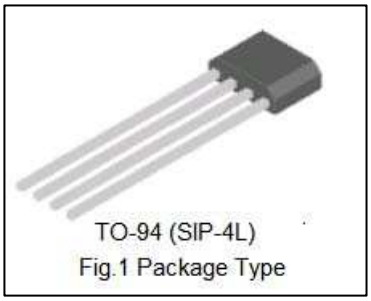
H277

Complementary Output Hall Effect Sensor IC



General Description

H277 is designed to integrate Hall sensor with output driver together on the same chip. It is suitable for dual coils brush-less DC motors, dual coils brush-less DC fan, speed measurement, and revolution counting.

It includes a band-gap reference voltage source, a Hall device, an amplifier, a hysteretic controller and an open-collector output drive capable of sinking up to 300mA current load. An on-chip protection diode is implemented to prevent reverse power fault.

H277 has a control circuit to prevent “dead angle” from logic race condition in DC Fan. It has excellent characteristic of temperature compensation. The internal temperature compensated voltage source can let sensor to get uniform sensitivity in a wide temperature range.

It is rated for operation over temperature rage from -20°C to +85°C and voltage ranges from 3.0V to 20V.

Features

- On-chip Hall sensor
- 3.0V to 20V operating voltage
- Internal Temperature compensation
- Special design providing logic race condition immunity, shorter switching time, and good switch reliability
- 300mA output sink current
- Internal on-chip protection diode
- SIP-4L Package

Applications

- Dual-coil Brush-less DC Motor
- Dual-coil Brush-less DC Fan
- Revolution Counting
- Speed Measurement

Typical Application Circuit (Brush-Less DC Fan)

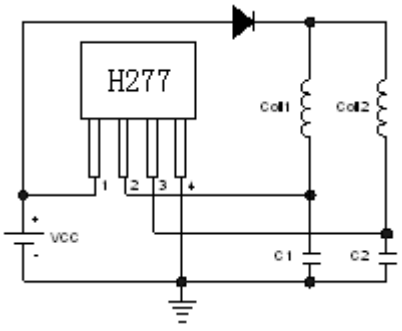
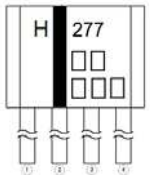


Fig.2 H277 Application Circuit

Pin Configuration



Name	P/I/O	Pin No.	Description
VCC	P	1	Power Supply Input
DO	O	2	Output Pin
DOB	O	3	Output Pin
GND	P	4	Ground

