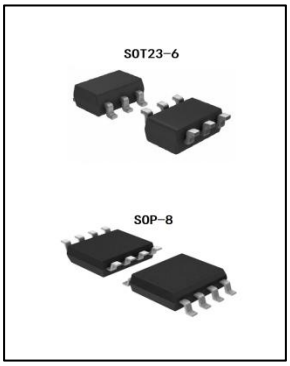
Bi-Direction Relay Driver

SSP8023D

General Description



SSP8023D is a bi-direction relay driver circuit, used to control the DC motor and the magnetic latching relay, with large output capability, ultra-low power consumption. It can be widely used in smart meters and other pulses, level control applications.

Features

- Max input voltage: 40V. Limit operating voltage:30V. Recommended safe working voltage: 5~24V (The recommended safe operating voltage range is for commercially available 9~12 relays (Internal resistance is about 50Ω), Other specifications of relays should be determined according to the measured conditions.)
- Limit operating current: 800mA
- The input high low conversion level is about 1.5V, which is compatible with various microcontrollers
- Integrated high speed continuation diode with built-in reverse voltage function to cancel TVS tubes in general applications
- Typical operating power: 5W (It is equivalent to 400mA output current at 12V working voltage. When the working voltage increases, the corresponding output current should decrease.)
- Limit power: 10W（It is equivalent to 800mA output current at 12V working voltage. When the working voltage increases, the corresponding output current should decrease. Working beyond the limit can cause chip damage.）

Applications

- Smart Meter
- Motor drive
- Magnetic latching relay control

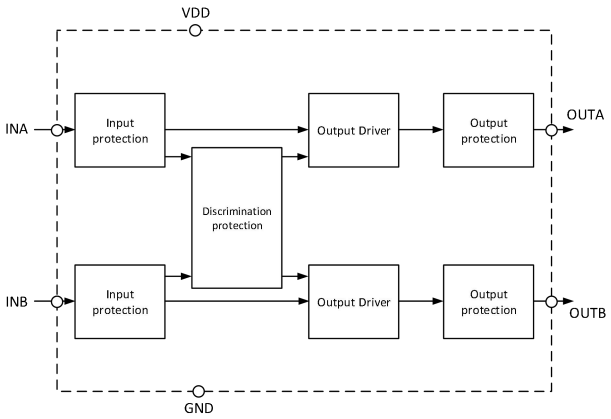
Order specification

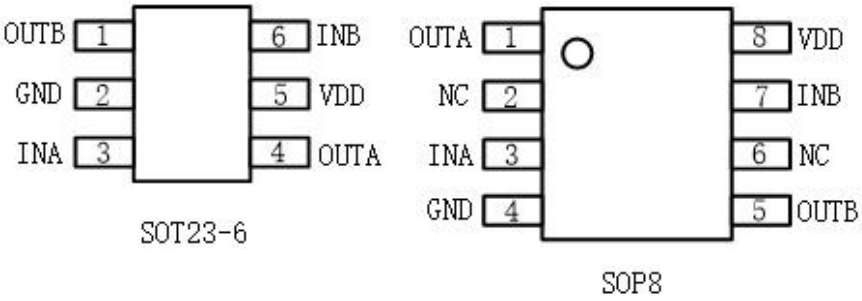
Part No	Package	Manner of Packing	Devices per bag/reel
SSP8023D	SOP23-6	Reel	3000
SSP8023D	SOP8	Reel	4000

Print rules

Package	Marking
SOT23-6	8023S
SOP8	8023S

Block Diagram and Pin Arrangement Diagram





Pin Assignment

Pin No.		Pin Name	Description
SOT23-6	SOP8		
5	8	VDD	Supply input voltage
2	4	GND	Ground.
3	3	INA	Input A
4	1	OUTA	Output A
6	7	INB	Input B
1	5	OUTB	Output B

Functional Description

SSP8023D is a bi-direction relay driver circuit, used to control the DC motor and the magnetic latching relay. INA and INB are triggered by pulse, so long as the input terminal is directly connected with the output terminal of the corresponding device, it can work; The trigger pulse is triggered according to the function list state and the relay acts accordingly.

