芯北科技
CHIPNORTH

CN8031

H 桥电机驱动器

4.5～24V，0.9Ω，持续工作电流：0.8A，峰值：3A

■ 介绍

CN8031 是用于驱动可逆电机的 H 桥电机驱动器，可驱动一个 DC 电机，一个步进电机的绕组或其他负载。

CN8031 在 4.5V 至 24V 的电动机电源电压下工作，根据逻辑控制，它可以提供高达 0.8A（ESOP-8）或 0.65A（SOT23-6）的输出电流。

CN8031 由两个输入引脚控制。两个开/关输入确定输出模式：前进，后退，惯性停车或制动。当两个输入均处于低电平时，可以实现非常低的待机电路电流。

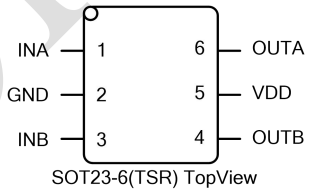
CN8031 可提供 SOT23-6，SOP-8 或 ESOP-8 封装。

■ 应用领域

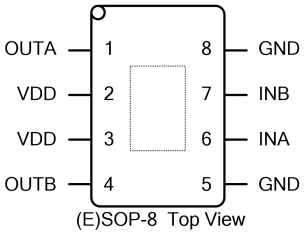
- 智能断路器
- 智能锁
- 智能水/气表
- 玩具

■ 特征

- 宽功率范围：4.5V 至 24V
- 0.8A 最大连续输出
- 高于 3A 的峰值电流能力
- 低 MOSFET 导通电阻：Rhs =0.6Ω，Rls =0.3Ω
- 正向，反向，惯性或制动输出模式
- 适用于广泛的 MCU 控制逻辑
- 输入逻辑迟滞
- 热关断



SOT23-6(TSR) TopView



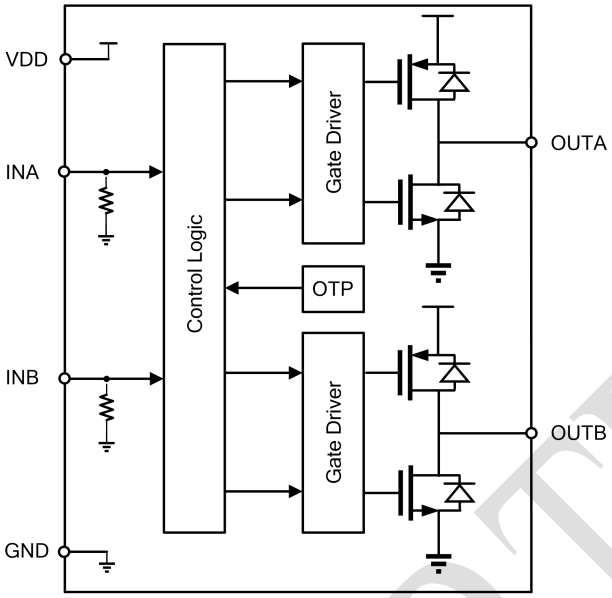
(E)SOP-8 Top View

■ 订单信息

零件号	封装	卷带式	标记*
CN8031TSR	SOT23-6	3000 /卷	31YW
CN8031SHR	SOP-8	2500 /卷	CN8031/KYYWW
CN8031EHR	ESOP-8	2500 /卷	CN8031/KYYWW

*注：Y / YY =年；W / WW =周；31 / 3B / CN8031 =产品名称；K =产品代码

■ 简化框图



■ 引脚说明

TSR SOT23-6	(E)SOP-8	符号	描述
6	1	OUTA	输出，将此引脚连接到电机绕组。
5	2,3	VDD	电源电压。需要使用一个去电容器来防止大的电压尖峰。
4	4	OUTB	输出，将此引脚连接到电机绕组。
2	5,8,9	GND	热 PAD 也是 GND。
1	6	INA	逻辑输入，带有一个大的内部下拉电阻。
3	7	INB	逻辑输入，带有一个大的内部下拉电阻。

■ 输入逻辑真值表

INA	INB	OUTA	OUTB	功能（直流电动机）
L	L	Hi-Z	Hi-Z	惯性或停车
L	H	L	H	反向
H	L	H	L	正向
H	H	L	L	制动

■ 绝对最大额定值

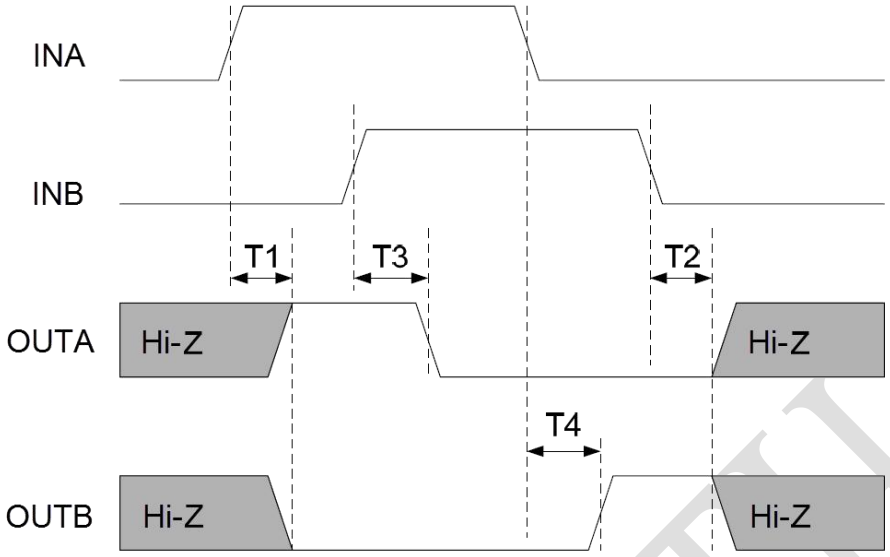
符号	参数	值		单位
V_{VDD}	VDD 电源电压范围	-0.4 ~ +25		V
V_{OUTX}	输出引脚电压范围	V_{VDD}		
V_{INX}	输入引脚电压范围	GND-0.4 ~ 5.5		V
T_J	最高结温	150		℃
T_{STG}	储存温度范围	-55~160		℃
θ_{JA}*	封装热阻（环境到结点）	SOT23-6	180	SOT23-6
		SOP-8	160	SOP-8
		ESOP-8	80	ESOP-8
$V_{ESD\ (HBM)}$	静电放电电压（人体模型）	4000		V

