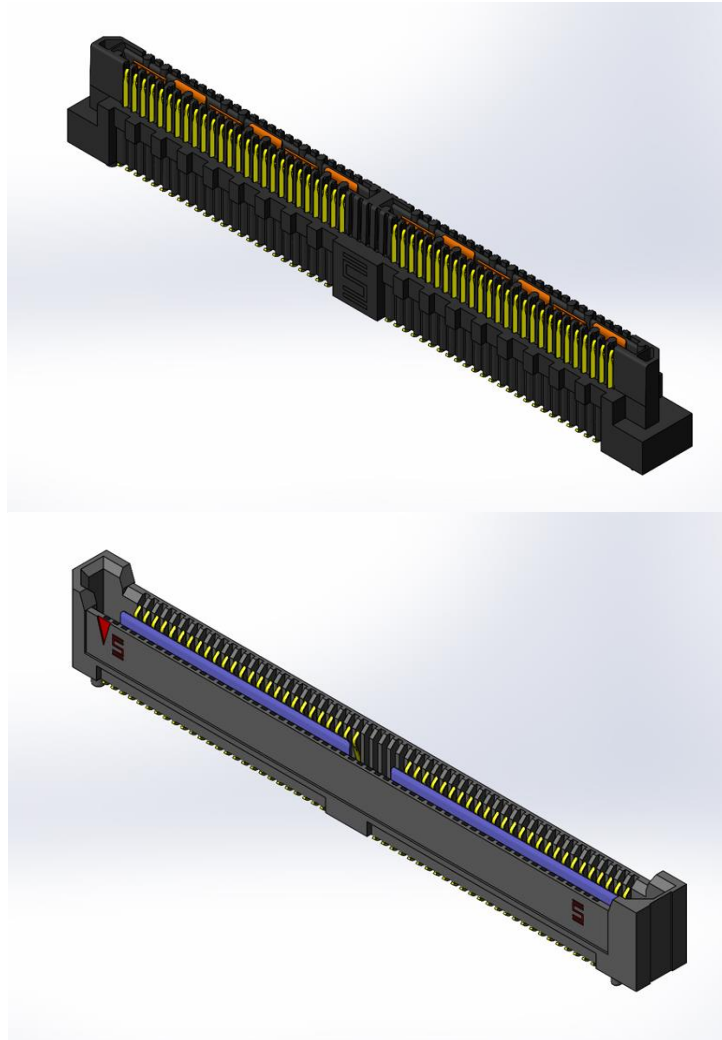




Project Number: Design Qualification Test Report	Tracking Code: CR-1170805_Report_Rev_1
Requested by: Mark Shireman	Date: 2/24/2025
Part #: QRF8-052-05.0-L-D-A/QRM8-052-05.0-L-D-A	
Part description: QRF8-QRM8	Tech: Keney Chen
Test Start: 10/8/2024	Test Completed: 2/10/2025



DESIGN QUALIFICATION TEST REPORT

QRF8/ QRM8

QRF8-052-05.0-L-D-A/QRM8-052-05.0-L-D-A

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
2/19/2025	1	Initial Issue	KC

CERTIFICATION

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

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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-113008-TST-XXX.

FLOWCHARTS

Gas Tight

Group 1

QRF8-052-05.0-L-D-A

QRM8-052-05.0-L-D-A

8 Assemblies

Step	Description
1.	LLCR ⁽²⁾
2.	Gas Tight ⁽¹⁾
3.	LLCR ⁽²⁾ 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

Step	Description
1.	Contact Gaps
2.	Normal Force ⁽¹⁾ Deflection = 0.015 " Expected Force at Max Deflection = 100 g

QRF8-052-05.0-L-D-A

QRM8-052-05.0-L-D-A

8 Contacts Minimum

Signal Without Thermals

Step	Description
1.	Contact Gaps
2.	Normal Force ⁽¹⁾ Deflection = 0.004 " Expected Force at Max Deflection = 50 g

QRF8-052-05.0-L-D-A

QRM8-052-05.0-L-D-A

8 Contacts Minimum

Ground Without Thermals

Step	Description
1.	Contact Gaps
2.	Thermal Age ⁽²⁾
3.	Contact Gaps
4.	Normal Force ⁽¹⁾ Deflection = 0.015 " Expected Force at Max Deflection = 100 g

QRF8-052-05.0-L-D-A

QRM8-052-05.0-L-D-A

8 Contacts Minimum

Signal With Thermals

Step	Description
1.	Contact Gaps
2.	Thermal Age ⁽²⁾
3.	Contact Gaps
4.	Normal Force ⁽¹⁾ Deflection = 0.004 " Expected Force at Max Deflection = 50 g

QRF8-052-05.0-L-D-A

QRM8-052-05.0-L-D-A

8 Contacts Minimum

Ground With Thermals

(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**

QRF8-052-05.0-L-D-A

QRM8-052-05.0-L-D-A

8 Assemblies

Step	Description
1.	Contact Gaps
2.	Mating/Unmating Force ⁽²⁾
3.	LLCR ⁽¹⁾
4.	Thermal Age ⁽³⁾
5.	LLCR ⁽¹⁾ 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**

