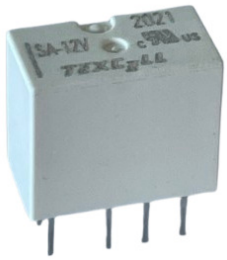
| Subminiature Signal Relay | SA |
|---|---|

Features

- Offers excellent board space savings
- Surge withstand voltage up to 2500V, meets FCC part 68 and Telecordia
- Meets IEC 62368-1
- SMT and DIP types available
- High contact capacity 2A
- Low power consumption
- Single side stable and latching type available




c UL us
(File No.:E122258)

## 1. COIL DATA (at 23°C)

### 1) Single side stable

| Nominal Voltage (VDC) | Pick-up Voltage (VDC) | Drop-out Voltage (VDC) | Max. Allowable Voltage (VDC) | Coil Resistance (Ω) | Coil Power (mW) |
|---|---|---|---|---|---|
| 1.5 | 1.13 | 0.15 | 3.0 | 16 x (1±10%) | 140 |
| 2.4 | 1.80 | 0.24 | 4.8 | 41 x (1±10%) | |
| 3 | 2.25 | 0.30 | 6 | 64.3 x (1±10%) | |
| 4.5 | 3.38 | 0.45 | 9 | 145 x (1±10%) | |
| 5 | 3.75 | 0.5 | 10 | 178 x (1±10%) | |
| 6 | 4.50 | 0.6 | 12 | 257 x (1±10%) | |
| 9 | 6.75 | 0.9 | 18 | 579 x (1±10%) | |
| 12 | 9 | 1.2 | 24 | 1028 x (1±10%) | |
| 24 | 18 | 2.4 | 48 | 2504 x (1±10%) | 230 |

### 2) 1 coil latching

| Nominal Voltage (VDC) | Set Voltage (VDC) max. | Reset Voltage (VDC) max. | Max Allowable Voltage (VDC) | Coil Resistance (Ω) | Coil Power (mW) |
|---|---|---|---|---|---|
| 1.5 | 1.13 | 1.13 | 3.0 | 22.5 x (1±10%) | 100 |
| 2.4 | 1.80 | 1.80 | 4.8 | 58 x (1±10%) | |
| 3 | 2.25 | 2.25 | 6 | 90 x (1±10%) | |
| 4.5 | 3.38 | 3.38 | 9 | 203 x (1±10%) | |
| 5 | 3.75 | 3.75 | 10 | 250 x (1±10%) | |
| 6 | 4.50 | 4.50 | 12 | 360 x (1±10%) | |
| 9 | 6.75 | 6.75 | 18 | 810 x (1±10%) | |
| 12 | 9 | 9 | 24 | 1440 x (1±10%) | |
| 24 | 18 | 18 | 48 | 4800 x (1±10%) | 120 |



© Texcell Co., Ltd. All rights reserved.

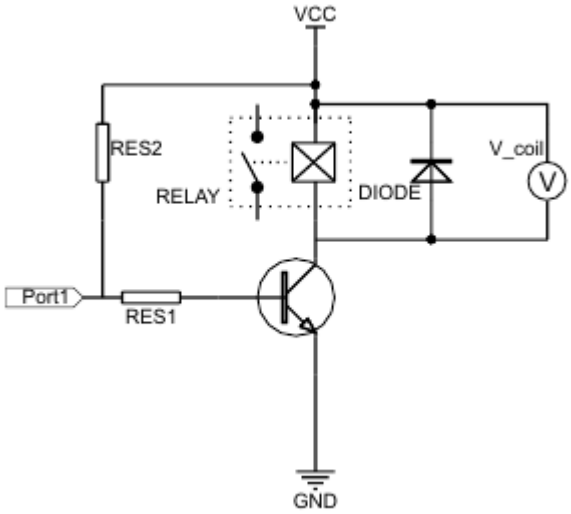
**Note**:

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.



© Texcell Co., Ltd. All rights reserved.

