

POWER RELAY

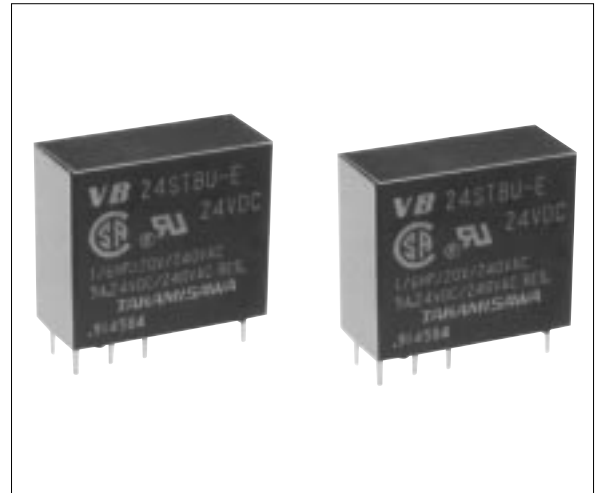
2 POLE—5 A (MEDIUM LOAD CONTROL)

VB SERIES

Lead Free / RoHS compliant*

■ FEATURES

- UL, CSA, VDE, SEV, SEMKO, FIMKO, IMQ recognized TV-3 rated
 - Working class: C
 - UL class B (130°C) insulation
 - Type of service: continuous duty
 - Heavy duty miniature slim type power relay
 - High isolation in small package
 - Insulation distance: 8 mm
 - Dielectric strength: 5,000 VAC (between coil and contacts)
 - Surge strength: 10,000 V
 - Standard and high sensitivity types available
 - Flux free type and plastic sealed type available
 - Lead Free since date code: 0438B9, 0434R - Please see page 8 for more information
- * some part numbers still contain cadmium and are not RoHS compliant



■ ORDERING INFORMATION

[Example] VB - 12 S M B U - 5
 (a) (*) (b) (c) (d) (e) (f) (*) (g)

| | | |
|-----|---------------------|---|
| (a) | Series Name | VB: VB Series |
| (b) | Nominal Voltage | Refer to the COIL DATA CHART |
| (c) | Coil Type | Nil : Standard type (700-750 mW) S : High sensitive type (530 mW) |
| (d) | Contact Arrangement | M : 2 form A (DPST-NO) T : 2 form C (DPDT) |
| (e) | Enclosure | B : Flux free type C : Plastic sealed type (with tape) K : Plastic sealed type |
| (f) | Standard | Nil : TV-rating U : General (non TV-rating) |
| (g) | Contact Material | N : Silver alloy Nil : Silver cadmium oxide (TV-3 rating) 5 : Silver cadmium oxide (non TV-rating) Nil : Gold overlay silver-nickel (non TV-rating) E : Silver-nickel (non TV-rating) |

Actual marking omits the hyphen (-) of (*)

■ SAFETY STANDARD AND FILE NUMBERS

UL508, 873 (File No. E56140, E108658)

C 22.2 No. 1, No. 14 (File No. LR35579)

VDE0435, 0630, 0631, 0700, 0860 (File No. 11039-4940-1009)

Please note that UL/CSA ratings may differ from the standard ratings. Please request when the approval markings are required on the cover and/or when a relay recognized by VDE, SEV, SEMKO, FIMKO, IMQ is required.


| | Type | Nominal voltage | Contact rating |
|-----------|--|-----------------|---|
| TV-Rating | VB-() M | 3 to 100 VDC | TV-3 120 VAC 1/6HP 120 VAC/240 VAC 5 A 24 VDC/240 VAC resistive 1.9A 250VAC inductive (PF=0.4) Pilot duty C 150 |
| Standard | VB-() () U-() VB-() S () U-() | 3 to 100 VDC | 1/6HP 120 VAC/240 VAC 5 A 24 VDC/240 VAC resistive 1.9A 250VAC inductive (PF=0.4) Pilot duty C 150 |