<u>Group 1</u>		<u>Group 2</u>		<u>Group 3</u>	
QRF8-052-05.0-L-D-A		QRF8-026-05.0-L-D-A		QRF8-078-05.0-L-D-A	
QRM8-052-05.0-L-D-A		QRM8-026-05.0-L-D-A		QRM8-078-05.0-L-D-A	
8 Assemblies		8 Assemblies		8 Assemblies	
Step	Description	Step	Description	Step	Description
1.	Contact Gaps	1.	Contact Gaps	1.	Contact Gaps
2.	LLCR ⁽²⁾	2.	Mating/Unmating Force ⁽³⁾	2.	Mating/Unmating Force ⁽³⁾
3.	Mating/Unmating Force ⁽³⁾	3.	Cycles Quantity = 25 Cycles	3.	Cycles Quantity = 25 Cycles
4.	Cycles Quantity = 25 Cycles	4.	Mating/Unmating Force ⁽³⁾	4.	Mating/Unmating Force ⁽³⁾
5.	Mating/Unmating Force ⁽³⁾	5.	Cycles Quantity = 25 Cycles	5.	Cycles Quantity = 25 Cycles
6.	Cycles Quantity = 25 Cycles	6.	Mating/Unmating Force ⁽³⁾	6.	Mating/Unmating Force ⁽³⁾
7.	Mating/Unmating Force ⁽³⁾	7.	Cycles Quantity = 25 Cycles	7.	Cycles Quantity = 25 Cycles
8.	Cycles Quantity = 25 Cycles	8.	Mating/Unmating Force ⁽³⁾	8.	Mating/Unmating Force ⁽³⁾
9.	Mating/Unmating Force ⁽³⁾	9.	Cycles Quantity = 25 Cycles	9.	Cycles Quantity = 25 Cycles
10.	Cycles Quantity = 25 Cycles	10.	Mating/Unmating Force ⁽³⁾	10.	Mating/Unmating Force ⁽³⁾
11.	Mating/Unmating Force ⁽³⁾				
12.	Contact Gaps				
13.	LLCR ⁽²⁾ Max Delta = 15 mOhm				
14.	Thermal Shock ⁽⁴⁾				
15.	LLCR ⁽²⁾ Max Delta = 15 mOhm				
16.	Humidity ⁽¹⁾				
17.	LLCR ⁽²⁾ 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**

QRF8-052-05.0-L-D-A
QRM8-052-05.0-L-D-A
2 Assemblies

Step	Description
1.	DWV Breakdown ⁽²⁾

Group 2

QRF8-052-05.0-L-D-A

2 Assemblies

Step	Description
1.	DWV Breakdown ⁽²⁾

Group 3

QRM8-052-05.0-L-D-A
2 Assemblies

Step	Description
1.	DWV Breakdown ⁽²⁾

Group 4

QRF8-052-05.0-L-D-A
QRM8-052-05.0-L-D-A
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⁾

Row-to-Row**Group 5**

QRF8-052-05.0-L-D-A
QRM8-052-05.0-L-D-A
2 Assemblies

Step	Description
1.	DWV Breakdown ⁽²⁾

Group 6

QRF8-052-05.0-L-D-A

2 Assemblies

Step	Description
1.	DWV Breakdown ⁽²⁾

Group 7

QRM8-052-05.0-L-D-A
2 Assemblies

Step	Description
1.	DWV Breakdown ⁽²⁾

Group 8

QRF8-052-05.0-L-D-A
QRM8-052-05.0-L-D-A
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⁾

FLOWCHARTS Continued**Pin-to-Ground**Group 9

QRF8-052-05.0-L-D-A
QRM8-052-05.0-L-D-A
2 Assemblies

Step	Description
1.	DWV Breakdown ⁽²⁾

Group 10

QRF8-052-05.0-L-D-A
2 Assemblies

Step	Description
1.	DWV Breakdown ⁽²⁾

Group 11

QRM8-052-05.0-L-D-A
2 Assemblies

Step	Description
1.	DWV Breakdown ⁽²⁾

Group 12

QRF8-052-05.0-L-D-A
QRM8-052-05.0-L-D-A
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**Mechanical Shock/Random Vibration/LLCR**Group 1

QRF8-052-05.0-L-D-A

QRM8-052-05.0-L-D-A

8 Assemblies

Step Description

1. LLCR ⁽¹⁾
2. Mechanical Shock ⁽²⁾
3. Random Vibration ⁽³⁾
4. LLCR ⁽¹⁾
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 DetectionGroup 1

QRF8-052-05.0-L-D-A

QRM8-052-05.0-L-D-A

60 Points

Step Description

1. Nanosecond Event Detection
(Mechanical Shock) ⁽¹⁾
2. Nanosecond Event Detection
(Random Vibration) ⁽²⁾

(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**Current Carrying Capacity**Group 1

QRF8-078-05.0-L-D-A
QRM8-078-05.0-L-D-A
2 Pins Powered
Signal

Step	Description
1.	CCC ⁽²⁾ Rows = 2 Number of Positions = 1

Group 2

QRF8-078-05.0-L-D-A
QRM8-078-05.0-L-D-A
4 Pins Powered
Signal

Step	Description
1.	CCC ⁽²⁾ Rows = 2 Number of Positions = 2

Group 3

QRF8-078-05.0-L-D-A
QRM8-078-05.0-L-D-A
6 Pins Powered
Signal

Step	Description
1.	CCC ⁽²⁾ Rows = 2 Number of Positions = 3

Group 4

QRF8-078-05.0-L-D-A
QRM8-078-05.0-L-D-A
8 Pins Powered
Signal

Step	Description
1.	CCC ⁽²⁾ Rows = 2 Number of Positions = 4

Group 5

QRF8-078-05.0-L-D-A
QRM8-078-05.0-L-D-A
156 Pins Powered
Signal

Step	Description
1.	CCC ⁽²⁾ Rows = 2 Number of Positions = 78

Group 6

QRF8-078-05.0-L-D-A
QRM8-078-05.0-L-D-A
1 Pins Powered
Ground

Step	Description
1.	CCC ⁽²⁾ Rows = 1 Number of Positions = 1

Group 7

QRF8-078-05.0-L-D-A
QRM8-078-05.0-L-D-A
2 Pins Powered
Ground

Step	Description
1.	CCC ⁽²⁾ Rows = 1 Number of Positions = 2

Group 8

QRF8-078-05.0-L-D-A
QRM8-078-05.0-L-D-A
3 Pins Powered
Ground

Step	Description
1.	CCC ⁽²⁾ Rows = 1 Number of Positions = 3

Group 9

QRF8-078-05.0-L-D-A
QRM8-078-05.0-L-D-A

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

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

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.

