

# POWER RELAY

## 2 POLES—5 A LOW PROFILE TYPE

### FTR-F1 SERIES

RoHS compliant

#### ■ FEATURES

- Low profile power relay (height 16.5 mm) employing unique construction
- DPST/DPDT 5 A, TV-3 rating available
- Higher isolation by employing reinforced insulation construction
  - Insulation distance: 8 mm (between coil and contact)
  - Dielectric strength: 5 kV (between coil and contact)
  - Surge strength: 10 kV (between coil and contact)
- Pin configuration compatible to VB/FBR620
- UL, CSA, VDE, SEMKO, SEV, CQC, FIMKO, IMQ, DEMKO, NEMKO recognized
- RoHS compliant since date code: 0434R  
Please see page 8 for more information



#### ■ ORDERING INFORMATION - 5A Rating Type

FTR-F1    A    A    005    V    -\*\*  
 [Example]    (a)    (b)    (c)    (d)    (e)    (f)

(a)	Series Name	FTR-F1: FTR-F1 Series			
(b)	Contact Arrangement	A	: 2 form A (DPST-NO)		
		C	: 2 form C (DPDT)		
(c)	Coil Type	A	: Standard type (530 mW)		
		D	: High sensitive type (400 mW)		
(d)	Nominal Voltage	003	: 3 VDC (high sensitive type 'D' only)		
		005	: 5 VDC	012: 12 VDC	048: 48 VDC
		006	: 6 VDC	018: 18 VDC	060: 60 VDC
		009	: 9 VDC	024: 24 VDC	110: 110 VDC
(e)	Contact Material/TV Type	V	: Gold plate silver tin oxide (standard type)		
		T	: Gold plate silver tin oxide (TV-3 rating type, only standard make type)		
(f)	Custom Designation	RG	: Transparency cover		

Ordering Code:  
FTR-F1AA005V

Actual Marking:  
F1AA005V

# FTR-F1 SERIES

## ■ PART NUMBERS

530mW type

Ordering Part Number	Series	Contact	Coil Power	Coil Voltage	Contact Material	Special Designation
FTR-F1AA005V(-RG)	FTR-F1	A: 2 form A	A: 530 mW	5	V: Gold plate silver tin oxide	RG: Transparency cover
FTR-F1AA006V(-RG)				6		
FTR-F1AA009V(-RG)				9		
FTR-F1AA012V(-RG)				12		
FTR-F1AA018V(-RG)				18		
FTR-F1AA024V(-RG)				24		
FTR-F1AA048V(-RG)				48		
FTR-F1AA060V(-RG)				60		
FTR-F1AA110V(-RG)		A: 550 mW	110			
FTR-F1CA005V(-RG)		C: 2 form C	A: 530 mW	5		
FTR-F1CA006V(-RG)				6		
FTR-F1CA009V(-RG)				9		
FTR-F1CA012V(-RG)				12		
FTR-F1CA018V(-RG)				18		
FTR-F1CA024V(-RG)				24		
FTR-F1CA048V(-RG)				48		
FTR-F1CA060V(-RG)	60					
FTR-F1CA110V(-RG)	A: 550 mW	110				

TV-3 type

Ordering Part Number	Series	Contact	Coil Power	Coil Voltage	Contact Material	Special Designation
FTR-F1AA005T(-RG)	FTR-F1	A: 2 form A	A: 530 mW	5	T: Gold plate silver tin oxide (TV-3 type)	RG: Transparency cover
FTR-F1AA006T(-RG)				6		
FTR-F1AA009T(-RG)				9		
FTR-F1AA012T(-RG)				12		
FTR-F1AA018T(-RG)				18		
FTR-F1AA024T(-RG)				24		
FTR-F1AA048T(-RG)				48		
FTR-F1AA060T(-RG)				60		
FTR-F1AA110T(-RG)			A: 550 mW	110		

# FTR-F1 SERIES

## ■ PART NUMBERS

400mW type

Ordering Part Number	Series	Contact	Coil Power	Coil Voltage	Contact Material	Special Designation
FTR-F1AD003V(-RG)	FTR-F1	A: 2 form A	D: 400 mW	3	V: Gold plate silver tin oxide	RG: Transparency cover
FTR-F1AD005V(-RG)				5		
FTR-F1AD006V(-RG)				6		
FTR-F1AD009V(-RG)				9		
FTR-F1AD012V(-RG)				12		
FTR-F1AD024V(-RG)				24		
FTR-F1AD048V(-RG)				48		
FTR-F1CD003V(-RG)		C: 2 form C		3		
FTR-F1CD005V(-RG)				5		
FTR-F1CD006V(-RG)				6		
FTR-F1CD009V(-RG)				9		
FTR-F1CD012V(-RG)				12		
FTR-F1CD024V(-RG)				24		
FTR-F1CD048V(-RG)				48		

