POWER RELAY
1 POLE - 10A
VS Series

FTR-K1 SERIES

- UL, CSA, VDE, SEV, CQC recognized
- TV-5 is available
- Working class: C
- UL class B (130°C) coil wire insulation
- Type of service: continuous duty
- Heavy duty miniature slim type power relay
- High isolation in small package
  - Insulation distance: 8 mm
  - Dielectric strength: 5,000 VAC (between coil and contacts)
  - Surge strength: 10,000 V
- Standard and high sensitivity types available
- Flux proof type and plastic sealed type available
- Cadmium free is available
- RoHS compliant. Please see page 8 for more information

PARTNUMBER INFORMATION

Example: VS 12 S M B U N UC

(a) Relay type
(b) Coil rated voltage
(c) Coil type
(d) Contact configuration
(e) Enclosure
(f) TV type
(g) Contact material
(h) Safety standard

Note: Actual marking omits the hyphen (-) of (*)
## SPECIFICATION

<table>
<thead>
<tr>
<th>Contact Data</th>
<th>TV-5 Rating Type</th>
<th>Standard Type</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>VS - ( ) M</td>
<td>VS - ( ) MN</td>
</tr>
<tr>
<td></td>
<td>VS - ( ) U-5</td>
<td>VS - ( ) U-N</td>
</tr>
<tr>
<td></td>
<td>VS - ( ) U-E</td>
<td></td>
</tr>
</tbody>
</table>

**Configuration**

1 form A (SPST-NO), 1 form C (SPDT)

**Construction**

Single

**Material**

Silver cadmium-oxide | Silver alloy | Silver cadmium-oxide | Silver alloy | Gold overlay silver nickel

**Resistance (initial)**

Max. 100mΩ at 6VDC, 1A

**Contact rating**

10A, 240VAC / 24VDC

**Max. carrying current**

*¹ 14A

**Max. switching voltage**

250VAC, 150 VDC

**Max. switching power**

2,400VA, 240W

**Max. inrush current (at lamp load)**

78A, 120VAC

**Min. switching load**

*² 100 mA, 5 VDC (M, 5, E), 10mA 5 VDC (VS-)

**Life**

**Mechanical**

Min. 20 x 10⁶ operations

**Electrical**

- **Contact rating**
  - Min. 100 x 10³ operations
- **Motor**
  - Min. 30 x 10³ operations
- **Lamp**
  - Min. 50 x 10³ operations (at 78A, 120VAC, lamp)
  - Min. 15 x 10³ operations (high sensitive type)

**Coil Data**

- **Rated power (at 20 °C)**
  - 700-750 mW standard type, 530 mW high sensitive type
- **Operate power (at 20 °C)**
  - 350-370 mW standard type, 350 mW high sensitive type
- **Operating temperature range**
  - -40 °C to +85 °C standard type, 40 °C to +75 °C high sensitive type (no frost)

**Timing Data**

- **Operate (at nominal voltage)**
  - Max. 15 ms (without bounce)
- **Release (at nominal voltage)**
  - Max. 10 ms (no diode)

**Insulation**

- **Resistance (initial)**
  - Min. 1,000MΩ at 500VDC
- **Dielectric strength**
  - Open contacts: 1,000VAC (50/60Hz) 1min., 10mA detection current
  - Contacts to coil: 5,000VAC (50/60Hz) 1min., 10mA detection current
- **Surge strength**
  - Coil to contacts: 10,000V, 1.2 x 50μs standard wave
- **Clearance**
  - 8 mm
- **Creepage**
  - 8 mm
- **EN61810-1, VDE0435**
  - Voltage: 250 V
- **Pollution degree**
  - 2
- **Material group**
  - III

**Other**

- **Vibration resistance**
  - Misoperation: 10 to 55Hz double amplitude 1.5 mm
  - Endurance: 10 to 55Hz double amplitude 1.5 mm
- **Shock**
  - Misoperation: Min. 100m/s² (11 ± 1ms)
  - Endurance: Min. 1,000m/s² (6 ± 1ms)
- **Weight**
  - Approximately 17 g

---

*¹ When max. carrying current is more than 10A, PCB layout needs to be considered.

