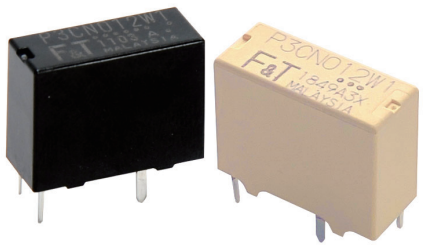
COMPACT POWER RELAY FOR AUTOMOTIVE APPLICATION
1 POLE - 25A (for 12V car battery)

FTR-P3 Series

RoHS Compliant

■ FEATURES

- Compact for high density packaging
- High contact capacity with proven contact material.
  (100,000 operations at 25A, 14VDC)
- Coil power savings (600mW nominal achieved with state-of-the-art magnetic design)
- Ease of PCB layout (all terminals on perimeter, coil and contact terminals separated)
- Optional over-voltage circuit breaking capability (0.6mm gap)
- Packaging for auto-insertion
- Reflowable & high stand-off type available
- RoHS compliant



■ APPLICATIONS

Body control (power windows, power seats, tilt steering, sun roof, wiper, retractable antenna etc.)

■ PART NUMBERS

[Example] FTR-P3 C N 012 W1 - 06
(a) (b) (c) (d) (e) (f)

(a)	Relay type	FTR-P3 series
(b)	Contact configuration	A : 1a (1 Form A) (only with -06) C : 1c (1 Form C)
(c)	Contact gap	N : 0.25mm P : 0.6mm (standard, -ML)
(d)	Coil rated voltage	012 : 9....12VDC Please refer to coil rating table
(e)	Contact material	W1 : Silver tin oxide indium
(f)	Special type	None : Standard ML : Multi-layered contact 06 : High stand-off (reflowable type)

Actual marking does not carry the type name: “FTR (-ML) (-06)”

E.g.: Ordering code: FTR-P3CN012W1-06 Actual marking: P3CN012W1

■ SPECIFICATIONS

Item			Specifiations			Remarks
			Standard (without suffix)	Multi-layered contact (-ML)	Reflowable (-06)	
Contact data	Configuration		1c (1 Form C, SPDT)		1a (1 Form A, SPST) 1c (1 Form C, SPDT)	
	Material		Silver tin oxide indium			
	Contact path voltage drop		Max. 100mV			At 1A, 12VDC
	Contact rating		25A, 14VDC			Locked motor load
	Max. carrying current *1		25A/1 hour			25°C, 100% rated coil voltage
	Max. switcing voltage		16VDC			Reference
	Max. switching current		35A			Reference
	Max. switching load *2		1A, 6VDC			Reference
Coil data	Operating ambient temperature range		-40°C to +85°C		-40°C to +125°C	No frost
	Storage temperature range		-40°C to +85°C, 45 to 85%RH	-40°C to +100°C , 45 to 85%RH	-40°C to +125°C, 45 to 85%RH	No frost
Time	Operate		Min. 10 ms (without bounce, no diode)			At nominal voltage
	Release		Min.5 ms (without bounce, no diode) Min. 15 ms (without bounce, with diode)			At nominal voltage
Life	Mechanical		Min.10 x 10^6 operations	Min.1 x 10^6 operations		
	Electrical		Min.100 x 10^3 operations, 25A, 14VDC (1 operation=1 forward and 1 reverse)			Locked motor load
Insulation	Resistance (initial)		100MΩ			At 500VAC
	Dielectric withstanding voltage (initial)		500VAC, 1 minute			
Others	Vibration resistance	Misoperation	10 to 200Hz, acceleration 43m/s^2 (4.4G), constant acceleration			
		Endurance	10 to 200Hz, acceleration 43m/s^2 (4.4G), constant acceleration			
	Shock resistance	Misoperation	100m/s^2 minimum (11±1ms)			
		Endurance	1,000m/s^2 minimum (6±1ms)			
	Dimensions / weight		7.2×17.4×13.5 mm / 5g		7.2×17.4×14.1 mm / 5g	

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

*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 DATA

FTR-P3 (0.25mm contact gap, standard/multi-layered contact)

