Single-Phase Full-Wave Motor Driver for Fan Motor SDC11556

General Description

The SDC11556 is a single phase DC fan motor driver IC. It is optimal for use in applications that require miniaturization and low noise. The driver includes lock detection, thermal shutdown and over-current protection. Maximum output current is 1A. Package is Pb-free and Halogen-free.

Features

- Operation voltage: 2.0V~6.0V
- Lock detection
- Control output terminal(FG)
- Built-in thermal shutdown circuit
- Over current protection
- Low cross-over noise

Application

- Single phase DC fan motor

Pin Configuration

MSOP-8

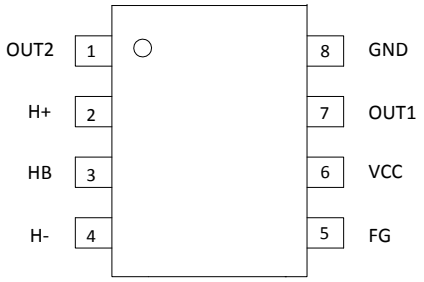


Figure 1. Pin Configuration

Pin Number	Pin Name	Function
1	OUT2	Motor output terminal
2	H+	Hall input terminal
3	HB	Hall bias
4	H-	Hall input terminal
5	FG	FG signal output terminal
6	VCC	Power supply terminal
7	OUT1	Motor output terminal
8	GND	Ground terminal

Table 1. Pin Description

Functional Block Diagram

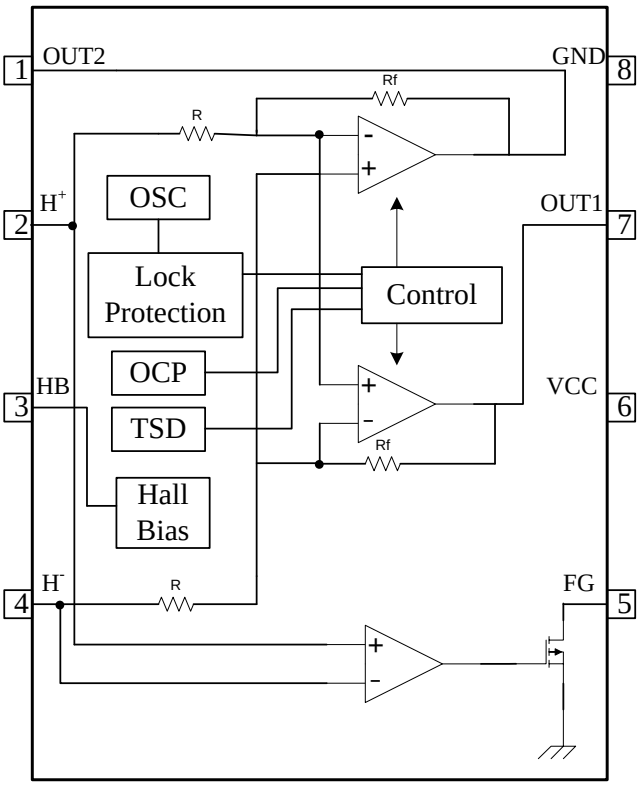


Figure 2. Functional Block Diagram

Ordering Information

SDC11556 X X - X

- Circuit Type
- E1: Pb-free
  G1: Halogen-free
- TR: Tape
  Blank: Tube
- Package
  MSOP-8: M

Package	Temperature Range	Part Number		Marking ID		Packing Type
		Pb-free	Halogen-free	Pb-free	Halogen-free	
MSOP-8	-40°C~85°C	SDC11556MTR-E1	SDC11556MTR-G1	1556	1556G	Tape
		SDC11556M-E1	SDC11556M-G1	1556	1556G	Tube

Absolute Maximum Ratings (Note: Stresses greater than those listed under Absolute Maximum Ratings may cause permanent damage to the device.)

