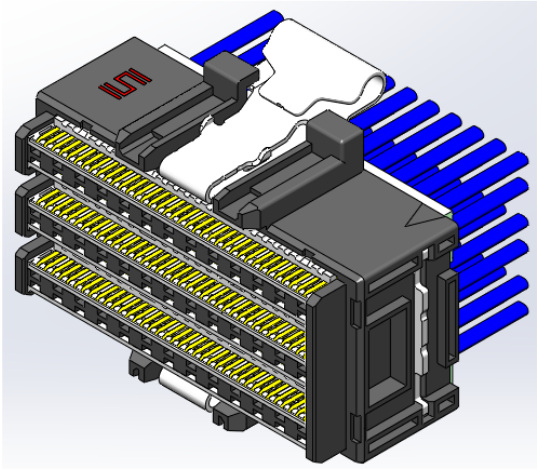
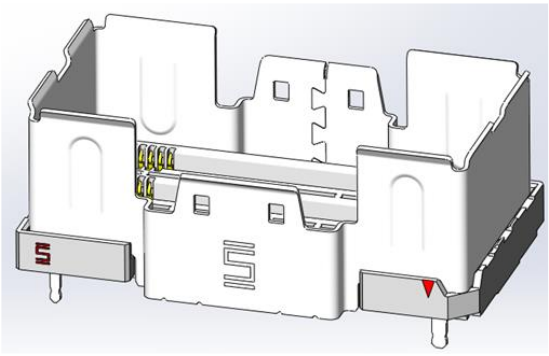
| | |
|---|---|
| Project Number: Design Qualification Test Report | Tracking Code: 3411480_Report_Rev_1 |
| Requested by: Roy Luo | Date: 9/21/2022 |
| Part #: ARP6-DP-008-04-06.0-B-L-L/APF6-025-03.5-L-04-2-L-TR<br>HDR-225218-01(ARP6 SINGLE END)/APF6-037-03.5-L-06-2-L-TR | |
| Part description: ARP6/APF6 | Tech: Kason He and Tony Wagoner |
| Test Start: 7/15/2022 | Test Completed: 8/23/2022 |





# DESIGN QUALIFICATION TEST REPORT

## ARP6/APF6
## ARP6-DP-008-04-06.0-B-L-L/APF6-025-03.5-L-04-2-L-TR
## HDR-225218-01(ARP6 SINGLE END)/APF6-037-03.5-L-06-2-L-TR

## REVISION HISTORY

| DATA | REV.NUM. | DESCRIPTION | ENG |
|---|---|---|---|
| **9/21/2022** | **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 TLWI-0001.
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
9) Samtec Test PCBs used: PCB-112160-TST/PCB-112102-TST/PCB-112103-TST.

# FLOWCHARTS

## Gas Tight

Group 1
HDR-225218-01
APF6-037-03.5-L-06-2-L-TR
8 Assemblies

| Step | Description |
|---|---|
| 1. | LLCR (2) |
| 2. | Gas Tight (1) |
| 3. | LLCR (2)<br>Max Delta = 15 mOhm |

(1) Gas Tight = EIA-364-36

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

## Normal Force

Group 1
APF6-025-03.5-L-04-2-L-TR

8 Contacts Minimum
Signal Without Thermals

| Step | Description |
|---|---|
| 1. | Contact Gaps |
| 2. | Normal Force (1)<br>Expected Force at Max Deflection = 71 g<br>Deflection = 0.011 " |

Group 2
APF6-025-03.5-L-04-2-L-TR

8 Contacts Minimum
Signal With Thermals

| Step | Description |
|---|---|
| 1. | Contact Gaps |
| 2. | Thermal Age (2) - Non Standard |
| 3. | Contact Gaps |
| 4. | Normal Force (1)<br>Expected Force at Max Deflection = 69 g<br>Deflection = 0.011 " |

(1) Normal Force = EIA-364-04

(2) Thermal Age = EIA-364-17
Test Condition = 4 (105°C)
Time Condition = B (250 Hours)

## FLOWCHARTS Continued

# Thermal Aging

Group 1
HDR-225218-01
APF6-037-03.5-L-06-2-L-TR
8 Assemblies

| Step | Description |
|---|---|
| 1. | Contact Gaps |
| 2. | Mating/Unmating Force (2) |
| 3. | LLCR (1) |
| 4. | Thermal Age (3) - Non Standard |
| 5. | LLCR (1)<br>Max Delta = 15 mOhm |
| 6. | Mating/Unmating Force (2) |
| 7. | Contact Gaps |

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

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

(3) Thermal Age = EIA-364-17
Test Condition = 4 (105°C)
Time Condition = B (250 Hours)

## FLOWCHARTS Continued

# Mating/Unmating/Durability

***Smallest Pin Count***

Group 1

ARP6-DP-008-04-06.0-B-L-L

APF6-025-03.5-L-04-2-L-TR

8 Assemblies

| Step | Description |
|---|---|
| 1. | Contact Gaps |
| 2. | Mating/Unmating Force (3) |
| 3. | Cycles<br>Quantity = 25 Cycles |
| 4. | Mating/Unmating Force (3) |
| 5. | Cycles<br>Quantity = 25 Cycles |
| 6. | Mating/Unmating Force (3) |
| 7. | Cycles<br>Quantity = 25 Cycles |
| 8. | Mating/Unmating Force (3) |
| 9. | Cycles<br>Quantity = 25 Cycles |
| 10. | Mating/Unmating Force (3) |
| 11. | Contact Gaps |

***Largest Pin Count***

Group 2

HDR-225218-01

APF6-037-03.5-L-06-2-L-TR

8 Assemblies

| Step | Description |
|---|---|
| 1. | Contact Gaps |
| 2. | LLCR (2) |
| 3. | Mating/Unmating Force (3) |
| 4. | Cycles<br>Quantity = 25 Cycles |
| 5. | Mating/Unmating Force (3) |
| 6. | Cycles<br>Quantity = 25 Cycles |
| 7. | Mating/Unmating Force (3) |
| 8. | Cycles<br>Quantity = 25 Cycles |
| 9. | Mating/Unmating Force (3) |
| 10. | Cycles<br>Quantity = 25 Cycles |
| 11. | Mating/Unmating Force (3) |
| 12. | Contact Gaps |
| 13. | LLCR (2)<br>Max Delta = 15 mOhm |
| 14. | Thermal Shock (4) - Non Standard |
| 15. | LLCR (2)<br>Max Delta = 15 mOhm |
| 16. | Humidity (1) |
| 17. | LLCR (2)<br>Max Delta = 15 mOhm |
| 18. | Mating/Unmating Force (3) |

(1) Humidity = EIA-364-31
Test Condition = B (240 Hours)
Test Method = III (+25°C to +65°C @ 90% RH to 98% RH)
Test Exceptions: ambient pre-condition and delete steps 7a and 7b

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

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

(4) Thermal Shock = EIA-364-32
Exposure Time at Temperature Extremes = 1/2 Hour
Method A, Test Condition = I (-55°C to +85°C)
Test Duration = A-3 (100 Cycles)

# FLOWCHARTS Continued

## IR/DWV

***Pin-to-Pin***

| Group 1<br>HDR-225218-01<br>APF6-037-03.5-L-06-2-L-TR<br>2 Assemblies | | Group 2<br>HDR-225218-01<br>2 Assemblies | | Group 3<br>APF6-037-03.5-L-06-2-L-TR<br>2 Assemblies | | Group 4<br>HDR-225218-01<br>APF6-037-03.5-L-06-2-L-TR<br>2 Assemblies | |
|---|---|---|---|---|---|---|---|
| **Step** | **Description** | **Step** | **Description** | **Step** | **Description** | **Step** | **Description** |
| 1. | DWV Breakdown (2) | 1. | DWV Breakdown (2) | 1. | DWV Breakdown (2) | 1. | IR (4) |
| | | | | | | 2. | DWV at Test Voltage (1) |
| | | | | | | 3. | Thermal Shock (5) |
| | | | | | | 4. | IR (4) |
| | | | | | | 5. | DWV at Test Voltage (1) |
| | | | | | | 6. | Humidity (3) |
| | | | | | | 7. | IR (4) |
| | | | | | | 8. | DWV at Test Voltage (1) |

***Row-to-Row***

| Group 5<br>HDR-225218-01<br>APF6-037-03.5-L-06-2-L-TR<br>2 Assemblies | | Group 6<br>HDR-225218-01<br>2 Assemblies | | Group 7<br>APF6-037-03.5-L-06-2-L-TR<br>2 Assemblies | | Group 8<br>HDR-225218-01<br>APF6-037-03.5-L-06-2-L-TR<br>2 Assemblies | |
|---|---|---|---|---|---|---|---|
| **Step** | **Description** | **Step** | **Description** | **Step** | **Description** | **Step** | **Description** |
| 1. | DWV Breakdown (2) | 1. | DWV Breakdown (2) | 1. | DWV Breakdown (2) | 1. | IR (4) |
| | | | | | | 2. | DWV at Test Voltage (1) |
| | | | | | | 3. | Thermal Shock (5) |
| | | | | | | 4. | IR (4) |
| | | | | | | 5. | DWV at Test Voltage (1) |
| | | | | | | 6. | Humidity (3) |
| | | | | | | 7. | IR (4) |
| | | | | | | 8. | DWV at Test Voltage (1) |

# FLOWCHARTS Continued

***Pin-to-Ground***

**Group 9**
HDR-225218-01
APF6-037-03.5-L-06-2-L-TR
2 Assemblies

| Step | Description |
|---|---|
| 1. | DWV Breakdown (2) |

**Group 10**
HDR-225218-01
2 Assemblies

| Step | Description |
|---|---|
| 1. | DWV Breakdown (2) |

**Group 11**
APF6-037-03.5-L-06-2-L-TR
2 Assemblies

| Step | Description |
|---|---|
| 1. | DWV Breakdown (2) |

**Group 12**
HDR-225218-01
APF6-037-03.5-L-06-2-L-TR
2 Assemblies

| Step | Description |
|---|---|
| 1. | IR (4) |
| 2. | DWV at Test Voltage (1) |
| 3. | Thermal Shock (5) |
| 4. | IR (4) |
| 5. | DWV at Test Voltage (1) |
| 6. | Humidity (3) |
| 7. | IR (4) |
| 8. | DWV at Test Voltage (1) |

***Pin-to-Closest Metallic Hardware***

**Group 13**
HDR-225218-01
APF6-037-03.5-L-06-2-L-TR
2 Assemblies

| Step | Description |
|---|---|
| 1. | DWV Breakdown (2) |

**Group 14**
HDR-225218-01
2 Assemblies

| Step | Description |
|---|---|
| 1. | DWV Breakdown (2) |

**Group 15**
APF6-037-03.5-L-06-2-L-TR
2 Assemblies

| Step | Description |
|---|---|
| 1. | DWV Breakdown (2) |

**Group 16**
HDR-225218-01
APF6-037-03.5-L-06-2-L-TR
2 Assemblies

| Step | Description |
|---|---|
| 1. | IR (4) |
| 2. | DWV at Test Voltage (1) |
| 3. | Thermal Shock (5) |
| 4. | IR (4) |
| 5. | DWV at Test Voltage (1) |
| 6. | Humidity (3) |
| 7. | IR (4) |
| 8. | DWV at Test Voltage (1) |

---

(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) Humidity = EIA-364-31
Test Condition = B (240 Hours)
Test Method = III (+25°C to +65°C @ 90% RH to 98% RH)
Test Exceptions: ambient pre-condition and delete steps 7a and 7b

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

(5) Thermal Shock = EIA-364-32
Exposure Time at Temperature Extremes = 1/2 Hour
Method A, Test Condition = I (-55°C to +85°C)
Test Duration = A-3 (100 Cycles)

# FLOWCHARTS Continued

## Current Carrying Capacity

**Group 1**
ARP6-DP-012-06-12.0-B-L-L
APF6-037-03.5-L-06-2-L-TR
6 Pins Powered
Signal

| Step | Description |
|---|---|
| 1. | CCC (2)<br>Rows = 6<br>Number of Positions = 1 |

**Group 2**
ARP6-DP-012-06-12.0-B-L-L
APF6-037-03.5-L-06-2-L-TR
12 Pins Powered
Signal

| Step | Description |
|---|---|
| 1. | CCC (2)<br>Rows = 6<br>Number of Positions = 2 |

**Group 3**
ARP6-DP-012-06-12.0-B-L-L
APF6-037-03.5-L-06-2-L-TR
18 Pins Powered
Signal

| Step | Description |
|---|---|
| 1. | CCC (2)<br>Rows = 6<br>Number of Positions = 3 |

**Group 4**
ARP6-DP-012-06-12.0-B-L-L
APF6-037-03.5-L-06-2-L-TR
24 Pins Powered
Signal

| Step | Description |
|---|---|
| 1. | CCC (2)<br>Rows = 6<br>Number of Positions = 4 |

**Group 5**
ARP6-DP-012-06-12.0-B-L-L
APF6-037-03.5-L-06-2-L-TR
144 Pins Powered
Signal

| Step | Description |
|---|---|
| 1. | CCC (2)<br>Rows = 6<br>Number of Positions = 24 |

**Group 6**
ARP6-DP-012-06-12.0-B-L-L
APF6-037-03.5-L-06-2-L-TR
6 Pins Powered
Ground

| Step | Description |
|---|---|
| 1. | CCC (2)<br>Rows = 6<br>Number of Positions = 1 |

