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## 1. OBJECTIVE

This specification shall be used for qualifying any SMT Modular Jack single port vertical and horizontal made by FCI.

## 2. SCOPE

This specification covers both the SMT TOP ENTRY and SIDE ENTRY PCB MODULAR JACK ASSEMBLY designed as the receptacle portion of a modular (pluggable) telecommunications system for both commercial and private use.

The mating Plug is described in this specification only to the extent necessary to define performance of the mated combination; it is not intended that the Plug design be limited by this document.

The specification is composed of the following sections.

## 3. GENERAL

### 3.1 Qualification

Modular Jacks furnished under this specification shall be products capable of meeting the qualification test requirements specified herein.

### 3.2 Material

The material for each part shall be as specified herein, or equivalent. Substitute material(s) shall meet the performance requirements of this specification.

#### 3.2.1 **Housing**

The housing shall be a flame retardant high-temperature plastic material, conforming to the flammability grade UL 94V-0. Material shall be specified in detailed drawings.

#### 3.2.2 **Contact spring wire**

The contact spring shall be high performance phosphor bronze alloy. Material temper shall be specified in detailed drawings.


### 3.3 Finish

The contact spring wire shall be plated with:

- a) 0,075  $\infty$ m minimum Gold flash over a minimum of 0,76  $\infty$ m Palladium Nickel over a minimum of 1,27  $\infty$ m Nickel underplate
- or: b) 0,76  $\infty$ m Gold finish over a minimum of 1,27  $\infty$ m Nickel underplate
- or: c) 1,27  $\infty$ m Gold finish over a minimum of 1,27  $\infty$ m Nickel underplate

### 3.4 Design and construction

The Jack shall consist of a one-piece molded housing and non-removable contact springs.

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The Jack design shall conform to the plug/jack contact specification and all applicable mechanical specifications, including insertion and removal forces given in FCC par 68 Subpart F

**3.4.1 Housing configuration**

Multiple housing configurations shall be available for use with various Plug configurations.

**3.4.2 Contact spring alignment**

Individual contact springs in the unmated Jack shall neither touch or cross the plane of adjacent springs when viewed from the front of the Jack.

**3.4.3 Workmanship**

Modular Jacks shall be uniform in quality and shall be free from burrs, scratches, cracks, voids, chips, blisters, pin holes, sharp edges, and other defects what will adversely affect life or serviceability.

**3.5 Mating Plug**

**3.5.1 Surface finish**

The Plug terminal shall be smooth and free of burrs in the contact area.

**3.5.2 Finish**

The mating plug finish shall be 1,27  $\mu$ m hard gold minimum in accordance with MIL-G-45204, type II, grade C, in the contact area.

**3.5.3 Configuration**

The Plug shall conform to the dimensional requirements shown in figure 1.

**3.6 Electrical characteristics**


**3.6.1 Current rating**

The maximum current rating of the Jack and its mating Plug shall be 1.5 Amp DC (see paragraph 5.1).

**3.6.2 Voltage proof**

There shall be no evidence of arc-over, insulation breakdown or excessive leakage current (> 1 milli-ampere), when the unmated Jack is tested in accordance with IEC 512-2 TEST 4a Method A Voltage proof. The following details shall apply:

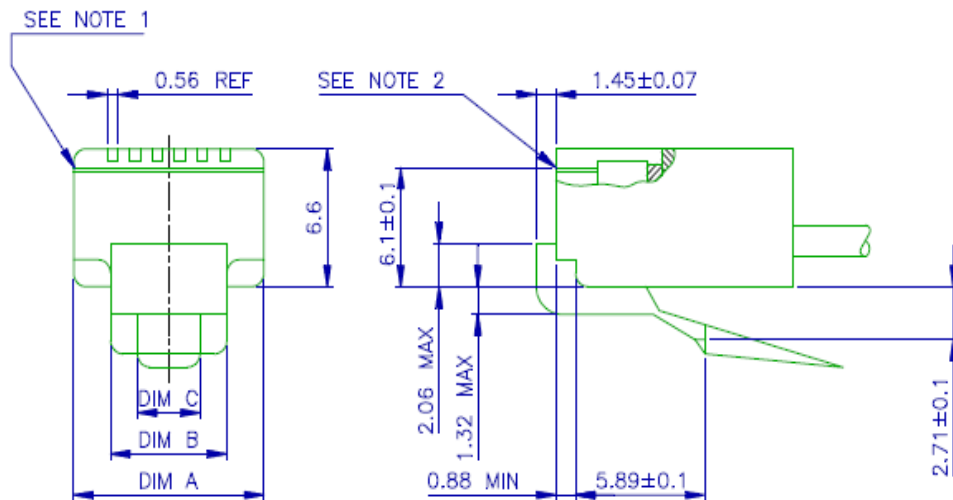
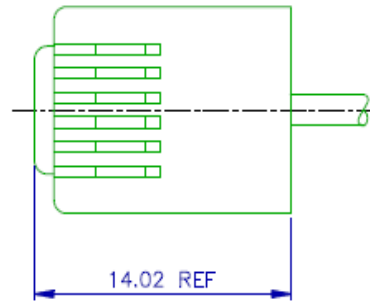
- (a) Test potential: 1000 V AC
- (b) Test duration: 60 seconds


