

Bi-direction Relay Driver 3.5~40V Peak current limiting protection:800mA

1 Description

CN8021, as a bi-direction relay driver circuit, is used to control magnetic latching relays. With a large output capability and ultra-low power consumption, it can be widely used in intelligent electro-meter and other related fields.

CN8021 is available in SOT23-6 and SOP-8 package.

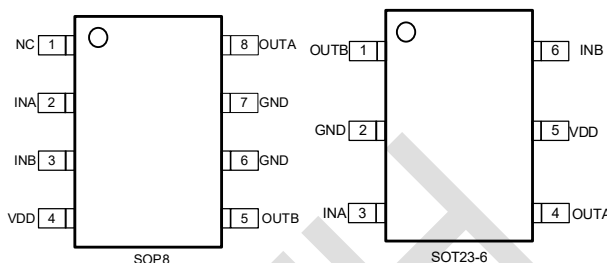
2 Features

- Recommended Supply Voltage Range: 3.5 ~40V
- Peak current limiting protection:800mA
- Ambient Temperature Range: -40 ~+105°C
- Compatible with 3~5V MCU
- Input Signal Anti-Noise Processing

3 Applications

- Smart Circuit Breaker
- Smart Locks
- Smart Water/Gas Meter
- Toys

4 Pinout



5 Ordering information

Product Number	Package	Quantity/Tape
CN8021A	SOP-8	2500/Reel 4000/Reel
CN8021B	SOT23-6	3000/Reel

6 Marking

Product Number	Marking
CN8021A	CN8021 YYWW
CN8021B	CN8021B YYWW

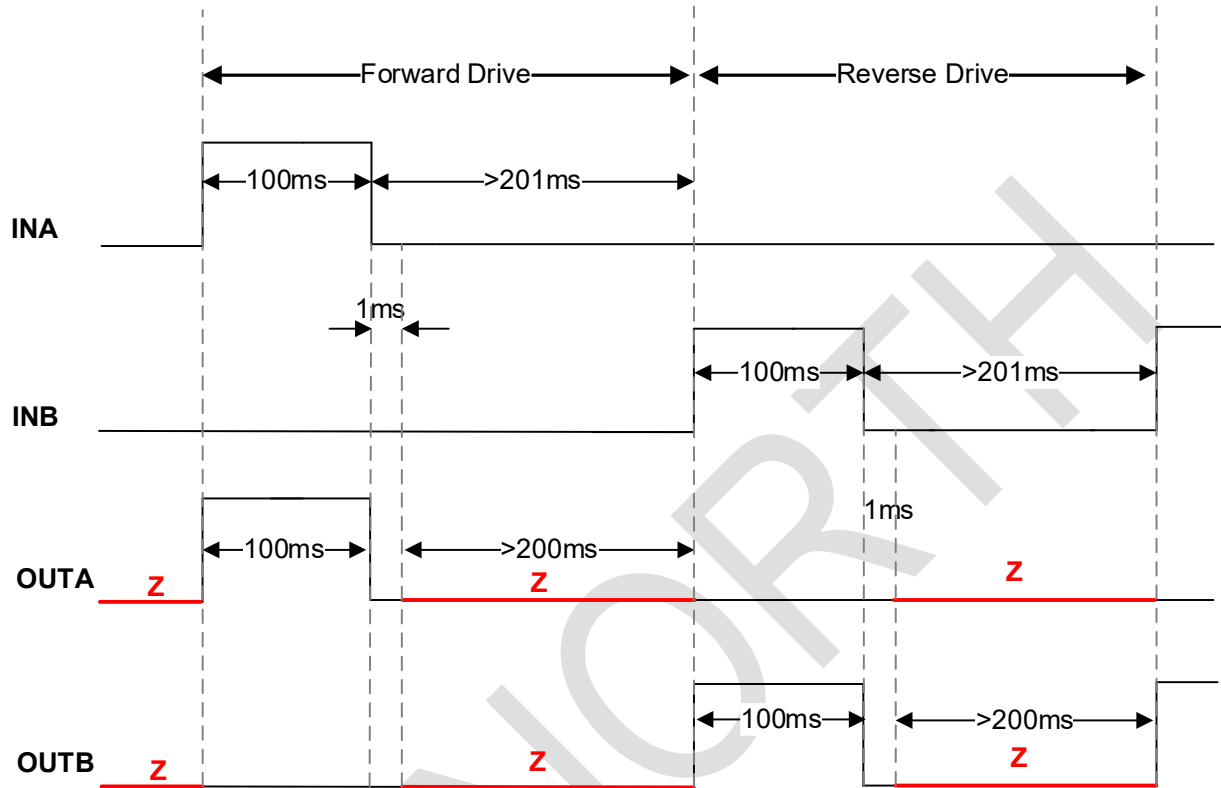
Note: YY=Year WW=Week.

