

# MINIATURE RELAY

## 2 POLES—1 to 2 A (FOR SIGNAL SWITCHING)

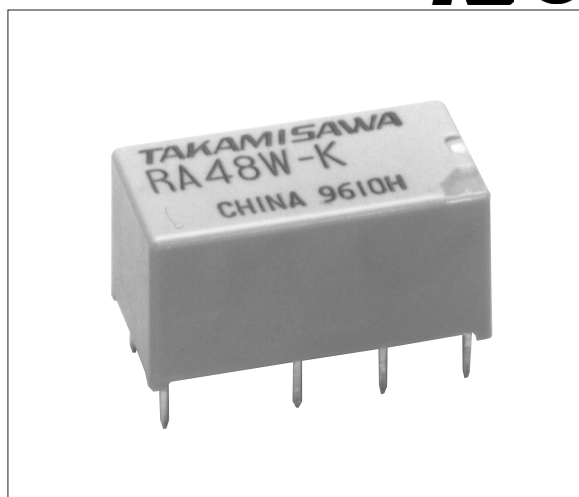
### RA SERIES

RoHS compliant



#### ■ FEATURES

- Ultra high sensitivity (75 to 150 mW)
- High reliability bifurcated contacts
- Complies to UL, CUL and regulations Part 68
  - Dielectric strength 1,000 VAC between coil and contacts
  - Surge strength 1,500 V
- UL, CSA recognized
- Wide operating range
- DIL pitch terminals
- Plastic sealed type
- Latching type available
- Dial-pulse relay available
- RoHS compliant since date code: 041001
  - Please see page 7 for more information



#### ■ ORDERING INFORMATION

[Example]      RA   L   –   D   12   W   –   K  
                   (a)   (b)   (\*)   (c)   (d)   (e)          (f)

|     |                    |                                                      |
|-----|--------------------|------------------------------------------------------|
| (a) | Series Name        | RA : RA Series                                       |
| (b) | Operation Function | Nil : Standard type<br>L : Latching type             |
| (c) | Number of Coil     | Nil : Single winding type<br>D : Double winding type |
| (d) | Nominal Voltage    | Refer to the COIL DATA CHART                         |
| (e) | Contact            | W : Bifurcated type                                  |
| (f) | Enclosure          | K : Plastic sealed type                              |

Note: Actual marking omits the hyphen (-) of (\*)  
 For movable and stationary contact with gold overlay type, add suffix “-OH”.

## COIL DATA CHART

|               | MODEL      | Nominal voltage | Coil resistance ( $\pm 10\%$ ) | Must operate voltage*1 | Must release voltage*1 | Nominal power |
|---------------|------------|-----------------|--------------------------------|------------------------|------------------------|---------------|
| Standard Type | RA-1.5 W-K | 1.5 VDC         | 15 $\Omega$                    | +1.0 VDC               | +0.15 VDC              | 150 mW        |
|               | RA- 3 W-K  | 3 VDC           | 60 $\Omega$                    | +2.0 VDC               | +0.3 VDC               | 150 mW        |
|               | RA-4.5 W-K | 4.5 VDC         | 135 $\Omega$                   | +3.1 VDC               | +0.45 VDC              | 150 mW        |
|               | RA- 5 W-K  | 5 VDC           | 167 $\Omega$                   | +3.4 VDC               | +0.5 VDC               | 150 mW        |
|               | RA- 6 W-K  | 6 VDC           | 240 $\Omega$                   | +4.0 VDC               | +0.6 VDC               | 150 mW        |
|               | RA- 9 W-K  | 9 VDC           | 540 $\Omega$                   | +6.1 VDC               | +0.9 VDC               | 150 mW        |
|               | RA-12 W-K  | 12 VDC          | 960 $\Omega$                   | +8.1 VDC               | +1.2 VDC               | 150 mW        |
|               | RA-18 W-K  | 18 VDC          | 2,160 $\Omega$                 | +12.3 VDC              | +1.8 VDC               | 150 mW        |
|               | RA-24 W-K  | 24 VDC          | 2,880 $\Omega$                 | +16.1 VDC              | +2.4 VDC               | 200 mW        |
|               | RA-48 W-K  | 48 VDC          | 11,520 $\Omega$                | +32.2 VDC              | +4.8 VDC               | 200 mW        |

