H-Bridge Motor Driver 2.5V~6V, 0.45Ω Peak current limiting protection:2.5A

1 Description

The CN8001A is an H-bridge motor driver used for driving reversible motors, which can drive one DC motor, one winding of a stepper motor, or other loads.

The CN8001A operates on a motor power supply voltage from 2.5V to 6V, With 2.5A current limit.

The CN8001A is controlled by two input pins. The two on/off inputs determine the output mode: forward, reverse, coast, or brake. Very low standby circuit current can be achieved when the two inputs are both at a low level.

The CN8001A is available with DFN2x2-8, SOT23-6, SOP-8 or ESOP-8 package.

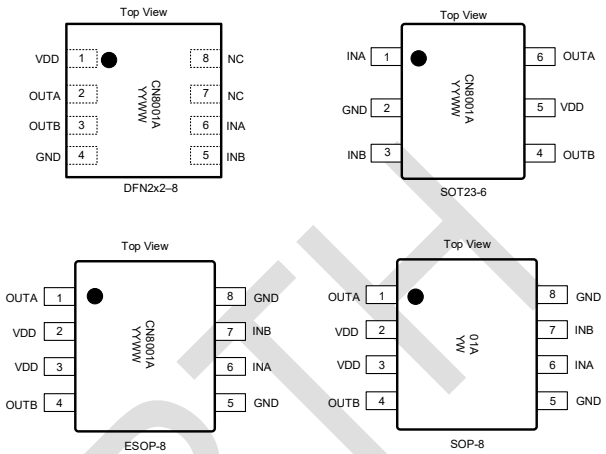
2 Features

- Wide Power Range: 2.5V to 6V
- Peak current limiting protection:2.5A
- Low MOSFET On Resistance: Rhs=0.3Ω, Rls=0.15Ω
- Forward, Reverse, Coast, or Brake Output Modes
- Suitable for wide range MCU control logic
- Input logic hysteresis
- Thermal Shutdown
- OCP: 2.5A

3 Applications

- Smart BreakerSmart Lock
- Smart Water/Gas Meter
- Toys

4 Pinout



5 Ordering information

Product Number	Package	Quantity/Tape
CN8001DHR-A	DFN2X2-8	4000/Tape
CN8001TSR-A	SOT23-6	3000/Tape
CN8001SHR-A	SOP-8	4000/Tape
CN8001EHR-A	ESOP-8	4000/Tape

6 Marking

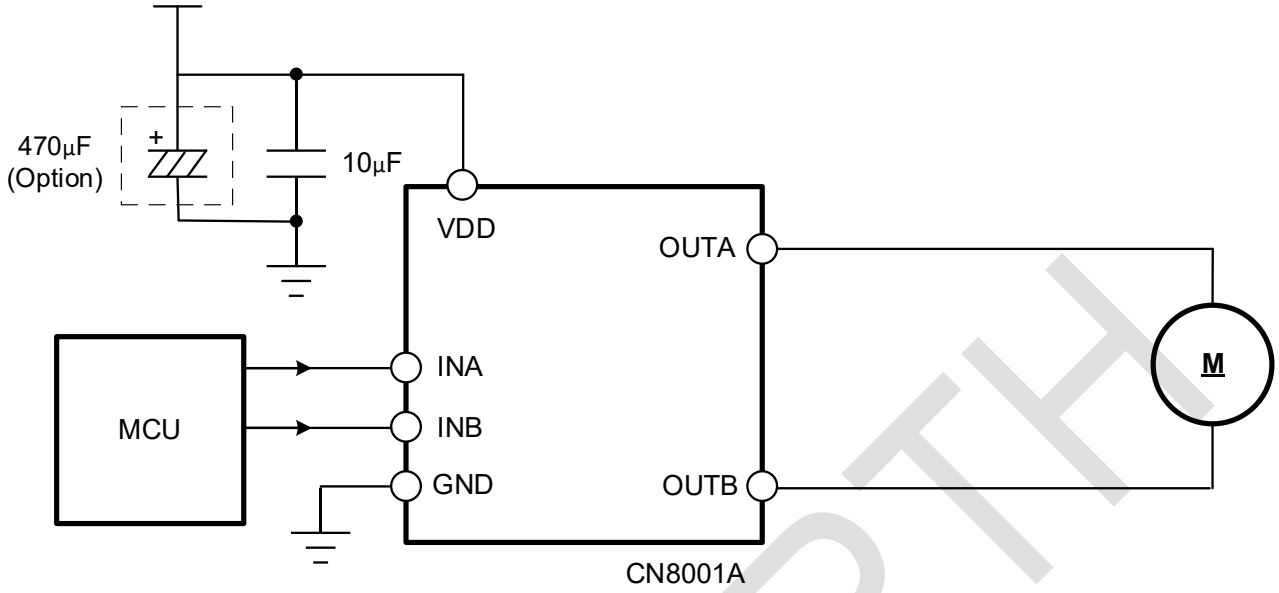
Product Number	Marking
CN8001DHR-A	CN8001A YYWW
CN8001TSR-A	CN8001A YYWW
CN8001SHR-A	01AYW
CN8001EHR-A	CN8001A YYWW

