

H-Bridge Motor Driver, 4.4V-45V, 0.7Ω, Current Limit 4.5A

1 Description

The CN8043 is an H-bridge motor driver for driving reversible motors that can drive a DC motor, a stepper motor winding or other loads.

The CN8043 operates from a motor supply voltage of 4.4V to 45V, It has a overcurrent protection of 4.5A.

The CN8043 is controlled by two input pins. The two on/off inputs determine the output mode: forward, reverse, coast or brake. When both inputs are low, very low standby circuit currents can be achieved.

The CN8043 is available in ESOP-8 and SOP-8 packages.

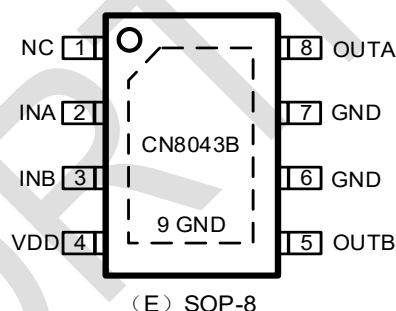
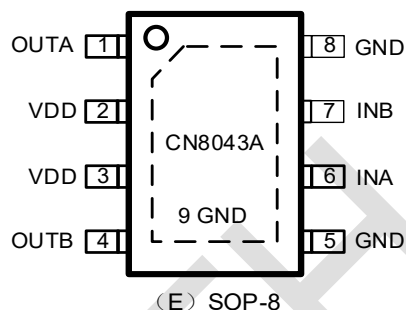
2 Features

- Wide power range: 4.4V to 45V
- 4.5A overcurrent protection
- Low MOSFET on-resistance: $R_{hs} = 0.45\Omega$, $R_{ls} = 0.25\Omega$
- Forward, reverse, coast or brake output modes
- Suitable for a wide range of MCU control logic
- Input logic hysteresis
- Thermal shutdown

3 Applications

- Smart Circuit Breaker
- Smart Lock
- Smart water/gas meters
- Toys

4 Pinout



5 Ordering information

Product Number	Package	Quantity/Tape
CN8043AEHR	ESOP-8	4000/Tape
CN8043BEHR	ESOP-8	4000/Tape
CN8043ASHR	SOP-8	4000/Tape
CN8043BSHR	SOP-8	4000/Tape

6 Marking

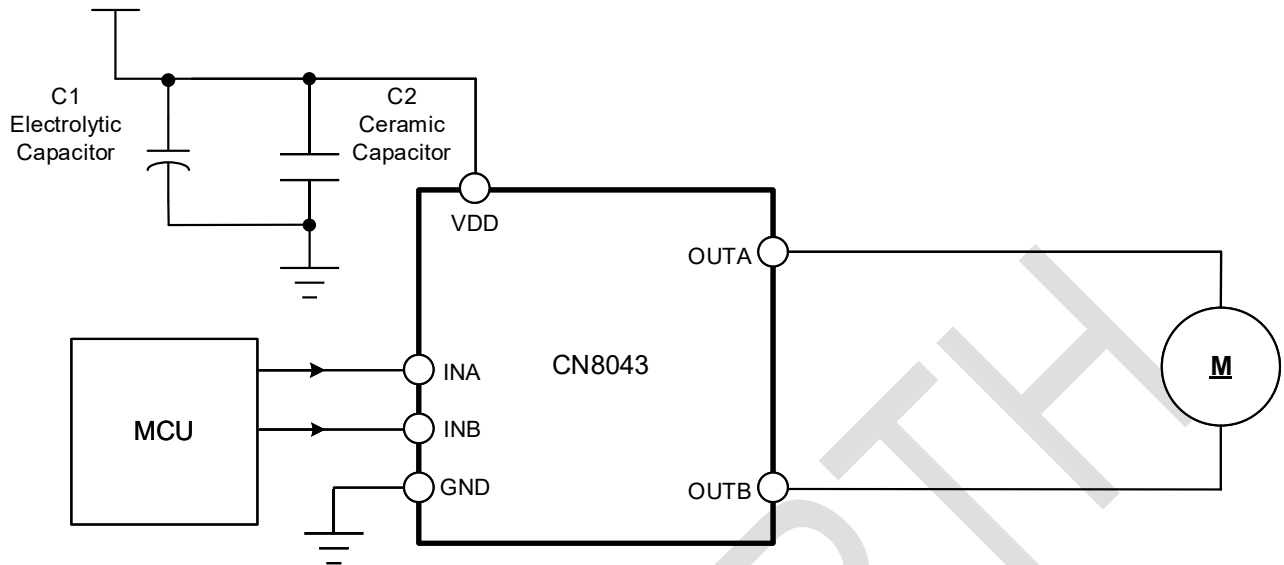
Product Number	Marking
CN8043AEHR	CN8043A YYWW
CN8043BEHR	CN8043B YYWW
CN8043ASHR	8043A YYWW
CN8043BSHR	8043B YYWW

