Description

The PT2468 provides an integrated motor driver for cameras, consumer products, toys and other application with low-voltage or battery-powered motion control.

The PT2468 can supply up to 1.8A of output current. It operates on a motor power supply (VM) from 0 to 11V and a device power supply voltage (VCC) of 1.8V to 5V.

Ultra- low r_{ds-on} allows SOP-8 package available. The PT2468 has a PWM (IN1-IN2) input interface

Full protections are integrated with over-current protection, under-voltage lockout and over-temperature shutdown.

Feature

- H-Bridge Motor Driver
  - DC Motor or Other Loads
  - Low On-Resistance : HS+LS 280mΩ
- 1.8-A Maximum Drive Current
- Separate Motor and Logic Supply
  - Motor VM : 0 to 11V
  - Logic VCC : 1.8V to 5V
- Small Package and Footprint
  - 8-Pin SOP
- Protection Features
  - VCC Under-voltage Lockout
  - Over-Current Protection
  - Thermal Shutdown

Application

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

Block Diagram

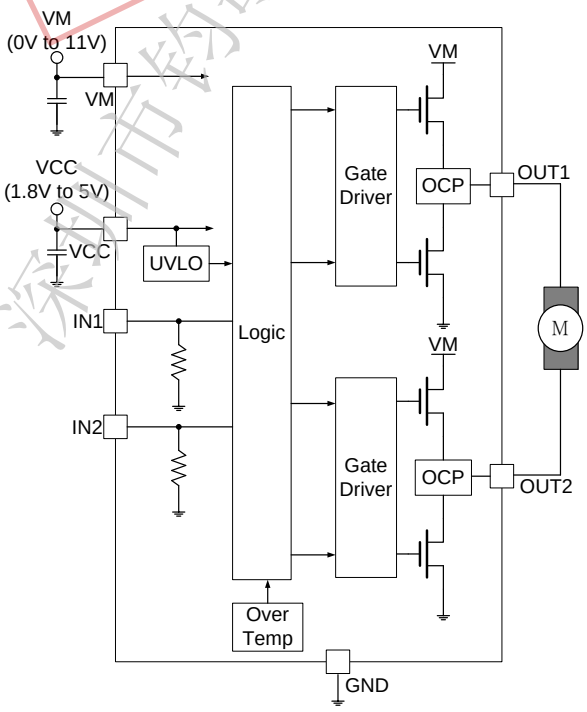


Figure 1. Function Block Diagram

Application Circuit

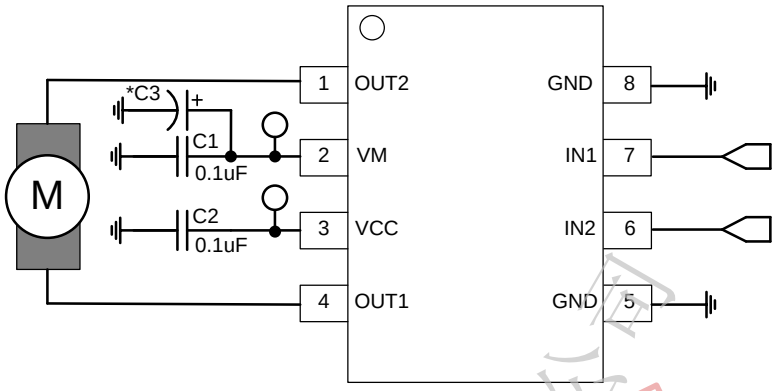
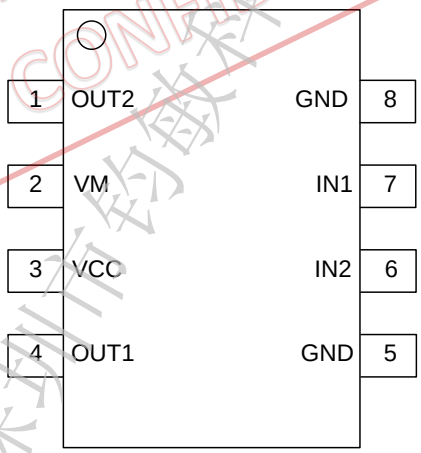


Figure 2. Schematic of Application

*C3 is optional for better performance. Details are referred to at the chapter *"Power Supply Recommendations"*.

