

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°C and 85°C for the E temperature range, and -40°C to 125°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.

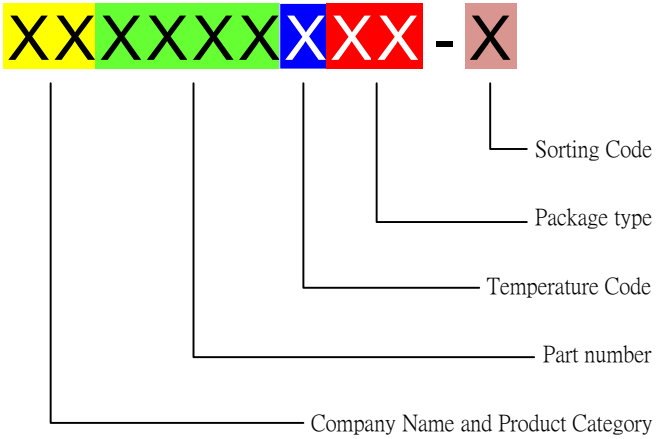
Features and Benefits

- Chopper stabilized amplifier stage
- Optimized for BLDC motor applications
- Reliable and low shifting on high Temp condition
- Good ESD Protection
- 100% tested at 125°C for K.
- 100% tested at 150°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

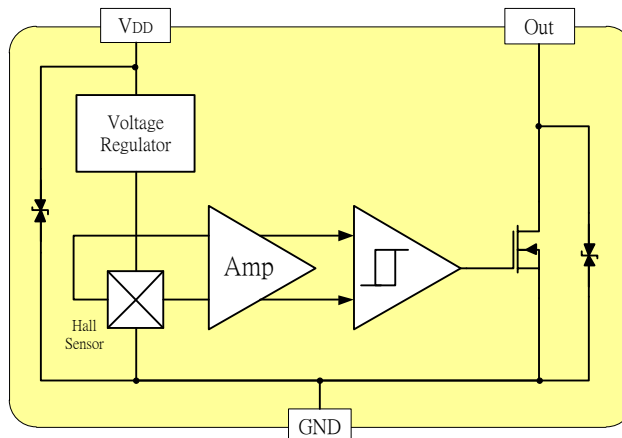
Ordering Information

	<p>Company Name and Product Category MH:MST Hall Effect/MP:MST Power MOSFET</p> <p>Part number 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>Temperature range E: 85 °C, I: 105 °C, K: 125 °C, L: 150 °C</p> <p>Package type 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>Sorting α, β, Blank.....</p>
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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	(θ_{ja}) UA / SO / SQ	206 / 543 / 543	$^{\circ}\text{C}/\text{W}$
	(θ_{jc}) UA / SO / SQ	148 / 410 / 410	$^{\circ}\text{C}/\text{W}$
Package Power Dissipation, (P_D) UA / SO / SQ		728 / 543 / 543	mW

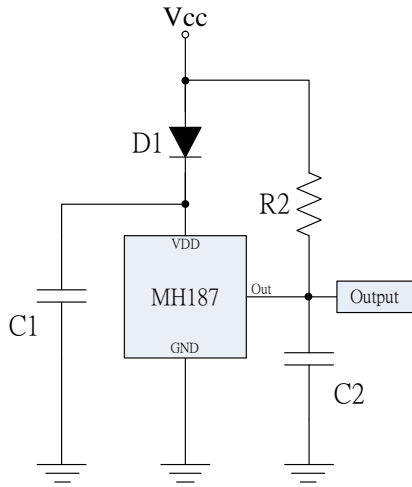
Note: Do not apply reverse voltage to V_{DD} and V_{OUT} Pin, It may be caused for Miss function or damaged device.

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	3.5		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	μA
Output Rise Time, (T_R)	$R_L=820\Omega$, $C_L=20\text{pF}$			0.45	μS
Output Fall Time, (T_F)	$R_L=820\Omega$; $C_L=20\text{pF}$			0.45	μS
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