## 2. CONTACT DATA

| | | |
|---|---|---|
| Contact Arrangement | | 2 Form C |
| Contact Resistance | | 100mΩ max. (at 10mA 30mVDC) |
| Contact Material | | AgNi + Au plated |
| Contact Ratings (Resistive load) | | 1A 30VDC<br>2A 30VDC<br>1A 60VDC<br>0.5A 110VDC<br>0.5A 125VAC<br>1A 125VAC |
| Max. Switching Voltage | | 250VAC / 220VDC |
| Max. Switching Current | | 4A |
| Max. Switching Power | | 125VA / 120W |
| Min. applicable load[1)] | | 10mV 10μA |
| Life Expectancy | Electrical | 100,000 operations (at 1A 30VDC, 0.5A 125VAC) |
| | Mechanical | 100,000,000 operations |

## 3. CHARACTERISTICS

| | | |
|---|---|---|
| Insulation Resistance | | 1000MΩ (at 500VDC) |
| Dielectric Strength | Open Contacts | 750VAC 1mm |
| | Coil and Contacts | 1500VAC 1min |
| | Contact Sets | 1800VAC 1min |
| Surge withstand voltage<br>Between open contacts (10/160μs)<br>Between coil & contacts (2/10μs) | | 1500V (FCC part 68)<br>2500V (Telecordia) |
| Operate Time (Set Time) | | 3ms max. |
| Release Time (Reset Time) | | 3ms max. |
| 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. 1.1g |
| Moisture sensitivity levels<br>(Only for SMT type, JEDEC-STD-020) | | MSL3 |
| Outline Dimension (L x W x H) | | 10.6 x 5.7 x 9.0mm |



**© Texcell Co., Ltd. All rights reserved.**

**Notes**: The data shown above are initial values.

## 4. SAFETY APPROVAL

| | |
|---|---|
| UL / cUL | 1A 30VDC at 85℃<br>2A 30VDC at 85℃<br>1A 60VDC at 105℃<br>0.5A 110VDC at 85℃<br>0.5A 125VAC at 85℃<br>1A 125VAC at 85℃ |

**Notes**: 1) All values unspecified are at room temperature

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

## 5. ORDERING INFORMATION

| SA - 12V L1 S R<br>① ② ③ ④ ⑤ | |
|---|---|
| ① Relay Model | SA |
| 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<br>L1: 1 coil latching |
| ④ Termination | Nil: DIP<br>S: Standard SMT<br>S1: Short terminal SMT |
| ⑤ Packing | Nil: Tube packing (Only for DIP type)<br>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.

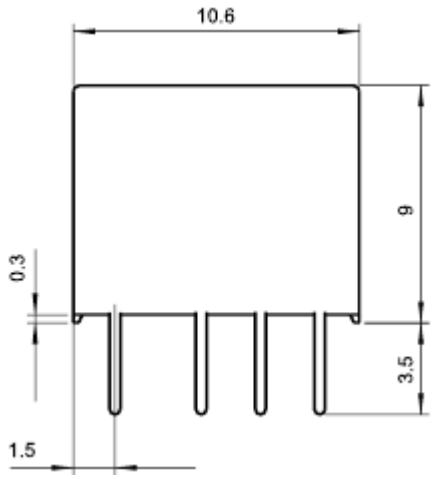


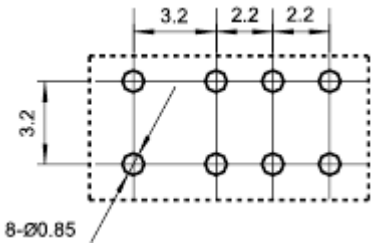
© Texcell Co., Ltd. All rights reserved.

6. DIMENSIONS (Unit: mm)

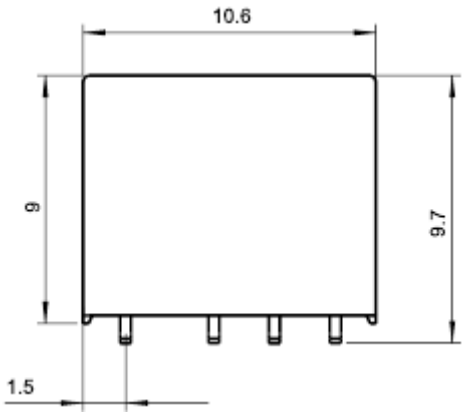
Outline Dimensions PCB Layout (Bottom view)