*注：PCB 上有 8 cm^2 铜箔。

■ 电气特性

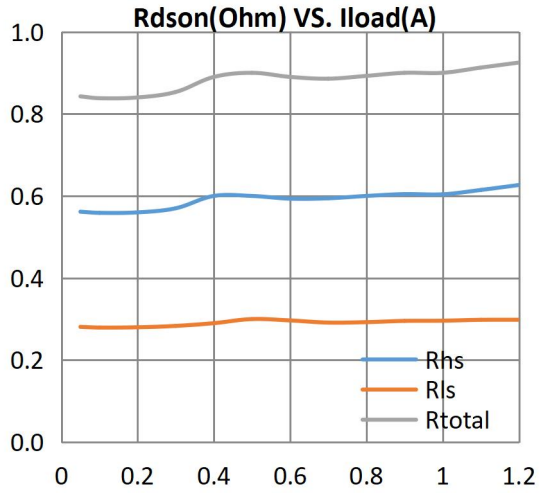
测试条件：TA = 25°C，VDD = 12V，除非另有说明。

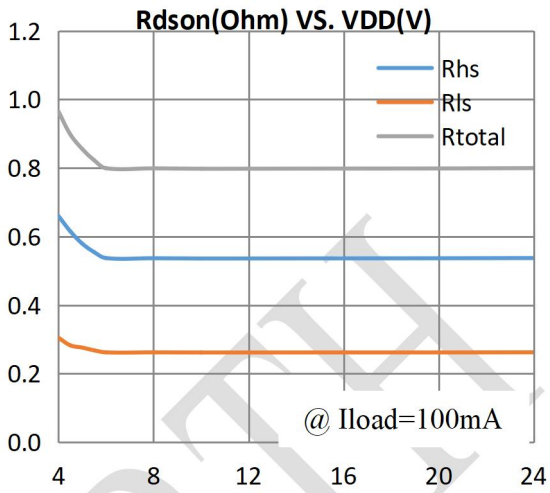
参量	符号	条件	最小值	典型值	最大值	单位
工作电源电压	VDD		4.5		24	V
待机模式电源电流	Iq0	INA=INB=0V		25	36	μA
工作电源电流	Iq1			60	75	μA
UVLO 阈值				4.05	4.4	V
UVLO 滞后				0.3		V
输入高压	VIH		1.95			V
输入低电压	VIL				0.45	V
输入大电流	IIH	VIN=3.3V		3.5		μA
输入下拉电阻	RIN			1.2		MΩ
HS 接通电阻	Rhs	ILOAD=300mA		0.6	0.75	Ω
LS 接通电阻	Rls	ILOAD=300mA		0.3	0.4	Ω
输出使能时间	T1			150		ns
输出失能时间	T2			250		ns
延迟时间	T3	INx high to OUTx high		200		ns
	T4	INx low to OUTx low		350		ns
死区时间				200		ns
热关断阈值				155		°C
热关断磁滞				25		°C

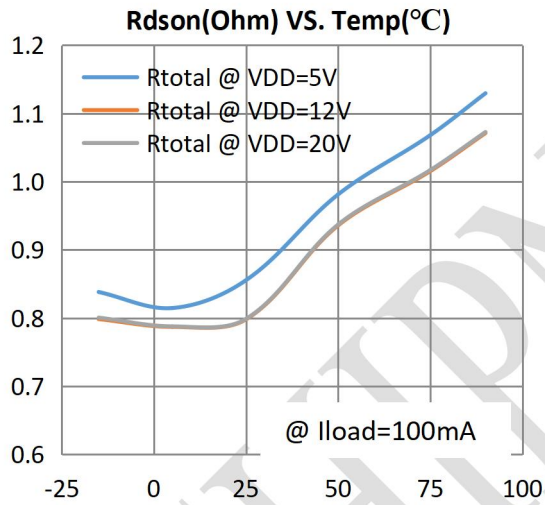


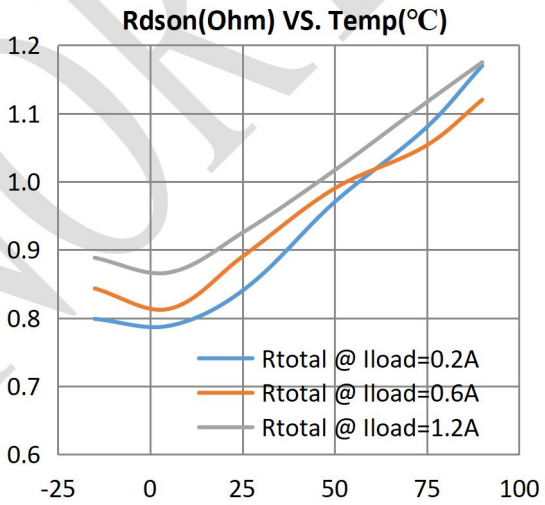
■ 典型电气参数

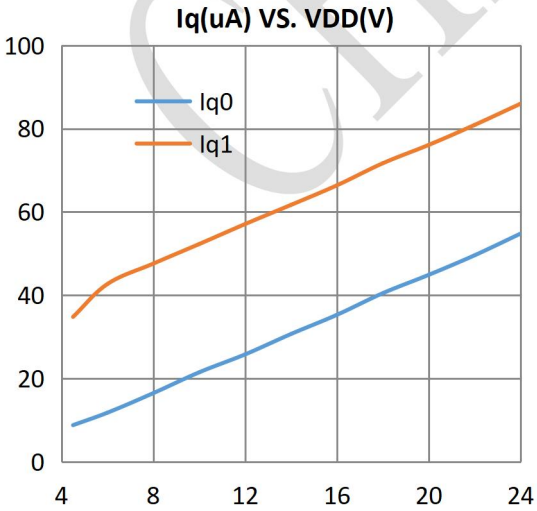
测试条件：TA = 25°C，VDD = 12V，Iload=0mA,除非另有说明。

