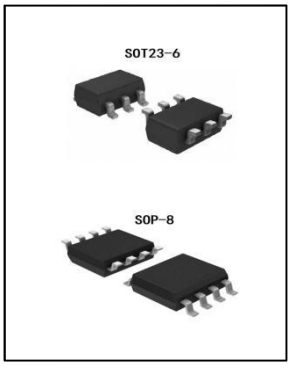
Relay driver chip



Description

The SL8023 is a bidirectional relay driver IC designed for controlling operations of DC motors, latching relays, and similar devices. It features high output current capability and low static power consumption, making it suitable for a wide range of applications including smart meters and other pulse or level conversion applications.

Features

● The chip has a DC withstand voltage of 40V, with a maximum operating voltage limit of 30V. The recommended safe operating voltage range is 5 to 15V (this range is recommended for commercially available relays rated around 9 to 12 ohms; other relay specifications should be determined based on actual testing).

● Maximum operating current is 800mA.

● Input high-to-low voltage conversion levels are around 1.5V, compatible with various microcontrollers.

● Integrated high-speed freewheeling diode with clamping reverse voltage function, suitable as a substitute for TVS diodes in general applications.

● Typical operating power is 5W (equivalent to outputting 400mA current at 12V operating voltage; corresponding output current should decrease with increased operating voltage).

● Maximum power is 10W (equivalent to outputting 800mA current at 12V operating voltage; corresponding output current should decrease with increased operating voltage. Operating beyond the maximum power will damage the chip).

Applications

● Smart electric meters

● Motor driving

● Control of latching relays

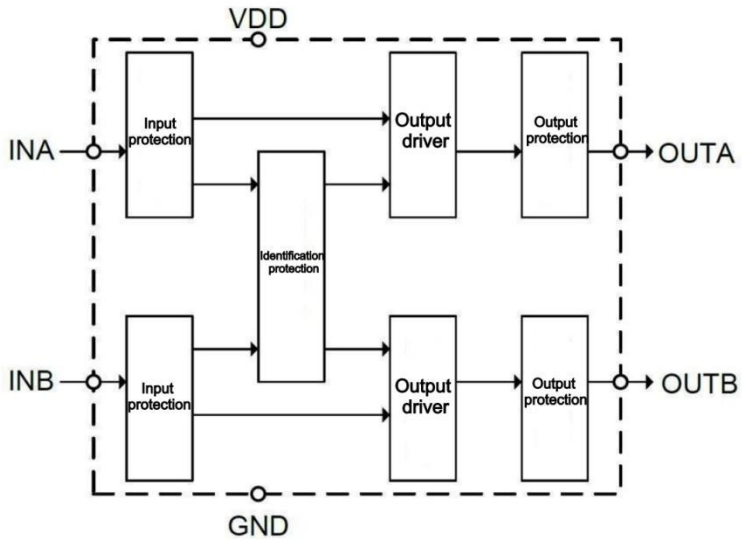
Ordering information

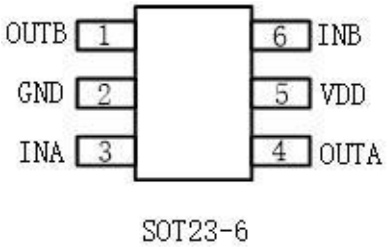
Product Number	Encapsulation	Packing	Min Packaging Quantity
SL8023	SOT23-6	reel	3000
SL8023S	SOP8	reel	4000

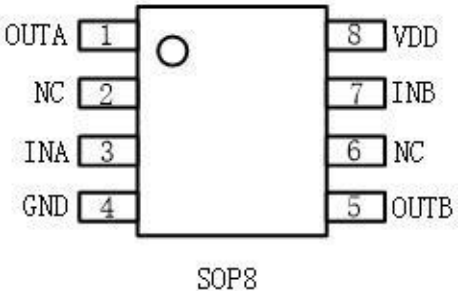
Printing rules

Package	Logo Silk Screen
SOT23-6	8023S
SOP8	8023S

Functional block diagram and pin assignment







Pin description

Pin Number		Symbol	Description
SOT23-6	SOP8		
5	8	VDD	chip power input
2	4	GND	chip ground
3	3	INA	A-channel logic input
4	1	OUTA	A-channel drive output
6	7	INB	B-channel drive output
1	5	OUTB	B-channel drive output

Functional description

SL8023 is a bidirectional relay driver integrated circuit used for controlling DC motors, latching relays, and similar devices. INA and INB are triggered by pulses; simply connecting the input terminals to the corresponding device outputs enables operation. Trigger pulses activate the relay according to the functional table states.

