**6 Pins,1.6 Pitch,1 Piece BtoB Connector**

## 1. Purpose:

This is qualification test. The purpose of this test is to evaluate the performance of 6 pin 1.6p B to B.

Testing was performed on below products to determine it compliance with the requirements of product specification 108-115066.

## 2. Scope:

This is test report for 6 pins 1.6pitch BtoB connector. Testing was performed at TE connectivity Shanghai Electrical Components Test Laboratory.

## 3. Conclusion:

The product met the electrical, mechanical, and environmental performance requirements of TE product specification 108-115066.

## 4. Test samples:

Samples were taken randomly from current production. The following part numbers were used for test:

| Description | Product Part No. |
|---|---|
| 6 Pins,1.6 Pitch,1 Piece BtoB Connector | 2199170-2 |

## 5. Test Method

5.1 Examination of Product

Visual, dimensional and functional per applicable inspection plan.

Requirements: Meets requirements of product drawing

Test Method: In accordance with IEC 60512-1-1and IEC 60512-1-2.

5.2 Terminal Resistance (Low Level)

Measure at nominal working position (20 mV, 100 mA max.). Simple sketch shows the testing method. Four-wire measurement method.

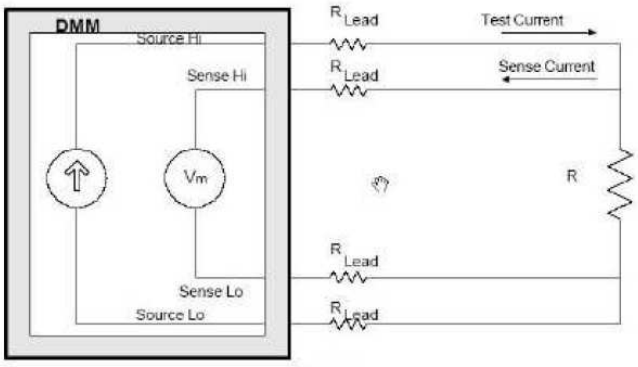



**Figure 2 Termination Resistance Measurement Points**

Requirements: 30mΩ Max. (Initial), 50mΩ Max. (Final)

Test Method: IEC 60512-2-1

5.3 Insulation resistance

Unmated connector with 100V DC between adjacent contacts for 1 min.

Requirements: 1000 MΩMin.

Test Method: IEC 60512-3-1

5.4 Dielectric strength

Unmated connector with 500 V AC between adjacent contacts for 1 min. Leakage current 0.5mA

Requirements: No breakdown.

Test Method: IEC 60512-3-1

5.5 Temperature Rise

Measured at maximum rated current with series all contacts.

Current: 0.5A

Requirement: 1. 30℃ Max.; 2. No mechanical damage

Test method: IEC 60512-5-2

5.6 Normal Force

First press to housing surface, then measure on second cycle. Max. value is read on up going curve and min. value is read on down going curve of force-deflection curve.

Requirements: ①0.25N Min. :Compressed to 1.6mm to PWB surface;

5.7 Terminal Retention Force

Draw out a contact on the solder tail, away from the housing max 5 mm / min.

Requirements: 1.0N Min.

5.8 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 Zaxis) in minimum deflection position.

Requirements: ①Discontinuity max 1 us ②Resistance 50mOhm max. ③No mechanical damage

Test method: IEC60068-2-64

5.9 Mechanical shock

Pulse shape half sine, peak acceleration 50 G, pulse 11 ms, 3 shocks in both directions in XYZ axis (18 shocks).

Requirements: ①Discontinuity max 1 us ②Resistance 50mOhm max. ③No mechanical damage

Test method: IEC60068-2-27Ea

5.10 Durability

Mate contact up to 300 cycles to housing surface at the speed of max 20 times / min including pause between mate / unmate.

Requirements:①No mechanical damage

②Resistance 50mOhm max.

