1.0 Objective

This specification defines the performance, test, quality and reliability requirements of the Barklip Connector product.

2.0 Scope

This specification is applicable to the termination characteristics of the Barklip connector which provides a means of bringing high current levels up to 150A from Bus Bar conductors to printed circuit boards or 170A from Bus Bar to Bus Bar.

3.0 Ratings

3.1 Operating Voltage Rating = 480 VDC (The voltage rating is also dependant on the application)

3.2 Operating Current Rating = 170 Amperes Max.

3.3 Operating Temperature Range = -40 ^{o}C to +105 ^{o}C

4.0 Applicable Documents

4.1 FCI Specifications

4.1.1 Application Specification: GS-20-0396

4.2 Industry or Trade Association Standards

4.2.1 Telcordia GR-1217

4.3 National or International Standards

4.3.1 Flammability: UL-94V-0

4.3.2 EIA 364: Electrical Connector/Socket Test Procedures Including Environmental Classifications.

4.3.3 IEC 60512: Connectors for Electronic Equipment – Tests and Measurement

4.3.4 IEC 60068: Basic environmental testing procedures.

4.4 Safety Agency Approvals

4.4.1 CSA std. C22.2 No. 182.3-M1987

4.4.2 UL-1977

5.0 Requirements

5.1 Qualification

Connectors furnished under this specification shall be capable of meeting the qualification test requirements specified herein.

5.2 Material

The material for each component shall be as specified herein or equivalent.

Power Contacts – High Conductivity Copper alloy

Clip – Stainless steel

Housing – Thermoplastic, UL 94V-0

5.3 Finish

The finish for applicable components shall be as specified herein or equivalent.

Contact area: See customer drawing

5.4 Design and Construction

Connectors shall be of the design, construction, and physical dimensions specified on the applicable product drawing. There shall be no cracks, burrs, or other physical defects that may impair performance.

5.5 Connectors Mating Part (Bus Bar)

Recommended material: Copper, solid blade

Material Thickness: 3.0±0.1 mm

Common stock width: 20.0 mm minimum

Smallest nominal pitch at contacting area: Solder type: 25 mm

Screw-mount type: 30mm

Pitch tolerance at connector area: ±1.0 mm (pitch tolerance includes twist and flatness)

Surface roughness in contact area: Ra 1.6 µm maximum

Plating in contact area: 3 µm min Silver over 1.27 µm min Nickel

Mating edges: 0.5 mm minimum, rounded or chamfered

6.0 Electrical Characteristics

6.1 Contact Resistance, Low Level (LLCR)

The low level contact resistance shall not exceed 0.2 milliohms initially. The low level contact resistance shall also not exceed 0.2 milliohms after any treatment and/or environmental exposure. Measurements shall be in accordance with EIA 364-23

The following details shall apply:

a. Test Voltage - 20 mV DC Max. open circuit.

b. Test Current - 100 mA DC Max.

6.2 Insulation Resistance

The insulation resistance of mated connectors shall not be less than 5000 Megohms initially and 1000 Megohms after environmental exposure.

Measurements shall be in accordance with EIA 364-21.

The following details shall apply:

a. Test Voltage - 500 volts DC.

b. Electrification Time - 1 minute

c. Points of Measurement - Smallest pitch between 2 connectors when mounted on a PCB:

Solder type: 25 mm/Screw-mount type: 30mm

6.3 Dielectric Withstanding Voltage

There shall be no evidence of arc-over, insulation breakdown when mated connectors are tested in accordance with EIA 364-20.

The following details shall apply:

a. Test Voltage - 1000 Volts, AC.

b. Test Duration - 60 seconds.

c. Points of Measurement - Smallest pitch between 2 connectors when mounted on a PCB:

Solder type: 25 mm/Screw-mount type: 30mm

6.4 Current Rating

The temperature rise above ambient shall not exceed 30 °C at any point in the connector system when all contacts are powered at 170A Max.

