



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

DSP RELAYS



Protective construction: Sealed type

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 highperformance 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

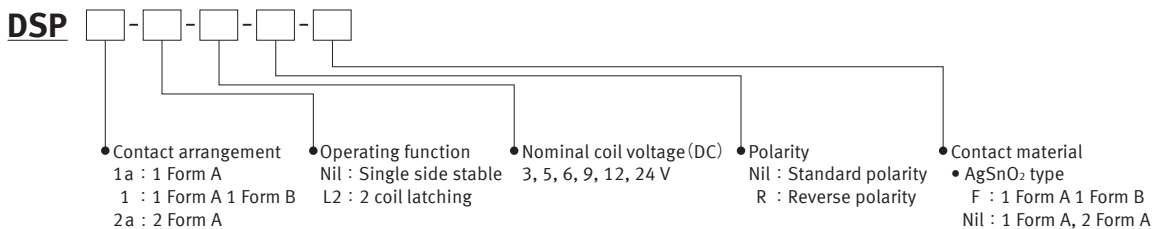
Complies with Japan Electrical Appliance and Material Safety Law requirements for operating 200 V power supply circuits, and complies with UL, CSA, and TÜV safety standards.

9. Sockets are available

TYPICAL APPLICATIONS

- Office and industrial electronic devices
- Terminal devices of information processing equipment, such as printer, data recorder
- Office equipment (copier, facsimile)
- Measuring instruments
- NC machines, temperature controllers and programmable logic controllers

ORDERING INFORMATION



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.

* **Sockets available.**

RATING

1.Coil data

- Operating characteristics such as 'Operate voltage' and 'Release voltage' are influenced by mounting conditions, ambient temperature, etc. Therefore, please use the relay within $\pm 5\%$ of rated coil voltage.
- 'Initial' means the condition of products at the time of delivery.

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 [$\pm 10\%$] (at 20°C 68°F) | Coil resistance [$\pm 10\%$] (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) | 100 mA | 30Ω | 300mW | 130%V of nominal voltage |
| 5V DC | | | 60 mA | 83Ω | | |
| 6V DC | | | 50 mA | 120Ω | | |
| 9V DC | | | 33.3mA | 270Ω | | |
| 12V DC | | | 25 mA | 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 [$\pm 10\%$] (at 20°C 68°F) | | Coil resistance [$\pm 10\%$] (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) | 100 mA | 100 mA | 30Ω | 30Ω | 300mW | 300mW | 130%V of nominal voltage |
| 5V DC | | | 60 mA | 60 mA | 83Ω | 83Ω | | | |
| 6V DC | | | 50 mA | 50 mA | 120Ω | 120Ω | | | |
| 9V DC | | | 33.3mA | 33.3mA | 270Ω | 270Ω | | | |
| 12V DC | | | 25 mA | 25 mA | 480Ω | 480Ω | | | |
| 24V DC | | | 12.5mA | 12.5mA | 1,920Ω | 1,920Ω | | | |

2. Specifications

| Characteristics | Item | Specifications | | |
|--|--|---|--|---|
| | | 1 Form A | 1 Form A 1 Form B | 2 Form A |
| 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 AgSnO2 type | | |
| Rating | Nominal switching capacity (resistive load) | 8 A 250 V AC, 5 A 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 (0.2 A) | | |
| | 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 (Initial) | between contacts and coil | 5,000 V | |
| | Operate time [Set time] (at 20°C 68°F) (Initial) | 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) (Initial) | 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/s ² (Half-wave pulse of sine wave: 11 ms; detection time: 10μs.) | |
| | | Destructive | Min. 980 m/s ² (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. 5×10 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 |
| | Max. operating speed | 3 cps | | |
| Unit weight | Approx. 4.5 g .16 oz | | | |

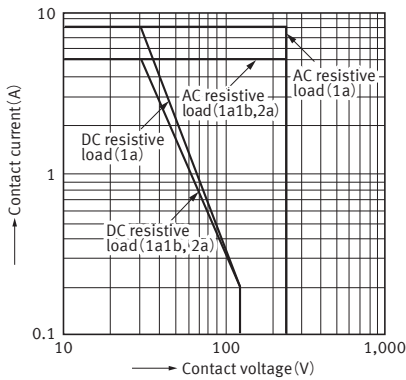
Notes: *1. This value can change due to the switching frequency, environmental conditions, and desired reliability level, therefore it is recommended to check this with the actual load.

