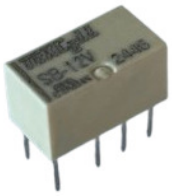
Miniature Signal Relay	SB

Features

- Low coil power at 50mW.
  Coil(5V) operating current≤10mA
  Can be directly driven by microprocessor.
- Bifurcated contacts
- Products with electrical endurance ≥3x10^{8}ops available.
  It is an ideal replacement device for small reed relays
- Products compliant with IEC 60079 available
- Products compliant with IEC 60335-1 available
- Smallest size in signal relay industry: 9.0(L) x 4.8(W) x 4.9(H) mm



c UL us
(File No.:E122258)

1. COIL DATA (at 23℃)

1) Single side stable

Nominal Voltage (VDC)	Pick-up Voltage (VDC)	Drop-out Voltage (VDC)	Max Allowable Voltage (VDC)	Coil Current (mA)(±10%)	Coil Resistance (Ω)	Coil Power (mW)
1.5	1.2	0.15	2.2	33.3	45 x (1±10%)	Approx. 50
2.4	1.92	0.24	3.6	20.8	115.2 x (1±10%)	
3	2.4	0.30	4.5	16.7	180 x (1±10%)	
4.5	3.6	0.45	6.7	11.1	405 x (1±10%)	
5	4	0.5	7.5	10	500 x (1±10%)	
6	4.8	0.6	9.0	8.3	720 x (1±10%)	
9	7.2	0.9	13.5	5.6	1620 x (1±10%)	
12	9.6	1.2	18	4.2	2880 x (1±10%)	
24	19.2	2.4	36	4.2	5760 x (1±10%)	Approx. 100

2) 1 coil latching

Nominal Voltage (VDC)	Set Voltage (VDC)	Reset Voltage (VDC)	Max Allowable Voltage (VDC)	Coil Current (mA)(±10%)	Coil Resistance (Ω)	Coil Power (mW)
1.5	1.2	1.2	3	33.3	45 x (1±10%)	Approx. 50
2.4	1.92	1.92	4.8	20.8	115.2 x (1±10%)	
3	2.4	2.4	6	16.7	180 x (1±10%)	
4.5	3.6	3.6	9	11.1	405 x (1±10%)	
5	4	4	10	10	500 x (1±10%)	
6	4.8	4.8	12	8.3	720 x (1±10%)	
9	7.2	7.2	18	5.6	1620 x (1±10%)	
12	9.6	9.6	24	4.2	2880 x (1±10%)	
24	19.2	19.2	36	4.2	5760 x (1±10%)	Approx. 100

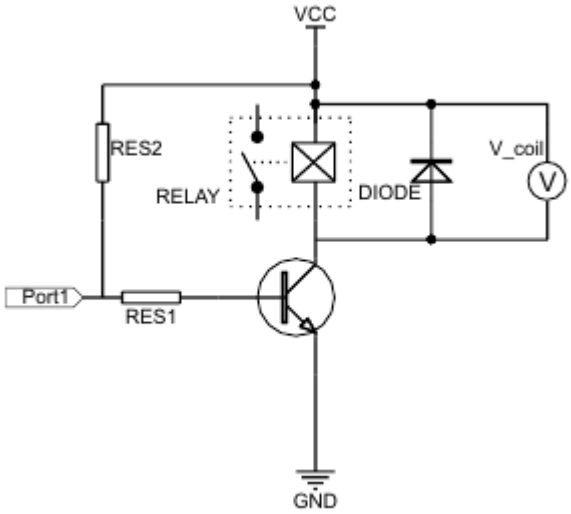
Note:

1) The data shown above are initial values.

2) To supply rated step voltage to coil is the foundation of relay proper operation.

Please make sure the applied voltage to the coil reach at rated values.

Please refer to the typical diagram below for single side stable relay. The “V_coil” is the rated voltage:



3) In case 5V of transistor drive circuit, it is recommended to use 4.5V type relay, and 3V to use 2.4V type relay.