Note: YY/Y=Year; WW/W=Week.

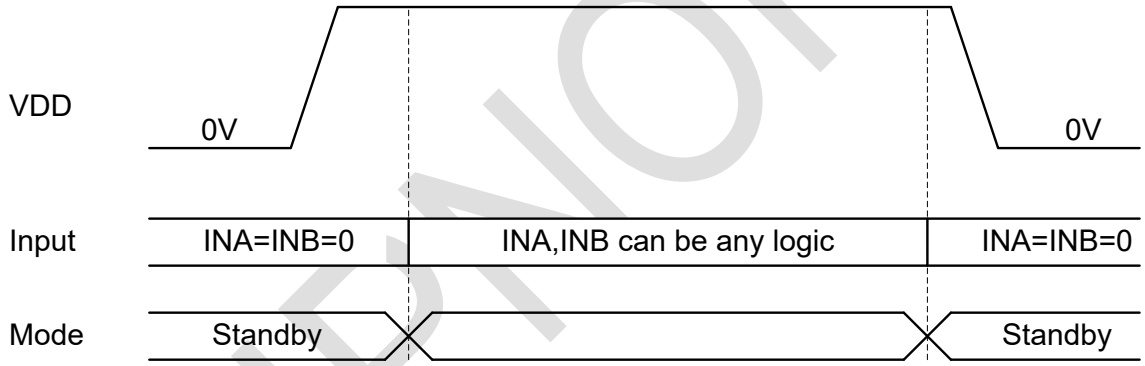
Green (RoHS & HF): CHIPNORTH defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your CHIPNORTH representative directly.

