TMI8261 18V 4.5A Brushed DC Motor Driver

FEATURES

- H-Bridge Motor Driver
  Drives One DC Motor, One Winding of a Stepper Motor, or Other Loads
- Wide 3.0V to 18V Operating Voltage
- Low Standby Current：<1μA
- Maximum Output Continuous Current 4.5A
- Ultra Low Rds(on): 63~65 mΩ
- VM Undervoltage Lockout (UVLO)
- Overcurrent Protection (OCP)
- Thermal Shutdown (TSD)
- Integrated Fast Stop Function
- Small Package and Footprint: SOP8

APPLICATIONS

- Electronic locks
- Electric toys
- Massager
- Robots

GENERAL DESCRIPTION

The TMI8261 is a DC bidirectional motor drive integrated chip, suitable for medium and large current, medium and high torque motors.

There are two logic input terminals, used to control the motor forward, backward and brake, PWM mode control mode.

This circuit has good anti-interference, tiny standby current, ultra-low output internal resistance, using BCD process, strong withstand voltage, and strong reverse surge current capability to release inductive load.

The package form of TMI8261 is SOP8, and is completely with ROHS specifications, and the lead frame is 100% lead-free.

TYPICAL APPILCATION

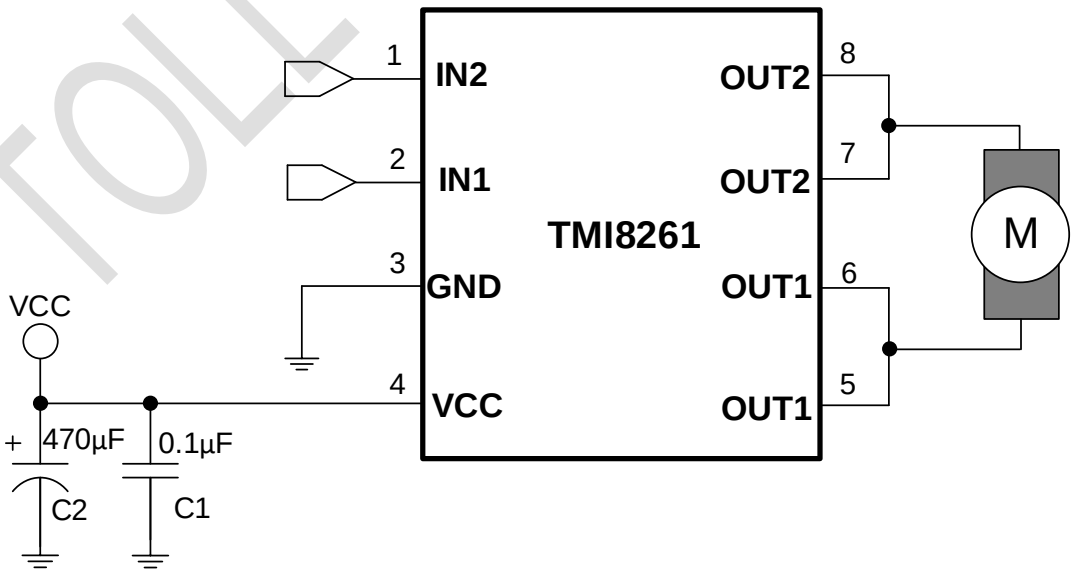
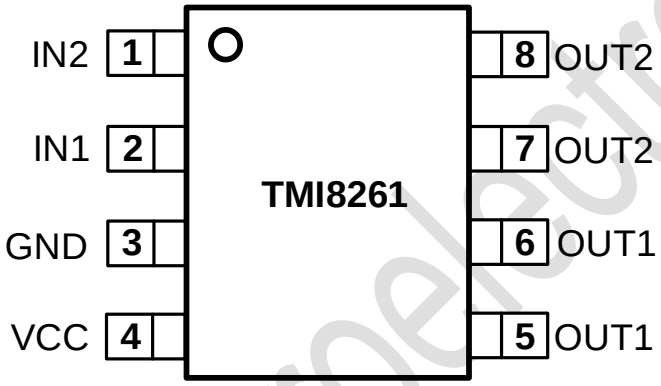


