



## *MH259 Specifications*

# **Micropower Open Drain Output Hall Effect Switch**

MH259 Hall-effect sensor is a temperature stable, stress-resistant 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.

MH259 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.

MH259 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), SP is an PSOT-23(0.55 mm nominal height), ST is an SOT-23(0.7mm 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 Halogen Free version was verified by third party Lab.


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

- CMOS Hall IC Technology
- Strong RF noise protection
- 2.5 to 6.0V for battery-powered applications
- Omni polar, output switches with absolute value of North or South pole from magnet
- Operation down to 2.5V, Micro power consumption
- High Sensitivity for reed switch replacement applications
- Multi Small Size option
- Low sensitivity drift in crossing of Temp range
- Ultra Low power consumption at 350uA (Avg)
- High ESD Protection, HBM  $> \pm 4\text{KV}$ ( min )
- Open Drain output
- RoHS compliant 2011/65/EU and Halogen Free

### ***Applications***

- Solid state switch
- Lid close sensor for battery powered devices
- Magnet proximity sensor for reed switch replacement in low duty cycle applications
- Water Meter
- Floating Meter

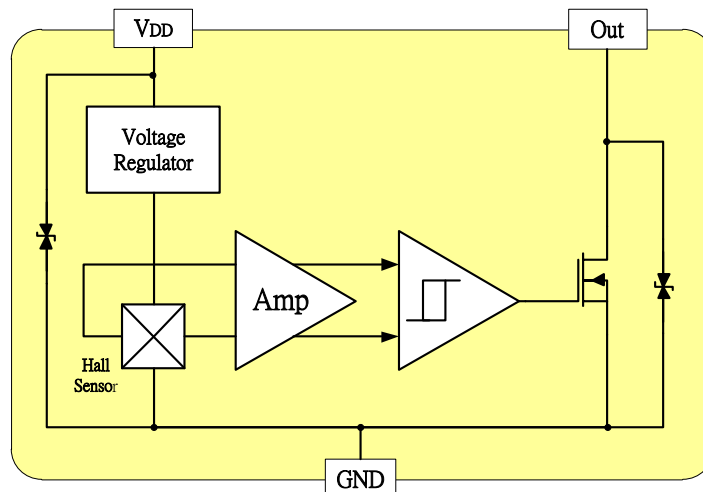
### Ordering Information

	<p><b>Company Name and Product Category</b></p> <p>MH:MST Hall Effect/MP:MST Power IC</p> <p><b>Part number</b></p> <p>181,182,183,184,185,248,249,276,477,381,381F,381R,382.....</p> <p>If part # is just 3 digits, the fourth digit will be omitted.</p> <p><b>Temperature range</b></p> <p>E: 85 °C, I: 105 °C, K: 125 °C, L: 150 °C</p> <p><b>Package type</b></p> <p>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,SG:SOT-89(3pin)</p> <p><b>Sorting</b></p> <p><math>\alpha</math>, <math>\beta</math>, Blank.....</p>
<p>Sorting Code</p> <p>Package type</p> <p>Temperature Code</p> <p>Part number</p> <p>Company Name and product Category</p>	

Part No.	Temperature Suffix	Package Type
MH259KUA	K (-40°C to + 125°C)	UA (TO-92S)
MH259EUA	E (-40°C to + 85°C)	UA (TO-92S)
MH259ESO	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.



