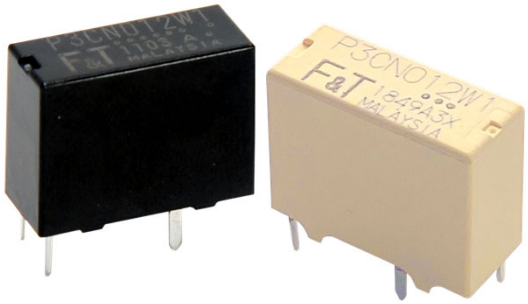
COMPACT POWER RELAY

For automotive applications

1 POLE – 25A (for 12V car battery)

FTR-P3 Series

■ FEATURES



- Compact for high density packaging
- High contact capacity with proven contact material. (100,000 operations, 14 V, 25 A)
- 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, contact our representative)
- Packaging for auto-insertion (tube packing, 30 relays/tube)
- Application examples: power window, power seat,tilt steering, sunroof, wiper, retractable antenna, etc.
- Reflowable & high stand-off type available.
- RoHS compliant

■ PARTNUMBER INFORMATION

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

(a)	Relay type	FTR-P3	: FTR-P3 Series
(b)	Contact configuration	A C	: 1 form A (only with -06) : 1 form C
(c)	Contact gap	N P	: 0.25 mm gap : 0.6 mm gap (standard and -ML)
(d)	Coil rated voltage	012	: 9….12VDC See coil rating table
(e)	Contact material	W1	: Silver-tin oxide indium
(f)	Special type	Non -ML -06	: Standard : Multi-layered contacts : High stand-off (reflowrable type)

Actual marking does not carry the type name: "FTR (-ML) (-06)"
E.g.: Ordering code: FTR-P3CN012W1-06 Actual marking: P3CN012W1

■ SPECIFICATIONS

Item			FTR-P3			
			Standard (without suffix)	Multi-layered contact (-ML)	Reflowable (-06)	
Contact Data	Configuration		1 form C (SPDT)		1 form A (SPST)	1 form C (SPDT)
	Material		Silver-tin-oxide indium			
	Contact path voltage drop		Max. 100mV at 1A, 12VDC			
	Contact rating		25A at 14VDC (locked motor load)			
	Max. carrying current *1		25A/1 hour (25℃, 100% rated coil voltage)			
	Max. switching voltage		16VDC (reference)			
	Max. switching current		35A (reference)			
	Min. switching load *2		6VDC, 1A (reference)			
Life	Mechanical		Min.10 x 10^6 operations	Min.1 x 10^6 operations		
	Electrical		Min.100 x 10^3 operations, 14VDC, 25A (locked motor load) (1 operation=1 forward and 1 reverse)			
Coil Data	Operating ambient temperature range		-40℃ to +85℃ (no frost)		-40℃ to +125℃ (no frost)	
	Storage temperature range (no frost)		-40℃ to +85℃, 45 to 85%RH	-40℃ to +100℃ , 45 to 85%RH	-40℃ to +125℃, 45 to 85%RH	
Timing Data	Operate (at nominal voltage)		Min. 10 ms (without bounce, no diode)			
	Release (at nominal voltage)		Min.5 ms (without bounce, no diode) Min. 15 ms (without bounce, with diode)			
Insulation	Resistance (initial)		100MΩ at 500VAC			
	Dielectric withstanding voltage (initial)		500VAC, 1 minute			
Other	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	Misoperation	100m/s^2 minimum (11±1ms)			
		Endurance	1,000m/s^2 minimum (6±1ms)			
	Weight		Approximately 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 RATING

FTR-P3 Series (0.25mm contact gap) (Standard, multi layered contact)

Coil Code	Rated Coil Voltage (VDC)	Coil Resistance +/-10% (Ohm)	Must Operate Voltage (VDC) *	Must Release Voltage (VDC) *
009	9	135	5.5 (at 20℃)	0.7 (at 20℃)
			6.9 (at 85℃)	0.9 (at 85℃)
010	10	167	6.3 (at 20℃)	0.8 (at 20℃)
			7.9 (at 85℃)	1.0 (at 85℃)
012	12	240	7.3 (at 20℃)	1.0 (at 20℃)
			9.2 (at 85℃)	1.3 (at 85℃)