THERMAL (Thermal aging):

- 1) EIA-364-17, *Temperature Life with or without Electrical Load Test Procedure for Electrical Connectors*.
- 2) Test Condition 4 at 105° C
- 3) Test Time Condition A 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.

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.

MECHANICAL SHOCK (Specified Pulse):

- 1) Reference document: EIA-364-27, *Mechanical Shock Test Procedure for Electrical Connectors*
- 2) Test Condition C
- 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 G² / 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

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.

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

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. $\leq +5.0$ 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

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 three temperature points are reported:
 - a. Ambient
 - b. 85° C
 - c. 95° C
 - d. 115° C
- 8) Typically, neighboring contacts (in close proximity to maximize heat build up) 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

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 TC², 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 TC² software in order to acquire and record the test data.
- 10) The permanent set of each contact shall be measured within the TC² 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.

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

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. $\leq +5.0$ 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° C
 - ix. The final LLCR shall be conducted within 1 hour after drying.

RESULTS

Temperature Rise, CCC at a 20% de-rating

Signal pin

- CCC for a 30°C Temperature Rise -----3.3 A per contact with 2 contacts (2 x 1) powered
- CCC for a 30°C Temperature Rise -----2.5 A per contact with 4 contacts (2 x 2) powered
- CCC for a 30°C Temperature Rise -----2.2 A per contact with 6 contacts (2 x 3) powered
- CCC for a 30°C Temperature Rise -----1.7 A per contact with 8 contacts (2 x 4) powered
- CCC for a 30°C Temperature Rise -----0.7 A per contact with 156 contacts (2 x 78) powered

Ground pin

- CCC for a 30°C Temperature Rise -----23.0 A per contact with 1 contacts (1 x 1) powered
- CCC for a 30°C Temperature Rise -----18.9 A per contact with 2 contacts (1 x 2) powered
- CCC for a 30°C Temperature Rise -----18.3 A per contact with 3 contacts (1 x 3) powered

All Signal (0.5A per contact)and Ground pin

- CCC for a 30°C Temperature Rise -----17.5 A per contact with 3 contacts (1 x 3) powered

Mating/Unmating Forces

Thermal Aging Group

Initial

- Mating
 - Min ----- 4.31 Lbs
 - Max----- 5.79 Lbs
- Unmating
 - Min ----- 3.87 Lbs
 - Max----- 5.04 Lbs
- After Thermal
 - Mating
 - Min ----- 2.22 Lbs
 - Max----- 3.15 Lbs
 - Unmating
 - Min ----- 1.76 Lbs
 - Max----- 2.32 Lbs

RESULTS Continued**Mating/Unmating Forces****Mating-Unmating Durability**

- **Initial**
 - **Mating**
 - **Min** ----- 3.65 Lbs
 - **Max** ----- 5.40 Lbs
 - **Unmating**
 - **Min** ----- 3.21 Lbs
 - **Max** ----- 4.27 Lbs
- **After 25 Cycles**
 - **Mating**
 - **Min** ----- 3.83 Lbs
 - **Max** ----- 5.66 Lbs
 - **Unmating**
 - **Min** ----- 3.51 Lbs
 - **Max** ----- 4.94 Lbs
- **After 50 Cycles**
 - **Mating**
 - **Min** ----- 4.01 Lbs
 - **Max** ----- 5.88 Lbs
 - **Unmating**
 - **Min** ----- 3.74 Lbs
 - **Max** ----- 5.18 Lbs
- **After 75 Cycles**
 - **Mating**
 - **Min** ----- 4.15 Lbs
 - **Max** ----- 6.15 Lbs
 - **Unmating**
 - **Min** ----- 3.91 Lbs
 - **Max** ----- 5.43 Lbs
- **After 100 Cycles**
 - **Mating**
 - **Min** ----- 4.34 Lbs
 - **Max** ----- 6.35 Lbs
 - **Unmating**
 - **Min** ----- 4.02 Lbs
 - **Max** ----- 5.61 Lbs
- **Humidity**
 - **Mating**
 - **Min** ----- 2.36 Lbs
 - **Max** ----- 2.72 Lbs
 - **Unmating**
 - **Min** ----- 1.75 Lbs
 - **Max** ----- 2.23 Lbs

RESULTS Continued**Mating/Unmating Forces****Mating-Unmating Basic (QRF8-026-05.0-L-D-A/QRM8-026-05.0-L-D-A)**

