

# POWER RELAY

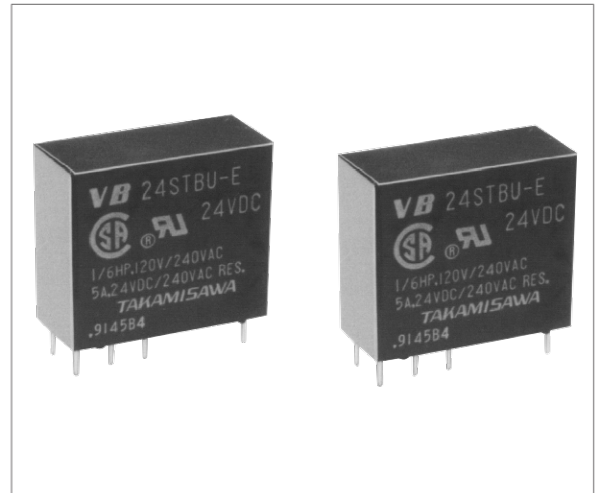
## 2 POLE—5 A (MEDIUM LOAD CONTROL)

### VB SERIES

RoHS compliant

#### FEATURES

- UL, CSA, VDE, SEV, SEMKO, CQC 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 standard package
  - Insulation distance: 8 mm
  - Dielectric strength: 5000 VAC (between coil and contacts)
  - Surge strength: 10000 V
- Standard and high sensitivity types available
- Flux free type and plastic sealed type available
- Lead Free since date code: 0408B00034F - Please see page 8 for more information



#### ORDERING INFORMATION

[Example] VB - 12 S M B U -

(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)<br>S : High sensitive type (530 mW)  |
| (d) | Contact Arrangement | M : 2 form A (DPST-NO)<br>T : 2 form C (DPDT)   |
| (e) | Enclosure           | B : Flux free type<br>C : Plastic sealed type (with tape)<br>K : Plastic sealed type  |
| (f) | Standard            | Nil : TV-rating<br>U : General (non TV-rating)  |
| (g) | Contact Material    | N : Silver alloy<br>Nil : Silver cadmium oxide (TV-3 rating)<br>5 : Silver cadmium oxide (non TV-rating)<br>Nil : Gold overlay silver-nickel (non TV-rating)<br>E : Silver-nickel (non TV-rating) |

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

# VB SERIES

## COIL DATA CHART

| TV-3 Rating           |             | Standard              | Nominal Coil resistance | Must operate | Must release | Nominal  |          |        |
|-----------------------|-------------|-----------------------|-------------------------|--------------|--------------|----------|----------|--------|
| 5A                    |             |                       |                         | voltage      | (10%)        | voltage  | voltage  | power  |
| 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-( )  |                         | 3 V DC       | 17 Ω         | 2.1 VDC  | 0.3 VDC  | 0.53 W |
|                       |             | VB- 5S ( ) ( ) U-( )  |                         | 5 V DC       | 47 Ω         | 3.5 VDC  | 0.5 VDC  | 0.53 W |
|                       |             | VB- 6S ( ) ( ) U-( )  |                         | 6 V DC       | 68 Ω         | 4.2 VDC  | 0.6 VDC  | 0.53 W |
|                       |             | VB- 9S ( ) ( ) U-( )  |                         | 9 V DC       | 155 Ω        | 6.3 VDC  | 0.9 VDC  | 0.53 W |
|                       |             | VB-12S ( ) ( ) U-( )  |                         | 12 V DC      | 270 Ω        | 8.4 VDC  | 1.2 VDC  | 0.53 W |
|                       |             | VB-14S ( ) ( ) U-( )  |                         | 14 V DC      | 370 Ω        | 9.8 VDC  | 1.4 VDC  | 0.53 W |
|                       |             | VB-18S ( ) ( ) U-( )  |                         | 18 V DC      | 610 Ω        | 12.6 VDC | 1.8 VDC  | 0.53 W |
|                       |             | VB-24S ( ) ( ) U-( )  |                         | 24 V DC      | 1,100 Ω      | 16.8 VDC | 2.4 VDC  | 0.53 W |
|                       |             | VB-36S ( ) ( ) U-( )  |                         | 36 V DC      | 2,450 Ω      | 25.2 VDC | 3.6 VDC  | 0.53 W |
|                       |             | VB-48S ( ) ( ) U-( )  |                         | 48 V DC      | 4,400 Ω      | 33.6 VDC | 4.8 VDC  | 0.53 W |
|                       |             | VB-60S ( ) ( ) U-( )  |                         | 60 V DC      | 6,800 Ω      | 42.0 VDC | 6.0 VDC  | 0.53 W |
|                       |             | 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.

