

DESCRIPTION

The PT2484/PT2484A is a dual channel H-bridge motor driver that operates on wide supply voltage range from 4V to 16V. Four individual control logic pins provides flexibility to drives a 4-wire bipolar stepping motor or two brushed dc motors or solenoid load. The chip has built-in protection circuit to prevent the short circuit or over temperature event to damage the H-bridge driver.

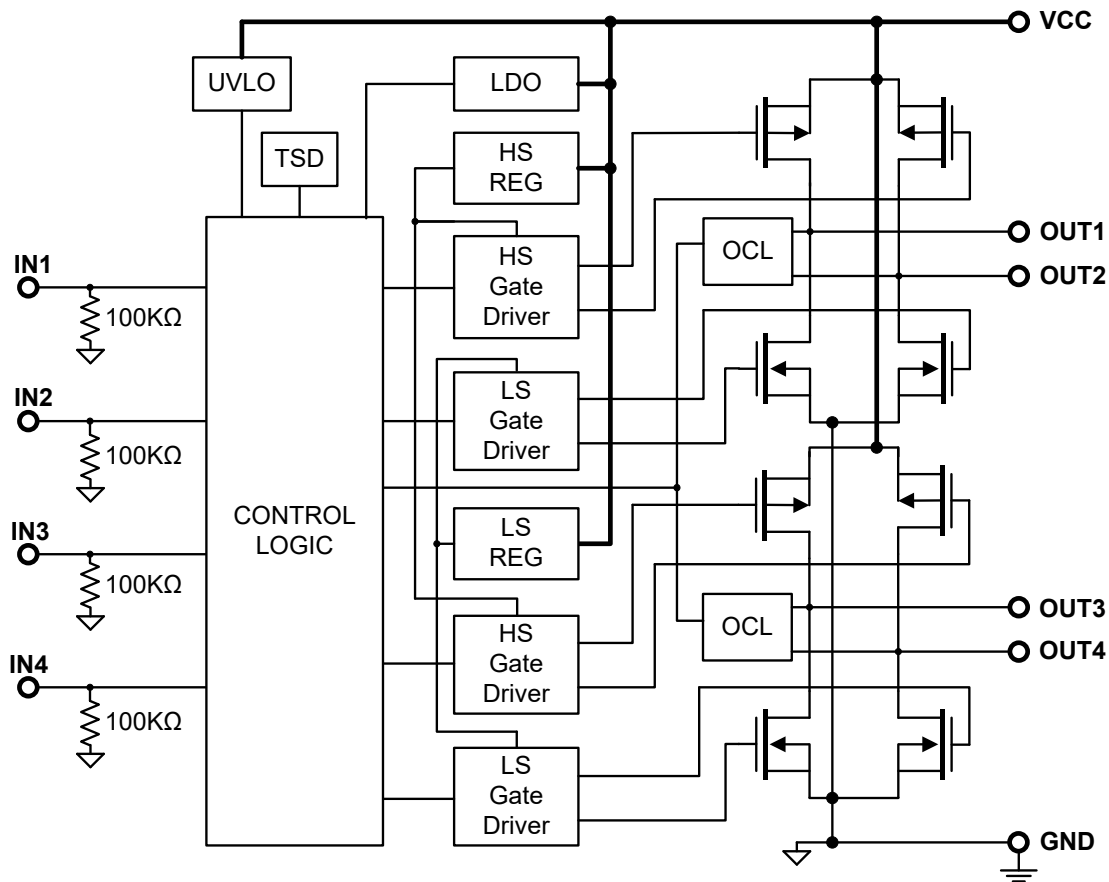
APPLICATIONS

- Airflow flap control for refrigerators.
- Air Conditioner venting control
- Home appliance
- Office automation machines

