

PRODUCT QUALIFICATION TEST REPORT No 20151118003

2 mm Series Type A Right Angle Receptacle, 110 Signal Pins

Part Number: K3A110FR0P1430

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|-----------------|------------|-------------------|
| Editor | <u>秦玲</u> | <u>2015.11.18</u> |
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1.0 OBJECTIVE

This report containing the result of the qualification test demonstrate compliance of HMFA110002413B to the requirement of the product specification.

2.0 SCOPE

This report is applicable to the qualification of K3A110FR0P1430

3.0 APPLICABLE DOCUMENTS

3.1 Product Drawing K3A110FR0P1430-drawing

3.2 Telcordia GR-1217-CORE Issue 2, December 2008

4.0 TEST SEQUENCE

| Test Description | | Test Group | | | | | |
|------------------|---|---------------|---|---|---|---|---|
| | | A | B | C | D | E | F |
| | | Test Sequence | | | | | |
| 1 | Visual | 1 | 1 | 1 | 1 | 1 | 1 |
| 2 | Contact engagement and separation force | 2 | | 2 | | | |
| 3 | Mating and unmating force | 3 | 2 | 3 | | | |
| 4 | Insulation Resistance | 4 | 3 | 4 | 2 | | |
| 5 | Dielectric Withstanding Voltage | 5 | 4 | 5 | 3 | | |
| 6 | Low Level Contact Resistance | 6 | 5 | 6 | 4 | | |
| 7 | Contact Resistance | | | | | | |
| 8 | Vibration | 7 | | | | | |
| 9 | Low Level Contact Resistance | 8 | | | | | |
| 10 | Contact Resistance | | | | | | |
| 11 | Shock | 9 | | | | | |
| 12 | Thermal Shock | | 6 | | | | |
| 13 | Temperature Life | | | 7 | | | |
| 14 | Insulation Resistance | | 7 | | | | |
| 15 | Dielectric Withstanding Voltage | | 8 | | | | |
| 16 | Humidity | | 9 | | | | |
| 17 | Durability | | | | 5 | | |

| | | | | | | | |
|----|---|----|----|----|----|---|---|
| 18 | Mating and unmating force | | | | 6 | | |
| 19 | Low Level Contact Resistance | 10 | 10 | 8 | 7 | | |
| 20 | Contact Resistance | | | | | | |
| 21 | Mating and unmating force | 11 | 11 | 9 | | | |
| 22 | Dielectric Withstanding Voltage | | | | 8 | | |
| 23 | Contact engagement and separation force | 12 | | 10 | 9 | | |
| 24 | Contact Retention | | | | | | |
| 25 | Insert Retention | 13 | 12 | 11 | 10 | | |
| 26 | Industrial MFG Atmosphere | | | | 11 | | |
| 27 | Low Level Contact Resistance | | | | 12 | | |
| 28 | Contact Resistance | | | | | | |
| 29 | Insulation Resistance | 14 | 13 | 12 | | | |
| 30 | Dielectric Withstanding Voltage | 15 | 14 | 13 | | | |
| 31 | Flammability | | | | | 2 | |
| 32 | Pin Insertion/Retention Force | | | | | | 2 |
| 33 | Contact engagement and separation force | | 15 | | 13 | | |
| 34 | Visual | 16 | 16 | 14 | 14 | | |
| | Number of Connector Samples | 3 | 3 | 3 | 3 | 3 | 3 |
| | Number of Defects Permitted | 0 | 0 | 0 | 0 | 0 | 0 |

5.0 TEST METHOD OF INSPECTION

5.1 Low Level Contact Resistance (LLCR)

The low level contact resistance shall not exceed the values shown in Table1 when measured in accordance with EIA 364-23. The following details shall apply:

- a. There shall be no electrical discontinuities during subsequent electrical

tests, and the low level contact resistance shall not exceed the values in Method of connection – See IEC-61076-4-101- 5.1.1 for contact resistance measurement points.

