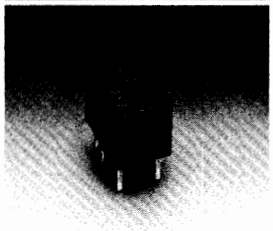
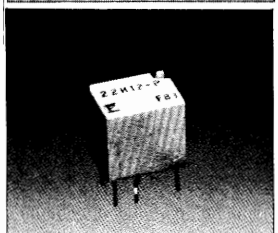
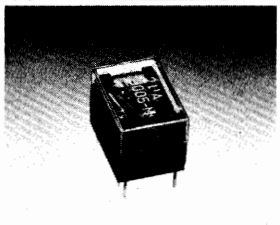
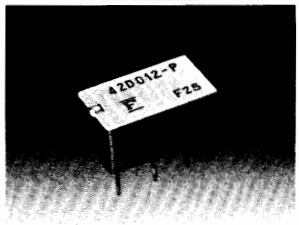
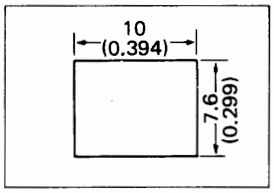
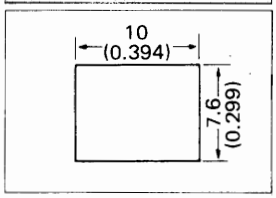
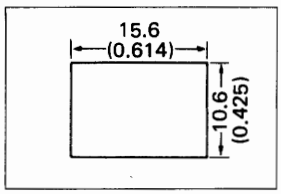
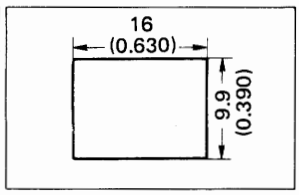
RELAYS

Fujitsu Printed Circuit Board Relays

• Preferred Type

Signal control relays

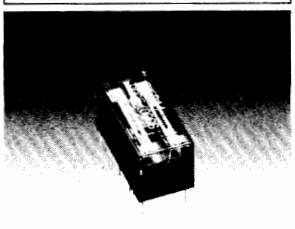
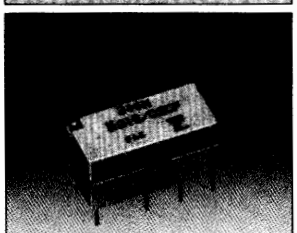
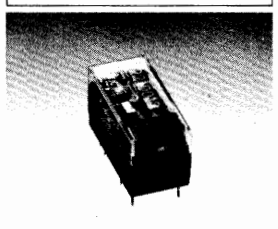
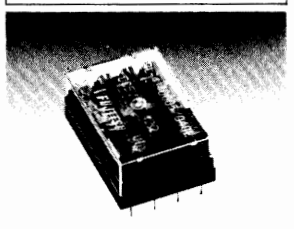
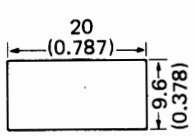
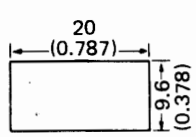
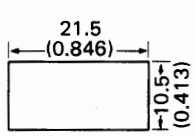
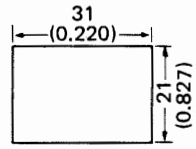
Series	•FBR20	FBR20H	•FBR210	•FBR40
Outer view				
mm (in.)	Height 10mm (0.394)	Height 10mm (0.394)	Height 10.8mm (0.425)	Height 8mm (0.315)
Base area (L x W)mm (in.)				
Contact arrangement	1 c	1 c	1 c	2 c
Rated contact current 15A / 10A / 8A / 5A / 3A / 1A / 0.5A	2A (carrying) — 1A (Switching)	2A (carrying) — 1A (switching)	2A (carrying) — 1A (Switching)	1A
Contact rating (resistive load)	24V DC, 1A 120V AC, 0.5A	24V DC, 1A 120V AC, 0.5A	28V DC, 1A 120V AC, 0.5A	24V DC, 1A 120V AC, 0.3A
Coil voltage — DC	1.5V to 24V	1.5V to 24V	1.5V to 24V	3V to 24V
Coil voltage — AC	–	–	–	–
Coil power dissipation — DC	0.3W	0.2W	0.2W, 0.45W	0.15W (0.2W)
Coil power dissipation — AC (at 60Hz)	–	–	–	–
Service life — Mechanical	5 x 10^6 ops.	5 x 10^6 ops.	5 x 10^6 ops.	1 x 10^7 ops.
Service life — Electrical (at rated contact load)	Standard type 1x10^5 ops. –P type 2 x 10^5 ops.	Standard type 1x10^5 ops. –P type 2 x 10^5 ops.	DC 3 x 10^5 ops. AC 1 x 10^5 ops.	1 x 10^5 ops.
Dielectric withstand voltage (50Hz to 60Hz AC for 1 minute) — Between coil and contact	750V	500V (standard) 1,000V (high withstand voltage)	500V	1,000V
Dielectric withstand voltage (50Hz to 60Hz AC for 1 minute) — Between open contacts	500V	500V	500V	500V
Terminal shape	PC board terminals			
Safety standard	–	–	–	–
Options Special Functions	• Bifurcated contacts available	• Immersion-cleanable type available (N type) • Bifurcated contacts available	• Immersion-cleanable type available (N type) • Bifurcated contacts available	• Immersion-cleanable type available (N type)

RELAYS

Fujitsu Printed Circuit Board Relays

●Preferred Types

Signal control relays

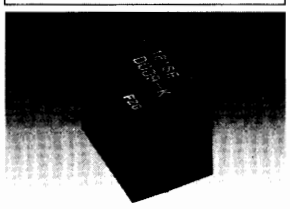
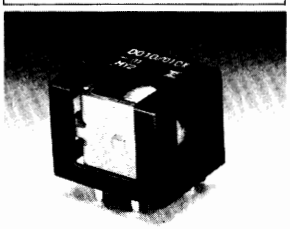
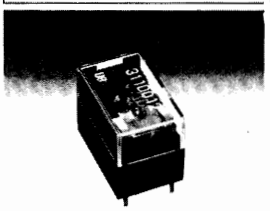
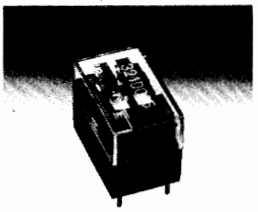
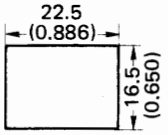
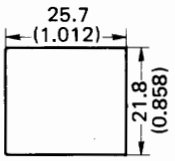
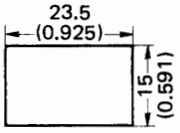
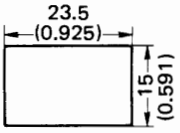
Series	FBR240	FBR240H	FBR220	FRL-410
Outer view				
mm (in.)	Height 10mm (0.394)	Height 10mm (0.394)	Height 11.8mm (0.465)	Height 12.8mm (0.504)
Base area (L x W)mm (in.)				
Contact arrangement	2 c	2 c	2 c	2 c, 4 c
Rated contact current 15A / 10A / 8A / 5A / 3A / 1A / 0.5A	2A (carrying)	2A (carrying)	1A	2A (carrying)
	1A (Switching)	1A (Switching)		1A (Switching)
Contact rating (resistive load)	28V DC, 1A 120V AC, 0.5A	28V DC, 1A 120V AC, 0.5A	28V DC, 1A 120V AC, 0.5A	30V DC, 1A 120V AC, 1A
Coil voltage — DC	3V to 24V	3V to 48V	3V to 24V	5V to 48V
Coil voltage — AC	–	–	–	–
Coil power dissipation — DC	0.5W	0.2W	0.5W	0.45W, 0.6W
Coil power dissipation — AC (at 60Hz)	–	–	–	–
Service life — Mechanical	2 x 10^7 ops.	2 x 10^7 ops.	5 x 10^6 ops.	3 x 10^7 ops.
Service life — Electrical (at rated contact load)	DC 5 x 10^5 ops. AC 1 x 10^5 ops.	DC 5 x 10^5 ops. AC 1 x 10^5 ops.	DC 3 x 10^5 ops. AC 1 x 10^5 ops.	DC 3 x 10^6 ops. AC 1 x 10^5 ops.
Dielectric withstand voltage (50Hz to 60Hz AC for 1 minute) — Between coil and contact	500V (standard) 1,000V (high withstand voltage)	1,000V	500V	500V
Dielectric withstand voltage (50Hz to 60Hz AC for 1 minute) — Between open contacts	500V	500V	500V	500V
Terminal shape				
Safety standard	–	–	–	–
Options Special Functions	• Immersion-cleanable type available (N type) • Bifurcated contacts available	• Immersion-cleanable type available (N type) • Bifurcated contacts available	• Immersion-cleanable type available (N type)	• Immersion-cleanable type available (N type) • Bifurcated contacts available