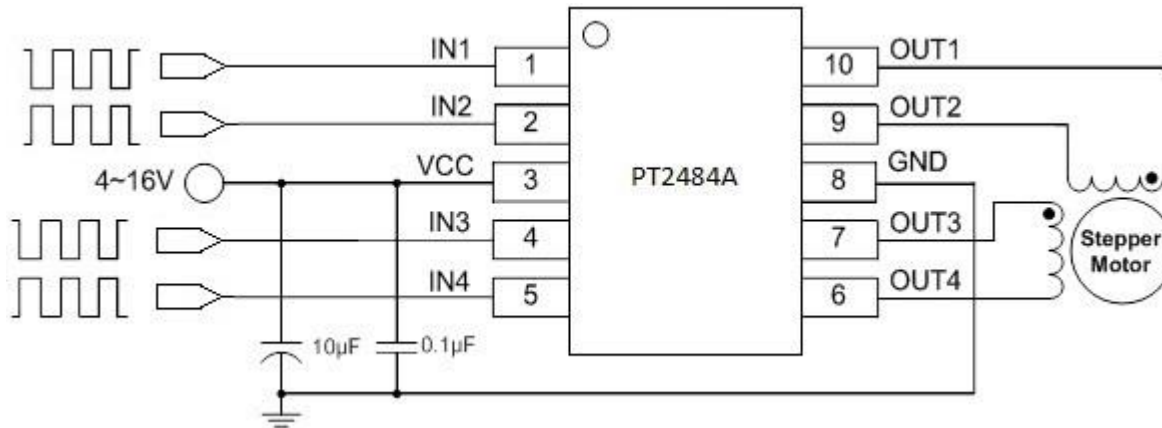
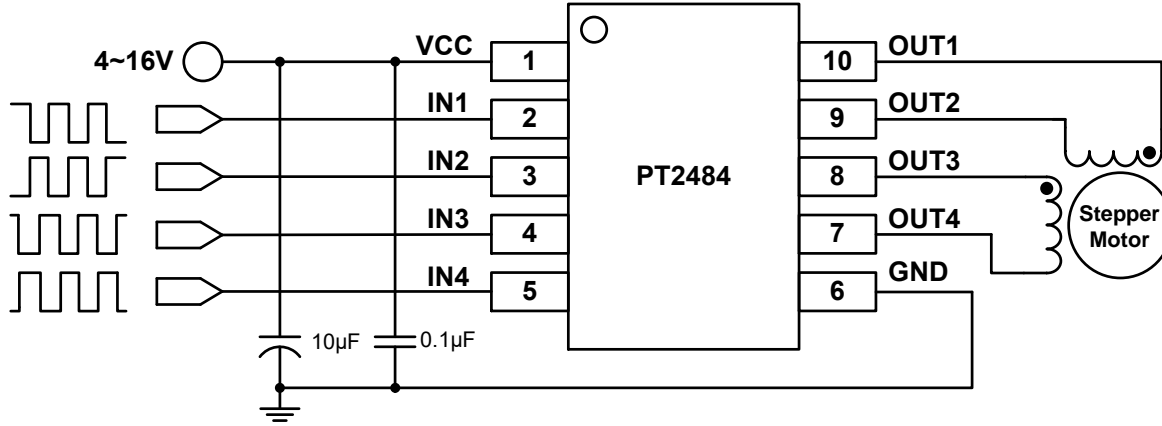
FEATURES

- Wide Supply Voltage Range: 4V to 16V
- Single voltage supply with built-in regulator; control logic supply is not necessary.
- Dual H-bridge Drivers for a bipolar stepping motor or two brushed dc motors.
- MOSFET RDS(on) Resistance HS + LS = 1.2Ω
- Maximum Output Current: 1A (Peak), 700mA (RMS).
- Low Power Stand-by mode
- Built-in Protection Circuits with Thermal Shutdown (TSD), Under Voltage Lock-Out (UVLO)
- Output current limiting (OCL) during load terminal connects to GND.
- 10Pins Small Outline Package (SOP), Pitch=1.0mm.
- 10Pins Small Outline Package (MSOP), Pitch=0.5mm.

