

# CSH277A4

Complementary Output Hall Effect Latched Sink Driver IC

## Description

The CSH277A4 is an integrated Hall sensors with output drivers designed for electronic commutation of brushless DC motor applications. The device includes an on-chip Hall voltage generator for magnetic sensing, a comparator that amplifies the Hall voltage, and a Schmitt trigger to provide switching hysteresis for noise rejection, and complementary open collector drivers for sinking large current loads. An internal bandgap regulator is used to provide temperature compensated supply voltage for internal circuits and allows a wide operating supply range. If a magnetic flux density larger than threshold BOP, DO is turned on (low) and DOB is turned off (high). The output state is held until a magnetic flux density reversal falls below Brp causing DO to be turned off and DOB turned on. CSH277A4 is rated for operation over temperature range from -20°C to 85°C and voltage range from 3.5V to 20V. The devices are available in low cost die forms or rugged 4 pin SIP packages.

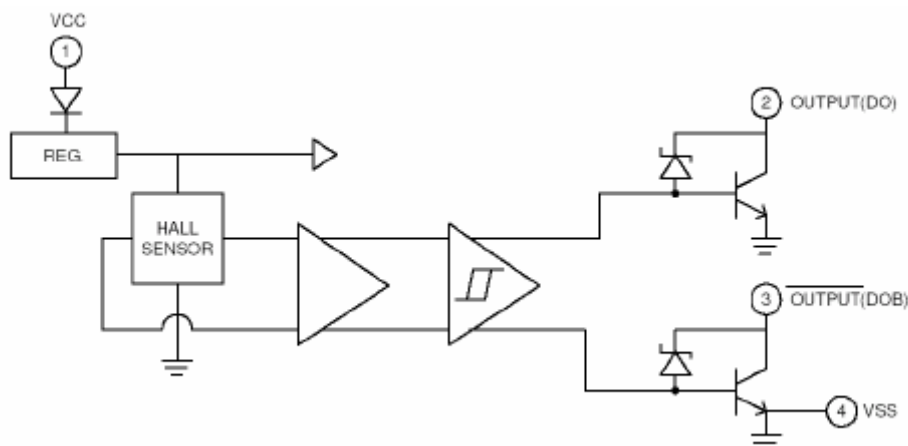
## Features

- On-chip Hall sensor IC with two different sensitivity and hysteresis settings
- Internal bandgap regulator allows temperature compensated operations and a wide operating voltage range
- High output sinking capability up to 400mA for driving large load
- Lower current change rate reduces the peak output voltage during switching
- Build in protection diode for chip reverse power connecting
- Package: SIP-4L

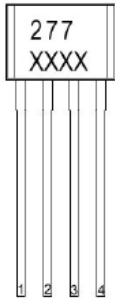
## Applications

- Brushless DC motor
- Brushless DC fan
- Revolution counting
- Speed measurement

## Functional Block Diagrams



## Pin Descriptions



Name	P/I/O	Pin#	Description
Vcc	P	1	Positive Power supply
DO	O	2	Output Pin
DOB	O	3	Output Pin
Vss	P	4	Ground

## Absolute Maximum Ratings at Ta = 25°C

Parameter	Symbol	Value	Unit
Supply Voltage	Vcc	20V	V
Reverse Vcc Polarity Voltage	VRCC	-35V	V
Magnetic flux density	B	Unlimited	
Output OFF Voltage	Vce	60(Notel)	V
Output ON Current	Continuous	Ic	mA
	Hold		
Operating Temperature Range	Ta	-20 ~ 85	°C
Storage Temperature Range	Ts	-65 ~ 150	°C
Package Power Dissipation	Pd	550	mW
Maximum Junction Temp.	Tj	175	°C

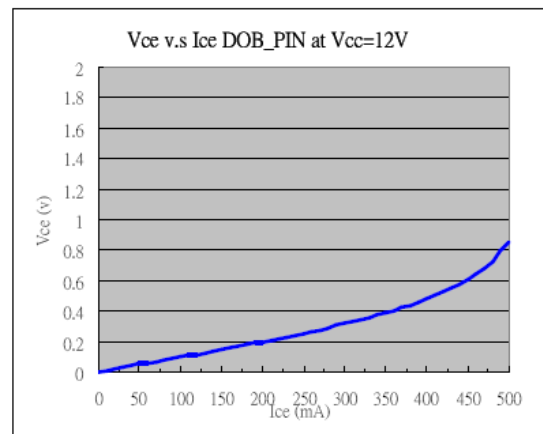
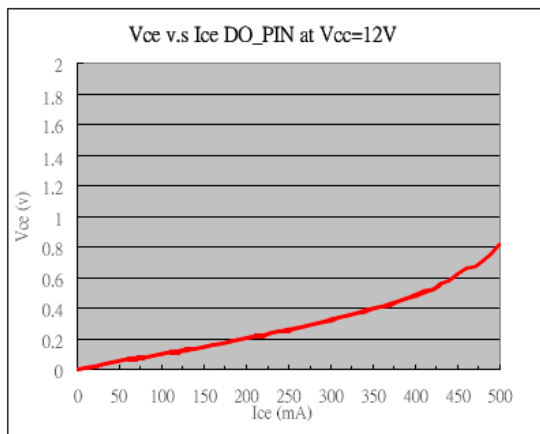
Note1: Output Zener protection voltage.

