

# COMPACT POWER RELAY

## 1 POLE—25 A FOR AUTOMOTIVE APPLICATIONS

### FTR-P3 Series

RoHS compliant

#### ■ FEATURES

- Compact for high density packaging.  
(65% volume of previous generation FBR 51/52 Series).
- High contact capacity with proven contact material.  
(100,000 operations, 14 V, 25 A achieved, even with reduced size).
- 125°C version is available.
- Surface mount compatible version (reflowable) is available.
- Coil power savings  
(600mW nominal achieved with state-of-the-art magnetic analysis/design).
- Ease of PCB layout  
(all terminals on perimeter, coil and contact terminals separated).
- Optional over-voltage circuit breaking capability  
(0.6mm gap, contact our representative).
- Packaging for auto-insertion (tube packing, 30 relays/tube).
- RoHS compliant since date code: 0630  
Please see page 8 for more information



#### ■ ORDERING INFORMATION

[Example]      FTR-P3    C    N    012   W1    \*\*\*  
                  (a)    (b)    (c)    (d)   (e)    (f)

|     |                      |                                                                                                                                                                               |
|-----|----------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| (a) | Series Name          | FTR-P3 Series                                                                                                                                                                 |
| (b) | Contact Arrangement  | C : 1 Form C                                                                                                                                                                  |
| (c) | Contact Gap          | N : 0.3mm gap<br>P : 0.6mm gap                                                                                                                                                |
| (d) | Nominal Coil Voltage | 009 : 09VDC<br>010 : 10VDC<br>012 : 12VDC                                                                                                                                     |
| (e) | Contact Material     | W1 : Silver-tin oxide-indium                                                                                                                                                  |
| (f) | Custom Designation   | Nil : Standard (85°C)<br>-01 : High temperature (125°C)<br>-05 : High temperature (125°C) and reflowable<br>-06 : High temperature (125°C) and reflowable<br>Higher stand-off |

Note: The part number stamped on the relay cover does not include "FTR".

Example: Ordering part number: FTR-P3CN012W1

Stamped on part number: P3CN012W1

#### ■ TYPICAL APPLICATIONS

|              |            |                     |
|--------------|------------|---------------------|
| Power window | Power seat | Tilt steering       |
| Door lock    | Wiper/IWW  | Retractable antenna |
| Sun roof     |            |                     |

## ■ SPECIFICATIONS

| Item          |                                           |                      | Specification                                                                                                         |                                             |
|---------------|-------------------------------------------|----------------------|-----------------------------------------------------------------------------------------------------------------------|---------------------------------------------|
|               |                                           |                      | Standard                                                                                                              | High temperature version<br>(-01, -05, -06) |
| Contact       | Arrangement                               |                      | 1 form C (SPDT)                                                                                                       |                                             |
|               | Material                                  |                      | Silver-tin oxide-indium                                                                                               |                                             |
|               | Contact path Voltage Drop (Initial)       |                      | Maximum 100 mV (at 1 A 12 VDC)                                                                                        |                                             |
|               | Rating                                    |                      | 25 A at 14VDC (locked motor load)                                                                                     |                                             |
|               | Maximum Carry Current*1                   |                      | 25 A / 1hour (25° C, 100% rated coil voltage)                                                                         |                                             |
|               | Maximum Switching Current (Reference)     |                      | 35 A at 16 VDC                                                                                                        |                                             |
|               | Minimum Switching Load*2 (Reference)      |                      | 1 A, 6 VDC                                                                                                            |                                             |
| Coil          | Operating Ambient Temperature Range       |                      | -40° C to +85° C (no frost)                                                                                           | -40° C to +125° C (no frost)                |
|               | Storage Temperature Range                 |                      | -40° C to +100° C (no frost)                                                                                          | -40° C to +125° C (no frost)                |
| Timing Values | Operate (at nominal voltage)              |                      | Maximum 10ms (not including bounce)                                                                                   |                                             |
|               | Release (at nominal voltage)              |                      | Maximum 5ms (not including bounce, no diode)<br>Maximum 15ms (not including bounce, with diode)                       |                                             |
| Life          | Mechanical                                |                      | 10 x 10 <sup>6</sup> operations minimum                                                                               |                                             |
|               | Electrical                                |                      | 100 x 10 <sup>3</sup> operations minimum, 14 VDC, 25 A (locked motor load)<br>(1 operation = 1 forward and 1 reverse) |                                             |
| Other         | Vibration Resistance                      | Operational          | 10-55Hz, 1.5mm double amplitude (=9.13G @ 55Hz)                                                                       |                                             |
|               | Shock Resistance                          | Operational          | 100 m/s <sup>2</sup> minimum (10G)                                                                                    |                                             |
|               |                                           | Withstand, no damage | 1, 000 m/s <sup>2</sup> minimum (100G)                                                                                |                                             |
|               | Insulation Resistance (initial)           |                      | 100M ohms @500 VAC                                                                                                    |                                             |
|               | Dielectric Withstanding Voltage (initial) |                      | 500 VAC                                                                                                               |                                             |
|               | Weight                                    |                      | Approximately 5g                                                                                                      |                                             |