Table 1 – Contact Resistance

| | Initial (mΩ Max) | Change (mΩ Max) |
|--------|------------------|-----------------|
| Signal | 20 | 5 |

5.2 Insulation Resistance

The insulation resistance of mated connector pair connectors shall not be less than 10000 MΩ initially, (10000 MΩ after environmental exposure) when measured in accordance with EIA 364-21. The following details shall apply:

- a. Test Voltage - 500 volts DC
- b. Points of Measurement - Between adjacent contacts and between contacts and metal shields
- c. Electrification Time - 1 minute

5.3 Dielectric Withstanding Voltage

There shall be no evidence of arc-over, insulation breakdown, or excessive leakage current (> 0.5 mA) when the mated connectors are tested in accordance with EIA 364-20A. The following details shall apply:

- a. Test Voltage - 500 V r.m.s
- b. Test Duration - 60 seconds.
- c. Points of Measurement -- Between adjacent contacts and between contacts and the metal shields.

5.4 Contact Retention to Housing

There shall be no loosening of the contact or damage to the contact or damage to the connector when a axial force of 10N is applied to a contact in either direction along the axis of retention, when measured in accordance with EIA-364-25B.

5.5 Mating and unmating force

The total mating force to mate a male header with receptacle header shall not exceed 0.75N for each signal contacts, and 1N for each shield contacts when measured in accordance with EIA-364-13.

The total unmating force to mate a male header with receptacle header shall not less 0.15N for signal times the number of each contacts, when measured in accordance with EIA-364-13.

- a: Cross Head Speed – 25.4 mm/minute (1 inch/minute).
- b: Lubrication – None
- c: Utilize free floating fixtures.
- d: Voltage: Applied at a rate of 500 volts per second

5.6 Pin Insertion/Retention Force

The force required to insert an individual signal compliant pin into a plated through hole in a printed circuit board at a rate of 5.1 mm/minute (0.2inches/minute) shall not exceed 55 N. The retention force in an axial direction opposite that of insertion shall not be less than 10 N. Total single module (5*22) insertion force shall not exceed 6050 N when inserted by a standard application press.

5.7 Thermal Shock

EIA 364-32A November 1983, Test Condition II

- a. Number of Cycles - 5
- b. Temperature Range - Between -55°C to $+125^{\circ}\text{C}$ and -5°C to $+3^{\circ}\text{C}$
- c. Transfer Time - 5 minutes, maximum
- d. Time at Each Temperature - 30 minutes

5.8 Temperature Life

EIA 364-17 17B, April 1999, Method A, Test Condition 4. Headers and receptacles shall be mated without any electrical load