**Group 7**
ARP6-DP-012-06-12.0-B-L-L
APF6-037-03.5-L-06-2-L-TR
All Power

| Step | Description |
|---|---|
| 1. | CCC - All Power (1) |

(1) CCC - All Power = 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
HDR-225218-01
APF6-037-03.5-L-06-2-L-TR
8 Assemblies

| Step | Description |
|---|---|
| 1. | LLCR (1) |
| 2. | Mechanical Shock (2) - Non Standard |
| 3. | Random Vibration (3) - Non Standard |
| 4. | LLCR (1)<br>Max Delta = 15 mOhm |

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

(2) Mechanical Shock = EIA-364-27
Test Condition = C (100 G Peak, 6 milliseconds, Half Sine)
Number of Shocks = 3 Per Direction, Per Axis, 18 Total

(3) Random Vibration = EIA-364-28
Condition = VB (7.56 gRMS Average, 2 Hours/Axis)

### Mechanical Shock/Random Vibration/Event Detection

Group 1
HDR-225218-01
APF6-037-03.5-L-06-2-L-TR
60 Points

| Step | Description |
|---|---|
| 1. | Nanosecond Event Detection (Mechanical Shock) (1) - Non Standard |
| 2. | Nanosecond Event Detection (Random Vibration) (2) - Non Standard |

(1) Nanosecond Event Detection (Mechanical Shock)
Use EIA-364-87 for Nanosecond Event Detection:
Test Condition = F (50 nanoseconds at 10 ohms)
Use EIA-364-27 for Mechanical Shock:
Test Condition = C (100 G Peak, 6 milliseconds, Half Sine)
Number of Shocks = 3 Per Direction, Per Axis, 18 Total

(2) Nanosecond Event Detection (Random Vibration)
Use EIA-364-87 for Nanosecond Event Detection:
Test Condition = F (50 nanoseconds at 10 ohms)
Use EIA-364-28 for Random Vibration:
Condition = VB (7.56 gRMS Average, 2 Hours/Axis)

## FLOWCHARTS Continued

### Cable Pull

***Smallest Pin Count***

| Group 1 | Group 2 |
|---|---|
| ARP6-DP-008-04-12.0-B-L-L | ARP6-DP-008-04-12.0-B-L-L |
| APF6-025-03.5-L-04-2-L-TR | APF6-025-03.5-L-04-2-L-TR |
| 5 Assemblies | 5 Assemblies |
| 0 Degrees | 90 Degrees |

| Step | Description | Step | Description |
|---|---|---|---|
| 1. | Cable Pull (1) | 1. | Cable Pull (1) |

***Largest Pin Count***

| Group 3 | Group 4 |
|---|---|
| ARP6-DP-012-06-12.0-B-L-L | ARP6-DP-012-06-12.0-B-L-L |
| APF6-037-03.5-L-06-2-L-TR | APF6-037-03.5-L-06-2-L-TR |
| 5 Assemblies | 5 Assemblies |
| 0 Degrees | 90 Degrees |

| Step | Description | Step | Description |
|---|---|---|---|
| 1. | Cable Pull (1) | 1. | Cable Pull (1) |

(1) Cable Pull = EIA-364-38
Measure and Record Force Required to Failure
Failure = Discontinuity >1 microsecond at 10 ohms

## FLOWCHARTS Continued

### Cable Flex

***Smallest Pin Count***

Group 1

ARP6-DP-008-04-16.0-B-L-L

APF6-025-03.5-L-04-2-L-TR

8 Assemblies

| Step | Description |
|---|---|
| 1. | IR (3) - Non Standard |
| 2. | DWV at Test Voltage (2) |
| 3. | Cable Flex (1) |
| 4. | Visual Inspection |
| 5. | IR (3) - Non Standard |
| 6. | DWV at Test Voltage (2) |

***Largest Pin Count***

Group 2

ARP6-DP-012-06-16.0-B-L-L

APF6-037-03.5-L-06-2-L-TR

8 Assemblies

| Step | Description |
|---|---|
| 1. | IR (3) - Non Standard |
| 2. | DWV at Test Voltage (2) |
| 3. | Cable Flex (1) |
| 4. | Visual Inspection |
| 5. | IR (3) - Non Standard |
| 6. | DWV at Test Voltage (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) 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

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

## ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

### THERMAL:

1) EIA-364-17, *Temperature Life with or without Electrical Load Test Procedure for Electrical Connectors.*
2) Test Condition at 105° C.
3) Test Time Condition B for 250 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 1: -55°C to +85°C
3) Test Time: ½ hour dwell at each temperature extreme
4) Number of Cycles: 100
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 B, 240 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.

### 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.

### MECHANICAL SHOCK (Specified Pulse):

1) Reference document: EIA-364-27, *Mechanical Shock Test Procedure for Electrical Connectors*
2) Test Condition G
3) Peak Value: 100 G
4) Duration: 6 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.

### NORMAL FORCE (FOR CONTACTS TESTED IN THE HOUSING):

1) Reference document: EIA-364-04, *Normal Force Test Procedure for Electrical Connectors*.
2) The contacts shall be tested in the connector housing.
3) If necessary, a "window" shall be made in the connector body to allow a probe to engage and deflect the contact at the same attitude and distance (plus 0.05 mm [0.002"]) as would occur in actual use.
4) The connector housing shall be placed in a holding fixture that does not interfere with or otherwise influence the contact force or deflection.
5) Said holding fixture shall be mounted on a floating, adjustable, X-Y table on the base of the Dillon $TC^2$, computer controlled test stand with a deflection measurement system accuracy of 5.0 µm (0.0002").
6) The nominal deflection rate shall be 5 mm (0.2")/minute.
7) Unless otherwise noted a minimum of five contacts shall be tested.
8) The force/deflection characteristic to load and unload each contact shall be repeated five times.
9) The system shall utilize the $TC^2$ software in order to acquire and record the test data.
10) The permanent set of each contact shall be measured within the $TC^2$ software.
11) The acquired data shall be graphed with the deflection data on the X-axis and the force data on the Y-axis and a print out will be stored with the Tracking Code paperwork.

### 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

## ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes.

### 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 inches 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 minutes
        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).

## ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes.

### TEMPERATURE RISE (Current Carrying Capacity, CCC):

1) EIA-364-70, *Temperature Rise versus Current Test Procedure for Electrical Connectors and Sockets*.
2) When current passes through a contact, the temperature of the contact increases as a result of $I^2R$ (resistive) heating.
3) The number of contacts being investigated plays a significant part in power dissipation and therefore temperature rise.
4) The size of the temperature probe can affect the measured temperature.
5) Copper traces on PC boards will contribute to temperature rise:
    a. Self-heating (resistive)
    b. Reduction in heat sink capacity affecting the heated contacts
6) A de-rating curve, usually 20%, is calculated.
7) Calculated de-rated currents at four temperature points are reported:
    a. Ambient
    b. $85^{o}$ C
    c. $95^{o}$ C
    d. $115^{o}$ C
8) Typically, neighboring contacts (in close proximity to maximize heat buildup) are energized.
9) The thermocouple (or temperature measuring probe) will be positioned at a location to sense the maximum temperature in the vicinity of the heat generation area.
10) A computer program, *TR 803.exe*, ensures accurate stability for data acquisition.
11) Hook-up wire cross section is larger than the cross section of any connector leads/PC board traces, jumpers, etc.
12) Hook-up wire length is longer than the minimum specified in the referencing standard.

## ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes.

### CABLE PULL:

1) Secure cable near center and pull-on connector
    a. At 0°, in-line with cable
    b. At 90°, in-line with cable

Fig. 1
0° Connector pull

### CABLE DURABILITY:

1) Oscillate and monitor electrical continuity for open circuit indication.
    a. ± 70°Flex Mode, bend up to 500 cycles. load on cable end.

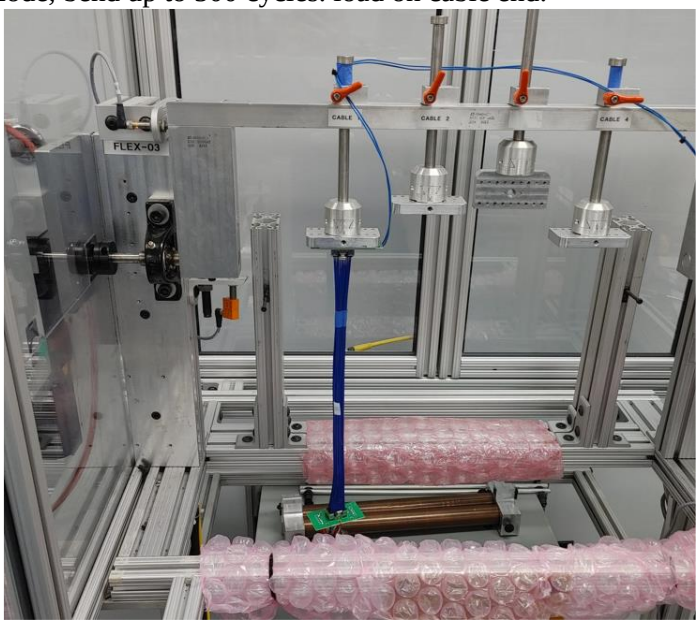



Fig. 2
(Setup picture)

# RESULTS

## Temperature Rise, CCC at a 20% de-rating

**Signal Pin**

- **CCC for a 30°C Temperature Rise----------1.3 A per contact with 6 contacts (6x1) powered.**
- **CCC for a 30°C Temperature Rise----------0.9 A per contact with 12 contacts (6x2) powered.**
- **CCC for a 30°C Temperature Rise----------0.8 A per contact with 18 contacts (6x3) powered.**
- **CCC for a 30°C Temperature Rise----------0.7 A per contact with 24 contacts (6x4) powered.**
- **CCC for a 30°C Temperature Rise----------0.3 A per contact with 144 contacts (6x24) powered.**

**Ground Pin**

- **CCC for a 30°C Temperature Rise----------8.7 A 6 ground tied together with all contact powered.**

**Ground pin and Signal pin**

- **CCC for a 30°C Temperature Rise----------8.0 A 6 adjacent ground tied to together and signal contacts powered @ 1/2 rated current.**

## Mating – Unmating Forces

**Thermal Aging Group**

- **Initial**
  - **Mating**
    - **Min ----------11.74 lbs**
    - **Max----------13.55 lbs**
  - **Unmating**
    - **Min ---------- 5.61 lbs**
    - **Max---------- 6.66 lbs**
- **After Thermal**
  - **Mating**
    - **Min ---------- 7.61 lbs**
    - **Max---------- 8.25 lbs**
  - **Unmating**
    - **Min ---------- 5.48 lbs**
    - **Max---------- 6.44 lbs**

## RESULTS Continued

### Mating – Unmating Forces

**Mating-Unmating Durability Group 2 Largest Pin Count**

- **Initial**
  - **Mating**
    - **Min ----------10.56 Lbs**
    - **Max----------12.14 Lbs**
  - **Unmating**
    - **Min ---------- 4.71 Lbs**
    - **Max---------- 6.61 Lbs**
- **After 25 Cycles**
  - **Mating**
    - **Min ----------10.52 Lbs**
    - **Max----------12.37 Lbs**
  - **Unmating**
    - **Min ---------- 5.22 Lbs**
    - **Max---------- 7.32 Lbs**
- **After 50 Cycles**
  - **Mating**
    - **Min ----------10.68 Lbs**
    - **Max----------12.27 Lbs**
  - **Unmating**
    - **Min ---------- 5.72 Lbs**
    - **Max---------- 7.89 Lbs**
- **After 75 Cycles**
  - **Mating**
    - **Min ----------10.76 Lbs**
    - **Max----------12.23 Lbs**
  - **Unmating**
    - **Min ---------- 6.21 Lbs**
    - **Max---------- 8.20 Lbs**
- **After 100 Cycles**
  - **Mating**
    - **Min ----------10.88 Lbs**
    - **Max----------12.27 Lbs**
  - **Unmating**
    - **Min ---------- 6.51 Lbs**
    - **Max---------- 8.30 Lbs**
- **Humidity**
  - **Mating**
    - **Min ---------- 8.29 Lbs**
    - **Max---------- 9.92 Lbs**
  - **Unmating**
    - **Min ---------- 4.84 Lbs**
    - **Max---------- 7.00 Lbs**

## RESULTS Continued

**Mating-Unmating Basic Group 1 Smallest Pin Count**

- **Initial**
  - **Mating**
    - **Min ---------- 5.12 Lbs**
    - **Max---------- 5.76 Lbs**
  - **Unmating**
    - **Min ---------- 2.49 Lbs**
    - **Max---------- 3.05 Lbs**
- **After 25 Cycles**
  - **Mating**
    - **Min ---------- 5.44 Lbs**
    - **Max---------- 6.23 Lbs**
  - **Unmating**
    - **Min ---------- 2.82 Lbs**
    - **Max---------- 3.52 Lbs**
- **After 50 Cycles**
  - **Mating**
    - **Min ---------- 5.44 Lbs**
    - **Max---------- 6.29 Lbs**
  - **Unmating**
    - **Min ---------- 3.17 Lbs**
    - **Max---------- 3.85 Lbs**
- **After 75 Cycles**
  - **Mating**
    - **Min ---------- 5.50 Lbs**
    - **Max---------- 6.39 Lbs**
  - **Unmating**
    - **Min ---------- 3.37 Lbs**
    - **Max---------- 4.07 Lbs**
- **After 100 Cycles**
  - **Mating**
    - **Min ---------- 5.51 Lbs**
    - **Max---------- 6.44 Lbs**
  - **Unmating**
    - **Min ---------- 3.12 Lbs**
    - **Max---------- 4.27 Lbs**

## RESULTS Continued

### Normal Force at 0.0098 inches deflection

**C-481**

- **Initial**
  - **Min----------62.60 gf Set ----- 0.0007 inch**
  - **Max----------65.60 gf Set ----- 0.0009 inch**
- **Thermal**
  - **Min----------31.20 gf Set------ 0.0029 inch**
  - **Max----------38.10 gf Set------ 0.0035 inch**

