



## FEATURES

### 1. Even with small form factor, sensitive enough for direct IC-driving

The dimensions of this high-density 4-gap balanced armature are 31 mm × 14 mm × 11 mm 1.220 inch × .551 inch × .433 inch. Despite this small size, high sensitivity is achieved by a mechanism that incorporates high-efficiency polarized magnetic circuits along with our exclusive spring alignment method. With an minimum operating power of about 150 mW, nominal operating power of 240 mW, this relay can be directly driven by transistor or chip controllers.

### 2. High switching capability

Strong against lamp inductive loads, maximum switching capacity has reached 3,040 VA (8A 380V AC).

### 3. High breakdown voltage – Optimal for control in 250 V power circuits

High breakdown voltage has been achieved. Between contacts and coil of 3,750 Vrms; Surge breakdown voltage between coil and contact of 6,000 V, and between open contacts of 1,200 Vrms mean that these relays are suitable even for 250 V power circuit control.

### 4. Improved stability

#### Conforms to all types of safety standards.

Insulating distance of more than 3 mm secured, approx. 4 mm. Complies with Japan Electrical Appliance and Material Safety Law requirements for operating 200 V power supply circuits, and conforms with UL, CSA and VDE standards.

### 5. Latching types available

In addition to single side stable types, convenient 2 coil latching types with memory functions are also available. Moreover, we offer 2 Form A specifications which, with double pole switching for applications such as 250 V power circuit switching, can enable safer designs.

### 6. Automatic cleaning possible

The sealed design means that these relays can undergo immersion in automatic washing systems and are suitable for automatic soldering. Even in difficult environments, the contacts remain reliable.

### 7. Easy to design PC board patterns

Features 4/10 dual-in-line terminals. Because the lead spacing has a pitch greater than 7.54 mm .297 inch, designers can make easy adjustments with the width of the land size. This, along with the large insulation distance, simplifies the drawing of PC board patterns.

### 8. To improve soldering efficiency, preapplication of solder to the terminals is recommended.

### 9. Sockets are available.

## ORDERING INFORMATION

ST  -  -  - F

#### Contact arrangement

- 1: 1 Form A 1 Form B
- 2: 2 Form A

#### Operating function

- Nil: Single side stable
- L: 1 coil latching
- L2: 2 coil latching

#### Coil voltage

DC 3, 5, 6, 9, 12, 24, 48 V

#### Contact material

F: AgSnO<sub>2</sub> type contact

Note: UL/CSA, VDE type is standard.

## TYPES

| Contact arrangement | Nominal coil voltage | Single side stable | 1 coil latching | 2 coil latching |
|---------------------|----------------------|--------------------|-----------------|-----------------|
|                     |                      | Part No.           | Part No.        | Part No.        |
| 1 Form A 1 Form B   | 3V DC                | ST1-DC3V-F         | ST1-L-DC3V-F    | ST1-L2-DC3V-F   |
|                     | 5V DC                | ST1-DC5V-F         | ST1-L-DC5V-F    | ST1-L2-DC5V-F   |
|                     | 6V DC                | ST1-DC6V-F         | ST1-L-DC6V-F    | ST1-L2-DC6V-F   |
|                     | 9V DC                | ST1-DC9V-F         | ST1-L-DC9V-F    | ST1-L2-DC9V-F   |
|                     | 12V DC               | ST1-DC12V-F        | ST1-L-DC12V-F   | ST1-L2-DC12V-F  |
|                     | 24V DC               | ST1-DC24V-F        | ST1-L-DC24V-F   | ST1-L2-DC24V-F  |
| 2 Form A            | 48V DC               | ST1-DC48V-F        | ST1-L-DC48V-F   | ST1-L2-DC48V-F  |
|                     | 3V DC                | ST2-DC3V-F         | ST2-L-DC3V-F    | ST2-L2-DC3V-F   |
|                     | 5V DC                | ST2-DC5V-F         | ST2-L-DC5V-F    | ST2-L2-DC5V-F   |
|                     | 6V DC                | ST2-DC6V-F         | ST2-L-DC6V-F    | ST2-L2-DC6V-F   |
|                     | 9V DC                | ST2-DC9V-F         | ST2-L-DC9V-F    | ST2-L2-DC9V-F   |
|                     | 12V DC               | ST2-DC12V-F        | ST2-L-DC12V-F   | ST2-L2-DC12V-F  |
| 24V DC              | ST2-DC24V-F          | ST2-L-DC24V-F      | ST2-L2-DC24V-F  |                 |
|                     | 48V DC               | ST2-DC48V-F        | ST2-L-DC48V-F   | ST2-L2-DC48V-F  |