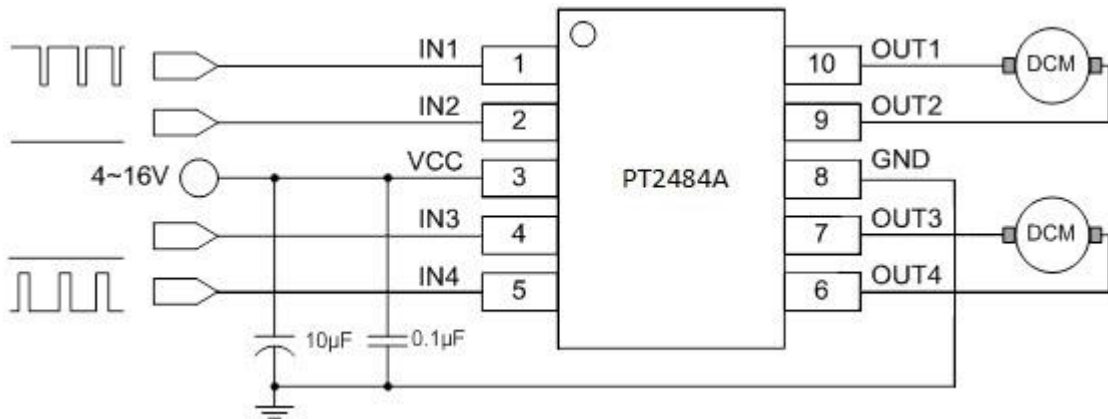
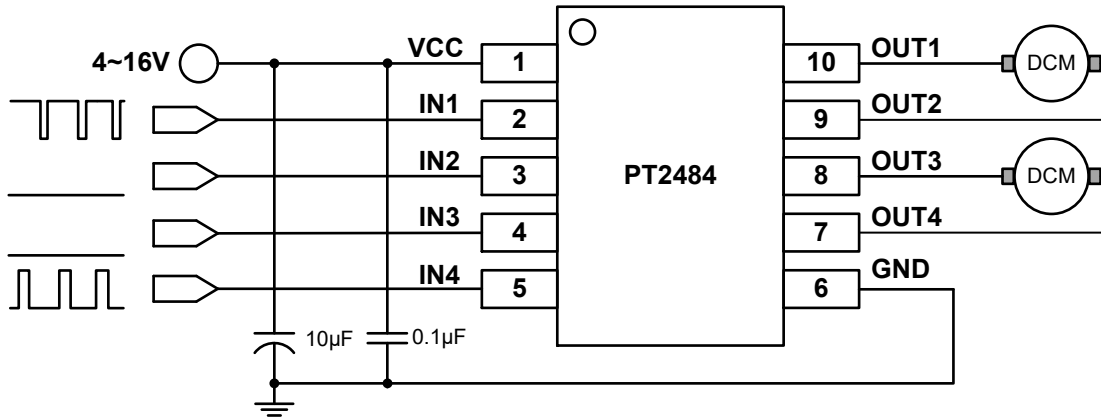
BLOCK DIAGRAM



APPLICATION CIRCUITS



Drives a bipolar stepping motor

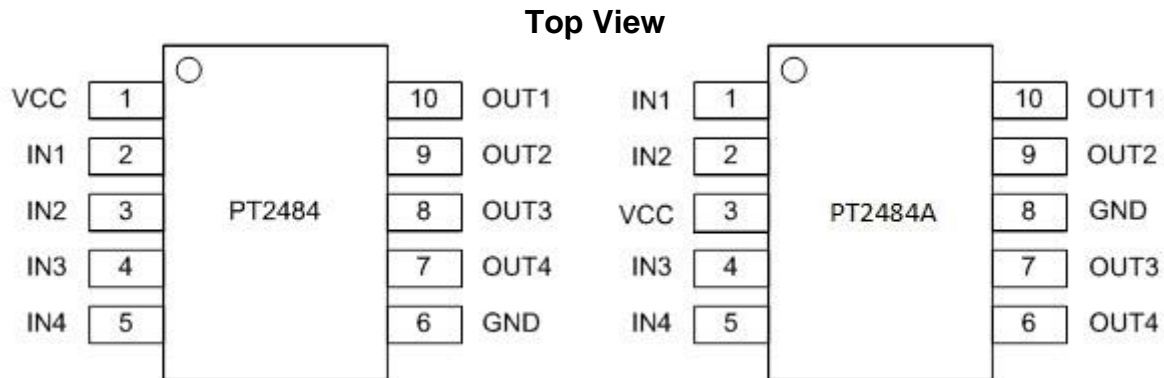


Drives two brushed dc motor

ORDER INFORMATION

Valid Part Number	Package Type	Top Code
PT2484-S	10Pins, SOP	PT2484-S
PT2484A-S	10Pins, SOP	PT2484A-S
PT2484A	10Pins, MSOP	PT2484A

