General Description

The OCH2970A is an integrated Hall sensor with H-Bridged output driver designed forbrushless DC motor applications. The device includes an on-chipHall sensor for magnetic sensing, an amplifier that amplifies the Hall voltage, a comparatorto provide switching hysteresis for noise rejection, a bi-directional drivers for sinking anddriving large currentload.

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

OCH2970A is available in FTSOT23-6L (TO23-6F) packageand is rated over the -40°C to 125°C.

Features

- One-chip Solution (Hall Element + Driver)
- Input VoltageRange:2V to 7V
- High Sensitivity Hall Sensor
  B_{OP}(15GS), B_{RP}(-15GS)
- Start Voltage 1.9V(min.)
- Soft Switch
- FG Output
- Lock-shutdown Protection &Auto-Restart Function
- Speed Controllable By PWM Input Signal
- Thermal Shutdown Protection
- -40℃ to + 125℃ Temperature Range
- RoHS Compliant& Halogen-Free
- Available in FTSOT23-6L(TO23-6F)package

Applications

- Single Coil Design Cooling Fans
- Single Coil DC Brushless Fan
- Single Coil DC Brushless Motor

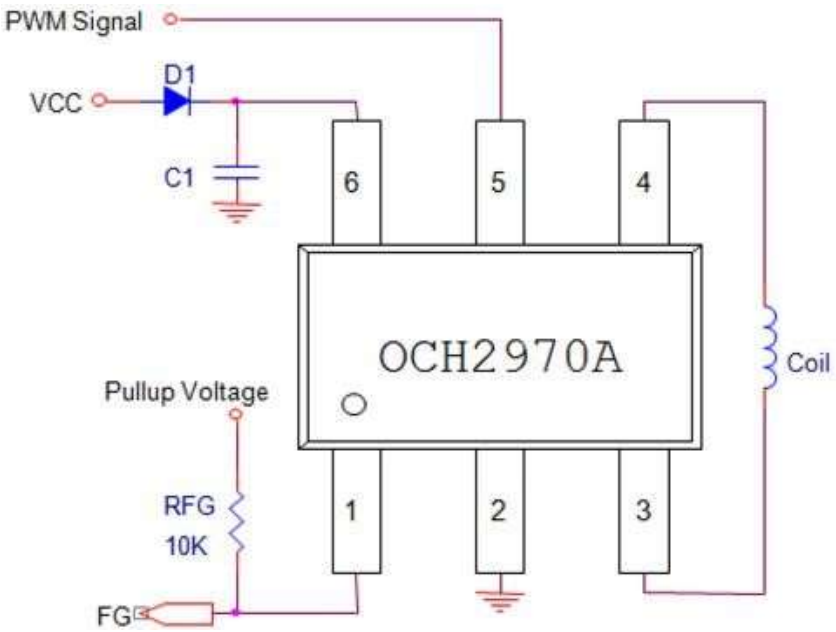
Pin Configuration

(Top View)

Figure 1, Pin AssignmentsOfOCH2970A

Pin Name	Pin Number	Pin Function
FG	1	FG Signal Output
GND	2	Ground
DOB	3	Output 1
DO	4	Output 2
PWM	5	PWM Signal Input
V_{DD}	6	Positive Power Supply

■ Typical Application Circuit



Note1:When the power pulse is relatively large， Must use least C1=1μFceramic capacitorfor the decoupling between $V_{DD}$and GND and place the capacitor as close to the IC asPossible.

Figure 2, Typical Application Circuit Of OCH2970A

■ Ordering Information

PartNumber	Package Type	Packing Qty.	B_{OP} (Gauss)	B_{RP} (Gauss)	Temperature	Eco Plan	Lead
OCH2970ATOAE	FTSOT23-6L （TO23-6F）	3000pcs /Reel	15(Typ.)	-15(Typ.)	-40~ +125℃	ROHS& Halogen-Free	Cu

