

# MINIATURE RELAY

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

### A SERIES

RoHS compliant



#### ■ FEATURES

- Extremely low profile and light weight  
—Height: 5 mm  
—Weight: approximately 1.2 g
- Meet FCC (Part 68) standard
- Conforms to FCC rules and regulations part 68  
—Surge strength 1,500 V
- High reliability—bifurcated contacts
- Wide operating range
- DIL pitch terminals
- Plastic sealed type
- Latching version available
- RoHS compliant since date code: 0437B8  
Please see page 7 for more information



#### ■ ORDERING INFORMATION

[Example]       $\frac{A}{(a)} \frac{L}{(b)} - \frac{D}{(*)} \frac{12}{(c)} \frac{W}{(e)} - \frac{K}{(f)} - \frac{HA}{(g)}$

|     |                    |                                                      |
|-----|--------------------|------------------------------------------------------|
| (a) | Series Name        | A : A 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                              |
| (g) | Coil Sensitivity   | Nil : Standard<br>HA : 75% must voltage operate      |

Note: Actual marking omits the hyphen (-) of (\*)

## ■ COIL DATA CHART

|               | MODEL    | Nominal voltage | Coil resistance (±10%) | Must operate voltage* <sup>1</sup> | Must release voltage* <sup>1</sup> | Nominal power |
|---------------|----------|-----------------|------------------------|------------------------------------|------------------------------------|---------------|
| Standard Type | A-1.5W-K | 1.5 VDC         | 16.1Ω                  | +1.13 VDC                          | +0.15 VDC                          | 140 mW        |
|               | A- 3 W-K | 3 VDC           | 64.3Ω                  | +2.25 VDC                          | +0.3 VDC                           | 140 mW        |
|               | A-4.5W-K | 4.5 VDC         | 145Ω                   | +3.38 VDC                          | +0.45 VDC                          | 140 mW        |
|               | A- 5 W-K | 5 VDC           | 178Ω                   | +3.75 VDC                          | +0.5 VDC                           | 140 mW        |
|               | A- 6 W-K | 6 VDC           | 257Ω                   | +4.5 VDC                           | +0.6 VDC                           | 140 mW        |
|               | A- 9 W-K | 9 VDC           | 579Ω                   | +6.75 VDC                          | +0.9 VDC                           | 140 mW        |
|               | A-12 W-K | 12 VDC          | 1,028Ω                 | +9.0 VDC                           | +1.2 VDC                           | 140 mW        |
|               | A-18 W-K | 18 VDC          | 1,620Ω                 | +13.5 VDC                          | +1.8 VDC                           | 200 mW        |
|               | A-24 W-K | 24 VDC          | 2,880Ω                 | +18.0 VDC                          | +2.4 VDC                           | 200 mW        |
|               | A-48 W-K | 48 VDC          | 7,680Ω                 | +36.0 VDC                          | +4.8 VDC                           | 300 mW        |

