1. INTRODUCTION

1.1 Purpose

Testing was performed on TE Connectivity (TE) Crown Clip™ Junior High Current Bus Bar Power Connector to determine its conformance to the requirement of Product Specification.

1.2 Scope

This report covers the electrical, mechanical, and environmental performance of TE Connectivity (TE) Crown Clip™ Junior High Current Bus Bar Power Connector. Qualification Test was performed at the China Engineering Center Testing Laboratory between 28 Jan. 2019 and 15 Apr. 2019 (REF).

1.3 Conclusion

TE Connectivity (TE) Crown Clip™ Junior High Current Bus Bar Power Connector conformed to the electrical, mechanical, and environmental performance requirements of Product Specification 108-128048.

1.4 Test Specimens

The specimens were representative of normal production lots, Specimens identified with the following part numbers were used for test.

TE Part Number	Description
2204900-*	TE CCJ HC320 Bus Bar Power Connector
2204899-*	TE CCJ HC250 Bus Bar Power Connector
Test Bus Bar	6mm Mating Bus Bar, Gold plating
Test PCB	Test PCB

Figure 1

1.5 Environmental Conditions

Unless otherwise stated. The following environmental conditions prevailed during testing

Temperature: 25±10 °C
Relative Humidity: 50±25% RH

| Indicates Change

1.6 Product Qualification and Requalification Test Sequence

Test or Examination	Test Group								
	1	2	3	4	5	6	7	8	9
	Test sequence								
Initial examination of product	1	1	1	1	1	1	1		
Product contact resistance test	2,5,7	4,7,9,13	2,5,7,9	2,7,11	2(a),5(a)		2,4		
Contact resistance at rated current				5,9					
Insulation resistance		2,10							
Withstanding voltage		3,11							
Temperature rise vs. Current				4,8					
Vibration			8						
Mechanical shock			6						
Durability	3(b)	5		3(b)	4(b)				
Mating force			3						
Unmating force			4						
Retention force						2			
Over-setting force						4			
Thermal shock		6							
Humidity-temperature cycling		8							
Temperature life	4								
Salt spray test				6					
Mixed flowing gas					3(c)				
Dust							3		
Solderability test.						3			
Reseating	6	12		10					
Final examination of product	8	14	10	12	6	5	5		

NOTE

(a) LLCR shall be measured according to MFG test sequence.
(b) Durability (preconditioning)
(c) MFG test. ½ samples mated 336 hours(14 days); ½ samples unmated 168 hours(7days) and then mated for final 168 hours (7days).

2. SUMMARY OF TESTING

2.1 Initial Examination of Product

All specimens submitted for testing were representative of normal production lots. A Certificate Conformance (C of C) was issued by Product Assurance. Specimens were visually examined and no evidence of physical damage detrimental to product performance was observed.

2.2 Product Contact Resistance Test

Contact resistance measurements for TE Connectivity (TE) Crown Clip™ Junior High Current Bus Bar Power Connector meet product specification.
TE CCJ HC320 Connector, P/N 2204900-*: 0.5 milliohms maximum, and Δ0.5 milliohms maximum.
TE CCJ HC250 Connector, P/N 2204899-*: 0.5 milliohms maximum, and Δ0.5 milliohms maximum.

2.3 Product Contact Resistance at Rated Current

Contact resistance measurements for TE Connectivity (TE) Crown Clip™ Junior High Current Bus Bar Power Connector meet product specification.
TE CCJ HC320 Connector, P/N 2204900-*: 0.5 milliohms maximum, and Δ0.5 milliohms maximum.
TE CCJ HC250 Connector, P/N 2204899-*: 0.5 milliohms maximum, and Δ0.5 milliohms maximum.

2.4 Insulation Resistance Test

All insulation resistance measurements were greater than 1500 megohms.

2.5 Withstanding Voltage Test

No dielectric breakdown or flashover occurred

2.6 Current vs. Temperature Rise Test

Rated current energized at specific current in accordance with Product Specification. Detail refer to the Current vs. Temperature Rise Curve in Product Specification.

TE P/N	Description	Rated Current (A)
2204900	TE CCJ HC320 Power Connector	160A every contact, 320A per connector
2204899	TE CCJ HC250 Power Connector	125A every contact, 250A per connector

Figure 3. TE Crown Clip™ Senior High Current Power Connector Rated Current Specification and Test Record.

2.7 Vibration Test

No discontinuities were detected during vibration testing. Flowing vibration test. No cracks, breaks, or loose parts on the specimens were visible.

2.8 Mechanical Shock Test

No discontinuities were detected during mechanical shock testing. Following mechanical shock testing, no cracks, breaks, or loose parts on the specimens were visible.

2.9 Durability Test

No evidence of physical damage was visible as the result of mating and unmating the specimens 200 cycles.

2.10 Mating /Unmating Force Test

All mating force measurements meet product specification.

2.11 Retention Force Test

All retention force measurements meet product specification.

2.12 Thermal Shock Test

No evidence of physical damage was visible as the result of thermal shock testing

2.13 Humidity/temperature cycling Test

No evidence of physical damage was visible as the result of humidity/temperature cycling.

2.14 Temperature Life Test

No evidence of physical damage was visible as the result of temperature life testing.

2.15 Mixed Flowing Gas Test

No evidence of physical damage was visible as the result of exposure to the pollutants of mixed flowing gas

2.16 Salt Spray Test

No evidence of physical damage was visible as the result of exposure to the pollutants of salt spray test.

