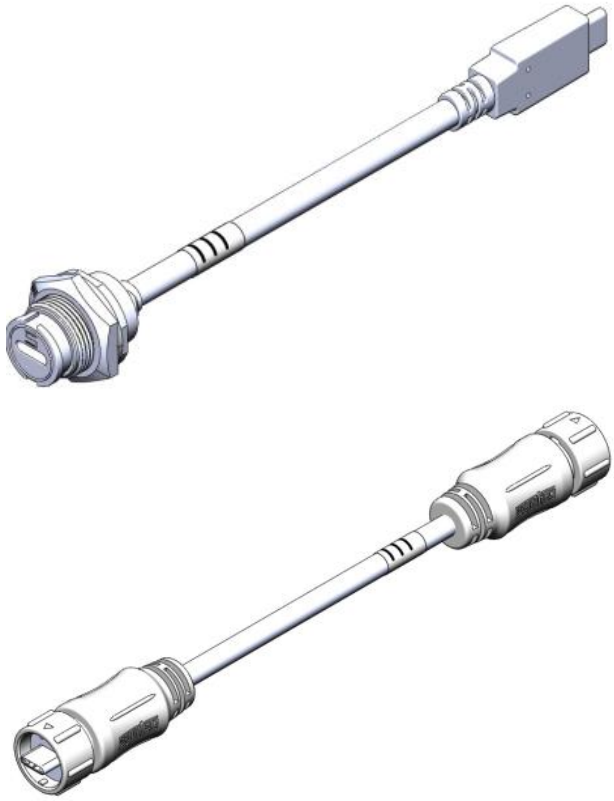
Project Number: Design Qualification Test Report	Tracking Code: CR-852304_Report_Rev_1
Requested by: Eddie Wang	Date: 3/6/2024
Part #: BCU-C-S-1.00-SC-P/BPCU-C-S-1.00-UC-P	
Part description: BCU/BPCU	Tech: Peter Chen and Aaron McKim
Test Start: 10/25/2022	Test Completed: 11/29/2022



DESIGN QUALIFICATION TEST REPORT

BCU/BPCU

BCU-C-S-1.00-SC-P/BPCU-C-S-1.00-UC-P

Disclaimer: This test report has been prepared by Samtec based on testing conducted in accordance with EIA test procedures. It is important to note that this report is not intended to supersede or replace the specifications set forth by the USB Implementors Forum (USB-IF). The test results following herein for Insulation Resistance (IR), Working Voltage, Current Rating, and Low-Level Contact Resistance (LLCR) Max Delta may meet or improve upon the USB-IF published specification however are for reference only.

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
3/6/2024	**1**	**Initial Issue**	**KH**

CERTIFICATION

All instruments and measuring equipment were calibrated to National Institute for Standards and Technology (NIST) traceable standards according to IS0 10012-l and ANSI/NCSL 2540-1, as applicable.

SCOPE

To perform the following tests: Design Qualification test. Please see test plan.

APPLICABLE DOCUMENTS

Standards: EIA Publication 364

TEST SAMPLES AND PREPARATION

1) All materials were manufactured in accordance with the applicable product specification.
2) All test samples were identified and encoded to maintain traceability throughout the test sequences.
3) After soldering, the parts to be used for LLCR and DWV/IR testing were cleaned according to CO-SC-WI-3029.
4) Either an automated cleaning procedure or an ultrasonic cleaning procedure may be used.
5) The automated procedure is used with aqueous compatible soldering materials.
6) Parts not intended for testing LLCR and DWV/IR are visually inspected and cleaned if necessary.
7) Any additional preparation will be noted in the individual test sequences.
8) Solder Information: Lead Free

FLOWCHARTS

Gas Tight

Group 1

BCU-C-S-1.00-SC-P

BPCU-C-S-1.00-UC-P

8 Assemblies

Step	Description
1.	LLCR (2) - Non Standard
2.	Gas Tight (1)
3.	LLCR (2) - Non Standard Max Delta = 30 mOhm

(1) Gas Tight = EIA-364-36

(2) LLCR = EIA-364-23

Open Circuit Voltage = 20 mV Max

Test Current = 100 mA Max

FLOWCHARTS Continued

Mating/Unmating/Durability

Group 1
BCU-C-S-1.00-SC-P
BPCU-C-S-1.00-UC-P
5 Assemblies

Step	Description
1.	LLCR (2)
2.	Mating/Unmating Force (3) Bayonet nut = does not take into consideration
3.	Cycles Quantity = 25 Cycles
4.	Mating/Unmating Force (3) Bayonet nut = does not take into consideration
5.	Cycles Quantity = 25 Cycles
6.	Mating/Unmating Force (3) Bayonet nut = does not take into consideration
7.	Cycles Quantity = 25 Cycles
8.	Mating/Unmating Force (3) Bayonet nut = does not take into consideration
9.	Cycles Quantity = 25 Cycles
10.	Mating/Unmating Force (3) Bayonet nut = does not take into consideration
11.	LLCR (2) Max Delta = 30 mOhm
12.	Thermal-Shock EIA = 364-32 test Condition A Duration = 5 cycles at -40°C/+85°C *Note: After the test, the function and appearance can't be impacted.*
13.	LLCR (2) Max Delta = 30 mOhm
14.	Humidity (1) - Non Standard EIA = 364-31
15.	LLCR (2) Max Delta = 30 mOhm
16.	Mating/Unmating Force (3) Bayonet nut = does not take into consideration

(1) Humidity = Other
Test Condition = A (96 Hours)
Test Method = III (+25°C to +65°C @ 95% RH); 1 cycles/ day

(2) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max

(3) Mating/Unmating Force = EIA-364-13

FLOWCHARTS Continued

IR/DWV

Pin-to-Pin

Group 1 BCU-C-S-1.00-SC-P BPCU-C-S-1.00-UC-P 2 Assemblies		Group 2 BCU-C-S-1.00-SC-P 2 Assemblies		Group 3 BPCU-C-S-1.00-UC-P 2 Assemblies		Group 4 BCU-C-S-1.00-SC-P BPCU-C-S-1.00-UC-P 2 Assemblies	
Step	**Description**	**Step**	**Description**	**Step**	**Description**	**Step**	**Description**
1.	DWV Breakdown (2) - Non Standard	1.	DWV Breakdown (2) - Non Standard	1.	DWV Breakdown (2) - Non Standard	1.	IR (4) - Non Standard
						2.	DWV at Test Voltage (1) - Non Standard EIA = 364-20
						3.	Thermal Shock (5) - Non Standard EIA = 364-32, test Condition A Duration = 5 cycles at -40°C /+85°C
						4.	IR (4) - Non Standard
						5.	DWV at Test Voltage (1) - Non Standard EIA = 364-20
						6.	Humidity (3) - Non Standard EIA = 364-31
						7.	IR (4) - Non Standard
						8.	DWV at Test Voltage (1) - Non Standard EIA = 364-20

(1) DWV at Test Voltage = EIA-364-20
Test Condition = 1 (Sea Level)
DWV test voltage is equal to 75% of the lowest breakdown voltage
Test voltage applied for 60 seconds

(2) DWV Breakdown = EIA-364-20
Test Condition = 1 (Sea Level)
DWV test voltage is equal to 75% of the lowest breakdown voltage
Test voltage applied for 60 seconds

(3) DWV Breakdown = EIA-364-20
Test Condition = 1 (Sea Level)
DWV test voltage is equal to 75% of the lowest breakdown voltage
Test voltage applied for 60 seconds

(4) Humidity = Other
Test Condition = A (96 Hours)
Test Method = III (+25°C to +65°C @ 95% RH); 1 cycles/ day

(5) IR = EIA-364-21
Test Condition = 500 Vdc, 2 Minutes Max

(6) Thermal Shock = Other
After the test, the function and appearance can't be impacted

FLOWCHARTS Continued

Current Carrying Capacity

Group 1	Group 2	Group 3	Group 4
BCU-C-S-1.00-SC-P BPCU-C-S-1.00-UC-P 1 Pins Powered Signal	BCU-C-S-1.00-SC-P BPCU-C-S-1.00-UC-P 2 Pins Powered Signal	BCU-C-S-1.00-SC-P BPCU-C-S-1.00-UC-P 3 Pins Powered Signal	BCU-C-S-1.00-SC-P BPCU-C-S-1.00-UC-P 4 Pins Powered Signal
Step **Description**	**Step** **Description**	**Step** **Description**	**Step** **Description**
1. CCC (1) Rows = 1 Number of Positions = 1	1. CCC (2) Rows = 1 Number of Positions = 2	1. CCC (2) Rows = 1 Number of Positions = 3	1. CCC (2) Rows = 1 Number of Positions = 4

(1) CCC = EIA-364-70
Method 2, Temperature Rise Versus Current Curve
(TIN PLATING) - Tabulate calculated current at RT, 65°C, 75°C and 95°C after derating 20% and based on 105°C
(GOLD PLATING) - Tabulate calculated current at RT, 85°C, 95°C and 115°C after derating 20% and based on 125°C

(2) CCC = EIA-364-70
Method 2, Temperature Rise Versus Current Curve
(TIN PLATING) - Tabulate calculated current at RT, 65°C, 75°C and 95°C after derating 20% and based on 105°C
(GOLD PLATING) - Tabulate calculated current at RT, 85°C, 95°C and 115°C after derating 20% and based on 125°C

FLOWCHARTS Continued

Mechanical Shock/Random Vibration/LLCR

Group 1
BCU-C-S-1.00-SC-P
BPCU-C-S-1.00-UC-P
5 Assemblies

Step	Description
1.	LLCR (1)
2.	Random Vibration (2) - Non Standard EIA = 364-28 Frequency = 50 to 2000 Hz PDS = 0.04 g^2/Hz. Duration = 1 Hour/Axis, 3 Axes Total. g's = 7.56g rms
3.	LLCR (1) Max Delta = 30 mOhm

(1) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max

(2) Random Vibration = Other
The electrical load conditions shall be 100mA maximum for all contacts.