# VB SERIES

## ■ SPECIFICATIONS

| Item                    |                                   | TV-3 Rating   |  | Standard Type                         |              |   |
|-------------------------|-----------------------------------|---|--|---------------------------------------|--------------|---|
|                         |                                   | VB-( ) M  | VB-( ) M-N   | VB-( ) U-5                            | VB-( ) U-N   | VB-( ) U<br>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) (1 A 25 VDC) | 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         | 250 VAC, 150 VDC  |  |                                       |              |   |
|                         | Maximum Switching Current         | 5 A   |  |                                       |              |   |
|                         | Minimum Switching Load            | 100 mA 5 VDC (VB-M, 5, E) 10 mA 5 VDC (VB-)                                     |  |                                       |              |   |
|                         | Maximum Inrush Current            | 5 A 120 VAC (at lamp load)  |  | —                                     |              |   |
|                         | Coil                              | Nominal Power (at 20°C)   | Standard type: 700 to 750mW, high sensitivity type: 530mW            |                                       |              |   |
| Operate Power (at 20°C) |                                   | Standard type: 350 to 370mW, high sensitivity type: 260mW                       |  |                                       |              |   |
| 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 5 ms  |  |                                       |              |   |
|                         | Release (at nominal voltage)      | Maximum 10 ms   |  |                                       |              |   |
| Life                    | Mechanical                        | 2 × 10 <sup>7</sup> operations minimum  |  |                                       |              |   |
|                         | Electrical                        | 1 × 10 <sup>5</sup> operations minimum at rated load                            |  |                                       |              |   |
|                         |                                   | 5 × 10 <sup>4</sup> operations minimum at motor load (1/8HP 120 VAC)            | 3 × 10 <sup>4</sup> operations minimum at motor load (1/8HP 120 VAC) |                                       |              |   |
|                         |                                   | 5 × 10 <sup>4</sup> 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 <sup>2</sup> (11 ± 1 ms)                                     |                                       |              |   |
|                         |                                   | Endurance   | 1,000 m/s <sup>2</sup> (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 

**■ SAFETY STANDARDS**

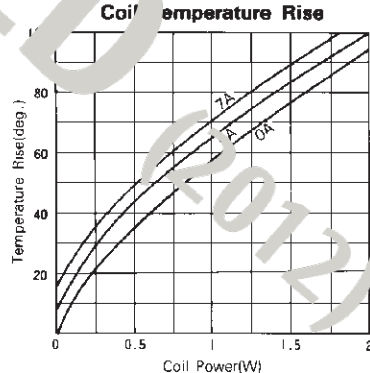
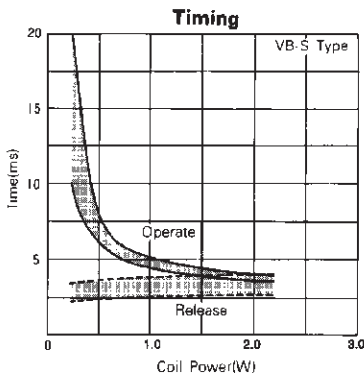
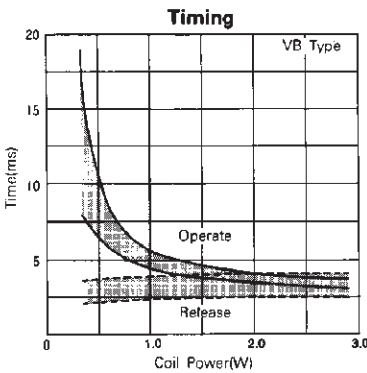
| Type | Compliance               | Contact rating   |
|------|--------------------------|--|
| UL   | UL 508, 873<br>E56140    | Flammability: UL 94-V0 (plastics)<br>TV-rating<br>5A, 240VAC/24VDC (resistive)<br>1/6 HP, 240VAC/120VAC<br>Pilot duty: C150<br>TV-3 120VAC |
| CSA  | C22.2 No. 14<br>LR 35579 |  |
| VDE  | 0435, 0531, 0700, 0860   | 5A, 240VAC/24VDC (resistive)<br>1/6 HP, 240VAC/120VAC<br>Pilot duty: C150  |