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

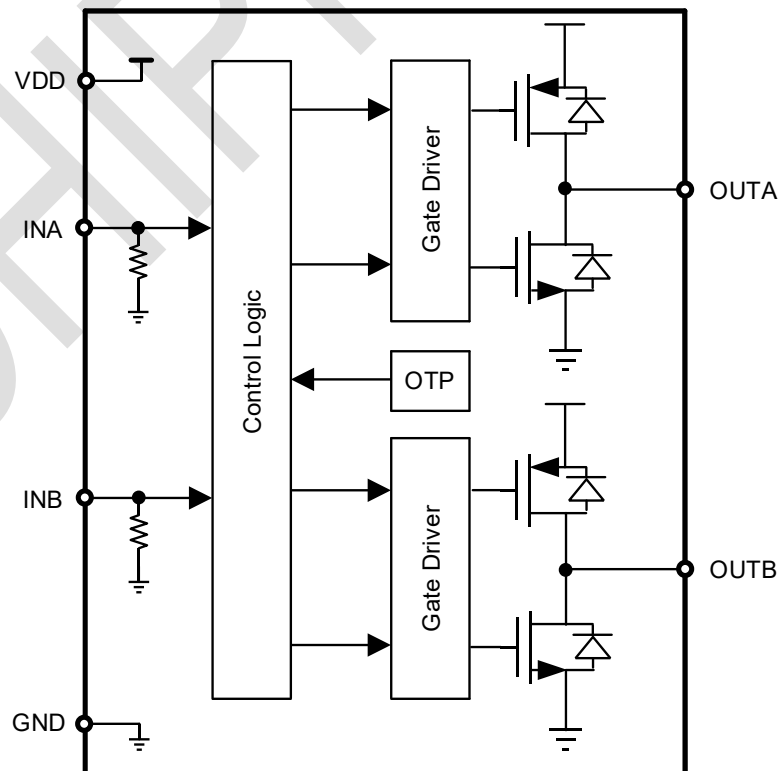
7 Typical Application



Note:

- (1) When CN8043 drives the relay, $C1 \geq 10\mu\text{F}$, $C2 \geq 0.1\mu\text{F}$, the capacitor needs to be placed as close as possible to the VDD pin of the chip.
- (2) When CN8043 drives the motor, $C1 \geq 100\mu\text{F}$, $C2 \geq 0.1\mu\text{F}$, the capacitor needs to be placed as close as possible to the VDD pin of the chip.

8 Block Diagram



9 Pin Descriptions

CN8043A	CN8043B	Pin Name	Descriptions
1	8	OUTA	output, connect this pin to the motor winding.
2、3	4	VDD	Supply Voltage. A capacitor is required to prevent large voltage spikes.
4	5	OUTB	Output, connect this pin to the motor winding.
5、8	6、7	GND	Hot PAD is also GND.
6	2	INA	Logic input with a large internal pull-down resistor.
7	3	INB	Logic input with a large internal pull-down resistor.
/	1	NC	Recommended to be connected to GND.

10 Specifications

10.1 Absolute Maximum Ratings

Parameter	Symbol	Value	Units
VDD Supply Voltage Range	VDD	-0.4 ~ +52	V
Output Pin Voltage Range	V _{OUTA} 、V _{OUTB}	-0.4 ~ +52	V
Input Pin Voltage Range	V _{INA} 、V _{INB}	-0.4 ~ 6	V
Storage Temperature Range	T _{STG}	-55~150	°C
Welding Temperature	T _{LEAD}	260 (soldering, 10s)	°C

10.2 ESD Ratings

Discharge mode	Value	Value	Units
HBM	JEDECJS-001-2023	±6000	V
CDM	JEDECJS-002-2022	±2000	V
Latch up	JESD78F.02-2023	800	mA

10.3 Recommended Operating Range

Parameter	Symbol	Conditions	Min.	Max.	Units
VDD Voltage Range	VDD	Connect a 100 mA resistive load between OUTA and OUTB.	4.4	45	V
Input Capacitor	CIN		10		uF
Continuous load capacity	ILOAD	ESOP-8 (TA=25°C)	Continuous load	1.5	A
			a pulse width of 120 ms and a period of 1 s	3.5	
			a pulse width of 70 ms and a period of 1 s	4	
		SOP-8 (TA=25°C)	Continuous load	1.2	
			a pulse width of 120 ms and a period of 1 s	3	
			a pulse width of 38 ms and a period of 1 s	4	
Operating Temperature	T _A		-40	105	°C

