

# COMPACT HIGH POWER RELAY

For automotive applications

1 POLE - 60A (For 12V Car Battery)

## FBR59-HW Series

### ■ FEATURES

- 1 pole, 60A, 1 form U
- High temperature grade (-40°C to 125°C)
- Comparable capability with Power Mini ISO plug-in relays
- Through hole reflow type available
- RoHS compliant, lead free

Please see page 4 for more information



### ■ Part Numbers

[Example]    FBR59    N    D12    -    Y    -    HW    -    RW  
                   (a)    (b)    (c)       (d)       (e)       (f)

|     |                    |           |  |
|-----|--------------------|-----------|--|
| (a) | Relay type         | FBR59     | : FBR59 series                             |
| (b) | Enclosure          | N         | : Plastic sealed type                      |
| (c) | Coil rated voltage | D12       | : 9...12VDC<br>Coil rating table at page 3 |
| (d) | Contact material   | Y         | : Silver-tin oxide                         |
| (e) | Contact rating     | HW        | : 60A                                      |
| (f) | Soldering          | Nil<br>RW | : Standard<br>: Through hole reflow (THR)  |

Actual markings does not carry the type name: "FBR"

E.g.: Ordering code: FBR59ND12-Y-HW Actual marking: 59ND12-Y-HW

# FBR59-HW Series

## ■ Specifications

| Item         |                                 |               | FBR59-HW  |   |
|--------------|---------------------------------|---------------|---|---|
|              |                                 |               |   | Remarks / conditions                                  |
| Contact data | Configuration                   |               | 1 form U  |   |
|              | Construction                    |               | Single  |   |
|              | Material                        |               | Silver-tin oxide  |   |
|              | Voltage drop                    |               | Max. 100 mV   | At 1A, 12VDC  |
|              | Contact rating                  |               | 60A, 14VDC<br>45A, 14VDC                                      | Resistive load<br>Motor load                          |
|              | Max. carrying current           |               | 60A / 1h  |   |
|              | Max. inrush current             |               | 220A  |   |
|              | Min. switching load *           |               | 1A 6VDC   | Reference   |
|              | Max. switching load **          |               | 60A, 14VDC<br>45A, 14VDC                                      | Resistive load<br>Motor load                          |
| Coil         | Operating temperature range     |               | -40°C ~ +125°C  | No frost  |
| Timing data  | Operate                         |               | Max. 10ms   | At nominal voltage<br>(without diode, without bounce) |
|              | Release                         |               | Max. 10ms   | At nominal voltage<br>(without diode, without bounce) |
|              | Storage temperature / humidity  |               | -40°C to 125°C, 45 to 85RH                                    | No frost  |
| Life         | Mechanical                      |               | Min. 1 x 10 <sup>6</sup> operations                           | without contact load                                  |
|              | Electrical                      |               | Min. 100 x 10 <sup>3</sup> operations                         | resistive load  |
| Insulation   | Insulation resistance           |               | Min. 100MΩ at 500VDC  | Initial   |
|              | Dielectric withstanding voltage | Open contacts | 500VAC (50/60Hz), 1 minute                                    |   |
|              |                                 | Coil contact  | 500VAC (50/60Hz), 1 minute                                    |   |
| Other        | Vibration resistance            | Misoperation  | 10 to 200Hz, 44m/s <sup>2</sup> (4.5G), constant acceleration |   |
|              |                                 | Endurance     | 10 to 200Hz, 44m/s <sup>2</sup> (4.5G), constant acceleration |   |
|              | Shock resistance                | Misoperation  | Min. 100m/s <sup>2</sup> (11 ± 1ms)                           |   |
|              |                                 | Endurance     | Min. 1,000m/s <sup>2</sup> (6 ± 1ms)                          |   |
|              | Dimensions / weight             |               | 15.0 x 20.0 x 16.8 mm / approx. 13g                           |   |

\*: 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.

\*\*: Maximum switching loads mentioned above are reference values. Please refer to operation range graph for continuous current.

