

# MINIATURE RELAY

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

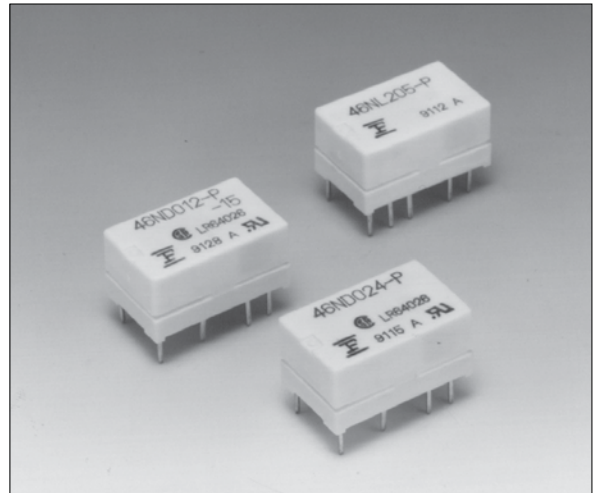
# FBR46 SERIES

RoHS compliant



### ■ FEATURES

- Miniature size  
About 50% smaller in volume compared with the FBR240 series used mainly in communication equipment.
- High surge voltage  
2,500 V minimum of surge strength (Bellcore standard), and 1,500 VAC minimum of dielectric strength between coil and contact (-15, -16 type).
- Low power consumption  
85 mW of operate power (150 mW of nominal power consumption) by built-in permanent magnet.
- Shipping tube package
- RoHS compliant since date code: 0433A  
Please see page 7 for more information



### ■ ORDERING INFORMATION

[Example]  $\frac{\text{FBR46}}{\text{(a)}}$   $\frac{\text{N}}{\text{(b)}}$   $\frac{\text{D}}{\text{(*)}}$   $\frac{\text{012}}{\text{(c)}}$   $\frac{\text{-P}}{\text{(d)}}$   $\frac{\text{-15}}{\text{(e)}}$   $\frac{\text{-CSA}}{\text{(f)}}$

(a)	Series Name	FBR46 : FBR46 Series
(b)	Enclosure	N : Plastic sealed
(*)	Coil Type	D : Standard, -15, -16 (DC coil) G : 65% Operate type
(c)	Nominal Voltage	(Example) Standard, -15, -16 type 005: 5 VDC 012: 12 VDC (refer to the COIL DATA CHART) (Example) Latching type 05: 5 VDC 12: 12 VDC
(d)	Contact Material	-P : Gold-overlay silver-palladium
(e)	Dielectric Strength	Nil : Between coil and contacts 1,000 VAC, between contacts 750 VAC -15 : Between coil and contacts 1,500 VAC, between contacts 750 VAC -16 : Between coil and contacts 1,500 VAC, between contacts 1,000 VAC
(f)	Safety Specification	Nil : Standard (UL114 recognized) -CSA : UL114 + CSA recognized

Note: The designation name is stamped on the top of the relay case as follows:  
(Example) Designation ordered: FBR46ND012-P  
Stamp: 46ND012-P

# FBR46 SERIES

## ■ COIL DATA CHART

### 1. STANDARD (D type)

MODEL	Nominal voltage	Coil resistance ( $\pm 10\%$ )	Nominal current (at nominal voltage) approx.	Must operate voltage*1	Must release voltage*1	Nominal power	Operate power	Coil temperature rise
FBR46ND003-P	3 VDC	60 $\Omega$	50 mA	75% max. of nominal voltage	5% min. of nominal voltage	Approx. 150 mW (at nominal voltage)	Approx. 85 mW max.	Approx. 25 deg (at nominal voltage)
FBR46ND005-P	5 VDC	167 $\Omega$	30 mA					
FBR46ND006-P	6 VDC	240 $\Omega$	25 mA					
FBR46ND009-P	9 VDC	540 $\Omega$	17 mA					
FBR46ND012-P	12 VDC	960 $\Omega$	13 mA					
FBR46ND024-P	24 VDC	2,880 $\Omega$	8 mA	200 mW	112 mW	30 deg		

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

### 2. 65% OPERATE TYPE (G type)

MODEL	Nominal voltage	Coil resistance ( $\pm 10\%$ )	Nominal current (at nominal voltage) approx.	Must operate voltage*1	Must release voltage*1	Nominal power	Operate power	Coil temperature rise
FBR46NG003-P	3 VDC	36 $\Omega$	83 mA	65% max. of nominal voltage	10% min. of nominal voltage	Approx. 250 mW (at nominal voltage)	Approx. 106 mW max.	Approx. 35 deg (at nominal voltage)
FBR46NG005-P	4.5 VDC	81 $\Omega$	56 mA					
FBR46NG006-P	6 VDC	144 $\Omega$	41 mA					
FBR46NG009-P	9 VDC	324 $\Omega$	27 mA					
FBR46NG012-P	12 VDC	576 $\Omega$	20 mA					
FBR46NG024-P	24 VDC	2,304 $\Omega$	10 mA					

