FUJITSU

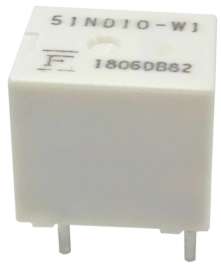
COMPACT POWER RELAY

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] FBR51 - N D12 - W1
(a) (b) (c) (d)

(a)	Relay type	FBR51 FBR52	: FBR51-Series - Standard type (contact gap 0.3mm) : FBR52-Series - Wide contact gap type (contact gap 0.6mm)
(b)	Enclosure	N	: Plastic sealed type
(c)	Coil rated voltage	D12	: 6....12VDC Coil rating table at page 3
(d)	Contact material	W1 WL WF	: Silver-tin oxide indium (high power type, 1 form C) : Silver-tin oxide indium (lamp loads, 1 form A, FBR51 only) : 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 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 (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 No diode, excluding bounce
	Release		Max. 5ms	At nominal voltage No diode, excluding bounce
Life	Mechanical	AC contact rating	Min. 10 x 10^6 operations	
	Electrical (resistive)	DC contact rating	Min. 100 x 103 operations	At contact rating, locked motor load
Other	Vibration resistance	Misoperation	10 to 200Hz, acceleration 44m/s2(4.5G) constant acceleration	Direction X, Y, Z, contact ON/OFF total 6 cycles
		Endurance	10 to 200Hz, acceleration 44m/s2(4.5G) constant acceleration	Direction X, Y, Z, contact OFF total 6 hours
	Shock resistance	Misoperation	Min. 100m/s² (11 ± 1ms)	Direction X, Y, Z, contact ON/OFF total 36 times
		Endurance	Min. 1,000m/s² (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		AgSnO2In (for flasher)	AgSnO2In (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 (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 No diode, excluding bounce
	Release		Max. 5ms		At nominal voltage No diode, excluding bounce
Life	Mechanical	AC contact rating	Min. 10 x 10^6 operations		
	Electrical (resistive)	DC contact rating	Min. 2.5 x 106 operations at inrush 11A 14VDC (0.35 sec - ON/0.35 sec - OFF)	Min. 100 x 10^3 operations	At contact rating, lamp load
Other	Vibration resistance	Misoperation	10 to 200Hz, acceleration 44m/s2(4.5G) constant acceleration		Direction X, Y, Z, contact ON/ OFF total 6 cycles
		Endurance	10 to 200Hz, acceleration 44m/s2(4.5G) constant acceleration		Direction X, Y, Z, contact OFF total 6 hours
	Shock resistance	Misoperation	Min. 100m/s² (11 ± 1ms)		Direction X, Y, Z, contact ON/ OFF total 36 times
		Endurance	Min. 1,000m/s² (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 4.5 (at 85°C)	0.5 0.7 (at 85°C)
D09	6	135	5.4 6.8 (at 85°C)	0.7 0.9 (at 85°C)
D10	9	180	6.3 7.9 (at 85°C)	0.8 1.0 (at 85°C)
D12	12	240	7.3 9.2 (at 85°C)	1.0 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 4.5 (at 85°C)	0.5 0.7 (at 85°C)
D09	6	100	5.4 6.8 (at 85°C)	0.7 0.9 (at 85°C)
D10	9	135	6.3 7.9 (at 85°C)	0.8 1.0 (at 85°C)
D12	12	180	7.3 9.2 (at 85°C)	1.0 1.3 (at 85°C)

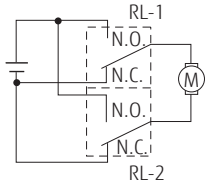
Note: All values in the table are valid at 20oC and zero contact current, unless otherwise specified.
*: Specified operated values are valid for pulse wave voltage.
Please use at rated coil voltage. Please refer to characteristic data and set up adequate voltage in case of use at over voltage.

