

## Scalable Shielded SIM 6 position

"The product may not perform according to the product specification if precautions have not been taken in the application to provide mechanical stability of the connector in relation to its mating parts".

### 1 SCOPE.

#### 1.1 Content.

This specification covers performance, test and quality requirements for a TE\* SIM Connector. The connector is designed to make a connection between a Subscriber Identity Module (SIM) according to ISO 7816-2 and a printed circuit board (PC-Board).

#### 1.2 Qualification.

When tests are performed on subject product, procedures specified in this specification shall be used. All inspections shall be performed using applicable inspection plan and product drawing.

### 2 APPLICABLE DOCUMENTS.

The following documents form a part of this specification to the extent specified herein. Unless otherwise specified, latest edition of the document applies. In the event of conflict between the requirements in this specification and the product drawing, the product drawing shall take precedence. In the event of conflict between requirements of this specification and referenced documents, this specification shall take precedence.

#### 2.1 TE Documents.

501-19136 Test report of "Scalable Shielded SIM"  
107-60338 Packaging Objectives "Scalable Shielded SIM "

#### 2.2 TE Drawings

C-2042647 Customer drawing of "Scalable Shielded SIM "  
C-2042920 Customer drawing of "Scalable Shielded SIM "  
C-1551285 Customer drawing of "Scalable Shielded SIM narrow version "

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### 2.3 Other Documents.

IEC 60512	Basic testing procedures and measuring methods for electromechanical components for electronic equipment.
IEC 60068	Basic environmental testing procedures.
ISO 7816-2	Identification Cards - Integrated Circuits Cards with contacts - dimensions and locations of the contacts
GSM 11.11	IETS Subscriber Identity Module - Interface Specification.

## 3 REQUIREMENTS.

### 3.1 Design and Construction:

Products shall be of design, construction and physical dimensions as specified on the applicable product drawing.

### 3.2 Material and Finish:

- |    |                          |  |
|----|--------------------------|--|
| A. | Contact material:        | - copper alloy.  |
|    | Plating Mating side:     | - post-plated with nickel and selective gold over palladium or palladium/nickel. |
|    | Plating Termination end: | - post-plated with nickel and selective tin.                                     |
| B. | Clip material:           | - stainless steel  |
|    | Plating:                 | - selective post-plated nickel with selective tin on soldered tabs               |
| C. | Housing material:        | - Glass filled Liquid Crystal Polymer (LCP).                                     |

### 3.3 Ratings:

- |    |                        |                    |
|----|------------------------|--------------------|
| A. | Voltage:               | 15 V max.          |
| B. | Current:               | 0.5 A max./contact |
| C. | Operating temperature: | -30°C to 85°C.     |
|    | Storage temperature:   | -55°C to 85°C.     |
| D. | Durability:            | 1,500 cycles       |

**3.4 Performance and Test description:**

The product is designed to meet electrical, mechanical and environmental performance specified in this paragraph as tested per test sequence specified in paragraph. 3.6.

Unless otherwise specified, all tests are performed at ambient environmental conditions per IEC specification 60068-1 clause 5.3. and are performed with connectors in mated conditions.

V I S U A L			
Para	Test Title	Performance / Severity Requirements	Procedure
3.4.1	Examination of product	Meets requirements of product drawing and applicable instructions on customer drawing, and application specification.	Visual, dimensional and functional per applicable inspection plan. In acc. with IEC 60512-1-1 Magnification 10x

E L E C T R I C A L			
Para	Test Title	Performance / Severity Requirements	Procedure
3.4.2	Contact resistance	Max. open voltage 20mV. Max. current 100 mA DC. All contacts to be measured using a GSM 11.11 SIM-card. Measuring points shall be as indicated in figure 1. Requirements: Initial Value 50 mOhms max. Final value 100 mOhms max.	In acc. with IEC 60512-2-1  "See also para. 3.5.1."
3.4.3	Insulation resistance	Test voltage 500 <sup>±15</sup> V DC or AC Peak. Duration: 1 minute, unmated. Test between adjacent contacts. Requirements: 1000MOhms Min.	In acc. with IEC 60512-3-1
3.4.4	Dielectric strength	Test voltage: 400 V AC Duration 1 minute, unmated. Test between adjacent contacts. Requirements: No voltage breakdown or flash over	In acc. with IEC 60512-4-1
3.4.5	Temperature Rise	Current-load .5 A. Test shall be conducted for 1, 2, 3, up to 6 contacts loaded simultaneously. Requirements: After tests maximum increase for environmental temperature, 30 degree C Max.	In acc. with IEC 60512-5-1