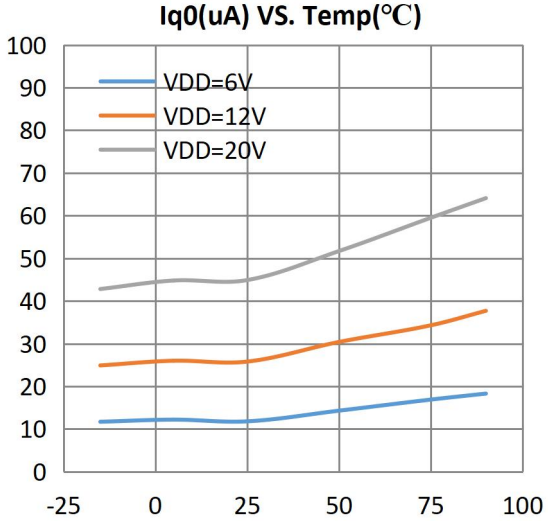


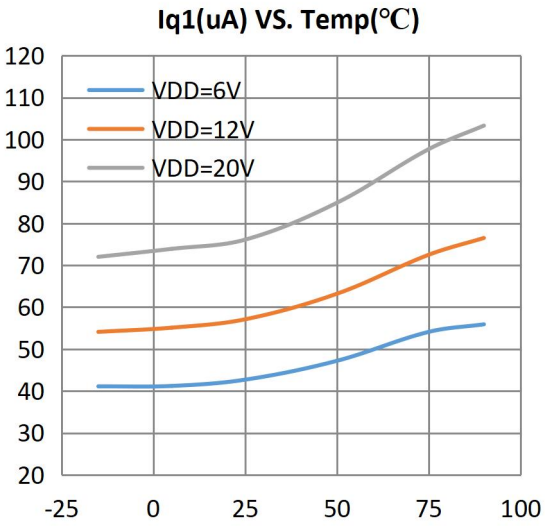


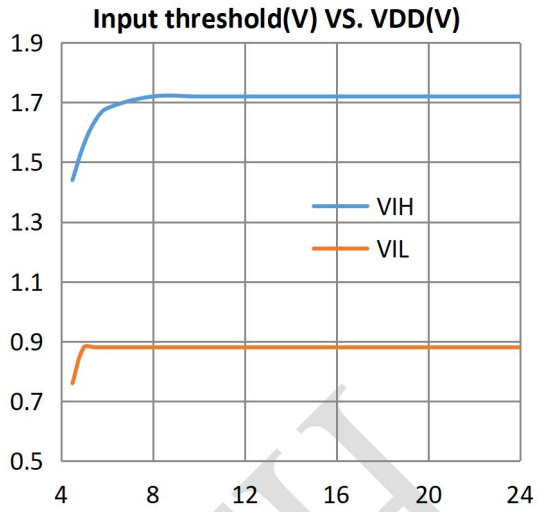


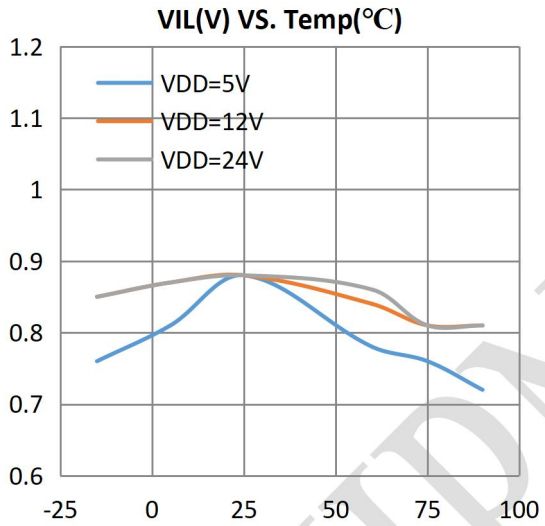


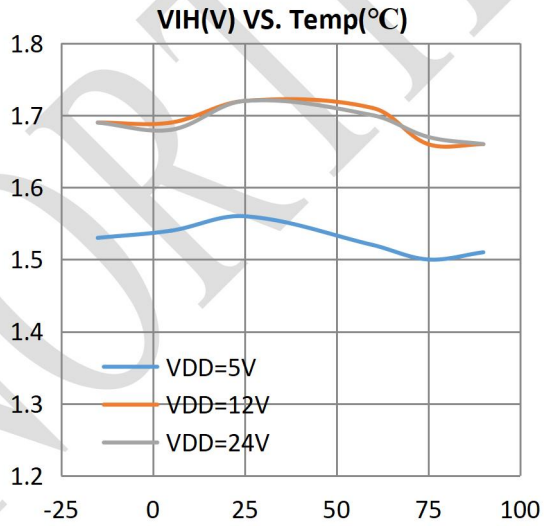




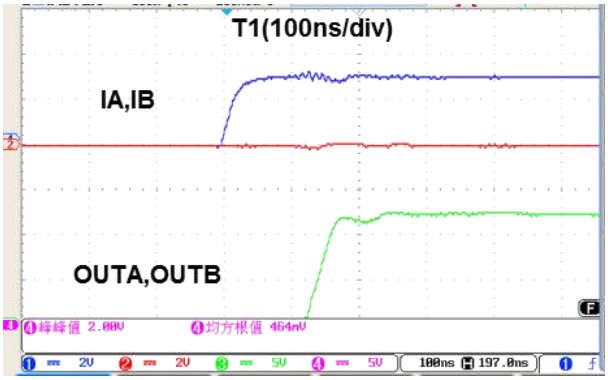

Iq1(uA) VS. Temp(℃)
VDD=6V
VDD=12V
VDD=20V
120
110
100
90
80
70
60
50
40
30
20
-25
0
25
50
75
100


Input threshold(V) VS. VDD(V)
VIH
VIL
1.9
1.7
1.5
1.3
1.1
0.9
0.7
0.5
4
8
12
16
20
24

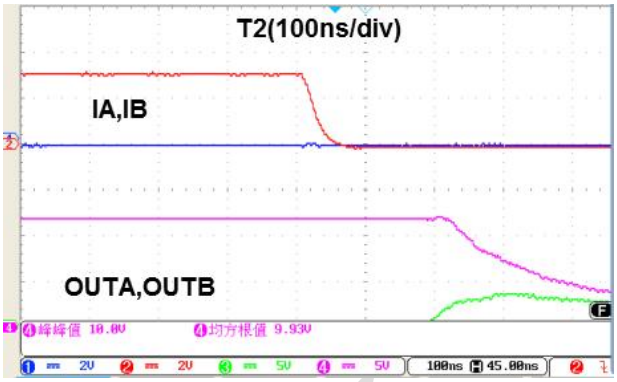

VIL(V) VS. Temp(℃)
VDD=5V
VDD=12V
VDD=24V
1.2
1.1
1
0.9
0.8
0.7
0.6
-25
0
25
50
75
100


VIH(V) VS. Temp(℃)
VDD=5V
VDD=12V
VDD=24V
1.8
1.7
1.6
1.5
1.4
1.3
1.2
-25
0
25
50
75
100

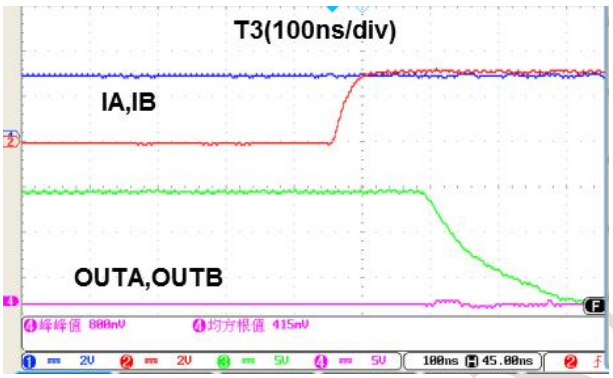
Output Enable Time (T1)



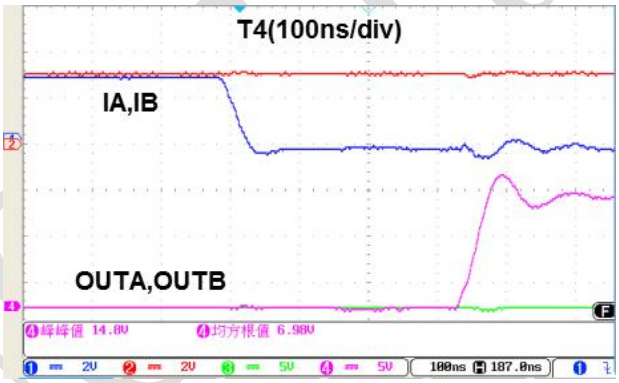
Output Disable Time (T2)



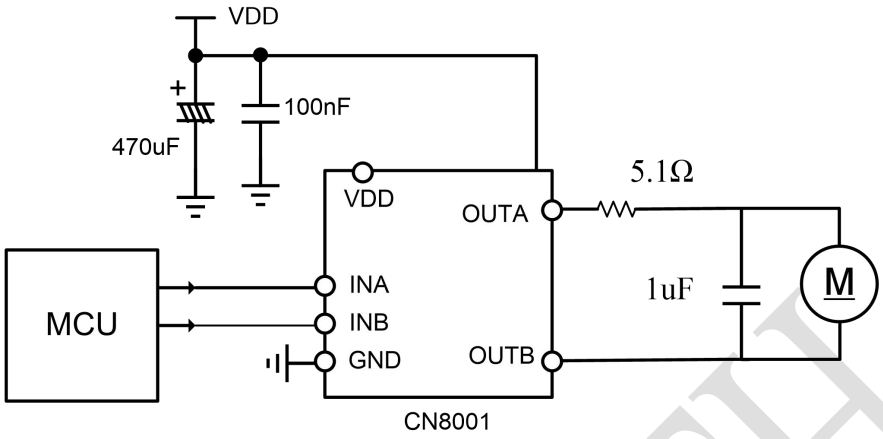
Delay Time (T3)