Mechanical Shock/Random Vibration/Event Detection

Group 1
BCU-C-S-1.00-SC-P
BPCU-C-S-1.00-UC-P
8 Assemblies

Step	Description
1.	Nanosecond Event Detection (Mechanical Shock) (1) - Non Standard EIA = 364-27 Test condition = H *Note: are subjected to 11 ms duration 30 Gs half-sine shock pulses. Three shocks in each direction applied along three mutually perpendicular planes for a total of 18 shocks*

(1) Nanosecond Event Detection (Mechanical Shock) = Other
No discontinuities of 1 µs or longer duration when mated

FLOWCHARTS Continued

Dust/Water

IPx7 Water Submersion

Group 1
BCU-C-S-1.00-SC-P
BPCU-C-S-1.00-UC-P
3 Assemblies

Step	Description
1.	Water Submersion - IPX7 (1) Depth = 1 meters
2.	Visual Inspection

IPx8 Deep Water Submersion

Group 2
BCU-C-S-1.00-SC-P
BPCU-C-S-1.00-UC-P
3 Assemblies

Step	Description
1.	Water Submersion - IPX8 (2) Depth = 2 meters Duration = 30 min
2.	Visual Inspection

Group 3
BCU-C-S-1.00-SC-P
BPCU-C-S-1.00-UC-P
3 Assemblies

Step	Description
1.	Water Submersion - IPX8 (2) Depth = 3 meters Duration = 30 min
2.	Visual Inspection

Group 4
BCU-C-S-1.00-SC-P
BPCU-C-S-1.00-UC-P
3 Assemblies

Step	Description
1.	Water Submersion - IPX8 (2) Depth = 4 meters Duration = 30 min
2.	Visual Inspection

Group 5
BCU-C-S-1.00-SC-P
BPCU-C-S-1.00-UC-P
3 Assemblies

Step	Description
1.	Water Submersion - IPX8 (2) Depth = 5 meters Duration = 30 min
2.	Visual Inspection

Group 6
BCU-C-S-1.00-SC-P
BPCU-C-S-1.00-UC-P
3 Assemblies

Step	Description
1.	Water Submersion - IPX8 (2) Depth = 6 meters Duration = 30 min
2.	Visual Inspection

Group 7
BCU-C-S-1.00-SC-P
BPCU-C-S-1.00-UC-P
3 Assemblies

Step	Description
1.	Water Submersion - IPX8 (2) Depth = 7 meters Duration = 30 min
2.	Visual Inspection

Group 8
BCU-C-S-1.00-SC-P
BPCU-C-S-1.00-UC-P
3 Assemblies

Step	Description
1.	Water Submersion - IPX8 (2) Depth = 8 meters Duration = 30 min
2.	Visual Inspection

Group 9
BCU-C-S-1.00-SC-P
BPCU-C-S-1.00-UC-P
3 Assemblies

Step	Description
1.	Water Submersion - IPX8 (2) Depth = 9 meters Duration = 30 min
2.	Visual Inspection

Group 10
BCU-C-S-1.00-SC-P
BPCU-C-S-1.00-UC-P
3 Assemblies

Step	Description
1.	Water Submersion - IPX8 (2) Depth = 10 meters Duration = 30 min
2.	Visual Inspection

(1) Water Submersion - IPX7 = CEI/IEC 60529
(2) Water Submersion - IPX8 = CEI/IEC 60529

FLOWCHARTS Continued

Cable Pull

Group 1
BCU-C-S-1.00-SC-P
BPCU-C-S-1.00-UC-P
5 Assemblies
0 Degrees

Step	Description
1.	Cable Pull (1) - Non Standard EIA = 364-38

(1) Cable Pull = Other
Application of a steady state axial load of 40 N for one minute.
Failure = Discontinuity >1 microsecond at 10 ohms

Cable Flex

Group 1
BCU-C-S-1.00-SC-P
BPCU-C-S-1.00-UC-P
8 Assemblies
Circular Cable

Step	Description
1.	IR (2)
2.	Cable Flex (1)
3.	Visual Inspection
4.	IR (2)
5.	Rotate Cable 90°
6.	Cable Flex (1)
7.	Visual Inspection
8.	IR (2)

(1) Cable Flex = EIA-364-41
Circular Jacket Cable - to be tested 90° each direction (180° total)
Flat Cable - to be tested 70° each direction (140° total)
Monitor continuity during flex testing
Failure = Discontinuity >1 microsecond at 10 ohms

(2) IR = EIA-364-21
Test Condition = 500 Vdc, 2 Minutes Max

FLOWCHARTS Continued

Low Temperature

Group 1
BCU-C-S-1.00-SC-P
BPCU-C-S-1.00-UC-P
3
Custom Group

Step	Description
1.	LLCR (1) Max Delta = 30 mOhm
2.	Low Temperature EIA = 364-59, Condition 3 Duration = -40 degree C for 96 hrs
3.	LLCR (1) Max Delta = 30 mOhm

(1) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max

Temperature Life

Group 1
BCU-C-S-1.00-SC-P
BPCU-C-S-1.00-UC-P
5 Assemblies

Step	Description
1.	LLCR (1) Max Delta = 30 mOhm
2.	Temperature Life EIA364-17 = Condition 3 85 degree C = 96 hrs W/O = Electrical Load
3.	LLCR (1) Max Delta = 30 mOhm

(1) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

LOW TEMPERATURE:

1) EIA-364-59, *Temperature Life with or without Electrical Load Test Procedure for Electrical Connectors.*
2) Test Condition 3: -40° C.
3) Test Time Condition C for 96 hours.
4) All test samples are pre-conditioned at ambient.
5) All test samples are exposed to environmental stressing in the mated condition.

TEMPERATURE LIFE:

1) EIA-364-17, *Temperature Life with or without Electrical Load Test Procedure for Electrical Connectors.*
2) Test Condition 3: +85° C.
3) Test Time Condition C for 96 hours.
4) All test samples are pre-conditioned at ambient.
5) All test samples are exposed to environmental stressing in the mated condition.

THERMAL SHOCK:

1) EIA-364-32, *Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors.*
2) Test Condition A: -40°C to +85°C.
3) Test Time: ½ hour dwell at each temperature extreme.
4) Number of Cycles: 5
5) All test samples are pre-conditioned at ambient.
6) All test samples are exposed to environmental stressing in the mated condition.

HUMIDITY:

1) Reference document: EIA-364-31, *Humidity Test Procedure for Electrical Connectors.*
2) Test Condition A, 96 Hours.
3) Method III, +25° C to + 65° C, 90% to 98% Relative Humidity excluding sub-cycles 7a and 7b.
4) All samples are pre-conditioned at ambient.
5) All test samples are exposed to environmental stressing in the mated condition.

MECHANICAL SHOCK (Specified Pulse):

1) Reference document: EIA-364-27, *Mechanical Shock Test Procedure for Electrical Connectors*
2) Test Condition H
3) Peak Value: 30 G
4) Duration: 11 Milliseconds
5) Wave Form: Half-sine
6) Velocity: 12.3 ft/s
7) Number of Shocks: 3 Shocks / Direction, 3 Axis (18 Total)

VIBRATION:

1) Reference document: EIA-364-28, *Vibration Test Procedure for Electrical Connectors*
2) Test Condition V, Letter B
3) Power Spectral Density: 0.04 G^2 / Hz
4) G 'RMS': 7.56
5) Frequency: 50 to 2000 Hz
6) Duration: 2.0 Hours per axis (3 axis total)

NANOSECOND-EVENT DETECTION:

1) Reference document: EIA-364-87, *Nanosecond-Event Detection for Electrical Connectors*
2) Prior to test, the samples were characterized to assure the low nanosecond event being monitored will trigger the detector.
3) After characterization it was determined the test samples could be monitored for 50 nanosecond events

ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes.