Note: \*1 Specified values are subject to pulse wave voltage.  
All values in the table are measured at 20°C.

|                              | MODEL        | Nominal voltage | Coil resistance ( $\pm 10\%$ ) | Set voltage*1 | Reset voltage*1 | Nominal power |
|------------------------------|--------------|-----------------|--------------------------------|---------------|-----------------|---------------|
| Single Winding Latching Type | RAL-1.5 W-K  | 1.5 VDC         | 30 $\Omega$                    | +1.0 VDC      | -1.0 VDC        | 75 mW         |
|                              | RAL- 3 W-K   | 3 VDC           | 120 $\Omega$                   | +2.1 VDC      | -2.1 VDC        | 75 mW         |
|                              | RAL-4.5 W-K  | 4.5 VDC         | 270 $\Omega$                   | +3.1 VDC      | -3.1 VDC        | 75 mW         |
|                              | RAL- 5 W-K   | 5 VDC           | 335 $\Omega$                   | +3.4 VDC      | -3.4 VDC        | 75 mW         |
|                              | RAL- 6 W-K   | 6 VDC           | 400 $\Omega$                   | +4.1 VDC      | -4.1 VDC        | 75 mW         |
|                              | RAL- 9 W-K   | 9 VDC           | 1,080 $\Omega$                 | +6.3 VDC      | -6.3 VDC        | 75 mW         |
|                              | RAL-12 W-K   | 12 VDC          | 1,920 $\Omega$                 | +8.3 VDC      | -8.3 VDC        | 75 mW         |
|                              | RAL-18 W-K   | 18 VDC          | 4,320 $\Omega$                 | +12.5 VDC     | -12.5 VDC       | 75 mW         |
|                              | RAL-24 W-K   | 24 VDC          | 5,760 $\Omega$                 | +16.6 VDC     | -16.6 VDC       | 100 mW        |
|                              | RAL-48 W-K   | 48 VDC          | 11,520 $\Omega$                | +21.0 VDC     | -21.0 VDC       | 200 mW        |
| Double Winding Latching Type | RAL-D1.5 W-K | 1.5 VDC         | P 15 $\Omega$                  | +1.0 VDC      |                 | 150 mW        |
|                              |              |                 | S 15 $\Omega$                  |               | +1.0 VDC        |               |
|                              | RAL-D 3 W-K  | 3 VDC           | P 60 $\Omega$                  | +2.0 VDC      |                 | 150 mW        |
|                              |              |                 | S 60 $\Omega$                  |               | +2.0 VDC        |               |
|                              | RAL-D4.5 W-K | 4.5 VDC         | P 135 $\Omega$                 | +3.1 VDC      |                 | 150 mW        |
|                              |              |                 | S 135 $\Omega$                 |               | +3.1 VDC        |               |
|                              | RAL-D 5 W-K  | 5 VDC           | P 167 $\Omega$                 | +3.4 VDC      |                 | 150 mW        |
|                              |              |                 | S 167 $\Omega$                 |               | +3.4 VDC        |               |
|                              | RAL-D 6 W-K  | 6 VDC           | P 240 $\Omega$                 | +4.0 VDC      |                 | 150 mW        |
|                              |              |                 | S 240 $\Omega$                 |               | +4.0 VDC        |               |
|                              | RAL-D 9 W-K  | 9 VDC           | P 540 $\Omega$                 | +6.1 VDC      |                 | 150 mW        |
|                              |              |                 | S 540 $\Omega$                 |               | +6.1 VDC        |               |
|                              | RAL-D 12 W-K | 12 VDC          | P 960 $\Omega$                 | +8.1 VDC      |                 | 150 mW        |
|                              |              |                 | S 960 $\Omega$                 |               | +8.1 VDC        |               |
|                              | RAL-D 18 W-K | 18 VDC          | P 2,160 $\Omega$               | +12.3 VDC     |                 | 150 mW        |
|                              |              |                 | S 2,160 $\Omega$               |               | +12.3 VDC       |               |
|                              | RAL-D 24 W-K | 24 VDC          | P 2,880 $\Omega$               | +16.1 VDC     |                 | 200 mW        |
|                              |              |                 | S 2,880 $\Omega$               |               | +16.1 VDC       |               |
|                              | RAL-D 48 W-K | 48 VDC          | P 11,520 $\Omega$              | +32.2 VDC     |                 | 200 mW        |
|                              |              |                 | S 11,520 $\Omega$              |               | +32.2 VDC       |               |

