MH477 is the integrated Hall sensor with output drivers designed for electrical commutation of brush-less DC motor application. The devices are included as follows: on-chip Hall voltage generator for magnetic sensing; the amplifier that amplifies the Hall voltage; a comparator is to provide switching hysteresis for noise rejection; the bi-direction drivers for sinking and driving large current load. Internal band gap regulator is used to provide temperature compensated bias for internal circuits and allows a wide operating supply voltage range.

If a magnetic flux density larger than threshold Bop, DO is turned to sink and DOB is turned to drive. The output state is held until a magnetic flux density reversal falls below Brp causing DO to be turned to drive and DOB turned to sink.

MH477 is rated for operation over-temperature range from -20 °C to 85 °C, also the thermal shut-down function is included, and voltage range from 3.5V to 20V. The device is packaged by SIP-4.

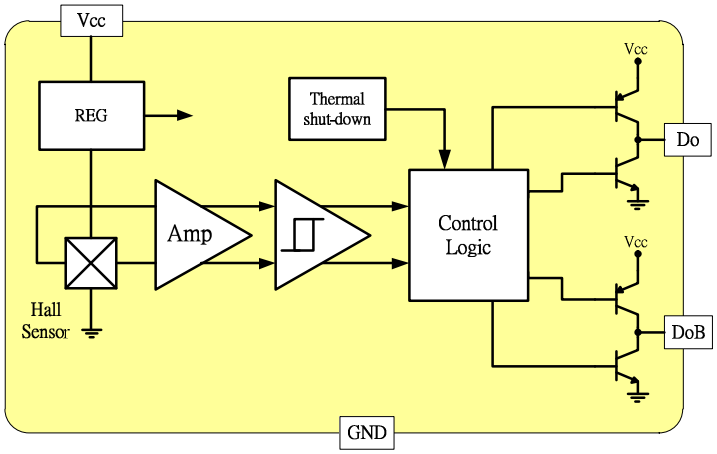
Features and Benefits

- On-chip Hall sensor with two different sensitivity and hysteresis settings
- Bi-direction H type output drivers for single coil
- Internal band gap regulator allows temperature compensated operations
- 3.5V to 20V operating voltage
- 350mA (avg.) output sink current
- -20° to +85°C operating temperature
- Thermal Shut-Down Function
- Low cost and high sensitivity Fan Driver

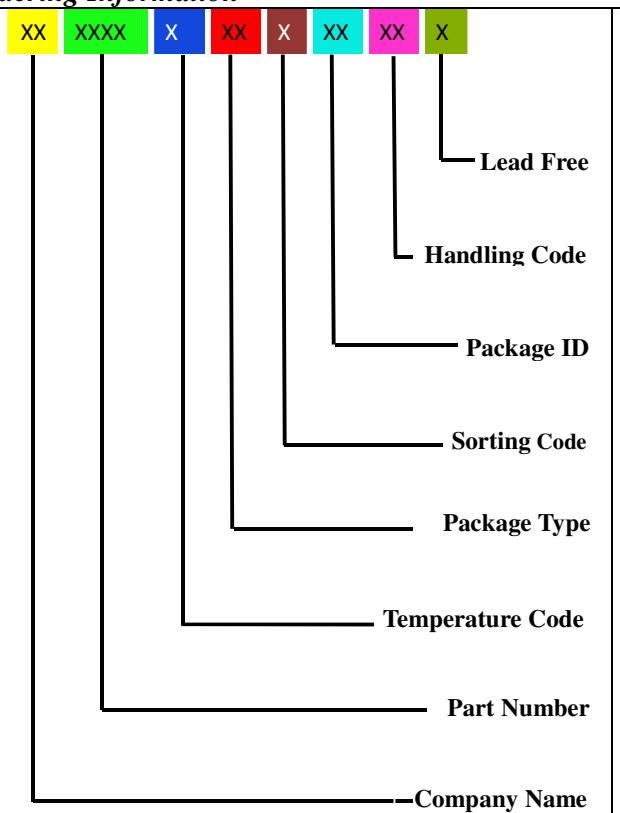
Applications

- Single-coil Brush-less DC Motor
- Single -coil Brush-less DC Fan

Functional Diagram



Ordering Information



Lead Free	BLANK: Lead Free Device ,G: Green
Handling Code	BLANK: ESD bag, TR: Tape & Reel
Package ID	01,02,03…..
Sorting Code	α , β ,Blank…..
Package Type	UA:TO-92S,SO:SOT-23,ST:Tsot-23,SQ:QFN
Temperature Code	E: 85^{O} C, K: 125^{O} C, L: 150^{O} C
Part Number	181,182,185,186,187,189,281,282,248,249…
Company Name	MH: Magnesensor Technology