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.

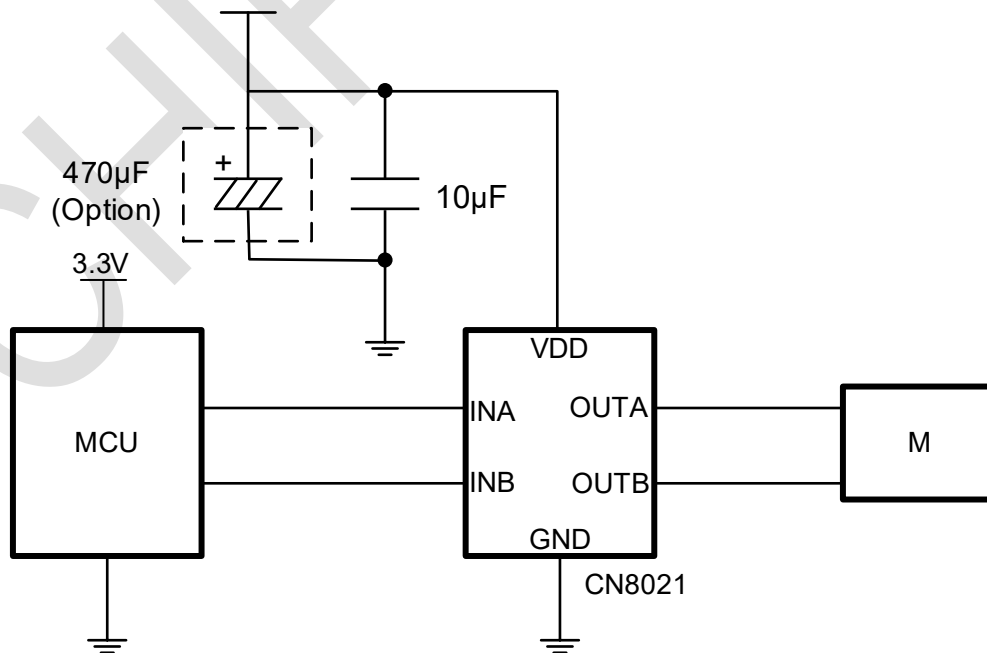
Moisture sensitivity level(MSL):3

7 Typical Application

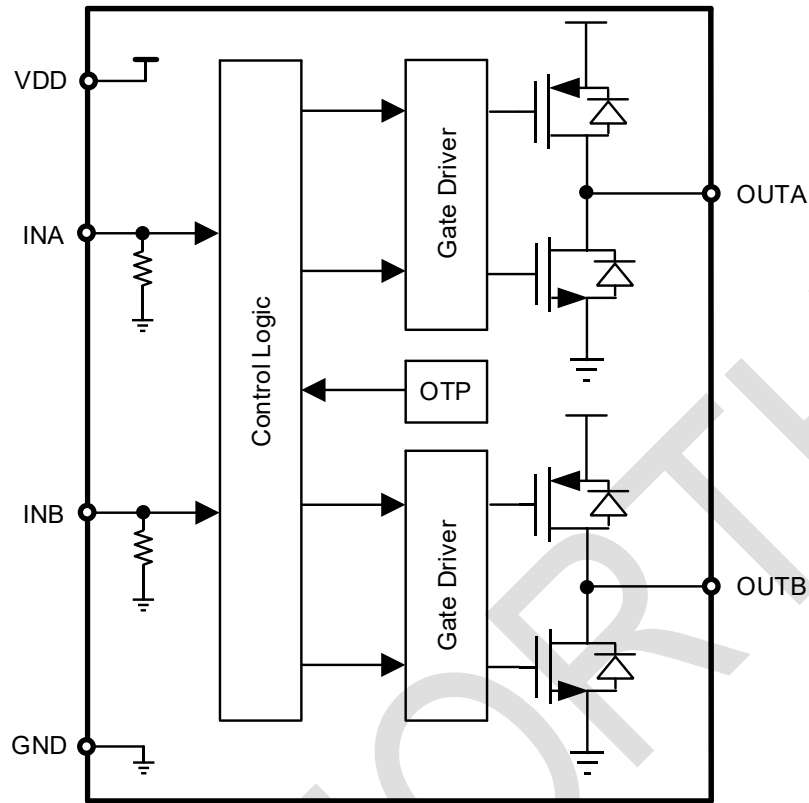
CN8021 adopts pulse trigger, as long as the input pulse is triggered according to the function table status, the relay will have the corresponding action.