*2. Wave is standard shock voltage of ±1.2×50μs according to JEC-212-1981

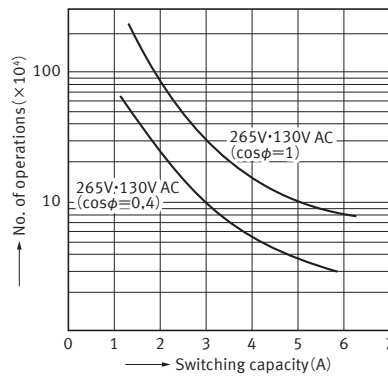
*3. The upper limit of the ambient temperature is the maximum temperature that can satisfy the coil temperature rise value. Refer to Usage, transport and storage conditions in NOTES.

REFERENCE DATA

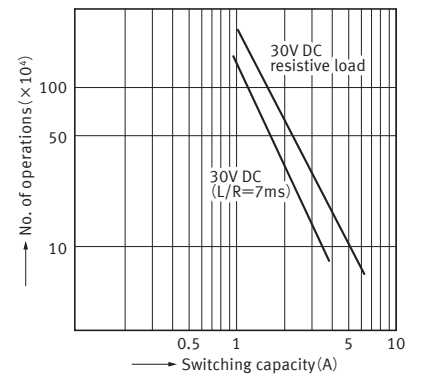
1. Max. switching capacity



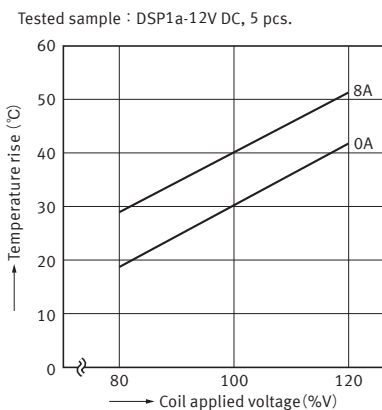
2.-(1) Life curve (1 Form A 1 Form B)



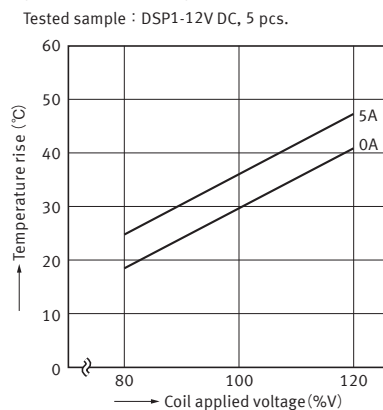
2.-(2) Life curve (1 Form A 1 Form B)



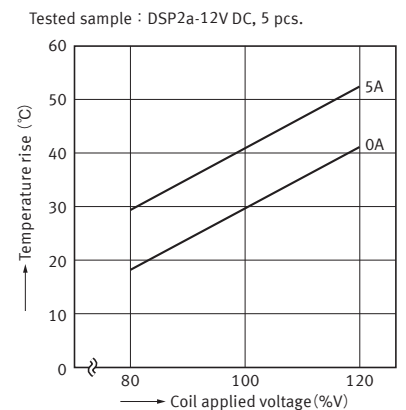
3.-(1) Coil temperature rise (1 Form A)



3.-(2) Coil temperature rise (1 Form A 1 Form B)

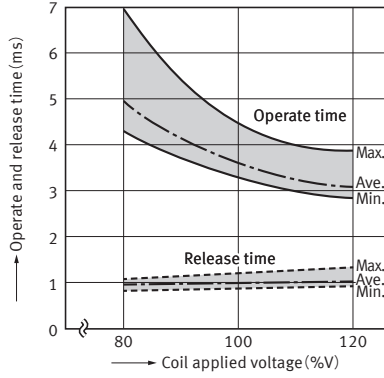


3.-(3) Coil temperature rise (2 Form A)



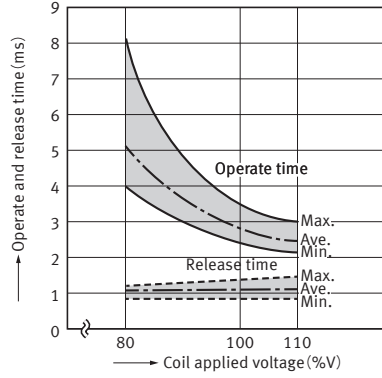
4.-(1) Operate & release time
(without diode, 1 Form A)

Tested sample : DSP1a-12V DC, 5 pcs.