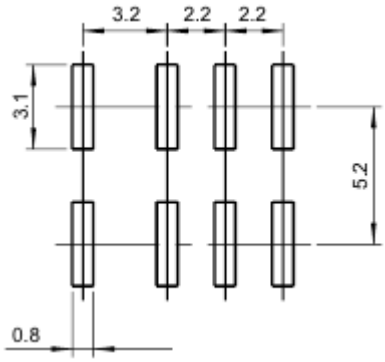
**DIP type**



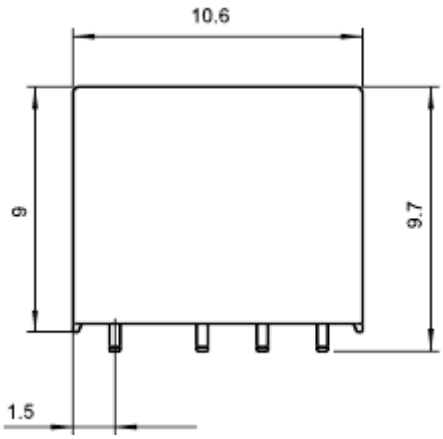



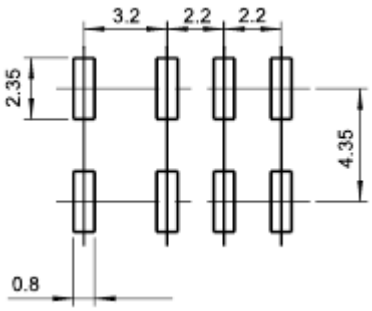

**Standard SMT type**




**Short terminal SMT type**



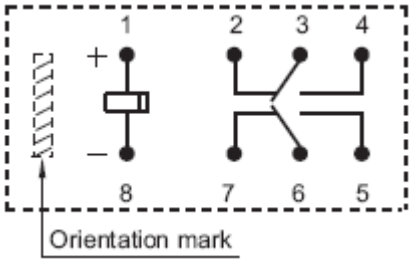






© Texcell Co., Ltd. All rights reserved.

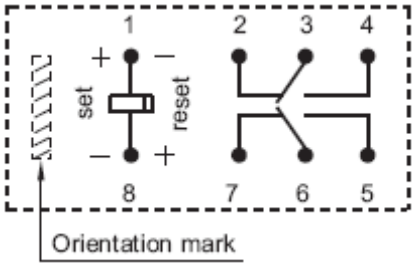
Wiring Diagram (Bottom View)

Single side stable




No energized condition

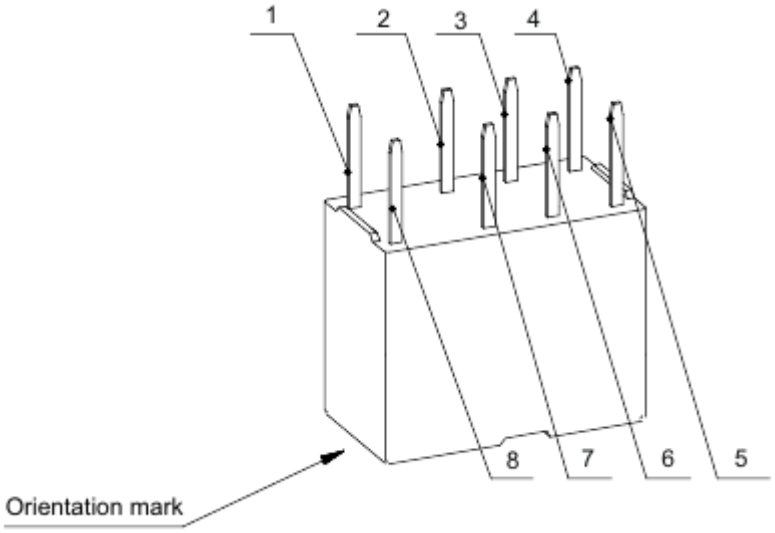
1 coil latching




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.

