Panasonic
ideas for life

# 1a 8A, 1a1b/2a 5A small polarized power relays

# DSP RELAYS

**RoHS compliant**

## FEATURES

1. **Compact with high contact rating**
   Even with small 10 mm .394 inch (H) x 11 mm .433 inch (W) x 20 mm .787 inch (L) (dimensions, high capacity switching is provided: 1a, 8 A 250 V AC; 2a and 1a1b, 5 A 250 V AC.
2. **High switching capability**
   High contact pressure, low contact bounce, and wiping operation improve resistance to weld bonding. Resistant against lamp load and dielectric loading: 1a achieves maximum switching capacity of 2,000 VA (8A 250 V AC).
3. **High sensitivity**
   Using the same type of high-performance polar magnetic circuits as DS relays, by matching the spring load to the magnetic force of attraction, greater sensitivity has been achieved. The resultant pick up sensitivity of about 190 mW makes possible direct driving of transistors and chips.
4. **High breakdown voltage**
   Breakdown voltage has been raised by keeping the coil and contacts separate.

| Between contact and coil | Between contacts |
|---|---|
| 3,000 Vrms for 1 min. 5,000 V surge breakdown voltage | 1,000 Vrms for 1 min. 1,500 V surge breakdown voltage |

Conforms with FCC Part 68

5. **Latching types available**
6. **Wide variation**
   Three types of contact arrangement are offered: 1a, 2a, and 1a1b. In addition, each is available in standard and reversed polarity types.
7. **Sealed construction allows automatic washing.**
8. **Complies with safety standards**
   Complies with Japan Electrical Appliance and Material Safety Law requirements for operating 200 V power supply circuits, and complies with UL, CSA, and TÜV safety standards.
9. **Sockets are available.**

## TYPICAL APPLICATIONS

1. **Office and industrial electronic devices**
2. **Terminal devices of information processing equipment, such as printer, data recorder.**
3. **Office equipment (copier, facsimile)**
4. **Measuring instruments**
5. **NC machines, temperature controllers and programmable logic controllers.**



## ORDERING INFORMATION

DSP □ - □ - □ - □ - □

Contact arrangement
1a: 1 Form A
1: 1 Form A 1 Form B
2a: 2 Form A

Operating function
Nil: Single side stable
L2: 2 coil latching

Nominal coil voltage
DC 3, 5, 6, 9, 12, 24 V

Polarity
Nil: Standard polarity
R: Reverse polarity

Contact material
• $AgSnO_2$ type
F: 1 Form A 1 Form B
Nil: 1 Form A, 2 Form A

Notes: 1. Reverse polarity types available (add suffix-R)
2. Certified by UL, CSA and TÜV

# TYPES

| Contact arrangement | Nominal coil voltage | Single side stable | 2 coil latching |
|---|---|---|---|
| | | Part No. | Part No. |
| 1 Form A | 3V DC | DSP1a-DC3V | DSP1a-L2-DC3V |
| | 5V DC | DSP1a-DC5V | DSP1a-L2-DC5V |
| | 6V DC | DSP1a-DC6V | DSP1a-L2-DC6V |
| | 9V DC | DSP1a-DC9V | DSP1a-L2-DC9V |
| | 12V DC | DSP1a-DC12V | DSP1a-L2-DC12V |
| | 24V DC | DSP1a-DC24V | DSP1a-L2-DC24V |
| 1 Form A 1 Form B | 3V DC | DSP1-DC3V-F | DSP1-L2-DC3V-F |
| | 5V DC | DSP1-DC5V-F | DSP1-L2-DC5V-F |
| | 6V DC | DSP1-DC6V-F | DSP1-L2-DC6V-F |
| | 9V DC | DSP1-DC9V-F | DSP1-L2-DC9V-F |
| | 12V DC | DSP1-DC12V-F | DSP1-L2-DC12V-F |
| | 24V DC | DSP1-DC24V-F | DSP1-L2-DC24V-F |
| 2 Form A | 3V DC | DSP2a-DC3V | DSP2a-L2-DC3V |
| | 5V DC | DSP2a-DC5V | DSP2a-L2-DC5V |
| | 6V DC | DSP2a-DC6V | DSP2a-L2-DC6V |
| | 9V DC | DSP2a-DC9V | DSP2a-L2-DC9V |
| | 12V DC | DSP2a-DC12V | DSP2a-L2-DC12V |
| | 24V DC | DSP2a-DC24V | DSP2a-L2-DC24V |