③Normal Force:

--0.25N Min: Compressed to 1.6mm to PWB surface;

5.11 Connector Peel Strength

A load in max 5 mm/min applied to the whole side of the connector on PWB. All four directions(X,Y) along PWB.

Requirements: Load 5N/Contact

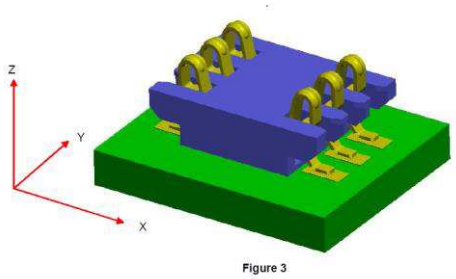



Figure 3

5.12 Thermal Shock

25cycle of Ta=-40°C for 0.5hour then change to 25°C max. 5min then Tb=+85°C for 0.5hour, then cool to ambient. Recovery 2hour at ambient atmosphere.

Requirements: LLCR 50mΩ Max. (Final)

Test Method: IEC60068-2-14Na

5.13 Damp Heat Cyclic

18 cycles of 24 h in operational mode, mated condition, RH 90-100%, 25 -> 55 °C in 3 h, then maintain for 9 h, then 55 -> 25 °C in 3 h, maintain for 9 h. Recovery at 25 °C RH75% for 2h.

Measure resistance without opening the mating.

Requirements: LLCR 50mΩ Max. (Final)

Test Method: IEC60068-2-30Db

5.14 Condensing Humidity Cyclic

96 h in operational mode, mated condition, RH 90%, 60°C for 30 min -> then 60 to 10 °C in 25min, then maintain for 30 min , then 10 to 60°C in 20 min. This cycle profile is continued for 4days. Recovery at 25°C RH 75% for 2h.

Measure resistance without opening the mating.

Requirements: LLCR 50mΩ Max. (Final)

5.15 Dry Cold

At –40°C for 96 h, recovery 2 h at ambient atmosphere.

Requirements: LLCR 50mΩ Max. (Final)

Test Method: IEC60068-2-1Ab

5.16 Dry Heat

At 85°C for 96 h, recovery 2 h at ambient atmosphere.

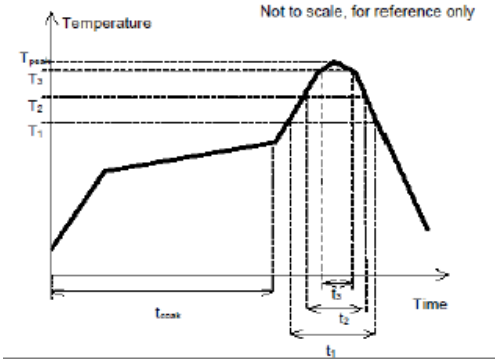
Requirements: LLCR 50mΩ Max. (Final)

Test Method: IEC60068-2-2Bb

5.17 Resistance to soldering Reflow Heat

Test with reflow profile for soldering heat resistance described in Figure 1. Though oven 3 times, first top side up, then twice up side down.

Requirements: No mechanical damage, no loosening of solder joint.




| Pb-free reflow profile requirements for soldering heat resistance | | |
|---|---|---|
| Parameter | Reference | Specification |
| Average temperature gradient in preheating | | 2.5°C/s |
| Soak time | $t_{soak}$ | 2-3 minutes |
| Time above 217°C | $t_1$ | Max 60 s |
| Time above 230°C | $t_2$ | Max 50 s |
| Time above 250°C | $t_3$ | Max 10 s |
| Peak temperature in reflow | $T_{peak}$ | 255°C (–0/+5°C) |
| Temperature gradient in cooling | | Max -5°C/s |