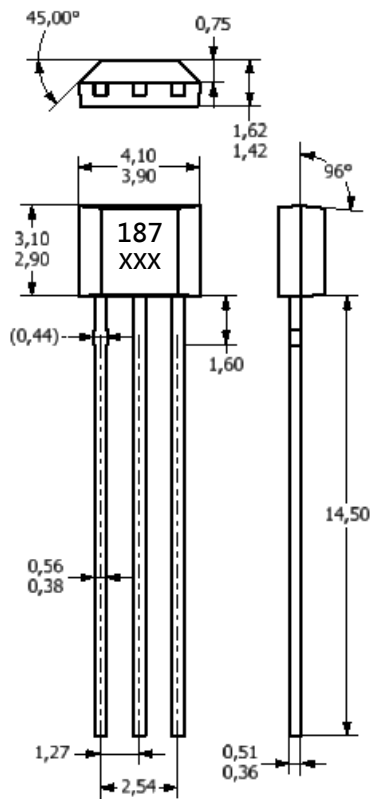


- D1 : 1N4148 or 100Ω
- C1 : 1000PF
- C2 : 15PF
- R2 : 10KΩ

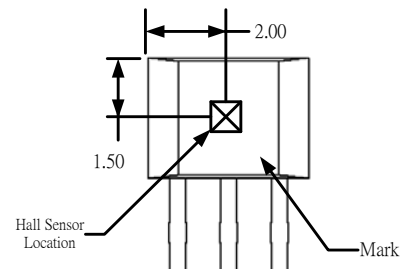
Sensor Location, package dimension and marking

MH187 Package

UA Package



Hall Chip location



NOTES:

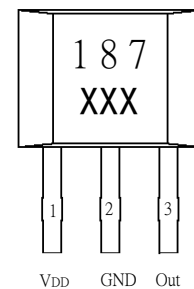
- 1).Controlling dimension: mm
- 2).Leads must be free of flash and plating voids
- 3).Do not bend leads within 1 mm of lead to package interface.

4).PINOUT:

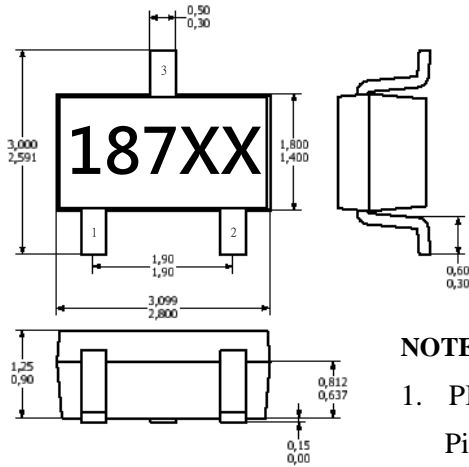
- Pin 1 VDD
- Pin 2 GND
- Pin 3 Output

Output Pin Assignment

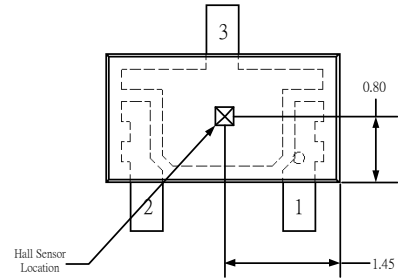
(Top view)



SO Package (Top View)



Hall Plate Chip Location (Bottom view)

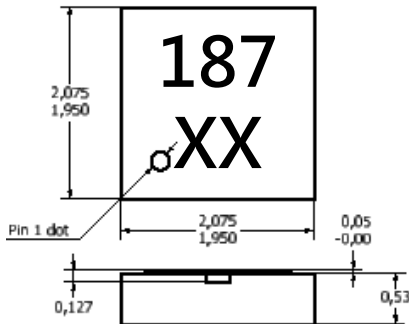


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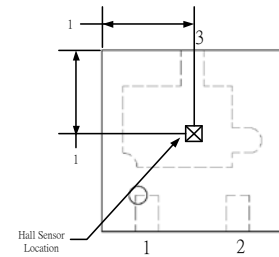
- PINOUT (See Top View at left :)
 Pin 1 V_{DD}
 Pin 2 Output
 Pin 3 GND
- Controlling dimension: mm
- Lead thickness after solder plating will be 0.254mm maximum

SQ Package

(Top View)

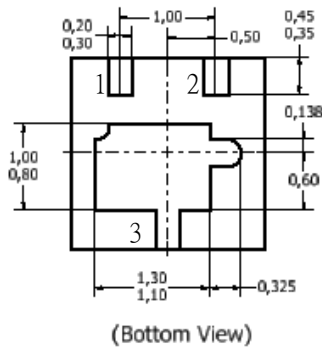


Hall Plate Chip Location (Top view)



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.



(Bottom View)