

Features and Benefits

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

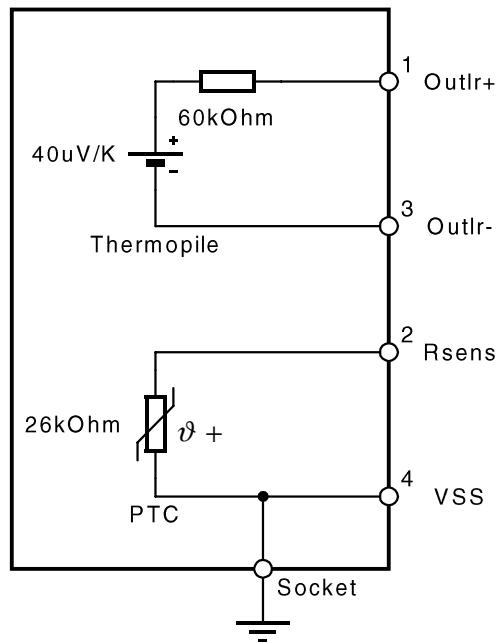
Applications

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.

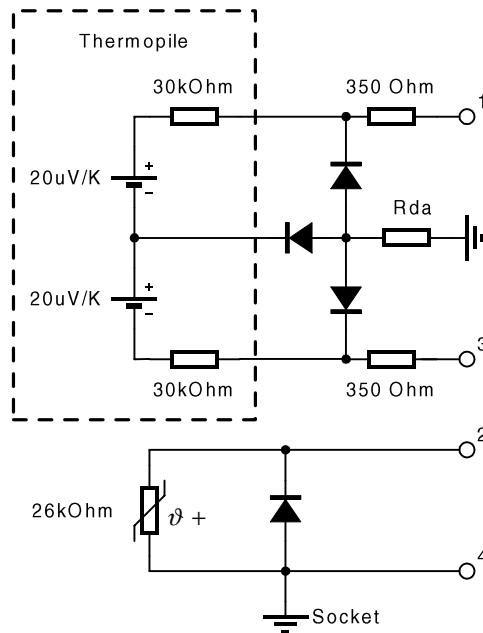
MLX90247B Electrical Specifications

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

Parameter	Symbol	Test Condition	Min	Typ	Max	Unit
Thermopile Resistance	Rtp	@298K	44	59.5	75	k Ω
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 Ω
Thermal Coefficient PTC ⁽¹⁾	A1 A2	25 $^{\circ}\text{C}$ -100 $^{\circ}\text{C}$	5720	7150 11.57	8580	ppm/K ppm/K ²

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

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.



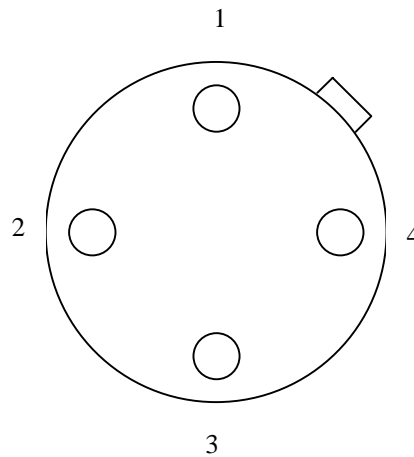
MLX90247B Absolute Maximum Ratings

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

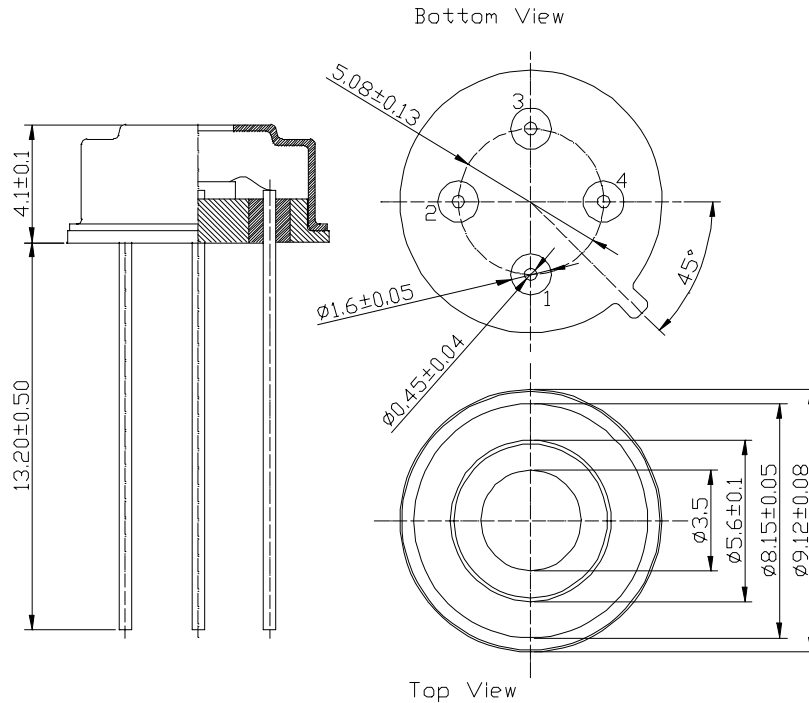
ML90247B Mechanical Specifications

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.

Disclaimer Melexis reserves the right to periodically make modifications to product specifications. The information included herein is believed to be accurate and reliable. However, Melexis assumes no responsibility for its use; nor for any infringements of patents or other rights of third parties which may result from its use.

RA (TO-39) Package Outline



For the latest version of this document,
Go to our website at:
www.melexis.com
Or for additional information
contact Melexis Direct:

USA
Melexis Inc.
41 Locke Road, Concord, NH 03301
Phone: +1 603 223 2362 Fax: +1 603 223 9614
E-mail: sales_usa@melexis.com

United Kingdom
Silicon Concepts
PCB Lynchborough Road, Hampshire GU30 7SB, United Kingdom
Phone: +44 1428 751 617 Fax: +44 1428 751 603
E-mail: sales_uk@melexis.com

Germany
Schliess-strasse 55, 40549 Düsseldorf, Germany
Phone: +49 211 5360212 Fax: +49 211 5360250
E-mail: sales_de@melexis.com

France
Melexis France
Tour Arago, 5 rue Bellini, 92806 Puteaux-La-Défense, France.
Phone: +33 1 47 78 11 34 Fax: +33 1 47 78 06 35
E-mail: sales_france@melexis.com

Italy
Dimacred IRL
Via Papa Giovanni XXIII no. 25, 20046 Biassono, Italy
Phone: +39 039 249 4856 Fax: +39 039 491773
E-mail: sales_italy@melexis.com

Japan
Thermopile Japan Co., LTD
3-48-10 Ogikubo, Suginami-ku, Tokyo
Phone: +81 3 3392 6961 Fax: +81 3 3392 6901
E-mail: sales@thermopile.co.jp

Taiwan
Beechwood Int'l Taiwan Co.
Room 8, 17F, No. 189, Taipei, Taiwan
Phone: +886 2 2739 3322 Fax: +886 2 2739 3090
E-mail: sales_taiwan@melexis.com