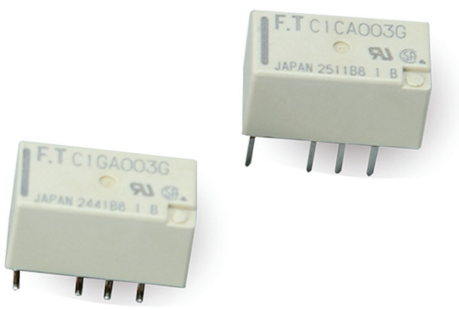
SIGNAL RELAY FOR AUTOMOTIVE APPLICATIONS
2 POLES - 2A HIGH INSURATION/WIDE GAP

FTR-C1 Series

RoHS Compliant

■ FEATURES



- Switchable 1mA, 400VDC for EV high voltage
- 2 Poles, 2 form C
- Contact gap: More than 0.6mm
- Dielectric strength: 1,500VAC between open contacts
  3,000VAC between coil and contact
- Dimensions of large contact gap relay
  Height: 9.4mm maximum (THT), 9.7mm maximum (SMT)
  Length: 15.2mm maximum
  Width: 7.7mm maximum
- Conforms to IEC60950/ EN60950/UL1950/CSA C 22.2 No. 950 working voltage 250V (supplementary)
- High insulation: Clearance: min 2.0mm (coil and contacts)
  Creepage: min 2.5mm (coil and contacts)
- Low power consumption 280mW (latching type 140mW)
- RoHS Compliant
- Plastic sealed

■ APPLICATIONS

Switching audio circuit for emergency call
Battery controller (battery monitoring, abnormal detection of overvoltage and overcurrent, low/high voltage leakage detection)

■ PART NUMBERS

[Example] FTR-C1 G A 4.5 G - B05 - AUT
(a) (b) (c) (d) (e) (f) (g)

(a)	Relay type	FTR-C1 series
(b)	Contact configuration	C : Through hole type G : Surface mount type S : Surface mount type reduced mounting area
(c)	Coil type	A : Standard type B : Single coil latching type
(d)	Coil rated voltage	4.5 : 3....24VDC Please refer to coil rating table
(e)	Contact material	G : Gold plated silver palladium (stationary contact) Silver palladium (movable contact)
(f)	Tage/reel version	Nil : Tube packing B05 : Tape & reel packing, only available for surface mount type
(g)	Special type	AUT : For automotive

Actual marking does not carry the type name : “FTR” “B05” and “AUT” . E.g.: Ordering code: FTR-C1CA012G-B05-AUT Actual marking: C1CA012G

■ SPECIFICATIONS

Item			Specifications		Remarks/Conditions
			Non-latching FTR-C1( )A	Latching FTR-C1( )B	
Contact Data	Configuration		2c (2 Form C)		
	Construction		Bifurcated		
	Material		Gold plated silver palladium (stationary contact) Silver palladium (movable contact)		
	Resistance (initial)		Max. 150mΩ		At 1A, 6VDC
	Contact rating		1A, 30VDC		Resistive
	Max. switching power		30W(30VDC) 0.4W(400VDC)		
	Max. carrying current		2A		
	Min. switching load *1		0.01mA, 10mVDC		Reference
Coil	Rated power		280 to 300mW	140 to 180mW	
	Operate power		158 to 162mW	158 to 162mW	
	Pulse width		-	Min. 20ms	
	Operating temperature range		-40°C to +85°C		No frost
	Storage temperature / humidity		-40°C to +85°C / 5% to 85% RH		No frost
Time	Operate (at nominal voltage)		Max. 6ms		Without bounce
	Release (at nominal voltage)		Max. 6ms		Without bounce
Life	Mechanical		Min. 10 x 10^6 operations		
	Electrical		Min.500 x 10^3 operations		1mA, 400VDC (resistive)
			Min. 100 x 10^3 operations		1A, 30VDC (resistive)
Insulation	Insulation resistance		Min. 1,000MΩ		At 500VDC
	Dielectric strength	Open contacs	1,500VAC (50/60Hz) 1min.		
		Adjacent contacts	1,500VAC (50/60Hz) 1min.		
		Contacts to coil	3,000VAC (50/60Hz) 1min.		
	Surge strength	Contacts to coil	5,000V, 2 x 10μs		
	Clearance	Open contacts	0.6mm		
		Adjacent contacts	1.0mm		
		Contacts to coil	2.0mm		
	Creepage	Open contacts	0.6mm		
		Adjacent contacts	1.0mm		
		Contacts to coil	2.5mm		
Other	Vibration resistance	Misoperation>1μs	10 to 55 to 10Hz single amplitude 1.65mm		Coil ON/OFF, 3 axis, total 6 cycles
		Endurance	10 to 55 to 10Hz single amplitude 2.5mm		Coil OFF, 3 axis, total 6 hours
	Sock resistance	Misoperation>1μs	Min. 500m/s^2 (11±1ms)		Coil ON/OFF, 3 axis, total 36 operations
		Endurance	Min. 1,000m/s^2 (6±1ms)		Coil OFF, 3 axis, total 18 operations
	Dimensions / Weight		7.5 x 15.0 x 9.3mm / Approximately 2g		
	Sealing		RT III (plastic sealed)		

