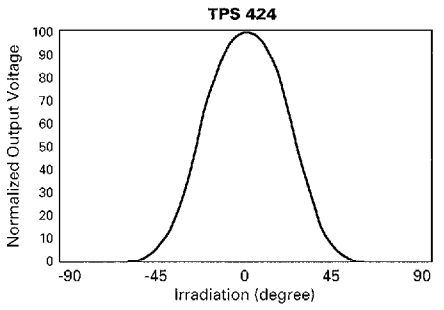


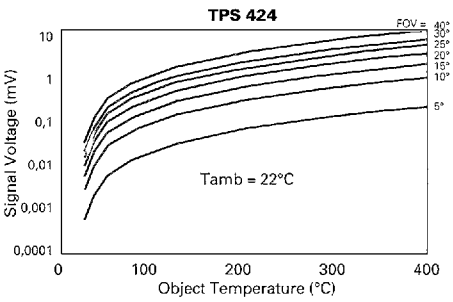
- **0,5 x 0,5 Sensitive Area**
- **40 Thermoelements in Series**
- **Low Temperature Coefficient of Sensitivity**

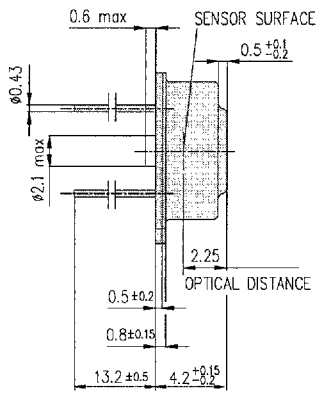
The thermopilesensor TPS 424 consists of a series of 40 thermoelements, forming a sensitive area of 0,5 x 0,5 mm². The sensor is hermetically sealed into a housing, similar to TO-39, with optical filter. The standard filter is 5...14 µm broadband window. The series TPS 434 is the same thermopile, additionally fit with temperature reference. The thermosensor exhibits an almost white noise, comparable to an ohmic resistance. It has a constant signal versus frequency up to its frequency limit, and is directly proportional to incident radiation.

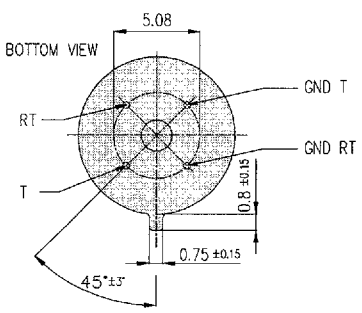


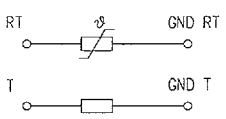
PARAMETER	TPS 424/434	unit	condition
Chip Size	2,2 * 2,2	mm²	
Elements	40		
Sensitive Area	0,5 * 0,5	mm²	Absorber
Sensitivity	48 (±30 %)	V/W	Standard, 1 Hz, 500 K
Resistance	45 (±20)	kΩ	
Noise Voltage	25..30	nV	r.m.s., 300 K, 1 Hz
	200..250		pk-pk, 300 K, 1 Hz
NEP	0,54	nW/√Hz	Standard, 1 Hz, 500 K
Detectivity	$9{,}3*10^8$	cm*√Hz/W	Standard, 1 Hz, 500 K
Time constant	25	ms	typical
TK of Resistance	< 0,1	%/K	
TK of Responsivity	< ±0,05	%/K	
Temperature Range	-20..100	°C	Operation
Temperature Range	-40..100	°C	Storage
Temperature Reference Thermistor (Type 'T')			