The following details shall apply:

a. Reference - EIA 364-70

6.5 Hot insertion/extraction (155A DC 48V)

Contact resistance after test 0.2 milliohms maximum.

a. Mating/unmating cycles: 50 Min.

b. Mating/unmating speed: less than10cycles/minute

7.0 Mechanical Characteristics

7.1 Mating/Unmating Force

Mating force: 40 N maximum (one connector/at nominal pitch),
60 N maximum (one connector/all misaligned pitch)

Unmating force: 12.5 N minimum (one connector/at nominal pitch)
12.5 N minimum (one connector/ all misaligned pitch)

The following details shall apply:

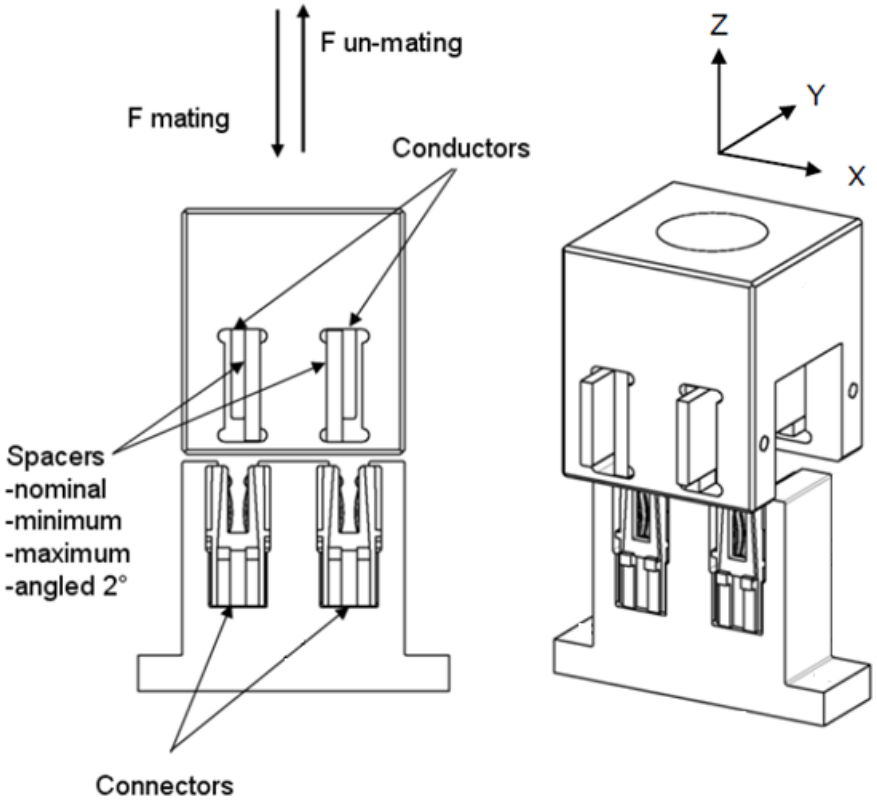
a. Cross Head Speed: 25.4 mm per minute.

b. Utilize free floating fixtures.

c. The bus bar thickness is 3.00+/-0.10mm

d. EIA 364-13, Method A

e. The pitch of the connectors in the test-tool is 25.0mm.The pitch of the conductors is 25±1mm and can be adjusted by using spacers.



7.2 Durability(preconditioning) - EIA 364-09

The connector pairs shall be capable of withstanding 50 mating/unmating cycles. When used for pre-conditioning treatment, 20 mating/unmating cycles shall be applied prior to mechanical/environmental exposure.

a. Cycling Rate : 127 mm per minute maximum

b. Use free floating fixtures

7.3 Durability - EIA 364-09

With connector mounted on PCB mate and unmate samples for 50 cycles with a bus bar conductor.

a. Cycling Rate: 127 mm per minute.

b. Use free floating fixtures

7.4 Mechanical Shock –EIA 364-27

a. Condition - A (50G, 11 millisecond, half-sine pulses type)

b. Shocks - 3 shocks in both directions along each of three orthogonal axes (18 shocks total)

c. Mounting - Rigidly mount assemblies

d. No discontinuities greater than 1.0 microsecond

7.5 Random Vibration – EIA 364-28

a. Test Condition - Test Condition V, Test condition C (50-2000Hz, 9.26g rms)

b. Duration – 120 minutes along each of three orthogonal axes

c. Mounting - Rigidly mount assemblies

d. No discontinuities greater than 1.0 microseconds

7.6 Reseating

Manually unmate/mate the interconnect system once.

a. Sample Size – Dependent upon current test group, refer to specific sample sizes.

b. Failure Criteria - No evidence of physical damage.

c. No lubrication to be used during cycling.

8.0 Environmental Conditions

After exposure to the following environmental conditions in accordance with the specified test procedure and/or details, the product shall show no physical damage and shall meet the electrical and mechanical

requirements per paragraphs 6.0 and 7.0 as specified in the Table 1 test sequences. Unless specified otherwise, assemblies shall be mated during exposure.

