

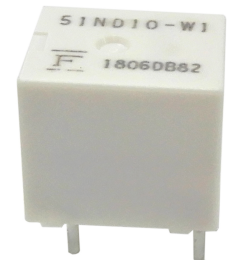
# COMPACT POWER RELAY

## 1 POLE - 25/30A (For automotive applications)

### FBR51, 52 Series

#### ■ FEATURES

- Compact and light weight structure
- High current contact capacity  
(carrying current: 35 A/10 minutes, 30 A/1 hour)
- High resistance to vibration and shock
- Improved heat resistance and extended operation range
- Two contact gap options  
(FBR51: 0.3 mm, FBR52: 0.6 mm)
- Three types of contact material



#### ■ Part Numbers

[Example]  $\frac{\text{FBR51}}{\text{(a)}} - \frac{\text{N}}{\text{(b)}} - \frac{\text{D12}}{\text{(c)}} - \frac{\text{W1}}{\text{(d)}}$

|     |                    |       |   |
|-----|--------------------|-------|---|
| (a) | Relay type         | FBR51 | : FBR51-Series - Standard type (contact gap 0.3mm)              |
|     |                    | FBR52 | : FBR52-Series - Wide contact gap type (contact gap 0.6mm)      |
| (b) | Enclosure          | N     | : Plastic sealed type   |
| (c) | Coil rated voltage | D12   | : 6...12VDC<br>Coil rating table at page 3                      |
| (d) | Contact material   | W1    | : Silver-tin oxide indium (high power type, 1 form C)           |
|     |                    | WL    | : Silver-tin oxide indium (lamp loads, 1 form A, FBR51 only)    |
|     |                    | WF    | : Silver-tin oxide indium (flasher loads, 1 form A, FBR51 only) |

Actual marking does not carry the type name: "FBR"  
E.g.: Ordering code: "FBR51ND12-W1", actual marking: "51ND12-W1"

## ■ Specifications (for motor load)

| Item         |                             |                   | Characteristics<br>W1 contact   | Remarks / conditions                             |
|--------------|-----------------------------|-------------------|---|--|
| Contact data | Configuration               |                   | 1 form C (SPDT)   |  |
|              | Material                    |                   | AgSnO2In (high capacity type)   |  |
|              | Voltage drop                |                   | Max. 100mV  | At 1A/12VDC                                      |
|              | Contact rating              |                   | 25A, 14VDC  | At locked motor load                             |
|              | Max. carrying current       |                   | 35A / 10 min., 30A 1hr  |  |
|              | Max. inrush current         |                   | 60A   | Reference  |
|              | Max. switching voltage      |                   | 16VDC   | Reference  |
|              | Max. switching power        |                   | 35A   | Reference  |
|              | Min. switching load *1      |                   | 1A 6VDC   | Reference  |
| Coil         | Storage temperature range   |                   | 40°C ~ +100°C   | No frost   |
|              | Operating temperature range |                   | -40°C ~ +85°C<br>(At long continuous carry current conditions, refer to "operating coil voltage range" on page 7) | No frost   |
| Timing data  | Operate                     |                   | Max. 10ms   | At nominal voltage<br>No diode, excluding bounce |
|              | Release                     |                   | Max. 5ms  | At nominal voltage<br>No diode, excluding bounce |
| Life         | Mechanical                  | AC contact rating | Min. 10 x 10 <sup>6</sup> operations  |  |
|              | Electrical (resistive)      | DC contact rating | Min. 100 x 10 <sup>3</sup> operations   | At contact rating, locked motor load             |
| Other        | Vibration resistance        | Misoperation      | 10 to 200Hz, acceleration 44m/s <sup>2</sup> (4.5G) constant acceleration   | Direction X, Y, Z, contact ON/OFF total 6 cycles |
|              |                             | Endurance         | 10 to 200Hz, acceleration 44m/s <sup>2</sup> (4.5G) constant acceleration   | Direction X, Y, Z, contact OFF total 6 hours     |
|              | Shock resistance            | Misoperation      | Min. 100m/s <sup>2</sup> (11 ± 1ms)   | Direction X, Y, Z, contact ON/OFF total 36 times |
|              |                             | Endurance         | Min. 1,000m/s <sup>2</sup> (6 ± 1ms)  | Direction X, Y, Z, contact OFF total 18 times    |
|              | Dimensions / weight         |                   | 12.1 x 15.5 x 13.7 mm / approx. 6g  |  |

\*1: Minimum switching loads mentioned above are reference values. Please perform the confirmation test with actual load before production since reference values may vary according to switching frequencies, environmental conditions and expected reliability levels. Care shall be taken on the heat generated on PC board when maximum carrying current exceeds 10A. Please perform the confirmation test with actual conditions.