Complies with SEV, SEMK, CQC, VDE

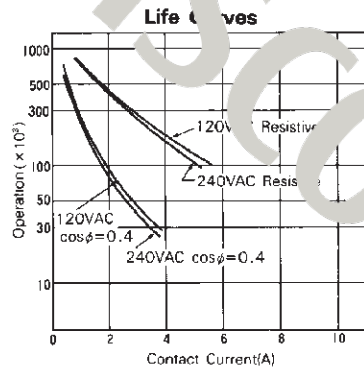
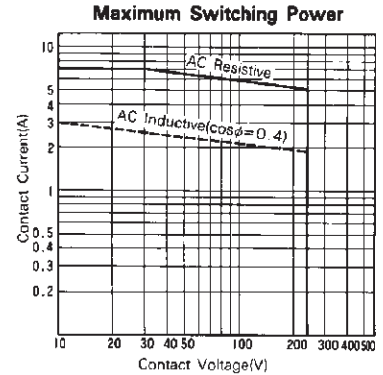
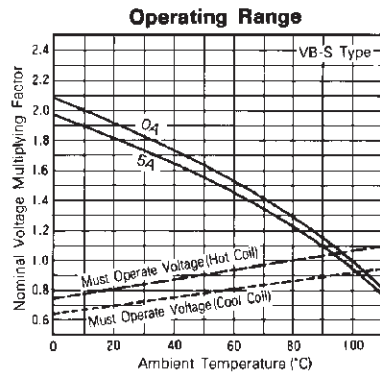
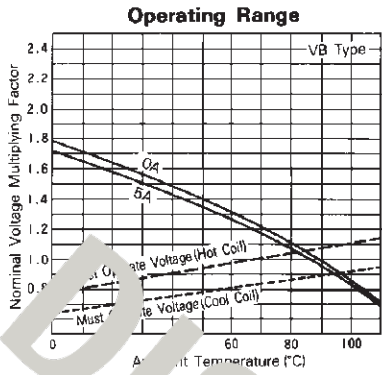
**■ INSULATION**

| Item                             |                                       | Note                                |
|----------------------------------|---------------------------------------|-------------------------------------|
| Resistance (initial)             | Minimum 1000 M $\Omega$               | at 500 VDC                          |
| Dielectric Strength              | open contacts                         | 1,000 VAC (50/60 Hz) 1 min.         |
|                                  | coil and contacts<br>adjacent contact | 5,000 VAC 1 min., 10,000 VAC 1 min. |
| Surge Voltage (coil and contact) | 10,000 V (6,000V adjacent contact)    | 1.2 x 50 $\mu$ s standard wave      |