4) For monostable relays, if you need to drop down voltage and hold mode after reliably operating, make sure that the effective value of holding voltage is not less than 60% of the rated voltage.

5) The maximum allowable voltage refers to the maximum voltage which relay coil could endure in a short period of time.

6) When user’s requirements can’t be found in the above table, special order allowed.

7) During the relay pick-up or drop-out processes, there are stages of contact pressure change, contact vibration and unstable contact etc.

When the voltage applied to coil is gradually changed. It will lengthen the unstable stage and affect relay endurance. To reduce this influence, please apply step voltage(switching circuit) to relay coil.

2. CONTACT DATA

Contact Arrangement		2 Form C
Contact Resistance		100mΩ max. (at 10mA 30mVDC)
Contact Material		Ag alloy + Au plated
Contact Ratings (Resistive load)		1A 30VDC 0.3A 125VAC
Max. Switching Voltage		250VAC / 220VDC
Max. Switching Current		2A
Max. Switching Power		62.5VA / 60W
Min. applicable load[2)]		10mV 10μA
Life Expectancy	Electrical	100,000 operations 300,000,000 operations[4)] (Two sets of NO or NC in paralle[5)], 10mA 5VDC, 0.1s on: 0.1s off, 40℃)
	Mechanical	100,000,000 operations

Notes:

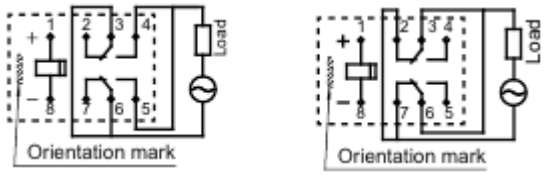
1) The data shown above are initial values.

2) Min. applicable load is reference value. Please perform the confirmation test with the actual load before production since reference value may change according to switching frequencies, environmental conditions and expected contact resistance and reliability.

3) Only typical loads are listed above. Other load specifications can be available upon request.

4) Available products with electrical endurance ≥3x10^8ops upon request.

5) Two sets of NO or NC parallel wiring diagrams (bottom view) are as follows.



6) For low level and long durability applications, it is recommended to use two sets of NO or NC parallel.
If you need to use a single set of NO or NC, please contact to us

3. CHARACTERISTICS

Insulation Resistance		1000MΩ (at 500VDC)
Dielectric Strength	Open Contacts	750VAC 1mm
	Coil and Contacts	1500VAC 1min
	Contact Sets	1000VAC 1min
Surge withstand voltage Between open contacts (10X160μs) Between coil & contacts (2X10μs)		 1500V (FCC part 68) 2500V (Telecordia)
Operate Time (Set Time)		2ms max.
Release Time (Reset Time)		2ms max.
Temperature Rise		50K max. (at 1A load, 85℃ environment)
Temperature Range		-40℃ to 85℃
Vibration Resistance	Functional	10 ~ 55Hz 3.3mm DA
	Destructive	10 ~ 55Hz 5.0mm DA
Shock Resistance	Functional	735m/s^2
	Destructive	980m/s^2
Humidity		5 ~ 85% RH
Termination		PCB (DIP, SMT)
Weight		Approx. 0.5g
Outline Dimension (L x W x H)		9.0 x 4.8 x 4.9mm

Notes: The data shown above are initial values.

4. HIGH FREQUENCY[1)]

Frequency[2)]	100MHz	900MHz
Insertion loss[3)]	0.03	0.3
Voltage standing wave ratio V.SWR[3)]	1.05	1.4
Isolation[3)]	43dB	25dB

Notes:

1) The characteristic impedance of the measuring system is 50Ω.

2) If there is a demand for frequencies higher than 3G, please contact us.

3) The data shown above are initial values.

5. SAFETY APPROVAL

UL / cUL	1A 30VDC 85℃ 2A 30VAC 40℃ 0.3A 125VAC 85℃ 0.5A 125VAC 40℃

Notes: Only some typical ratings are listed above. If more details are required, please contact us.