\*1 Need to consider the head from PCB when max. current is more than 10A.

\*2 Values when switching a resistive load at normal room temperature and humidity and in a clean environment.  
The minimum switching load varies with the switching frequency and operating environment.

# FTR-P3 SERIES

## COIL DATA CHART

FTR-P3 Series (0.25mm contact gap)

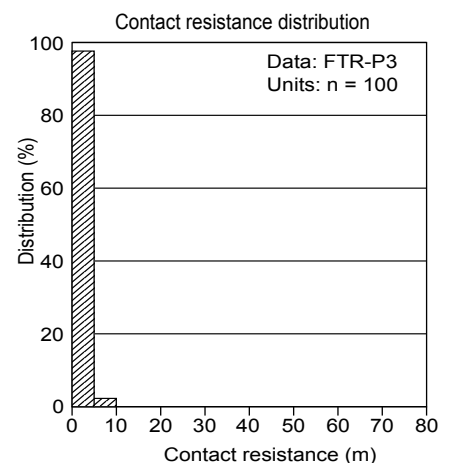
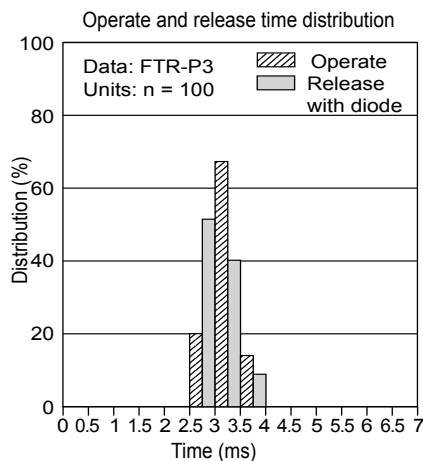
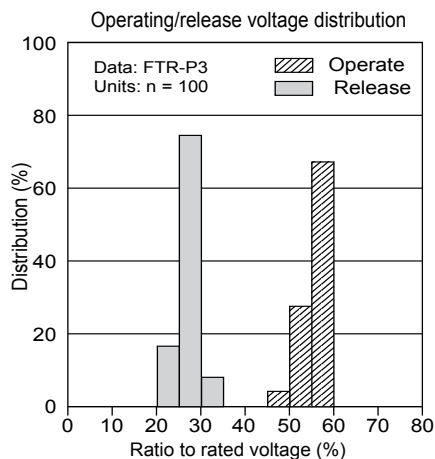
| Model             | Nominal Coil Voltage | Coil Resistance ( $\pm 10\%$ at 20°C) | Must Operate Voltage                   | Must Release Voltage (at 20°C) | Coil Power at Nominal Voltage | Thermal Resistance (approx.) |
|-------------------|----------------------|---------------------------------------|----------------------------------------|--------------------------------|-------------------------------|------------------------------|
| FTR-P3CN009W1 ( ) | 9VDC                 | 135 $\Omega$                          | 5.5VDC (at 20° C)<br>6.9VDC (at 85° C) | 0.75VDC                        | 0.6W                          | 73° C/W                      |
| FTR-P3CN010W1 ( ) | 10VDC                | 167 $\Omega$                          | 6.3VDC (at 20° C)<br>7.9VDC (at 85° C) | 0.9VDC                         | 0.6W                          | 73° C/W                      |
| FTR-P3CN012W1 ( ) | 12VDC                | 240 $\Omega$                          | 7.3VDC (at 20° C)<br>9.2VDC (at 85° C) | 1.0VDC                         | 0.6W                          | 73° C/W                      |

