## MINIATURE RELAY

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

## **FBR46 SERIES**

## **RoHS** compliant



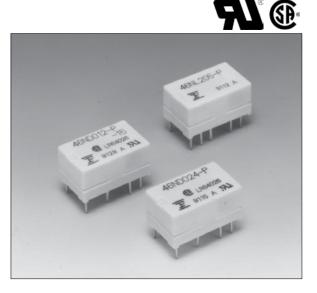
#### Miniature size

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

	FBR46	Ν	D	012	-P	-15	-CSA
[Example]	(a)	(b)	(*)	(C)	(d)	(e)	(f)

Fieda	se see page 7 for more information	S			
■ O	RDERING INFORMATIONple] $\frac{FBR46}{(a)}$ $\frac{N}{(b)}$ $\frac{D}{(*)}$ $\frac{012}{(c)}$	$\frac{-P}{(d)} \frac{-15}{(e)} \frac{-CSA}{(f)}$			
(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 (Example) Latching type 005: 5 VDC 05: 5 VDC 012: 12 VDC 12: 12 VDC (refer to the COIL DATA CHART)			
(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

#### ■ COIL DATA CHART

1. STANDARD (D type)

MODEL	Nominal voltage	Coil resistance (±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 Ω	50 mA					
FBR46ND005-P	5 VDC	167 Ω	30 mA	75% max.	5% min.	Approx.	Approx.	Approx.
FBR46ND006-P	6 VDC	240 Ω	25 mA	of nominal voltage	of nominal voltage		85 mW max.	25 deg (at nominal
FBR46ND009-P	9 VDC	540 Ω	17 mA		renage	voltage		voltage)
FBR46ND012-P	12 VDC	960 Ω	13 mA					
FBR46ND024-P	24 VDC	2,880 Ω	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 (±10%)	Nominal current (at nominal voltage) approx.	Must operate voltage*1	Must release voltage* <sup>1</sup>	Nominal power	Operate power	Coil temperature rise
FBR46NG003-P	3 VDC	36 Ω	83 mA					
FBR46NG005-P	4.5 VDC	81 Ω	56 mA	050/		Approx. 250 mW (at nominal voltage	Approx. 106 mW max.	Approx. 35 deg (at nominal voltage)
FBR46NG006-P	6 VDC	144 Ω	41 mA	of nominal				
FBR46NG009-P	9 VDC	324 Ω	27 mA	voltage				
FBR46NG012-P	12 VDC	576 Ω	20 mA					
FBR46NG024-P	24 VDC	2,304 Ω	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)								
				Nominal				