Note: \*1 Specified values are subject to pulse wave voltage.  
All values in the table are measured at 20°C.

P: Primary coil S: Secondary coil

## SPECIFICATIONS

| Item       |                              |              | Standard Type                                                                                                                | Single Winding Latching Type | Double Winding Latching Type |
|------------|------------------------------|--------------|------------------------------------------------------------------------------------------------------------------------------|------------------------------|------------------------------|
|            |                              |              | RA-( ) W-K                                                                                                                   | RAL-( ) W-K                  | RAL-D ( ) W-K                |
| Contact    | Arrangement                  |              | 2 form C (DPDT)                                                                                                              |                              |                              |
|            | Material                     |              | Gold overlay palladium                                                                                                       |                              |                              |
|            | Style                        |              | Bifurcated (cross bar)                                                                                                       |                              |                              |
|            | Resistance (initial)         |              | Maximum 100 mΩ (at 1 A 6 VDC)                                                                                                |                              |                              |
|            | Rating (resistive)           |              | 0.5 A 120 VAC or 1 A 24 VDC                                                                                                  |                              |                              |
|            | Maximum Carrying Current     |              | 2 A                                                                                                                          |                              |                              |
|            | Maximum Switching Power      |              | 60 VA, 24 W                                                                                                                  |                              |                              |
|            | Maximum Switching Voltage    |              | 250 VAC, 220 VDC                                                                                                             |                              |                              |
|            | Maximum Switching Current    |              | 2 A                                                                                                                          |                              |                              |
|            | Minimum Switching Load*1     |              | 0.01 mA 10 mVDC                                                                                                              |                              |                              |
|            | Capacitance (10 MHz)         |              | Approximately 1.5 pF (between open contacts), 1.0 pF (adjacent contacts)<br>Approximately 1.7 pF (between coil and contacts) |                              |                              |
| Coil       | Nominal Power (at 20°C)      |              | 50 to 200 mW                                                                                                                 | 75 to 200 mW                 | 150 to 200 mW                |
|            | Operate Power (at 20°C)      |              | 30 to 90 mW                                                                                                                  | 40 to 50 mW                  | 70 to 90 mW                  |
|            | Operating Temperature        |              | -40°C to +80°C (no frost) (refer to the CHARACTERISTIC DATA)                                                                 |                              |                              |
| Time Value | Operate (at nominal voltage) |              | Maximum 6 ms                                                                                                                 | Maximum 6 ms (set)           |                              |
|            | Release (at nominal voltage) |              | Maximum 4 ms                                                                                                                 | Maximum 6 ms (reset)         |                              |
| Life       | Mechanical                   |              | 2 × 10 <sup>7</sup> operations minimum                                                                                       |                              |                              |
|            | Electrical                   |              | 2 × 10 <sup>5</sup> ops. min. (0.5 A 120 VAC), 5 × 10 <sup>5</sup> ops. min. (1 A 24 VDC)                                    |                              |                              |
| Other      | Vibration Resistance         | Misoperation | 10 to 55 Hz (double amplitude of 5.0 mm)                                                                                     |                              |                              |
|            |                              | Endurance    | 10 to 55 Hz (double amplitude of 5.0 mm)                                                                                     |                              |                              |
|            | Shock Resistance             | Misoperation | 500 m/s <sup>2</sup> (11 ±1 ms)                                                                                              |                              |                              |
|            |                              | Endurance    | 1,000 m/s <sup>2</sup> ( 6 ±1 ms)                                                                                            |                              |                              |
|            | Weight                       |              | Approximately 3.7 g                                                                                                          |                              |                              |

\*1 Minimum switching loads mentioned above are reference values. Please perform the confirmation test with the actual load before production since reference values may vary according to switching frequencies, environmental conditions and expected reliability levels.

