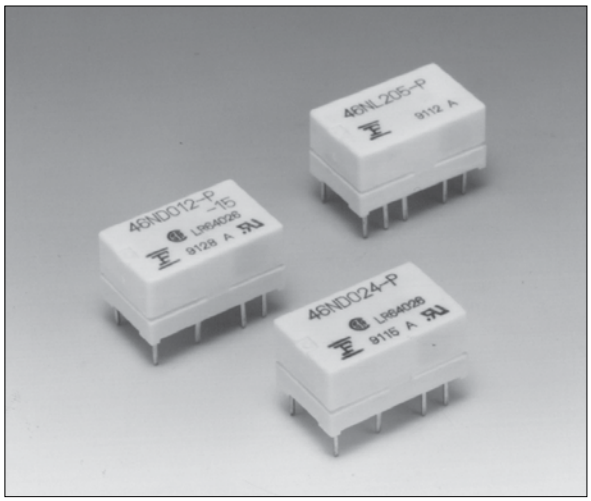
MINIATURE RELAY

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] FBR46 (a) N (b) D (*) 012 (c) -P (d) -15 (e) -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: 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

■ 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.

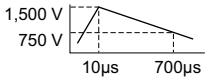
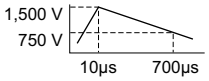
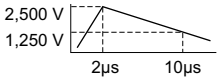
■ SPECIFICATIONS

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*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)		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		50×10^6 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 2.5g			

*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.

■ INSULATION

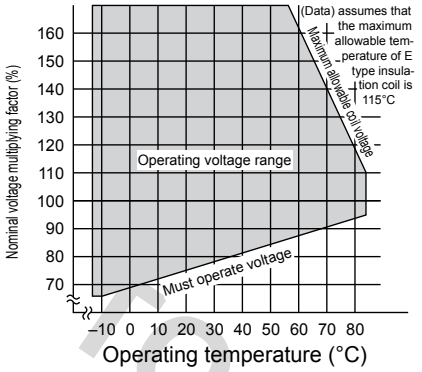
Item	Standard	65% operate	-15 type	-16 type
Resistance (initial) (500 VDC)	Minimum 1,000 MΩ 1 min.			
Dielectric Strength	open contacts 720VAC - 1 min. coil and contact adjacent contact 1,000 VAC -1min.		open contacts 750VAC coil and contact adjacent contact 1,500 VAC -1min.	open contacts 1,000VAC -1min.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

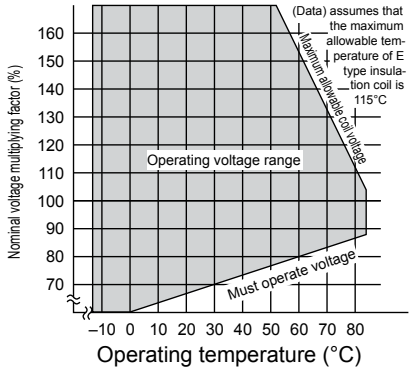
Type	Compliance	Contact rating
UL	UL 114 E63615	Flammability: UL 94-V0 (plastics) 0.3A, 250VAC (resistive) 1A, 30VDC
CSA	C22.2 No. 14 LR 40304, LR 64026	

■ CHARACTERISTIC DATA

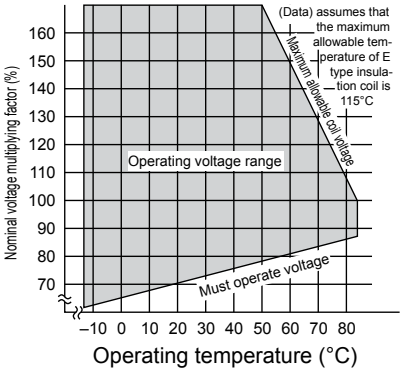
Range of operation temperature and voltage [D type]