*1: Minimujm 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

● Standard (non-latching) type

Coil Code	Rated Coil Voltage (VDC)	Coil Resistance (Ω) ±10%	Must Operate Voltage*1 (VDC)	Must Release Voltage*1 (VDC)	Nominal Coil Power (mW)
003	3	32.1	2.25	0.3	280
4.5	4.5	72.3	3.38	0.45	
005	5	89.3	3.75	0.5	
012	12	514	9.0	1.2	
024	24	1,920	18.0	2.4	300

● Latching type

Coil Code	Rated Coil Voltage (VDC)	Coil Resistance (Ω) ±10%	Set Voltage*1 (VDC)	Reset Voltage*1 (VDC)	Nominal Coil Power (mW)
003	3	64	+2.25	-2.25	140
4.5	4.5	145	+3.38	-3.38	
005	5	179	+3.75	-3.75	
012	12	1,029	+9.0	-9.0	
024	24	3,200	+18.0	-18.0	180

Note: All values in the table are valid for 20°C and zero contact current.

* Specified operate values are valid for pulse wave voltage.

Note: Please use at rated coil voltage. Please perform the confirmation test with actual conditions.

■ SAFETY STANDARDS

Type	Compliance	Contact Rating
UL	Flammability: UL 94-V-0 (plastics)	
	UL 508 File No. E63615	0.3A, 125 VAC (general use) (UL) 0.5A, 125VAC (CSA) 2A, 30VDC (general use) 0.3A, 110VDC (general use)
CSA	C22.2 No. 14 File No. LR 40304	

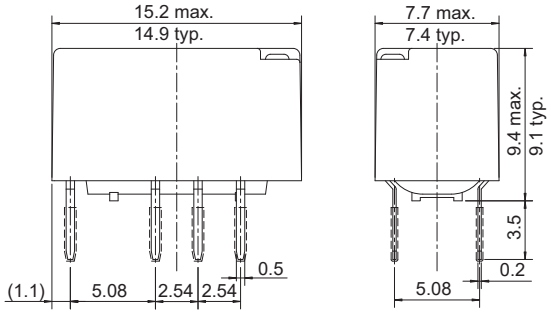
■ PART NUMBER LIST

Part Number	Contact configuration	Coil Type	Contact Material	Tape/Reel version	Note
FTR-C1CA( )G-AUT	Through hole	Standard	Gold plated silver palladium (stationary contact) Silver palladium (movable contact)	Tube	Tape & reel package is not available
FTR-C1CB( )G-AUT		Latching			
FTR-C1GA( )G-AUT	Surface mount	Standard		Tube	-
FTR-C1GA( )G-B05-AUT				Tape & reel	
FTR-C1GB( )G-AUT		Latching		Tube	
FTR-C1GB( )G-B05-AUT				Tape & reel	
FTR-C1SA( )G-AUT	Surface mount reduced mounting area	Standard		Tube	-
FTR-C1SA( )G-B05-AUT				Tape & reel	
FTR-C1SB( )G-AUT		Latching		Tube	
FTR-C1SB( )G-B05-AUT				Tape & reel	