**C-482**

- **Initial**
  - **Min----------49.20 gf Set ----- 0.0002 inch**
  - **Max----------54.00 gf Set ----- 0.0009 inch**
- **Thermal**
  - **Min----------32.80 gf Set------ 0.0018 inch**
  - **Max----------39.10 gf Set------ 0.0025 inch**

### Cable Pull force

**Smallest Pin Count**

- **0° Pull**
  - **Min----------52.20 lbs**
  - **Max----------58.76 lbs**
- **90° Pull**
  - **Min----------28.67 lbs**
  - **Max----------33.53 lbs**

**Largest Pin Count**

- **0° Pull**
  - **Min----------41.67 lbs**
  - **Max----------44.11 lbs**
- **90° Pull**
  - **Min----------43.09 lbs**
  - **Max----------45.78 lbs**

## RESULTS Continued

### Insulation Resistance minimums, IR

**Pin to Pin**

- **Initial**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**
- **Thermal Shock**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000Meg Ω ---------- Passed**
- **Humidity**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**

**Row to Row**

- **Initial**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**
- **Thermal Shock**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000Meg Ω ---------- Passed**
- **Humidity**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**

**Pin to Ground**

- **Initial**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**
- **Thermal Shock**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000Meg Ω ---------- Passed**
- **Humidity**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**

**Pin to Closest Metallic Hardware**

- **Initial**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**
- **Thermal Shock**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000Meg Ω ---------- Passed**
- **Humidity**
  - **Mated ---------- 45000 Meg Ω ---------- Passed**
  - **Unmated ---------- 45000 Meg Ω ---------- Passed**

## RESULTS Continued

### Dielectric Withstanding Voltage minimums, DWV

- **Minimums**
  - **Breakdown Voltage ----------658 VAC**
  - **Test Voltage ----------495 VAC**
  - **Working Voltage ----------165 VAC**

**Pin to Pin**

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

**Row to Row**

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

**Pin to Ground**

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

**Pin to Closest Metallic Hardware**

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

## RESULTS Continued

### Cable Flex:

**Insulation Resistance minimums, IR**

**Smallest Pin Count**

**Pin to Pin**

- **Initial**
  - **Mated----------45000 Meg Ω ---------- Passed**
- **After 500 flex cycles**
  - **Mated----------45000 Meg Ω ---------- Passed**

**Row to Row**

- **Initial**
  - **Mated----------45000 Meg Ω ---------- Passed**
- **After 500 flex cycles**
  - **Mated----------45000 Meg Ω ---------- Passed**

**Pin to Ground**

- **Initial**
  - **Mated----------45000 Meg Ω ---------- Passed**
- **After 500 flex cycles**
  - **Mated----------45000 Meg Ω ---------- Passed**

**Pin to Closest Metallic Hardware**

- **Initial**
  - **Mated----------45000 Meg Ω ---------- Passed**
- **After 500 flex cycles**
  - **Mated----------45000 Meg Ω ---------- Passed**

**Largest Pin Count**

**Pin to Pin**

- **Initial**
  - **Mated----------45000 Meg Ω ---------- Passed**
- **After 500 flex cycles**
  - **Mated----------45000 Meg Ω ---------- Passed**

**Row to Row**

- **Initial**
  - **Mated----------45000 Meg Ω ---------- Passed**
- **After 500 flex cycles**
  - **Mated----------45000 Meg Ω ---------- Passed**

**Pin to Ground**

- **Initial**
  - **Mated----------35000 Meg Ω ---------- Passed**
- **After 500 flex cycles**
  - **Mated----------44000 Meg Ω ---------- Passed**

**Pin to Closest Metallic Hardware**

- **Initial**
  - **Mated----------45000 Meg Ω ---------- Passed**
- **After 500 flex cycles**
  - **Mated----------45000 Meg Ω ---------- Passed**

## RESULTS Continued

**Dielectric Withstanding Voltage minimums, DWV**

- **Test Voltage ----------495 VAC**

**Smallest Pin Count**
**Pin to Pin**

- **Initial DWV ----------Passed**
- **After 500 Flex cycles DWV ----------Passed**

**Row to Row**

- **Initial DWV ----------Passed**
- **After 500 Flex cycles DWV ----------Passed**

**Pin to Ground**

- **Initial DWV ----------Passed**
- **After 500 Flex cycles DWV ----------Passed**

**Pin to Closest Metallic Hardware**

- **Initial DWV ----------Passed**
- **After 500 Flex cycles DWV ----------Passed**

**Largest Pin Count**
**Pin to Pin**

- **Initial DWV ----------Passed**
- **After 500 Flex cycles DWV ----------Passed**

**Row to Row**

- **Initial DWV ----------Passed**
- **After 500 Flex cycles DWV ----------Passed**

**Pin to Ground**

- **Initial DWV ----------Passed**
- **After 500 Flex cycles DWV ----------Passed**

**Pin to Closest Metallic Hardware**

- **Initial DWV ----------Passed**
- **After 500 Flex cycles DWV ----------Passed**

## RESULTS Continued

**LLCR Gas Tight Group (144 signal and 48 ground LLCR test points)**

**Signal Pin**

- **Initial ---------- 380.10 mOhms Max**
- **Gas Tight**
  - **<= +5.0 mOhms ---------- 96 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 34 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 14 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 ---------- 26.97 mOhms Max**
- **Gas Tight**
  - **<= +5.0 mOhms ---------- 48 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**

**LLCR Thermal Aging (144 signal and 48 ground LLCR test points)**

**Signal Pin**

- **Initial ---------- 92.93 mOhms Max**
- **Thermal Aging**
  - **<= +5.0 mOhms ---------- 120 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 20 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 4 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 ---------- 26.82 mOhms Max**
- **Thermal Aging**
  - **<= +5.0 mOhms ---------- 48 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 (144 signal and 48 ground LLCR test points)**

**Signal Pin**

- **Initial ---------- 376.60 mOhms Max**
- **Durability, 100 Cycles**
  - **<= +5.0 mOhms ---------- 120 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 24 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 ---------- 135 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 7 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 2 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 ---------- 125 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 15 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 4 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 ---------- 27.92 mOhms Max**
- **Durability, 100 Cycles**
  - **<= +5.0 mOhms ---------- 48 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 ---------- 48 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 ---------- 48 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 Shock & Vibration (144 signal and 48 ground LLCR test points)

**Signal pin**

- **Initial ---------- 376.78 mOhms Max**
- **Shock &Vibration**
  - **<= +5.0 mOhms ---------- 118 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 21 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 5 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 ---------- 37.65 mOhms Max**
- **Shock &Vibration**
  - **<= +5.0 mOhms ---------- 42 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 6 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**

### Mechanical Shock & Random Vibration:

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

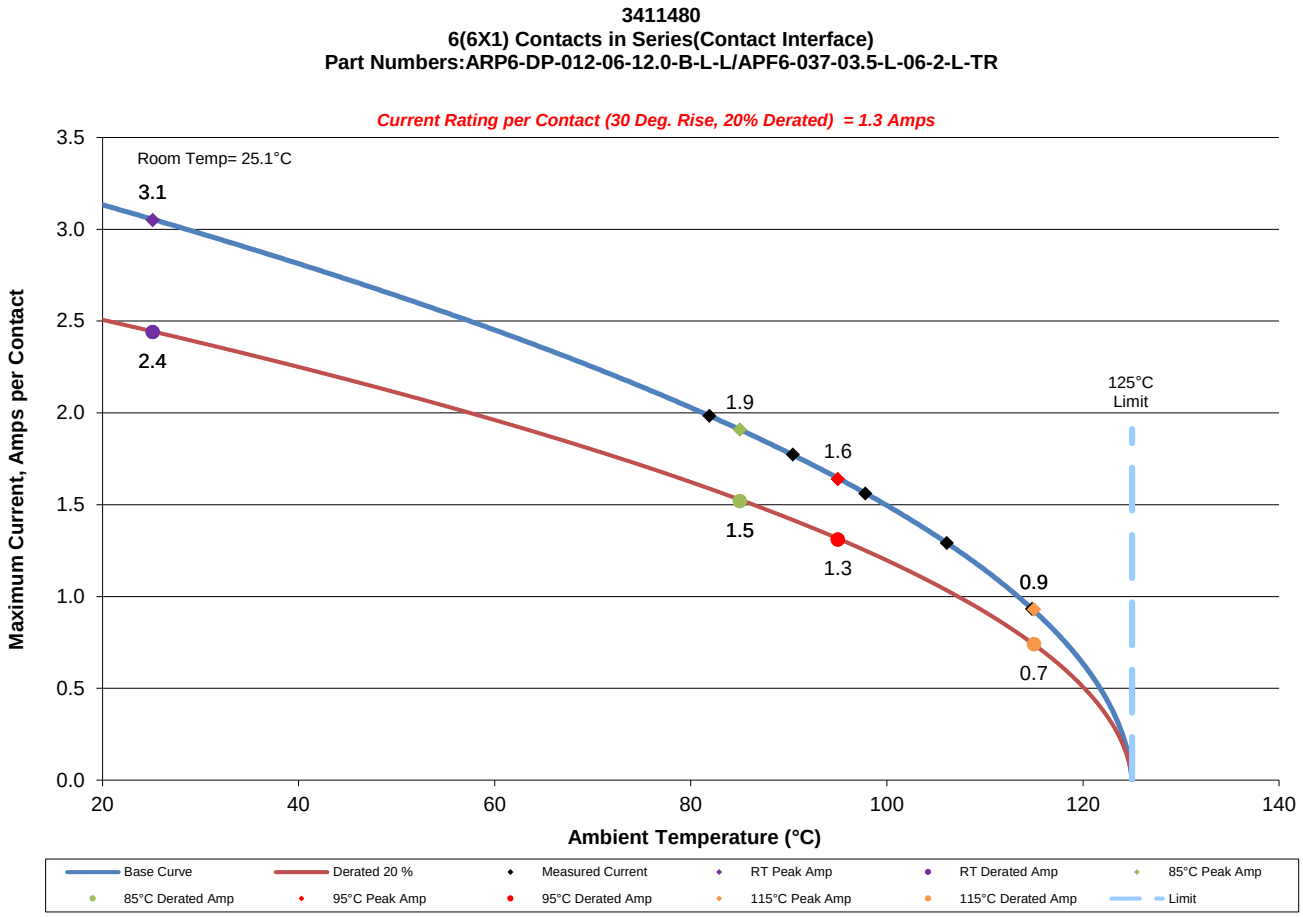
# DATA SUMMARIES

## TEMPERATURE RISE (Current Carrying Capacity, CCC):

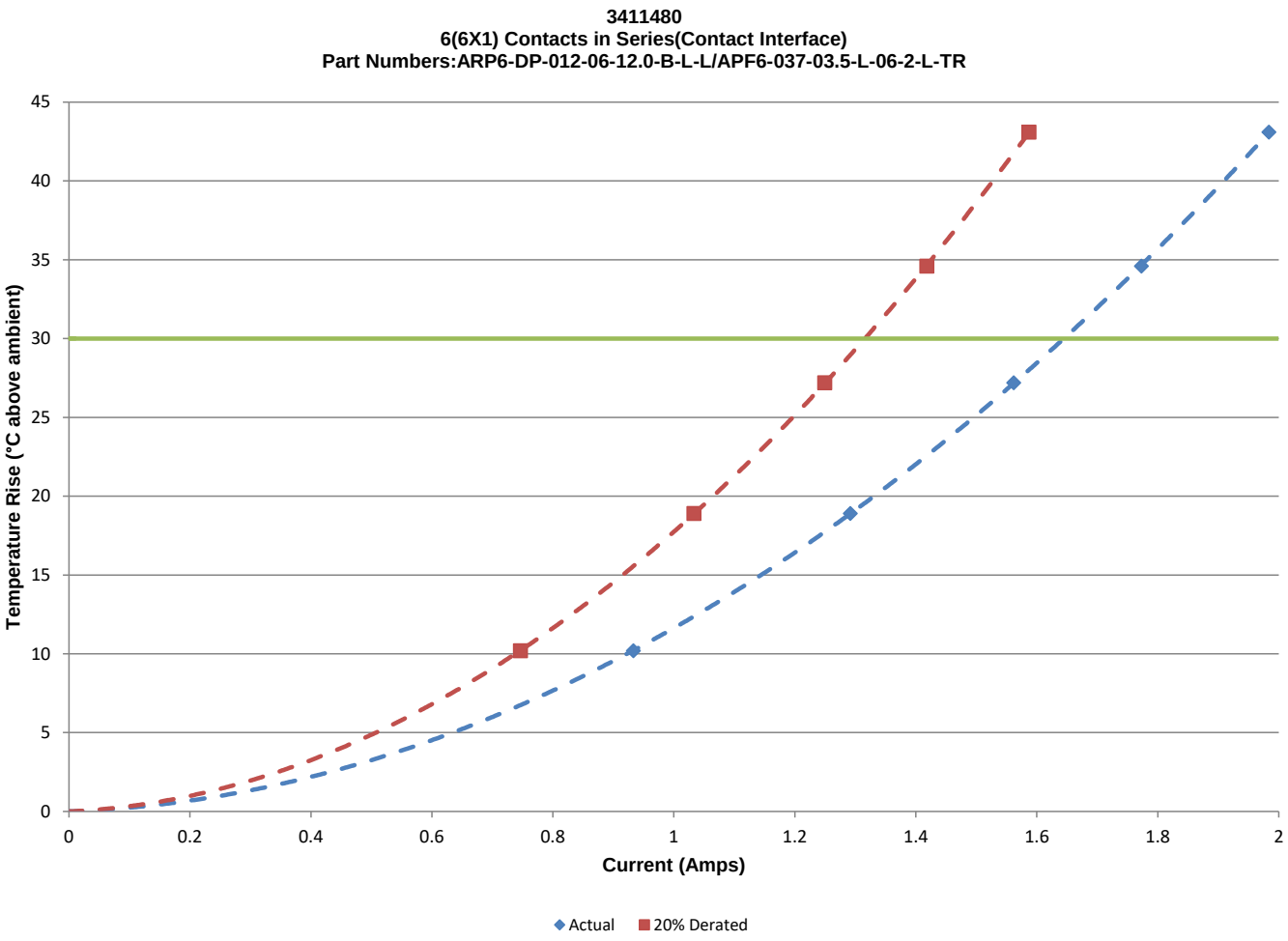
1) High quality thermocouples whose temperature slopes track one another were used for temperature monitoring.
2) The thermocouples were placed at a location to sense the maximum temperature generated during testing.
3) Temperature readings recorded are those for which three successive readings, 15 minutes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