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

|                              | MODEL      | Nominal voltage | Coil resistance (±10%) | Set voltage* <sup>1</sup> | Reset voltage* <sup>1</sup> | Nominal power |
|------------------------------|------------|-----------------|------------------------|---------------------------|-----------------------------|---------------|
| Single Winding Latching Type | AL-1.5W-K  | 1.5 VDC         | 22.5Ω                  | +1.13 VDC                 | -1.05 VDC                   | 100 mW        |
|                              | AL- 3 W-K  | 3 VDC           | 90Ω                    | +2.25 VDC                 | -2.1 VDC                    | 100 mW        |
|                              | AL-4.5W-K  | 4.5 VDC         | 203Ω                   | +3.38 VDC                 | -3.15 VDC                   | 100 mW        |
|                              | AL- 5 W-K  | 5 VDC           | 250Ω                   | +3.75 VDC                 | -3.5 VDC                    | 100 mW        |
|                              | AL- 6 W-K  | 6 VDC           | 360Ω                   | +4.5 VDC                  | -4.2 VDC                    | 100 mW        |
|                              | AL- 9 W-K  | 9 VDC           | 810Ω                   | +6.75 VDC                 | -6.3 VDC                    | 100 mW        |
|                              | AL-12 W-K  | 12 VDC          | 1,440Ω                 | +9.0 VDC                  | -8.4 VDC                    | 100 mW        |
|                              | AL-18 W-K  | 18 VDC          | 2,160Ω                 | +13.5 VDC                 | -12.6 VDC                   | 150 mW        |
|                              | AL-24 W-K  | 24 VDC          | 3,840Ω                 | +18.0 VDC                 | -16.8 VDC                   | 150 mW        |
| Double Winding Latching Type | AL-D1.5W-K | 1.5 VDC         | P 11.25Ω               | +1.13 VDC                 |                             | 200 mW        |
|                              |            |                 | S 11.25Ω               |                           | +1.05 VDC                   |               |
|                              | AL-D 3 W-K | 3 VDC           | P 45Ω                  | +2.25 VDC                 |                             | 200 mW        |
|                              |            |                 | S 45Ω                  |                           | +2.1 VDC                    |               |
|                              | AL-D4.5W-K | 4.5 VDC         | P 101Ω                 | +3.38 VDC                 |                             | 200 mW        |
|                              |            |                 | S 101Ω                 |                           | +3.15 VDC                   |               |
|                              | AL-D 5 W-K | 5 VDC           | P 125Ω                 | +3.75 VDC                 |                             | 200 mW        |
|                              |            |                 | S 125Ω                 |                           | +3.5 VDC                    |               |
|                              | AL-D 6 W-K | 6 VDC           | P 180Ω                 | +4.50 VDC                 |                             | 200 mW        |
|                              |            |                 | S 180Ω                 |                           | +4.2 VDC                    |               |
|                              | AL-D 9 W-K | 9 VDC           | P 405Ω                 | +6.75 VDC                 |                             | 200 mW        |
|                              |            |                 | S 405Ω                 |                           | +6.3 VDC                    |               |
|                              | AL-D12 W-K | 12 VDC          | P 720Ω                 | +9.0 VDC                  |                             | 200 mW        |
|                              |            |                 | S 720Ω                 |                           | +8.4 VDC                    |               |
|                              | AL-D18 W-K | 18 VDC          | P 1,080Ω               | +13.5 VDC                 |                             | 300 mW        |
|                              |            |                 | S 1,080Ω               |                           | +12.6 VDC                   |               |
|                              | AL-D24 W-K | 24 VDC          | P 1,920Ω               | +18.0 VDC                 |                             | 300 mW        |
|                              |            |                 | S 1,920Ω               |                           | +16.8 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

## ■ SPECIFICATIONS

| Item       |                              |              | Standard Type                                                                                                       | Single Winding Latching Type     | Double Winding Latching Type |
|------------|------------------------------|--------------|---------------------------------------------------------------------------------------------------------------------|----------------------------------|------------------------------|
|            |                              |              | A-( ) W-K                                                                                                           | AL-( ) W-K                       | AL-D ( ) W-K                 |
| Contact    | Arrangement                  |              | 2 form C (DPDT)                                                                                                     |                                  |                              |
|            | Material                     |              | Gold overlay silver alloy                                                                                           |                                  |                              |
|            | Resistance (initial)         |              | Maximum 50 mΩ (at 1 A 6 VDC)                                                                                        |                                  |                              |
|            | Rating (resistive)           |              | 0.5 A 125 VAC or 1 A 30 VDC                                                                                         |                                  |                              |
|            | Maximum Carrying Current     |              | 2 A                                                                                                                 |                                  |                              |
|            | Maximum Switching Power      |              | 62.5 AV/30 W                                                                                                        |                                  |                              |
|            | Maximum Switching Voltage    |              | 125VAC, 110VDC                                                                                                      |                                  |                              |
|            | Maximum Switching Current    |              | 2 A                                                                                                                 |                                  |                              |
|            | Minimum Switching Load*1     |              | 0.01 mA 10 mVDC                                                                                                     |                                  |                              |
|            | Capacitance                  |              | Approximately 0.5 pF (between open contacts, adjacent contacts)<br>Approximately 1.0 pF (between coil and contacts) |                                  |                              |
| Coil       | Nominal Power (at 20°C)      |              | 140 to 300 mW                                                                                                       | 100 to 150 mW                    | 200 to 300 mW                |
|            | Operate Power (at 20°C)      |              | 80 to 170 W                                                                                                         | 60 to 85 mW                      | 150 to 170 mW                |
|            | Operating Temperature        |              | -40°C to +85°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                   |              | 1 × 10 <sup>8</sup> ops. minimum                                                                                    | 1 × 10 <sup>7</sup> ops. minimum |                              |
|            | Electrical                   |              | 2 × 10 <sup>5</sup> ops. min. (0.5 A 125 VAC), 5 × 10 <sup>5</sup> ops. min. (1 A 30 VDC)                           |                                  |                              |
| Other      | Vibration                    | Misoperation | 10 to 55 Hz (double amplitude of 3.3 mm)                                                                            |                                  |                              |
|            | Resistance                   | Endurance    | 10 to 55 Hz (double amplitude of 5.0 mm)                                                                            |                                  |                              |
|            | Shock                        | Misoperation | 500 m/s <sup>2</sup> (11 ±1 ms)                                                                                     |                                  |                              |
|            | Resistance                   | Endurance    | 1,000 m/s <sup>2</sup> ( 6 ±1 ms)                                                                                   |                                  |                              |
|            | Weight                       |              | Approximately 1.2 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.