- **Initial**
 - **Mating**
 - **Min** ----- 1.81 Lbs
 - **Max** ----- 2.44 Lbs
 - **Unmating**
 - **Min** ----- 1.62 Lbs
 - **Max** ----- 1.95 Lbs
- **After 25 Cycles**
 - **Mating**
 - **Min** ----- 1.87 Lbs
 - **Max** ----- 2.57 Lbs
 - **Unmating**
 - **Min** ----- 1.90 Lbs
 - **Max** ----- 2.23 Lbs
- **After 50 Cycles**
 - **Mating**
 - **Min** ----- 2.14 Lbs
 - **Max** ----- 2.66 Lbs
 - **Unmating**
 - **Min** ----- 1.91 Lbs
 - **Max** ----- 2.19 Lbs
- **After 75 Cycles**
 - **Mating**
 - **Min** ----- 2.18 Lbs
 - **Max** ----- 2.75 Lbs
 - **Unmating**
 - **Min** ----- 1.93 Lbs
 - **Max** ----- 2.25 Lbs
- **After 100 Cycles**
 - **Mating**
 - **Min** ----- 2.18 Lbs
 - **Max** ----- 2.86 Lbs
 - **Unmating**
 - **Min** ----- 1.97 Lbs
 - **Max** ----- 2.35 Lbs

RESULTS Continued**Mating/Unmating Forces****Mating-Unmating Basic (QRF8-078-05.0-L-D-A/QRM8-078-05.0-L-D-A)**

- **Initial**
 - **Mating**
 - **Min** ----- 5.50 Lbs
 - **Max** ----- 7.42 Lbs
 - **Unmating**
 - **Min** ----- 3.34 Lbs
 - **Max** ----- 4.98 Lbs
- **After 25 Cycles**
 - **Mating**
 - **Min** ----- 4.94 Lbs
 - **Max** ----- 7.01 Lbs
 - **Unmating**
 - **Min** ----- 3.70 Lbs
 - **Max** ----- 5.20 Lbs
- **After 50 Cycles**
 - **Mating**
 - **Min** ----- 4.99 Lbs
 - **Max** ----- 6.90 Lbs
 - **Unmating**
 - **Min** ----- 3.77 Lbs
 - **Max** ----- 5.42 Lbs
- **After 75 Cycles**
 - **Mating**
 - **Min** ----- 5.09 Lbs
 - **Max** ----- 6.99 Lbs
 - **Unmating**
 - **Min** ----- 3.93 Lbs
 - **Max** ----- 5.57 Lbs
- **After 100 Cycles**
 - **Mating**
 - **Min** ----- 5.20 Lbs
 - **Max** ----- 7.08 Lbs
 - **Unmating**
 - **Min** ----- 4.07 Lbs
 - **Max** ----- 5.71 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 ----- 45000 Meg 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 ----- 45000 Meg 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 ----- 45000 Meg Ω ----- Passed
- **Humidity**
 - Mated -----45000 Meg Ω ----- Passed
 - Unmated -----45000 Meg Ω ----- Passed

Dielectric Withstanding Voltage minimums, DWV

- **Minimums**
 - Breakdown Voltage -----918 VAC
 - Test Voltage -----689 VAC
 - Working Voltage ----- 230 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

RESULTS Continued**LLCR Thermal Aging Group (192 signal LLCR test points)**

- **Initial** ----- 19.16 mOhms Max
- **Thermal**
 - **<= +5.0 mOhms** ----- 185 Points ----- Stable
 - **+5.1 to +10.0 mOhms** ----- 7 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 Gas Tight Group (192 signal LLCR test points)

- **Initial** ----- 20.54 mOhms Max
- **Acid Vapor and Thermal**
 - **<= +5.0 mOhms** ----- 192 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 (192 signal LLCR test points)**

- **Initial** ----- 19.67 mOhms Max
- **Durability, 100 Cycles**
 - **<= +5.0 mOhms** ----- 192 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** ----- 186 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
- **Humidity**
 - **<= +5.0 mOhms** ----- 185 Points ----- Stable
 - **+5.1 to +10.0 mOhms** ----- 7 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 Shock & Vibration Group (192 signal LLCR test points)

- **Initial** ----- 18.65 mOhms Max
- **Shock & Vibration**
 - **<= +5.0 mOhms** ----- 192 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

Mechanical Shock & Random Vibration:

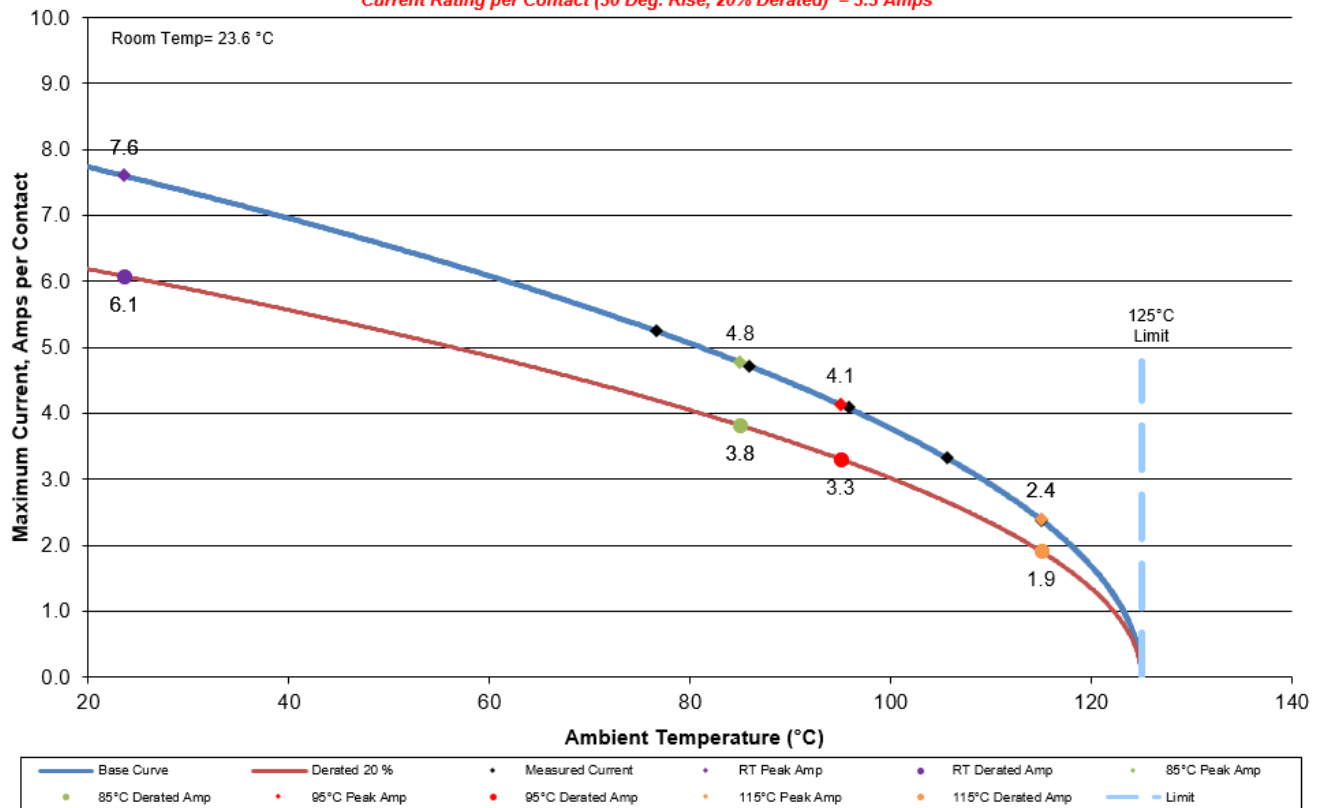
- **Shock**
 - **No Damage**----- Pass
 - **50 Nanoseconds**----- Pass
- **Vibration**
 - **No Damage**----- Pass
 - **50 Nanoseconds**----- Pass

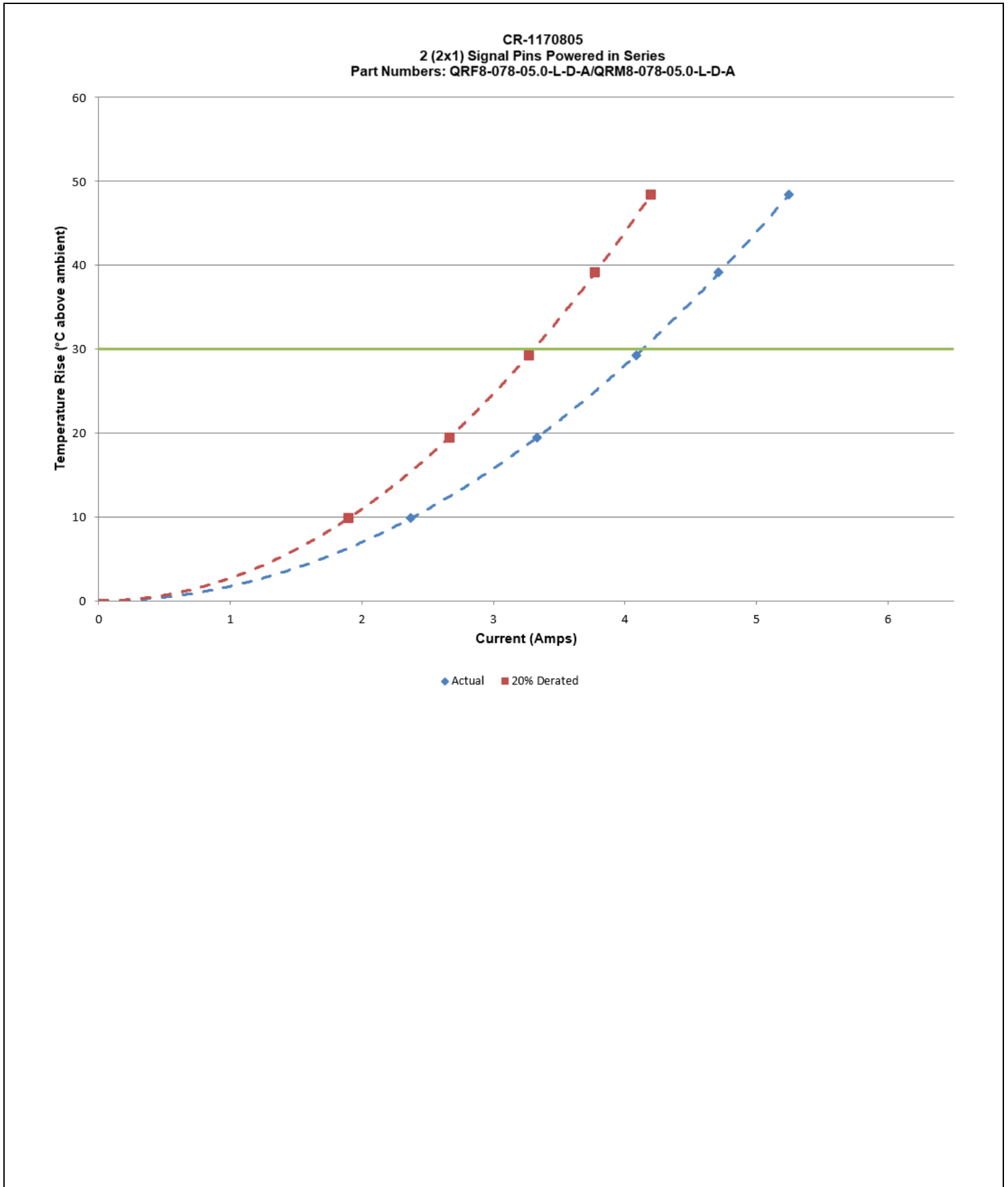
DATA SUMMARIES

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:
 - a. Linear configuration with 2 adjacent signal conductors/contacts powered