\*Exceeding the absolute maximum ratings may cause permanent damage. Exposure to absolute maximum rated conditions for extended periods may affect device reliability.

## Electrical Characteristics (Ta=+25°C, Vcc=4.0V to 20V)

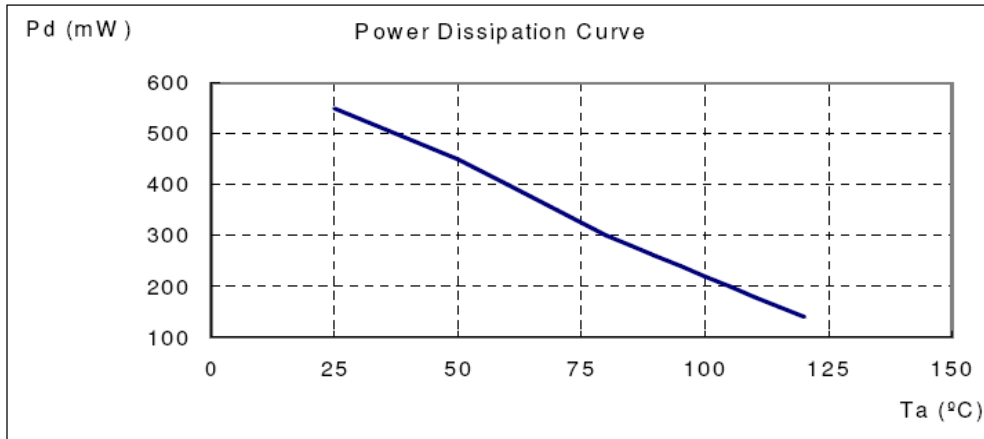
Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Low Supply Voltage	Vce	Vcc=3.5V, IL=100mA	-	0.4	-	V
Supply Voltage	Vcc	-	3.5	-	20	V
Output Saturation Voltage	Vce(sat)	Vcc=14V, IL=300mA	-	0.3	0.6	V
Output Leakage Current	Icex	Vce=14V, Vcc=14V	-	<0.1	10	uA
Supply Current	Icc	Vcc=20V, Output Open	-	14	20	mA
Output Rise Time	tr	Vcc=14V, RL=820Ω, CL=20pf	-	3.0	10	us
Output Falling Time	tf	Vcc=14V, RL=820Ω, CL=20pf	-	0.3	1.5	us
Switch Time Differential	Δt	Vcc=14V, RL=820Ω, CL=20pf	-	3.0	10	us

## Output Driver Current vs. Vce Plot



## Power dissipation vs. Environment Temperature

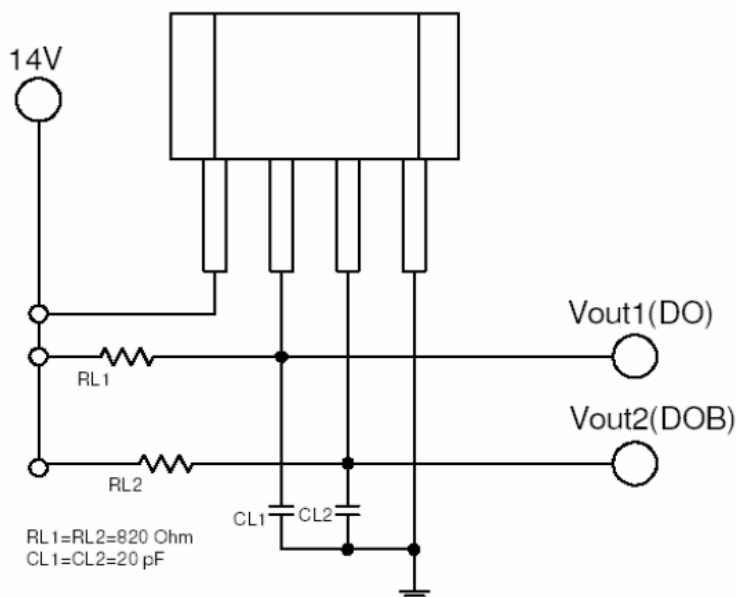
Ta(°C)	25	50	60	70	80	85	90	95	100	105	110	115	120
Pd(mW)	550	450	400	350	300	280	260	240	220	200	180	160	140