Coil Code	Rated Coil Voltage (VDC)	Coil Resistance ±10% (Ω)	Must Operate Voltage*1 (VDC)	Must Release Voltage*1 (VDC)
009	9	135	5.5 (at 20°C) 6.9 (at 85°C)	0.7 (at 20°C) 0.9 (at 85°C)
010	10	167	6.3 (at 20°C) 7.9 (at 85°C)	0.8 (at 20°C) 1.0 (at 85°C)
012	12	240	7.3 (at 20°C) 9.2 (at 85°C)	1.0 (at 20°C) 1.3 (at 85°C)

FTR-P3 (0.25 mm contact gap, reflowable (-06))

Coil Code	Rated Coil Voltage (VDC)	Coil Resistance ±10% (Ω)	Must Operate Voltage*1 (VDC)	Must Release Voltage*1 (VDC)
009	9	135	5.5 (at 20°C) 6.9 (at 85°C) 7.8 (at 125°C)	0.7 (at 20°C) 0.9 (at 85°C) 1.0 (at 125°C)
010	10	167	6.3 (at 20°C) 7.9 (at 85°C) 8.9 (at 125°C)	0.8 (at 20°C) 1.0 (at 85°C) 1.1 (at 125°C)
012	12	240	7.3 (at 20°C) 9.2 (at 85°C) 10.3 (at 125°C)	1.0 (at 20°C) 1.3 (at 85°C) 1.4 (at 125°C)

FTR-P3 (0.6mm contact gap, standard/multi-layered contact)

Coil Code	Rated Coil Voltage (VDC)	Coil Resistance ±10% (Ω)	Must Operate Voltage*1 (VDC)	Must Release Voltage*1 (VDC)
009	9	100	5.5 (at 20°C) 6.9 (at 85°C)	0.7 (at 20°C) 0.9 (at 85°C)
010	10	125	6.3 (at 20°C) 7.9 (at 85°C)	0.8 (at 20°C) 1.0 (at 85°C)
012	12	167	7.3 (at 20°C) 9.2 (at 85°C)	1.0 (at 20°C) 1.3 (at 85°C)

Note: All values in the tables are valid for 20°C and zero contact current, unless otherwise stated.

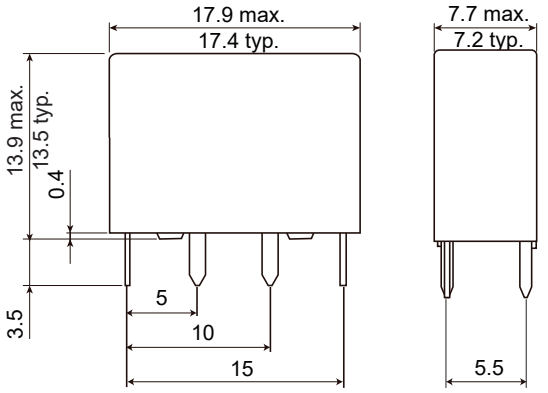
Must operate voltages/must release voltages at 125°C are available only for reflowable type.

* Specified operate values are valid for pulse wave voltage.

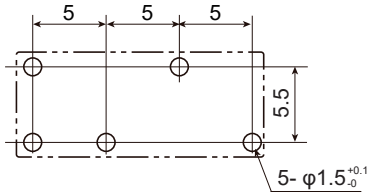
■ DIMENSIONS

FTR-P3CN( )W1(-ML)

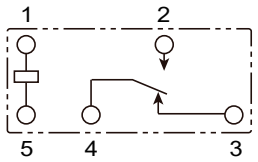
- Dimensions



- PC board mounting hole layout (Plated through hole) (BOTTOM VIEW)

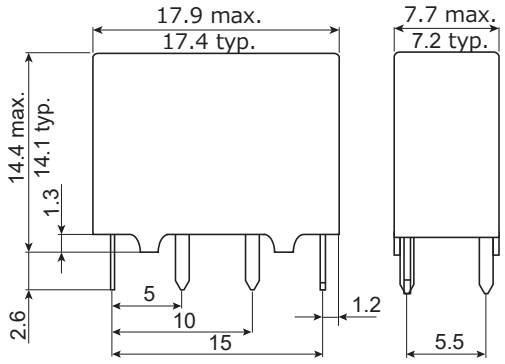


- Schematics (BOTTOM VIEW)