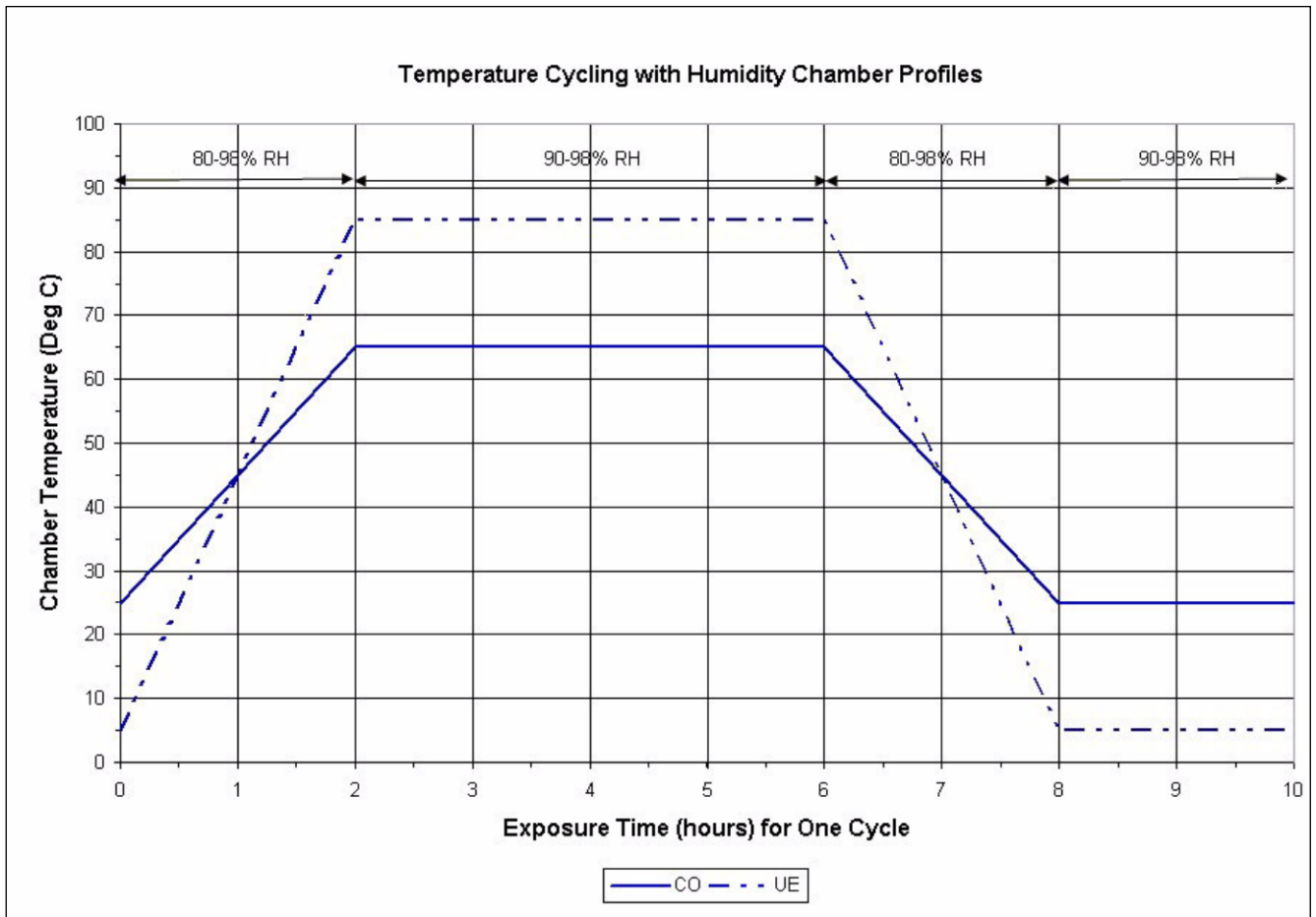
- a. Test Temperature - $105^{\circ}\text{C} \pm 2^{\circ}\text{C}$
- b. Test Duration - 1000 hours

5.9 Humidity

Mated samples are to be exposed to cyclical humidity and temperature in accordance with EIA-364-31C, Method III, with the following exceptions. Samples are to be subjected to 50 cycles of 10 hours duration for a total of 500 hours after 24 hours in a conditioning oven at $50 \pm 2^{\circ}\text{C}$. A cycle consists of the following steps:

Requirement see figure 1

Figure 1 Temperature Cycling With Humidity Chamber Profiles



- a. Ramp from 25+/-2°C at 80%-98% RH to 65+/-2°C at 94%+/-4% RH in 120 minutes
- b. Dwell at 65+/-2°C at 94%+/-4% RH for 4 hours
- c. Ramp down to 25+/-2°C at 80%-98% RH in 120 minutes
- d. Dwell at 25+/-2°C at 80%-98% RH for 2 hours

5.10 MFG

Samples are to be exposed to industrial gas mixture in accordance with Telcordia GR-1217-CORE, Issue 2, December 2008, Section 9.1.3. The headers only are to be exposed for 10 days to the gas mixture detailed below, with interim resistance measurements made after the 5th and 10th

days. The samples are then mated with the appropriate receptacle and exposed to an additional 10 days with resistance measurements taken after the 15th and 20th days of exposure. The test chamber is to be maintained at a temperature of 30°C+/-1°C with a relative humidity of 70%+/-2%.

