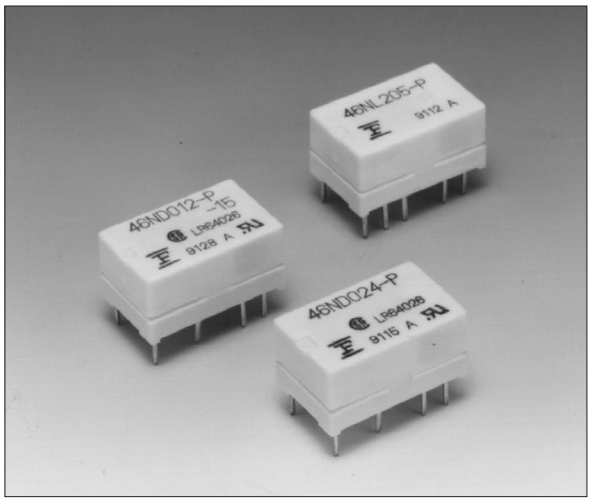
MINIATURE RELAY

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

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

(a)	Series Name	FBR46 : FBR46 Series
(b)	Enclosure	N : Plastic sealed
(*)	Coil Type	D : Standard, -15, -16 (DC coil) G : 65% Operate type L1 : Single winding latching type L2 : Double winding latching type (refer to the SPECIFICATIONS)
(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

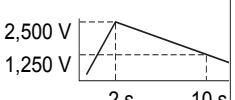
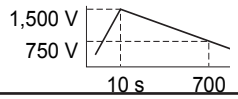
■ SAFETY STANDARD AND FILE NUMBERS

UL114 (File No. E63615)
C22.2 No. 14 (File No. LR40304 or LR64026)

Nominal voltage	Contact rating
1.5 to 24 VDC	1 A 30 VDC resistive 0.5 A 120 VAC resistive

* Excluding latching type FBR46L

■ SPECIFICATIONS

Item			D type, G type	-15 type	-16 type	Latching
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*1		125 V			
	Maximum Switching Current		1 A			
	Minimum Switching load*2		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)		0.15 to 0.2 W 0.25 W	0.2 to 0.25 W		0.2 W
	Operate power (at 20°C)		0.085 to 0.112 0.106 W maximum	0.112 to 0.14 W maximum		0.128 W maximum
	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 2 ms			
Insulation	Resistance (initial)		Minimum 1000 MΩ (at 500 VDC)			
	Dielectric Strength (for 1 minute)	between coil and contacts between adjacent contacts	1,000 VAC	1,500 VAC		1,000 VAC
		between open contacts	750 VAC		1,000 VAC	750 VAC
		between set-reset-coil	—			250 VAC
	Surge Strength	between coil and contacts	1,500 V (at 10 × 700 µs)	2,500 V (at 2 × 10 µs) 		1,500 V (at 10 × 700µs)
	between adjacent contacts	between open contacts	1,500 V(at 10 × 700 µs) 			

Continued

Item			D type, G type	-15 type	-16 type	Latching
Life	Mechanical		50×10^6 operations minimum			
	Electrical (refer to the REFERENCE DATA)	DC	2×10^5 operations minimum (at contact rating)			
		AC	1×10^5 operations minimum (at contact rating)			
Other	Vibration Resistance		10 to 55 Hz (double amplitude of 1.5 mm)			
	Shock Resistance	Misoperation	500 m/s^2 (11 ±^{1} ms)			
		Endurance	1,000 m/s^2 (11 ±^{1} ms)			
	Weight		Approximately 2.5 g			

*1 If the switching voltage exceeds the rated contact voltage, reduce the current. The current values vary according to the type of load.
*2 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.

