MLX90248

CMOS Omnipolar™ High Sensitivity Micropower Hall

Features and Benefits

- Chopper stabilized amplifier stage
- Micropower consumption for battery-powered applications
- Omnipolar, output switches with absolute value of North or South pole from magnet
- Operation down to 2.5V
- High Sensitivity for direct reed switch replacement applications

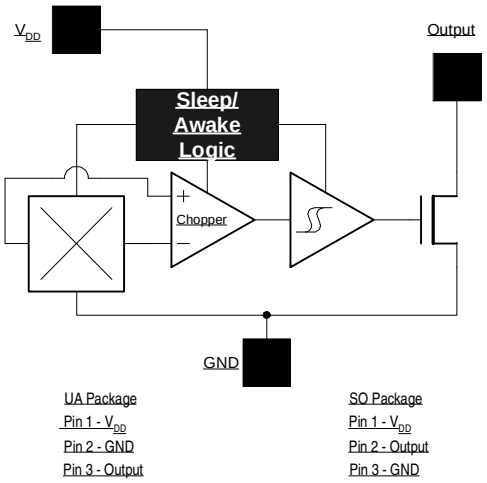
Applications

- Solid state switch
- Handheld Wireless Handset Awake Switch
- Lid close sensor for battery powered devices
- Magnet proximity sensor for reed switch replacement in low duty cycle applications

Ordering Information

Part No.	Temperature Suffix	Package
MLX90248	E (-40°C to 85°C)	UA (TO-92 flat)
MLX90248	E (-40°C to 85°C)	SO (SOT-23)

Functional Diagram



Note: *Static sensitive device; please observe ESD precautions. Reverse V_{DD} protection is not included. For reverse voltage protection, a 100W resistor in series with V_{DD} is recommended.*

Description

The MLX90248 Omnipolar™ Hall effect sensor IC is fabricated from mixed signal CMOS technology. It incorporates advanced chopper-stabilization techniques to provide accurate and stable magnetic switch points.

The circuit design provides an internally controlled clocking mechanism to cycle power to the Hall element and analog signal processing circuits. This serves to place the high current-consuming portions of the circuit into a “Sleep” mode. Periodically the device is “Awakened” by this internal logic and the magnetic flux from the Hall element is evaluated against the predefined thresholds. If the flux density is above or below the Bop/Brp thresholds then the output transistor is driven to change states accordingly. While in the “Sleep” cycle the output transistor is latched in its previous state. The design has been optimized for service in applications requiring extended operating lifetime in battery powered systems.

The output transistor of the 90248 will be latched on (B_{OP}) in the presence of a sufficiently strong South or North magnetic field facing the marked side of the package. The output will be latched off (B_{RP}) in the absence of a magnetic field.

The SOT-23 device is magnetically inverted from the UA SIP device

MLX90248 Electrical Specifications

DC operating parameters: T_A = 25°C, V_{DD} = 3V_{DC} (unless otherwise specified).

Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Supply Voltage	V_{DD}	Operating	2.5	2.75	3.5	V
Supply Current	I_{DD}	Average		10		uA
Output Current	I_{out}				1	mA
Saturation Voltage	V_{SAT}	I_{OUT}=1mA			0.4	V
Awake mode time	T_{aw}	Operating		150		u S
Sleep mode time	T_{sl}	Operating		50	70	mS

Magnetic Specifications

DC operating parameters: T_A = 25°C, V_{DD} =3 V_{DC} (unless otherwise specified).

