GENERAL DESCRIPTION

KY8023 is a bi-direction relay driver circuit, used to control 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.

KY8023 can provide 400mA typical driving current, which will different according to the relay coil resistance. The maximum driving current can reach 800mA when the supply voltage is equal to or below 15V. The input high level threshold V_{TH} is 1.3V.
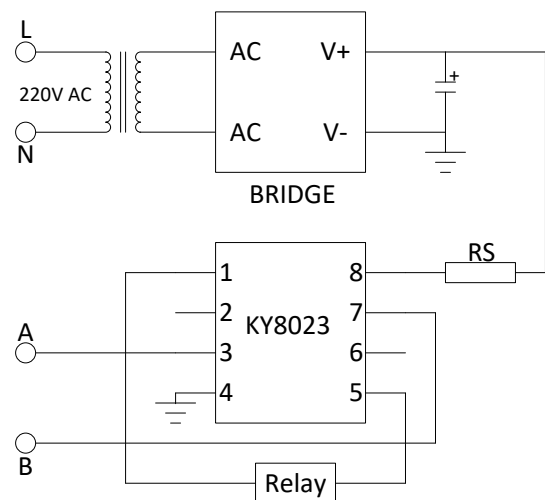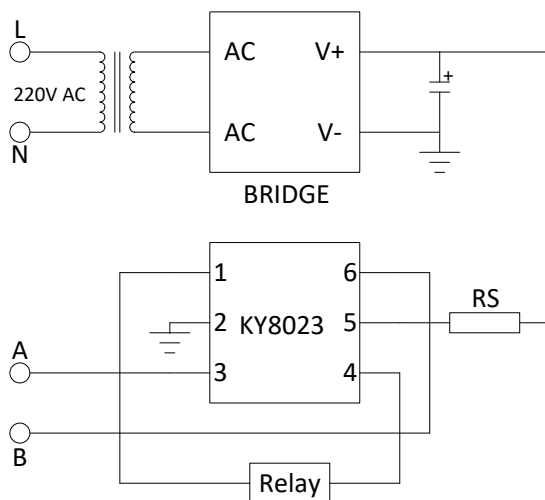
KY8023 is available in SOT23-6L and SOP-8 packages.

FEATURES

- Input voltage : 5V~40V
- Recommended supply voltage with relay load
  : 5V~30V
- I_{SS}＜1μA (high impedance state)
- Input high level threshold : 1.3V
- Typical driving current : 400mA
  Maximum : 800mA (V_{IN}≤15V)
- Rdson=7Ω (V_{IN}=12V, PMOSFET+NMOSFET)
  Rdson=5Ω (V_{IN}=30V, PMOSFET+NMOSFET)
- Fly-wheel diode forward voltage : 1.3V(I_S=1A)
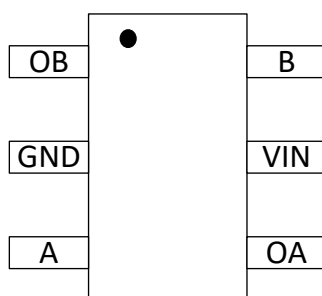- Environment temperature : -40 ~ +85℃
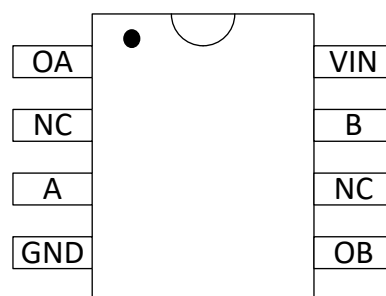- SOT23-6L and SOP-8 packages

APPLICATIONS

- Smart meter

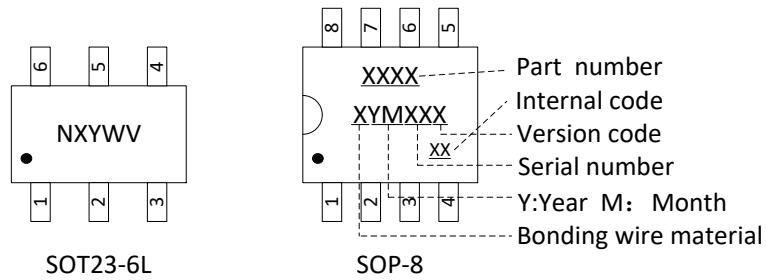## TYPICAL APPLICATION CIRCUIT

PIN ASSIGNMENT

SOT23-6L

SOP-8

ORDER INFORMATION

PART NO	PACAKGE	TEMPERATURE	TAPE & REEL
KY8023S6	SOT23-6L	-40 ~ +85℃	3000/REEL
KY8023P8	SOP-8	-40 ~ +85℃	2500/REEL

MARKING DESCRIPTION

SOT23-6L　　　SOP-8

"N": product code

"X": Package factory

"Y": Wafer foundry vendor.