LOGIC FUNCTION TABLE

Input		Output	
INA	INB	OUTA	OUTB
0	0	High-impedance	High-impedance
0	1	0	1
1	0	1	0
1	1	High-impedance	High-impedance

Absolute Maximum Ratings

T_{amb}=25°C,unless specified otherwise.

Parameter	Symbol	Value	Unit
Max Input Voltage	V_{DD}-V_{GND}	+40	V
OUTA/OUTB Voltage	V_{OUTA}/V_{OUTB}	+40	V
Other Input / Output Voltage	V_{IN}/V_{OUT}	VGND-0.4~VDD+0.4	V
Max Junction Temperature	T_j	150	℃
Operating Temperature	T_o	-40~85	℃
Storage Temperature	T_{stg}	-65~150	℃
Thermal Resistance (Junction to Ambient)	R_{ja}	120	℃/W
ESD (Human-Body Model)	HBM	8000	V
ESD (Machine Model)	MM	200	V

Note: These are stress ratings only. Stresses exceeding the range specified under “Absolute Maximum Ratings” may cause substantial damage to the device. Functional operation of this device at other conditions beyond those listed in the specification is not implied and prolonged exposure to extreme conditions may affect device reliability.

Recommended operating conditions

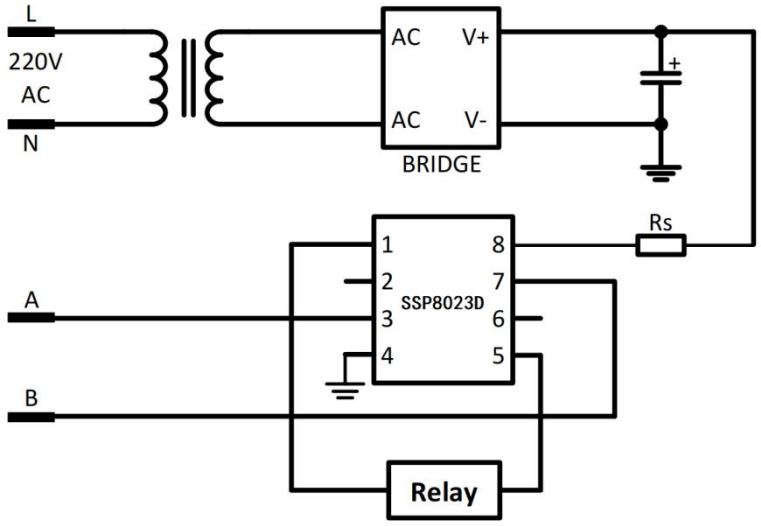
Parameter	Symbol	Value	Unit
Input voltage range	V_{IN}	+36(MAX.)	V
Operating temperature range	T_j	-40~85	℃

Electrical Characteristics(1) (2)

T_{amb}=25°C,unless specified otherwise.

