General Description

The OCH2987 is an integrated Hall sensor with H-Bridged output driver designed for brushless DC motor applications. The device is using HV process includes an on-chip Hall sensor for magnetic sensing, an amplifier that amplifies the Hall voltage, a comparator to provide switching hysteresis for noise rejection, a bi-directional drivers for sinking and driving large current load.

Placing the device in a variable magnetic field, if the magnetic flux density is larger than threshold BOP, the DO is turned to sink and DOB is turned to drive. This output state is held until the magnetic flux density reverses and falls below BRP, then causes DO to be turned to drive and DOB turned to sink.

OCH2987 is available in SIP-4L package and is rated over the -40°C to 125°C.

Features

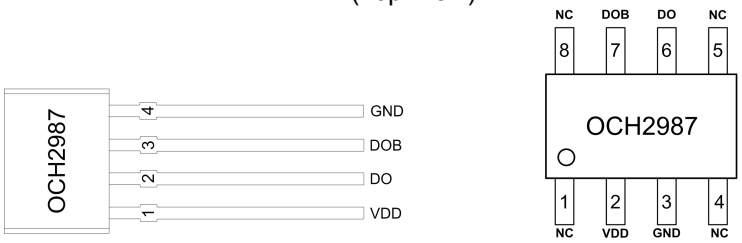
- One-chip Solution (Hall Element + Driver)
- Input Voltage Range : 3V to 24V
- Low Output Switching Current Noise
- Built-in VCC To GND reverse voltage protection
- Rotor Lock Protection (Lock detection, output shutdown and automatic re-start)
- High Sensitivity Hall Sensor
  BOP(25GS),BRP(-25GS)
- Thermal Shutdown Protection
- -40℃ to +125 ℃ Temperature Range
- RoHS Compliant
- Available in SIP-4L(TO94) package

Applications

- Single Coil Design Cooling Fans
- Single Coil DC Brushless Fan
- Single Coil DC Brushless Motor
- Office Automated Equipment
- Brown-Goods
- Home Applications
- Car Audio Cooling Fan

Pin Configuration

(Top View)

