

**BOARD TO BOARD CONNECTOR****1. SCOPE.****1.1 Content.**

This specification covers performance, test and quality requirements for a TE\* Board to Board SMD connector. The connector is designed to make a connection between a contact surface and a Printed Wire Board (PWB). The connector is soldered to the PWB and can connect to a flex foil or PWB.

**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 extend 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.**

501-19167                      Test report of "Board to board connector"

**2.2 TE Drawings**

C-1551759                      Customer drawing of "Board to Board connector"

**2.3 Other Documents.**

109-5000	Test Specification, General Requirements for Test Methods
IEC 60512	Basic testing procedures and measuring methods for electromechanical components for electronic equipment.
IEC 60068	Basic environmental testing procedures.

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### 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.  
Plating solder tabs: - Post-plated with nickel and selective gold.
- B. Housing material: - Glass filled Liquid Crystal Polymer (LCP).

#### 3.3 Ratings:

- A. Voltage: 50 V max.
- B. Current: 0,3 A max./contact
- C. Operating temperature: -40°C to 85°C  
Storage temperature: -40°C to 85°C
- D. Durability: 15 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 par. 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			
Par.	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

ELECTRICAL			
3.4.2	Contact resistance	Max. open voltage 20mV. Max. current 100 mA DC. All contacts to be measured. <u>Requirement:</u> Initial: 40 mΩ max. ΔR: 30 mΩ max.	In acc. with IEC 60512-2-1  Measuring points shall be as indicated in figure 1, Ref. par. 3.5.1.
3.4.3	Insulation resistance	Minimum 100 MΩ, after the testing 100 V DC	In acc. with IEC 60512-3-1
3.4.4	Dielectric strength	No voltage breakdown 100 V DC	In acc. with IEC 60512-4-1
MECHANICAL			
Par.	Test Title	Performance / Severity Requirements	Procedure
3.4.5	Contact normal force (Per contact)	Normal force shall be measured: 1. at contact position Dim A <u>Min. Requirement:</u> See Table 1. 2. at contact position Dim C <u>Max. Requirement:</u> See Table 1.	Normal force test equipment  (1 <sup>st</sup> and 2 <sup>nd</sup> operation force / deflection curve)  (See figure 3 par. 3.5.3)
3.4.6	Mechanical Operation	Mating and un-mating to maximum deflection Dim B. Mating cycles: 15, Speed: 2mm/s, <u>Requirement:</u> No mechanical damage	In acc. with IEC 60512-9-1  (See Figure 3 par. 3.5.3)
3.4.8	Resistance to soldering heat (Hot-Air)	3 cycles of Hot-Air heat-curve as specified in figure 4. (unmated) <u>Requirements:</u> No cracks, chips or melting.	In acc. with IPC/JEDEC J-STD-020B with increased T peak Ref. Par. 3.5.4
3.4.7	Solderability	Component solder tails to be immersed in lead free solder bath. Solder bath temp: 245°C±3°C Immersion time 2 – 3 sec. <u>Requirement:</u> Min 95% of immersed surface to be wetted.	In acc. with IEC 60512-12-1
3.4.9	Mechanical Shock	Connector to be mounted in test-frame, contact position at Dim B. 30g, 6ms, 3.4m/s half sine pulse 6 successive shocks in 3 mutually perpendicular axis <u>Requirement:</u> No mechanical damage Discontinuity <1us	In acc. with IEC 60512-6-3  (See Figure 3 par. 3.5.3)

