

MH253 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.

MH253 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.

MH253 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(0.55 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 Halogen Free version was verified by third party Lab.

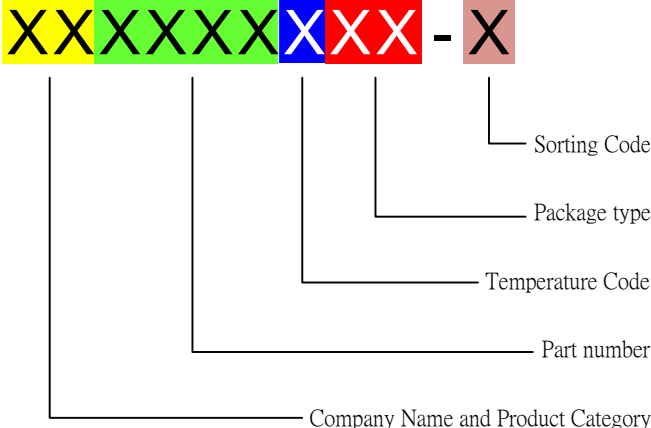
### ***Features and Benefits***

- CMOS Hall IC Technology
- Solid-State Reliability much better than reed switch
- Omni polar output switches with absolute value of North or South pole from magnet
- Low power consumption(2.6mA)
- High Sensitivity for reed switch replacement
- 100% tested at  $125^{\circ}\text{C}$  for K.
- Small Size
- ESD HBM  $\pm 4\text{KV}$  Min
- COST competitive

### ***Applications***

- Solid state switch
- Lid close sensor for power supply devices
- Magnet proximity sensor for reed switch replacement in high duty cycle applications.
- Safety Key on sporting equipment
- Revolution counter
- Speed sensor
- Position Sensor
- Rotation Sensor
- Safety Key

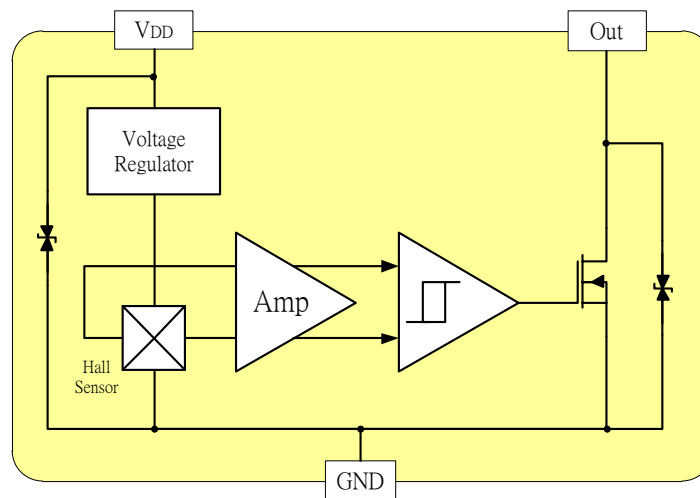
### Ordering Information

	<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 fourth 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,SG:SOT-89(3pin)</p> <p><b>Sorting</b> <math>\alpha, \beta</math>, Blank.....</p>
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Part No.	Temperature Suffix	Package Type
MH253KUA	K (-40°C to + 125°C)	UA (TO-92S)
MH253EUA	E (-40°C to + 85°C)	UA (TO-92S)
MH253ESO	E (-40°C to + 85°C)	SO (SOT-23)
MH253ESQ	E (-40°C to + 85°C)	SQ (QFN2020-3)

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 ( $T_a=25^\circ\text{C}$ )

Characteristics		Values	Unit
Supply voltage, ( $V_{DD}$ )		7	V
Output Voltage, ( $V_{out}$ )		6	V
Reverse voltage, ( $V_{DD}$ ) ( $V_{out}$ )		-0.3	V
Magnetic flux density		Unlimited	Gauss
Output current, ( $I_{out}$ )		25	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 / SQ	206 / 543 / 543	$^\circ\text{C}/\text{W}$
	( $\theta_{JC}$ ) UA / SO / SQ	148 / 410 / 410	$^\circ\text{C}/\text{W}$
Package Power Dissipation, ( $P_D$ ) UA / SO / SQ		606 / 230 / 230	mW

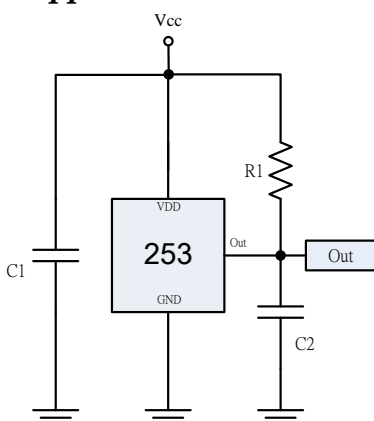
*Note:* Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute maximum-rated conditions for extended periods may affect device reliability.

