5V H bridge driver

Description

The MS3010 provides an integrated motor-driver， solution for cameras, consumer products, toys, andother low-voltage or battery-powered motion-control applications. The device has one H-bridge driver, and can drive one dc motor or one winding of a steppermotor, as well as other devices like solenoids.

The MS3010 can supply up to 0.8 A of output current. It operates on a motor power-supply voltage from 1.8 V to 6 V.

The MS3010 has a PWM (IN/IN) input interface which is compatible with industry-standard devices. There are internal over temperature protection.

SOP8

Features

- H-Bridge Motor Driver
  - -- Drives a DC Motor or One Winding of a Stepper Motor or Other Loads
  - -- Low MOSFET On-Resistance: HS + LS 850 mΩ
- 0.8A MAX Drive Current
- motor supply VCC：1.8~6V
- PWM (IN/IN) Interface
- over temperature protection
- Low-Power Sleep Mode (When IN1=IN2=0)

Applications

- Cameras
- DSLR Lenses
- Consumer Products
- Toys
- Robotics
- Medical Devices

Product Information

Product	Package	Mark
MS3010	SOP8	MS3010

FUNCTIONAL BLOCK DIAGRAM

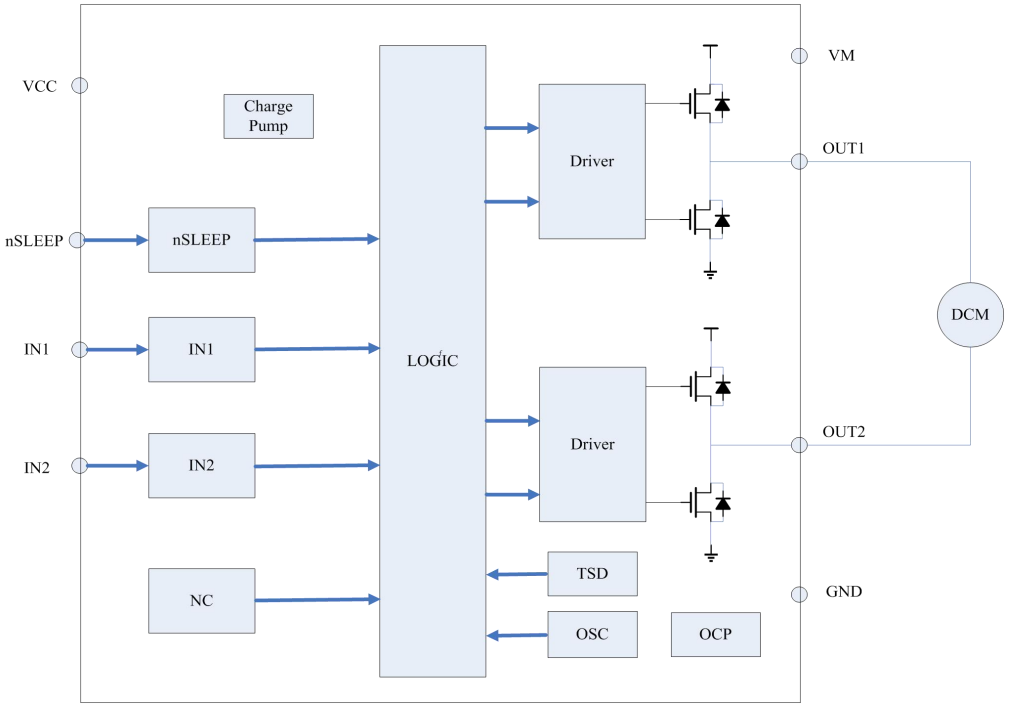


Figure 1： MS3010 Functional block

Absolute Maximum Ratings

Parameter	Symbol	Range	UNIT
Power supply voltage range	VCC	-0.3~6	V
Digital pin voltage range	INx	-0.5~6	V
motor drive output current	Imax	0~0.8A	A
Operating virtual junction temperature range	Tjmax	-40~150	℃
Storage temperature range	Tstg	-60~150	℃
ESD(human body)	ESD	±2500	V

Electrical Characteristics(unless otherwise noted，T=25℃，VCC=5V）

RECOMMENDED OPERATING CONDITIONS：(T=25℃，unless otherwise noted)