## ■ Specifications (for lamp load)

| Item         |                             |                   | Characteristics   |                                       | Remarks / conditions                             |
|--------------|-----------------------------|-------------------|---|---------------------------------------|--|
|              |                             |                   | W1 contact  | WL Contact                            |  |
| Contact data | Configuration               |                   | 1 form C (SPDT)   |                                       |  |
|              | Material                    |                   | AgSnO <sub>2</sub> In (for flasher)   | AgSnO <sub>2</sub> In (for lamp)      |  |
|              | Voltage drop                |                   | Max. 100mV  |                                       | At 2A/12VDC                                      |
|              | Contact rating              |                   | 14VDC, 80W  | 14VDC, 120W                           | At lamp load                                     |
|              | Max. carrying current       |                   | 35A / 10 min., 30A 1hr  |                                       | At 25 °C with nominal coil voltage               |
|              | Max. inrush current         |                   | 60A   |                                       | At lamp load, reference                          |
|              | Max. switching voltage      |                   | 16VDC   |                                       | Reference  |
|              | Max. switching power        |                   | 35A   |                                       | Reference  |
|              | Min. switching load *1      |                   | 1A 6VDC   |                                       | Reference  |
| Coil         | Storage temperature range   |                   | 40°C ~ +100°C   |                                       | No frost   |
|              | Operating temperature range |                   | -40°C ~ +85°C<br>(At long continuous carry current conditions, refer to "operating coil voltage range" on page 7) |                                       | No frost   |
| Timing data  | Operate                     |                   | Max. 10ms   |                                       | At nominal voltage<br>No diode, excluding bounce |
|              | Release                     |                   | Max. 5ms  |                                       | At nominal voltage<br>No diode, excluding bounce |
| Life         | Mechanical                  | AC contact rating | Min. 10 x 10 <sup>6</sup> operations  |                                       |  |
|              | Electrical (resistive)      | DC contact rating | Min. 2.5 x 10 <sup>6</sup> operations at inrush 11A 14VDC (0.35 sec - ON/0.35 sec - OFF)                          | Min. 100 x 10 <sup>3</sup> operations | At contact rating, lamp load                     |
| Other        | Vibration resistance        | Misoperation      | 10 to 200Hz, acceleration 44m/s <sup>2</sup> (4.5G) constant acceleration   |                                       | Direction X, Y, Z, contact ON/OFF total 6 cycles |
|              |                             | Endurance         | 10 to 200Hz, acceleration 44m/s <sup>2</sup> (4.5G) constant acceleration   |                                       | Direction X, Y, Z, contact OFF total 6 hours     |
|              | Shock resistance            | Misoperation      | Min. 100m/s <sup>2</sup> (11 ± 1ms)   |                                       | Direction X, Y, Z, contact ON/OFF total 36 times |
|              |                             | Endurance         | Min. 1,000m/s <sup>2</sup> (6 ± 1ms)  |                                       | Direction X, Y, Z, contact OFF total 18 times    |
|              | Dimensions / weight         |                   | 12.1 x 15.5 x 13.7 mm / approx. 6g  |                                       |  |

\*1: Minimum switching loads mentioned above are reference values. Please perform the confirmation test with actual load before production since reference values may vary according to switching frequencies, environmental conditions and expected reliability levels. Care shall be taken on the heat generated on PC board when maximum carrying current exceeds 10A. Please perform the confirmation test with actual conditions.