SEC Australian Safety Regulation (State Electricity Commission of Victoria)
SEV Schweizerischer Elektrotechnischer Verein
Telecom Australia
JEACL (Japan Electric Appliance Control Law)

Fujitsu Printed Circuit Board Relays

● Preferred Types

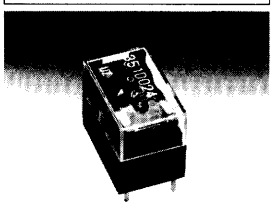
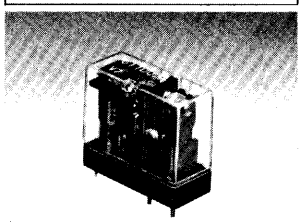
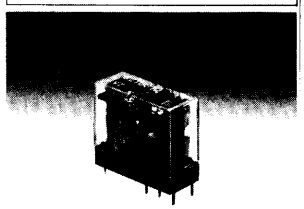
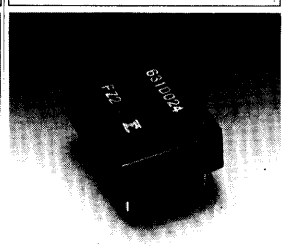
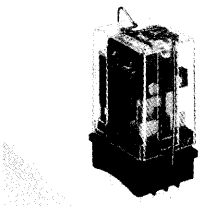
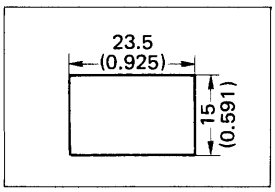
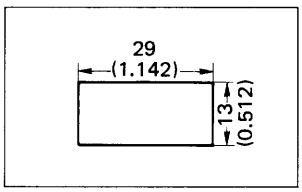
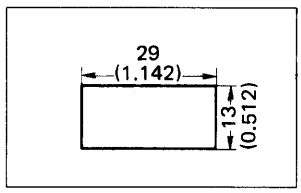
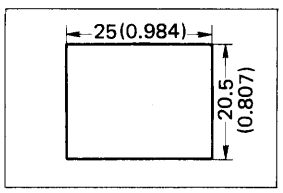
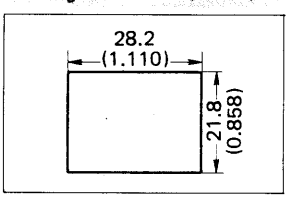
Miniature control relays

Series	●FBR160	FRL-270	FBR310	FBR320
Outer view				
	Height 16.5mm (0.650)	Height 19.7mm (0.776)	Height 18mm (0.709)	Height 18mm (0.709)
Base area (L x W) mm (in.)				
Contact arrangement	1 c, 1 a	1 a, 1 c	1 c	2 c, 2 a
Rated contact current	3A, 5A	15A	3A, 5A	3A, 4A
Contact rating (resistive load)	(Standard type) 28V DC, 3A 120V AC, 3A (Large-capacity type) 28V DC, 5A 120V AC, 5A	Make contact 12V DC, 15A 24V DC, 10A Break contact 12V DC, 10A 24V DC, 7A	(Standard type) 28V DC, 3A 120V AC, 3A (Large-capacity type) 28V DC, 6A 120V AC, 5A	(Standard type) 28V DC, 3A 120V AC, 3A (Large-capacity type) 28V DC, 4A 120V AC, 4A
Coil voltage DC	5V to 24V	12V, 24V	5V to 48V	5V to 48V
Coil voltage AC	–	–	–	–
Coil power dissipation DC	0.36W	0.6W, 1.7W	0.36W, 0.45W	0.6W
Coil power dissipation AC (at 60Hz)	–	–	–	–
Service life Mechanical	1 x 10^7 ops.	1 x 10^7 ops.	1 x 10^7 ops.	1 x 10^7 ops.
Service life Electrical (at rated contact load)	1 x 10^5 ops.	25 x 10^4 ops.	1 x 10^5 ops.	1 x 10^5 ops.
Dielectric withstand voltage (50Hz to 60Hz AC for 1 minute) Between coil and contact	1,500V	500V	1,500V	1,500V
Dielectric withstand voltage (50Hz to 60Hz AC for 1 minute) Between open contacts	500V	500V	500V	500V
Terminal shape				
Safety standard		–		
Options Special Functions	• Immersion-cleanable type available (N type)	• For automotive applications	• Immersion-cleanable type available (N type)	• Immersion-cleanable type available (N type)

RELAYS

Fujitsu Printed Circuit Board And General Purpose Relays

● Preferred Type

Miniature control relays				General purpose relays
FBR350	●FBR610	●FBR620	●FBR630	●FRL-260
				
Height 18mm (0.709)	Height 25mm (0.984)	Height 25mm (0.984)	Height 10.5mm (0.413)	Height 34.4mm (1.354)
				