6. Unless otherwise stated, the following environmental conditions prevailed during testing:

Temperature:15°C to 35°C Relative Humidity: 25% to 75%

7. Test Sequence

| Description | A | B | C | D | E | F | G | H | J | K |
|---|---|---|---|---|---|---|---|---|---|---|
| Low Level Contact Resistance (LLCR). | 1,4,6 | 1,9 | 1,4 | | | | | 2 | 2 | 2 |
| Insulation resistance. | | 2,10 | | | | | | | | |
| Dielectric strength | | 3,11 | | | | | | | | |
| Temperature rise vs. current. | | | | 2 | | | | | | |
| Normal Force | | 4,6 | | | | | | | | |
| Terminal retention force | | | | | 1 | | | | | |
| Random vibration. | 2 | | | | | | | | | |
| Mechanical shock. | 3 | | | | | | | | | |
| Durability. | | 5 | | | | | | | | |
| Connector peel strength | | | | | | 1 | | | | |
| Thermal shock. | | 7 | | | | | | | | |
| Damp Heat Cyclic | 5 | | | | | | | | | |
| Condensing humidity cyclic | | 8 | | | | | | | | |
| Dry Cold | | | 2 | | | | | | | |
| Dry Heat | | | 3 | | | | | | | |
| Resistance to soldering Reflow heat | | | | 1 | | | | | | |
| Solder ability | | | | | | | 1 | | | |
| Salt fog test | | | | | | | | 1 | | |
| Bump test | | | | | | | | | 1 | |
| Low Level Drop Test | | | | | | | | | | 1 |
| Sample size | 5pcs | 5pcs | 5pcs | 5pcs | 5pcs | 5pcs | 5pcs | 5pcs | 5pcs | 5pcs |