VB SERIES

■ SPECIFICATIONS

| Item | | TV-3 Rating | | Standard Type | | |
|------------------|-------------------------------------|---|--|--|--------------|---|
| | | VB-() M | VB-() M-N | VB-() U-S | VB-() U-N | VB-() U VB-()-E |
| Contact | Arrangement | 2 form A (DPST-NO) | | 2 form A (DPST-NO) or 2 form C (DPDT) | | |
| | Material | Silver-cadmium oxide | Silver-alloy | Silver-cadmium oxide | Silver-alloy | Gold overlay silver-nickel (non gold overlay only VB-E) |
| | Style | Single | | | | |
| | Resistance (initial) (at 1 A 6 VDC) | Maximum 200 mΩ | | | | Maximum 100 mΩ |
| | Rating (resistive) | 5 A 240 VAC/24 VDC | | | | |
| | Maximum Carrying Current | 7 A | | | | |
| | Maximum Switching Power | 1,200 VA, 120 W | | | | |
| | Maximum Switching Voltage | 380 VAC, 150 VDC | | | | |
| | Maximum Switching Current | 5 A | | | | |
| | Minimum Switching Load *1 | 100 mA 5 VDC (VB-M, 5, E) 10 mA 5 VDC (VB-) | | | | |
| | Maximum Inrush Current | 51 A 120 VAC (at lamp load) | — | | | |
| Coil | Nominal Power (at 20°C) | Standard type: 0.70 to 0.75 W, high sensitivity type: 0.53 W | | | | |
| | Operate Power (at 20°C) | Standard type: 0.35 to 0.37 W, high sensitivity type: 0.26 W | | | | |
| | Operating Temperature | Standard type: -40°C to +65°C, high sensitivity type: -40°C to +75°C (no frost) | | | | |
| Time Value | Operate (at nominal voltage) | Maximum 15 ms | | | | |
| | Release (at nominal voltage) | Maximum 10 ms | | | | |
| Insulation | Resistance (at 500 VDC) | Minimum 1,000 MΩ | | | | |
| | Dielectric Strength | between open contacts | 1,000 VAC 1 minute (3000 VAC between adjacent contacts) | | | |
| | | between coil and contacts*2 | 5,000 VAC 1 minute | | | |
| Surge Strength*3 | 10,000 V at(1.2 × 50 μs) | | | | | |
| Life | Mechanical | 2 × 10 ⁷ operations minimum | | | | |
| | Electrical | 1 × 10 ⁵ operations minimum at rated load | | | | |
| | | | 5 × 10 ⁴ operations minimum at motor load (1/8HP 120 VAC) | 3 × 10 ⁴ operations minimum at motor load (1/8HP 120 VAC) | | |
| | | | 5 × 10 ⁴ operations minimum at lamp load | — | | |
| Other | Vibration Resistance | Misoperation | 10 to 55 Hz (double amplitude of 1.5 mm) | | | |
| | | Endurance | 10 to 55 Hz (double amplitude of 1.5 mm) | | | |
| | Shock Resistance | Misoperation | 100 m/s ² (11 ± 1 ms) | | | |
| | | Endurance | 1,000 m/s ² (6 ± 1 ms) | | | |
| | Weight | Approximately 17 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.

*2 IMQ 

*3 IMQ 

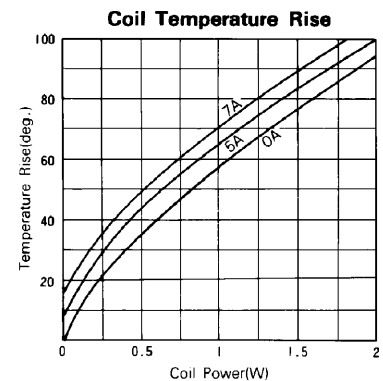
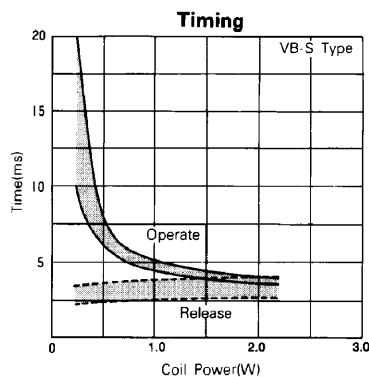
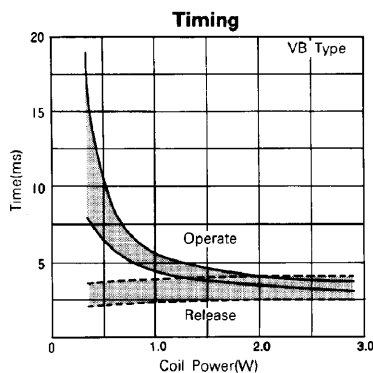
VB SERIES