MATING/UNMATING:

1) Reference document: EIA-364-13, *Mating and Unmating Forces Test Procedure for Electrical Connectors*.
2) The full insertion position was to within 0.003" to 0.004" of the plug bottoming out in the receptacle to prevent damage to the system under test.
3) One of the mating parts is secured to a floating X-Y table to prevent damage during cycling.

LLCR:

1) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
2) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
3) The following guidelines are used to categorize the changes in LLCR as a result from stressing.
    a. <= +5.0 mOhms: ----------Stable
    b. +5.1 to +10.0 mOhms:----------Minor
    c. +10.1 to +15.0 mOhms: ----------Acceptable
    d. +15.1 to +50.0 mOhms: ----------Marginal
    e. +50.1 to +1000 mOhms: ----------Unstable
    f. >+1000 mOhms:----------Open Failure

GAS TIGHT:

To provide method for evaluating the ability of the contacting surfaces in preventing penetration of harsh vapors which might lead to oxide formation that may degrade the electrical performance of the contact system.

1) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
2) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
3) The following guidelines are used to categorize the changes in LLCR as a result from stressing.
    a. <= +5.0 mOhms:----------Stable
    b. +5.1 to +10.0 mOhms:----------Minor
    c. +10.1 to +15.0 mOhms: ----------Acceptable
    d. +15.1 to +50.0 mOhms: ----------Marginal
    e. +50.1 to +1000 mOhms:----------Unstable
    f. >+1000 mOhms:----------Open Failure
4) Procedure:
    a. Reference document: EIA-364-36, *Test Procedure for Determination of Gas-Tight Characteristics for Electrical Connectors, Sockets and/or Contact Systems*.
    b. Test Conditions:
        i. Class II--- Mated pairs of contacts assembled to their plastic housings.
        ii. Reagent grade Nitric Acid shall be used of sufficient volume to saturate the test chamber.
        iii. The ratio of the volume of the test chamber to the surface area of the acid shall be 10:1.
        iv. The chamber shall be saturated with the vapor for at least 15 minutes before samples are added.
        v. Exposure time, 55 to 65 minutes.
        vi. The samples shall be no closer to the chamber walls than 1 inch and no closer to the surface of the acid than 3 inches.
        vii. The samples shall be dried after exposure for a minimum of 1 hour.
        viii. Drying temperature 50^{o} C
        ix. The final LLCR shall be conducted within 1 hour after drying.

ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes.

INSULATION RESISTANCE (IR):

To determine the resistance of insulation materials to leakage of current through or on the surface of these materials when a DC potential is applied.

1) PROCEDURE:
    a. Reference document: EIA-364-21, *Insulation Resistance Test Procedure for Electrical Connectors*.
    b. Test Conditions:
        i. Between Adjacent Contacts or Signal-to-Ground
        ii. Electrification Time 2.0 minute
        iii. Test Voltage (500 VDC) corresponds to calibration settings for measuring resistances.
2) MEASUREMENTS:
3) When the specified test voltage is applied (VDC), the insulation resistance shall not be less than 1000 megohms.

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

To determine if the sockets can operate at its rated voltage and withstand momentary over potentials due to switching, surges, and other similar phenomenon. Separate samples are used to evaluate the effect of environmental stresses so not to influence the readings from arcing that occurs during the measurement process.

1) PROCEDURE:
    a. Reference document: EIA-364-20, *Withstanding Voltage Test Procedure for Electrical Connectors*.
    b. Test Conditions:
        i. Between Adjacent Contacts or Signal-to-Ground
        ii. Barometric Test Condition 1
        iii. Rate of Application 500 V/Sec
        iv. Test Voltage (VAC) until breakdown occurs.
2) MEASUREMENTS/CALCULATIONS
    a. The breakdown voltage shall be measured and recorded.
    b. The dielectric withstanding voltage shall be recorded as 75% of the minimum breakdown voltage.
    c. The working voltage shall be recorded as one-third (1/3) of the dielectric withstanding voltage (one-fourth of the breakdown voltage).

WATER TESTING:

1) Reference document: CEI/IEC 60529 Code IPX7, CEI/IEC 60529 Code IPX8.

ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes.

CABLE PULL:

1) Application of a steady state axial load of 40 N for 1 minute.

Fig. 1
0° Connector pull.

CABLE DURABILITY:

1) Oscillate and monitor electrical continuity for open circuit indication.
    a. ± 90°Flex Mode, bend up to 200 cycles. load on cable end.

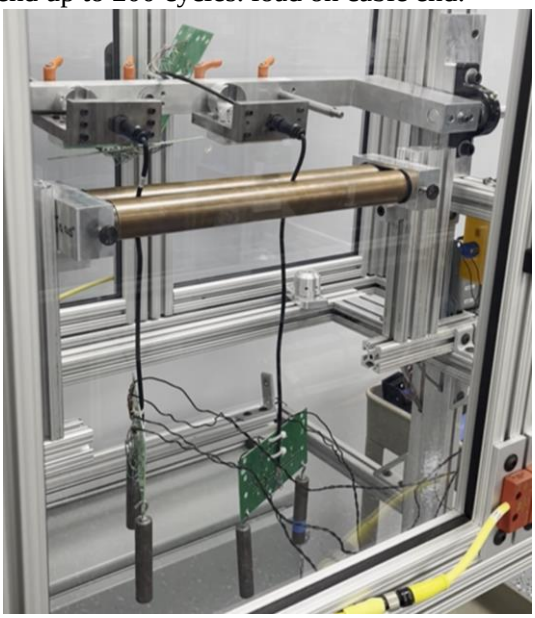


Fig. 2
(Setup picture)

RESULTS

Temperature Rise, CCC at a 20% de-rating

- **CCC for a 30°C Temperature Rise----------2.0 A per contact with 1 contact (1 x 1) powered.**
- **CCC for a 30°C Temperature Rise----------1.7 A per contact with 2 contacts (1 x 2) powered.**
- **CCC for a 30°C Temperature Rise----------1.4 A per contact with 3 contacts (1 x 3) powered.**
- **CCC for a 30°C Temperature Rise----------1.3 A per contact with 4 contacts (1 x 4) powered.**

RESULTS Continued

Mating – Unmating Forces

Mating/Unmating Durability Group

- **Initial**
  - **Mating**
    - **Min ---------- 2.40 lbs**
    - **Max---------- 4.47 lbs**
  - **Unmating**
    - **Min ---------- 1.45 lbs**
    - **Max---------- 2.89 lbs**
- **After 25 Cycles**
  - **Mating**
    - **Min ---------- 2.46 lbs**
    - **Max---------- 4.20 lbs**
  - **Unmating**
    - **Min ---------- 1.89 lbs**
    - **Max---------- 2.76 lbs**
- **After 50 Cycles**
  - **Mating**
    - **Min ---------- 2.43 lbs**
    - **Max---------- 4.10 lbs**
  - **Unmating**
    - **Min ---------- 1.85 lbs**
    - **Max---------- 2.81 lbs**
- **After 75 Cycles**
  - **Mating**
    - **Min ---------- 2.61 lbs**
    - **Max---------- 4.25 lbs**
  - **Unmating**
    - **Min ---------- 1.99 lbs**
    - **Max---------- 2.87 lbs**
- **After 100 Cycles**
  - **Mating**
    - **Min ---------- 2.66 lbs**
    - **Max---------- 4.38 lbs**
  - **Unmating**
    - **Min ---------- 2.25 lbs**
    - **Max---------- 2.91 lbs**
- **After Humidity**
  - **Mating**
    - **Min ---------- 2.41 lbs**
    - **Max---------- 2.85 lbs**
  - **Unmating**
    - **Min ---------- 2.20 lbs**
    - **Max---------- 2.60 lbs**

Cable Pull

- **Steady State Axial Load 40N for 60 seconds -- - - - - - - - - - - - - - - Pass.**

RESULTS Continued

Insulation Resistance minimums, IR

Pin to Pin

- **Initial**
  - **Mated ---------- 5100 Meg Ω ---------- Passed**
  - **Unmated ---------- 6300 Meg Ω ---------- Passed**
- **Thermal Shock**
  - **Mated ---------- 4250 Meg Ω ---------- Passed**
  - **Unmated ---------- 5800 Meg Ω ---------- Passed**
- **Humidity**
  - **Mated ---------- 1650 Meg Ω ---------- Passed**
  - **Unmated ---------- 2500 Meg Ω ---------- Passed**

Dielectric Withstanding Voltage minimums, DWV

- **Minimums**
  - **Breakdown Voltage ----------957 VAC**
  - **Test Voltage ----------718 VAC**
  - **Working Voltage ----------235 VAC**

Pin to Pin

- **Initial DWV ----------Passed**
- **Thermal DWV----------Passed**
- **Humidity DWV----------Passed**

Cable Flex:

