

Motor Driver, Forward/Reverse, Low Saturation Voltage, 12V

FEATURES

- DMOS output transistor adoption
(Upper and lower total RON=1 Ω typ)
- V_{CC} max=20V, I_O max=1A
- 4V to 16V Operating supply voltage range
(The control system power supply is unnecessary.)
- The compact package (SOP10) is adopted.
- Pin compatible with LV8548MC
- Current consumption 0 when standby mode
- It is possible to connect in parallel (parallel connection of drive channel)
- Built-in brake function

APPLICATIONS

- Refrigerator
- Flatbed Scanner, Document Scanner
- POS Printer, Label Printer
- PoE Point of sales Terminal
- Clothes Dryer
- Vacuum cleaner
- Time Recorder

GENERAL DESCRIPTION

The TMI8548 is a 2-channel low saturation voltage forward/reverse motor driver IC. It is optimal for motor drive in 12V system products and can drive either two DC motors, one DC motor using parallel connection, or it can drive a stepper motor in Full-step and Half-step.

TYPICAL APPLICATION

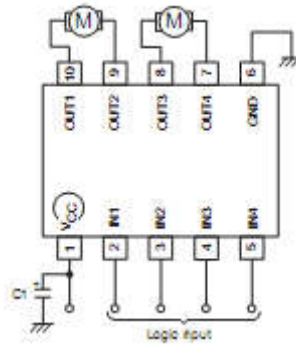


Figure 1. Example of applied circuit when two DC motor driving

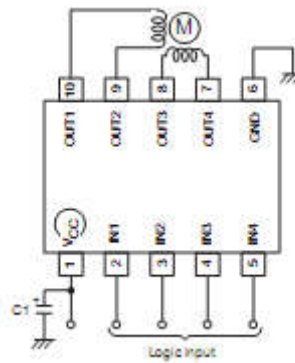


Figure 2. Example of applied circuit when one stepper motor driving

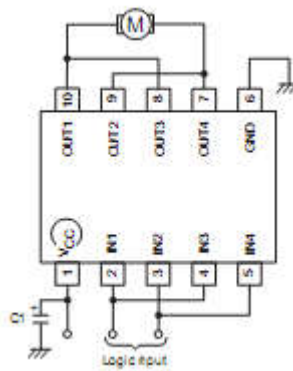
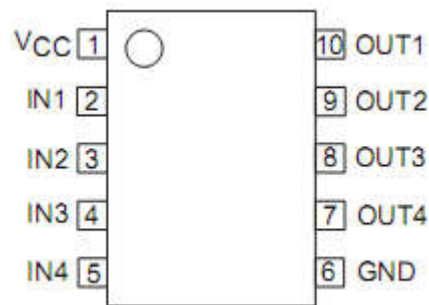


Figure 3. Example of applied circuit when connecting it in parallel

ABSOLUTE MAXIMUM RATINGS

Items	Symbol	Value	Unit
Maximum power supply voltage	V _{CC} max	-0.3~20	V
Output impression voltage ,	V _{OUT}	-0.3~20	V
Input impression voltage	V _{IN}	-0.3~6	V
GND pin outflow current	I _{GND}	1.0	A
Allowable Power dissipation	P _D max	1.0	W
Operating temperature	T _{opr}	-40~85	°C
Storage temperature	T _{stg}	-40~165	°C

PACKAGE/ORDER INFORMATION



SOP10

Top Mark: T8548 YYXXX

Part Number	Package	Top mark	Quantity/ Reel
TMI8548	SOP10	T8548 YYXXX	3000

PIN FUNCTIONS

Pin	Name	Function
1	V _{CC}	Power-supply voltage pin.
2	IN1	Motor drive control input pin. Driving control input pin of OUT1 (10pin) and OUT2 (9pin). It is used in combination with IN2 pin (3pin). For the digital input, range of the "L" level is 0 to 0.4(V), range of the "H" level is from 1.5 to 5.5(V). PWM can be input. Pull-down resistance 100(k) is built into in the pin. It becomes a standby mode because all IN1, IN2, IN3, and IN4 pins are made "L", and the circuit current can be adjusted to 0.
3	IN2	Motor drive control input pin. Driving control input pin of OUT1 (10pin) and OUT2 (9pin). It is used in combination with IN1 pin (2pin). PWM can be input. With built-in pull-down resistance.
4	IN3	Motor drive control input pin. Driving control input pin of OUT3 (8pin) and OUT4 (7pin). It is used in combination with IN4 pin (5pin). PWM can be input. With built-in pull-down resistance.
5	IN4	Motor drive control input pin. Driving control input pin of OUT3 (8pin) and OUT4 (7pin). It is used in combination with IN3 pin (4pin). PWM can be input. With built-in pull-down resistance.
6	GND	GND Ground pin.
7	OUT4	OUT4 Driving output pin. The motor coil is connected between terminal OUT3 (8pin).
8	OUT3	OUT3 Driving output pin. The motor coil is connected between terminal OUT4 (7pin).
9	OUT2	OUT2 Driving output pin. The motor coil is connected between terminal OUT1(10pin).
10	OUT1	OUT1 Driving output pin. The motor coil is connected between terminal OUT2 (9pin).