Note: ( ) is "Nil", "-01", "05", or "-06"

FTR-P3 Series (0.6mm contact gap)

| Model          | Nominal Coil Voltage | Coil Resistance ( $\pm 10\%$ at 20°C) | Must Operate Voltage                 | Must Release Voltage (at 20°C) | Coil Power at Nominal Voltage | Thermal Resistance (approx.) |
|----------------|----------------------|---------------------------------------|--------------------------------------|--------------------------------|-------------------------------|------------------------------|
| FTR-P3-CP009W1 | 9VDC                 | 100 $\Omega$                          | 5.5VDC (at 20°C)<br>6.9VDC (at 85°C) | 0.75VDC                        | 0.8W                          | 73°C/W                       |
| FTR-P3-CP010W1 | 10VDC                | 125 $\Omega$                          | 6.3VDC (at 20°C)<br>7.9VDC (at 85°C) | 0.9VDC                         | 0.8W                          | 73°C/W                       |
| FTR-P3-CP012W1 | 12VDC                | 167 $\Omega$                          | 7.3VDC (at 20°C)<br>9.2VDC (at 85°C) | 1.0VDC                         | 0.8W                          | 73°C/W                       |

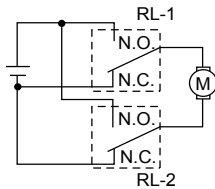
## REFERENCE DATA



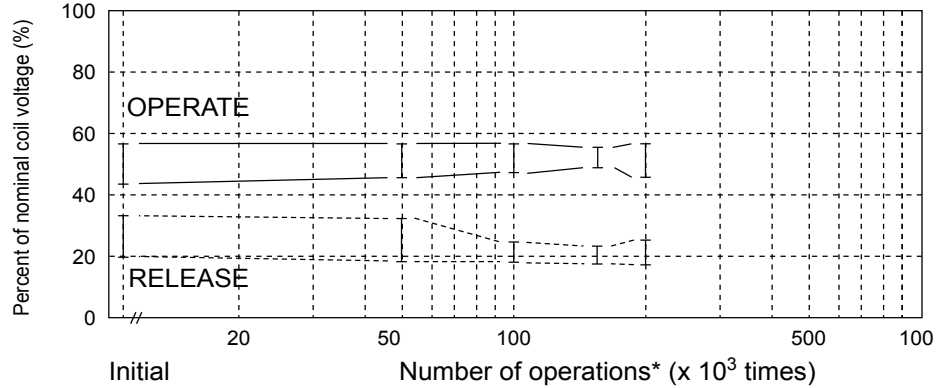
## ■ CHARACTERISTIC DATA

### 1. LIFE TEST (EXAMPLES)

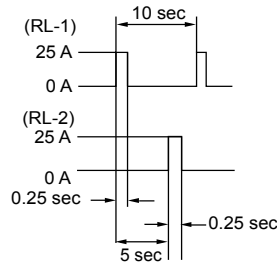
- Test item  
14 V DC-25 A  
locked motor  
100K operations\* minimum  
0.25 seconds ON,  
9.75 seconds OFF