Part No.	Temperature Suffix	Package Type	Grade
MH 477	E (-20° to +85°)	VK (4-pin TO-92S)	A, B

Absolute Maximum Ratings *At(Ta=25°C)*

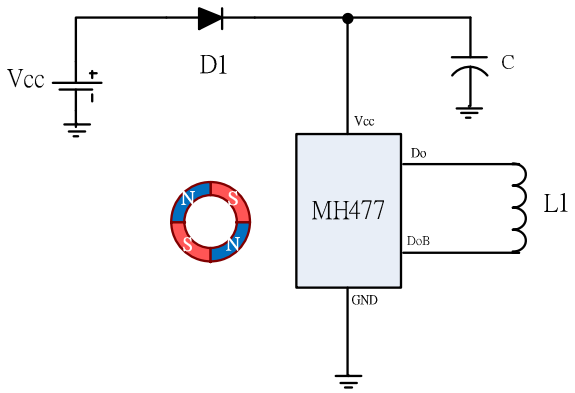
Characteristics		Values	Unit
Supply voltage, (Vcc)		20	V
Magnetic flux density		Unlimited	Gauss
Output “on” current, Icc	Continuous	350	mA
	Hold	400	
	Peak (Start Up)	700	
Operating temperature range, (Ta)		-20 to +85	°C
Storage temperature range, (Ts)		-65 to +150	°C
Maximum Junction Temp, (Tj)		150	°C
Thermal Resistance	(θ_{JA})	227	°C / w
	(θ_{JC})	49	°C / w
Package Power Dissipation, (P_D)		550	mW
Electro-Static Discharge,(HMB)		4	KV

Electrical Specifications

DC Operating Parameters T_A=25°C, V_{DD}=12V (Unless otherwise specified)

Parameters	Test Conditions	Min	Typ	Max	Units
Supply Voltage, (Vcc)		3.5		20.0	V
Supply Current, (Icc)	B<Brp		12	25.0	mA
Output Saturation Voltage (Sink)	V_{CC}=14V, I_C=200mA		280	650	mV
Output Saturation Voltage (Drive)	V_{CC}=14V, I_C=200mA	Vcc-1.3	Vcc-1	Vcc	V
Output Leakage Current,(Ic)	Vout=12V, Vce=12V		<0.1	10.0	μA
Output Rise Time,(tr)	Vcc=14V,RL=820Ω,CL=20PF		1.0	5.0	μs
Output Falling Time,(tf)	Vcc=14V,RL=820Ω,CL=20PF		0.3	1.5	μs
Switch Time Differential,(Δt)	Vcc=14V,RL=820Ω,CL=20PF		1.0	5.0	μs
Thermal shut-down Temp			160		°C
Thermal shut-down Hysteresis			30		°C

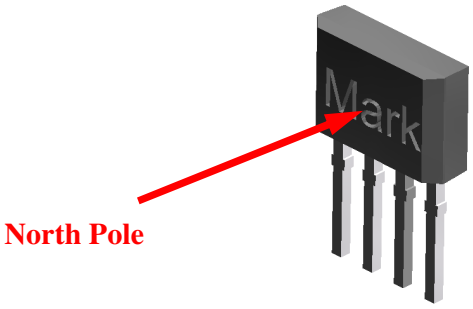
Typical application circuit

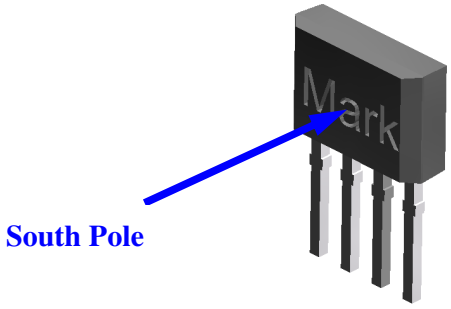


Output Behavior versus Magnetic Pole

DC Operating Parameters Ta = -20 to 85°C, Vdd = 3.5 to 20V (unless otherwise specified)

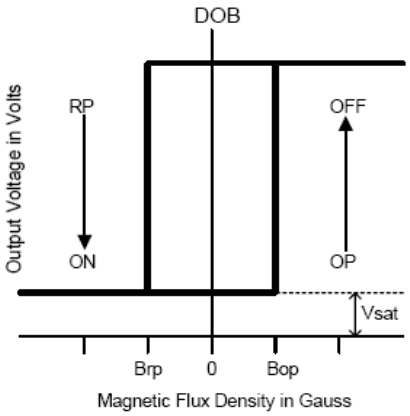
Parameter	Test condition	Do(2)	DoB(3)
South pole	B>Bop	Low	High
North pole	B<Brp	High	Low