Standard packing: Carton: 50 pcs.; Case: 500 pcs.
Note: Reverse polarity type are manufactured by lot upon receipt of order. Self-clinching types are also available, please consult us.
* For sockets, see page 100.

# RATING

### 1. Coil data

1) Single side stable

| Nominal coil voltage | Pick-up voltage (at 20°C 68°F) | Drop-out voltage (at 20°C 68°F) | Nominal operating current [±10%] (at 20°C 68°F) | Coil resistance [±10%] (at 20°C 68°F) | Nominal operating power | Max. applied voltage (at 20°C 68°F) |
|---|---|---|---|---|---|---|
| 3V DC | 80%V or less of nominal voltage (Initial) | 10%V or more of nominal voltage (Initial) | 100mA | 30Ω | 300mW | 130%V of nominal voltage |
| 5V DC | | | 60mA | 83Ω | | |
| 6V DC | | | 50mA | 120Ω | | |
| 9V DC | | | 33.3mA | 270Ω | | |
| 12V DC | | | 25mA | 480Ω | | |
| 24V DC | | | 12.5mA | 1,920Ω | | |

2) 2 coil latching

| Nominal coil voltage | Set voltage (at 20°C 68°F) | Reset voltage (at 20°C 68°F) | Nominal operating current [±10%] (at 20°C 68°F) | | Coil resistance [±10%] (at 20°C 68°F) | | Nominal operating power | | Max. applied voltage (at 20°C 68°F) |
|---|---|---|---|---|---|---|---|---|---|
| | | | Set coil | Reset coil | Set coil | Reset coil | Set coil | Reset coil | |
| 3V DC | 80%V or less of nominal voltage (Initial) | 80%V or less of nominal voltage (Initial) | 100mA | 100mA | 30Ω | 30Ω | 300mW | 300mW | 130%V of nominal voltage |
| 5V DC | | | 60mA | 60mA | 83Ω | 83Ω | | | |
| 6V DC | | | 50mA | 50mA | 120Ω | 120Ω | | | |
| 9V DC | | | 33.3mA | 33.3mA | 270Ω | 270Ω | | | |
| 12V DC | | | 25mA | 25mA | 480Ω | 480Ω | | | |
| 24V DC | | | 12.5mA | 12.5mA | 1,920Ω | 1,920Ω | | | |

