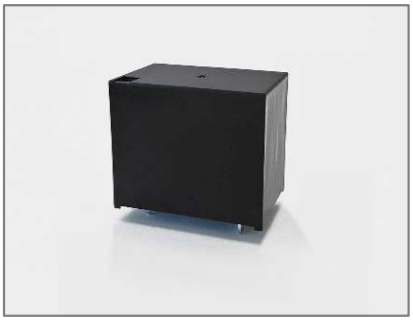
AUTOMOTIVE RELAY
1 POLE – 60A

FTR-E1-HC Series

RoHS Compliant

■ FEATURES



- 60A 400VDC higher voltage switching
- No specific polarity requirement for the connection of load terminals
- Low power consumption (approx. 1.2W at rated coil voltage)
- High insulation design: Dielectric strength between coil and contacts
  5,000VAC 1 minute, between contacts 2,500VAC 1 minute
- Plastic material: UL flammability 94V-0
- Plastic sealed

■ APPLICATIONS

Electric vehicles (HEV, PHEV, EV), fast charge stations, photovoltaic power generation systems, hybrid construction machineries, battery systems, etc.

■ PART NUMBERS

[Example] FTR-E1 A A 012 Y - HC
(a) (b) (c) (d) (e) (f)

(a)	Relay type	FTR-E1 series
(b)	Contact arrangement	A : 1a (1 Form X)
(c)	Coil power consumption	A : Standard (1.2W)
(d)	Nominal coil voltage	012 : 12VDC 024 : 24VDC
(e)	Contact material	Y : Silver alloy
(f)	Option	HC : High capacity type

Note: Actual marking does not carry the type name: “FTR”.
E.g.: Ordering code: FTR-E1AA012Y-HC, actual marking: E1AA012Y-HC.

■ SPECIFICATIONS

Item			Specifications	Remarks / Conditions
Contact Data	Arrangement		1a (1 form X)	
	Material		Silver alloy	
	Rating		60A, 400VDC	Resistive, at 60℃
			50A, 450VDC	Resistive, at 85℃
	Voltage drop		Max. 0.5V	At 20A
	Max. carrying current		60A (at 60℃, cable size 14mm^2) 50A (at 85℃, cable size 14mm^2)	
	Min. switching load*1		1A 12VDC	Reference
Coil	Rated power consumption		Approx. 1.2W	
	Operating power consumption		588mW	
	Operating temperature range		-40℃ to +60℃ at 60A *2 -40℃ to +85℃ at 50A *2	
Time	Operate		Max. 30ms (without bounce)	At nominal voltage, at 20℃, without bounce
	Release		Max. 10ms (without bounce, without diode)	
Life	Mechanical		500 x 10^3 operations	18,000 cycles/hour
	Electrical		500 operations*3	At 60A 400VDC or 60A 450VDC
Insulation	Insulation resistance		Min. 1,000MΩ	At 1,000VDC, initial
	Dielectric withstanding voltage	Open contacts	2,500VAC (50/60Hz), 1 minute	
		Coil-contact	5,000VAC (50/60Hz), 1 minute	
Others	Vibration resistance	Misoperation	5 to 200Hz, acceleration 45m/s^2 constant acceleration	Detect time 1ms, ON/OFF
		Endurance	5 to 200Hz, acceleration 45m/s^2 constant acceleration	ON/OFF, vertical 4 hours, horizontal 2 hours
	Shock resistance	Misoperation	100m/s^2 (11±1ms)	Detect time 1ms
		Endurance	1,000m/s^2 (6±1ms)	ON/OFF total 36 cycles
	Dimensions / Weight		28.3 x 43.6 x 36.8 mm / Approx. 80g	

Note: Values of electrical characteristics are under 15 to 35 degC, 25 to 75%RH, air pressure 86kPa to 106kPa (JIS standard condition) unless otherwise specified.

*1: 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.

*2: Relays shall be kept frost-free.