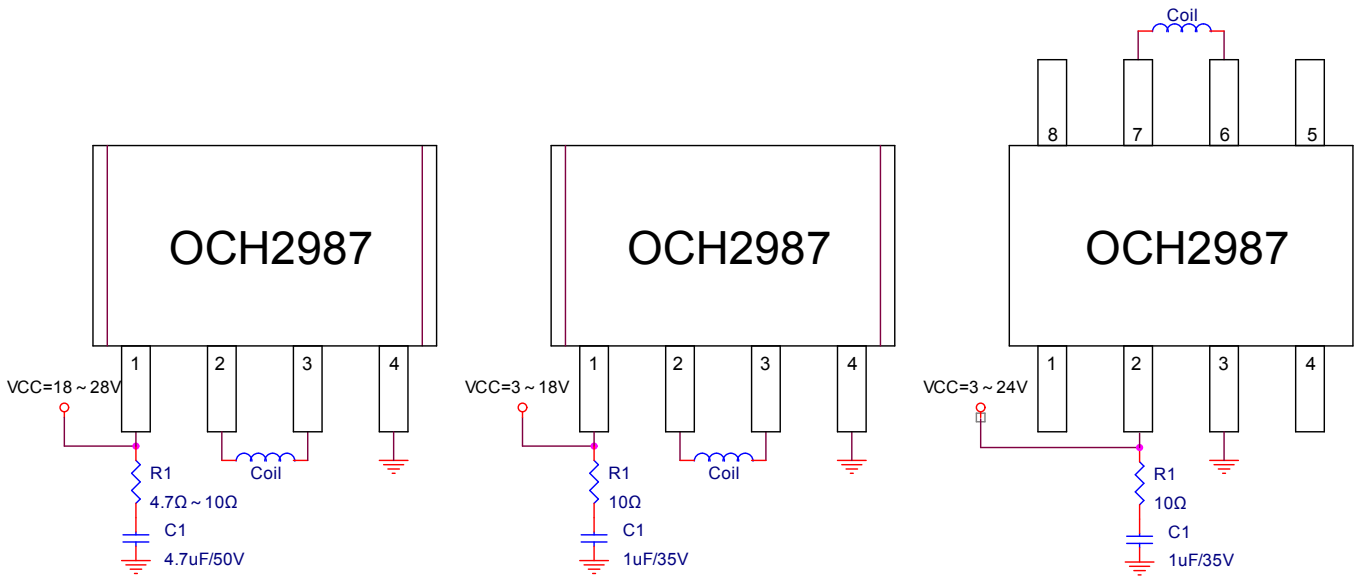


SIP-4L SOP-8F

Figure 1, Pin Assignments of OCH2987

Pin Name	Pin Number		Pin Function
	SIP-4L	SOP-8F	
VDD	1	2	Positive Power Supply
DO	2	6	Output 1
DOB	3	7	Output 2
GND	4	3	Ground
NC	-	1、4、5、8	NC

■ Typical Application Circuit



Note1: When the power pulse is relatively large，Must use least C1=4.7μF(ceramic capacitor) capacitor & R1=4.7~10Ω for the decoupling between VDD and GND and place the capacitor as close to the IC as Possible.

Figure 2, Typical Application Circuit Of OCH2987

■ Ordering Information

Part Number	Output Current	Package Type	Packing Qty	B_{OP} (Gauss)	B_{RP} (Gauss)	Temperature	Eco Plan	Lead
OCH2987MD	350mA	SIP-4L	1000pcs /Bag	25(Typ.)	-25(Typ.)	-40 ~ 125℃	ROHS	Cu

■ Block Diagram

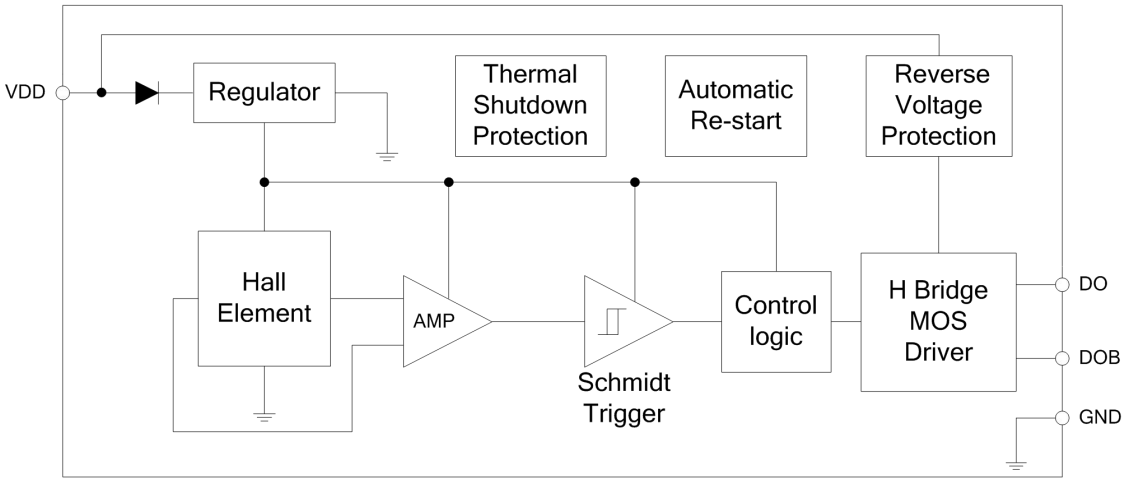


Figure 3, Block Diagram Of OCH2987

■ Absolute Maximum Ratings[1] (T_A=25°C, unless otherwise noted)

Parameter	Symbol	Rating	Unit
V_{DD} Pin to GND	V_{DD}	-30 to +30	V
Continuous Output Current	$I_{O(CONT)}$	350	mA
Hold Output Current	$I_{O(HOLD)}$	700	mA
Peak Output Current	$I_{O(PEAK)}$	1000	mA
Junction temperature	TJ	160	℃
Storage Temperature Range	T_S	-55 to +150	℃
Maximum Soldering Temperature (at leads, 10 sec)	T_{LEAD}	300	℃

■ Recommended Operating Conditions[2]

Parameter		Symbol	Rating	Unit
V_{DD} Pin Voltage to GND		V_{DD}	3 to 24	V
Operating Temperature Range	$I_{O(CONT)<250mA}$	T_{OP}	-40 to +125	℃
	$I_{O(CONT)>250mA}$	T_{OP1}	-40 to +85	℃

Note2: Stresses above those listed in absolute maximum ratings may cause permanent damage to the device. Functional operation at conditions other than the operating conditions specified is not implied. Only one absolute maximum rating should be applied at any one time.