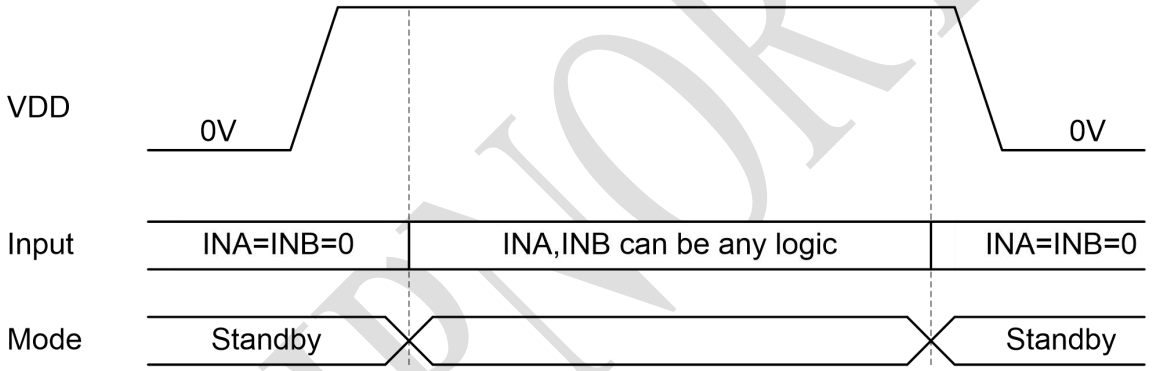
Delay Time (T4)



■ 典型应用图

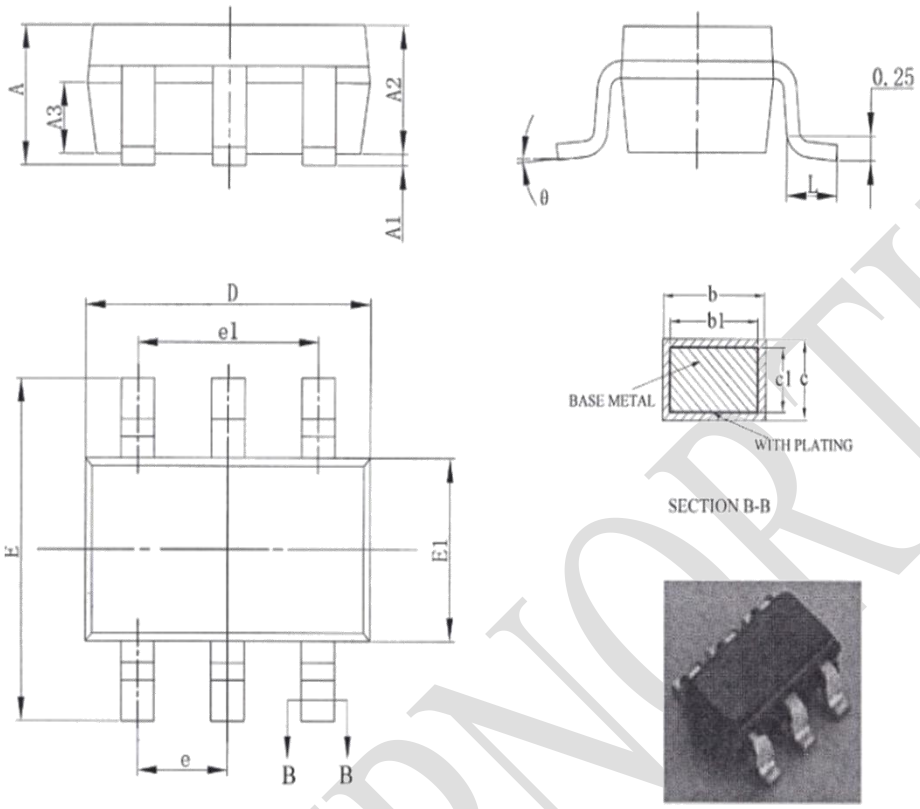


请确保输入信号 INA 和 INB 引脚在上电和掉电期间保持低电平。



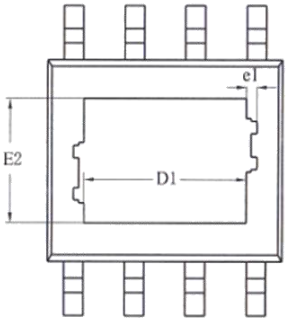
■ 封装信息

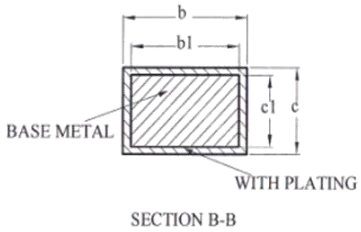
SOT23-6



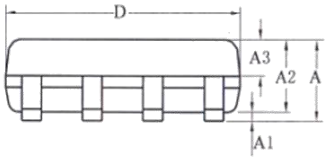
SYMBOL	MILLIMETER		
	MIN	NOM	MAX
A	—	—	1.25
A1	0.04	—	0.10
A2	1.00	1.10	1.20
A3	0.55	0.65	0.75
b	0.38	—	0.48
b1	0.37	0.40	0.43
c	0.11	—	0.21
c1	0.10	0.13	0.16
D	2.72	2.92	3.12
E	2.60	2.80	3.00
E1	1.40	1.60	1.80
e	0.95BSC		
e1	1.90BSC		
L	0.30	—	0.60
θ	0	—	8°

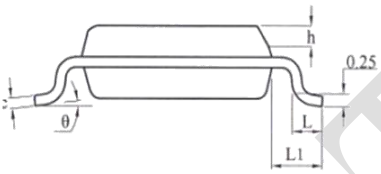
ESOP-8, SOP-8

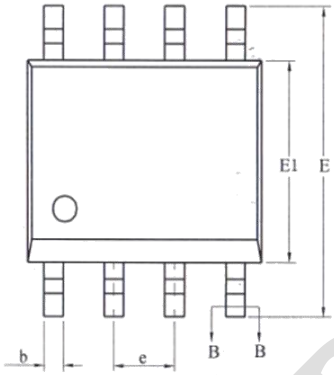


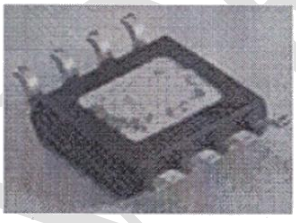


SECTION B-B









SYMBOL	MILLIMETER		
	MIN	NOM	MAX
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	1.27BSC		
h	0.25	—	0.50
L	0.50	0.60	0.80
L1	1.05REF		
θ	0	—	8°

Size(mil) / L/F Size (mil)	D1	E2	e1
90*90	2.09REF	2.09REF	0.16REF
95*130	3.10REF	2.21REF	0.10REF

H-Bridge Motor Driver 4.5V~24V, 0.9Ω, Continuous: 0.8A Peak: 3A

1 Description

The CN8031 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 CN8031 operates on a motor power supply voltage from 4.5V to 24V, which can supply an output current of up to 0.8A (ESOP-8) or 0.65A(SOT23-6) according to the logic control.