■ Block Diagram

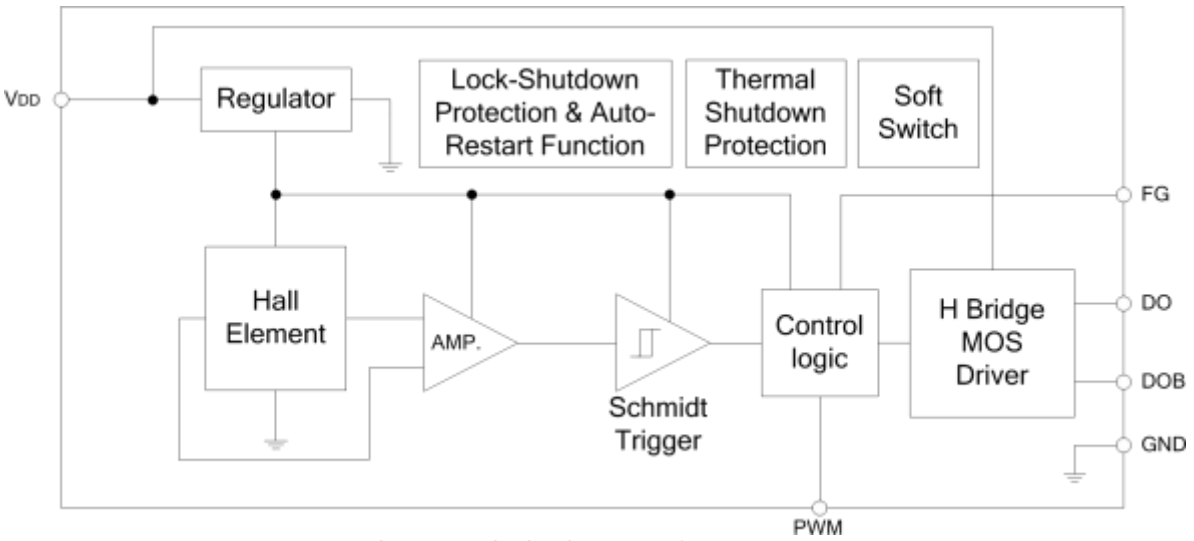


Figure 3, Block Diagram Of OCH2970A

■ Absolute Maximum Ratings[2/3/4] (T_A=25°C, unless otherwise noted)

Parameter	Symbol	Rating	Unit
V_{DD} Pin To Gnd Voltage	V_{DD}	-0.3 to +8	V
DO、DOB、FG Pin Output Voltage	V_{OUT}	-0.3 to +8	V
PWM Pin Input Voltage	V_{PWM}	-0.3 to +8	V
FG Pin Output Sink Current	I_{FG}	20	mA
Hold Output Current	$I_{O(HOLD)}$	700	mA
Peak Output Current	$I_{O(PEAK)}$	1300	mA
Junction temperature	T_J	160	℃
Thermal Resistance	θ_{JA}	238	℃/W
Maximum Power Dissipation	P_D	523	mW
Storage Temperature Range	T_S	-55 to +150	℃
Maximum Soldering Temperature (at leads, 10 sec)	T_{LEAD}	260	℃

Note2:The maximum dissipation power P_D allowed at any ambient temperature point is calculated: P_D（max）=（T_J-T_A）/θ_{JA}，T_J=160℃。When applied, do not exceed the maximum rating to prevent chip damage, and work for a long time at maximum rating may affect chip reliability.
Note3: 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.
Note 4: The device is not guaranteed to function outside of its operating conditions.

■ Recommended Operating Conditions[3/4/5]

Parameter	Symbol	Rating	Unit
V_{DD} Pin Voltage to GND	V_{DD}	2 to 6	V
PWM Pin Input Voltage	V_{PWM}	0~ V_{DD}	V
Operating Temperature Range	T_{OP}	-40 to +125	℃

Note5：In practical application, the effect of fan coil heating on the chip must take into account, with the actual over temperature protection point of actual test of high temperature fan for reference. On the basis of pre leave relatively safe temperature allowance, avoid chip in the critical limit (maximum ratings) for a long time and affects the reliability .

■ Electrical Characteristics

Typical values are at T_A= +25℃,V_{DD}=5V, unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
I_{DD}	Supply Current	Output Open	-	5.15	7	mA
$R_{DS(ON)}$	Output On-Resistance	I_O=0.3A	-	1.55	-	Ω
$R_{FG(ON)}$	Output On-Resistance	I_O=5mA	-	21	-	Ω
I_{FGOL}	FG Pin OFF Leakage Current	V_{FG}=6V	-	<0.01	1	μA
T_{ON}	Locked Protection On Time		-	0.45	-	Sec
T_{OFF}	Locked Protection Off Time		-	3.95	-	Sec
V_{PWMH}	PWM Signal High Level		2		V_{DD}+0.5	V
V_{PWML}	PWM Signal Low Level		-0.1		0.8	V
F_{PWM}	PWM Input Frequency		6		55	KHZ
T_{SD}	Thermal Shutdown Temperature		-	165	-	℃
T_{SH}	Thermal Shutdown Hysteresis		-	30	-	℃

■ Magnetic Characteristics

V_{DD}=5V,Ta=25°C					
Parameter	**Symbol**	**Min.**	**Typ.**	**Max.**	**Unit**
South Pole Operate point	B_{OP}	5	15	30	G
North Pole Release Point	B_{RP}	-30	-15	-5	G
Hysteresis	Bhy	10	30	45	G