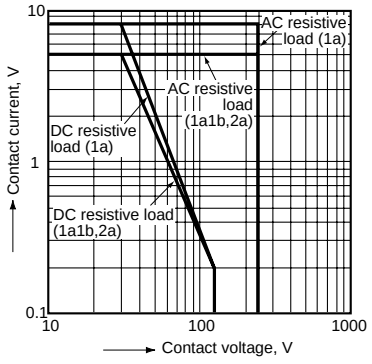
## 2. Specifications

| Characteristics | Item | | Specifications | | |
|---|---|---|---|---|---|
| Contact | Arrangement | | 1 Form A | 1 Form A 1 Form B | 2 Form A |
| | Contact resistance (Initial) | | Max. 30 mΩ (By voltage drop 6 V DC 1A) | | |
| | Contact material | | Au-flashed $AgSnO_2$ type | | |
| Rating | Nominal switching capacity (resistive load) | | 8 A 250 V AC, 5A 30V DC | 5 A 250 V AC, 5 A 30 V DC | |
| | Max. switching power (resistive load) | | 2,000 VA, 150 W | 1,250 VA, 150 W | |
| | Max. switching voltage | | 250 V AC, 125 V DC | | |
| | Max. switching current | | 8 A AC, 5 A DC | 5 A AC, DC | |
| | Nominal operating power | | 300 mW | | |
| | Min. switching capacity (Reference value)*1 | | 10m A 5 V DC | | |
| Electrical characteristics | Insulation resistance (Initial) | | Min. 1,000MΩ (at 500V DC) Measurement at same location as “Breakdown voltage” section. | | |
| | Breakdown voltage (Initial) | Between open contacts | 1,000 Vrms for 1min. (Detection current: 10mA.) | | |
| | | Between contact sets | 2,000 Vrms (1 Form A 1 Form B, 2 Form A) (Detection current: 10mA.) | | |
| | | Between contact and coil | 3,000 Vrms for 1min. (Detection current: 10mA.) | | |
| | Surge breakdown voltage*2 | between contacts and coil | 5,000 V | | |
| | Temperature rise (coil) (at 65°C 149°F) | | Max. 55°C | Max. 40°C | Max. 55°C |
| | Operate time [Set time] (at 20°C 68°F) | | Max. 10 ms [10 ms] (Nominal coil voltage applied to the coil, excluding contact bounce time.) | | |
| | Release time [Reset time] (at 20°C 68°F) | | Max. 5 ms [10 ms] (Nominal coil voltage applied to the coil, excluding contact bounce time.) (without diode) | | |
| Mechanical characteristics | Shock resistance | Functional | Min. 196 m/s² (Half-wave pulse of sine wave: 11 ms; detection time: 10µs.) | | |
| | | Destructive | Min. 980 m/s² (Half-wave pulse of sine wave: 6 ms.) | | |
| | Vibration resistance | Functional | 10 to 55 Hz at double amplitude of 2 mm (Detection time: 10µs.) | | |
| | | Destructive | 10 to 55 Hz at double amplitude of 3.5 mm | | |
| Expected life | Mechanical | | Min. $5\times10^7$ (at 180 times/min.) | | |
| | Electrical | | Min. $10^5$ (resistive load) | | |
| Conditions | Conditions for operation, transport and storage*3 (Not freezing and condensing at low temperature) | | Ambient temperature: –40°C to +60°C –40°F to +140°F | Ambient temperature: –40°C to +65°C –40°F to +149°F | Ambient temperature: –40°C to +60°C –40°F to +140°F |
| | Solder heating | | 250°C 482°F (10s), 300°C 572°F (5s), 350°C 662°F (3s) (Soldering depth: 2/3 terminal pitch) | | |
| | Max. operating speed | | 3 cps | | |
| Unit weight | | | Approx. 4.5 g .16 oz | | |

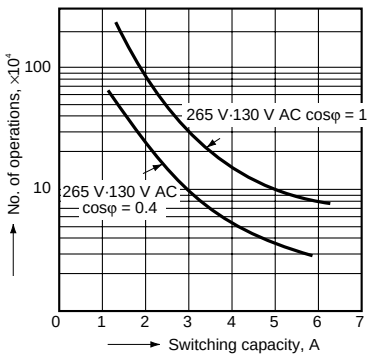
Notes: *1. This value can change due to the switching frequency, environmental conditions, and desired reliability level, therefore it is recommended to check this with the actual load.
*2. Wave is standard shock voltage of ±1.2×50µs according to JEC-212-1981
*3. The upper limit of the ambient temperature is the maximum temperature that can satisfy the coil temperature rise value. Refer to Usage, transport and storage conditions in NOTES.