8.1 Thermal Shock –EIA 364-32

a. Number of Cycles –Method A, Test condition II, 25 cycles.
b. Temperature Range – Between -65 °C and +105 °C
c. Time at Each Temperature - 30 minutes minimum
d. Transfer Time - 5 minutes, maximum

8.2 Cycling Temperature&Humidity –EIA 364-31, method III ,condition B

a. Relative Humidity and temperature - between 25ºC and 65ºC at 80% to 98% relative humidity
b. Duration – 10 days
c. Omitting 7b vibration test

8.3 High Temperature Life –EIA 364-17, Method A.

a. Test Temperature - 105 °C
b. Test Duration - 1000 hours
c. Pre-condition - Perform 20 cycles of durability for product

8.4 Mixed Flowing Gas corrosion (MFG) –EIA 364-65

a. Class - IIA
b. Duration - 14 days
c. ½ of samples mated for 336 hours, ½ of samples unmated for 168 hours, then mated for final 168 hours.
d. After 7 days duration, test the LLCR. After 14 days duration, also test the LLCR.

8.5 Thermal disturbance-EIA 364-110

a. The test specimens shall be mated during the test.
b. Temperature Range – +15°C±3°C to +85°C±3°C
c. Thermal Ramp – minimum of 2°C per minute.
d. Dwell time to ensuring that the contacts reach the temperature extremes for a minimum of 5 minutes.
e. Number of cycles – 10.
f. Humidity does not need to be controlled during this portion of the test.

8.6 Solderability - FCI GS-19-037

a. Test Condition - 4.5
b. Steam or dry aging - 4 hours
c. Minimum solder coverage: 95 %

8.7 High Temperature Life(preconditioning) –EIA 364-17, Method A.

a. Test Temperature - 105 °C

b. Test Duration - 72 hours

c. Pre-condition - Perform 20 cycles of durability for product

8.8 Dust - EIA 364-91

a. Dust Composition #1

b. Duration (hours):1 hour

c. Both connector halves are to be exposed unmated.

9.0 QUALITY ASSURANCE PROVISIONS

9.1 Equipment Calibration

All test equipment and inspection facilities used in the performance of any test shall be maintained in a calibration system in accordance with ISO 9000.

9.2 Inspection Conditions

Unless otherwise specified herein, all inspections shall be performed under the following

ambient conditions:

a. Temperature : 25 +/- 5 °C

b. Relative Humidity: 30% to 60%

c. Barometric Pressure: Local ambient

9.3 Sample Quantity and Description

The sample size and description for each test is listed in table 1

9.4 Acceptance

9.4.1 Electrical and mechanical requirements placed on test samples as indicated in paragraphs 6.0 and 7.0 shall be established from test data using appropriate statistical techniques or shall otherwise be customer specified, and all samples tested in accordance with this product specification shall meet the stated requirements.

9.4.2 Failures attributed to equipment, test setup, or operator error shall not disqualify the product. If product failure occurs, corrective action shall be taken and samples resubmitted for qualification.

9.5 Qualification Testing

Qualification testing shall be performed on sample units produced with equipment and procedures normally used in production. The test sequences shall be as shown in the qualification test table 1.

9.6 Re-Qualification Testing

If any of the following conditions occur, the responsible product engineer shall initiate requalification testing consisting of all applicable parts of the qualification test matrix.

a. A significant design change is made to the existing product which impacts the product form, fit or function. Examples of significant changes shall include, but not be limited to, changes in the plating material composition or thickness, contact force, contact surface geometry, insulator design, contact base material, or contact lubrication requirements.

b. A significant change is made to the manufacturing process which impacts the product form, fit or function.

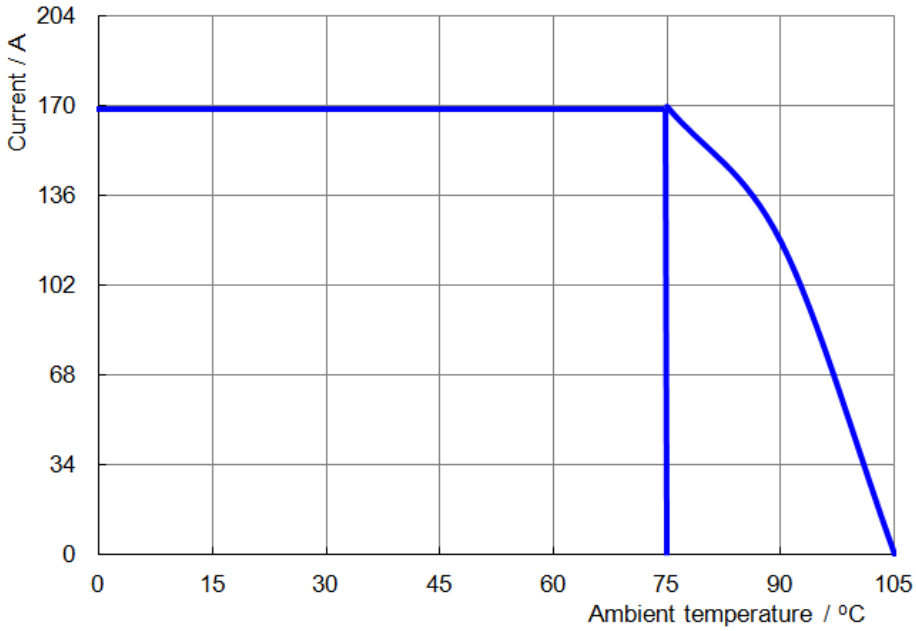
c. A significant event occurs during production or end use requiring corrective action to be taken relative to the product design or manufacturing process.