Note: INA and INB are the external drive control logic, OUTA and OUTB are the output waveforms, and Z indicates that the output is in high resistance state. (In this figure, OUTA and OUTB are externally connected to pull-down to ground by default, so that they can be held low when high resistance is present).



8 Block Diagram



9 Logic Function Table

INA	INB	OUTA	OUTB
0	0	Hi-z	Hi-z
0	1	0	1
1	0	1	0
1	1	0	0

10 Pin Descriptions

PIN			Description
Name	CN8021A	CN8021B	
OUTA	8	4	Output, connect this pin to the motor winding.
VDD	4	5	Supply Voltage. A capacitor is required to prevent large voltage spikes.
OUTB	5	1	Output, connect this pin to the motor winding.
GND	6/7	2	Hot PAD is also GND.
INA	2	3	Logic input with a large internal pull-down resistor.
INB	3	6	Logic input with a large internal pull-down resistor.
NC	1	/	Recommended to be connected to GND.

11 Specifications

11.1 Absolute Maximum Ratings

Parameter	Value	Units
VDD Supply Voltage Range	-0.4~45	V
INA/INB Supply Voltage Range	- 0.3 ~ 10	V
OUTA/OUTB Supply Voltage Range	-0.4~45	V
Storage Temperature Range	-55~150	°C
Welding Temperature	260 (soldering,10s)	°C

Note:

1.Stress exceeds these ratings listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Expose to absolute-maximum-rated conditions for extended periods may affect device reliability.

2.All voltage values are referenced to the ground terminal

11.2 ESD Ratings

Discharge mode	Standardize	Value	Units
HBM	JEDECJS-001-2023	±4000	V
CDM	JEDECJS-002-2022	±2000	V

11.3 Recommended Operating Range

Parameter	Symbol	Min.	Max.	Units
Input Voltage	VDD	3.5	40	V
Input Logic Level	VINx	2.0	7	V
Ambient Temperature Range	TA*	-40	105	°C

