

## General Description

The OCH29895 is an integrated Hall sensor with H-Bridged output driver designed for brushless DC motor applications. The device is using high voltage BCD 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. OCH29895 built-in power supply reverse connection protection circuit enables the OCH29895 do no need for external reverse diode in application, can reducing the fan cost. OCH29895 is available in SIP-4L package and is rated over the -40°C to 125°C.

## Features

- Built-in VCC to GND reverse voltage protection
- Low Output Switching Current Noise
- One-chip Solution(Hall Element+Driver)
- Input Voltage Range:3.5V to 30V
- High Sensitivity Hall Sensor BOP (20GS), BRP (-20GS)
- Thermal Shutdown Protection
- Lock-shutdown Protection & Auto-Restart Function
- $R_{DS(ON)}$  :1.65Ω
- RoHS Compliant
- Available in SIP-4L(TO94) package

## Applications

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

## Pin Configuration

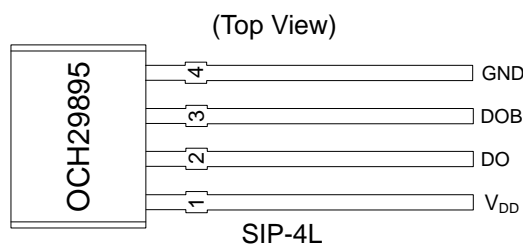


Figure 1, Pin Assignments of OCH29895

Pin Name	Pin No.	Pin Function
V <sub>DD</sub>	1	Positive Power Supply
DO	2	Output 1
DOB	3	Output 2
GND	4	Ground

## Typical Application Circuit

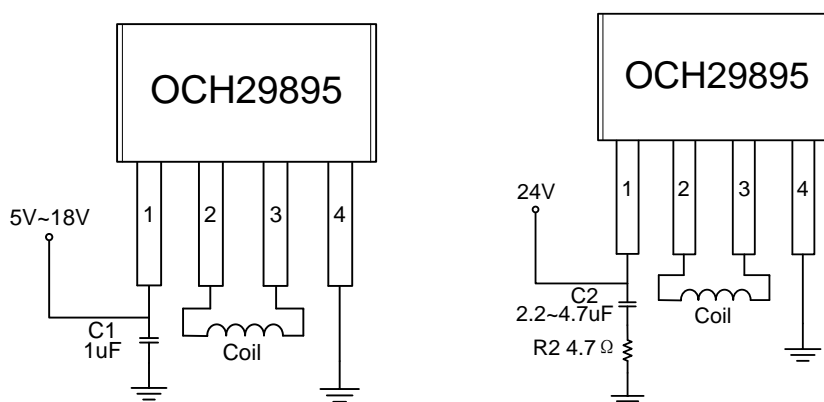


Figure 2, Typical Application Circuit Of OCH29895

Note1 : When the power pulse is relatively large , Must use least C1=1μF ceramic capacitor or C2=2.2~4.7uF electrolytic capacitor for the decoupling between V<sub>DD</sub> and GND and place the capacitor as close to the IC as Possible.



## ■ Ordering Information

Part Number	Output Current	Package Type	Packing Qty.	B <sub>OP</sub> (Gauss)	B <sub>RP</sub> (Gauss)	Temperature	Eco Plan	Lead
OCH29895ME-D	500mA	SIP-4L	1000pcs /Bag	20(Typ.)	-20(Typ.)	-40 ~ 125°C	ROHS	Cu