3.4.10	Vibration (random)	Connector to be mounted in test-frame, contact position at Dim B. Frequency 5 – 500Hz, 0.01 g <sup>2</sup> /Hz, 100 min at X-Y-Z axis, Total 300 min for 3 axis. <u>Requirement:</u> No mechanical damage Discontinuity <1us	In acc. with IEC 60512-6-5  (See Figure 3 par. 3.5.3)
3.4.11	Vibration Sinusoidal	Connector to be mounted in test-frame, contact position at Dim B. Frequency 10 – 150Hz, 5.1g acceleration, Sweep rate at 1 octave/minute, 90 min at X-Y-Z axis, Total 270 min for 3 axis. <u>Requirement:</u> No mechanical damage Discontinuity <1us	In acc. with IEC 60512-6-4  (See Figure 3 par. 3.5.3)
<b>ENVIRONMENTAL</b>			
Par.	Test Title	Performance / Severity Requirements	Procedure
3.4.12	Rapid change of temperature	Connector to be mounted in test-frame, contact position at Dim B. -40°/85°C, 10min / 10min, Transition time: <300 sec. Number of cycles: 640 Recovery time: 1 hour	In acc. with IEC 60512-11-4  (See Figure 3 par. 3.5.3)
3.4.13	Dry heat	Connector to be mounted in test-frame, contact position at Dim B. Temperature: 85°C Duration: 500hrs. Recovery time: 1 hour	In acc. with IEC 60512-11-9  (See Figure 3 par. 3.5.3)
3.4.14	Cold	Connector to be mounted in test-frame, contact position at Dim B. Temperature –40°C Duration 500hrs. Recovery time: 1hr	In acc. with IEC 60512-11-10  (See Figure 3 par. 3.5.3)
3.4.15	Damp/heat steady state	Connector to be mounted in test-frame, contact position at Dim B. 85°C / RH 85% 1000hrs	In acc. with IEC 60068-2-78 Test Cab  (See Figure 3 par. 3.5.3)

3.4.16	Salt Mist	Connector to be mounted in test-frame, contact position at Dim B. Temperature $35\pm 2^{\circ}\text{C}$ , 100% RH Salt mist: $5\pm 1\%$ salt solution Duration 2 hrs, after each period store parts in climate chamber at $40^{\circ}\text{C}$ / 93% RH for 22 hrs. Total 3 cycles <u>Requirement:</u> No functional damage	In acc. with IEC 60512-11-6  (See Figure 3 par. 3.5.3)
3.4.17	Ammonia gas test	Contacts in undeflected state. Exposure to ammonia gas according to ASTM B858 or ISO 6957 $25^{\circ}\text{C}$ ; 24hrs	In acc. With ASTM B858 or ISO 6957

### 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, PCB tracks 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).

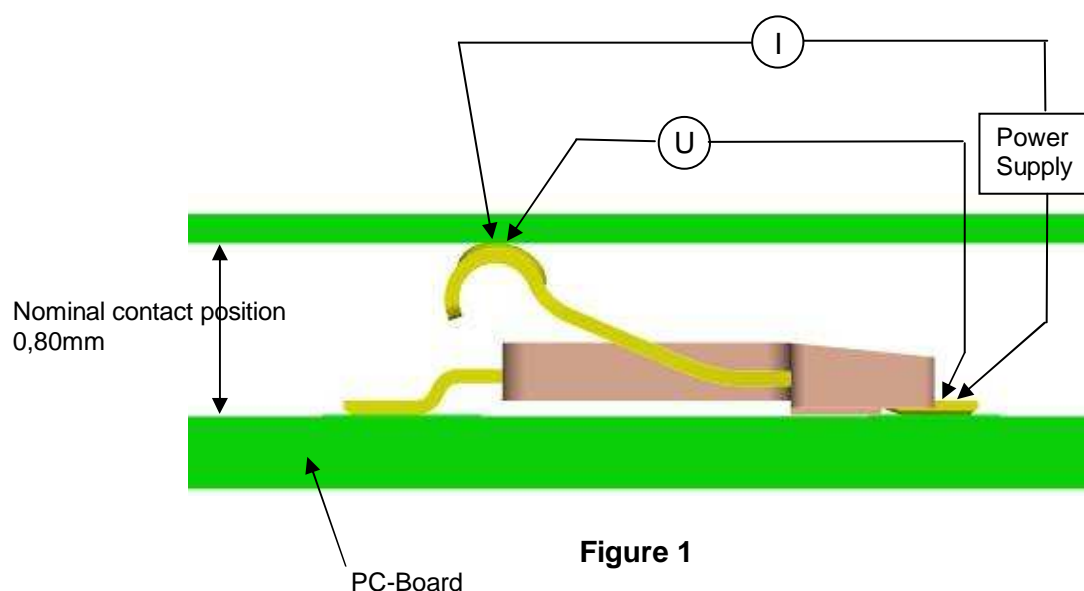
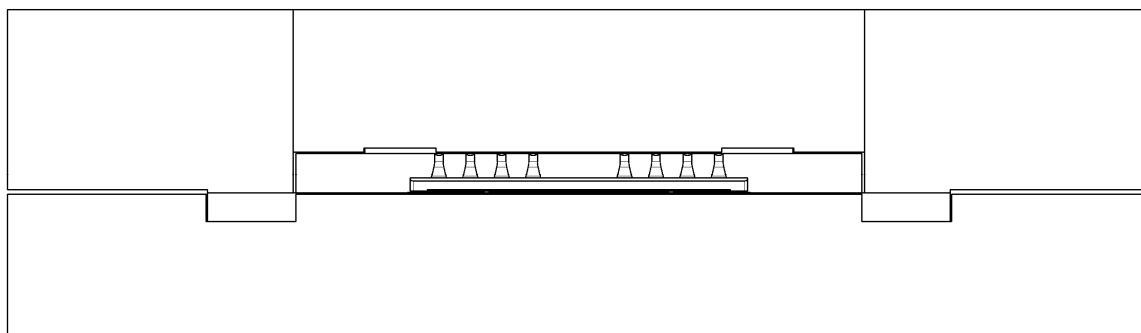