**Signal Pin**

a. Linear configuration with 6 adjacent conductors/contacts powered

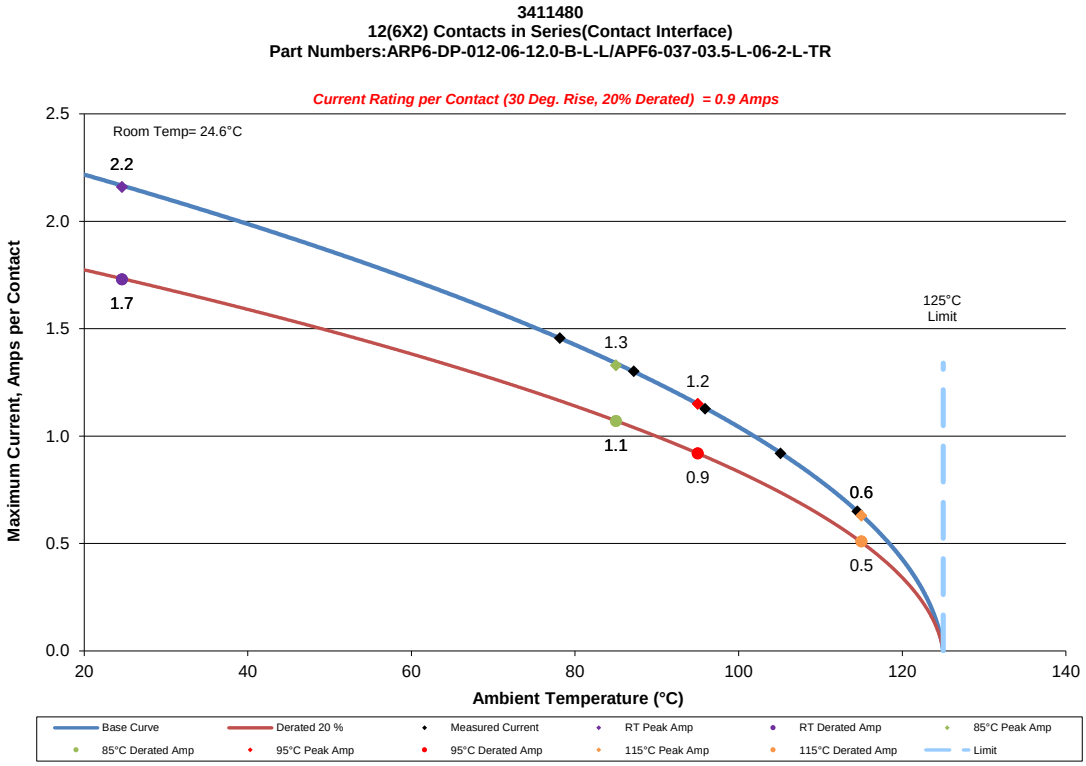


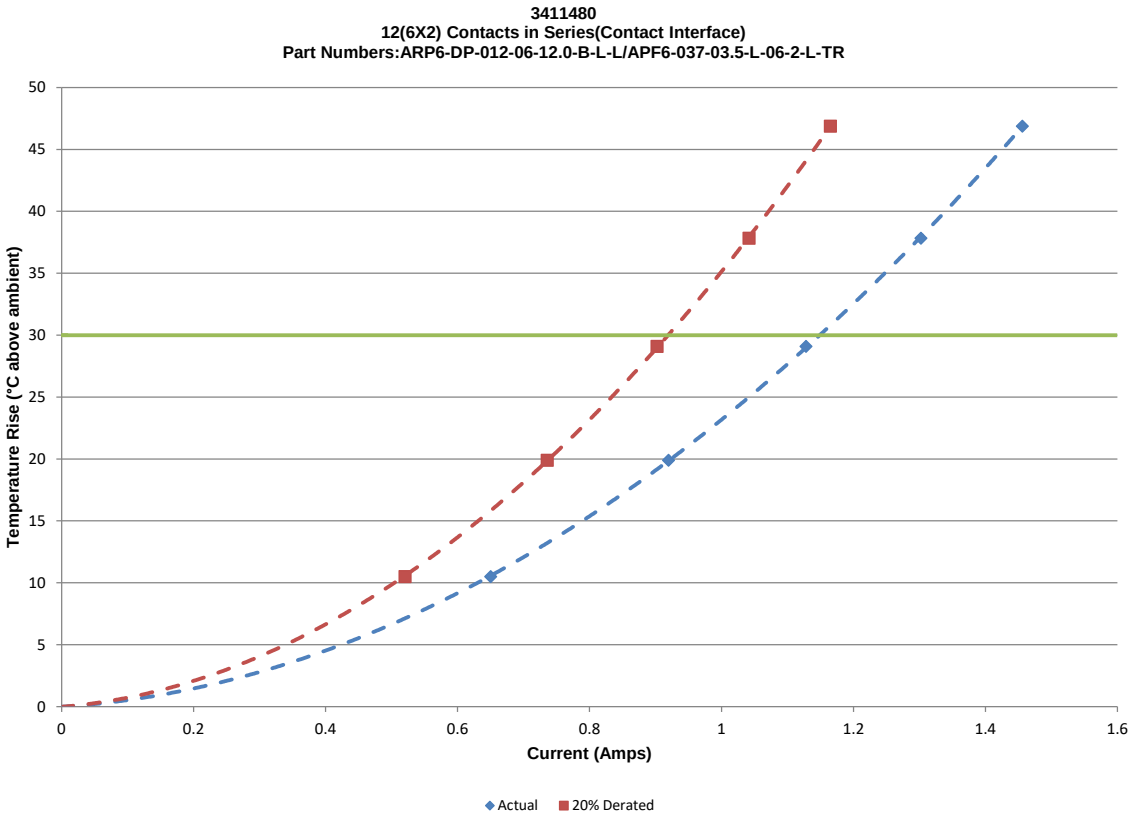
## DATA SUMMARIES Continued



# DATA SUMMARIES Continued

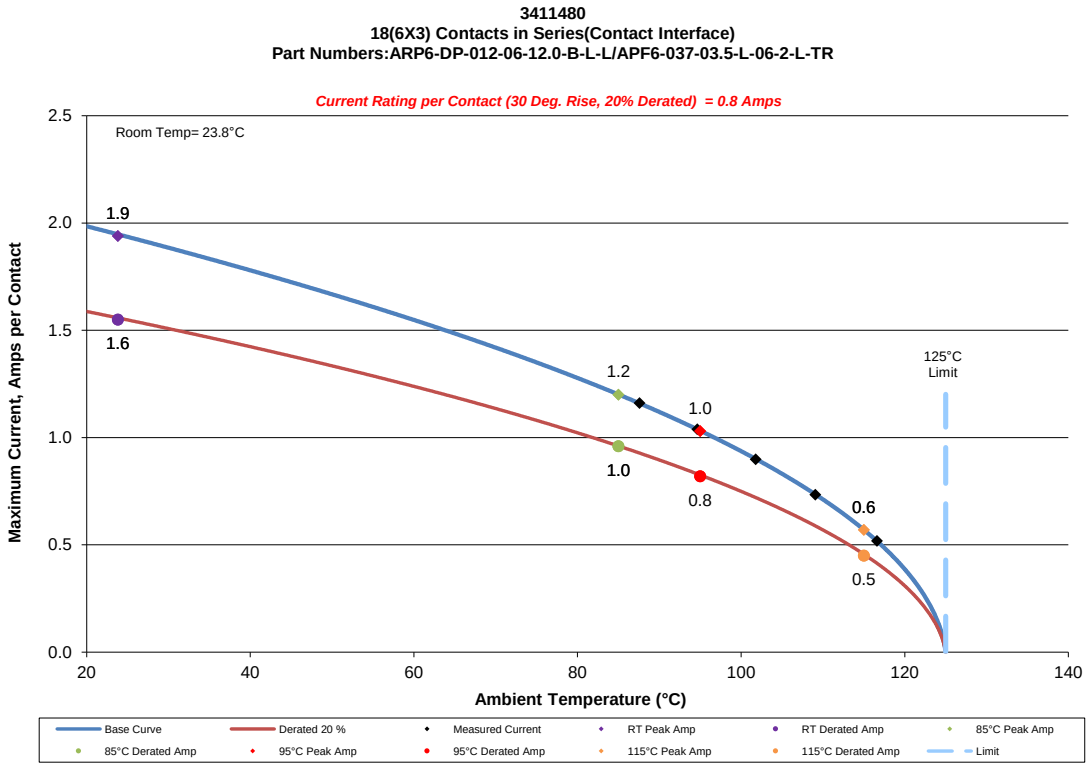
b. Linear configuration with 12 adjacent conductors/contacts powered

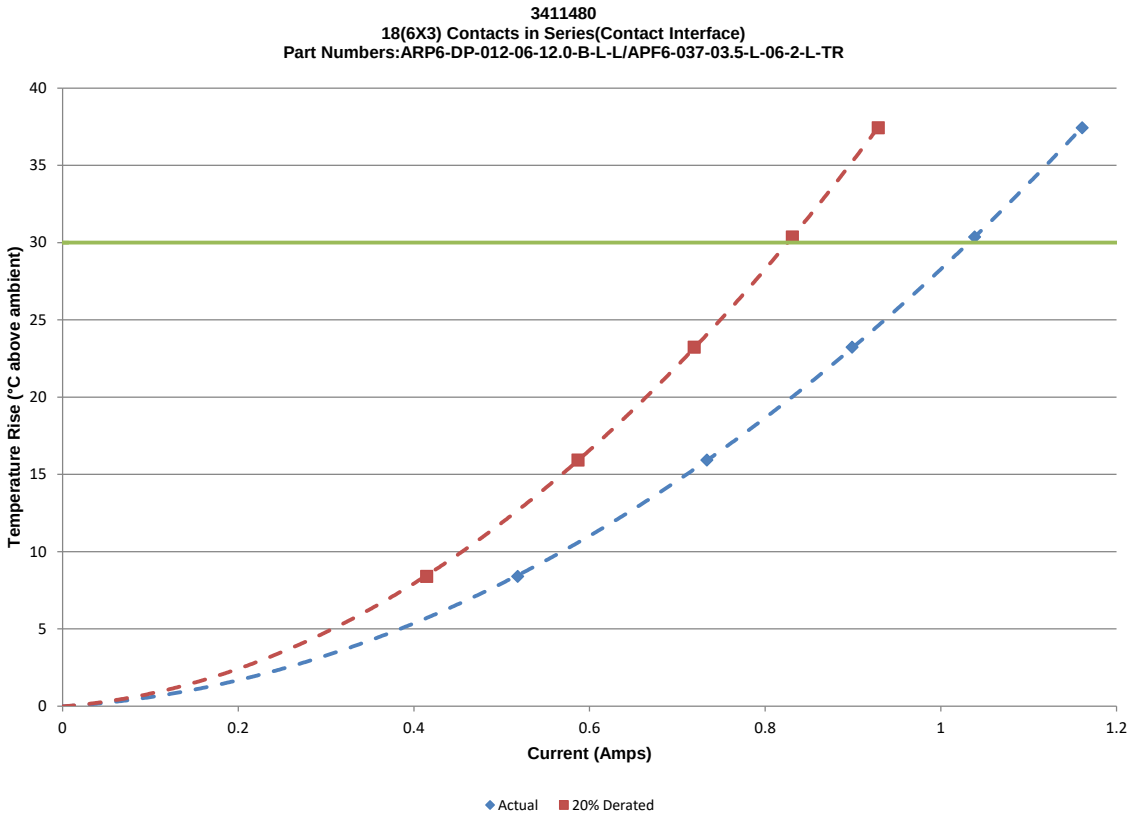


# DATA SUMMARIES Continued

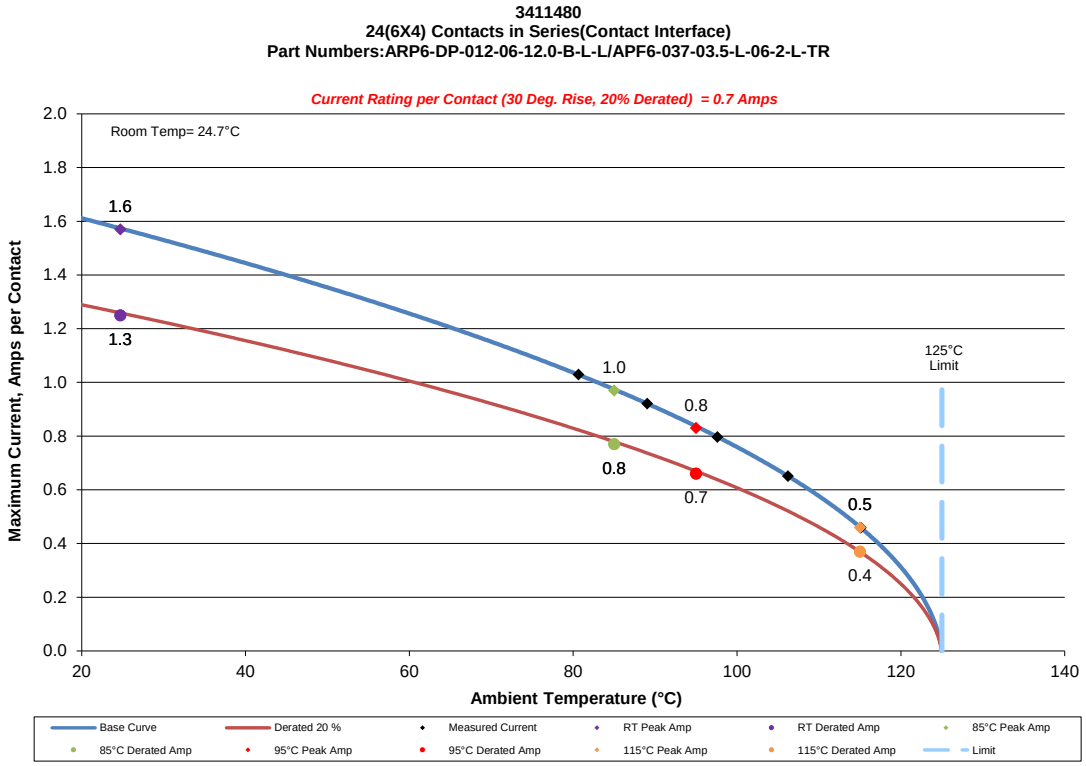
c. Linear configuration with 18 adjacent conductors/contacts powered