"W": The week of manufacturing. "A" stands for week 1, "Z" stands for week 26, "a" stands for week 27, "z" stands for week 52.

"V": Product version code.

PIN DESCRIPTION

PIN NO		SYMBOL	DESCRIPTTION
KY8023S6	KY8023P8		
4	1	OA	Output A
	2	NC	Not connected
3	3	A	Input A
2	4	GND	Ground
1	5	OB	Output B
	6	NC	Not connected
6	7	B	Input B
5	8	VIN	Supply input voltage

ABSOLUTE MAXIMUM RATINGS (Note)

SYMBOL	ITEMS		VALUE	UNIT
V_{IN}	Input Voltage		-0.3~40	V
T_J	Junction Temperature		150	℃
T_a	Ambient Temperature		-40~125	℃
θja	Package thermal resistance	SOT23-6L	190	℃/W
		SOP-8	128	
θjc		SOT23-6L	110	
		SOP-8	45	

T_{STG}	Storage Temperature	-55 to 150	℃
T_{SOLDER}	Package Lead Soldering Temperature	260℃, 10s	
HBM	ESD Susceptibility, Human Body Mode	3000	V
MM	ESD Susceptibility, Machine Mode	300	V
LU	Latch-up	500	mA

Note: Exceed these limits to damage to the device. Exposure to absolute maximum rating conditions may affect device reliability.

RECOMMANDED OPERATING RANGE

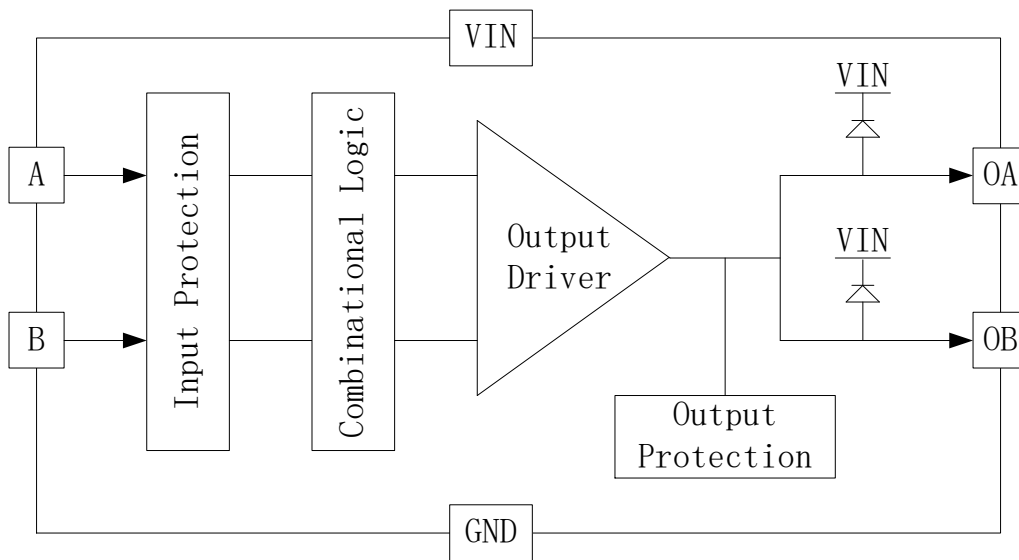| SYMBOL	ITEMS	VALUE	UNIT
V_{IN}	VIN Supply Voltage	5~30	V
T_{OPT}	Operating Temperature	-40 to +85	℃

ELECTRICAL CHARACTERISTICS

The following specifications apply for V_{IN}=12V T_A=25℃, unless specified otherwise.

SYMBOL	ITEMS	CONDITIONS	MIN	TYP	MAX	UNIT
V_{IN}	Input Voltage		5		30	V
I_Q	Quiescent Current	V_A=3V or V_B=3V		200	250	µA
		V_A=5V or V_B=5V		450	550	
Rdson	Switch Rdson	V_{IN}=12V,R_L=75Ω		8	10	Ω
		V_{IN}=30V,R_L=75Ω		5.5	10	
		V_{IN}=12V,R_L=40Ω		7	10	
		V_{IN}=30V,R_L=40Ω		5	10	
V_{TH}	ON Input High Voltage			1.3		V
R_{IN}	Equivalent Input Resistor			115		KΩ
V_{SD}	Fly-Wheel Diode Forward Voltage	I_S=1A		1.3	1.5	V
I_{SS}	Shut-down Current	V_A=V_B=0,V_{IN}=40V			1	µA
T_R	Rise Time	V_{IN}=12V,R_L=80Ω		50		ns
$T_{D(ON)}$	Turn ON Delay Time	V_{IN}=12V,R_L=80Ω		50		ns
T_F	Fall Time	V_{IN}=12V,R_L=80Ω		40		ns
$T_{D(OFF)}$	Turn OFF Delay Time	V_{IN}=12V,R_L=80Ω		0.8		µs

