Single Phase Hall Effect Fan Driver

❖ GENERAL DESCRIPTION

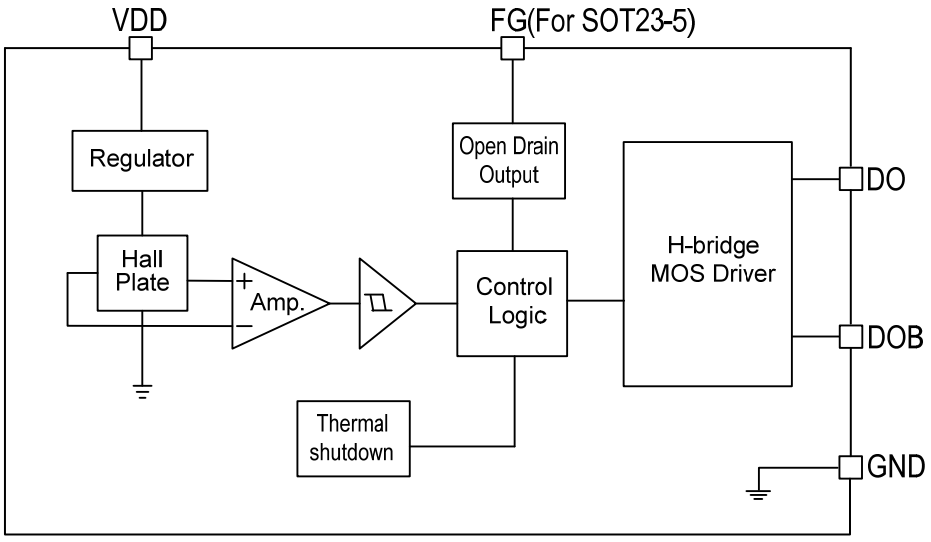
The MA477 is an integrated Hall sensor with H-Bridged output driver designed for brushless DC motor applications. The device is using HV BCD process includes an on-chip Hall sensor for magnetic sensing, an amplifier that amplifies the Hall voltage, a comparator to provide switching hysteresis for noise rejection, a bi-directional drivers for sinking and driving large current load.

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.MA477 are available in SIP-4L & SOT23-5L package.

❖ FEATURES

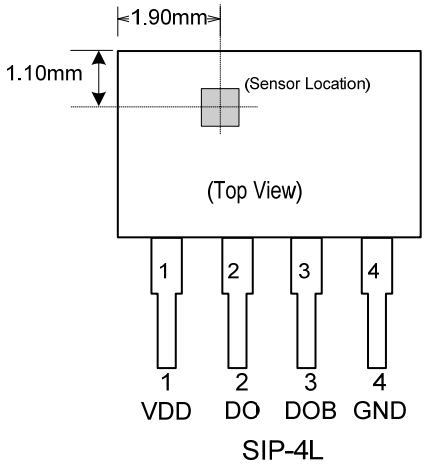
- On-Chip High sensitivity Hall-effect Sensor
- Operating Voltage: 3.5V to 20V
- H-Bridge Output Drivers for Single Coil
- Thermal Shutdown Protection
- Low Output Switching Current Noise
- -40°C to 85°C Operating Temperature
- Low Profile SIP-4L & SOT23-5L Package

❖ BLOCK DIAGRAM

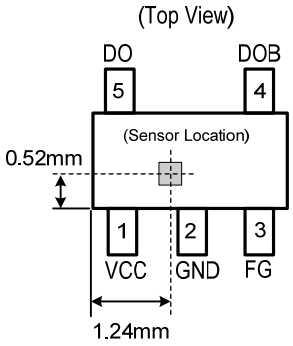


❖ PIN ASSIGNMENT

The packages of MA477 are SIP-4L & SOT23-5L;



SIP-4L



SOT23-5L

Name	Description
VDD	Supply Voltage
DO	Output 1
DOB	Output 2
GND	Ground.
FG	Frequency Generation