1 c	1 c, 1 a, 1 b	2 c, 2 a, 2 b	1 a, 1 c	1 c, 2 c, 3 c, 4 c, 4 a
3A, 6A	5A, 10A, 14A (carrying), 16A	7A (carrying), 5A (switching)	10A	1A, 3A, 5A, 10A, 15A
(Standard type) 28V DC, 3A 120V AC, 3A (Large-capacity type) 28V DC, 6A 120V AC, 6A	(Standard type) 30V DC, 10A 240V AC, 10A (Medium-capacity type) 30V DC, 5A 240V AC, 10A (Large-capacity type) 1a, 1b types 30V DC, 10A 240V AC, 16A	30V DC, 5A 240V AC, 5A	30V DC, 10A 120V AC, 10A 240V AC, 8A	(Medium-capacity type) 1c, 2c, 3c type 30V DC, 5A 240V AC, 5A 4c, 4a type 30V DC, 1A to 5A 120V AC, 1A to 5A (Large-capacity type) 1c, 2c type 30V DC, 10A to 15A 240V AC, 10A to 15A
5V to 48V	5V to 60V	5V to 60V	5V to 48V	6V to 110V
–	–	–	–	6V to 240V
0.45W	0.5W	0.5W	0.5W	0.9W
–	–	–	–	1.2VA, 1.4VA
1 x 10^7 ops.	2 x 10^7 ops.	2 x 10^7 ops.	1 x 10^7 ops.	5 x 10^7 ops.
DC 1 x 10^5 ops. AC 5 x 10^4 to 1 x 10^5 ops.	1 x 10^5 to 2 x 10^5 ops.	1 x 10^5 ops.	1 x 10^5 ops.	1 x 10^5 to 5 x 10^5 ops.
2,000V	5,000V	5kV (3kV between adjacent contacts)	2,500V	1,500V
750V	1,000V	1,000V	1,000V	1,000V
Y	Y	Y	Y	Y Y Y
UL, CSA	UL, CSA, SEC	UL, CSA, SEC	UL, CSA	UL, CSA, SE
• Immersion-cleanable type available (N type) • 6kV min. lightning surge	• Immersion-cleanable type available (N type) • 10kV min. lightning surge	• Immersion-cleanable type available (N type) • 10kV min. lightning surge	• 5kV min. lightning surge 5,000V	• With operation indicator lamp • Meets TV standards • With surge absorption diode

* Y quick-connect terminals Y PC board terminals Y solder, plug-in terminals

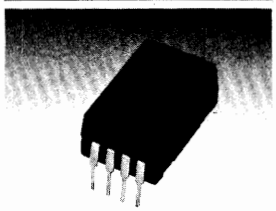
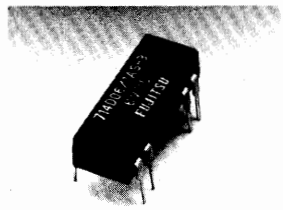
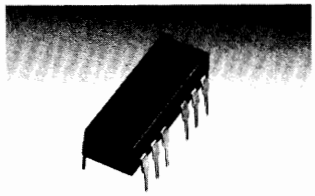
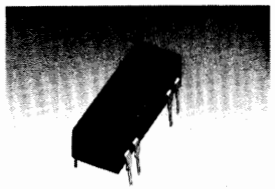
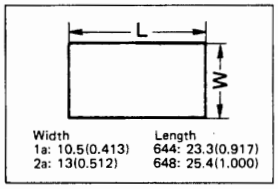
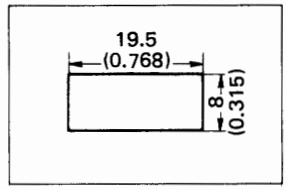
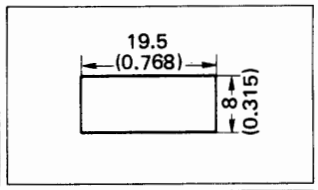
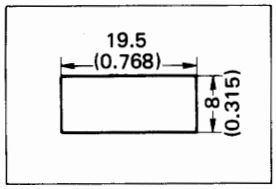
FUJITSU quality electronic products from COMPONENTS

RELAYS

Fujitsu Dry Reed Relays

●Preferred Types

Dry reed relays

Series	●FRL-640	FRL-710	FRL-710 Latching reed relays	●FRL-730
Outer view	 Height 9mm (0.354)	 Height 5.1mm (0.201)	 Height 5.1mm (0.201)	 Height 6mm (0.236)
Base area (L x W) mm (in.)	 Width 1a: 10.5(0.413) 2a: 13(0.512) Length 644: 23.3(0.917) 648: 25.4(1.000)			
Contact arrangement	1 a, 1 b, 2 a, 2 b	1 a, 2 a	1 a	1 a
Rated contact current 15A / 10A / 8A / 5A / 3A / 1A / 0.5A	2 A (carrying) 1A (switching) K type 0.5A (switching) S type	2 A (carrying) 0.3A (switching)	2A (carrying) 0.2A (switching)	2A (carrying) 0.5A (switching)
Contact rating (resistive load)	K type 50 VA (100V DC max. 1 A max.) S type 10 VA (100V DC max. 0.5A max.)	4 VA (30V DC max. 0.3A max.)	4 VA (30V DC max. 0.2A max.)	10 VA (100V DC max. 0.5A max.)
Coil voltage DC	5V to 24V	5V to 12V	5V to 12V	5V to 12V
Coil voltage AC	–	–	–	–
Coil power dissipation DC	0.045W to 0.38W	0.045W to 0.17W	5.0W to 7.2W	0.065W to 0.27W
Coil power dissipation AC (at 60Hz)	–	–	–	–
Service life Mechanical	1 x 10^7 ops.	1 x 10^7 ops.	1 x 10^7 ops.	1 x 10^7 ops.
Service life Electrical (at rated contact load)	1 x 10^6 ops.	1 x 10^6 ops.	1 x 10^6 ops.	1 x 10^6 ops.
Dielectric withstand voltage (50Hz to 60Hz AC for 1 minute) Between coil and contact	500V DC	500V DC	500V DC	500V DC
Dielectric withstand voltage (50Hz to 60Hz AC for 1 minute) Between open contacts	200V DC	200V DC	200V DC	250V DC
Terminal shape				
Safety standard	–	–	–	–
Options special function	• Relays meeting JEACL standards available	• Relays with magnetic shields available • Relays with electro-static shields available		• Built-in diode for IC protection available • Relays with magnetic shields available • Relays with electrostatic shields available

RELAYS

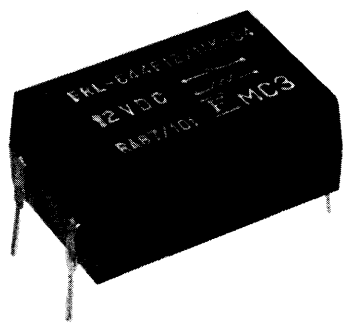
irh COMPONENTS

Telecom Approved

Fujitsu FRL644E(04) Reed Relays

● Preferred Types

Suitable for Telecom Line Interface applications requiring 5mm minimum PCB track clearance.



- ***High Isolation 5kV (40uS Impulse) contact to coil. 3.5kV R.M.S. 1 min contact to coil***
- ***Conforms to Telecom Spec 1302***
- ***Telecom Aust. Engineering Approval RA 87/101***
- ***Heavy duty (50VA) reed switch insert ensures reliable operation. (Form A & Form B)***
- ***Suitable for pulse operation e.g. automatic telephone diallers***
- ***Low power consumption 140mW at 20° C (12 volt coil)***
- ***5V - 12V - 24V dc Coils Stock types (Form A)***
- ***Epoxy construction for immersion cleaning safety***
- ***-10 to +70° C operating range***

ENGINEERING DATA

Item	Characteristics
Contact Arrangement	1 Form A (1AK) 1 Form B (1BK)
Contact Rating	50VA max. (100V AC, 0.5A max.) resistive 30W max. (100V DC, 0.7A max.)
Initial Contact Resistance	150mΩ max. at rated voltage
Contact Materials	Rhodium
Rated Coil Voltage	5●, 6, 12●, 24V● DC
Coil Temperature Rise	20°C max.
Insulation Resistance	100MΩ min. at 100V DC 200V DC between open contacts
Dielectric Withstanding Voltage	5,000 V/1 μs/40 μs (Between coil and contact) 5,000V 2,500V 1μsec 40μsec 3,500 V. rms, 1 min. (Between coil and contact)
Operate Time	1.0 ms. max. including bounce time
Release Time	0.1 ms. max. including bounce time Form A 1.0 ms. max. including bounce time Form B
Life Expectancy — Electrical	10^6 min. at rated load (resistive)
Mechanical	10^7 min.
Vibration	10 to 55Hz (Dual amplitude: 1.5mm)
Shock	30G
Temperature Range	−10°C to +70°C
Weight	6 gr. approx.