FTR-P3-06 Series

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

FTR-P3 Series (0.6mm contact gap) (Standard, multi layered contact)

Coil Code	Rated Coil Voltage (VDC)	Coil Resistance +/-10% (Ohm)	Must Operate Voltage (VDC) *	Must Release Voltage (VDC) *
009	9	100	5.5 (at 20℃)	0.7 (at 20℃)
			6.9 (at 85℃)	0.9 (at 85℃)
010	10	125	6.3 (at 20℃)	0.8 (at 20℃)
			7.9 (at 85℃)	1.0 (at 85℃)
012	12	167	7.3 (at 20℃)	1.0 (at 20℃)
			9.2 (at 85℃)	1.3 (at 85℃)

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 125degC are available only for reflowable type.
* Specified operate values are valid for pulse wave voltage.

■ CHARACTERISTIC DATA

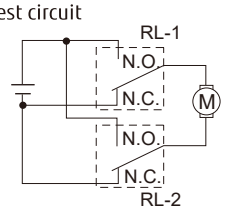
(Characteristic data is not guaranteed value but measured values of samples from production line)

Life test (examples)

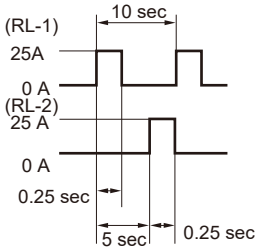
Test condition

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

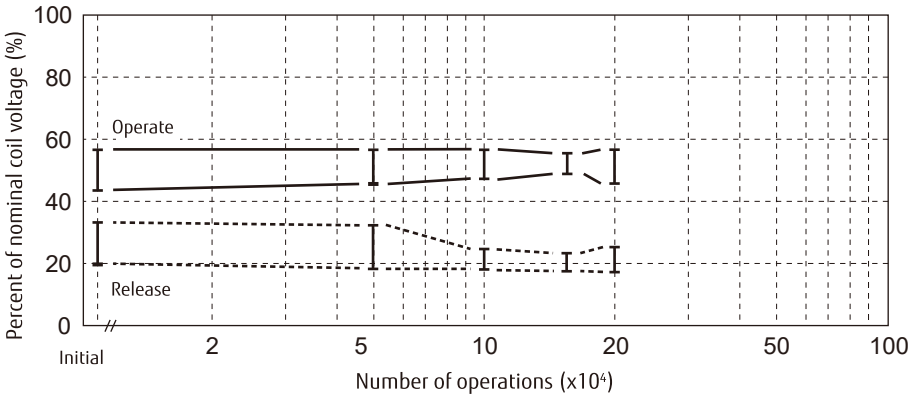
Test circuit



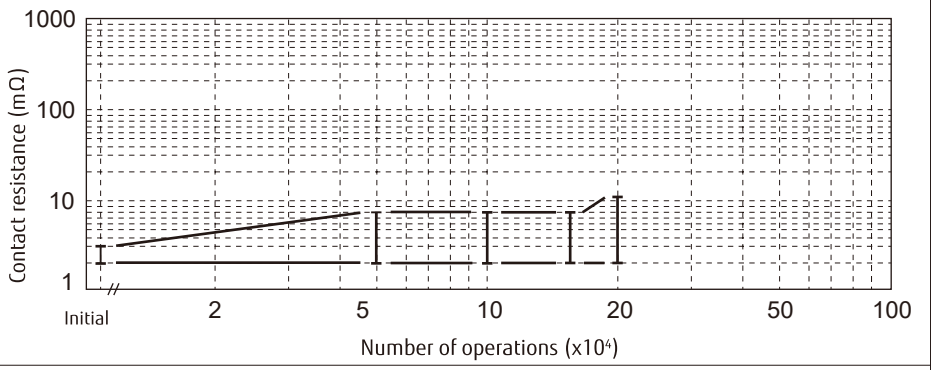
Current wave form



・Shift of operate / release voltage

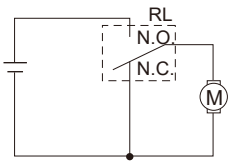


・Change of contact resistance (Measured at DC6V, 1A wet)

