

# 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)
- Plastic sealed relay
- Pin configuration compatible to VB/FBR620
- UL, CSA, VDE, SEMKO, BSI recognized
- Conforms to FIMKO, IMQ, DEMKO (under approval)
- Environmentally friendly cadmium free contact type is available
- RoHS compliant since date code: 0434R  
Please see page 7 for more information



#### ■ ORDERING INFORMATION

[Example]  $\frac{\text{FTR-F1}}{\text{(a)}} \frac{\text{A}}{\text{(b)}} \frac{\text{A}}{\text{(c)}} \frac{\text{005}}{\text{(d)}} \frac{\text{V}}{\text{(e)}} \frac{\text{-**}}{\text{(f)}}$

(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 (0.53 W)		
		D	: High sensitive type (0.4W)		
(d)	Nominal Voltage	003	: 3 VDC (high sensitive type 'D' only)		
		005	: 5 VDC	009: 9 VDC	024: 24 VDC
		006	: 6 VDC	012: 12 VDC	048: 48 VDC
(e)	Contact Material/TV Type	V	: Gold plate silver alloy (standard type)		
		T	: Gold plate silver alloy (TV-3 rating type, only standard make type)		
(f)	Custom Designation	To be assigned custom specification			

Ordering Code: FTR-F1AA005V  
Actual Marking: F1AA005V

# FTR-F1 SERIES

## ■ SAFETY STANDARD AND FILE NUMBERS

UL508, 873 (File No. E63614)

C 22.2 No. 14 (File No. LR40304-30/ LR107822)

VDE 0435, 0631, 0700, 0860 (File No. 11039-4940-1019)

	Type	Nominal voltage	Contact rating
TV-Rating	FTR-F1AA( )T	5 to 48 VDC	TV-3 120 VAC 1/6 HP 125 VAC 1/4 HP 250 VAC 5 A 24 VDC/250 VAC resistive Pilot duty R 300
Standard/ sensitive	FTR-F1CA(V)	5 to 48 VDC	Same as above without TV-3 2A 250VAC inductive (PF=0.4)

## ■ SPECIFICATIONS

Item		Standard Type	Sensitive Type	TV-3 Rating Type
Contact	Arrangement	2 form A (DPST-NO), 2 form C (DPDT)		2 form A (DPST-NO)
	Material	Gold plate silver alloy		
	Style	Single		
	Resistance (initial)	Maximum 100 mΩ (at 1 A 6 VDC)		
	Rating (resistive)	5 A 250 VAC/24 VDC		
	Maximum Carrying Current	7 A		
	Maximum Switching Rating	1,250 VA/120 W		
	Maximum Switching Voltage	400 VAC 300 VDC		
	Maximum Switching Current	5 A		
	Minimum Switching Load*1	10 mA 5 VDC		
	Maximum Inrush Current	—		51 A 120 VAC (at lamp load)
Coil	Nominal Power (at 20°C)	0.53 W	0.4 W	0.53 W
	Operate Power (at 20°C)	0.26 W	0.225W	0.26W
	Operating Temperature	-40°C to +75°C (no frost) (refer to the CHARACTERISTIC DATA)		
Time Value	Operate (at nominal voltage)	Maximum 15 ms		
	Release (at nominal voltage)	Maximum 5 ms		
Insulation	Resistance (at 500 VDC)	Minimum 1,000 MΩ		
	Dielectric Strength	between open contacts	1,000 VAC 1 minute (3,000 VAC between adjacent contacts)	
		between coil and contacts	5,000 VAC 1 minute	
Surge Strength	10,000 V (at 1.2 × 50 μs)			
Life	Mechanical	2 × 10 <sup>7</sup> operations minimum		
	Electrical	Contact Rating	1 × 10 <sup>5</sup> operations minimum	
		Lamp Load	—	2.5 × 10 <sup>4</sup> ops. minimum
Other	Vibration Resistance	Misoperation	10 to 55 Hz (double amplitude of 1.65 mm)	
		Endurance	10 to 55 Hz (double amplitude of 3.3 mm)	
	Shock Resistance	Misoperation	100 m/s <sup>2</sup> (11 ±1 ms)	
		Endurance	1,000 m/s <sup>2</sup> (6 ±1 ms)	
	Weight	Approximately 12 g		

