

# MINIATURE RELAY

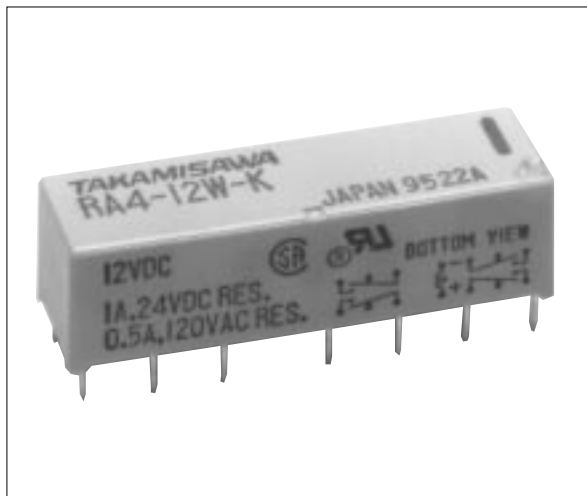
## 4 POLES—1 to 2 A (FOR SIGNAL SWITCHING)

### RA4 SERIES

**RoHS Compliant**

#### ■ FEATURES

- Ultra high sensitivity
- High reliability-bifurcated contacts
- Conforms to FCC rules and regulations Part 68
  - Dielectric strength 1,500 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
- RoHS compliant since date code: 0418H  
Please see page 7 for more information



#### ■ ORDERING INFORMATION

[Example]     RA4   L   –   D   12   W   –   K  
                   (a) (b)    (c) (d) (e)    (f)

|     |                    |  |
|-----|--------------------|--|
| (a) | Series Name        | RA4 : RA4 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: For movable and stationary contact with gold overlay type, add suffix “-OH”.

#### ■ SAFETY STANDARD AND FILE NUMBERS

UL478, 508 (File No. E45026)

C22.2 No. 14 (File No. LR35579)

Please request when the approval markings are required on the cover.

| Nominal voltage | Contact rating   |
|-----------------|------------------|
| 1.5 to 48 VDC   | 0.5 A    120 VAC |
|                 | 2 A      30 VDC  |
|                 | 0.5 A    60 VDC  |
|                 | resistive        |

# RA4 SERIES

## ■ SPECIFICATIONS

| Item           |                              | Standard Type  | Single Winding Latching Type             | Double Winding Latching Type |
|----------------|------------------------------|--|--|------------------------------|
|                |                              | RA4-( ) W-K  | RA4L-( ) W-K                             | RA4L-D ( ) W-K               |
| Contact        | Arrangement                  | 4 form C (4PDT)  |  |                              |
|                | Material                     | Gold overlay silver alloy / silver alloy   |  |                              |
|                | Style                        | Bifurcated   |  |                              |
|                | 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 1.4 pF (between open contacts), 1.3 pF (adjacent contacts)<br>Approximately 2.4 pF (between coil and contacts) |  |                              |
| Coil           | Nominal Power (at 20°C)      | 0.2 W  | 0.09 W                                   | 0.18 W                       |
|                | Operate Power (at 20°C)      | 0.1 W  | 0.045 W                                  | 0.09 W                       |
|                | 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)                     |                              |
| Insulation     | Resistance (at 500 VDC)      | Minimum 1,000 MΩ   |  |                              |
|                | Dielectric Strength          | between open contacts  | 1,000 VAC 1 minute                       |                              |
|                |                              | between adjacent contacts  | 1,500 VAC 1 minute                       |                              |
|                |                              | between coil and contacts  | 1,500 VAC 1 minute                       |                              |
| Surge Strength | 1,500 V                      |  |  |                              |
| 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 3.3 mm) |                              |
|                |                              | Endurance  | 10 to 55 Hz (double amplitude of 5.0 mm) |                              |
|                | Shock Resistance             | Misoperation   | 300 m/s <sup>2</sup> (11 ±1 ms)          |                              |
|                |                              | Endurance  | 1,000 m/s <sup>2</sup> ( 6 ±1 ms)        |                              |
|                | Weight                       | Approximately 6.4 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.