### Electrical Specifications

DC Operating Parameters  $T_A=+25^\circ\text{C}$ ,  $V_{DD}=5.0\text{V}$

Parameters	Test Conditions	Min	Typ	Max	Units
Supply Voltage, ( $V_{DD}$ )	Operating	2.5		6	V
Supply Current, ( $I_{DD}$ )	Average		2.6	6.0	mA
Output Low Voltage, ( $V_{DS(ON)}$ )	$I_{OUT}=10\text{mA}$			400	mV
Output Leakage Current, ( $I_{off}$ )	$I_{OFF}$ B<BRP, $V_{OUT} = 5\text{V}$			10	$\mu\text{A}$
Output Rise Time, ( $T_R$ )	$R_L=10\text{k}\Omega$ , $C_L=20\text{pF}$			0.45	$\mu\text{s}$
Output Fall Time, ( $T_F$ )	$R_L=10\text{k}\Omega$ ; $C_L=20\text{pF}$			0.45	$\mu\text{s}$
Electro-Static Discharge	HBM	4			KV
Operate Point, ( $B_{OPS}$ ) ( $B_{OPN}$ )	S pole to branded side, $B > BOP$ , $V_{out}$ On		30	60	Gauss
	N pole to branded side, $B > BOP$ , $V_{out}$ On	-60	-30		
Release Point ( $B_{RPS}$ ) ( $B_{RPN}$ )	S pole to branded side, $B < BRP$ , $V_{out}$ Off	5	25		Gauss
	N pole to branded side, $B < BRP$ , $V_{out}$ Off		-25	-5	
Hysteresis, ( $B_{HYS}$ )	$ B_{OPx} - BRPx $		5		Gauss

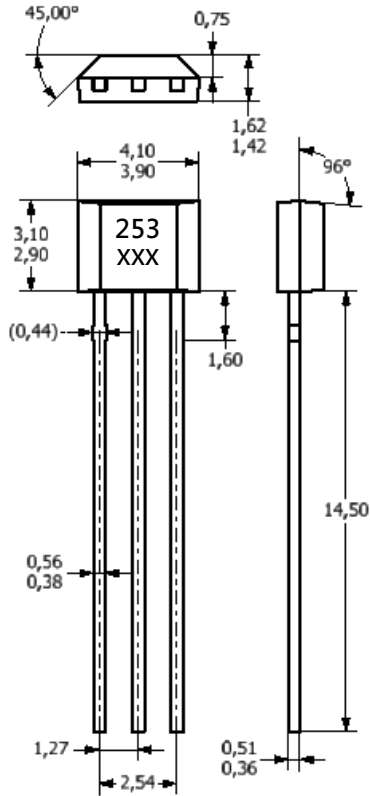
### Typical Application circuit



$C1 : 10\text{nF}$   
 $C2 : 100\text{pF}$   
 $R1 : 10\text{K}\Omega$

**Sensor Location, Package Dimension and Marking**  
**MH253 Package**

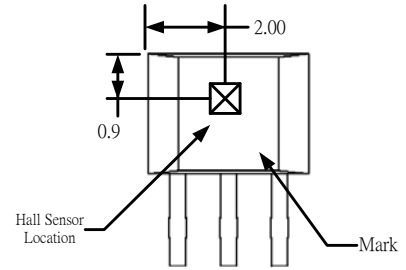
**UA Package**



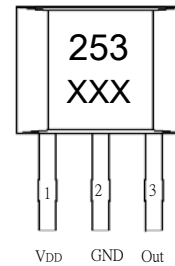
**NOTES:**

- 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

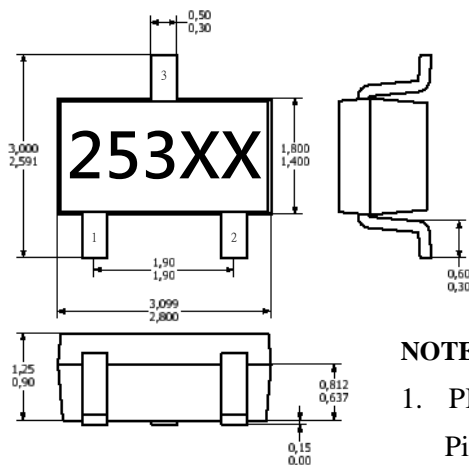
**Hall Chip location**



**Output Pin Assignment (Top view)**



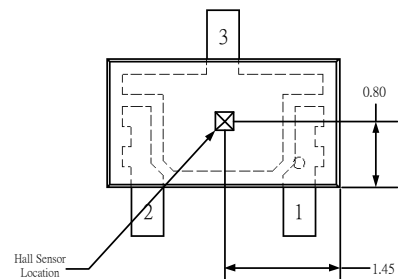
**SO Package (Top View)**



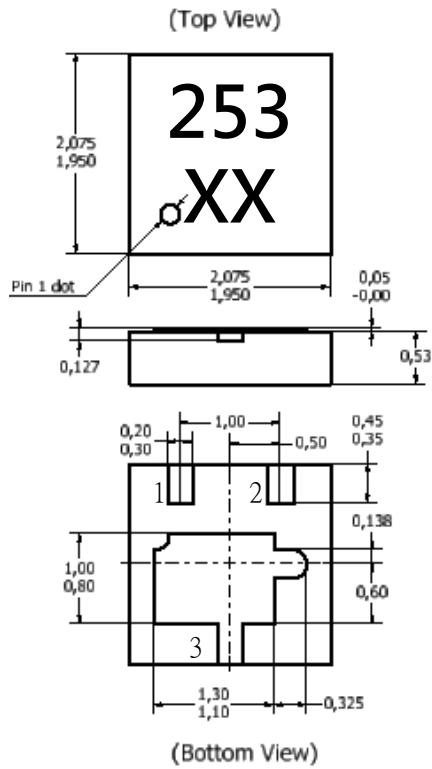
**NOTES:**

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

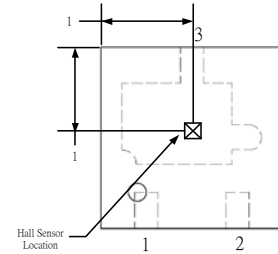
**Hall Plate Chip Location (Bottom view)**



**SQ Package**



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



**NOTES:**

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

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