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

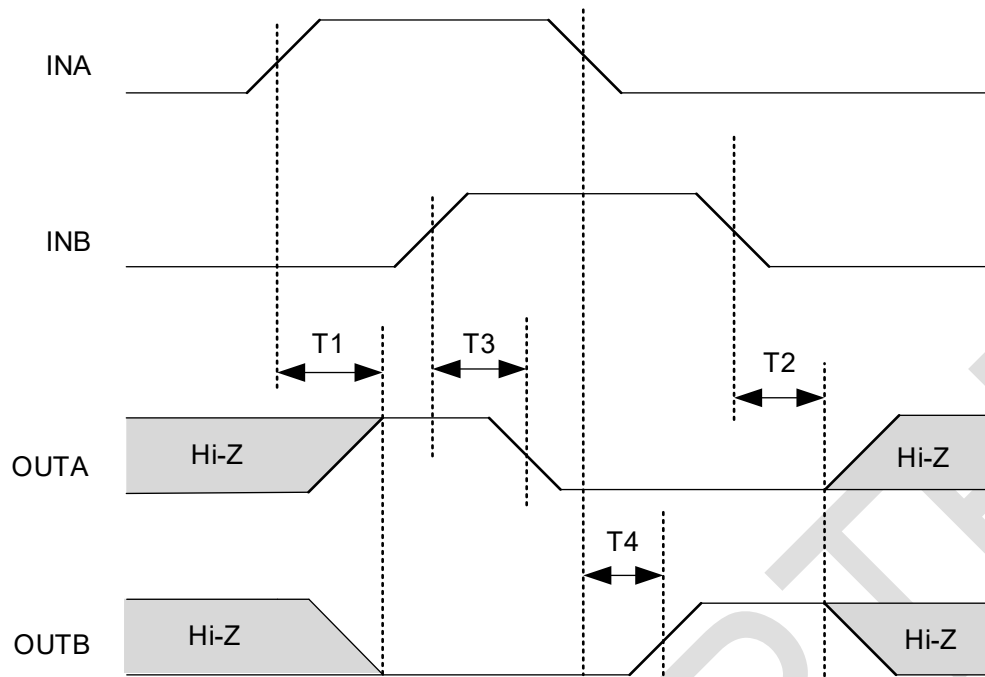
11.4 Thermal Information

Parameter	Package	Value	Unit
θ_{JA}	SOT23-6	180	°C/W
	SOP-8	100	°C/W

11.5 Electrical Characteristics

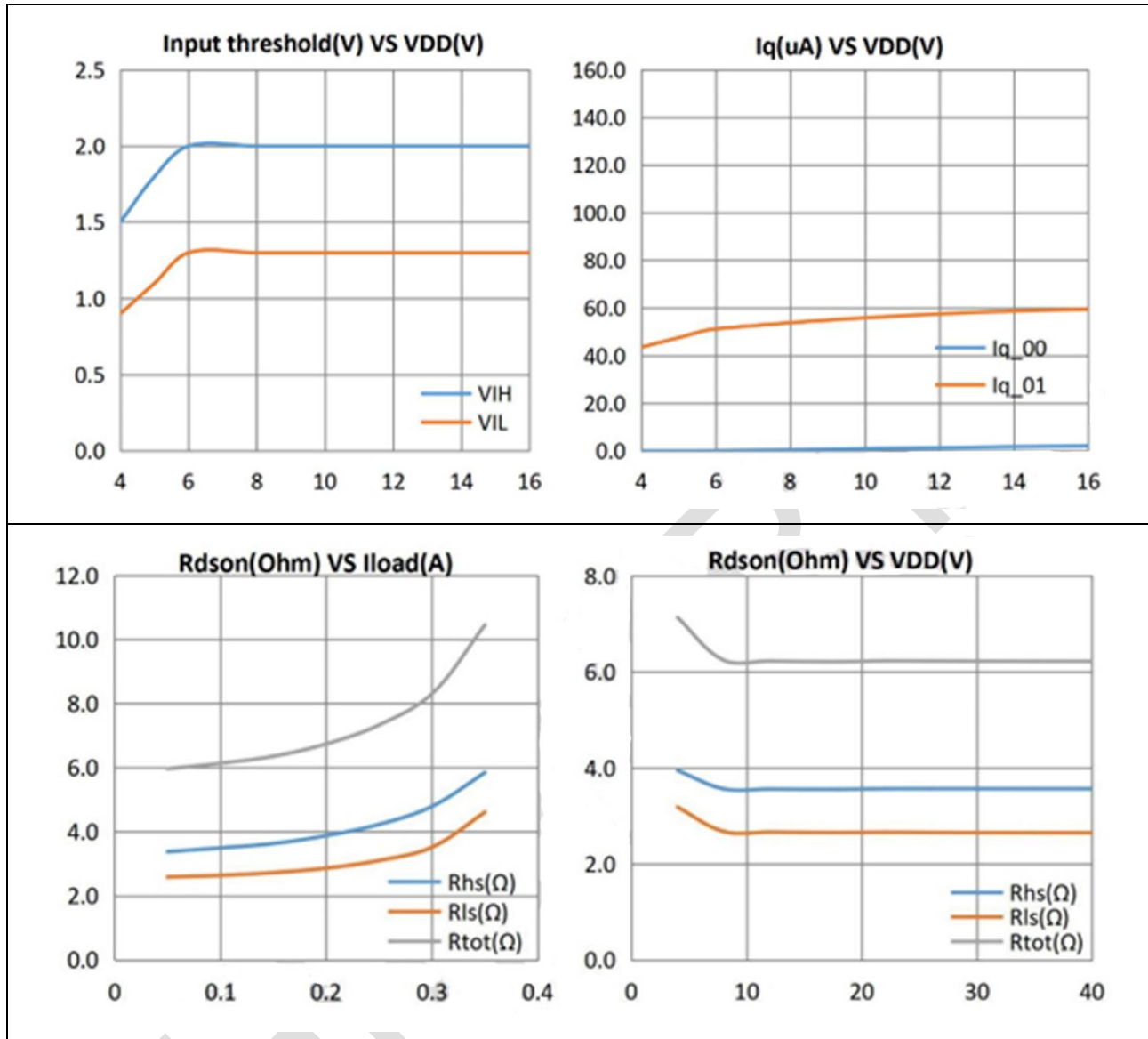
Test conditions: TA = 25 °C unless otherwise noted.