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### Micropower Open Drain Output Hall Effect Switch

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

Characteristics		Values	Unit
Supply voltage, ( $V_{DD}$ )		6.5	V
Output Voltage, ( $V_{out}$ )		6.5	V
Reverse voltage, ( $V_{DD}$ ) ( $V_{out}$ )		-0.3	V
Magnetic flux density		Unlimited	Gauss
Output current, ( $I_{out}$ )		10	mA
Operating Temperature Range, ( $T_a$ )	“E” version	-40 to +85	$^\circ\text{C}$
	“K” version	-40 to +125	$^\circ\text{C}$
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	206 / 543	$^\circ\text{C}/\text{W}$
	( $\theta_{JC}$ ) UA / SO	148 / 410	$^\circ\text{C}/\text{W}$
Package Power Dissipation, ( $P_D$ ) UA / SO		606 / 230	mW

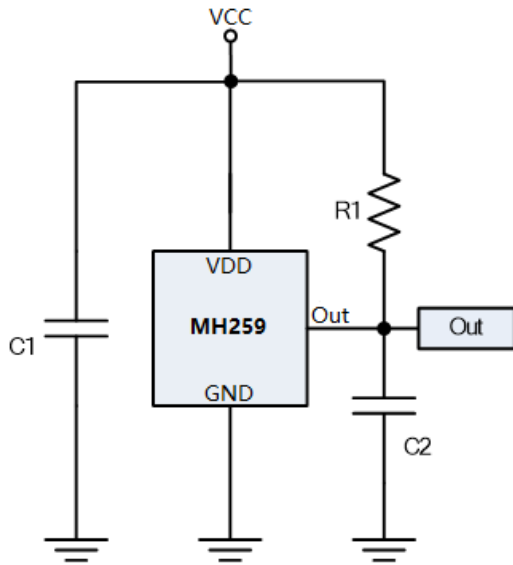
*Note: Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.*

#### 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		6	V
Supply Current, ( $I_{DD}$ )	Awake State		1.5	3.0	mA
	Sleep State		3.5	7.0	$\mu\text{A}$
	Average		350	600	$\mu\text{A}$
Output Saturation Voltage,	$I_{out}=5\text{mA}$ , $B > BOP$			200	mV
Output Leakage Current, ( $I_{off}$ )	$I_{OFF}$ $B < BRP$ , $V_{OUT} = 5.5\text{V}$			1.0	$\mu\text{A}$
Awake mode time, ( $T_{aw}$ )	Operating		40	80	$\mu\text{s}$
Sleep mode time, ( $T_{SL}$ )	Operating		160	320	$\mu\text{s}$
Duty Cycle, ( $D, C$ )			25		%
Response Time, ( $T_{RES}$ )				2000	Hz
Electro-Static Discharge	HBM	4			KV
Operating Point	BOPS S pole to branded side, $B > BOP$ , $V_{out}$	20		55	Gauss
	BOPN N pole to branded side, $B > BOP$ , $V_{out}$	-55		-20	Gauss
Release Point	BRPS S pole to branded side, $B < BRP$ , $V_{out}$	10		45	Gauss
	BRPN N pole to branded side, $B < BRP$ , $V_{out}$	-45		-10	Gauss
Hysteresis	BHYS $ BOP_x - BRP_x $		10		Gauss