ESD RATING

Items	Description	Value	Unit
V _{ESD}	Human Body Model for all pins	±2000	V

JEDEC specification JS-001

RECOMMENDED OPERATING CONDITIONS

Items	Description	Value	Unit
V_{CC}	Power supply voltage	4~16	V
V_{INH}	Input "H" level voltage	1.5~5	V
V_{INL}	Input "L" level voltage	-0.3~0.4	V

ELECTRICAL CHARACTERISTICS

($V_{CC}=12V$, $T_A = 25^{\circ}C$, unless otherwise noted.)

Parameter	Symbol	Test Conditions	Min	Typ	Max	Unit
Power Supply Voltage	I_{CC0}	Standby mode IN1=IN2=IN3=IN4="LOW"			1	μA
	I_{CC1}	It is "High" from IN1 as for either of IN4. Load opening		1.1	1.52	mA
Input current	I_{IN}	$V_{IN}=5V$	35	50	65	μA
Thermal shutdown operating temperature	Ttsd	Design certification		160		$^{\circ}C$
Width of temperature hysteria	$\Delta Ttsd$	Design certification		40		$^{\circ}C$
Low voltage protection function operation voltage	$V_{th}V_{CC}$		3.3	3.5	3.65	V
Release voltage	Vthret		3.55	3.8	3.93	V
Output ON resistance (Upper and lower total)	R_{DSON}	$I_{OUT}=1.0A$	0.7	1	1.25	Ω
Output leak current	I_{Oleak}	$V_O=6V$	0		10	μA
Diode forward voltage	VD	$I_D=1.0A$			1.0	V

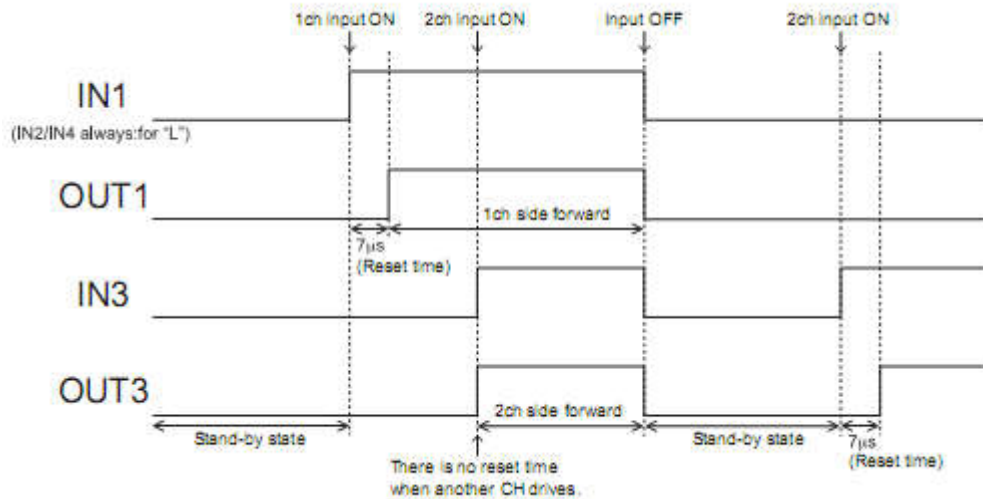
FUNCTION DESCRIPTION

1. DCM output control logic

Input				Output				Remark
IN1	IN2	IN3	IN4	OUT1	OUT2	OUT3	OUT4	
L	L	L	L	OFF	OFF	OFF	OFF	Stand-by
L	L			OFF	OFF			1CH Stand-by Forward Reverse Brake
H	L			H	L			
L	H			L	H			
H	H			L	L			
		L	L			OFF	OFF	2CH Stand-by Forward Reverse Brake
		H	L			H	L	
		L	H			L	H	
		H	H			L	L	