<b>MECHANICAL (continued)</b>			
<b>Para</b>	<b>Test Title</b>	<b>Performance / Severity Requirements</b>	<b>Procedure</b>
<b>3.4.6</b>	Contact normal force	Normal force shall be measured with point of action as indicated in figure 2. Requirements: 1. 0,20 N min. at 0.24mm distance from housing top on return curve. 2. 0.90 N max. at max. deflection.	According to GSM 11.11.  See also para. 3.5.2
<b>3.4.7</b>	Durability (life cycles)	Manually mate and un-mate a new standard GSM 11.11 SIM-card with the SIM connector. Operation cycles: 1500 Rate: 500 cycles/hour. Speed: 2.54 cm/minute	In acc. with IEC 60512-9-1
<b>3.4.8</b>	Vibration (random)	Frequency: 10 - 100 Hz; 3 m2/s3 (0.0132 g2/Hz) ; 100 - 500 Hz; -3dB/Oct. for: 3 x 60 min (X- Y- and Z-axis) in minimum deflection position. Requirements: No mechanical damage. Discontinuity <1us	In acc. with IEC 60068-2-64Fh
<b>3.4.9</b>	Shear strength	No shearing at 50N during 10 seconds. See figure 3 for point of action.	See also para. 3.5.3
<b>3.4.10</b>	Retention forces of contacts	Apply force of 1 N min. at point of action indicated in figure 4. Speed: 0.1 mm/s	See also para. 3.5.4
<b>3.4.11</b>	Shock (specified pulse)	Pulse shape half sine, peak acceleration 50 G, pulse 11 ms, 3 shocks in both directions in XYZ axis (18 shocks) Requirements: No mechanical damage. Discontinuity <1us	In acc. with IEC 60068-2-27Ea
<b>3.4.12</b>	Bump	Duration 6 ms, 254 m/s <sup>2</sup> 3 x 1000 for both direction in xyz axis (6000 shocks) Requirements: No mechanical damage. Discontinuity <1us	In acc. with IEC 60068-2-29Eb

ENVIRONMENTAL			
Para	Test Title	Performance / Severity Requirements	Procedure
3.4.13	Thermal Shock	25 cycle of Ta= -55 C for 0.5 h then change to 25 C max. 5 min then Tb= +85 C for 0.5 h, then cool to ambient. Recovery 2 h at ambient atmosphere.	In acc. with IEC 60068-2-14
3.4.14	Dry heat (steady state)	At +85°C for 96hours; recovery period 1-2 hours under ambient atmospheric conditions.	In acc. with IEC 60068-2-2Bb
3.4.15	Dry Cold (steady state)	At - 40°C for 96hours; recovery period 1-2hours under ambient atmospheric conditions.	In acc. with IEC 60068-2-1Ab
3.4.16	Damp heat (Cyclic)	Temp 25-55°C, RH 90-100% for 18 cycles of 24 hours each. Transition time: 3hours Recovery: 2 hours at 25°C RH 75%.  Unmated tests: Connector with free contacts No power on.  Requirements: No corrosion on contact area after testing	In acc. with IEC 60068-2-30 Db

### 3.5 Additional testing details.

#### 3.5.1 Termination resistance

Termination resistance shall be measured as indicated in figure 1.

Bulk-resistance of circuits outside the connector, such as SIM-card pads, PC-Board paths and wire for series connection, are not included in the requirement and therefore shall be measured and documented separately for reference (in case of significant influence).