The CN8031 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 CN8031 is available with SOT23-6, SOP-8 or ESOP-8 package.

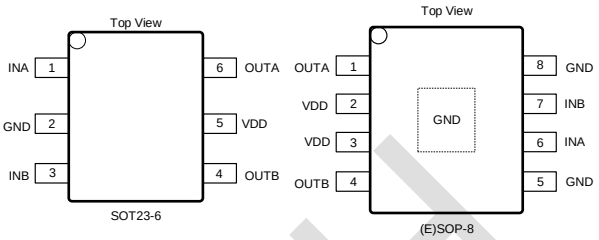
2 Features

- Wide Power Range: 4.5V to 24V
- 0.8A Maximum Continuous Output
- Above 3A peak current ability
- Low MOSFET On Resistance: Rhs=0.3Ω, Rls=0.3Ω
- Forward, Reverse, Coast, or Brake Output Modes
- Suitable for wide range MCU control logic
- Input logic hysteresis
- Thermal Shutdown

3 Applications

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

4 Pinout



5 Ordering information

Product Number	Package	Quantity/Tape
CN8031TSR	SOT23-6	3000/Tape
CN8031SHR	SOP-8	2500/Tape
CN8031SHR	SOP-8	4000/Tape
CN8031EHR	ESOP-8	2500/Tape
CN8031EHR	ESOP-8	4000/Tape

6 Marking

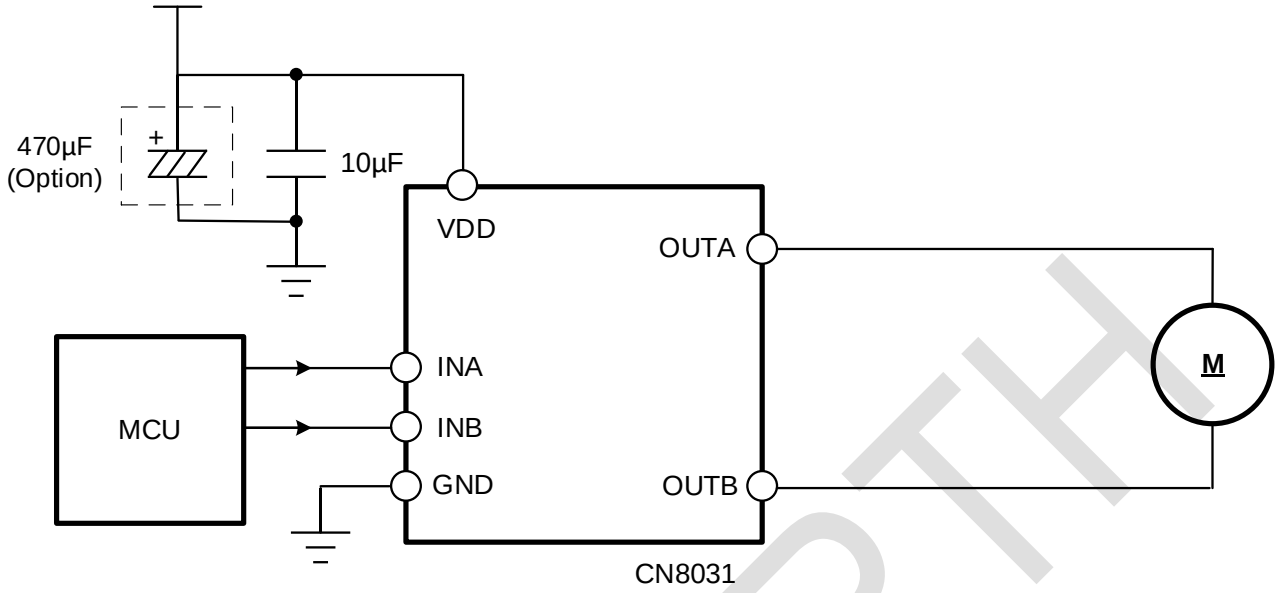
Product Number	Marking
CN8031TSR	31YW
CN8031SHR	CN8031 KYYWW
CN8031EHR	CN8031 KYYWW

Note: YY=Year WW=Week.

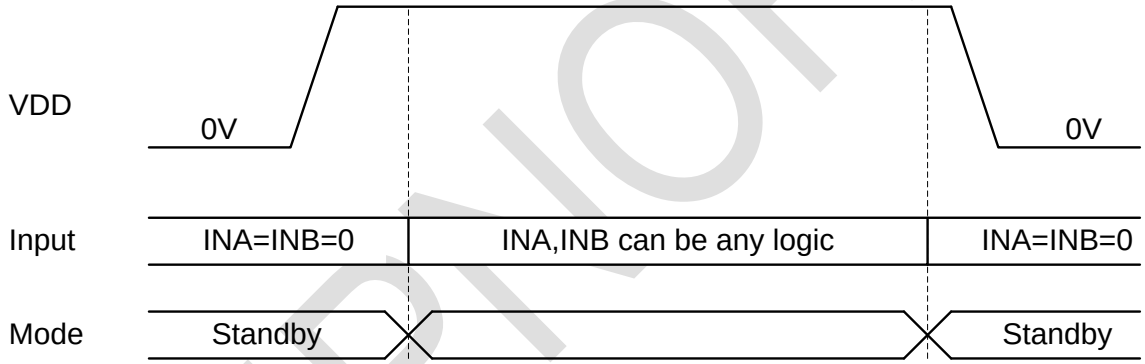
Green (RoHS & HF): CHIPNORTH defines "Green" to mean Pb-Free (RoHS compatible) and free of halogen substances. If you have additional comments or questions, please contact your CHIPNORTH representative directly.