## ■ Block Diagram

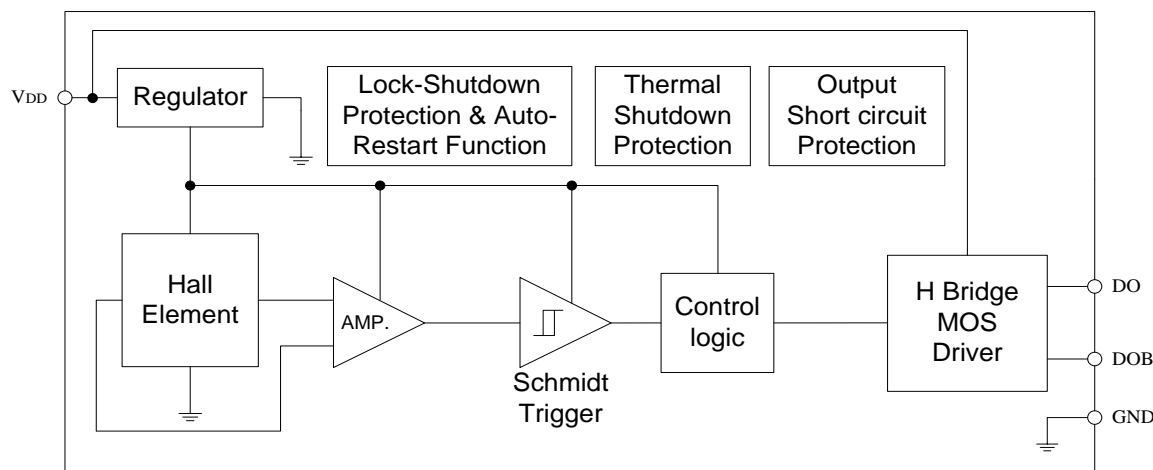


Figure 3, Block Diagram Of OCH29895

■ Absolute Maximum Ratings(T<sub>A</sub>=25°C,unless otherwise noted)

Parameter	Symbol	Rating	Unit
V <sub>DD</sub> Pin to GND	V <sub>DD</sub>	-27 to +32	V
Continuous Output Current	I <sub>O(CONT)</sub>	500	mA
Hold Output Current	I <sub>O(HOLD)</sub>	1000	mA
Peak Output Current	I <sub>O(PEAK)</sub>	1500	mA
Maximum Power Dissipation	PD	860	mW
Thermal Resistance	θ <sub>JA</sub>	157	°C /W
Junction temperature	T <sub>J</sub>	160	°C
Storage Temperature Range	T <sub>S</sub>	-55 to +150	°C
Maximum Soldering Temperature(at leads,10 sec)	T <sub>LEAD</sub>	260	°C

Note2: The maximum dissipation power PD allowed at any ambient temperature point is calculated:  $PD(max) = (T_J - T_A) / \theta_{JA}$ , T<sub>J</sub> = 160°C. 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.

## ■ Recommended Operating Conditions

Parameter	Symbol	Rating	Unit
V <sub>DD</sub> Pin to GND	V <sub>DD</sub>	3.5 to 30	V
Operating Temperature Range	T <sub>OP</sub>	-40 to +125	°C

Note3: 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  $T_A=+25^{\circ}\text{C}$ ,  $V_{DD}=24\text{V}$ , unless otherwise noted.

Symbol	Parameter	Conditions	Min.	Typ.	Max.	Unit
<b>Supply</b>						
$V_{DD}$	Input Voltage	-	3.5	-	30	V
$I_{DD}$	Supply Current	No load	-	2.5	5	mA
<b>Output</b>						
$R_{DS(ON)}$	Output On-Resistance	$I_O=0.3\text{A}$	-	1.65	-	$\Omega$
<b>Protection</b>						
$T_{ON}$	Locked Protection On Time	-	-	0.4	-	Sec
$T_{OFF}$	Locked Protection Off Time	-	-	2.4	-	Sec
$R_{duty}$	Locked Protection Duty Ratio	$T_{OFF}/T_{ON}$		6		-
$T_{SD}$	Thermal Shutdown Temperature	-	150	160	-	$^{\circ}\text{C}$
$T_{SH}$	Thermal Shutdown Hysteresis	-	-	30	-	$^{\circ}\text{C}$

## ■ Magnetic Characteristics

Typical values are at  $T_A=+25^{\circ}\text{C}$ ,  $V_{DD}=12\text{V}$ , unless otherwise noted.

Parameter	Symbol	Min.	Typ.	Max.	Unit
Operating Point	BOP	5	20	45	Gauss
Release Point	BRP	-45	-20	-5	Gauss
Hysteresis	BHYS	-	40	-	Gauss

## ■ Driver Output Vs. Magnetic Pole

Parameter	Test Conditions	DO	DOB
South Pole	$B > \text{BOP}$	Low	High
North Pole	$B < \text{BRP}$	High	Low