Pin Description



Pin Name	I/O	Description	Pin No.
OUT2	OUTPUT	Motor output 2	1
VM	POWER	Motor power supply	2
VCC	POWER	Logic power supply	3
OUT1	OUTPUT	Motor output 1	4
GND	POWER	Ground	5
IN2	INPUT	Input 2	6
IN1	INPUT	Input 1	7
GND	POWER	Ground	8

Absolute Maximum Ratings

Parameters			MIN	MAX	Unit
Motor power supply voltage , VM			-0.3	12	V
Logic power supply voltage , VCC			-0.3	5.5	V
Operating Temperature, Top			-40	150	°C
Storage Temperature, Tstg			-60	150	°C
Operation Humidity			20	85	%
Storage Humidity			20	90	%
ESD	All Pins	HBM	±4		KV
		MM	±0.4		KV
		CDM*	±1.5		KV

*CDM test is based on ANSI/ESDA/JECEC JS-002-2014

Recommended Operating Conditions

Parameters		MIN	MAX	Unit
VM	Motor power supply voltage	0	11	V
VCC	Logic power supply voltage	1.8	5	V
I_{OUT}	Motor peak current	0	1.8	A
f_{PWM}	Externally applied PWM frequency	0	250	KHz
V_{LOGIC}	Logic level input voltage	0	5	V
T_A	Operating ambient temperature	-40	85	°C

Electrical Characteristics

T_A=25℃ , over recommended operating conditions unless otherwise noted

SYMBOL	PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
POWER SUPPLIES(VM,VCC)						
VM Current						
I_{VM1}	VM coast current	VM=5V ; VCC=3V ; No PWM Coast Mode		65	90	uA
I_{VM2}	VM F/R current	VM=5V ; VCC=3V ; No PWM Forward/Reverse Mode		300	500	uA
I_{VM3}	VM brake current	VM=5V ; VCC=3V ; No PWM Brake Mode		65	90	uA
I_{VM4}	VM PWM current	VM=5V ; VCC=3V PWM=50KHz		240	400	uA
VCC Current						
I_{VCC1}	VCC coast current	VM=5V ; VCC=3V ; No PWM Coast Mode		380	500	uA
I_{VCC2}	VCC F/R current	VM=5V ; VCC=3V ; No PWM Forward/Reverse Mode		450	650	uA
I_{VCC3}	VCC brake current	VM=5V ; VCC=3V ; No PWM Brake Mode		480	650	uA
I_{VCC4}	VCC PWM current	VM=5V ; VCC=3V PWM=50KHz		450	650	uA
CONTROL INPUTS (IN1 , IN2)						
V_{IL}	Input logic low voltage				0.3*VCC	V
V_{IH}	Input logic high voltage		0.5*VCC			V
I_{IL}	Input logic low current	V_{IN}=0V			5	uA
I_{IH}	Input logic high current	V_{IN}=3.3V			50	uA

R_{PD}	Pulldown resistance	IN1 IN2		100		KΩ
MOTOR DRIVER OUTPUTS (OUT1 , OUT2)						
$r_{DS(ON)}$	HS + LS FETs on-resistance	VM=5V ; VCC=3V ; Io=800mA ; Tj=25℃		280		mΩ
PROTECTION CIRCUITS						
V_{UVLO}	VCC under-voltage lockout	VCC falling			1.7	V
		VCC rising	1.8			V
I_{OCP}	Over-current protection trip level		1.9		3.5	A
t_{RETRY}	Over-current retry time			1		mS
T_{TSD}	Thermal shutdown temperature	Die temperature		160		℃