## Magnetic Characteristics

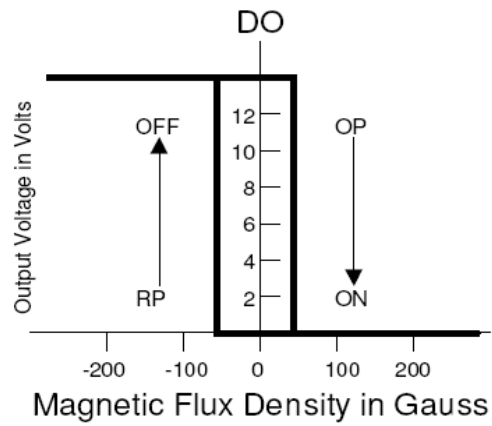
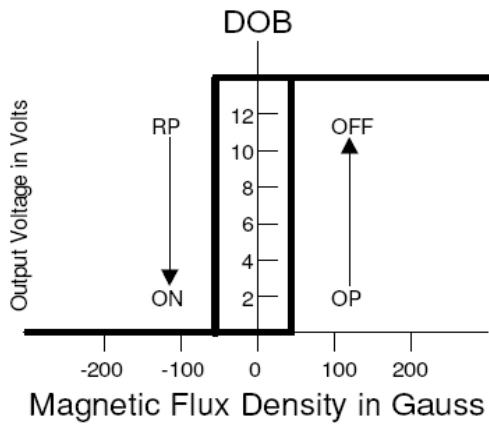
Characteristic	Symbol	Ta=+25°C		Ta=0°C to 70°C		Unit	
		Min	Max	Min	Max		
Operate Point	BIN A	Bop	5	50	5	50	Gauss
	BIN B	Bop	-	70	-	70	Gauss
	BIN C	Bop	-	100	-	100	Gauss
Release Point	BIN A	Brp	-50	-5	-50	-5	Gauss
	BIN B	Brp	-70	-	-70	-	Gauss
	BIN C	Brp	-100	-	-100	-	Gauss
Hysteresis	BIN A	Bhys	40	80	40	80	Gauss
	BIN B	Bhys	40	80	40	80	Gauss
	BIN C	Bhys	40	80	40	80	Gauss

## Test Circuit

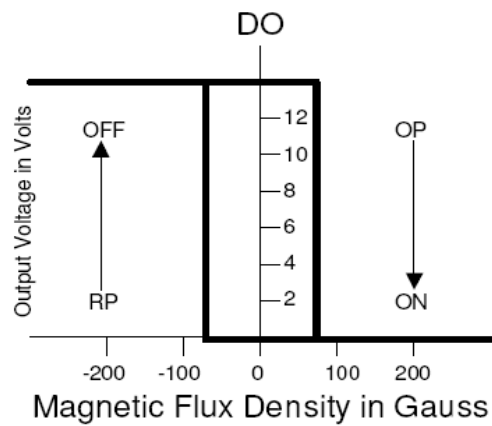
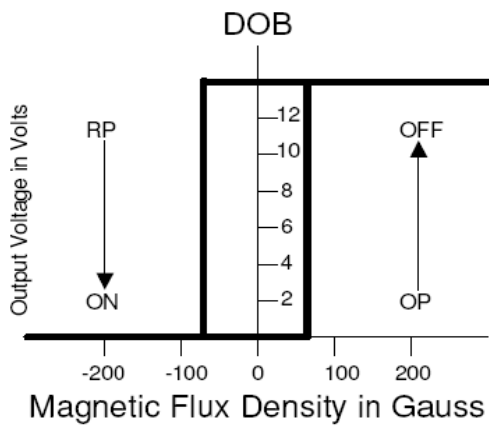