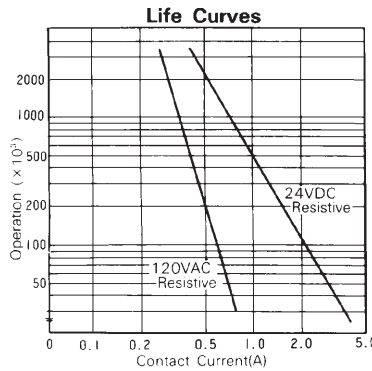
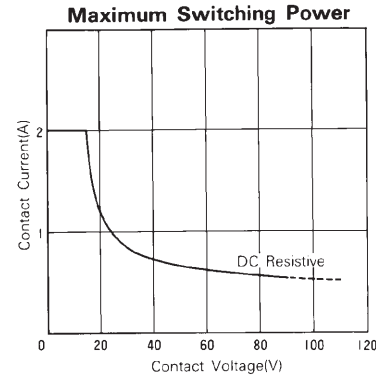
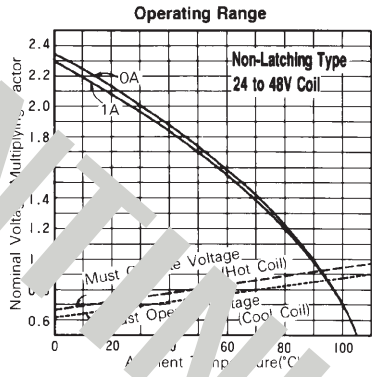
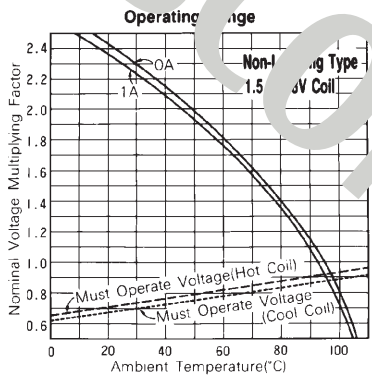
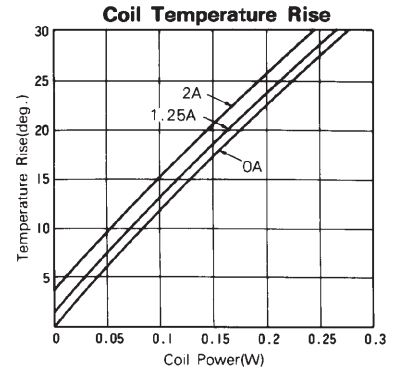
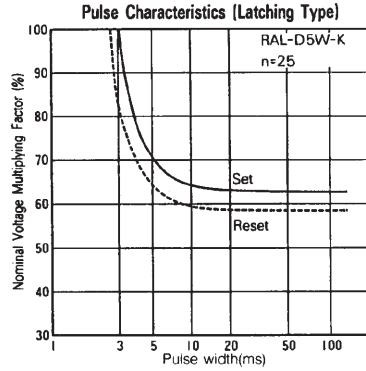
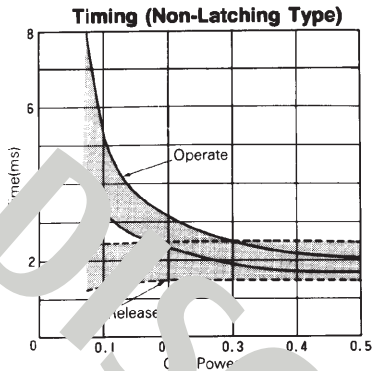
## INSULATION

| Item                |                                        | Standard                                       | Single latch | Double latch |
|---------------------|----------------------------------------|------------------------------------------------|--------------|--------------|
| Isolation (initial) |                                        | Minimum 1,000 MΩ (at 500VDC)                   |              |              |
| Dielectric Strength | open contacts                          | 1,000VAC 1 min.,                               |              |              |
|                     | coil and contacts/<br>adjacent contact | 1,500VAC 1 min.,                               |              |              |
| Surge Voltage       |                                        | 1500V (coil-contact) (10/160 μs standard wave) |              |              |