Moisture sensitivity level(MSL):3

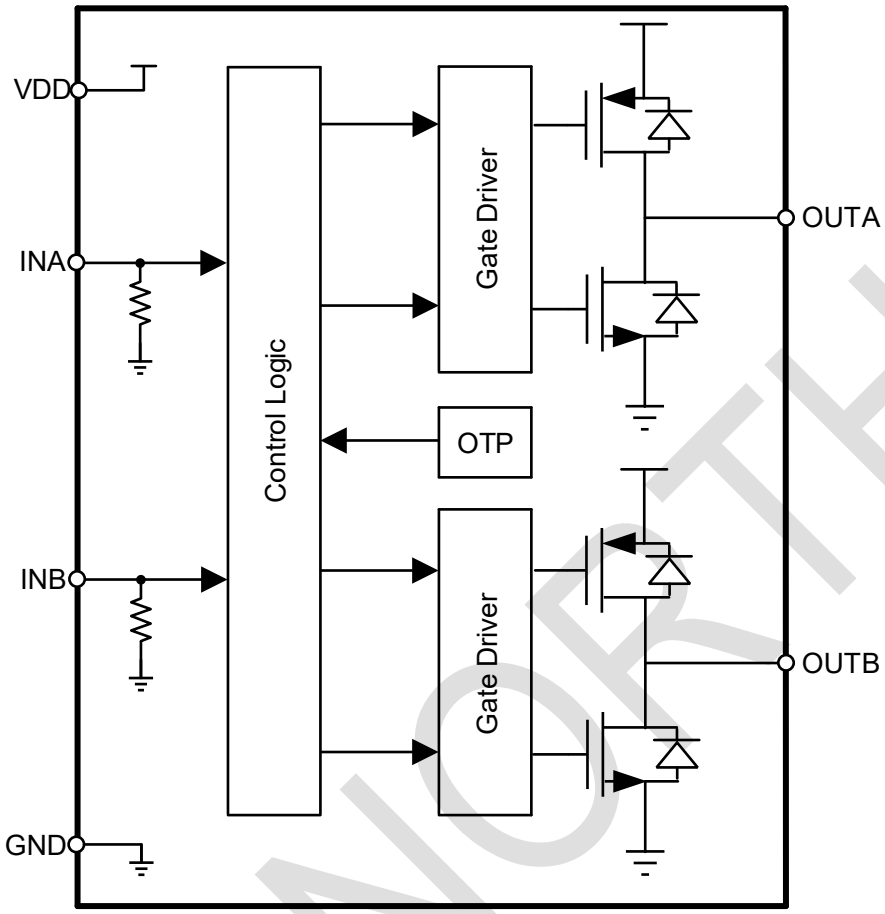
7 Typical Application



Please make sure that the input pins INA and INB remain low during power-up and power-down.



8 Block Diagram



9 Pin Descriptions

Pin No.					Descriptions
Pin Name	CN8001 DHR-A	CN8001 TSR-A	CN8001 SHR-A	CN8001 EHR-A	
VDD	1	5	2、3	2、3	High Voltage Supply voltage. A decap capacitor is required to prevent large voltage spikes.
GND	4、9	2	5、8、9	5、8、9	Thermal PAD is also GND.
OUTA	2	6	1	1	Output, Connect this pin to the motor winding.
OUTB	3	4	4	4	
INA	6	1	6	6	Logic input, with a large internal pull-down resistor.
INB	5	3	7	7	Logic input, with a large internal pull-down resistor.
NC	7、8				

10 Specifications

10.1 Absolute Maximum Ratings

Parameter	Symbol	Value	Units
VDD Supply Voltage Range	V_{DD}	-0.4 ~ +7	V
Output Pins Voltage Range	V_{OUTx}	V_{IN}	V
Input Pins Voltage Range	V_{INx}	GND-0.4 ~ +7	V
Storage Temperature Range	T_{STG}	-55~150	°C
Soldering temperature	T_{LEAD}	260（soldering,10s）	°C

10.2 ESD Ratings

Discharge mode	Value	Units
HBM	±4000	V

10.3 Recommended Operating Range

Parameter	Symbol	Min.	Max.	Units
VDD Supply Voltage Range	V_{DD}	2.5	6	V
Logic Level Input Voltage	V_{INx}	1.3	6	V
Operating ambient temperature	T_A^*	-40	105	°C

*Note: Calculate the maximum ambient temperature based on the specific thermal resistance.