● Stock Type (Form A)

FUJITSU MICRO REED RELAYS FRL-644 SERIES SELECTION TABLE

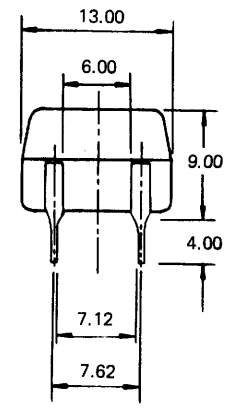
Contact		Rated Voltage in V DC	Pick-up Voltage in V DC at 20°C	Coil Resistance in Ohm ±15% at 20°C	Coil Power Dissipation in mW	Designation
Materials	Arrangements					
Rhodium	1 Form A (Make)	● 5	3.8	550	45	FRL644E05/1AK – 04
		6	4.5	550	65	FRL644E06/1AK – 04
		● 12	9.0	1050	140	FRL644E12/1AK – 04
		● 24	18.0	2800	200	FRL644E24/1AK – 04

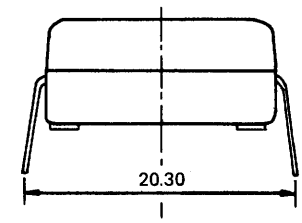
Contact		Rated Voltage in V DC	Pick-up Voltage in V DC at 20°C	Coil Resistance in Ohm ±15% at 20°C	Coil Power Dissipation in mW	Designation
Materials	Arrangements					
Rhodium	1 Form B (Break)	● 5	3.8	300	85	FRL644E05/1BK – 04
		6	4.5	300	120	FRL644E06/1BK – 04
		12	9.0	1300	110	FRL644E12/1BK – 04
		24	18.0	3800	150	FRL644E24/1BK – 04

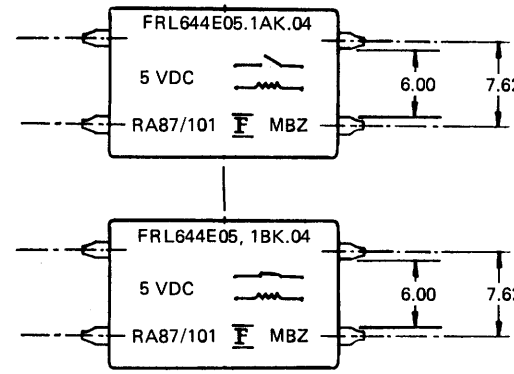
● Stock Types

DIMENSIONS

ALL DIMENSIONS IN MILLIMETRES







RELAYS

Telecom Approved SECV Approved

Fujitsu FBR600 Series Miniature High Power Relays

ENGINEERING DATA

Item	FBR610	FBR620
Contact Arrangements	Single-pole standard type: 1 Form A, 1 Form B, 1 Form C Single-pole K type: 1 Form A, 1 Form B	2-pole standard type: 2 Form A, 2 Form B, 2 Form C
Contact Ratings	Single-pole standard type: 10A at 240V AC or 30V DC Single-pole K type: 16A at 240V AC or 10A at 30V DC	2-pole standard type: 5A at 240V AC or 30V DC (resistive load)
Contact Material	Silver-alloy	Silver-alloy
Initial Contact Resistance	100 mΩ max. at 6V DC, 1A	
Rated Coil Voltage	5, 6, 9, 12, 18, 24, 48, 60V DC	
Coil Power Dissipation (at rated voltage at 20°C)	0.5W approx.	0.5W approx.
Coil Temperature Rise (at rated voltage at 20°C)	35 deg. approx.	35 deg. approx.
Insulation Resistance	1000 MΩ min. at 500V DC	
Dielectric Withstanding Voltage Between contacts	1000V AC for 1 minute	
Between adjacent contacts	–	3000V AC for 1 minute
Between coil and contact	5000V AC for 1 minute	
Lightening (1 x 40 μs) Between adjacent contacts	–	6000V min.
Between coil and contact	10000 V min.	
Operate Time	8 ms approx. at rated voltage at 20°C	
Release Time	2.5 ms approx.	
Life Expectancy Mechanical	20 x 10^6 ops. min.	
Life Expectancy Electrical	Single-pole standard type: 200 x 10^3 ops. min. at 240V AC, 10A or 100 x 10^3 ops. at 30V DC, 10A (resistive load) Single-pole K type: 100 x 10^3 ops. min. at rated voltage (resistive load)	2-pole standard type: 100 x 10^3 ops. min. at rated voltage (resistive load)
Vibration	10 ~ 55 Hz (Dual amplitude: 1.5 mm)	
Shock	10G (11 ms)	
Temperature Range	−40 ~ + 70°C	−40 ~ + 70°C
Weight	16 gr. approx.	

- ***High isolation - 5kVrms contact to coil. SECV Approval CS80157V***
- ***10kV - 40μS Impulse***
- ***8mm creepage contact to coil***
- ***Conforms to Telecom Spec 1053 Issue 2, 1054 Issue 2***
- ***Telecom Aust Approval No RA80/157 (FBR611-621 only)***
- ***International Approvals - VDE, UL, CSA***
- ***High switching capability: 10A, 240V a.c. 30V d.c. Res SPDT 5A, 240V a.c. 30V d.c. Res DPDT 16A, 240V a.c. 30V d.c. Res SPST***
- ***High sensitivity - 250mW at 20° C***
- ***Low coil dissipation - 500mW at 20° C***
- ***-40° C to +70° C operating range***
- ***Single coil magnetic latch version available***
- ***Epoxy sealed PCB terminations prevent flux contamination***

COIL TABLE

Rated Voltage in V DC	Rated Voltage Designation	Coil Resistance in Ω at 20°C	Pick-up Voltage at 20°C	Open Voltage at 20°C
5	005	50	less than 70% of rated voltage	more than 10% of rated voltage (reference)
• 6	006	72		
9	009	160		
• 12	012	285		
18	018	640		
• 24	024	1150		
48	048	4600		
60	060	7200		

• Preferred voltage

FBR600 SERIES RELAYS SELECTION TABLE

Type	Contact Rating	Contact Arrangement	Standard Coil Type
Single-pole standard type	10A at 240V AC or 30V DC	1 Form C	• FBR611D□
		1 Form A	FBR613D□
		1 Form B	FBR615D□
Single-pole K type	16A at 240V AC or 10A at 30V DC	1 Form A	FBR613D□-K
		1 Form B	FBR615D□-K
2-pole standard type	5A at 240V AC or 30V DC	2 Form C	• FBR621D□
		2 Form A	FBR623D□
		2 Form B	FBR625D□

• Preferred type

Dimensions 1-pole standard type

2-pole standard type

Unit: mm (inch)