PIN CONFIGURATION



PIN DESCRIPTION

Pin Name	I/O	Description	Pin No.		
			PT2484-S	PT2484A-S	PT2484A
			SOP-10	SOP-10	MSOP-10
VCC	Power	Power input pin, the operation voltage is from 4V to 16V. Connects a 0.1 μ F bypass capacitor between VCC and GND pin and add at least 10 μ F capacitor in the power line.	1	3	3
IN1	I	Control input pin 1 for H-bridge driver 1, built-in a 100K Ω pull-low resistor.	2	1	1
IN2	I	Control input pin 2 for H-bridge driver 1, built-in a 100K Ω pull-low resistor.	3	2	2
IN3	I	Control input pin 3 for H-bridge driver 2, built-in a 100K Ω pull-low resistor.	4	4	4
IN4	I	Control input pin 4 for H-bridge driver 2, built-in a 100K Ω pull-low resistor.	5	5	5
GND	Power	Ground pin	6	8	8
OUT4	O	OUT4 of H-bridge driver 2	7	6	6
OUT3	O	OUT3 of H-bridge driver 2	8	7	7
OUT2	O	OUT2 of H-bridge driver 1	9	9	9
OUT1	O	OUT1 of H-bridge driver 1	10	10	10
PGND	GND	Connect to GND.	-	-	Thermal Pad

FUNCTION DESCRIPTION

The PT2484/PT2484A is a dual H-bridge motor driver integrates P-channel and N-channel MOSFET switches. The PT2484/PT2484A powered from a single supply and range from 4V to 16V, and it could drives output current up to 1A to the motor, the output current is determinate by motor winding resistance; winging inductance and back EMF and VCC supply voltage. The P2484/PT2484A has low power stand-by mode could reduce quiescent current down to less than 3 μ A to minimize system standby consumption.

H-BRIDGE OUTPUT CONFIGURATION

The motor driver output current polarity is determinate by input logic status, please refer to Table 1 for corresponds between the input and output.

VCC	IN1	IN2	IN3	IN4	OUT1	OUT2	OUT3	OUT4	Output States	
									H-Bridge 1	H-Bridge 2
<UVLO	x	x	x	x	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Stand-by, logic state of all input pins ignored.	
>UVLO	L	L	L	L	Hi-Z	Hi-Z	Hi-Z	Hi-Z	Stand-by	Stand-by
	H	L	H	L	H	L	H	L	Forward	Forward
	L	H	L	H	L	H	H	L	Reverse	Reverse
	H	H	H	H	L	L	L	L	Brake	Brake

Table 1, H-Bridge Output Configuration

INPUT TO OUTPUT LOGIC STATES

In the power-on period, all of outputs will remain in Hi-Z state and ignore the input logic states until the VCC rises up to exceed UVLO threshold. If all of four input pin staying on low states the device will goes into stand-by mode and all of outputs will remain in Hi-Z state. In the stand-by mode if any input pin is pull up to logic high state, the correspond H-bridge output will be turns on after the T_{RESET} time, if one of the H-bridge is turns on, another H-bridge can be enable by others input pins instantly and no needs waiting for T_{RESET} .

The driving signal for a bipolar stepping motor can be generates by an external MCU, please refer to the waveform shown in Figure 2, there have full-step (2-phase) and half-step (1-2 phase) excitation can be chose.