Insulation Resistance minimums, IR

Pin to Pin

- **Initial**
  - **Mated ---------- 4500 Meg Ω ---------- Passed**
- **After 100 flex cycles**
  - **Mated ---------- 4800 Meg Ω ---------- Passed**
- **After 200 flex cycles**
  - **Mated ---------- 4500 Meg Ω ---------- Passed**

IPX7 Testing (Water)

	Initial (Before Exposure)	After Exposure
Water	**No Water Present**	**No Water Present**

IPX8 Testing (Water)

	Initial (Before Exposure)	After Exposure
Water	**No Water Present**	**No Water Present**

RESULTS Continued

LLCR Gas Tight (114 Signal, 8 power and 8 ground LLCR test points)

Signal pin

- **Initial ---------- 194.21 mOhms Max**
- **Gas-Tight**
  - **<= +5.0 mOhms ---------- 82 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 32 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**

Power pin

- **Initial ---------- 30.21 mOhms Max**
- **Gas-Tight**
  - **<= +5.0 mOhms ---------- 8 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**

Ground pin

- **Initial ---------- 40.53 mOhms Max**
- **Gas-Tight**
  - **<= +5.0 mOhms ---------- 8 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**

RESULTS Continued

LLCR Mating/Unmating Durability Group (65 signal, 5 power and 5 ground LLCR test points)

Signal Pin

- **Initial ---------- 194.21 mOhms Max**
- **Durability, 100 Cycles**
  - **<= +5.0 mOhms ---------- 60 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 5 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**
- **Thermal Shock**
  - **<= +5.0 mOhms ---------- 38 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 21 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 6 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**
- **Humidity**
  - **<= +5.0 mOhms ---------- 28 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 29 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 8 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**

Power Pin

- **Initial ---------- 30.21 mOhms Max**
- **Durability, 100 Cycles**
  - **<= +5.0 mOhms ---------- 5 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**
- **Thermal Shock**
  - **<= +5.0 mOhms ---------- 5 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**
- **Humidity**
  - **<= +5.0 mOhms ---------- 5 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**

RESULTS Continued

Ground Pin

- **Initial ---------- 40.53 mOhms Max**
- **Durability, 100 Cycles**
  - **<= +5.0 mOhms ---------- 5 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**
- **Thermal Shock**
  - **<= +5.0 mOhms ---------- 5 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**
- **Humidity**
  - **<= +5.0 mOhms ---------- 5 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**

RESULTS Continued

LLCR Vibration (65 signal, 5 Ground 1 and 5 ground 2 LLCR test points)

Signal pin

- **Initial ---------- 486.86 mOhms Max**
- **Vibration**
  - **<= +10.0 mOhms ---------- 65 Points ---------- Stable**
  - **+10.1 to +20.0 mOhms ---------- 0 Points ---------- Minor**
  - **+20.1 to +30.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+30.1 to +100.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+100.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**

Ground pin 1

- **Initial ---------- 90.00 mOhms Max**
- **Vibration**
  - **<= +10.0 mOhms ---------- 2 Points ---------- Stable**
  - **+10.1 to +20.0 mOhms ---------- 2 Points ---------- Minor**
  - **+20.1 to +30.0 mOhms ---------- 1 Points ---------- Acceptable**
  - **+30.1 to +100.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+100.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**

Ground pin 2

- **Initial ---------- 75.97 mOhms Max**
- **Vibration**
  - **<= +10.0 mOhms ---------- 5 Points ---------- Stable**
  - **+10.1 to +20.0 mOhms ---------- 0 Points ---------- Minor**
  - **+20.1 to +30.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+30.1 to +100.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+100.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**

Mechanical Shock:

- **Shock**
  - **No Damage---------- ---------- Pass**
  - **50 Nanoseconds ---------- ---------- Pass**

RESULTS Continued

LLCR Low Temperature (39 Signal, 3 power and 3 ground LLCR test points)

Signal pin

- **Initial ---------- 178.45 mOhms Max**
- **After Low Temperature**
  - **<= +5.0 mOhms ---------- 22 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 17 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**

Power pin

- **Initial ---------- 27.36 mOhms Max**
- **After Low Temperature**
  - **<= +5.0 mOhms ---------- 3 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**

Ground pin

- **Initial ---------- 39.94 mOhms Max**
- **After Low Temperature**
  - **<= +5.0 mOhms ---------- 2 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 1 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**

RESULTS Continued

LLCR Temperature Life (65 Signal, 5 power and 5 ground LLCR test points)

Signal pin

- **Initial ---------- 182.97 mOhms Max**
- **After Temperature Life**
  - **<= +5.0 mOhms ---------- 51 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 14 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**

Power pin

- **Initial ---------- 28.22 mOhms Max**
- **After Temperature Life**
  - **<= +5.0 mOhms ---------- 5 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**

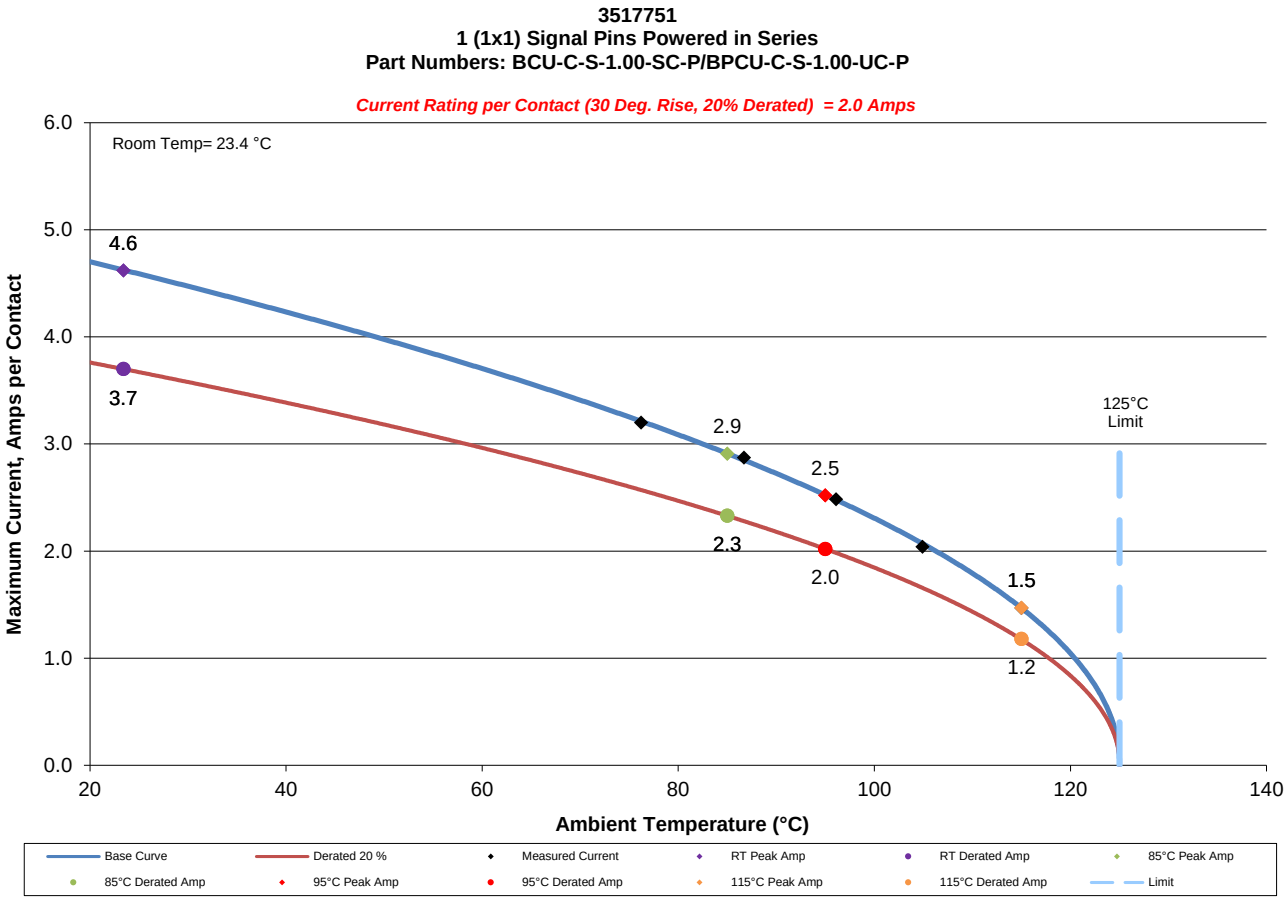
Ground pin

- **Initial ---------- 41.03 mOhms Max**
- **After Temperature Life**
  - **<= +5.0 mOhms ---------- 5 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**