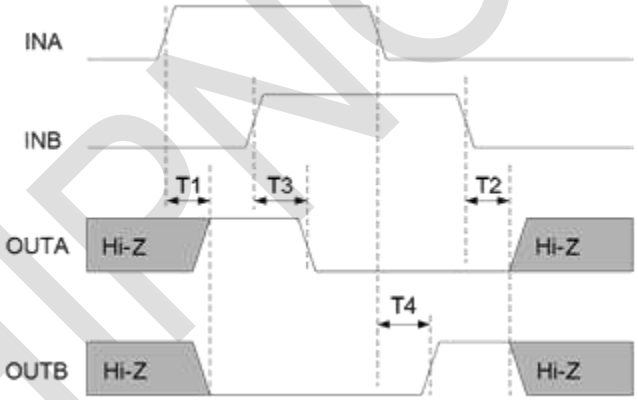
10.4 Thermal Information

Parameter	Package	Value	Unit
θ_{JA}	DFN2x2-8	140	°C /W
	SOT23-6	180	°C /W
	SOP-8	160	°C /W
	ESOP-8	80	°C /W

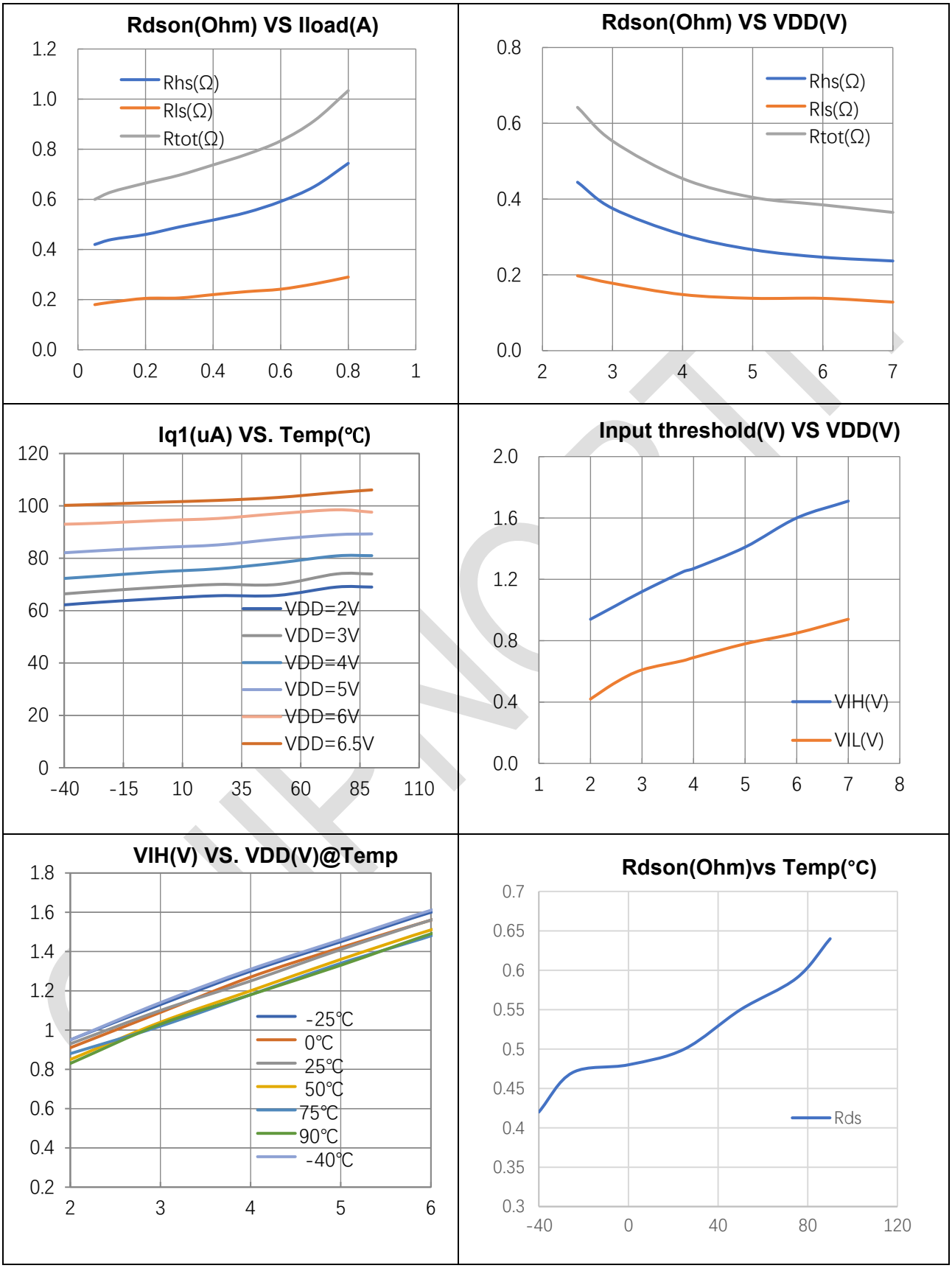
10.5 Electrical Characteristics

Test conditions: TA=25°C, VDD=6V, unless otherwise specified.

Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operating supply voltage	VDD		2.5		6	V
Operating supply current	Iq0	INA=INB=0V		0.1	1	μA
Operating supply current	Iq1	At least one input =3.3V		80	100	μA
Input high voltage	VIH		1.3			V
Input low voltage	VIL				0.8	V
INx Input current	I_INx	V_INx=3.3V		15		μA
Input pull-down resistance	RIN			200		KΩ
HS switch on resistance	Rhs	ILOAD=100mA		0.30	0.50	Ω
LS switch on resistance	Rls	ILOAD=100mA		0.15	0.25	Ω
Output enable time	T1			1200		ns
Output disable time	T2			1200		ns
Delay time	T3	INB high to OUTA low		150		ns
	T4	INA low to OUTB high		350		ns
Dead time				100		ns
Thermal shutdown threshold	OTP			155		°C
Thermal shutdown hysteresis				25		°C
current limiting	OCP			2.5		A



10.6 Characteristics Curve



11 Detailed Description

11.1 Overview