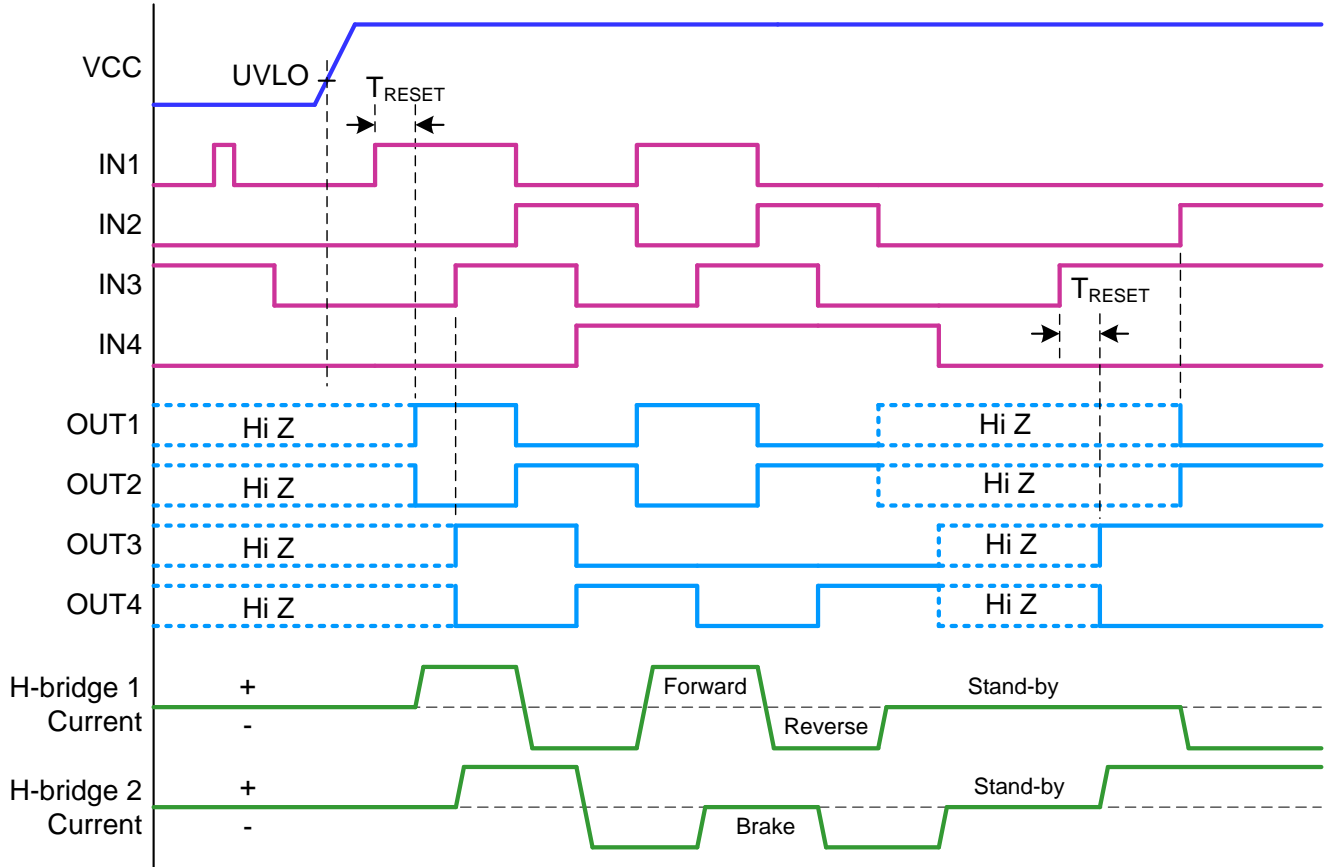


Figure 1, Input to output logic states waveform

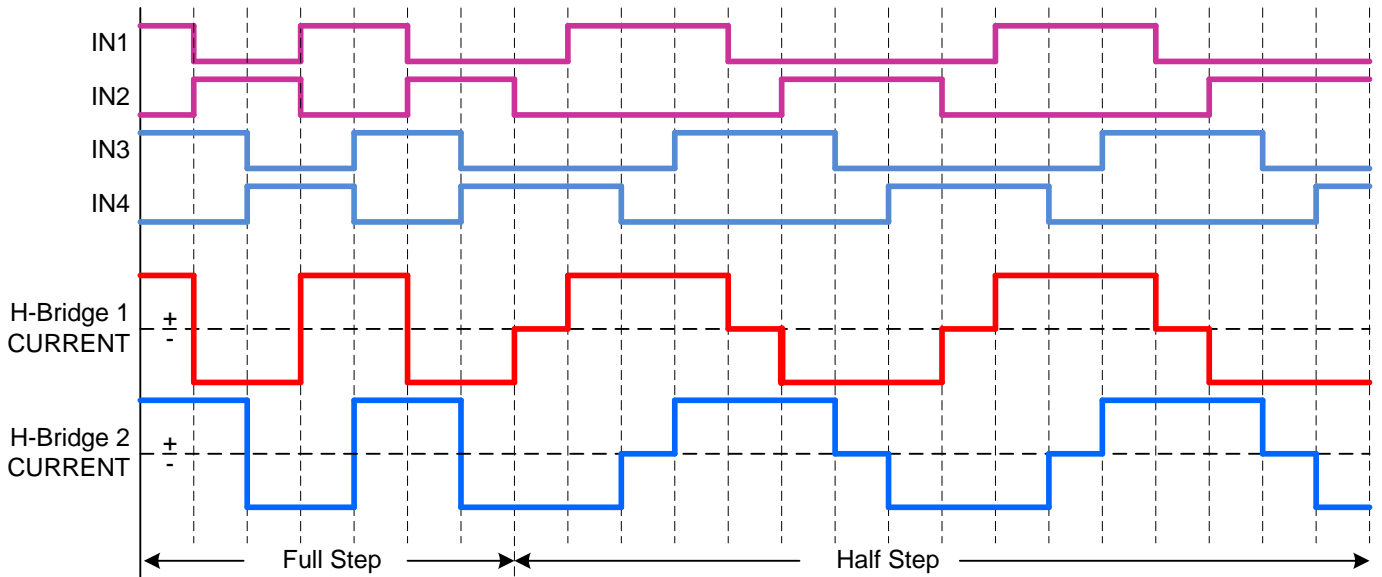


Figure 2, Input logic waveform for stepping motor drives

OUTPUT CURRENT LIMITING (OCL)

If any H-bridge output terminal is short circuits to GND unintentionally, or the motor winding is short internally, the Output Current Limiting (OCL) circuit will suppress the output current under 1A; this function can help the driver staying on safe operation area and avoid over current stresses. If short circuit event is not removes, the chip junction temperature will rise and finally trigger the thermal shutdown (TSD) to turn off the output.

THERMAL SHUTDOWN (TSD)

If the chip temperature exceeds preset 170°C, the H-bridge will be turn off. Once the chip temperature is reducing to below hysteresis window, H-bridge outputs will re-enable.

UNDERVOLTAGE LOCKOUT (UVLO)

If the VCC pin voltage drops below the under voltage lockout threshold (3.8V), the H-bridge outputs will be disabled and internal logic state will be reset. Operation will resume when VCC voltage rises above the UVLO threshold.