# RA4 SERIES

## ■ COIL DATA CHART

|               | MODEL       | Nominal voltage | Coil resistance (±10%) | Must operate voltage*1 | Must release voltage*1 | Nominal power |
|---------------|-------------|-----------------|------------------------|------------------------|------------------------|---------------|
| Standard Type | RA4-1.5 W-K | 1.5 VDC         | 11Ω                    | +1.0 VDC               | +0.15 VDC              | 200 mW        |
|               | RA4- 3 W-K  | 3 VDC           | 45Ω                    | +2.1 VDC               | +0.3 VDC               | 200 mW        |
|               | RA4-4.5 W-K | 4.5 VDC         | 100Ω                   | +3.1 VDC               | +0.45 VDC              | 200 mW        |
|               | RA4- 5 W-K  | 5 VDC           | 125Ω                   | +3.5 VDC               | +0.5 VDC               | 200 mW        |
|               | RA4- 6 W-K  | 6 VDC           | 180Ω                   | +4.2 VDC               | +0.6 VDC               | 200 mW        |
|               | RA4- 9 W-K  | 9 VDC           | 405Ω                   | +6.3 VDC               | +0.9 VDC               | 200 mW        |
|               | RA4- 12 W-K | 12 VDC          | 720Ω                   | +8.4 VDC               | +1.2 VDC               | 200 mW        |
|               | RA4- 18 W-K | 18 VDC          | 1,620Ω                 | +12.6 VDC              | +1.8 VDC               | 200 mW        |
|               | RA4- 24 W-K | 24 VDC          | 2,880Ω                 | +16.8 VDC              | +2.4 VDC               | 200 mW        |
|               | RA4- 48 W-K | 48 VDC          | 11,520Ω                | +33.6 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.

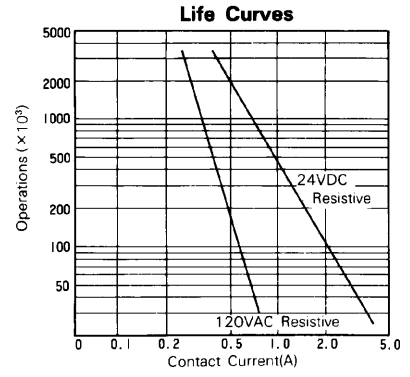
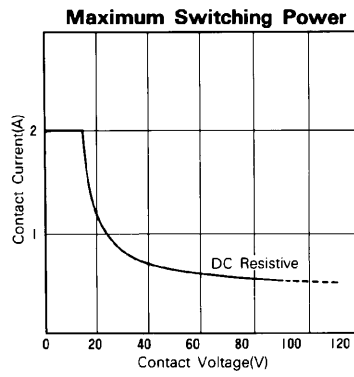
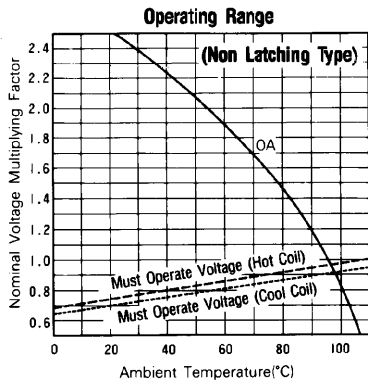
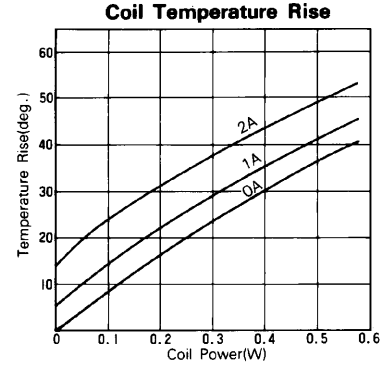
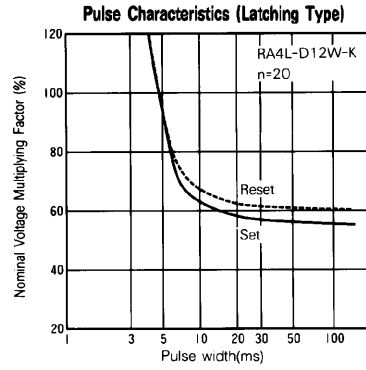
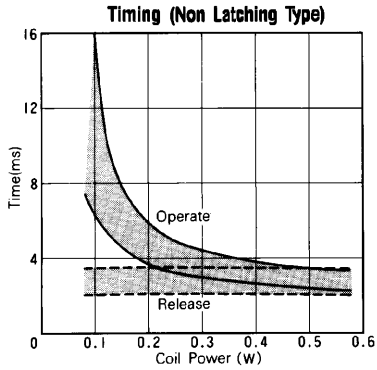
# RA4 SERIES