4.-(2) Operate & release time
(without diode, 1 Form A 1 Form B)

Tested sample : DSP1-12V DC, 5 pcs.



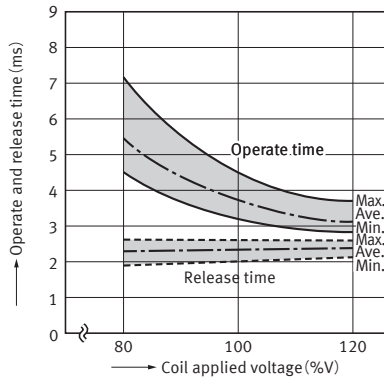
4.-(3) Operate & release time
(without diode, 2 Form A)

Tested sample : DSP2a-12V DC, 5 pcs.



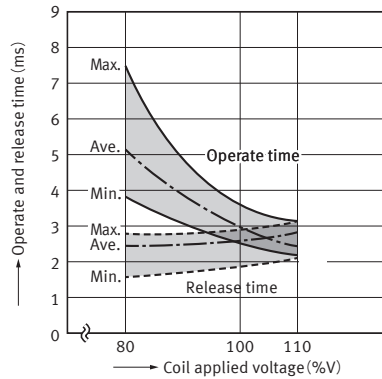
4.-(4) Operate & release time
(with diode, 1 Form A)

Tested sample : DSP1a-12V DC, 5 pcs.



4.-(5) Operate & release time
(with diode, 1 Form A 1 Form B)

Tested sample : DSP1-12V DC, 5 pcs.



4.-(6) Operate & release time
(with diode, 2 Form A)

Tested sample : DSP2a-12V DC, 5 pcs.



5.-(1) Change of pick-up and drop-out voltage
(1 Form A)

Tested sample : DSP1a-12V DC, 5 pcs.



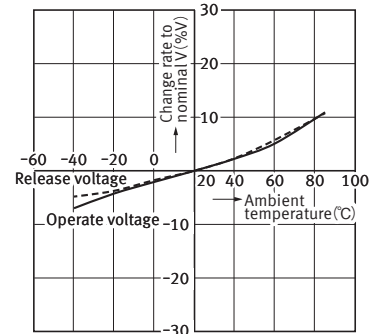
5.-(2) Change of pick-up and drop-out voltage
(1 Form A 1 Form B)

Tested sample : DSP1-12V DC, 5 pcs.



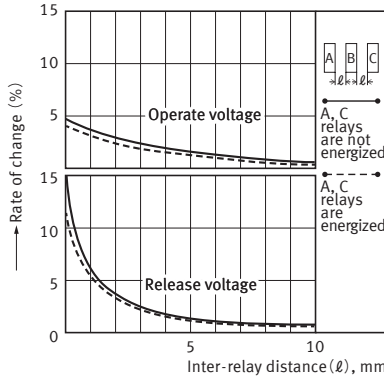
5.-(3) Change of pick-up and drop-out voltage
(2 Form A)

Tested sample : DSP2a-12V DC, 5 pcs.



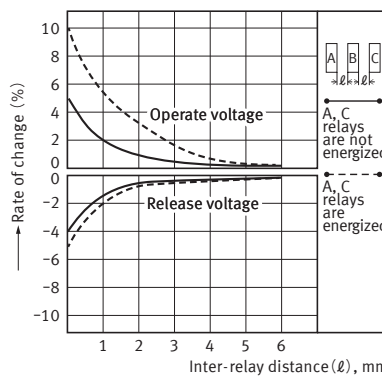
6.-(1) Influence of adjacent mounting
(1 Form A)

Tested sample : DSP1a-12V DC, 5 pcs.