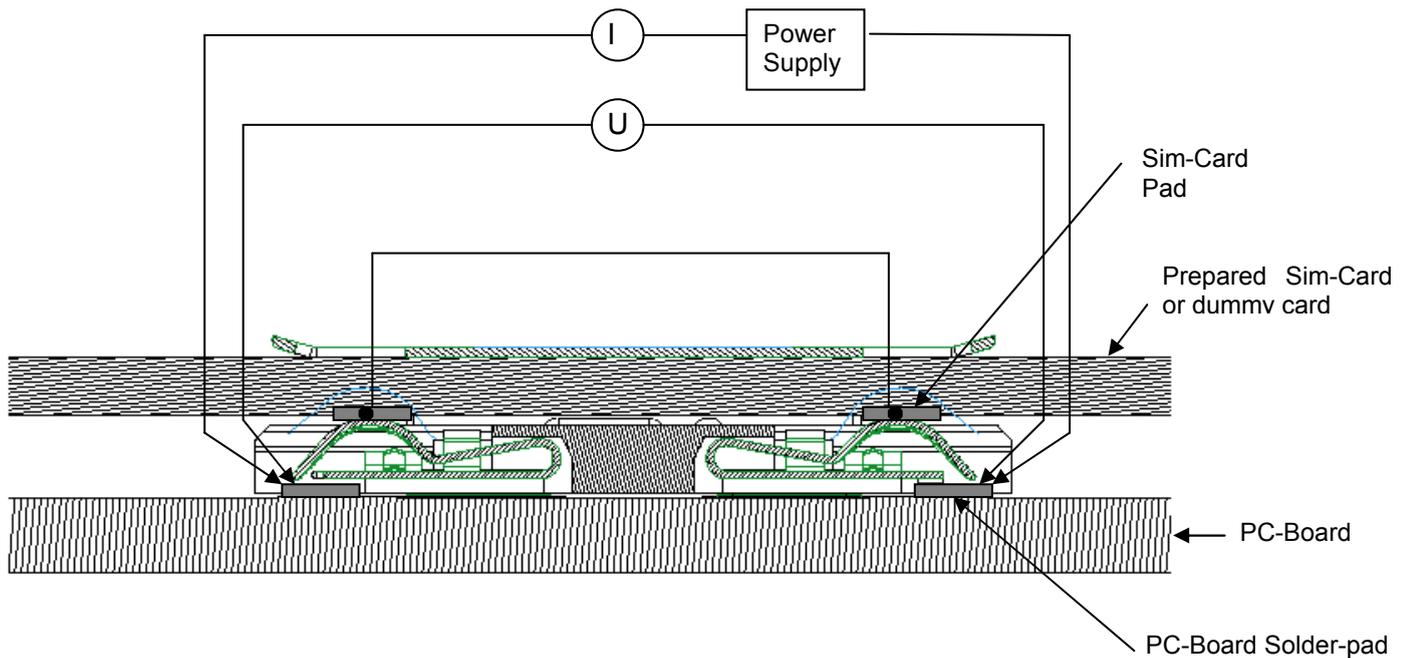


Figure 1.

#### 3.5.2 Contact Normal Force

Normal force shall be measured with stroke up to mating face and back. Force/deflection curve shall display the measuring results.

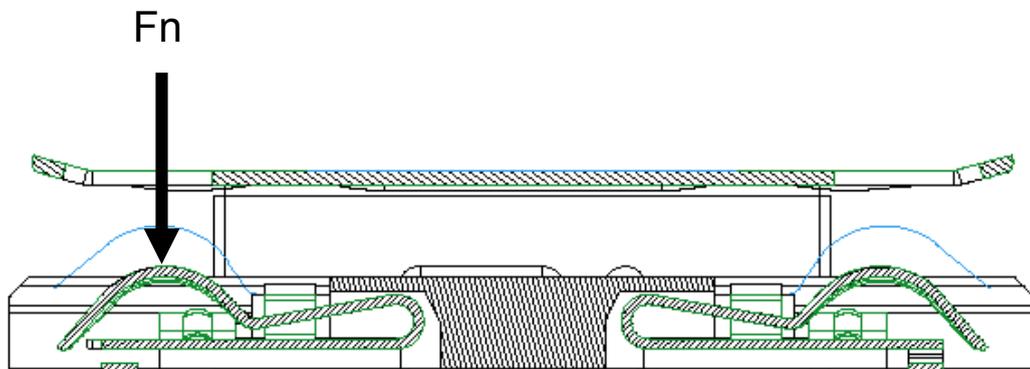


Figure 2

### 3.5.3 Shear Force

Specified force shall be applied with point of action as specified in figure 3.