COIL DATA CHART

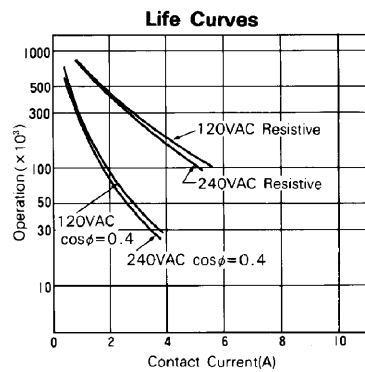
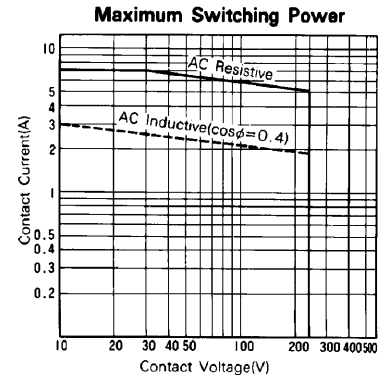
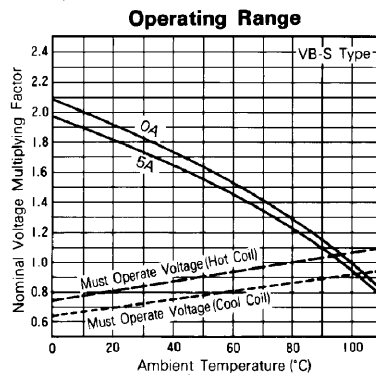
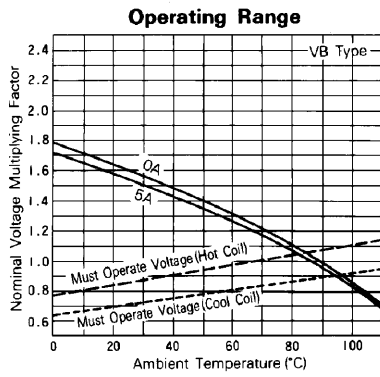
| TV-3 Rating | | Standard | Nominal voltage | Coil resistance (10%) | Must operate voltage | Must release voltage | Nominal power |
|-----------------------|-----------------------|-----------------------|-----------------|-----------------------|----------------------|----------------------|---------------|
| 5A | | | | | | | |
| Standard Type | VB- 3M () | VB- 3 () () U-() | 3 V DC | 12.5 Ω | 2.1 VDC | 0.3 VDC | 0.72 W |
| | VB- 5M () | VB- 5 () () U-() | 5 V DC | 36 Ω | 3.5 VDC | 0.5 VDC | 0.70 W |
| | VB- 6M () | VB- 6 () () U-() | 6 V DC | 50 Ω | 4.2 VDC | 0.6 VDC | 0.72 W |
| | VB- 9M () | VB- 9 () () U-() | 9 V DC | 115 Ω | 6.3 VDC | 0.9 VDC | 0.70 W |
| | VB- 12M () | VB- 12 () () U-() | 12 V DC | 200 Ω | 8.4 VDC | 1.2 VDC | 0.72 W |
| | VB- 14M () | VB- 14 () () U-() | 14 V DC | 280 Ω | 9.8 VDC | 1.4 VDC | 0.70 W |
| | VB- 18M () | VB- 18 () () U-() | 18 V DC | 460 Ω | 12.6 VDC | 1.8 VDC | 0.70 W |
| | VB- 24M () | VB- 24 () () U-() | 24 V DC | 820 Ω | 16.8 VDC | 2.4 VDC | 0.70 W |
| | VB- 36M () | VB- 36 () () U-() | 36 V DC | 1,850 Ω | 25.2 VDC | 3.6 VDC | 0.70 W |
| | VB- 48M () | VB- 48 () () U-() | 48 V DC | 3,300 Ω | 33.6 VDC | 4.8 VDC | 0.70 W |
| | VB- 60M () | VB- 60 () () U-() | 60 V DC | 5,100 Ω | 42.0 VDC | 6.0 VDC | 0.70 W |
| | VB-100M () | VB-100 () () U-() | 100 V DC | 13,400 Ω | 70.0 VDC | 10.0 VDC | 0.75 W |
| High Sensitivity Type | VB- 3S () () U-() | VB- 3S () () U-() | 3 V DC | 17 Ω | 2.1 VDC | 0.3 VDC | 0.53 W |
| | VB- 5S () () U-() | VB- 5S () () U-() | 5 V DC | 47 Ω | 3.5 VDC | 0.5 VDC | 0.53 W |
| | VB- 6S () () U-() | VB- 6S () () U-() | 6 V DC | 68 Ω | 4.2 VDC | 0.6 VDC | 0.53 W |
| | VB- 9S () () U-() | VB- 9S () () U-() | 9 V DC | 155 Ω | 6.3 VDC | 0.9 VDC | 0.53 W |
| | VB-12S () () U-() | VB-12S () () U-() | 12 V DC | 270 Ω | 8.4 VDC | 1.2 VDC | 0.53 W |
| | VB-14S () () U-() | VB-14S () () U-() | 14 V DC | 370 Ω | 9.8 VDC | 1.4 VDC | 0.53 W |
| | VB-18S () () U-() | VB-18S () () U-() | 18 V DC | 610 Ω | 12.6 VDC | 1.8 VDC | 0.53 W |
| | VB-24S () () U-() | VB-24S () () U-() | 24 V DC | 1,100 Ω | 16.8 VDC | 2.4 VDC | 0.53 W |
| | VB-36S () () U-() | VB-36S () () U-() | 36 V DC | 2,450 Ω | 25.2 VDC | 3.6 VDC | 0.53 W |
| | VB-48S () () U-() | VB-48S () () U-() | 48 V DC | 4,400 Ω | 33.6 VDC | 4.8 VDC | 0.53 W |
| | VB-60S () () U-() | VB-60S () () U-() | 60 V DC | 6,800 Ω | 42.0 VDC | 6.0 VDC | 0.53 W |
| | VB-100S () () U-() | VB-100S () () U-() | 100 V DC | 18,860 Ω | 70.0 VDC | 10.0 VDC | 0.53 W |