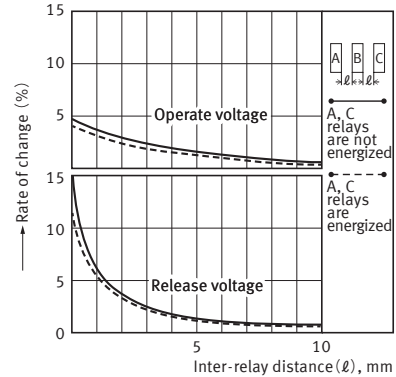
6.-(2) Influence of adjacent mounting
(1 Form A 1 Form B)

Tested sample : DSP1-12V DC, 5 pcs.



6.-(3) Influence of adjacent mounting
(2 Form A)

Tested sample : DSP2a-12V DC, 5 pcs.

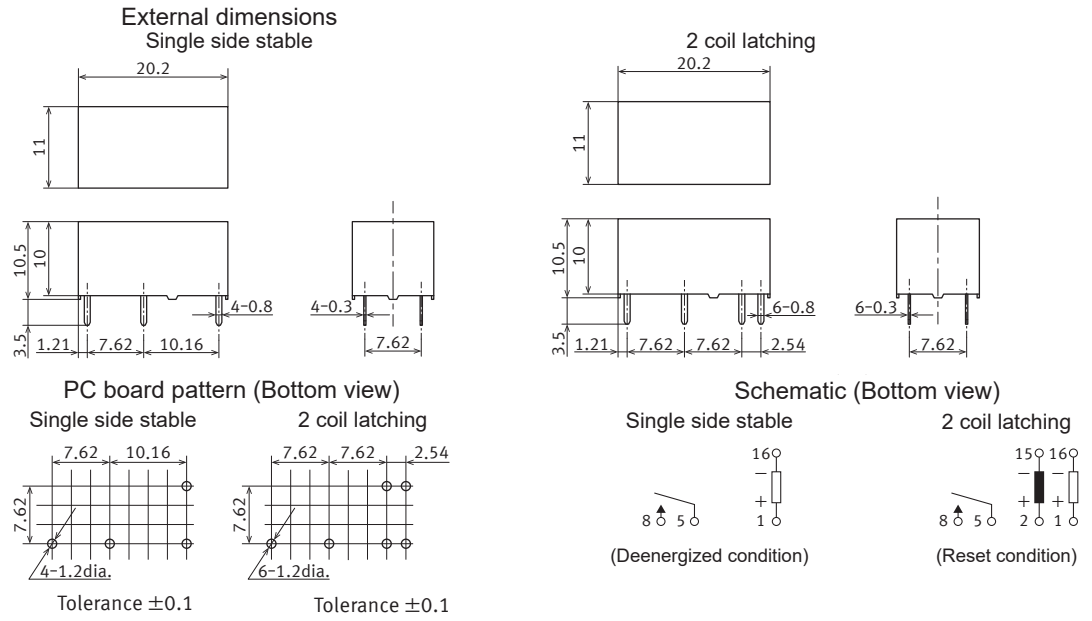


DIMENSIONS (mm)

CAD The CAD data of the products with a "CAD" mark can be downloaded from our Website.

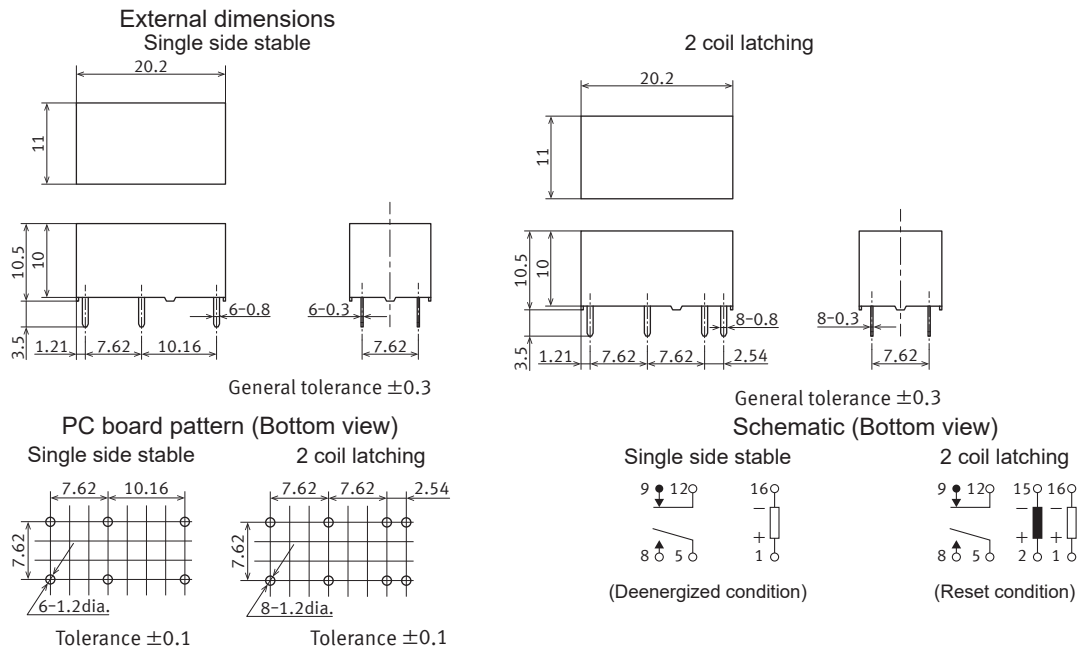
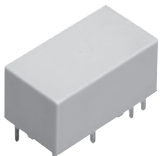
1. 1 Form A type

