



## ***MH193 Specifications***

### **Ultra High Sensitivity Built-in Pull High Res Hall Effect Latch**

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MH193 Hall-effect sensor is a temperature stable, stress-resistant sensor. 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.

MH193 includes the following on a single silicon chip: voltage regulator, Hall voltage generator, small-signal amplifier, chopper stabilization, Schmitt trigger, Pull-up resistor output. Advanced DMOS 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 both south and north polarity magnetic fields for operation. In the presence of a south polarity field of sufficient strength, the device output sensor on, and only switches off when a north polarity field of sufficient strength is present.

MH193 is rated for operation between the ambient temperatures  $-40^{\circ}\text{C}$  and  $85^{\circ}\text{C}$  for the E temperature range, and  $-40^{\circ}\text{C}$  to  $125^{\circ}\text{C}$  for the K temperature range. The two package styles available provide magnetically optimized solutions for most applications. Package SO is an SOT-23, a miniature low-profile surface-mount package, while package UA is a three-lead ultra mini SIP for through-hole mounting.

Packages is Halogen Free standard and which have been verified by third party lab.

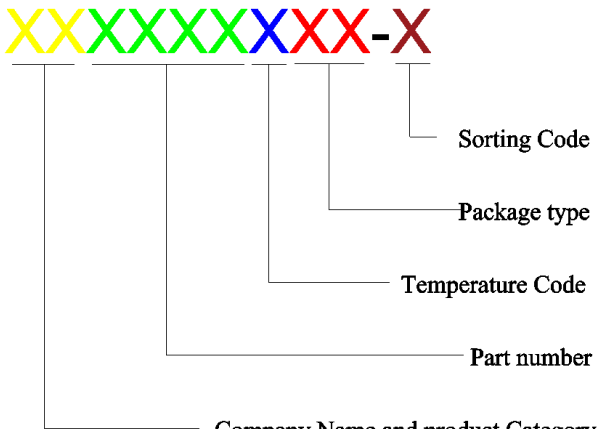
### ***Features and Benefits***

- DMOS Hall IC Technology
- Chopper stabilized amplifier stage.
- Optimized for BLDC motor applications.
- Reliable and low shifting on high Temp condition.
- Switching offset compensation at typically 69kHz
- Pull-up resistor output
- Good ESD Protection.
- 100% tested at  $125^{\circ}\text{C}$  for K.
- Custom sensitivity / Temperature selection are available.
- RoHS compliant 2011/65/EU and Halogen Free

### ***Applications***

- High temperature Fan motor
- 3 phase BLDC motor application
- Speed sensing
- Position sensing
- Current sensing
- Revolution counting
- Solid-State Switch
- Linear Position Detection
- Angular Position Detection
- Proximity Detection
- High ESD Capability