The CN8001A is an H-bridge driver that can drive a DC motor or other devices such as solenoid valves. Outputs can be controlled via the CN8001A's PWM interfaces (INA and INB). These devices integrate the necessary driver FETs and FET control circuits, thereby greatly reducing the number of components in a motor driver system. In addition, the CN8001A adds protection functions that go beyond conventional discrete implementations: overcurrent protection and thermal shutdown.

11.2 RPM Adjustment

PWM (Pulse Width Modulation) technology achieves precise control of motor speed by adjusting the duty cycle of the pulse signal. This technique regulates the average value of the motor input voltage and thus controls the motor speed by changing the duty cycle of the PWM signal, i.e., the ratio of the pulse width to the pulse period. Specifically, the larger the duty cycle of the PWM signal, the higher the average value of the motor input voltage and the faster the motor speed; on the contrary, the smaller the duty cycle, the slower the motor speed.

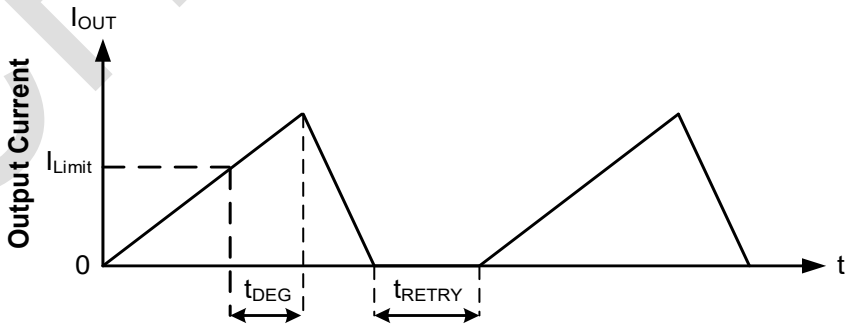
11.3 Motor Control

The CN8001A is controlled via PWM input connectors (INA and INB connectors). Each output is controlled by the corresponding input pin.