CAD



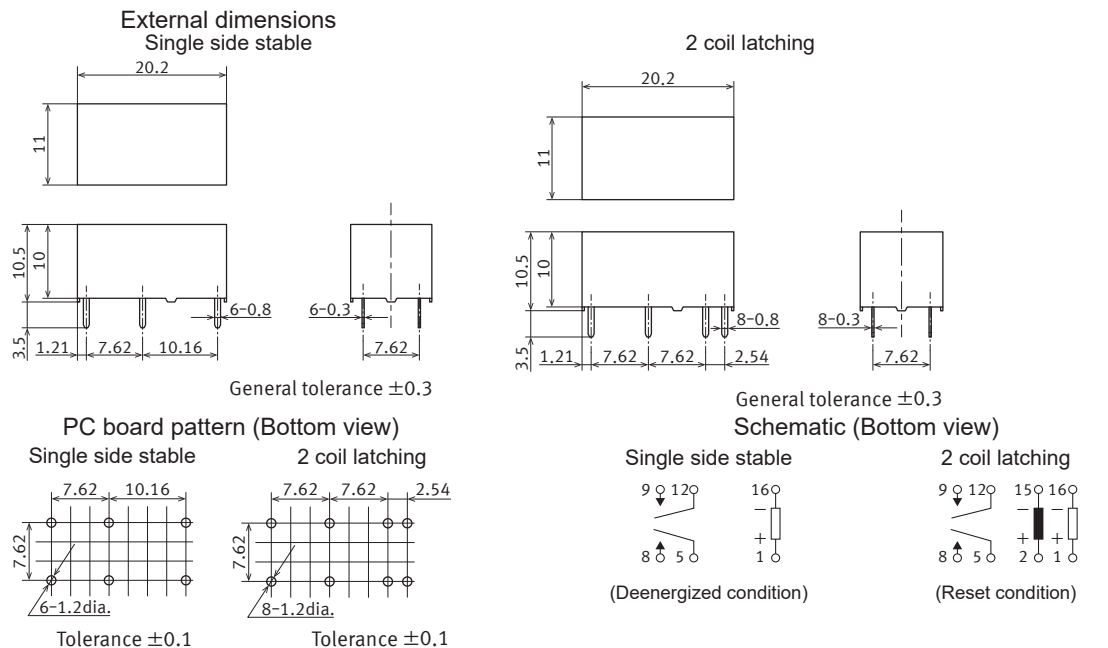
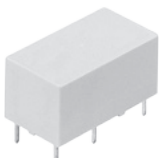
2. 1 Form A 1 Form B type