Symbol	Description	Conditions	MIN	TYP	MAX	UNIT
VDD	Supply Power Voltage		3.5		40	V
IVDD	Power Down Current	INA=INB=0V, VDD=12V		1.5	3	uA
IB	Input Logic Bias Current	INA=INB=3.3V		8	20	uA
Id	Operating supply current	INA=3V, INB=0V or INA=0V, INB=3V	30	60	100	uA
VTH_H	Input Logic High		2.2			V
VTH_L	Input Logic Low				1.4	V
RDS(ON)	Output On-Resistance (RHS + RLS)	VDD=12V, RLOAD=75Ω		7		Ω
		VDD=12V, RLOAD=40Ω		7		Ω
		VDD=22V, RLOAD=75Ω		7.5		Ω
		VDD=22V, RLOAD=40Ω		10		Ω
		VDD=30V, RLOAD=75Ω		10		Ω
		VDD=30V, RLOAD=40Ω		10		Ω
TDEGLITCH	Input Noise Blanking Time		0.1		1	μs
Output enable time	T1			200		ns
Output disable time	T2			300		ns
Delay time	T3	INB high to OUTA low		250		ns
	T4	INA low to OUTB high		250		ns
Anti-reverse excitation protection time	T5			1		ms
Thermal shutdown threshold				150		°C
Thermal shutdown hysteresis				30		°C
OCP				0.8		A