■ Characteristic Data (Reference)

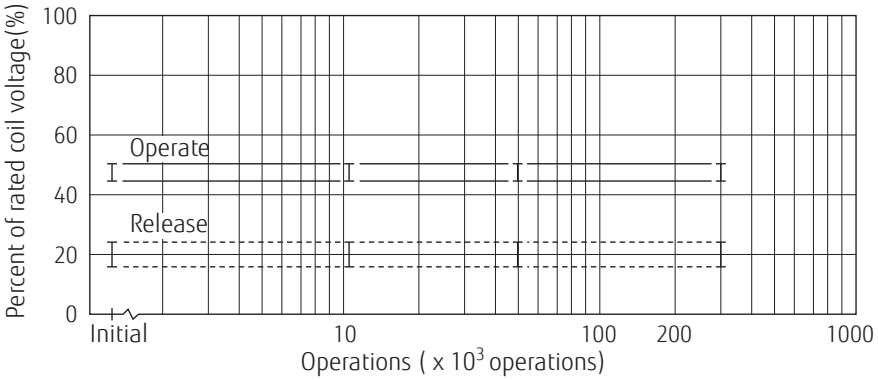
* Characteristic data is not a guaranteed value, but measured values of samples from production line.

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

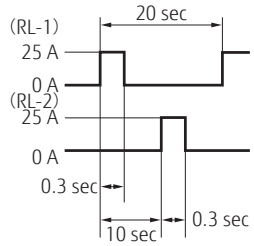
- Test circuit



Operate/release voltage

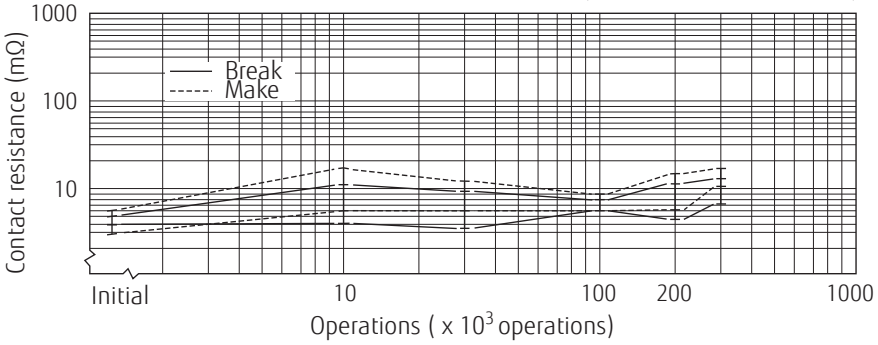


- Current wave form



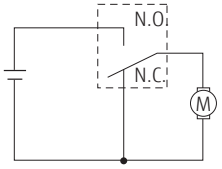
Contact resistance

(measured at 6VDC 1A wet)

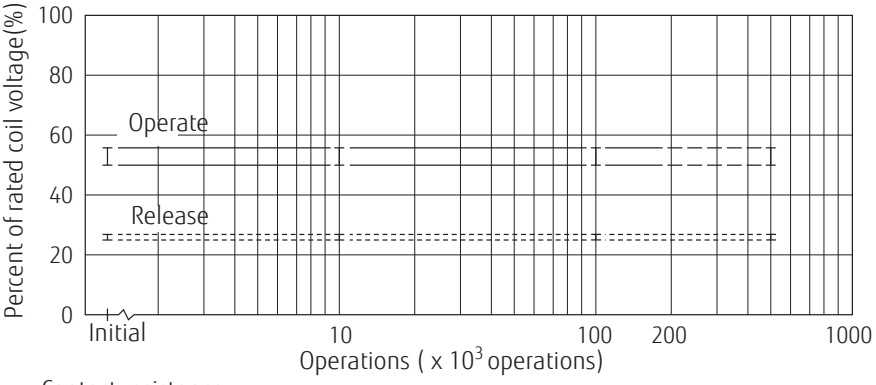


- Test item
  20A 14VDC
  motor free 400,000
  operations minimum
  (FBR51N( )-W1 type)