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TYPE	POS	DIM A	DIM B	DIM C
TYPE 616	4	7.62±0.1	4.93±0.1	2.54±0.1
TYPE 623	6	9.65±0.1	6.05±0.1	3.25±0.1
TYPE 645	8	11.68±0.1	6.1±0.1	3.25±0.1

NOTES:

1. AWG 24 solid wire commonly connected to each terminal.
2. 0.25 maximum mismatch allowed on this surface.
3. Material compatible with requirements of this specification.



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### 3.6.3 Insulation resistance

The insulation resistance of the unmated Jack shall be not less than  $500 \cdot 10^6 \Omega$  initially and  $50 \cdot 10^6 \Omega$  after tests, when measured in accordance with IEC 512-2 TEST 3a, Method A. The following details shall apply:

(a) Test condition: 100 V DC

### 3.6.4 Contact resistance

The contact resistance between the Modular Jack and its specific Plug test shall not exceed 20 m $\Omega$  (30 m $\Omega$  after test) when measured in accordance with IEC 512-2 TEST 2a, method A. The following details shall apply:

(a) Test current: 100 mA DC

## 3.7 Mechanical characteristics

### 3.7.1 Operating temperatures

The operating temperatures of the SMT Jack are ranging from -25°C to +70°C.

### 3.7.2 Total mating force

The total force (including any latching mechanism) required to fully mate the Modular Jack and Plug shall not exceed 22.24 Newton for a 4 position combination or 29.5 Newton for a 6 position combination or 39.0 Newton for an 8 position combination when measured in accordance with IEC 512-7 TEST 13a, insertion speed : 25 mm/mn.

### 3.7.3 Spring contact

The spring contact ends shall be located in the slots opposite the face of the Jack in the Unmated condition. Spring contact force is 0.98 N minimum.

### 3.7.4 Retention

#### 3.7.4.1 OVERALL ASSEMBLY

After soldering on PCB, there shall be no evidence of mechanical damage to the Jack, Plug or latching mechanism, nor separation of the Plug from the Jack when a static load of 22.5 Newton is applied between the Jack and Plug during 10 sec. in the direction of normal removal when measured in accordance with IEC 512-5 TEST 8b.


#### 3.7.4.2 JACK TO BOARD HORIZONTAL VERSION

After soldering, the mounting mechanism of the Jack shall withstand a force of 100 Newton applied on the Jack during 5 sec. in a direction parallel to the plane of the board, and measured according IEC 950 chapter 4.2.3 and 4.2.4.

### 3.7.5 Durability

After 500 mating cycles of the Modular Jack and its Specific Plug, the maximum spring form shall be as specified (see paragraph 3.7.3) the contact resistance shall not exceed 30 m $\Omega$  (see paragraph 3.6.4).

Modular Jacks can be lubricated using approved lubricant.

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### 3.7.6 Solderability

The solder tails and hold down shall meet the solderability requirements commonly used in electronic industry. More than 95% of the tested area shall be covered with fresh, smooth and uniform solder.

Solderability to be tested, prior to any other tests.

### 3.7.7 Specific test for 8 position version

The contact resistance of contact spring 1 and 8 shall not exceed 30 mΩ after 5 mating cycles with a standard 6 position plug.

## 3.8 Environmental conditions

### 3.8.1 Thermal shock

After exposure of the unmated Modular Jack to alternate periods of extreme high and low temperature, there shall be no evidence of cracking or crazing of the housing or other physical damage to the Jack. After the test, the dielectric withstanding voltage of the unmated Jack shall be not less than 1000 volts rms, 50 Hz (see paragraph 3.6.2). The test shall be in accordance with IEC 512-6 TEST 11d and IEC 68-2-14 TEST Na. The following details shall apply:

- (a) Test condition: Na (5 cycles)
- (b) Temperature range: -55°C to +50°C

### 3.8.2 Damp heat

Within one (1) hour after exposure of the unmated Jack to a high humidity, variable temperature environment, the insulation resistance shall be not less than  $500 \cdot 10^6 \Omega$  (see paragraph 3.6.3). After the test the contact resistance of the mated Jack and Plug shall not exceed 30 milli-ohms (see paragraph 3.6.4). The test shall be in accordance with IEC 516-6, TEST 11c and IEC 68-2-3 TEST Ca. The following details shall apply:

- (a) Test duration: 10 days (240 hours)
- (b) Relative humidity: (93 + 2 / - 3) %


### 3.8.3 Dry heat

After exposure of the unmated Jack and Plug to an operating, high temperature environment, the contact resistance shall not exceed 30 mΩ (see paragraph 3.6.4). After exposure of the unmated Jack to the same chamber temperature, the insulation resistance shall be not less than  $10 \cdot 10^6 \Omega$  (see paragraph 3.6.3). The test shall be in accordance with IEC 512-6 TEST 11i and IEC 68-2-2 TEST Bb. The following details shall apply:

- (a) Test chamber temperature: + 70°C
- (b) Test condition: Bb
- (c) Duration: 250 hours

### 3.8.4 Hydrogen sulfide (H<sub>2</sub>S) exposure

After exposure of the mated Jack and Plug to an H<sub>2</sub>S atmosphere, the low level circuit resistance shall not exceed 30 mΩ (see paragraph 3.6.4). The following details shall apply:

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- (a) Atmosphere: approximately 0.1 ppm H<sub>2</sub>S in moist air
- (b) Test temperature: +40°C
- (c) Test duration: 48 hours in a sealed, 9000 cc, desicator

### 3.8.5 Salt spray

After exposure of the mated Jack and Plug to a salt fog atmosphere, the low level circuit (contact) resistance shall not exceed 30 mΩ (see paragraph 3.6.4). The test shall be in accordance with IEC 512-6 TEST 11f and IEC 68-2-11 TEST Ka. The following details shall apply:


Duration : 48 hours

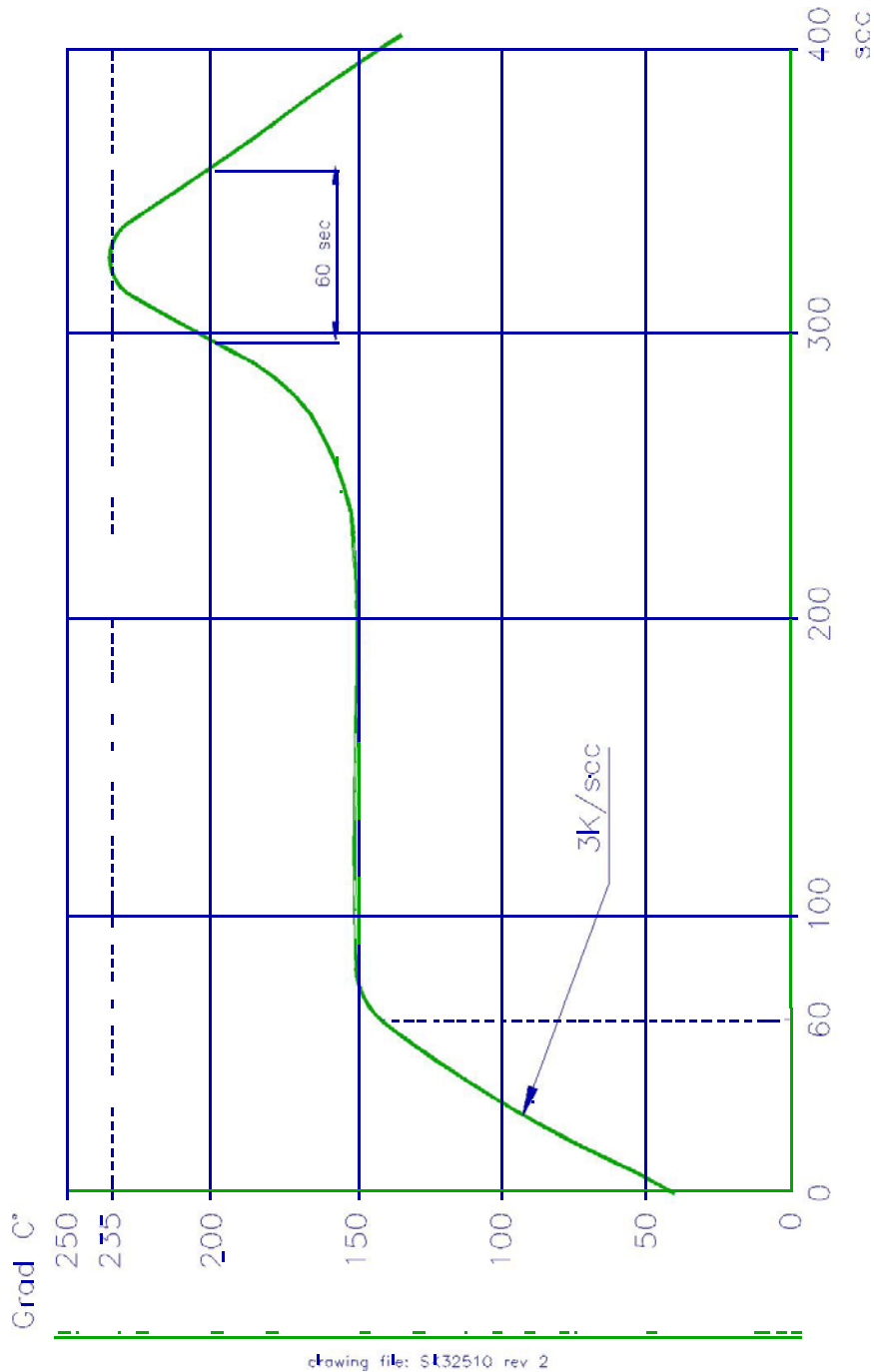
### 3.8.6 Resistance to soldering heat

The housing shall withstand the high temperatures encountered during soldering of the Jack to the printed wiring board without any functional deterioration. The following details shall apply:


- (a) Procedure: see oven profile curve (figure3)

The connector also shall withstand twice the temperatures encountered during an infra red reflow soldering process, as specified in figure 3 (turbo - convection - reflow - solder system); measuring point on the joint of the PCB and solderleg of the Jack.

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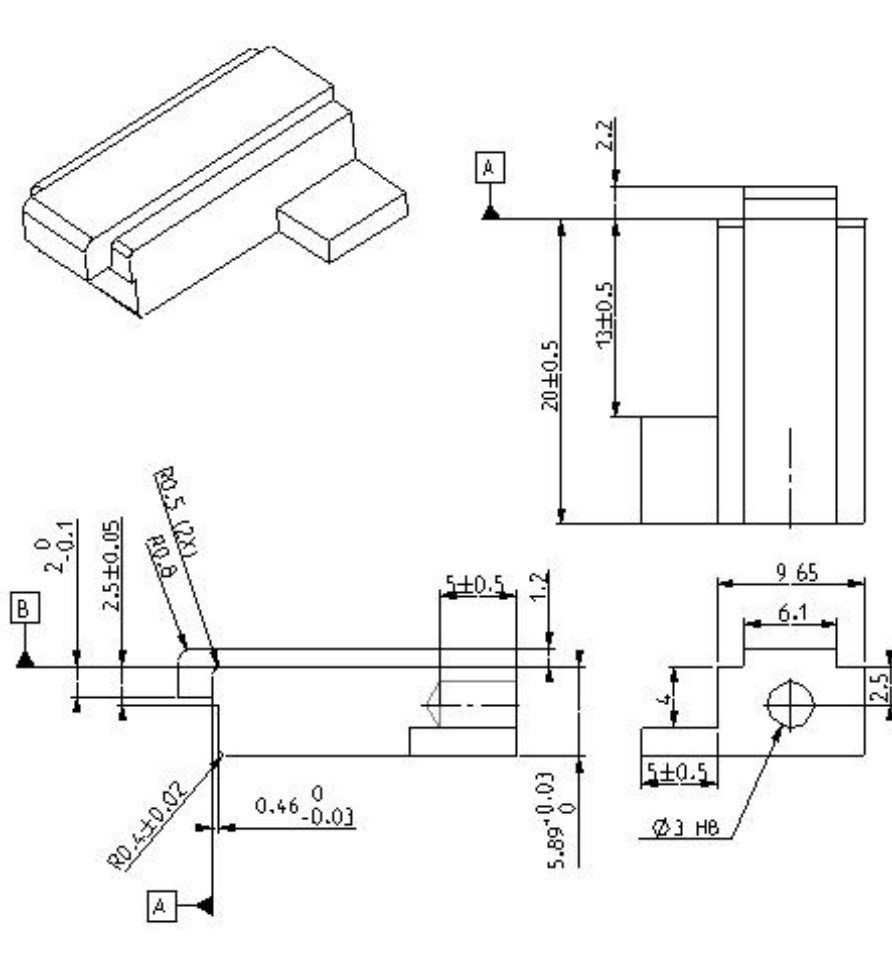
#### 4. DEFINITIONS


##### 4.1 Current rating

Actual current in the "use" circuitry approximates 0.020 ampere DC. Operating environments such as high temperature are significantly affected by the magnitude of the current in the connector; the "use" current has, therefore, been selected as a more practical test parameter.

