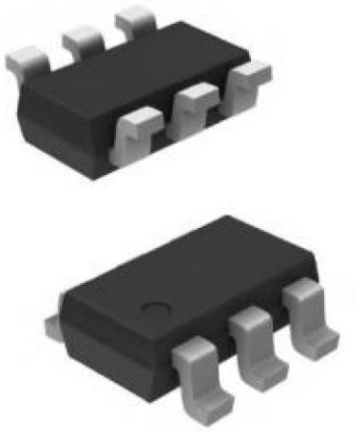


Figure 1. Physical Photos of AT8023D

APPLICATIONS

- Smart Meter
- Motor Drive
- Magnetic Latching Relay Control

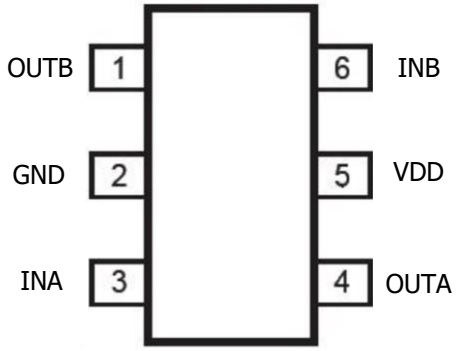
DESCRIPTION

AT8023D 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 12Vworkingvoltage. 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.)

PIN CONFIGURATIONS



PIN DESCRIPTION

Table 1: Pin Function

Pin #	Symbol	Description
5	VDD	Power Supply Input Voltage.
2	GND	Ground.
3	INA	Input A.
4	OUTA	Output A.
6	INB	Input B.
1	OUTB	Output B.

Table 2. Absolute Maximum Ratings

Parameter	Symbol	Value	Unit
Power Supply Input Voltage	V_{DD} – V_{GND}	40	V
OUTA or OUTB Voltage	V_{OUTA} or V_{OUTB}	40	V
Other Input or Output Voltage	V_{IN} or V_{OUT}	(V_{GND} – 0.4) ~ (V_{DD} + 0.4)	V
Max. Junction Temperature	T_J	150	°C
Operating Temperature	T_O	–40 ~ 85	°C
Storage Temperature	T_{STG}	–65 ~ 150	°C
Thermal Resistance (Junction to Ambient)	θ_{JA}	120	°C/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.

ELECTRICAL CHARACTERISTICS

(At T_A = +25°C, unless otherwise noted.)

Table 3.

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
Static Shutdown Characteristics						
Output Breakdown Current	BV_{DSS}	V_{INA} = V_{INB} = 0V, I_D = 250μA	40			V
Output Leakage Current	I_{DSS}	V_{INA} = V_{INB} = 0V, V_D = 24V			10	μA
Static Opening Characteristics						
Input Threshold Voltage	V_{TH}			1.5	2	V
Output On-Resistance	$R_{DS(ON)}$	V_{DD} = 12V, R_L = 80Ω		7	10	V
		V_{DD} = 30V, R_L = 80Ω		6	10	
		V_{DD} = 12V, R_L = 40Ω		7	10	
		V_{DD} = 30V, R_L = 40Ω		6	10	

Parameter	Symbol	Test Conditions	Min.	Typ.	Max.	Unit
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