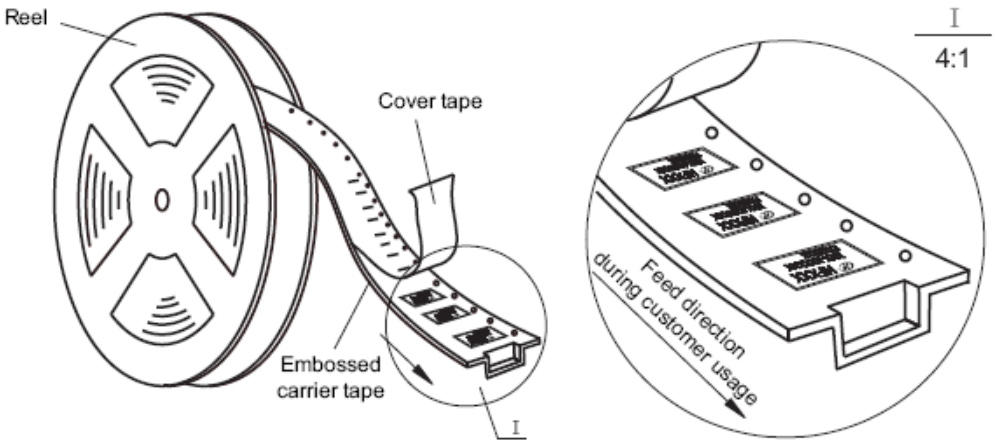
3) The width of the gridding is 2.5mm.



