FUJITSU THE POSSIBILITIES ARE INFINITE

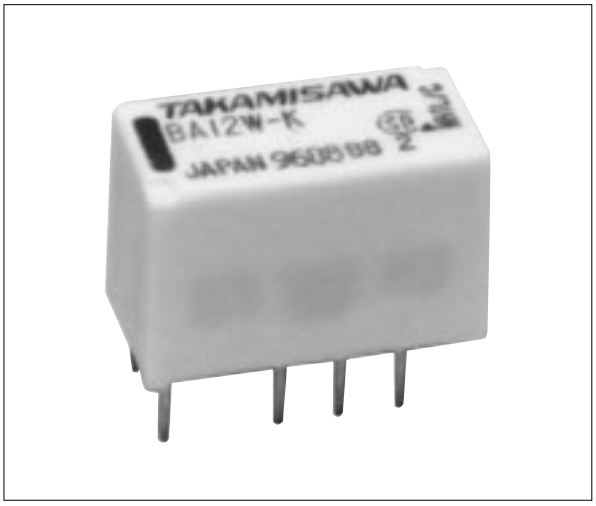
# MINIATURE RELAY

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

# BA SERIES

## ■ FEATURES

- Slim type relay for high density mounting
- CSA recognized
- Conforms to IEC60950, Bellcore specification and FCC Part 68
  —Clearance more than 2.0 mm between coil and contacts
  —Creepage more than 2.5 mm between coil and contacts
  —Dielectric strength 2,000 VAC between coil and contacts
  —Surge strength 3,000 V between coil and contacts (at 2 × 10 μs surge wave)
- High sensitivity and low consumption power
- Latching type available
- High reliability—bifurcated contacts
- Plastic sealed type
- Conforms to UL (under approval)
- SMT is available: BAS




## ■ ORDERING INFORMATION

[Example] BA (a) L (b) – (*) D (c) 12 (d) W (e) K (g)

| | | |
|---|---|---|
| (a) | Series Name | BA : BA 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 |
| (g) | Enclosure | K : Plastic sealed type |

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

## ■ SAFETY STANDARD AND FILE NUMBERS

CSA CERTIFIED NRTL/C to C22.2 No. 14 No. 950 (File No. LR35579), UL 508, 1950 (File No. E45026)

| Relay type | Nominal voltage | Contact rating |
|---|---|---|
| BA<br>BAL<br>BALD | 1.5 to 48 VDC | 0.5 A 125 VAC<br>2 A 30 VDC<br>0.3 A 110 VDC<br>— resistive |

## ■ SPECIFICATIONS

| Item | | | Standard | Single Winding Latching Type | Double Winding Latching |
|---|---|---|---|---|---|
| | | | BA-( ) W-K | BAL-( ) W-K | BAL-D ( ) W-K |
| Contact | Arrangement | | 2 form C (DPDT) | | |
| | Material | | Gold overlay silver alloy | | |
| | Style | | Bifurcated | | |
| | Resistance (initial) (at 1 A 6 VDC) | | Maximum 50 mΩ | | |
| | 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 | | 250 VAC, 220 VDC | | |
| | 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) | | 0.25 to 0.36 W | 0.2 W | 0.36 W |
| | Operate Power (at 20°C) | | 0.14 to 0.2 W | 0.15 W | 0.205 W |
| | Operating Temperature | | –40°C to +70°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 | | | |
| | | between coil and contacts | 2,000 VAC 1 minute | | 1,000 VAC 1 minute |
| | Surge Strength | | 3,000 V (at 2×10 μs) | | 1,500 V (at 10×160 μs) |
| Life | Mechanical | | $1 \times 10^7$ operations minimum | | |
| | Electrical | | $2 \times 10^5$ operations minimum (0.5 A 125 VAC)<br>$5 \times 10^5$ operations minimum (1 A 30 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 | 500 m/s$^2$ (11 ±1 ms) | | |
| | | Endurance | 1,000 m/s$^2$ ( 6 ±1 ms) | | |
| | Weight | | Approximately 1.9 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.