Parameter	Symbol	Min	Max	Unit
Maximum supply voltage	V_{CCMAX}	-	7	V
Maximum output current	I_{OUTMAX}	-	1000	mA
FG signal maximum output current	I_{FGMAX}	-	10	mA
FG signal maximum output voltage	V_{FGMAX}	-	7	V
HB maximum output current	I_{HBMAX}	-	10	mA
Power dissipation	Pd_{MAX1}	-	585	mW
Operate temperature range	T_{OPR}	-40	105	°C
Storage temperature range	T_{STG}	-55	150	°C
Junction temperature range	T_{JMAX}	-	150	°C

Table 2. Absolute Maximum Ratings

Recommended Operating Conditions

Parameter	Symbol	Min	Max	Unit
Operating supply voltage range	V_{CC}	2.0	6.0	V
Hall input voltage range	V_H	0.4	V_{CC}-1.3	V

Table 3. Recommended Operating Conditions

Electrical Characteristics (Ta=25°C, V_{CC}=5V, unless otherwise specified)

Parameter	Symbol	Limit			Unit	Conditions
		Min	Typ	Max		
Supply current	I_{CC}	-	3	6	mA	-
Hall Input						
Input offset voltage	V_{HOFS}	-	-	±6	mV	-
Output						
Output voltage	V_O	-	0.3	0.5	V	I_O=250mA Upper and lower total
Input-output gain	G_{IO}	45	48	51	dB	
FG low voltage	V_{FGL}	-	0.2	0.3	V	I_{FG}=3mA
FG leakage current	I_{FGL}	-	-	10.0	uA	V_{FG}=5V
Input hysteresis voltage	V_{HYS}	±5	±10	±15	mV	
Hall bias voltage	V_{HB}	1.1	1.3	1.5	V	I_{HB}=-5mA
Lock Protection						
Lock detection on time	t_{ON}	0.35	0.50	0.65	Sec	-
Lock detection off time	t_{OFF}	3.5	5.0	6.5	Sec	-

Table 4. Electrical Characteristics

Truth Table

H+	H-	OUT1	OUT2	FG	Mode
H	L	H	L	L(Output Tr : ON)	Operation mode
L	H	L	H	Z(Output Tr : OFF)	
H	L	L	L	L(Output Tr : ON)	Lock mode
L	H	L	L	Z(Output Tr : OFF)	