Timing Requirements

T_A=25℃, VM=5V, VCC=3V, R_L=20Ω

TIME	Parameter	MAX	Unit
t_1	Output enable time	0.8	uS
t_2	Output disable time	0.8	uS
t_3	Delay time, INx high to OUTx high	0.7	uS
t_4	Delay time, INx low to OUTx low	0.7	uS
t_5	Output rise time	0.5	uS
t_6	Output fall time	0.5	uS

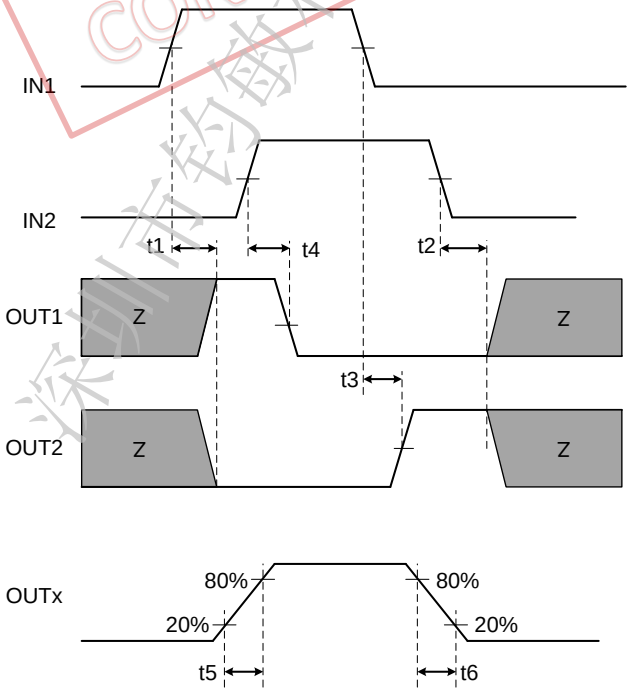


Figure 3. Input and Output Timing

Typical Operating Characteristics

(VM=5V, VCC=3V unless otherwise noted)

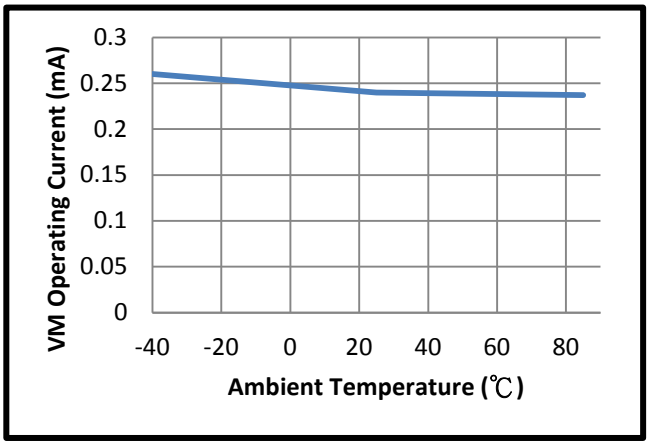


Figure 4. I_{VM} vs T_A (50KHz PWM)

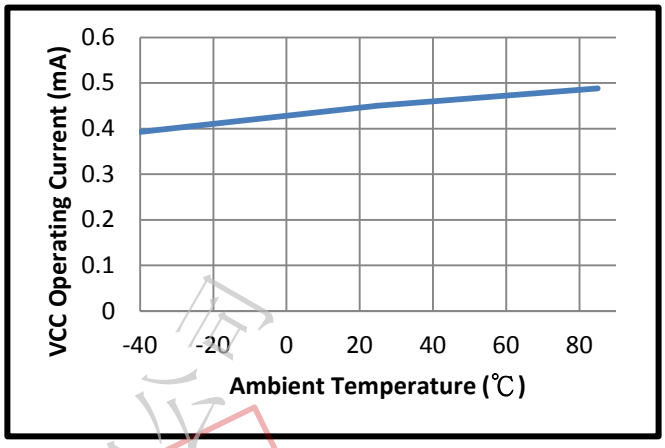


Figure 5. I_{VCC} vs T_A (50KHz PWM)