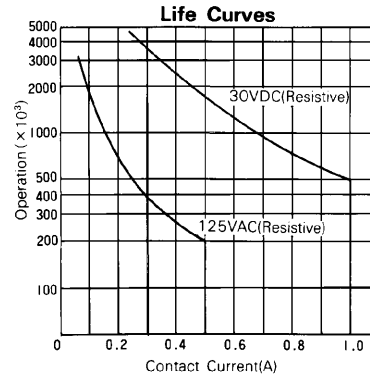
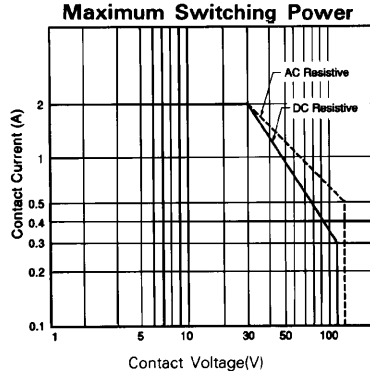
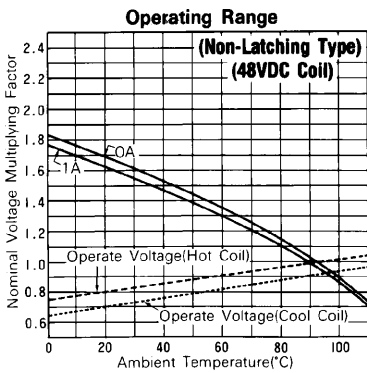
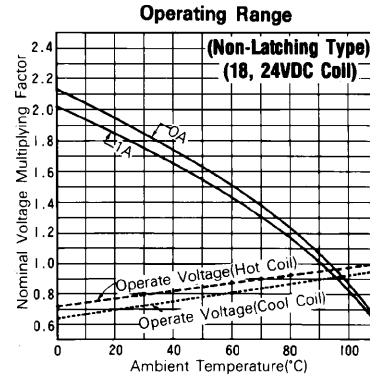
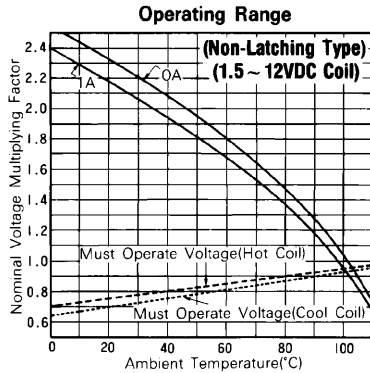
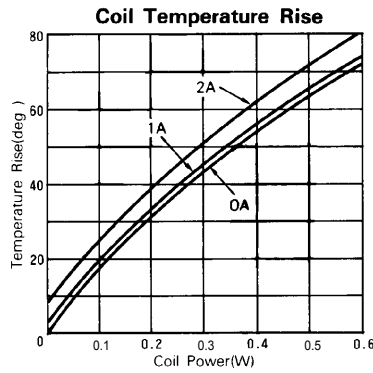
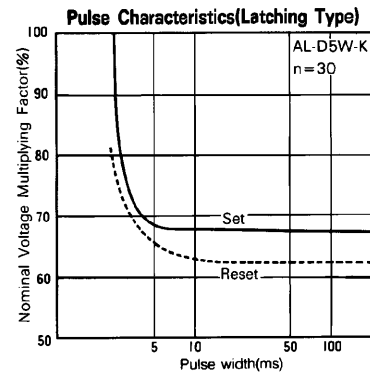
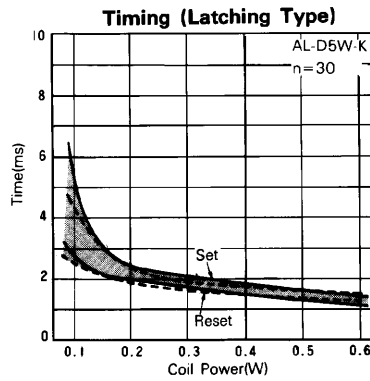
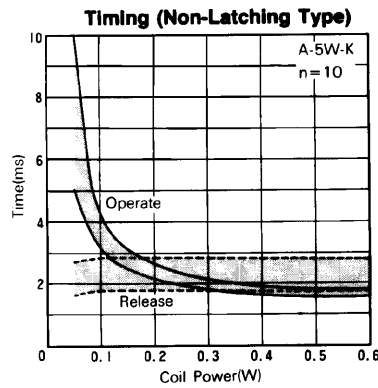
## ■ INSULATION