Moisture sensitivity level(MSL):3

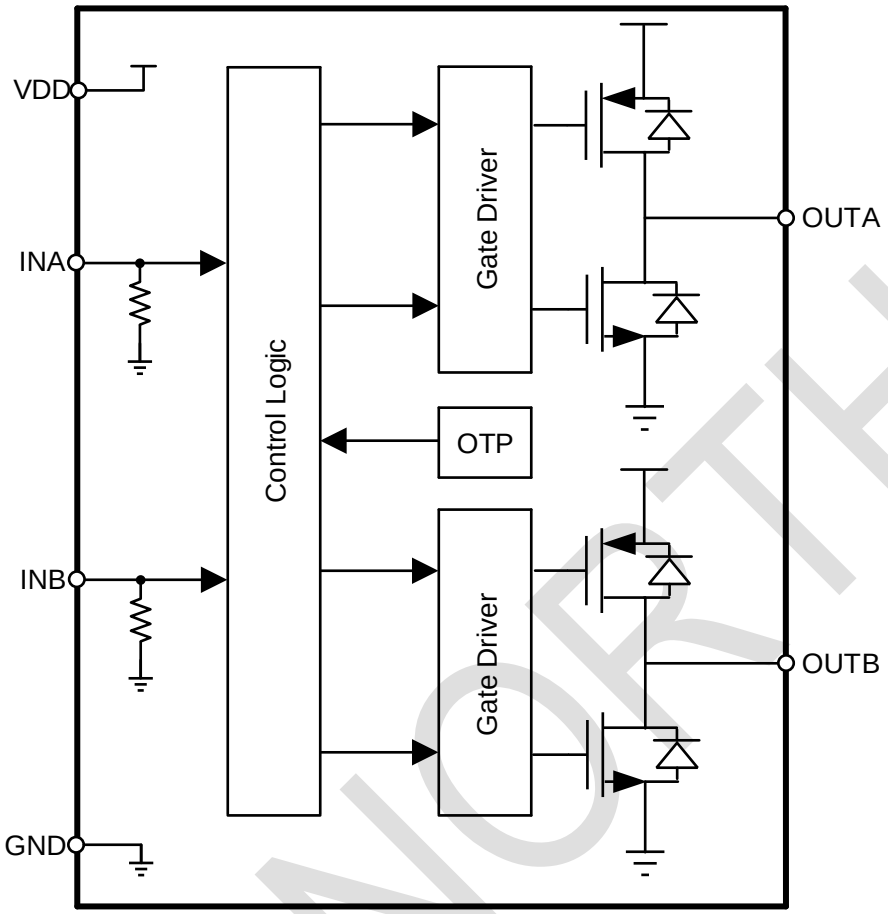
7 Typical Application



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	CN8031TSR	CN8031SHR	CN8031EHR	
OUTA	6	1	1	Output, Connect this pin to the motor winding.
VDD	5	2,3	2,3	Supply voltage. A decap capacitor is required to prevent large voltage spikes.
OUTB	4	4	4	Output, Connect this pin to the motor winding.
GND	2	5,8,9	5,8,9	Thermal PAD is also GND.
INA	1	6	6	Logic input, with a large internal pull-down resistor.
INB	3	7	7	Logic input, with a large internal pull-down resistor.

10 Specifications

10.1 Absolute Maximum Ratings

Parameter	Symbol	Value	Units
VDD Supply Voltage Range	V_{DD}	-0.4 ~ +25	V
Output Pins Voltage Range	V_{OUTx}	V_{VDD}	V
Input Pins Voltage Range	V_{INx}	GND-0.4 ~ 5.5	V
Storage Temperature Range	T_{STG}	-55~150	°C
Soldering temperature	T_{LEAD}	260（Soldering 10s）	°C

*Note: There is 8 cm^2 copper foil on PCB.

10.2 ESD Ratings

Discharge mode	Value	Units
HBM	±4000	V

Note: There is 8 cm2 copper foil on the PCB.

10.3 Recommended Operating Range

Parameter	Symbol	Min.	Max.	Units
VDD Supply Voltage Range	V_{DD}	4.5	24	V
Logic Level Input Voltage	V_{INx}	1.3	6	V
Operating ambient temperature	T_A^*	-40	105	°C

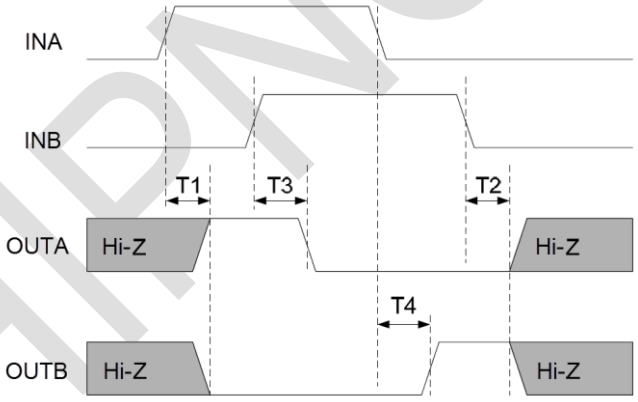
10.4 Thermal Information

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

10.5 Electrical Characteristics

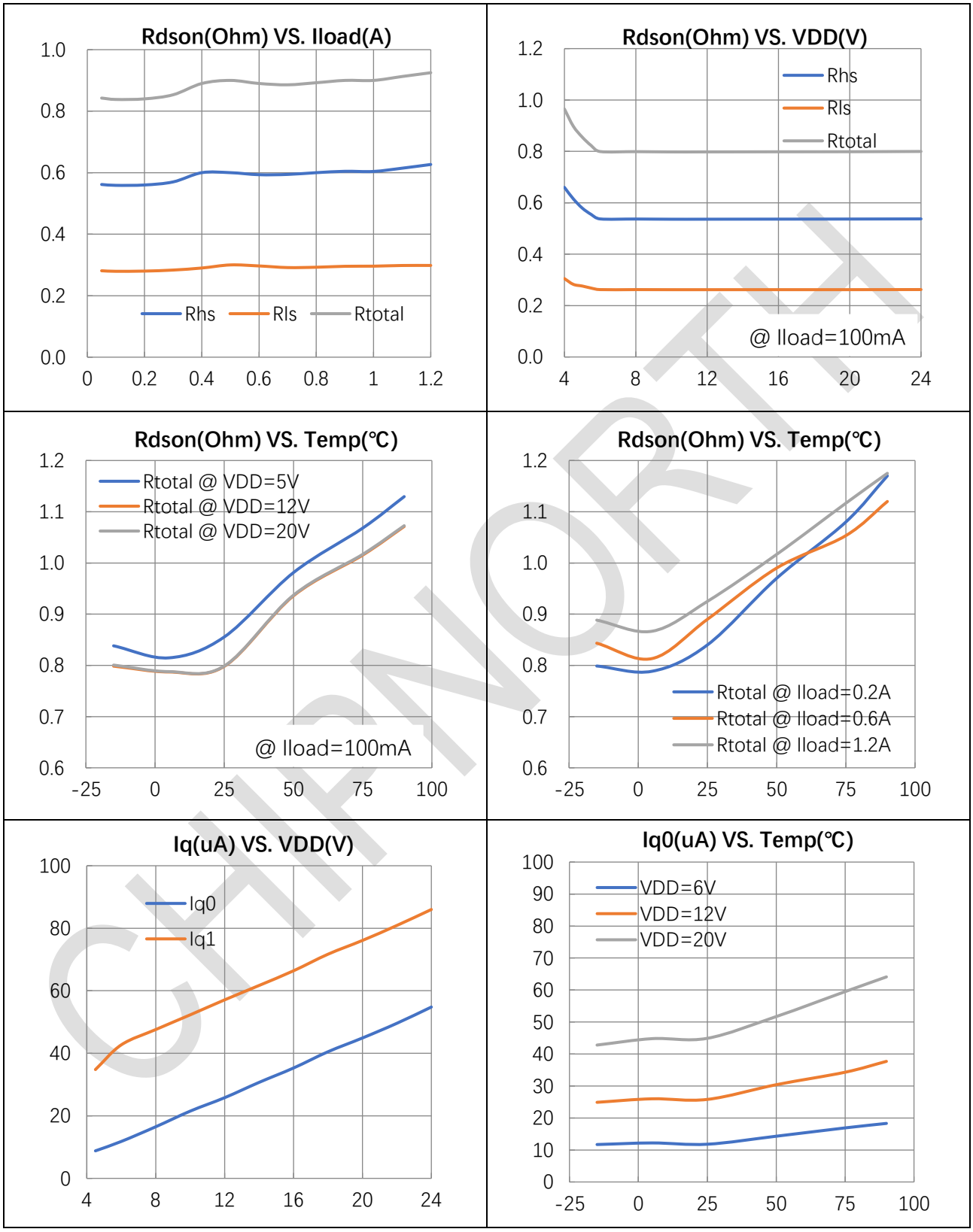
Test conditions: TA = 25°C, VDD=12V, unless otherwise specified.