Block Diagram

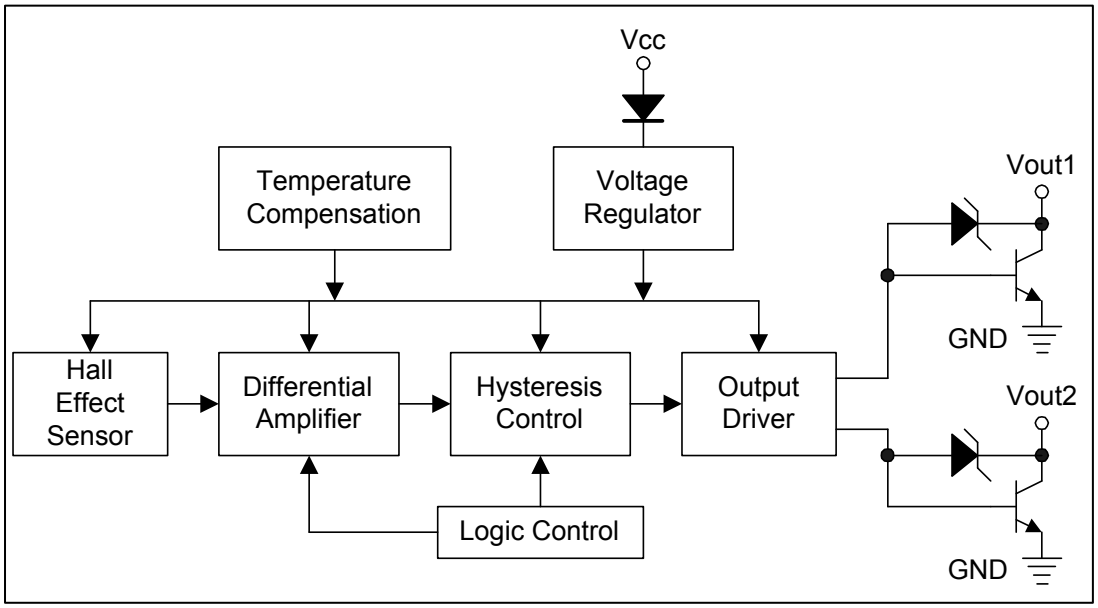


Fig.3 Functional Block Diagram of H277

Absolute Maximum Ratings (Ta=25°C)

Characteristics	Symbol	Values	Unit
Supply Voltage	V_{CC}	20	V
Output breakdown Voltage	$V_{OUT(breakdown)}$	35	V
Magnetic Flux Density	B	Unlimited	Gauss
Output Zener Breakdown	V_Z	28	V
Output ON Current (continuous)	I_C	300	mA
Maximum Output Current	I_{CMAX}	1	A
Operating Temperature Range	T_A	-20 to +85	℃
Storage Temperature Range	T_{Stg}	-65 to +150	℃
Package Power Dissipation	P_D	500	mW
Maximum Junction Temperature	T_J	150	℃

Electrical Characteristics (T=+25℃, V_{CC}=3V~20V)

Characteristic	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Supply Voltage	V_{CC}		3	-	20	V
Output Saturation Voltage	$V_{CE(sat)}$	V_{CC}=3V, I_L=100mA	-	200	-	mV
		V_{CC}=14V, I_L=300mA	-	300	600	
Output Leakage Current	Icex	Vce=14V, V_{CC}=14V	-	-	2	uA
Supply Current	Iccq	V_{CC}=20V, Output Open	-	14	20	mA
Output Rise Time	Tr	V_{CC}=14V, R_L=400Ω, C_L=20pF	-	1	5	uS
Output Falling Time	Tf	V_{CC}=14V, R_L=400Ω, C_L=20pF	-	0.2	1.2	uS

Magnetic Characteristics

Characteristic		Symbol	Min.	Max.	Unit	Grade
H277A	Operate Point	B_{op}	-	50	Gauss	A
	Release Point	B_{rp}	-50	-	Gauss	
H277B	Operate Point	B_{op}	-	70	Gauss	B
	Release Point	B_{rp}	-70	-	Gauss	
H277C	Operate Point	B_{op}	-	90	Gauss	C
	Release Point	B_{rp}	-90	-	Gauss	
H277D	Operate Point	B_{op}	-	130	Gauss	D
	Release Point	B_{rp}	-130	-	Gauss	