## Hysteresis Characteristics

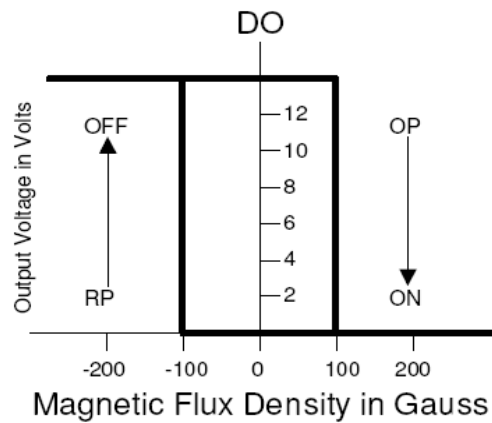
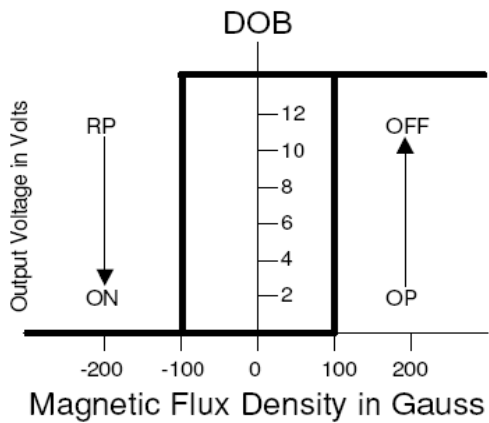
Bin A



Bin B

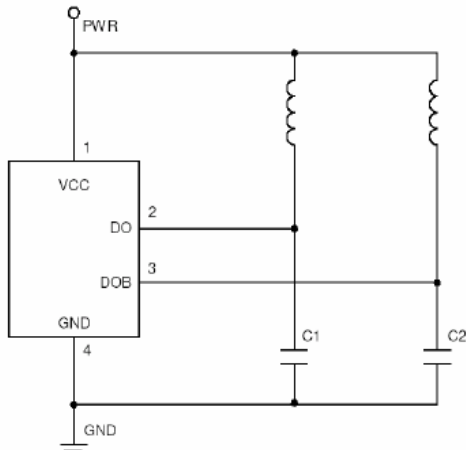


Bin C



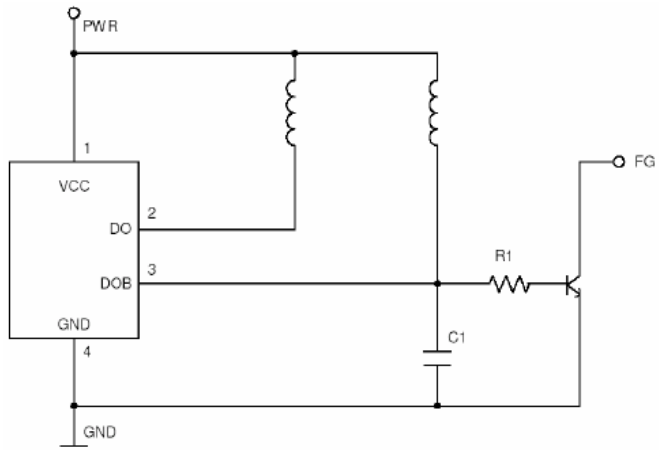
## Application Circuit Double Coil

### 1) Output on current, $I_c > 250\text{mA}$



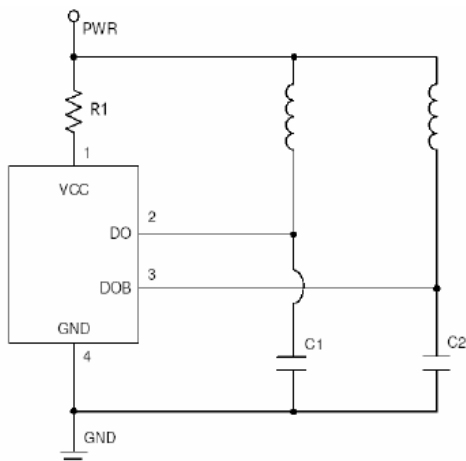
Remark: C1, C2: Capacitor  $2.2\mu\text{F} \sim 4.7\mu\text{F}$  (optional)

### 2) With FG output



Remark: C1: Capacitor  $0.1\mu\text{F} \sim 1\mu\text{F}$  R1: Resistor  $1\text{K}\Omega$

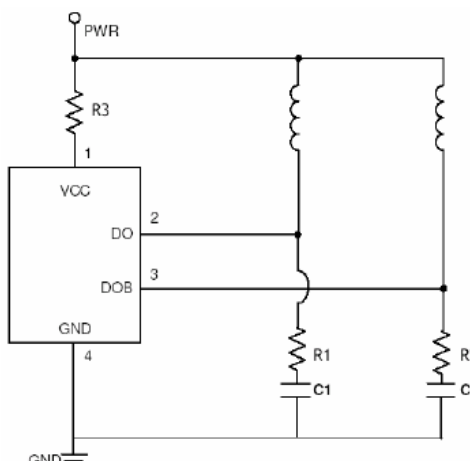
### 3) $V_{cc} > 18\text{V}$



Remark: C1, C2: Capacitor  $2.2\mu\text{F} \sim 4.7\mu\text{F}$  (optional)  
 R1: Resistor

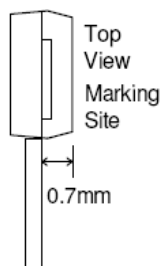
\*R1's value will decide power consumption of IC & effect IC's start up voltage.