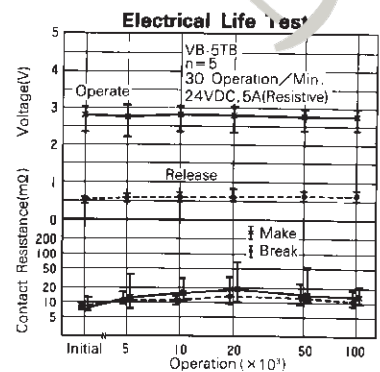
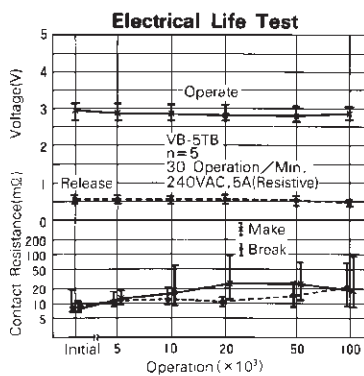
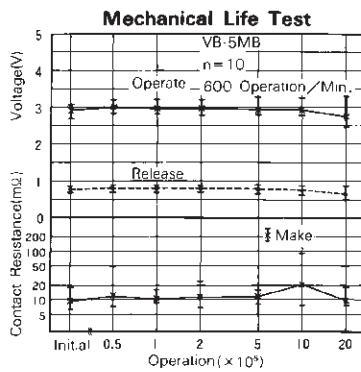
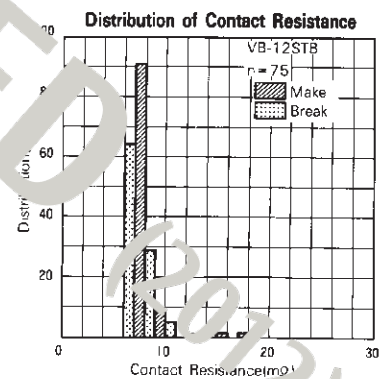
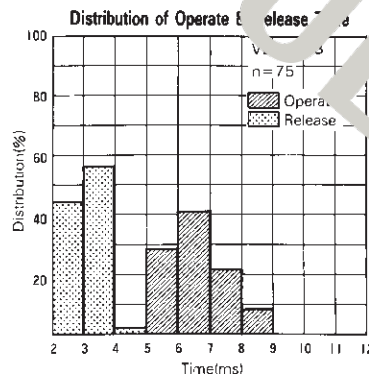
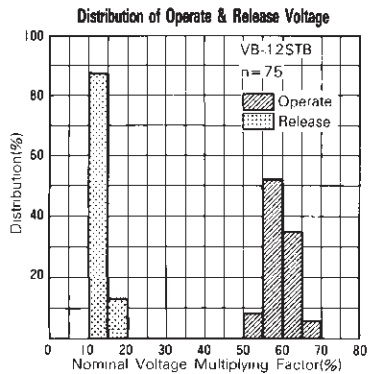
**■ CHARACTERISTIC DATA**



# VB SERIES



## REFERENCE DATA

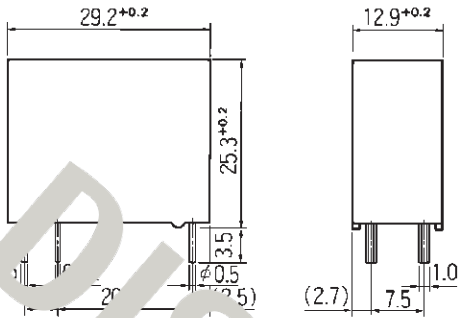


# VB SERIES

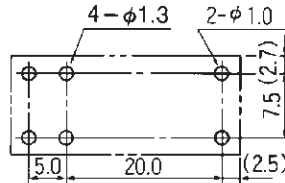
## ■ DIMENSIONS

### ● Dimensions

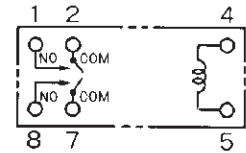
VB-M type



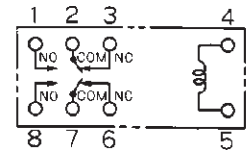
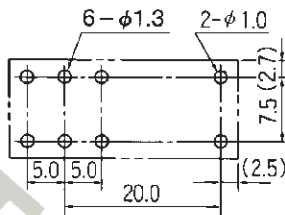
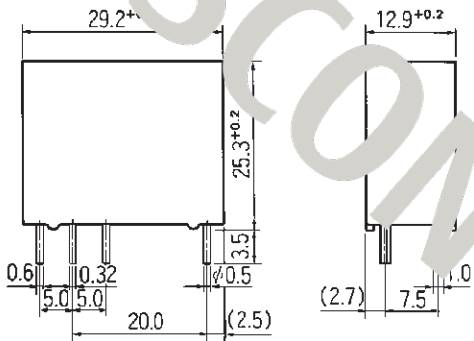
### ● Schematics (BOTTOM VIEW)



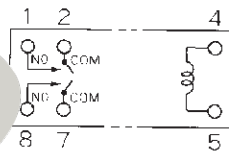
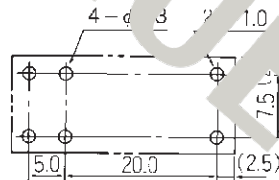
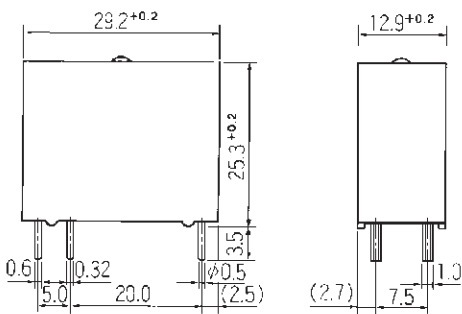
### ● PC board mounting hole layout (BOTTOM VIEW)