CR-1170805
2 (2x1) Signal Pins Powered in Series
Part Numbers: QRF8-078-05.0-L-D-A/QRM8-078-05.0-L-D-A
Current Rating per Contact (30 Deg. Rise, 20% Derated) = 3.3 Amps



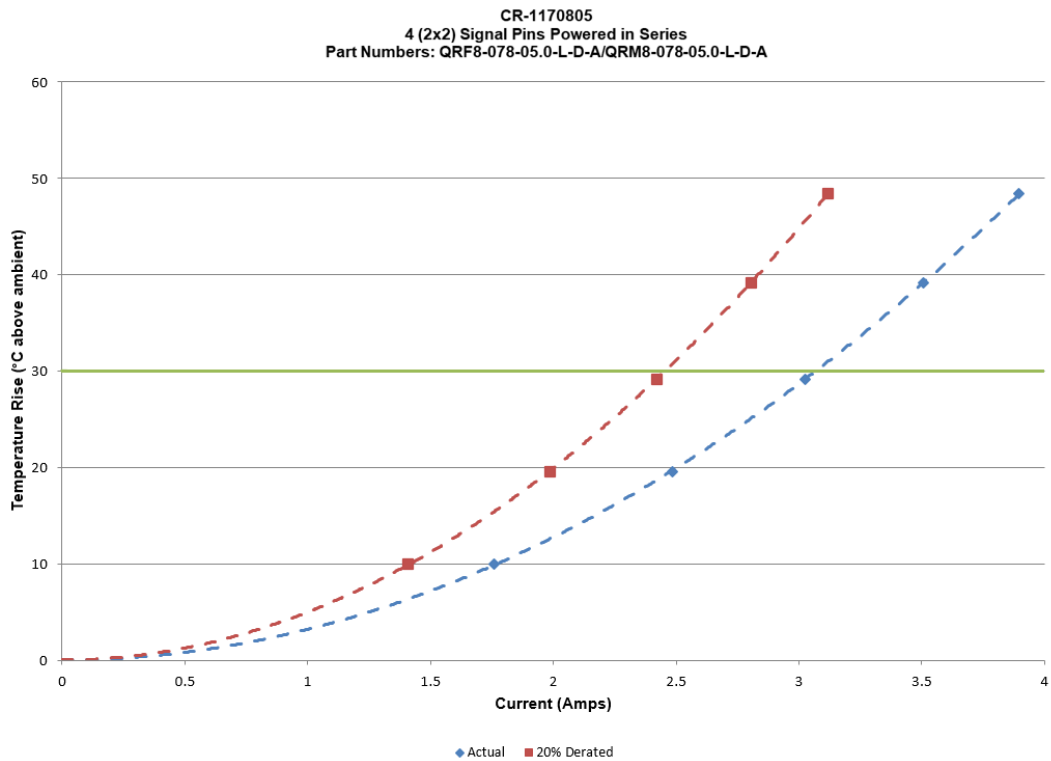
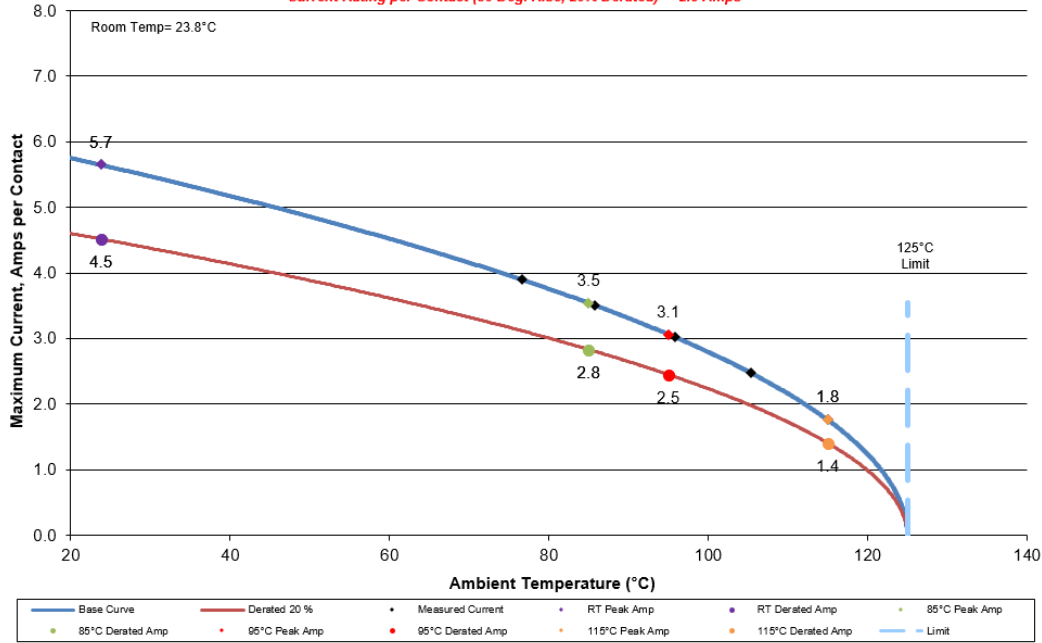