## ■ Coil Data (FBR51 series)

| Coil code | Rated Coil Voltage | Coil Resistance +/-10% | Must Operate Voltage* | Must Release Voltage* |
|-----------|--------------------|------------------------|-----------------------|-----------------------|
|           | (VDC)              | (Ω)                    | (VDC)                 | (VDC)                 |
| D06       | 6                  | 60                     | 3.6<br>4.5 (at 85°C)  | 0.5<br>0.7 (at 85°C)  |
| D09       | 6                  | 135                    | 5.4<br>6.8 (at 85°C)  | 0.7<br>0.9 (at 85°C)  |
| D10       | 9                  | 180                    | 6.3<br>7.9 (at 85°C)  | 0.8<br>1.0 (at 85°C)  |
| D12       | 12                 | 240                    | 7.3<br>9.2 (at 85°C)  | 1.0<br>1.3 (at 85°C)  |

## Coil Data (FBR52 series)

| Coil code | Rated Coil Voltage | Coil Resistance +/-10% | Must Operate Voltage* | Must Release Voltage* |
|-----------|--------------------|------------------------|-----------------------|-----------------------|
|           | (VDC)              | (Ω)                    | (VDC)                 | (VDC)                 |
| D06       | 6                  | 45                     | 3.6<br>4.5 (at 85°C)  | 0.5<br>0.7 (at 85°C)  |
| D09       | 6                  | 100                    | 5.4<br>6.8 (at 85°C)  | 0.7<br>0.9 (at 85°C)  |
| D10       | 9                  | 135                    | 6.3<br>7.9 (at 85°C)  | 0.8<br>1.0 (at 85°C)  |
| D12       | 12                 | 180                    | 7.3<br>9.2 (at 85°C)  | 1.0<br>1.3 (at 85°C)  |

Note: All values in the table are valid at 20oC and zero contact current, unless otherwise specified.

\*: Specified operated values are valid for pulse wave voltage.

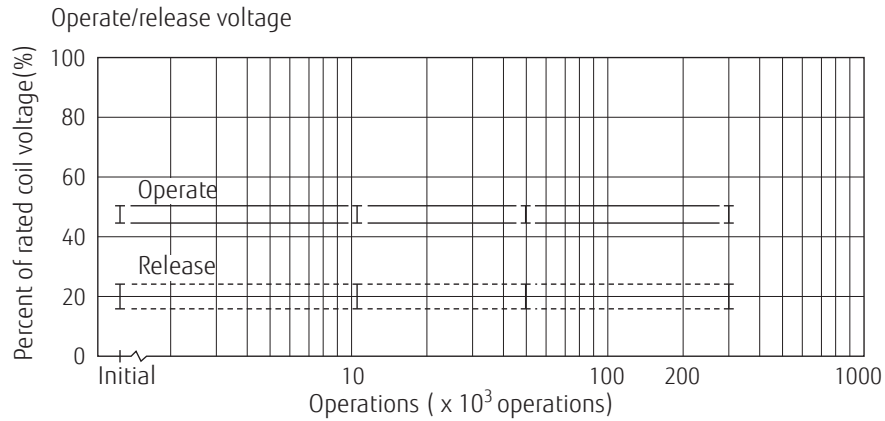
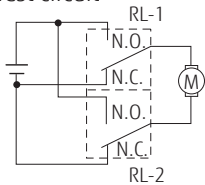
Please use at rated coil voltage. Please refer to characteristic data and set up adequate voltage in case of use at over voltage.

## ■ Characteristic Data (Reference)

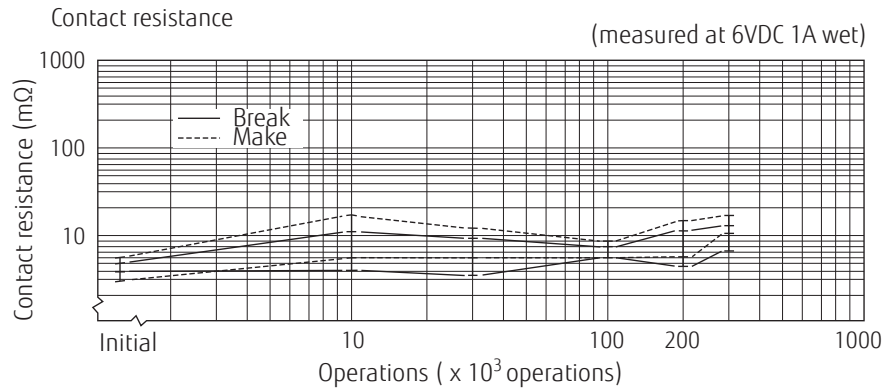
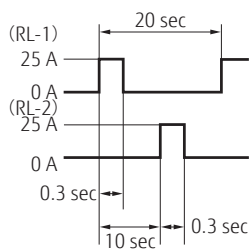
\* Characteristic data is not a guaranteed value, but measured values of samples from production line.