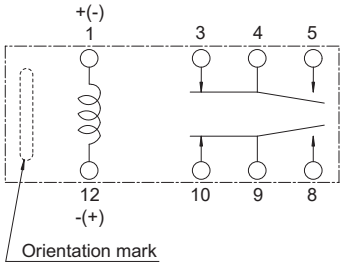
■ DIMENSIONS

Through hole type

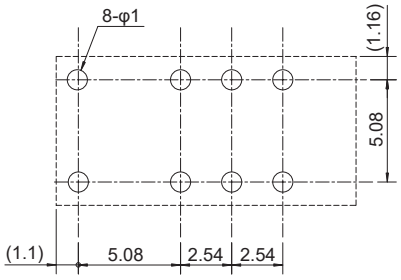
●Dimensions



●Schematics
(BOTTOM VIEW)

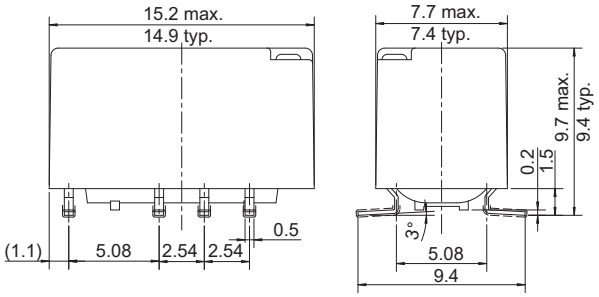


●Recommended PCB layout
(BOTTOM VIEW)

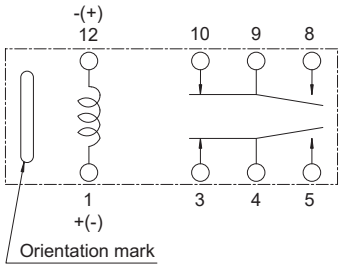


Surface mount type

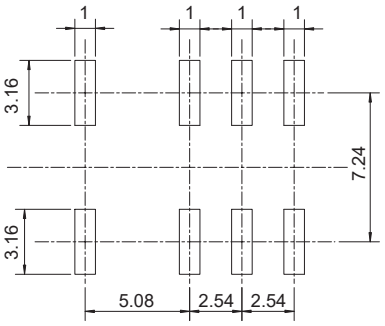
●Dimensions



●Schematics
(TOP VIEW)

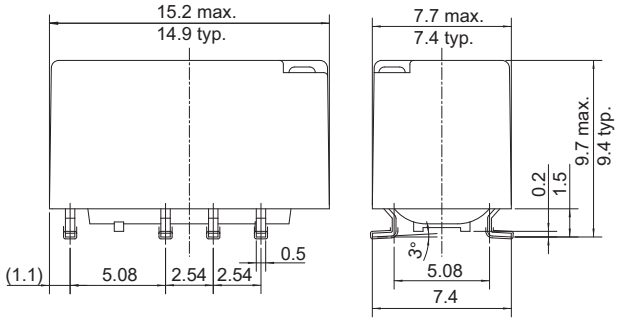


●Recommended PCB layout
(TOP VIEW)

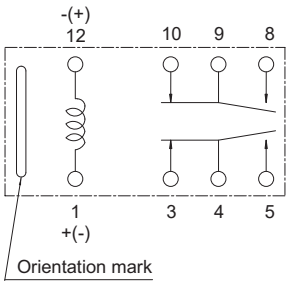


Surface mount (space saving) type

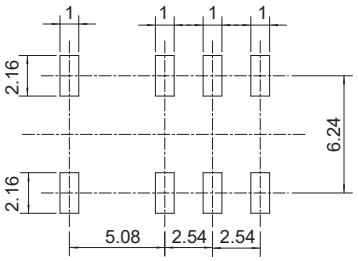
●Dimensions



●Schematics
(TOP VIEW)



●Recommended PCB layout
(TOP VIEW)



Note: (...) : dimensions are reference
Note: Dimensions of the terminals do not include thickness of pre-soldering.
Note: Dimensions do not include tolerances. Please ask specification in case you need tolerances.
Note: Tolerance of PCB layout: ±0.1 unless otherwise specified.