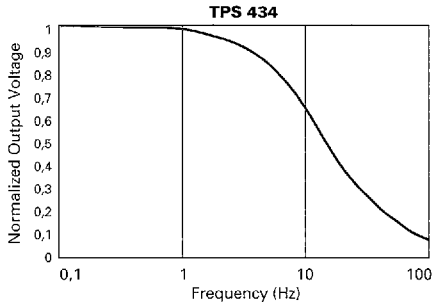












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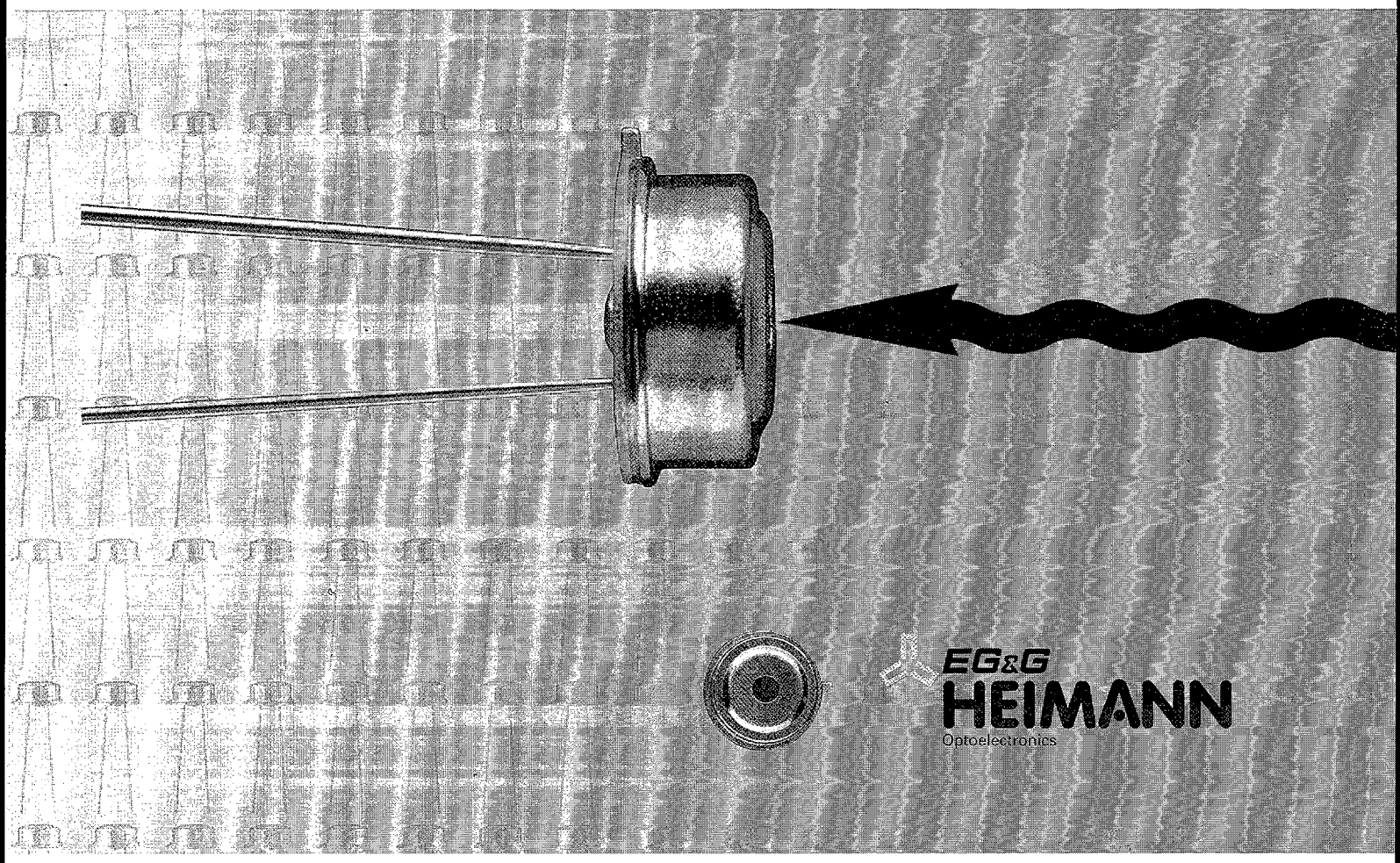
Guidelines for Users of Thermopile Sensors



Thermopile sensors do not require a mechanical chopper

The advantage of the thermopile technology is a common mode reaction, the signal is proportional to the incident radiation and does not require a modulated signal. This allows a simple and small construction of non-contact measurement devices.

Thermopile sensors have a temperature coefficient

Similar to any electronic component, thermopile sensor parameters show a temperature coefficient. A very important aspect to be considered is the temperature coefficient of the sensitivity. In some sensors available on the market coefficients up to 0,5%/K can be observed. EG&G Heimann Optoelectronics has developed a new generation of thermopiles. Our types inhibit a very low temperature coefficient, such as 0,01%/K. This reduces the necessity of compensation and eases the use dramatically in many applications.

Thermopile sensors need some optics

For the infrared measurement it is important to correlate the field of view of the sensor with the object to be measured. Any additional target within the field of view will influence the measurement proportional to its size and radiating energy. It is recommendable to provide an optical system, which grants that the measuring spot is smaller than the total size of the object. Most of the existing designs use some form of optics, a special infrared transmissive lense or a gold plated tube or a metallic mirror. The materials for the optics should neither absorb radiation nor have a temperature coefficient which could influence the measurement.

The influence of the environmental temperature

The output of the sensor results from the difference of the membrane temperature against the bulky chip which also serves as a heat sink. The membrane is heated by the incident radiation, whereas the chip temperature stays in line with the temperature of the sensor case. In other words, the signal output depends on the object temperature and the temperature of the case. For a constant object temperature, the signal will vary with the temperature of the case. To allow easy compensation, we provide types with internal temperature reference: A built-in thermistor senses the temperature of chip and case. The resistance has to be converted into a signal voltage which should be high when the case is cold and decrease when the case warms up. Then it can be used to adjust the amplification of the thermopile output.

The influence of the environmental temperature

The device can face deviation in accuracy raised by a temperature shock. Under such fast influences the compensations can not follow the fast reaction of the thermopile. It is therefore recommended to insulate the thermopile as much as possible from the case of the unit and further mount the thermopile sensor in a piece of metal with big thermal capacity. The thermal shock will be slowed down to a speed where the compensation electronics can cope with it and overcome this inaccuracy effect.

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