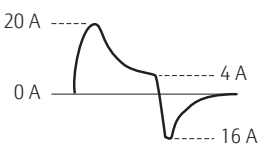
- Test circuit



Operate/release voltage

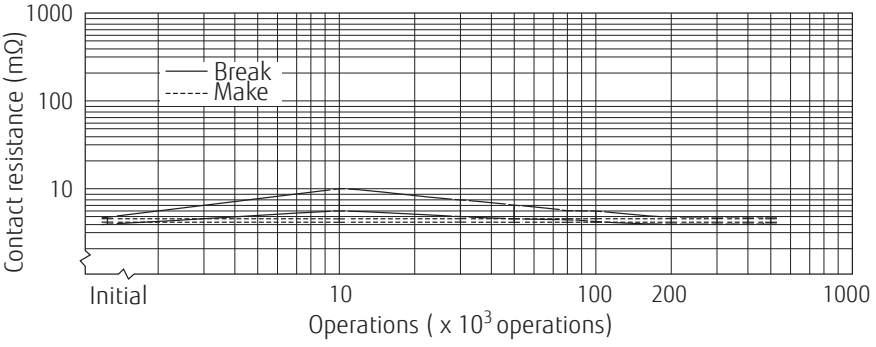


- Current wave form



Contact resistance

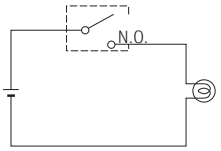
(measured at 6VDC 1A wet)



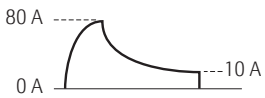
- Life test (example)

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

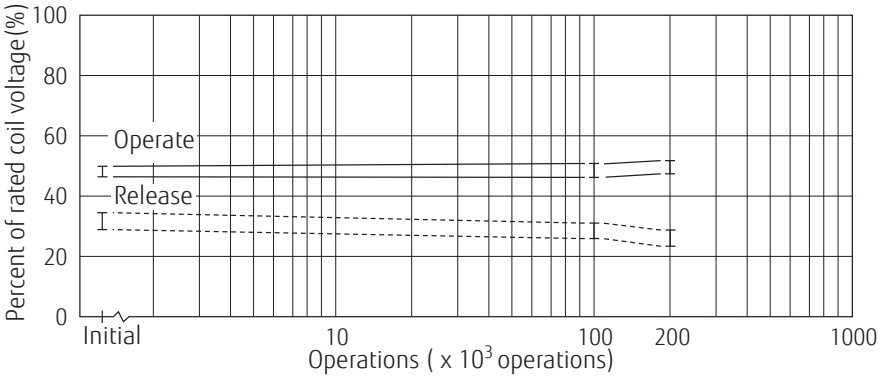
- Test circuit



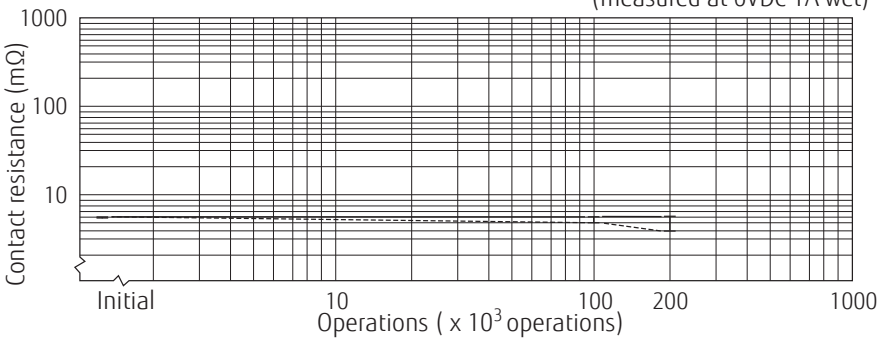
- Current wave form



Operate/release voltage

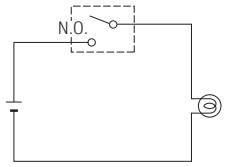


Contact resistance (measured at 6VDC 1A wet)