BLOCK DIAGRAM

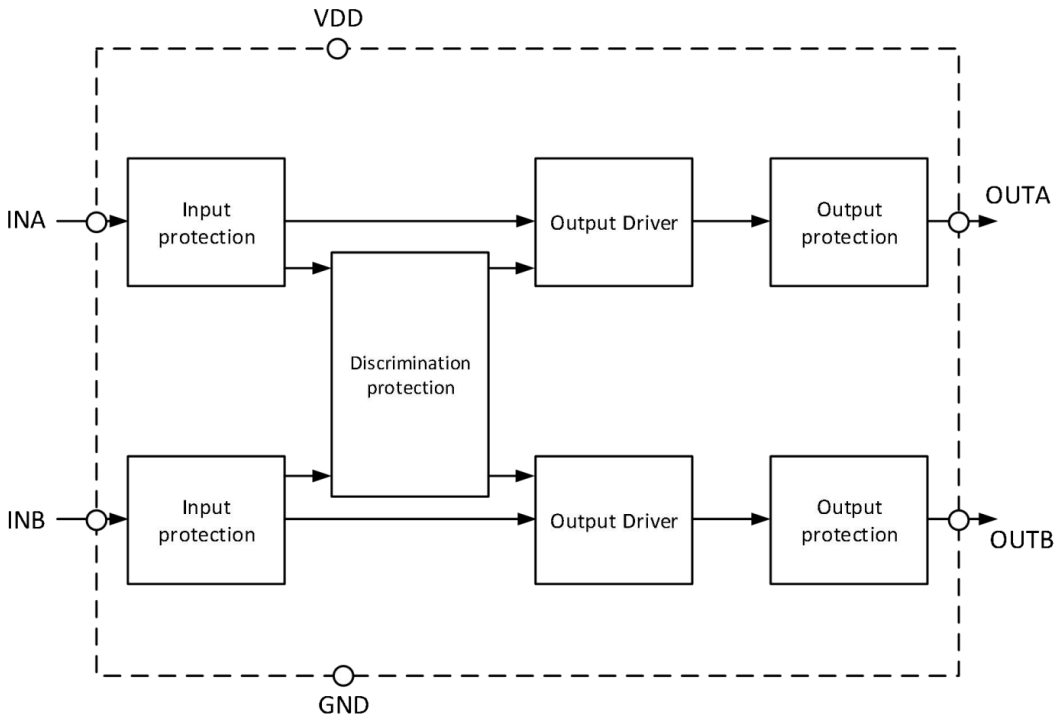


Figure 2. Block Diagram

APPLICATION CIRCUITS

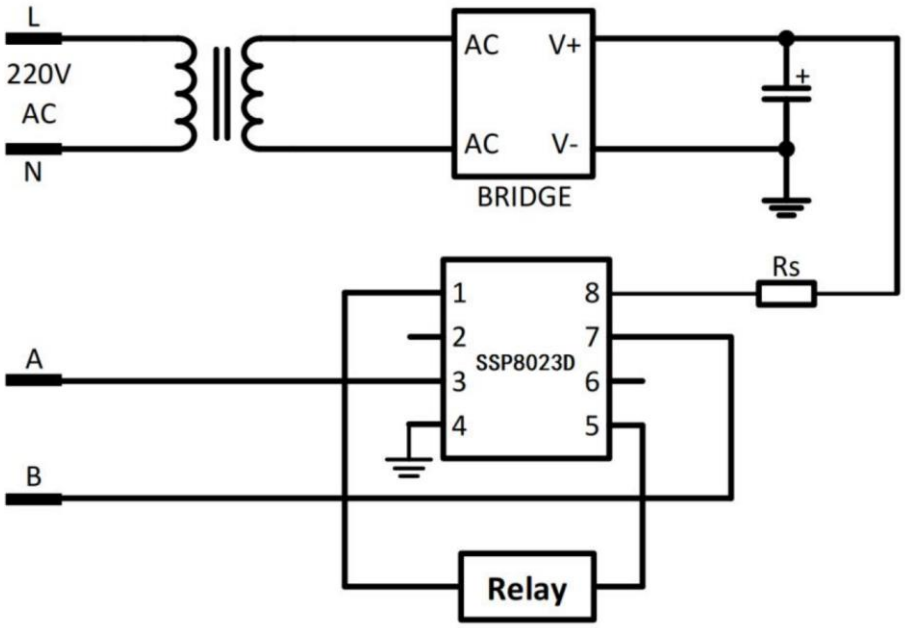


Figure 3. Typical Application Circuits

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.

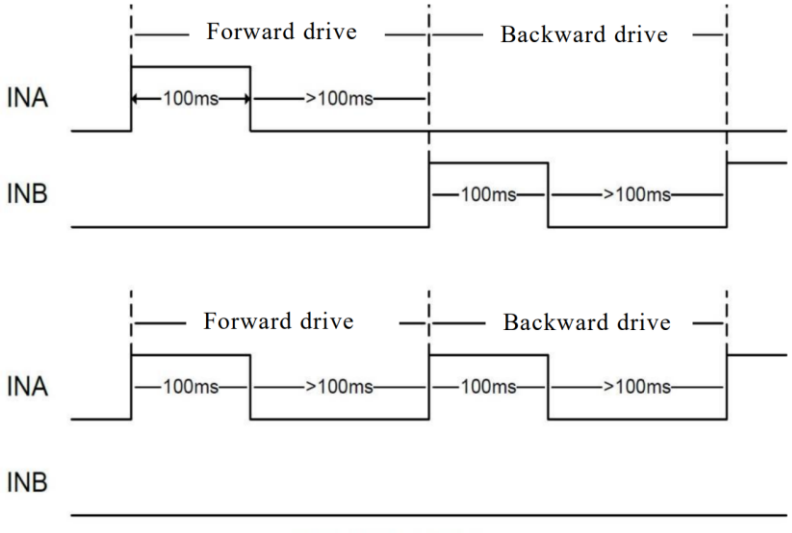
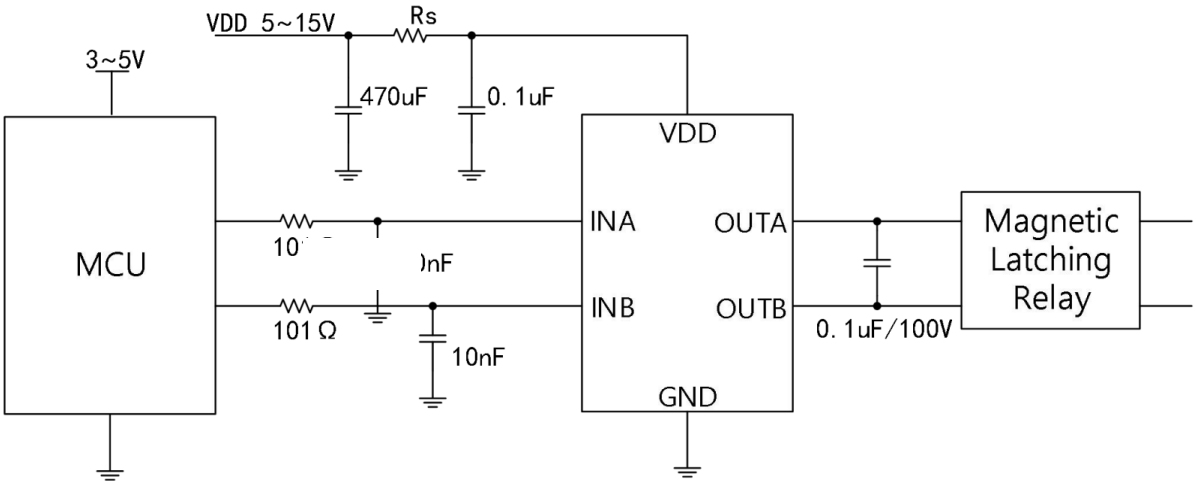