❖ RDER/MARKING INFORMATION

Order Information	Top Marking (SIP-4L)
MA477XXX Package Type P4: SIP-4L Packing Blank: Tube	Logo ← MA477 → Part number YYWWX → ID code:internal → WW:01~52 → Year:14=2014
Order Information	**Top Marking (SOT23-5L)**
MA477 X X Package Type B: SOT23-5L Packing Blank: Tube A : Taping	H4 Y W X → ID Code: Internal → Week: 01~26(A~Z) 27~52(a~z) → Year : 6 = 2016

❖ A BSOLUTE MAXIMUM RATINGS (at T_A=25°C)

Characteristics		Symbol	Rating	Unit
Supply Voltage		V_{CC}	22	V
Magnetic Flux Density		B	Unlimited	Gauss
Output Current	Continuous	I_O	300	mA
	Hold		400	
	Peak (start up)		800	
Power Dissipation		P_D	550	mW
Storage Temperature Range		T_{STG}	-50 to +150	°C
Thermal Resistance from Junction to case		θ_{JC}	49	°C/W
Thermal Resistance from Junction to ambient		θ_{JA}	227	°C/W
Recommended Operating Conditions (T_A=25 °C)				
Supply Voltage		V_{CC}	3.5 to 20	V
Ambient Temperature		T_A	-40 to 85	°C

❖ ELECTRICAL CHARACTERISTICS

(V_{DD} = 12V, T_A = +25°C, unless otherwise noted.)

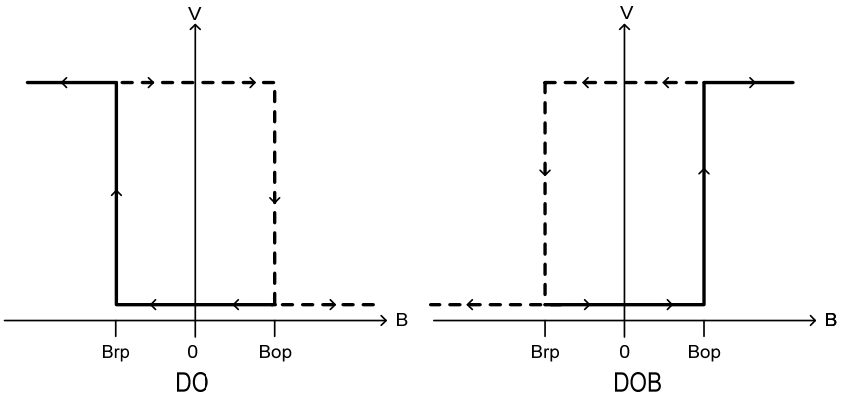
Characteristics	Symbol	Conditions	Min	Typ	Max	Units
Average Supply Current	I_{DD}	no load	-	3	-	mA
On resistance(RPMOS+RNMOS)	$R_{DS(ON)}$	300mA	-	2.6	-	Ω
Thermal Shutdown Threshold	T_{SHUT}		150	-	-	°C
Operating Point	B_{OP}		5	30	50	Gauss
Releasing Point	B_{RP}		-50	-30	-5	Gauss
Hysteresis	B_{HYS}		-	60	-	Gauss

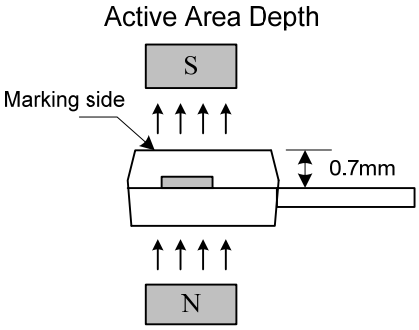
Note: Guaranteed by design.