Gas concentrations per Central Office

Uncontrolled Environment

| Gas Constituent | Gas Concentration |
|------------------|-------------------|
| NO ₂ | 200 ppb |
| CL ₂ | 20 ppb |
| H ₂ S | 100 ppb |
| SO ₂ | 200 ppb |

5.11 Vibration Sinusoidal

In accordance with Telcordia GR-1217-CORE, Issue 2, December 2008

- a. Vibration Amplitude – 1.5mm double amplitude or 10G acceleration
- b. Frequency Range - 10 to 500 hertz
- c. Duration - 8 hours along each of three orthogonal axes (24 hours total)
- d. No discontinuities greater than 1 u second
- e. Mounting - Rigidly mount assemblies

5.12 Mechanical Shock

In accordance with Telcordia GR-1217-CORE, Issue 2, December 2008 sections 6.3.5 and 9.1.2.1.

- a. Conditions - half-sine 30G, 11 millisecond duration
- b. Shocks - 3 shocks along each of three orthogonal axes
- c. Mounting - Rigidly mount assemblies
- d. Requirement- No discontinuities greater than 10 nano-seconds for signal contacts, 1 micro-second for ground connections.

5.13 Durability

Standard laboratory procedure as applicable to the specific product.

- a. Number Cycles - 200 cycles
- b. Cycling Rate - 5 inches per minute

5.14 Flammability retardant

Housing material must have the performance what extinguish by self-motion, For flammability test should satisfy as below

- a: No flammability;
- b: Extinguish by self-motion in 10s;
- c: Flame or ardor granule drop from specimen are not made flame extend to the bottom under the specimen

6.0 TEST ITEMS AND RESULTS ARE AS FOLLOWS

6.1 Test Group A

| TEST DESCRIPTION | REQUIREMENTS | RESULT | RATE |
|------------------|---|--|------|
| Visual, Initial | appearance (technology, marks, plating) and dimension measured conform to document as | No Damage on appearance, qualified coating thickness test, dimension measurement is OK | Pass |

| | | | | | | |
|---|---|---|-----------|-----------|-------------|------|
| | specified | | | | | |
| Contact Engagement and Separation Force (Gauge retention force) , Initial | Signal:0.15 N Standard gauge can keep (not move or fall down) | 0.15 N Standard gauge can keep | | | Pass | |
| Mating and Unmating Force, Initial | Mating force: 0.75NX110Pin=82.5N Max Unmating force: 0.15NX110Pin=16.5N Min | Mating force | MIN 68 | MAX 73 | AVG 70.1 | Pass |
| | | Unmating force | MIN 57 | MAX 65 | AVG 60.3 | |
| | | UNIT | N | | | |
| Insulation Resistance, Initial | Insulation resistance: 10000MΩ(Min) | >10000MΩ | | | Pass | |
| Dielectric Withstanding Voltage , Initial | No evidence of arc-over insulation breakdown, Test Voltage - 500 VDC, 60Hz. Test Duration - 60 seconds. | No arc-over insulation breakdown Appearance No Damage | | | Pass | |
| Low-Level Contact Resistance , Initial | 20mΩ Max | MIN | MAX | AVG | Pass | |
| | | 1.35 | 2.98 | 2.27 | | |
| | | UNIT | mΩ | | | |
| Vibration | No Discontinuity > 1 μs, and samples shall pass the requirements of following test items | No Damage, No Discontinuity | | | Pass | |
| Shock | No Discontinuity > 1 μs, and samples shall pass the requirements of following test items | No Damage, No Discontinuity | | | Pass | |
| Low-Level Contact Resistance ,After, Vibration& Shock | ΔLLCR <5 mΩ | MIN | MAX | AVG | Pass | |
| | | 1.26 | 2.24 | 1.87 | | |
| | | UNIT | mΩ | | | |
| Mating and Unmating Force, After, Vibration& Shock | Mating force: 0.75NX110Pin=82.5N Max Unmating force: 0.15NX110Pin=16.5N Min | Mating force | MIN 63 | MAX 70 | AVG 67.4 | Pass |
| | | Unmating force | MIN 53 | MAX 60 | AVG 57.7 | |
| | | UNIT | N | | | |
| Contact Engagement and Separation Force (Gauge retention force) ,After, Vibration & Shock | Signal:0.15 N Standard gauge can keep (not move or fall down) | 0.15 N Standard gauge can keep | | | Pass | |
| Insert Retention, After, Vibration& Shock | 10N Min | MIN | MAX | AVG | Pass | |
| | | 15 | 20 | 18.4 | | |
| | | UNIT | N | | | |
| Insulation Resistance, After, Vibration & Shock | Insulation resistance: 1000MΩ(Min) | >1000MΩ | | | Pass | |

