

MH187 Hall-effect sensor is a temperature stable, stress-resistant latch. 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.

MH187 includes the following on a single silicon chip: voltage regulator, Hall voltage generator, small-signal amplifier, chopper stabilization, Schmitt trigger, ESD circuit protection, 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 both south and north polarity magnetic fields for operation. In the presence of a south polarity field of sufficient strength, the device output latches on, and only switches off when a north polarity field of sufficient strength is present.

MH187 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 three 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), a miniature low-profile surface-mount package, while package UA is a three-lead ultra-mini SIP for through-hole mounting.

The UA package SO type and SQ type are Halogen Free package. All of them have been verified by third party Lab.

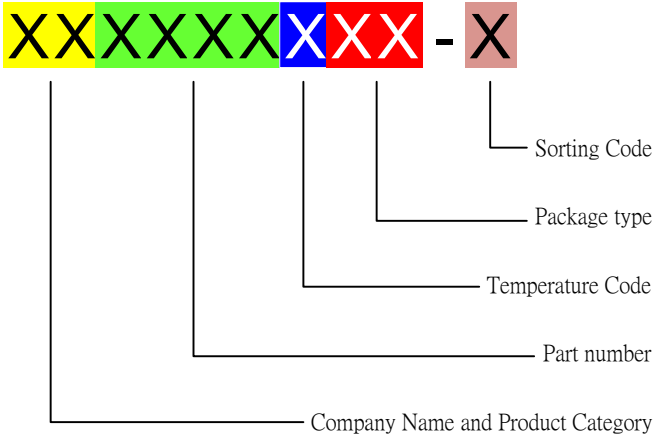
### ***Features and Benefits***

- Chopper stabilized amplifier stage
- Optimized for BLDC motor applications
- Reliable and low shifting on high Temp condition
- Good ESD Protection
- 100% tested at  $125^{\circ}\text{C}$  for K.
- 100% tested at  $150^{\circ}\text{C}$  for L.
- Custom sensitivity / Temperature selection are available.

### ***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

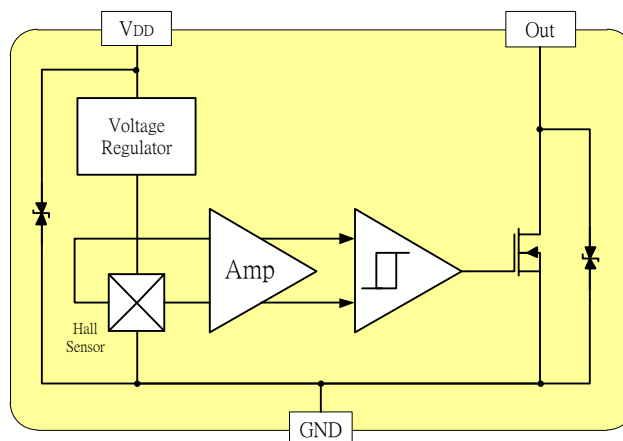
### Ordering Information

	<p><b>Company Name and Product Category</b> MH:MST Hall Effect/MP:MST Power MOSFET</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)</p> <p><b>Sorting</b> <math>\alpha</math>, <math>\beta</math>, Blank.....</p>
---	--

Part No.	Temperature Suffix	Package Type
MH187LUA	L (-40°C to + 150°C)	UA (TO-92S)
MH187KUA	K (-40°C to + 125°C)	UA (TO-92S)
MH187KSO	K (-40°C to + 125°C)	SO (SOT-23)
MH187KSQ	K (-40°C to + 125°C)	SQ (QFN2020-3)
MH187EUA	E (-40°C to + 85°C)	UA (TO-92S)
MH187ESO	E (-40°C to + 85°C)	SO (SOT-23)
MH187ESQ	E (-40°C to + 85°C)	SQ (QFN2020-3)

*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
Magnetic flux density		Unlimited	Gauss
Output current, ( $I_{out}$ )		50	mA
Operating Temperature Range, ( $T_a$ )	“E” version	-40 to +85	$^{\circ}\text{C}$
	“K” version	-40 to +125	$^{\circ}\text{C}$
	“L” version	-40 to +150	$^{\circ}\text{C}$
Storage temperature range, ( $T_s$ )		-65 to +175	$^{\circ}\text{C}$
Maximum Junction Temp, ( $T_j$ )		175	$^{\circ}\text{C}$
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		728 / 543 / 543	mW

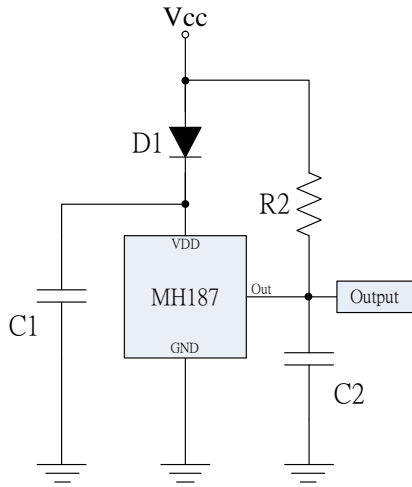
*Note: Do not apply reverse voltage to  $V_{DD}$  and  $V_{OUT}$  Pin, It may be caused for Miss function or damaged device.*