90248

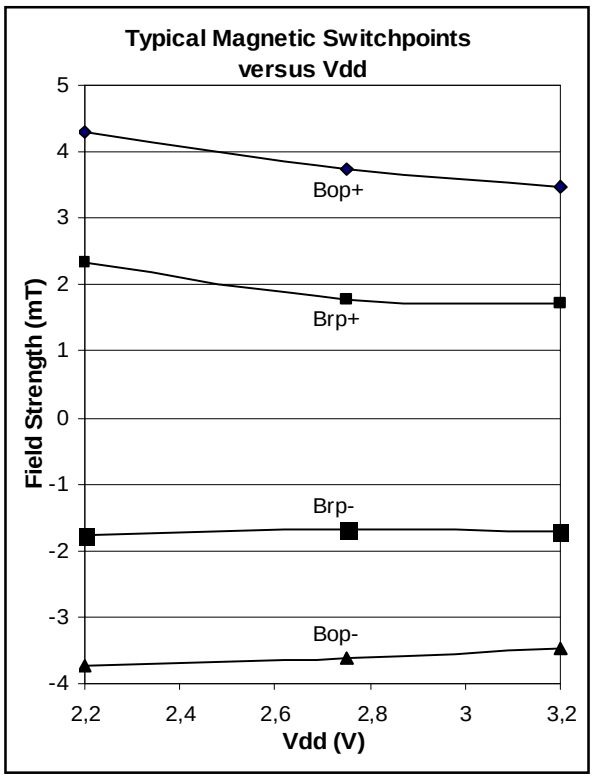
Parameter	Symbol	Test Conditions	Min	Typ	Max	Units
Operating Point	B_{OP}			+/-3.8	+/-6.0	mT
Release Point	B_{RP}		+/-0.5	+/-2.1		mT
Hysteresis	B_{hys}			1.7		mT

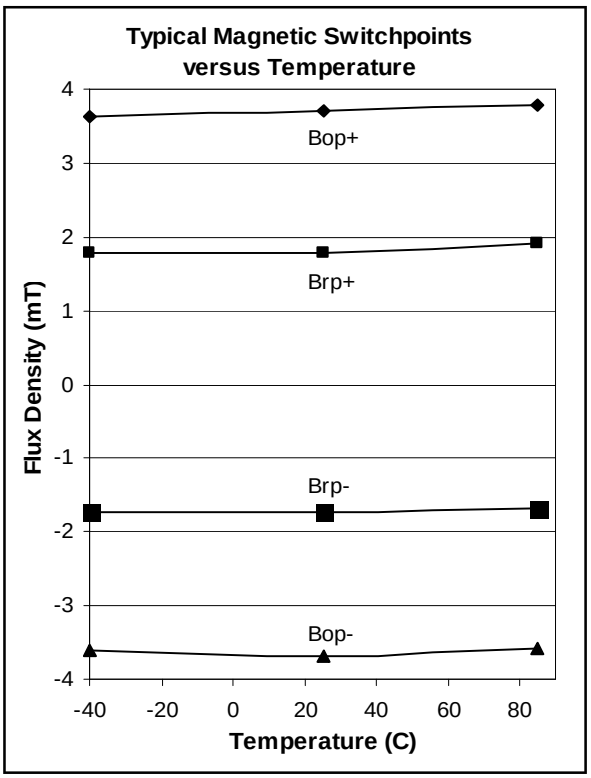
Note: 1 mT = 10 Gauss.