Figure 1. Basic Application Circuit

ABSOLUTE MAXIMUM RATINGS (Note 1)

Parameter	Value	Unit
Power supply voltage (VCC)	-0.3~20	V
Logic input voltage (IN2, IN1)	-0.3~VCC	V
Output continuous current (I_{OUT}) (SOP8)	0~4.5	A
Operating temperature (T_{OP})	-25~85	°C
Power consumption (P_D)	2	W
Operating junction temperature (Note 2)	-40~150	°C
Storage temperature	-55~150	°C

PACKAGE/ORDER INFORMATION



TMI8261
SOP8

Part Number	Package	Top mark	Quantity/ Reel
TMI8261	SOP8	TMI8261 XXXXX	3000

TMI8261 device is Pb-free and RoHS compliant.

PIN FUNCTIONS

Pin	Name	I/O	Description
1	IN2	Input	Backwards logic control.
2	IN1	Input	Forwards logic control.
3	GND	Ground	Logic ground.
4	VCC	Power	Power supply.
5/6	OUT1	Output	Forwards output.
7/8	OUT2	Output	Backwards output.

ESD RATING

Items	Description	Value	Unit
V_{ESD}	Human body model for all pins	±2000	V

JEDEC specification JS-001

RECOMMENDED OPERATING CONDITIONS

Parameter	Symbol	Min	Max	Units
Power supply voltage range	VCC	3	18	V
Logic input voltage range	V_{IN_X}	-0.3	20	V
Output continuous current (Forward)	I_{OUT_X}	0	4.5	A
Output continuous current (Reverse)	I_{OUT_X}	0	4.5	A
Logic input frequency	F_{IN_X}	0	50	kHz

ELECTRICAL CHARACTERISTICS

(T_A = 25°C, over recommended operating conditions unless otherwise noted.)

Parameter	Symbol	Conditions	Min	Typ.	Max	Unit
Power supply (VCC)						
Operation voltage	$V_{operation}$		3.0		18	V
Shutdown current	I_{CCST}	VCC=12V, IN1=IN2=0V, no load			1	μA
Standby current	I_{CC}	VCC=12V, IN1=IN2=5V or IN1=5V &	0.3	0.6	1	mA
PWM current	I_{CCPWM1}	VCC=12V, IN1=5V, IN2=50kHz, no	1	1.8	3	mA
Undervoltage lockout	UVLO	VCC rising	1.9	2.2	2.8	V
Logic inputs						
Input logic high	V_{INH}		2.2		6	V
Input logic low voltage	V_{INL}				0.7	V
Input logic high	I_{INH}	VCC = 12V, VIN = 5V		110	200	μA
Input logic low current	I_{INL}	VCC = 12V, VIN= 0V			1	μA
H-bridge FETs						
FETs on resistance	$R_{ds(on)}$	I_{LOAD}=1A, HS+LS		63		mΩ
FETs on resistance	$R_{ds(on)}$	I_{LOAD}=3A, HS+LS		65		mΩ
Over temperature protection						
Thermal shutdown	T_{OTP}			150		°C
Thermal shutdown	TSD_R			120		°C
Over current protection						
OCP trip current	I_{OCP}			12		A

Note 1: Absolute Maximum Ratings are those values beyond which the life of a device may be impaired.

Note 2: T_J is calculated from the ambient temperature T_A and power dissipation P_D according to the following formula: $T_J = T_A + P_D \times \theta_{JA}$. The maximum allowable continuous power dissipation at any ambient temperature is calculated by $P_{D\,(MAX)} = (T_{J(MAX)}-T_A)/\theta_{JA}$.