Note: Values of electrical characteristics are under 15 to 35 degC, 25 to 75%RH (JIS standard condition) unless otherwise specified.

Note: 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

# FBR59-HW Series

## ■ Coil Data

| Coil code | Rated Coil Voltage (VDC) | Coil Resistance +/-10% ( $\Omega$ ) | Must Operate Voltage* (VDC)      | Must Release Voltage* (VDC)     |
|-----------|--------------------------|-------------------------------------|----------------------------------|---------------------------------|
| D09       | 9                        | 170                                 | 5.4 (at 20°C)<br>7.7 (at 125°C)  | 0.7 (at 20°C)<br>1.0 (at 125°C) |
| D10       | 10                       | 220                                 | 6.3 (at 20°C)<br>9 (at 125°C)    | 0.8 (at 20°C)<br>1.2 (at 125°C) |
| D12       | 12                       | 320                                 | 7.3 (at 20°C)<br>10.4 (at 125°C) | 1.0 (at 20°C)<br>1.5 (at 125°C) |

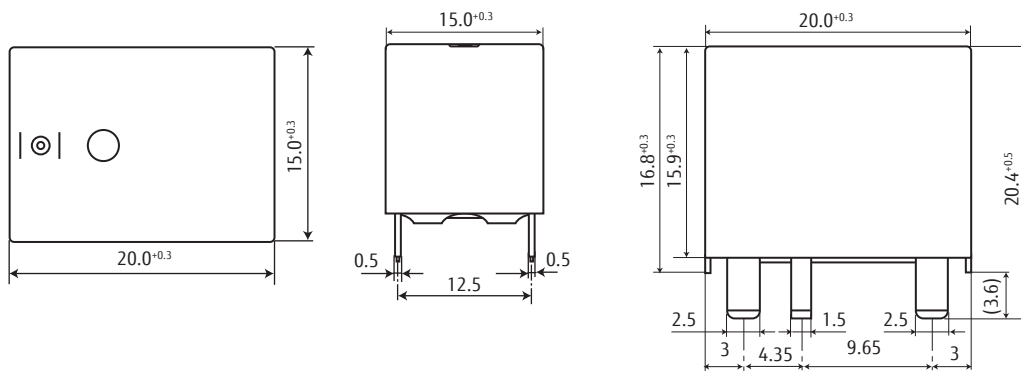
Note: All values in the table are valid at 20°C and zero contact current, unless otherwise specified.

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

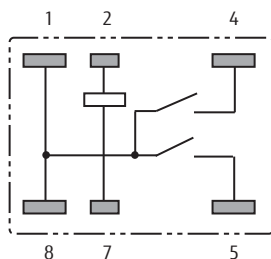
Note: Please use at rated coil voltage. Please refer to characteristic data and set up adequate voltage in case of use at over voltage.

## ■ Dimensions

- Dimensions

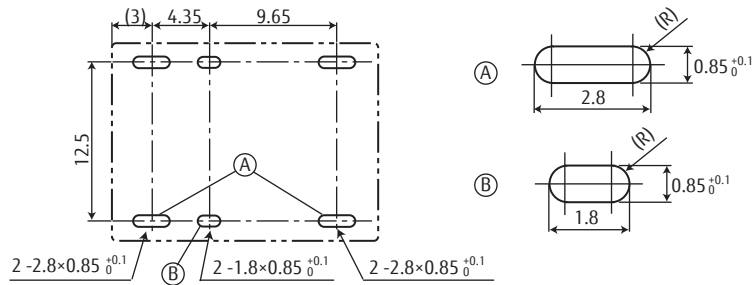


- Schematics  
(BOTTOM VIEW)



# FBR59-HW Series

- PC Board Mounting Hole Layout (BOTTOM VIEW)