| MODEL                        |               | Nominal voltage   | Coil resistance ( $\pm 10\%$ ) | Set voltage* <sup>1</sup> | Reset voltage* <sup>1</sup> | Nominal power |
|------------------------------|---------------|-------------------|--------------------------------|---------------------------|-----------------------------|---------------|
| Single Winding Latching Type | RA4L-1.5 W-K  | 1.5 VDC           | 25 $\Omega$                    | +1.0 VDC                  | -1.0 VDC                    | 90 mW         |
|                              | RA4L- 3 W-K   | 3 VDC             | 100 $\Omega$                   | +2.1 VDC                  | -2.1 VDC                    | 90 mW         |
|                              | RA4L-4.5 W-K  | 4.5 VDC           | 225 $\Omega$                   | +3.1 VDC                  | -3.1 VDC                    | 90 mW         |
|                              | RA4L- 5 W-K   | 5 VDC             | 278 $\Omega$                   | +3.5 VDC                  | -3.5 VDC                    | 90 mW         |
|                              | RA4L- 6 W-K   | 6 VDC             | 400 $\Omega$                   | +4.2 VDC                  | -4.2 VDC                    | 90 mW         |
|                              | RA4L- 9 W-K   | 9 VDC             | 900 $\Omega$                   | +6.3 VDC                  | -6.3 VDC                    | 90 mW         |
|                              | RA4L- 12 W-K  | 12 VDC            | 1,600 $\Omega$                 | +8.4 VDC                  | -8.4 VDC                    | 90 mW         |
|                              | RA4L- 18 W-K  | 18 VDC            | 3,600 $\Omega$                 | +12.6 VDC                 | -12.6 VDC                   | 90 mW         |
|                              | RA4L- 24 W-K  | 24 VDC            | 6,400 $\Omega$                 | +16.8 VDC                 | -16.8 VDC                   | 90 mW         |
|                              | RA4L- 48 W-K  | 48 VDC            | 25,600 $\Omega$                | +33.6 VDC                 | -33.6 VDC                   | 90 mW         |
| Double Winding Latching Type | RA4L-D1.5 W-K | 1.5 VDC           | P 12.5 $\Omega$                | +1.0 VDC                  |                             | 180 mW        |
|                              |               |                   | S 12.5 $\Omega$                |                           | +1.0 VDC                    |               |
|                              | RA4L-D 3 W-K  | 3 VDC             | P 50 $\Omega$                  | +2.1 VDC                  |                             | 180 mW        |
|                              |               |                   | S 50 $\Omega$                  |                           | +2.1 VDC                    |               |
|                              | RA4L-D4.5 W-K | 4.5 VDC           | P 113 $\Omega$                 | +3.1 VDC                  |                             | 180 mW        |
|                              |               |                   | S 113 $\Omega$                 |                           | +3.1 VDC                    |               |
|                              | RA4L-D 5 W-K  | 5 VDC             | P 139 $\Omega$                 | +3.5 VDC                  |                             | 180 mW        |
|                              |               |                   | S 139 $\Omega$                 |                           | +3.5 VDC                    |               |
|                              | RA4L-D 6 W-K  | 6 VDC             | P 200 $\Omega$                 | +4.2 VDC                  |                             | 180 mW        |
|                              |               |                   | S 200 $\Omega$                 |                           | +4.2 VDC                    |               |
|                              | RA4L-D 9 W-K  | 9 VDC             | P 450 $\Omega$                 | +6.3 VDC                  |                             | 180 mW        |
|                              |               |                   | S 450 $\Omega$                 |                           | +6.3 VDC                    |               |
|                              | RA4L-D 12 W-K | 12 VDC            | P 800 $\Omega$                 | +8.4 VDC                  |                             | 180 mW        |
|                              |               |                   | S 800 $\Omega$                 |                           | +8.4 VDC                    |               |
|                              | RA4L-D 18 W-K | 18 VDC            | P 1,800 $\Omega$               | +12.6 VDC                 |                             | 180 mW        |
|                              |               |                   | S 1,800 $\Omega$               |                           | +12.6 VDC                   |               |
|                              | RA4L-D 24 W-K | 24 VDC            | P 3,200 $\Omega$               | +16.8 VDC                 |                             | 180 mW        |
|                              |               |                   | S 3,200 $\Omega$               |                           | +16.8 VDC                   |               |
| RA4L-D 48 W-K                | 48 VDC        | P 12,800 $\Omega$ | +33.6 VDC                      |                           | 180 mW                      |               |
|                              |               | S 12,800 $\Omega$ |                                | +33.6 VDC                 |                             |               |