2.17 Dust Test

No evidence of physical damage was visible as the result of exposure to the pollutants of dust test.

2.18 Solderability Dip Test

All solderable areas had a minimum of 95% solder coverage.

2.19 Final Examination of Product

Specimens were visually examined and no evidence of physical damage detrimental no product performance was observed.

3 TEST METHODS

3.1 Initial Examination of Product

A Certificate of Conformance was issued stating that all specimens in the test package were produced, inspected, and accepted as conforming to product drawing requirements, and manufactured using the same core manufacturing processes and technologies as production parts.

3.2 Product Contact Resistance Test

Low level contact resistance measurements were made with four terminal measuring technique. The test current was maintained at 100 milliamperes maximum with a 20 millivolt maximum open circuit voltage, in accordance with EIA-364-27

3.3 Product Contact Resistance Test at Rated Current

Specimens were subjected to contact resistance testing in accordance with product Specification 108-128048, and EIA –364-06. Specimens were energized at rated current and resistance measurements were recorded.

3.4 Insulation Resistance Test

Insulation resistance was measured between adjacent power contacts of mated specimens. A test voltage of 500 volts DC was applied for 2 minutes before the resistance was measured, in accordance with EIA–364-21C

3.5 Withstanding Voltage Test

A test potential of 2500 volts DC was applied between the adjacent power contacts of mated specimens. This potential was applied for 1 minute and then returned to zero. In accordance with EIA–364-20B Condition I

3.6 Current vs Temperature Rise Test

Stabilize at a single current level until 3 readings at 5 minute intervals are within 1^0C. Test with single energized contact and with all adjacent power contacts energized. In accordance with EIA-364-70, Method 1.

3.7 Vibration Test

Mated specimens were subjected to a random vibration test, specified by a random vibration spectrum with excitation frequency bounds of 20 and 2000 Hz. The spectrum remained flat at 0.06 G2/Hz from 20Hz to upper bound frequency of 500Hz. The root-mean square amplitude of excitation was 9.26 GRMS. The specimens were subjected to this test time of 120 minutes in each of three mutually perpendicular planes. Specimens were monitored for discontinuities of microsecond or greater using an energizing current of 100 milliamperes. In accordance with EIA–364-28 Condition V.

3.8 Mechanical Shock Test

Mated specimens were subjected to a mechanical shock test having a half – sine waveform of 50 gravity units (g peak) and duration of 11 milliseconds. Three shocks in each direction were applied along the 3 mutually perpendicular planes for a total of 18 shocks. Specimens were monitored for discontinuities of one microsecond or greater using a current of 100 milliamperes DC. In accordance with EIA–364-27B Method A.

3.9 Durability Test

Specimens were mated and unmated 200 cycles at a maximum rate of 500 cycles per hour. In accordance with EIA–364-09.

3.10 Mating/Un-mating Force Test

The force required to mate individual specimens was measured using a tensile/compression device with the floating fixture and a rate of travel of 25.4 mm per minute, in accordance with EIA–364-13B.

3.11 Retention Force Test

The force required to the individual assembly specimens between housing and contact, was measured using a tensile/compression device with the free floating fixture and a rate of travel of 25.4 mm per minute in accordance with EIA–364-13B.

3.12 Thermal Shock Test

Mated specimens were subjected to 36 cycles of thermal shock with each cycle consisting of 30 minute dwells at -40° and 105°C. The transition between temperatures was less than 1 minute in accordance with EIA–364-32C.

3.13 Humidity-temperature Cycling Test

Mated specimens were exposed to 10 cycles of humidity-temperature cycling. Each cycle lasted 24 hours and consisted of cycling the temperature between 25 and 65°C at 80 to 100 %RH, in accordance with EIA–364-31B Method III.

3.14 Temperature Life Test

Mated specimens were exposed to a temperature of 105°C for 504 hours (21 days) in accordance with EIA–364-17B Method A.

3.15 Mixed Flowing Gas Test

Specimens were exposed for 14 days to a mixed flowing gas Class IIA exposure. Class IIA exposure is defined as a temperature of 30±1°C and a relative humidity of 70 ±2% with the pollutants of Cl2 at 10 ±3 ppb, NO2 at 200±50 ppb, H2S at 10±5 ppb and SO2 at 100±20 ppb, in accordance with EIA-364-65, class IIA. ½ subject samples mated for 336 hours (14days); ½ subject samples unmated 168 hours (7days), and then mated for final 168 hours (7days).

3.16 Salt Spray Test

Mated specimens were exposed for 48 hours to a 5% solution salt spray, at 35 +1/-2°C, in accordance with EIA–364-26.

3.17 Dust Test

Unmated specimens were exposed for one hour in accordance with IEC 60529.

3.18 Solderability Dip Test

The specimens were immersed at a maximum rate of 25.4 mm [1 in] per second into a soldering bath filled with melted lead-free solder (96.5% Sn, 3.0% Ag and 0.5% Cu) controlled at 260 ± 5°C until the solderable area shall be the 95% minimum solder coverage. The specimens were held in the solder bath for 3 seconds. The specimens were then given a visual examination using 30X magnification. In accordance with EIA-364-52.

3.19 Final Examination of Product

Specimens were visually examined for evidence of physical damage detrimental to produce performance.