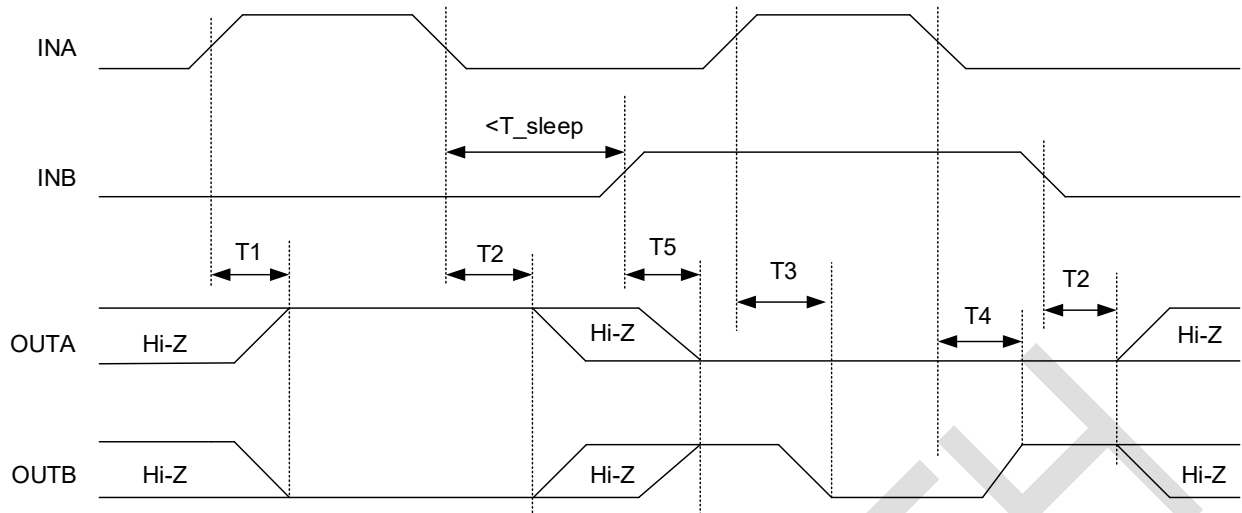
10.4 Thermal Information

Parameter	Package	Value	Unit
θ _{JA}	ESOP-8	60	°C/W
	SOP-8	100	°C/W

10.5 Electrical Characteristics

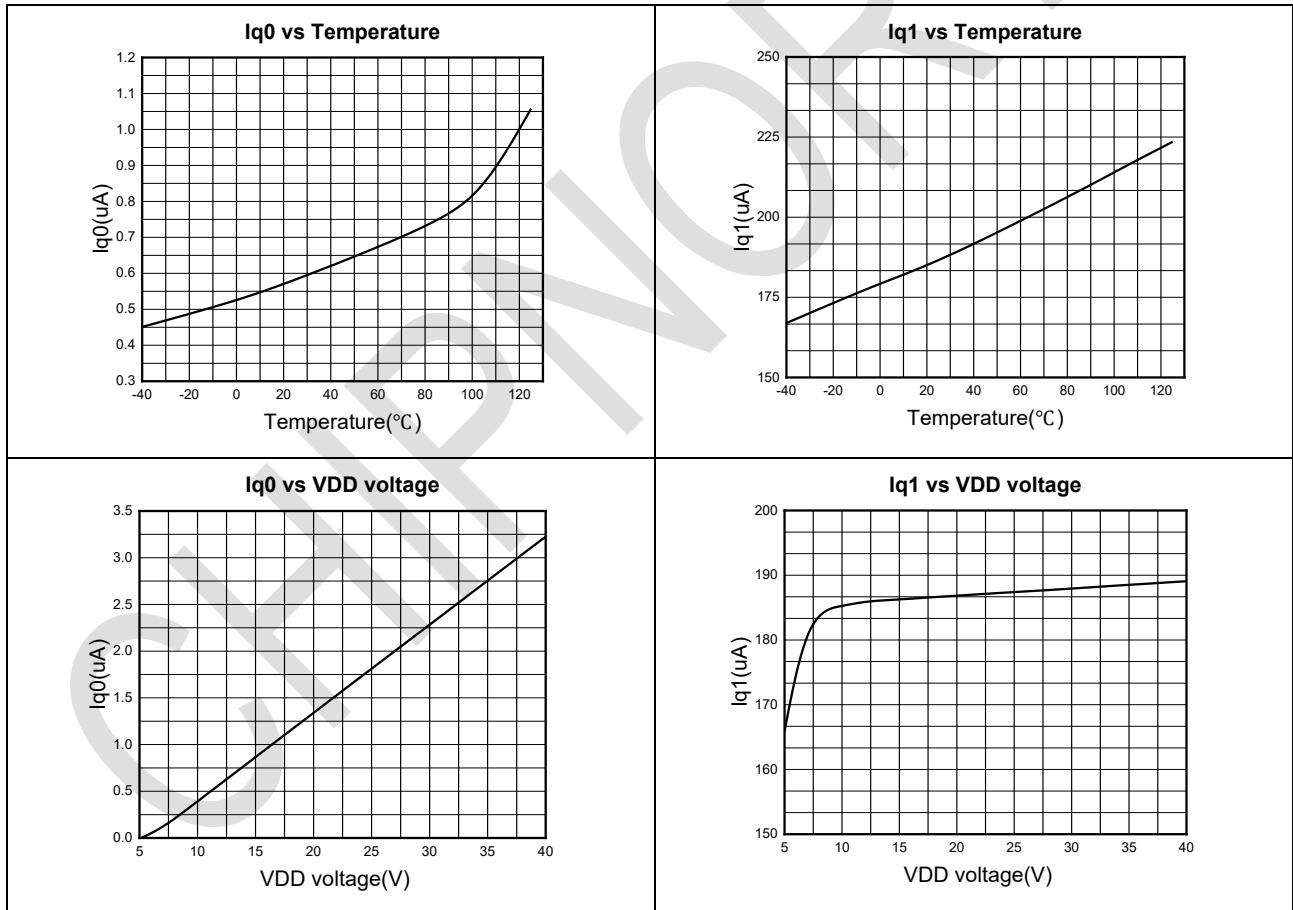
Test conditions: TA = 25°C, VDD = 12V, unless otherwise specified.