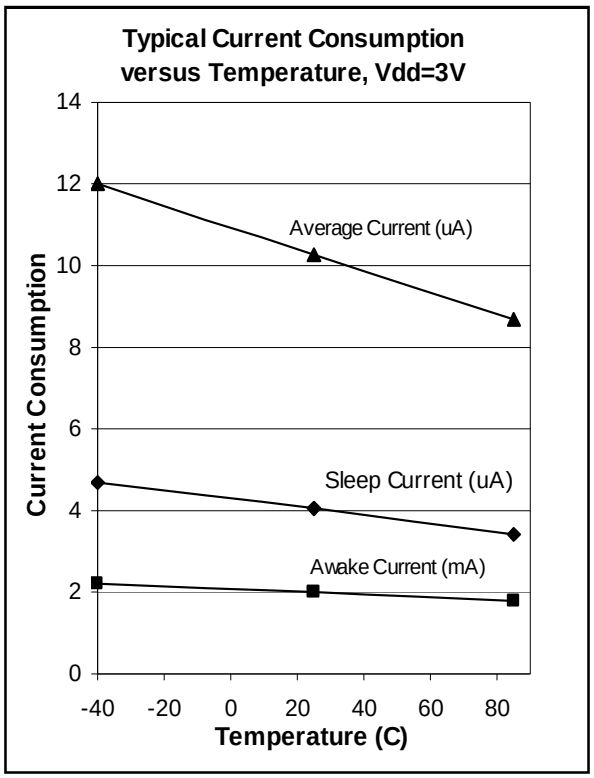
Absolute Maximum Ratings

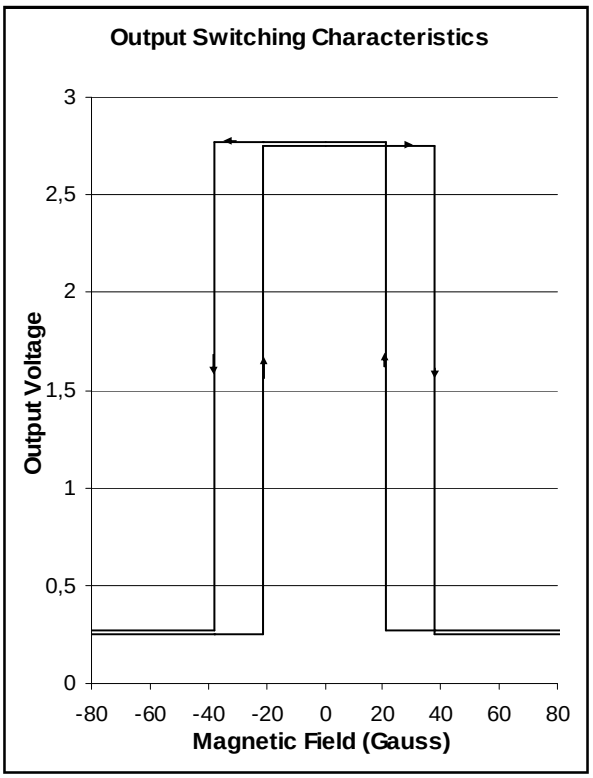
Supply Voltage (Operating), V_{DD}	5V
Supply Current (Fault), I_{DD}	5mA
Output Voltage, V_{OUT}	5V
Output Current (Fault), I_{OUT}	5mA
Operating Temperature Range, T_A	-40 to 85°C
Storage Temperature Range, T_S	-55 to 150°C

Performance Graphs









Unique Features

CMOS Hall IC Technology

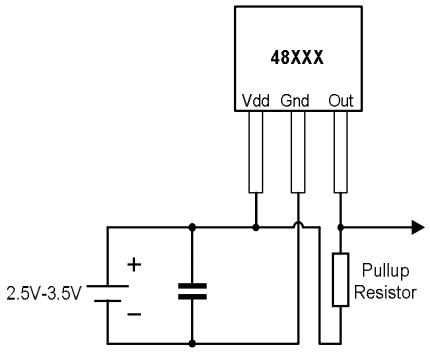
The chopper stabilized amplifier uses switched capacitor techniques to eliminate the amplifier offset voltage, which, in bipolar devices, is a major source of temperature sensitive drift. CMOS makes this advanced technique possible. The CMOS chip is also much smaller than a bipolar chip, allowing very sophisticated circuitry to be placed in less space. The small chip size also contributes to lower physical stress and less power consumption.

Installation Comments

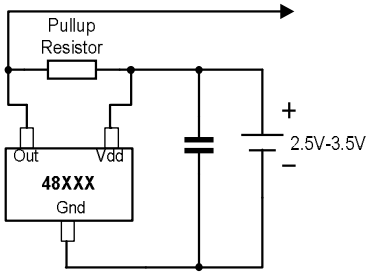
Consider temperature coefficients of Hall IC and magnetics, as well as air gap and life time variations. Observe temperature limits during wave soldering.

