

# MINIATURE RELAY

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

### FBR211 SERIES

RoHS compliant



#### ■ FEATURES

- 2 A maximum carrying current  
Capable of 2 A maximum continuous carrying current in the contact
- Superior reliability gold-overlay contacts  
P type: Gold overlay silver-palladium contacts
- Interchangeable terminal pitch of one inch grid terminal layout
- High sensitivity, low power dissipation types also available  
Standard types: 0.4 W (A or B type)  
High sensitivity type: 0.1 W (C or E type)
- Conforms to FCC 68.512 (high dielectric strength type)
- UL recognized (File number E5615)
- CSA recognized (File number LR6416)
- RoHS compliant since date code 4331  
Please see page 5 for more information



#### ■ ORDERING INFORMATION

[Example]      FBR211   S   A   D012   U   -   P   (CSA)  
                  (a)   (b)   (c)   (d)   (e)   (f)   (g)   (h)

|     |                           |                                                                                                                                                                     |
|-----|---------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (a) | Series Name               | FBR211                                                                                                                                                              |
| (b) | Enclosure                 | S: Flux free type<br>N: Plastic sealed type                                                                                                                         |
| (c) | Coil Power and Schematics | A: Standard A type } (nominal power 450 mW type)<br>B: Standard B type }<br>C: High sensitivity C type } (nominal power 20 mW type)<br>E: High sensitivity E type } |
| (d) | Nominal Voltage           | (Example) D003: 3 VDC<br>D012: 12 VDC (refer to the COIL DATA CHART)                                                                                                |
| (e) | UL Marking on Cover       | Nil : No UL marking<br>U : UL marking                                                                                                                               |
| (f) | Contact Material          | P : Gold-overlay silver-palladium<br>M : Gold-overlay silver                                                                                                        |
| (g) | Special Type              | Nil : Standard<br>2 : High dielectric strength type                                                                                                                 |
| (h) | CSA Marking               | Nil : Standard<br>-CSA : UL + CSA marking (valid when (e) is U)                                                                                                     |

Note: The designation name is stamped on the top of the relay case as follows:  
(Example) Designation ordered: FBR211SAD005-P  
Stamp: 211SAD005-P

# FBR211 SERIES

## ■ COIL DATA CHART

### 1. STANDARD (A or B type)

| MODEL          |                |                |                | Nominal voltage | Coil resistance (±10%) | Nominal current (at nominal voltage) approx. | Must operate voltage        | Must release voltage        | Maximum allowable voltage | Nominal power                       | Coil temperature rise               |
|----------------|----------------|----------------|----------------|-----------------|------------------------|----------------------------------------------|-----------------------------|-----------------------------|---------------------------|-------------------------------------|-------------------------------------|
| A type         |                | B type         |                |                 |                        |                                              |                             |                             |                           |                                     |                                     |
| Flux free      | Plastic sealed | Flux free      | Plastic sealed |                 |                        |                                              |                             |                             |                           |                                     |                                     |
| FBR211SAD001-n | FBR211NAD001-n | FBR211SBD001-n | FBR211NBD001-n | 1.5 VDC         | 5 Ω                    | 300 mA                                       | 70% max. of nominal voltage | 10% min. of nominal voltage | 150% of nominal voltage   | Approx. 450 mW (at nominal voltage) | Approx. 45 deg (at nominal voltage) |
| FBR211SAD003-n | FBR211NAD003-n | FBR211SBD003-n | FBR211NBD003-n | 3 VDC           | 20 Ω                   | 150 mA                                       |                             |                             |                           |                                     |                                     |
| FBR211SAD005-n | FBR211NAD005-n | FBR211SBD005-n | FBR211NBD005-n | 5 VDC           | 56 Ω                   | 89 mA                                        |                             |                             |                           |                                     |                                     |
| FBR211SAD006-n | FBR211NAD006-n | FBR211SBD006-n | FBR211NBD006-n | 6 VDC           | 80 Ω                   | 75 mA                                        |                             |                             |                           |                                     |                                     |
| FBR211SAD009-n | FBR211NAD009-n | FBR211SBD009-n | FBR211NBD009-n | 9 VDC           | 180 Ω                  | 50 mA                                        |                             |                             |                           |                                     |                                     |
| FBR211SAD012-n | FBR211NAD012-n | FBR211SBD012-n | FBR211NBD012-n | 12 VDC          | 320 Ω                  | 38 mA                                        |                             |                             |                           |                                     |                                     |
| FBR211SAD024-n | FBR211NAD024-n | FBR211SBD024-n | FBR211NBD024-n | 24 VDC          | 1,280 Ω                | 19 mA                                        |                             |                             |                           |                                     |                                     |