Figure 1

### 3.5.2 Test frames

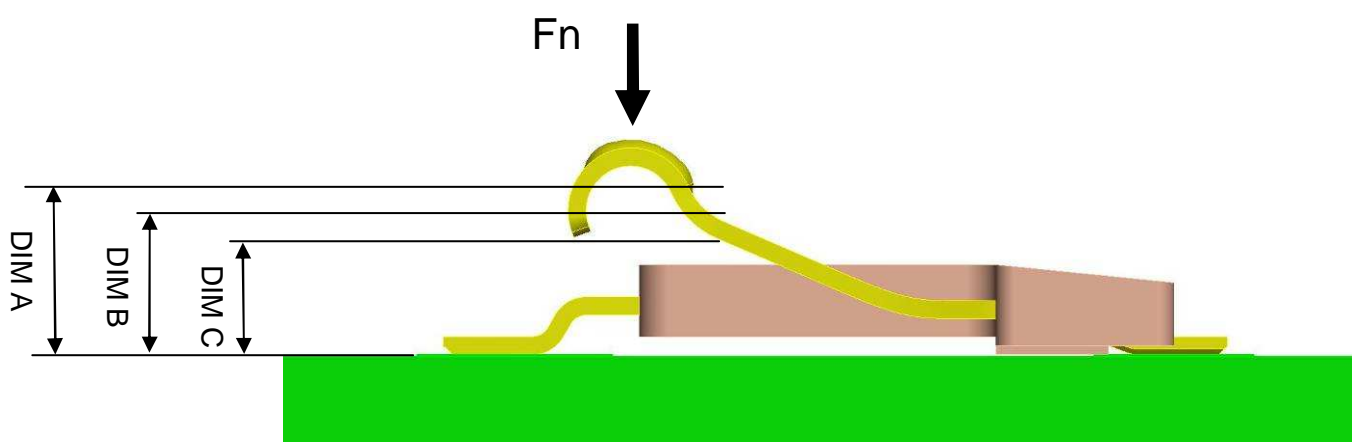
Test-frames shall provide mechanical stability of the connector in relation to its mating parts.



**Figure 2**

During Vibration, an electrical circuit is checking that no electrical contact interruptions occur that exceed the requirement.

### 3.5.3 Normal Force



**Figure 3**

Dim (mm)	Force (N)
A: 0.90	0.40 Min.
B: 0.80	0.75±0.20
C: 0.70	1.20 Max.

**Table 1**

### 3.5.4 Resistance to soldering-heat

Resistance to soldering-heat test shall cover the hot air-soldering heat-curve as indicated in figure 4 Ref. IPC/JEDEC J-STD-020B with increased T peak.