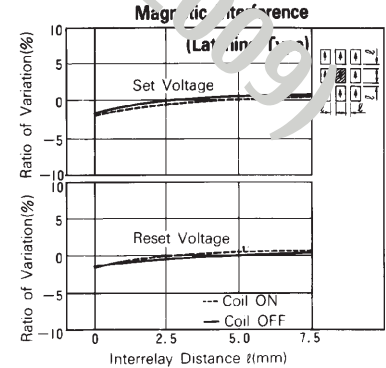
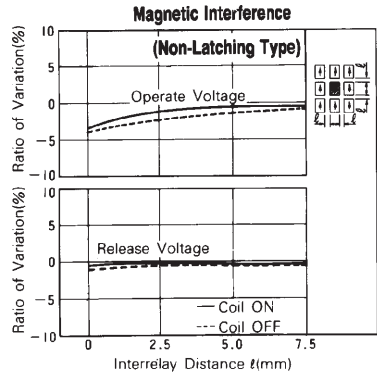
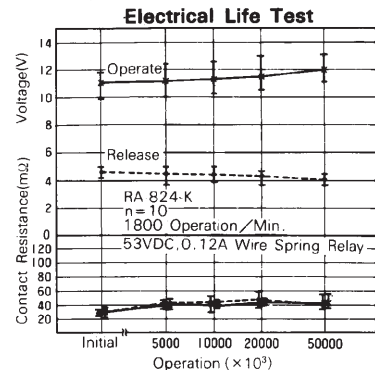
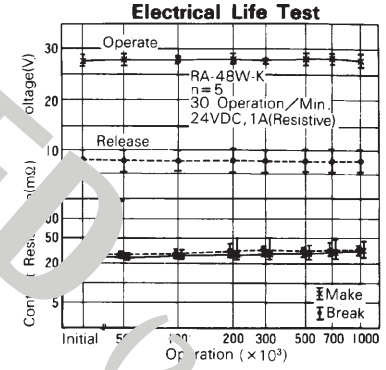
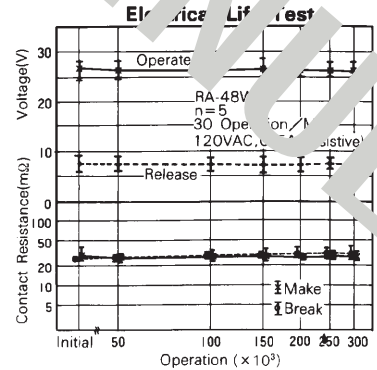
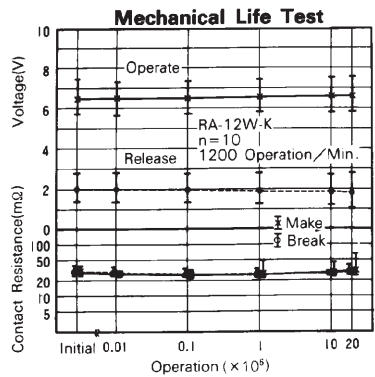
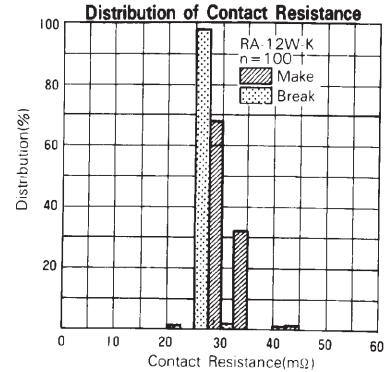
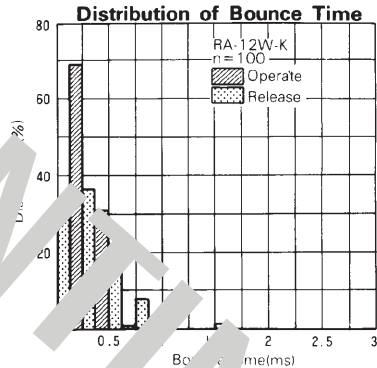
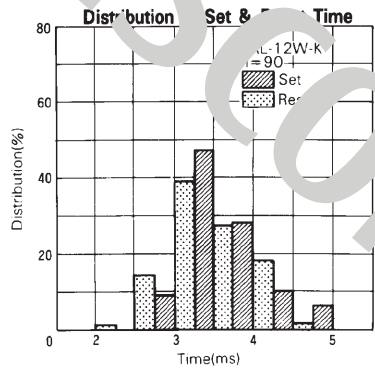
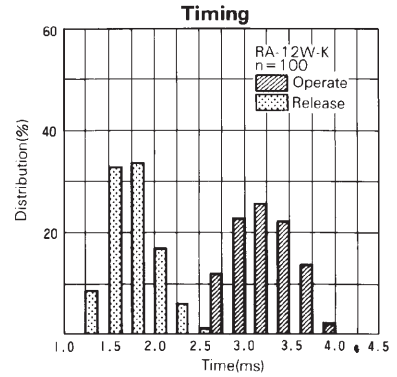
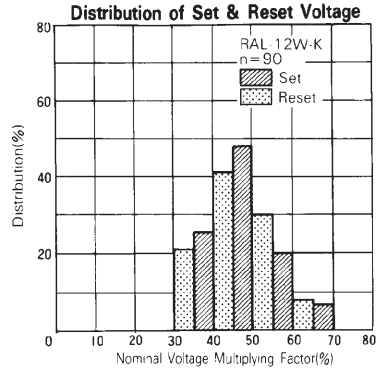
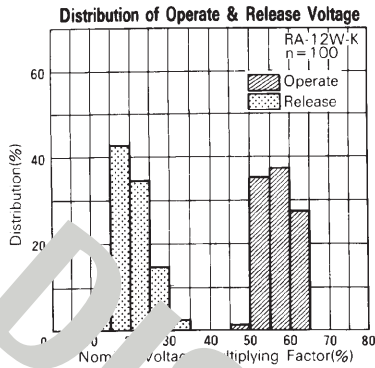
## SAFETY STANDARDS