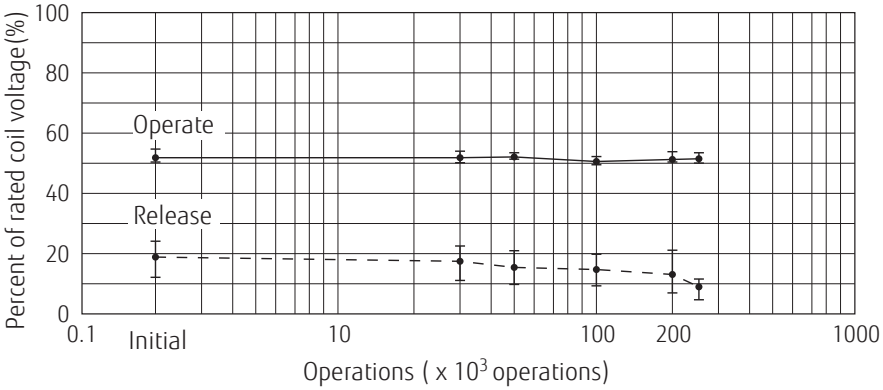
- Test item
  Inrush 11A 14VDC
  flasher, hazard lamp
  (80W)load 2,500,000
  operations minimum
  (FBR51N( )-WF type)

- Test circuit

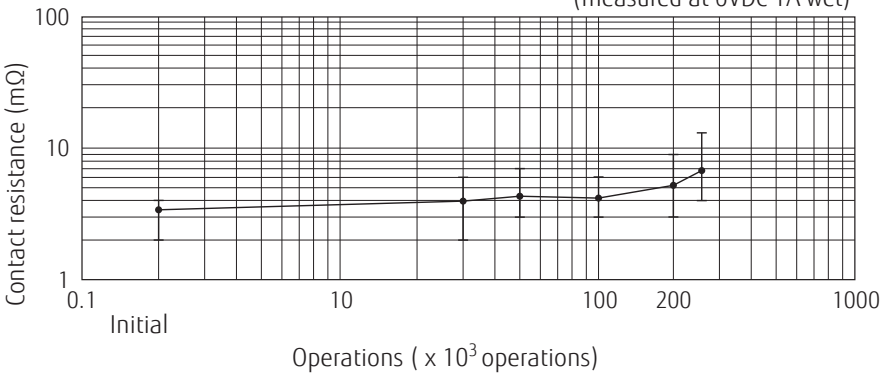


- Current wave form

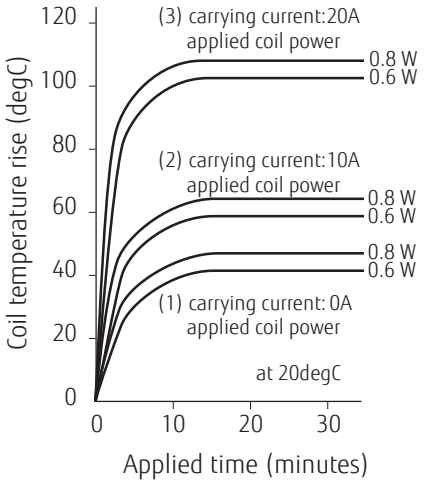
Operate/release voltage



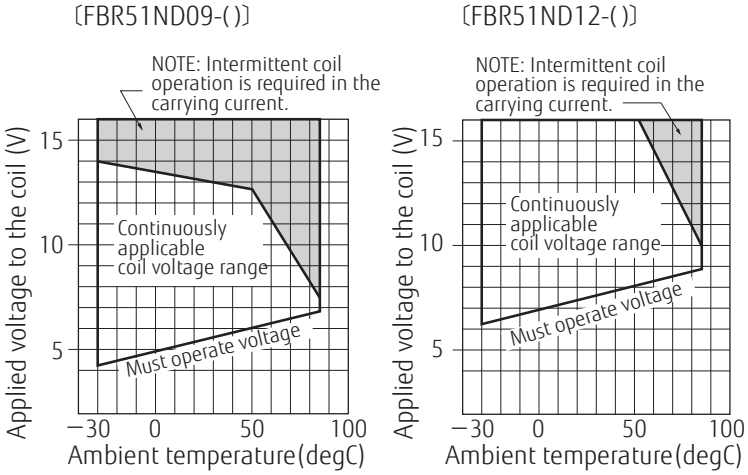
Contact resistance (measured at 6VDC 1A wet)