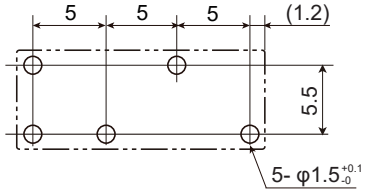


FTR-P3CN( )W1-06 (1 Form C)

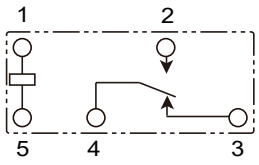
- Dimensions



- PC board mounting hole layout (Plated through hole) (BOTTOM VIEW)

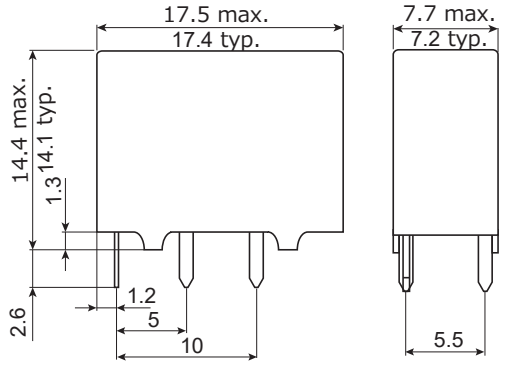


- Schematics (BOTTOM VIEW)

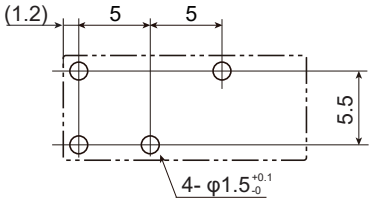


FTR-P3AN( )W1-06 (1 Form A)

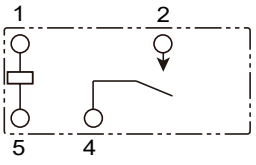
- Dimensions



- PC board mounting hole layout (Plated through hole) (BOTTOM VIEW)



- Schematics (BOTTOM VIEW)



- DimensionsDimensions of the terminals does not include thickness of pre-soldering.
- Tolerance of PC board mounting hole layout：±0.1 unless otherwise specified.

Unit: mm
( ): Reference

■ CHARACTERISTIC DATA

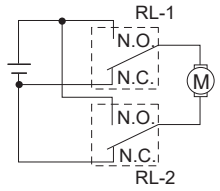
(Characteristic data is not guaranteed value but measured values of samples from production line.)

Life test (examples)