| | | | |
|--|---|--|------|
| Dielectric Withstanding Voltage ,After, Vibration& Shock | No evidence of arc-over insulation breakdown, Test Voltage - 500 VDC, 60Hz. Test Duration - 60 seconds. | No arc-over insulation breakdown Appearance No Damage | Pass |
| Visual, Vibration & Shock , After | appearance (technology, marks, plating) and dimension measured conform to document as specified | No Damage on appearance, qualified coating thickness test, dimension measurement is OK | Pass |

6.2 Test Group B

| TEST DESCRIPTION | REQUIREMENTS | RESULT | | | RATE | |
|--|--|--|-----------|-----------|-------------|------|
| Visual, Initial | appearance (technology, marks, plating) and dimension measured conform to document as specified | No Damage on appearance, qualified coating thickness test, dimension measurement is OK | | | Pass | |
| Mating and Unmating Force, Initial | Mating force: 0.75X110Pin=82.5N Max Unmating force: 0.15NX110Pin=16.5N Min | Mating force | MIN 67 | MAX 73 | AVG 70.6 | Pass |
| | | Unmating force | MIN 58 | MAX 62 | AVG 60.5 | |
| | | UNIT | N | | | |
| Insulation Resistance, Initial | Insulation resistance: 10000MΩ(Min) | >10000MΩ | | | Pass | |
| Dielectric Withstanding Voltage, Initial | No evidence of arc-over insulation breakdown, Test Voltage - 500 VDC, 60Hz. Test Duration - 60 seconds. | No arc-over insulation breakdown Appearance No Damage | | | Pass | |
| Low-Level Contact Resistance, Initial | 20mΩ Max | MIN | MAX | AVG | Pass | |
| | | 1.39 | 2.88 | 2.24 | | |
| | | UNIT | mΩ | | | |
| Thermal Shock | a. Number of Cycles - 5 b. Temperature Range - Between -55 °C +0°C/-5°C and +125° C+3°C/-5°C c. Transfer Time - 5 minutes, maximum d. Time at Each Temperature - 30 minutes | No Damage | | | Pass | |

| | | | | | | |
|---|---|--|------|------|------|------|
| Insulation Resistance, After, Thermal Shock | Insulation resistance: 1000MΩ(Min) | >1000MΩ | | | Pass | |
| Dielectric Withstanding Voltage ,After, Thermal Shock | No evidence of arc-over insulation breakdown, Test Voltage - 500 VDC, 60Hz. Test Duration - 60 seconds. | No arc-over insulation breakdown Appearance No Damage | | | Pass | |
| Humidity | No Damage | No Damage | | | Pass | |
| Low-Level Contact Resistance ,After, Thermal Shock, Humidity | Δ LLCR <5 mΩ | MIN | MAX | AVG | Pass | |
| | | 0.50 | 1.02 | 0.84 | | |
| | | UNIT | mΩ | | | |
| Mating and Unmating Force, After, Thermal Shock, Humidity | Mating force: 0.75X110Pin=82.5N Max Unmating force: 0.15NX110Pin=16.5N Min | Mating force | MIN | MAX | AVG | Pass |
| | | | 63 | 71 | 67.1 | |
| | | Unmating force | MIN | MAX | AVG | |
| | | 53 | 58 | 55.9 | | |
| UNIT | N | | | | | |
| Insert Retention, After, Thermal Shock, Humidity | 10N Min | MIN | MAX | AVG | Pass | |
| | | 14 | 22 | 18.8 | | |
| | | UNIT | N | | | |
| Insulation Resistance, After, Thermal Shock, Humidity | Insulation resistance: 10000MΩ(Min) | >10000MΩ | | | Pass | |
| Dielectric Withstanding Voltage After, Thermal Shock, Humidity | No evidence of arc-over insulation breakdown, Test Voltage - 500 VDC, 60Hz. Test Duration - 60 seconds. | No arc-over insulation breakdown Appearance No Damage | | | Pass | |
| Contact Engagement and Separation Force (Gauge retention force) ,After, Thermal Shock, Humidity | Signal:0.15 N Standard gauge can keep (not move or fall down) | 0.15 N Standard gauge can keep | | | Pass | |
| Visual,, After, Thermal Shock, Humidity | appearance (technology、 marks、 plating) and dimension measured conform to document as specified | No Damage on appearance, qualified coating thickness test、 dimension measurement is OK | | | Pass | |