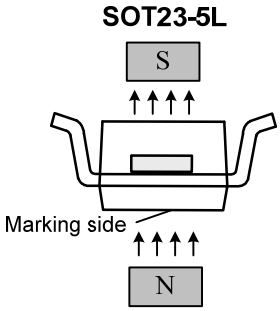
Driver output vs. magnetic pole

Characteristics	Test Conditions	DO	DOB
North pole	B < Brp	High	Low
South pole	B > Bop	Low	High

Note: The magnetic pole is applied facing the branded side of the package

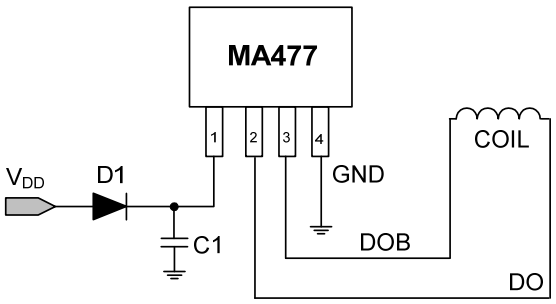






❖ APPLICATION CIRCUIT

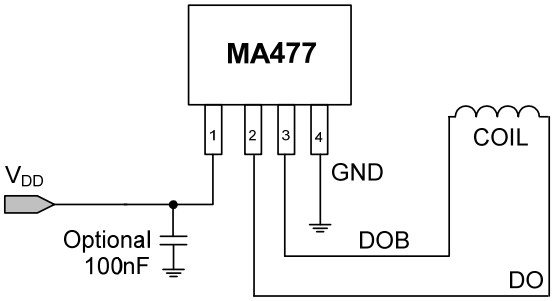
1. Circuit 1



NOTE

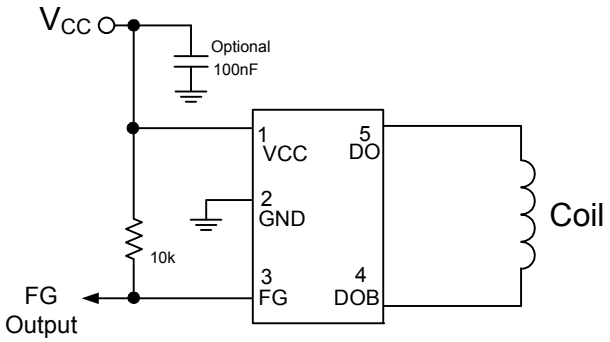
1. D1 is reversed protection diode,
2. C1 : ECA >=2.2uF, MLCC>=10uF