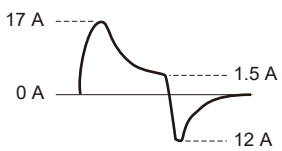


Test condition

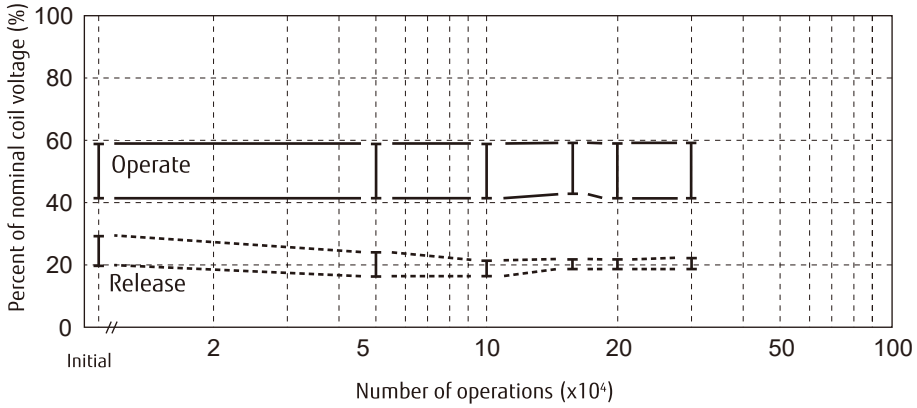
Inrush current 17A, 14VDC
motor free
300,000 operations min.
0.25 seconds ON
9.75 seconds OFF



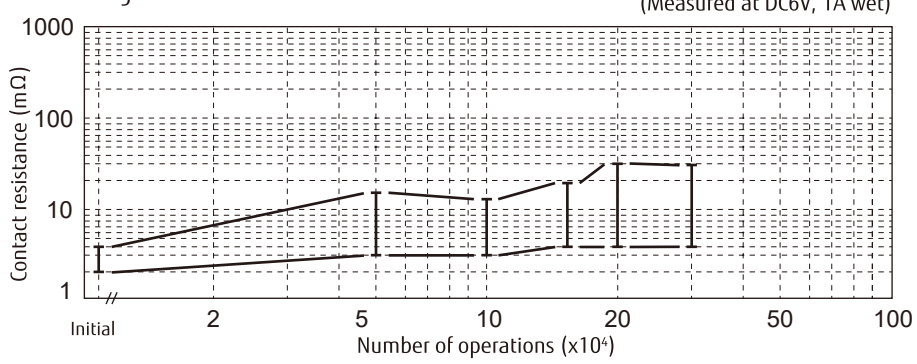
Current wave form



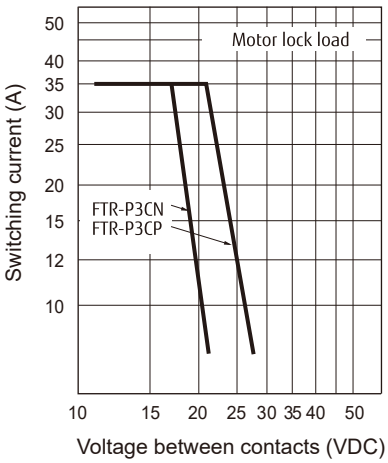
・Shift of operate / release voltage



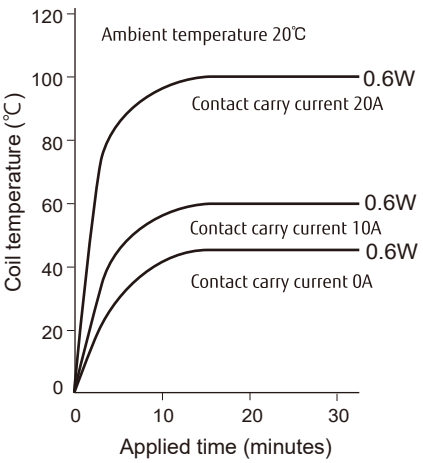
・Change of contact resistance (Measured at DC6V, 1A wet)