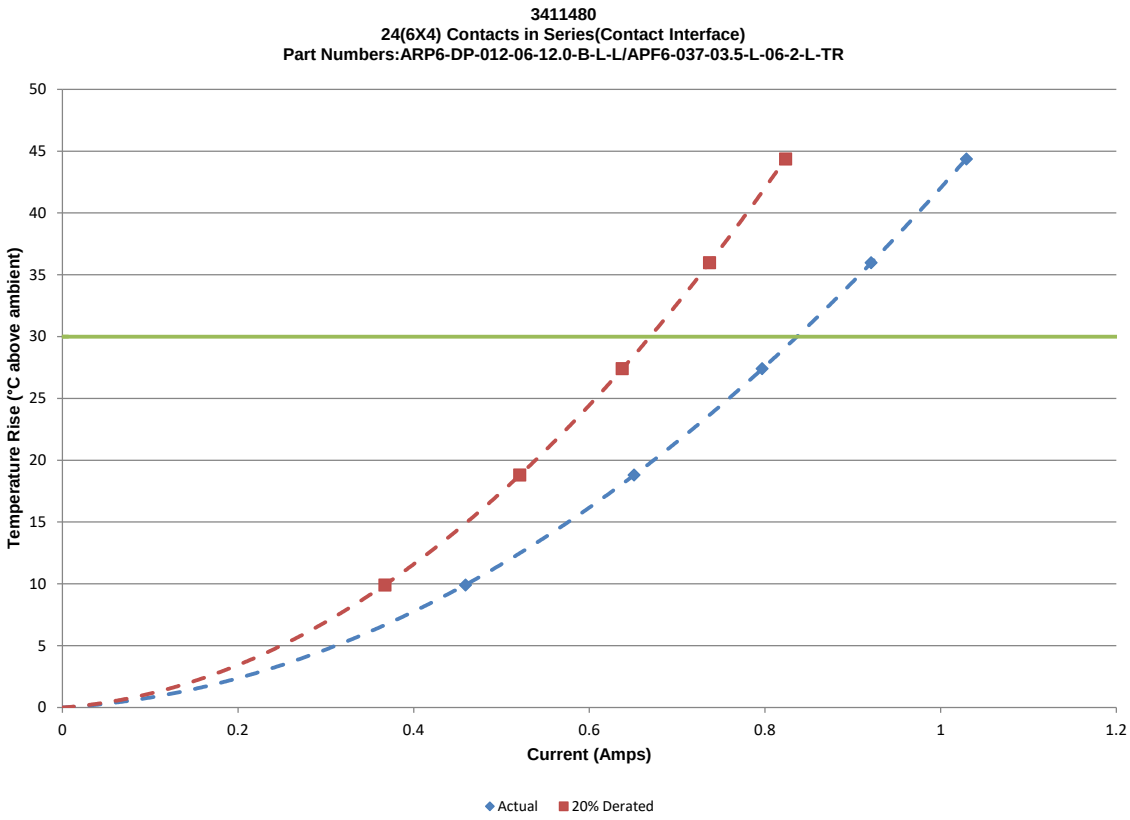


## DATA SUMMARIES Continued

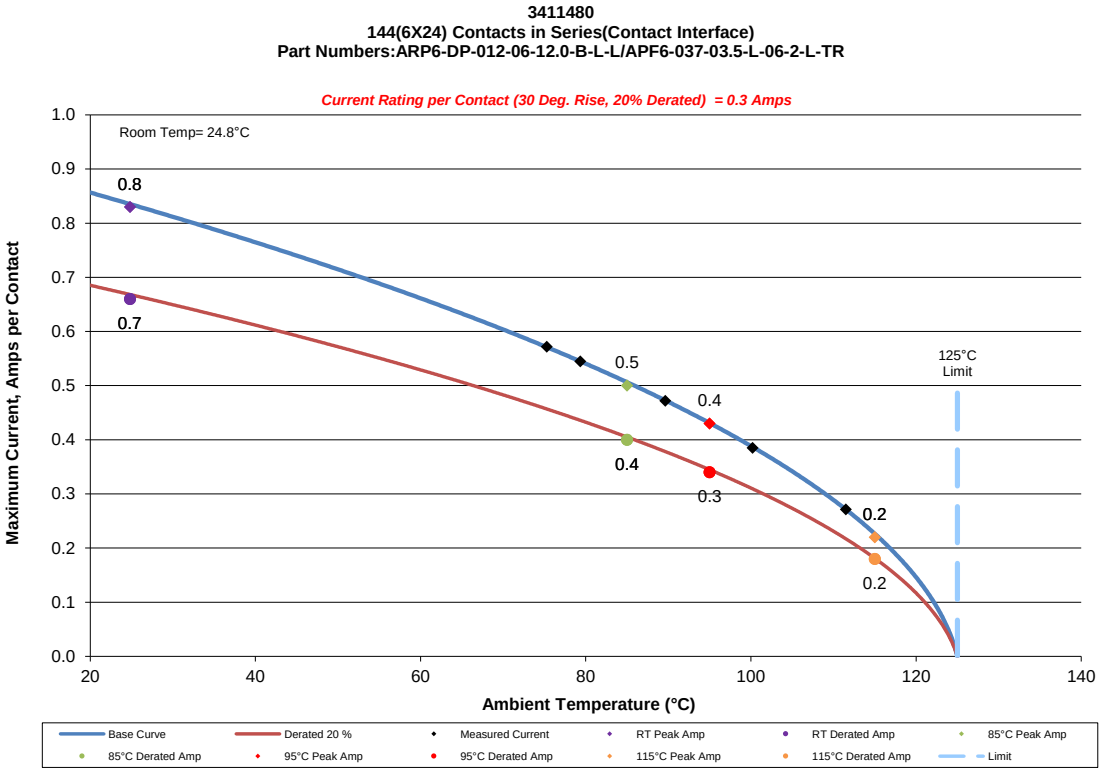
d. Linear configuration with 24 adjacent conductors/contacts powered