2. Circuit 2



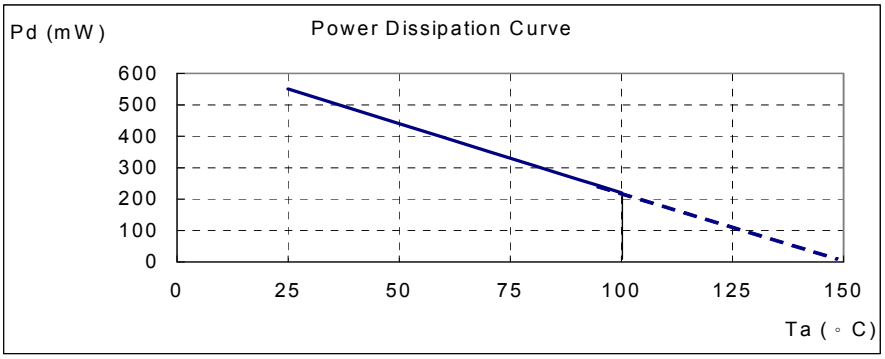
❖ APPLICATION CIRCUIT

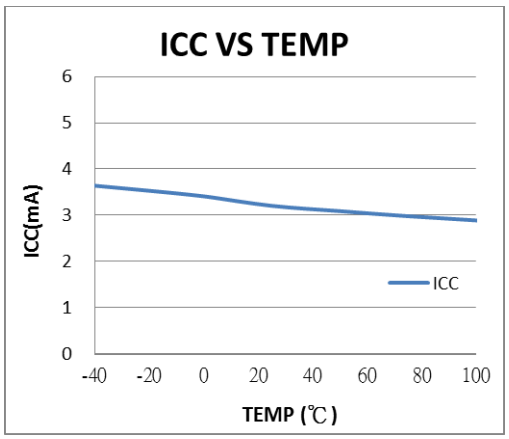
3. Circuit 3

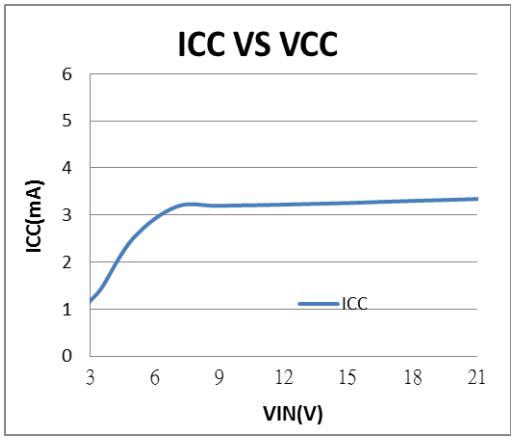


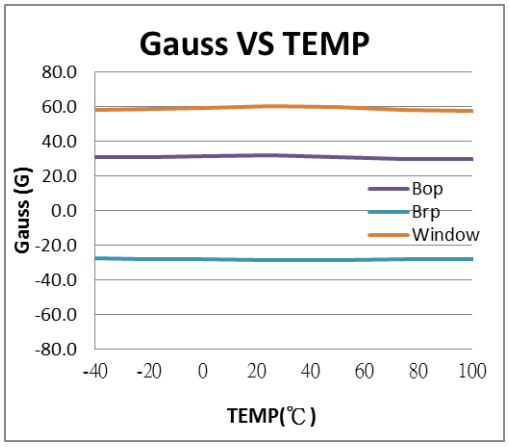
❖ PERFORMANCE CHARACTERISTICS

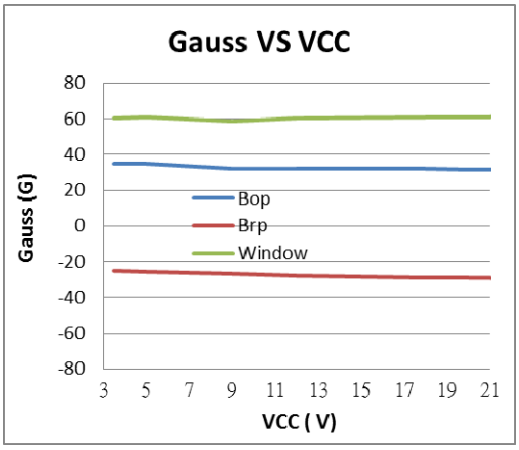
T_A (°C)	25	50	60	70	80	85	90	95	100
Pd (mW)	550	440	396	352	308	286	264	242	220
T_A (°C)	**105**	**110**	**115**	**120**	**125**	**130**	**135**	**140**	**150**
Pd (mW)	198	176	154	132	110	88	66	44	0