**© Texcell Co., Ltd. All rights reserved.**

7. TAPE  PACKING (Unit: mm)

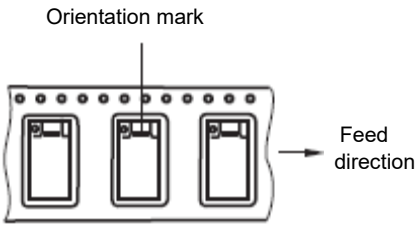
Direction of Relay Insertion

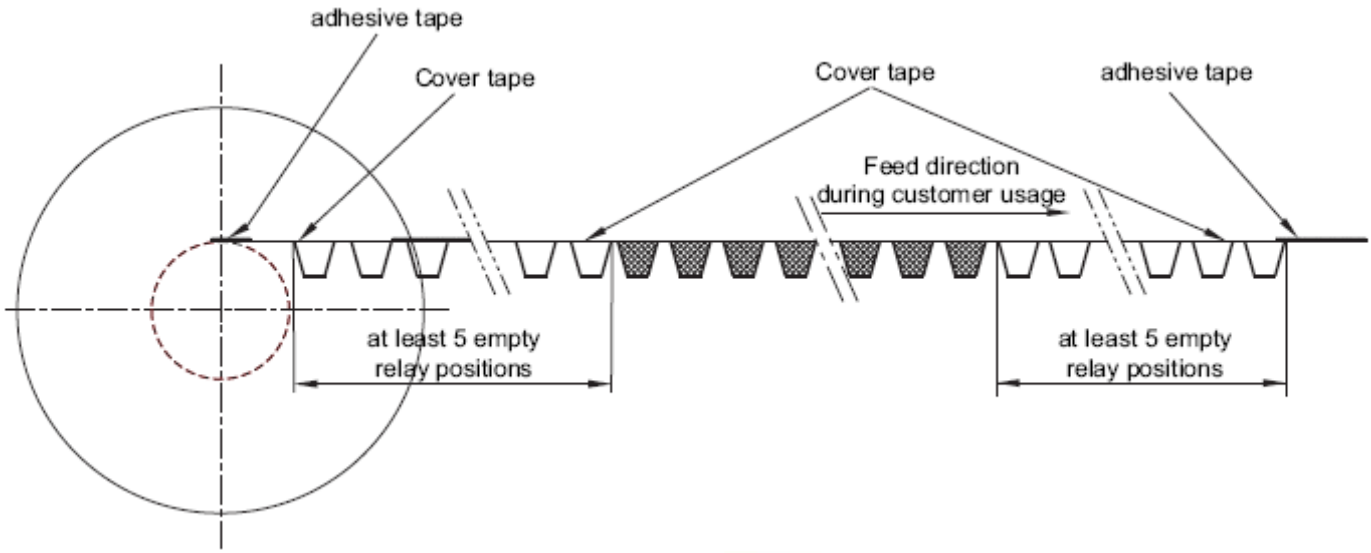



**Note:**

1) Packing: 500pcs/reel, 4 reels/carton

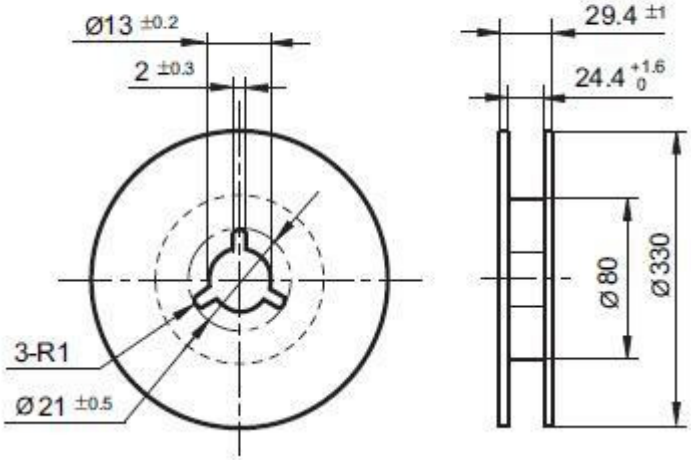
2) MOQ for reel packing is 500pcs




Reel Dimensions

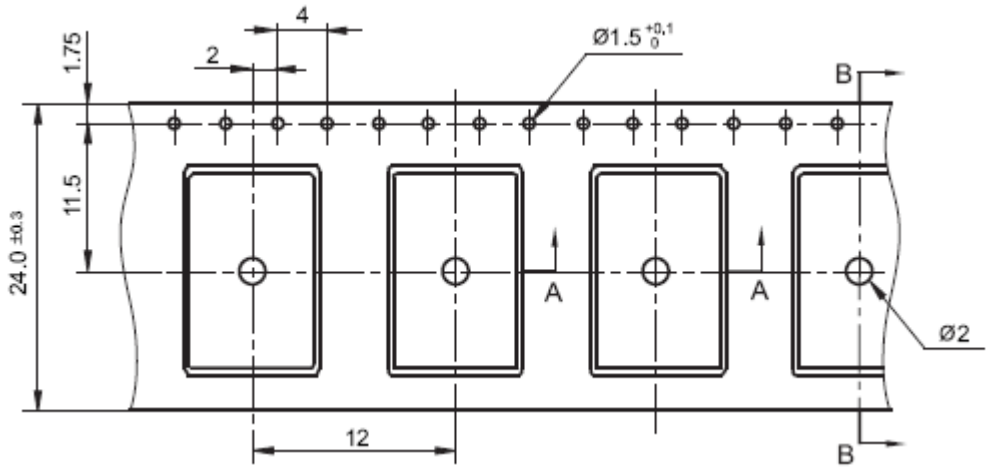
.



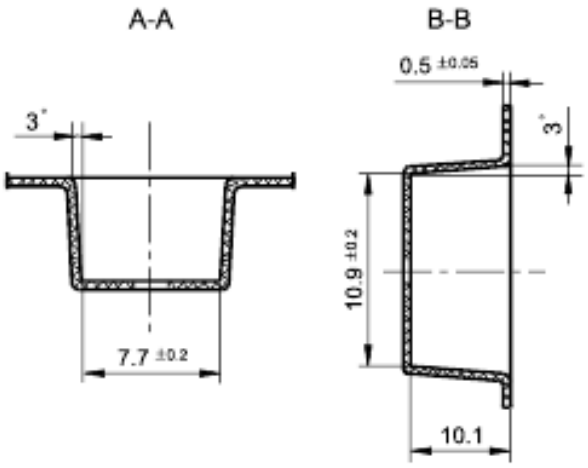



© Texcell Co., Ltd. All rights reserved.