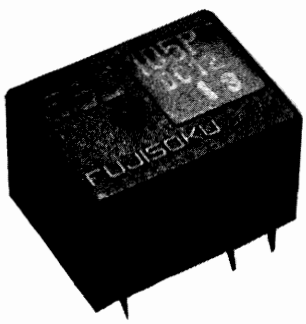
	•1 Form C	1 Form A		1 Form B		•2 Form C	2 Form A	2 Form B
	Standard type,	Standard type,	K type	Standard type,	K type			
SCHEMATICS (bottom view)								
MOUNTING HOLE LAYOUT (bottom view)								

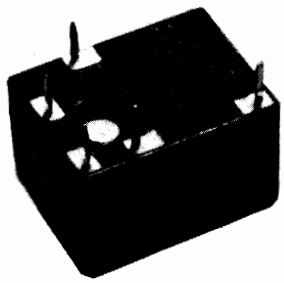
RELAYS

irh COMPONENTS

Telecom Approved

SSD 105P Single Pole Double Throw Miniature Relays





- *Low profile (14.4mm board height)*
- *High isolation (3.5kVrms 1 minute) (5kV dc 1 minute)*
- *7kV - impulse (3 times for 40uS)*
- *Conforms to Telecom Spec 1302*
- *Telecom Aust. Approval RA81/110*
- *Switching capacity 0.1 to 5A depending on contact material*
- *High sensitivity*
- *Sealed and dustproof construction*

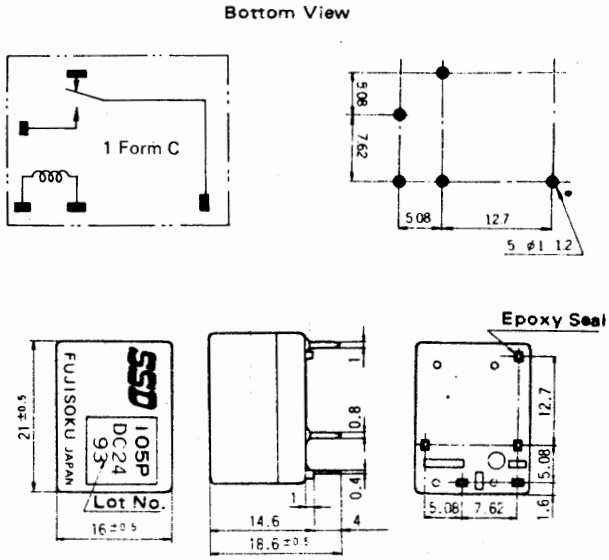
■ MAXIMUM LOAD RATINGS (Resistive)

Type Voltage	AC125V	AC250V	DC30V
SSD 101P-11	100mA	50mA	100mA
U_L SSD 103P-11	3A	2.5A	3A
* U_L SSD 105P-11	5A	3A	5A

* Preferred type

operating time	ms ⩽	7
release time	ms ⩽	4
max switching frequency at P_{max}	Imp/Min	30

■ CIRCUIT DIAGRAM & MOUNTING DIMENSIONS



■ COIL DATA

Rated Voltage (V)	DC6	DC9	DC12	DC24
Rated Current (mA)	75	50	37	18.5
Coil Resistance (Ω)	80	180	320	1280

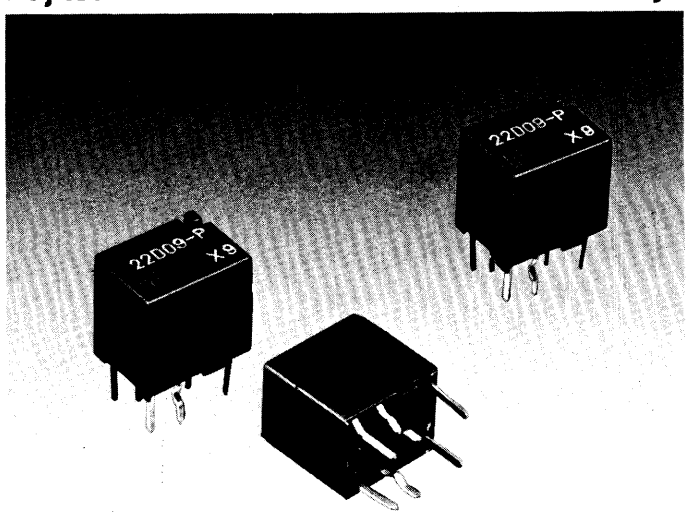
* Coil rated current tolerance is +15%, −20% at ambient temperature of 20 °C.

Relay Type	R at 20 °C Ω ± 10%	V Pull-in at 20 °C ⩽ VDC	V max at 20 °C VDC	V max at 85 °C VDC	I at 20 °C mA	P at 20 °C mW	L mH
6VDC	80	3.9	9	3.9	75	450	80
9VDC	160	5.9	13.5	5.9	56	450	160
12VDC	320	7.8	18	8.5	37	450	320
24VDC	1280	15.6	36	17.3	18.5	450	1280

FUJISOKU quality electronic products from irh COMPONENTS

RELAYS

Fujitsu FBR20 Series Micro-Miniature Relays



Features

- **Microminiature size**
  Two FBR20-series relays can be mounted in the space required for a single FBR210-series relay.
- **1A contact rating**
  Despite their microminiature size, FBR20-series relays have a contact rating of 1A at 24V DC.
- **Strong shock resistance**
  Even with a 50G shock, FBR20 series relays never miss an operation.
- **Makes pattern design easy**
  Separate location of drive (coil) and output (contact) terminals allows easy PC board pattern design.
- **Formed terminals for temporary mounting**
  The uniquely designed terminals allow FBR20-series relays to be mounted temporarily on PC boards.
- **Automatic soldering protection**
  Each terminal is sealed to prevent flux from entering the relay during automatic soldering.

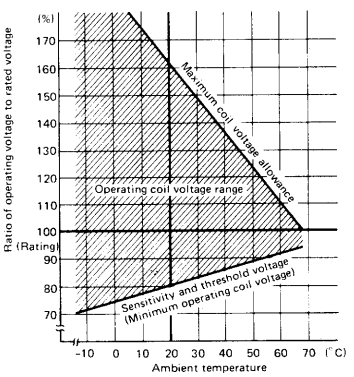
ENGINEERING DATA

Item	Specifications
Contact Arrangement	SPDT (1 Form C)
Contact Shape	Single contact (FBR21) • Bifurcated contact (FBR22)
Contact Material	Gold overlay silver • Gold overlay silver-palladium alloy (–P)
Contact Rating	24 VDC·1A, 120 VAC·0.5A (resistive load)
Maximum Carrying Current	2A
Maximum Switching Voltage	125 VDC, 125 VAC
Maximum Switching Power	24 WDC, 60 VA AC (resistive load)
Initial Contact Resistance	100mΩ max. (measured at 6V DC·0.1A)
Coil Power	0.3W (at rated voltage, 20°C)
Coil Temperature Rise	45°C (at rated voltage, 20°C)
Insulation Resistance	1,000MΩ min. (at 500 VDC)
Withstanding Voltage	Between contacts: 500VAC for 1 minute Between contact and coil: 750 VAC for 1 minute
Vibration	20G, 10 ~ 300 Hz (dual amplitude, maximum 3.0 mm) No contact chatter longer than 1.0 ms.
Shock	Operation error: 50G (sine half-wave of 11 ms). No contact chatter longer than 1.0 ms.
Operate Time	5 ms max. (at rated voltage)
Release Time	3 ms max. (after rated operation)
Life Expectancy	Mechanical: 5 x 10^6 ops. min. Electrical: Gold-overlay silver contacts: 100 x 10^3 ops. min. Gold-overlay silver-palladium alloy contacts: 200 x 10^3 ops. min. (at rated contact load)
Maximum Switching Frequency	Mechanical: 18,000 operations/hour Electrical: 1,800 operations/hour (at contact rated load)
Ambient Temperature	-30°C ~ +65°C (at rated operation)
Ambient Humidity	45 ~ 85% RH
Weight	1.7 g (approx.)