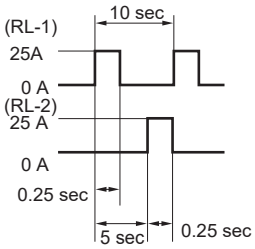
Test condition

25A, 14VDC
motor lock
100,000 operations min.
0.25 seconds ON
9.75 seconds OFF

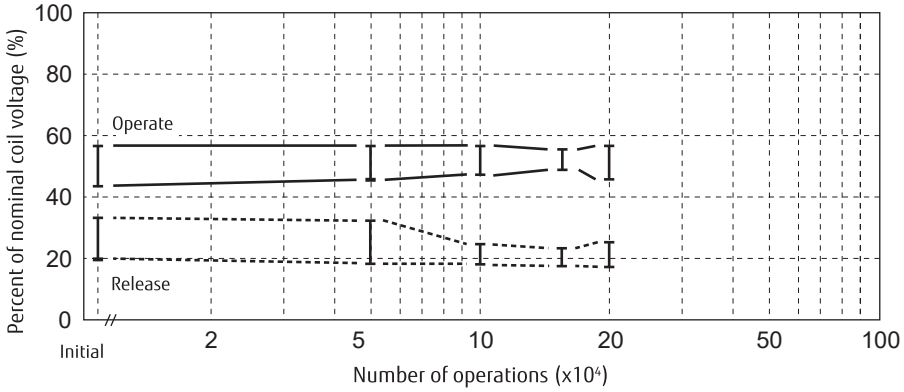
Test circuit



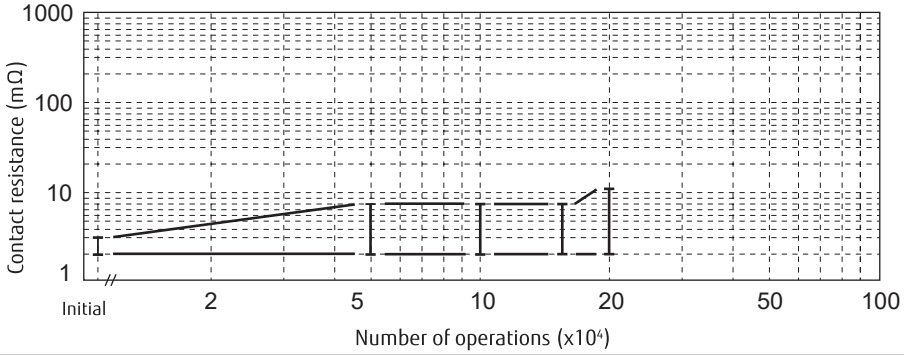
Current wave form



・Shift of operate / release voltage

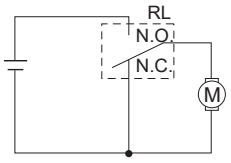


・Change of contact resistance (Measured at DC6V, 1A wet)

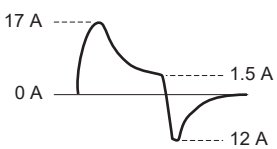


Test condition

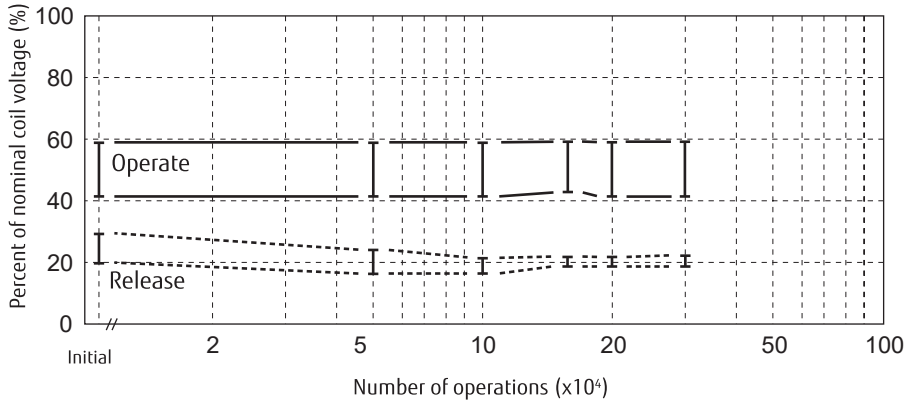
Inrush current 17A, 14VDC
motor free
300,000 operations min.
0.25 seconds ON
9.75 seconds OFF



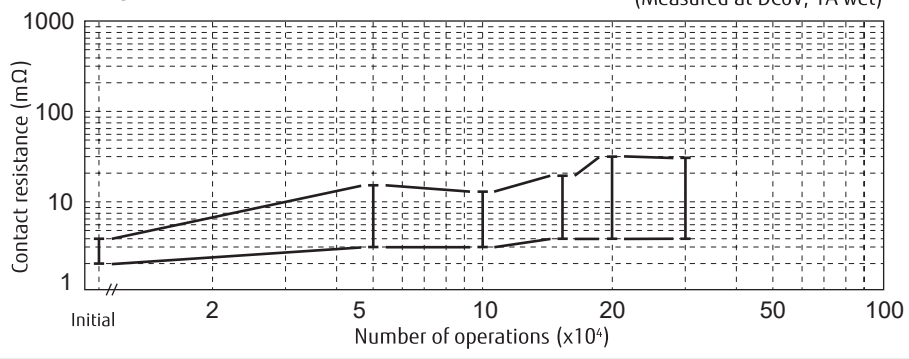
Current wave form



・Shift of operate / release voltage



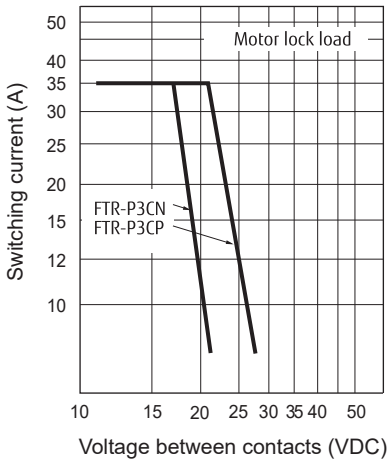
・Change of contact resistance (Measured at DC6V, 1A wet)