DATA SUMMARIES Continued

b. Linear configuration with 4 adjacent signal conductors/contacts powered

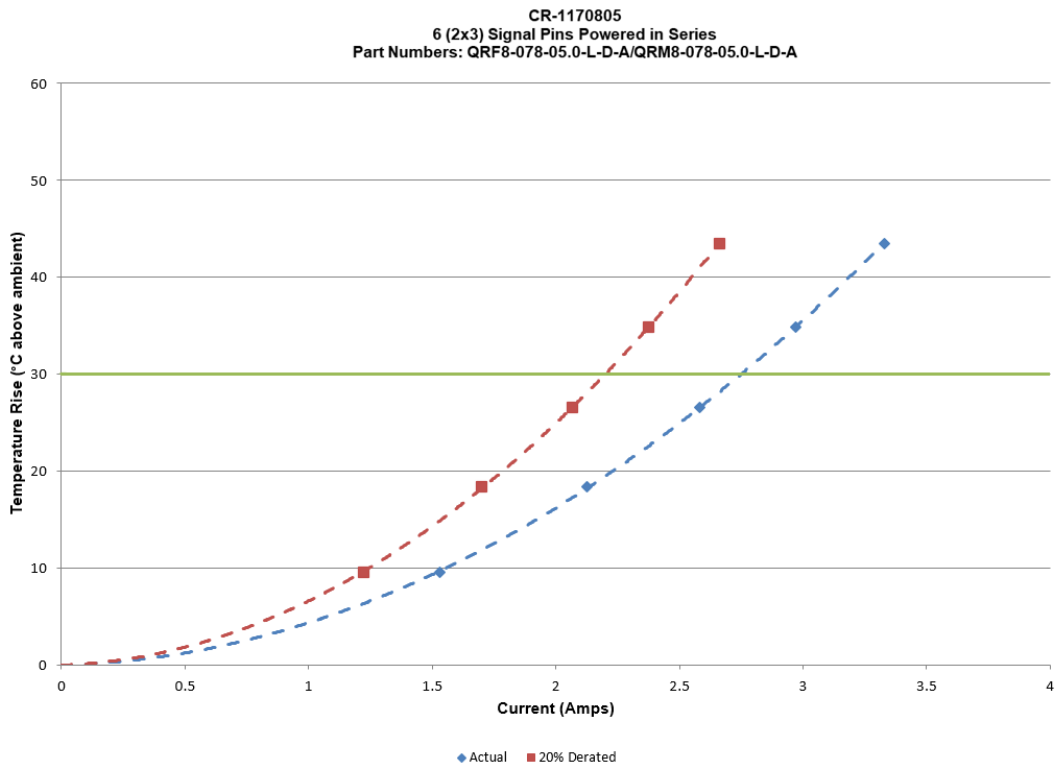
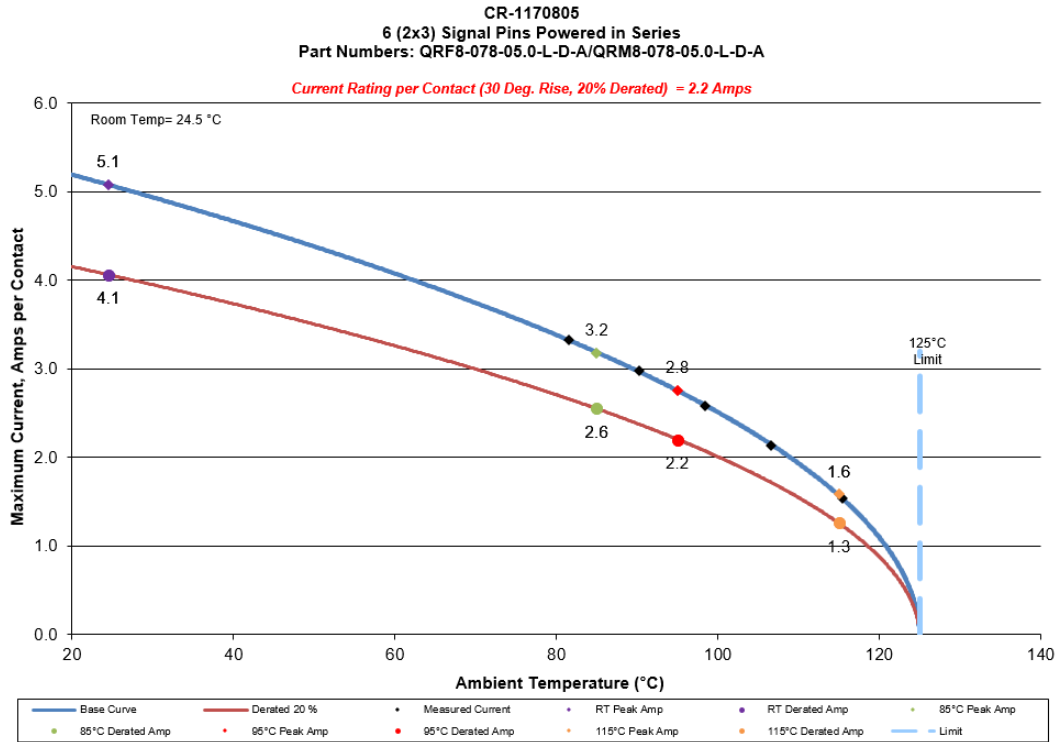
CR-1170805
 4 (2x2) Signal Pins Powered in Series
 Part Numbers: QRF8-078-05.0-L-D-A/QRM8-078-05.0-L-D-A