*² Minimum switching loads mentioned above are reference values. Please perform the confirmation test with actual load before production since reference values may vary according to switching frequencies, environmental conditions and expected reliability levels.
### COIL RATING

#### Standard type

<table>
<thead>
<tr>
<th>Coil Code</th>
<th>Rated Coil Voltage (VDC)</th>
<th>Coil Resistance +/- 10% (Ohm)</th>
<th>Must Operate Voltage (VDC) *</th>
<th>Must Release Voltage (VDC) *</th>
<th>Max. Coil Voltage (VDC)</th>
<th>Rated Power (mW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>12.5</td>
<td>2.1</td>
<td>0.3</td>
<td>4.95</td>
<td>720</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>36</td>
<td>3.5</td>
<td>0.5</td>
<td>8.25</td>
<td>700</td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>50</td>
<td>4.2</td>
<td>0.6</td>
<td>9.90</td>
<td>720</td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>115</td>
<td>6.3</td>
<td>0.9</td>
<td>14.85</td>
<td>700</td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>200</td>
<td>8.4</td>
<td>1.2</td>
<td>19.8</td>
<td>720</td>
</tr>
<tr>
<td>14</td>
<td>14</td>
<td>280</td>
<td>9.8</td>
<td>1.4</td>
<td>23.1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>18</td>
<td>460</td>
<td>12.6</td>
<td>1.8</td>
<td>29.7</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>24</td>
<td>820</td>
<td>16.8</td>
<td>2.4</td>
<td>39.6</td>
<td>700</td>
</tr>
<tr>
<td>36</td>
<td>36</td>
<td>1,850</td>
<td>25.2</td>
<td>3.6</td>
<td>59.4</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>48</td>
<td>3,300</td>
<td>33.6</td>
<td>4.8</td>
<td>79.2</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>60</td>
<td>5,100</td>
<td>42</td>
<td>6</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>100</td>
<td>13,400</td>
<td>70</td>
<td>10</td>
<td>165</td>
<td>750</td>
</tr>
</tbody>
</table>

#### High sensitive type (250 mW)

<table>
<thead>
<tr>
<th>Coil Code</th>
<th>Rated Coil Voltage (VDC)</th>
<th>Coil Resistance +/- 10% (Ohm)</th>
<th>Must Operate Voltage (VDC) *</th>
<th>Must Release Voltage (VDC) *</th>
<th>Max. Coil Voltage (VDC)</th>
<th>Rated Power (mW)</th>
</tr>
</thead>
<tbody>
<tr>
<td>3</td>
<td>3</td>
<td>17</td>
<td>2.1</td>
<td>0.3</td>
<td>4.95</td>
<td>530</td>
</tr>
<tr>
<td>5</td>
<td>5</td>
<td>47</td>
<td>3.5</td>
<td>0.5</td>
<td>8.25</td>
<td></td>
</tr>
<tr>
<td>6</td>
<td>6</td>
<td>68</td>
<td>4.2</td>
<td>0.6</td>
<td>9.90</td>
<td></td>
</tr>
<tr>
<td>9</td>
<td>9</td>
<td>115</td>
<td>6.3</td>
<td>0.9</td>
<td>14.85</td>
<td></td>
</tr>
<tr>
<td>12</td>
<td>12</td>
<td>270</td>
<td>8.4</td>
<td>1.2</td>
<td>19.8</td>
<td></td>
</tr>
<tr>
<td>14</td>
<td>14</td>
<td>370</td>
<td>9.8</td>
<td>1.4</td>
<td>23.1</td>
<td></td>
</tr>
<tr>
<td>18</td>
<td>18</td>
<td>610</td>
<td>12.6</td>
<td>1.8</td>
<td>29.7</td>
<td></td>
</tr>
<tr>
<td>24</td>
<td>24</td>
<td>1,000</td>
<td>16.8</td>
<td>2.4</td>
<td>39.6</td>
<td></td>
</tr>
<tr>
<td>36</td>
<td>36</td>
<td>2,450</td>
<td>25.2</td>
<td>3.6</td>
<td>59.4</td>
<td></td>
</tr>
<tr>
<td>48</td>
<td>48</td>
<td>4,400</td>
<td>33.6</td>
<td>4.8</td>
<td>79.2</td>
<td></td>
</tr>
<tr>
<td>60</td>
<td>60</td>
<td>6,800</td>
<td>42</td>
<td>6</td>
<td>99</td>
<td></td>
</tr>
<tr>
<td>100</td>
<td>100</td>
<td>18,860</td>
<td>70</td>
<td>10</td>
<td>165</td>
<td></td>
</tr>
</tbody>
</table>

Note: All values in the tables are valid for 20°C and zero contact current.
* Specified operate values are valid for pulse wave voltage.
### SAFETY STANDARDS