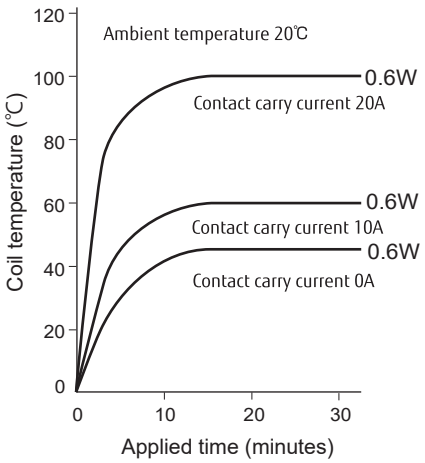
■ CHARACTERISTIC DATA

(Characteristic data is not guaranteed value but measured values of samples from production line.)

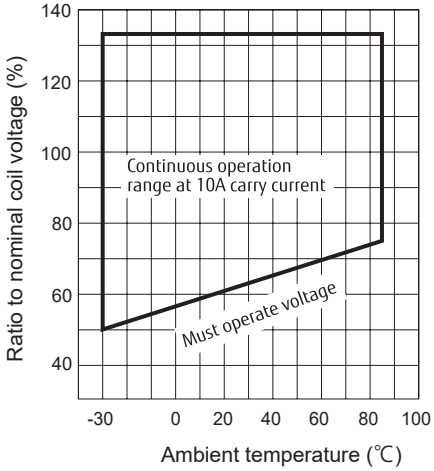
Maximum break capacity



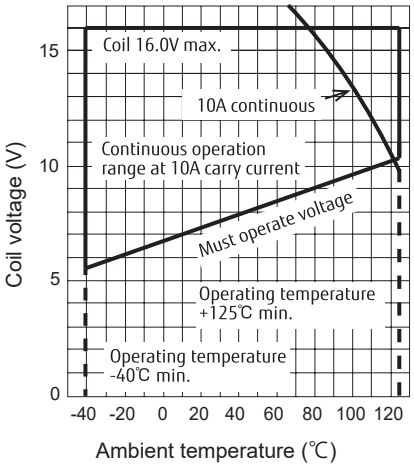
Coil temperature rise



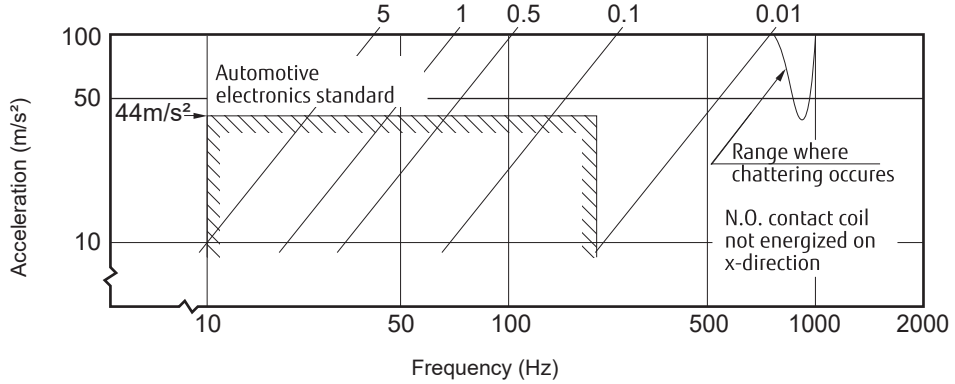
Operating coil voltage range
(Standard/Multi-layered contacts)



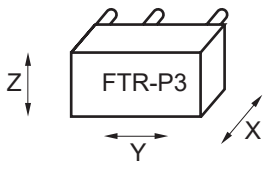
Operating coil voltage range
(Reflowable)



Vibration resistance characteristics
Dual amplitude (mm)