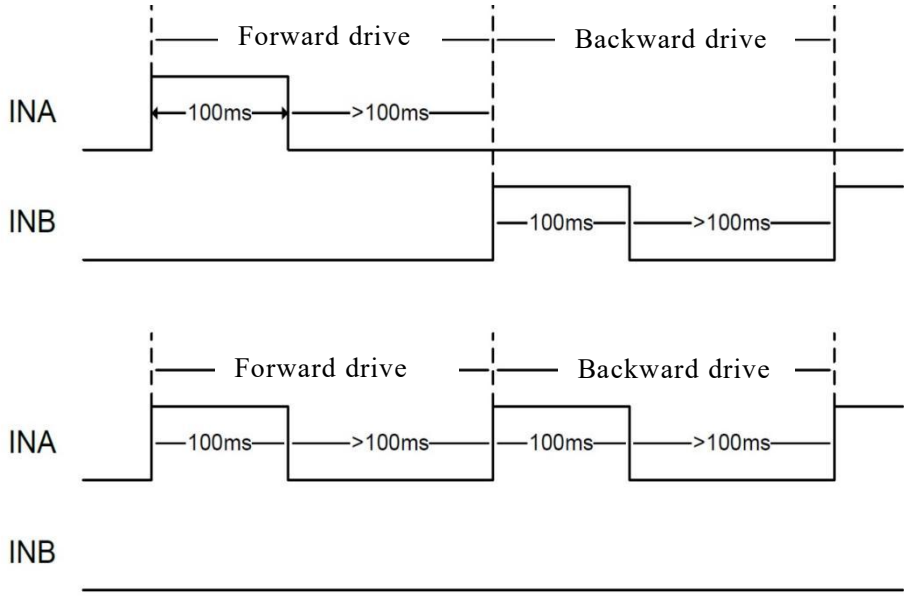
Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Shutdown Characteristics						
Output Breakdown Current	BV_{DSS}	V_{INA}=V_{INB}=0V, I_D=250uA	40			V
Output Leakage Current	I_{DSS}	V_{INA}=V_{INB}=0V, V_D=24V			10	μA
Static Opening Characteristics						
Input Threshold Voltage	VTH			1.5	2	V
Output On-resistance	$R_{DS(ON)}$	V_{DD}=12V, R_L=80Ω		7	10	Ω
		V_{DD}=30V, R_L=80Ω		6	10	Ω
		V_{DD}=12V, R_L=40Ω		7	10	Ω
		V_{DD}=30V, R_L=40Ω		6	10	Ω
Input Characteristics						
Equivalent Input Resistor	R_{IN}	V_{DD}=12V，V_{INA}=V_{INB}=0V		120		kΩ
Input Current	I_{IN}	V_{INA}=3V or V_{INB}=3V		250	400	μA
		V_{INA}=5V or V_{INB}=5V		450	600	μA
FWD Characteristics						
Forward Conduction Voltage	V_{SD}	I_S=1A		1.5	2	V
Reverse Recovery Time	T_{RR}	V_{DD}=12V, R_L=80Ω		190		ns
Transmission Characteristics						
Rise Time	T_R	V_{DD}=12V, R_L=80Ω		50		ns
Turn ON Delay Time	$T_{D(ON)}$	V_{DD}=12V, R_L=80Ω		60		ns
Fall Time	T_F	V_{DD}=12V, R_L=80Ω		50		ns
Turn OFF Delay Time	$T_{D(OFF)}$	V_{DD}=12V, R_L=80Ω		2		ns

Application Circuits



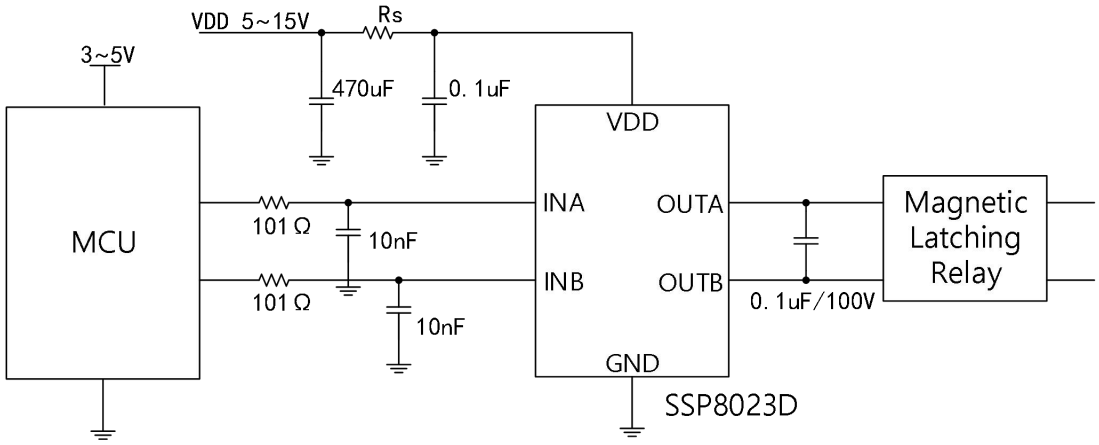
Typical Application Diagram

The input terminals A and B are triggered by pulse. The input terminal of the chip is connected with the output terminal of the corresponding device to work. The trigger pulse is triggered according to the function list state and the relay acts accordingly. In smart meter applications,the recommended pulse width=100ms. The length of the intervals should be longer than 100ms. These intervals include: intervals between forward drive pulse and next backward drive pulse, intervals between forward drive pulse and next forward drive pulse, intervals between backward drive pulse and next forward drive pulse, intervals between backward drive pulse and next backward drive pulse.