LOGIC FUNCTION TABLE

Input A	Input B	Output OA	Output OB	RELAY RESPONSE
1	0	1	0	ON
0	1	0	1	OFF
0	0	High-impedance	High-impedance	Hold
1	1	High-impedance	High-impedance	Hold

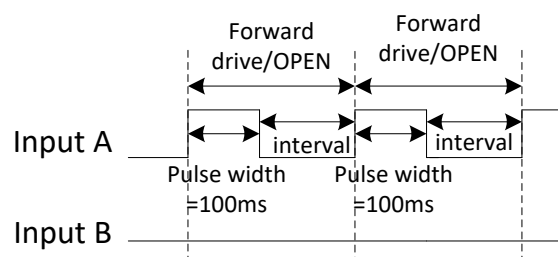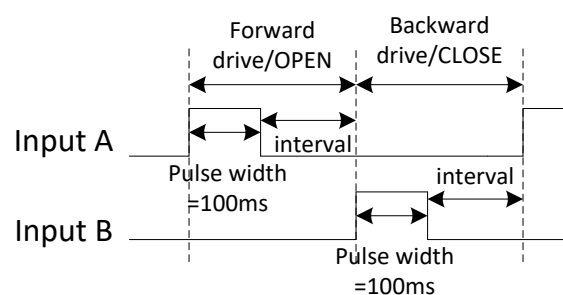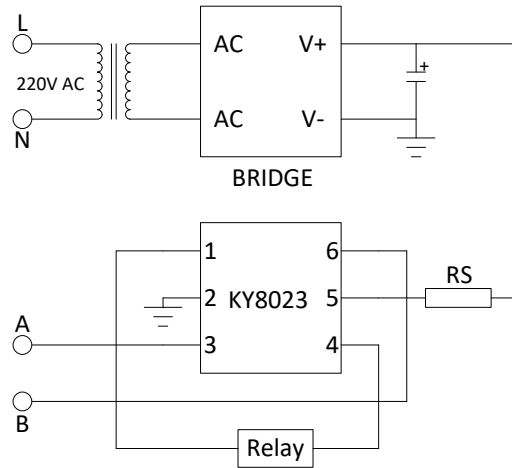## SIMPLIFIED BLOCK DIAGRAM

DETAILED DESCRIPTION

Pulse triggering

If input is driven by square pulse, connect the inputs to the pulse source directly. Relay will operate as logic table stated (V_{IN} should be less than the power supply voltage, Rs is current-limiting resistor, it can be ignored in the voltage is below 20V, i.e. Rs=0).