8. Test Result

| Group | Test Item | N | Condition | Test Result | | | Requirement | Judgment |
|---|---|---|---|---|---|---|---|---|
| | | | | Max | Min | Ave | | |
| A | Examination of Product | 5 | Initial | No physical damage occurred | | | No abnormalities | Pass |
| | LLCR | 5 | Initial | 19.04 | 16.09 | 17.74 | <30mΩ | Pass |
| | Random Vibration | 5 | Final | No discontinuities of 1 microsecond or longer duration occurred | | | No abnormalities | Pass |
| | Mechanical Shock | 5 | Final | No discontinuities of 1 microsecond or longer duration occurred | | | No abnormalities | Pass |
| | LLCR | 5 | Final | 20.49 | 16.23 | 18.54 | <50mΩ | Pass |
| | Damp Heat Cyclic | 5 | Final | No physical damage occurred | | | No abnormalities | Pass |
| | LLCR | 5 | Final | 21.97 | 17.46 | 20.25 | <50mΩ | Pass |
| | Examination of Product | 5 | Final | No physical damage occurred | | | No abnormalities | Pass |
| B | Examination of Product | 5 | Initial | No physical damage occurred | | | No abnormalities | Pass |
| | LLCR | 5 | Initial | 21.92 | 16.35 | 17.92 | <50mΩ | Pass |
| | Insulation Resistance | 5 | Initial | 1.1E+9 | 2.1E+9 | 1.4E+9 | >1000MΩ | Pass |
| | Dielectric Strength | 5 | Initial | No breakdown | | | No abnormalities | Pass |
| | Normal Force at 1.6mm to PWB | 5 | Initial | 0.46 | 0.43 | 0.44 | >0.25N | Pass |
| | Durability | 5 | Final | No physical damage occurred | | | No abnormalities | Pass |
| | Normal Force at 1.6mm to PWB | 5 | Final | 0.45 | 0.42 | 0.43 | >0.25N | Pass |
| | Thermal Shock | 5 | Final | No physical damage occurred | | | No abnormalities | Pass |
| | Condensation Humidity Cyclic | 5 | Final | No physical damage occurred | | | No abnormalities | Pass |
| | LLCR | 5 | Final | 23.77 | 19.03 | 21.76 | <50mΩ | Pass |
| | Insulation Resistance | 5 | Final | 6.3E+9 | 5.1E+9 | 5.5E+9 | >1000MΩ | Pass |
| | Dielectric Strength | 5 | Final | No breakdown | | | No abnormalities | Pass |
| | Examination of Product | 5 | Final | No physical damage occurred | | | No abnormalities | Pass |
| C | Examination of Product | 5 | Initial | No physical damage occurred | | | No abnormalities | Pass |
| | LLCR | 5 | Initial | 22.41 | 17.17 | 19.09 | <30mΩ | Pass |
| | Dry Cold | 5 | Final | No physical damage occurred | | | No abnormal | Pass |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | | | | ities | |
| | Heat Cold | 5 | Final | No physical damage occurred | | | No abnormal ities | Pass |
| | LLCR | 5 | Final | 26.92 | 17.75 | 19.54 | <50mΩ | Pass |
| | Examination of Product | 5 | Initial | No physical damage occurred | | | No abnormal ities | Pass |
| D | Examination of Product | 5 | Initial | No physical damage occurred | | | No abnormal ities | Pass |
| | Resistance to Soldering R Heat | 5 | Final | No physical damage occurred | | | No abnormal ities | Pass |
| | Temperature Rise vs. Current | 5 | Final | 2.75 | 2.44 | 2.61 | <30°C | Pass |
| | Examination of Product | 5 | Final | No physical damage occurred | | | No abnormal ities | Pass |
| E | Examination of Product | 5 | Initial | No physical damage occurred | | | No abnormal ities | Pass |
| | Terminal Retention Force | 5 | Final | 2.86 | 1.75 | 2.13 | >1.0N | Pass |
| | Examination of Product | 5 | Final | No physical damage occurred | | | No abnormal ities | Pass |
| F | Examination of Product | 20 | Initial | No physical damage occurred | | | No abnormal ities | Pass |
| | Connector Peel Strength | 20 | Final | 63.5 | 39.1 | 51.2 | >30N | Pass |
| | Examination of Product | 20 | Final | No physical damage occurred | | | No abnormal ities | Pass |
| G | Examination of Product | 20 | Initial | No physical damage occurred | | | No abnormal ities | Pass |
| | Solder ability | 20 | Final | Solder coverage more than 95% | | | No abnormal ities | Pass |
| | Examination of Product | 20 | Final | No physical damage occurred | | | No abnormal ities | Pass |
| H | Examination of Product | 5 | Initial | No physical damage occurred | | | No abnormal ities | Pass |
| | LLCR | 5 | Initial | 21.78 | 16.02 | 18.62 | <30 mΩ | Pass |
| | Salt for test | 5 | Final | No physical damage occurred | | | No abnormal ities | Pass |
| | LLCR | 5 | Final | 30.29 | 27.47 | 28.34 | <50 mΩ | Pass |
| | Examination of Product | 5 | Final | No physical damage occurred | | | No abnormal ities | Pass |
| J | Examination of Product | 5 | Initial | No physical damage occurred | | | No abnormal ities | Pass |
| | LLCR | 5 | Initial | 18.86 | 16.35 | 17.2 | <30 mΩ | Pass |

| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| | Bump test | 5 | Final | No discontinuities of 1 microsecond or longer duration occurred | | | No abnormalities | Pass |
| | LLCR | 5 | Final | 19.8 | 16.42 | 17.66 | <50 mΩ | Pass |
| | Examination of Product | 5 | Final | No physical damage occurred | | | No abnormalities | Pass |
| K | Examination of Product | 5 | Initial | No physical damage occurred | | | No abnormalities | Pass |
| | LLCR | 5 | Initial | 21.78 | 16.58 | 18.47 | <30 mΩ | Pass |
| | Low level drop test | 5 | Final | No discontinuities of 1 microsecond or longer duration occurred | | | No abnormalities | Pass |
| | LLCR | 5 | Final | 21.86 | 17.2 | 19.12 | <50 mΩ | Pass |
| | Examination of Product | 5 | Final | No physical damage occurred | | | No abnormalities | Pass |

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*END*