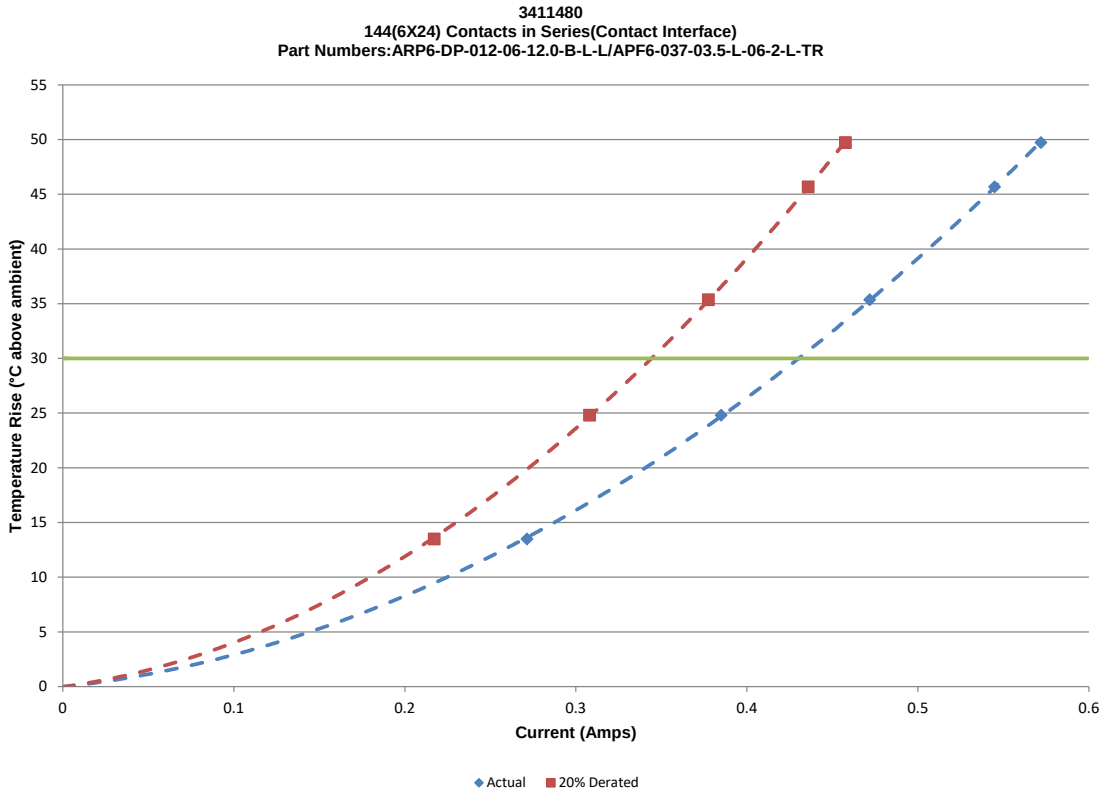


## DATA SUMMARIES Continued

e. Linear configuration with all adjacent conductors/contacts powered

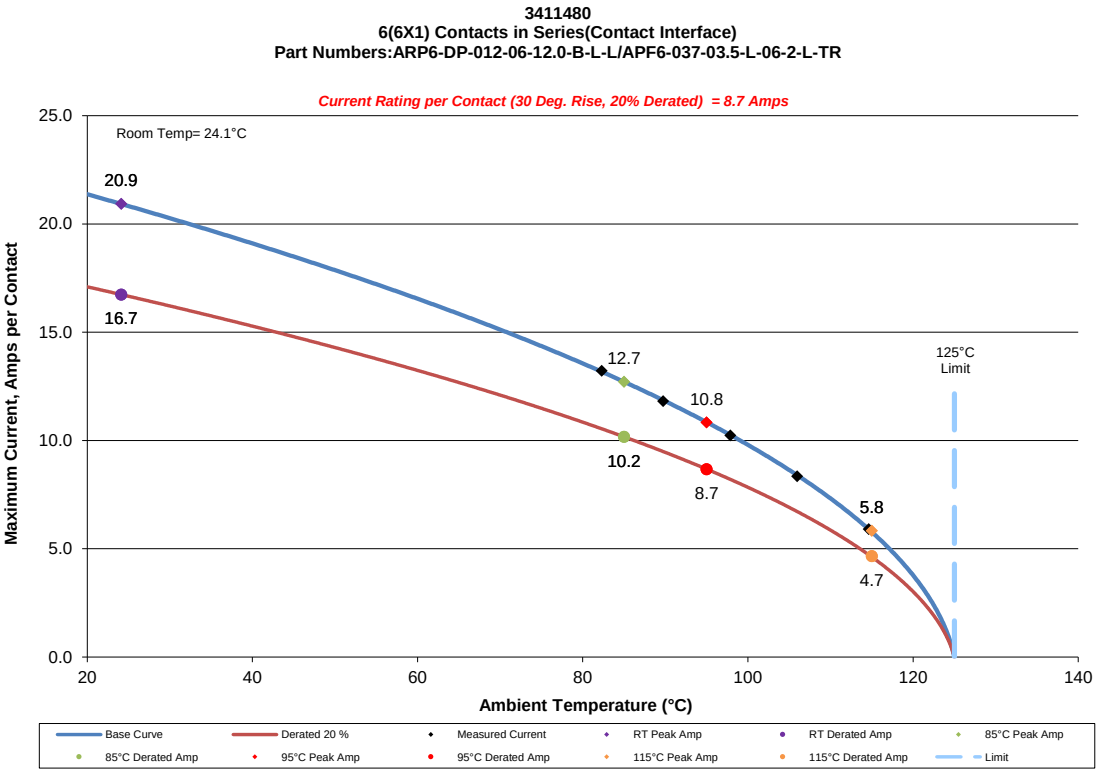


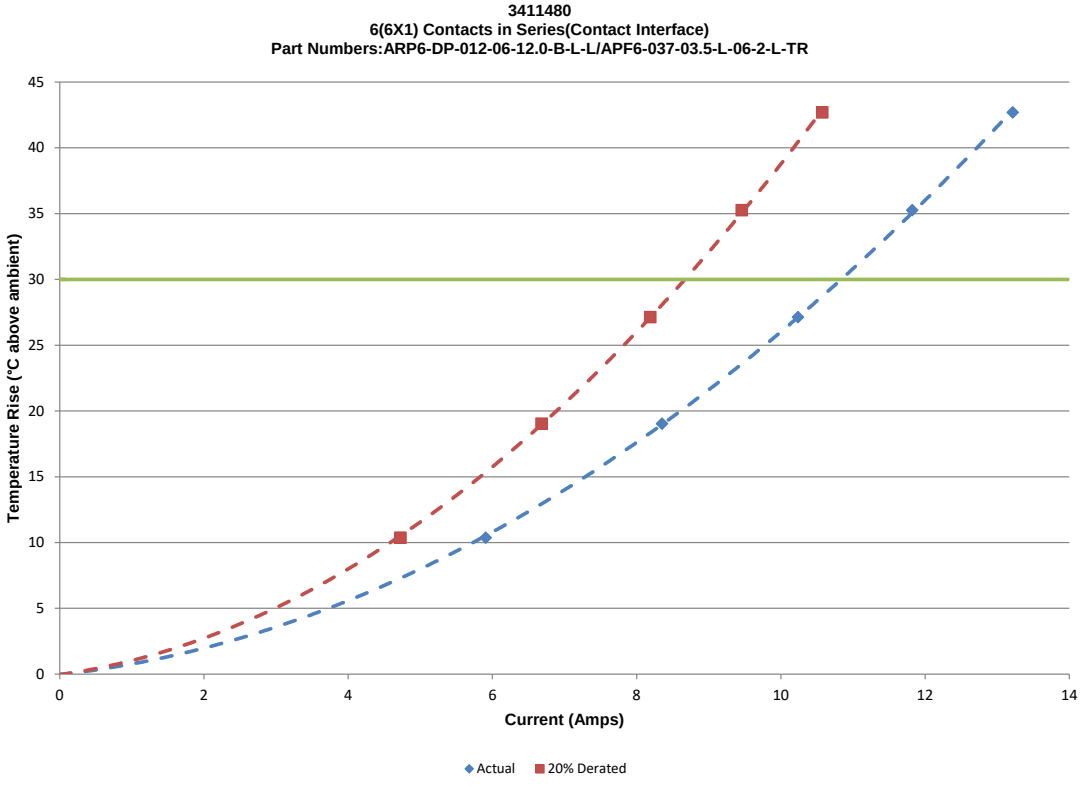



# DATA SUMMARIES Continued

**Ground Pin**

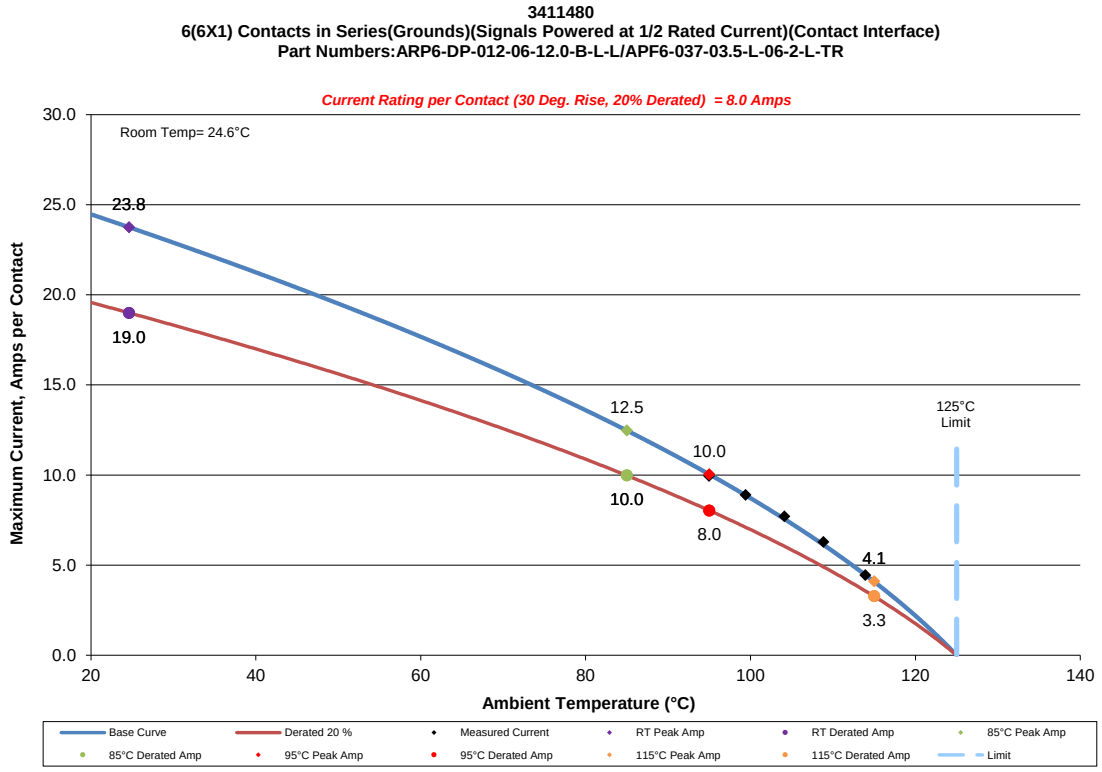
f. Linear configuration with all adjacent conductors/contacts powered

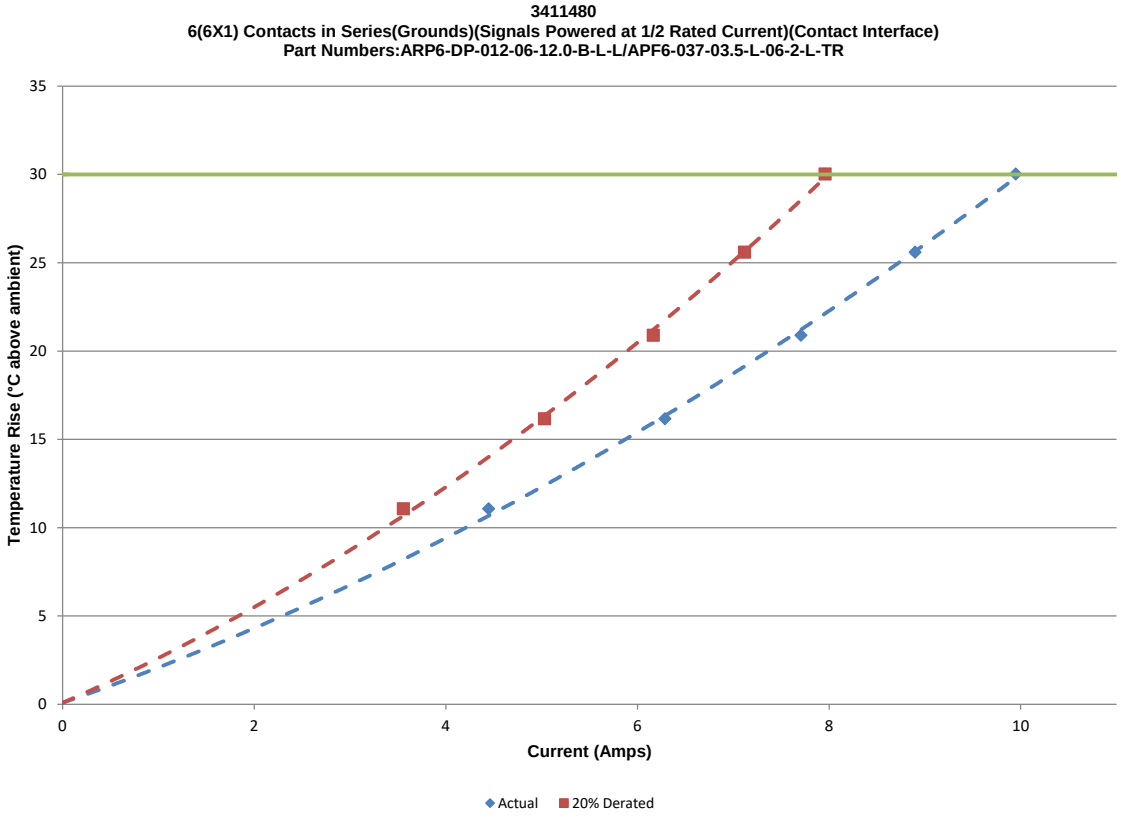


## DATA SUMMARIES Continued

g. Linear configuration with all adjacent conductors/contacts powered



## DATA SUMMARIES Continued

### MATING-UNMATING FORCE:

**Thermal Aging Group**

| | Initial | | | | After Thermals | | | |
|---|---|---|---|---|---|---|---|---|
| | **Mating** | | **Unmating** | | **Mating** | | **Unmating** | |
| | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) |
| Minimum | 52.22 | 11.74 | 24.95 | 5.61 | 33.85 | 7.61 | 24.38 | 5.48 |
| Maximum | 60.27 | 13.55 | 29.62 | 6.66 | 36.70 | 8.25 | 28.65 | 6.44 |
| **Average** | 55.70 | **12.52** | 27.06 | **6.08** | 35.66 | **8.02** | 26.27 | **5.91** |
| St Dev | 2.74 | 0.62 | 1.38 | 0.31 | 1.03 | 0.23 | 1.57 | 0.35 |
| Count | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

**Mating-Unmating Durability Group (Largest Pin Count)**

| | Initial | | | | After 25 Cycles | | | |
|---|---|---|---|---|---|---|---|---|
| | **Mating** | | **Unmating** | | **Mating** | | **Unmating** | |
| | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) |
| Minimum | 46.97 | 10.56 | 20.95 | 4.71 | 46.79 | 10.52 | 23.22 | 5.22 |
| Maximum | 54.00 | 12.14 | 29.40 | 6.61 | 55.02 | 12.37 | 32.56 | 7.32 |
| **Average** | 50.41 | **11.33** | 25.50 | **5.73** | 51.54 | **11.59** | 28.77 | **6.47** |
| St Dev | 2.51 | 0.56 | 2.94 | 0.66 | 3.26 | 0.73 | 3.15 | 0.71 |
| Count | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | After 50 Cycles | | | | After 75 Cycles | | | |
| | **Mating** | | **Unmating** | | **Mating** | | **Unmating** | |
| | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) |
| Minimum | 47.50 | 10.68 | 25.44 | 5.72 | 47.86 | 10.76 | 27.62 | 6.21 |
| Maximum | 54.58 | 12.27 | 35.09 | 7.89 | 54.40 | 12.23 | 36.47 | 8.20 |
| **Average** | 51.70 | **11.62** | 31.19 | **7.01** | 51.98 | **11.69** | 32.94 | **7.41** |
| St Dev | 2.86 | 0.64 | 3.27 | 0.73 | 2.73 | 0.61 | 3.18 | 0.72 |
| Count | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |
| | After 100 Cycles | | | | After Humidity | | | |
| | **Mating** | | **Unmating** | | **Mating** | | **Unmating** | |
| | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) |
| Minimum | 48.39 | 10.88 | 28.96 | 6.51 | 36.87 | 8.29 | 21.53 | 4.84 |
| Maximum | 54.58 | 12.27 | 36.92 | 8.30 | 44.12 | 9.92 | 31.14 | 7.00 |
| **Average** | 52.10 | **11.71** | 34.07 | **7.66** | 40.80 | **9.17** | 26.49 | **5.96** |
| St Dev | 2.53 | 0.57 | 3.03 | 0.68 | 2.37 | 0.53 | 3.44 | 0.77 |
| Count | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

## DATA SUMMARIES Continued

**Mating-Unmating Basic (Smallest Pin Count)**

| | Initial | | | | 25 Cycles | | | |
|---|---|---|---|---|---|---|---|---|
| | **Mating** | | **Unmating** | | **Mating** | | **Unmating** | |
| | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) |
| Minimum | 22.77 | 5.12 | 11.08 | 2.49 | 24.20 | 5.44 | 12.54 | 2.82 |
| Maximum | 25.62 | 5.76 | 13.57 | 3.05 | 27.71 | 6.23 | 15.66 | 3.52 |
| **Average** | 24.30 | **5.46** | 12.10 | **2.72** | 25.53 | **5.74** | 13.77 | **3.10** |
| St Dev | 0.99 | 0.22 | 0.93 | 0.21 | 1.39 | 0.31 | 1.03 | 0.23 |
| Count | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

| | 50 Cycles | | | | 75 Cycles | | | |
|---|---|---|---|---|---|---|---|---|
| | **Mating** | | **Unmating** | | **Mating** | | **Unmating** | |
| | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) | Newtons | Force (Lbs) |
| Minimum | 24.20 | 5.44 | 14.10 | 3.17 | 24.46 | 5.50 | 14.99 | 3.37 |
| Maximum | 27.98 | 6.29 | 17.12 | 3.85 | 28.42 | 6.39 | 18.10 | 4.07 |
| **Average** | 25.54 | **5.74** | 15.07 | **3.39** | 25.72 | **5.78** | 16.13 | **3.63** |
| St Dev | 1.52 | 0.34 | 1.03 | 0.23 | 1.56 | 0.35 | 0.98 | 0.22 |
| Count | 8 | 8 | 8 | 8 | 8 | 8 | 8 | 8 |

| | 100 Cycles | | | |
|---|---|---|---|---|
| | **Mating** | | **Unmating** | |
| | Newtons | Force (Lbs) | Newtons | Force (Lbs) |
| Minimum | 24.51 | 5.51 | 13.88 | 3.12 |
| Maximum | 28.65 | 6.44 | 18.99 | 4.27 |
| **Average** | 25.97 | **5.84** | 16.54 | **3.72** |
| St Dev | 1.55 | 0.35 | 1.49 | 0.33 |
| Count | 8 | 8 | 8 | 8 |