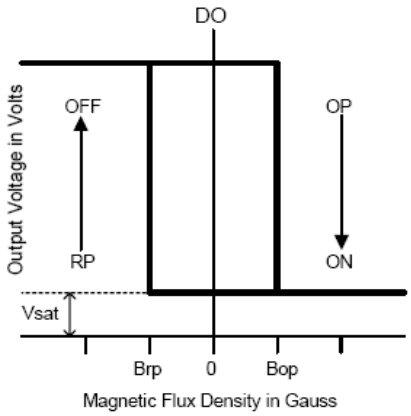




Do = High, DoB = Low(Vsat)

Do = Low(Vsat) , DoB =High





Magnetic Specifications

DC Operating Parameter T_A=25°C, V_{cc}=12V

Ⓐ Grade

Parameters	Symbol	Min	Typ	Max	Units
Operate Point	Bop	5		70	Gauss
Release Point	Brp	-70		-5	Gauss
Hysteresis	Hys		70		Gauss

Ⓑ Grade

Parameters	Symbol	Min	Typ	Max	Units
Operate Point	Bop			100	Gauss
Release Point	Brp	-100			Gauss
Hysteresis	Hys		70		Gauss

Package Power Dissipation

The power dissipation of the Package is a function of the pad size. This can vary from the minimum pad size for soldering to a pad size given for maximum power dissipation. Power dissipation for a surface mount device is determined by $T_{J(max)}$, the maximum rated junction temperature of the die, $R_{\theta JA}$, the thermal resistance from the device junction to ambient, and the operating temperature, Ta. Using the values provided on the data sheet for the Package, PD can be calculated as follows:

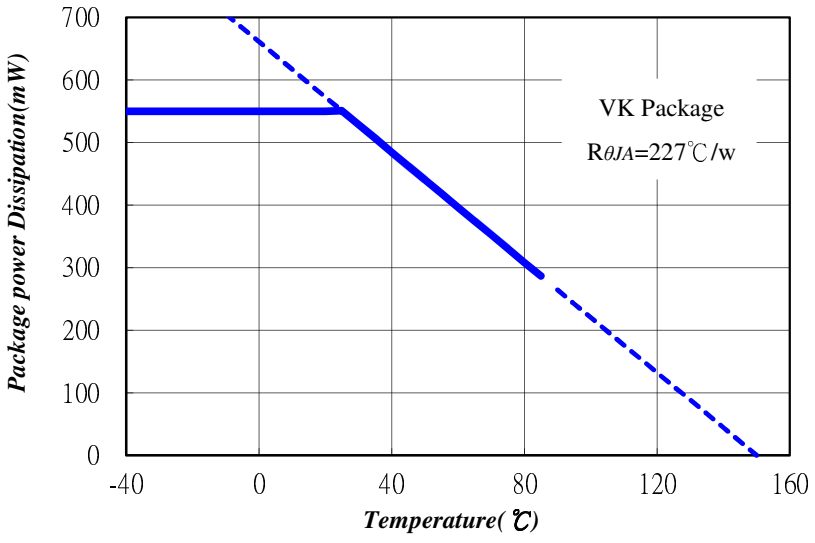
$$PD = \frac{T_{j(\max)} - T_a}{R_{\theta ja}}$$

The values for the equation are found in the maximum ratings table on the data sheet. Substituting these values into the equation for an ambient temperature Ta of 25°C, one can calculate the power dissipation of the device which in this case is 500 milliwatts.

$$P_{D(VK)} = \frac{150℃ - 25℃}{227\ ℃/W} = 550mW$$

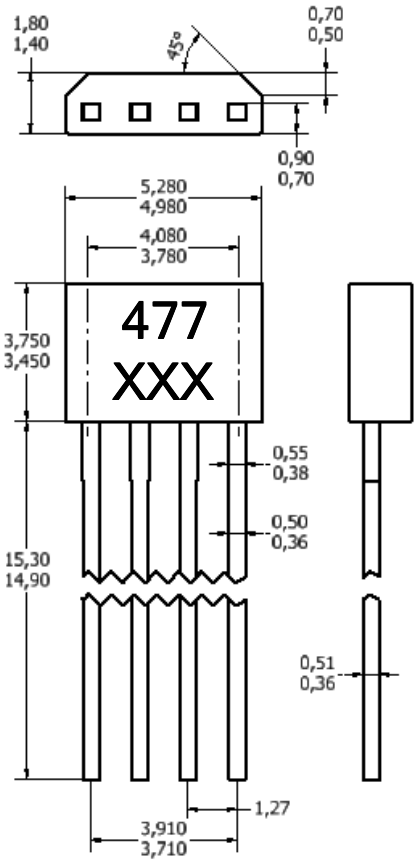
The 227°C/W for the VK package assumes the use of the recommended footprint on a glass epoxy printed circuit board to achieve a power dissipation of 550 milliwatts. There are other alternatives to achieving higher power dissipation from the Package. Another alternative would be to use a ceramic substrate or an aluminum core board such as Thermal Clad. Using a board material such as Thermal Clad, an aluminum core board, the power dissipation can be doubled using the same footprint.