Typical Application

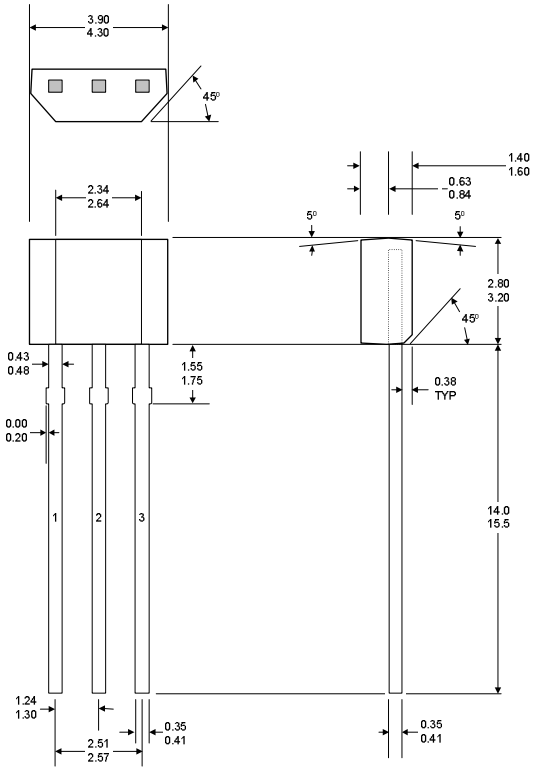
UA Package



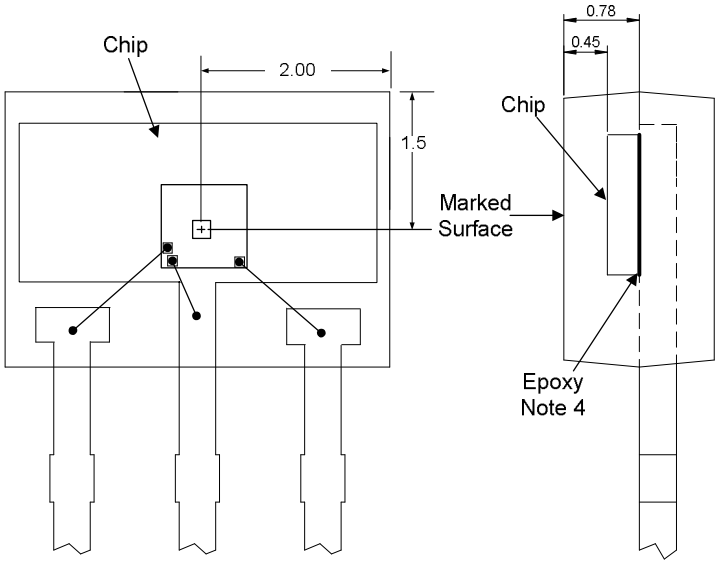
SOT-23 (Top View)