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

### 3. HIGH DIELECTRIC STRENGTH TYPE (-15, -16 type)

MODEL		Nominal voltage	Coil resistance ( $\pm 10\%$ )	Nominal current (at nominal voltage) approx.	Must operate voltage*1	Must release voltage*1	Nominal power	Operate power	Coil temperature rise
-15 type	-16 type								
FBR46ND003-P-15	FBR46ND003-P-16	3 VDC	45 $\Omega$	67 mA	75% max. of nominal voltage	5% min. of nominal voltage	Approx. 200 mW (at nominal voltage)	Approx. 112 mW max.	Approx. 30 deg (at nominal voltage)
FBR46ND005-P-15	FBR46ND005-P-16	5 VDC	125 $\Omega$	40 mA					
FBR46ND006-P-15	FBR46ND006-P-16	6 VDC	180 $\Omega$	33 mA					
FBR46ND009-P-15	FBR46ND009-P-16	9 VDC	405 $\Omega$	22 mA					
FBR46ND012-P-15	FBR46ND012-P-16	12 VDC	720 $\Omega$	17 mA					
FBR46ND024-P-15	FBR46ND024-P-16	24 VDC	2,304 $\Omega$	10 mA	250 mW	140 mW	35 deg		

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

# FBR46 SERIES

## ■ SPECIFICATIONS



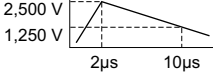
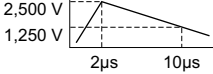
Item		Standard	-65% operate	-15 type	-16 type
Contact	Arrangement and Style	2 form C (DPDT), bifurcated			
	Material	Gold-overlay silver-palladium			
	Resistance (initial)	Maximum 100 mΩ (at 0.1 A 6 VDC)			
	Ratings (resistive)	0.5 A 120 VAC or 1 A 30 VDC			
	Maximum Carrying Current	1.25 A			
	Maximum Switching Power	60 AV or 30 W			
	Max. Switching Voltage* <sup>1</sup>	125 V			
	Maximum Switching Current	1 A			
	Minimum Switching load* <sup>2</sup>	0.01 mA 10 mVDC (reference)			
	Electrostatic Capacity (reference)	Approximately 2 pF (between coil and contacts) Approximately 1 pF (between open contacts)			
Coil	Nominal power (at 20°C)	150 to 200 mW	205 mW	200 to 250 mW	
	Operate power (at 20°C)	85 to 112 mW	106 mW	112 to 114 mW	
	Operating Temperature	-30°C to +70°C (no frost) (refer to the CHARACTERISTIC DATA)			
	Operating Humidity	45 to 85%RH			
Time Value	Operate (at nominal voltage)	Maximum 5 ms			
	Release (at nominal voltage)	Maximum 5 ms			
Life	Mechanical	50 × 10 <sup>6</sup> operations minimum			
	Electrical (refer to the REFERENCE DATA)	DC	2 × 10 <sup>5</sup> operations minimum (at contact rating)		
		AC	1 × 10 <sup>5</sup> operations minimum (at contact rating)		
Other	Vibration Resistance	10 to 55 Hz (double amplitude of 1.5 mm)			
	Shock Resistance	Misoperation	500 m/s <sup>2</sup> (11 ± <sup>1</sup> ms)		
		Endurance	1,000 m/s <sup>2</sup> (11 ± <sup>1</sup> ms)		
	Weight	Approximately 2.5g			

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

\*<sup>2</sup> 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.