■ Driver Output VS Magnetic Pole

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

■ Operating Characteristics

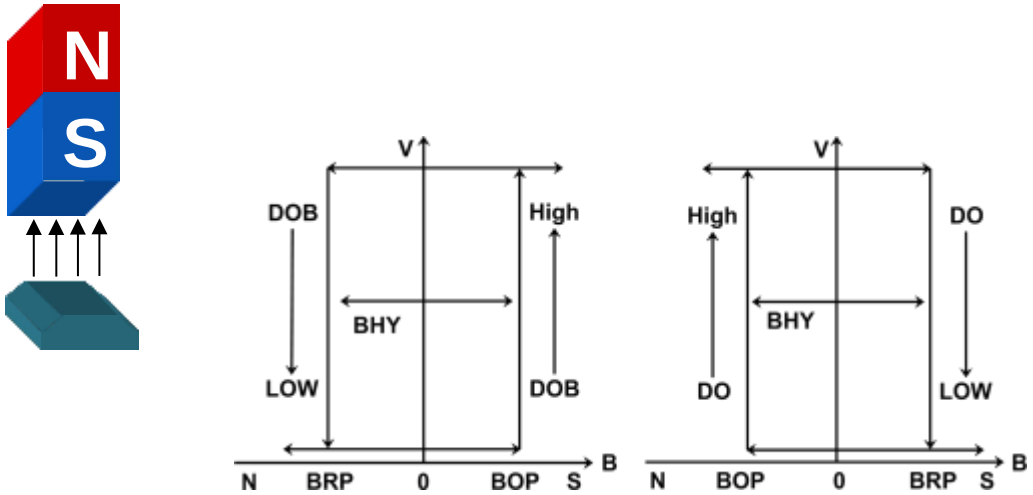
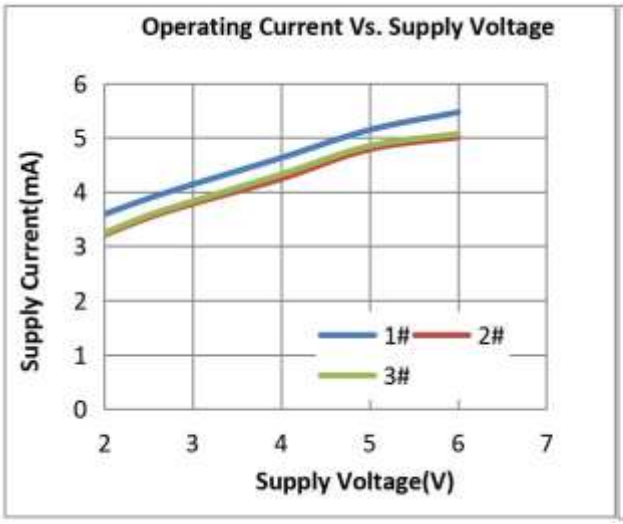


Figure 4, Magnetic Hysteresis CharacteristicsOCH2970A

Truth Table (FTSOT23-6L/TO23-6F)

Input		Output			Mode
B	PWM	DOB	DO	FG	
Bop	-	H	L	L	Operation Mode (PWM Pin NC)
Brp	-	L	H	OFF	
Bop	H	H	L	L	Operation Mode (PWM Speed Control State)
Brp	H	L	H	OFF	
Bop	L	L	L	L	
Brp	L	L	L	OFF	
Bop	-	L	L	OFF	Lock Mode
Brp	-	L	L	OFF	
-	L	L	L	OFF	Standby Mode