\*1 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

## ■ COIL DATA CHART

MODEL		Nominal voltage	Coil resistance (±10%)	Must operate voltage	Must release voltage
Standard Type	TV-3 Rating Type				
FTR-F1 (C, A) A005 V	FTR-F1AA005 T	5 VDC	47 Ω	3.5 VDC	0.5 VDC
FTR-F1 (C, A) A006 V	FTR-F1AA006 T	6 VDC	68 Ω	4.2 VDC	0.6 VDC
FTR-F1 (C, A) A009 V	FTR-F1AA009 T	9 VDC	155 Ω	6.3 VDC	0.9 VDC
FTR-F1 (C, A) A012 V	FTR-F1AA012 T	12 VDC	270 Ω	8.4 VDC	1.2 VDC
FTR-F1 (C, A) A024 V	FTR-F1AA024 T	24 VDC	1,100 Ω	16.8 VDC	2.4 VDC
FTR-F1 (C, A) A048 V	FTR-F1AA048 T	48 VDC	4,400 Ω	33.6 VDC	4.8 VDC

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

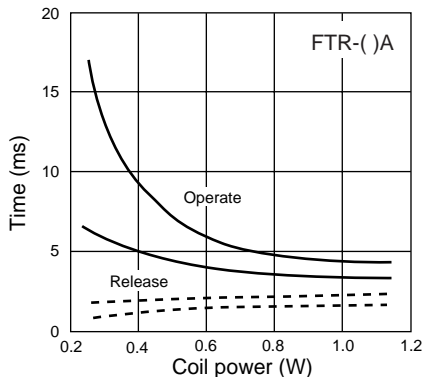
Sensitive Type

MODEL		Nominal voltage	Coil resistance (±10%)	Must operate voltage	Must release voltage
Standard Type					
FTR-F1 (C, A) D003 V		3 VDC	22.5 Ω	2.25 VDC	0.3 VDC
FTR-F1 (C, A) D005 V		5 VDC	62 Ω	3.75 VDC	0.5 VDC
FTR-F1 (C, A) D006 V		6 VDC	90 Ω	4.5 VDC	0.6 VDC
FTR-F1 (C, A) D009 V		9 VDC	202 Ω	6.75 VDC	0.9 VDC
FTR-F1 (C, A) D012 V		12 VDC	360 Ω	9.0 VDC	1.2 VDC
FTR-F1 (C, A) D024 V		24 VDC	1,440 Ω	18.0 VDC	2.4 VDC
FTR-F1 (C, A) D048 V		48 VDC	5,760 Ω	36.0 VDC	4.8 VDC