Table 5. Truth Table

Power Dissipation Curve

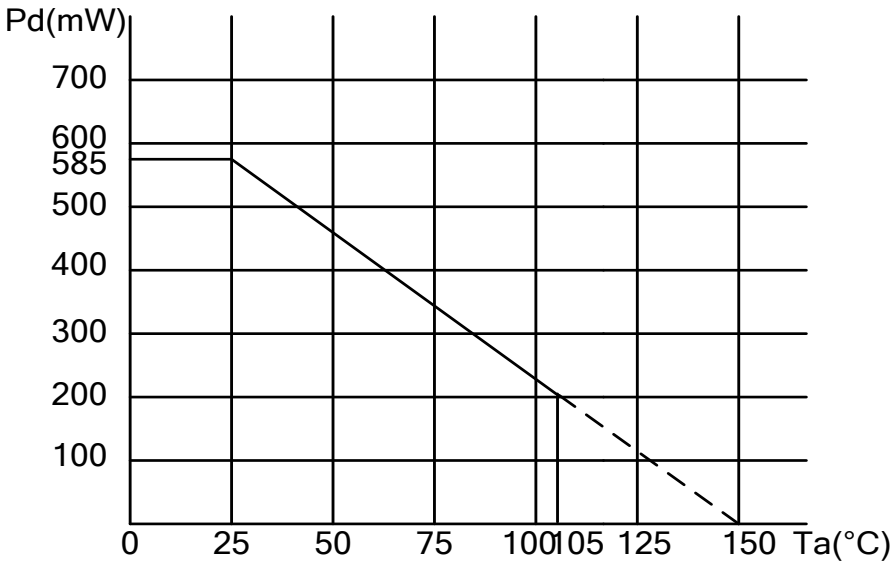


Figure 3. Power Dissipation Curve

Typical Application

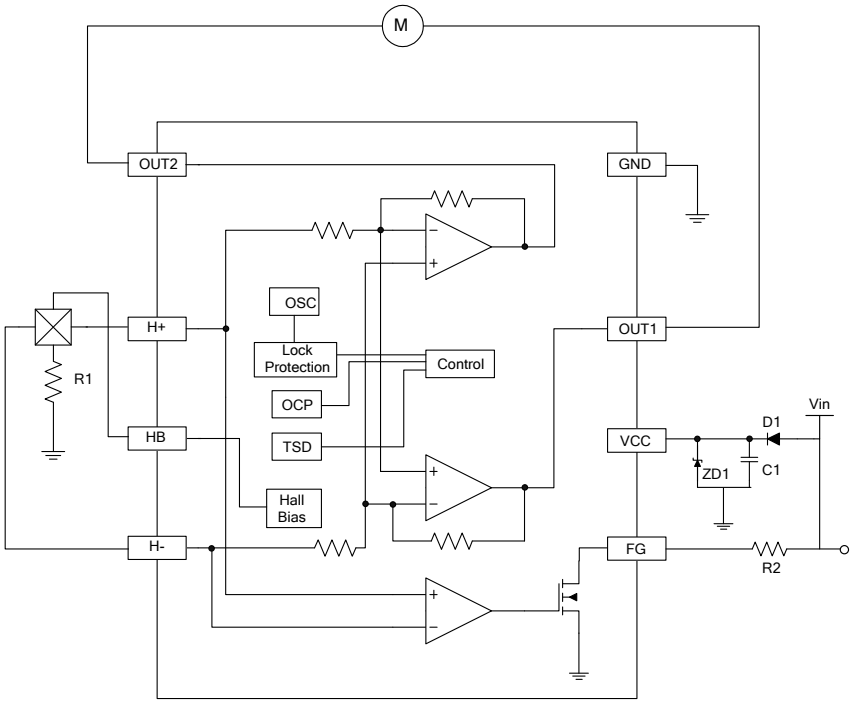


Figure 4. Typical Application

Reverse connection of power supply may break the device. A countermeasure is needed such as using reverse current protection diode (D1) between power supply and VCC terminal

The BEMF causes re-circulate current to power supply, when power-on or output changes. It may cause VCC terminal to raise voltage, especially using reverse current protection diode (D1) because of there is no way to return current to power supply. In such case, please take necessary measures like below.

Connect a zener diode (ZD1) between VCC and GND terminal not to exceed the absolute maximum rating voltage.

Connect a capacitor (C1) between VCC and GND terminal to make the path of return current to power supply.

Lock Detection

This IC detect the rotation of the motor by hall signal, and adjust lock detection ON time (Ton) and lock detection OFF time (t_{OFF}) by the internal counter. These time (t_{ON}, t_{OFF}) are showed below.

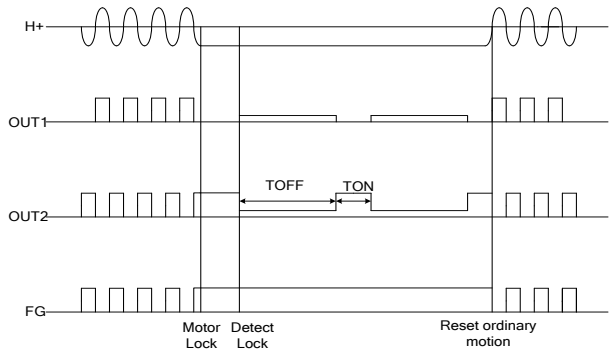


Figure 5. Lock Detection

Note:

1、Absolute Maximum Ratings

This product is produced with strict quality control, but destroyed in using beyond absolute maximum ratings. Once IC destroyed, a failure mode cannot be defined (like short-mode or open-mode).Therefore, physical security counter measure, like fuse, is to be given when a specific mode to be beyond absolute maximum rating is considered.

2、Reverse Connection of Power Supply

Reverse connection of the power supply may break the device. A countermeasure is needed such as using reverse current protection diodes between the power supply and the VCC terminal.

3、Power Supply Line

The BEMF causes re-circulate current to power supply, Please connect a capacitor between power supply and GND as a route of re-circulate current. And please determine the capacitance after confirmation that the capacitance does not causes any problems.

4、GND Potential

The GND terminal should be the location of the lowest voltage on the chip.

5、Thermal Design

The thermal design should allow enough margin for actual power dissipation.

