

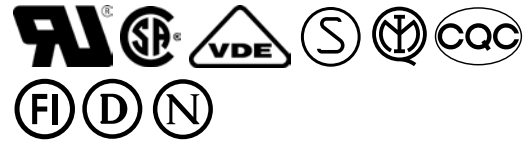
# POWER RELAY

## 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		
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		

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		

# 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	

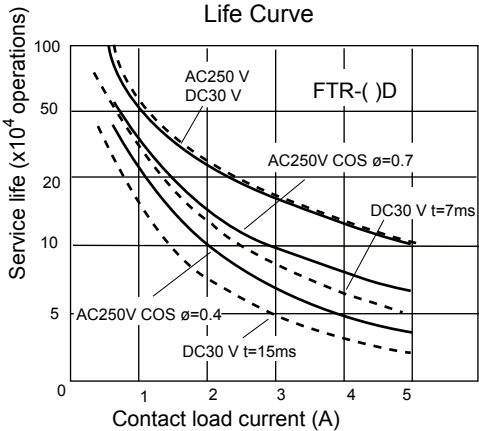
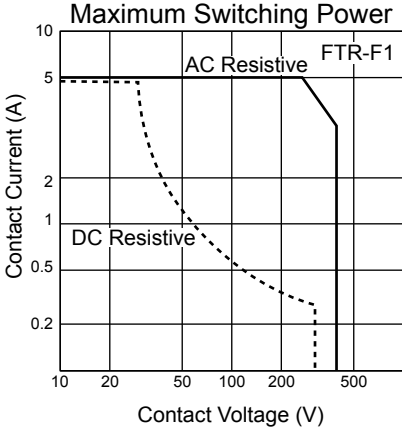
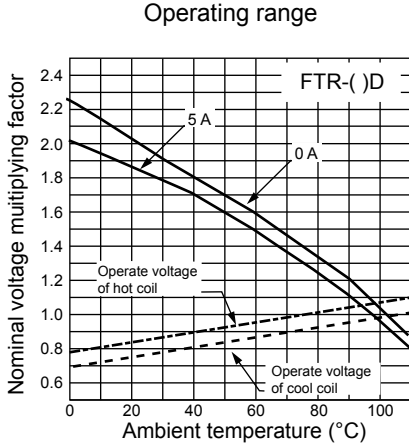
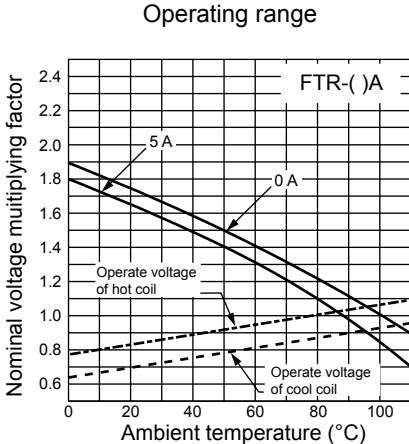
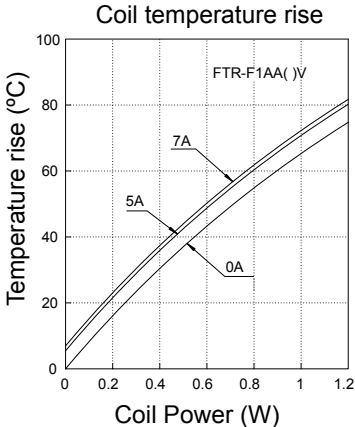
## ■ SAFETY STANDARDS

Type	Compliance	Contact rating
UL	UL 508	Flammability: UL 94-V0 (plastics) 5A, 24VDC (resistive)
	E63614	5A, 250 VAC (resistive)
CSA	C22.2 No. 14	1/6 HP, 125VAC
	LR 40304	1/4 HP, 250VAC Pilot duty: C300 Pilot duty: R300 (F1AA( )T, F1AA( )V) TV-3 (F1AA( )T)
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