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

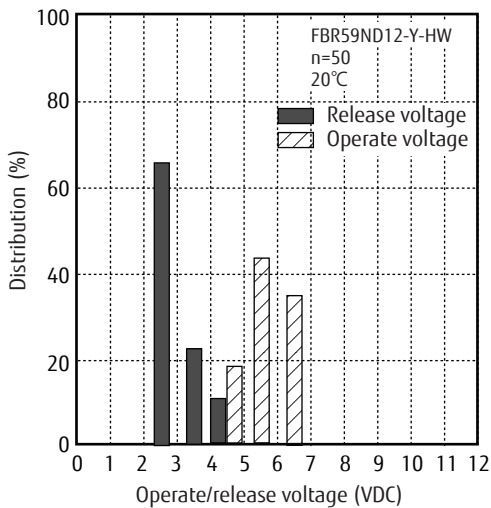
\* Tolerance of PC board mounting hole layout :  $\pm 0.1$  unless otherwise specified.

( ): Reference value

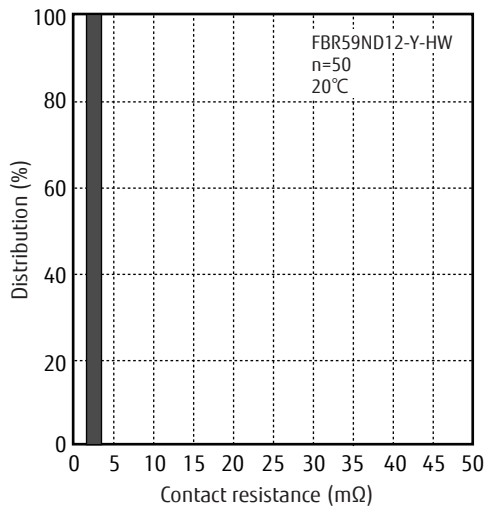
Unit: mm

## Characteristic Data (Reference)

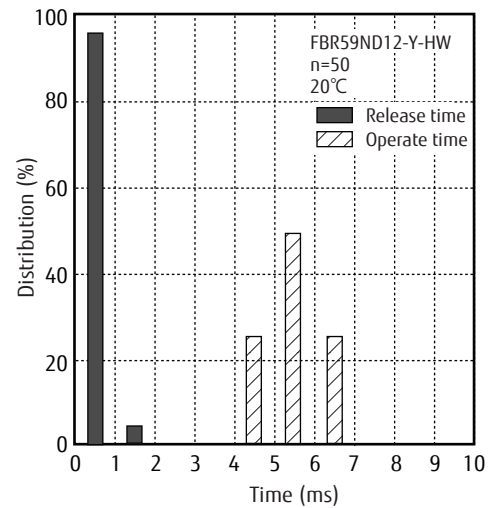
Distribution of operate/release voltage



Distribution of contact resistance

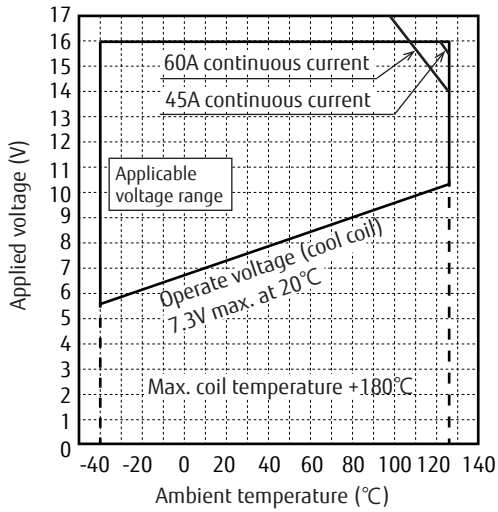