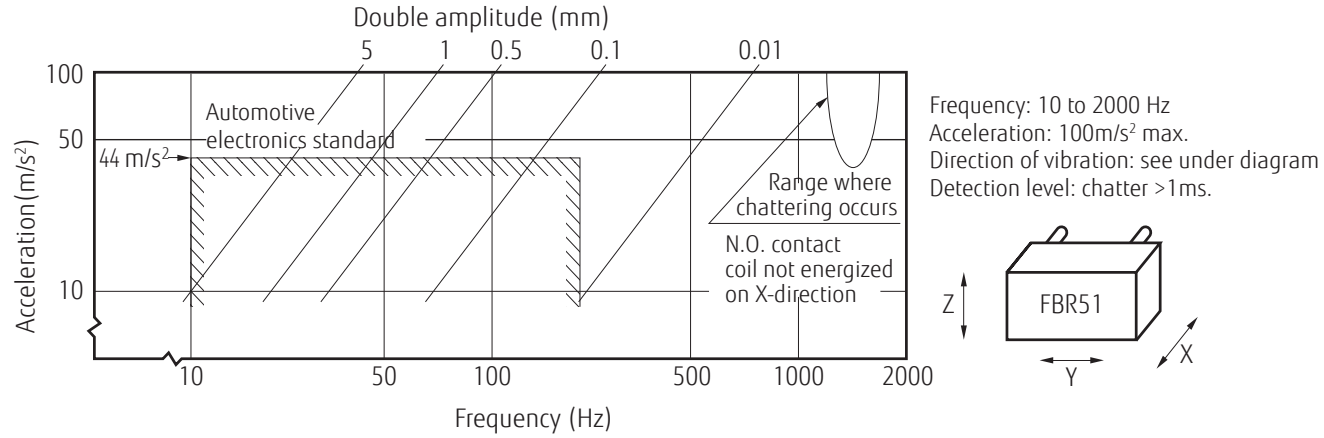
Coil Temperature Rise



Operating Coil Voltage Range

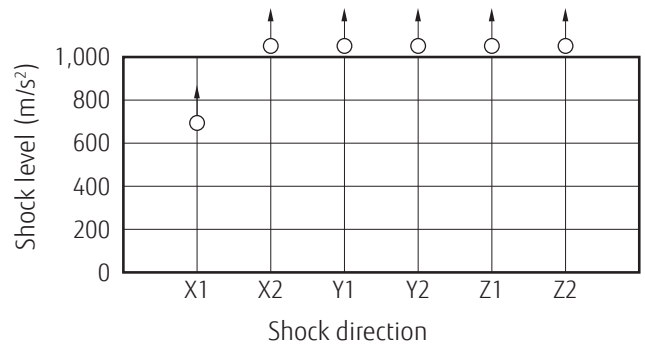


Coil Temperature Rise



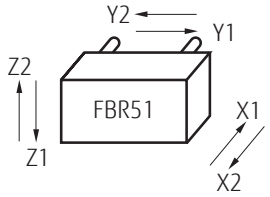
Frequency: 10 to 2000 Hz
Acceleration: 100m/s² max.
Direction of vibration: see under diagram
Detection level: chatter >1ms.

Shock Resistance Characteristics

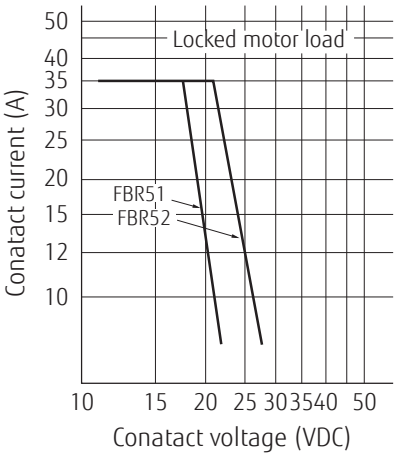


○: N.C.contact (coil de-energized)
N.O.contact: min. 1,000m/s² in all directions

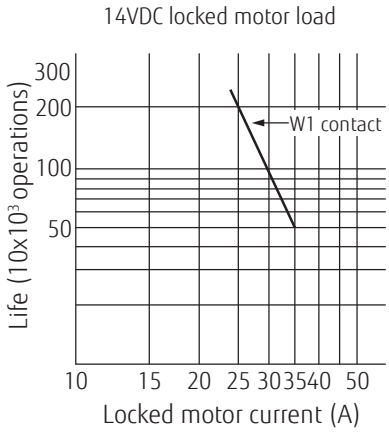
Shock application time: $6^{+/-1}$ms, half-sine wave
Test material: coil, energized and de-energized
Shock direction: set under diagram
Detection level: chatter > 1ms.