<table>
<thead>
<tr>
<th>Type</th>
<th>Compliance</th>
<th>Contact rating</th>
</tr>
</thead>
<tbody>
<tr>
<td>UL</td>
<td>UL 508</td>
<td>Flammability: UL 94-V0 (plastics)</td>
</tr>
<tr>
<td></td>
<td>E 56140</td>
<td>[TV-rating VS-( ) M, SM, M-N]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10A, 240VAC/24VDC (resistive)</td>
</tr>
<tr>
<td>CSA</td>
<td>C22.2 No. 14, LR 35579</td>
<td>1/3 hp, 240VAC/120VAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pilot duty: C150</td>
</tr>
<tr>
<td></td>
<td></td>
<td>TV-5 120 VAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[UN, SU-N]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>15A, 120VAC/24VDC (resistive)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10A, 240VAC (resistive)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1/3 hp, 240VAC/120VAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pilot duty: B150</td>
</tr>
<tr>
<td></td>
<td></td>
<td>[VS-( ) ( ) U-( ), ( )S( ) U-( )]</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10A, 240VAC/24VDC (resistive)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>1/3 hp, 240VAC/120VAC</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Pilot duty: C150</td>
</tr>
<tr>
<td>VDE</td>
<td>0435, 0631, 0700, 0860, 40014665</td>
<td>10A, 250VAC, cos φ 1</td>
</tr>
<tr>
<td></td>
<td></td>
<td>2.9A, 250VAC, cos φ 0.4</td>
</tr>
<tr>
<td></td>
<td></td>
<td>10A, 24VDC, 0msec</td>
</tr>
</tbody>
</table>

Also complies with SEV, CQC

### CHARACTERISTIC DATA

- **Timing (Standard Type)**
- **Timing (High Sensitive Type)**
- **Coil Temperature Rise (Standard Type)**
- **Operating Range**
Discontinued in March 2019

**FTR-K1 Series**

**Maximun Switching Power**

- Switching current (A)
- Contact voltage (V)

**Life Curves**

- 120VAC (Resistive)
- 24VAC (Resistive)
- 24VDC (Resistive)

**Distribution of Operate & Release Voltage**

- Normal Voltage Multiplying Factor (%)

**Distribution of Operation & Release Time**

- Time (ms)

**Distribution of Contact Resistance**

- Contact Resistance (μΩ)

**Mechanical Life Test**

- Voltage (V)
- Operation (x 10^6)
- Contact Resistance (μΩ)

**Electrical Life Test**

- Voltage (V)
- Operation (x 10^6)
- Contact Resistance (μΩ)
**DIMENSIONS**

- **Dimensions**

  VS-MB type flux proof type

  ![Dimensions](image1)

  VS-MC type (plastic sealed type with tape)

  ![Dimensions](image2)

  VS-MK type (Plastic sealed type)

  ![Dimensions](image3)

- **Schematics**
  (BOTTOM VIEW)

  ![Schematics](image4)

- **PC board mounting hole layout**
  (BOTTOM VIEW)

  ![PC board mounting hole layout](image5)

**Unit: mm**
Discontinued in March 2019

VS SERIES

- Dimensions

VS-TB type (Flux proof type)

VS-TC type (Plastic sealed type with tape)

VS-TK type (Plastic sealed type)

- Schematics
  (BOTTOM VIEW)

- PC board mounting hole layout
  (BOTTOM VIEW)

Note: This datasheet provide only + tolerance for outer dimensions.
RoHS Compliance and Lead Free Information

1. General Information
   - All relays produced by Fujitsu Components are compliant with RoHS directive 2011/65/EU including amendments.
   - Cadmium as used in electrical contacts is exempted from the RoHS directives. As per Annex III of directive 2011/65/EU.
   - All relays are lead-free. Please refer to Lead-Free Status Info for older date codes at: http://www.fujitsu.com/downloads/MICRO/fcai/relays/lead-free-letter.pdf
   - Lead free solder plating on relay terminals is Sn-3.0Ag-0.5Cu, unless otherwise specified. This material has been verified to be compatible with PbSn assembly process.

2. Recommended Lead Free Solder Condition
   - Recommended solder Sn-3.0Ag-0.5Cu.

   **Flow Solder Condition:**
   - Pre-heating: maximum 120°C within 90 sec.
   - Soldering: dip within 5 sec. at 255°C ± 5°C solder bath
   - Relay must be cooled by air immediately after soldering

   **Solder by Soldering Iron:**
   - Soldering Iron 30-60W
   - Temperature: maximum 350-360°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, unless otherwise indicated.