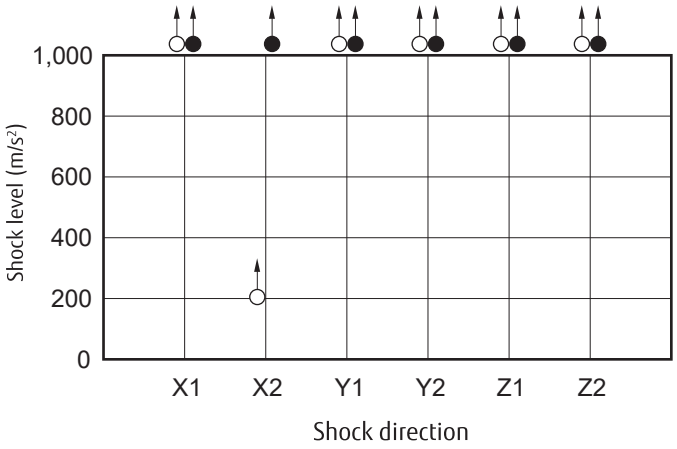
Frequency: 10 to 2000 Hz
Acceleration: 100m/s² max.
Direction of vibration:
see diagram below
Detection level:
chatter > 1ms



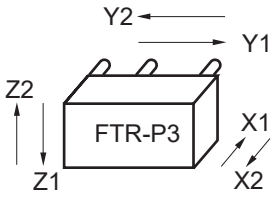
■ CHARACTERISTIC DATA

(Characteristic data is not guaranteed value but measured values of samples from production line.)

Shock resistance characteristics

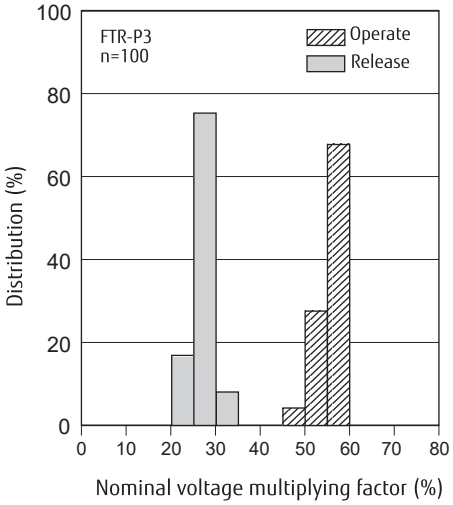


Shock application time: 6±1ms, half-sine wave
Test material: coil energized and de-endrgized
Detection level: chatter > 1ms

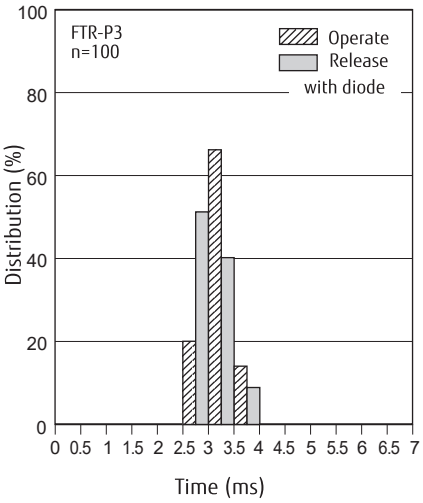


○ : break contact (coil de-energized)
● : make contact (coil energized)