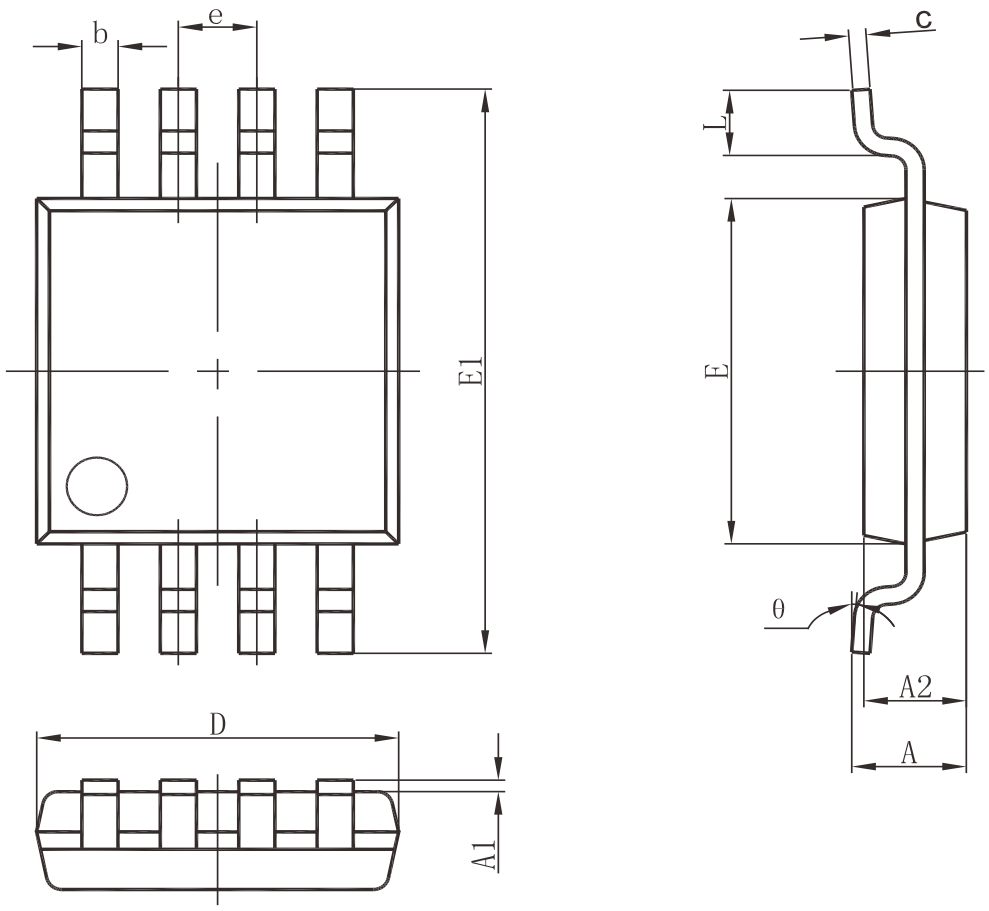
6、Mounting Failures

Mounting failures, such as misdirection or miss-mounts, may destroy the device.

The electrical short caused by falling particle, between outputs; power supply and output; or output and ground, may damage the device.

Package Dimension

MSOP-8



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min	Max	Min	Max
A	0.820	1.100	0.032	0.043
A1	0.020	0.150	0.001	0.006
A2	0.750	0.950	0.030	0.037
b	0.250	0.380	0.010	0.015
c	0.090	0.230	0.004	0.009
D	2.900	3.100	0.114	0.122
e	0.650(BSC)		0.026(BSC)	
E1	4.750	5.050	0.187	0.199
E	2.900	3.100	0.114	0.122
L	0.400	0.800	0.016	0.031
θ	0°	6°	0°	6°

Shaoxing Devechip Microelectronics Co., Ltd.

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Contact us:

Headquarters of Shaoxing

Address: Tian Mu Road, No13,

Shaoxing city, Zhejiang province, China

Zip code: 312000

Tel: (86) 0575-8861 6750

Fax: (86) 0575-8862 2882

Shenzhen Branch

Address: 22A, Shangbu building, Nan Yuan Road, No.68,

Futian District, Shenzhen city, Guangdong province, China

Zip code: 518031

Tel: (86) 0755-8366 1155

Fax: (86) 0755-8301 8528