|                      |                                     |                                                |
|----------------------|-------------------------------------|------------------------------------------------|
| Item                 |                                     |                                                |
| Resistance (initial) |                                     | Minimum 1,000 MΩ (500VDC)                      |
| Dielectric Strength  | open contacts                       | 1,000 VAC 1 min.                               |
|                      | coil and contacts adjacent contacts | 1,000 VAC 1 min.                               |
| Surge Voltage        |                                     | 1500V (coil-contact) (10/160 μs standard wave) |

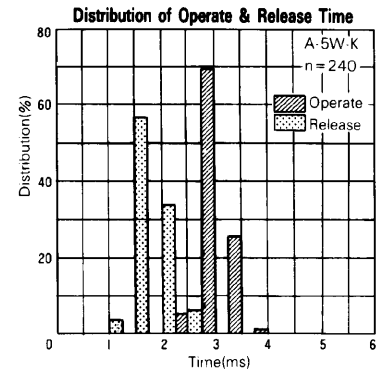
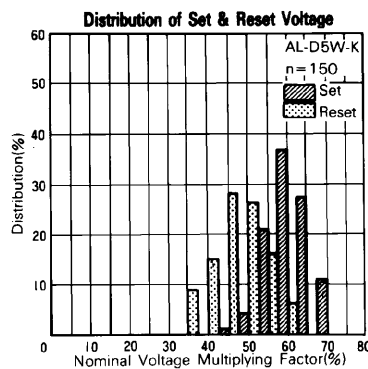
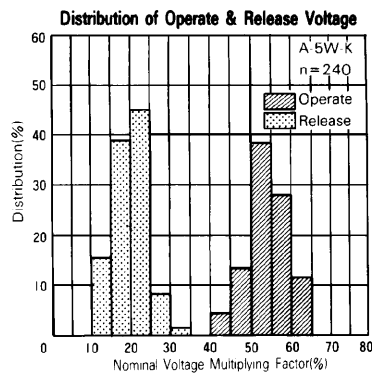
## ■ SAFETY STANDARD AND FILE NUMBERS

| Type | Compliance                | Contact rating                                                                                                       |
|------|---------------------------|----------------------------------------------------------------------------------------------------------------------|
| UL   | UL 478, UL 508<br>E 45026 | Flammability: UL 94-V0 (plastics)<br>0.5A, 125VAC (General use)<br>2A, 30VDC (resistive)<br>0.3A, 110VDC (resistive) |
| CSA  | C22.2 No. 14<br>LR 35579  |                                                                                                                      |