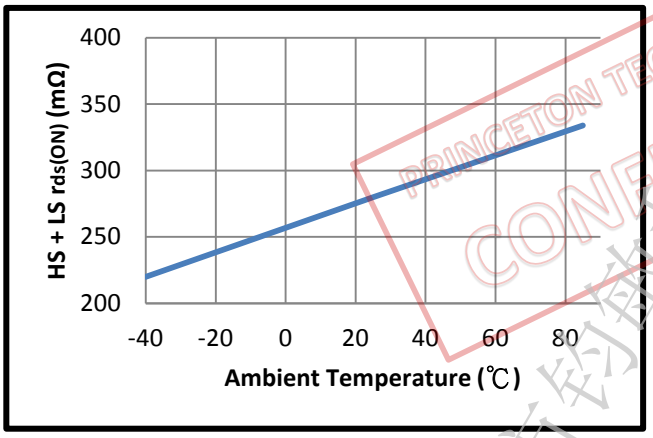


Figure 6. HS + LS r_{DS}-on vs T_A

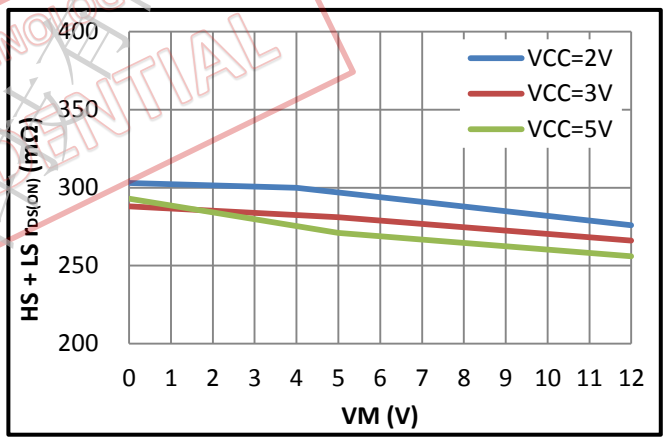


Figure 7. HS + LS r_{DS}-on vs VM

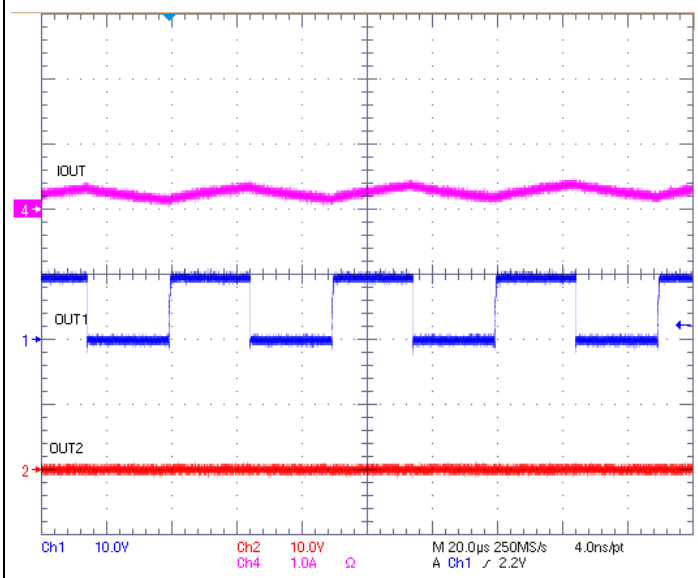


Figure 8. 50% Duty Cycle , Forward Direction

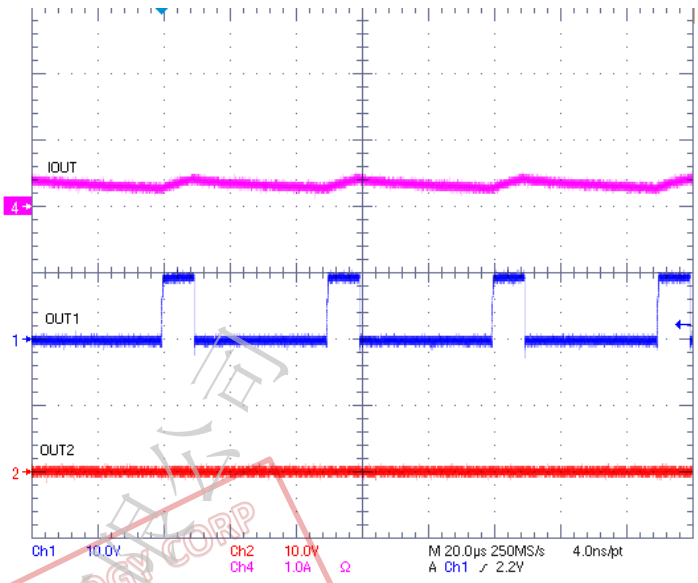


Figure 9. 20% Duty Cycle , Forward Direction

