

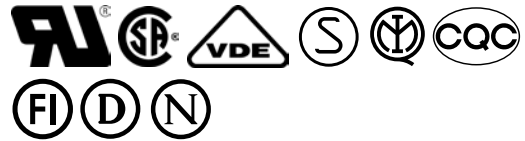
# POWER RELAY

## 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<br>F1(A, C)A ( )V                        | TV-3 rating<br>F1AA ( )T                   | Sensitive Type<br>F1(A, C)D ( )V      |
|------------|--|--|--|---------------------------------------|
| Contact    | Arrangement                            | 2 form A (DPST-NO),<br>2 form C (DPDT)                 | 2 form A (DSDT-NO)                         | 2 form A (DPST-NO)<br>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)<br>-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)<br>Voltage<br>Pollution<br>Isolation material group | 250 V<br>3<br>IIIa |                             |
| Isolation category / Reference voltage (VDE0110b)                                      | C / 250 V          |                             |

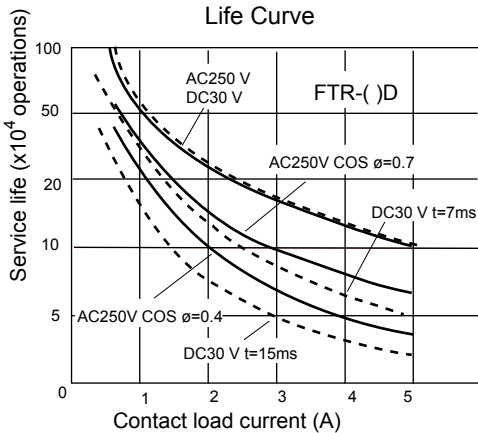
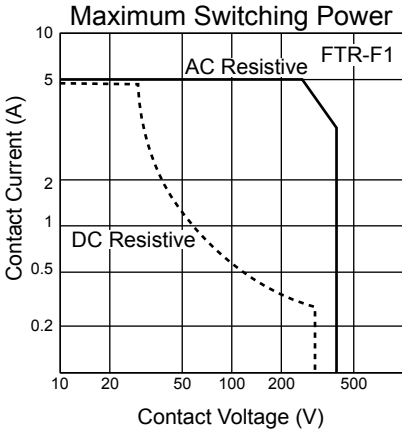
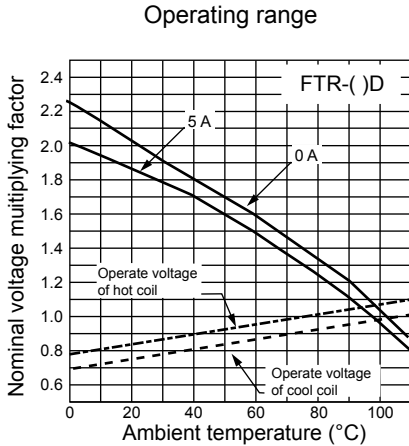
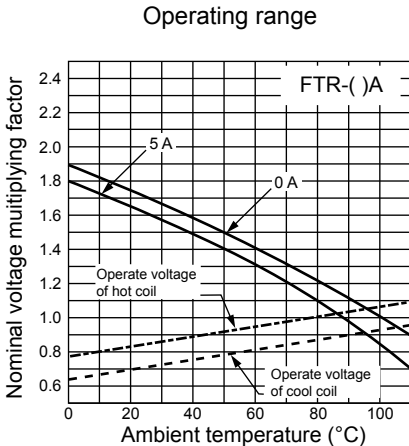
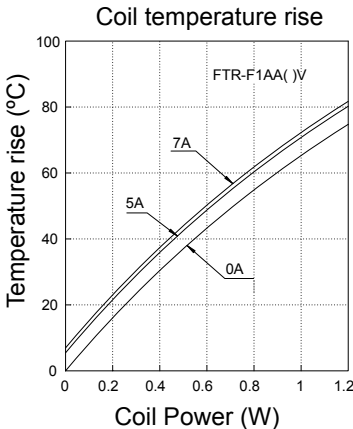
## ■ SAFETY STANDARDS

| Type       | Compliance   | Contact rating  |
|------------|--|---|
| UL         | UL 508   | Flammability: UL 94-V0 (plastics)<br>5A, 24VDC (resistive)<br>5A, 250 VAC (resistive)<br>1/6 HP, 125VAC<br>1/4 HP, 250VAC<br>Pilot duty: C300<br>Pilot duty: R300 (F1AA( )T, F1AA( )V)<br>TV-3 (F1AA( )T) |
|            | E63614   |   |
| CSA        | C22.2 No. 14<br>LR 40304                           |   |
| VDE        | 0435, 0631, 0700, 0860                             | 5A, 250 VAC (cosØ=1)<br>2A, 250 VAC (cosØ=0.4)<br>5 A 24VDC (0ms), 85°C   |
| SEMKO      | EN 61058-1:1992 and A1<br>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