■ 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	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 Ω	30 mA					
FBR46ND006-P	6 VDC	240 Ω	25 mA					
FBR46ND009-P	9 VDC	540 Ω	17 mA					
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*1	Nominal power	Operate power	Coil temperature rise
FBR46NG003-P	3 VDC	36 Ω	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 Ω	56 mA					
FBR46NG006-P	6 VDC	144 Ω	41 mA					
FBR46NG009-P	9 VDC	324 Ω	27 mA					
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)

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
-15 type	-16 type								
FBR46ND003-P-15	FBR46ND003-P-16	3 VDC	45 Ω	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 Ω	40 mA					
FBR46ND006-P-15	FBR46ND006-P-16	6 VDC	180 Ω	33 mA					
FBR46ND009-P-15	FBR46ND009-P-16	9 VDC	405 Ω	22 mA					
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.

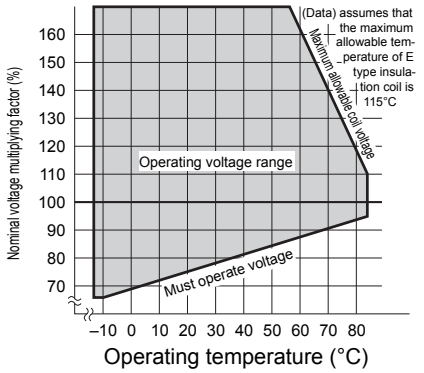
4. LATCHING TYPE (L1, L2 type)

MODEL		Nominal voltage	Coil resistance (±10%)	Nominal current (at nominal voltage) approx.	Must operate voltage*1	Must release voltage*1	Nominal power	Operate power
Single winding latching type	Double winding latching type							
FBR46NL103-P	FBR46NL203-P	3 VDC	45 Ω	67 mA	80% max. of nominal voltage	80% max. of nominal voltage	Approx. 200 mW (at nominal voltage)	Approx. 128 mW max.
FBR46NL105-P	FBR46NL205-P	5 VDC	125 Ω	40 mA				
FBR46NL106-P	FBR46NL206-P	6 VDC	180 Ω	33 mA				
FBR46NL109-P	FBR46NL209-P	9 VDC	405 Ω	22 mA				
FBR46NL112-P	FBR46NL212-P	12 VDC	720 Ω	17 mA				

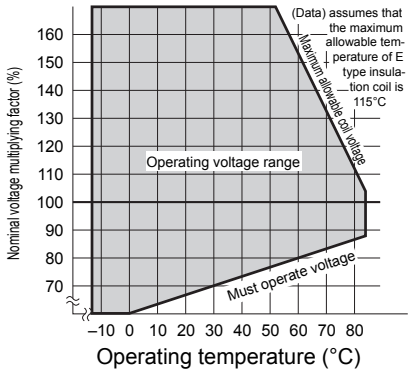
*1: Specified values are subject to pulse wave voltage.
Note: All values in the table are measured at 20°C.

■ CHARACTERISTIC DATA

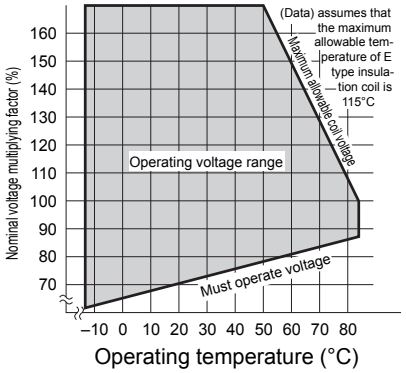
Range of operation temperature and voltage [D type]



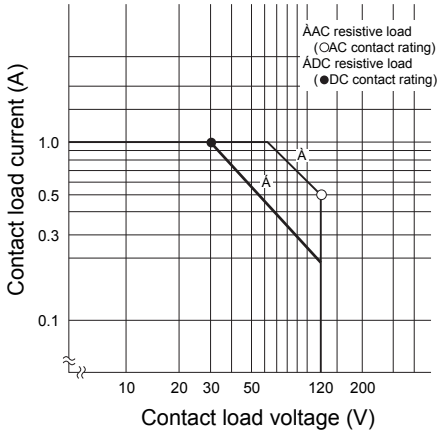
Range of operation temperature and voltage [G type]