# REFERENCE DATA

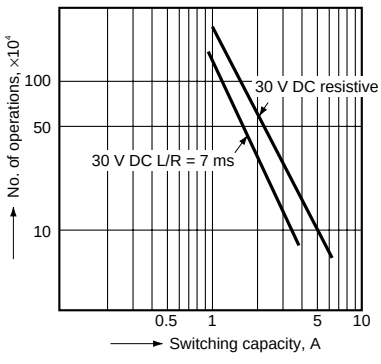
1. Max. switching capacity



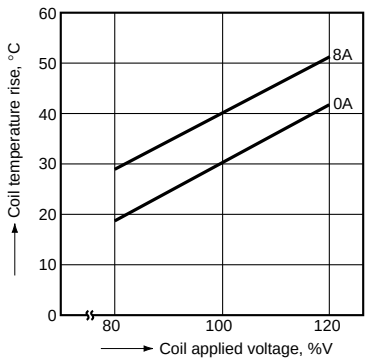

2.-(1) Life curve (1 Form A 1 Form B)



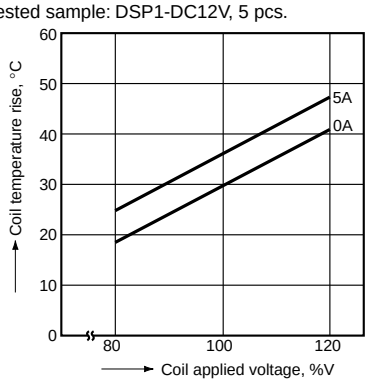

2.-(2) Life curve (1 Form A 1 Form B)



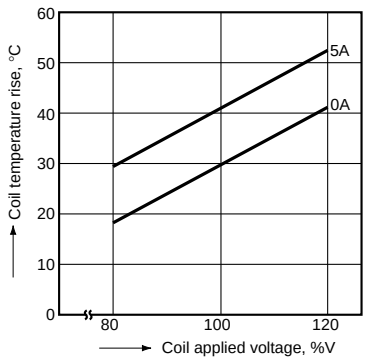

3.-(1) Coil temperature rise (1 Form A)
Tested sample: DSP1a-DC12V, 5 pcs.



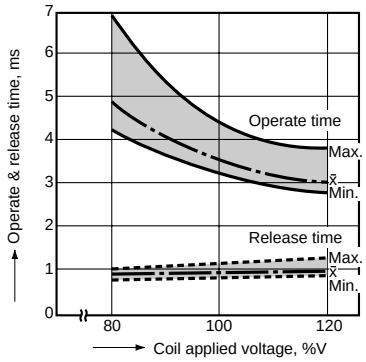

3.-(2) Coil temperature rise (1 Form A 1 Form B)
Tested sample: DSP1-DC12V, 5 pcs.



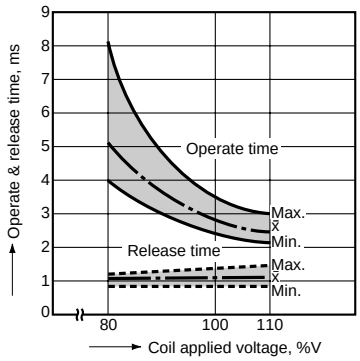

3.-(3) Coil temperature rise (2 Form A)
Tested sample: DSP2a-DC12V, 5 pcs.



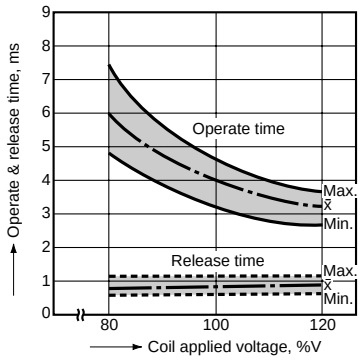
4.-(1) Operate & release time
(without diode, 1 Form A)
Tested sample: DSP1a-DC12V, 5 pcs.



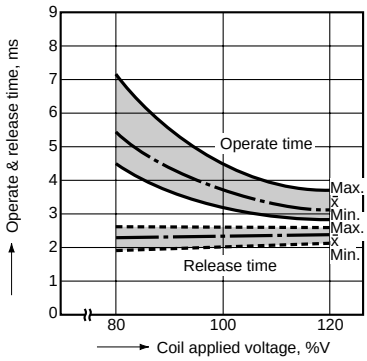

4.-(2) Operate & release time
(without diode, 1 Form A 1 Form B)
Tested sample: DSP1-DC12V, 5 pcs.