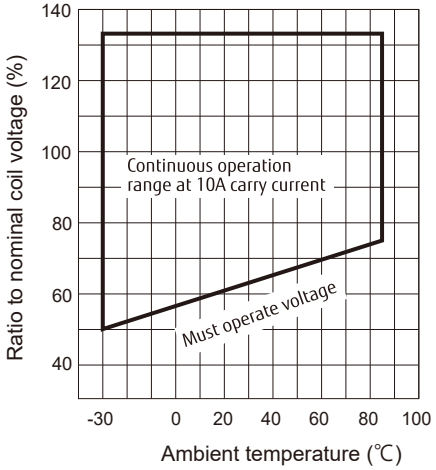
Maximum break capacity



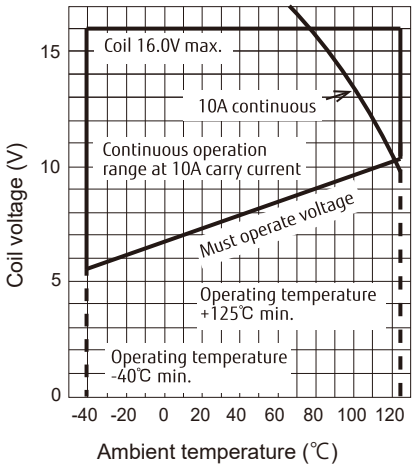
Coil temperature rise



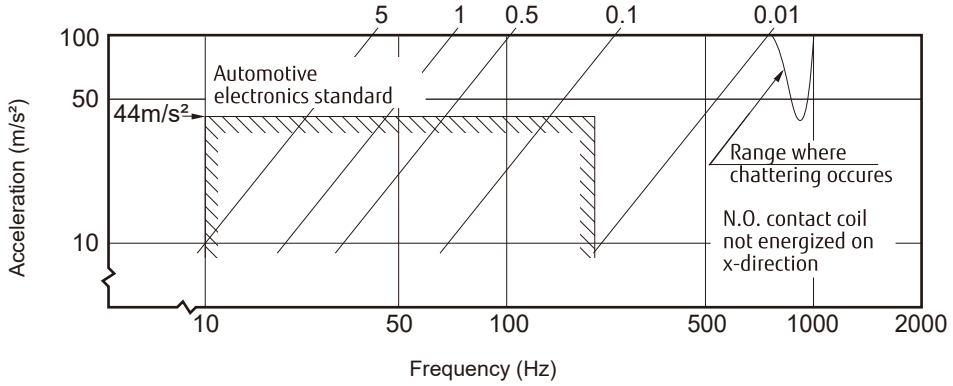
Operating coil voltage range
(Standard/Multi-layered contacts)



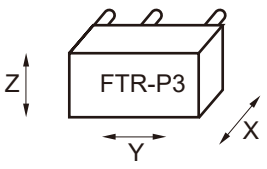
Operating coil voltage range
(Reflowable)



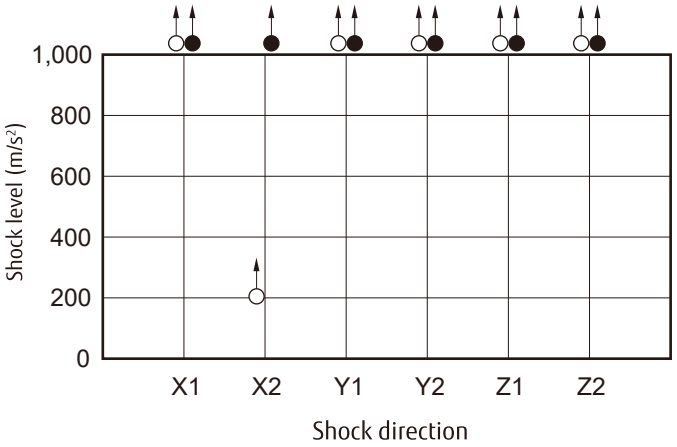
Vibration resistance characteristics
Dual amplitude (mm)



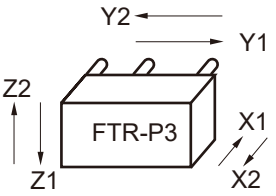
Frequency: 10 to 2000 Hz
Acceleration: 100m/s² max.
Direction of vibration:
see diagram below
Detection level:
chatter > 1ms