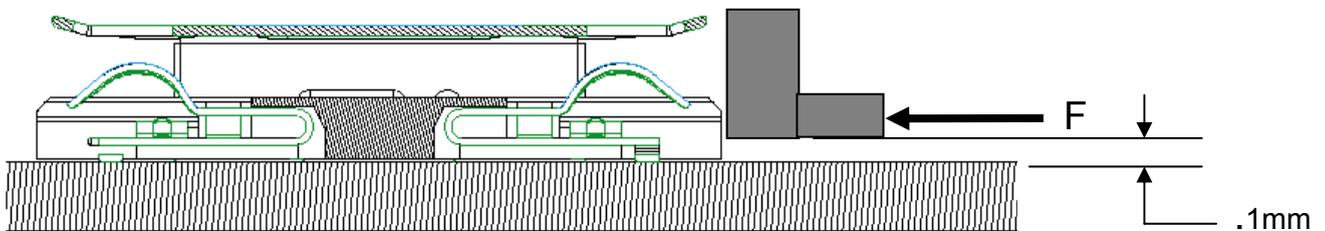


Figure 3

### 3.5.4 Retention force of Contacts

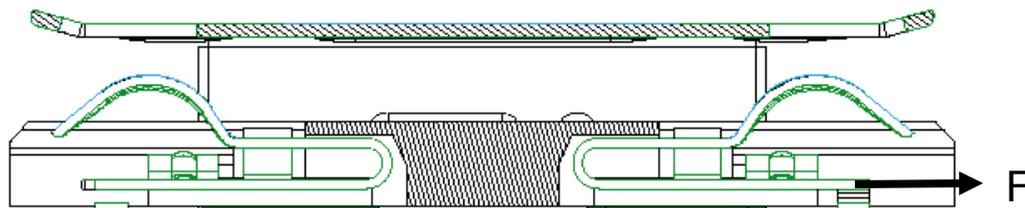


Figure 4

### 3.5.5 Resistance to soldering heat

Resistance to soldering-heat test shall cover the Forced hot air convection (reflow) heat curve as indicated in figure 9.

ref. IPC/JEDEC J-STD-020B with increased  $T_p$ .

Between exposures, parts shall be allowed to cool down to room temperature, for 5 minutes minimum.

