

MH248 Hall-effect sensor is a temperature stable, stress-resistant, micro-power switch. Superior high-temperature performance is made possible through a dynamic offset cancellation that utilizes chopper-stabilization. This method reduces the offset voltage normally caused by device over molding, temperature dependencies, and thermal stress.

MH248 includes the following on a single silicon chip: voltage regulator, Hall voltage generator, small-signal amplifier, chopper stabilization, Schmitt trigger, open-drain output. Advanced CMOS wafer fabrication processing is used to take advantage of low-voltage requirements, component matching, very low input-offset errors, and small component geometries.

This device requires the presence of omni-polar magnetic fields for operation.

MH248 is rated for operation between the ambient temperatures  $-40^{\circ}\text{C}$  and  $+85^{\circ}\text{C}$  for the E temperature range. The four package styles available provide magnetically optimized solutions for most applications. Package types SO is an SOT-23(1.1 mm nominal height), SQ is an QFN2020-3(0.5 mm nominal height), Tsot-23 is an ST(0.7 mm nominal height), a miniature low-profile surface-mount package, while package UA is a three-lead ultra-mini SIP for through-hole mounting.

The package type is in a lead Halogen Free version was verified by third party Lab.

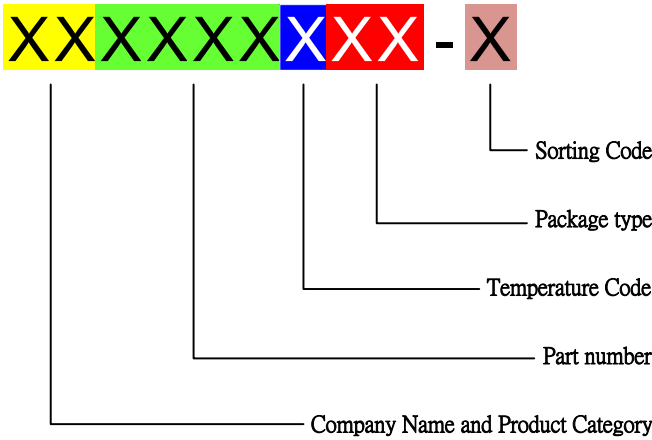
### ***Features and Benefits***

- CMOS Hall IC Technology
- Solid-State Reliability
- Micro power consumption for battery-powered applications
- Omni polar, output switches with absolute value of North or South pole from magnet
- Operation down to 2.5 V and Max at 3.5V.
- High Sensitivity for direct reed switch replacement applications
- Multi Small Size option
- Custom sensitivity selection is available in optional package.
- Pb Free/Green chip is qualified by third party lab.

### ***Applications***

- Solid state switch
- Handheld Wireless Handset Awake Switch ( Flip Cell/PHS Phone/Note Book/Flip Video Set)
- Lid close sensor for battery powered devices
- Magnet proximity sensor for reed switch replacement in low duty cycle applications