9.7 Qualification Test Table 1

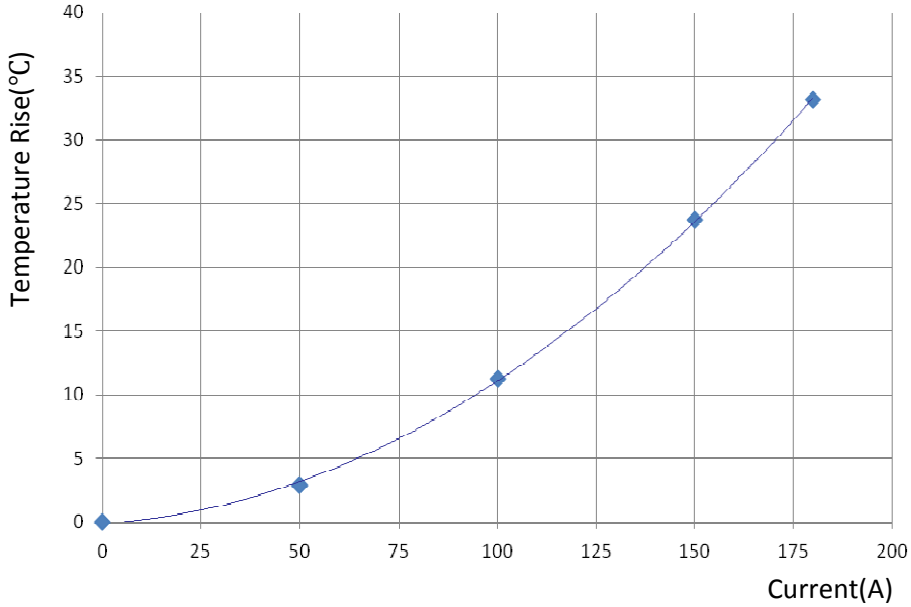
Test Sequence Table 1

Test Items	Section	Test Group									
		1	2	3	4	5	6	7	8	9	10
		Test Sequence									
Examination of Product	5.4	1,7	1,8	1, 10	1, 10	1, 11	1, 10	1,9	1,5	1,3	1,3
Contact Resistance Low Level	6.1	2,6	2,5, 7	2,5, 7,9	2,5, 7,9	2,5, 7 (After7days), 8 (After14days) ,10	2,5, 7, 9	4,6	2,4		
Insulation Resistance	6.2							2,7			
Dielectric Withstanding Voltage	6.3							3,8			
Current Rating (T-rise: 30°C Max.)	6.4									2	
Hot insertion/extraction	6.5								3		
Mating/Unmating Force	7.1	3,5									
Durability (Preconditioning)	7.2		3	3	3	3	3				
Durability	7.3	4						5			
Mechanical Shock	7.4				6						
Random Vibration	7.5				8						
Reseating	7.6		6	8		9	8				
Thermal Shock	8.1			4							
Cycling Temperature and Humidity	8.2			6							
High Temperature Life	8.3		4								
Mixed Flowing Gas	8.4					6					
Thermal disturbance	8.5						6				
Solderability	8.6										2
High Temperature Life (preconditioning)	8.7				4	4					
Dust	8.8						4				
Samples quantity(PCS)		5	5	5	5	5	5	5	5	5	5

10.1 Current temperature derating curve



10.2 Temperature rise vs current curve



Above rating is for reference only. Appropriate de-rating is required per ambient conditions, bus bar size to achieve thermal balance, gross heating from adjacent components, and other factors that influence connector performance.

REVISION RECORD

Rev	Page	Description	EC#	Date
6	1	Preliminary release	TBD	2015-05-12