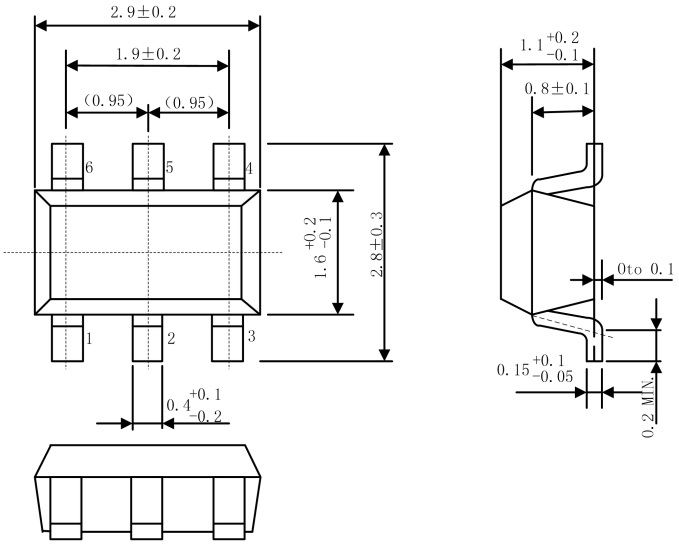


Schematic diagram of pulse excitation

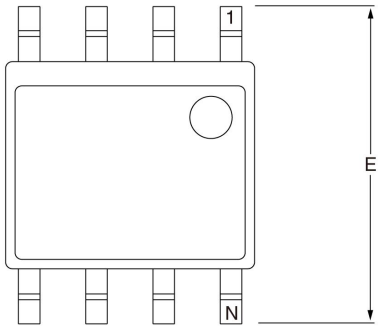
Recommended circuit



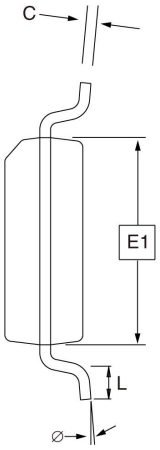
Package Information（SOT23-6）



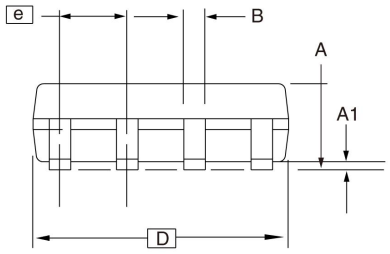
Package Information（SOP8）



Top View



End View



Side View

COMMON DIMENSIONS
(Unit of Measure = mm)

SYMBOL	MIN	NOM	MAX	NOTE
A	1.35	–	1.75	
A1	0.10	–	0.25	
b	0.31	–	0.51	
C	0.17	–	0.25	
D	4.80	–	5.00	
E1	3.81	–	3.99	
E	5.79	–	6.20	
e	1.27 BSC			
L	0.40	–	1.27	
∅	0°	–	8°	

Special Instructions

The company reserves the right of final interpretation of this specification.

Version Change Description

Version：V1.4	Author：Yang	Time：2021.8.18
Modify the record：		
1. Re-typesetting the manual and checking some data		
Version：V1.5	Author：Yang	Time：2021.11.26
Modify the record：		
1. Add print rules		
Version：V1.6	Author：Yang	Time：2021.12.22
Modify the record：		
1. Add the recommended circuit		
Version：V1.7	Author：Yang	Time：2022.5.23
Modify the record：		
1. Update order specification		
Version：V1.8	Author：Yang	Time：2022.8.16
Modify the record：		
1. Add recommended operating conditions		

Statement

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