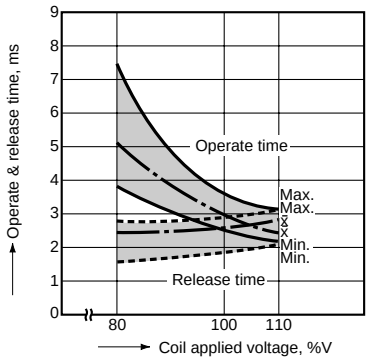

4.-(3) Operate & release time
(without diode, 2 Form A)
Tested sample: DSP2a-DC12V, 5 pcs.)



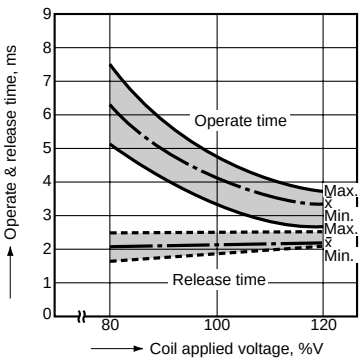

4.-(4) Operate & release time
(with diode, 1 Form A)
Tested sample: DSP1a-DC12V, 5 pcs.



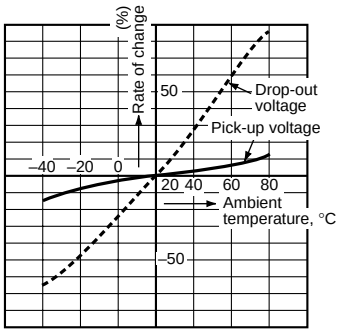

4.-(5) Operate & release time
(with diode, 1 Form A 1 Form B)
Tested sample: DSP1-DC12V, 5 pcs.



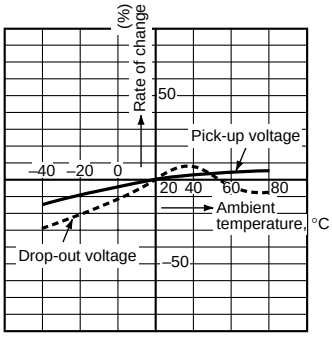

4.-(6) Operate & release time
(with diode, 2 Form A)
Tested sample: DSP2a-DC12V, 5 pcs.



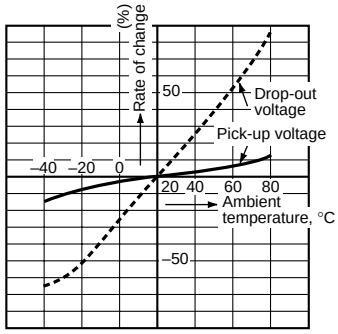

5.-(1) Change of pick-up and drop-out voltage
(1 Form A)
Tested sample: DSP1a-DC12V, 5 pcs.



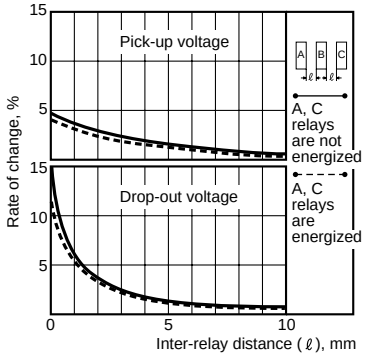

5.-(2) Change of pick-up and drop-out voltage
(1 Form A 1 Form B)
Tested sample: DSP1-DC12V, 5 pcs.



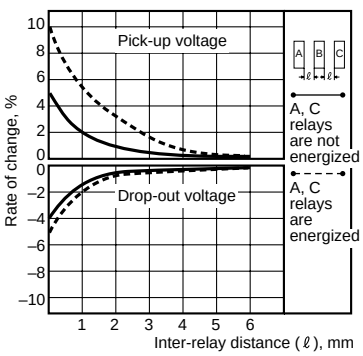

5.-(3) Change of pick-up and drop-out voltage
(2 Form A)
Tested sample: DSP2a-DC12V, 5 pcs.