Distribution of operate/release time

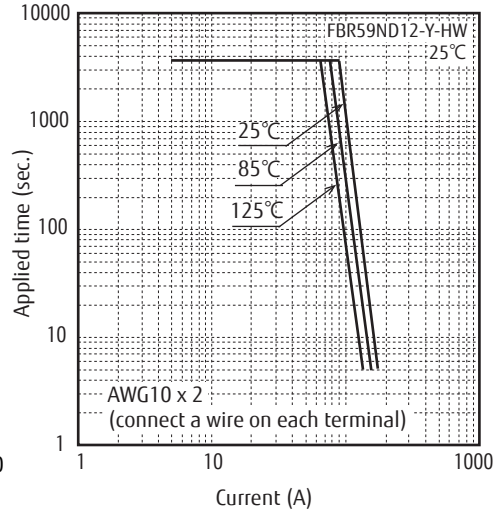


# FBR59-HW Series

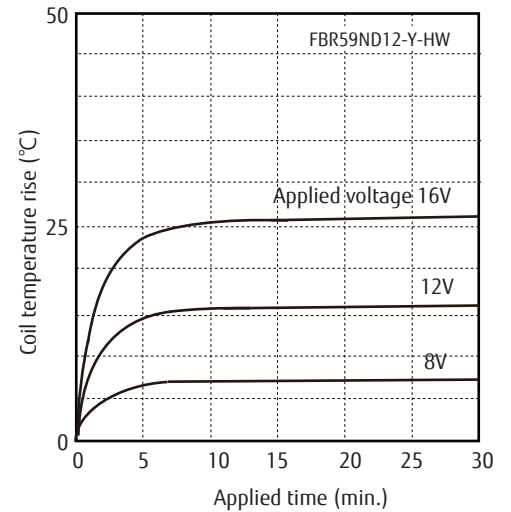
Operating range



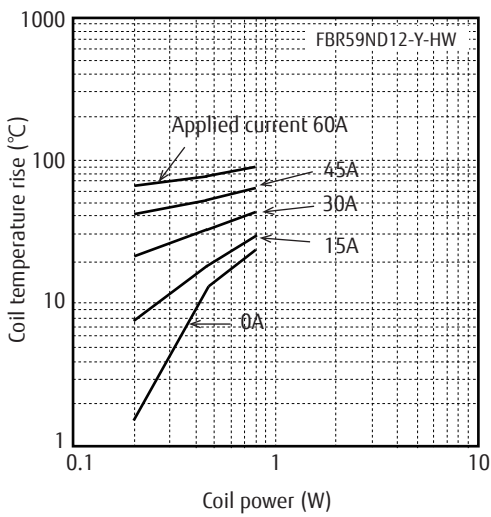
Contact current capacity



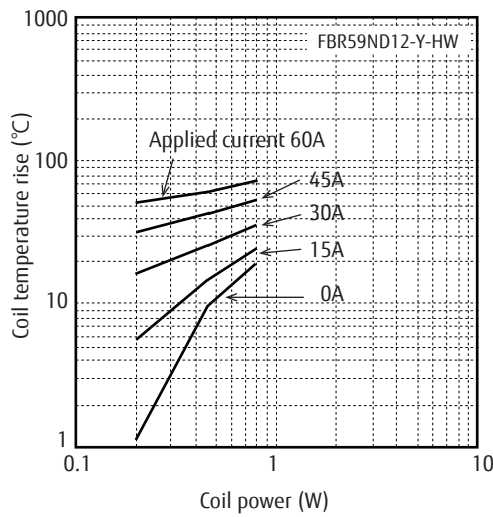
Coil temperature rise  
(ambient temperature 25°C)



Coil temperature rise  
(ambient temperature 25°C)

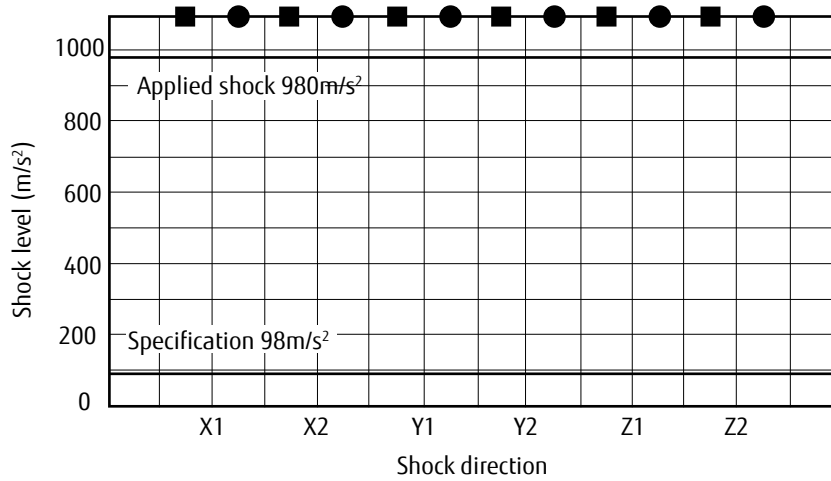


Coil temperature rise  
(ambient temperature 85°C)