- Test item  
25A 14VDC  
motor lock 200,000  
operations minimum  
(FBR52N(-)-W1 type)

- Test circuit

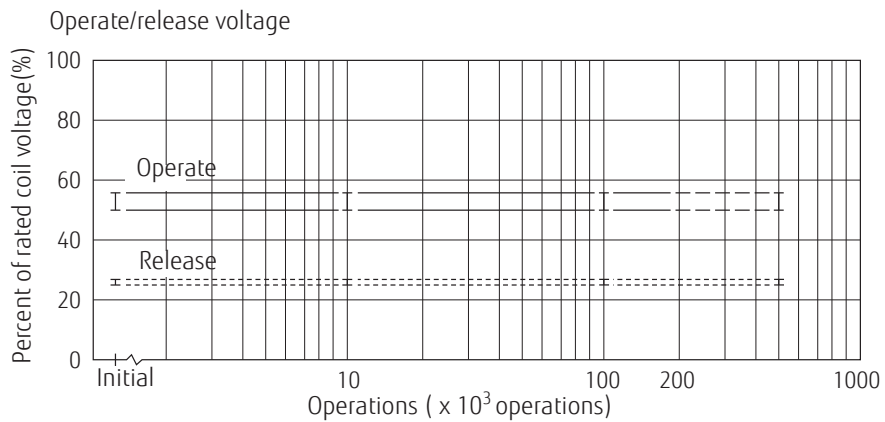
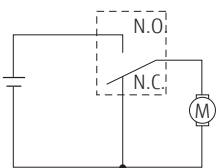


- Current wave form

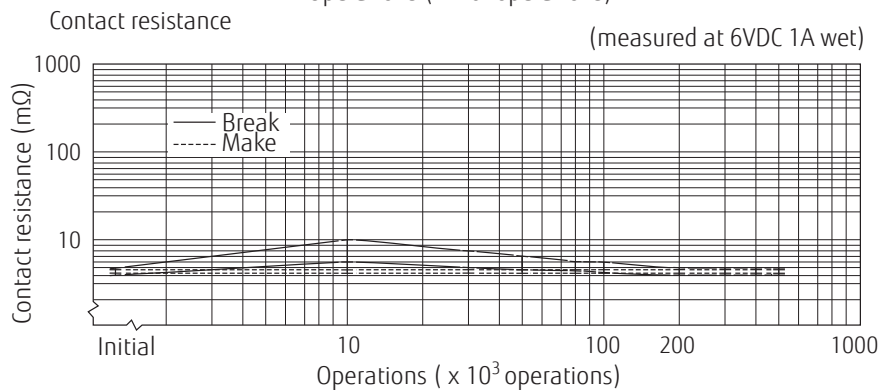
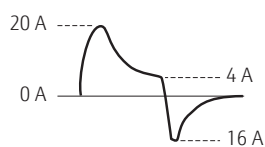


- Test item  
20A 14VDC  
motor free 400,000  
operations minimum  
(FBR51N(-)-W1 type)

- Test circuit



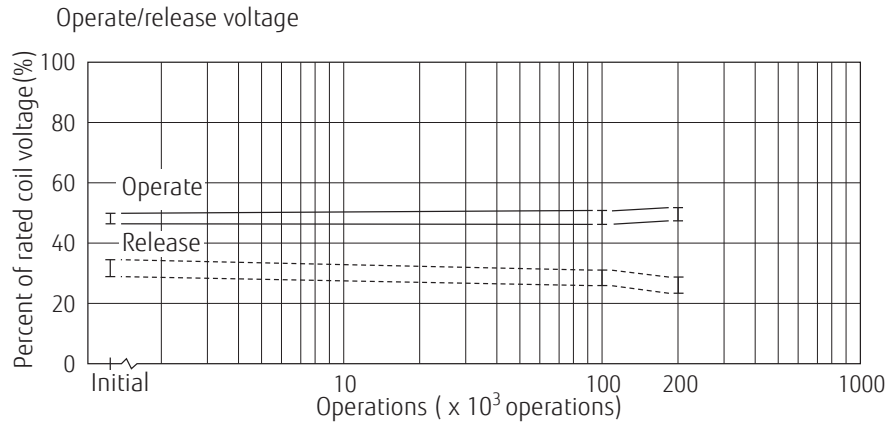
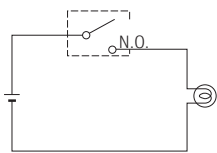
- Current wave form