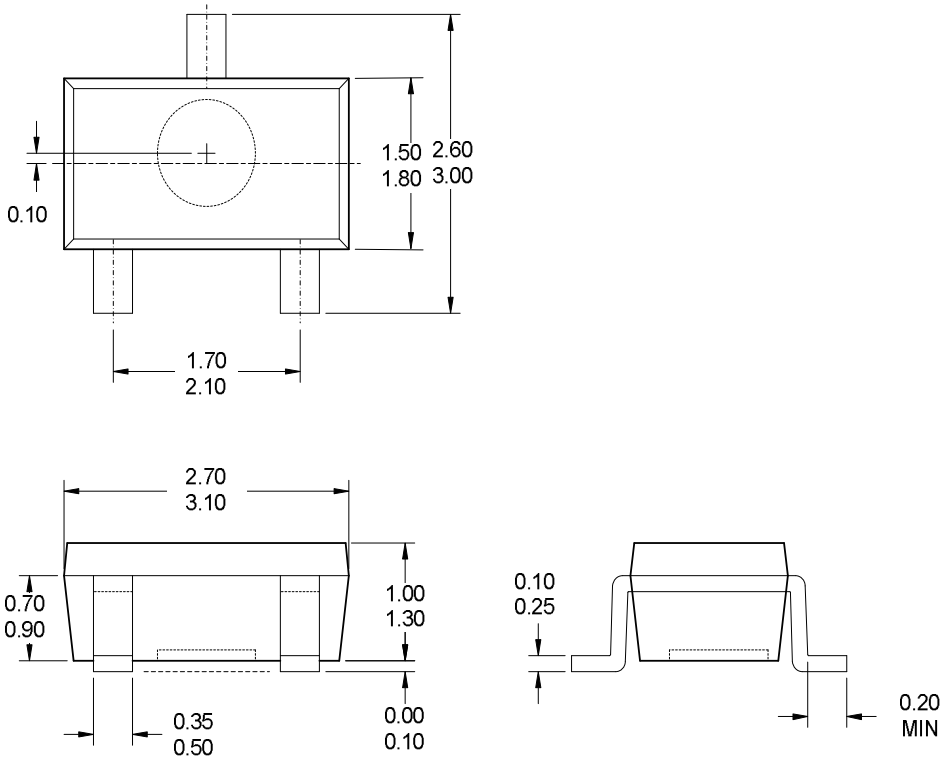
TO-92 (UA) Package Physical Characteristics



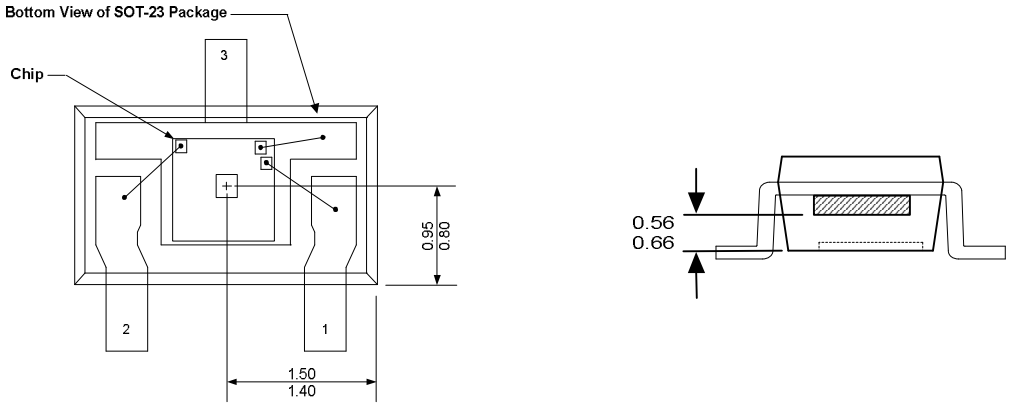
TO-92 (UA) Package Hall Location



SOT-23 (SO) Package Physical Characteristics



SOT-23 (SO) Package Hall Location



Reliability information

Melexis devices are classified and qualified regarding suitability for infrared, vapor phase and wave soldering with usual (63/37 SnPb-) solder (melting point at 183degC).
The following test methods are applied:

- IPC/JEDEC J-STD-020A (issue April 1999)
  Moisture/Reflow Sensitivity Classification For Nonhermetic Solid State Surface Mount Devices
  CECC00802 (issue 1994)
- Standard Method For The Specification of Surface Mounting Components (SMDs) of Assessed Quality
- MIL 883 Method 2003 / JEDEC-STD-22 Test Method B102
  Solderability

For all soldering technologies deviating from above mentioned standard conditions (regarding peak temperature, temperature gradient, temperature profile etc) additional classification and qualification tests have to be agreed upon with Melexis.

The application of Wave Soldering for SMD's is allowed only after consulting Melexis regarding assurance of adhesive strength between device and board.

For more information on manufacturability/solderability see quality page at our website: http://www.melexis.com/

ESD Precautions

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

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