Shock resistance characteristics

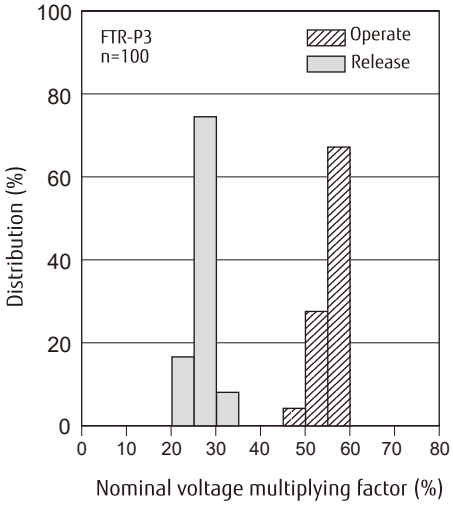


Shock application time: 11±1ms, half-sine wave
Test material: coil energized and de-endrgized
Detection level: chatter > 1ms

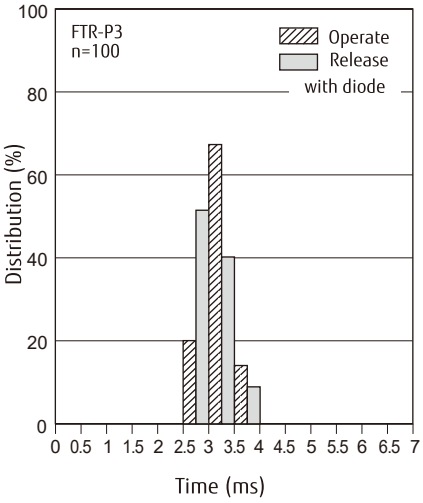


○ : break contact (coil de-energized)
● : make contact (coil energized)

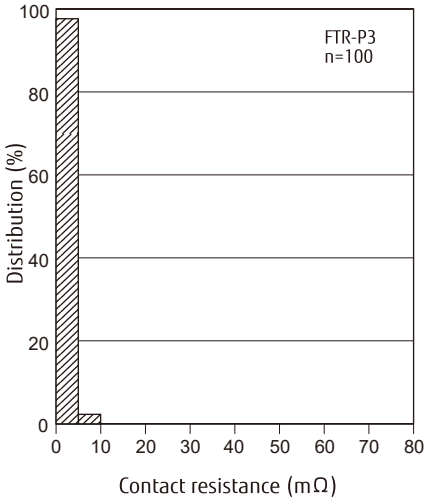
Distribution of operate/relase voltage



Distribution of operate/relase time



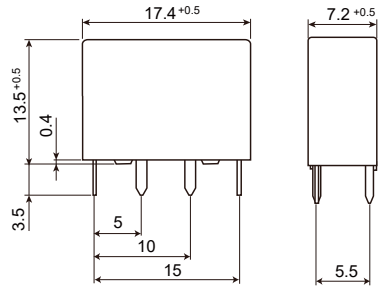
Distribution of contact resistance



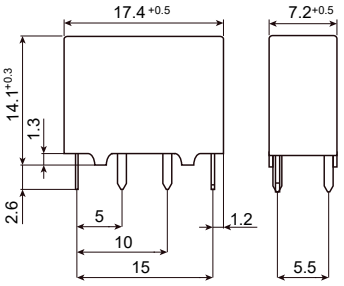
■ DIMENSIONS

- Dimensions

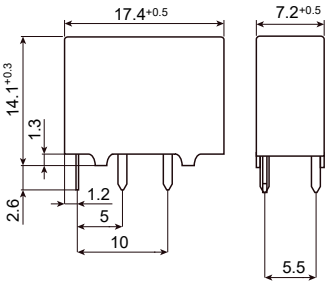
FTR-P3CN*** W1(-ML)



FTR-P3CN***W1-06 (1 form C)



FTR-P3AN***W1-06 (1 form A)

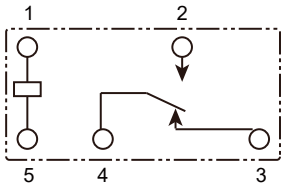


* Dimensions of the terminals does not include thickness of pre-solder

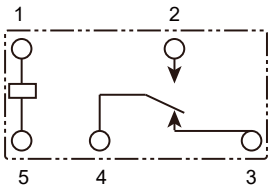
Unit: mm

- Schematics
  (Bottom view)