**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	3.0		26.0	V
Supply Current, ( $I_{DD}$ )	$B < B_{OP}$			5.0	mA
Output Saturation Voltage, ( $V_{sat}$ )	$I_{OUT} = 10 \text{ mA}$ , $B > B_{OP}$			400.0	mV
Output Leakage Current, ( $I_{off}$ )	$I_{OFF} B < B_{RP}$ , $V_{OUT} = 12\text{V}$			15.0	$\mu\text{A}$
Output Rise Time, ( $T_R$ )	$R_L=820\Omega$ , $C_L=20\text{pF}$			0.45	$\mu\text{S}$
Output Fall Time, ( $T_F$ )	$R_L=820\Omega$ ; $C_L=20\text{pF}$			0.45	$\mu\text{S}$
Electro-Static Discharge	HBM	4			KV
Operate Point, ( $B_{OP}$ )		15		60	Gauss
Release Point, ( $B_{RP}$ )		-60		-15	Gauss
Hysteresis, ( $B_{HYS}$ )			80		Gauss

**Typical application circuit**

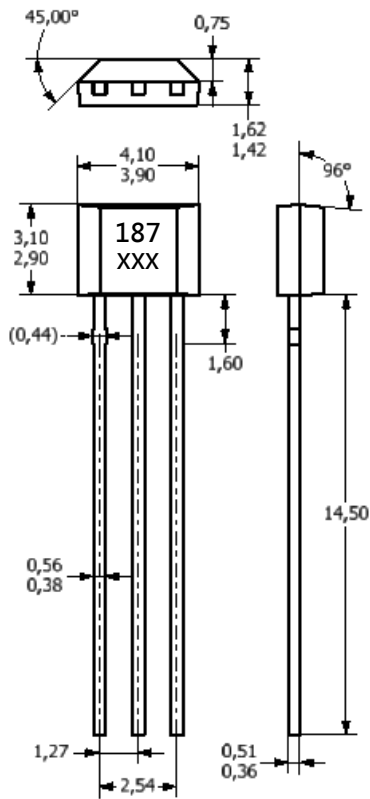


- D1 : 1N4148 or 100Ω
- C1 : 1000PF
- C2 : 15PF
- R2 : 10KΩ

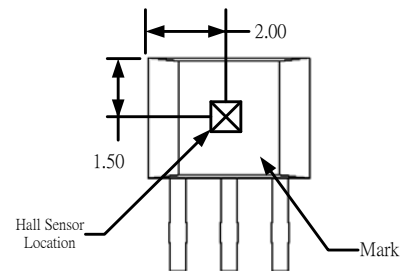
**Sensor Location, package dimension and marking**

**MH187 Package**

**UA Package**



**Hall Chip location**



**NOTES:**

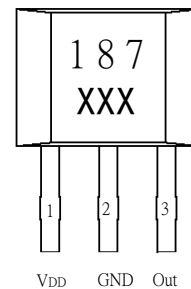
- 1).Controlling dimension: mm
- 2).Leads must be free of flash and plating voids
- 3).Do not bend leads within 1 mm of lead to package interface.

**4).PINOUT:**

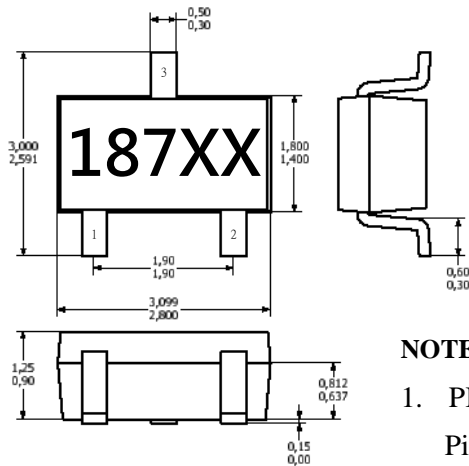
- Pin 1      VDD
- Pin 2      GND
- Pin 3      Output

**Output Pin Assignment**

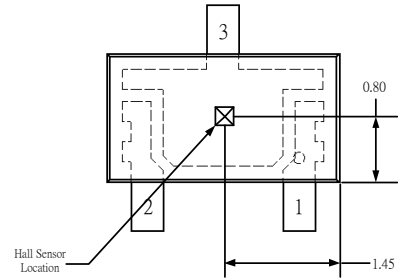
**(Top view)**



### SO Package (Top View)



### Hall Plate Chip Location (Bottom view)

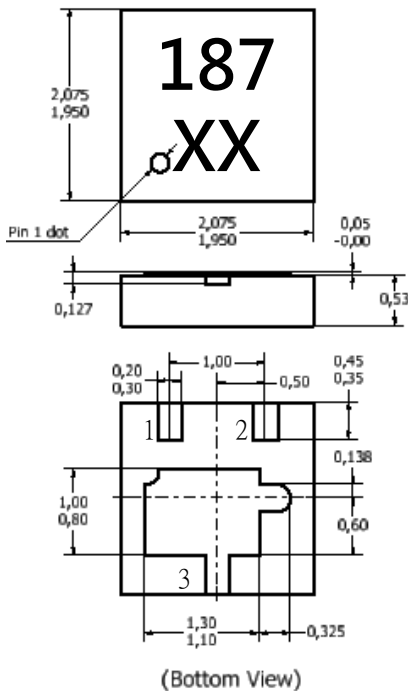


#### NOTES:

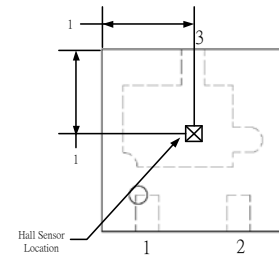
- PINOUT (See Top View at left :)  
 Pin 1  $V_{DD}$   
 Pin 2 Output  
 Pin 3 GND
- Controlling dimension: mm
- Lead thickness after solder plating will be 0.254mm maximum

### SQ Package

#### (Top View)



### Hall Plate Chip Location (Top view)



#### NOTES:

- PINOUT (See Top View at left)  
 Pin 1  $V_{DD}$   
 Pin 2 Output  
 Pin 3 GND
- Controlling dimension: mm;
- Chip rubbing will be 10mil maximum;
- Chip must be in PKG. center.