Unit: mm

■ RECOMMENDED SOLDERING CONDITIONS FOR SURFACE MOUNT TYPE

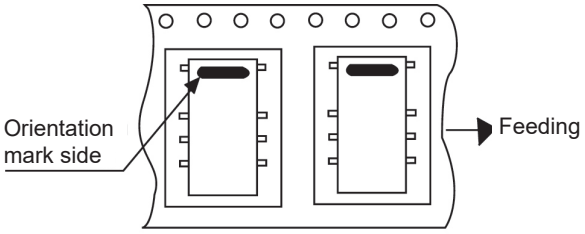
(Temperature profile, please see page 7)

Notes:

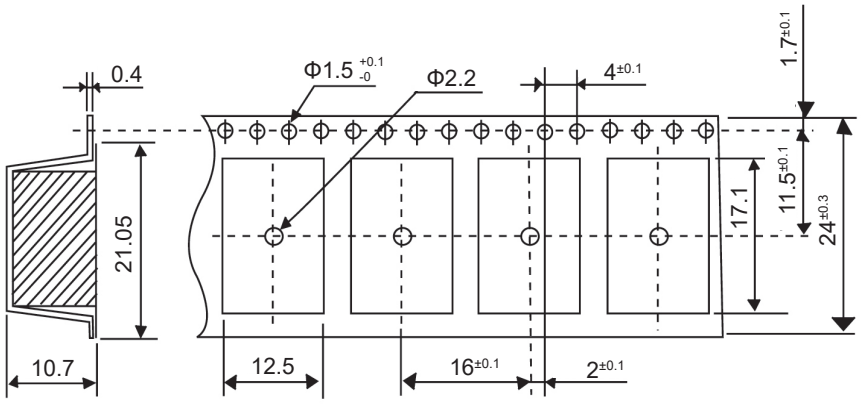
1. Temperature profiles show the temperature of PC board surface
2. Please perform soldering test with your actual PC board before mass production, since the temperatures of PC board surfaces vary according to the size of PC board, status of parts mounting and heating method.

■ TAPE & REEL PACKAGING SPECIFICATION

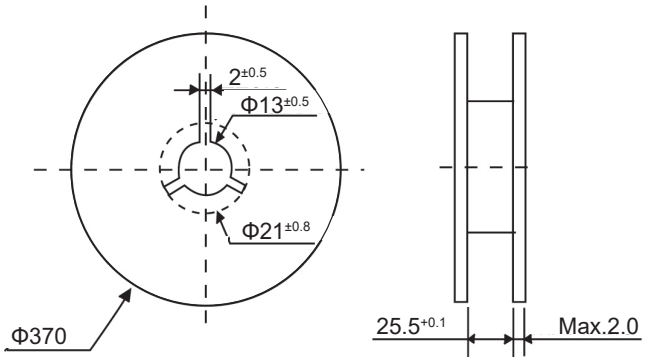
1. Taping standards: JIS C 0806 and RC-10092B (EIAJ)
2. Tape type: TB2416 or TE2416
3. Reel type: RD24D
4. Quantity of 1 reel: 500 pieces



Tape Dimensions:



Reel Dimensions:

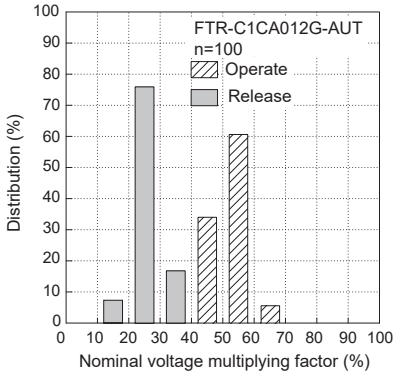


Unit: mm

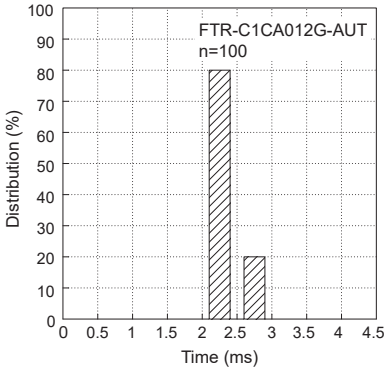
■ CHARACTERISTIC DATA

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

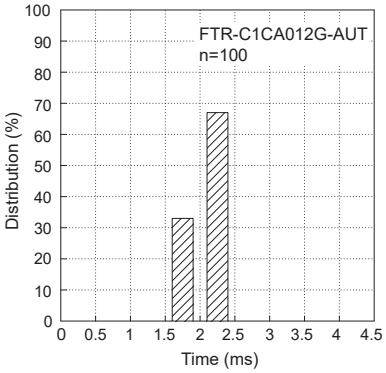
Distribution of operate/release voltage



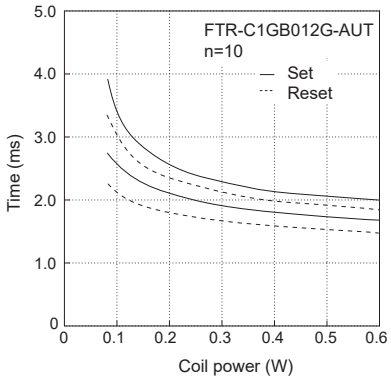
Distribution of operate time



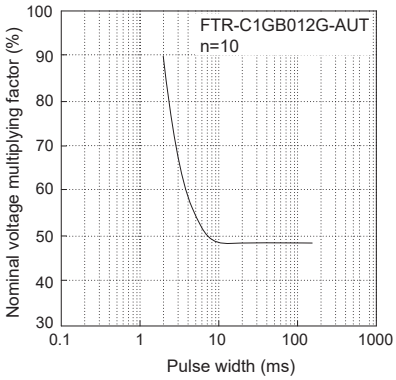
Distribution of release time



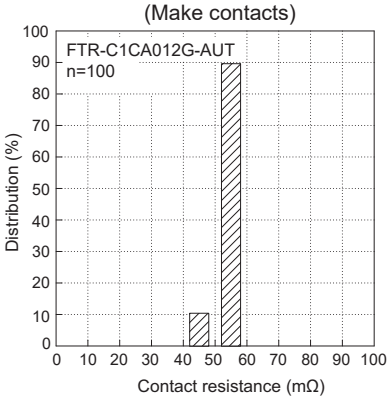
Set/reset time characteristics



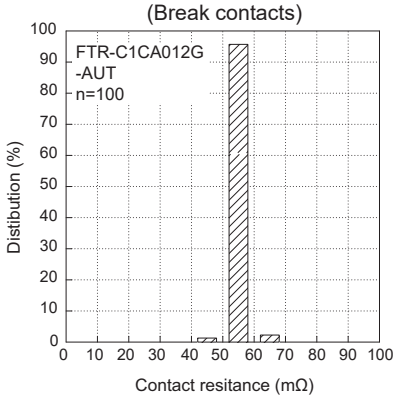
Pulse characteristics



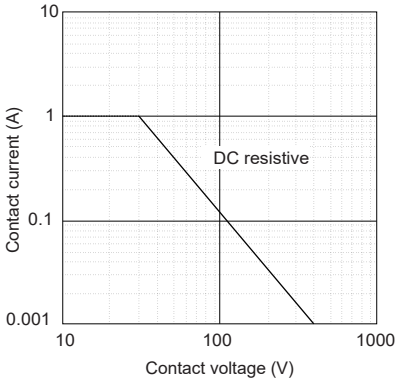
Distribution of contact resistance (Make contacts)



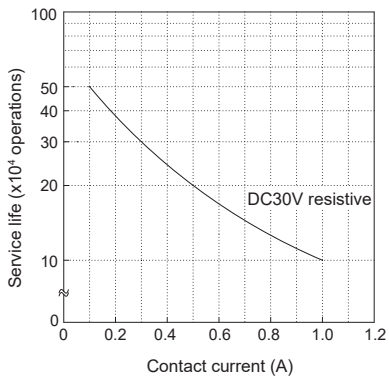
Distribution of contact resistance (Break contacts)