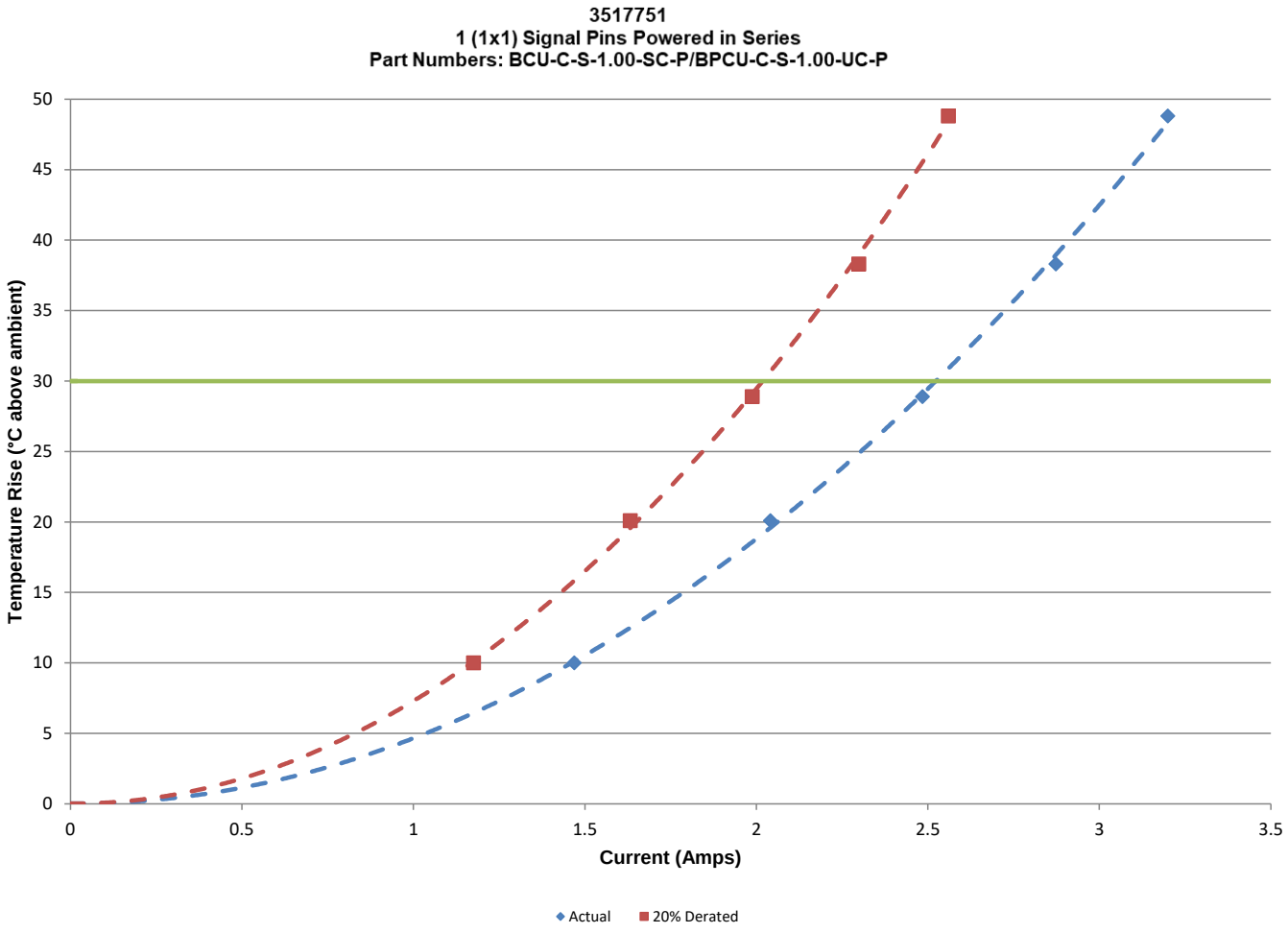
DATA SUMMARIES

TEMPERATURE RISE (Current Carrying Capacity, CCC):

1) High quality thermocouples whose temperature slopes track one another were used for temperature monitoring.
2) The thermocouples were placed at a location to sense the maximum temperature generated during testing.
3) Temperature readings recorded are those for which three successive readings, 15 minutes apart, differ less than 1° C (computer-controlled data acquisition).
4) Adjacent contacts were powered:
    a. Linear configuration with 1 adjacent conductors/contacts powered.