POWER SUPPLY BYPASS AND LAYOUT GUIDE

The parasitic inductance between the power supply and the motor driver will limits the current slew rate, and if local bounce absorb capacitance is not enough, the parasitic inductance/capacitance will easily goes oscillation and causes system unstable. Therefore, the VCC pin should be bypassing to GND with a 0.1μF low-ESR MLCC capacitor in minimum distance, and a 10μF bypass capacitor should be placed on the VCC power line track, the PCB track between the VCC pin and power input terminal (also the GND track) should be a thick trace or polygon connection.

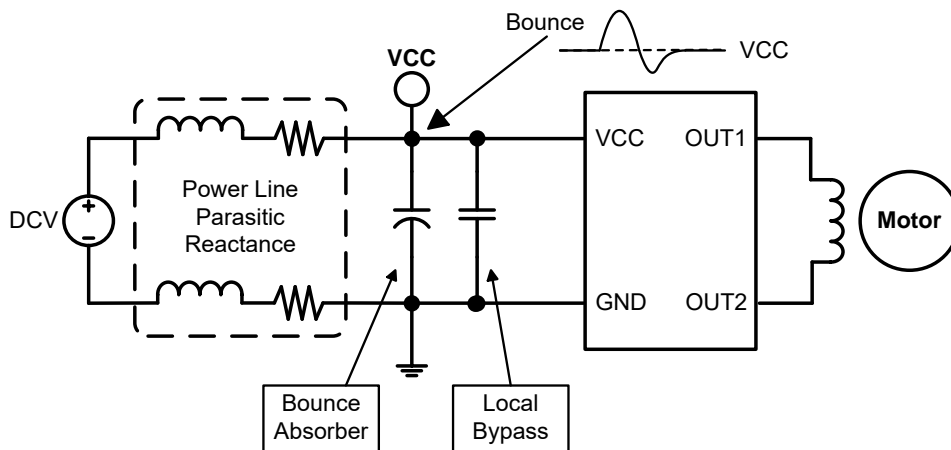


Figure 3 : Example Setup of Motor Drive System with External Power Supply

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min.	Max.	Unit
Supply voltage	V_{CC}	-0.3	20	V
Digital pin voltage	V_{IN}	-0.3	7	V
Output current	I_{out}		1	A
Operating temperature	T_{opr}	-40	+85	°C
Storage temperature	T_{stg}	-40	+150	°C
ESD, Human body model	HBM	-4000	+4000	V
ESD, Machine model	MM	-400	+400	V