*3: Please always use a varistor to protect the coil from back electromotive force. Use of other protection element may shorten relay life excessively. Varistor shall be connected in parallel to the relay coil. Please refer to recommended circuit layout. Varistor voltage shall have 3 times as high as applied coil voltage

! Care shall be taken on the heat generated on PC board when maximum carrying current exceed 10A.

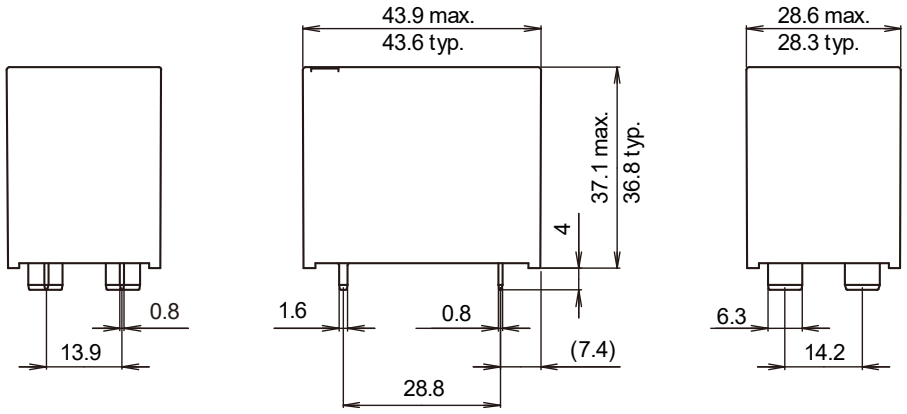
■ COIL DATA

Coil Code	Rated Coil Voltage (VDC)	Coil Resistance ±10% (Ω)	Must Operate Voltage* (VDC)	Must Release Voltage* (VDC)
012	12	120	8.4 (at 20℃) 10.5 (at 85℃)	1.0 (at 20℃) 1.3 (at 85℃)
024	24	480	16.8 (at 20℃) 21.2 (at 85℃)	2.0 (20℃) 2.6 (at 85℃)

Note: All values in the table are valid at 20℃ and zero contact current unless otherwise specified.
Note: Please use at rated coil voltage.
*: Specified operate values are valid for pulse wave voltage.

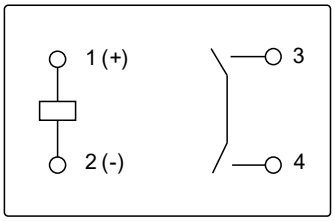
■ DIMENSIONS

● Dimensions

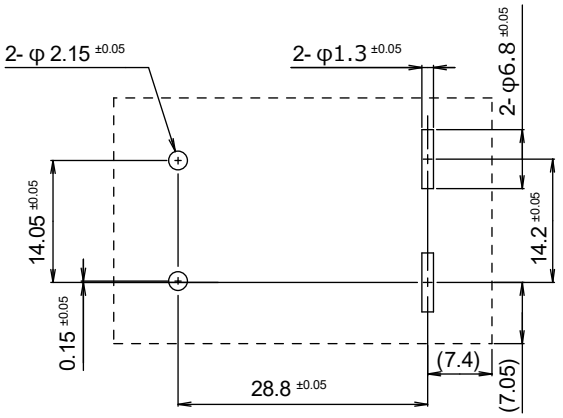


- Dimensions of the terminals do not include thickness of pre-solder.
- Dimensions do not include tolerance.

● Schematics(BOTTOM VIEW)



● PC Board Mounting Hole Layout



Unit: mm
( ): Reference

CAUTIONS

- All values mentioned in this datasheet are provided under ideal conditions. Please perform the confirmation test before actual use.
- Reflow soldering is prohibited.
- 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.
- Please connect relay coils according to specified polarity.

Cautions for high voltage DC switching relays

- There is a possibility that the relay is not able to switch off the load at high voltage DC load. Fail safe circuit must be provided to prevent injury, fire or other harms resulting from failure occurred on relays.
- Relays are periodic maintenance parts. Do not exceed the specified life time and/or switching conditions.

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.

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/

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