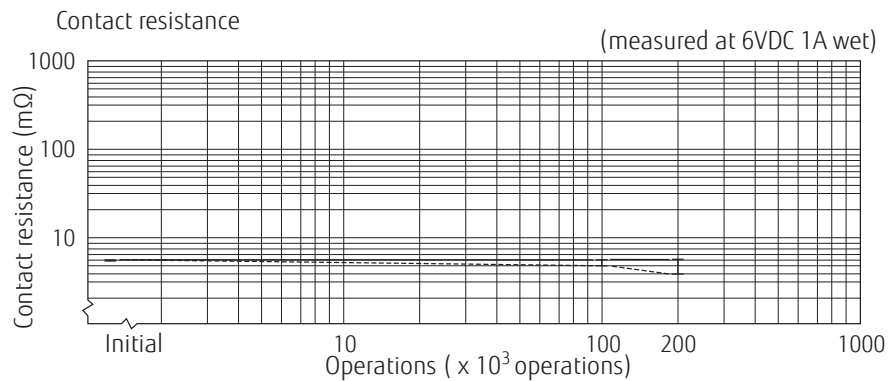
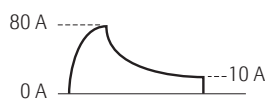
- Life test (example)

- Test item  
Inrush 80A 14VDC  
lamp load (120W)  
100,000 ops. minimum  
(FBR51N( )-WL type)

- Test circuit

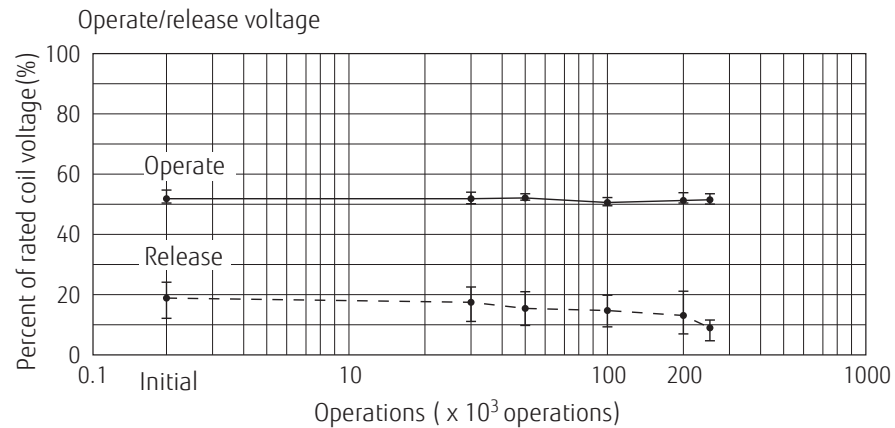
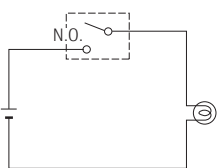


- Current wave form

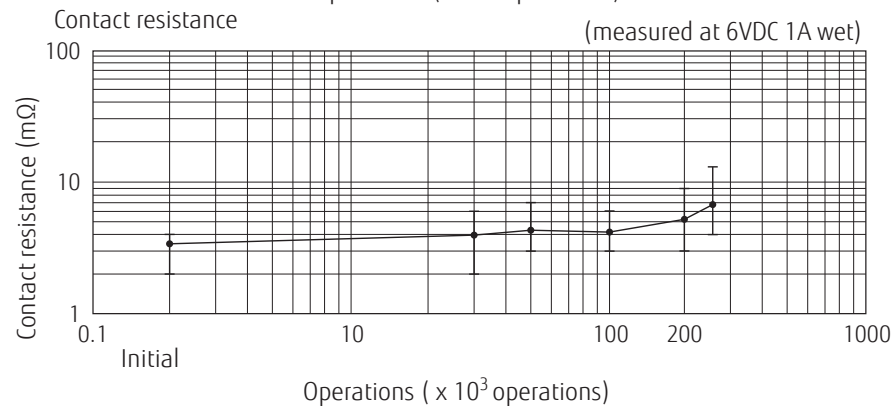


- Test item  
Inrush 11A 14VDC  
flasher, hazard lamp  
(80W)load 2,500,000  
operations minimum  
(FBR51N( )-WF type)