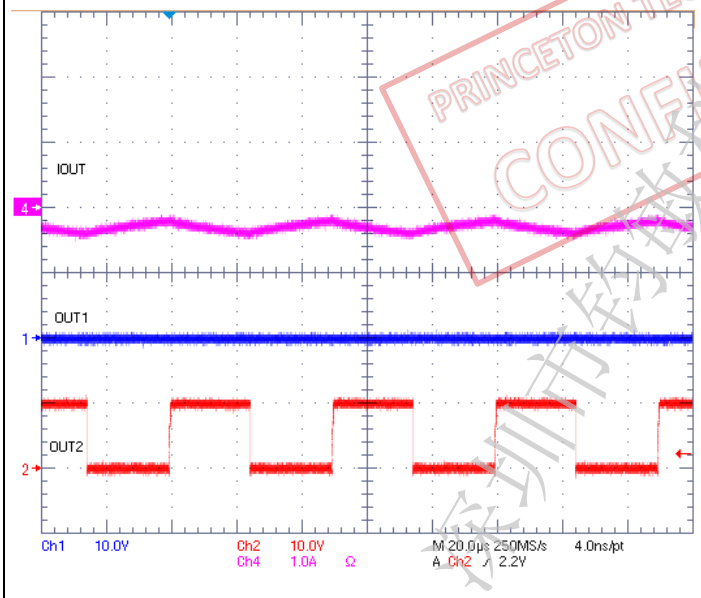


Figure 10. 50% Duty Cycle , Reverse Direction

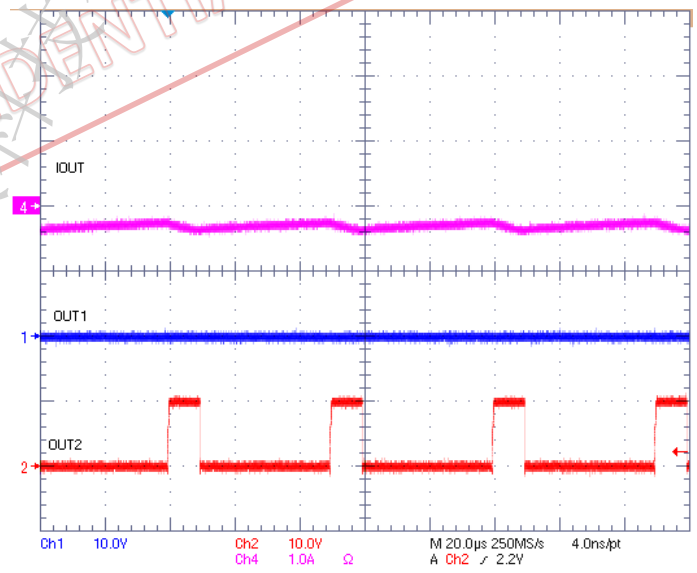


Figure 11. 20% Duty Cycle , Reverse Direction

Bridge Control

The PT2468 is controlled using a PWM input interface, also called an IN-IN interface. Each output is controlled by a corresponding input pin.