Note 3: Thermal shutdown threshold and hysteresis are guaranteed by design.

OPERATION

Bridge Control

The TMI8261 output consists of four N-channel MOSFETs that are designed to drive high current. These outputs are controlled by the two logic inputs IN1 and IN2 as listed in Table 1.

Table 1. H-Bridge Control

IN1	IN2	OUT1	OUT2	DESCRIPTION
L	L	High-Z	High-Z	Coast; H-bridge disabled to High-Z
L	H	L	H	Reverse (Current OUT2 →OUT1)
H	L	H	L	Forward (Current OUT1 →OUT2)
H	H	L	L	Brake; low-side slow decay

Output Timing Diagram

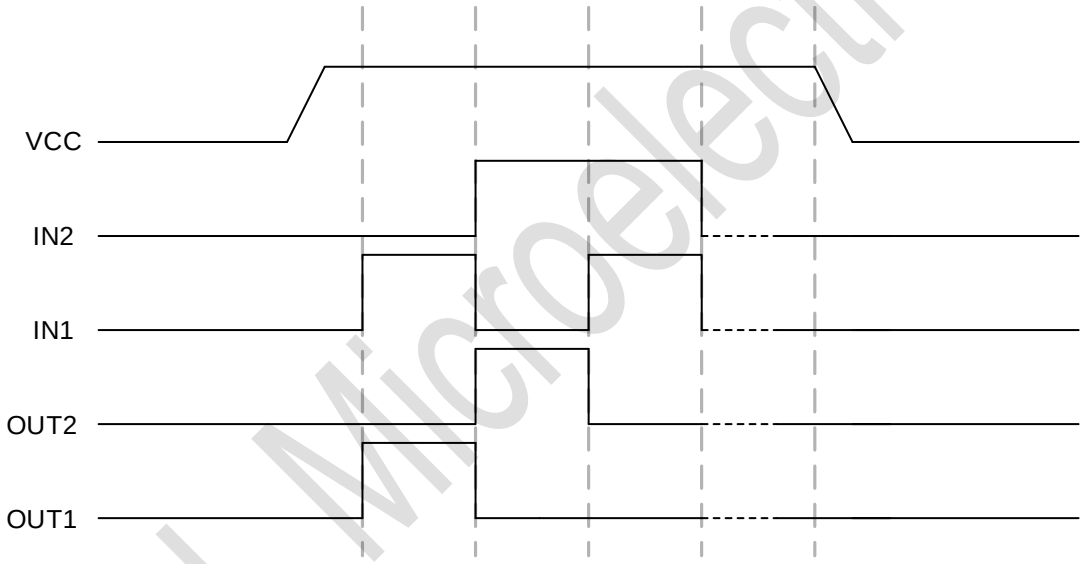


Figure 2. TMI8261 Output Timing Diagram

Application Directions

The peripheral components on the typical application circuit as shown in Figure 1 are described as follows:

C1 and C2 are VCC input capacitors, the main functions are as follows:

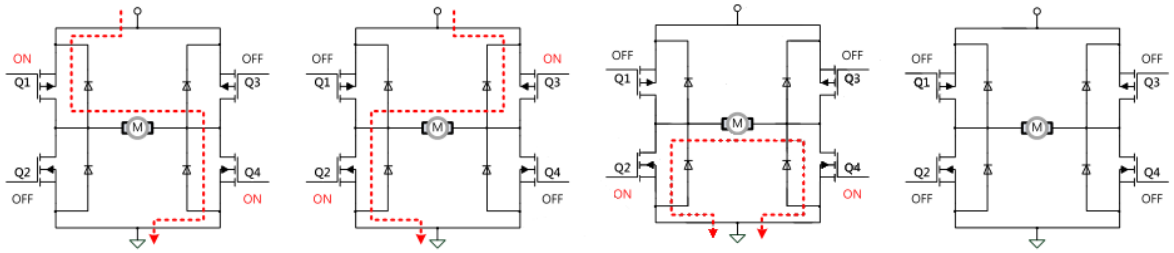
1. Absorb the energy released by the motor to the power supply, stabilize the VCC power supply voltage, prevent the IC from being directly broken down due to the high surge voltage, and have the function of filtering ripple and interference noise.
2. At the moment when the motor starts, it can release current to help the motor start quickly.
3. The selection of the VCC input capacitor C2 needs to be based on the voltage stability of the VCC and the motor load current. If the VCC voltage wave is large or the motor load current is large, a larger capacitor value must be selected.
4. C1 and C2 capacitors need to be as close to VCC as possible on the PCB configuration.