3: The device is not guaranteed to function outside of its operating conditions.

■ Electrical Characteristics

Typical values are at T_A= +25℃, V_{DD} =12V, unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
Supply						
V_{DD}	Input Voltage		3	-	24	V
I_{DD}	Supply Current	Output Open	-	2.45	5	mA
Output						
$R_{DS(ON)}$	Output On-Resistance	I_O=0.3A	-	2.7	-	Ω
Protection						
T_{ON}	Locked Protection On Time		-	0.3	-	Sec
T_{OFF}	Locked Protection Off Time		-	3	-	Sec
R_{duty}	Locked Protection Duty Ratio	T_{OFF}/T_{ON}	-	10	-	-
TSD	Thermal Shutdown Temperature		150	160	-	℃
TSH	Thermal Shutdown Hystersis		-	30	-	℃
Magnetic Characteristics						
BOP	Operating Point		5	25	45	Gauss
BRP	Release Point		-45	-25	-5	Gauss
BHYS	Hysteresis		-	50	-	Gauss

■ Driver Output VS Magnetic Pole

Parameter	Test Conditions	DO	DOB
South Pole	B > BOP	Low	High
North Pole	B < BRP	High	Low

■ Operating Characteristics

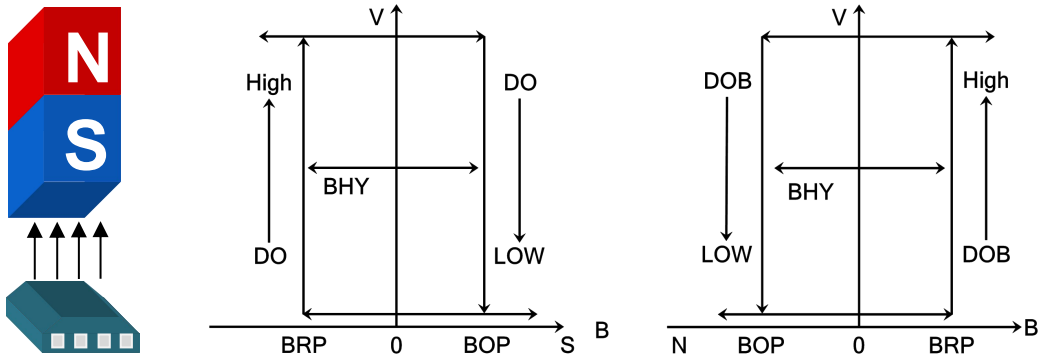
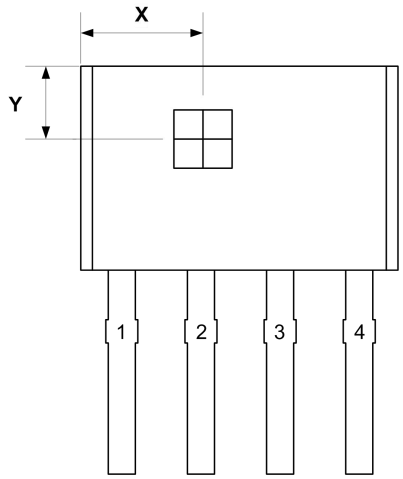