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

### 2. HIGH SENSITIVE (C or E type)

| MODEL          |                |                |                | Nominal voltage | Coil resistance (±10%) | Nominal current (at nominal voltage) approx. | Must operate voltage        | Must release voltage        | Maximum allowable voltage | Nominal power                       | Coil temperature rise               |
|----------------|----------------|----------------|----------------|-----------------|------------------------|----------------------------------------------|-----------------------------|-----------------------------|---------------------------|-------------------------------------|-------------------------------------|
| C type         |                | E type         |                |                 |                        |                                              |                             |                             |                           |                                     |                                     |
| Flux free      | Plastic sealed | Flux free      | Plastic sealed |                 |                        |                                              |                             |                             |                           |                                     |                                     |
| FBR211SCD001-n | FBR211NCD001-n | FBR211SED001-n | FBR211NED001-n | 1.5 VDC         | 12 Ω                   | 125 mA                                       | 70% max. of nominal voltage | 10% min. of nominal voltage | 225% of nominal voltage   | Approx. 200 mW (at nominal voltage) | Approx. 25 deg (at nominal voltage) |
| FBR211SCD003-n | FBR211NCD003-n | FBR211SED003-n | FBR211NED003-n | 3 VDC           | 45 Ω                   | 67 mA                                        |                             |                             |                           |                                     |                                     |
| FBR211SCD005-n | FBR211NCD005-n | FBR211SED005-n | FBR211NED005-n | 5 VDC           | 120 Ω                  | 42 mA                                        |                             |                             |                           |                                     |                                     |
| FBR211SCD006-n | FBR211NCD006-n | FBR211SED006-n | FBR211NED006-n | 6 VDC           | 150 Ω                  | 33 mA                                        |                             |                             |                           |                                     |                                     |
| FBR211SCD009-n | FBR211NCD009-n | FBR211SED009-n | FBR211NED009-n | 9 VDC           | 300 Ω                  | 23 mA                                        |                             |                             |                           |                                     |                                     |
| FBR211SCD012-n | FBR211NCD012-n | FBR211SED012-n | FBR211NED012-n | 12 VDC          | 700 Ω                  | 17 mA                                        |                             |                             |                           |                                     |                                     |
| FBR211SCD024-n | FBR211NCD024-n | FBR211SED024-n | FBR211NED024-n | 24 VDC          | 2,600 Ω                | 9 mA                                         |                             |                             |                           |                                     |                                     |

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

## ■ SPECIFICATIONS

| Item       |                                          | Standard (A or B type)                                                                                                                                                                                                       | High sensitive (C or E type)                                      |
|------------|------------------------------------------|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------|
| Contact    | Arrangement                              | 1 form C (SPDT)                                                                                                                                                                                                              |                                                                   |
|            | Material                                 | Gold-overlay silver-palladium / gold-overlay silver                                                                                                                                                                          |                                                                   |
|            | Resistance (initial)                     | Maximum 100 mΩ (at 0.1 A 6 VDC)                                                                                                                                                                                              |                                                                   |
|            | Rating (resistive)                       | 0.5 A 120 VAC or 1 A 28 VDC                                                                                                                                                                                                  |                                                                   |
|            | Maximum Carrying Current                 | 2 A                                                                                                                                                                                                                          |                                                                   |
|            | Maximum Switching Power                  | 60 VA or 28 W                                                                                                                                                                                                                |                                                                   |
|            | Max. Switching Voltage*1                 | 220 VAC or 150 VDC                                                                                                                                                                                                           |                                                                   |
|            | Maximum Switching Current                | 1.25 A (AC) or 2 A (DC)                                                                                                                                                                                                      |                                                                   |
|            | Minimum Switching load*2 (reference)     | Plastic sealed 1 mA, 1V<br>Flux free 1 mA, 5V                                                                                                                                                                                |                                                                   |
| Coil       | Nominal Power (20°C)                     | Approximately 450 mW                                                                                                                                                                                                         | Approximately 200 mW                                              |
|            | Operate Power (at 20°C)                  | Approximately 315 mW maximum                                                                                                                                                                                                 | Approximately 140 mW maximum                                      |
|            | Operating Temperature                    | -25°C to +55°C (no frost)                                                                                                                                                                                                    | -25°C to +75°C (no frost)                                         |
|            | Operating Humidity                       | 5 to 85%RH                                                                                                                                                                                                                   |                                                                   |
| Time Value | Operate (at nominal voltage)             | Maximum 5 ms                                                                                                                                                                                                                 |                                                                   |
|            | Release (at nominal voltage)             | Maximum 5 ms                                                                                                                                                                                                                 |                                                                   |
| Life       | Mechanical                               | 5 × 10 <sup>6</sup> operations minimum                                                                                                                                                                                       |                                                                   |
|            | Electrical (Refer to the REFERENCE DATA) | 3 × 10 <sup>5</sup> operations minimum (at 1 A/ 28 VDC resistive load)<br>1 × 10 <sup>5</sup> operations minimum (at 2 A/ 12 VDC resistive load)<br>1 × 10 <sup>5</sup> operations minimum (at 0.5 A/120 VDC resistive load) |                                                                   |
|            |                                          |                                                                                                                                                                                                                              |                                                                   |
| Other      | Vibration Resistance                     |                                                                                                                                                                                                                              | 10 to 55 Hz (double amplitude of 1.5 mm)                          |
|            | Shock Resistance                         | Misoperation                                                                                                                                                                                                                 | 100 m/s <sup>2</sup> (11±1 ms)      60 m/s <sup>2</sup> (11±1 ms) |
|            |                                          | Endurance                                                                                                                                                                                                                    | 1,000 m/s <sup>2</sup> (11±1 ms)                                  |
|            | Weight                                   |                                                                                                                                                                                                                              | Approximately 4 g                                                 |