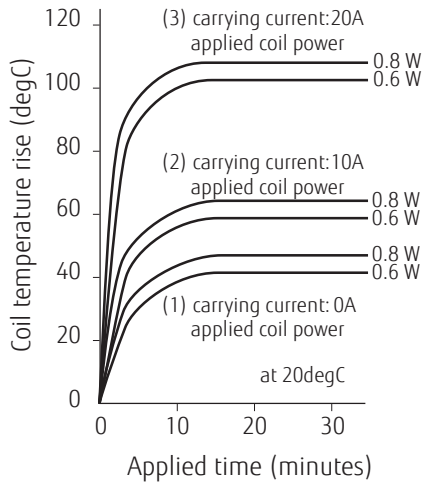
- Test circuit



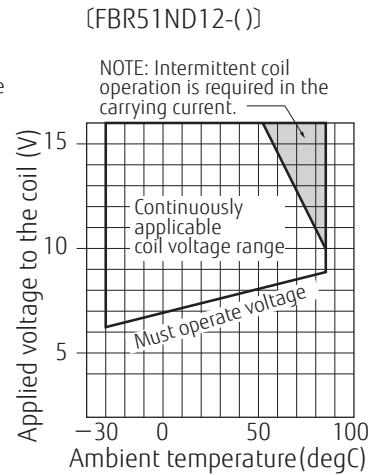
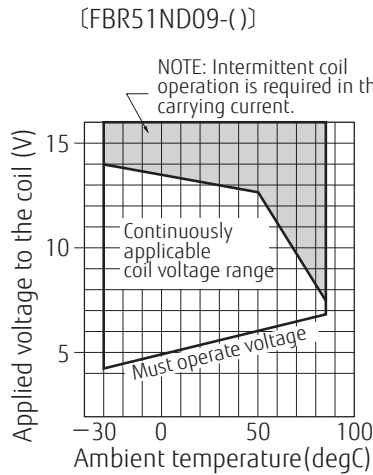
- Current wave form



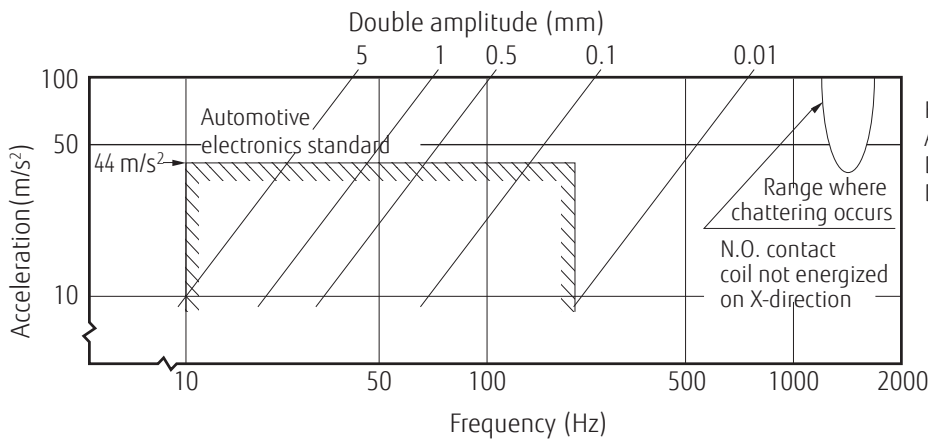
### Coil Temperature Rise



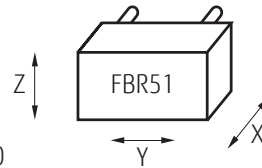
### Operating Coil Voltage Range



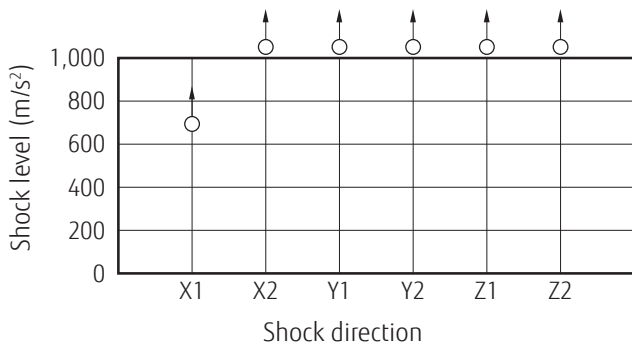
### Coil Temperature Rise



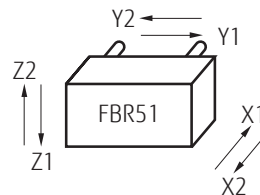
Frequency: 10 to 2000 Hz  
Acceleration: 100m/s<sup>2</sup> max.  
Direction of vibration: see under diagram  
Detection level: chatter > 1ms.