Figure 4, Magnetic Hysteresis Characteristics Of OCH2987

Output Switch Principle

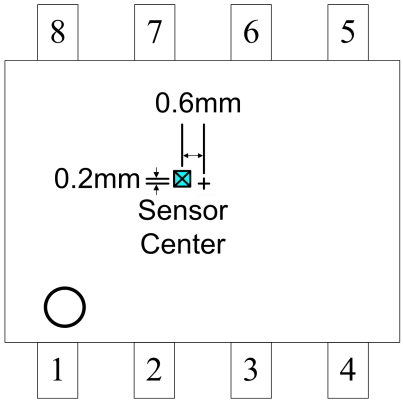
The OCH2987 built in a Hall-effect sensor plane to sense the vertical magnetic flux density (B). There are two output drivers in OCH2987 to drive Single-phase DC brushless fan or motor. When the South pole magnetic field is close to the IC marking surface and the magnetic flux density higher than operate point (B_{OP}), the DO pin output will turned to Low and the DOB pin output will turned to High. When the South pole magnetic field far away the IC marking surface and North pole magnetic field close to the IC marking surface until the magnetic flux density higher than release point (B_{RP}), the DO pin output will turned to High and the DOB pin output will turned to low.

■ Hall Sensor Location



Orientation	Value	Unit
X	1.85	mm
Y	1.35	mm

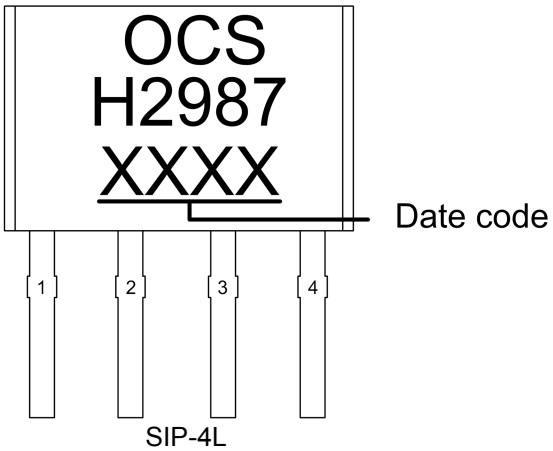
SIP-4L



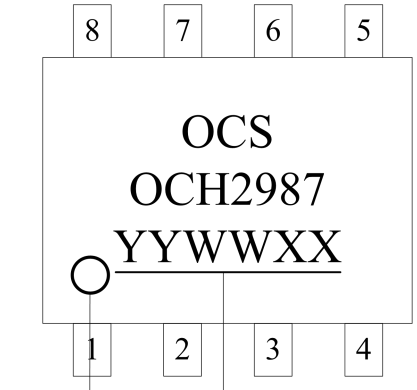
SOP-8F

The Figure 5, hall sensor location, where marks the IC number.