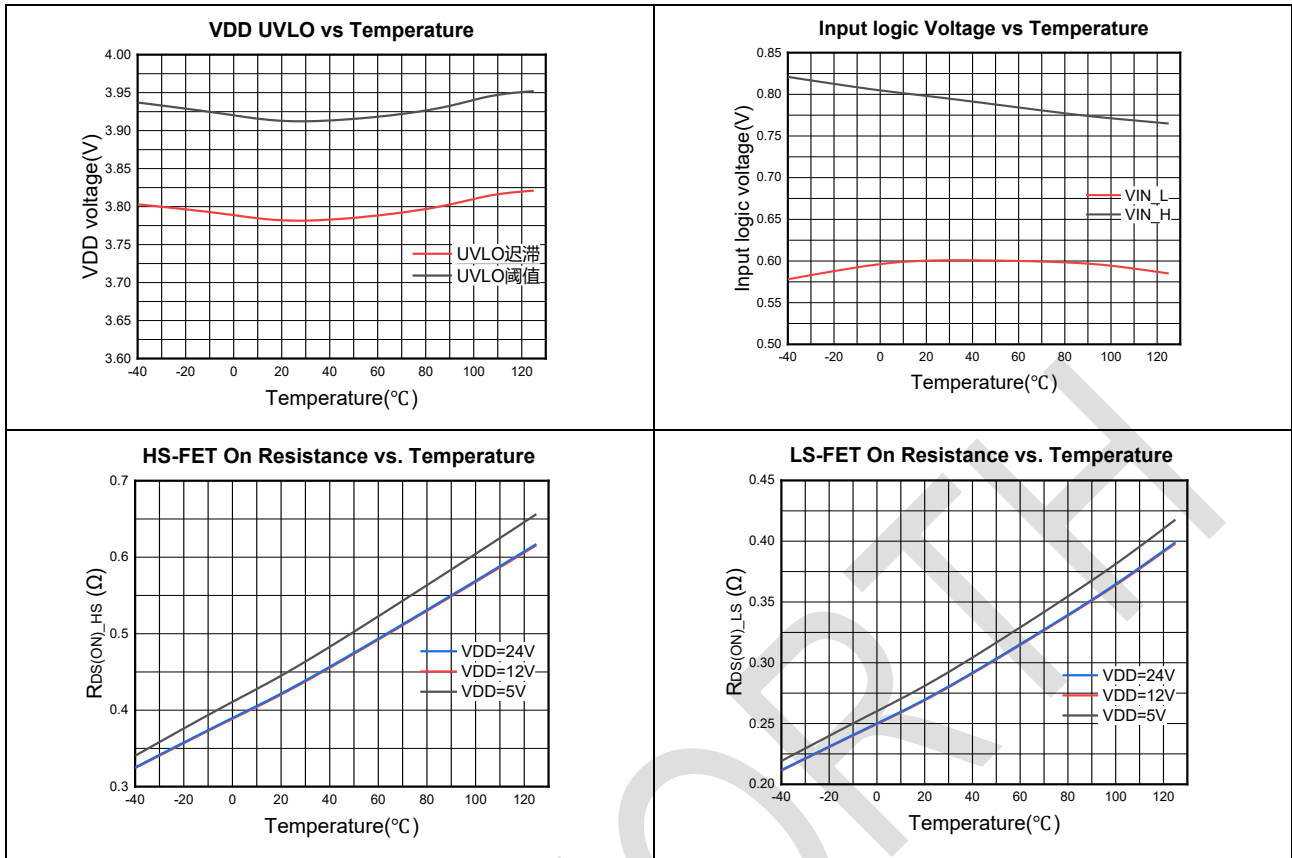
Parameter	Symbol	Conditions	Min	Typ	Max	Unit
VDD						
Standby Mode Supply Current	Iq0	INA=INB=0V		0.6	3.5	μA
Operating Supply Current	Iq1		85	200	275	μA
Time to enter sleep mode	T_sleep	Inputs low to sleep		1.1		ms
Output Enable Time	T1	VDD > VUVLO with INA or INB high		10		us
INPUT						
Input High Voltage	VIH		1.2			V
Input Low Voltage	VIL				0.4	V
Input Hysteresis Voltage	V _{IN HYS}			0.15		V
Input Current	IIH	VIN=3.3V		3.5		μA
Input Low Current	I _{INL}	IN=0V		0	1	μA
Input Pull Down Resistor	RIN		0.8	1.2	1.6	MΩ
OUTPUT						
HS turn-on resistor	Rhs	ILOAD=300mA	0.2	0.45	0.9	Ω
LS turn-on resistor	Rls	ILOAD=300mA	0.125	0.25	0.5	Ω
Body Diode Forward Voltage	V _D	IOUT=1A		0.8	1	V
Delay Time	T2	INA and INB low to OUT Hi-Z delay time		200		ns
	T3	INx high to OUTx low delay time		200		ns
	T4	INx low to OUTx high delay time		300		ns
	T5	INA or INB high to OUT quit Hi-Z delay time		200		ns
Time to output rising	Tr	OUT=0.1VDD to OUT=0.9VDD		17		ns
Time to output falling	Tf	OUT=0.9VDD to OUT=0.1VDD		20		ns
Dead time	Tdead			200		ns
Circuit Protection						
VDD Rising Voltage	V _{UVLO_R}		3.6	4	4.4	V
VDD Falling Voltage	V _{UVLO_F}		3.45	3.85	4.25	V
UVLO Hysteresis Voltage	V _{UVLO_H}			0.15		V
Current Limit Protection	OCP		3.5	4.5	5.5	A
OCP deglitch time	T _{OCP}			1.8		μs
OCP Retry time	T _{RETRY}			1.1		ms
Thermal shutdown threshold	OTP			155		°C
Thermal shutdown Hysteresis	T _{HYS}			30		°C



10.6 Characteristics Curve

Test conditions: $T_A = 25^{\circ}\text{C}$, $V_{DD} = 12\text{V}$, unless otherwise specified.





11 Detailed Description

11.1 Overview

The CN8043 is an H-bridge driver that can drive a DC motor or other devices such as solenoid valves. The output can be controlled by the PWM interfaces (INA and INB) of the CN8043. 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 CN8043 adds protection features that go beyond conventional discrete implementations: overcurrent protection and thermal shutdown.

11.2 Speed Regulation

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 input voltage to the motor by changing the duty cycle of the PWM signal, i.e. the ratio of the pulse width to the pulse period, which in turn controls the motor speed. 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; conversely, the smaller the duty cycle, the slower the motor speed.

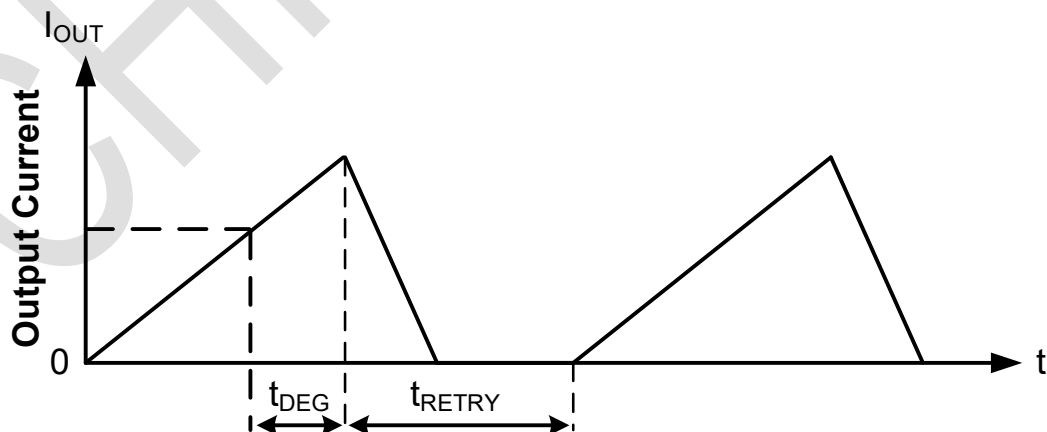
11.3 Motor Control

The CN8043 is controlled via PWM input interfaces (INA and INB interfaces). 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 Overcurrent Protection