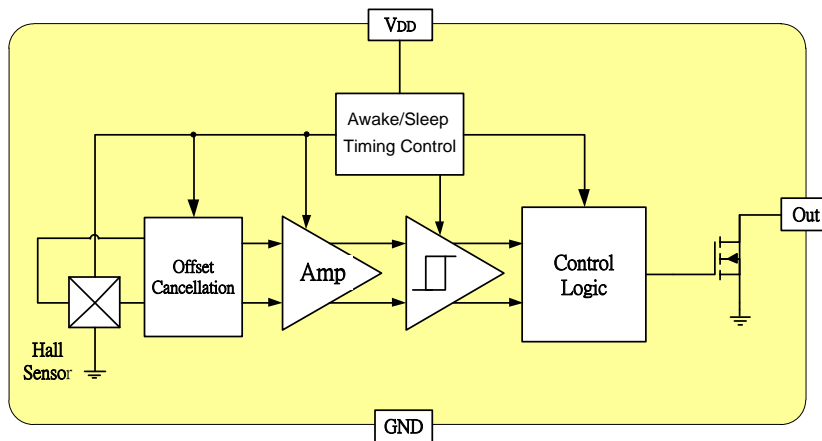
**Ordering Information**

	<p><b>Company Name and Product Category</b>          MH:MST Hall Effect/MP:MST Power IC</p> <p><b>Part number</b>          181,182,183,184,185,248,249,276,477,381,381F,381R,382.....          If part # is just 3 digits, the forth digit will be omitted.</p> <p><b>Temperature range</b>          E: 85 °C, I: 105 °C, K: 125 °C, L: 150 °C</p> <p><b>Package type</b>          UA:TO-92S,VK:TO-92S(4pin),VF:TO-92S(5pin),SO:SOT-23,          SQ:QFN-3,ST:TSOT-23,SN:SOT-553,SF:SOT-89(5pin),          SS:TSOT-26,SD:DFN-6</p> <p><b>Sorting</b>  <math>\alpha</math>, <math>\beta</math>, Blank.....</p>
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Part No.	Temperature Suffix	Package Type
MH248EUA	E (-40°C to + 85°C)	UA (TO-92S)
MH248ESO	E (-40°C to + 85°C)	SO (SOT-23)
MH248EST	E (-40°C to + 85°C)	ST (TSOT-23)
MH248ESQ	E (-40°C to + 85°C)	SQ (QFN2020-3)
MH248ESO- $\alpha$	E (-40°C to + 85°C)	SO (SOT-23)
MH248ESO- $\beta$	E (-40°C to + 85°C)	SO (SOT-23)
MH248ESO- $\gamma$	E (-40°C to + 85°C)	SO (SOT-23)

Custom sensitivity selection is available by MST sorting technology

**Functional Diagram**



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

**Absolute Maximum Ratings At ( $T_a=25\text{ }^\circ\text{C}$ )**

Characteristics		Values	Unit
Supply voltage, ( $V_{DD}$ )		5	V
Output Voltage, ( $V_{out}$ )		5	V
Reverse voltage, ( $V_{DD}$ ) ( $V_{out}$ )		-0.3	V
Magnetic flux density		Unlimited	Gauss
Output current ( $I_{out}$ )		2	mA
Operating temperature range, ( $T_a$ )		-40 to +85	$^\circ\text{C}$
Storage temperature range, ( $T_s$ )		-55 to +150	$^\circ\text{C}$
Maximum Junction Temp, ( $T_j$ )		150	$^\circ\text{C}$
Thermal Resistance	( $\theta_{JA}$ ) UA / SO / ST / SQ	206 / 543 / 310 / 543	$^\circ\text{C}/\text{W}$
	( $\theta_{JC}$ ) UA / SO / ST / SQ	148 / 410 / 223 / 410	$^\circ\text{C}/\text{W}$
Package Power Dissipation, ( $P_D$ ) UA / SO / ST / SQ		606 / 230 / 400 / 230	mW

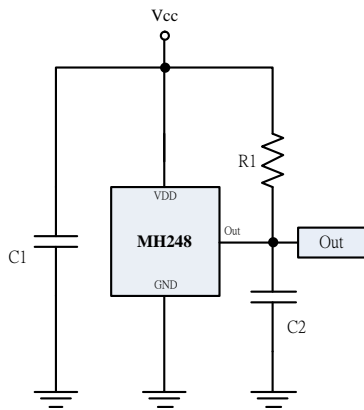
*Note: Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.*

**Electrical Specifications**

*DC Operating Parameters  $T_A=+25\text{ }^\circ\text{C}$ ,  $V_{DD}=3.0\text{V}$*