6. ORDERING INFORMATION

SB ① - 12V ② L1 ③ / ④ S ⑤ R ⑥	
① Relay Model	SB
② Coil Voltage	1.5V=1.5VDC, 2.4V=2.4VDC, 3V=3VDC, 4.5V=4.5VDC, 5V=5VDC, 6V=6VDC, 9V=9VDC, 12V=12VDC, 24V=24VDC
③ Sort	Nil: Single side stable L1: 1 coil latching
④ Classification	/
⑤ Termination	Nil: DIP S: Standard SMT S1: Short terminal SMT
⑥ Packing	Nil: Tube packing (Only for DIP type) R: Tape & reel packing (only for SMT type)[1)]

Note:

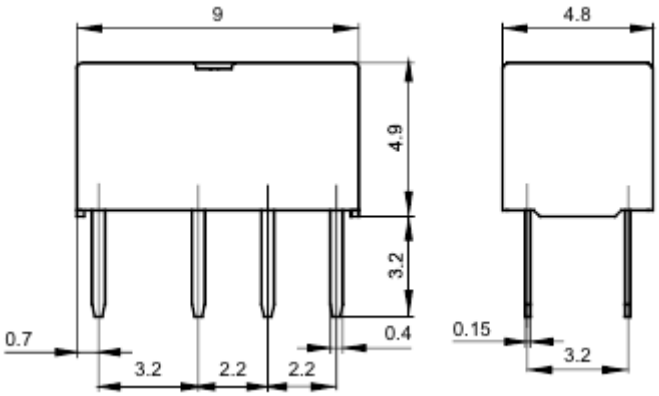
R type (Tape and reel) packing is moisture-proof which meets requirement of MSL-3. Please choose R type packing for SMT products. For R type, the letter “R” will only printed on packing tag but not on relay cover. Tube packing is normally not available for SMT products unless specially requested by customer. But, please note that tube packing is not moisture-proof so please bake the products before use according to description of Notice 11 herewith. In addition, tube packing will be adopted when the ordering quantity of R type is equal to or less than 100 pieces unless otherwise specified.

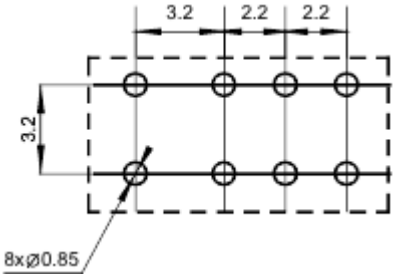
7. DIMENSIONS (Unit: mm)

Outline Dimensions

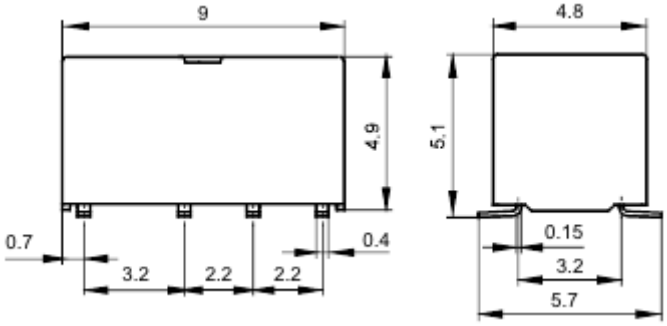
PCB Layout (Bottom view)