Note: All values in the table are measured at 20 °C.

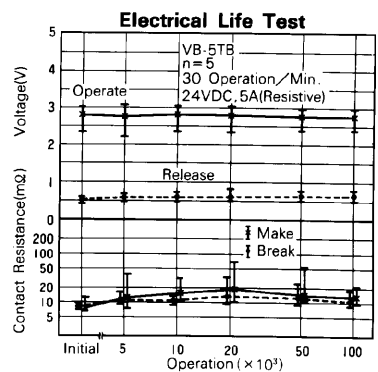
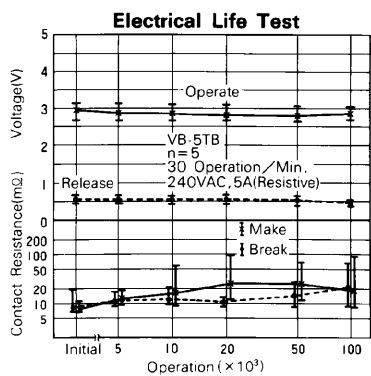
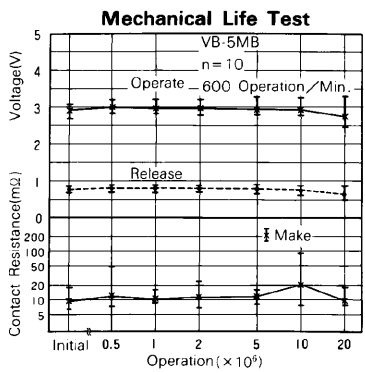
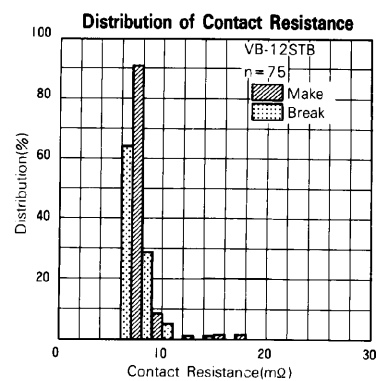
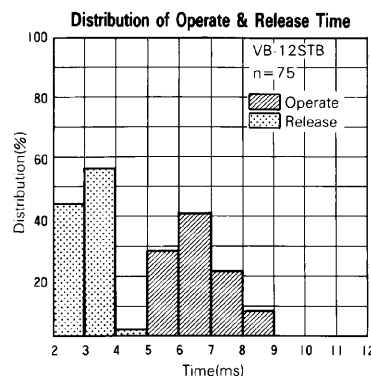
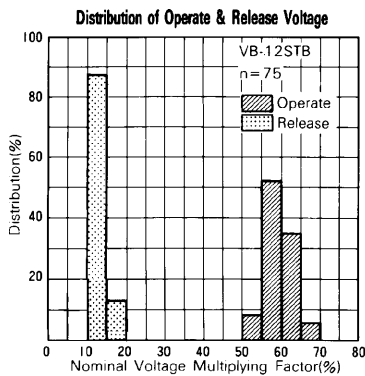
CHARACTERISTIC DATA