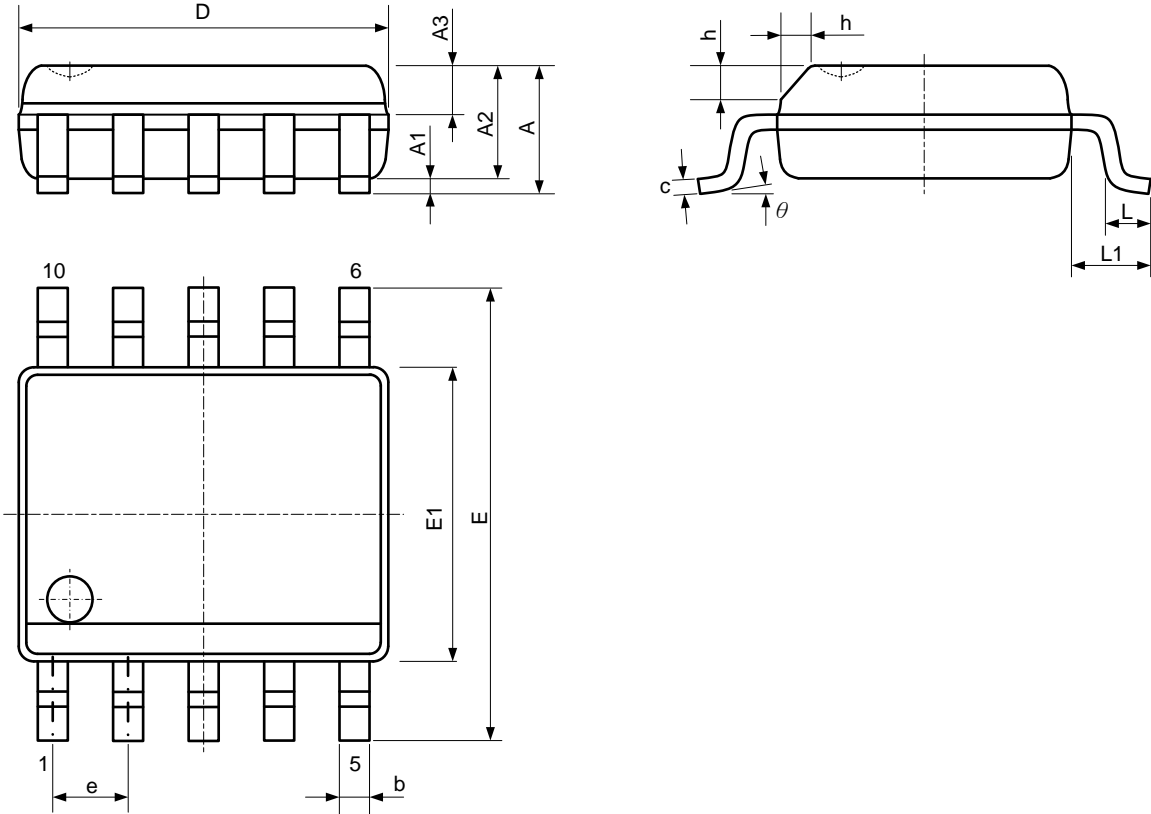
ELECTRICAL CHARACTERISTICS

$T_A=25^{\circ}\text{C}$, $V_{CC}=12\text{V}$, over recommended operating conditions unless otherwise noted

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Power Supply						
Input supply voltage	V_{CC}		4		16	V
UVLO threshold	$UVLO_1$	Rising	3.55	3.8	3.95	V
	$UVLO_2$	Falling	3.3	3.5	3.65	
Quiescent current	I_{CC}	$IN1\sim4=5\text{V}$		1	3	mA
	I_{CC_STBY}	$IN1\sim4=0\text{V}$		1.5	3	μA
H-Bridge MOSFETs						
Body-diode forward voltage	V_F	$I_{OUT}=1\text{Amp}$		1	1.2	V
MOSFETs on resistance	R_{DS}	$I_{OUT}=1\text{A}$, HS+LS	1	1.2	1.5	Ω
Off-state output leakage current	I_{OFF}	$IN1\sim4=0\text{V}$			10	μA
Output current	I_{OUT}			0.7	1	A
Control Logic						
Input logic low voltage	V_{IL}	$IN1\sim4$			0.6	V
Input logic high voltage	V_{IH}	$IN1\sim4$	2.2			V
Input pull low resistance	R_{PD}	$IN1\sim4$	80	100	120	$\text{K}\Omega$
Output dead time	T_{DT}		250	400	600	ns
Wake-up time	T_{RESET}	INx high to outputs on	1	1.5	3	μs
Protection Circuitry						
Over current limiting level	I_{OCL}		1.2			A
Thermal shutdown	TSD			170		°C
Thermal shutdown hysteresis	T_{HYS}			60		°C