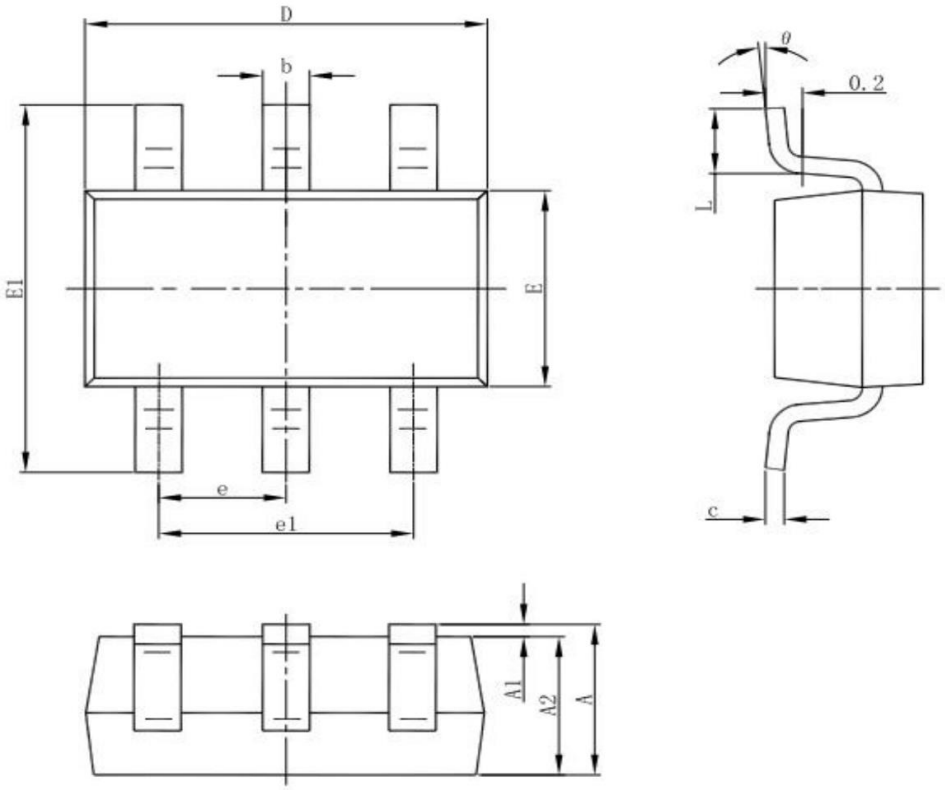
Figure 4. Schematic Diagram Of Pulse Excitation

Recommended circuit



OUTLINE DIMENSIONS

SOT23-6



Symbol	Dimensions In Millimeters		Dimensions In Inches	
	Min.	Max.	Min.	Max.
A	1.050	1.250	0.041	0.049
A1	0.000	0.100	0.000	0.004
A2	1.050	1.150	0.041	0.045
b	0.300	0.500	0.012	0.020
c	0.100	0.200	0.004	0.008
D	2.820	3.020	0.111	0.119
E	1.500	1.700	0.059	0.067
E1	2.650	2.950	0.104	0.116
e	0.950(BSC)		0.037(BSC)	
e1	1.800	2.000	0.071	0.079
L	0.300	0.600	0.012	0.024
θ	0°	8°	0°	8°

ORDERING INFORMATION

Part Number	Buy Now
AT8023D	

NOTICE

1. It is important to carefully read and follow the warnings, cautions, and product-specific notes provided with electronic components. These instructions are designed to ensure the safe and proper use of the component and to prevent damage to the component or surrounding equipment. Failure to follow these instructions could result in malfunction or failure of the component, damage to surrounding equipment, or even injury or harm to individuals. Always take the necessary precautions and seek professional assistance if unsure about proper use or handling of electronic components.
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