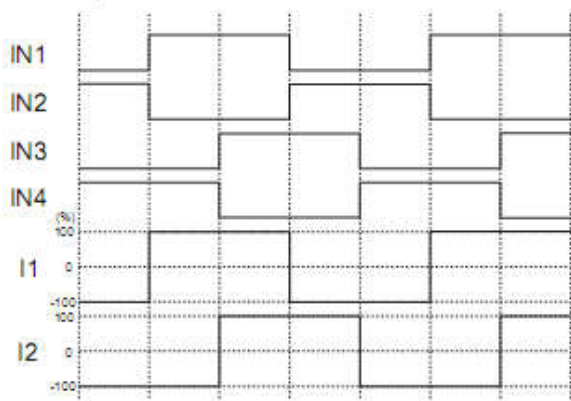
2. About the switch time from the stand-by state to the state of operation

When IN1, IN2, IN3, IN4 are "L", this IC has completely stopped operating. After the time of reset of about 7s of an internal setting, it shifts to a prescribed output status corresponding to the state of the input when the signal enters the input terminal. Reset of about 7s doesn't hang even if the motor is driven from the stand-by state when either CH drives and the output becomes an output status corresponding to the state of the input. As for full power TR between the reset time, turning off is maintained.

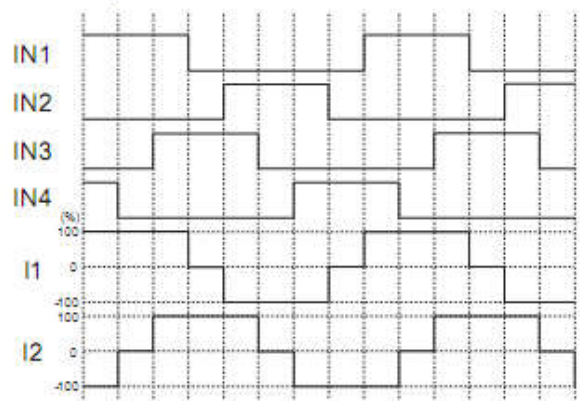


3. Example of current wave type in each excitation mode when stepper motor parallel input is controlled.

.Full-step mode



.Half-step mode



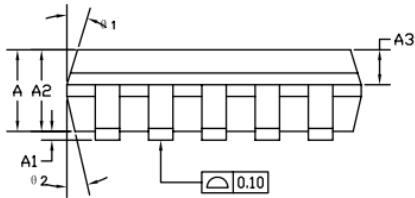
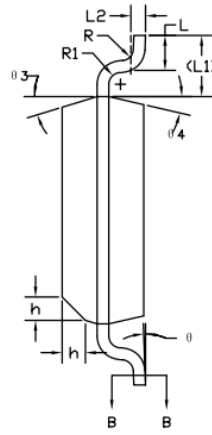
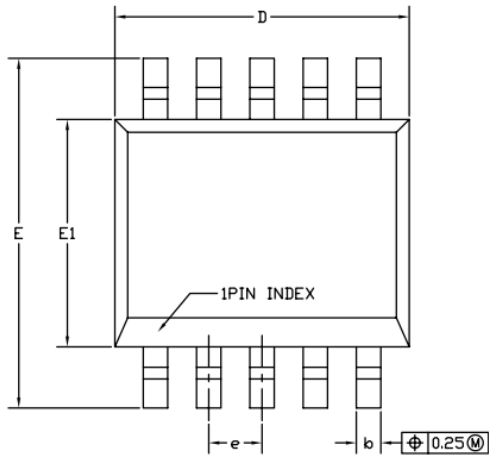
4. Thermal shutdown function

The thermal shutdown circuit is incorporated and the output is turned off when junction temperature T_j exceeds 160°C . As the temperature falls by hysteresis, the output turned on again (automatic restoration). The thermal shutdown circuit does not guarantee the protection of the final product because it operates when the temperature exceed the junction temperature of $T_{jmax}=150^\circ\text{C}$.

TSD = 160°C (typ)

ΔTSD = 40°C (typ)

PACKAGE INFORMATION



COMMON DIMENSIONS
(UNITS OF MEASURE=MILLIMETER)

SYMBOL	MIN	NOM	MAX
A	1.35	1.55	1.75
A1	0.10	0.15	0.25
A2	1.25	1.40	1.65
A3	0.50	0.60	0.70
b	0.37	—	0.50
b1	0.36	0.41	0.46
c	0.16	—	0.25
c1	0.15	0.20	0.25
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	0.9144BSC		
L	0.45	0.60	0.80
L1	1.04REF		
L2	0.25BSC		
R	0.07	—	—
R1	0.07	—	—
h	0.30	0.40	0.50
θ	0°	—	8°
θ ₁	15°	17°	19°
θ ₂	11°	13°	15°
θ ₃	15°	17°	19°
θ ₄	11°	13°	15°

SOP10

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 interlead 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,