Maximum Switching Power

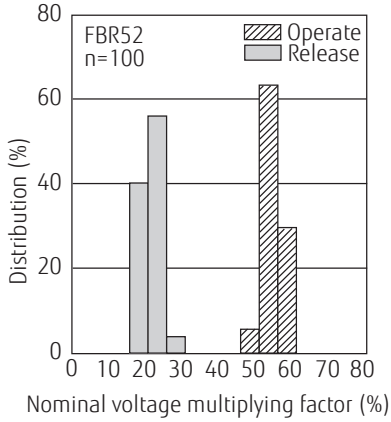


Live Curve

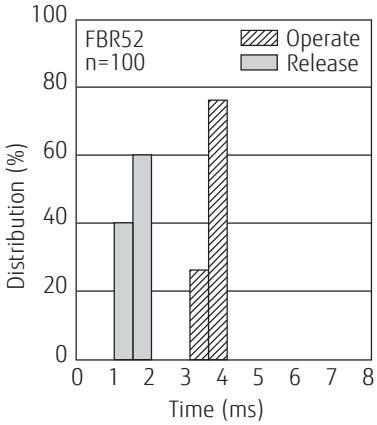


Initial Distributions data

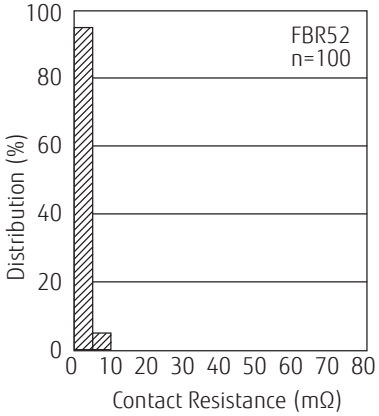
Distribution of operate and release voltage



Distribution of operate and release time

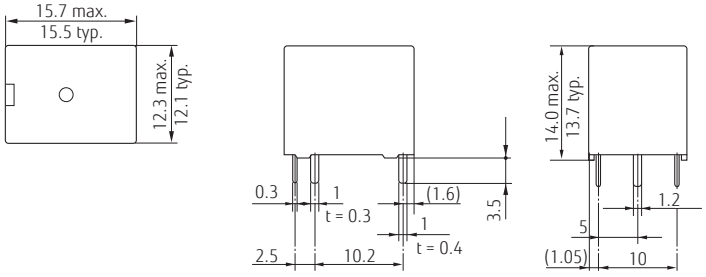


Distribution of contact resistance



■ Dimensions

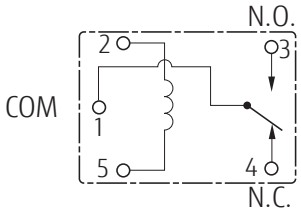
- Dimensions



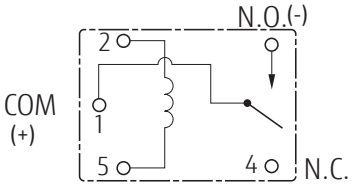
* Dimensions of the terminals do not include thickness of pre-solder.

- Schematics
  (BOTTOM VIEW)

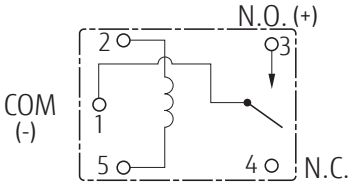
FBR50-W1



FBR50-WL

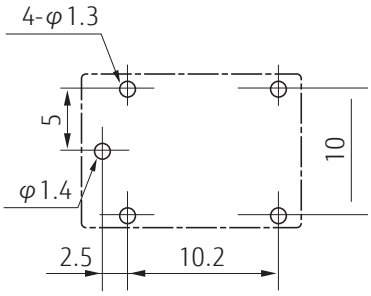


FBR50-WF



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 : ±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 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 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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Web: www.fujitsu.com/sg/products/devices/components/

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13524 Korea
Tel: (82) 31-708-7108
Fax: (82) 31-709-7108
Email: fcal@sg.fujitsu.com
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