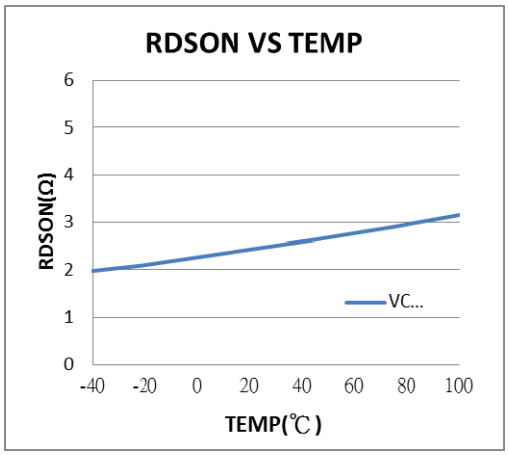


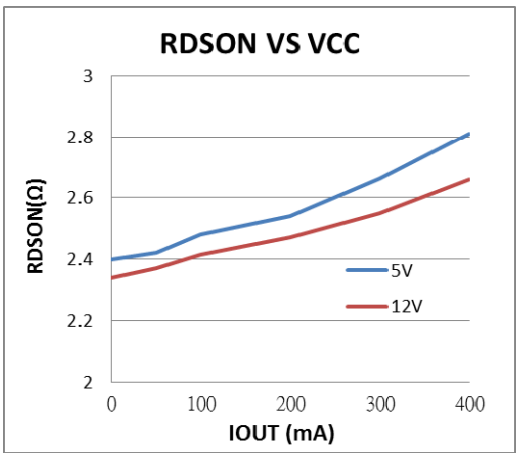

ICC VS TEMP
ICC(mA)
6
5
4
3
2
1
0
-40 -20 0 20 40 60 80 100
TEMP (℃)
ICC


ICC VS VCC
ICC(mA)
6
5
4
3
2
1
0
3 6 9 12 15 18 21
VIN(V)
ICC


Gauss VS TEMP
Gauss (G)
80.0
60.0
40.0
20.0
0.0
-20.0
-40.0
-60.0
-80.0
-40 -20 0 20 40 60 80 100
TEMP(℃)
Bop
Brp
Window

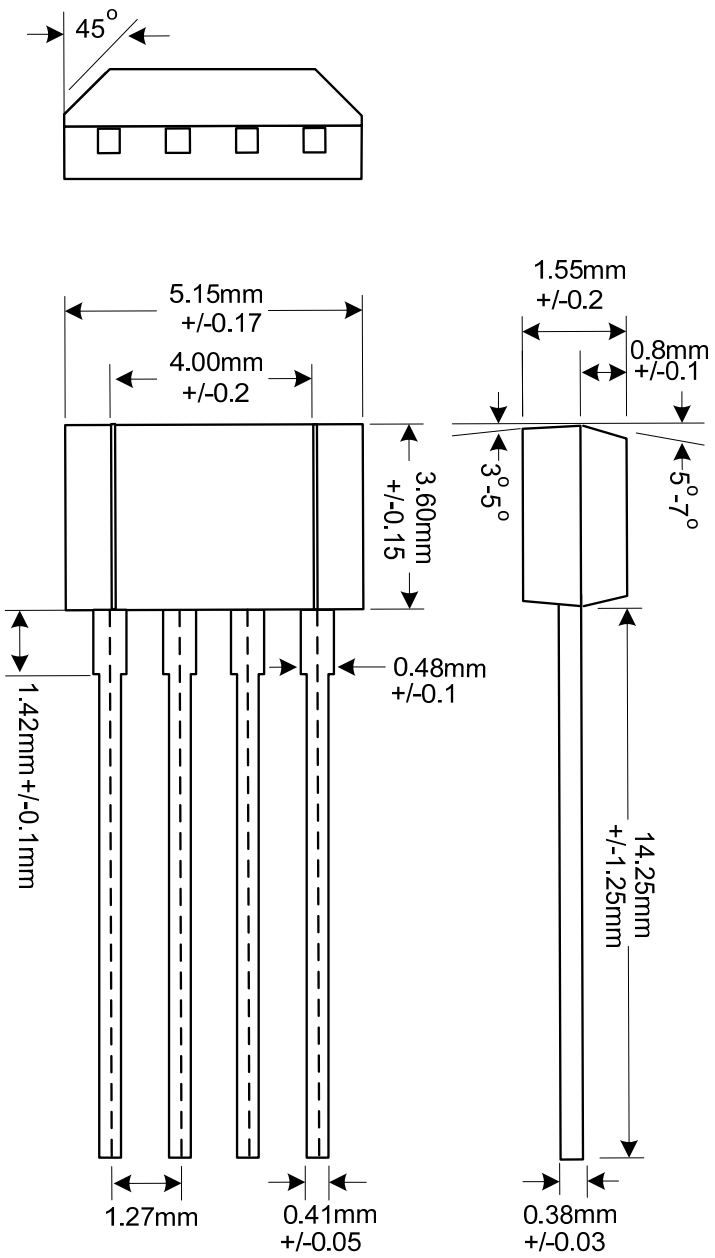

Gauss VS VCC
Gauss (G)
80
60
40
20
0
-20
-40
-60
-80
3 5 7 9 11 13 15 17 19 21
VCC (V)
Bop
Brp
Window