Parameter	Symbol	Min	Typ	Max	Unit
Device power supply voltage range	VCC	1.8		6	V
H-bridge output current	IOUT	0		0.8	A
Device power supply voltage range	fPWM	0		250	kHZ
Logic-level input voltage	Vlogic	0		6	V
Working temperature range	Ta	-40		85	℃

ELECTRICAL CHARACTERISTICS：(T=25℃，VCC=5V，unless otherwise noted）

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
VCC supply voltage	VCC		1.8		6	V
VCC operating supply current1	IVCC	VCC=5V， No PWM		100	550	uA
VCC operating supply current2	IVCCQ	VCC=5V		0.01	1	uA
H-Bridge FETs						
HS + LS FET on-resistance	RdsON	VCC=5V， Io=500mA		850	1000	mΩ
Off-state leakage current	IOFF	Vout=0V	-200		200	nA
Logic-Level Inputs (IN1, IN2)						
Input low voltage	VIL		0.20*VCC	0.27*VCC		V
Input high voltage	VIH			0.40*VCC	0.5*VCC	V
Input hysteresis	VHY			0.13*VCC		mV
Input low current	IIL	Vin=0	-5		5	uA
Input high current	IIH	Vin=3.3V， pin INx			50	uA
Pulldown resistance	Rpd			100		kΩ

Protection Circuits						
Thermal shutdown temperature	TSD		150	160	180	℃
Thermal shutdown temperature hysteresis	ΔTSD			20		℃

TIMING REQUIREMENTS（TA = 25°C, VCC = 5 V, RL = 20 Ω）

paramete r	Test conditions	range		unit
		min	max	
T1	Output enable time		30	us
T2	Output disable time		300	ns

T3	Delay time, INx high to OUTx high		160	ns
T4	Delay time, INx low to OUTx low		160	ns
T5	Output rise time	30	188	ns
T6	Output fall time	30	188	ns