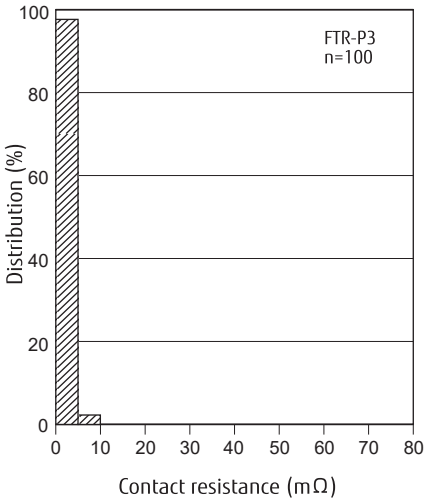
Distribution of operate/relase voltage



Distribution of operate/relase time



Distribution of contact resistance



■ PART NUMBER LIST

Part number	Contact Configuration	Contact Gap	Contact Material	Special Type
FTR-P3CN( )W1	1c (1 Form C, SPDT)	0.25mm	Silver tin oxide indium	-
FTR-P3CP( )W1		0.6mm		
FTR-P3CN( )W1-ML	1c (1 Form C, SPDT)	0.25mm	Silver tin oxide indium	Multi-layered contact
FTR-P3CP( )W1-ML		0.6mm		
FTR-P3AN( )W1-06	1a (1 Form A, SPST)	0.25mm	Silver tin oxide indium	High stand-off / reflowable type
FTR-P3CN( )W1-06	1c (1 Form C, SPDT)			

CAUTIONS

- All values mentioned in this datasheet are provided under ideal conditions. Please perform the confirmation test before actual use.
- Reflow soldering is prohibited for flow soldering type.
- Do not use relays in the atmosphere with sulfide gas, chloride gas or nitric oxide. Contact resistance may increase.
- Do not use silicon or silicon-containing product or materials near relays. It may cause contact failure.

GENERAL INFORMATION

1. RoHS Compliance

- All relays produced by FCL Components are compliant with RoHS directive 2011/65/EU, including commission delegated directive 2015/863.

2. Recommended lead free solder condition

- 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.
- Recommended solder for assembly: Sn-3.0Ag-0.5Cu.

Flow Solder Condition:

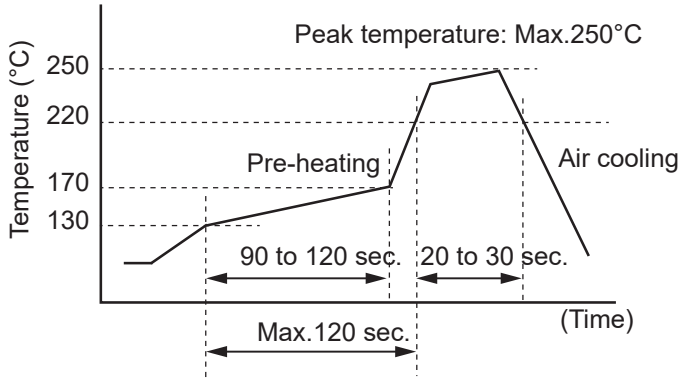
Pre-Heating: Maximum 120˚C within 90 sec.
Soldering: Dip within 5 sec. at 255°C±5°C solder bath
Relay must be cooled by air immediately after soldering

Solder by Soldering Iron:

Soldering Iron: 30-60W
Temperature: maximum 340-360˚C
Duration: maximum 3 sec.

Refow Solder Condition:

(Applicable only for reflow capable type)
Recommended reflow soldering profile
IRS (infrated reflow soldering)



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.

Contact

Japan
FCL COMPONENTS LIMITED
Shinagawa Seaside Park Tower
12-4, Higashi-shinagawa 4-chome,
Tokyo 140 0002, Japan
Tel: +81-3-3450-1682
Email: fcl-contact@cs.fcl-components.com

North and South America
FCL COMPONENTS AMERICA, INC.
2055 Gateway Place Suite 480,
San Jose, CA 95110 USA
Tel: +1-408-745-4900
Email: contact@fcl-components.us

Europe
FCL COMPONENTS EUROPE B.V.
Diamantlaan 25
2132 WV Hoofddorp, Netherlands
Tel: +31-23-556-0910
Email: info@fcl-components.eu

Asia Pacific
FCL COMPONENTS ASIA PTE LTD.
No. 20 Harbour Drive, #07-01B
Singapore 117612
Tel: +65-6375-8560
Email: fcal@fcl-components.com

China
FCL COMPONENTS (SHANGHAI) CO.,LTD.
Unit 1105, Central Park - Jing An,
No.329 Heng Feng Road, Shanghai
200070, China
Tel: +86-21-3253 0998
Email: fcsh@fcl-components.com

Hong Kong
FCL COMPONENTS HONG KONG CO., LIMITED
Unit 2313, Seapower Tower, Concordia Plaza, No.1 Science Museum Road,
TST, Kowloon, Hong Kong
Tel: +852-2881-8495
Email: fcal@fcl-components.com

Web: www.fcl-components.com/en/

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