### Shock Resistance Characteristics

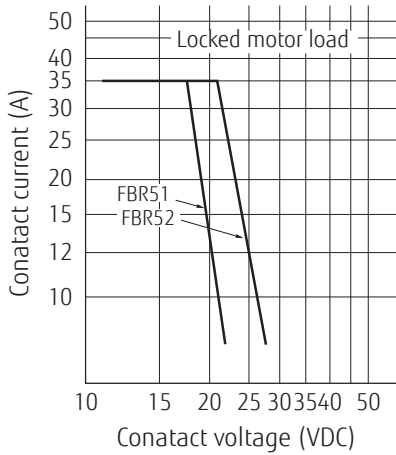


Shock application time: 6<sup>+1</sup>ms, half-sine wave  
Test material: coil, energized and de-energized  
Shock direction: set under diagram  
Detection level: chatter > 1ms.

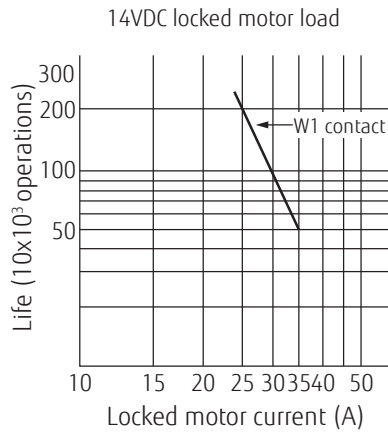


○ : N.C.contact (coil de-energized)  
N.O.contact: min. 1,000m/s<sup>2</sup> in all directions

Maximum Switching Power

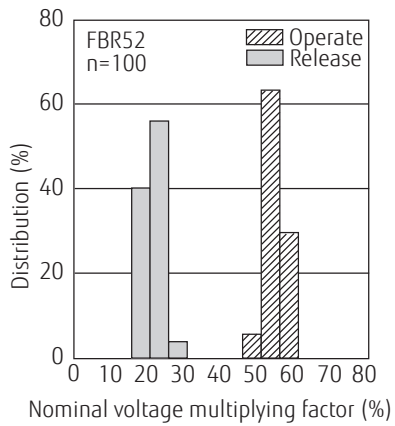


Live Curve

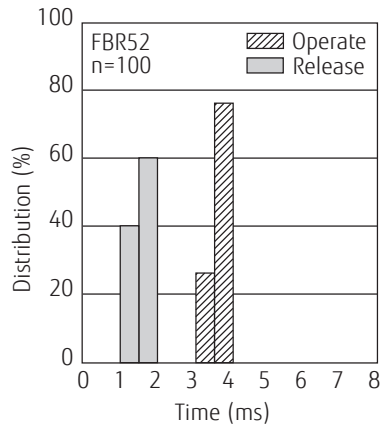


Initial Distributions data

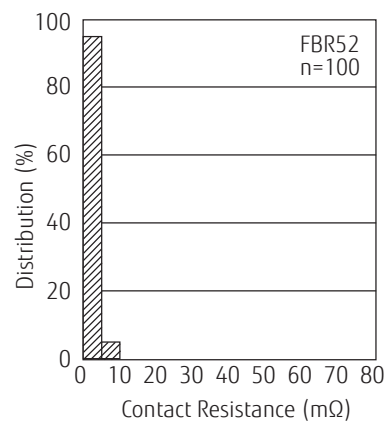
Distribution of operate and release voltage