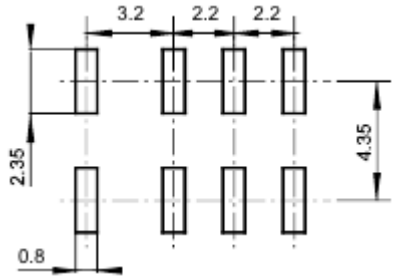
DIP type



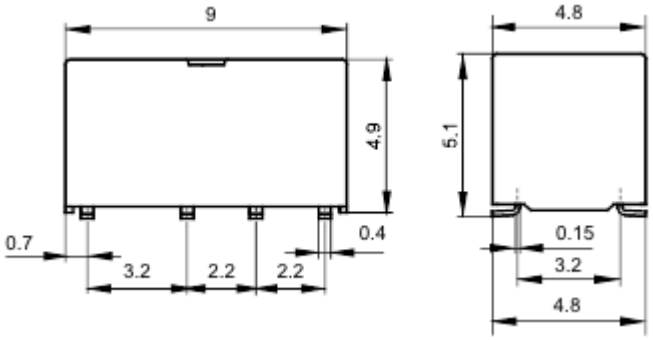


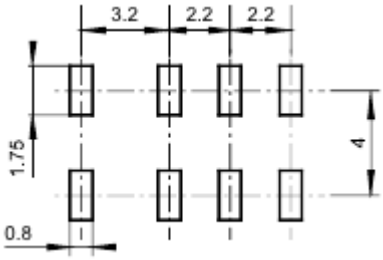
Standard SMT type





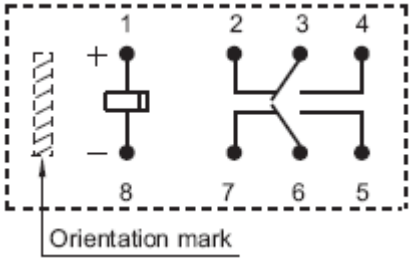
Short terminal SMT type



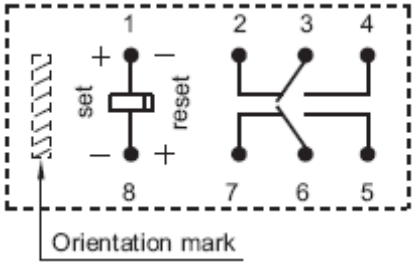


Wiring Diagram (Bottom View)

Single side stable



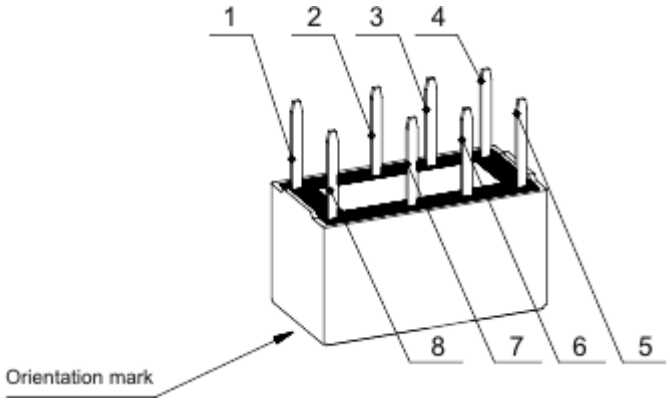
1 coil latching



No energized condition Reset condition

Pin Layout

Single side stable & 1 coil latching



Remark:

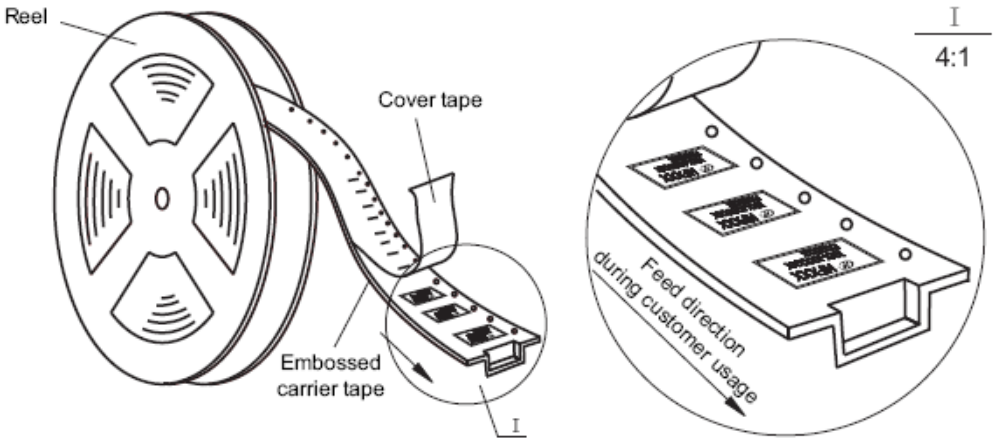
1) In case of no tolerance shown in outline dimension: outline dimension ≤1mm, tolerance should be ±0.2mm; outline dimension >1mm and ≤5mm, tolerance should be ±0.3mm; outline dimension >5mm, tolerance should be ±0.4mm.