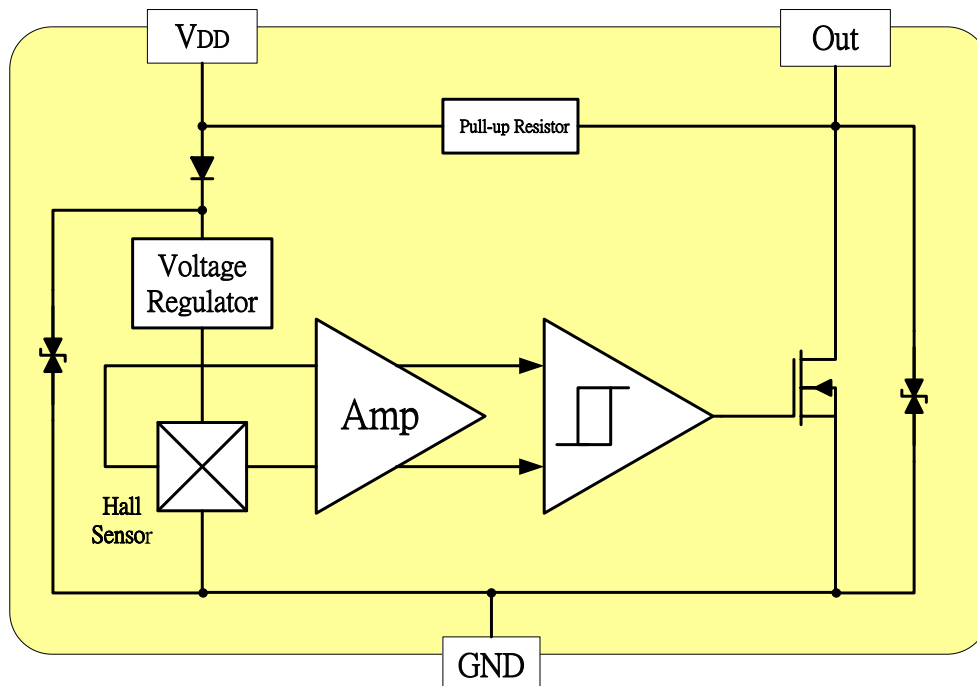
### Ordering Information

	<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
MH193KUA	K (-40°C to + 125°C)	UA (TO-92S)
MH193KSO	K (-40°C to + 125°C)	SO (SOT-23)
MH193EUA	E (-40°C to + 85°C)	UA (TO-92S)
MH193ESO	E (-40°C to + 85°C)	SO (SOT-23)

*KUA spec is using in industrial and automotive application. Special Hot Testing is utilized.*

### Functional Diagram



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

Characteristics		Values	Unit
Supply voltage, ( $V_{DD}$ )		28	V
Output Voltage, ( $V_{out}$ )		28	V
Reverse Voltage, ( $V_{DD} / V_{out}$ )		-0.3	V
Output current, ( $I_{SINK}$ )		25	mA
Operating Temperature Range, ( $T_A$ )	“E” Class	-40 ~ +85	$^{\circ}\text{C}$
	“K” Class	-40 ~ +125	$^{\circ}\text{C}$
Storage temperature range, ( $T_S$ )		-65 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

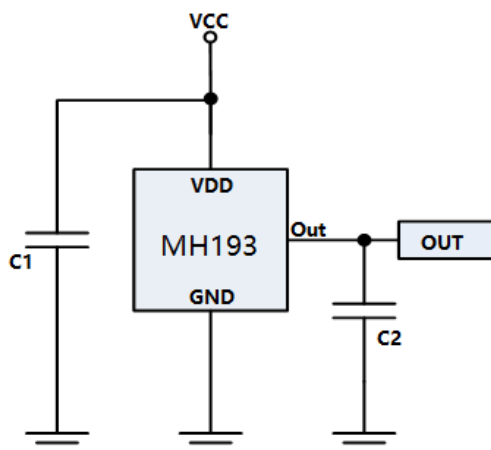
Note: Do not apply reverse voltage to  $V_{DD}$  and  $V_{OUT}$  Pin, It may be caused for Miss function or damaged device.

### Electrical Specifications

DC Operating Parameters :  $T_A=+25^{\circ}\text{C}$ ,  $V_{DD}=12\text{V}$

Parameters	Test Conditions	Min	Typ	Max	Units
Supply Voltage, ( $V_{DD}$ )	Operating	2.5		26	V
Supply Current, ( $I_{DD}$ )	$B < B_{OP}$			5.0	mA
Output Saturation Voltage, ( $V_{sat}$ )	$B > B_{OP}$			400.0	mV
Output Leakage Current, ( $I_{off}$ )	$I_{OFF} B < B_{RP}$ , $V_{OUT} = 12\text{V}$			10.0	$\mu\text{A}$
Internal Oscillator Chopper Frequency, ( $f_{OSC}$ )			69		kHz
Output Rise Time, ( $T_R$ )	$R_L=1.1\text{K}\Omega$ , $C_L=20\text{pF}$		0.04	0.45	$\mu\text{s}$
Output Fall Time, ( $T_F$ )	$R_L=820\Omega$ ; $C_L=20\text{pF}$		0.18	0.45	$\mu\text{s}$
Electro-Static Discharge	HMB	4			KV
Pull-up Resistor, ( $R_a$ )			10		$\text{K}\Omega$
Operate Point, (BOP)		5		25	GS
Release Point, (BRP)		-25		-5	GS
Hysteresis, (BHYS)			30		GS