### 4) $V_{cc} > 18\text{V}$



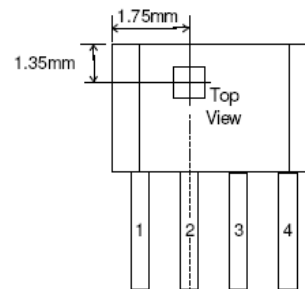
## Package Information

### Active Area Depth

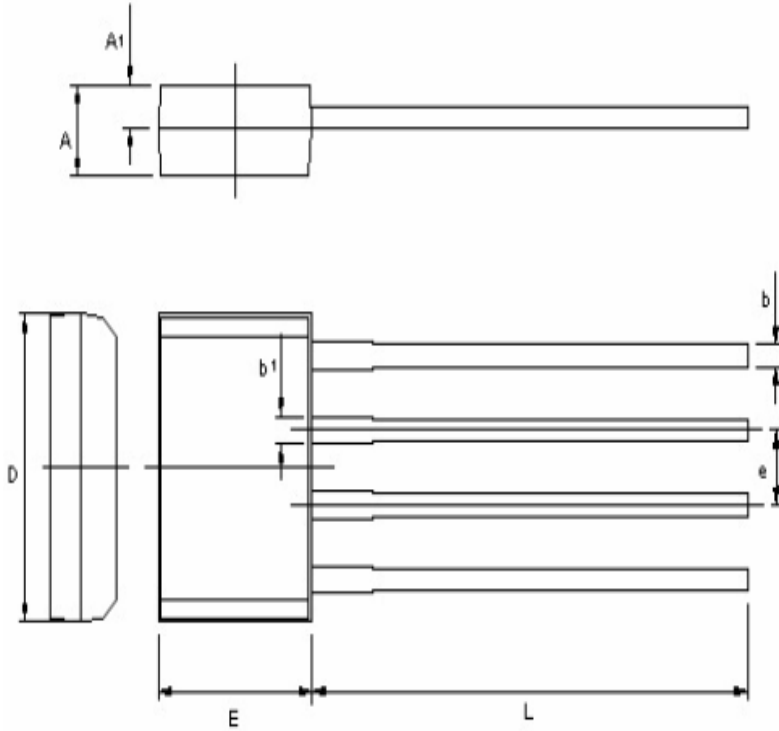


Tolerance:  $\pm 0.05\text{mm}$

### Package Sensor Location



## SIP-4L Dimension



**Marking:**

Device name ← 277  
 ← XXXX →

Date Code:  
 Year+Month  
 Year: 2006→6  
 2007→7, ...,  
 etc  
 Month : Jan→A,  
 Feb→B, Mar→  
 C, Apr→D, May  
 →E, Jun→F, Jul  
 →G, Aug→H,  
 Sep→J, Oct→K  
 Nov→L, Dec→  
 M

Lot Code:  
 01~99  
 serially

1 2 3 4

Style: Pin 1.VCC 2.Output 3.Output 4. Ground

4-Lead SIP-4L Plastic Package  
 CYStek Package Code: A4

DIM	Inches		Millimeters		DIM	Inches		Millimeters	
	Min.	Max.	Min.	Max.		Min.	Max.	Min.	Max.
A	0.051	0.071	1.295	1.803	D	0.201	0.211	5.105	5.359
A1	0.024	-	0.610	-	E	0.139	0.149	3.531	3.785
b	0.013	0.017	0.330	0.432	L	0.551	0.630	14.00	16.00
b1	0.016	0.020	0.406	0.508	e	0.05 REF		1.27 REF	

**Notes:** 1.Dimension and tolerance based on our Spec. dated Apr. 18,2002.  
 2.Controlling dimension: millimeters.  
 3.Maximum lead thickness includes lead finish thickness, and minimum lead thickness is the minimum thickness of base material.  
 4.If there is any question with packing specification or packing method, please contact your local CYStek sales office.

**Material:**  
 • Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

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