Each FET is equipped with an analog current-limiting circuit that restricts the current flowing through the FET by eliminating the gate drive. If the analog current limit persists for longer than t_{DEG} , all FET in the H-bridge will be disabled. Operation will automatically resume after t_{RETRY} . Both the high-side and low-side FETs can detect overcurrent conditions. Shorting or grounding the OUTA pin to the OUTB pin will result in overcurrent.

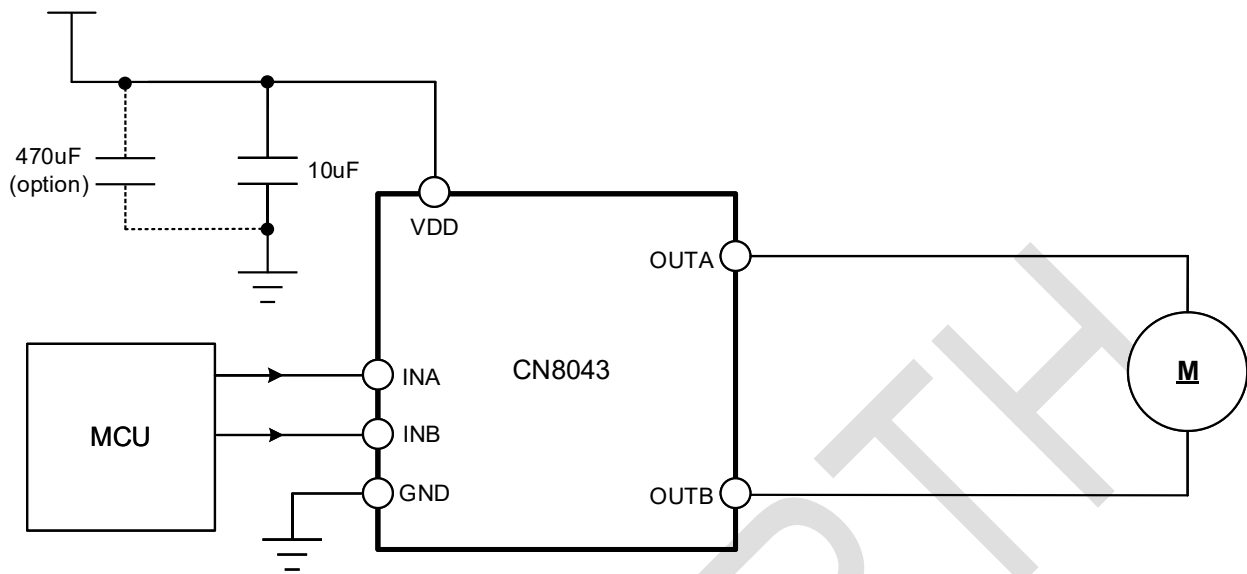


11.5 Thermal Shutdown

If the chip temperature exceeds 155°C , all FET in the H-bridge are disabled. Operation is automatically resumed when the chip temperature drops below 125°C .

12 Application information

12.1 Typical applications



12.2 Design requirements

Design parameters	Symbol	Value
Motor Supply Voltage	VDD	12V
Logic High	IN	3.3V
Motor Current RMS	IOUT	1A

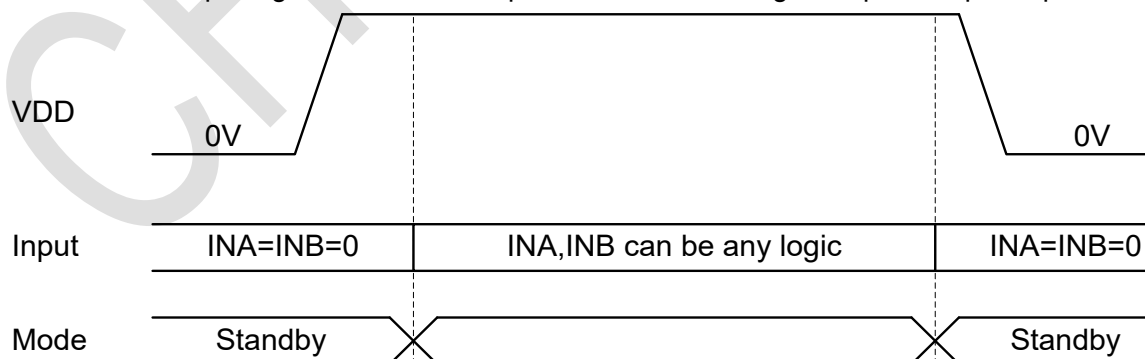
12.3 Design process

12.3.1 Motor Voltage

The proper motor voltage depends on the rating of the selected motor and the desired speed. With the same PWM duty cycle of the power FET, the higher the voltage, the faster the brushed DC motor speed. Higher voltages also increase the rate of change of current through the inductive motor windings.

12.3.2 VDD Power-Up

Make sure that the input signals INA and INB pins remain low during VDD power-up and power-down.



12.3.3 Low power operation

When INA and INB become low for more than 1.1ms, enter sleep mode to minimize system power consumption.