Power Dissipation versusTemperature

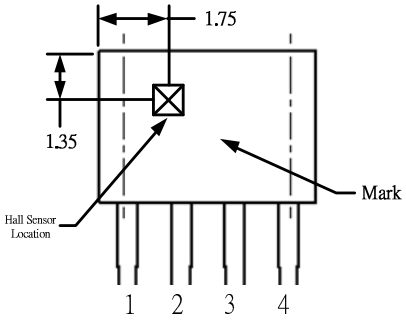


Sensor Location with Pin out and Package dimension

VK Package (To-92 4 pins)



Hall Chip location



NOTES:

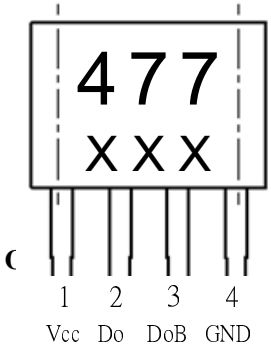
1).Controlling dimension: mm

2).Leads must be free of flash and plating voids

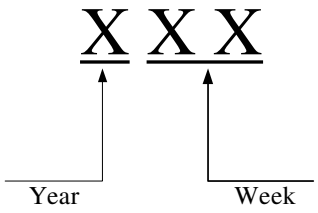
3).Do not bend leads within 1 mm of lead to package interface.

4).PINOUT:

Pin 1	Vcc
Pin 2	DO
Pin 3	DOB
Pin 4	GND

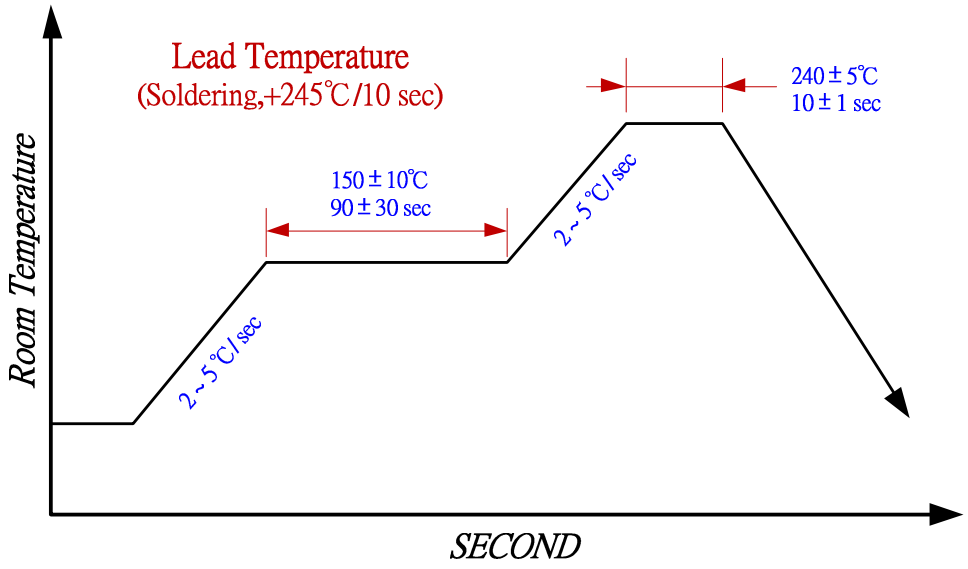


MH 477 VK (To-92S 4 pins) Date Code



EX：2010 Year_8 Week → 008

IR reflow curve



VK Soldering Condition

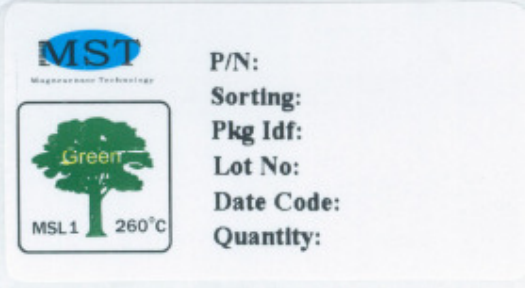
9. Packing specification:

Package	Per Reel/Bag	Per inner box	Per carton
TO-92S-4L	1,000pcs/bag	10bag /box	8 box/carton

10. Inner box label:

Bag and inner box PB free Label

Bag and inner box Green Label



Size: 3.4cm*6.4cm

Carton label:

Size: 5.6 cm * 9.8 cm

Combine lots:

When lots are combined, one reel could have two D/C； No more than two; One carton could have two devices, no more than two;