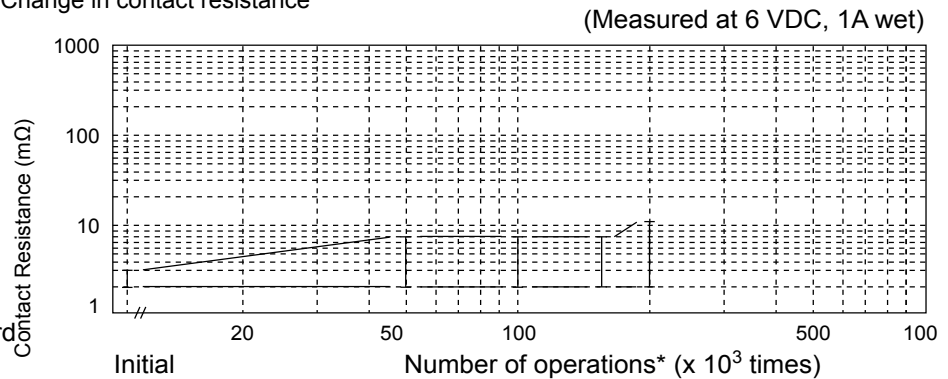
- Change of operate and release voltage



- Current wave form

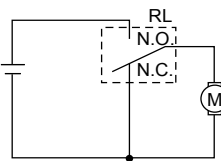


- Change in contact resistance

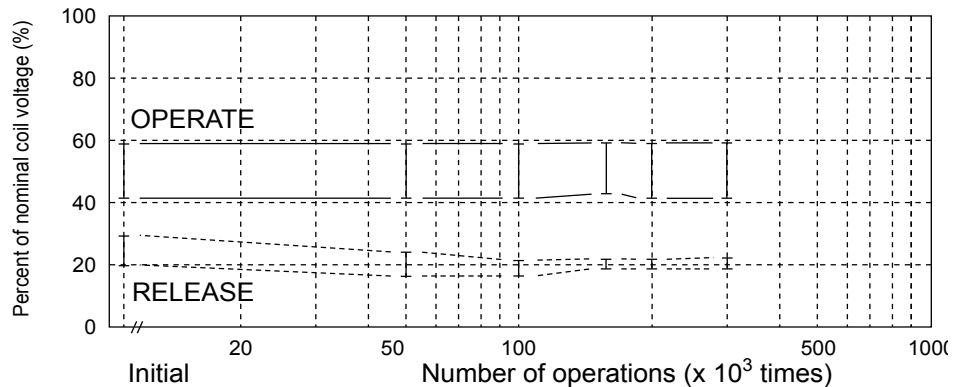


\* 1 operation = 1 forward and 1 reverse

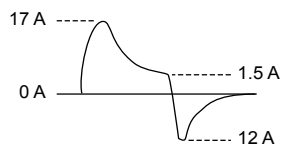
- Test item  
14 V DC,  
inrush current: 17A  
motor free  
300K operations minimum  
0.25 seconds ON,  
9.75 seconds OFF