RDSON VS TEMP
RDSON(Ω)
6
5
4
3
2
1
0
-40 -20 0 20 40 60 80 100
TEMP(℃)
VC...

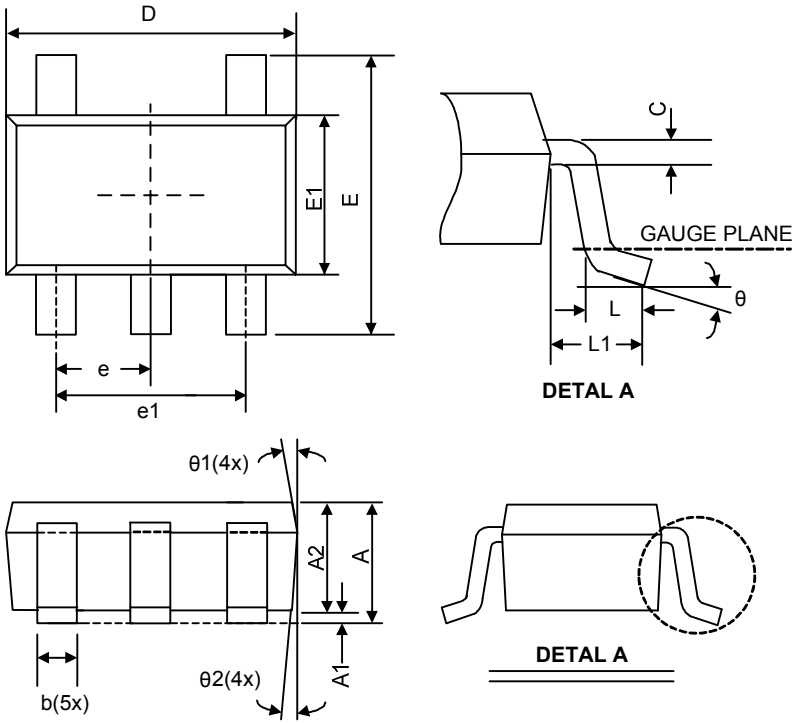

RDSON VS VCC
RDSON(Ω)
3
2.8
2.6
2.4
2.2
2
0 100 200 300 400
IOUT (mA)
5V
12V

❖ PACKAGE OUTLINES

(1) SIP-4L



(2) SOT23-5L



Symbol	Dimensions in Millimeters			Dimensions in Inches		
	Min.	Nom.	Max.	Min.	Nom.	Max.
A	1.05	-	1.35	0.041	-	0.053
A1	0.05	-	0.15	0.002	-	0.006
A2	1.00	1.10	1.20	0.039	0.043	0.047
b	0.30	-	0.50	0.012	-	0.020
C	0.08	-	0.22	0.003	-	0.009
D	2.80	2.90	3.00	0.110	0.114	0.118
E1	1.50	1.60	1.70	0.059	0.063	0.067
E	2.60	2.80	3.00	0.102	0.110	0.118
L	0.30	-	0.60	0.012	-	0.024
L1	0.50	0.60	0.70	0.020	0.024	0.028
e1	1.80	1.90	2.00	0.071	0.075	0.079
e	0.85	0.95	1.05	0.033	0.037	0.041
θ	0°	4°	8°	0°	4°	8°
θ1	5°	10°	15°	5°	10°	15°
θ2	5°	10°	15°	5°	10°	15°