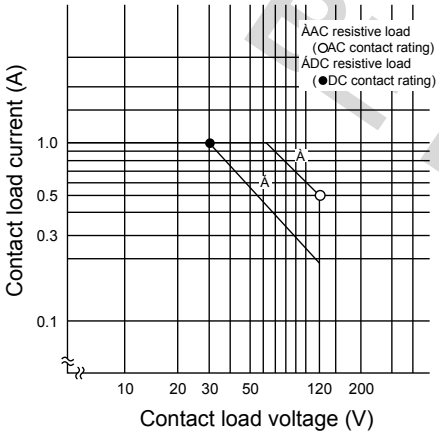
Range of operation temperature and voltage [G type]



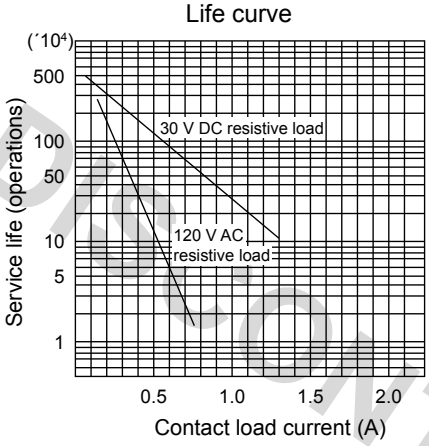
Range of operation temperature and voltage [–15,–16 type]



Maximum switching capacity

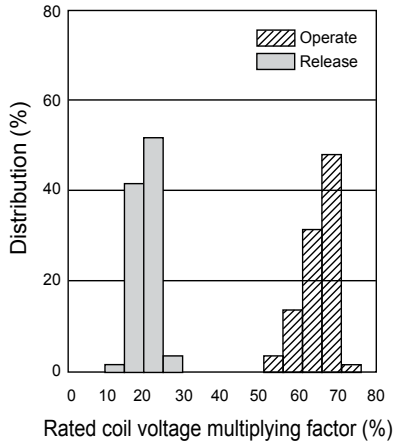


Life curve

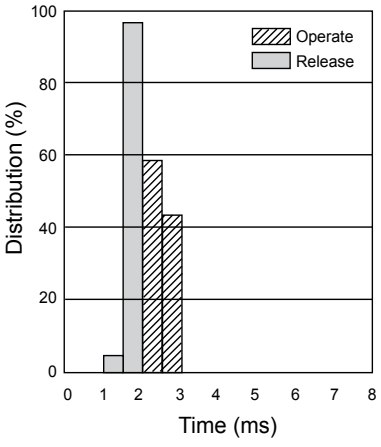


■ REFERENCE DATA

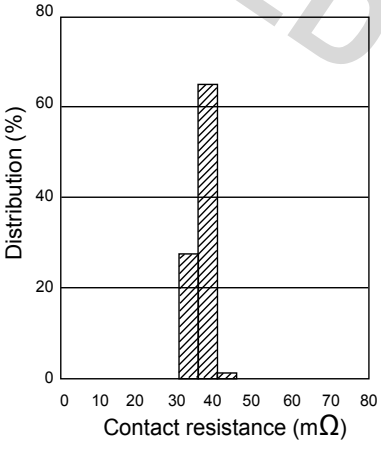
Distribution of operate and release voltage