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.
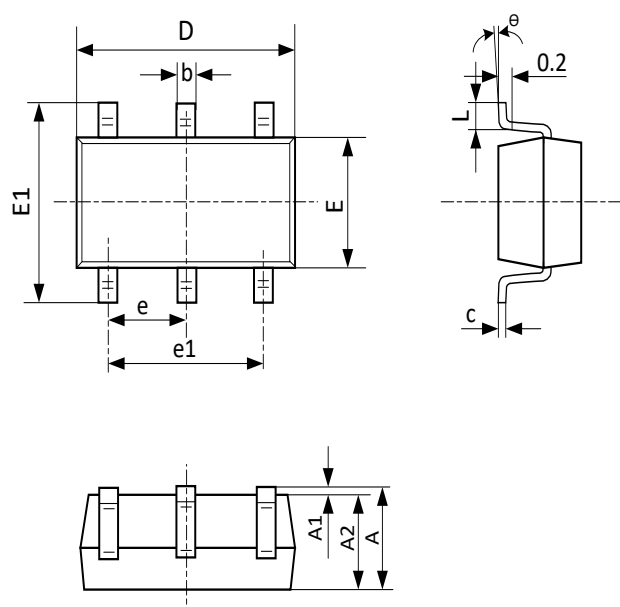
Pulse triggering application diagram
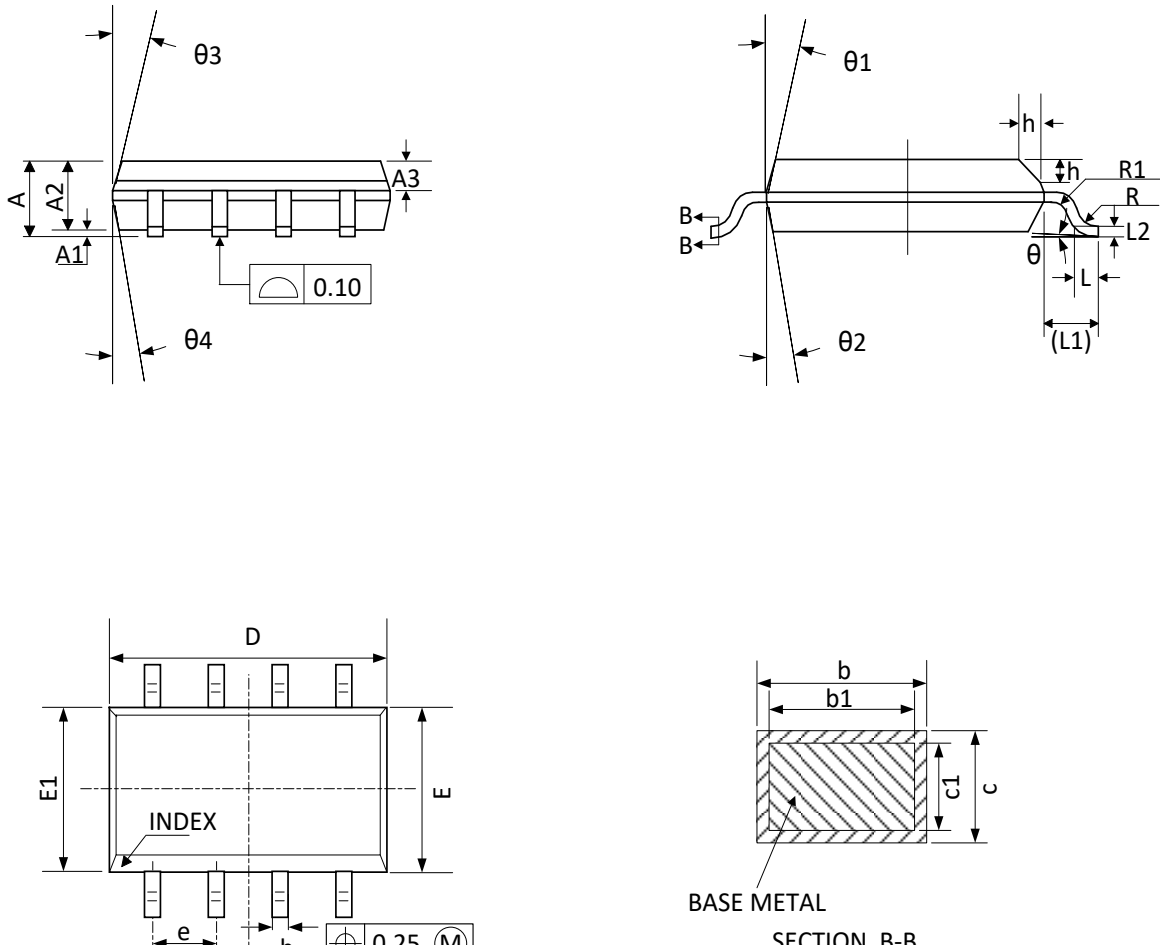
Relay free-wheel

Relay from ON to OFF, the energy stored in the relay inductor released by the chip's internal body diode and the relay inductor. Until the end of the release of this energy, relay proceeding to the next operation.

PACKAGE OUTLINE

Package	SOT23-6L	Devices per reel	3000Pcs	Unit	mm

Package Dimension：

Symbol	Dimensions In Millimeters		
	Min.	Typ.	Max.
A	1.050	-	1.250
A1	0.000	-	0.100
A2	1.050	-	1.150
b	0.300	0.400	0.500
c	0.100	-	0.200
D	2.820	2.900	3.020
E	1.500	1.600	1.700
E1	2.650	2.800	2.950
e	0.950 Typ.		
e1	1.800	1.900	2.000
L	0.300	-	0.600
θ	0°	-	8°

PACKAGE OUTLINE

Package	SOP-8	Devices per reel	2500Pcs	Unit	mm

Package Dimension：

BASE METAL

SECTION B-B

Symbol	Dimension (mm)			Symbol	Dimension (mm)		
	MIN	NOM	MAX		MIN	NOM	MAX
A	-	-	1.77	D	4.7	4.9	5.1
A1	0.08	0.18	0.28	E	5.8	6	6.2
A2	1.2	1.4	1.6	E1	3.7	3.9	4.1
A3	0.55	0.65	0.75	e	1.27BSC		
b	0.39	-	0.48	L	0.5	0.65	0.8
b1	0.38	0.41	0.43	L1	1.05BSC		
c	0.21	-	0.26	θ	0	-	8°

Revision History

Version No.	Date	Description
Rev 1.0	2019-03-20	Initial preliminary release

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