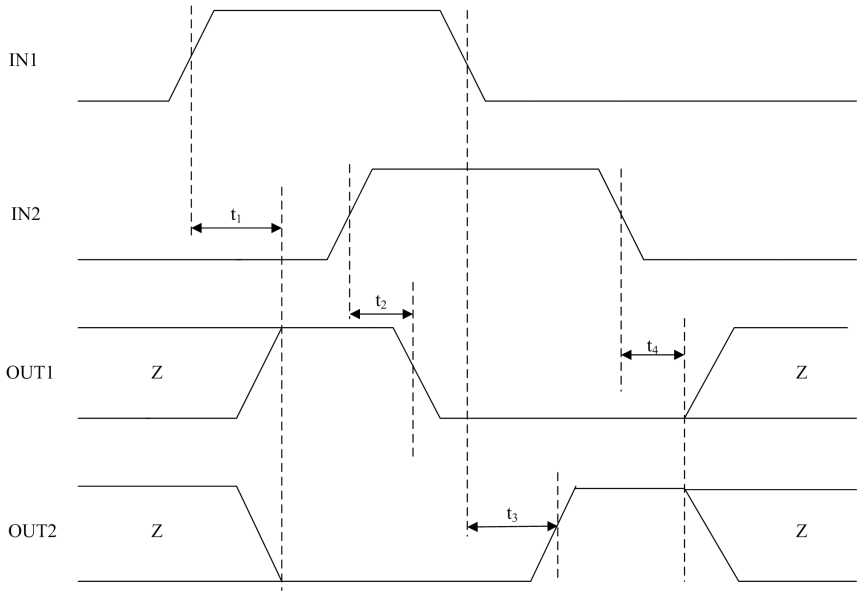


Figure 2 MS3010 Input/Output Timing1

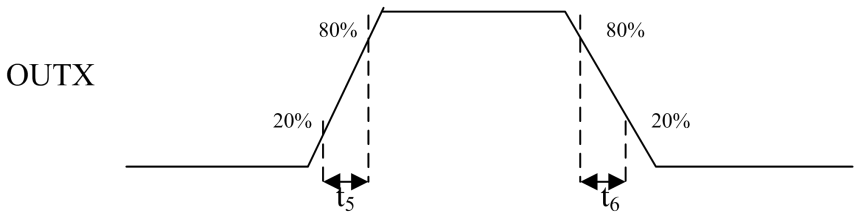
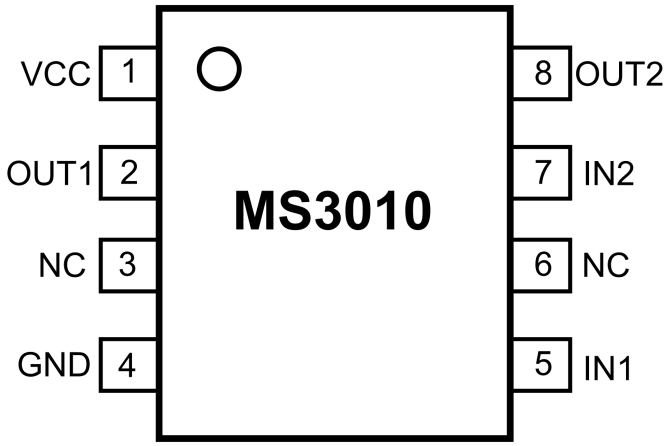


Figure 3 MS3010 Input/Output Timing2

Pin diagram



Pin Number	name	I/O	Pin Description
1	VCC	I/O	Power
2	OUT1	O	H-bridge out 1
4	GND	I/O	ground
5	IN1	I	Logic input 1
7	IN2	I	Logic input 2
8	OUT2	O	H-bridge out 2
3，6	NC		No connect

Functional Description

The MS3010 is controlled using a PWM input interface , also called an IN/IN interface. Each output is controlled by a corresponding input pin.

The following table shows the logic for the MS3010:

IN1	IN2	OUT1	OUT2	function
0	0	Z	Z	Sleep mode
0	1	L	H	Reverse
1	0	H	L	Forward
1	1	L	L	Brake

Sleep Mode

If the input pin IN1 ,IN2 are all set to logic-low state, the MS3010 enters a low-power sleep mode. In this state, all unnecessary internal circuitry is powered down.

Protection Circuits

If the die temperature exceeds safe limits, all FETs in the H-bridge are disabled. Once the die temperature has fallen to a safe level, operation automatically resumes.

The MS3010 has thermal shutdown (TSD) as described in the Protection Circuits section. If the die temperature exceeds approximately 160°C, the device is disabled until the temperature drops to a safe level.

Any tendency of the device to enter thermal shutdown is an indication of either excessive power dissipation, insufficient heatsinking, or too high an ambient temperature.

protection	conditions	Hbridge state	Resume conditions
TSD	Tj>160℃	disable	Tj<140℃

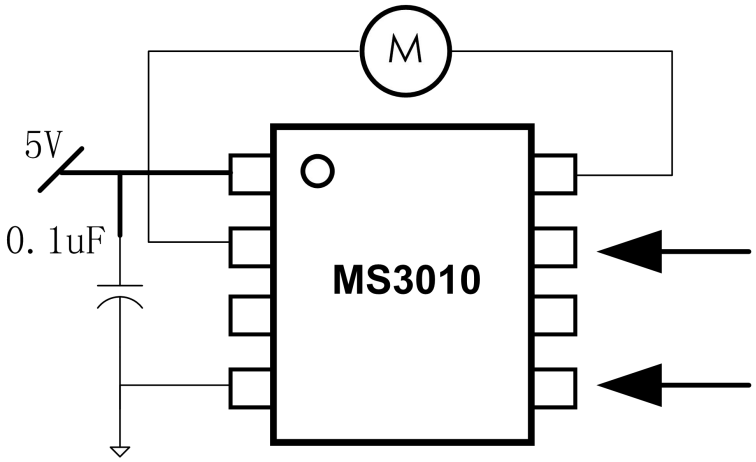
Sleep Mode

If the nSLEEP pin is brought to a logic-low state, the MS3010 enters a low-power sleep mode. In this state, all unnecessary internal circuitry is powered down.

mode	nSLEEP	Hbridge state
Normal working	IN1, IN2 not all ‘0’	enable
Sleeping model	IN1=IN2=0	disable
TSD	INx=X	disable