\*1 If the switching voltage exceeds the rated contact voltage, reduce the current. The current values vary according to the type of load.

\*2 Values when switching a resistive load at normal room temperature and humidity and in a clean environment. The minimum switching load varies with the switching frequency and operation environment.

## ■ INSULATION

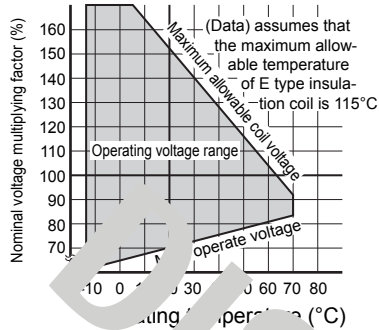
| Item                |  | Standard (A or B)                                 | High sensitive (C or E) |
|---------------------|--|---------------------------------------------------|-------------------------|
| Isolation (initial) |  | Minimum 100 MΩ (at 500VDC)                        |                         |
| Dielectric Strength |  | 500VAC 1 min. (standard)                          |                         |
|                     |  | 1,500VAC 1 min. (high isolation coil and contact) |                         |

## ■ SAFETY STANDARDS

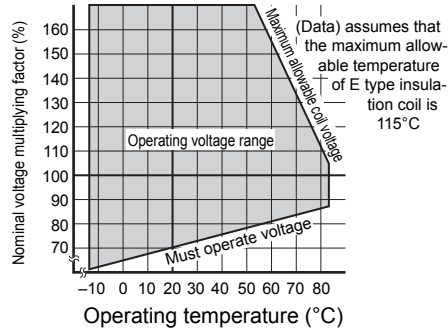
| Type | Compliance                         | Contact rating                                                |
|------|------------------------------------|---------------------------------------------------------------|
| UL   | UL 110<br>E63615                   | Flammability: UL 94-V0 (plastics)<br>0.5A, 120VAC (resistive) |
| CSA  | C22.2 No. 14<br>LR 40304, LR 46016 | 1A, 28VDC (resistive)                                         |

## CHARACTERISTIC DATA

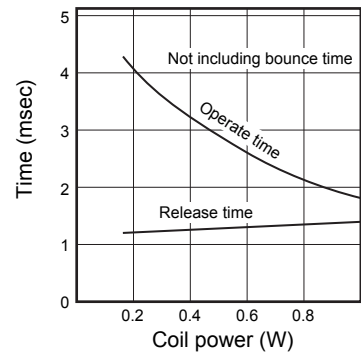
Range of operation temperature and voltage  
(Standard 0.45 W type)



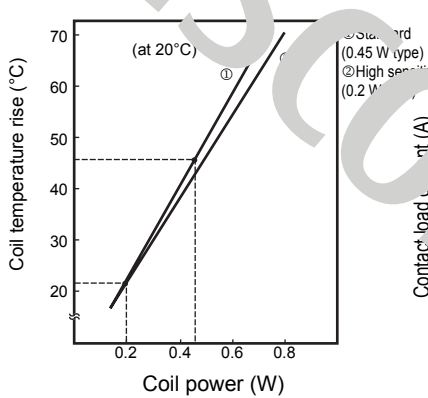
Range of operation temperature and voltage  
(high sensitive 0.2 W type)