CAD



3. 2 Form A type

CAD



SAFETY STANDARDS

| Item | UL (Recognized) | | CSA (Certified) | | TÜV (Certified) | |
|----------------------|-----------------|--|-----------------|--|----------------------|--|
| | File No. | Contact rating | File No. | Contact rating | File No. | Contact rating |
| 1 Form A | E43028 | 8A 125/250V AC General use 1/6HP 125/250V AC 5A 30V DC Resistive B300 | LR26550 | 8A 125/250V AC General use 1/6HP 125/250V AC 5A 30V DC Resistive B300 | B 13 11 13461 342 | 8A 250V AC (cosφ =1.0) 5A 250V AC (cosφ =0.4) 5A 30V DC (0 ms) |
| 1 Form A 1 Form B | E43028 | 5A 125/250V AC General use 1/6HP 125/250V AC 5A 30V DC Resistive 30W Max.: 1A 30V DC-0.24A 125V DC | LR26550 | 5A 125/250V AC General use 1/6HP 125/250V AC 5A 30V DC Resistive 30W Max.: 1A 30V DC-0.24A 125V DC B300 | B 13 11 13461 342 | 5A 250V AC (cosφ =1.0) 3A 250V AC (cosφ =0.4) 5A 30V DC (0 ms) |
| 2 Form A | E43028 | 5A 125/250V AC General use 1/10HP 125/250V AC 5A 30V DC Resistive | LR26550 | 5A 125/250V AC General use 1/10HP 125/250V AC 5A 30V DC Resistive | B 13 11 13461 342 | 5A 250V AC (cosφ =1.0) 3A 250V AC (cosφ =0.4) 5A 30V DC (0 ms) |

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

NOTES

1. For cautions for use, please read “GENERAL APPLICATION GUIDELINES”.

2. 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

3. 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.

4. External magnetic field

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

5. 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.

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

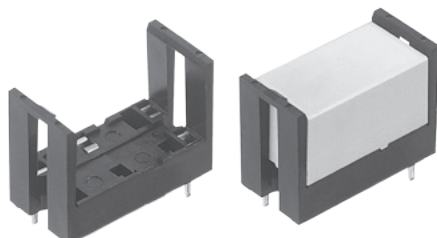
Please refer to **"the latest product specifications"** when designing your product.

• Requests to customers :

<https://industrial.panasonic.com/ac/e/salespolicies/>

ACCESSORIES

DSP RELAYS PC BOARD SOCKETS



TYPES

| Product name | Part No. | |
|------------------------|------------------------|---------------------|
| | For Single side stable | For 2 coil latching |
| For DSP1a | DSP1a-PS | DSP1a-PSL2 |
| For DSP1a, DSP1, DSP2a | DSP2a-PS | DSP2a-PSL2 |

Standard packing: Carton: 50 pcs., Case: 500 pcs.

TYPES AND APPLICABLE RELAYS

| Type No. | For DSP1a | | For DSP1a, DSP1, DSP2a | |
|-------------------|-----------|------------|------------------------|------------|
| | DSP1a-PS | DSP1a-PSL2 | DSP2a-PS | DSP2a-PSL2 |
| Applicable relays | | | | |
| DSP1a relays | OK | OK | OK | OK |
| DSP1a-L2 relays | | OK | | OK |
| DSP1 relays | | | OK | OK |
| DSP1-L2 relays | | | | OK |
| DSP2a relays | | | OK | OK |
| DSP2a-L2 relays | | | | OK |

SPECIFICATIONS

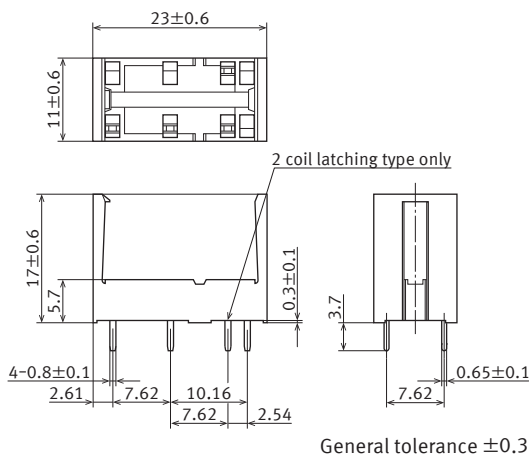
| Item | Specifications |
|-------------------------|---|
| Breakdown voltage | 3,000 Vrms between terminals (Except for the portion between coil terminals) |
| Insulation resistance | 1,000 MΩ between terminals at 500 V |
| Heat resistance | 150°C 302°F for 1 hour |
| Max. continuous current | 8 A (DSP1a-PS and DSP1a-PSL2), 5 A (DSP2a-PS and DSP2a-PSL2) |

DIMENSIONS (mm)