2) The tolerance without indicating for PCB layout is always ±0.1mm.

3) The pin dimension of the product outline drawing is the size before tinning (It will become larger after tinning), and the mounting hole size is the recommended design size of the PCB board hole. The specific PCB board hole design size can be mapped and adjusted according to the actual product.

8. TAPE PACKING (Unit: mm)

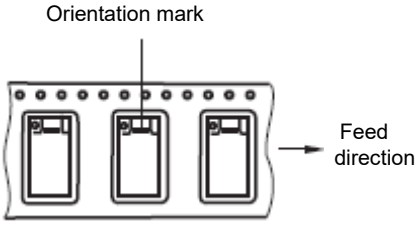
Direction of Relay Insertion

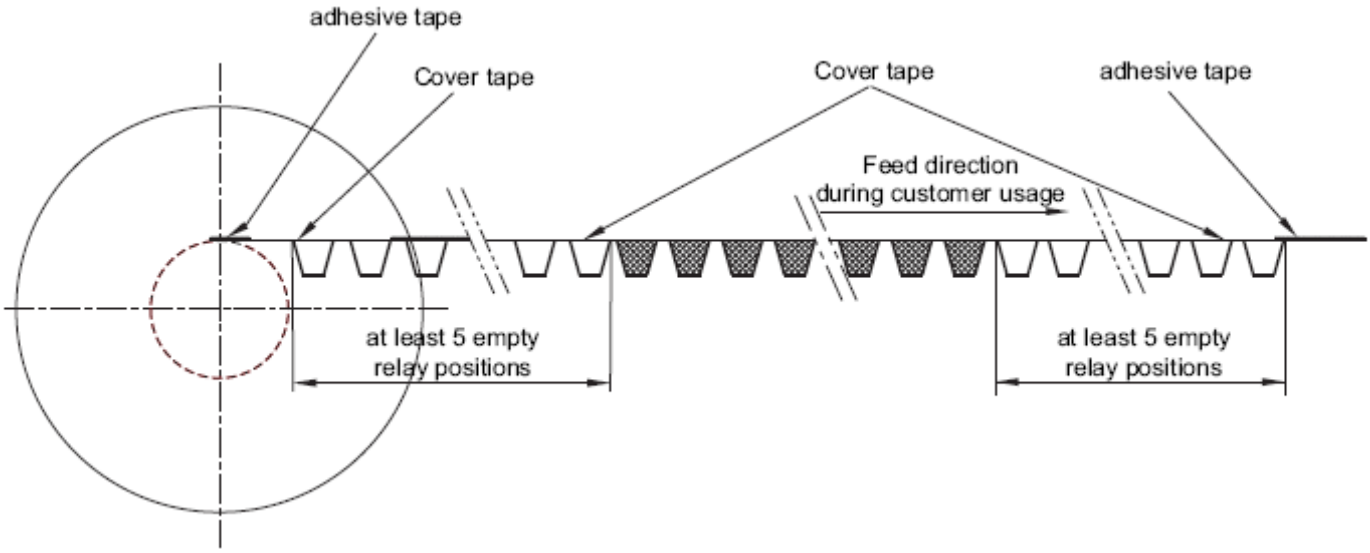


Note:

1) packing: 1000pcs/reel, 4 reels/carton

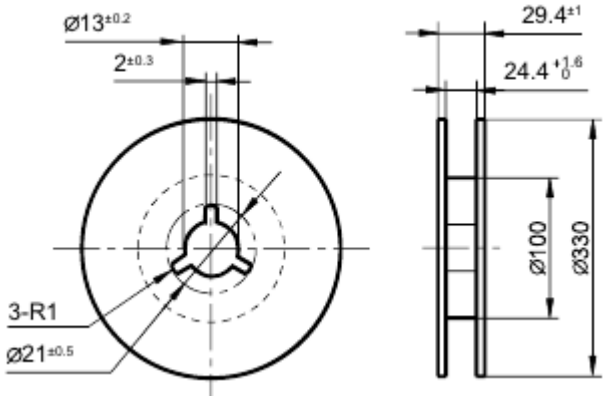
2) MOQ for reel packing is 1,000pcs





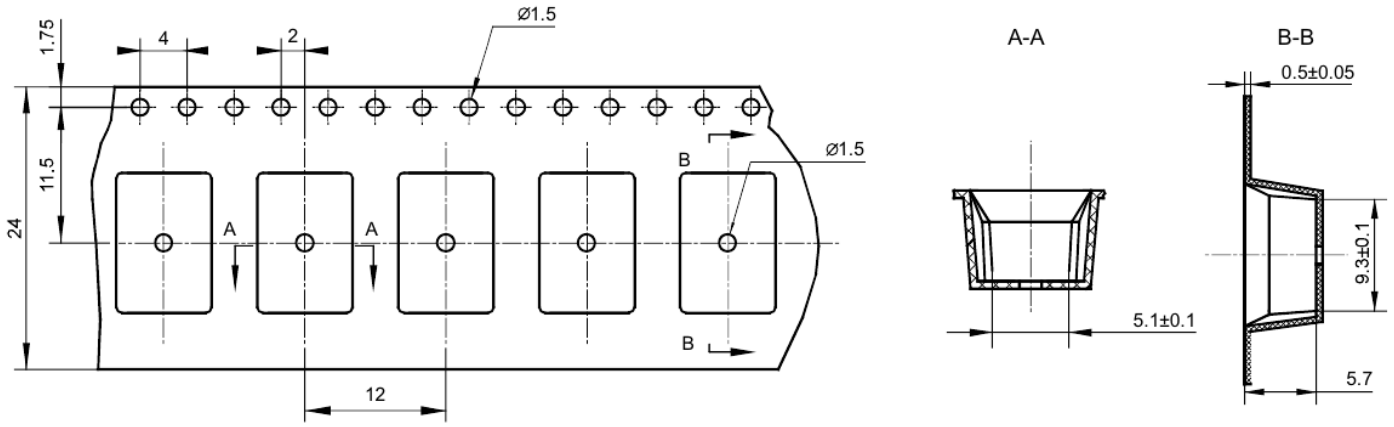
Reel Dimensions

.



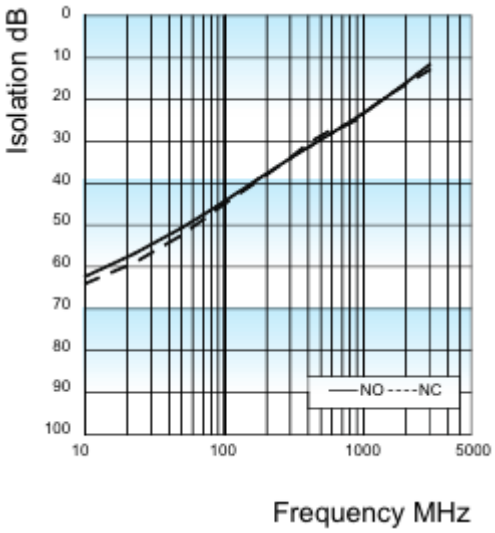
Tape Dimensions

(Standard SMT, Short terminal SMT)