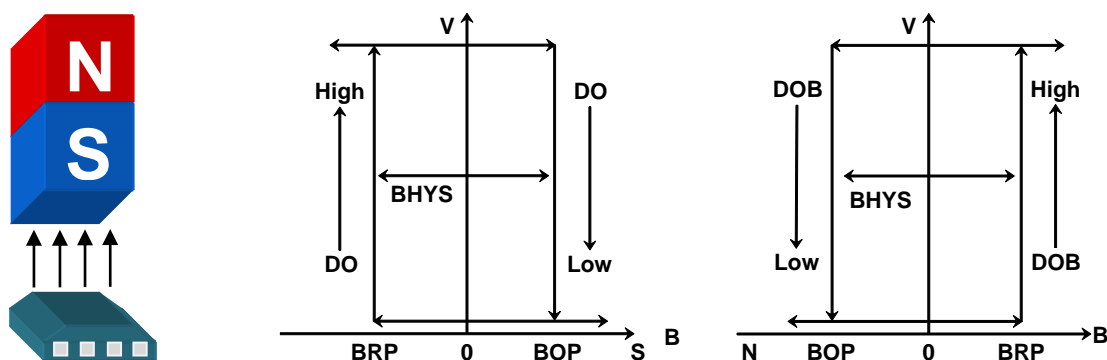
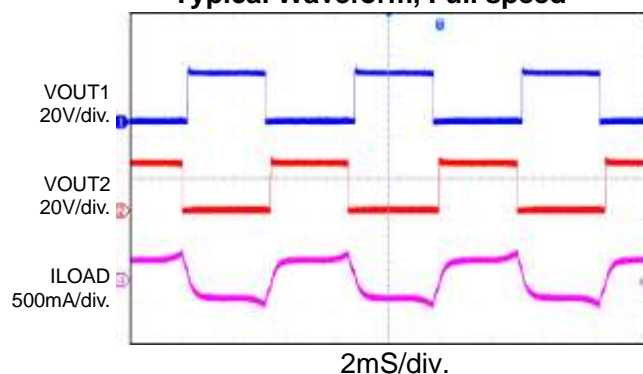


Figure 4 · Magnetic Hysteresis Characteristics Of OCH29895

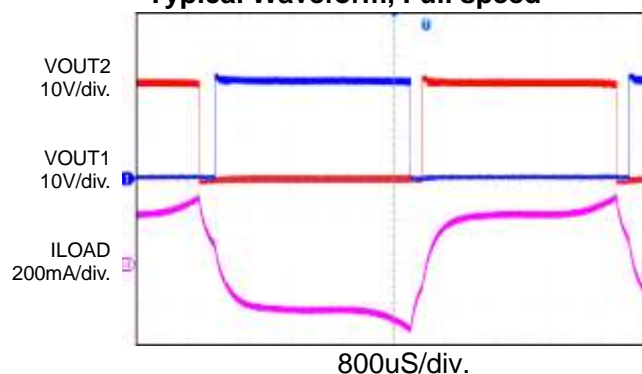
## ■ Typical Performance Characteristics

VCC = 24V, TA = 25°C, tested with fan unit, unless otherwise noted.