11.6 Characteristics Curve

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



12 Detailed Description

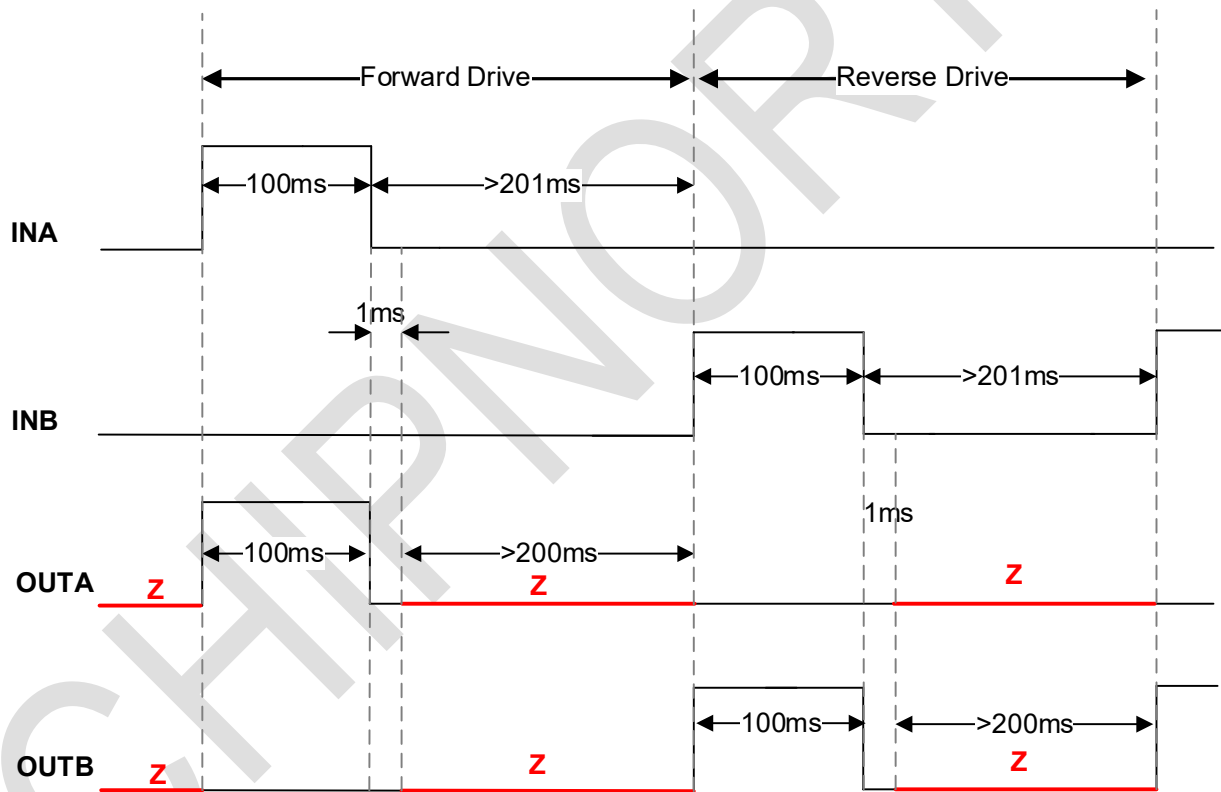
12.1 Overview

CN8021, as a bi-direction relay driver circuit, is used to control magnetic latching relays. With a large output capability and ultra-low power consumption, it can be widely used in intelligent electro-meter and other related fields.

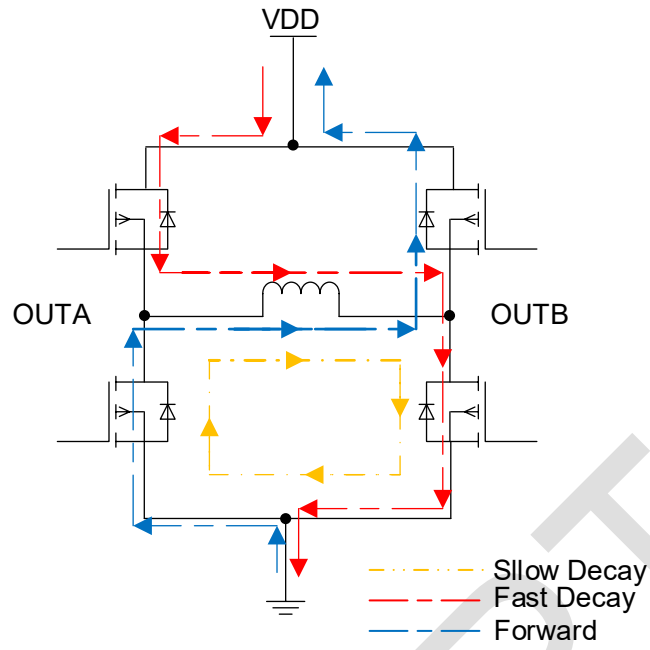
CN8021 is available in SOT23-6 and SOP-8 package.

12.2 Unique design

Description: In order to prevent the destructive effect of flyback potential on the chip, CN8021 is designed with the function of anti-flyback potential, through the internal logic configuration of the chip, before INA/INB enters into the "00" high-resistance shutdown state, the actual internal logic control will be added to the additional 1ms of the The internal logic is configured to add an additional 1ms of "11" cutoff before INA/INB enters the "00" high resistance cutoff state. This function can drain the remaining current energy in the relay inductor to earth through the two NMOS, which effectively reduces the chip damage caused by the flyback electromotive force.