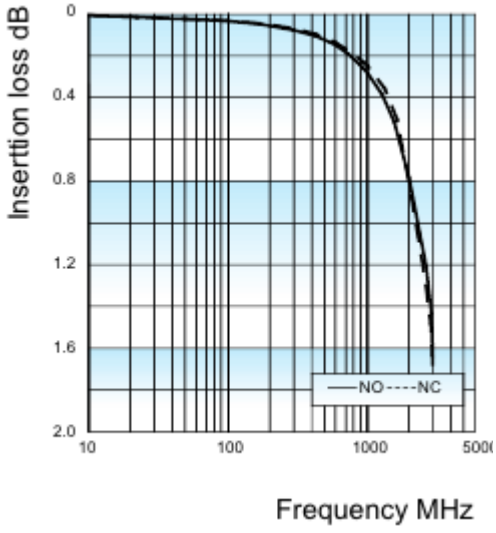


9. CHARACTERISTIC CURVES

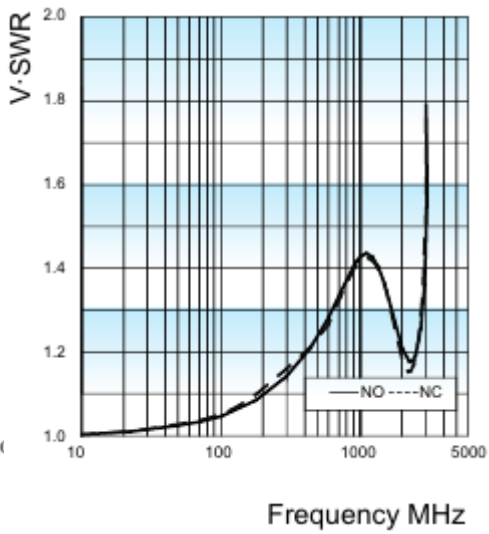
Isolation



Insertion Loss



Voltage Standard Wave Ration



Remark:

1) Ambient temperature condition is 23℃

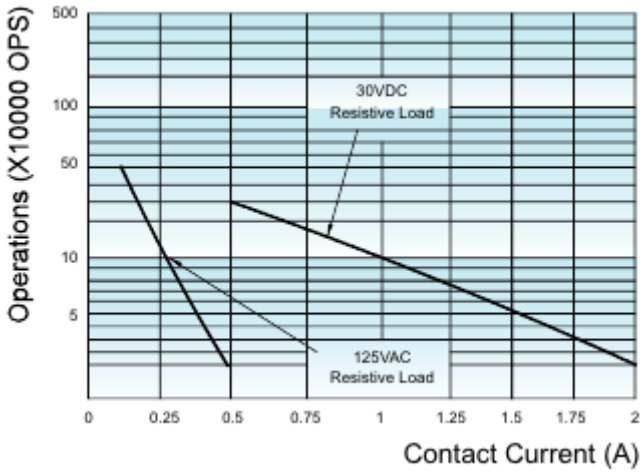
2) The data shown above are initial values.

3) The high-frequency characteristics will vary depending on the PCB board. Please be sure to check performance parameters including durability in actual equipment before use.

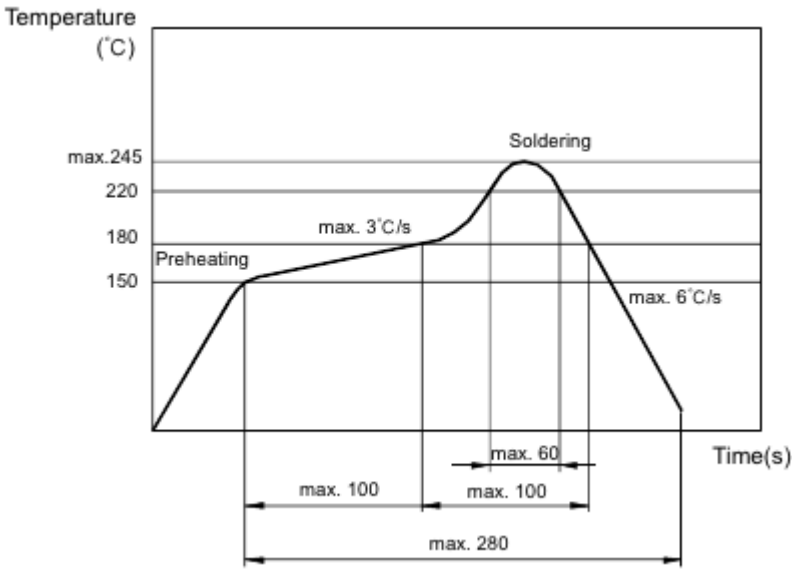
4) Test mode3l and specification: SB-XXSR, test instrument: keysight E5071C network analyzer, the characteristic impedance of the measurement system is 500Ω.