Table 1. Control Logic

IN1	IN2	OUT1	OUT2	FUNCTION (DC MOTOR)
0	0	Z	Z	Coast
0	1	L	H	Reverse
1	0	H	L	Forward
1	1	L	L	Brake

Protection Management

The PT2468 is fully protected against VCC under-voltage, overcurrent, and over-temperature events

Table 2. Fault Behavior

FAULT	CONDITION	H-BRIDGE	RECOVERY
VCC under-voltage	VCC < 1.7V	Disable	VCC>1.8V
Over-current	I_{OUT} > 1.9A (MIN)	Disable	t_{RETRY}
Thermal Shutdown	T_J > 150℃ (MIN)	Disable	T_J < 150℃

Power Supply Recommendations

Having appropriate local bulk capacitance is an important factor in motor-drive system design. It is generally beneficial to have more bulk capacitance.

The amount of local bulk capacitor needed depends on the following factors ,

- The highest current required by the motor system.
- The power-supply capacitance and ability to source current
- The amount of parasitic inductance between the power supply and motor system
- The acceptable voltage ripple
- The type of motor used (brushed dc, brushless dc, stepper)
- The motor braking method

The inductance between the power supply and motor drive system limits the rate at which current can change from the power supply. If the local bulk capacitance is too small, the system responds to excessive current demands or dumps from the motor with a change in voltage. When adequate bulk capacitance is used, the motor voltage remains stable and high current can be quickly supplied.

The voltage rating for bulk capacitors should be higher than the operating voltage, to provide margin for cases when the motor transfers energy to supply.

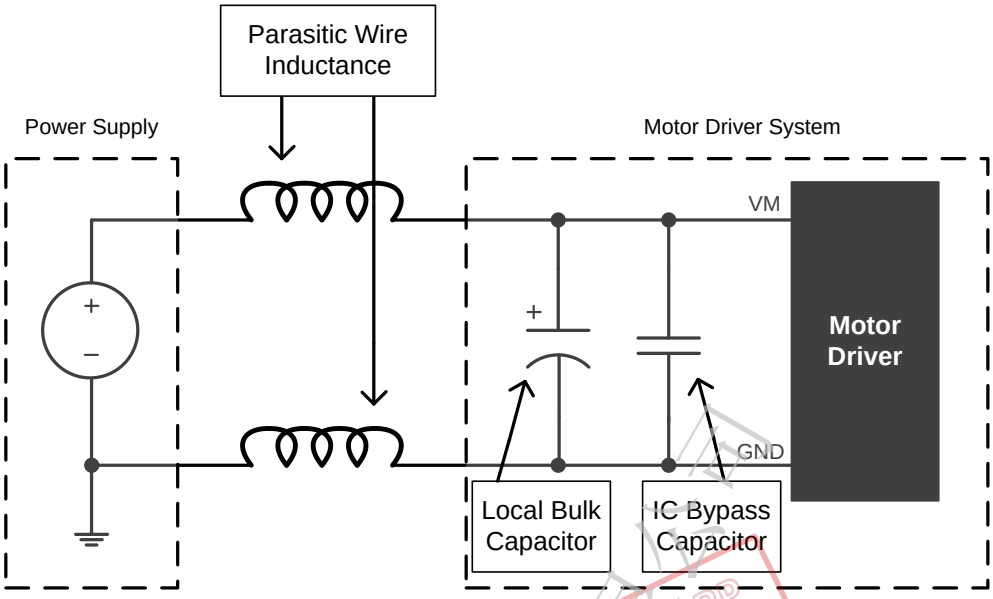
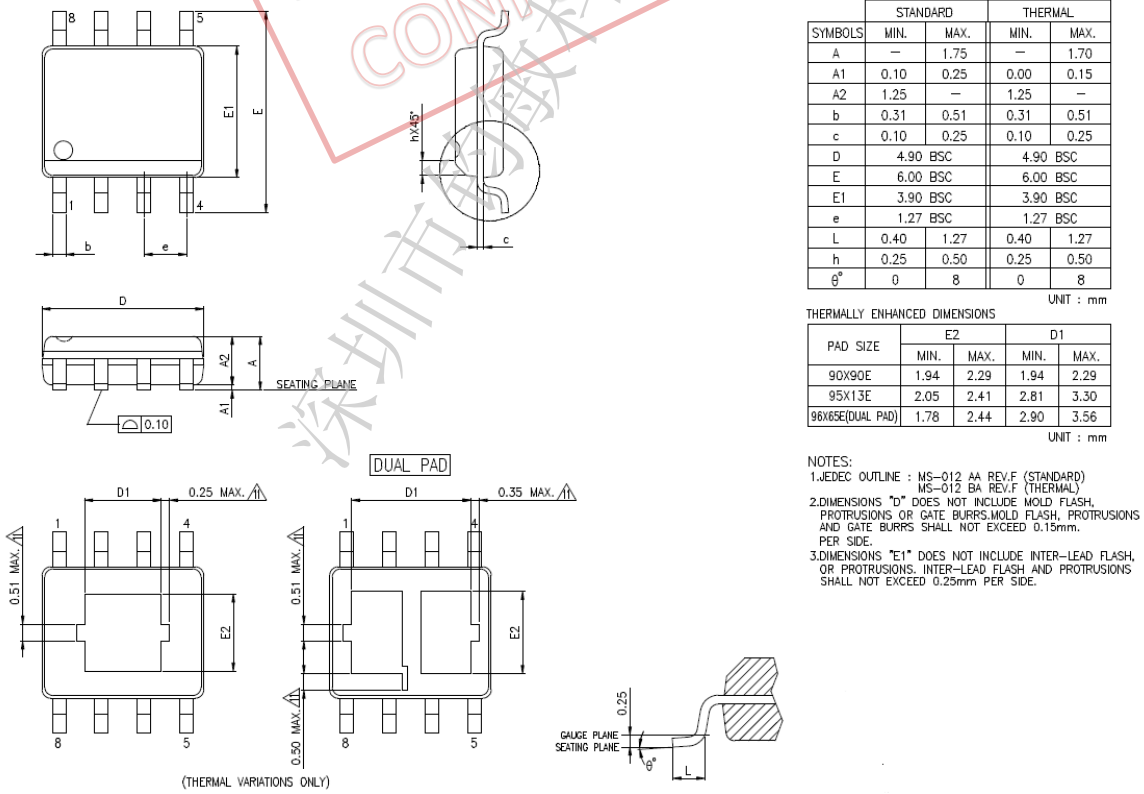


