

# PRODUCT QUALIFICATION TEST REPORT No 20151118001

## 2 mm Series Type A Straight Receptacle, 110 Signal Pins

Part Number: K3A110FS0P14301

<b>Editor</b>	<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 HMFA110001413A to the requirement of the product specification

**2.0 SCOPE**

This report is applicable to the qualification of K3A110FS0P14301

**3.0 APPLICABLE DOCUMENTS**

- 3.1 Product Drawing K3A110FS0P14301-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, (1000 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 - 500V 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  $-55^{\circ}\text{C} +0^{\circ}\text{C}/-5^{\circ}\text{C}$  and  $+125^{\circ}\text{C} +3^{\circ}\text{C}/-5^{\circ}\text{C}$
- 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

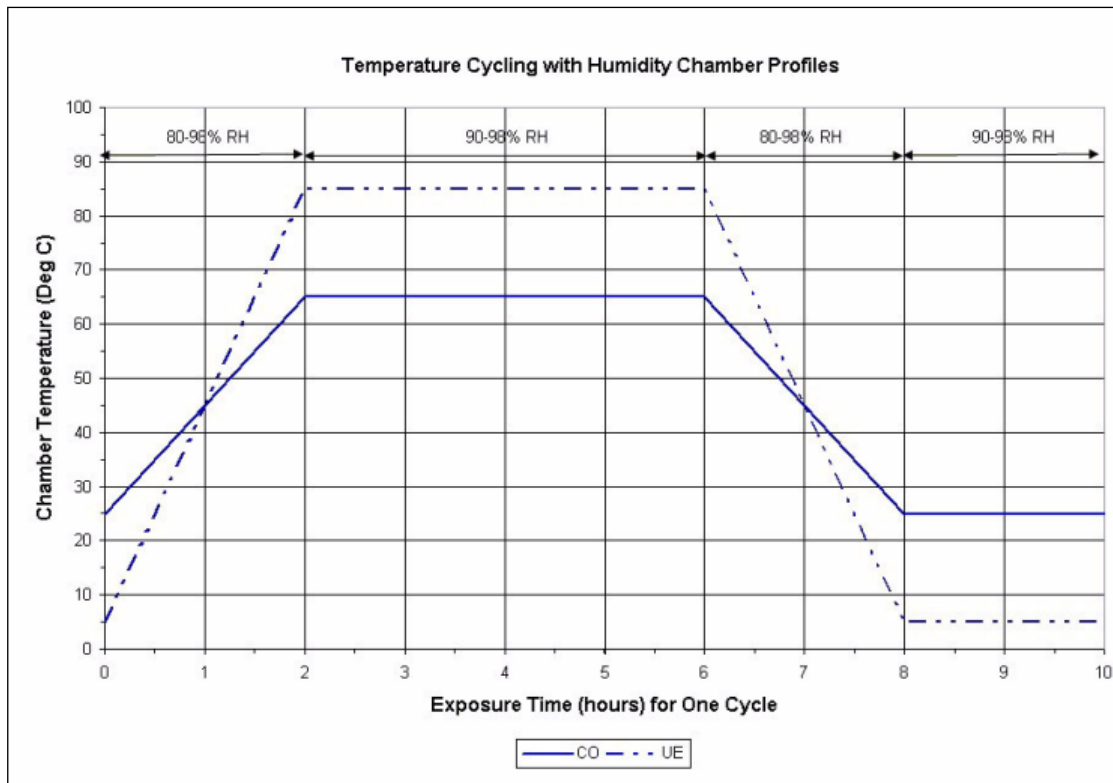
- a. Test Temperature -  $105 \pm 2^{\circ}\text{C}$
- b. Test Duration - 1000 hours

### 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 <sub>2</sub>	200 ppb
CL <sub>2</sub>	20 ppb
H <sub>2</sub> S	100 ppb
SO <sub>2</sub>	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, 1micro-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	No Damage on appearance, qualified coating thickness test, dimension measurement	Pass

	conform to document as specified	is OK				
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 72	AVG 69.8	Pass
		Unmating force	MIN 57	MAX 64	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	2.92	2.19		
		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 64	MAX 69	AVG 66.8	Pass
		Unmating force	MIN 52	MAX 60	AVG 57.4	
		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	
		16	20	18.8		
		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 70	MAX 73	AVG 71.2	Pass
		Unmating force	MIN 59	MAX 62	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	
		1.34	2.79	2.02		
		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	No Damage			Pass	

	- 30 minutes					
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	ΔLLCR <5 mΩ	MIN	MAX	AVG	Pass	
		0.51	0.92	0.74		
		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	70	66.8	
		Unmating force	MIN	MAX	AVG	
			53	59	56.5	
		UNIT	N			
Insert Retention, After, Thermal Shock, Humidity	10N Min	MIN	MAX	AVG	Pass	
		15	21	18.4		
		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	No Damage on appearance, qualified coating thickness test, dimension measurement is OK	Pass

	conform to document as 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: 0.75X110Pin=82.5N Max Unmating force: 0.15NX110Pin=16.5N Min	Mating force	MIN 69	MAX 74	AVG 71.5	Pass
		Unmating force	MIN 58	MAX 65	AVG 62.1	
		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	
		1.56	2.88	2.23		
		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 62	MAX 69	AVG 66.8	Pass
		Unmating force	MIN 53	MAX 61	AVG 56.8	
		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	
		14	21	19.2		
		UNIT	N			
Insulation Resistance, After, Temperature Life	Insulation resistance: 1000MΩ(Min)	>1000MΩ			Pass	
Dielectric Withstanding Voltage, After, Temperature	No evidence of arc-over insulation breakdown, Test	No arc-over insulation breakdown Appearance No Damage			Pass	

Life	Voltage - 500 VDC, 60Hz. Test Duration - 60 seconds.		
Visual, After, Temperature Life	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

### 6.4 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	
		1.24	2.78	1.92		
		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
		Unmating force	62	67	65.3	
			MIN	MAX	AVG	
		50	56	54.6		
		UNIT	N			
Low-Level Contact Resistance, After, Durability	ΔLLCR <5mΩ	MIN	MAX	AVG	Pass	
		0.68	0.98	0.84		
		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,	Signal:0.15 N Standard gauge can keep (not move or fall down)	0.15 N Standard gauge can keep			Pass	

Durability					
Insert Retention, After, Durability	10N Min	MIN	MAX	AVG	Pass
		15	21	18.66	
		UNIT	N		
MFG, Mated Exposure	No Damage	No Damage			Pass
Low-Level Contact Resistance, After, Durability, MFG	$\Delta$ LLCR < 5 m $\Omega$	MIN	MAX	AVG	Pass
		0.52	0.97	0.76	
		UNIT	m $\Omega$		
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
			34	43	38.6	
		Retention force	MIN	MAX	AVG	
			21	30	25.5	
		UNIT	N			

**REVISION RECORD**

<b><u>REV</u></b>	<b><u>DESCRIPTION</u></b>	<b><u>EDITOR</u></b>	<b><u>DATE</u></b>
A0	First Issue	Haiyan Sun	2015-11-18