INA	INB	OUTA	OUTB	Functions (DC motors)
L	L	Hi-Z	Hi-Z	Coast
L	H	L	H	Reverse
H	L	H	L	Forward
H	H	L	L	Brake

11.4 OCP

There is an analog current limit circuit on each field effect transistor that limits the current through the field effect transistor by eliminating gate drive. If the analog current limit analog current limit lasts longer than t_{DEG}, all field effect transistors in the H-bridge are disabled. Operation is automatically resumed after t_{RETRY}. Overcurrent of the field effect transistors is detected by both the high voltage side and the low voltage side FETs. overcurrent can be caused by a short circuit between the OUTA pin and the OUTB pin or by grounding the OUTB pin.

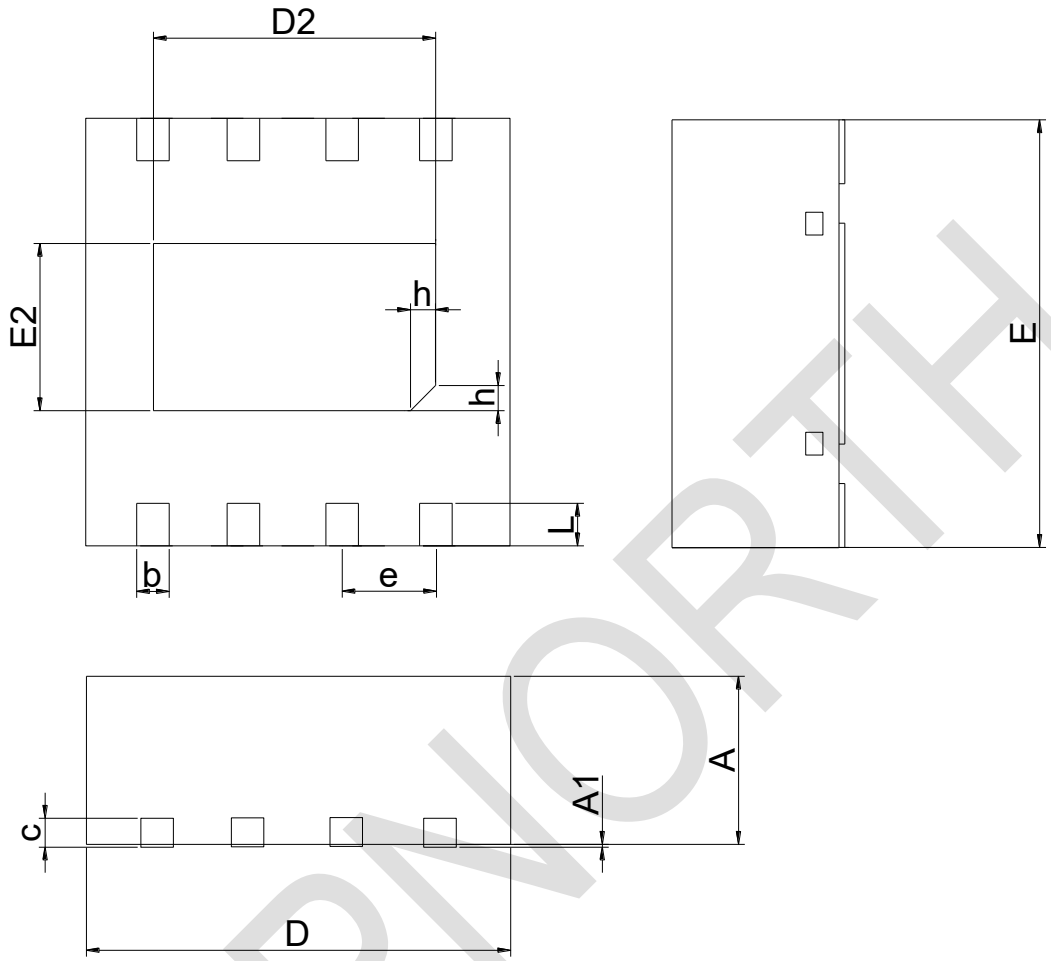


11.5 OTP

If the chip temperature exceeds 155°C, all field effect tubes in the H-bridge are disabled. Operation is automatically resumed when the chip temperature drops below 130°C.