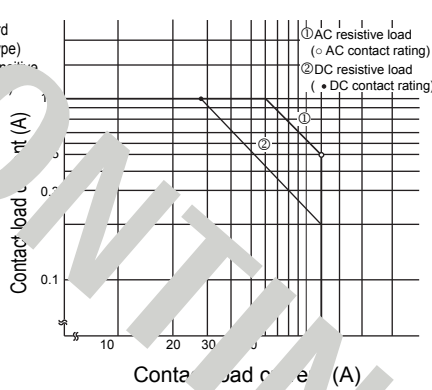
Operate and release time data



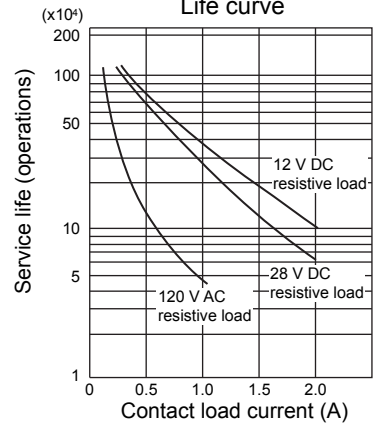
Coil temperature rise data



Maximum switching capacity

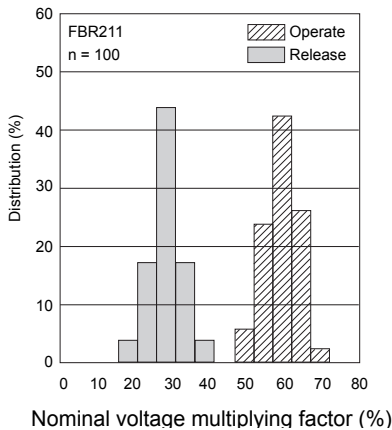


Life curve

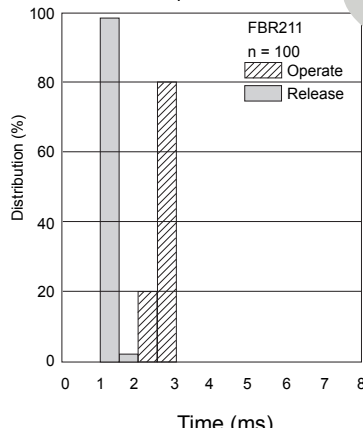


## REFERENCE DATA

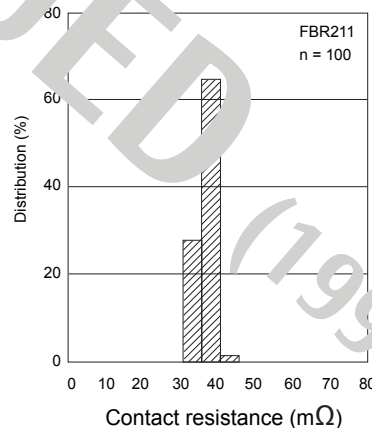
Distribution of operate and release voltage



Distribution of operate and release time



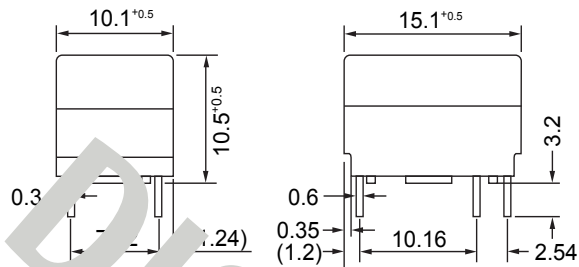
Distribution of contact resistance



## ■ DIMENSIONS

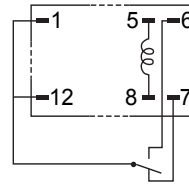
### 1. STANDARD (Flux free type)

#### ●Dimensions

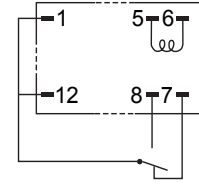


#### ●Schematics (BOTTOM VIEW)

(A type or C type)

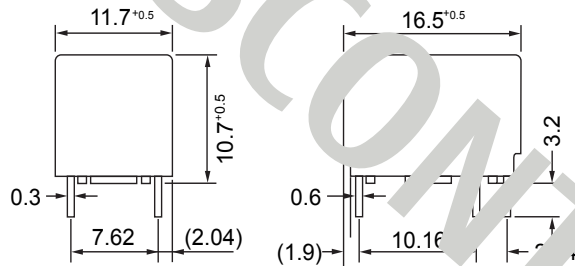


(B type or E type)



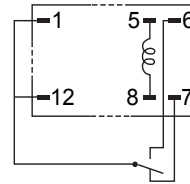
### 2. N-TYPE (Flux free sealed type)

#### ●Dimensions

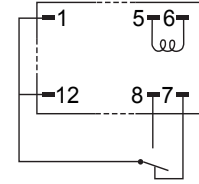


#### ●Schematics (BOTTOM VIEW)

(A type or C type)

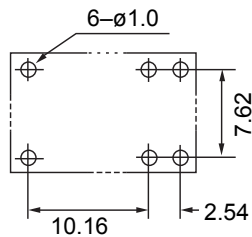


(B type or E type)



### 3. PC BOARD MOUNTING HOLE LAYOUT

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



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 (incompatible, etc.).
- "LF" is marked on each outer and inner carton. (No marking on individual relays).
- To avoid leaded relays (leaded-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.

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