Standard packing: Tube: 50 pcs.; Case: 500 pcs.

## 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. allowable voltage (at 20°C 68°F) |
|----------------------|---|---|---|---------------------------------------|-------------------------|---------------------------------------|
| 3V DC                | 80%V or less of nominal voltage (Initial) | 10%V or more of nominal voltage (Initial) | 78mA  | 38Ω                                   | 240mW                   | 150%V of nominal voltage              |
| 5V DC                |   |   | 47mA  | 105Ω                                  |                         |                                       |
| 6V DC                |   |   | 40mA  | 150Ω                                  |                         |                                       |
| 9V DC                |   |   | 25mA  | 360Ω                                  |                         |                                       |
| 12V DC               |   |   | 20mA  | 600Ω                                  |                         |                                       |
| 24V DC               |   |   | 10mA  | 2,400Ω                                |                         |                                       |
| 48V DC               |   |   | 5mA   | 9,000Ω                                |                         |                                       |

## 2) 1 coil latching

| 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. allowable voltage (at 20°C 68°F) |
|----------------------|---|---|---|---------------------------------------|-------------------------|---------------------------------------|
| 3V DC                | 80%V or less of nominal voltage (Initial) | 10%V or more of nominal voltage (Initial) | 37mA  | 80Ω                                   | 130mW                   | 150%V of nominal voltage              |
| 5V DC                |   |   | 21mA  | 230Ω                                  |                         |                                       |
| 6V DC                |   |   | 18mA  | 330Ω                                  |                         |                                       |
| 9V DC                |   |   | 12mA  | 730Ω                                  |                         |                                       |
| 12V DC               |   |   | 9mA   | 1,300Ω                                |                         |                                       |
| 24V DC               |   |   | 5mA   | 5,000Ω                                |                         |                                       |
| 48V DC               |   |   | 2.7mA   | 18,000Ω                               |                         |                                       |

## 3) 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. allowable 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) | 75mA  | 75mA       | 40Ω                                   | 40Ω        | 240mW                   | 240mW      | 150%V of nominal voltage              |
| 5V DC                |   |   | 45mA  | 45mA       | 110Ω                                  | 110Ω       |                         |            |                                       |
| 6V DC                |   |   | 37mA  | 37mA       | 155Ω                                  | 155Ω       |                         |            |                                       |
| 9V DC                |   |   | 25mA  | 25mA       | 360Ω                                  | 360Ω       |                         |            |                                       |
| 12V DC               |   |   | 18mA  | 18mA       | 640Ω                                  | 640Ω       |                         |            |                                       |
| 24V DC               |   |   | 10mA  | 10mA       | 2,400Ω                                | 2,400Ω     |                         |            |                                       |
| 48V DC               |   |   | 4.7mA   | 4.7mA      | 10,200Ω                               | 10,200Ω    |                         |            |                                       |