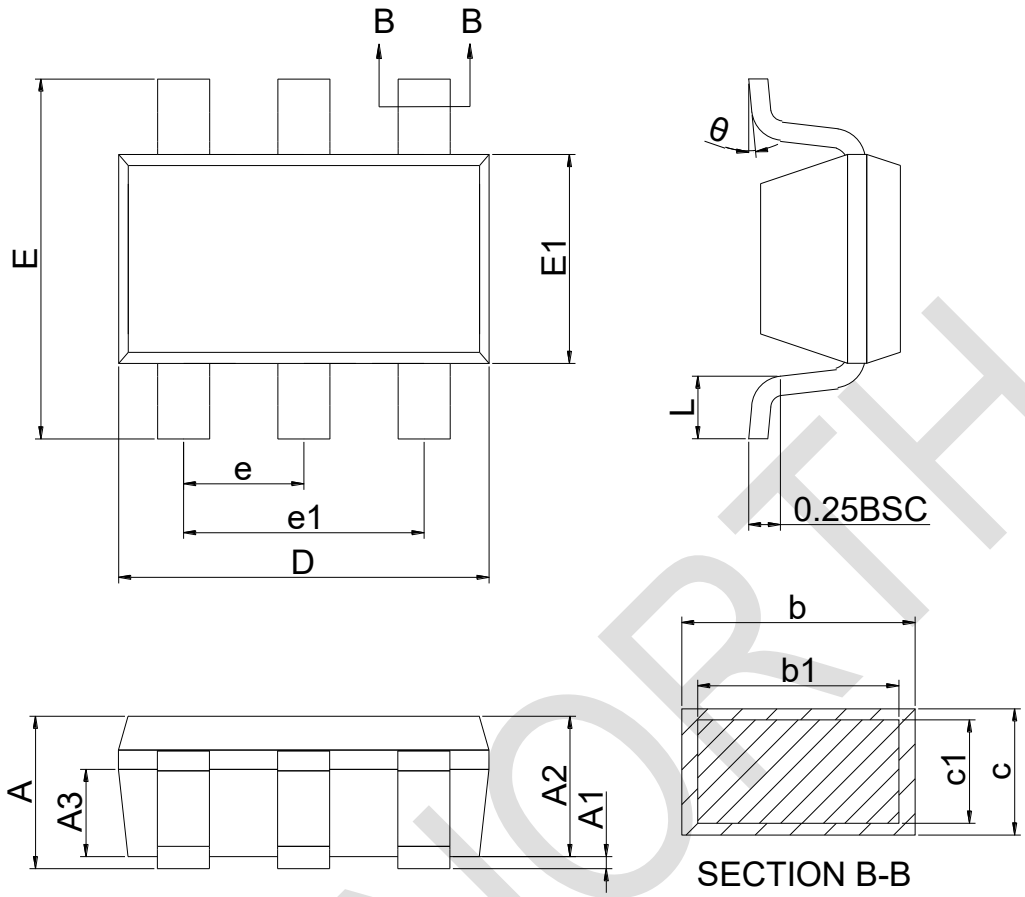
12 Package Information

DFN2X2-8



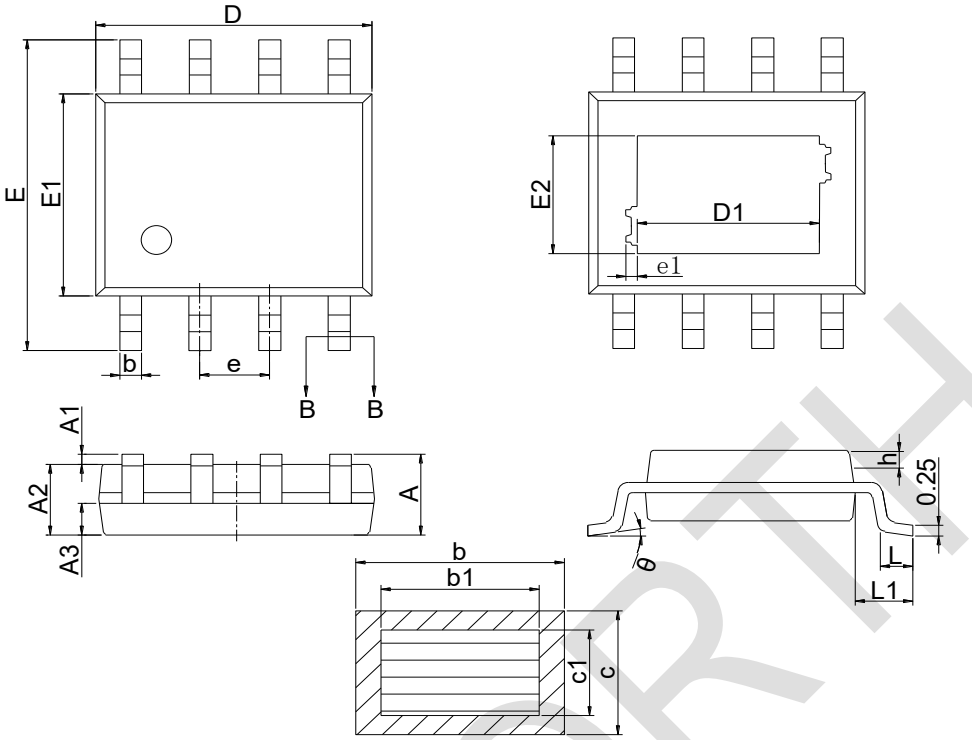
Dimension / Symbol	Min (mm)	Nom (mm)	Max (mm)
A	0.70	0.75	0.80
A1	0.00	0.002	0.005
b	0.18	0.29	0.30
c		0.20REF	
D	1.95	2.00	2.05
D2	1.50	1.55	1.60
e		0.50BSC	
E	1.95	2.00	2.05
E2	0.70	0.75	0.80
L	0.25	0.30	0.35
h	0.10	0.15	0.20
	L/F Carrier size (mm):1.00*1.80		

SOT23-6



Dimension / Symbol	Min (mm)	Nom (mm)	Max (mm)
A			1.25
A1	0.04		0.10
A2	1.00	1.10	1.20
A3	0.55	0.65	0.75
b	0.38		0.48
b1	0.37	0.40	0.43
c	0.11		0.21
c1	0.10	0.13	0.16
D	2.72	2.92	3.12
E	2.60	2.80	3.00
E1	1.40	1.60	1.80
e	0.95BSC		
e1	1.90BSC		
L	0.30		0.60
θ	0°		8°

ESOP-8



SECTION B-B

Dimension / Symbol	Min (mm)	Nom (mm)	Max (mm)
A			1.65
A1	0.05		0.15
A2	1.30	1.40	1.50
A3	0.60	0.65	0.70
b	0.39		0.47
b1	0.38	0.41	0.44
c	0.20		0.24
c1	0.19	0.20	0.21
D	4.80	4.90	5.00
E	5.80	6.00	6.20
E1	3.80	3.90	4.00
e	1.05REF		
h	0.25		0.50
L	0.50	0.60	0.80
L1	1.05REF		
θ	0°		8°

Size(mm) / L/F Size(nil)	D1	E2	e1
95*130	3.10REF	2.21REF	0.10REF

Note：SOP-8 has no heat dissipation pad, other dimensions are the same as ESOP-8

13 Important Statement

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