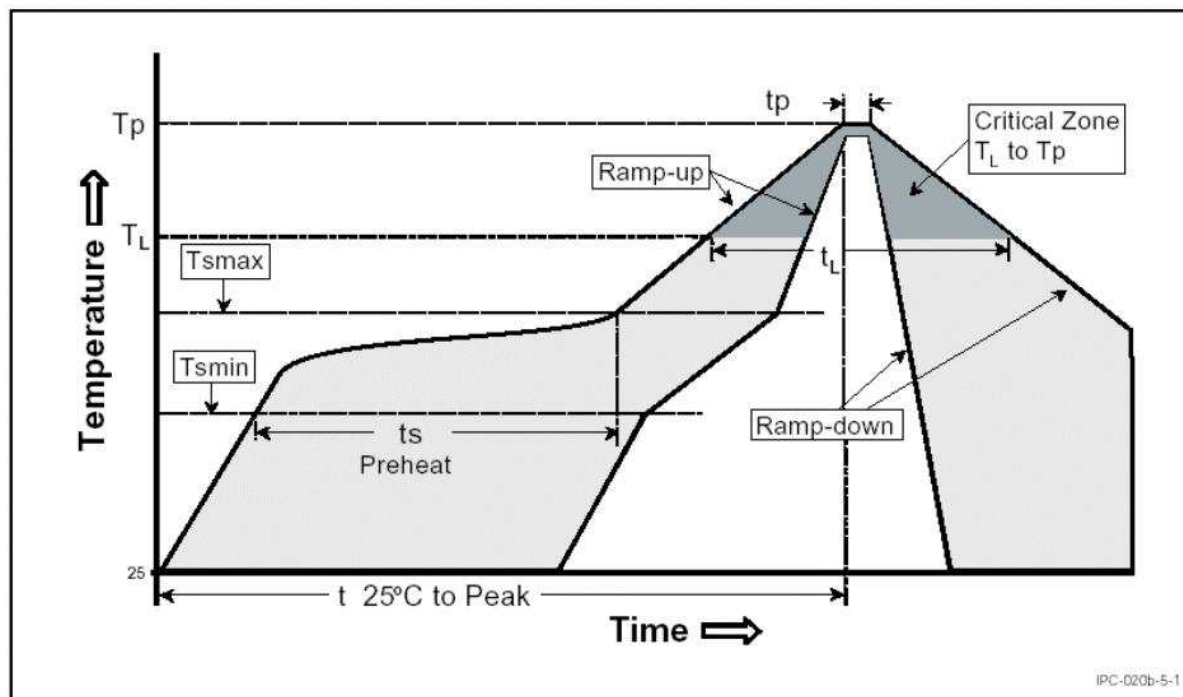


Figure 4

Method of heat transfer	a) Forced hot air convection (reflow) b) Vapour Phase soldering
Average temperature gradient in preheating	3.0 K/s
Temperature gradient in reflow	3.0 K/s
Preheating condition	max. 200°C/ max. 180s
Time above 200°C	not defined
Time above 217°C	60 – 150s
Time above 230°C	not defined
Peak temperature	max. 260°C
Temperature gradient in cooling	max. 6 K/s
Total reflow profile duration <sup>1)</sup>	480 s max.

1) time measured from T = 40°C in preheating up to T = 100°C in cooling

### 3.6 Product Qualification and Requalification Test Sequence.

Test or examination	TEST – GROUP (a)					
	1	2	3	4	5	6
	TEST – SEQUENCE (b)					
Examination of product	1, 3, 5	1, 3, 6	1, 11	1, 9	1, 6, 10	1, 3, 5
Contact resistance			2, 4, 6, 8, 10	2, 6	2, 7	
Insulation resistance				3, 7	3, 8	
Dielectric strength				4, 8	4, 9	
Contact normal force	4					
Mechanical Operation					5	
Resistance to soldering heat	2					
Solderability						2
Mechanical Shock		2				
Vibration Random		4				
Vibration Sinusoidal		5				
Rapid change of temperature			3			
Dry heat			5			
Cold			7			
Damp / heat steady state				5		
Salt Mist			9			
Ammonia Gas test						4

(a) See par. 4.1.A.

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

Sample description	Number of samples in test groups					
	1	2	3	4	5	6
Board to Board Conn.	10	10	10	10	10	10



#### **4 QUALITY ASSURANCE PROVISIONS.**

##### **4.5 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 par. 3.6.

##### **4.6 Requalification testing.**

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

##### **4.7 Acceptance.**

Acceptance is based upon verification that product meets requirements of par. 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 requalification. Testing to confirm corrective action is required before resubmittal.

##### **4.8 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.