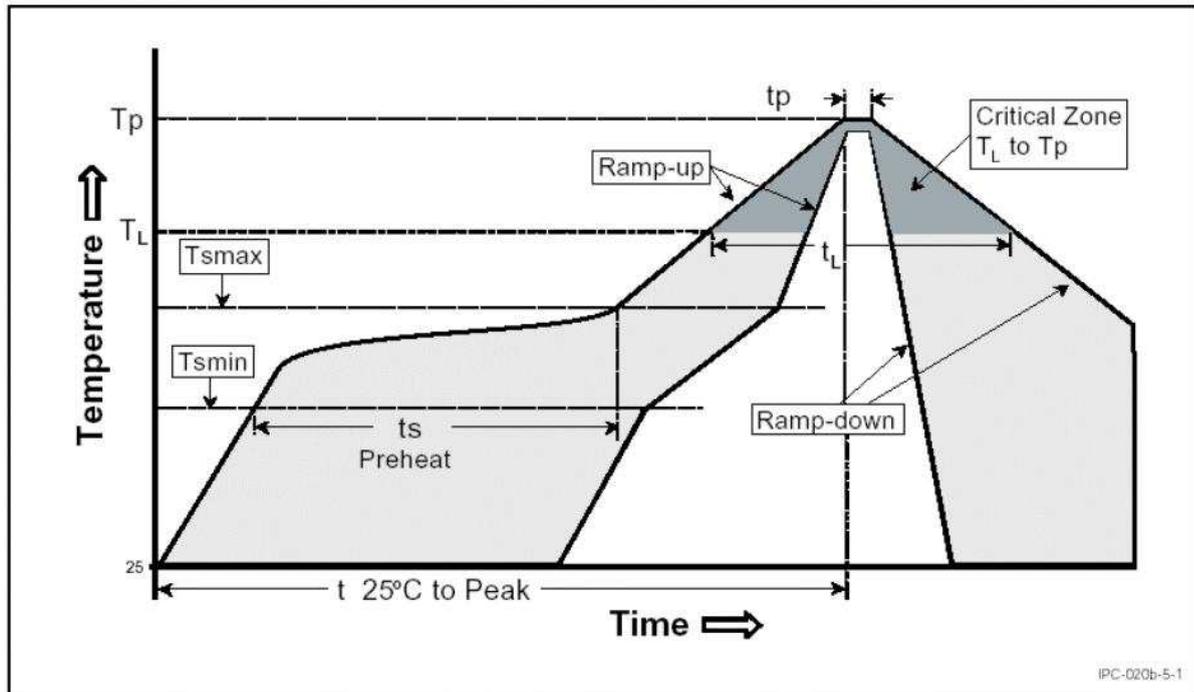


Figure 9. Forced hot air convection (reflow) heat curve.

Profile feature	Pb-Free Assembly Small Body
Average ramp-up rate ( $T_L$ to $T_P$ )	3°C /second max.
Preheat <ul style="list-style-type: none"> <li>- Temperature Min (<math>T_{S\ min}</math>)</li> <li>- Temperature Max (<math>T_{S\ max}</math>)</li> <li>- Time (min to max) (<math>t_s</math>)</li> </ul>	150°C 200°C 60-180 seconds
$T_{S\ max}$ to $T_L$ <ul style="list-style-type: none"> <li>- Ramp-up Rate</li> </ul>	3°C /second max.
Preheat <ul style="list-style-type: none"> <li>- Temperature Min (<math>T_L</math>)</li> <li>- Time (<math>t_L</math>)</li> </ul>	217°C 60-150 seconds
Peak temperature ( $T_P$ )	260 +0/-5°C
Time within 5°C of actual Peak Temperature ( $t_p$ )	20-40 seconds
Ramp-down Rate	6°C /second max.
Time 25°C to Peak Temperature	8 minutes max.

Note: All temperatures refer to topside of the package, measured on the package body surface.

**3.6 Product Qualification and Regualification Test Sequence.**

Test or examination	TEST - GROUP (a)				
	1	2	3	4	5
	TEST - SEQUENCE (b)				
Examination of product	1, 16	1,12	1,6	1,4	1,3
Contact resistance	3,10,13	3, 6, 10	3,5		
Insulation resistance	4, 14				
Dielectric Strength	5, 15				
Dry Cold	6				
Dry Heat	7				
Contact Force	8, 11	4, 11			
Durability (1500 cycles)	9				
Thermal shock		5			
Damp heat (cyclic)	12				
Temperature rise			4		
Vibration		7			
Shock		9			
Bump		8			
Shear strength				3	
Retention forces					2
Resistance to soldering heat (3 cycles)	2	2	2	2	

(a) See para. 4.1.A.

(b) Numbers indicate sequence in which tests are performed.

## 4 QUALITY ASSURANCE PROVISIONS.

### 4.1 Qualification testing.

#### A. Sample selection

Samples shall be prepared in accordance with applicable instructions and shall be selected at random from current production.

Unless otherwise specified, all test-groups shall consist of a minimum of 5 connectors of which all contacts shall be tested.

#### B. Test sequence

Qualification inspection shall be verified by testing samples as specified in para. 3.6.

### 4.2 Regualification testing.

If changes significantly affecting form, fit or function are made to product or manufacturing process, product assurance shall coordinate re-qualification testing, consisting of all or part of original testing sequence as determined by product, quality and reliability engineering.

### 4.3 Acceptance.

Acceptance is based upon verification that product meets requirements of para. 3.4. Failures attributed to equipment, test set-up, applied customer components or operator deficiencies shall not disqualify the product. When product failure occurs, corrective action shall be taken and samples resubmitted for re-qualification. Testing to confirm corrective action is required before re-submittal.

### 4.4 Quality conformance inspection.

Applicable TE quality inspection plan will specify sampling acceptable quality level to be used. Dimensional and functional requirements shall be in accordance with applicable product drawing and this specification.