10. CHARACTERISTIC CURVES

Endurance Curve



Reflow welding, temperature on PCB board
Recommended welding temperature



Notice

1) This relay is highly sensitive polarized relay. If correct polarity is not applied to the coil terminals, the relay does not operate properly.
2) To avoid using relays under strong magnetic field which will change the parameters of relays such as pick-up voltage and drop-out voltage.
3) Relay is on the “reset” status when being released from stock, with the consideration of shock risen from transit and relay mounting. It should be changed to the “set” status when application(connecting to the power supply). Please reset the relay to “set” or “reset” status on request.
4) Energizing coil with rated voltage is basic for normal operation of a relay, please make sure the energized voltage to relay coil have reached the rated voltage. Regarding latching relay, in order to maintain the “set” or “reset” status, impulse width of the rated voltage applied to coil should be more than 5 times of “set” or “reset” time.
5) For a monosteady state relay, after the relay is reliably operated, if it needs to be kept under pressure, make sure that the effective value of the voltage is not less than 60% of the rated voltage.
6) The relay may be damaged because of falling or when shocking conditions exceed the requirement.
7) For SMT products, validation with real application should be done before your series production, if the reflow-soldering temperature curve is out of our recommendation. Generally, two-time reflow-soldering is not recommended for the relay. However, if two-time reflow-soldering is required, a 60min. interval should be guaranteed and a validation should be done before production.
8) Please use wave soldering or manual soldering for straight-in relay, If you need reflow welding, please confirm the feasibility with us.
9) Contact is recommended for suitable condition and specifications if water cleaning or surface process is involved in assembling relays on PCB
10) Regarding the plastic sealed relay, we should leave it cooling naturally until below 40℃ after welding, then clean it and deal with coating, remarkably the temperature of solvents should also be controlled below 40℃. Please avoid cleaning the relay by ultrasonic, avoid using the solvents like gasoline, freon and so on, which would affect the configuration of relay or influence the environment.
11) Relays packaged in moisture barrier bags meet MSL-3 requirements. The relays should be stored at ambient conditions of ≤30℃ and ≤60% RH after they are removed from their packaging, and should be used within 168 hours. If the relays cannot be used within 168 hours, please repack them or store them in a drying oven at 25℃±5℃, ≤10% RH. Otherwise, relays may be subjected to a soldering test to check their performance, or they may be used after keeping them in an oven for 72 hours at with 50℃±5℃, ≤30% RH.
12) When applied with continuous current, the heat from relay coil will age its isolation. Thus, please do not ground connected the coil to reduce electrical erosion if possible. And please provide protection circuit to avoid broken wire and losses.
13) Please make sure that there are no silicon-based substances (such as silicon rubber, silicon oil, silicon-based coating agents, silicon fillers, etc.) around the relay, because it will generates silicon-containing volatile gas, which may cause poor contact in case of silicon-containing volatile gas sticking on contact.
14) During the relay pick-up or drop-out processes, there are stages of contact pressure change, contact vibration and unstable contact etc. When the voltage applied to coil is gradually changed. It will lengthen the unstable and affect relay endurance. To reduce this influence, please apply step voltage (switching circuit) to relay coil.