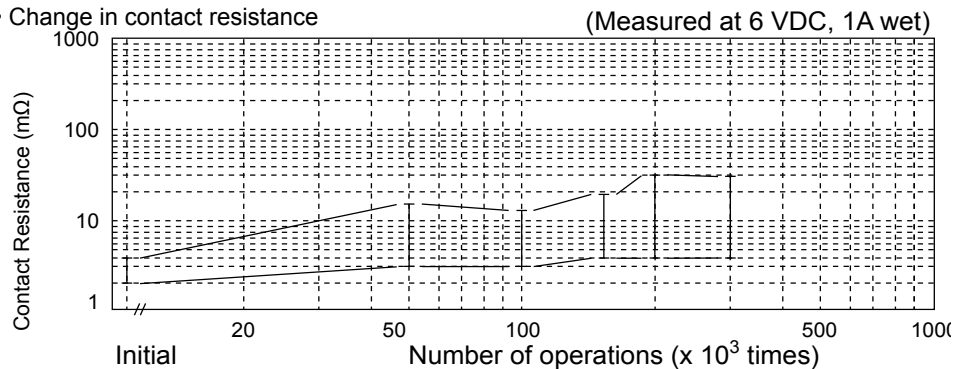
- Change of operate and release voltage



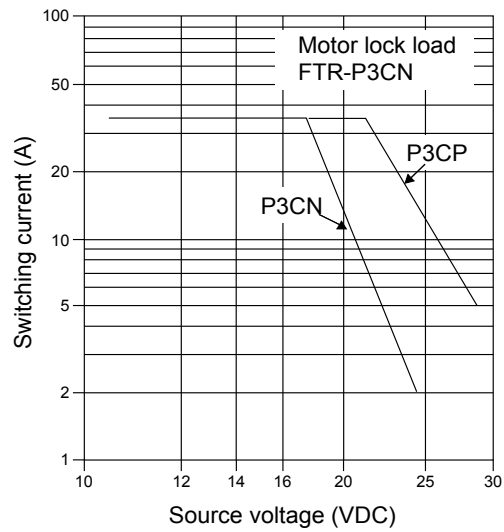
- Current wave form



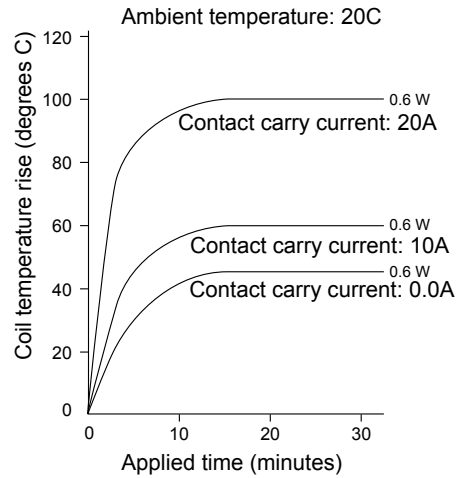
- Change in contact resistance



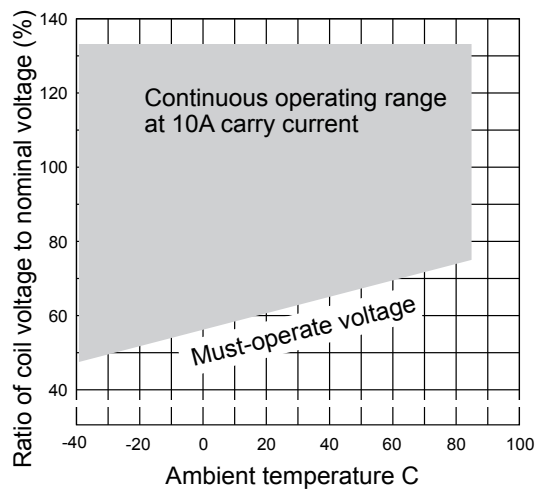
## 2. MAXIMUM BREAK CAPACITY



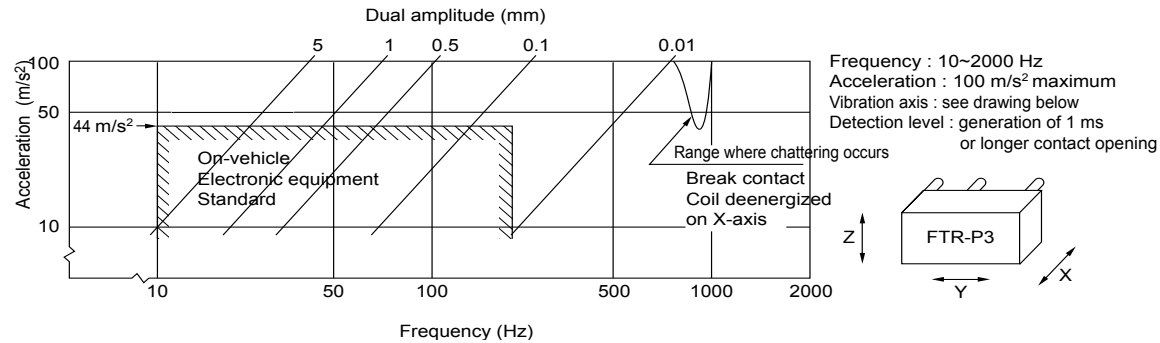