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

#### ■ SPECIFICATIONS

ltem			Standard	-65% operate	-15 type	-16 type		
Arrangement and Style			2 form C (DPDT), bifurcated					
Material			Gold-overlay silve	r-palladium				
Resistance (	initial)		Maximum 100 mΩ	2 (at 0.1 A 6 VDC)				
Ratings (resistive)			0.5 A 120 VAC or	1 A 30 VDC				
Maximum Ca	arrying Cu	rrent	1.25 A					
Maximum Sv	vitching Po	ower	60 AV or 30 W					
Max. Switchi	ng Voltage	e*1	125 V					
Maximum Sv	Maximum Switching Current							
Minimum Switching load*2			0.01 mA 10 mVD0	C (reference)				
Electrostatic Capacity (reference)			Approximately 2 pF (between coil and contacts) Approximately 1 pF (between open contacts)					
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					
Operate (at r	nominal vo	ltage)	Maximum 5 ms					
Release (at r	nominal vo	ltage)	Maximum 5 ms					
Mechanical			50 × 10 <sup>6</sup> operations minimum					
		DC	2 × 10 <sup>5</sup> operations minimum (at contact rating)					
REFERENCI	REFERENCE DATA)		1 × 10 <sup>5</sup> operations minimum (at contact rating)					
Vibration Resistance			10 to 55 Hz (double amplitude of 1.5 mm)					
Shock	Misoperation		500 m/s <sup>2</sup> (11 ± <sup>1</sup> ms)					
Resistance	Endurand	ce	1,000 m/s <sup>2</sup> (11 ± <sup>1</sup>	ms)		<u>~</u>		
Weight			Approximately 2.5g					
	Arrangement Material Resistance ( Ratings (resi Maximum Ca Maximum Sv Max. Switchi Maximum Sv Max. Switchi Maximum Sv Minimum Sw Electrostatic (reference) Nominal pow Operate pow Operate pow Operating Te Operating Te Operating Hu Operate (at r Release (at r Release (at r Mechanical Electrical (re REFERENCE Vibration Res Shock Resistance	Arrangement and Style Material Resistance (initial) Ratings (resistive) Maximum Carrying Cur Maximum Switching Po Max. Switching Voltage Maximum Switching Ioa Electrostatic Capacity (reference) Nominal power (at 20°C Operate power (at 20°C Operating Temperature Operating Humidity Operate (at nominal vo Release (at nominal vo Release (at nominal vo Mechanical Electrical (refer to the REFERENCE DATA) Vibration Resistance Shock Resistance Misoperate Endurand	Arrangement and Style   Material   Resistance (initial)   Ratings (resistive)   Maximum Carrying Current   Maximum Switching Power   Max. Switching Voltage*1   Maximum Switching Load*2   Electrostatic Capacity (reference)   Nominal power (at 20°C)   Operate power (at 20°C)   Operating Temperature   Operate (at nominal voltage)   Release (at nominal voltage)   Mechanical   Electrical (refer to the REFERENCE DATA)   Misoperation   Shock Resistance   Misoperation	Arrangement and Style2 form C (DPDT), MaterialMaterialGold-overlay silveResistance (initial)Maximum 100 mGRatings (resistive) $0.5 \text{ A } 120 \text{ VAC or}$ Maximum Carrying Current $1.25 \text{ A}$ Maximum Switching Power $60 \text{ AV or } 30 \text{ W}$ Maximum Switching Voltage*1 $125 \text{ V}$ Maximum Switching Current $1 \text{ A}$ Minimum Switching load*2 $0.01 \text{ mA } 10 \text{ mVDG}$ Electrostatic Capacity (reference)Approximately 2 p Approximately 1 pNominal power (at 20°C) $150 \text{ to } 200 \text{ mW}$ Operate power (at 20°C) $85 \text{ to } 112 \text{ mW}$ Operating Temperature $-30^{\circ}\text{C to } +70^{\circ}\text{C (r}$ Operate (at nominal voltage)Maximum 5 msRelease (at nominal voltage)Maximum 5 msMechanical $50 \times 10^6$ operationsVibration Resistance $10 \text{ to } 55 \text{ Hz (double color)}$ Shock ResistanceMisoperationShock Resistance $Misoperation$ Resistance $1,000 \text{ m/s}^2 (11 \pm 1)^{10}$	Arrangement and Style2 form C (DPDT), bifurcatedMaterialGold-overlay silver-palladiumResistance (initial)Maximum 100 mΩ (at 0.1 A 6 VDC)Ratings (resistive)0.5 A 120 VAC or 1 A 30 VDCMaximum Carrying Current1.25 AMaximum Switching Power60 AV or 30 WMaximum Switching Voltage*1125 VMaximum Switching load*20.01 mA 10 mVDC (reference)Electrostatic Capacity (reference)Approximately 2 pF (between coil and Approximately 1 pF (between open collared Approximately 1 pF (between open c	Arrangement and Style2 form C (DPDT), bifurcatedMaterialGold-overlay silver-palladiumResistance (initial)Maximum 100 mQ (at 0.1 A 6 VDC)Ratings (resistive)0.5 A 120 VAC or 1 A 30 VDCMaximum Carrying Current1.25 AMaximum Switching Power60 AV or 30 WMaximum Switching Voltage*1125 VMaximum Switching load*20.01 mA 10 mVDC (reference)Electrostatic Capacity (reference)Approximately 2 pF (between coil and contacts) Approximately 1 pF (between open contacts)Nominal power (at 20°C)150 to 200 mW205 mWOperating Temperature-30°C to +70°C (no frost) (refer to the CHARACTERISTIC Operating HumidityMaximum 5 msRelease (at nominal voltage)Maximum 5 msMechanical50 × 10 <sup>6</sup> operations minimum AC2 × 10 <sup>5</sup> operations minimum (at contact rating)Vibration ResistanceDC2 × 10 <sup>5</sup> operations minimum (at contact rating)Vibration ResistanceMisoperation500 m/s² (11 ±1 ms)ResistanceMisoperation500 m/s² (11 ±1 ms)		