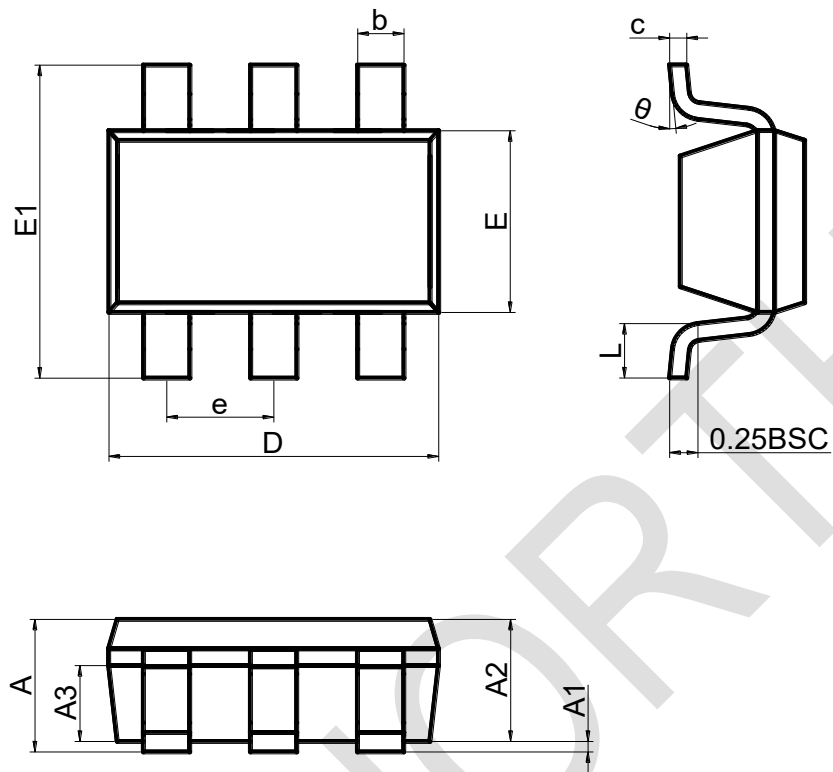


Note: INA and INB are the external drive control logic, INA_ACT and INB_ACT are the actual internal control logic, OUTA and OUTB are the output waveforms, and Z indicates that the output is in high resistance state. (In this figure, OUTA and OUTB are externally connected to pull-down to ground by default, so that they can be held low when high resistance is present).



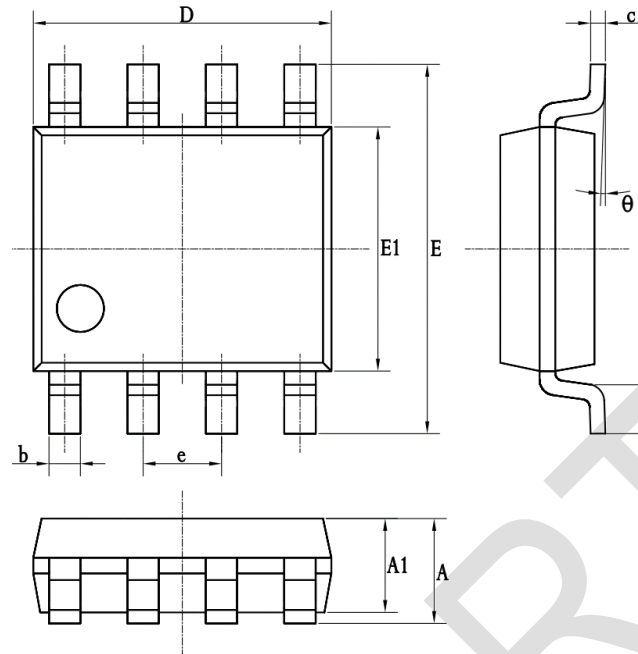
13 Package Information

SOT23-6



Dimension Symbol	Min (mm)	Nom (mm)	Max (mm)
A	0.90	1.10	1.40
A2	0.90	1.10	1.30
b	0.30	0.40	0.50
c	0.10	0.15	0.25
D	2.70	2.90	3.10
E	1.50	1.60	1.80
E1	2.50	2.80	3.10
e	-	0.95	-
L	0.20	-	-

SOP-8



Dimension Symbol	Min (mm)	Nom (mm)	Max (mm)
A	-	-	1.75
A1	1.25	-	1.55
b	0.33	-	0.51
c	0.17	-	0.26
D	4.70	-	5.10
E	5.80	-	6.20
E1	3.70	-	4.10
e	-	1.27	-
L	0.50	-	0.80
θ	0	-	8°

14 Important Statement

Chipnorth Electronic Technology (Nanjing) Co., Ltd. and its subsidiaries reserve the right to make modifications, improvements, corrections, or other changes to this document and to any of the products described herein at any time without notice. Chipnorth Electronic Technology (Nanjing) Co., Ltd. disclaims any liability arising out of the use of this document or any of the products described herein; Chipnorth Electronic Technology (Nanjing) Co., Ltd. does not transfer any license to its patents or trademarks or other rights. Any customer or user using this document or any of the products described herein assumes all risk and agrees to hold harmless Chipnorth Electronic Technology (Nanjing) Co., Ltd. and all companies whose products are displayed on Chipnorth Electronic Technology (Nanjing) Co., Ltd.

Chipnorth Electronic Technology (Nanjing) Co., Ltd. makes no warranty and assumes no responsibility for any products purchased through unauthorized sales channels. In the event that a customer purchases or uses a product from Chipnorth Electronic Technology (Nanjing) Co., Ltd. for any unintended or unauthorized use, the customer shall indemnify and hold harmless Chipnorth Electronic Technology (Nanjing) Co., Ltd. and its representatives from and against all claims, damages, and attorney's fees arising from any personal injury or death, directly or indirectly, arising out of or in connection with such purchase or use.