Work Mode Directions

Basic working mode:

1. Forward mode, defined as: IN2=L, IN1=H, then OUT2=L, OUT1=H;

2. Backward mode, defined as: IN2=H, IN1=L, then OUT2=H, OUT1=L;
3. Brake mode, defined as: IN2=H, IN1=H, then OUT2=L, OUT1=L;
4. Coast mode, defined as: IN2=L, IN1=L, at this time OUT2=Open, OUT1=Open.



Forwards Backwards Brake Coast

Figure 3. TMI8261 Work Modes

Thermal Shutdown (TSD) and Over Current Protection (OCP)

When using TMI8261, when the IC temperature exceeds 150°C (typical value), the overheating protection circuit of the built-in IC will forcibly turn off part of the driving MOS transistors to ensure the safety of customer products.

When the temperature of the IC drops to 120°C (typical), the IC will automatically resume to work quickly.

If the current flowing through the motor is greater than the internal overcurrent protection threshold, the internal integrated overcurrent protection circuit will turn off the MOS transistor and the IC stops working. After the motor current is lower than the internal overcurrent protection threshold, the IC works normally.

Block Diagram

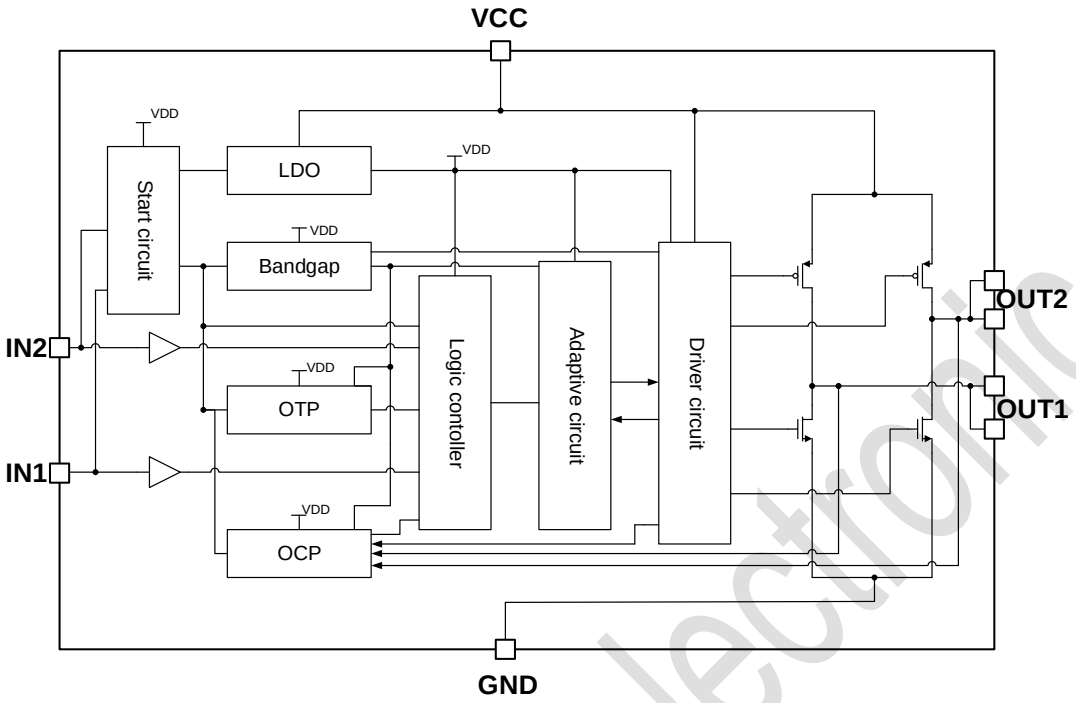
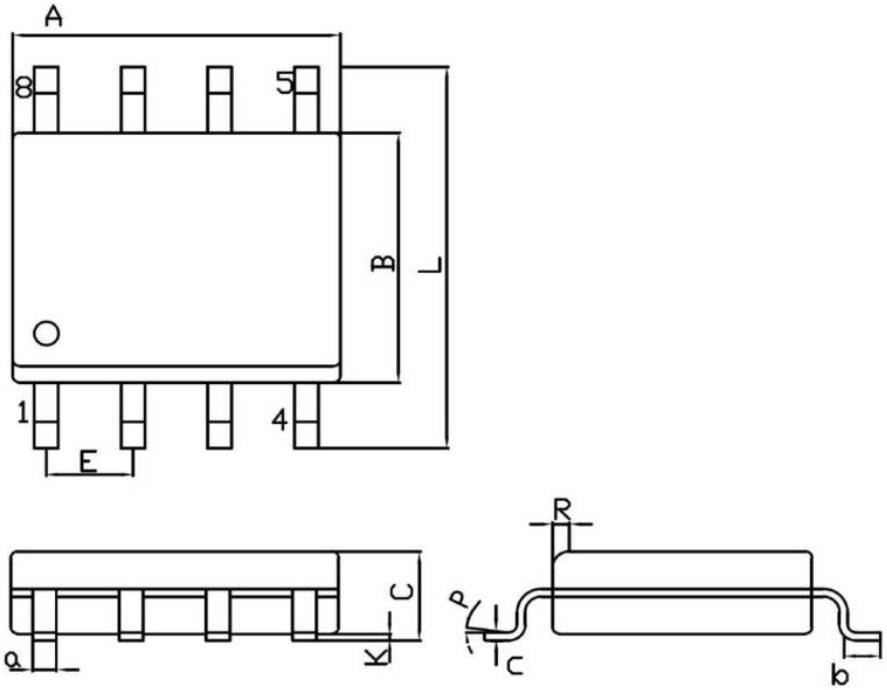


Figure 4. TMI8261 Block Diagram

PACKAGE INFORMATION

SOP8



Unit: mm

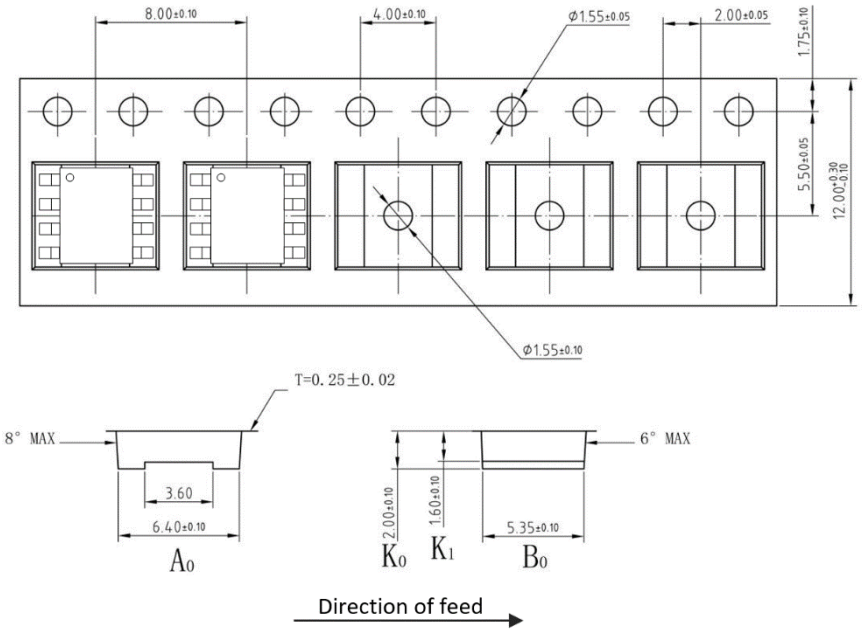
Symbol	Dimensions In Millimeters		Symbol	Dimensions In Millimeters	
	Min	Max		Min	Max
A	4.70	5.10	C	1.35	1.75
B	3.70	4.10	a	0.35	0.49
L	6.00	6.40	R	0.30	0.60
E	1.27 BSC		P	0°	7°
K	0.12	0.22	b	0.40	1.25
			c	0.203	0.243