## ■ COIL DATA CHART

| MODEL | | Nominal voltage | Coil resistance (±10%) | Must operate voltage*1 | Must release voltage*1 | Nominal power |
|---|---|---|---|---|---|---|
| Standard Type | BA-1.5 W-K | 1.5 VDC | 9 Ω | +1.13 VDC | +0.15 VDC | 250 mW |
| | BA- 3 W-K | 3 VDC | 36 Ω | +2.25 VDC | +0.3 VDC | 250 mW |
| | BA-4.5 W-K | 4.5 VDC | 81 Ω | +3.38 VDC | +0.45 VDC | 250 mW |
| | BA- 5 W-K | 5 VDC | 100 Ω | +3.75 VDC | +0.5 VDC | 250 mW |
| | BA- 6 W-K | 6 VDC | 144 Ω | +4.5 VDC | +0.6 VDC | 250 mW |
| | BA- 9 W-K | 9 VDC | 324 Ω | +6.75 VDC | +0.9 VDC | 250 mW |
| | BA- 12 W-K | 12 VDC | 576 Ω | +9.0 VDC | +1.2 VDC | 250 mW |
| | BA- 18 W-K | 18 VDC | 1,296 Ω | +13.5 VDC | +1.8 VDC | 250 mW |
| | BA- 24 W-K | 24 VDC | 2,304 Ω | +18.0 VDC | +2.4 VDC | 250 mW |
| | BA- 48 W-K | 48 VDC | 6,400 Ω | +36.0 VDC | +4.8 VDC | 360 mW |

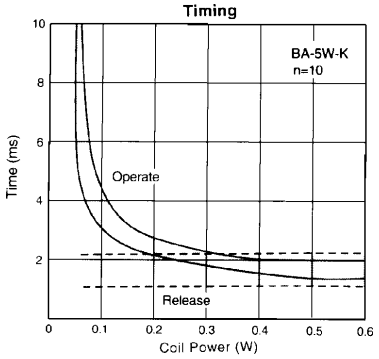
Note: *1 Specified values are subject to pulse wave voltage.
All values in the table are measured at 20°C.

| MODEL | | Nominal voltage | Coil resistance (±10%) | Set voltage*1 | Reset voltage*1 | Nominal power |
|---|---|---|---|---|---|---|
| Single Winding Latching Type | BAL-1.5 W-K | 1.5 VDC | 11.25 Ω | +1.13 VDC | –1.13 VDC | 200 mW |
| | BAL- 3 W-K | 3 VDC | 45 Ω | +2.25 VDC | –2.25 VDC | 200 mW |
| | BAL-4.5 W-K | 4.5 VDC | 101 Ω | +3.38 VDC | –3.38 VDC | 200 mW |
| | BAL- 5 W-K | 5 VDC | 125 Ω | +3.75 VDC | –3.75 VDC | 200 mW |
| | BAL- 6 W-K | 6 VDC | 180 Ω | +4.5 VDC | –4.5 VDC | 200 mW |
| | BAL- 9 W-K | 9 VDC | 405 Ω | +6.75 VDC | –6.75 VDC | 200 mW |
| | BAL- 12 W-K | 12 VDC | 720 Ω | +9.0 VDC | –9.0 VDC | 200 mW |
| | BAL- 18 W-K | 18 VDC | 1,620 Ω | +13.5 VDC | –13.5 VDC | 200 mW |
| | BAL- 24 W-K | 24 VDC | 2,880 Ω | +18.0 VDC | –18.0 VDC | 200 mW |
| Double Winding Latching Type | BAL-D1.5 W-K | 1.5 VDC | P 6.25 Ω | +1.13 VDC | | 360 mW |
| | | | S 6.25 Ω | | +1.13 VDC | |
| | BAL-D 3 W-K | 3 VDC | P 25 Ω | +2.25 VDC | | 360 mW |
| | | | S 25 Ω | | +2.25 VDC | |
| | BAL-D4.5 W-K | 4.5 VDC | P 56.3 Ω | +3.38 VDC | | 360 mW |
| | | | S 56.3 Ω | | +3.38 VDC | |
| | BAL-D 5 W-K | 5 VDC | P 69.4 Ω | +3.75 VDC | | 360 mW |
| | | | S 69.4 Ω | | +3.75 VDC | |
| | BAL-D 6 W-K | 6 VDC | P 100 Ω | +4.5 VDC | | 360 mW |
| | | | S 100 Ω | | +4.5 VDC | |
| | BAL-D 9 W-K | 9 VDC | P 225 Ω | +6.75 VDC | | 360 mW |
| | | | S 225 Ω | | +6.75 VDC | |
| | BAL-D 12 W-K | 12 VDC | P 400 Ω | +9.0 VDC | | 360 mW |
| | | | S 400 Ω | | +9.0 VDC | |
| | BAL-D 18 W-K | 18 VDC | P 900 Ω | +13.5 VDC | | 360 mW |
| | | | S 900 Ω | | +13.5 VDC | |
| | BAL-D 24 W-K | 24 VDC | P 1,600 Ω | +18.0 VDC | | 360 mW |
| | | | S 1,600 Ω | | +18.0 VDC | |

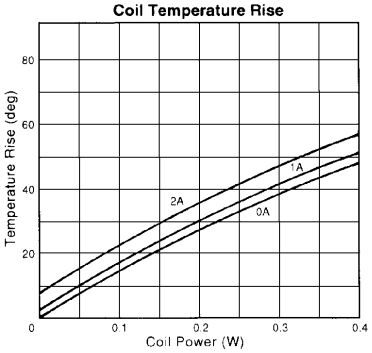
Note: *1 Specified values are subject to pulse wave voltage. P: Primary coil S: Secondary coil
All values in the table are measured at 20°C.