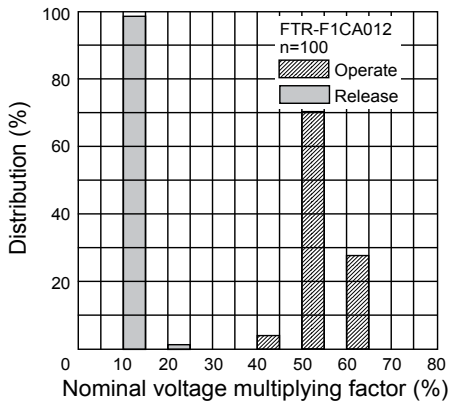
5A Rating Type



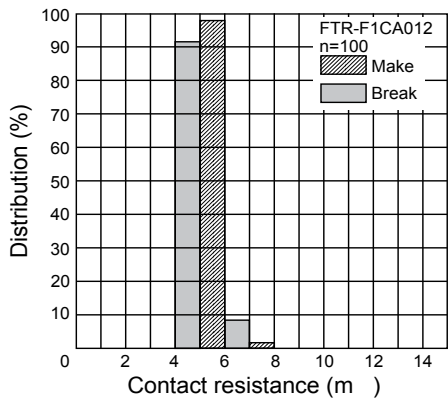
# FTR-F1 SERIES

## REFERENCE DATA

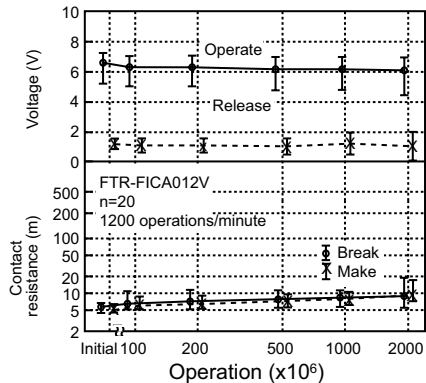
Distribution of operate and release voltage



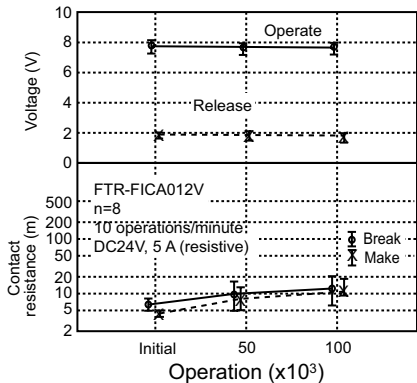
Distribution of contact resistance



Mechanical life test



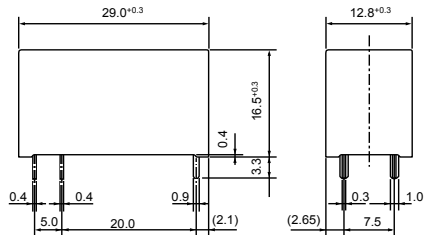
Electrical life test



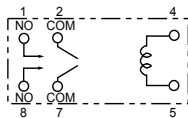
## DIMENSIONS

### Dimensions

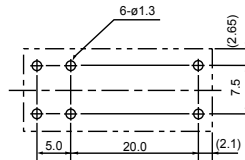
FTR-F1A type



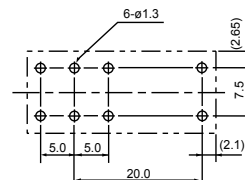
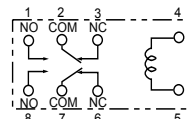
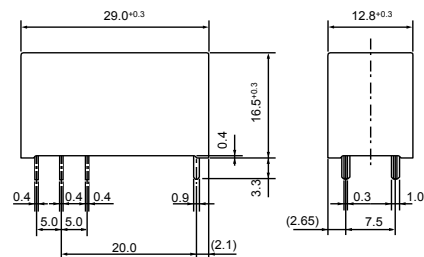
### Schematics (BOTTOM VIEW)



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



FTR-F1C type



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.



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Rev. November 29, 2007

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