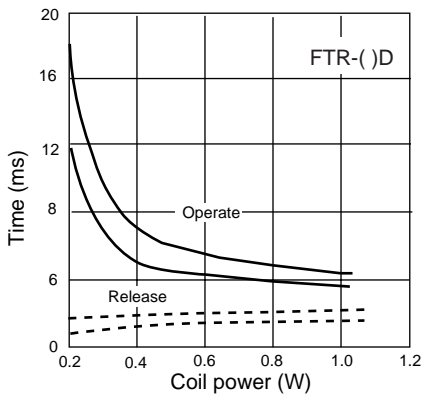
# FTR-F1 SERIES

## CHARACTERISTIC DATA

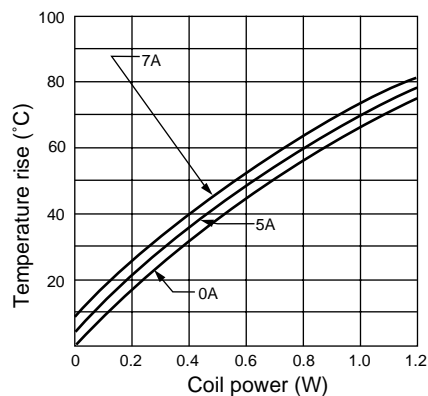
Timing



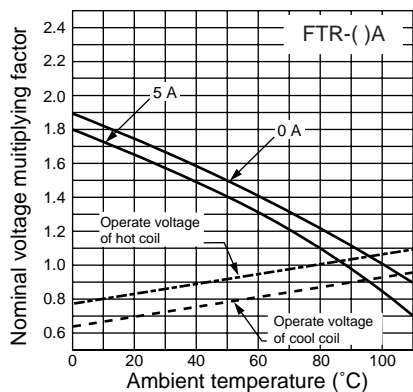
Timing



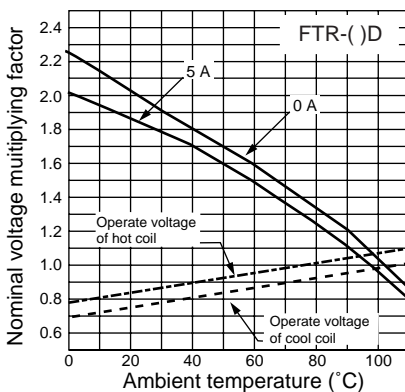
Coil temperature rise



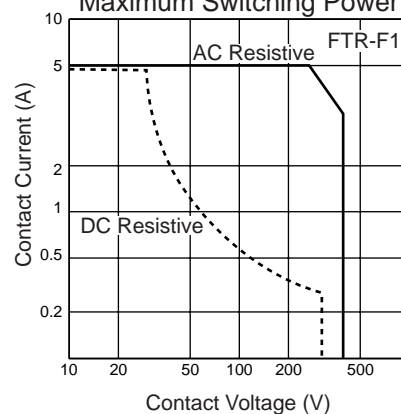
Operating range



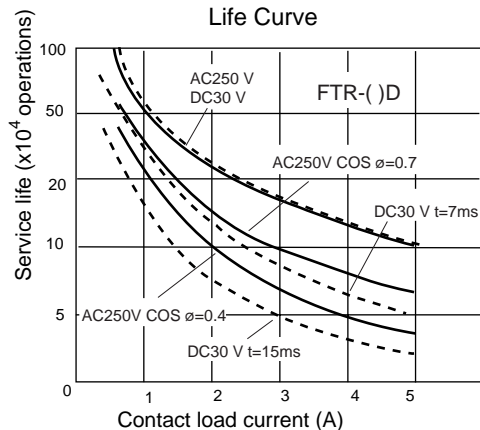
Operating range



Maximum Switching Power



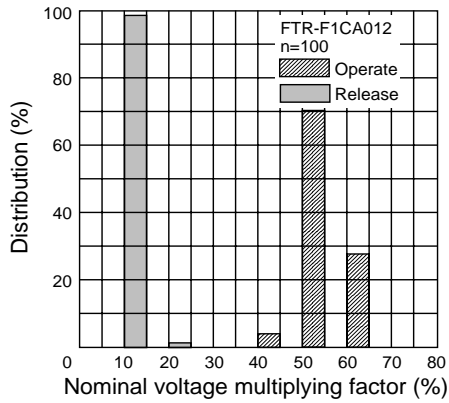
Life Curve



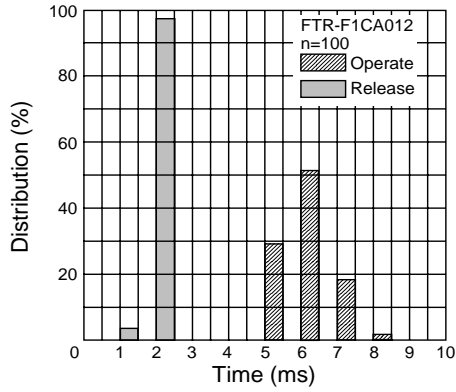
# FTR-F1 SERIES

## REFERENCE DATA

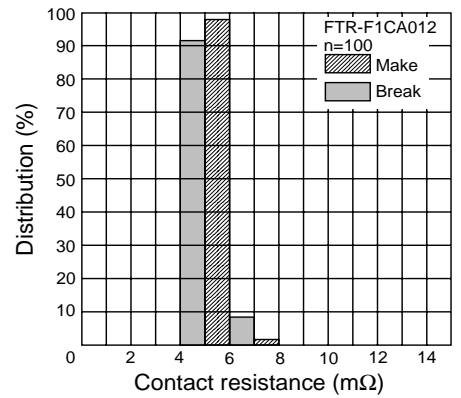
Distribution of operate and release voltage



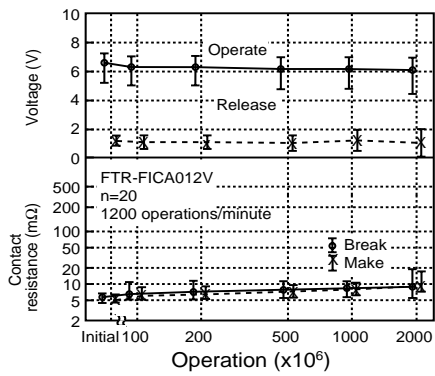
Distribution of operate and release time