6.3 Test Group C

| TEST DESCRIPTION | REQUIREMENTS | RESULT | RATE |
|--------------------|---|--|------|
| Visual, Initial | appearance (technology、 marks、 plating) and dimension measured conform to document as specified | No Damage on appearance, qualified coating thickness test、 dimension measurement is OK | Pass |
| Contact Engagement | Signal:0.15 N Standard | 0.15 N Standard gauge can keep | Pass |

| | | | | | | |
|---|---|--|-----------|-----------|--------------|------|
| and Separation Force (Gauge retention force) , Initial | gauge can keep (not move or fall down) | | | | | |
| Mating and Unmating Force, Initial | Mating force: 0.75X110Pin=82.5N Max Unmating force: 0.15NX110Pin=16.5N Min | Mating force | MIN 68 | MAX 75 | AVG 71.7 | Pass |
| | | Unmating force | MIN 58 | MAX 64 | AVG 62.4 | |
| | | UNIT | N | | | |
| Insulation Resistance, Initial | Insulation resistance: 10000MΩ(Min) | >10000MΩ | | | Pass | |
| Dielectric Withstanding Voltage | No evidence of arc-over insulation breakdown, Test Voltage - 500 VDC, 60Hz. Test Duration - 60 seconds. | No arc-over insulation breakdown Appearance No Damage | | | Pass | |
| Low-Level Contact Resistance , Initial | 20 mΩ Max | MIN | MAX | AVG | Pass | |
| | | 1.57 | 2.83 | 2.14 | | |
| | | UNIT | mΩ | | | |
| Temperature Life | No Damage | No Damage | | | Pass | |
| Low-Level Contact Resistance, After, Temperature Life | ΔLLCR <5 mΩ | MIN | MAX | AVG | Pass | |
| | | 0.49 | 0.88 | 0.61 | | |
| | | UNIT | mΩ | | | |
| Mating and Unmating Force, After, Temperature Life | Mating force: 0.75NX110Pin=82.5N Max Unmating force: 0.15NX110Pin=16.5N Min | Mating force | MIN 61 | MAX 69 | AVG 64.8. | Pass |
| | | Unmating force | MIN 53 | MAX 63 | AVG 57.1 | |
| | | UNIT | N | | | |
| | | | | | | |
| Contact Engagement and Separation Force (Gauge retention force) , After, Temperature Life | Signal:0.15 N Standard gauge can keep (not move or fall down) | 0.15 N Standard gauge can keep | | | Pass | |
| Insert Retention, After, Temperature Life | 10N Min | MIN | MAX | AVG | Pass | |
| | | 16 | 21 | 19.5 | | |
| | | UNIT | N | | | |
| Insulation Resistance, After, Temperature Life | Insulation resistance: 1000MΩ(Min) | >1000MΩ | | | Pass | |
| Dielectric Withstanding Voltage, After, Temperature Life | No evidence of arc-over insulation breakdown, Test Voltage - 500 VDC, 60Hz. Test Duration - 60 seconds. | No arc-over insulation breakdown Appearance No Damage | | | Pass | |
| Visual, After, Temperature | appearance (technology、 | No Damage on appearance, | | | Pass | |

| | | | |
|------|---|--|--|
| Life | marks、plating) and dimension measured conform to document as specified | qualified coating thickness test、dimension measurement is OK | |
|------|---|--|--|