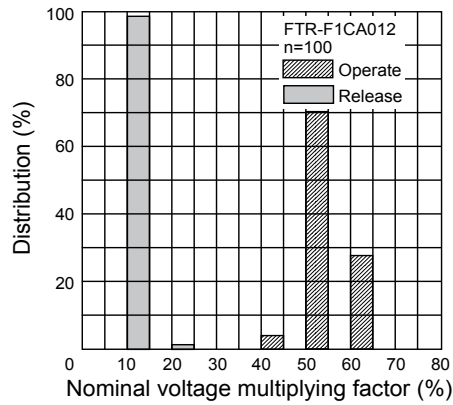
5A Rating Type



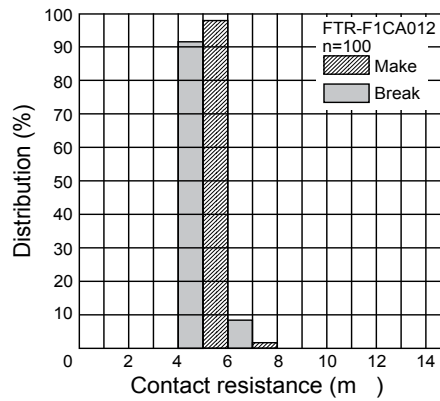
# FTR-F1 SERIES

## REFERENCE DATA

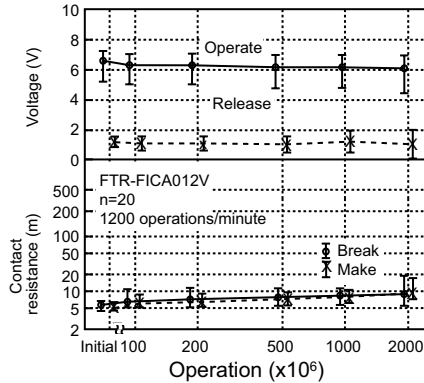
Distribution of operate and release voltage



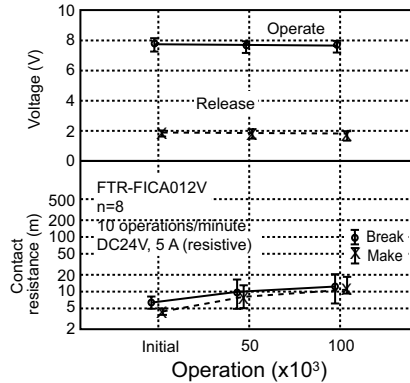
Distribution of contact resistance



Mechanical life test



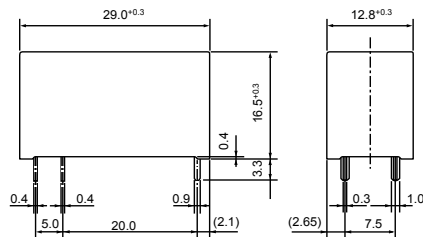
Electrical life test



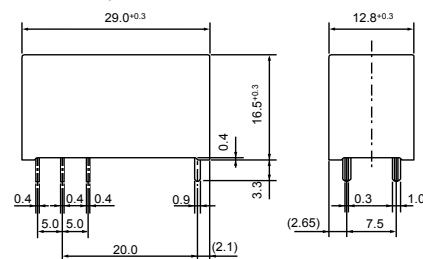
## DIMENSIONS

### Dimensions

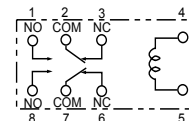
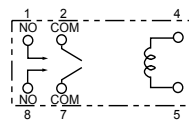
FTR-F1A type



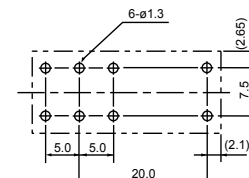
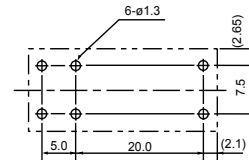
FTR-F1C type



### 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.



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- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



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