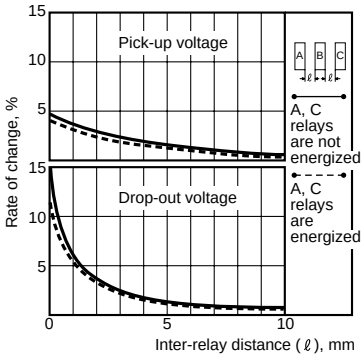

6.-(1) Influence of adjacent mounting
(1 Form A)
Tested sample: DSP1a-DC12V, 5 pcs.




6.-(2) Influence of adjacent mounting
(1 Form A 1 Form B)
Tested sample: DSP1-DC12V, 5 pcs.




6.-(3) Influence of adjacent mounting
(2 Form A)
Tested sample: DSP2a-DC12V, 5 pcs.



# DIMENSIONS (mm inch)

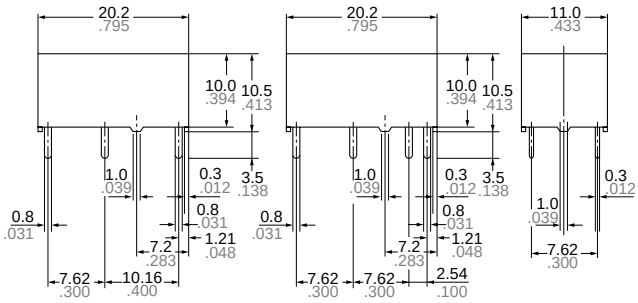
The CAD data of the products with a **CAD Data** mark can be downloaded from: http://industrial.panasonic.com/ac/e/

## 1. 1 Form A type

**CAD Data**

External dimensions

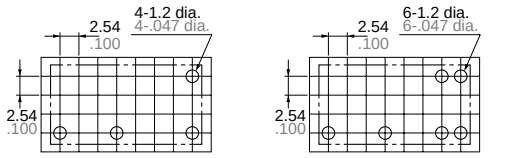
Single side stable 2 coil latching




General tolerance: ±0.3 ±.012

PC board pattern (Bottom view)

Single side stable 2 coil latching




Tolerance: ±0.1 ±.004

Schematic (Bottom view)

Single side stable 2 coil latching

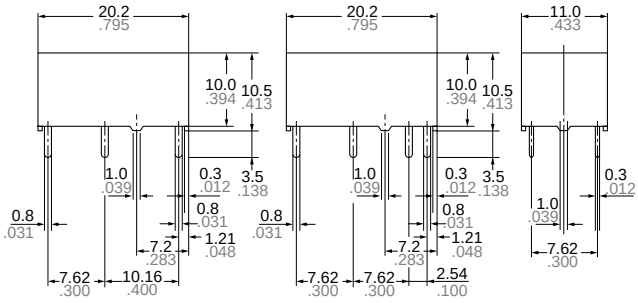

(Deenergized condition) (Reset condition)

## 2. 1 Form A 1 Form B type

**CAD Data**

External dimensions

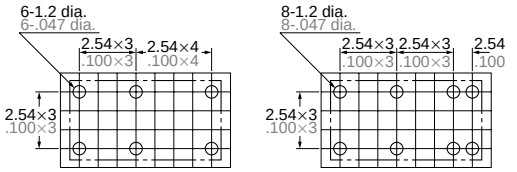
Single side stable 2 coil latching




General tolerance: ±0.3 ±.012

PC board pattern (Bottom view)

Single side stable 2 coil latching




Tolerance: ±0.1 ±.004

Schematic (Bottom view)