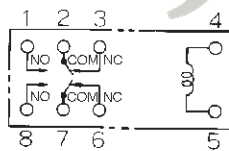
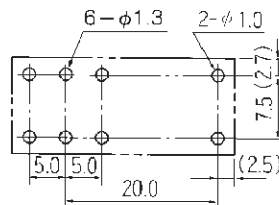
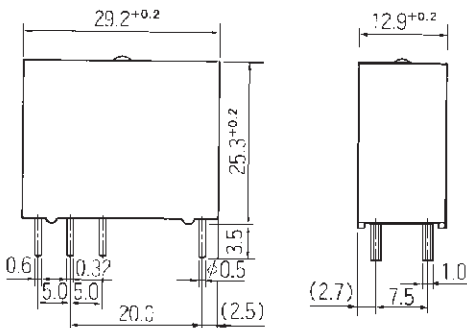
VB type



VB-MK type (Plastic sealed type)



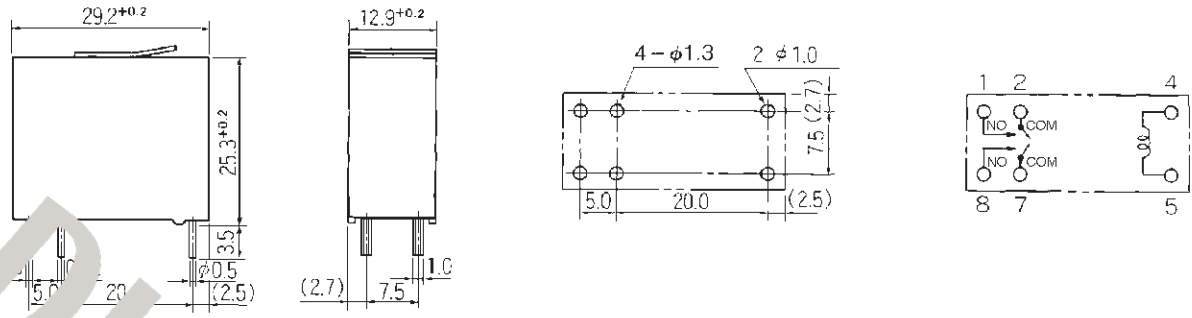
VB-K type (Plastic sealed type)



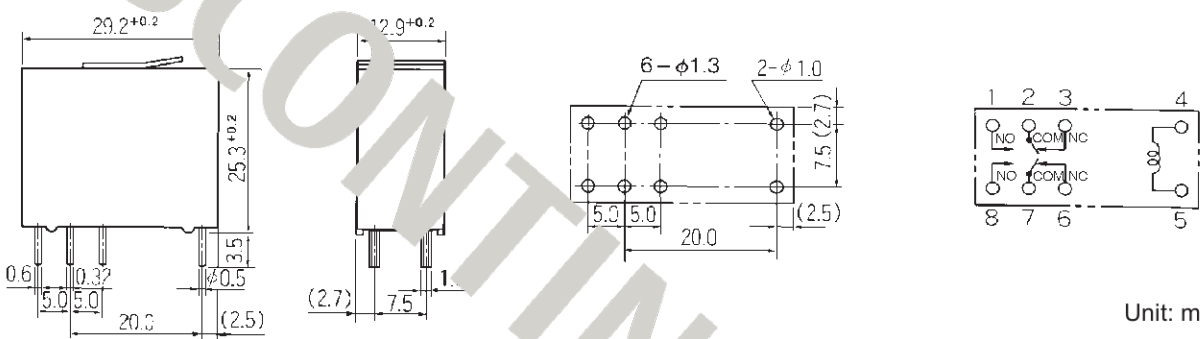
Unit: mm

# VB SERIES

VB-MC type (Plastic sealed type with tape)



VB-C type (Plastic sealed type with tape)



Unit: mm

DISCONTINUED (2012)

## 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. All 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 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: [info@ft.ed.fujitsu.com](mailto:info@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) 745-1970  
Email: [components@fujitsu.com](mailto:components@fujitsu.com)  
Web: <http://www.fujitsu.com/services/edevice/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: [fcsl@fcal.fujitsu.com](mailto:fcsl@fcal.fujitsu.com)  
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