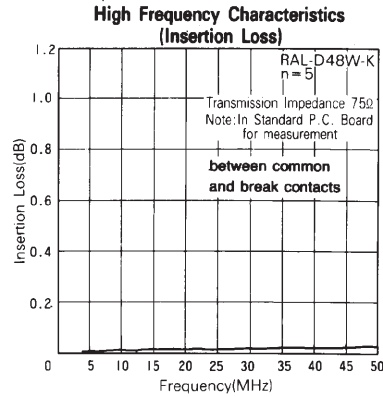
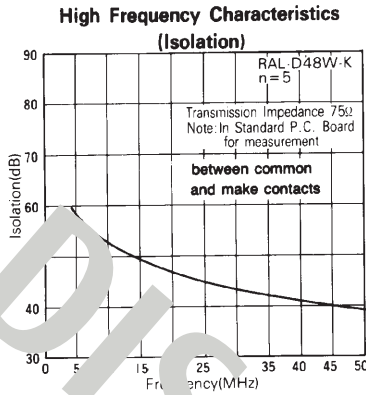
| Type | Compliance                | Contact rating                                                |
|------|---------------------------|---------------------------------------------------------------|
| UL   | UL 478, UL 508<br>E 45026 | Flammability: UL 94-V0 (plastics)<br>0.5A, 120VAC (resistive) |
| CSA  | C22.2 No. 14<br>LR 35579  | 2A, 30VDC (resistive)<br>0.5A, 60VDC (resistive)              |