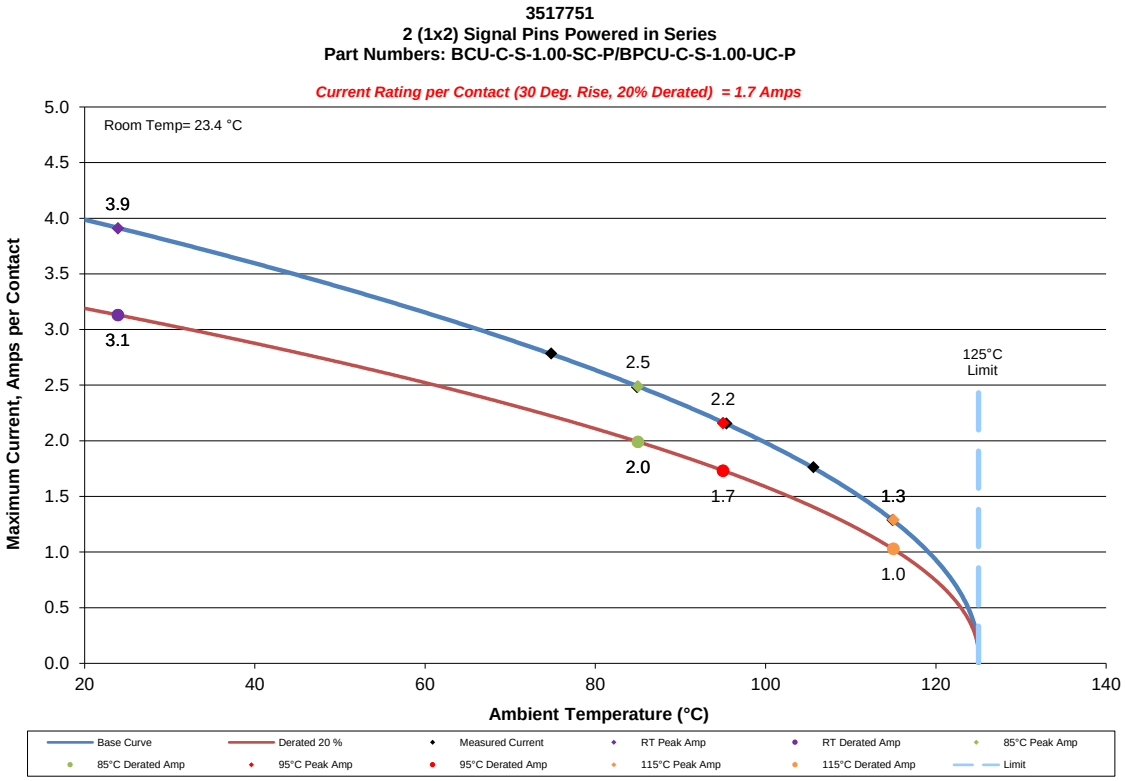


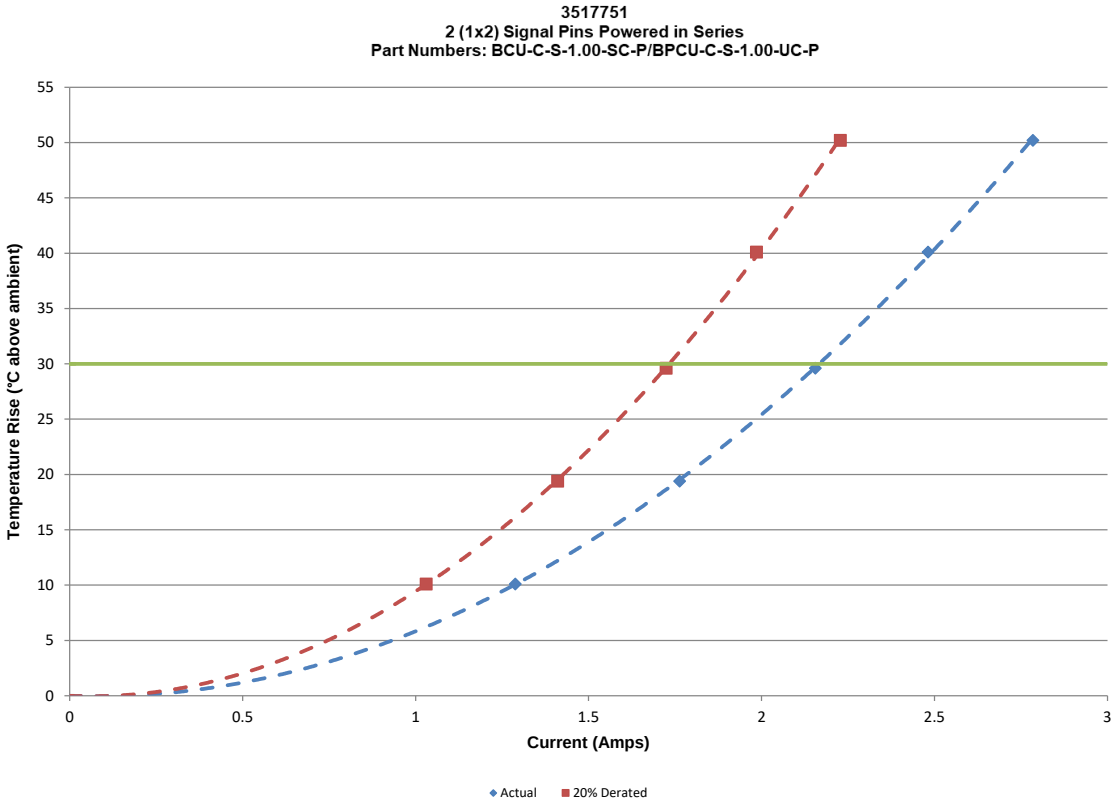
DATA SUMMARIES Continued



DATA SUMMARIES Continued

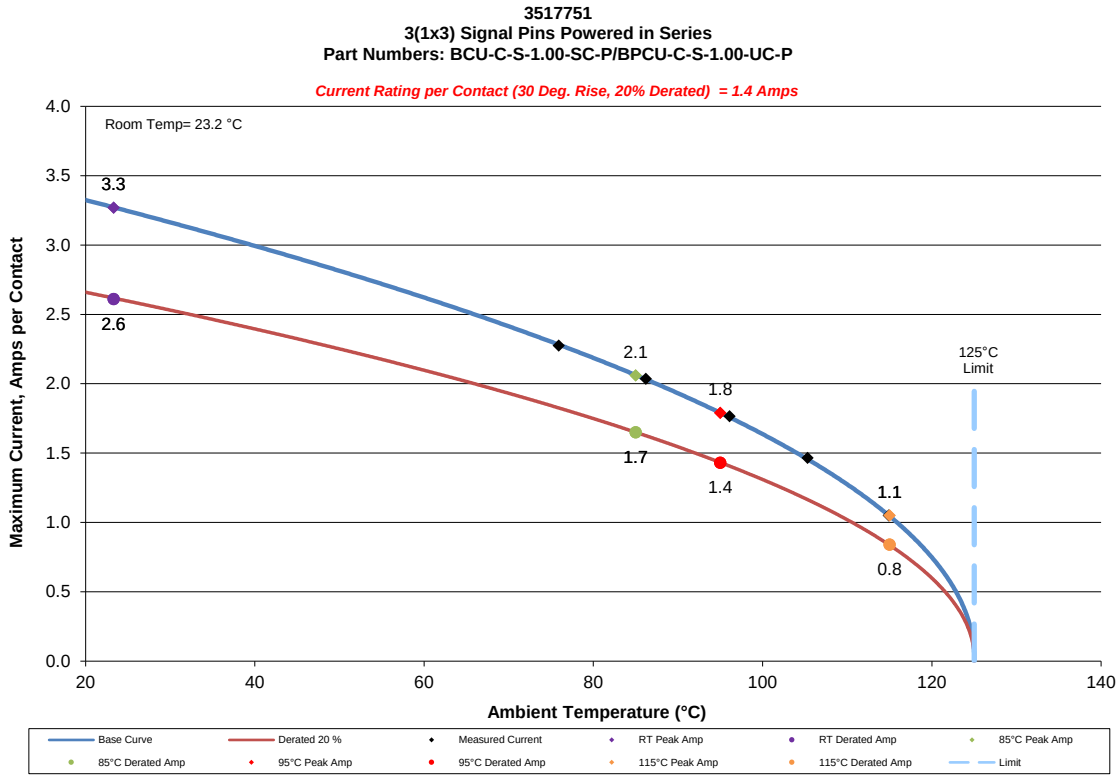
b. Linear configuration with 2 adjacent conductors/contacts powered.

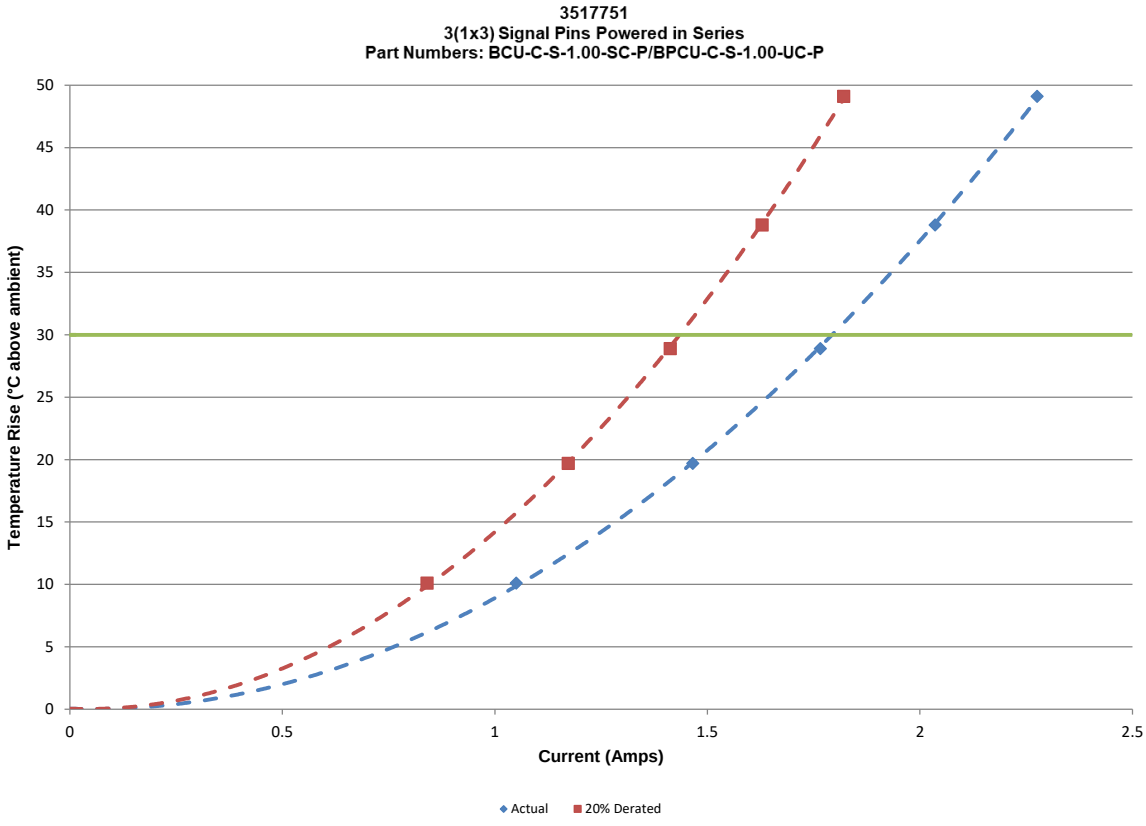




DATA SUMMARIES Continued

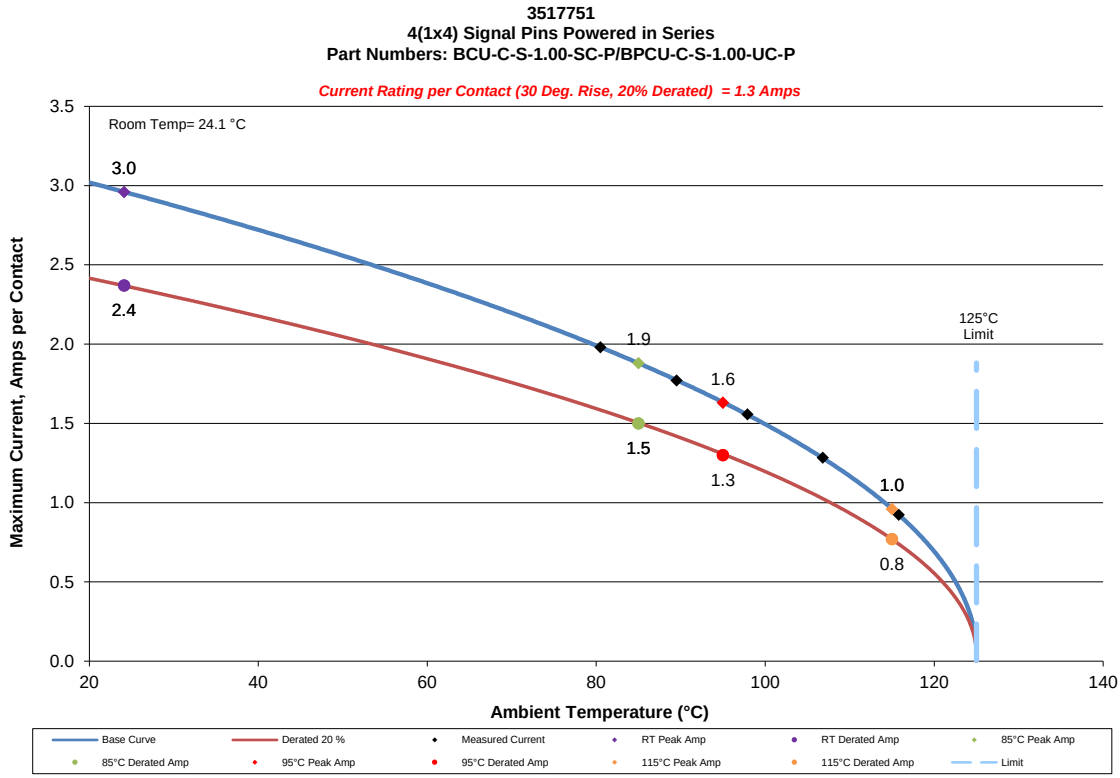
c. Linear configuration with 3 adjacent conductors/contacts powered.