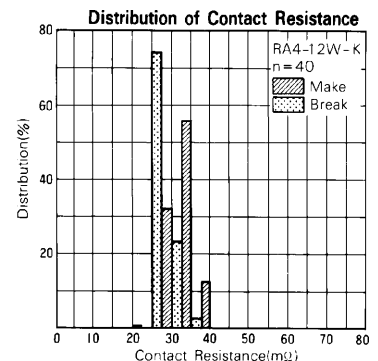
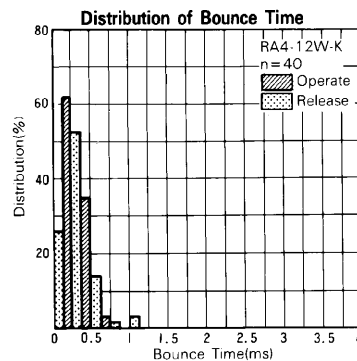
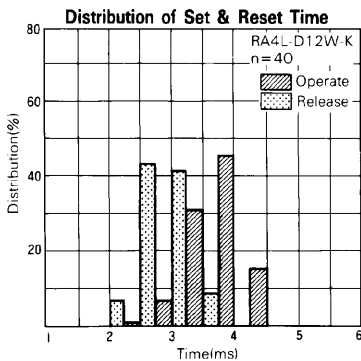
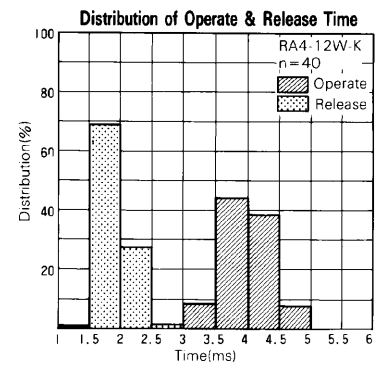
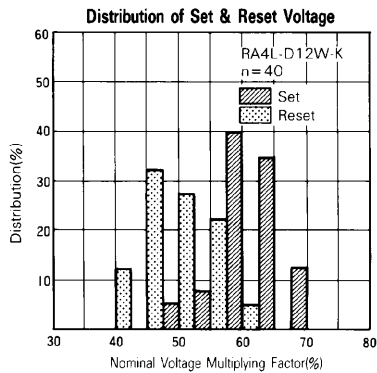
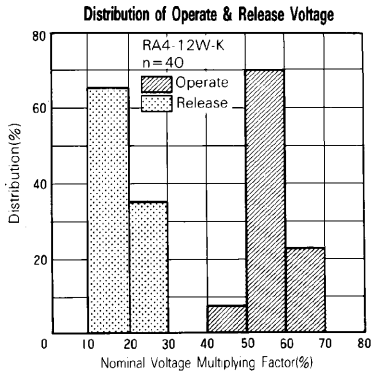
Note: \*<sup>1</sup> Specified values are subject to pulse wave voltage.  
All values in the table are measured at 20°C.