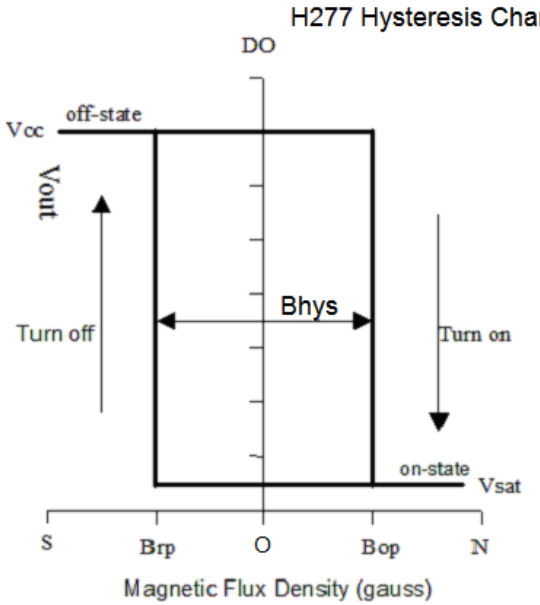


Fig.4 V_{DO} vs. Magnetic Flux Density

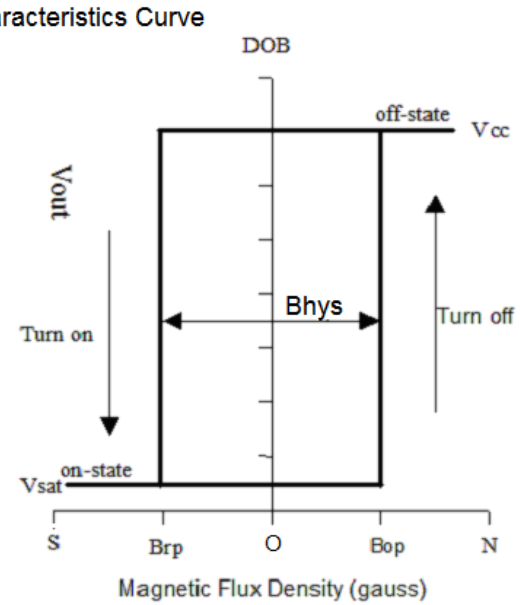


Fig.5 V_{DOB} vs. Magnetic Flux Density

Characteristics Curve

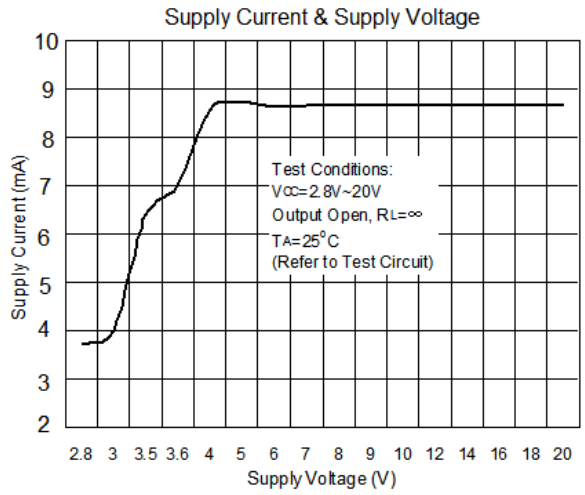


Fig.6 I_{CC} vs. V_{CC}

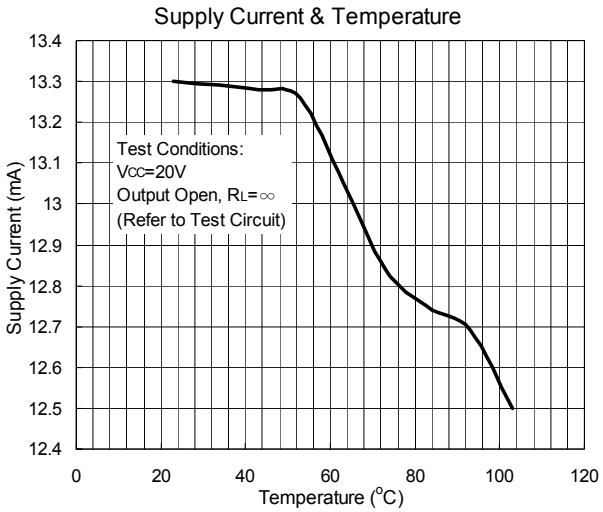


Fig.7 I_{CC} vs. T_A