• Preferred Type

REFERENCE

Maximum voltage allowance, sensitivity, and threshold voltage. Ratio of operating voltage to rated voltage.



Notes: Data assumes that the maximum temperature allowance is 115 C, and is not applicable to hot start.

COIL TABLE

(Table 2)

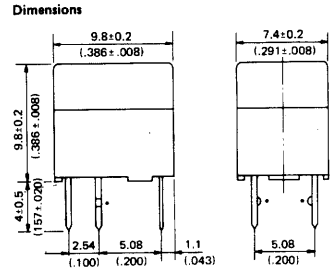
Type	Voltage Specifications	Coil rated voltage	Coil resistance (±10%)	Coil current (at rated voltage)	Pick-up voltage	Drop-out voltage	Maximum voltage allowance	Rated power consumption	Coil temperature rise
Standard Type	D01	DC 1.5V	7.5Ω	approx. 200mA	Less than 80% of rated voltage	More than 5% of rated voltage	160% of rated voltage	approx. 300 mW (at rated voltage)	approx. 45 deg. (at rated voltage)
	D03	DC 3 V	30 Ω	approx. 100mA					
	• D05	DC 5 V	83 Ω	approx. 60mA					
	D06	DC 6 V	120 Ω	approx. 50mA					
	D09	DC 9 V	270 Ω	approx. 33mA					
	• D12	DC 12 V	480 Ω	approx. 25mA					
	D18	DC 18 V	1,080 Ω	approx. 17mA					

Notes: 1. 24V relay is available by request. • Preferred Stock Types
2. Measured at 20 C

DIMENSIONS

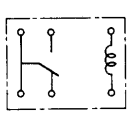
Unit: mm (inch)

Dimensions



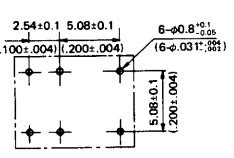
*Formed terminal for temporary lock

Schematic



(Bottom view)

Mounting hole layout



How to Order

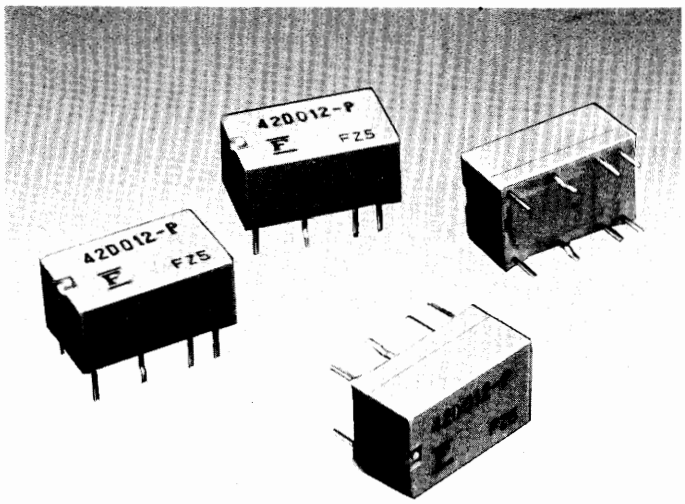
[Example] **FBR21 (N) D 12 - P - 02**
(A) (B) (C) (D) (E)

(A) Series name
FBR21: FBR20 series (Single contact)
FBR22: FBR20 series (Bifurcated contact)
(B) Construction
No designation: Standard
N: N type (Automatic soldering + immersion-cleanable)
(C) Rated coil voltage
(Example) D03: 3V DC standard coil
See Coil Ratings table "Voltage Specifications Symbols" for details
(D) Contact material
No designation: Gold-overlay silver contacts
P: Gold-overlay silver-palladium contacts
(E) **No designation:** Standard
02: High withstand voltage type
(at 1,000V AC for 1 minute)

Note: The designation is stamped on the top of the relay case as follows.
(Example) Designation ordered: **FBR21 D12-P**
Stamp: **21 D12-P**

RELAYS

Fujitsu FBR40 Series Micro-Miniature Relays



Features

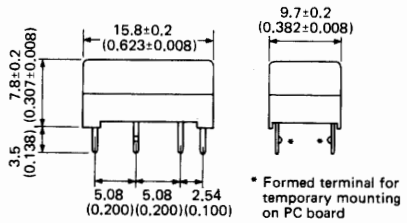
- **Microminiature low profile**
  These microminiaturized relays occupy only one-half of the volume and three-fourths of the mounting area of conventional FBR240-series relays.
  16mm (0.630 in.) (length) x 9.9 mm (0.390 in.) (width) x 8mm (0.315in.) (height)
- **Low power dissipation**
  With a built-in highly effective permanent magnet, the FBR40 has a pickup power dissipation of 85 mW. (Rated power dissipation is 150 mW.)
- **High withstand voltage design**
  With a dielectric withstand voltage between the coil and the contact greater than 1,000V AC, and surge voltage resistance greater than 1,500V, the FBR40 fully meets FCC68 302 standards.
- **Formed terminals available for temporary mounting**
  The unique design of the formed terminals allows FBR40 series relays to be mounted temporarily on the PC board.

Specifications

Item	Specification
Contact arrangement	2 form C (bifurcated contact)
Contact material	Gold-overlay silver (no contact symbols or markings) Gold-overlay silver-palladium alloy (contact symbol –P)
Contact resistance	100 mΩ max. (measured at 6V DC, 0.1A) initial value
Insulation resistance	100 MΩ min. (at 500V DC)
Dielectric withstand voltage	Between open contacts: 500V AC for 1 minute Between coil and contacts, between adjacent contacts: 1,000V AC for 1 minute
Surge voltage resistance	Between coil and contacts/ between adjacent contacts: 1,500V/10μsec/700μsec
Static electricity capacity between contacts (reference)	Between open contacts: Approx. 1 pF Between coil and contacts: Approx. 2pF
Vibration	Malfunctions: 10 Hz to 55 Hz (1.5 mm dual amplitude) Endurance: 10 Hz to 55 Hz (1.5 mm dual amplitude)
Shock	Malfunctions: 30G (11 ms) Endurance: 100G (11 ms)
Operate time	5 ms max. (not including bounce time)
Release time	5 ms max. (not including bounce time)
Service life Mechanical Electrical	10 x 10^6 ops. min. 100 x 10^3 ops. min. (at contact rated load)
Maximum switching frequency	Mechanical: 18,000 ops./hr Electrical: 1,800 ops./hr (at contact rated load)
Ambient temperature	–30°C to +70°C (Do not freeze.) (See Figure 2 for details.)
Operating humidity	45% to 85% RH
Weight	Approx. 3g

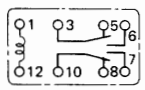
Dimensions and Schematics

- **Dimensions** Unit: mm (in.)