Note:

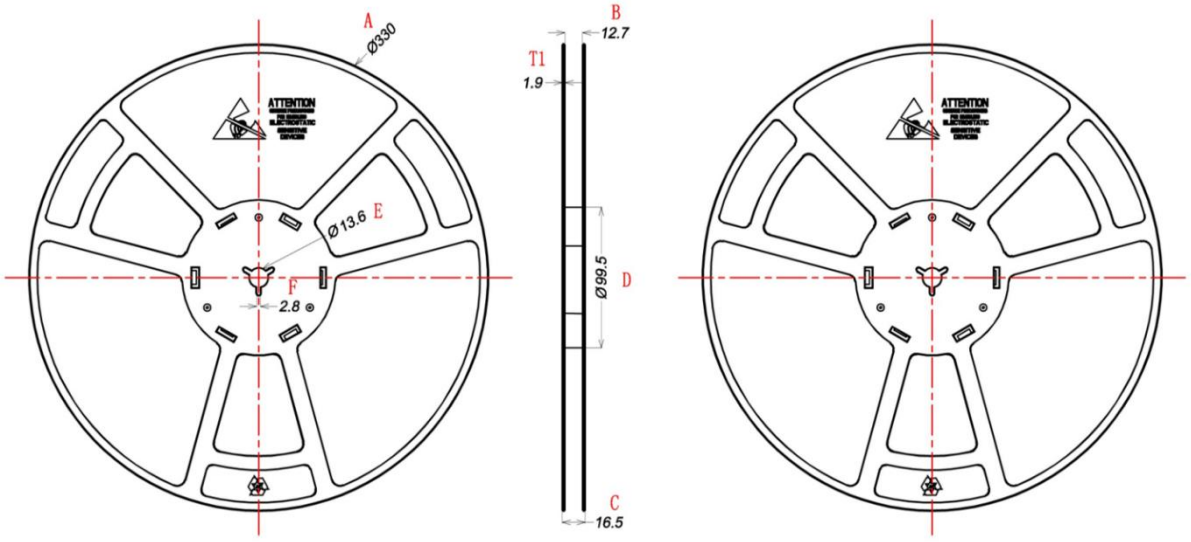
1) All dimensions are in millimeters.
2) Package length does not include mold flash, protrusion or gate burr.
3) Package width does not include inter lead flash or protrusion.
4) Lead popularity (bottom of leads after forming) shall be 0.10 millimeters max.
5) Pin 1 is lower left pin when reading top mark from left to right.

TAPE AND REEL INFORMATION

TAPE DIMENSIONS: SOP8



REEL DIMENSIONS: SOP8



Unit: mm

A	B	C	D	E	F	T1
Ø 330±1	12.7±0.5	16.5±0.3	Ø 99.5±0.5	Ø 13.6±0.2	2.8±0.2	1.9±0.2

Note:

1) All Dimensions are in Millimeter
2) Quantity of Units per Reel is 3000
3) MSL level is level 3.