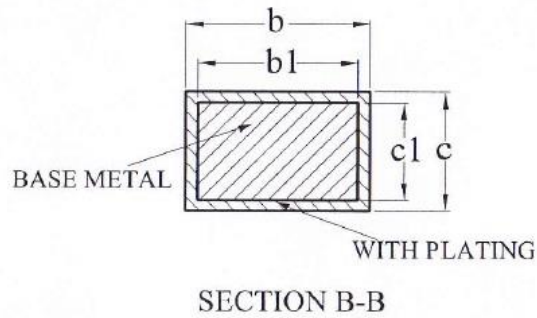
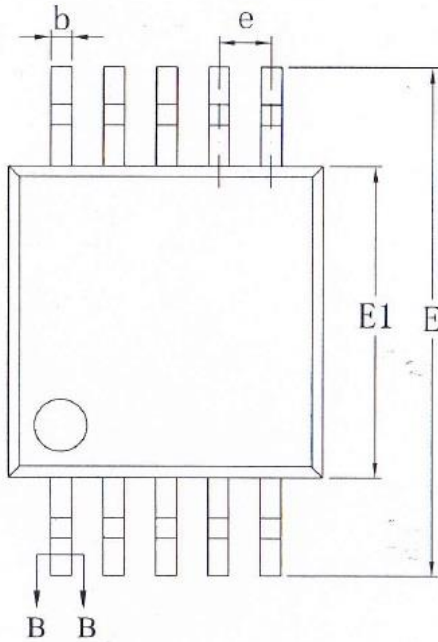
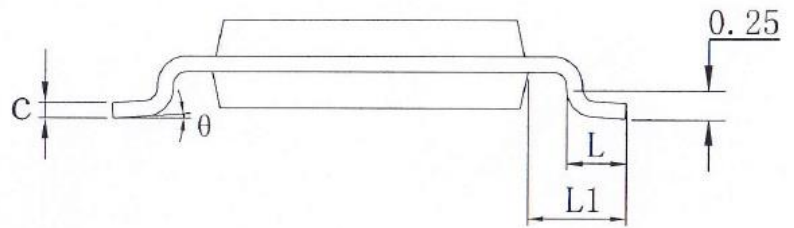
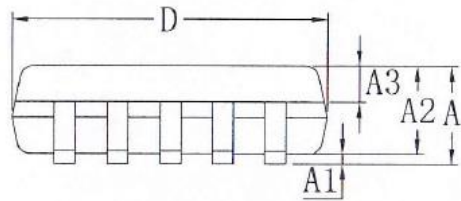
PACKAGE INFORMATION

10PINS, SOP, 4.9mm × 6.0mm, PITCH=1.0mm



Symbol	Dimensions		
	Min.	Nom.	Max.
A			1.75
A1	0.10		0.25
A2	1.25		1.5
b	0.30		0.47
c	0.10		0.25
D	4.80	4.90	5.00
e	1.00 BSC		
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
L	0.50		0.80
L1	1.05 REF		
h	0.25		0.5
θ	0°		8°

10PINS, MSOP



Symbol	Dimensions (mm)		
	Min.	Nom.	Max.
A			1.10
A1	0.05		0.15
A2	0.75	0.85	0.95
A3	0.30	0.35	0.40
b	0.18		0.26
b1	0.17	0.20	0.23
c	0.15		0.19
c1	0.14	0.15	0.16
D	2.90	3.00	3.10
E	4.70	4.90	5.10
E1	2.90	3.00	3.10
e	0.50 BSC		
L	0.40		0.70
L1	0.95 REF		
θ	0°		8°

IMPORTANT NOTICE

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