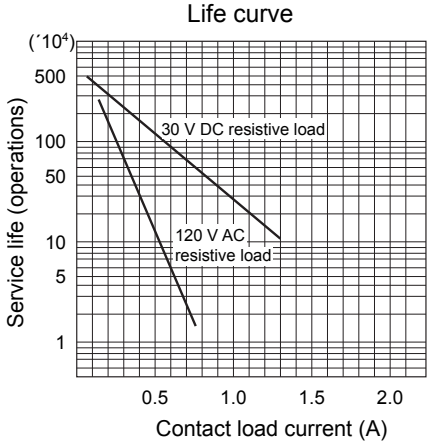
Range of operation temperature and voltage [–15,–16 type]



Maximum switching capacity

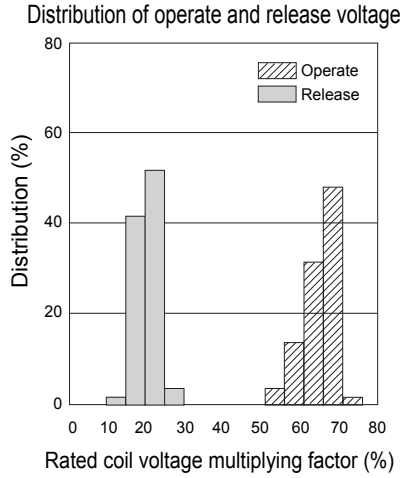


Life curve

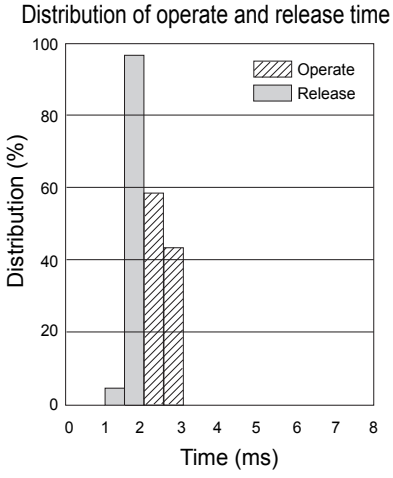


■ REFERENCE DATA

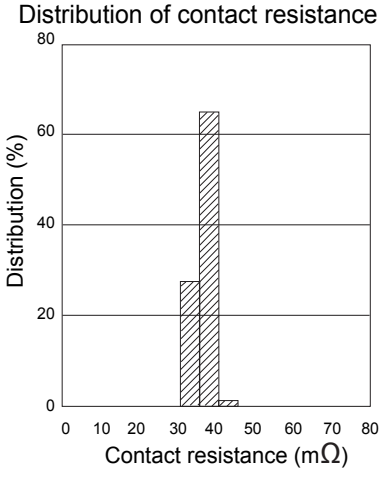
Distribution of operate and release voltage



Distribution of operate and release time

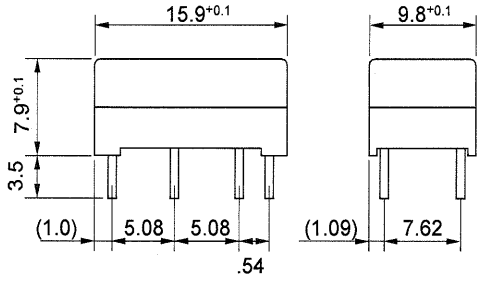


Distribution of contact resistance

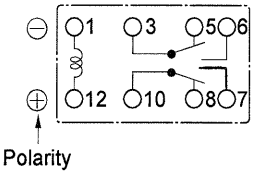


■ DIMENSIONS

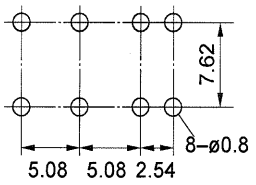
●Dimensions



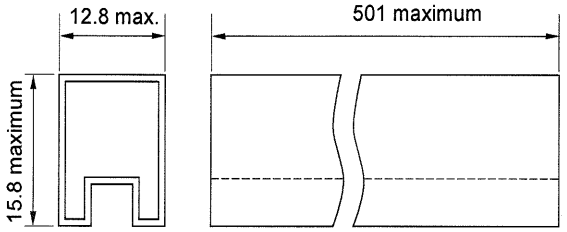
●Schematics (BOTTOM VIEW)