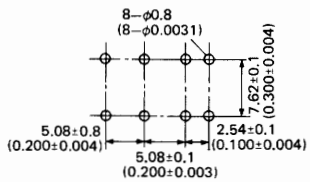
* Formed terminal for temporary mounting on PC board

- **Schematics**



(View from side of terminal)

- **PC board mounting hole layout**



Note 1: The designation is stamped on the top of
(Example) Designation ordered: FBR42D012-P
Stamp: 42D012-P
Note 2: The terminal numbers are not shown on the relays.

Contact Capacities

Item	Performance
Contact rating	24V DC, 1A 120V AC, 0.3A } (With resistive load)
Maximum switching voltage*	125V DC, 125V AC
Maximum continuous carrying current	1A
Maximum switching power	30W, 36VA
Minimum applicable load (reference values)** Gold-overlay silver Gold-overlay silver-palladium	Gold-overlay silver: 1VDC, 1mA Gold-overlay silver-palladium: 10mVDC, 10μA

* If the switching voltage exceeds the rated contact voltage, reduce the current. Since current values vary according to the type of load, please consult your dealer.
** Values when switching a resistive load at normal room temperature and humidity and in a clean atmosphere. The minimum applicable load varies with the switching frequency and operating environment.

How to Order

[Example] **FBR42** **(N)** **D** **012** - **P**
(A) (B) (C) (D) (E)

(A) Series name
FBR42: FBR40 series (Bifurcated contact)
(B) Construction
No designation: Standard (automatic soldering)
N: N type (automatic soldering + immersion-cleanable)
(C) Coil drive
D: DC drive type
(D) Rated coil voltage
(Example) 005: 5V
012: 12V
See Coil Ratings table for details.
(E) Contact material
No designation: Gold-overlay silver
–P: Gold-overlay silver-palladium alloy

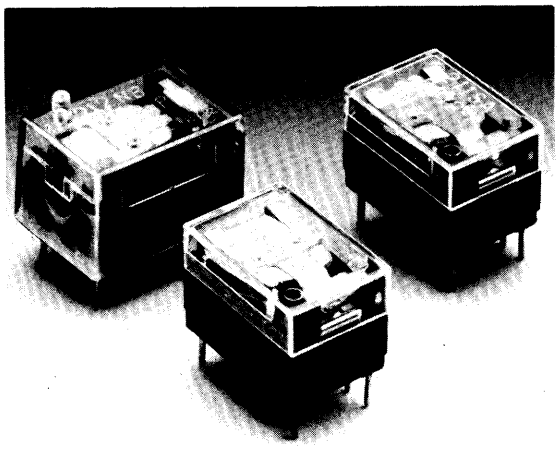
Coil Ratings

Coil rated voltage	Voltage specification symbol	Coil resistance	Rated current (when rated voltage applied)	Pickup voltage	Dropout voltage (reference values)	Rated power dissipation	Pickup power dissipation	Coil temperature rise
3V DC	D003	60Ω	Approx. 50mA	Less than 75% of rated coil voltage	More than 5% of rated coil voltage	Approx. 150 mW (when rated voltage applied)	Approx. 85 mW max.	Approx. 25°C
5V DC	D005	167Ω	Approx. 30mA					
6V DC	D006	240Ω	Approx. 25mA					
9V DC	D009	540Ω	Approx. 17mA					
12V DC	D012	960Ω	Approx. 13mA					
24V DC	D024	2,880Ω	Approx. 8mA			Approx. 200mW	Approx. 112mW max.	Approx. 30°C

Note: 1: All values in the table are measured at 20°C.
Note 2: 3V DC to 12V DC, 200 mW rated relays also available.

RELAYS

Fujitsu FBR210 Series Miniature Relays



Specifications

Item	Specification
Contact arrangement	1 form C (SPDT)
Contact material	Gold-overlay silver (–M) Gold-overlay silver-palladium (–P)
Contact resistance	100 mΩ max. (measured at 6V DC, 0.1A) initial value
Insulation resistance	100 MΩ min. (at 500V DC) initial value
Dielectric withstand voltage	500V AC for 1 minute
Vibration	10 Hz to 55 Hz (1.5 mm dual amplitude)
Shock	Malfunctions: Standard model – 10G (11 ms) High sensitivity model – 6G (11 ms) Endurance: 100G (11 ms)
Operate time	Approx. 5 ms (at rated voltage, not including bounce time)
Release time	Approx. 5 ms (after rated voltage, not including bounce time)
Service life Mechanical	5×10^6 ops. min. (maximum switching frequency 18,000 ops./hr)
Electrical	3×10^5 ops. min. (28V DC, 1A resistive load) 1×10^5 ops. min. (12V DC, 2A resistive load) 1×10^5 ops. min. (120V AC, 0.5A resistive load) (maximum switching frequency of 1,800 ops./hr)
Ambient temperature	Standard type: –25°C to +55°C High sensitivity type: –25°C to +75°C (at rated ops.)
Weight	Approx. 4g

Features

- **2A maximum carrying current**
  Capable of 2A maximum continuous carrying current in the contact.
- **Superior sensitive gold-overlay contacts**
  M type: Gold-overlay silver contacts
  P type: Gold-overlay silver-palladium contacts
- **Bifurcated contacts also available**
  The series FBR212 has highly reliable bifurcated contacts.
- **International terminal pitch of one inch grid terminal layout**
- **High sensitive, low power dissipation types also available**
  Standard types: 0.45W (A or B types)
  High sensitivity types: 0.2W (C or E types)

Contact Capacities

Item	DC load	AC load	Remarks
Contact rating	28V – 1A	120V – 0.5A	With resistive load
Maximum switching voltage*	150V	220V	
Maximum switching current	2A	1.25A	
Maximum carrying current	2A		
Maximum switching power	28W	60VA	

* If the switching voltage exceeds the rated contact voltage, reduce the current. Since current values vary according to the type of load, please consult your dealer.

Coil Ratings

- **Standard type (Type A or B)**

Voltage specification symbol	Coil rated voltage	Coil resistance (±10%)	Rated current (at rated voltage)	Pickup voltage	Dropout voltage	Maximum allowable voltage	Rated power dissipation	Coil temperature rise
D001	1.5V DC	5Ω	Approx. 300mA	70% max. of rated coil voltage	10% min. of rated coil voltage	150% of rated coil voltage	Approx. 450mW (when rated voltage applied)	Approx. 45°C (when rated voltage applied)
D003	3 V DC	20Ω	Approx. 150mA					
D005	5 V DC	56Ω	Approx. 89mA					
D006	6 V DC	80Ω	Approx. 75mA					
D009	9 V DC	180Ω	Approx. 50mA					
D012	12 V DC	320Ω	Approx. 38mA					
D024	24 V DC	1,280Ω	Approx. 19mA					

Note: All values in the table are measured at 20°C.

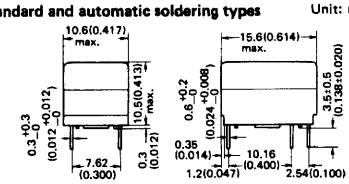
- **High sensitivity type (Type C or E)**

Voltage specification symbol	Coil rated voltage	Coil resistance (±10%)	Rated current (at rated voltage)	Pickup voltage	Dropout voltage	Maximum allowable voltage	Rated power dissipation	Coil temperature rise
D001	1.5V DC	12Ω	Approx. 125mA	Less than 70% of rated coil voltage	More than 10% of rated coil voltage	225% of rated coil voltage	Approx. 200mW (when rated voltage applied)	Approx. 25°C (when rated voltage applied)
D003	3 V DC	45Ω	Approx. 67mA					
D005	5 V DC	120Ω	Approx. 42mA					
D006	6 V DC	180Ω	Approx. 33mA					
D009	9 V DC	400Ω	Approx. 23mA					
D012	12 V DC	700Ω	Approx. 17mA					
D024	24 V DC	2,800Ω	Approx. 9mA					

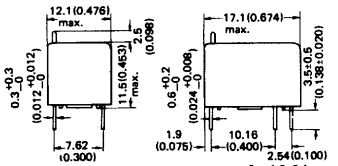
Note: All values in the table are measured at 20°C.