Figure 12. Motor Driver System With External Power Supply

Package Information

8L-SOP



SYMBOLS	STANDARD MIN.	STANDARD MAX.	THERMAL MIN.	THERMAL MAX.
A	—	1.75	—	1.70
A1	0.10	0.25	0.00	0.15
A2	1.25	—	1.25	—
b	0.31	0.51	0.31	0.51
c	0.10	0.25	0.10	0.25
D	4.90 BSC		4.90 BSC	
E	6.00 BSC		6.00 BSC	
E1	3.90 BSC		3.90 BSC	
e	1.27 BSC		1.27 BSC	
L	0.40	1.27	0.40	1.27
h	0.25	0.50	0.25	0.50
θ°	0	8	0	8

UNIT : mm

THERMALLY ENHANCED DIMENSIONS

PAD SIZE	E2 MIN.	E2 MAX.	D1 MIN.	D1 MAX.
90X90E	1.94	2.29	1.94	2.29
95X13E	2.05	2.41	2.81	3.30
96X65E(DUAL PAD)	1.78	2.44	2.90	3.56

UNIT : mm

NOTES:
1.JEDEC OUTLINE : MS-012 AA REV.F (STANDARD)
MS-012 BA REV.F (THERMAL)
2.DIMENSIONS "D" DOES NOT INCLUDE MOLD FLASH, PROTRUSIONS OR GATE BURRS.MOLD FLASH, PROTRUSIONS AND GATE BURRS SHALL NOT EXCEED 0.15mm. PER SIDE.
3.DIMENSIONS "E1" DOES NOT INCLUDE INTER-LEAD FLASH, OR PROTRUSIONS. INTER-LEAD FLASH AND PROTRUSIONS SHALL NOT EXCEED 0.25mm PER SIDE.