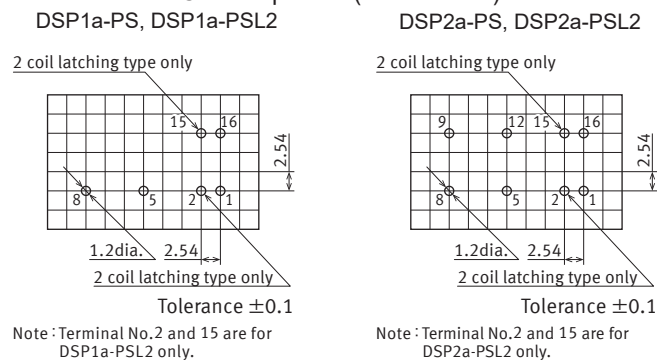
CAD The CAD data of the products with a "CAD" mark can be downloaded from our Website.

CAD

External dimensions

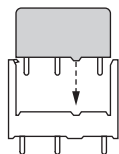


PC board pattern (Bottom view)

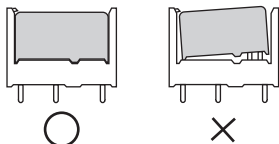


FIXING AND REMOVAL METHOD

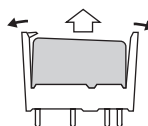
1. Match the direction of relay and socket.



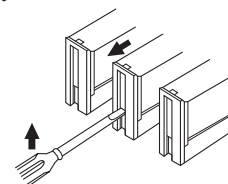
2. Both ends of relays are fixed so tightly that the socket hooks on the top surface of relays.



3. Remove the relay, applying force in the direction shown below.



4. In case there is not enough space for finger to pick relay up, use screw drivers in the way shown below.



Notes: 1. Exercise care when removing relays. If greater than necessary force is applied at the socket hooks, deformation may alter the dimensions so that the hook will no longer catch, and other damage may also occur.
2. It is hazardous to use IC chip sockets.

GUIDELINES FOR POWER RELAYS AND HIGH-CAPACITY DC CUT OFF RELAYS USAGE

For cautions for use, please read “GUIDELINES FOR RELAY USAGE”.

https://industrial.panasonic.com/ac/e/control/relay/cautions_use/index.jsp

Precautions for Coil Input

■ Long term current carrying

A circuit that will be carrying a current continuously for long periods without relay switching operation. (circuits for emergency lamps, alarm devices and error inspection that, for example, revert only during malfunction and output warnings with form B contacts) Continuous, long-term current to the coil will facilitate deterioration of coil insulation and characteristics due to heating of the coil itself.

For circuits such as these, please use a magnetic-hold type latching relay. If you need to use a single stable relay, use a sealed type relay that is not easily affected by ambient conditions and make a failsafe circuit design that considers the possibility of contact failure or disconnection.

■ DC Coil operating power

Steady state 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, please check with the actual circuit since the electrical characteristics may vary. The rated coil voltage should be applied to the coil and the set/reset pulse time of latching type relay differs for each relays, please refer to the relay's individual specifications.

■ Coil connection

When connecting coils of polarized relays, please check coil polarity (+,-) at the internal connection diagram (Schematic). If any wrong connection is made, it may cause unexpected malfunction, like abnormal heat, fire and so on, and circuit do not work. Avoid impressing voltages to the set coil and reset coil at the same time.

Ambient Environment

● Usage, Transport, and Storage Conditions

During usage, storage, or transportation, avoid locations subjected to direct sunlight and maintain normal temperature, humidity and pressure conditions.

● Temperature/Humidity/Pressure

When transporting or storing relays while they are tube packaged, there are cases the temperature may differ from the allowable range. In this case be sure to check the individual specifications. Also allowable humidity level is influenced by temperature, please check charts shown below and use relays within mentioned conditions. (Allowable temperature values differ for each relays, please refer to the relay's individual specifications.)

1) Temperature:

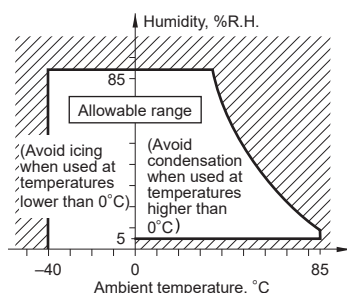
The tolerance temperature range differs for each relays, please refer to the relay's individual specifications

2) Humidity:

5 to 85 % RH

3) Pressure:

86 to 106 kPa



■ Maximum allowable voltage and temperature rise

Proper usage requires that the rated coil voltage be impressed on the coil. Note, however, that if a voltage greater than or equal to the maximum continuous voltage is impressed on the coil, the coil may burn or its layers short due to the temperature rise. Furthermore, do not exceed the usable ambient temperature range listed in the catalog.