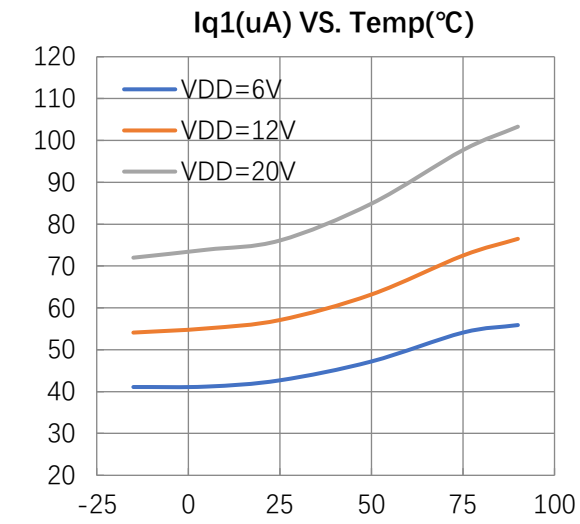
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
Operating supply voltage	VDD		4.5		24	V
Standby mode supply current	Iq0	INA=INB=0V		25	36	μA
Operating supply current	Iq1			60	75	μA
UVLO threshold rising				4.05	4.4	V
UVLO hysteresis				0.3		V
Input high voltage	VIH		1.95			V
Input low voltage	VIL				0.45	V
Input high current	IIH	VIN=3.3V		3.5		μA
Input pull-down resistance	RIN			1.2		MΩ
HS switch on resistance	Rhs	ILOAD=300mA		0.6	0.75	Ω
LS switch on resistance	Rls	ILOAD=300mA		0.3	0.4	Ω
Output enable time	T1			150		ns
Output disable time	T2			250		ns
Delay time	T3	INx high to OUTx high		200		ns
	T4	INx low to OUTx low		350		ns
Dead time				200		ns
Thermal shutdown threshold				155		°C
Thermal shutdown hysteresis				25		°C

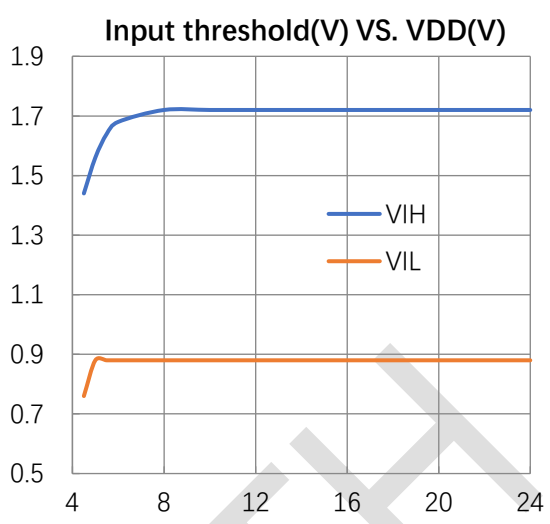


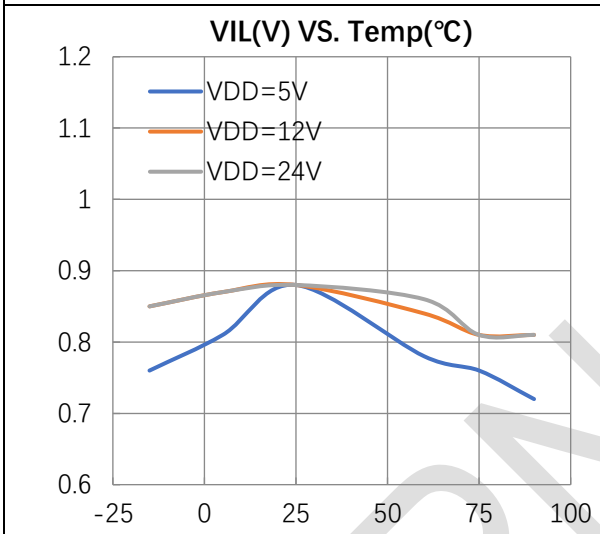
10.6 Characteristics Curve

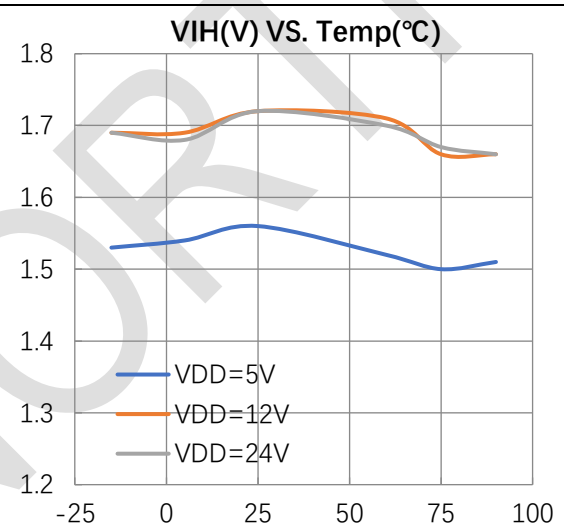
Test conditions: VDD=6V, TA=25°C, Iload=0mA unless otherwise noted.