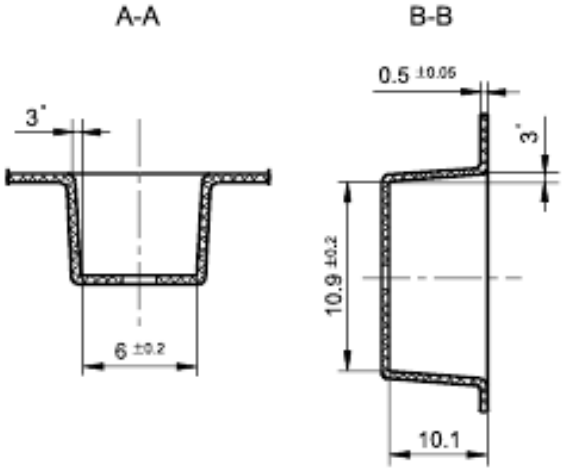
Tape Dimensions




**Standard SMT type**




**Short terminal SMT type**




**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.

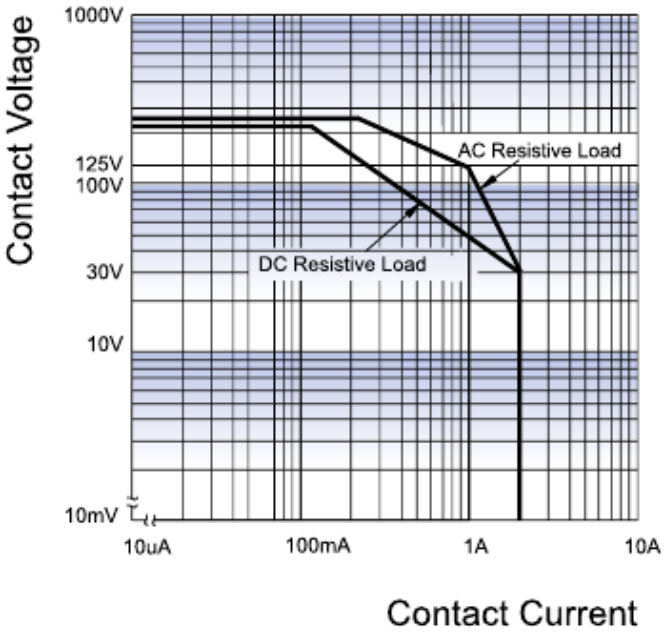
3) The width of the gridding is 2.54mm.



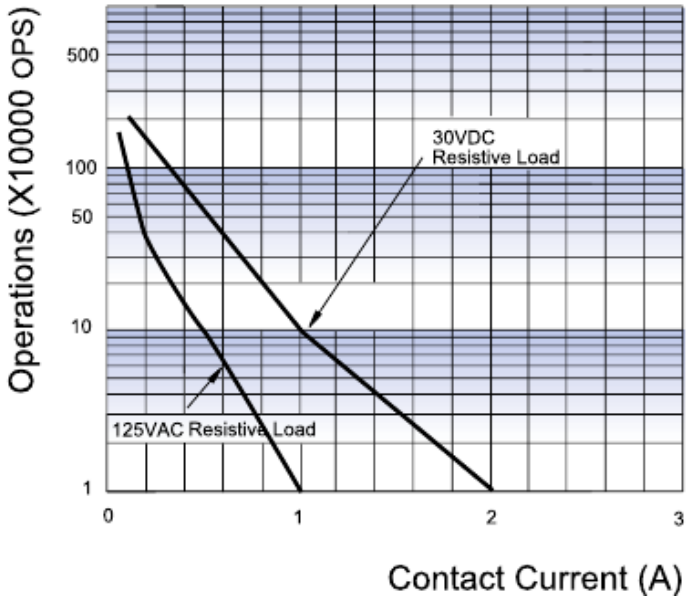
© Texcell Co., Ltd. All rights reserved.

## 8. CHARACTERISTIC CURVES

Maximum Switching Power

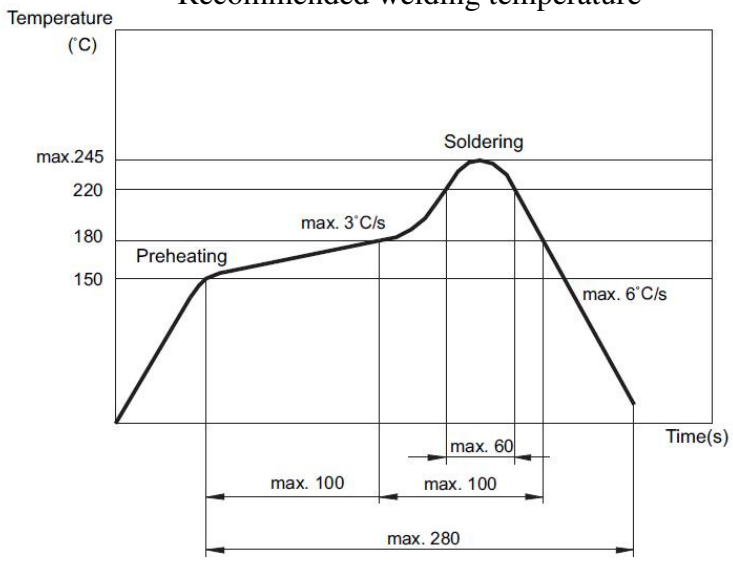



Endurance Curve




Reflow welding, temperature on PCB board

Recommended welding temperature






© Texcell Co., Ltd. All rights reserved.

**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.



© Texcell Co., Ltd. All rights reserved.