Distribution of operate and release time

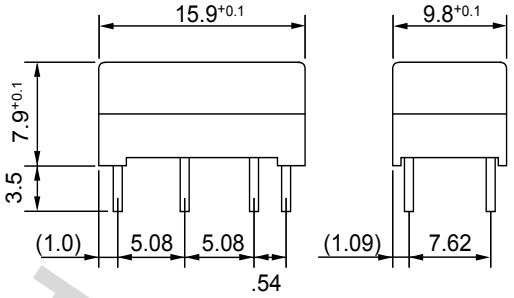


Distribution of contact resistance

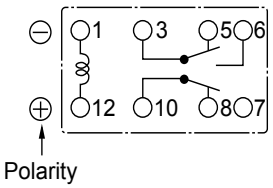


■ DIMENSIONS

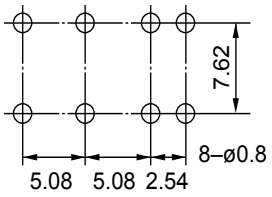
■ Dimensions



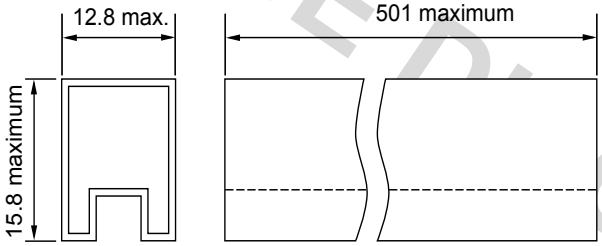
■ Schematics (BOTTOM VIEW)



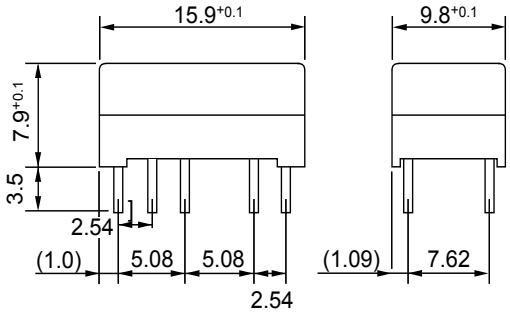
■ PC board mounting hole layout (BOTTOM VIEW)



■Tube carrier



■ Dimensions (Latching type)



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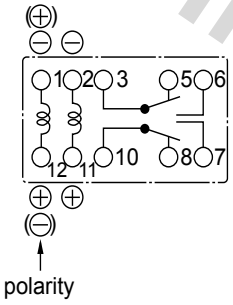

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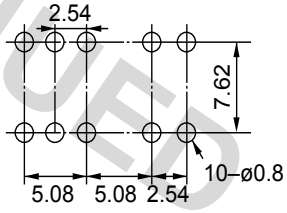
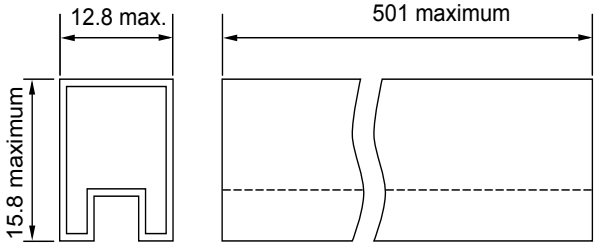


Note: ·No 2, 11 terminals are for double winding latching type only.
·(⊕) (⊖) are reset polarity for single winding latching type.
·The terminal number is not shown on the relay.

■ 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 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.

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.

Fujitsu Components International Headquarter Offices

Japan
Fujitsu Component Limited
Gotanda-Chuo Building
3-5, Higashigotanda 2-chome, Shinagawa-ku
Tokyo 141, Japan
Tel: (81-3) 5449-7010
Fax: (81-3) 5449-2626
Email: promothq@ft.ed.fujitsu.com
Web: www.fcl.fujitsu.com

Europe
Fujitsu Components Europe B.V.
Diamantlaan 25
2132 WV Hoofddorp
Netherlands
Tel: (31-23) 5560910
Fax: (31-23) 5560950
Email: info@fceu.fujitsu.com
Web: emea.fujitsu.com/components/

North and South America
Fujitsu Components America, Inc.
250 E. Caribbean Drive
Sunnyvale, CA 94089 U.S.A.
Tel: (1-408) 745-4900
Fax: (1-408) 745-4970
Email: components@us.fujitsu.com
Web: http://www.fujitsu.com/us/services/edevices/components/

Asia Pacific
Fujitsu Components Asia Ltd.
102E Pasir Panjang Road
#01-01 Citilink Warehouse Complex
Singapore 118529
Tel: (65) 6375-8560
Fax: (65) 6273-3021
Email: fcal@fcal.fujitsu.com
Web: http://www.fujitsu.com/sg/services/micro/components/

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