\*1 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

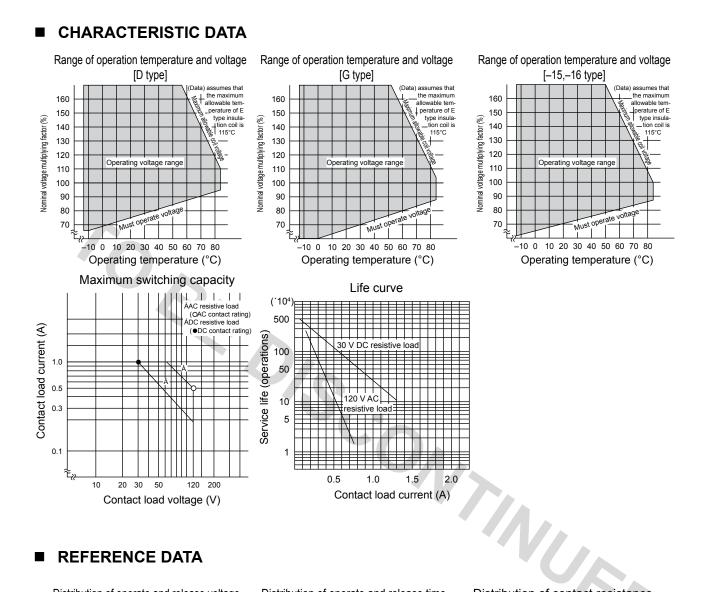
minimum switching load varies with the switching frequency and operation environment.

#### ■ INSULATION

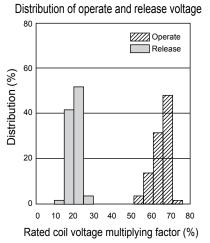
Item	Standard	65% operate	-15 type	-16 type		
Resistance (initial) (500 VDC)	Minimum 1,000 MΩ	1 min.				
Dielectric Strength	open contacts 720VAC - 1 min. coil and contact adjacent contact 1,000 VAC -1min.		open contacts 750VAC coil and contact adjacent contact 1,500 VAC -1min.	open contacts 1,000VAC -1min. coil and contact adjacent contact 1,500 VAC -1min.		
Surge Voltage	non-conducted term 1,500V 10 x 700µs standard 1,500 V 750 V 10µs		open contact 1,500V 10 x 700µs standard wave 1,500V 750V 10µs 700µs coil and contact adjacent contact 2,500V 2 x 10µs standard wave 2,500V 1,250V 1,250V 2 x 10µs			
SAFETY STAN	DARDS					

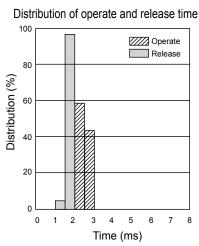
#### SAFETY STANDARDS

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

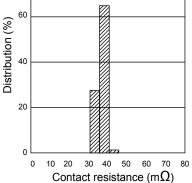


#### **REFERENCE DATA**



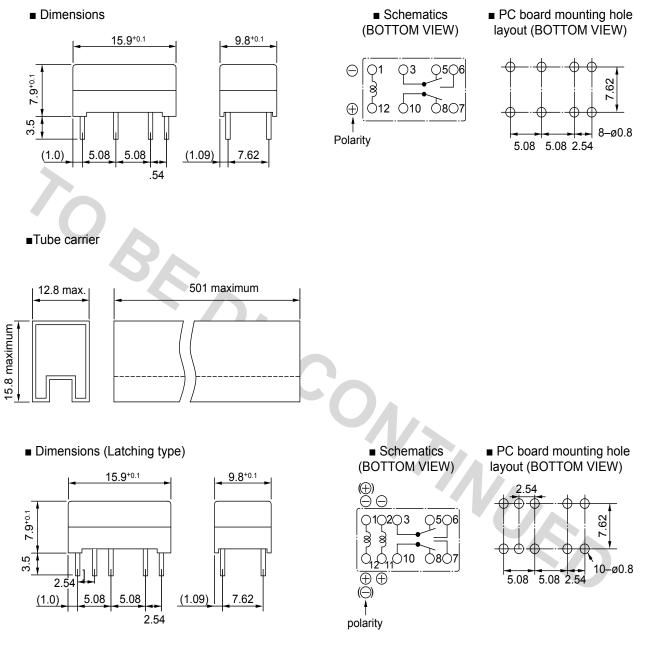




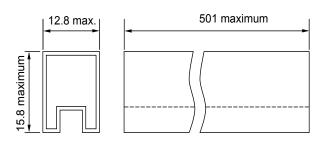


## **FBR46 SERIES**

#### DIMENSIONS



Tube carrier



Note:  $\cdot$ No 2, 11 terminals are for double winding latching type only.  $\cdot$ ( $\oplus$ ) ( $\bigcirc$ ) are reset polarity for single winding latching type.  $\cdot$ 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-3.0Aq-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). ٠
- 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 soler bath

#### Solder by Soldering Iron:

Soldering Iron Temperature: maximum 360°C Duration: maximum 3 sec.

# Ju. We highly recommend that you confirm your actual solder conditions

#### 3. Moisture Sensitivity

Moisture Sensitivity Level standard is not applicable to electromechanical realys.

#### 4. Tin Whisker

Dipped SnAqCu solder is known as low risk tin whisker. No considerable length whisker was found by our in house test.

## **FBR46 SERIES**

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