VB SERIES



REFERENCE DATA

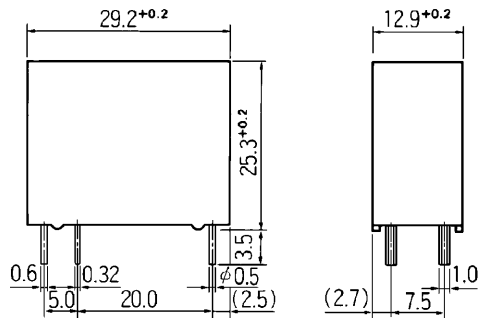


VB SERIES

■ DIMENSIONS

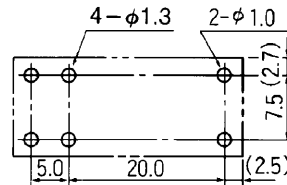
● Dimensions

VB-M type



● Schematics

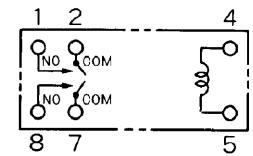
(BOTTOM VIEW)



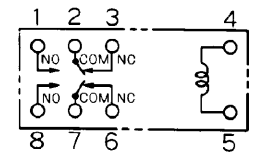
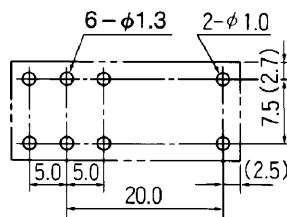
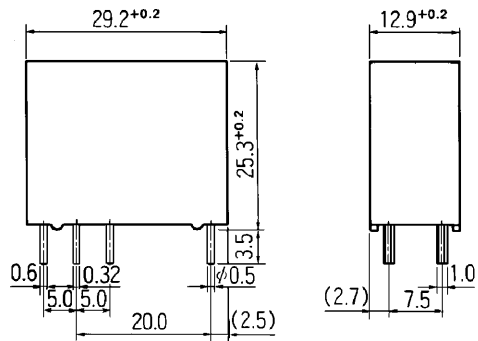
● PC board mounting

hole layout

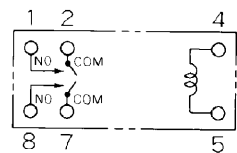
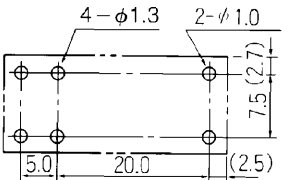
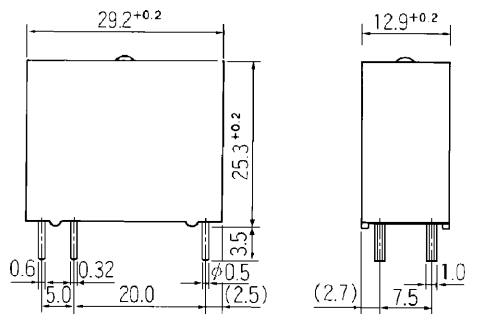
(BOTTOM VIEW)



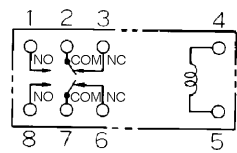
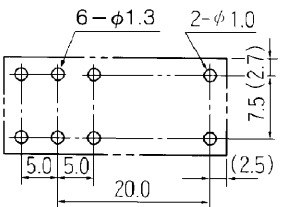
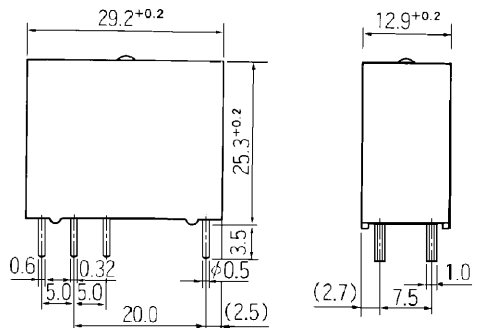
VB type