## ■ CHARACTERISTIC DATA

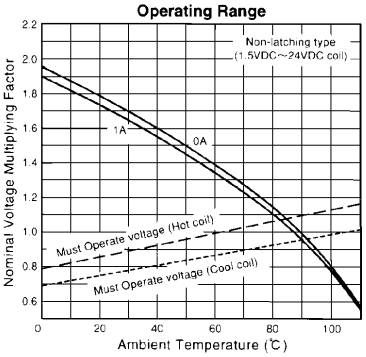
Timing



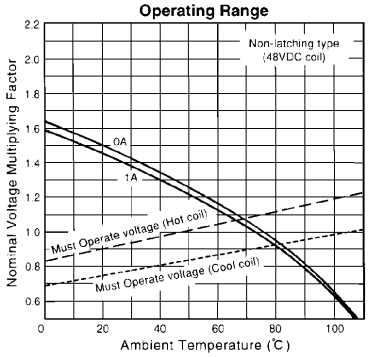

Coil Temperature Rise



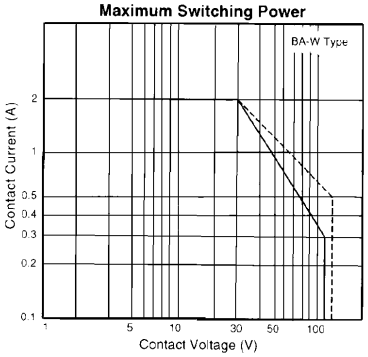

Operating Range



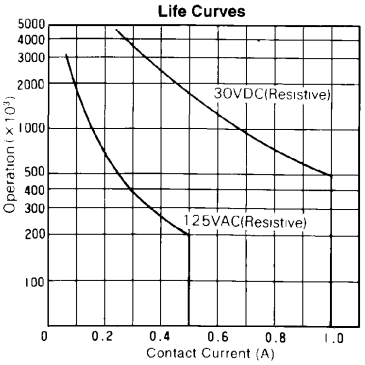

Operating Range



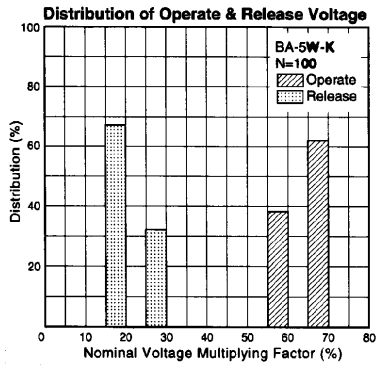

Maximum Switching Power

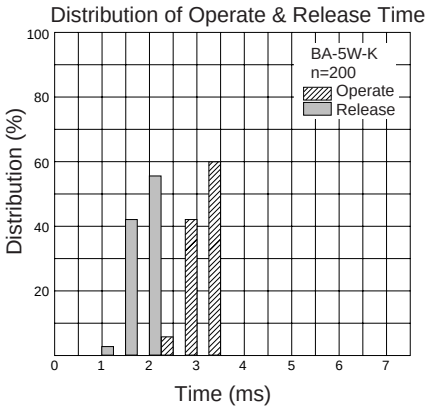


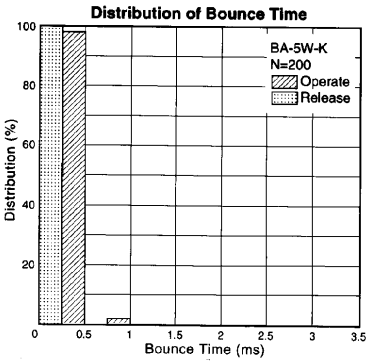

Life Curves

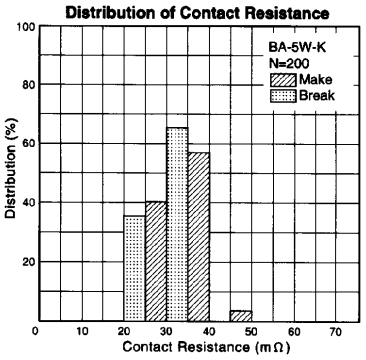


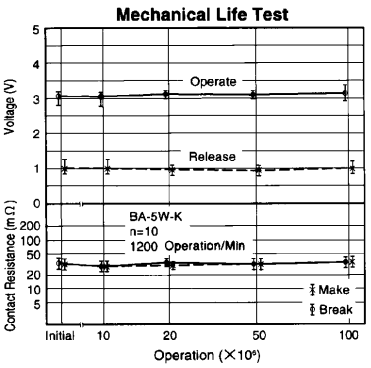
## ■ REFERENCE DATA

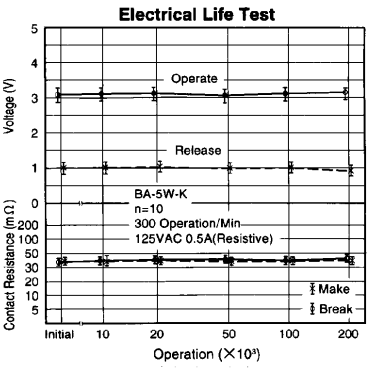


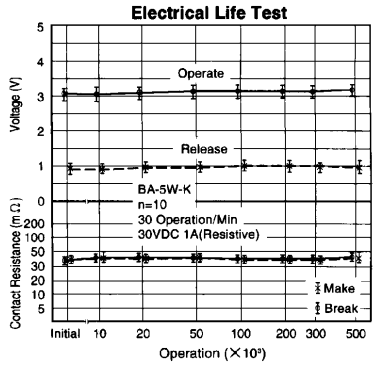



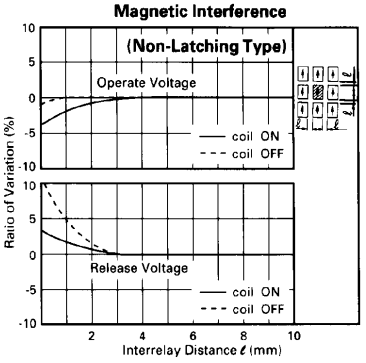



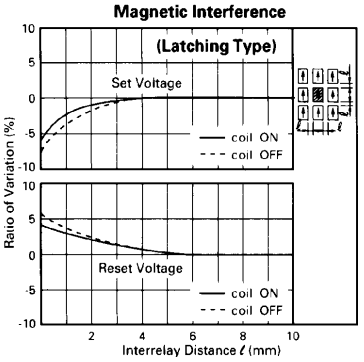



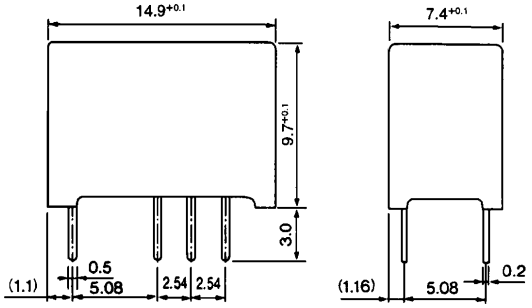
## ■ DIMENSIONS

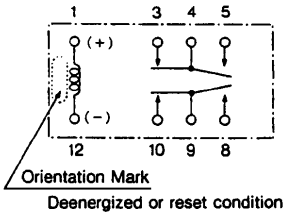