6.4 Test Group D

| TEST DESCRIPTION | REQUIREMENTS | RESULT | | | RATE | |
|---|---|--|------|-------|------|------|
| Visual, Initial | appearance (technology、marks、plating) and dimension measured conform to document as specified | No Damage on appearance、qualified coating thickness test、dimension measurement is OK | | | Pass | |
| Insulation Resistance, Initial | Insulation resistance: 10000MΩ(Min) | >10000MΩ | | | Pass | |
| Dielectric Withstanding Voltage, Initial | No evidence of arc-over insulation breakdown, Test Voltage - 500 VDC, 60Hz. Test Duration - 60 seconds. | No arc-over insulation breakdown Appearance No Damage | | | Pass | |
| Low-Level Contact Resistance, Initial | 20 mΩ Max | MIN | MAX | AVG | Pass | |
| | | 1.19 | 2.75 | 1.87 | | |
| | | UNIT | mΩ | | | |
| Durability | No Damage | No Damage | | | Pass | |
| Mating and Unmating Force, After, Durability | Mating force: 0.75NX110Pin=82.5N Max Unmating force: 0.15NX110Pin=16.5N Min | Mating force | MIN | MAX | AVG | Pass |
| | | | 63 | 697 | 65.6 | |
| | | Unmating force | MIN | MAX | AVG | |
| | | 51 | 57 | 54.8 | | |
| | | UNIT | N | | | |
| Low-Level Contact Resistance, After, Durability | ΔLLCR <5mΩ | MIN | MAX | AVG | Pass | |
| | | 0.66 | 1.02 | 0.83 | | |
| | | UNIT | mΩ | | | |
| Dielectric Withstanding Voltage, After, Durability | No evidence of arc-over insulation breakdown, Test Voltage - 500 VDC, 60Hz. Test Duration - 60 seconds. | No arc-over insulation breakdown Appearance No Damage | | | Pass | |
| Contact Engagement and Separation Force (Gauge retention force) , After, Durability | Signal:0.15 N Standard gauge can keep (not move or fall down) | 0.15 N Standard gauge can keep | | | Pass | |
| Insert Retention, After, Durability | 10N Min | MIN | MAX | AVG | Pass | |
| | | 13 | 20 | 17.94 | | |
| | | UNIT | N | | | |

| | | | | | |
|--|--|--|------------|------|------|
| MFG, Mated Exposure | No Damage | No Damage | | | Pass |
| Low-Level Contact Resistance, After, Durability, MFG | Δ LLCR < 5 m Ω | MIN | MAX | AVG | Pass |
| | | 0.50 | 1.04 | 0.79 | |
| | | UNIT | m Ω | | |
| Contact Engagement and Separation Force (Gauge retention force) , After, Durability, MFG | Signal:0.15 N Standard gauge can keep (not move or fall down) | 0.15 N Standard gauge can keep | | | Pass |
| Visual, After, Durability, MFG | appearance (technology, marks, plating) and dimension measured conform to document as specified | No Damage on appearance, qualified coating thickness test, dimension measurement is OK | | | Pass |

6.5 Test Group E

| TEST DESCRIPTION | REQUIREMENTS | RESULT | RATE |
|------------------|--|--|------|
| Visual, Initial | appearance (technology, marks, plating) and dimension measured conform to document as specified | No Damage on appearance, qualified coating thickness test, dimension measurement is OK | Pass |
| Flammability | Requirements for UL94-V0 | To be continued Burning for 10' s MAX, will not be fired | Pass |

6.6 Test Group F

| TEST DESCRIPTION | REQUIREMENTS | RESULT | | | RATE | |
|---|--|--|------|-----|------|------|
| Visual, Initial | appearance (technology, marks, plating) and dimension measured conform to document as specified | No Damage on appearance, qualified coating thickness test, dimension measurement is OK | | | Pass | |
| Compliant Pin Insertion/Retention Force | Insertion force: 55N Max Retention force: 10N Min | Insertion force | MIN | MAX | AVG | Pass |
| | | | 32 | 44 | 38.7 | |
| | | Retention force | MIN | MAX | AVG | |
| 22 | 31 | | 25.3 | | | |
| | | UNIT | N | | | |

REVISION RECORD

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