12.3.4 Input Capacitance

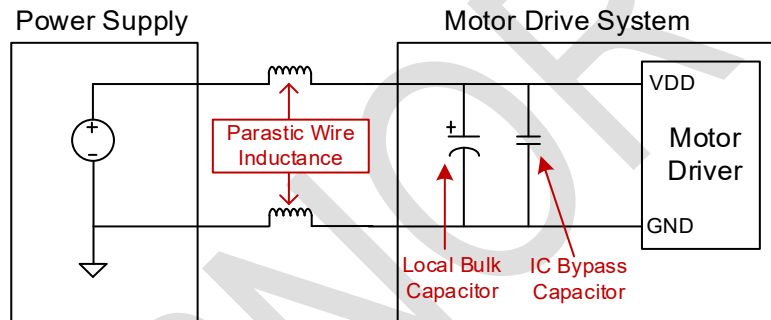
Proper input capacitance is an important factor in the design of a motor drive system. In general, the larger the capacitance, the better, with the disadvantage of increased cost and physical size.

The size of the required input capacitance depends on a number of factors including.

- Maximum current required by the motor system.
- Power supply capacitance and current source capability.
- Parasitic inductance between the power supply and motor system.
- Acceptable voltage ripple.
- Type of motor used (brushed DC motor, brushless DC motor, stepper motor).
- Method of motor braking.

The inductance between the power supply and the motor drive system limits the rate of change of the power supply current. If the input capacitor capacity is too small, the system responds to excessive current demand or motor dumps with voltage changes. If a large enough input capacitor is used, the motor voltage will remain stable and large currents will be available quickly.

Datasheets usually provide recommended values, but system-level testing is required to determine the proper capacitance.

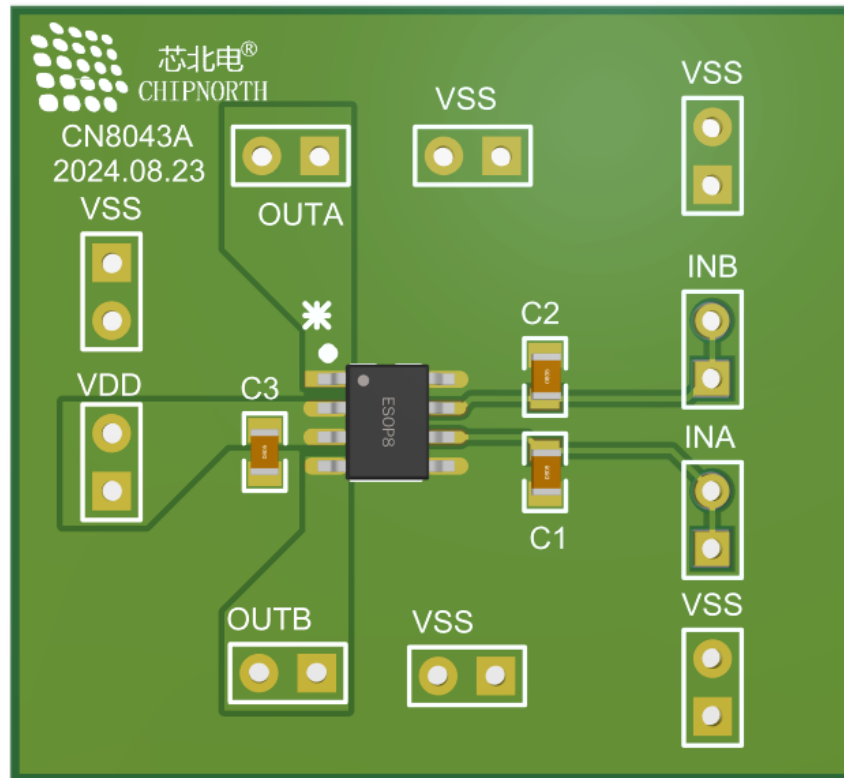


12.4 PCB Layout Guidelines

12.4.1 PCB Layout Recommendations

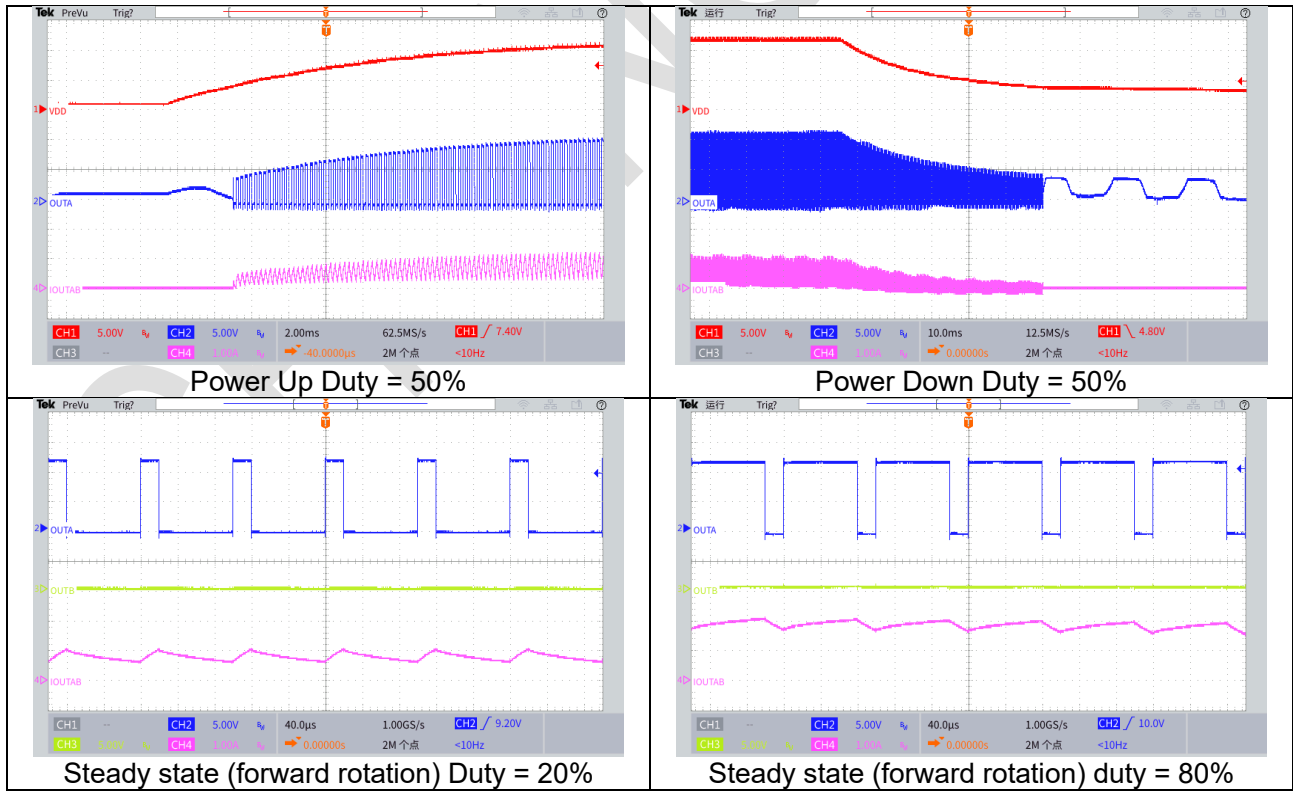
- It is recommended that low ESR ceramic capacitors be used to connect the VDD pin to GND, with a recommended rating of 10 μF . These capacitors should be placed as close as possible to the VDD pin, and the alignment should be as coarse as possible to connect to the ground plane.