Parameters	Test Conditions	Min	Typ	Max	Units
Supply Voltage, ( $V_{DD}$ )	Operating	2.5		3.5	V
Supply Current, ( $I_{DD}$ )	Awake State		2.5	4.0	mA
	Sleep State		8.0	12	$\mu\text{A}$
	Average		10	16	$\mu\text{A}$
Output Leakage Current, ( $I_{off}$ )	Output off			1	$\mu\text{A}$
Output Low Voltage, ( $V_{sat}$ )	$I_{OUT}=1\text{mA}$			0.3	V
Awake mode time, ( $T_{aw}$ )	Operating		70		$\mu\text{S}$
Sleep mode time, ( $T_{sl}$ )	Operating		70		mS
Duty Cycle, ( $D, C$ )			0.1		%
Operate Point, ( $B_{OPS}$ ) ( $B_{OPN}$ )	S pole to branded side, $B > BOP$ , $V_{out}$ On	6		60	Gauss
	N pole to branded side, $B > BOP$ , $V_{out}$ On	-60		-6	
Release Point ( $B_{RPS}$ ) ( $B_{RPN}$ )	S pole to branded side, $B < BRP$ , $V_{out}$ Off	5		59	Gauss
	N pole to branded side, $B < BRP$ , $V_{out}$ Off	-60		-5	
Hysteresis, ( $B_{HYS}$ )	$ BOPx - BRPx $		7		Gauss

**Typical Application circuit**

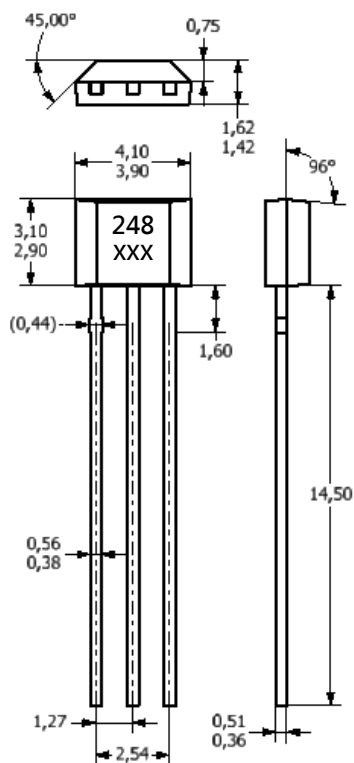


C1 : 10nF  
 C2 : 100pF  
 R1 : 100KΩ

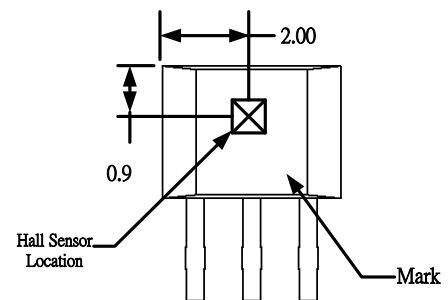
**Sensor Location, Package Dimension and Marking**

**MH248 Package**

**UA Package**



**Hall Chip location**



**NOTES:**

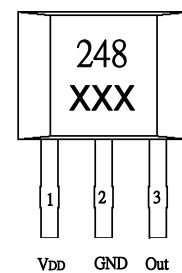
- 1).Controlling dimension: mm
- 2).Leads must be free of flash and plating voids
- 3).Do not bend leads within 1 mm of lead to package interface.

**4).PINOUT:**

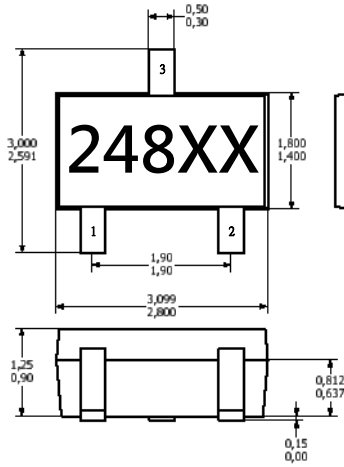
- |       |        |
|-------|--------|
| Pin 1 | VDD    |
| Pin 2 | GND    |
| Pin 3 | Output |