4. Tin Whiskers
   - Dipped SnAgCu solder is known as presenting a low risk to tin whisker development. No considerable length whisker was found by our in house test.
Fujitsu Components International Headquarter Offices

<table>
<thead>
<tr>
<th>Japan</th>
<th>Europe</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fujitsu Component Ltd.</td>
<td>Fujitsu Components Europe B.V.</td>
</tr>
<tr>
<td>Shinagawa Seaside Park</td>
<td>Diamantlaan 25</td>
</tr>
<tr>
<td>Tower 19F,</td>
<td>2132 WV Hoofddorp</td>
</tr>
<tr>
<td>12-4, Higashi-shinagawa</td>
<td>Netherlands</td>
</tr>
<tr>
<td>4-chome, Shinagawa-ku,</td>
<td>Tel: (31-23) 5560910</td>
</tr>
<tr>
<td>Tokyo, 140-0002, Japan</td>
<td>Fax: (31-23) 5560950</td>
</tr>
<tr>
<td>Tel: (81-3) 3450-1681</td>
<td>Email: <a href="mailto:info@fceu.fujitsu.com">info@fceu.fujitsu.com</a></td>
</tr>
<tr>
<td>Fax: (81-3) 3474-2385</td>
<td>Web: emea.fujitsu.com/components/</td>
</tr>
<tr>
<td>Email: <a href="mailto:fcl-contact@cs.jp.fujitsu.com">fcl-contact@cs.jp.fujitsu.com</a></td>
<td></td>
</tr>
<tr>
<td>Web: <a href="http://www.fcl.fujitsu.com">www.fcl.fujitsu.com</a></td>
<td></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>North and South America</th>
<th>Asia Pacific</th>
</tr>
</thead>
<tbody>
<tr>
<td>Fujitsu Components America, Inc.</td>
<td>Fujitsu Components Asia Ltd.</td>
</tr>
<tr>
<td>2290 North 1st Street, Suite 212</td>
<td>102E Pasir Panjang Road</td>
</tr>
<tr>
<td>San Jose, CA 95131, USA</td>
<td>#01-01 Citlink Warehouse Complex</td>
</tr>
<tr>
<td>Tel: (1-408) 745-4900</td>
<td>Singapore 118529</td>
</tr>
<tr>
<td>Fax: (1-408) 745-4970</td>
<td>Tel: (65) 6375-8560</td>
</tr>
<tr>
<td>Email: <a href="mailto:components@us.fujitsu.com">components@us.fujitsu.com</a></td>
<td>Fax: (65) 6273-3021</td>
</tr>
<tr>
<td>Web: <a href="http://us.fujitsu.com/components">http://us.fujitsu.com/components</a></td>
<td>Email: <a href="mailto:fcal@fcal.fujitsu.com">fcal@fcal.fujitsu.com</a></td>
</tr>
<tr>
<td></td>
<td>Web: <a href="http://www.fujitsu.com/sg/services/micro/components/">http://www.fujitsu.com/sg/services/micro/components/</a></td>
</tr>
</tbody>
</table>

©2014 Fujitsu Components Europe B.V. All rights reserved. All trademarks or registered trademarks are the property of their respective owners.

The contents, data and information in this datasheet are provided by Fujitsu Component Ltd. as a service only to its user and only for general information purposes. The use of the contents, data and information provided in this datasheet is at the users' own risk. Fujitsu has assembled this datasheet with care and will endeavor to keep the contents, data and information correct, accurate, comprehensive, complete and up to date. Fujitsu Components Europe B.V. and affiliated companies do however not accept any responsibility or liability on their behalf, nor on behalf of its employees, for any loss or damage, direct, indirect or consequential, with respect to this datasheet, its contents, data, and information and related graphics and the correctness, reliability, accuracy, comprehensiveness, usefulness, availability and completeness thereof. Nor do Fujitsu Components Europe B.V. and affiliated companies accept on their behalf, nor on behalf of its employees, any responsibility or liability for any representation or warrant of any kind, express or implied, including warranties of any kind for merchantability or fitness for particular use, with respect to these datasheets, its contents, data, information and related graphics and the correctness, reliability, accuracy, comprehensiveness, usefulness, availability and completeness thereof. Rev. August 04, 2014