##### 4.2 Specific test plug

Used to measure contact resistance




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## 5. PROCEDURE

**TABLE II - QUALIFICATION INSPECTION**

TEST	REQ'D	SAMPLE NUMBER								
	§	1	2	3	4	5	6	7	8	9
Total mating force	3.7.2	X	X		X	X	X			
Retention	3.7.4	X			X		X			
Contact resistance	3.6.4	X	X		X	X	X			
Insulation resistance	3.6.3			X						
Voltage proof	3.6.2			X						
Thermal shock	3.8.1	X		X						
Damp heat	3.8.2	X	X	X						
Insulation resistance	3.6.3			X						
Dry heat	3.8.3	X	X	X						
Durability	3.7.5				X					
Total mating force	3.7.2				X					
Maximum spring form	3.7.3				X					
Contact resistance	3.6.4				X					
Hydrogen sulfide	3.8.4				X	X	X			
Salt spray	3.8.5				X	X	X			
Retention (to failure)	3.7.4				X	X	X			
Solderability	3.7.6							X		
Resistance to soldering heat	3.8.6									X

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## 6. REFERENCE DOCUMENTS

The following documents of the issue, in effect on the date of the latest revision of this specification, shall form a part of this specification to the extent specified herein.

### FEDERAL STANDARDS

FED-STD-595	Colours
QQ-N-290	Nickel plating (electro deposited)
TIA-1096 (FCC Part 68 -Subpart F)	<i>Connector Requirements for Connection to the Telephone Network</i>

### MILITARY SPECIFICATIONS

MIL-G-45204 Gold plating (electro deposited)

### INDUSTRY SPECIFICATIONS AND STANDARDS


UL-94	Test for flammability of plastic materials
ASTM B-103	Phosphor bronze plate, sheet, strip & rolled bar
IEC 950	Safety of information technology equipment including electrical business equipment
IEC 512-2	Electromechanical components for electronic equipment's, basic testing procedures
IEC 512-7	Electromechanical components for electronic equipment's, basic testing procedures
IEC 512-5	Electromechanical components for electronic equipment's, basic testing procedures
IEC 512-6	Electromechanical components for electronic equipment's, basic testing procedures
IEC 68-2-14	Environmental testing
IEC 68-2-2	Environmental testing
IEC 68-2-11	Environmental testing

### FCI PROCEDURE

PMT-038 Internal test method

#### 6.1 Conflicting documents

In the event of any conflict between this specification and the detail specification sheet, the detail specification sheets shall take precedence.

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## 7. RECORD RETENTION

A	All	New Release	H50576	951220
B	3	Added:	H60240	960414
		§ 3.2.1 Material shall be specified in detailed drawings		
		§ 3.3 (a) 0,75 $\infty$ m Au-flash i.s.o. 0,38 $\infty$ m Au-flash		
	4	§ 3.6.1 1,5 Amp, 30 V DC, 42 V AC		
		i.s.o. 2 Amp DC		
	6	§ 3.6.3 500 mega Ohm i.s.o. 100 mega Ohm		
		(a) 100 V rms or DC		
		i.s.o. B (500 volts DC)		
	7	§ 3.7.3 Spring contact ends i.s.o. spring form		
		§ 3.7.4.2 deleted ", or Jack from the printed wiring board"		
	9	§ 3.8.2 500 mega Ohm i.s.o. 10 mega Ohm		
	10	§ 3.8.7 260°C i.s.o. 280°C 10 seconds i.s.o. 30 seconds.		
	11	added "Recommended"		
	All	deleted "TOP ENTRY PCB"		
C	All	Transfer responsibility of this GES to BSN	F80363	960618
D	1	SCOPE Add ' and SIDE ENTRY '	F80628	10/13/98
	7	§ 3.7.5 change § 3.7.3.1 to § 3.7.3 change § 3.7.3 to § 3.7.4.2 change § 3.7.1 to § 3.7.2	F80628	10/13/98
	7	§ 3.7.4 Add § 3.7.4.4	F80628	10/13/98
	9	§ 3.8.3 (a) change + 50°C to + 70 °c	F80628	10/13/98
E	All	Replace norm MIL by IEC	F10384	27/07/01
F	All	Document becomes UNRESTRICTED	F10-0030	12-Apr-2010
G	ALL	Update the FAI logo	ELX-N-14752	13-May-2013
H	11	Add federal standard TIA-1096	ELX-B-15088	27-June-2013