■ Marking Information



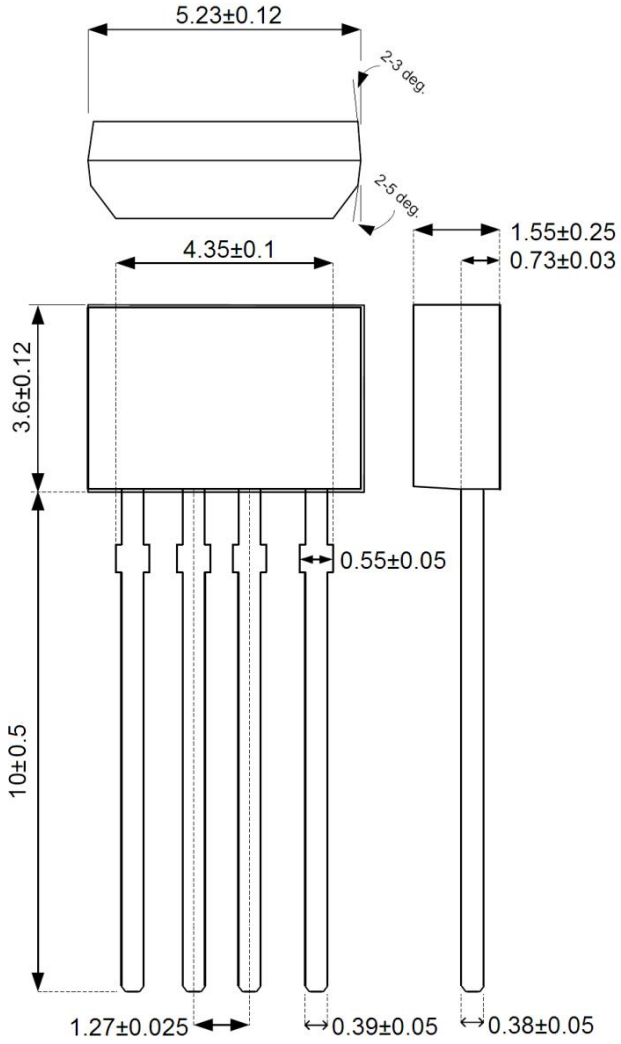
SIP-4L



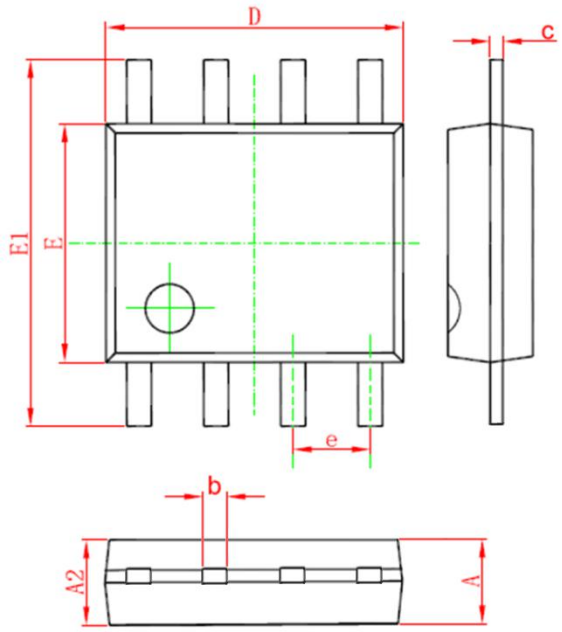
SOP-8F

■ Package Information

（1）SIP-4L (Unit: mm)



（2）SOP-8F



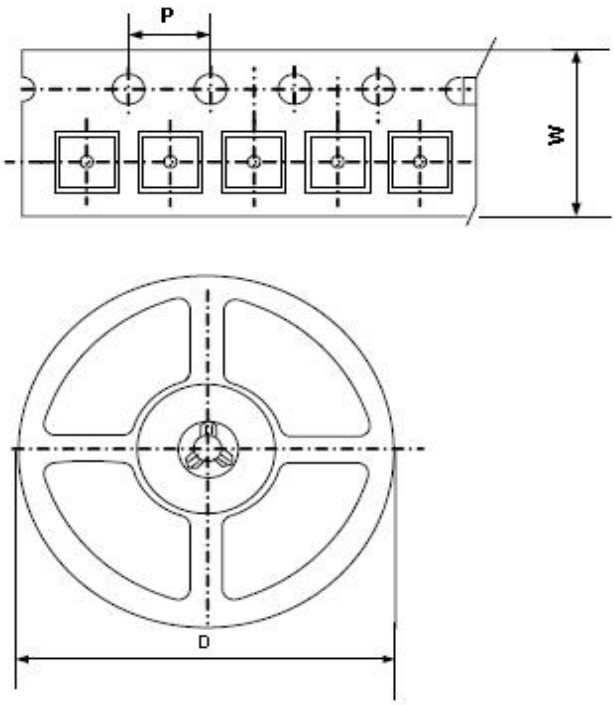
Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Norm.	Max.	Min.	Norm.	Max.
A	1.350	1.550	1.750	0.053	0.061	0.069
A1	0.100	0.175	0.250	0.004	0.007	0.010
A2	1.350	1.450	1.550	0.053	0.057	0.061
b	0.330	0.420	0.510	0.013	0.017	0.020
c	0.170	0.210	0.250	0.006	0.008	0.010
D	4.700	4.900	5.100	0.185	0.192	0.200
E	3.800	3.900	4.000	0.150	0.154	0.157
E1	5.800	6.000	6.200	0.228	0.236	0.244
e	1.270 (BSC)			0.050 (BSC)		

■ Packing Information

（1）SIP-4L

1. Packing type: Bag
2. Packing minimum: 1000pcs/Bag

（2）SOP-8F



Package Type	Carrier Width(W)	Pitch(P)	Reel Size(D)	Packing Minimum
SOP-8L/SOP-8F	12.0±0.1 mm	4.0±0.1 mm	330±1 mm	3500 Pcs

Note: Carrier Tape Dimension, Reel Size and Packing Minimum

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