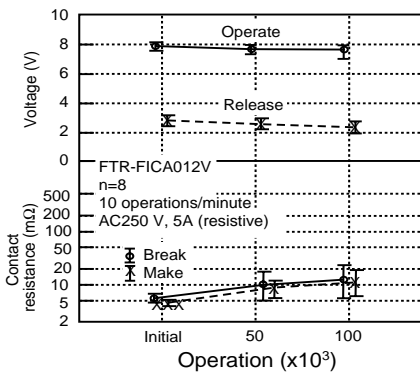
Distribution of contact resistance



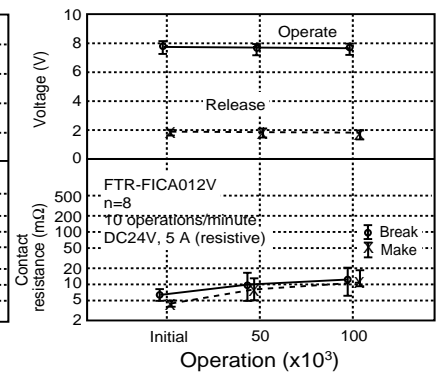
Mechanical life test



Electrical life test



Electrical life test

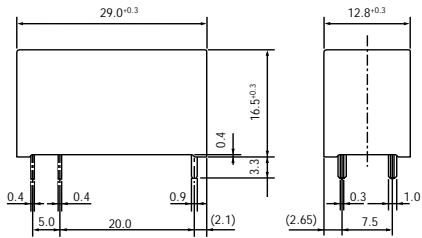


# FTR-F1 SERIES

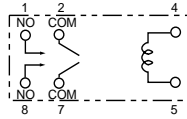
## ■ DIMENSIONS

### ● Dimensions

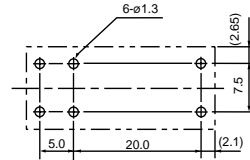
FTR-F1A type



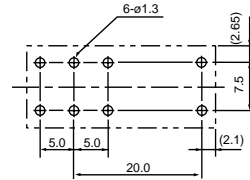
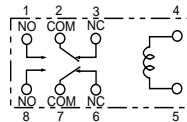
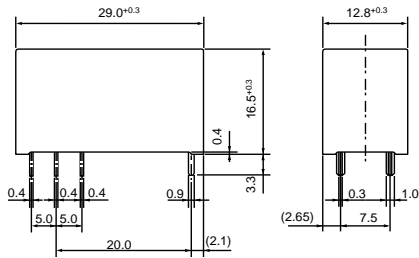
### ● Schematics (BOTTOM VIEW)



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



FTR-F1C type



Unit: mm

## RoHS Compliance and Lead Free Relay Information

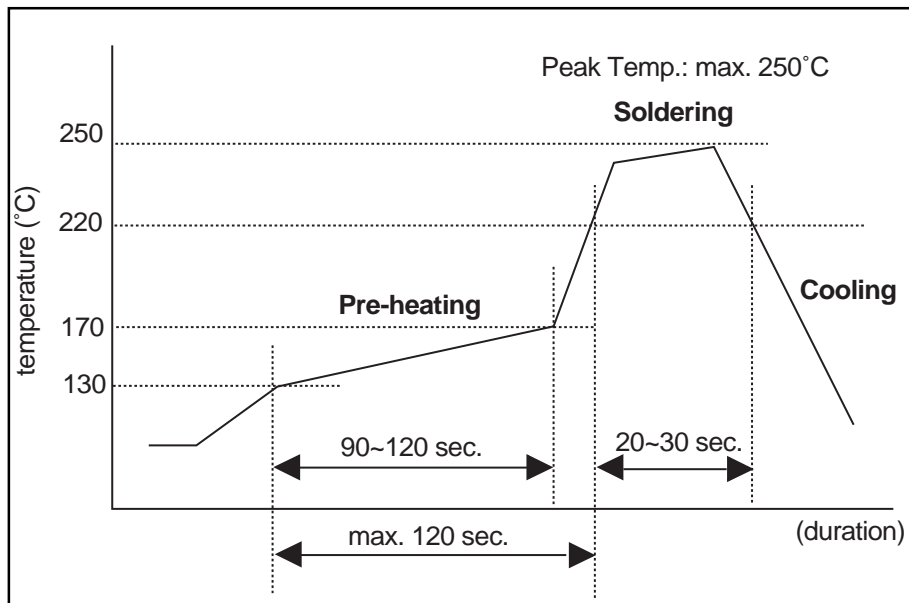
### 1. General Information

- Relays produced after the specific date code that is indicated on each data sheet are lead-free now. Most of our signal and power relays are lead-free. Please refer to Lead-Free Status Info. (<http://www.fcai.fujitsu.com/pdf/LeadFreeLetter.pdf>)
- Lead free solder paste currently used in relays is Sn-3.0Ag-0.5Cu. From February 2005 forward Sn-3.0Cu-Ni will be used for FTRB3 and FTR-B4 series relays.
- Most signal and some power relays also comply with RoHS. Please refer to individual data sheets. Relays that are RoHS compliant do not contain the 6 hazardous materials that are restricted by RoHS directive (lead, mercury, cadmium, chromium IV, PBB, PBDE).
- It has been verified that using lead-free relays in lead 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.

### 2. Recommended Lead Free Solder Profile

- Recommended solder paste Sn-3.0Ag-0.5Cu and Sn-3.0 Cu-Ni (only FTR-B3 and FTR-B4 from February 2005)

#### 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

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

### 5. Solid State Relays

- Each lead terminal will be changed from solder plating to Sn plating and Nickel plating. A layer of Nickel plating is between the terminal and the Sn plating to avoid whisker.

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