Logic Function Table

Input		Output	
INA	INB	OUTA	OUTB
0	0	high resistance	high resistance
0	1	0	1
1	0	1	0
1	1	high resistance	high resistance

Limit parameters

Unless otherwise specified，T_{amb}= 25℃

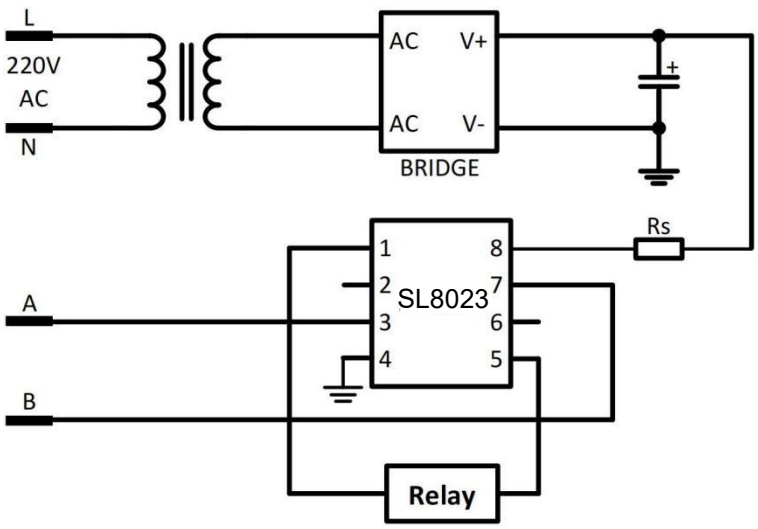
Parameter	Symbol	Rated Value	Unit
voltage	V_{DD}-V_{GND}	+40	V
OUTA, OUTB pins	V_{OUTA}/V_{OUTB}	+40	V
other pin input/output voltage	V_{IN}/V_{OUT}	V_{GND}-0.4~V_{DD}+0.4	V
max junction temp	T_j	150	℃
storage temperature	T_{stg}	-65~150	℃
thermal resistance（junction to ambient）	R_{ja}	120	℃/W
human body ESD discharge model	HBM	8000	V
machine ESD discharge model	MM	200	V

Electrical characteristics

Unless otherwise specified，T_{amb}= 25℃

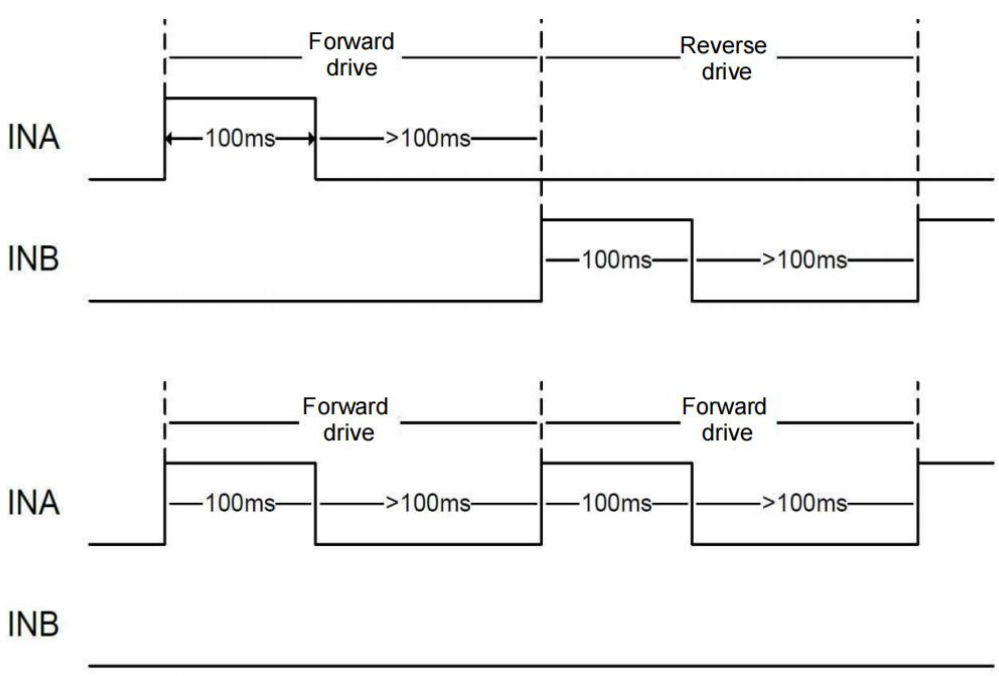
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Static shutdown characteristics						
output pin breakdown current	BV_{DSS}	V_{INA}=V_{INB}=0V， I_D=250uA	40			V
output pin leakage current	I_{DSS}	V_{INA}=V_{INB}=0V， V_D=24V			10	uA
Static opening characteristics						
input tube turn-on voltage	VTH			1.5	2	V
output tube equivalent 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						
input resistance to ground	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	uA
		V_{INA}=5V or V_{INB}=5V		450	600	uA
Flyback diode characteristics						
forward 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						
rising edge time	T_R	V_{DD}=12V， R_L=80Ω		50		ns
on delay	$T_{D(ON)}$	V_{DD}=12V， R_L=80Ω		60		ns
falling edge time	T_F	V_{DD}=12V， R_L=80Ω		50		ns
off delay	$T_{D(OFF)}$	V_{DD}=12V， R_L=80Ω		2		us