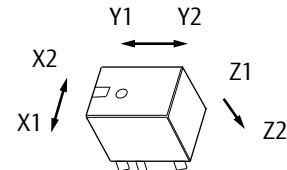


# FBR59-HW Series

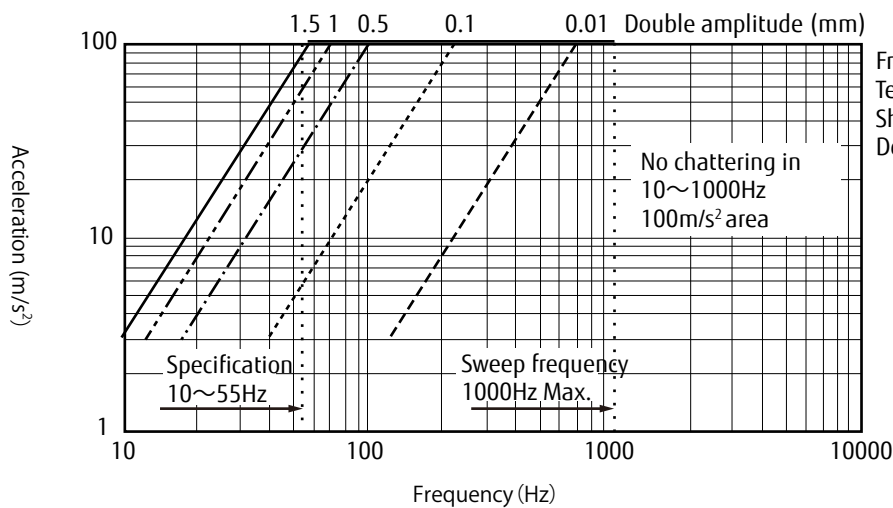
## Shock resistance characteristics



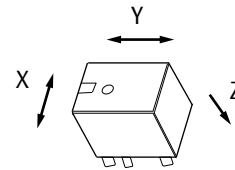
Shock application time:  $6 \pm 1\text{ms}$  half-sine wave  
Test conditions: Coil energized (12VDC) and de-energized  
Shock direction: see diagram below  
Detection level: chatter  $>1\text{ms}$



## Vibration resistance characteristics



Frequency : 10 to 1000Hz  
Test conditions: Coil energized (12VDC) and de-energized  
Shock direction: see diagram below  
Detection level: chatter  $>1\text{ms}$



# FBR59-HW Series

## 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 2001/65/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.

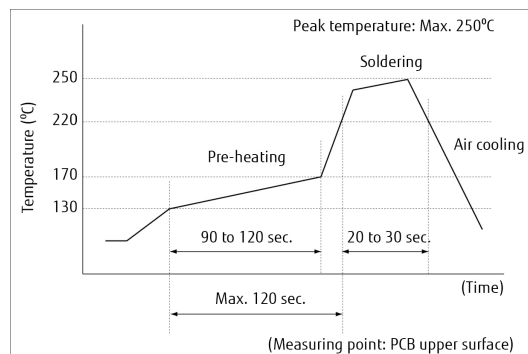
#### Flow Solder Condition:

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

#### Solder by Soldering Iron:

Soldering Iron 30-60W  
Temperature: maximum 340-360°C  
Duration: maximum 3 sec.

#### Re-Flow Solder Condition:



Applicable for FBR59NDxx-Y-HW-RW only

**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. -RW THR relay will be shipped in moisture barrier bag.

### 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.

# FBR59-HW Series

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