P: Primary coil S: Secondary coil

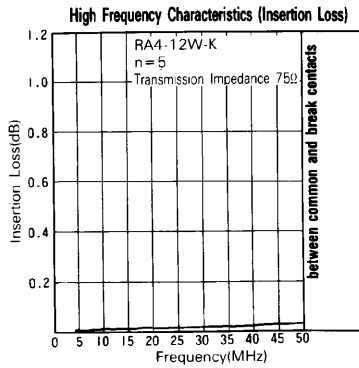
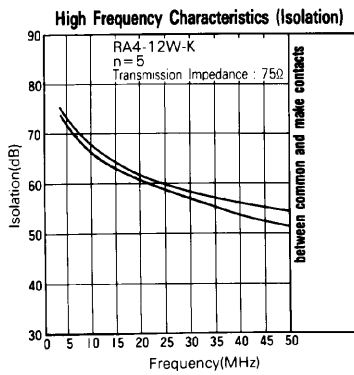
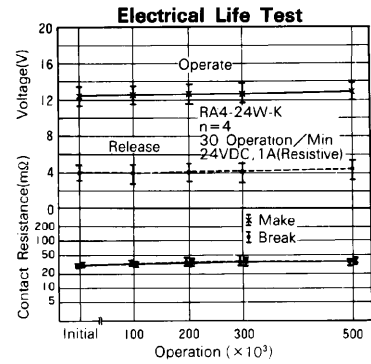
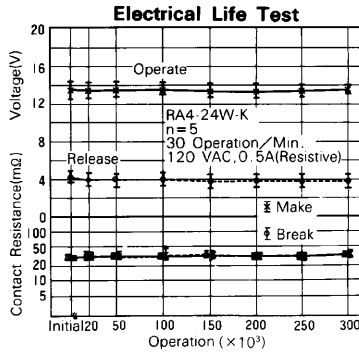
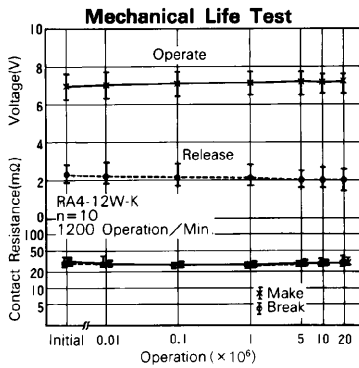
## CHARACTERISTIC DATA



## REFERENCE DATA



# RA4 SERIES



## ■ DIMENSIONS

### ● Dimensions

### ● Schematics

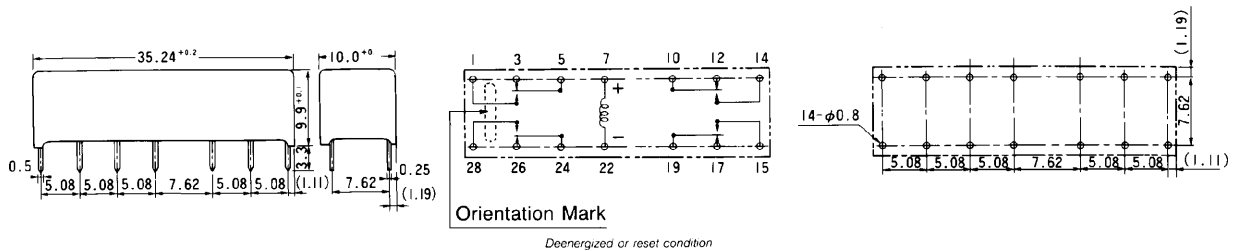
(Bottom View)