### Typical application circuit

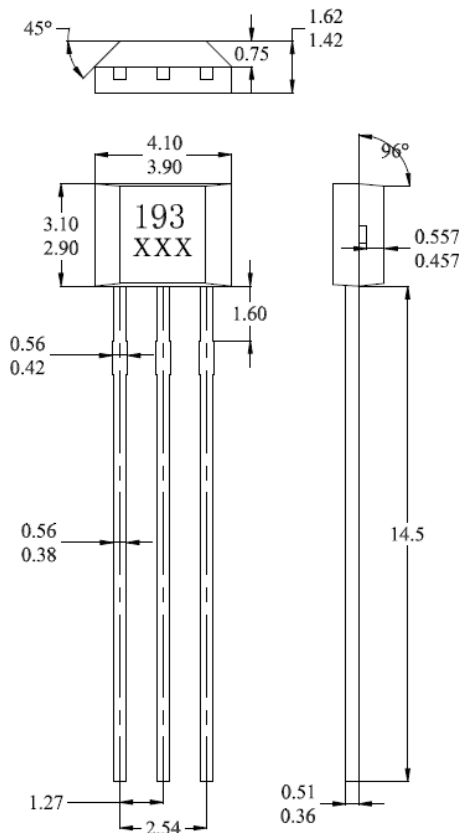


C1 : 10nF

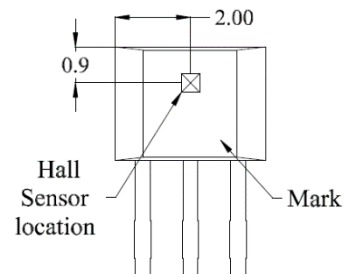
C2 : 1nF

### Sensor Location, Package Dimension and Marking

#### UA Package



#### Hall Chip location

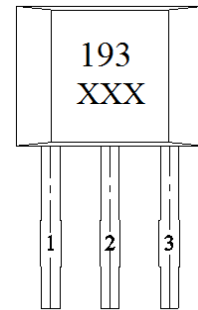


#### NOTES:

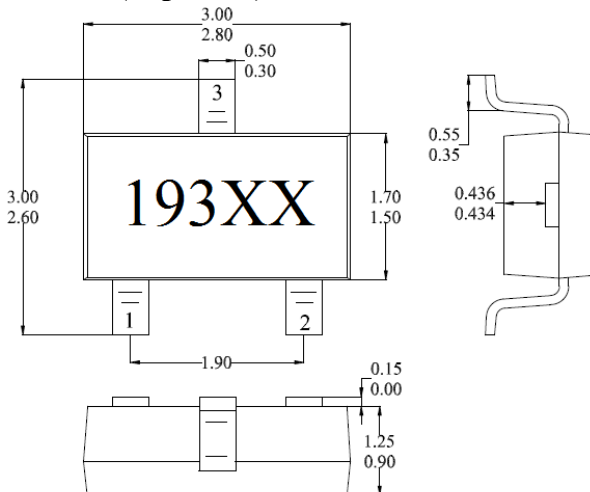
- 1).Controlling dimension: mm
- 2).Leads must be free of flash and plating voids
- 3).Do not bend leads within 1 mm of lead to package interface.
- 4).PINOUT:

Pin 1	V <sub>DD</sub>
Pin 2	GND
Pin 3	Output

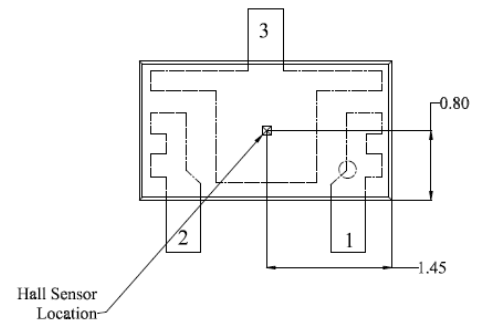
#### Output Pin Assignment (Top view)



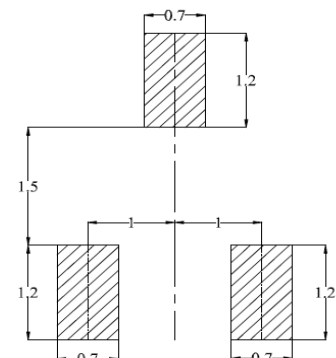
#### SO Package (Top View)



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



#### (For reference only) Land Pattern



#### NOTES:

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