

## Features and Benefits

- Solid state sensor
- High reliability
- Low cost, small size
- On chip temperature sensor

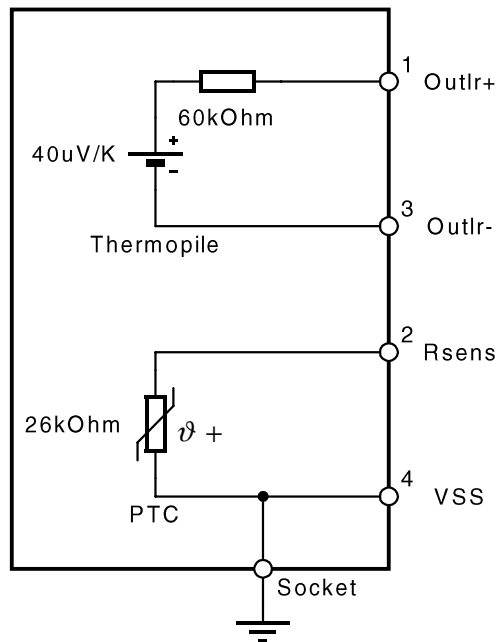
## Applications

- Non-Contact Temperature Sensing
- Differential Temperature Sensing
- Climate Control
- Ear, Temple Thermometers
- Household and Commercial Appliances

## Ordering Information

Part No.	Description
MLX90247B	Thermopile with On-chip PTC Thermistor

## Functional Diagram



## Description

The MLX90247B is a thermopile sensor IC which detects very small amounts of heat radiation. The sensor consists of a membrane with a thermopile on top of it.

The hot junctions of the thermopile are positioned near the center of the membrane, the cold junctions above the bulk silicon edge.

Due to the low thermal conductivity of the membrane, absorbed heat will cause the temperature to increase more at the center of the membrane than at the edge above the bulk. This temperature difference is converted to an electric potential by the thermo-electric effect in the thermopile junctions. No supply voltage is needed.

The sensor IC is integrated together with a PTC thermistor in one silicon mass. The PTC is adjacent to the cold junctions of the thermopile. As such, use of the PTC is considered the more accurate method of measuring thermopile cold junction temperature, and thus overall sensor accuracy when making non-contact temperature measurement.

The sensor and thermistor can be used independent of each other if desired, as the thermopile potential is floating.

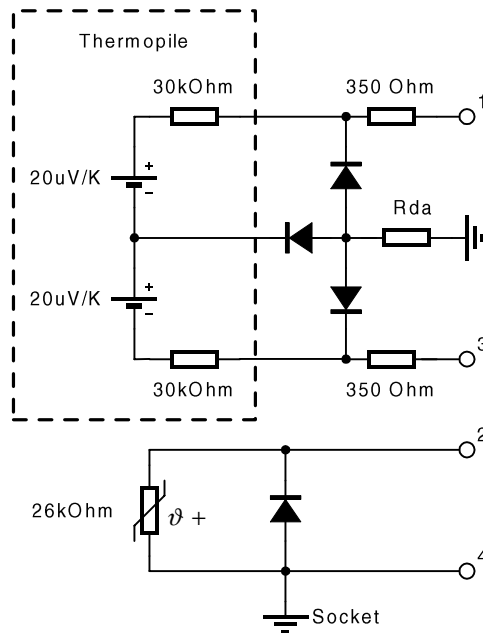
## MLX90247B Electrical Specifications

DC Operating Parameters  $T_A = -40^{\circ}\text{C}$  to  $150^{\circ}\text{C}$ , (unless otherwise specified)

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Thermopile Resistance	Rtp	@298K	44	59.5	75	k $\Omega$
Sensitivity	S	sensor @298K black body @299K	29	42	55	$\mu\text{V}/\text{K}$
TC of Sensitivity	TCs	@298K		0.1		%/K
Time constant	T				30	ms
Thermistor Value	Rptc	@298K	18.2	26	33.8	k $\Omega$
Thermal Coefficient PTC <sup>(1)</sup>	A1 A2	25°C-100°C	5720	7150 11.57	8580	ppm/K ppm/K <sup>2</sup>

$$(1) R(T) = R(298K) \cdot [1 + A1 \cdot (T - 298K) + A2 \cdot (T - 298K)^2]$$

Note: when measuring resistances with an ohm meter, please take care that the internal protection diodes, as indicated in the diagram below, are always reverse biased.