## DATA SUMMARIES Continued

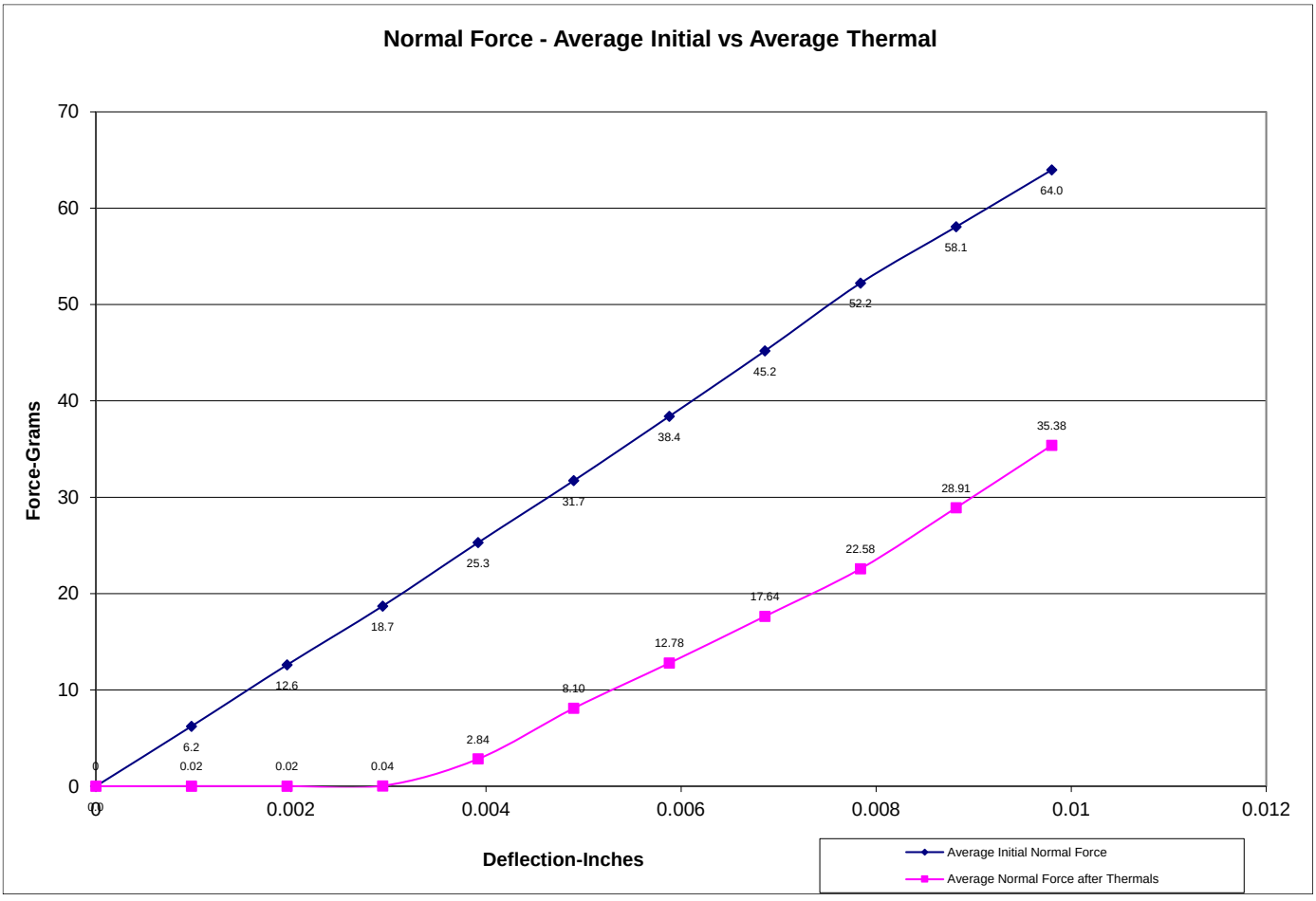
## NORMAL FORCE (FOR CONTACTS TESTED IN THE HOUSING):

1) Calibrated force gauges are used along with computer-controlled positioning equipment.
2) For Normal force 8-10 measurements are taken and the averages reported.

**C-481**

| Initial | Deflections in inches Forces in Grams | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **0.0010** | **0.0020** | **0.0029** | **0.0039** | **0.0049** | **0.0059** | **0.0069** | **0.0078** | **0.0088** | **0.0098** | ***SET*** |
| **Averages** | 6.23 | 12.59 | 18.70 | 25.29 | 31.72 | 38.40 | 45.18 | 52.23 | 58.07 | 63.97 | 0.0008 |
| **Min** | 5.70 | 11.70 | 17.00 | 22.80 | 29.20 | 35.80 | 43.00 | 50.40 | 56.50 | 62.60 | 0.0007 |
| **Max** | 7.40 | 13.30 | 20.80 | 27.30 | 33.90 | 40.70 | 47.10 | 54.40 | 59.80 | 65.60 | 0.0009 |
| **St. Dev** | 0.433 | 0.509 | 1.035 | 1.215 | 1.512 | 1.368 | 1.174 | 1.031 | 0.947 | 0.888 | 0.0001 |
| **Count** | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |

| After Thermals | Deflections in inches Forces in Grams | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **0.0010** | **0.0020** | **0.0029** | **0.0039** | **0.0049** | **0.0059** | **0.0069** | **0.0078** | **0.0088** | **0.0098** | ***SET*** |
| **Averages** | 0.02 | 0.02 | 0.04 | 2.84 | 8.10 | 12.78 | 17.64 | 22.58 | 28.91 | 35.38 | 0.0032 |
| **Min** | -0.30 | -0.30 | -0.30 | 0.10 | 5.80 | 10.70 | 15.40 | 20.00 | 24.90 | 31.20 | 0.0029 |
| **Max** | 0.10 | 0.20 | 0.20 | 4.80 | 9.90 | 14.60 | 19.30 | 24.20 | 31.40 | 38.10 | 0.0035 |
| **St. Dev** | 0.153 | 0.175 | 0.173 | 1.301 | 1.076 | 1.109 | 1.089 | 1.177 | 1.953 | 1.975 | 0.0002 |
| **Count** | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |



## DATA SUMMARIES Continued

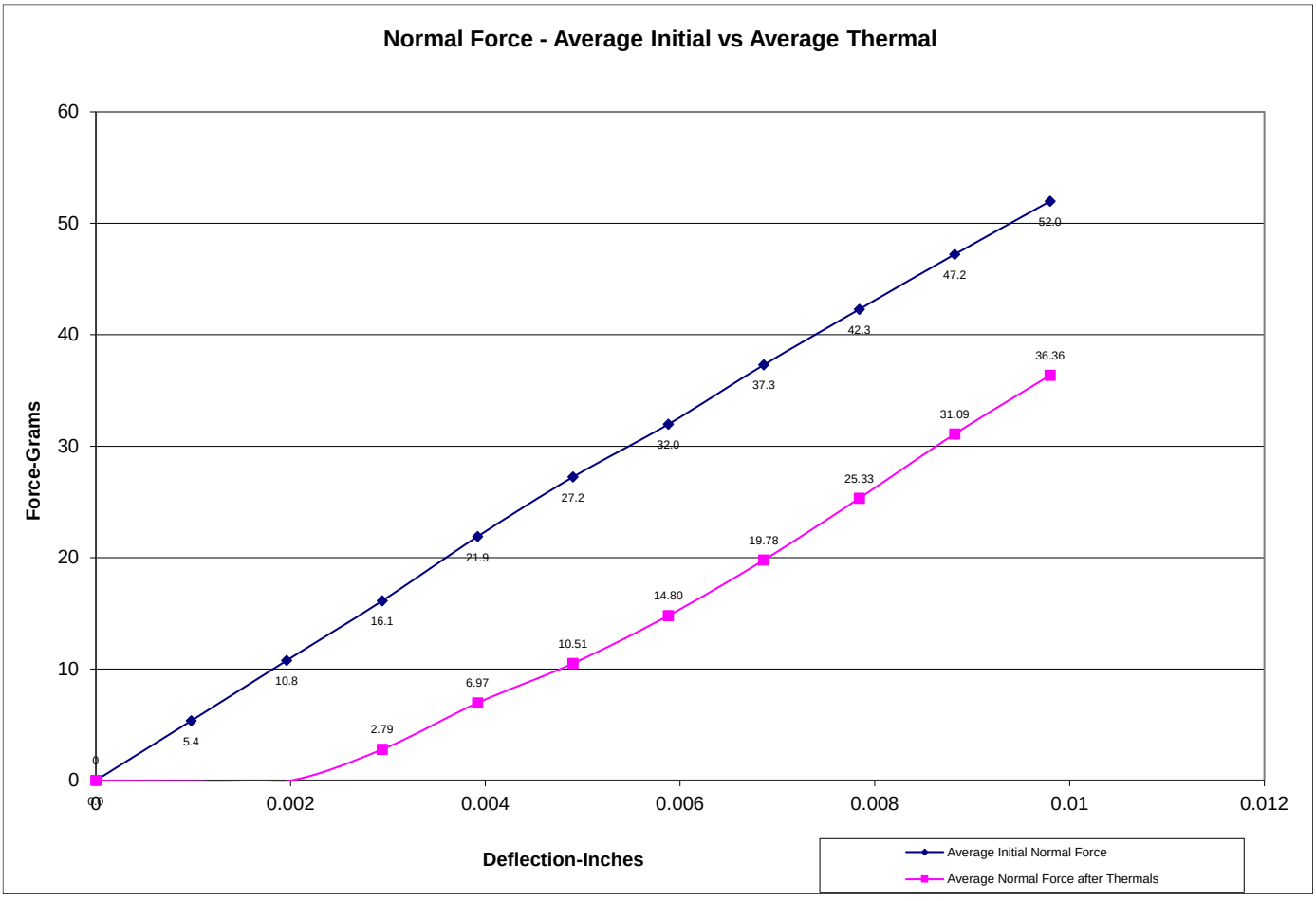
## NORMAL FORCE (FOR CONTACTS TESTED IN THE HOUSING):

1) Calibrated force gauges are used along with computer-controlled positioning equipment.
2) For Normal force 8-10 measurements are taken and the averages reported.

**C-482**

| Initial | Deflections in inches Forces in Grams | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **0.0010** | **0.0020** | **0.0029** | **0.0039** | **0.0049** | **0.0059** | **0.0069** | **0.0078** | **0.0088** | **0.0098** | ***SET*** |
| **Averages** | 5.36 | 10.77 | 16.12 | 21.89 | 27.23 | 31.98 | 37.30 | 42.28 | 47.22 | 51.98 | 0.0006 |
| **Min** | 4.70 | 9.80 | 14.70 | 20.10 | 25.30 | 29.70 | 34.80 | 39.80 | 44.50 | 49.20 | 0.0002 |
| **Max** | 6.10 | 12.20 | 17.70 | 23.90 | 29.20 | 34.20 | 39.50 | 44.30 | 49.00 | 54.00 | 0.0009 |
| **St. Dev** | 0.423 | 0.824 | 0.991 | 1.246 | 1.272 | 1.718 | 1.629 | 1.480 | 1.457 | 1.576 | 0.0002 |
| **Count** | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |

| After Thermals | Deflections in inches Forces in Grams | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | **0.0010** | **0.0020** | **0.0029** | **0.0039** | **0.0049** | **0.0059** | **0.0069** | **0.0078** | **0.0088** | **0.0098** | ***SET*** |
| **Averages** | -0.05 | -0.06 | 2.79 | 6.97 | 10.51 | 14.80 | 19.78 | 25.33 | 31.09 | 36.36 | 0.0022 |
| **Min** | -0.60 | -0.70 | 0.60 | 5.70 | 8.90 | 11.60 | 16.20 | 21.50 | 27.40 | 32.80 | 0.0018 |
| **Max** | 0.40 | 0.40 | 4.10 | 7.80 | 11.70 | 16.50 | 21.70 | 27.70 | 33.10 | 39.10 | 0.0025 |
| **St. Dev** | 0.288 | 0.303 | 0.929 | 0.629 | 0.844 | 1.419 | 1.610 | 1.927 | 1.659 | 1.715 | 0.0002 |
| **Count** | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 | 12 |



## DATA SUMMARIES Continued

### Cable Pull Force:

**Smallest Pin Count**

**0° Pull**

| | Force (lbs) |
|---|---|
| Minimum | **52.20** |
| Maximum | 58.76 |
| Average | 56.58 |

**90° Pull**

| | Force (lbs) |
|---|---|
| Minimum | **28.67** |
| Maximum | 33.53 |
| Average | 31.50 |

**Largest Pin Count**

**0° Pull**

| | Force (lbs) |
|---|---|
| Minimum | **41.67** |
| Maximum | 44.11 |
| Average | 43.41 |

**90° Pull**

| | Force (lbs) |
|---|---|
| Minimum | **43.09** |
| Maximum | 45.78 |
| Average | 44.10 |

## DATA SUMMARIES Continued

### INSULATION RESISTANCE (IR):

| | Pin to Pin | | |
|---|---|---|---|
| | Mated | Unmated | Unmated |
| Minimum | **HDR/APF6** | **HDR** | **APF6** |
| **Initial** | 45000 | 45000 | 45000 |
| **Thermal** | 45000 | 45000 | 45000 |
| **Humidity** | 45000 | 45000 | 45000 |

| | Row to Row | | |
|---|---|---|---|
| | Mated | Unmated | Unmated |
| Minimum | **HDR/APF6** | **HDR** | **APF6** |
| **Initial** | 45000 | 45000 | 45000 |
| **Thermal** | 45000 | 45000 | 45000 |
| **Humidity** | 45000 | 45000 | 45000 |

| | Pin to Ground | | |
|---|---|---|---|
| | Mated | Unmated | Unmated |
| Minimum | **HDR/APF6** | **HDR** | **APF6** |
| **Initial** | 45000 | 45000 | 45000 |
| **Thermal** | 45000 | 45000 | 45000 |
| **Humidity** | 45000 | 45000 | 45000 |

| | Pin to Closest Metallic Hardware | | |
|---|---|---|---|
| | Mated | Unmated | Unmated |
| Minimum | **HDR/APF6** | **HDR** | **APF6** |
| **Initial** | 45000 | 45000 | 45000 |
| **Thermal** | 45000 | 45000 | 45000 |
| **Humidity** | 45000 | 45000 | 45000 |