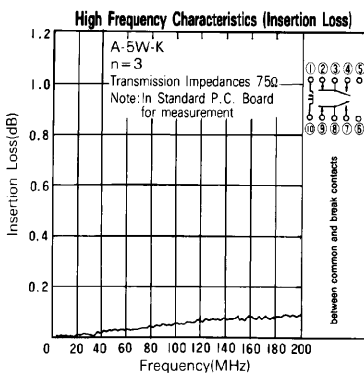
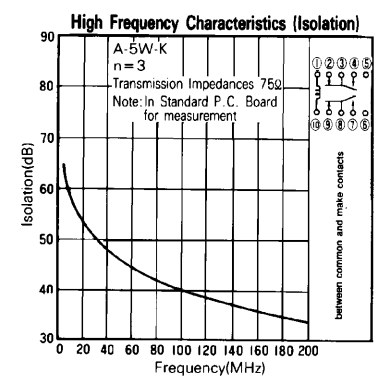
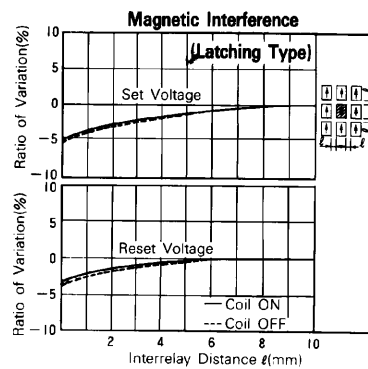
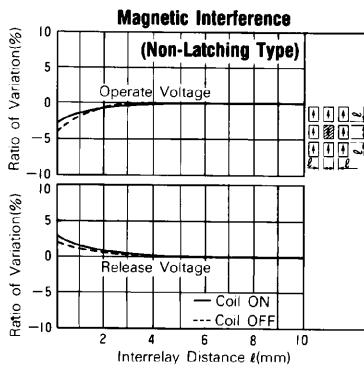
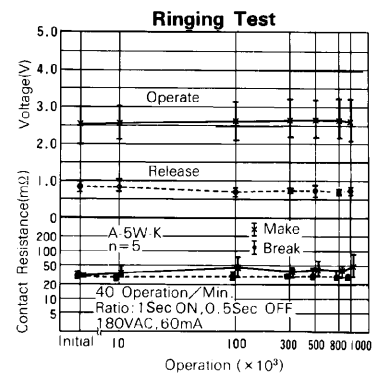
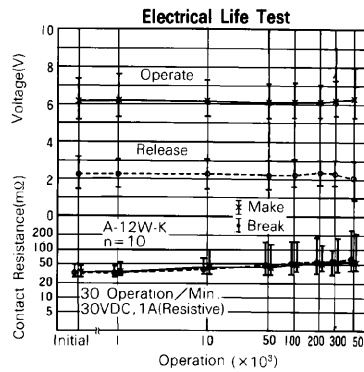
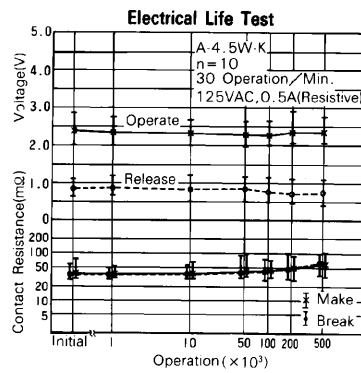
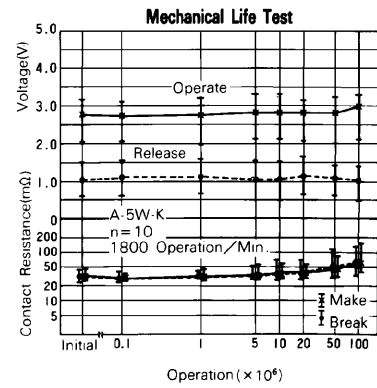
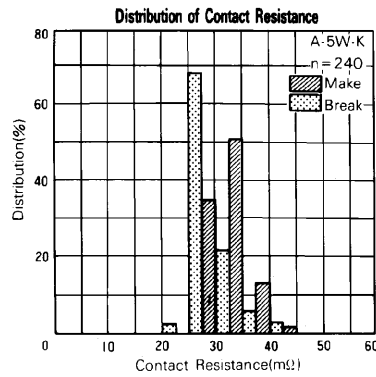
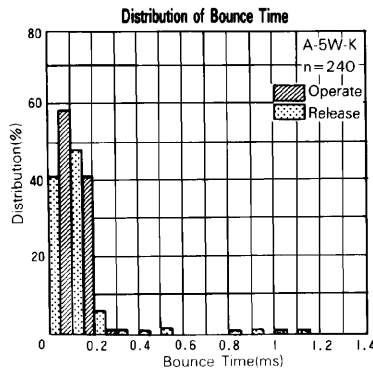
## CHARACTERISTIC DATA