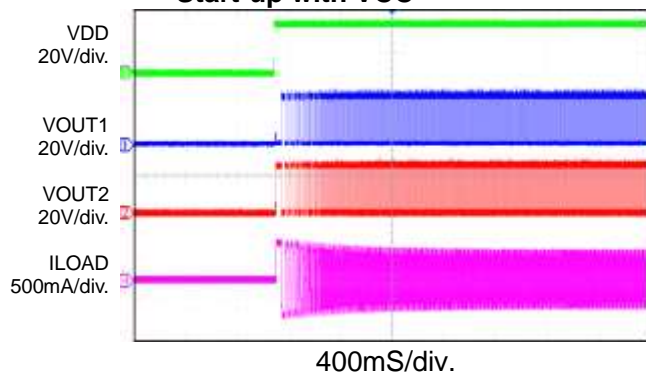
**Typical Waveform, Full speed**



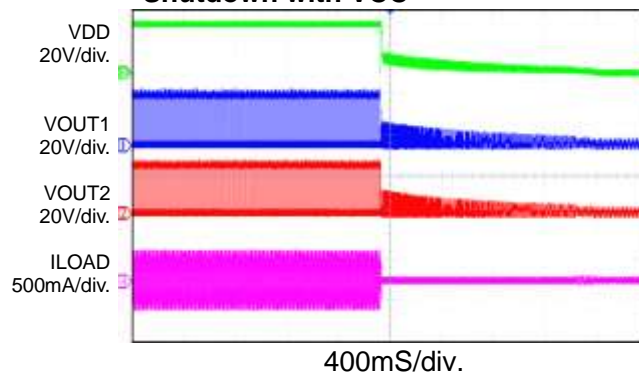
**Typical Waveform, Full speed**



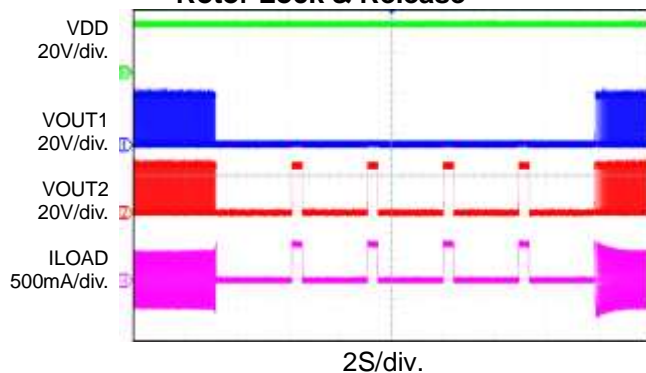
**Typical Waveform, Start-up with VCC**



**Typical Waveform, Shutdown with VCC**



**Typical Waveform, Rotor Lock & Release**



## ■ Function Description

### Output Switch Principle

The OCH29895 built in a Hall-effect sensor plane to sense the vertical magnetic flux density (B). There are two output drivers in OCH29895 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 (Bop), the DO pin output will turned to drive (Low) and the DOB pin output will turned to sink (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 (Brp), the DO pin output will turned to sink (High) and the DOB pin output will turned to drive (low).

### Rotor Lock and Restart Protection

The OCH29895 built in a rotor lock and restart protection, if the IC cannot detect the Hall sensor signal change during the detection  $T_{on}$  time, all MOSFETs of the H-bridge are turned off. After  $T_{off}$  recovery time, the IC attempts to start up again automatically.

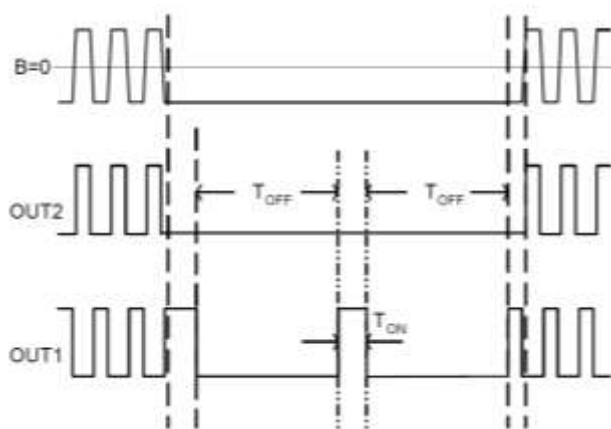


Figure 5, OCH29895 Rotor Lock and restart protection

### Thermal Protection

The OCH29895 has a thermal protection. When the internal junction temperature reaches  $160^{\circ}\text{C}$  (Typ.), the output devices will be switched off. When the IC's junction temperature cools by  $30^{\circ}\text{C}$ , the thermal sensor will turn the output devices on again, resulting in a pulsed output during continuous thermal protection.



## ■ Hall Sensor Location

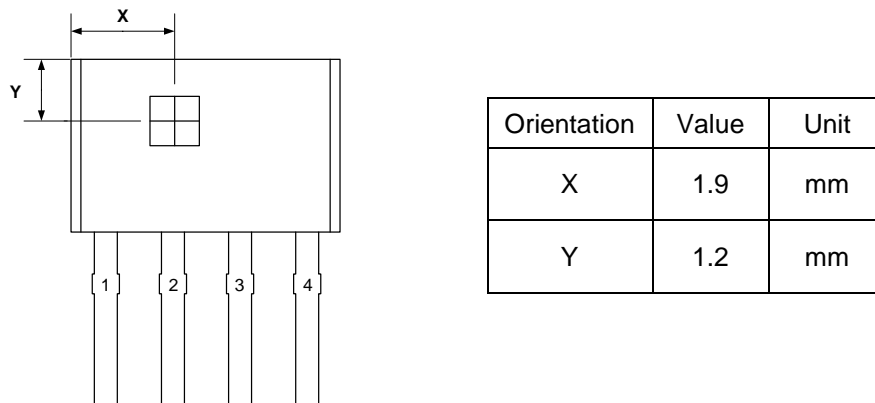
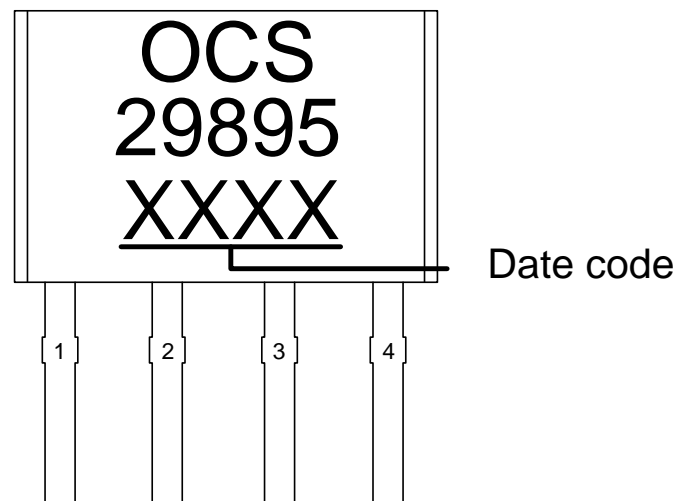