### ● PC board mounting

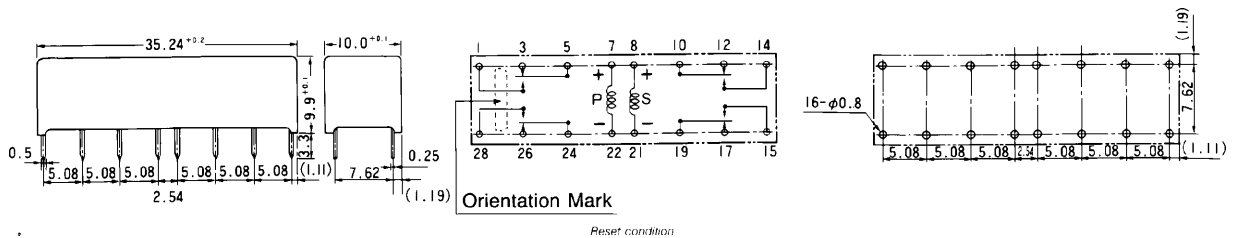
hole layout

(Bottom view)

RA4, RA4L type (Non-latching type, single winding latching type)



RA4L-D type (Double winding latching type)



Unit: mm

## RoHS Compliance and Lead Free Relay Information

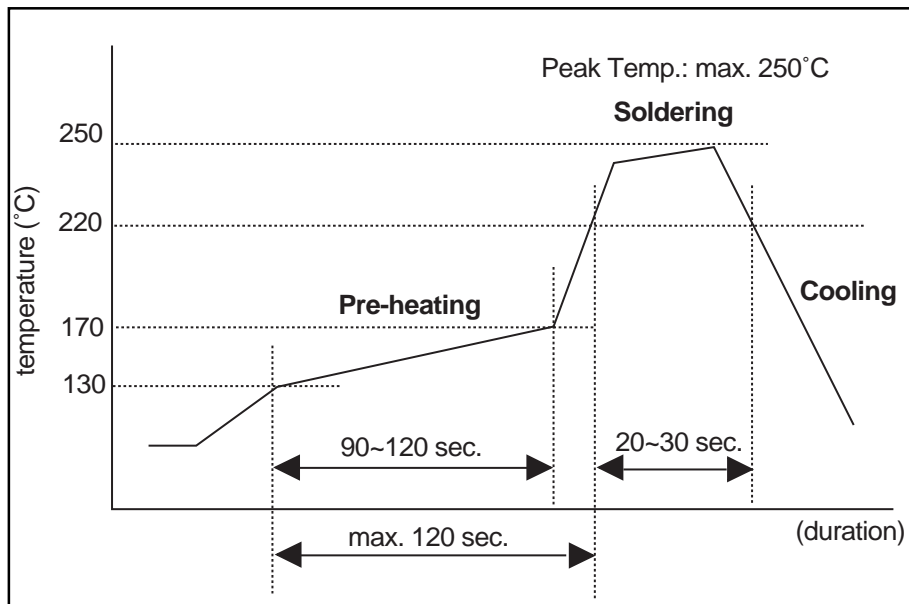
### 1. General Information

- 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.fcai.fujitsu.com/pdf/LeadFreeLetter.pdf>)
- Lead free solder paste currently used in relays is Sn-3.0Ag-0.5Cu. From February 2005 forward Sn-3.0Cu-Ni will be used for FTRB3 and FTR-B4 series relays.
- Most signal and some power relays also comply with RoHS. Please refer to individual data sheets. Relays that are RoHS compliant do not contain the 6 hazardous materials that are restricted by RoHS directive (lead, mercury, cadmium, chromium IV, PBB, PBDE).
- It has been verified that using lead-free relays in lead 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.

### 2. Recommended Lead Free Solder Profile

- Recommended solder paste Sn-3.0Ag-0.5Cu and Sn-3.0 Cu-Ni (only FTR-B3 and FTR-B4 from February 2005)

#### 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

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

### 5. Solid State Relays

- Each lead terminal will be changed from solder plating to Sn plating and Nickel plating. A layer of Nickel plating is between the terminal and the Sn plating to avoid whisker.

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