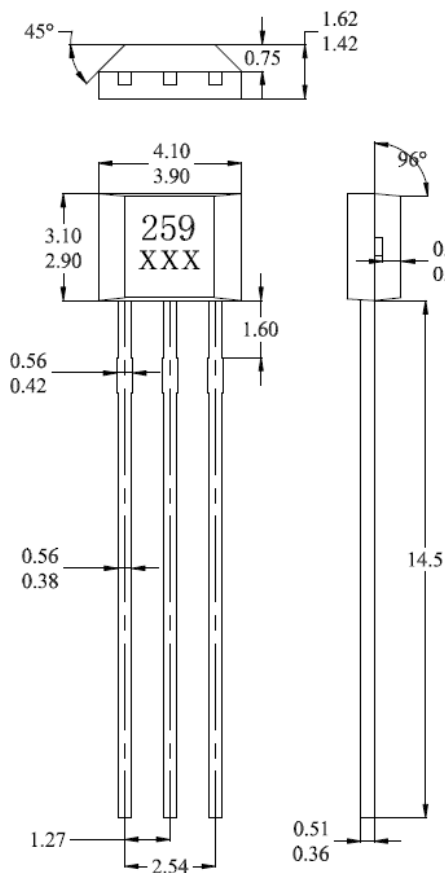
### Typical Application circuit



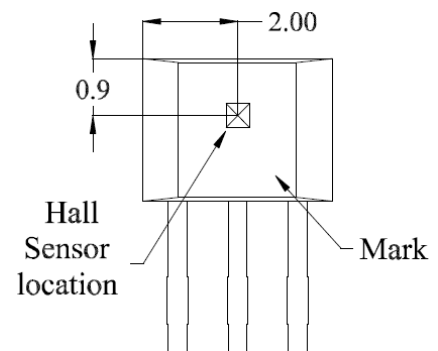
C1 : 10nF  
 C2 : 100pF  
 R1 : 10KΩ

### Sensor Location, Package Dimension and Marking

#### UA Package

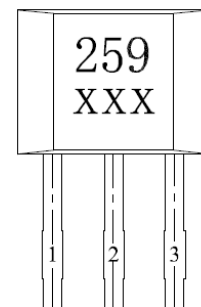


#### Hall Chip location



#### Output Pin Assignment

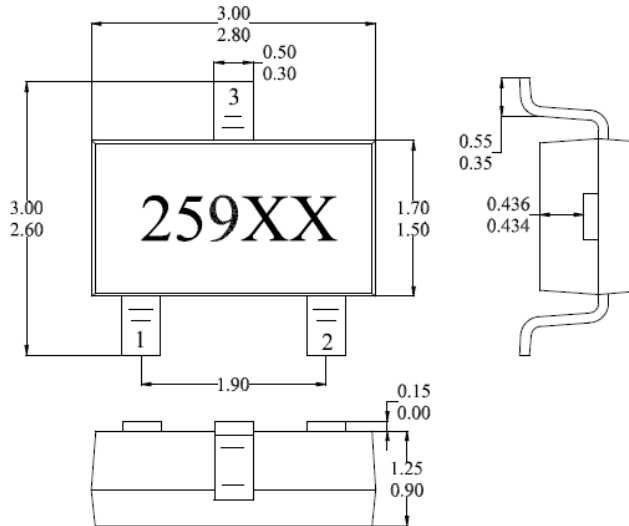
(Top view)



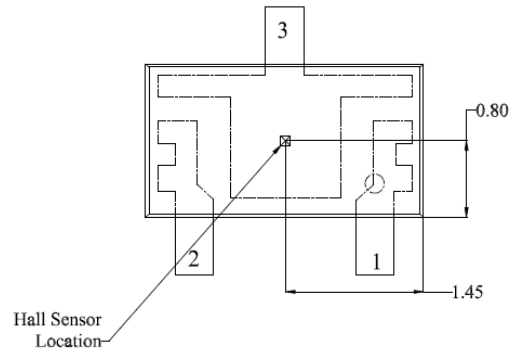
#### NOTES:

- 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

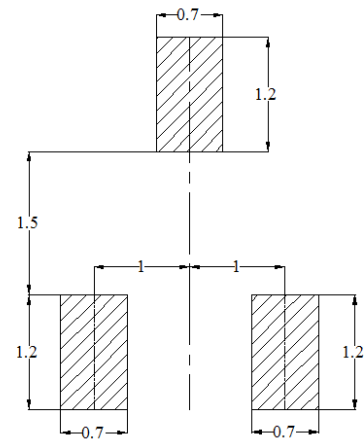
### SO Package (Top View)



### Hall Plate Chip Location (Bottom view)



### (For reference only) Land Pattern



#### NOTES:

1. PINOUT (See Top View at left :)  
 Pin 1  $V_{DD}$   
 Pin 2 Output  
 Pin 3 GND
2. Controlling dimension: mm
3. Lead thickness after solder plating will be 0.254mm maximum