Typical Characteristics



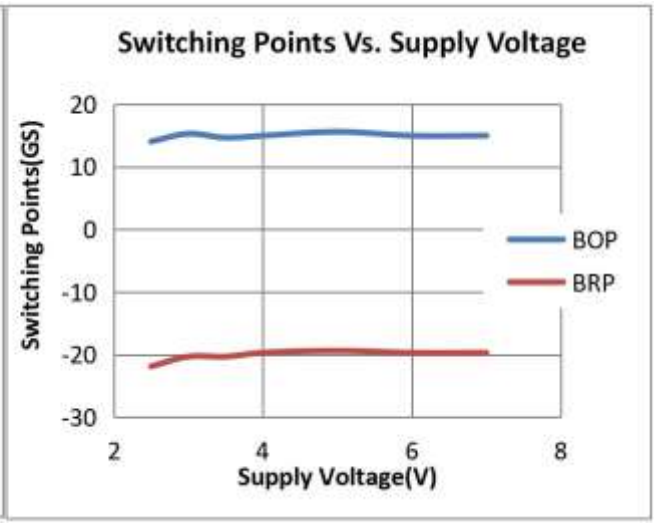
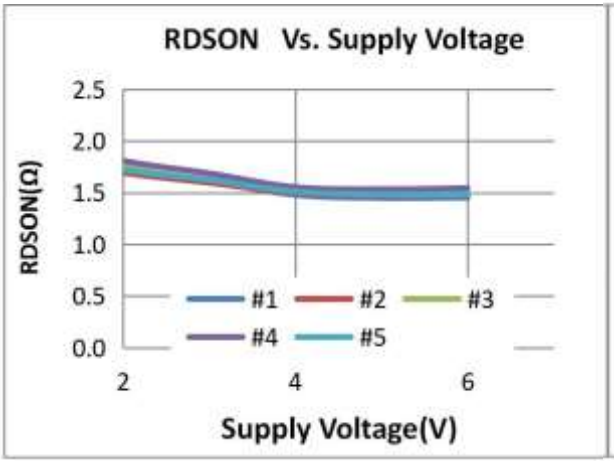


Figure 5Figure 6



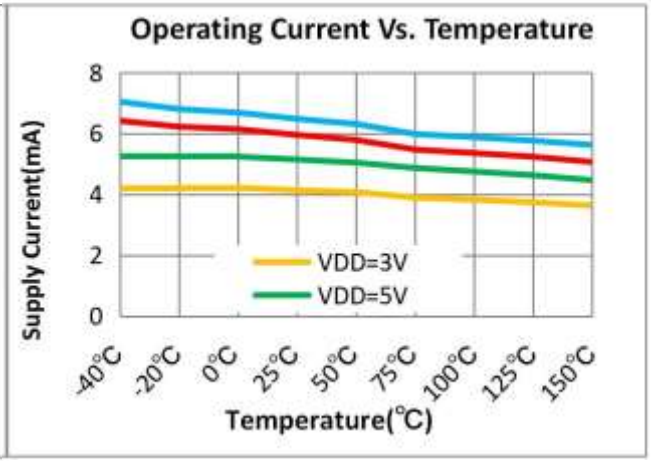
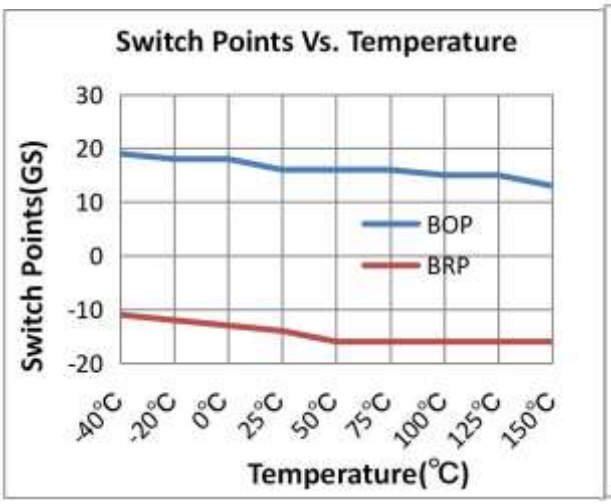