## CHARACTERISTIC DATA



## REFERENCE DATA

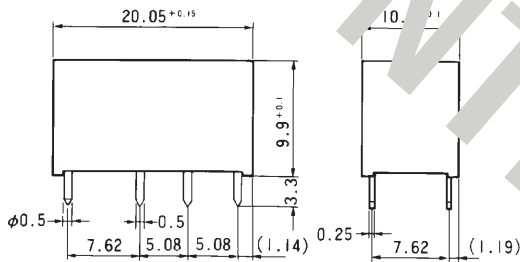




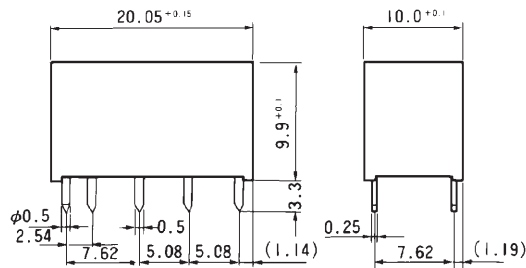
## ■ DIMENSION

### • Dimensions

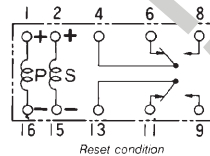
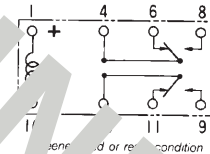
RA, RAL type (Non-latching type) Single winding latching type)



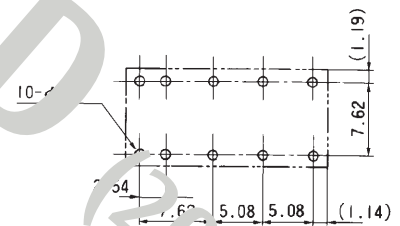
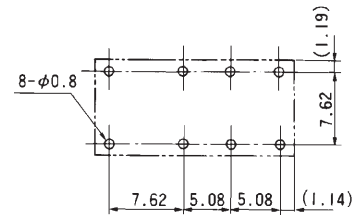
RAL-D type (Double winding latching type)



### • Schematics (Bottom View)



### • PC board mounting hole layout (Bottom View)



Unit: mm

## RoHS Compliance and Lead Free Relay Information

### 1. General Information

- Relays produced after the specific date code that is indicated on each data sheet are lead-free now. Most of our signal and power relays are lead-free. Please refer to Lead-Free Status Info. (<http://www.fujitsu.com/us/downloads/MICRO/fcai/relays/lead-free-letter.pdf>)
  - Lead free solder paste currently used in relays is Sn-3.0Ag-0.5Cu.
  - All signal and most power relays also comply with RoHS. Please refer to individual data sheets. Relays that are RoHS compliant do not contain the 5 hazardous materials that are restricted by RoHS directive (lead, mercury, chromium IV, PBB, PBDE).
  - It has been verified that using lead-free relays in leaded assembly process will not cause any problems (compatible).
  - "LF" is marked on each outer and inner carton. (No marking on individual relays).
  - To avoid leaded relays (for lead-free sample, etc.) please consult with area sales office.
  - We will ship leaded relays as long as the leaded relay inventory exists.
- Note: Cadmium was exempted from RoHS on October 21, 2005. (Amendment to Directive 2002/95/EC)

### 2. Recommended Lead Free Solder Profile

- Recommended solder paste: Sn-3.0Ag-0.5Cu.

#### Reflow Solder condition

##### Flow Solder condition:

Pre-heating: maximum 120°C  
Soldering: dip within 5 sec. at 260°C solder bath

##### Solder by Soldering Iron:

Soldering Iron  
Temperature: maximum 360°C  
Duration: maximum 3 sec.

**We highly recommend that you confirm your actual solder conditions**

### 3. Moisture Sensitivity

- Moisture Sensitivity Level standard is not applicable to electromechanical relays.

### 4. Tin Whisker

- Dipped SnAgCu solder is known as low risk tin whisker. No considerable length whisker was found by our in house test.

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