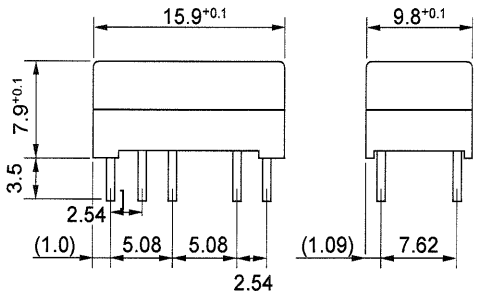
●PC board mounting hole layout (BOTTOM VIEW)



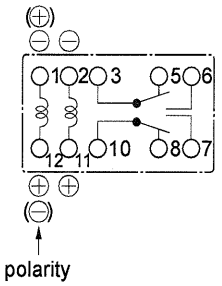
●Tube carrier



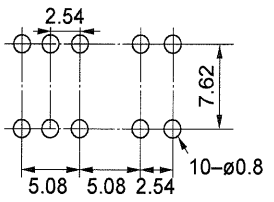
● Dimensions (Latching type)



● Schematics (BOTTOM VIEW)

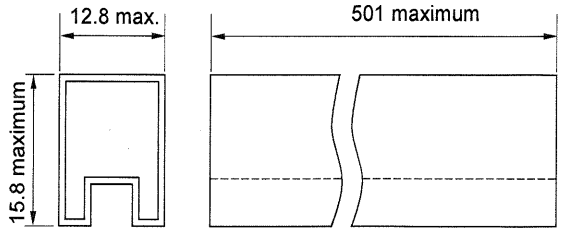


● PC board mounting hole layout (BOTTOM VIEW)



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.

● Tube carrier



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 condtion

Flow Solder condtion:

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.

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

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Web: http://www.fujitsu.com/sg/services/micro/components/

CROSS REFERENCE TABLE

BT SPEC				FUJITSU COMMERCIAL EQUIVALENT			
Relay Code	Coil Resist (Ω ± 10%)	Nominal Coil Voltage (v)	Pick-up current (mA)	Relay Code	Coil Resist (Ω ± 10%)	Nominal Coil Voltage (v)	Pick-up current (mA)
47 (W) / 5	36	4.5	80	FBR244(N)G005/02CF	36	5	78
47 (W) / 6	280	12	27	FBR244(N)G012/02CF	280	12	27.6
47 (W) / 7	1050	24	14	FBR244(N)G024/02CF	1050	24	13.6
47 (W) / 8	4000	48	7	FBR244(N)G048/02CF	4100	48	6.7
47 (W) / 9	200	9	32.5	-	-	-	-
Relay Code	Coil Resist (Ω ± 10%)	Nominal Coil Voltage (v)	Pick-up current (mA)	Relay Code	Coil Resist (Ω ± 10%)	Nominal Coil Voltage (v)	Pick-up current (mA)
53 (W) / 1	81	5	36	FBR46(N)G005-F	81	4.5	36
53 (W) / 2	324	9	18	FBR46(N)G009-F	324	9	18
53 (W) / 3	576	12	13.5	FBR46(N)G012-F	576	12	13.5
53 (W) / 4	1850	20	7	FBR46(N)G020-F *	1600	20	8
53 (W) / 5	2300	24	6.8	FBR46(N)G024-F	2304	24	6.8

FEC

176-353

176-354

176-355

* Not standard