# FBR46 SERIES

## ■ INSULATION

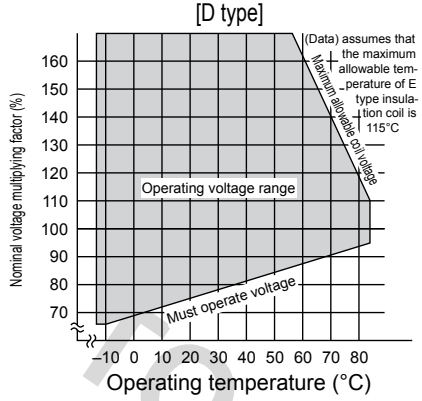
Item	Standard	65% operate	-15 type	-16 type
Resistance (initial) (500 VDC)	Minimum 1,000 MΩ 1 min.			
Dielectric Strength	open contacts 720VAC - 1 min. coil and contact adjacent contact 1,000 VAC - 1min.	open contacts 750VAC coil and contact adjacent contact 1,500 VAC - 1min.	open contacts 750VAC coil and contact adjacent contact 1,500 VAC - 1min.	open contacts 1,000VAC - 1min. coil and contact adjacent contact 1,500 VAC - 1min.
Surge Voltage	non-conducted terminals 1,500V 10 x 700μs standard wave  	open contact 1,500V 10 x 700μs standard wave  	open contact 1,500V 10 x 700μs standard wave  	coil and contact adjacent contact 2,500V 2 x 10μs standard wave  

## ■ SAFETY STANDARDS

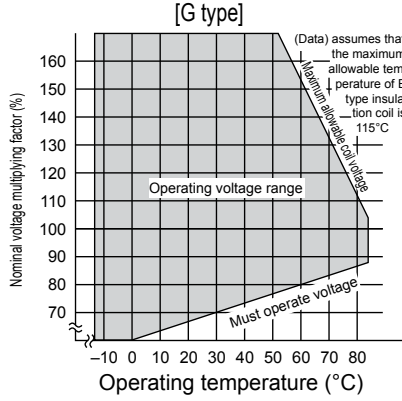
Type	Compliance	Contact rating
UL	UL 114 E63615	Flammability: UL 94-V0 (plastics) 0.3A, 250VAC (resistive) 1A, 30VDC
CSA	C22.2 No. 14 LR 40304, LR 64026	

## CHARACTERISTIC DATA

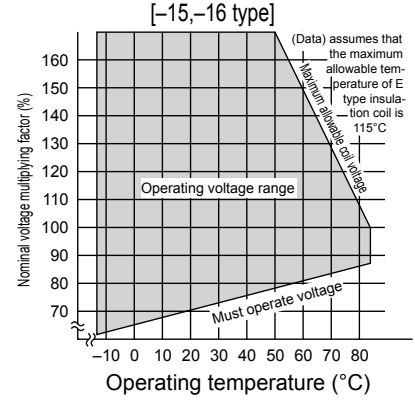
Range of operation temperature and voltage



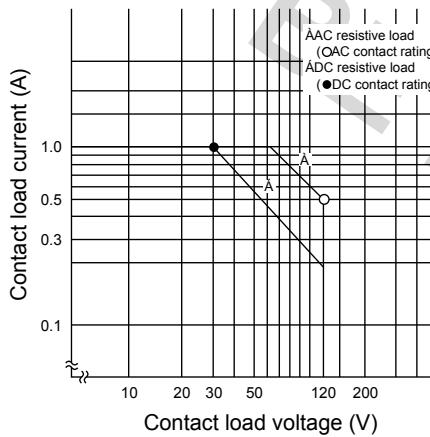
Range of operation temperature and voltage



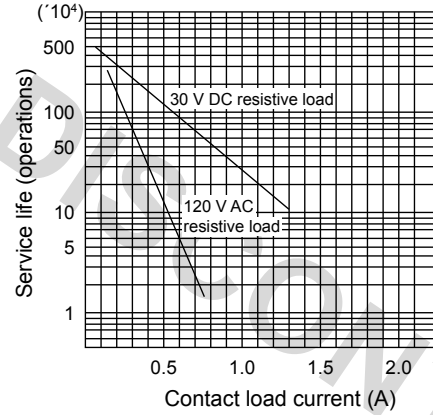
Range of operation temperature and voltage