## REFERENCE DATA



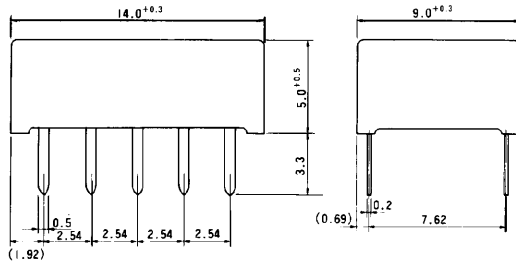
# A SERIES



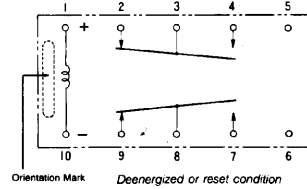
## ■ DIMENSIONS

### ● Dimensions

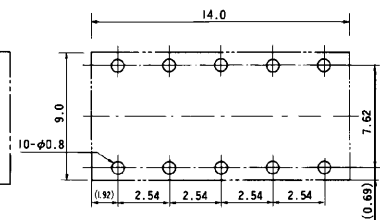
A, AL type (Non-latching type, single winding latching type)



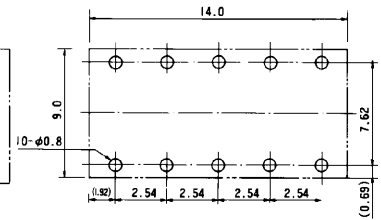
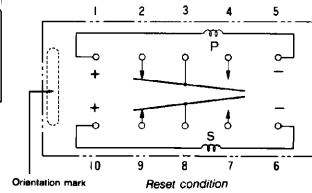
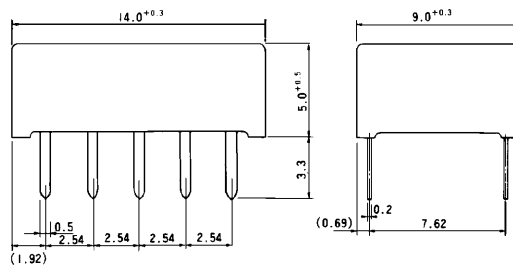
### ● Schematics (Bottom View)



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



AL-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.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.

## Fujitsu Components International Headquarter Offices

### Japan

Fujitsu Component Limited  
Gotanda-Chuo Building  
3-5, Higashigotanda 2-chome, Shinagawa-ku  
Tokyo 141, Japan  
Tel: (81-3) 5449-7010  
Fax: (81-3) 5449-2626  
Email: [promothq@ft.ed.fujitsu.com](mailto:promothq@ft.ed.fujitsu.com)  
Web: [www.fcl.fujitsu.com](http://www.fcl.fujitsu.com)

### North and South America

Fujitsu Components America, Inc.  
250 E. Caribbean Drive  
Sunnyvale, CA 94089 U.S.A.  
Tel: (1-408) 745-4900  
Fax: (1-408) 745-4970  
Email: [components@us.fujitsu.com](mailto:components@us.fujitsu.com)  
Web: <http://www.fujitsu.com/us/services/edevices/components/>

### Europe

Fujitsu Components Europe B.V.  
Diamantlaan 25  
2132 WV Hoofddorp  
Netherlands  
Tel: (31-23) 5560910  
Fax: (31-23) 5560950  
Email: [info@fceu.fujitsu.com](mailto:info@fceu.fujitsu.com)  
Web: [emea.fujitsu.com/components/](http://emea.fujitsu.com/components/)

### Asia Pacific

Fujitsu Components Asia Ltd.  
102E Pasir Panjang Road  
#01-01 Citilink Warehouse Complex  
Singapore 118529  
Tel: (65) 6375-8560  
Fax: (65) 6273-3021  
Email: [fcal@fcal.fujitsu.com](mailto:fcal@fcal.fujitsu.com)  
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