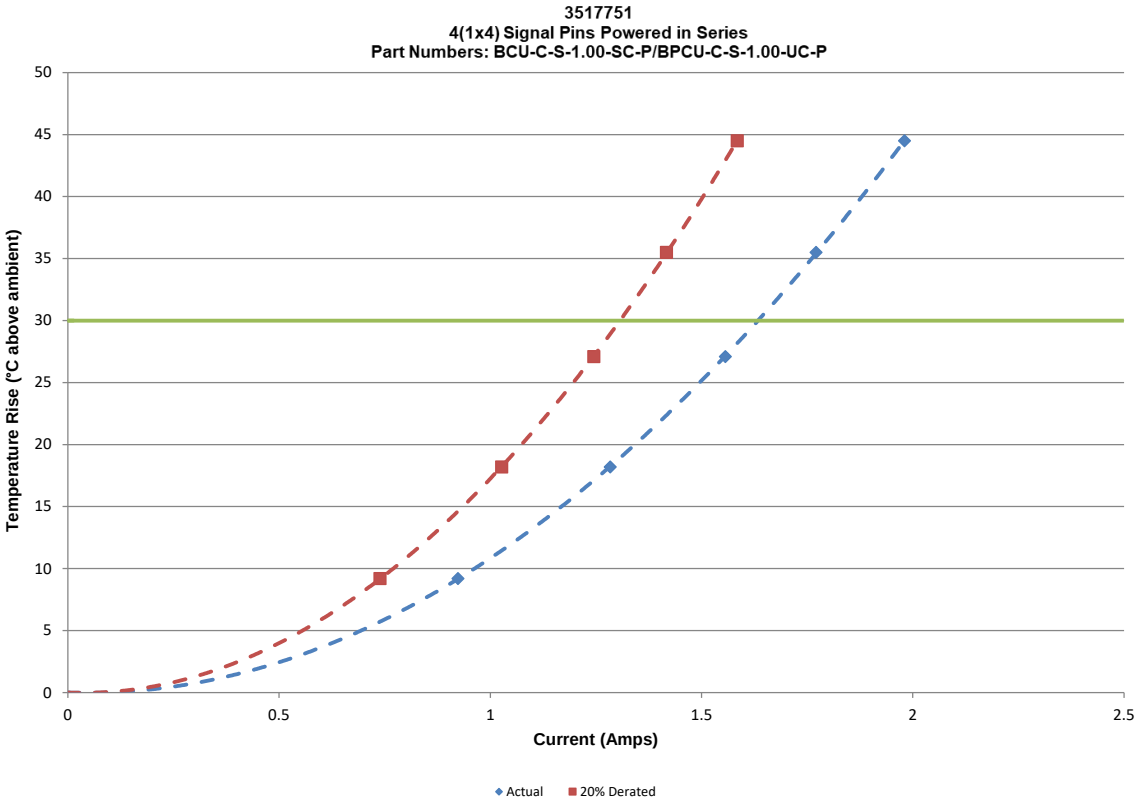




DATA SUMMARIES Continued

d. Linear configuration with 4 adjacent conductors/contacts powered.





DATA SUMMARIES Continued

MATING/UNMATING:

Mating/Unmating Durability Group

	Initial				After 25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	10.68	2.40	6.45	1.45	10.94	2.46	8.41	1.89
Maximum	19.88	4.47	12.85	2.89	18.68	4.20	12.28	2.76
Average	13.26	**2.98**	8.86	**1.99**	15.17	**3.41**	10.69	**2.40**
St Dev	3.74	0.84	2.44	0.55	2.92	0.66	1.43	0.32
Count	5	5	5	5	5	5	5	5
	After 50 Cycles				After 75 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	10.81	2.43	8.23	1.85	11.61	2.61	8.85	1.99
Maximum	18.24	4.10	12.50	2.81	18.90	4.25	12.77	2.87
Average	15.08	**3.39**	10.90	**2.45**	15.40	**3.46**	10.93	**2.46**
St Dev	2.80	0.63	1.73	0.39	2.69	0.60	1.66	0.37
Count	5	5	5	5	5	5	5	5
	After 100 Cycles				After Humidity			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	11.83	2.66	10.01	2.25	10.72	2.41	9.79	2.20
Maximum	19.48	4.38	12.94	2.91	12.68	2.85	11.56	2.60
Average	15.67	**3.52**	11.16	**2.51**	11.63	**2.61**	10.44	**2.35**
St Dev	2.79	0.63	1.43	0.32	0.73	0.16	0.69	0.16
Count	5	5	5	5	5	5	5	5

Cable Pull Force:

Sample #	Force (N)	Comments
1	40.00	Signals continue
2	40.00	Signals continue
3	40.00	Signals continue
4	40.00	Signals continue
5	40.00	Signals continue

DATA SUMMARIES Continued

INSULATION RESISTANCE (IR):

	Pin to Pin		
	Mated	Unmated	Unmated
Minimum	**BUC/BPCU**	**BUC**	**BPCU**
Initial	5100	6300	9000
Thermal	4250	5800	8500
Humidity	1650	2500	3500

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	**BUC/BPCU**
Break Down Voltage	957
Test Voltage	718
Working Voltage	235

Pin to Pin	
Initial Test Voltage	Passed
After Thermal Test Voltage	Passed
After Humidity Test Voltage	Passed

Cable Flex:

Insulation Resistance minimums, IR

Pin to Pin	
Mated	
Minimum	
Initial	4500
After 100 Flex Cycles	4800
After 200 Flex Cycles	4500

DATA SUMMARIES Continued

IPX7 Testing (Water)

Sample #	Visual Inspection
1	Pass
2	Pass
3	Pass

IPX8 Testing (Water)

Sample #	Visual Inspection
4	Pass
5	Pass
6	Pass

DATA SUMMARIES Continued

LLCR Mating-Unmating Durability:

1) A total of 65 signal, 5 power and 5 ground points were measured.
2) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets.*
3) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
4) The following guidelines are used to categorize the changes in LLCR as a result from stressing.
   a. <= +5.0 mOhms: ----------Stable
   b. +5.1 to +10.0 mOhms:----------Minor
   c. +10.1 to +15.0 mOhms: ----------Acceptable
   d. +15.1 to +50.0 mOhms: ----------Marginal
   e. +50.1 to +1000 mOhms: ----------Unstable
   f. >+1000 mOhms:----------Open Failure

LLCR Measurement Summaries by Pin Type				
Date	2022/10/25	2022/10/31	2022/11/24	2022/11/29
Room Temp (Deg C)	23	25	25	24
Rel Humidity (%)	54	50	50	52
Technician	Peter Chen	Peter Chen	Peter Chen	Peter Chen
mOhm values	**Actual Initial**	**Delta After cycles**	**Delta Thershock**	**Delta Humidity**
	Pin Type 1: Signal			
Average	185.30	3.07	5.15	6.01
St. Dev.	3.97	1.93	3.17	3.06
Min	179.54	0.04	0.04	0.71
Max	194.21	8.43	13.11	11.56
Summary Count	65	65	65	65
Total Count	65	65	65	65
	Pin Type 2: Power			
Average	29.19	2.52	1.10	2.10
St. Dev.	0.63	1.08	0.43	1.87
Min	28.66	1.41	0.69	0.04
Max	30.21	3.92	1.91	4.64
Summary Count	5	5	5	5
Total Count	5	5	5	5
	Pin Type 3: Ground			
Average	39.65	1.16	2.16	3.39
St. Dev.	0.72	0.54	0.78	1.23
Min	38.40	0.21	1.06	1.13
Max	40.53	1.79	3.20	4.52
Summary Count	5	5	5	5
Total Count	5	5	5	5

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
After cycles	**70**	**5**	**0**	**0**	**0**	**0**
Thershock	**48**	**21**	**6**	**0**	**0**	**0**
Humidity	**38**	**29**	**8**			

DATA SUMMARIES Continued

LLCR Gas Tight:

1) A total of 114 signal, 8 power and 8 ground points were measured.
2) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets.*
3) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
4) The following guidelines are used to categorize the changes in LLCR as a result from stressing.
   a. <= +5.0 mOhms: ----------Stable
   b. +5.1 to +10.0 mOhms: ----------Minor
   c. +10.1 to +15.0 mOhms:----------Acceptable
   d. +15.1 to +50.0 mOhms:----------Marginal
   e. +50.1 to +1000 mOhms: ----------Unstable
   f. >+1000 mOhms:----------Open Failure

LLCR Measurement Summaries by Pin Type				
Date	2022/11/1	2022/11/3		
Room Temp (Deg C)	23	25		
Rel Humidity (%)	52	50		
Technician	Peter Chen	Peter Chen		
mOhm values	**Actual Initial**	**Delta Acid Vapor**	**Delta**	**Delta**
	Pin Type 1: Signal			
Average	185.30	3.75		
St. Dev.	3.97	2.31		
Min	179.54	0.06		
Max	194.21	9.84		
Summary Count	114	114		
Total Count	114	114		
	Pin Type 2: Power			
Average	29.19	1.05		
St. Dev.	0.63	1.06		
Min	28.66	0.08		
Max	30.21	3.26		
Summary Count	8	8		
Total Count	8	8		
	Pin Type 3: Ground			
Average	39.65	2.51		
St. Dev.	0.72	1.32		
Min	38.40	0.60		
Max	40.53	4.24		
Summary Count	8	8		
Total Count	8	8		

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
Acid Vapor	**98**	**32**	**0**	**0**	**0**	**0**

DATA SUMMARIES Continued

LLCR Vibration:

1). A total of 65 signal, 5 ground 1 and 5 ground 2 points were measured.
2). EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets.*
3). The following guidelines are used to categorize the changes in LLCR as a result from stressing.
   a. <= +10 mOhms: ----------Stable
   b. +10.1 to +20.0 mOhms:----------Minor
   c. +20.1 to +30.0 mOhms: ----------Acceptable
   d. +30.1 to +100.0 mOhms: ----------Marginal
   e. +100.1 to +1000 mOhms----------Unstable
   f. >+1000 mOhms:----------Open Failure

LLCR Measurement Summaries by Pin Type		
Date	2023/1/26	2023/2/23
Room Temp (Deg C)	22	23
Rel Humidity (%)	39	49
Technician	Aaron Mckim	Aaron McKim
mOhm values	Actual	**Delta**
	Initial	**Shock-Vib**
Pin Type: Signal 1		
Average	464.75	0.87
St. Dev.	8.96	0.89
Min	445.79	0.01
Max	486.86	4.46
Summary Count	65	65
Total Count	65	65
Pin Type: GND 1		
Average	75.32	11.98
St. Dev.	11.34	6.64
Min	64.05	5.9
Max	90	22.86
Summary Count	5	5
Total Count	5	5
Pin Type: GND 2		
Average	75.22	0.17
St. Dev.	0.65	0.15
Min	74.61	0.01
Max	75.97	0.39
Summary Count	5	5
Total Count	5	5

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=10**	**>10 & <=20**	**>20 & <=30**	**>30 & <=100**	**>100 & <=1000**	**>1000**
Shock-Vib	**72**	**2**	**1**	**0**	**0**	**0**

DATA SUMMARIES Continued

Nanosecond Event Detection:

Shock and Vibration Event Detection Summary	
Contacts tested	60
Test Condition	H, 30g's, 11ms, Half-Sine
Shock Events	0
Total Events	0

DATA SUMMARIES Continued

LLCR Low Temperature:

1) A total of 39 signal, 3 power and 3 ground points were measured.
2) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets.*
3) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
4) The following guidelines are used to categorize the changes in LLCR as a result from stressing.

LLCR Measurement Summaries by Pin Type				
Date	2022/11/7	2022/11/8		
Room Temp (Deg C)	23	25		
Rel Humidity (%)	52	50		
Technician	Peter Chen	Peter Chen		
mOhm values	**Actual Initial**	**Delta Low Temp**	**Delta**	**Delta**
	Pin Type 1: Signal			
Average	162.30	4.92		
St. Dev.	7.86	2.79		
Min	147.83	0.41		
Max	178.45	9.82		
Summary Count	39	39		
Total Count	39	39		
	Pin Type 2: Power			
Average	26.56	1.88		
St. Dev.	0.63	0.58		
Min	25.83	1.09		
Max	27.36	2.48		
Summary Count	3	3		
Total Count	3	3		
	Pin Type 3: Ground			
Average	38.00	2.75		
St. Dev.	2.43	2.40		
Min	34.58	0.46		
Max	39.94	6.07		
Summary Count	3	3		
Total Count	3	3		

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
Low Temp	**27**	**18**	**0**	**0**	**0**	**0**

DATA SUMMARIES Continued

LLCR Temperature Life:

1) A total of 65 signal, 5 power and 5 ground points were measured.
2) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets.*
3) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
4) The following guidelines are used to categorize the changes in LLCR as a result from stressing.

LLCR Measurement Summaries by Pin Type				
Date	2022/11/4	2022/11/8		
Room Temp (Deg C)	23	25		
Rel Humidity (%)	52	50		
Technician	Peter Chen	Peter Chen		
mOhm values	**Actual Initial**	**Delta Temp Life**	**Delta**	**Delta**
	Pin Type 1: Signal			
Average	166.80	3.50		
St. Dev.	6.42	2.41		
Min	154.14	0.01		
Max	182.97	9.99		
Summary Count	65	65		
Total Count	65	65		
	Pin Type 2: Power			
Average	27.30	0.91		
St. Dev.	0.64	0.72		
Min	26.39	0.28		
Max	28.22	2.30		
Summary Count	5	5		
Total Count	5	5		
	Pin Type 3: Ground			
Average	38.89	2.83		
St. Dev.	1.56	0.88		
Min	36.34	1.53		
Max	41.03	3.92		
Summary Count	5	5		
Total Count	5	5		

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
Temp Life	**61**	**14**	**0**	**0**	**0**	**0**

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: HZ-TCT-01
Description: Normal force analyzer
Manufacturer: Mecmesin Multitester
Model: Mecmesin Multitester 2.5-i
Serial #: 08-1049-04
Accuracy: Last Cal: 3/5/2023, Next Cal: 3/4/2024

Equipment #: DG-THC-01
Description: Humidity transmitter
Manufacturer: Thermtron
Model: SM-8-8200
Serial #: 50613
Accuracy: Last Cal: 12/4/2023, Next Cal: 12/3/2024

Equipment #: HZ-TSC-01
Description: Vertical Thermal Shock Chamber
Manufacturer: Cincinnatti Sub Zero
Model: VTS-3-6-6-SC/AC
Serial #: 10-VT14994
Accuracy: See Manual
… Last Cal: 04/16/2023, Next Cal: 04/15/2024

Equipment #: DG-HPT-01
Description: Hipot Safety Tester
Manufacturer: Vitrek
Model: V73
Serial #: 025866
Accuracy:
… Last Cal: 04/16/2023, Next Cal: 04/15/2024

Equipment #: HZ-MO-05
Description: Micro-ohmmeter
Manufacturer: Keithley
Model: 3706
Serial #: 1285188
Accuracy: Last Cal: 11/27/2023, Next Cal: 11/26/2024

Equipment #: HZ-MO-01
Description: Micro-ohmmeter
Manufacturer: Keithley
Model: 2700
Serial #: 1199807
Accuracy: Last Cal: 05/19/2023, Next Cal: 05/18/2024

Equipment #: HZ-PS-01
Description: Power Supply
Manufacturer: Agilent
Model: 6031A
Serial #: MY41000982
Accuracy: Last Cal: 04/16/2023, Next Cal: 04/15/2024

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: SVC-01
Description: Shock & Vibration Table
Manufacturer: Data Physics
Model: LE-DSA-10-20K
Serial #: 10037
Accuracy: See Manual
… Last Cal: 04/22/2023, Next Cal: 04/22/2024

Equipment #: ACLM-01
Description: Accelerometer
Manufacturer: PCB Piezotronics
Model: 352C03
Serial #: 115819
Accuracy: See Manual
… Last Cal: 07/18/2023, Next Cal: 07/18/2024

Equipment #: ED-03
Description: Event Detector
Manufacturer: Analysis Tech
Model: 32EHD
Serial #: 1100604
Accuracy: See Manual
… Last Cal: 10/31/2023, Next Cal: 10/31/2024

Equipment #: MO-04
Description: Multimeter /Data Acquisition System
Manufacturer: Keithley
Model: 2700
Serial #: 0798688
Accuracy: See Manual
… Last Cal: 09/11/2023, Next Cal: 09/11/2024

Equipment #: IPX7-01
Description: IP-67 1.0 Meter Water Column Chamber
Manufacturer: Samtec Machine
Model: N/A
Serial #: N/A
Accuracy: No Calibration Required

Equipment #: IPX8-01
Description: IP-68 10.0 Meter Water Column Chamber
Manufacturer: Samtec Machine
Model: N/A
Serial #: N/A
Accuracy: No Calibration Required