**Output Pin Assignment**

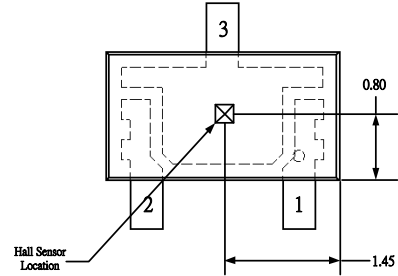
**(Top view)**



**SO Package**  
**(Top View)**



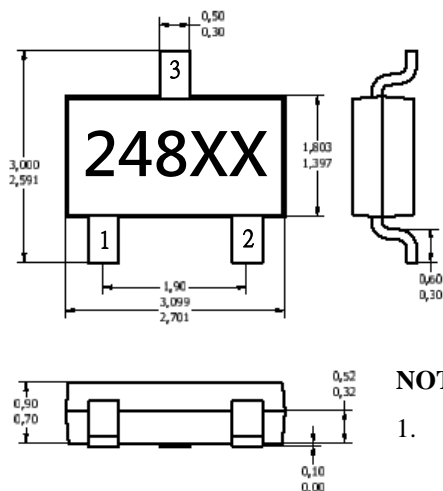
**Hall Plate Chip Location**  
**(Bottom view)**



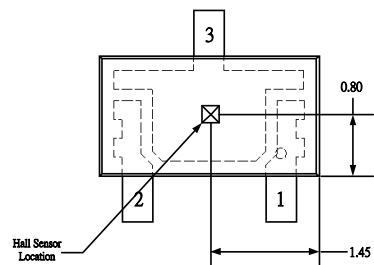
**NOTES:**

1. PINOUT (See Top View at left :)  
 Pin 1 V<sub>DD</sub>  
 Pin 2 Output  
 Pin 3 GND
2. Controlling dimension: mm
3. Lead thickness after solder plating will be 0.254mm maximum

**ST Package (TSOT-23)**  
**(Top View)**



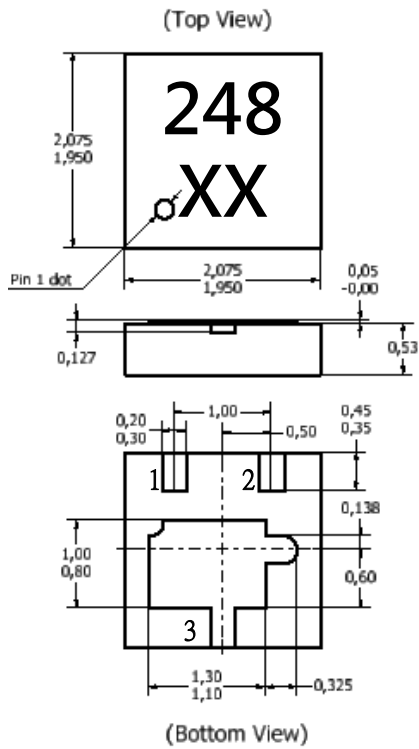
**Hall Plate Chip Location**  
**(Bottom view)**



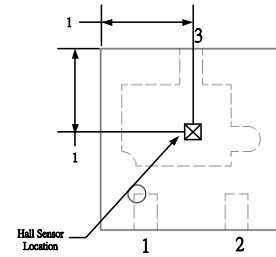
**NOTES:**

1. PINOUT (See Top View at left:)  
 Pin 1 V<sub>DD</sub>  
 Pin 2 Output  
 Pin 3 GND
2. Controlling dimension: mm;

**SQ Package**



**Hall Plate Chip Location**  
**(Top view)**



**NOTES:**

3. PINOUT (See Top View at left)  
Pin 1 VDD  
Pin 2 Output  
Pin 3 GND
4. Controlling dimension: mm;
5. Chip rubbing will be 10mil maximum;
6. Chip must be in PKG. center.