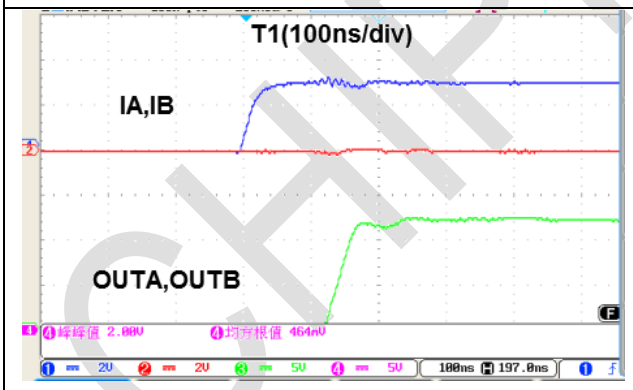




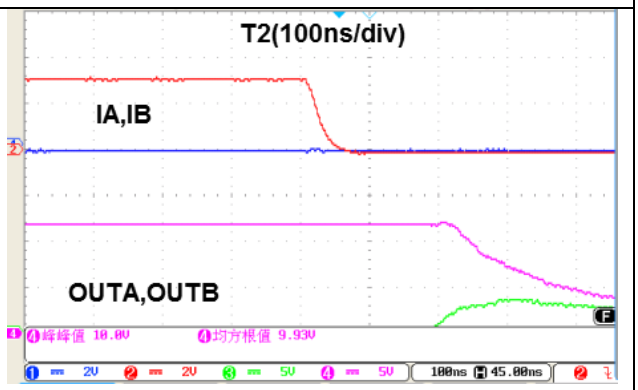




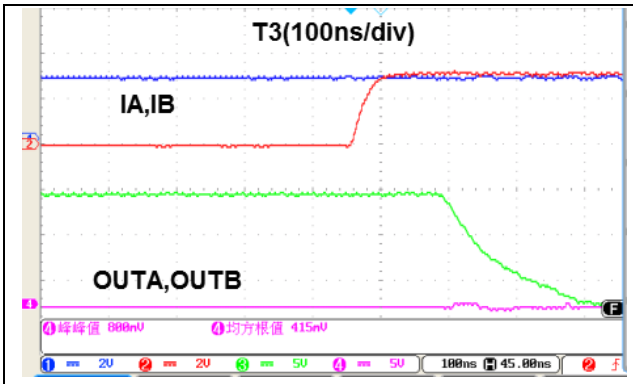




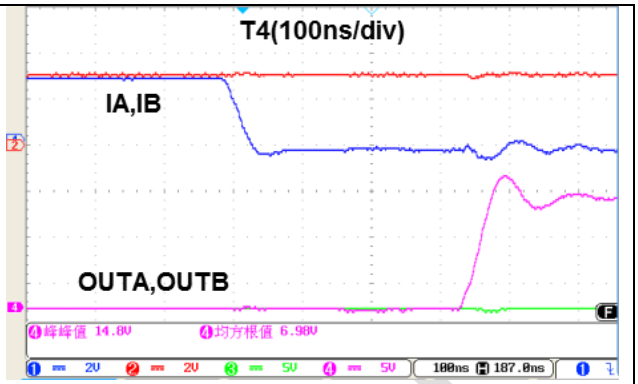
Output Enable Time (T1)



Output Disable Time (T2)



Delay Time (T3)



Delay Time (T4)

11 Detailed Description

11.1 Overview

The CN8031 is an H-bridge driver that can drive a DC motor or other devices such as solenoid valves. Outputs can be controlled via the CN8031'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 CN8031 adds protection functions that go beyond conventional discrete implementations: 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 CN8031 is controlled via PWM input connectors (INA and INB connectors). Each output is controlled by the corresponding input pin.

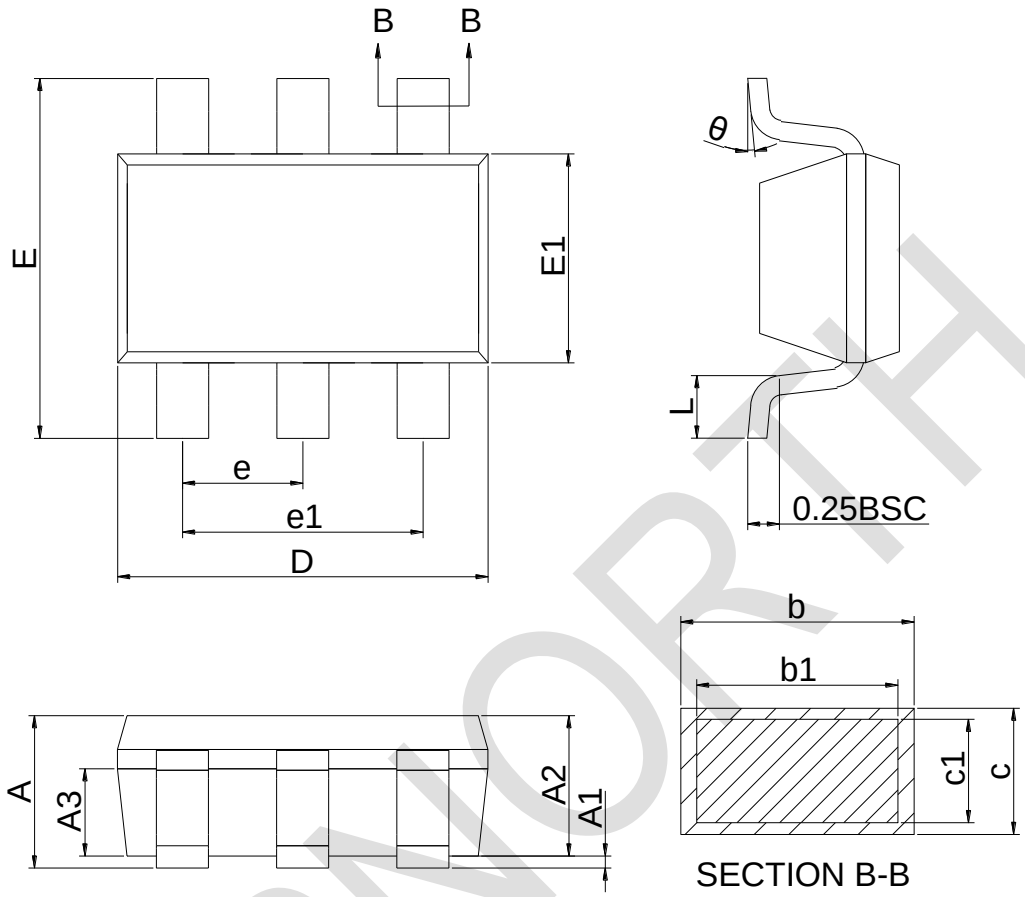
INA	INB	OUTA	OUTB	Functions (DC motors)
L	L	Hi-Z	Hi-Z	Inertia or parking
L	H	L	H	Reverse
H	L	H	L	Forward
H	H	L	L	Braking

11.4 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.

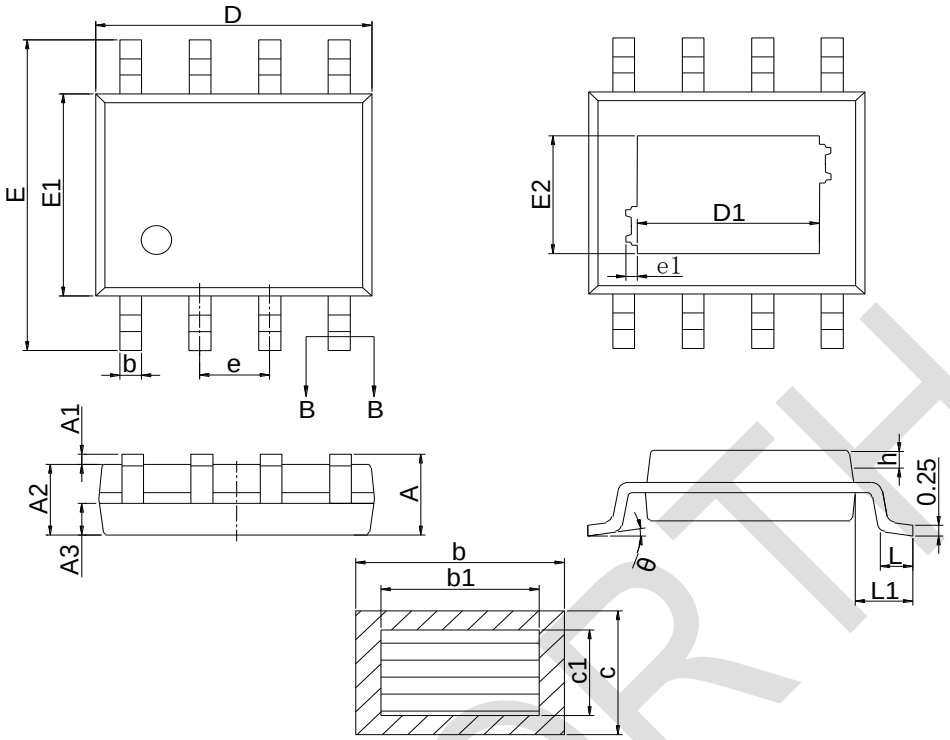
12 Package Information

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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