2. Specifications

| Characteristics                  | Item   | Specifications   |  |
|----------------------------------|--|--|--|
| Contact                          | Arrangement  | 1 Form A 1 Form B, 2 Form A  |  |
|                                  | Contact material   | Au-flashed AgSnO <sub>2</sub> type   |  |
|                                  | Initial contact resistance, max.                                 | Max. 30 mΩ (By voltage drop 6 V DC 1A)   |  |
| Rating                           | Max. switching power (resistive load)                            | 3,040 VA, 150 W  |  |
|                                  | Max. switching voltage   | 380 V AC, 250 V DC   |  |
|                                  | Max. switching current   | 8 A  |  |
|                                  | Minimum operating power  | 150mW (Single side stable, 2 coil latching)  |  |
|                                  | Nominal operating power  | 240mW (Single side stable, 2 coil latching)  |  |
|                                  | Min. switching capacity (Reference value)*1                      | 100 mA 5V DC   |  |
| Electrical characteristics       | Insulation resistance (Initial) (at 25°C, 50% relative humidity) |  | Min. 1,000MΩ (at 500V DC)<br>Measurement at same location as "Initial breakdown voltage" section.                                |
|                                  | Breakdown voltage (Initial)                                      | Between open contacts  | 1,200 Vrms for 1 min. (Detection current: 10 mA)   |
|                                  |  | Between contact sets   | 2,000 Vrms for 1 min. (Detection current: 10 mA)   |
|                                  |  | Between contact and coil   | 3,750 Vrms for 1 min. (Detection current: 10 mA)   |
|                                  | Surge breakdown voltage (Initial)*2                              |  | 6,000 V (Between contact and coil)   |
|                                  | Operate time [Set time] (at 20°C 68°F)                           |  | Max. 15 ms [Max. 15 ms]<br>(Nominal voltage applied to the coil, excluding contact bounce time.)                                 |
|                                  | Release time [Reset time] (at 20°C 68°F)                         |  | Max. 10 ms [Max. 15 ms]<br>(Nominal voltage applied to the coil, excluding contact bounce time.) (without diode)                 |
| Temperature rise (at 60°C 140°F) |  | Max. 55°C<br>(By resistive method, nominal voltage applied to the coil; contact carrying current: 8A.) |  |
| Mechanical characteristics       | Shock resistance   | Functional   | Min. 196 m/s <sup>2</sup> (Half-wave pulse of sine wave: 11 ms; detection time: 10μs.)   |
|                                  |  | Destructive  | Min. 980 m/s <sup>2</sup> (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 mm  |
| Expected life                    | Mechanical   | Min. 10 <sup>7</sup> (at 180 times/min.)   |  |
|                                  | Electrical   | Min. 10 <sup>5</sup> (8 A 250 V AC resistive) (ON : OFF = 1 s : 5 s)                                   |  |
| Conditions                       | Conditions for operation, transport and storage*3                |  | Ambient temperature: -40°C to +60°C -40°F to +140°F;<br>Humidity: 5 to 85% R.H. (Not freezing and condensing at low temperature) |
|                                  | Max. operating speed   |  | 20 times/min.*4  |
| Unit weight                      |  |  | Approx. 10g .353 oz  |

\*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.

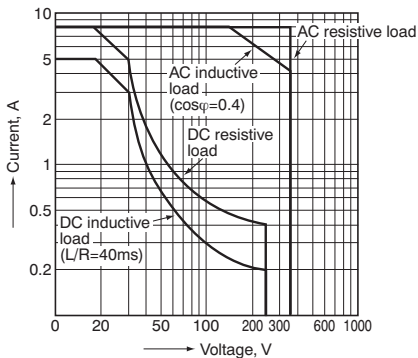
\*2 Wave is standard shock voltage of ±1.2×50μs according to JEC-212-1981.

\*3 Refer to "6. Usage, Storage and Transport Conditions" in [AMBIENT ENVIRONMENT](#) section in [Relay Technical Information](#).

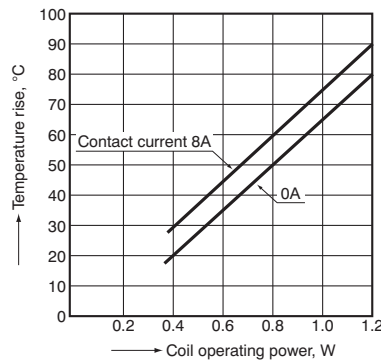
\*4 The max. operating speed amounts to 30cps without load.