Dimensions

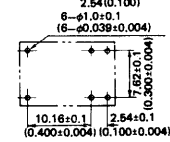
- **Standard and automatic soldering types** Unit: mm (in.)



- **Automatic soldering + immersion-cleanable type (N type)**

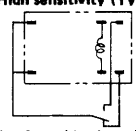


- **PC board mounting hole layout**



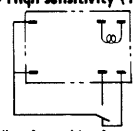
Schematics

- **Standard (Type A)**
- **High sensitivity (Type C)**



(View from side of terminal)

- **Standard (Type B)**
- **High sensitivity (Type E)**



(View from side of terminal)

How to Order

[Example] **FBR211 S A D 012 - M**
(A) (B) (C) (D) (E) (F)

(A) Series name
FBR211: FBR210 series (Single contact)
FBR212: FBR210 series (Bifurcated contact)

(B) Construction
No designation: Standard
S: Automatic soldering
N: Automatic soldering + immersion-cleanable

(C) Coil specifications and schematics
A: Standard type A } Coil power dissipation
B: Standard type B } 0.45W
C: High sensitivity type C } Coil power dissipation
E: High sensitivity type E } 0.2W

(D) Coil drive
D: DC drive type

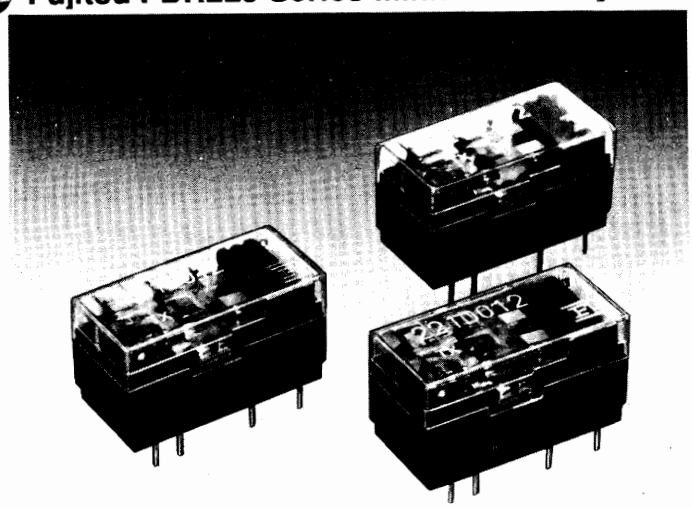
(E) Coil voltage: Voltages are shown as three digits.
(Example) 12V: 012, 6V: 006
1.5V: 001
See Coil Ratings table for details.

(F) **–M:** Gold-overlay silver contacts
–P: Gold-overlay silver-palladium contacts

Note: The designation is stamped on the top of the relay case as follows.
(Example) Designation ordered: **FBR211 AD012-M**
Stamp: **211 AD012-M**

RELAYS

Fujitsu FBR220 Series Miniature Relays



Features

- **Superior sensitive gold-overlay contacts**
  Standard type: Gold-overlay silver contacts
  –P type: Gold-overlay silver-palladium contacts
- **Automatic soldering protection**
  The terminal is sealed to prevent flux from entering the relay during automatic soldering.
- **1A contact rating**
  Durability to 300,000 ops. at 28V DC, 1A (resistive load)
- **International terminal pitch of 2.54 mm (0.1 in.) grid terminal layout**

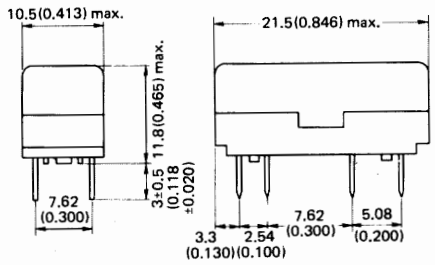
Contact Capacities

Item	DC load	AC load	Remarks
Contact rating	28V – 1A	120V – 0.5A	With resistive load
Maximum switching voltage*	125V	125V	
Maximum switching current	1A		
Maximum switching power	28W	60VA	

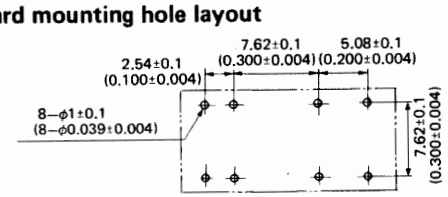
* If the switching voltage exceeds the rated contact voltage, reduce the current. Since current values vary according to the type of load, please consult your dealer.

Dimensions and Schematics

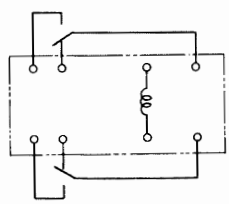
Unit: mm (in.)



- **PC board mounting hole layout**



- **Schematics**



(View from side of terminal)

Specifications

Item	Specification
Contact arrangement	2 form C (DPDT)
Contact resistance	100 mΩ max. (measured at 6V DC, 0.1A) initial value
Coil power dissipation	Approx. 0.5W (when rated voltage applied at 20°C)
Coil temperature rise	Approx. 50° (when rated voltage applied at 20°C)
Insulation resistance	100 MΩ min. (at 500V DC) initial value
Dielectric withstand voltage	500V AC for 1 minute
Vibration	10 Hz to 55 Hz (1.5mm dual amplitude)
Shock	10G (11 msec)
Operate time	10 ms max. (rated voltage, not including bounce time)
Release time	5 ms max. (after rated voltage, not including bounce time)
Service life Mechanical	5×10^6 ops. min. (maximum switching frequency 18,000ops./hr)
Service life Electrical	3×10^5 ops. min. (28V DC, 1A resistive load) 1×10^5 ops. min. (120V AC, 0.5A resistive load) (1,800 ops./hr maximum /hr switching frequency)
Ambient temperature	–25°C to +50°C (Do not freeze when below 0°C.)
Weight	Approx. 5g

Note: All values in the table are measured at 20°C.

Series Table

Standard type ●Preferred Type

Designation	Rated voltage	Coil resistance (±10%)	Pickup voltage
FBR221D003	3V DC	18Ω	75% max. of rated voltage
●FBR221D005	5V DC	50Ω	
●FBR221D006	6V DC	72Ω	
FBR221D009	9V DC	162Ω	
●FBR221D012	12V DC	290Ω	
●FBR221D024	24V DC	1,150Ω	

–P type ●Preferred Type

Designation	Rated voltage	Coil resistance (±10%)	Pickup voltage
FBR221D003-P	3V DC	18Ω	75% max. of rated voltage
FBR221D005-P	5V DC	50Ω	
FBR221D006-P	6V DC	72Ω	
FBR221D009-P	9V DC	162Ω	
●FBR221D012-P	12V DC	290Ω	
●FBR221D024-P	24V DC	1,150Ω	