VB-MK type (Plastic sealed type)



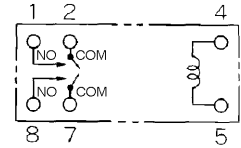
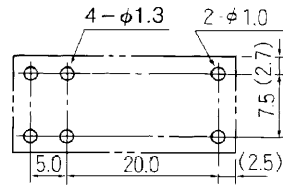
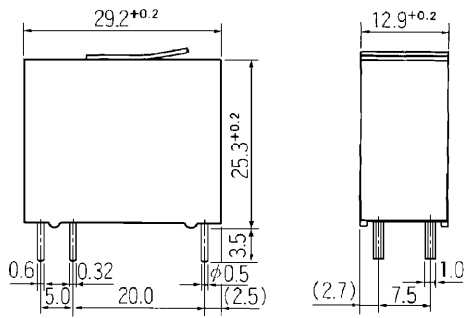
VB-K type (Plastic sealed type)



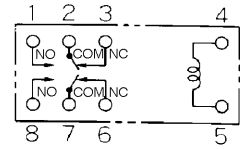
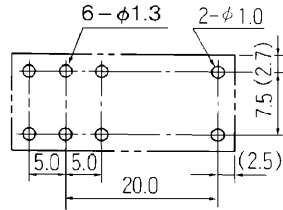
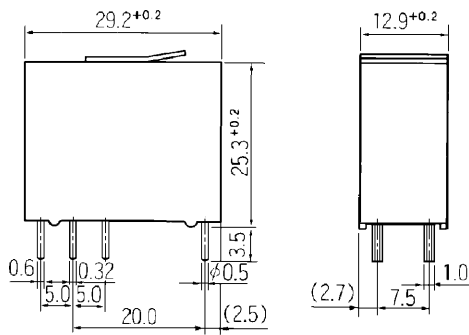
Unit: mm

VB SERIES

VB-MC type (Plastic sealed type with tape)



VB-C type (Plastic sealed type with tape)



Unit: mm

RoHS Compliance and Lead Free Relay Information

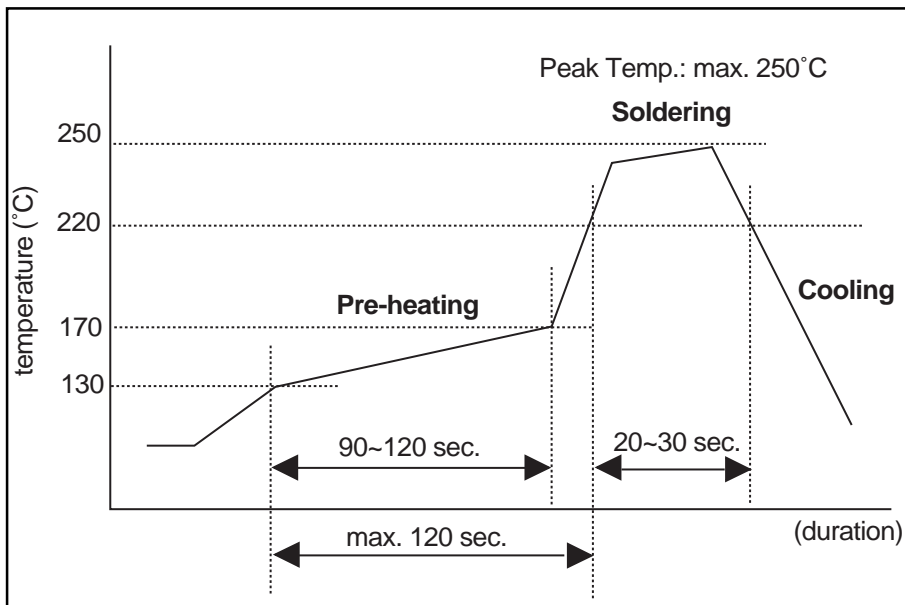
1. General Information

- 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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