REFERENCE DATA

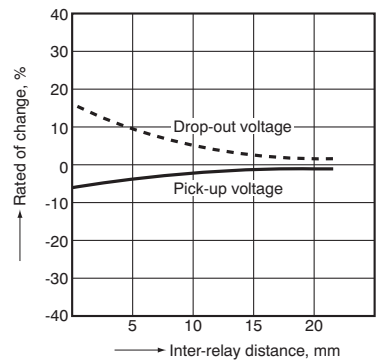
1. Max. switching power



2. Coil temperature rise



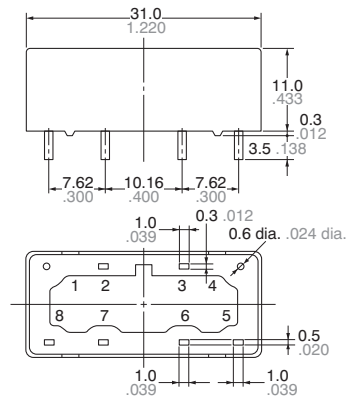
3. Influence of adjacent mounting



**CAD Data**

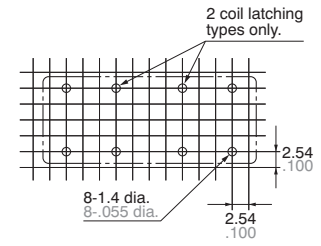


**External dimensions**



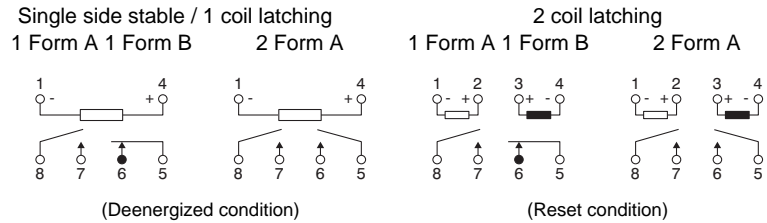
General tolerance:  $\pm 0.5 \pm .020$

**PC board pattern (Bottom view)**



Tolerance:  $\pm 0.1 \pm .004$

**Schematic (Bottom view)**



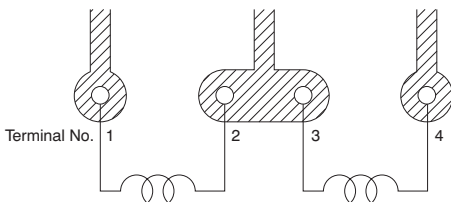
**SAFETY STANDARDS**

| UL/C-UL (Recognized) |   | CSA (Certified) |   | VDE (Certified) |   | TV rating (UL/CSA)         |        |
|----------------------|---|-----------------|---|-----------------|---|----------------------------|--------|
| File No.             | Contact rating                                | File No.        | Contact rating                                | File No.        | Contact rating  | File No.                   | Rating |
| E43028               | 8A 250V AC<br>1/4HP 125, 250V AC<br>5A 30V DC | LR26550<br>etc. | 8A 250V AC<br>1/4HP 125, 250V AC<br>5A 30V DC | 1017            | 8A 250V AC (cosφ=1.0)<br>4A 250V AC (cosφ=0.4)<br>5A 30V DC | UL: E43028<br>CSA: LR26550 | —      |

**NOTES**

**1. PC board patterns for 2 coil latching types**

When applying relays in power supply operation circuits for finished products regulated by the Electrical Appliance and Material Safety Law, use the pattern shown below.



**2. Soldering should be done under the following conditions:**

- 1) 250°C 482°F within 10s  
300°C 572°F within 5s  
350°C 662°F within 3s
- 2) 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. 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, see [Relay Technical Information](#).**

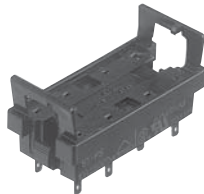
## ACCESSORIES

# ST RELAYS SOCKET

ST relay socket



ST-PS  
PC board terminal socket



ST-SS  
Solder terminal socket

### FEATURES

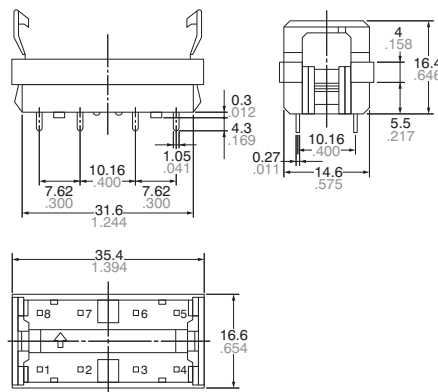
1. Possible to fit or remove the chassis with one touch ( $t = 0.6 \text{ mm}$  to  $2.2 \text{ mm}$  .024 inch to .087 inch)
2. Easy design of PC board pattern (2.54 mm x 4 pitch DIL terminal array)
3. Complies with Japan Electrical Appliance and Material Safety Law. (UL and VDE certification)
4. High breakdown voltage.