## 3. COIL TEMPERATURE RISE



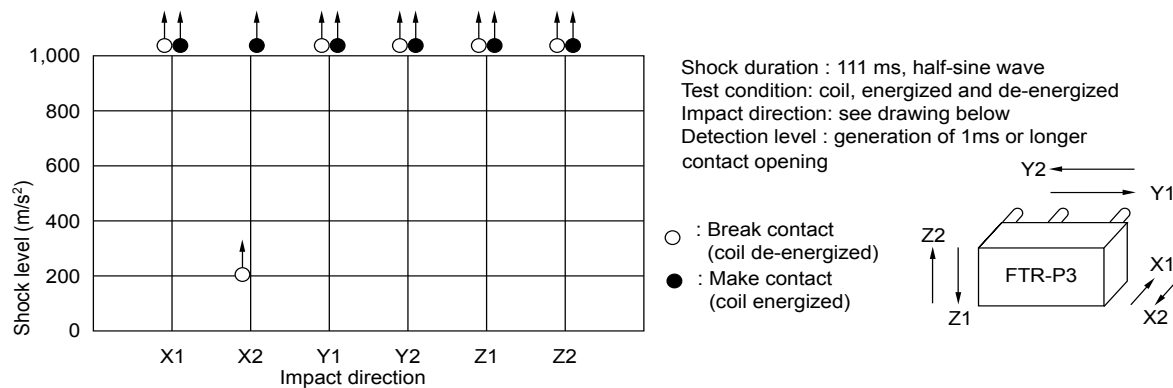
## 4. OPERATING COIL VOLTAGE RANGE



## 5. VIBRATION RESISTANCE CHARACTERISTIC

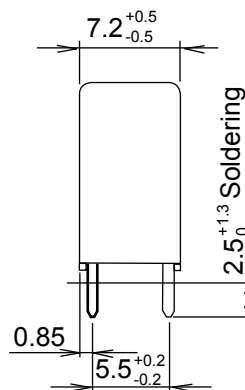
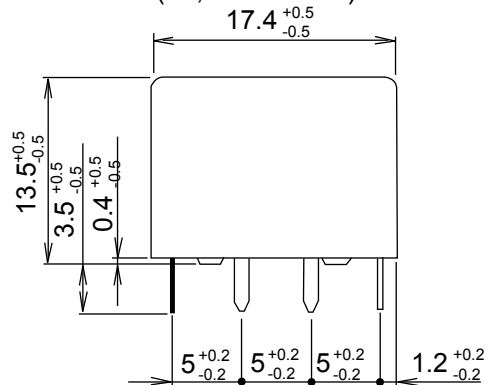


## 6. SHOCK RESISTANCE CHARACTERISTIC

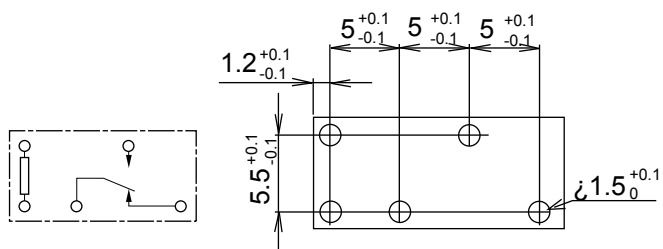
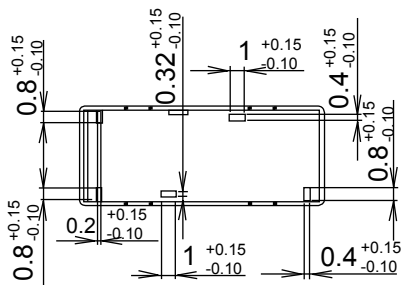