■ Operate voltage change due to coil temperature rise (Hot start)

In DC relays, after continuous passage of current in the coil, if the current is turned OFF, then immediately turned ON again, due to the temperature rise in the coil, the pick-up voltage will become somewhat higher. Also, it will be the same as using it in a higher temperature atmosphere. The resistance/temperature relationship for copper wire is about 0.4% for 1°C, and with this ratio the coil resistance increases. That is, in order to operate of the relay, it is necessary that the voltage be higher than the pick-up voltage and the pick-up voltage rises in accordance with the increase in the resistance value. However, for some polarized relays, this rate of change is considerably smaller.

● Dew condensation

Condensation occurs when the ambient temperature drops suddenly from a high temperature and humidity, or the relay is suddenly transferred from a low ambient temperature to a high temperature and humidity. Condensation causes the failures like insulation deterioration, wire disconnection and rust etc. Panasonic Corporation does not guarantee the failures caused by condensation.

The heat conduction by the equipment may accelerate the cooling of device itself, and the condensation may occur.

Please conduct product evaluations in the worst condition of the actual usage. (Special attention should be paid when high temperature heating parts are close to the device. Also please consider the condensation may occur inside of the device.)

● Icing

Condensation or other moisture may freeze on relays when the temperature become lower than 0°C. This icing causes the sticking of movable portion, the operation delay and the contact conduction failure etc. Panasonic Corporation does not guarantee the failures caused by the icing.

The heat conduction by the equipment may accelerate the cooling of relay itself and the icing may occur. Please conduct product evaluations in the worst condition of the actual usage.

● Low temperature and low humidity

The plastic becomes brittle if the switch is exposed to a low temperature, low humidity environment for long periods of time.

● High temperature and high humidity

Storage for extended periods of time (including transportation periods) at high temperature or high humidity levels or in atmospheres with organic gases or sulfide gases may cause a sulfide film or oxide film to form on the surfaces of the contacts and/or it may interfere with the functions. Check out the atmosphere in which the units are to be stored and transported.

GUIDELINES FOR POWER RELAYS AND HIGH-CAPACITY DC CUT OFF RELAYS USAGE

●Package

In terms of the packing format used, make every effort to keep the effects of moisture, organic gases and sulfide gases to the absolute minimum.

●Silicon

When a source of silicone substances (silicone rubber, silicone oil, silicone coating materials and silicone filling materials etc.) is used around the relay, the silicone gas (low molecular siloxane etc.) may be produced.

This silicone gas may penetrate into the inside of the relay. When the relay is kept and used in this condition, silicone compound may adhere to the relay contacts which may cause the contact failure. Do not use any sources of silicone gas around the relay (Including plastic seal types).

●NOx Generation

When relay is used in an atmosphere high in humidity to switch a load which easily produces an arc, the NOx created by the arc and the water absorbed from outside the relay combine to produce nitric acid. This corrodes the internal metal parts and adversely affects operation. Avoid use at an ambient humidity of 85%RH or higher (at 20°C). If use at high humidity is unavoidable, please contact our sales representative.

Others

■Cleaning

- 1) Although the environmentally sealed type relay (plastic sealed type, etc.) can be cleaned, avoid immersing the relay into cold liquid (such as cleaning solvent) immediately after soldering. Doing so may deteriorate the sealing performance.
- 2) Cleaning with the boiling method is recommended(The temperature of cleaning liquid should be 40°C or lower).
Avoid ultrasonic cleaning on relays. Use of ultrasonic cleaning may cause breaks in the coil or slight sticking of the contacts due to ultrasonic energy.

Please refer to "**the latest product specifications**" when designing your product.

•Requests to customers:

<https://industrial.panasonic.com/ac/e/salespolicies/>

Please contact

Panasonic Corporation

Electromechanical Control Business Division

■ 1006, Oaza Kadoma, Kadoma-shi, Osaka 571-8506, Japan
industrial.panasonic.com/ac/e/

Panasonic[®]

©Panasonic Corporation 2019