## ■ COIL DATA CHART

530mW type

Coil Voltage	Nominal Voltage (VDC)	Max. Coil Voltage* <sup>1</sup>	Coil Resistance (±10%)	Must Operate Voltage* <sup>2</sup>	Must Release Voltage* <sup>2</sup>	Nominal Power (mW)
005	5	8.5 VDC	47 Ω	3.5 VDC	0.5 VDC	530
006	6	10.2 VDC	68 Ω	4.2 VDC	0.6 VDC	
009	9	15.3 VDC	155 Ω	6.3 VDC	0.9 VDC	
012	12	20.4 VDC	270 Ω	8.4 VDC	1.2 VDC	
018	18	30.6 VDC	610 Ω	12.6 VDC	1.8 VDC	
024	24	40.8 VDC	1,100 Ω	16.8 VDC	2.4 VDC	
048	48	81.6 VDC	4,400 Ω	33.6 VDC	4.8 VDC	
060	60	102.0 VDC	6,800 Ω	42.0 VDC	6.0 VDC	550
110	110	187.0 VDC	22,000 Ω	77.0 VDC	11.0 VDC	

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

\*1: No contact current at 20°C

\*2: Specified values are subject to pulse wave voltage

# FTR-F1 SERIES

## ■ COIL DATA CHART

400mW type

Coil Voltage	Nominal Voltage (VDC)	Max. Coil Voltage* <sup>1</sup>	Coil Resistance (±10%)	Must Operate Voltage* <sup>2</sup>	Must Release Voltage* <sup>2</sup>	Nominal Power (mW)
003	3	6.0VDC	22.5 Ω	2.25 VDC	0.3 VDC	400
005	5	10.0 VDC	62 Ω	3.75 VDC	0.5 VDC	
006	6	12.0 VDC	90 Ω	4.5 VDC	0.6 VDC	
009	9	18.0 VDC	202 Ω	6.75 VDC	0.9 VDC	
012	12	24.0 VDC	360 Ω	9 VDC	1.2 VDC	
024	24	48.0 VDC	1,440 Ω	18 VDC	2.4 VDC	
048	48	96.0 VDC	5,760 Ω	36 VDC	4.8 VDC	

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

\*1: No contact current at 20°C

\*2: Specified values are subject to pulse wave voltage

## ■ SPECIFICATIONS

Item		Standard Type F1(A, C)A ( )V	TV-3 rating F1AA ( )T	Sensitive Type F1(A, C)D ( )V
Contact	Arrangement	2 form A (DPST-NO), 2 form C (DPDT)	2 form A (DSDT-NO)	2 form A (DPST-NO) 2 form C (DPDT)
	Material	Gold plate silver tin oxide		
	Configuration	Single		
	Resistance (initial)	Maximum 100 mΩ at 1 A, 6 VDC		
	Rating (resistive)	5A, 250VAC / 24VDC		
	Maximum Carrying Current* <sup>1</sup>	7A		
	Maximum Switching Rating	1,250 VA / 120W		
	Maximum Switching Voltage	400 VAC / 300VDC		
	Maximum Switching Load* <sup>2</sup>	10mA 5 VDC		
Coil	Nominal Power (at 20°C)	530mW, 110V type: 550mW		400mW
	Operate Power (at 20°C)	260mW, 110V type: 270mW		225mW
	Operating Temperature	-40°C to +75°C (no frost) -40°C to +70°C (-RG type)		
Time Value	Operate (without diode)	Maximum 15ms (at nominal voltage, no bounce)		
	Release (without diode)	Maximum 5ms (at nominal voltage, no bounce)		
Life	Mechanical	2 x 10 <sup>7</sup> ops minimum		
	Electrical	AC load	1 x 10 <sup>5</sup> ops min.	
		DC load	1 x 10 <sup>5</sup> ops min.	
	Lamp load (TV-3)	-	2.5 x 10 <sup>4</sup> ops min.	-
Other	Vibration Resistance	Misoperation	10 to 55 Hz, at double amplitude of 1.65mm	
		Endurance	10 to 55Hz, at double amplitude of 3.3mm	
	Shock Resistance	Misoperation	100m/s <sup>2</sup> (11±1ms)	
		Endurance	1,000m/s <sup>2</sup> (6±1ms)	
	Weight	Approximately 12g		

\*<sup>1</sup> Minimum switching loads mentioned above are reference values. Please perform the confirmation test with the actual load before production since reference values may vary according to switching frequencies, environmental conditions and expected reliability levels.