## DATA SUMMARIES Continued

### DIELECTRIC WITHSTANDING VOLTAGE (DWV):

| Voltage Rating Summary | |
|---|---|
| **Minimum** | **HDR/APF6** |
| **Break Down Voltage** | 658 |
| **Test Voltage** | 495 |
| **Working Voltage** | 165 |

| Pin to Pin | |
|---|---|
| **Initial Test Voltage** | Passed |
| **After Thermal Test Voltage** | Passed |
| **After Humidity Test Voltage** | Passed |

| Row to Row | |
|---|---|
| **Initial Test Voltage** | Passed |
| **After Thermal Test Voltage** | Passed |
| **After Humidity Test Voltage** | Passed |

| Pin to Ground | |
|---|---|
| **Initial Test Voltage** | Passed |
| **After Thermal Test Voltage** | Passed |
| **After Humidity Test Voltage** | Passed |

| Pin to Closest Metallic Hardware | |
|---|---|
| **Initial Test Voltage** | Passed |
| **After Thermal Test Voltage** | Passed |
| **After Humidity Test Voltage** | Passed |

## DATA SUMMARIES Continued

### Cable Flex:

#### Insulation Resistance minimums, IR

**Smallest Pin Count**

| Pin to Pin | |
|---|---|
| Mated | |
| Minimum | |
| **Initial** | 45000 |
| **After 500 Flex Cycles** | 45000 |

| Row to Row | |
|---|---|
| Mated | |
| Minimum | |
| **Initial** | 45000 |
| **After 500 Flex Cycles** | 45000 |

| Pin to Ground | |
|---|---|
| Mated | |
| Minimum | |
| **Initial** | 45000 |
| **After 500 Flex Cycles** | 45000 |

| Pin to Closest Metallic Hardware | |
|---|---|
| Mated | |
| Minimum | |
| **Initial** | 45000 |
| **After 500 Flex Cycles** | 45000 |

## DATA SUMMARIES Continued

**Largest Pin Count**

| Pin to Pin | |
|---|---|
| Mated | |
| Minimum | |
| **Initial** | 45000 |
| **After 500 Flex Cycles** | 45000 |

| Row to Row | |
|---|---|
| Mated | |
| Minimum | |
| **Initial** | 45000 |
| **After 500 Flex Cycles** | 45000 |

| Pin to Ground | |
|---|---|
| Mated | |
| Minimum | |
| **Initial** | 35000 |
| **After 500 Flex Cycles** | 44000 |

| Pin to Closest Metallic Hardware | |
|---|---|
| Mated | |
| Minimum | |
| **Initial** | 45000 |
| **After 500 Flex Cycles** | 45000 |

## DATA SUMMARIES Continued

### Dielectric Withstanding Voltage minimums, DWV

| Voltage Rating Summary | |
|---|---|
| **Minimum** | **HDR/APF6** |
| **Test Voltage** | 495 |

**Smallest Pin Count**

| Pin to Pin | |
|---|---|
| **Initial Test Voltage** | Passed |
| **After 500 Flex Cycles Test Voltage** | Passed |

| Row to Row | |
|---|---|
| **Initial Test Voltage** | Passed |
| **After 500 Flex Cycles Test Voltage** | Passed |

| Pin to Ground | |
|---|---|
| **Initial Test Voltage** | Passed |
| **After 500 Flex Cycles Test Voltage** | Passed |

| Pin to Closest Metallic Hardware | |
|---|---|
| **Initial Test Voltage** | Passed |
| **After 500 Flex Cycles Test Voltage** | Passed |

**Largest Pin Count**

| Pin to Pin | |
|---|---|
| **Initial Test Voltage** | Passed |
| **After 500 Flex Cycles Test Voltage** | Passed |

| Row to Row | |
|---|---|
| **Initial Test Voltage** | Passed |
| **After 500 Flex Cycles Test Voltage** | Passed |

| Pin to Ground | |
|---|---|
| **Initial Test Voltage** | Passed |
| **After 500 Flex Cycles Test Voltage** | Passed |

| Pin to Closest Metallic Hardware | |
|---|---|
| **Initial Test Voltage** | Passed |
| **After 500 Flex Cycles Test Voltage** | Passed |

## DATA SUMMARIES Continued

### LLCR Gas Tight:

1) A total of 144 signal and 48 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 | 2022/8/11 | 2022/8/12 | | |
| Room Temp (Deg C) | 22 | 22 | | |
| Rel Humidity (%) | 52 | 52 | | |
| Technician | Kason He | Kason He | | |
| **mOhm values** | **Actual Initial** | **Delta Acid Vapor** | **Delta** | **Delta** |
| | **Pin Type 1: Signal** | | | |
| Average | 352.74 | 4.00 | | |
| St. Dev. | 8.14 | 3.97 | | |
| Min | 331.71 | 0.00 | | |
| Max | 380.10 | 14.80 | | |
| Summary Count | 144 | 144 | | |
| Total Count | 144 | 144 | | |
| | **Pin Type 2: Ground** | | | |
| Average | 21.82 | 0.48 | | |
| St. Dev. | 2.10 | 0.38 | | |
| Min | 19.89 | 0.01 | | |
| Max | 26.97 | 1.51 | | |
| Summary Count | 48 | 48 | | |
| Total Count | 48 | 48 | | |

| ***LLCR Delta Count by Category*** | | | | | | |
|---|---|---|---|---|---|---|
| | **Stable** | **Minor** | **Acceptable** | **Marginal** | **Unstable** | **Open** |
| **mOhms** | **<=5** | **>5 & <=10** | **>10 & <=15** | **>15 & <=50** | **>50 & <=1000** | **>1000** |
| **Acid Vapor** | **144** | **34** | **14** | **0** | **0** | **0** |

## DATA SUMMARIES Continued

### LLCR Thermal Aging:

1) A total of 144 signal and 48 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 | 2022/7/19 | 2022/8/1 | | |
| Room Temp (Deg C) | 22 | 22 | | |
| Rel Humidity (%) | 52 | 52 | | |
| Technician | Kason He | Kason He | | |
| **mOhm values** | **Actual Initial** | **Delta Thermal** | **Delta** | **Delta** |
| | **Pin Type 1: Signal** | | | |
| Average | 352.88 | 3.61 | | |
| St. Dev. | 16.40 | 2.40 | | |
| Min | 337.53 | 0.35 | | |
| Max | 473.40 | 13.10 | | |
| Summary Count | 144 | 144 | | |
| Total Count | 144 | 144 | | |
| | **Pin Type 2: Ground** | | | |
| Average | 21.22 | 0.96 | | |
| St. Dev. | 2.28 | 0.41 | | |
| Min | 19.17 | 0.13 | | |
| Max | 26.82 | 1.93 | | |
| Summary Count | 48 | 48 | | |
| Total Count | 48 | 48 | | |

| ***LLCR Delta Count by Category*** | | | | | | |
|---|---|---|---|---|---|---|
| | **Stable** | **Minor** | **Acceptable** | **Marginal** | **Unstable** | **Open** |
| **mOhms** | **<=5** | **>5 & <=10** | **>10 & <=15** | **>15 & <=50** | **>50 & <=1000** | **>1000** |
| **Thermal** | **168** | **20** | **4** | **0** | **0** | **0** |

## DATA SUMMARIES Continued

### LLCR Mating/Unmating Durability Group

1). A total of 144 signal and 48 ground power 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 | 2022/7/19 | 2022/7/21 | 2022/7/26 | 2022/8/8 |
| Room Temp (Deg C) | 22 | 22 | 22 | 22 |
| Rel Humidity (%) | 52 | 50 | 52 | 52 |
| Technician | Kason He | Kason He | Kason He | Kason He |
| **mOhm values** | **Actual Initial** | **Delta 100 Cycles** | **Delta Therm Shck** | **Delta Humidity** |
| | **Pin Type 1: Signal** | | | |
| Average | 352.80 | 2.43 | 1.61 | 2.57 |
| St. Dev. | 7.20 | 2.58 | 1.92 | 2.57 |
| Min | 338.80 | 0.00 | 0.00 | 0.10 |
| Max | 376.60 | 9.99 | 10.95 | 11.74 |
| Summary Count | 144 | 144 | 144 | 144 |
| Total Count | 144 | 144 | 144 | 144 |
| | **Pin Type 2: Ground** | | | |
| Average | 21.94 | 0.40 | 0.53 | 0.50 |
| St. Dev. | 2.46 | 0.33 | 0.35 | 0.32 |
| Min | 19.62 | 0.01 | 0.01 | 0.00 |
| Max | 27.92 | 1.25 | 1.42 | 1.18 |
| Summary Count | 48 | 48 | 48 | 48 |
| Total Count | 48 | 48 | 48 | 48 |

| ***LLCR Delta Count by Category*** | | | | | | |
|---|---|---|---|---|---|---|
| | **Stable** | **Minor** | **Acceptable** | **Marginal** | **Unstable** | **Open** |
| **mOhms** | **<=5** | **>5 & <=10** | **>10 & <=15** | **>15 & <=50** | **>50 & <=1000** | **>1000** |
| **100 Cycles** | **168** | **24** | **0** | **0** | **0** | **0** |
| **Therm Shck** | **183** | **7** | **2** | **0** | **0** | **0** |
| **Humidity** | **173** | **15** | **4** | **0** | **0** | **0** |

## DATA SUMMARIES Continued

### LLCR Shock &Vibration:

1). A total of 144 signal and 48 ground 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. <= +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 | 2022/8/22 | 2022/8/26 | | |
| Room Temp (Deg C) | 22 | 22 | | |
| Rel Humidity (%) | 53 | 55 | | |
| Technician | Tony Wagoner | Tony Wagoner | | |
| **mOhm values** | Actual<br>**Initial** | **Delta**<br>**Shock-Vib** | | |
| **Pin Type: Signal 1** | | | | |
| Average | 351.44 | 2.53 | | |
| St. Dev. | 8.41 | 2.91 | | |
| Min | 330.38 | 0 | | |
| Max | 376.78 | 11.54 | | |
| Summary Count | 144 | 144 | | |
| Total Count | 144 | 144 | | |
| **Pin Type: GND 1** | | | | |
| Average | 27.77 | 2.19 | | |
| St. Dev. | 5.18 | 2.68 | | |
| Min | 20.86 | 0.02 | | |
| Max | 37.65 | 8.35 | | |
| Summary Count | 48 | 48 | | |
| Total Count | 48 | 48 | | |

| LLCR Delta Count by Category | | | | | | |
|---|---|---|---|---|---|---|
| | **Stable** | **Minor** | **Acceptable** | **Marginal** | **Unstable** | **Open** |
| **mOhms** | **<=5** | **>5 & <=10** | **>10 & <=15** | **>15 & <=50** | **>50 & <=1000** | **>1000** |
| **Shock-Vib** | **160** | **27** | **5** | **0** | **0** | **0** |

### Nanosecond Event Detection:

| Shock and Vibration Event Detection Summary | |
|---|---|
| Contacts tested | 60 |
| Test Condition | C, 100g's, 6ms, Half-Sine |
| Shock Events | 0 |
| Test Condition | V-B, 7.56 rms g |
| Vibration Events | 0 |
| Total Events | 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: 3/5/2022, Next Cal: 3/4/2023

**Equipment #:** DG-THC-01
**Description:** Humidity transmitter
**Manufacturer:** Thermtron
**Model:** SM-8-8200
**Serial #:** 50613
**Accuracy:** Last Cal: 12/4/2021, Next Cal: 12/3/2022

**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: 04/16/2022, Next Cal: 04/15/2023

**Equipment #:** DG-HPT-01
**Description:** Hipot Safety Tester
**Manufacturer:** Vitrek
**Model:** V73
**Serial #:** 025866
**Accuracy:**
… Last Cal: 04/16/2022, Next Cal: 04/15/2023

**Equipment #:** HZ-MO-05
**Description:** Micro-ohmmeter
**Manufacturer:** Keithley
**Model:** 3706
**Serial #:** 1285188
**Accuracy:** Last Cal: 1/2/2022, Next Cal: 1/1/2023

**Equipment #:** HZ-MO-01
**Description:** Micro-ohmmeter
**Manufacturer:** Keithley
**Model:** 2700
**Serial #:** 1199807
**Accuracy: Last** Cal: 05/19/2022, Next Cal: 05/18/2023

**Equipment #:** HZ-PS-01
**Description:** Power Supply
**Manufacturer:** Agilent
**Model:** 6031A
**Serial #:** MY41000982
**Accuracy:** Last Cal: 04/16/2022, Next Cal: 04/15/2023

## 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: 04/22/2022, Next Cal: 04/22/2023

**Equipment #:** ACLM-01
**Description:** Accelerometer
**Manufacturer:** PCB Piezotronics
**Model:** 352C03
**Serial #:** 115819
**Accuracy:** See Manual
… Last Cal: 07/18/2022, Next Cal: 07/18/2023

**Equipment #:** ED-03
**Description:** Event Detector
**Manufacturer:** Analysis Tech
**Model:** 32EHD
**Serial #:** 1100604
**Accuracy:** See Manual
… Last Cal: 10/31/2021, Next Cal: 10/31/2022