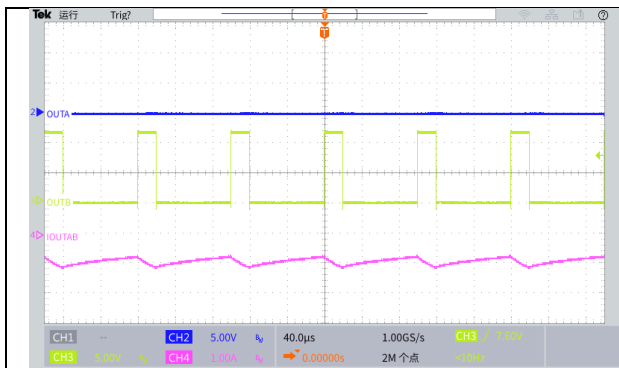
12.4.2 PCB Layout



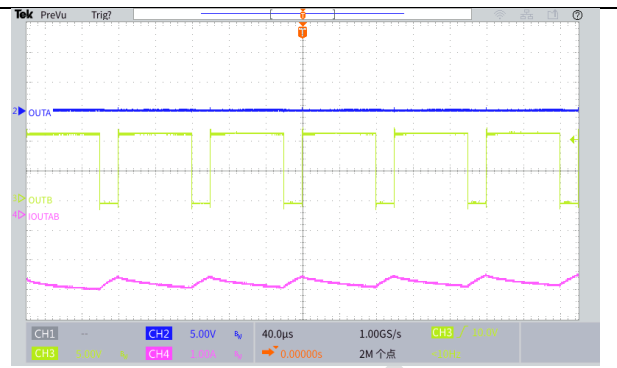
12.5 Operating waveforms

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

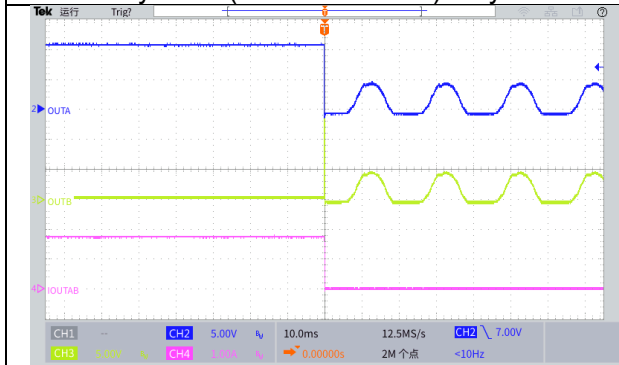




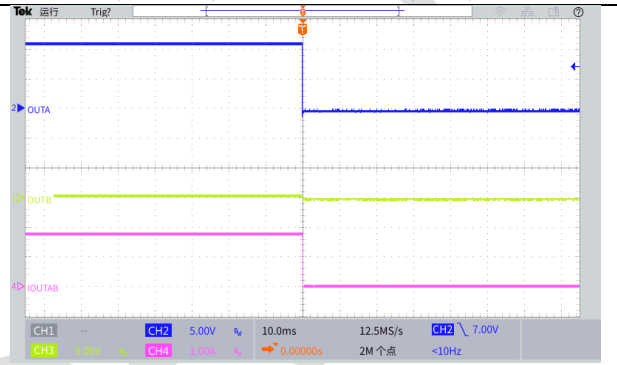
Steady state (reverse rotation) duty = 20%



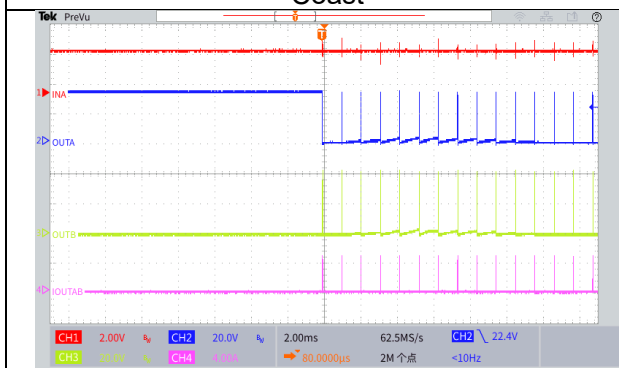
Steady state (reverse rotation) duty = 80%