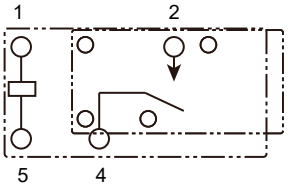
FTR-P3CN***W1(-ML)



FTR-P3CN***W1-06 (1 form C)

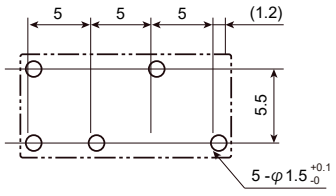


FTR-P3AN***W1-06 (1 form A)

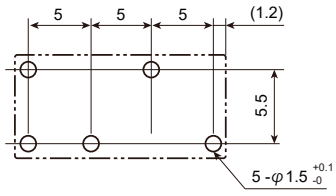


- PC board mounting hole layout (Plated through hole)
  (Bottom view)

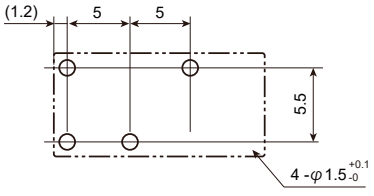
FTR-P3CN***W1(-ML)



FTR-P3CN***W1-06 (1 form C)



FTR-P3AN***W1-06 (1 form A)



Tolerance: +0.1 / -0 mm unless otherwise specified
unit: mm

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:

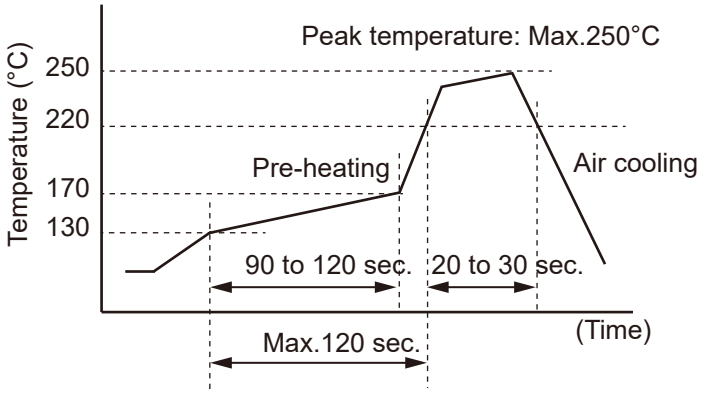
Soldering Iron:	30-60W
Temperature:	maximum 340-360˚C
Duration:	maximum 3 sec.

Reflow 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: fcai.components@fcl-components.com

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

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

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

© 2024 FCL Components Limited. All rights reserved. All trademarks or registered trademarks are the property of their respective owners.

FCL Products are intended for general use, including without limitation, in personal, household and office environments, in buildings and for ordinary use in the industry. FCL Products are not intended to be used in applications where extremely high safety is required (”High Safety Required Applications”), such as, but not limited to, applications in nuclear facilities, in aircraft automatic flight control, in air traffic control, in mass transit system control, in missile launch system, in weapon systems, in medical equipment for life support or any application involving a direct serious risk of physical injury or death.
Please do not use FCL Products without securing the sufficient safety and reliability required for the High Safety Required Applications. In addition, FCL shall not be liable against the customer and/or any third party for any claims or damages arising in connection with the use of FCL Products in the High Safety Required Applications.
FCL warrants that its Products, if properly used and services, will conform to their specification and will be free from defects in material and workmanship for twelve months from delivery.
The implied warranties of merchantability and fitness for a particular purpose and all other warranties, representations and conditions, express or implied by statute, trade usage or otherwise, expect as set forth in this warranty, are excluded and shall not apply to the Products delivered.

The contents, data and information in this datasheet are provided by FCL Components Limited 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.
FCL has assembled this datasheet with care and will endeavor to keep the contents, data and information correct, accurate, comprehensive, complete and up to date.
FCL Components Limited 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 FCL Components Limited and affiliated companies accept on their behalf, nor on behalf of its employees, any responsibility or liability with respect to these datasheets, its contents, data, information and related graphics and the correctness, reliability, accuracy, comprehensiveness, usefulness, availability and completeness thereof. Rev. February 1, 2024.