Figure 7Figure 8



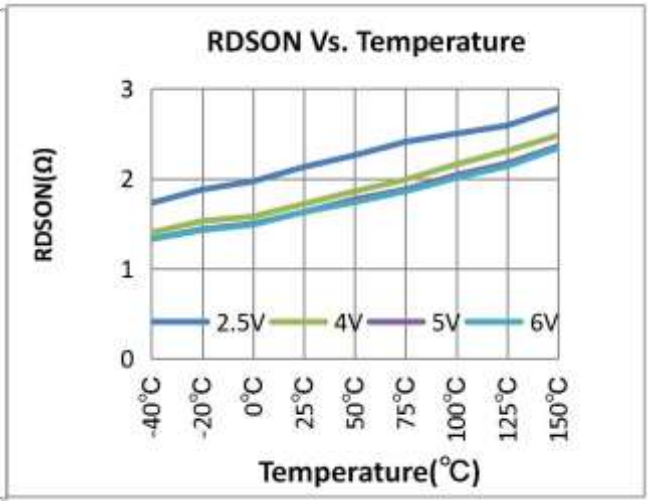


Figure 9Figure 10

■ Hall Sensor Location

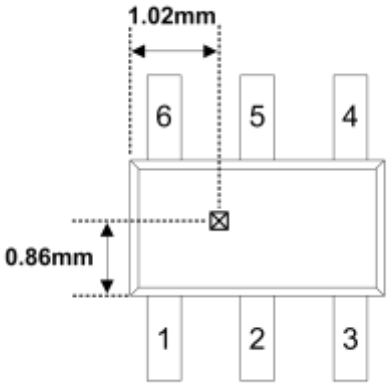
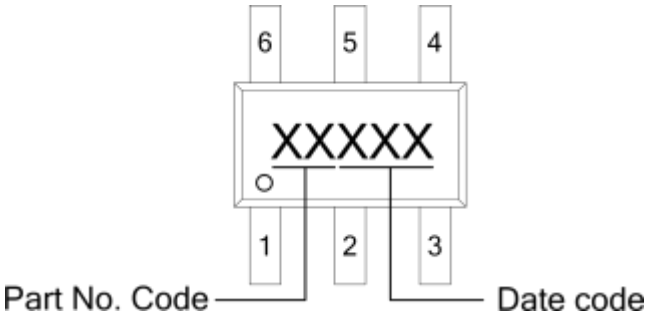
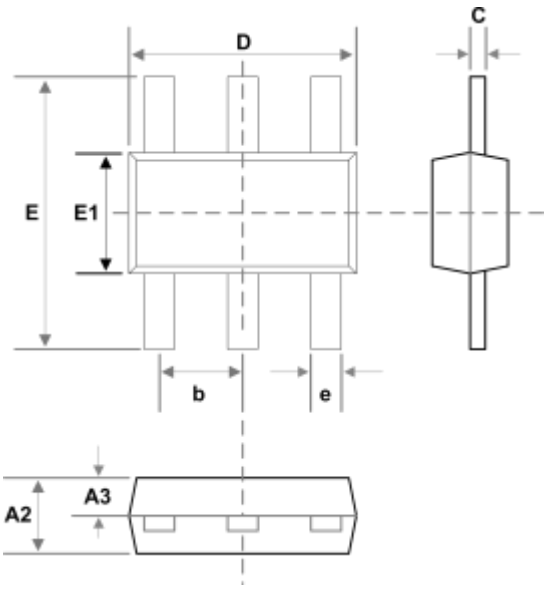


Figure11, Hall Sensor Location

■ Marking Information

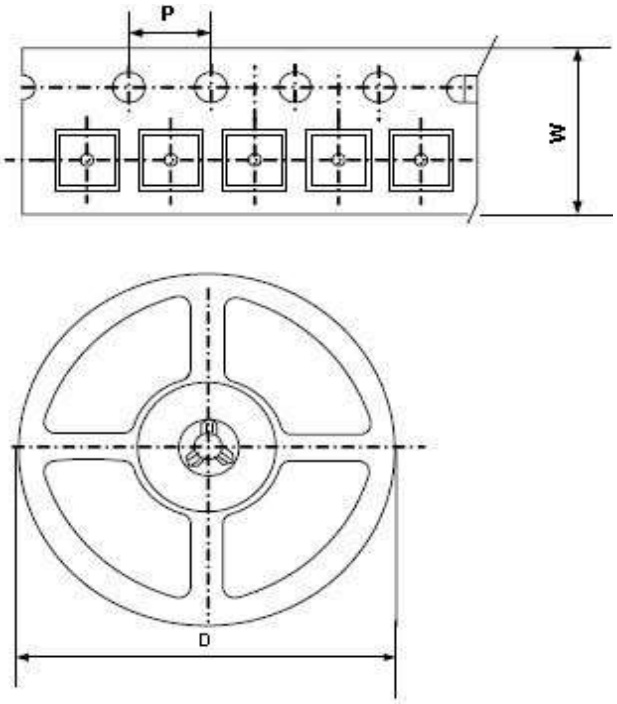


■ Package Information



Symbol	Dimensions In Millimeters			Dimensions In Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A2	0.70	1.10	1.20	0.03	0.04	0.05
A3	0.40	0.45	0.50	0.01	0.02	0.02
b	-	0.95	-	-	0.04	-
C	0.09	0.16	0.26	0.00	0.01	0.01
D	2.70	2.90	3.10	0.11	0.11	0.12
E	3.40	3.60	3.80	0.13	0.14	0.15
E1	1.50	1.60	1.70	0.06	0.06	0.07
e	0.30	0.40	0.50	0.01	0.02	0.02

■ Packing Information



Package Type	Carrier Width (W)	Pitch (P)	Reel Size(D)	Packing Minimum
FTSOT23-6L(TO23-6F)	8.0±0.1 mm	4.0±0.1 mm	180±1 mm	3000pcs

Note: Carrier Tape Dimension, Reel Sizeand Packing Minimum

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