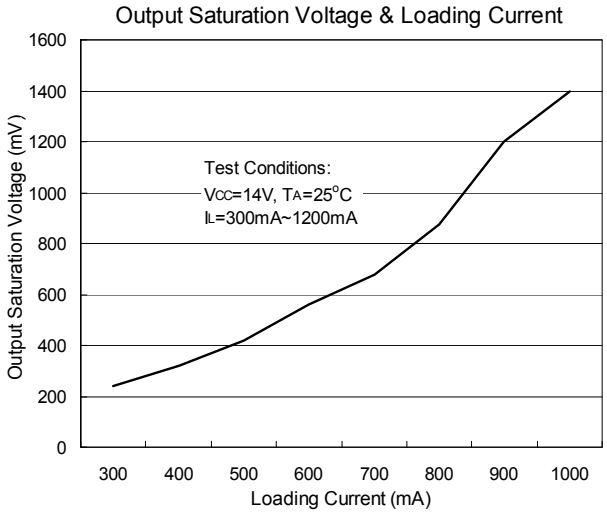


Fig.8 V_{sat} vs. I_C

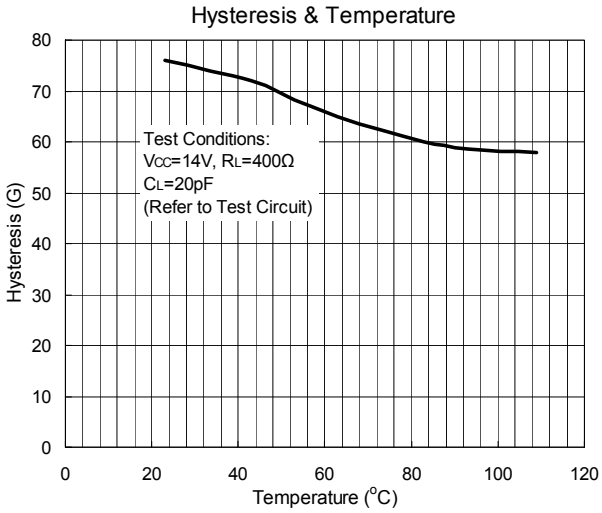


Fig.9 Bhys vs. T_A

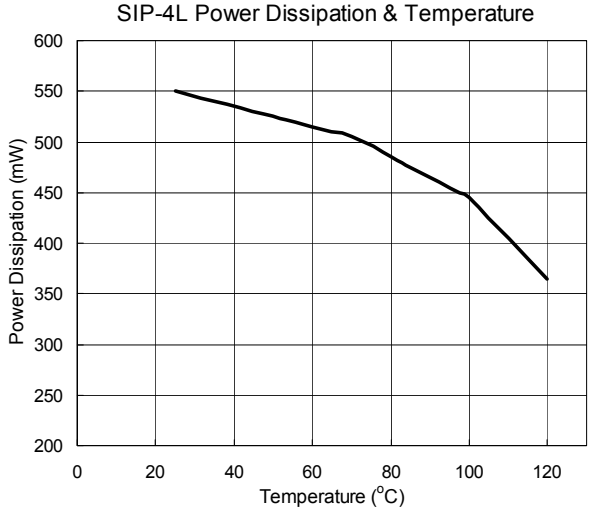


Fig.10 P_D vs. T_A

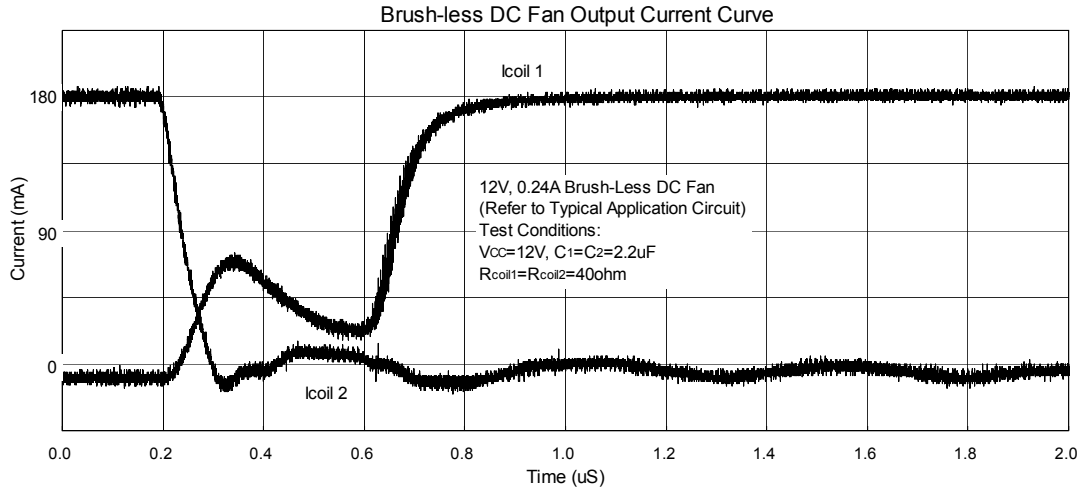


Fig.11 DC FAN Output Curve

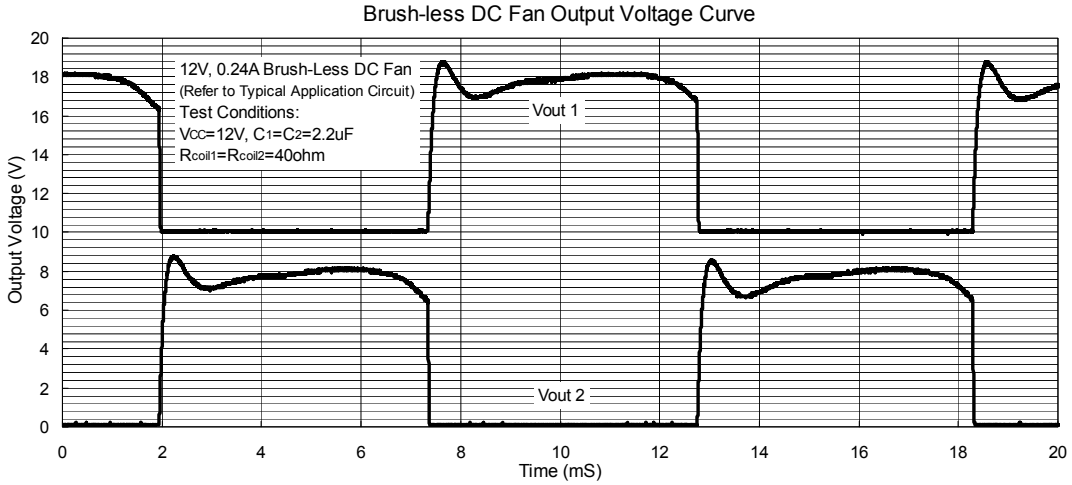