Maximum switching capacity

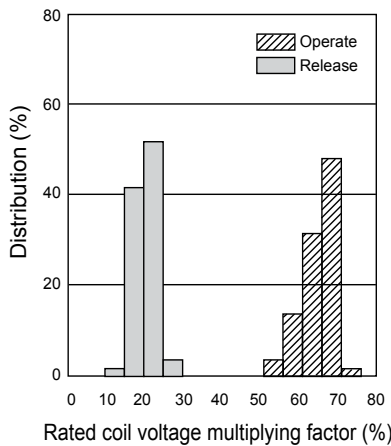


Life curve

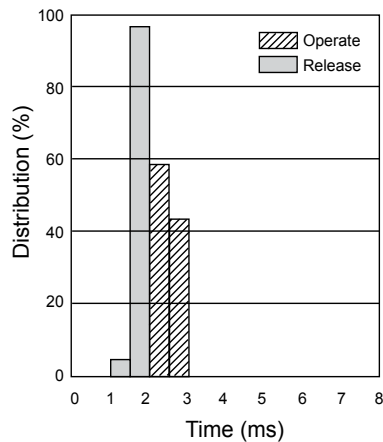


## REFERENCE DATA

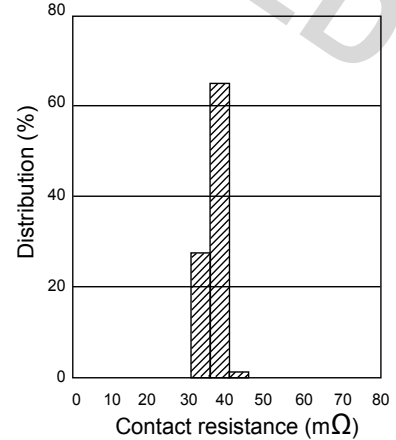
Distribution of operate and release voltage



Distribution of operate and release time



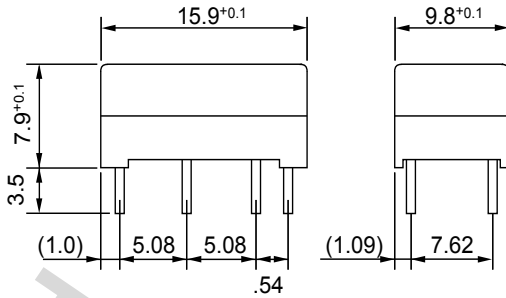
Distribution of contact resistance



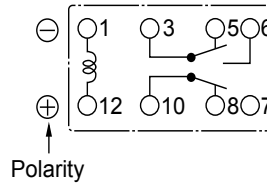
# FBR46 SERIES

## ■ DIMENSIONS

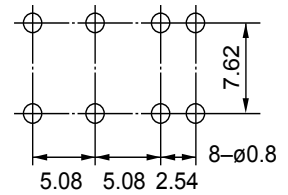
### ■ Dimensions



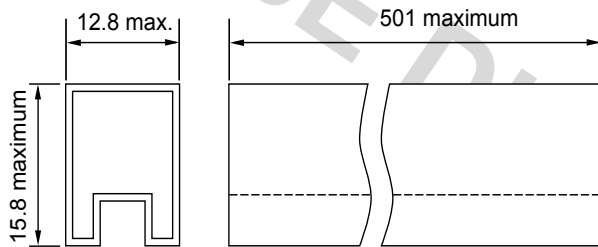
### ■ Schematics (BOTTOM VIEW)



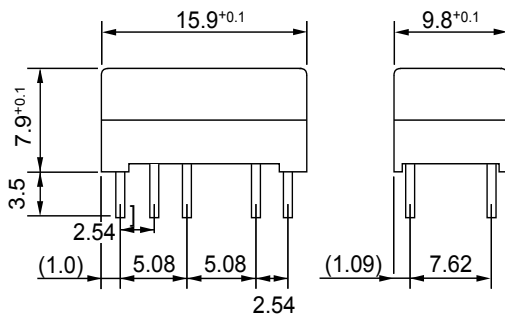
### ■ PC board mounting hole layout (BOTTOM VIEW)



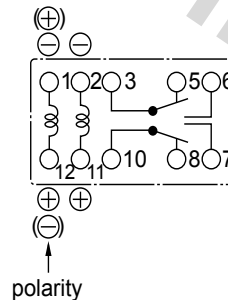
### ■ Tube carrier



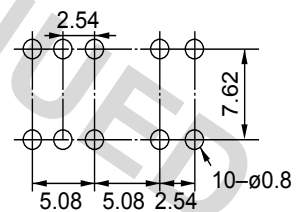
### ■ Dimensions (Latching type)



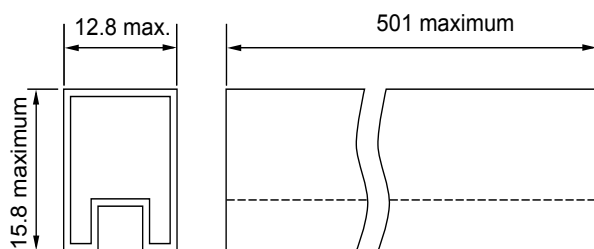
### ■ Schematics (BOTTOM VIEW)



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



### ■ Tube carrier



Note: ·No 2, 11 terminals are for double winding latching type only.  
 ·(⊕)(⊖) are reset polarity for single winding latching type.  
 ·The terminal number is not shown on the relay.

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 (compatible).
- "LF" is marked on each outer and inner carton. (No marking on individual relays).
- To avoid leaded relays (for lead-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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