Single side stable 2 coil latching

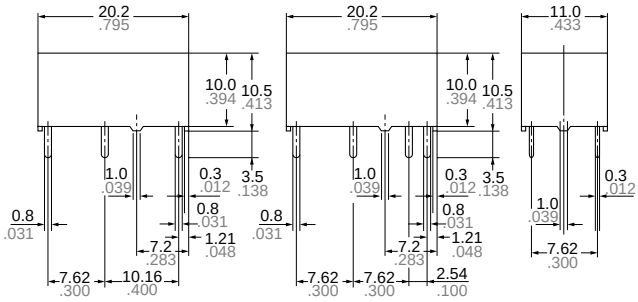

(Deenergized condition) (Reset condition)

## 3. 2 Form A type

**CAD Data**

External dimensions

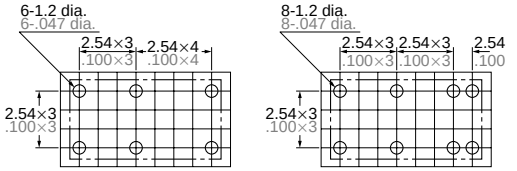
Single side stable 2 coil latching




General tolerance: ±0.3 ±.012

PC board pattern (Bottom view)

Single side stable 2 coil latching




Tolerance: ±0.1 ±.004

Schematic (Bottom view)

Single side stable 2 coil latching


(Deenergized condition) (Reset condition)

## SAFETY STANDARDS

| Item | UL/C-UL (Recognized) | | CSA (Certified) | | TÜV (Certified) | |
|---|---|---|---|---|---|---|
| | File No. | Contact rating | File No. | Contact rating | File No. | Rating |
| 1 Form A | E43028 | 8A 250V AC<br>1/6HP 125, 250V AC<br>5A 30V DC | LR26550<br>etc. | 8A 250V AC<br>1/6HP 125, 250V AC<br>5A 30V DC | B 02 10<br>13461 238 | 8A 250V AC (cos$\phi$=1.0)<br>5A 250V AC (cos$\phi$=0.4)<br>5A 30V DC |
| 1 Form A<br>1 Form B | E43028 | 5A 250V AC<br>1/6HP 125, 250V AC<br>5A 30V DC | LR26550<br>etc. | 5A 250V AC<br>1/6HP 125, 250V AC<br>5A 30V DC | B 02 10<br>13461 238 | 5A 250V AC (cos$\phi$=1.0)<br>3A 250V AC (cos$\phi$=0.4)<br>5A 30V DC |
| 2 Form A | E43028 | 5A 250V AC<br>1/10HP 125, 250V AC<br>5A 30V DC | LR26550<br>etc. | 5A 250V AC<br>1/10HP 125, 250V AC<br>5A 30V DC | B 02 10<br>13461 238 | 5A 250V AC (cos$\phi$=1.0)<br>3A 250V AC (cos$\phi$=0.4)<br>5A 30V DC |

* Remarks: The standard certified for may differ depending on where the product was manufactured.

## NOTES

**1. Soldering conditions**

Please obey the following conditions when soldering automatically.

1) Preheating: Within 120°C 248°F and within 120 seconds

2) Soldering iron: 260°C±5°C 500°F±41°F and within 6 seconds

**2. Cleaning**

For automatic cleaning, the boiling method is recommended. Avoid ultrasonic cleaning which subjects the relays to high frequency vibrations, which may cause the contacts to stick.

It is recommended that a fluorinated hydrocarbon or other alcoholic solvents be used.

**3. External magnetic field**

Since DY relays are highly sensitive polarized relays, their characteristics will be affected by a strong external magnetic field. Avoid using the relay under that condition.

**4. Coil operating power**

Pure DC current should be applied to the coil. The wave form should be rectangular. If it includes ripple, the ripple factor should be less than 5%.

However, check it with the actual circuit since the characteristics may be slightly different.

**5. When using, please be aware that the a contact and b contact sides of 1 Form A and 1 Form B types may go on simultaneously at operate time and release time.**

## For Cautions for Use.