Application circuit Example

Figure 4 Application circuit Example

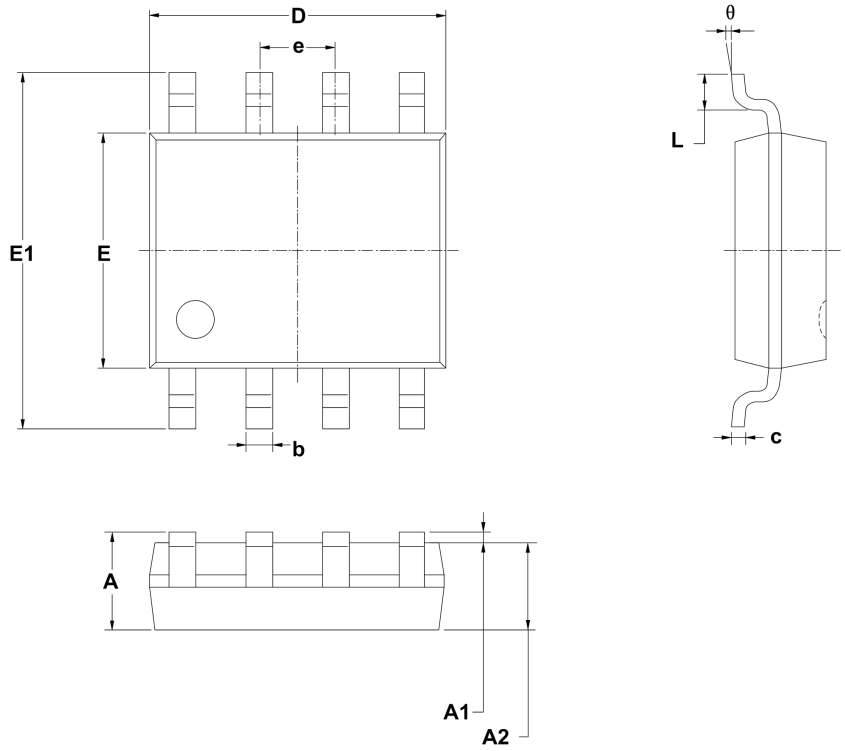


Grounding

In order to minimize the effects of ground bounce and offset issues, it is important to have a low impedance singlepoint ground, known as a star ground, located very close to the device. A low impedance ground will prevent ground bounce during high current operation and ensure that the supply voltage remains stable at the input terminal.

Package Outline Dimensions

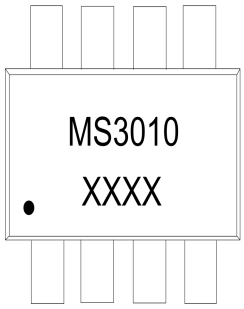
SOP8:



Symbol	Dimensions in Millimeters		Dimensions in Inches	
	Min	Max	Min	Max
A	1.350	1.750	0.053	0.069
A1	0.100	0.250	0.004	0.010
A2	1.350	1.550	0.053	0.061
b	0.330	0.510	0.013	0.020
c	0.170	0.250	0.006	0.010
D	4.700	5.100	0.185	0.200
E	3.800	4.000	0.150	0.157
E1	5.800	6.200	0.228	0.244
e	1.27 BSC		0.050 BSC	
L	0.400	0.800	0.016	0.050
θ	0 º	8 º	0 º	8 º

Marking and Packaging Specifications

1、Marking drawing description



MS3010： product name

XXXX ： Product code

2、Marking drawing pattern

Laser printing， contents in the middle, font type Arial.

3、Packaging Specifications

Device	Package	Piece/Reel	Reel/Box	Piece/Box	Box/Carton	Piece/Carton
MS3010	SOP8	2500	1	2500	8	20000

REVISION HISTORY

Revision	Revision Date	Description	Page
V1.0	2020/11/24		

STATEMENT

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- The process of improving product is endless. And our company would sincerely provide more excellent product for customer.

MOS CIRCUIT OPERATION PRECAUTIONS

Static electricity can be generated in many places. The following precautions can be taken to effectively prevent the damage of MOS circuit caused by electrostatic discharge:

1. The operator shall ground through the anti-static wristband.
2. The equipment shell must be grounded.
3. The tools used in the assembly process must be grounded.
4. Must use conductor packaging or anti-static materials packaging or transportation.

+86-571-89966911

Rm701, No.9Building, No. 1 WeiYe Road, Puyan Street, Binjiang District, Hangzhou, Zhejiang

http:// www.relmon.com