### SPECIFICATIONS

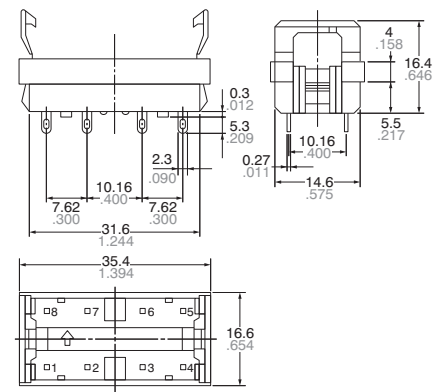
| Item                            | Specifications  |
|---------------------------------|---|
| Breakdown voltage (Initial)     | Between contact and coil: 4,000 Vrms for 1 min. (Detection current: 10 mA)<br>Between contact and terminal: 2,000 Vrms for 1 min. |
| Insulation resistance (Initial) | Min. 1,000 MΩ between terminals (500V DC)   |
| Heat resistance                 | 150°C 302°F for 1 hr  |
| Max. continuous current         | 10 A  |
| Relay insertion life            | 15 times  |

### DIMENSIONS (Unit: mm inch)

ST-PS



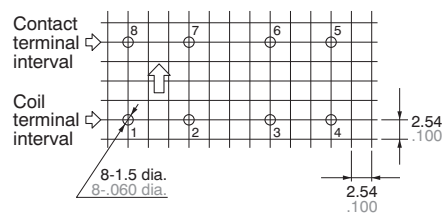
ST-SS



### PRECAUTIONS FOR USE (SOCKET)

#### 1. PC board mounting method

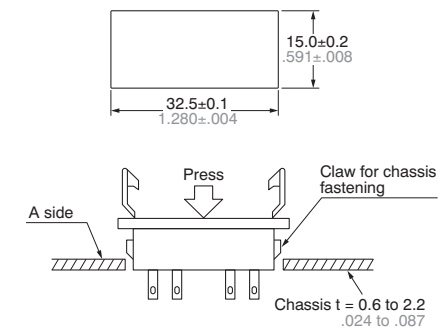
PC board pattern



The terminal configuration is symmetrical on the left and right, so an arrow mark  $\uparrow$  is stamped on the socket to prevent mis-insertion. We recommend printing the same arrow mark  $\uparrow$  on the component mounting side (side opposite from pattern) of the PC board. In this case, the terminal configuration becomes the terminal nos. noted near the drilling holes.

#### 2. Chassis cutout

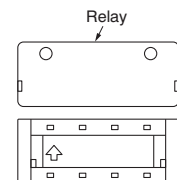
Chassis cutting dimensions



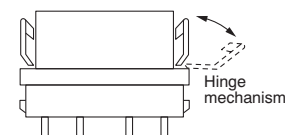
If the chassis hole is punched with a press, set so the release R on the front side (A side). The range for chassis thickness is 0.6 to 2.2 mm .024 to .087 inch.

#### 3. Relay mounting and removal

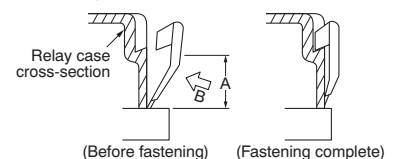
(1) Align the directions of the relay and socket.



(2) Insert the relay all the way in, so it is securely in place.



(3) Press the part indicated by A in the B direction, and fasten by placing the hook on the relay.



(4) When removing the relay, completely release the hooks on both sides and pull the relay out.