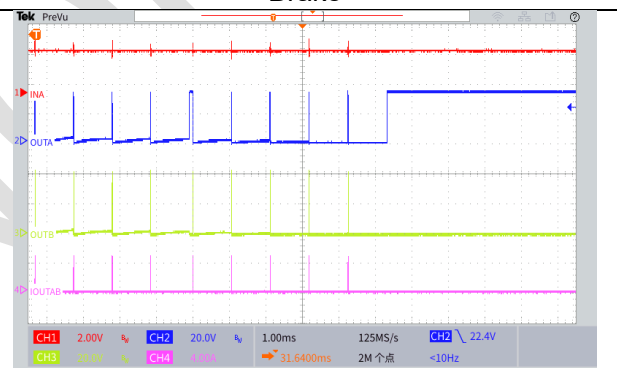
Coast



Brake



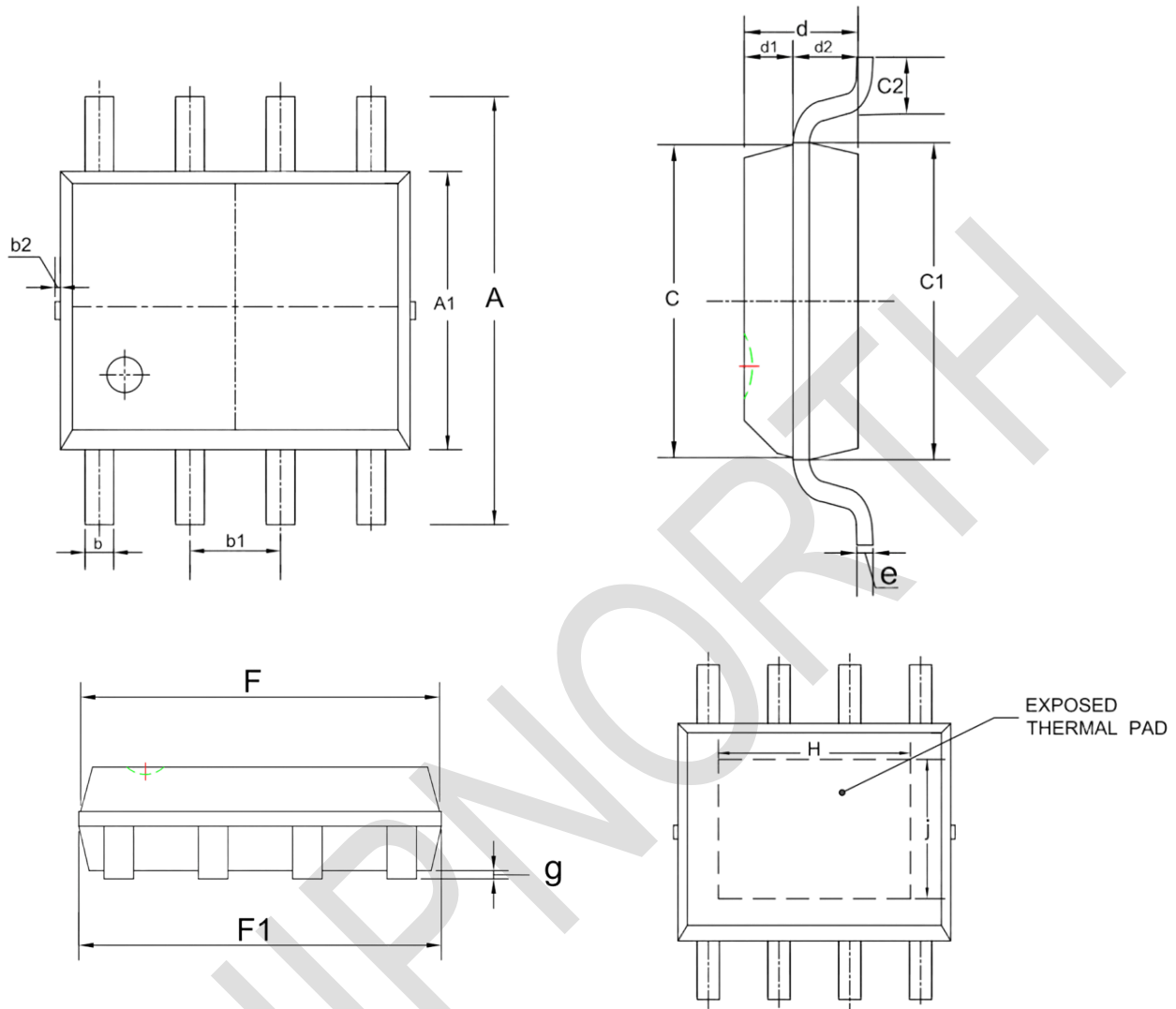
OCP



OCP Recovery

13 Package Information

(E)SOP-8



Note: Except for the absence of a thermal pad, the size information of the SOP-8 package is consistent with that of the ESOP-8 package.

Dimension Symbol	MIN (mm)	MAX (mm)	Dimension Symbol	MIN (mm)	MAX (mm)
A	5.85	6.15	d1	0.55	0.65
A1	3.8	4.0	d2	0.75	0.85
b	0.39	0.41	e	0.249	0.259
b1	1.26	1.28	F	4.75	4.95
b2	0	0.08	F1	4.8	5.0
C	3.75	3.95	g	0.06	0.16
C1	3.8	4.0	H	3.172	3.448
C2	0.5	0.7	j	2.283	2.496
d	1.35	1.5			

14 Important Statement

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15 版本修订

日期	版本号	修订说明
2025/04/03	R1.0	Official Release
2025/10/16	R1.1	Update Package information
2025/10/29	R1.2	Update Thermal Information
2025/12/19	R1.3	Update Electrical Characteristics information
2025/12/30	R1.4	Update Typical Application
2026/06/23	R1.5	Add Electrical Characteristics information
2026/09/07	R1.6	Update Recommended Operating Range