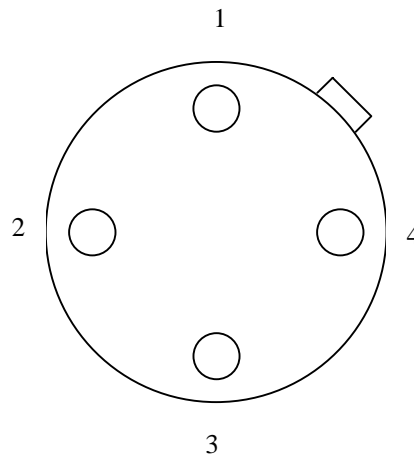
## MLX90247B Absolute Maximum Ratings

Parameter	Value	Unit	Comment
Operating temperature	-40 ~ 150	$^{\circ}\text{C}$	Keep diode leakage in mind at high temperatures
Storage temperature	-40 ~ 150	$^{\circ}\text{C}$	
Soldering temperature	<220	$^{\circ}\text{C}$	t<5sec

## MLX90247B Pinout

Pin	Symbol	Description
1	Outlr+	Infrared Thermopile positive output
2	Rsens	Thermistor for sensor ambient temperature measurement
3	Outlr-	Infrared Thermopile negative output
4	Vss	Thermistor ground / case potential

TO-39 package - connections



Top view = pins down

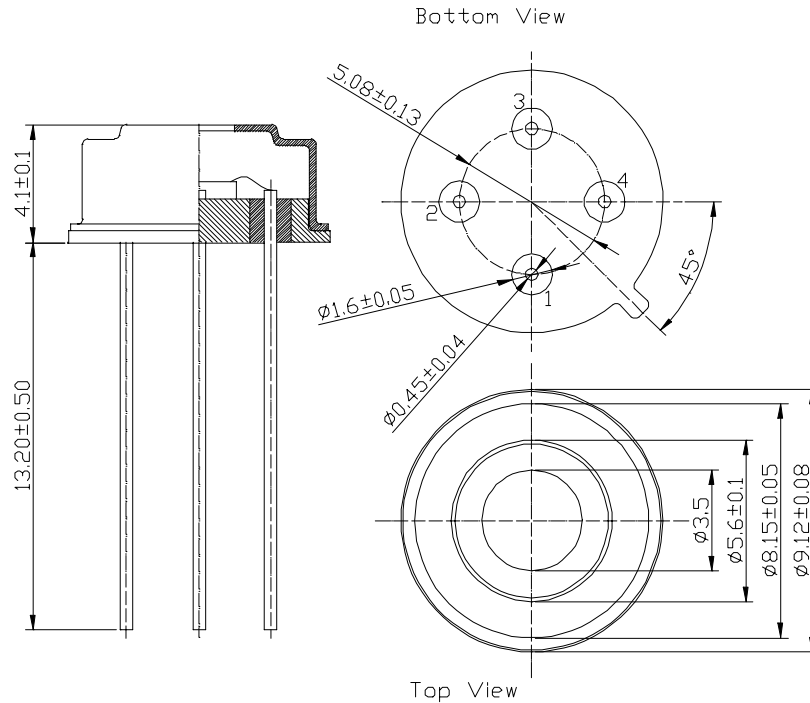
## ML90247B Mechanical Specifications

Parameter	Value	Unit	Comment
TO-39 specifications			
Metal cap			Welded
Filling gas			Nitrogen
Filter specifications			
Transmission	>75	%	$7.5\mu < \lambda < 13.5\mu$
Transmission	<0.5	%	$0 < \lambda < 5\mu$
Sensor window			
FOV	100	°	Full opening angle: Determined by aperture
Aperture diameter	3.5	mm	Default

**ESD Precautions** Electronic semiconductor products are sensitive to Electro Static Discharge (ESD). Always observe ESD control procedures whenever handling semiconductor devices.

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**RA (TO-39) Package Outline**



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