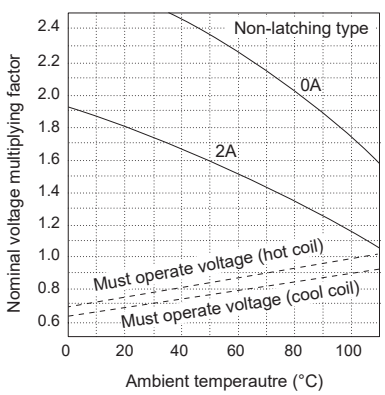
Maximum switching power



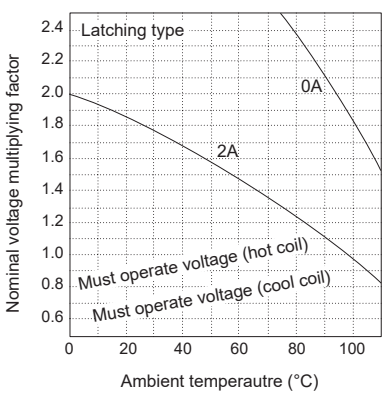
Life curve



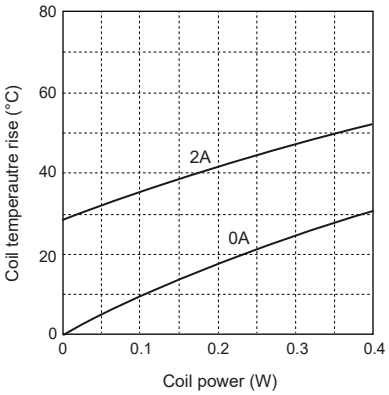
Operating range



Operating range



Coil temperature rise



CAUTIONS

- All values mentioned in this datasheet are provided under ideal conditions. Please perform the confirmation test before actual use.
- Reflow soldering is not available with standard 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.

Notes for latching relays

- Latching relays are shipped in the state reset, but state may change due to shock during transportation or mounting. Before using the relays, it is advisable to bring the relays in necessary state (set or reset) and program a circuit sequence. Otherwise, it will or will not operate simultaneously with power activation.
- Please connect relay coils according to specified polarity.
- Do not apply voltage to both set coil and reset coil at a time.

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

Flow Solder Condition:

Pre-Heating:	Maximum 120˚C within 90 sec.
Soldering:	Dip within 5 sec. at 255°C±5°C solder bath

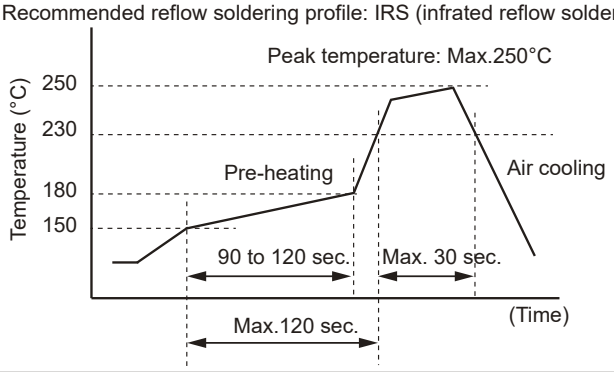
Relay must be cooled by air immediately after soldering

Solder by Soldering Iron:

Soldering Iron:	30-60W
Temperature:	Maximum 350-360˚C
Duration:	Maximum 3 sec.

Refow Solder Condition:
(Applicable only for reflow capable type)

Recommended reflow soldering profile: IRS (infrated reflow soldering)



Important notes for reflow soldering

- Temperature shall be measured at PC board upper surface.
- Temperature at PC board upper surface may be changed depending on size of PC board, components mounted on the PC board and/or heating method. Please perform the confirmation test wtih actual PC board.
- This reflow condition is applicable only for reflow-capable relays. Do not reflow reflow-incapable relays.
- Recommended solder for assembley: Sn-3.0 Ag -0.5 Cu.

We highly recommend that you confirm your actual solder conditions

3. Moisture Sensitivity

- SMT versions of FTR-C1 relays in Tape & Reel package will be shipped in Moisture Barrier Bag (MBB).
- Moisture Sensitivity Level (MSL) of FTR-C1 relay is indicated on the packing caution label.
- Relays must be stored in the unopened MBB at strage conditions <40°C/90% RH for a maximum 1 year.
- SMT versions of FTR-C1 relays in tube packing will not be shipped in MBB. Therefore, these relays shall be dried by baking before reflow soldering process according to IPC/Jedex J-STD-033.

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

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