Typical application circuit



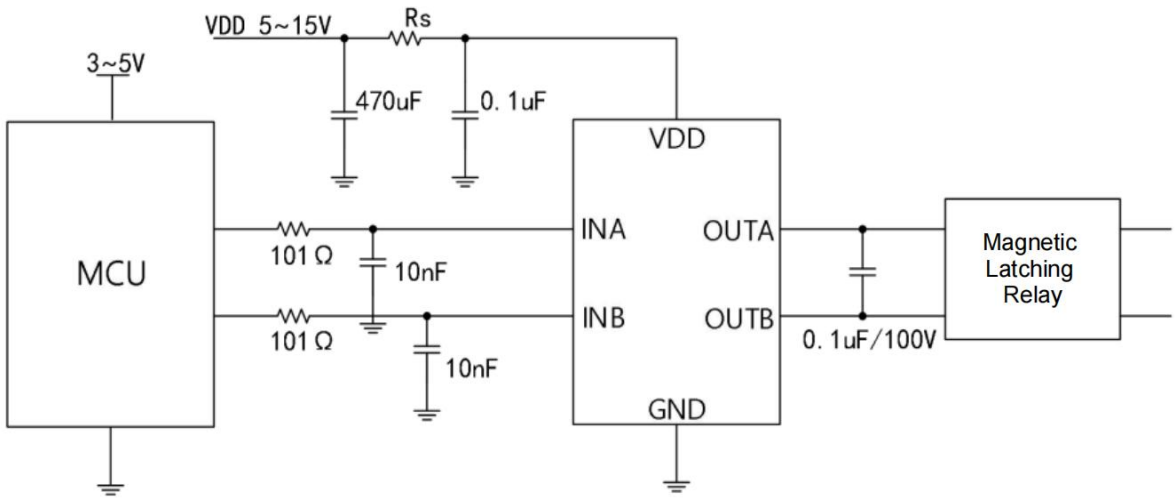
Typical Application Diagram

Input terminals A and B are pulse-triggered, requiring connection of the chip's input terminals to the corresponding device outputs for operation. Trigger pulses activate the relay according to the functional table states. In smart electric meter applications, a pulse width of 100 milliseconds is recommended. Minimum intervals of 100 milliseconds are required between: forward drive and the next forward drive pulse, forward drive and reverse drive pulses, reverse drive and forward drive pulses, and reverse drive and the next reverse drive pulse. A pulse diagram is provided below for reference.

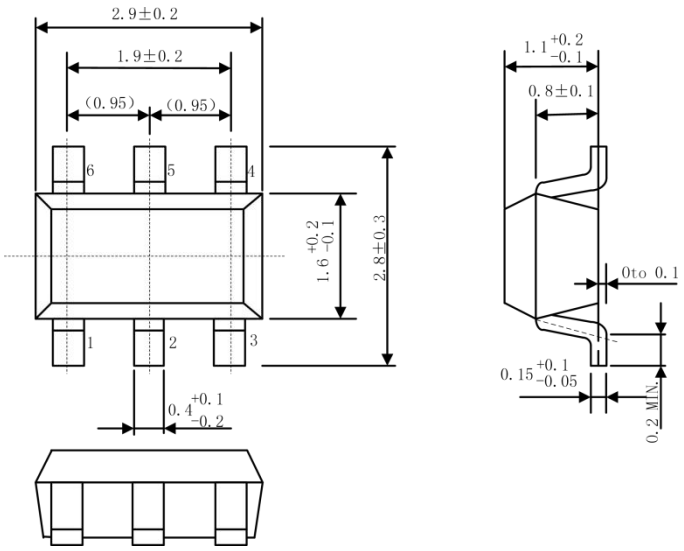


Pulse Excitation Schematic

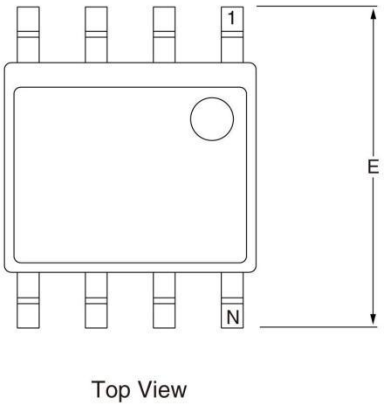
Recommended circuit



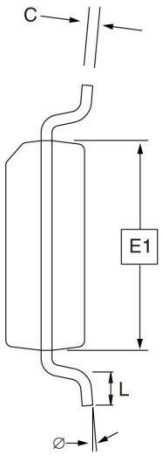
Package dimensions（SOT23-6）



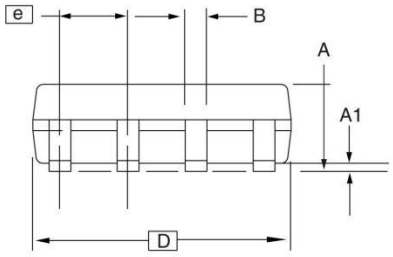
Package dimensions（SOP8）



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	
Ø	0°	–	8°	