Figure 8, hall sensor location, where marks the IC number.

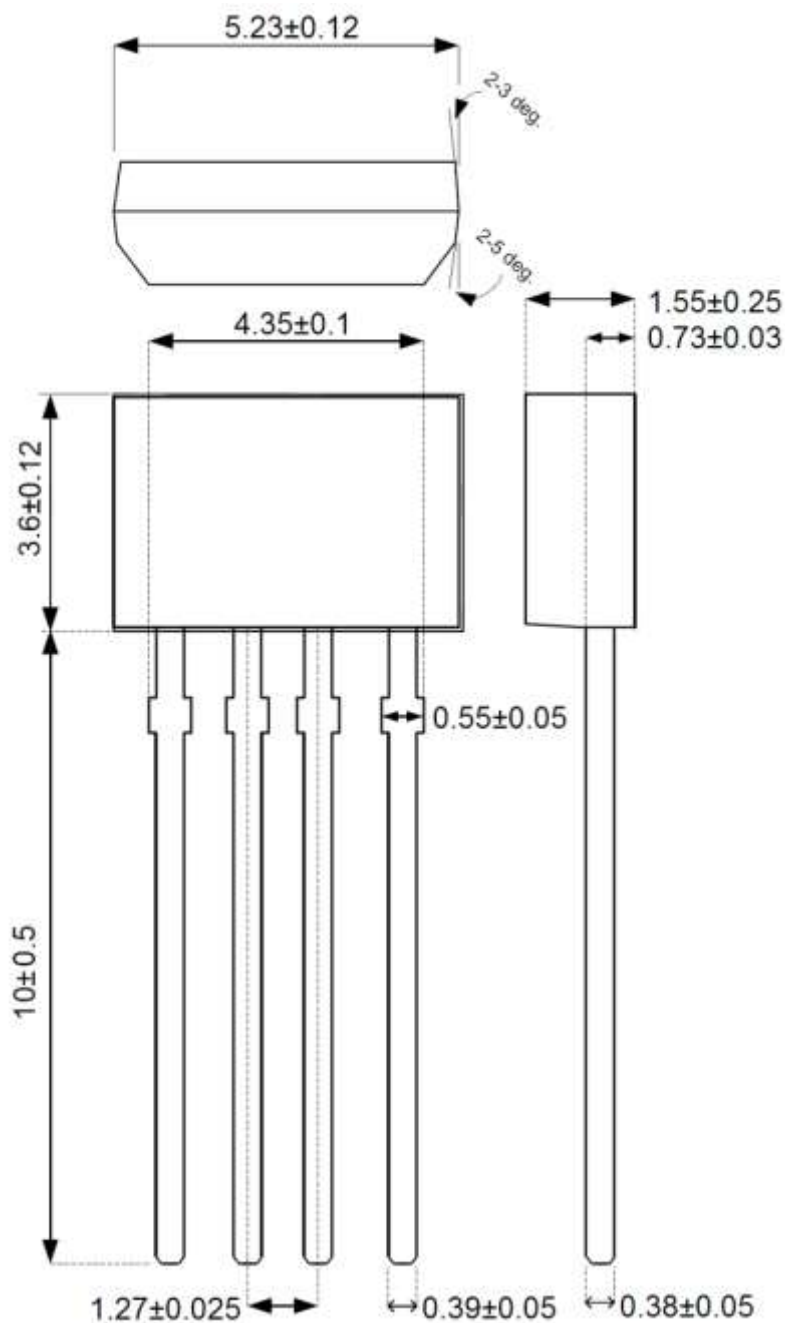
## ■ Marking Information

(1) SIP-4L



## ■ Package Information

(1) SIP-4L (Unit: mm)



## ■ Packing Information

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



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