## ■ DIMENSIONS AND SCHEMATICS

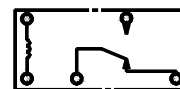
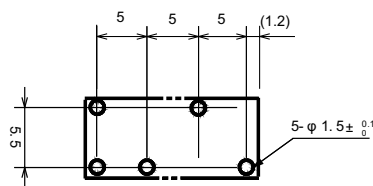
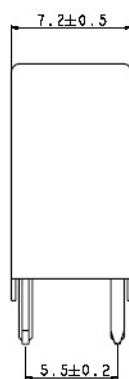
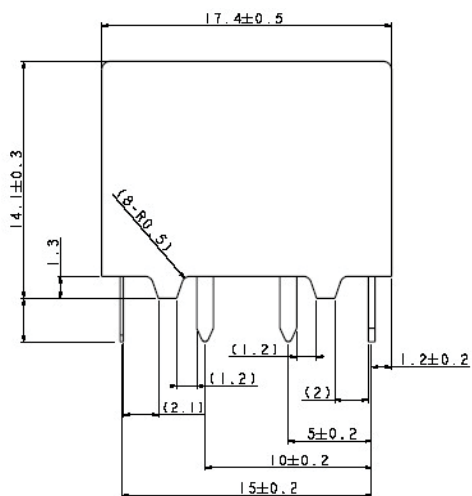
Dimensions (Nil, -01 and -05)



PCB mounting hole layout and schematic (Bottom view)



Dimensions (-06)



Units: 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.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 most 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 8630, Japan  
Tel: (81-3) 5449-7010  
Fax: (81-3) 5449-2626  
Email: [promothq@fcl.fujitsu.com](mailto:promothq@fcl.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: [fcsl.fcal.fujitsu.com](mailto:fcsl.fcal.fujitsu.com)  
Web: <http://www.fujitsu.com/sg/services/micro/components/>

©2009 Fujitsu Components America, Inc. All rights reserved. All trademarks or registered trademarks are the property of their respective owners.

Fujitsu Components America or its affiliates do not warrant that the content of datasheet is error free. In a continuing effort to improve our products Fujitsu Components America, Inc. or its affiliates reserve the right to change specifications/datasheets without prior notice.  
Rev. March 4, 2009.



Компания «ЭлектроПласт» предлагает заключение долгосрочных отношений при поставках импортных электронных компонентов на взаимовыгодных условиях!

Наши преимущества:

- Оперативные поставки широкого спектра электронных компонентов отечественного и импортного производства напрямую от производителей и с крупнейших мировых складов;
- Поставка более 17-ти миллионов наименований электронных компонентов;
- Поставка сложных, дефицитных, либо снятых с производства позиций;
- Оперативные сроки поставки под заказ (от 5 рабочих дней);
- Экспресс доставка в любую точку России;
- Техническая поддержка проекта, помощь в подборе аналогов, поставка прототипов;
- Система менеджмента качества сертифицирована по Международному стандарту ISO 9001;
- Лицензия ФСБ на осуществление работ с использованием сведений, составляющих государственную тайну;
- Поставка специализированных компонентов (Xilinx, Altera, Analog Devices, Intersil, Interpoint, Microsemi, Aeroflex, Peregrine, Syfer, Eurofarad, Texas Instrument, Miteq, Cobham, E2V, MA-COM, Hittite, Mini-Circuits, General Dynamics и др.);

Помимо этого, одним из направлений компании «ЭлектроПласт» является направление «Источники питания». Мы предлагаем Вам помощь Конструкторского отдела:

- Подбор оптимального решения, техническое обоснование при выборе компонента;
- Подбор аналогов;
- Консультации по применению компонента;
- Поставка образцов и прототипов;
- Техническая поддержка проекта;
- Защита от снятия компонента с производства.



#### Как с нами связаться

**Телефон:** 8 (812) 309 58 32 (многоканальный)

**Факс:** 8 (812) 320-02-42

**Электронная почта:** [org@eplast1.ru](mailto:org@eplast1.ru)

**Адрес:** 198099, г. Санкт-Петербург, ул. Калинина, дом 2, корпус 4, литера А.