# FTR-F1 SERIES

## ■ INSULATION

Item	FTR-F1	Note
Resistance (initial)	Minimum 1,000 MΩ	at 500 VDC
Dielectric Strength	open contacts	1,000 VAC (50/60 Hz) 1 min.
	coil and contacts	5,000 VAC (50/60 Hz) 1 min.
	adjacent contacts	3,000 VAC (50/60 Hz) 1 min.
Surge Voltage (coil and contact)	10,000 V	1.2 x 50µs standard wave
Clearance/Creepage	8 mm / 8 mm	
Insulation (DIN EN61810-1 VDE0435) Voltage Pollution Isolation material group	250 V 3 IIIa	
Isolation category / Reference voltage (VDE0110b)	C / 250 V	

## ■ SAFETY STANDARDS

Type	Compliance	Contact rating
UL	UL 508	Flammability: UL 94-V0 (plastics) 5A, 24VDC (resistive) 5A, 250 VAC (resistive) 1/6 HP, 125VAC 1/4 HP, 250VAC Pilot duty: C300 Pilot duty: R300 (F1AA( )T, F1AA( )V) TV-3 (F1AA( )T)
	E63614	
CSA	C22.2 No. 14 LR 40304	
VDE	0435, 0631, 0700, 0860	5A, 250 VAC (cosØ=1) 2A, 250 VAC (cosØ=0.4) 5 A 24VDC (0ms), 85°C
SEMKO	EN 61058-1:1992 and A1 EN 61095:1993 and A1+A11	250VAC, 5 (1)A
IEC60335-1	GWFI IEC 60695-2-12	>850°C (except for -RG)
	GWFI IEC 60695-2-13	>775°C(except for -RG)

Complies with BSI, IMC, CQC, NEMKO, DEMKO, FIMKO

■ REFERENCE DATA

5A Rating Type



# FTR-F1 SERIES

## REFERENCE DATA

Distribution of operate and release voltage



Distribution of contact resistance



Mechanical life test



Electrical life test



## DIMENSIONS

### Dimensions

FTR-F1A type



FTR-F1C type



### Schematics (BOTTOM VIEW)



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



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. All 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 power relays also comply with RoHS. Please refer to individual data sheets. Relays that are RoHS compliant do not contain the 5 hazardous materials that are restricted by RoHS directive (lead, mercury, chromium IV, PBB, PBDE).
- It has been verified that using lead-free relays in leaded assembly process will not cause any problems (compatible).
- "LF" is marked on each outer and inner carton. (No marking on individual relays).
- To avoid leaded relays (for lead-free sample, etc.) please consult with area sales office.
- We will ship leaded relays as long as the leaded relay inventory exists.

Note: Cadmium was exempted from RoHS on October 21, 2005. (Amendment to Directive 2002/95/EC)

### 2. Recommended Lead Free Solder Profile

- Recommended solder paste Sn-3.0Ag-0.5Cu.

#### Reflow Solder condition

**Flow Solder condition:**

Pre-heating: maximum 120°C  
Soldering: dip within 5 sec. at  
260°C solder bath

**Solder by Soldering Iron:**

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

**We highly recommend that you confirm your actual solder conditions**

### 3. Moisture Sensitivity

- Moisture Sensitivity Level standard is not applicable to electromechanical relays.

### 4. Tin Whisker

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



## 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](mailto:promothq@ft.ed.fujitsu.com)  
Web: [www.fcl.fujitsu.com](http://www.fcl.fujitsu.com)

### 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](mailto:components@us.fujitsu.com)  
Web: <http://www.fujitsu.com/us/services/edevices/components/>

### 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](mailto:info@fceu.fujitsu.com)  
Web: [emea.fujitsu.com/components/](http://emea.fujitsu.com/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](mailto:fcal@fcal.fujitsu.com)  
Web: <http://www.fujitsu.com/sg/services/micro/components/>

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Телефон: 8 (812) 309-75-97 (многоканальный)

Факс: 8 (812) 320-03-32

Электронная почта: [ocean@oceanchips.ru](mailto:ocean@oceanchips.ru)

Web: <http://oceanchips.ru/>

Адрес: 198099, г. Санкт-Петербург, ул. Калинина, д. 2, корп. 4, лит. А