Distribution of operate and release time



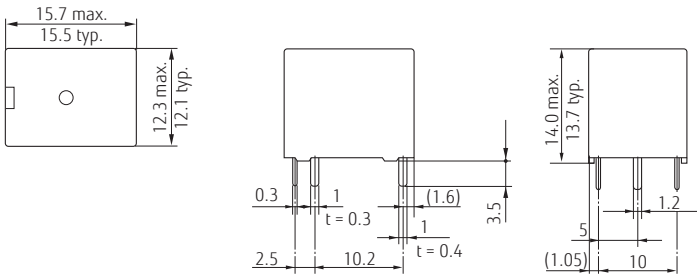
Distribution of contact resistance





## ■ Dimensions

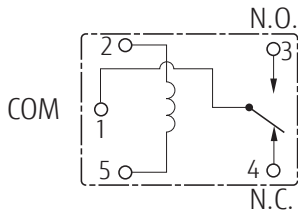
- Dimensions



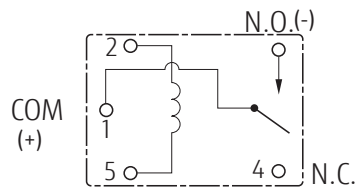
\* Dimensions of the terminals do not include thickness of pre-solder.

- Schematics  
(BOTTOM VIEW)

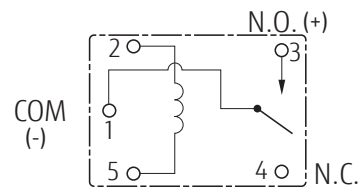
FBR50-W1



FBR50-WL

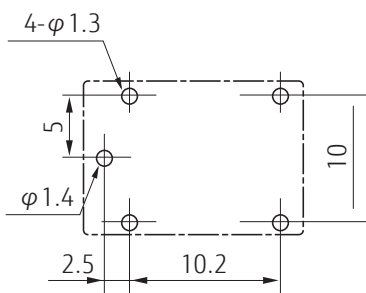


FBR50-WF



Refer to the test circuit at CHARACTERISTIC DATA for connection, and polarity.

- PC Board Mounting Hole Layout  
(BOTTOM VIEW)



( ): Reference value  
Unit: mm

\* Tolerance of PC board mounting hole layout :  $\pm 0.1$  unless otherwise specified.

## Cautions

- All values mentioned in this datasheet are provided under ideal conditions. Please perform the confirmation test before actual use.
- Please connect relay coils according to specified polarity.
- Reflow soldering is prohibited.
- Do not use relays in the atmosphere with sulfide gas, chloride gas or nitric oxide. Contact resistance may increase.
- Do not use silicon or silicon-containing product or materials near relays. It may cause contact failure.

## GENERAL INFORMATION

### 1. ROHS Compliance

- All relays produced by Fujitsu Components are compliant with RoHS directive 2011/65/EU including amendments.
- Use of Cadmium in electrical contacts is exempted as per Annex III of the RoHS directive 2011/65/EU. Please consider expiry date of exemption. Relays with Cadmium containing contacts are not to be used for new designs.
- All relays are lead-free. Please refer to Lead-Free Status Info for older date codes at:  
<http://www.fujitsu.com/downloads/MICRO/fcai/relays/lead-free-letter.pdf>
- Characteristic data is not guaranteed values, but measured values of samples from production line.

### 2. Recommended lead free solder condition

- Lead free solder plating on relay terminals is Sn-3.0Ag-0.5Cu, unless otherwise specified. This material has been verified to be compatible with PbSn assembly process.
- Recommended solder for assembly: Sn-3.0Ag-0.5Cu.

### Flow Solder Condition:

|  |   |
|--|---|
| Pre-Heating:   | maximum 120°C<br>within 90 sec.                 |
| Soldering:   | dip within 5 sec. at<br>255°C ± 5°C solder bath |
| Relay must be cooled by air<br>immediately after soldering |   |

### Solder by Soldering Iron:

|                 |                   |
|-----------------|-------------------|
| Soldering Iron: | 30-60W            |
| Temperature:    | maximum 350-360°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, unless otherwise indicated.

### 4. Tin Whiskers

- Dipped SnAgCu solder is known as presenting a low risk to tin whisker development. No considerable length whisker was found by our in house test.

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[FBR52ND06-W1](#) [FBR52ND10-W](#) [FBR52ND10-N](#) [FBR52ND10-W1](#) [FBR52ND09-N](#) [FBR52ND09-W](#) [FBR52ND12-N](#)  
[FBR52ND12-W](#) [FBR52ND09-W1](#) [FBR52ND12-W1](#)



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

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