Fig.12 DC FAN Output Curve

Test Circuit

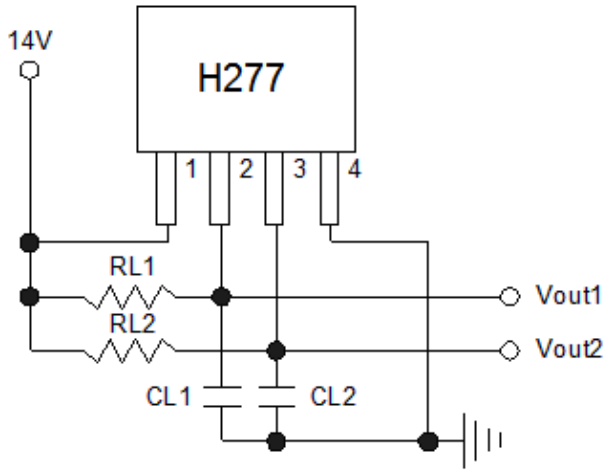
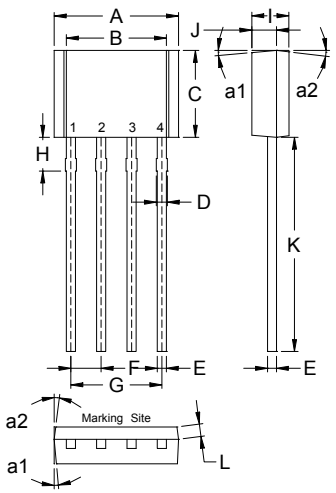


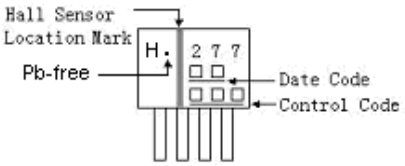
Fig.13 Test Circuit

SIP-4L Dimension



4-Lead SIP-4L
Plastic Package
HSMC Package Code: AD

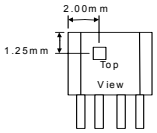
Marking:



Note: Green label is used for Pb-free packing

Pin Style: 1.VCC 2.Vout1 3.Vout2 4.GND

Hall Sensor Location:



Material:
- Lead solder plating: Sn60/Pb40 (Normal), Sn/3.0Ag/0.5Cu or Pure-Tin (Pb-free)
- Mold Compound: Epoxy resin family, flammability solid burning class: UL94V-0

DIM	Min.	Max.
A	5.12	5.32
B	4.10	4.30
C	3.55	3.75
D	0.43	0.49
E	0.35	0.41
F	1.24	1.30
G	3.78	3.84
H	1.32	1.52
I	1.45	1.65
J	0.93	1.13
K	13.00	15.50
L		
a1	3^o	5^o
a2	5^o	7^o

*: Typical, Unit: mm

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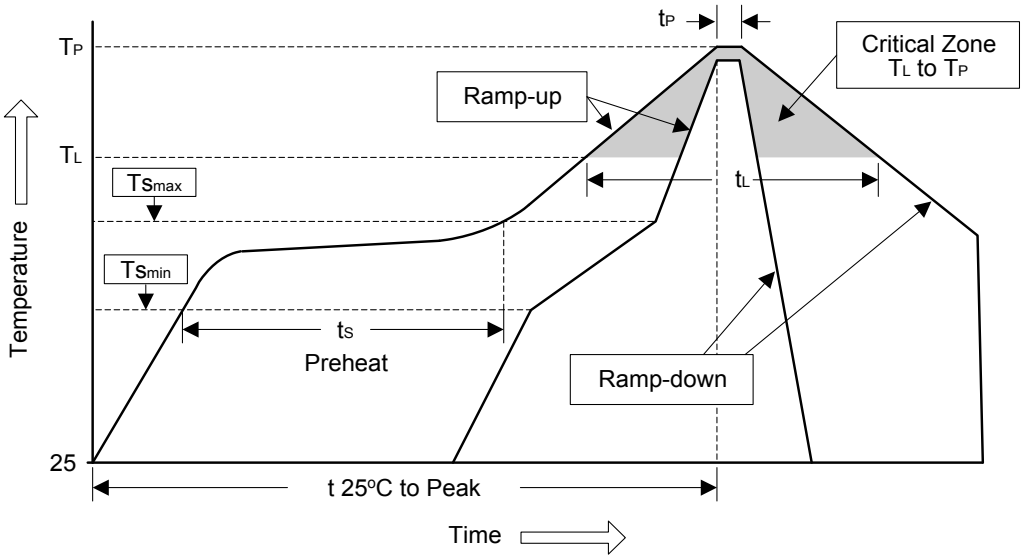
Soldering Methods for HSMC Products

1. Storage environment: Temperature=10°C~35°C Humidity=65%±15%

2. Reflow soldering of surface-mount devices

Figure 1: Temperature profile



Profile Feature	Sn-Pb Eutectic Assembly	Pb-Free Assembly
Average ramp-up rate (T_L to T_P)	<3°C/sec	<3°C/sec
Preheat - Temperature Min (Ts_{min}) - Temperature Max (Ts_{max}) - Time (min to max) (ts)	 100°C 150°C 60~120 sec	 150°C 200°C 60~180 sec
Tsmax to T_L - Ramp-up Rate	 <3°C/sec	 <3°C/sec
Time maintained above: - Temperature (T_L) - Time (t_L)	 183°C 60~150 sec	 217°C 60~150 sec
Peak Temperature (T_P)	240°C +0/-5°C	260°C +0/-5°C
Time within 5°C of actual Peak Temperature (t_P)	10~30 sec	20~40 sec
Ramp-down Rate	<6°C/sec	<6°C/sec
Time 25°C to Peak Temperature	<6 minutes	<8 minutes

3. Flow (wave) soldering (solder dipping)

Products	Peak temperature	Dipping time
Pb devices.	245°C ±5°C	5sec ±1sec
Pb-Free devices.	260°C +0/-5°C	5sec ±1sec