**●Dimensions**

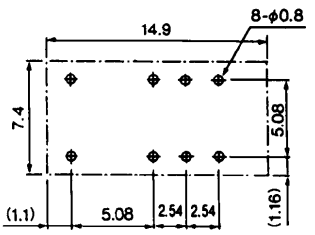
**●Schematics** (Bottom View)

**●PC board mounting hole layout** (Bottom view)

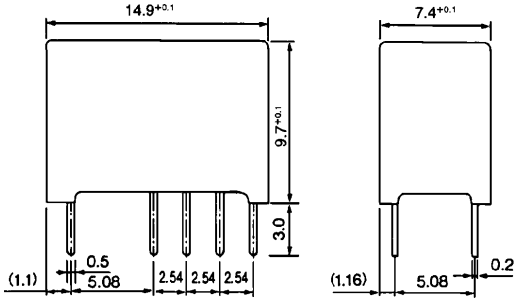
BA, BAL, BA-WD type (Non-latching, single winding latching, MBB type)

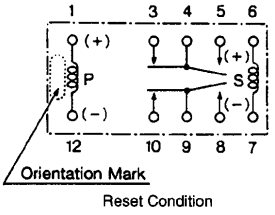


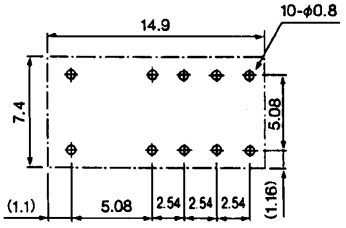




BAL-D type (Double winding latching type)




Unit: mm

**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
Web: 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: marcom@fcai.fujitsu.com
Web: www.fcai.fujitsu.com

**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
Web: www.fceu.fujitsu.com

**Asia Pacific**
Fujitsu Components Asia Ltd.
102E Pasir Panjang Road
#04-01 Citilink Warehouse Complex
Singapore 118529
Tel: (65) 375-8560
Fax: (65) 273-3021
Email: fcal@fcal.fujitsu.com
www.fcal.fujitsu.com