Current Rating per Contact (30 Deg. Rise, 20% Derated) = 2.5 Amps



DATA SUMMARIES Continued

c. Linear configuration with 6 adjacent signal conductors/contacts powered

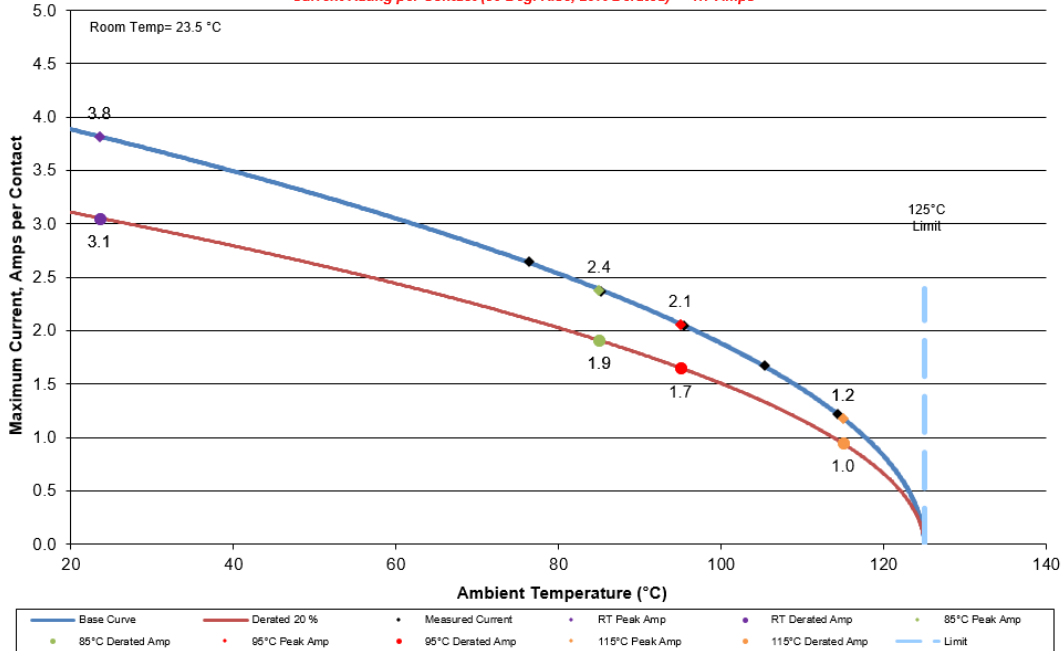


DATA SUMMARIES Continued

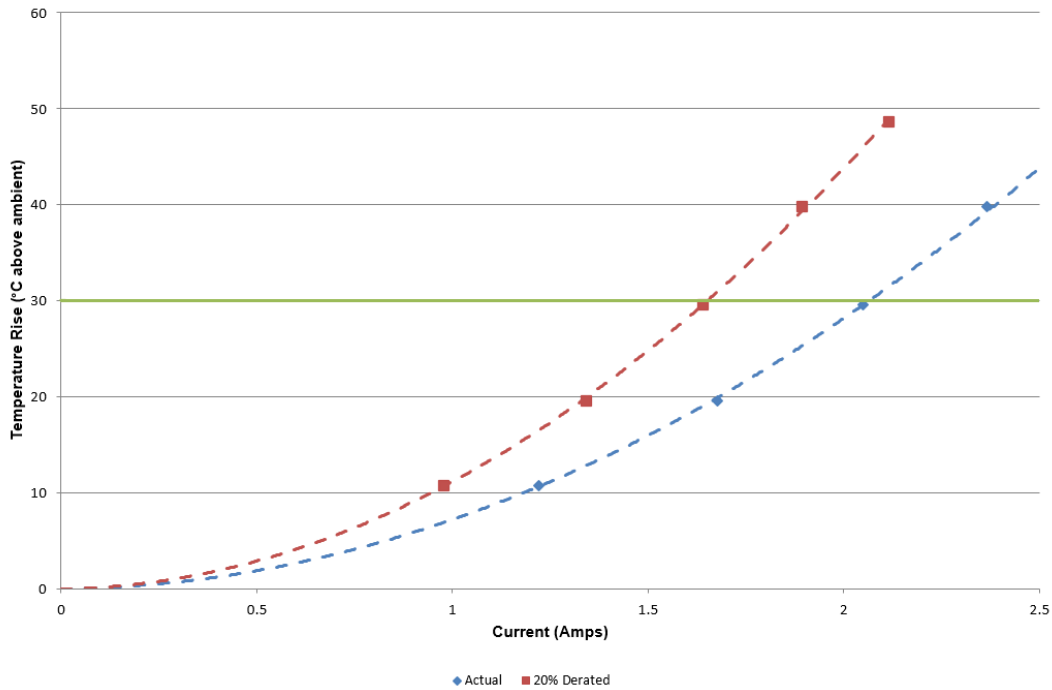
d. Linear configuration with 8 adjacent signal conductors/contacts powered

CR-1170805
 8 (2x4) Signal Pins Powered in Series
 Part Numbers: QRF8-078-05.0-L-D-A/QRM8-078-05.0-L-D-A

Current Rating per Contact (30 Deg. Rise, 20% Derated) = 1.7 Amps

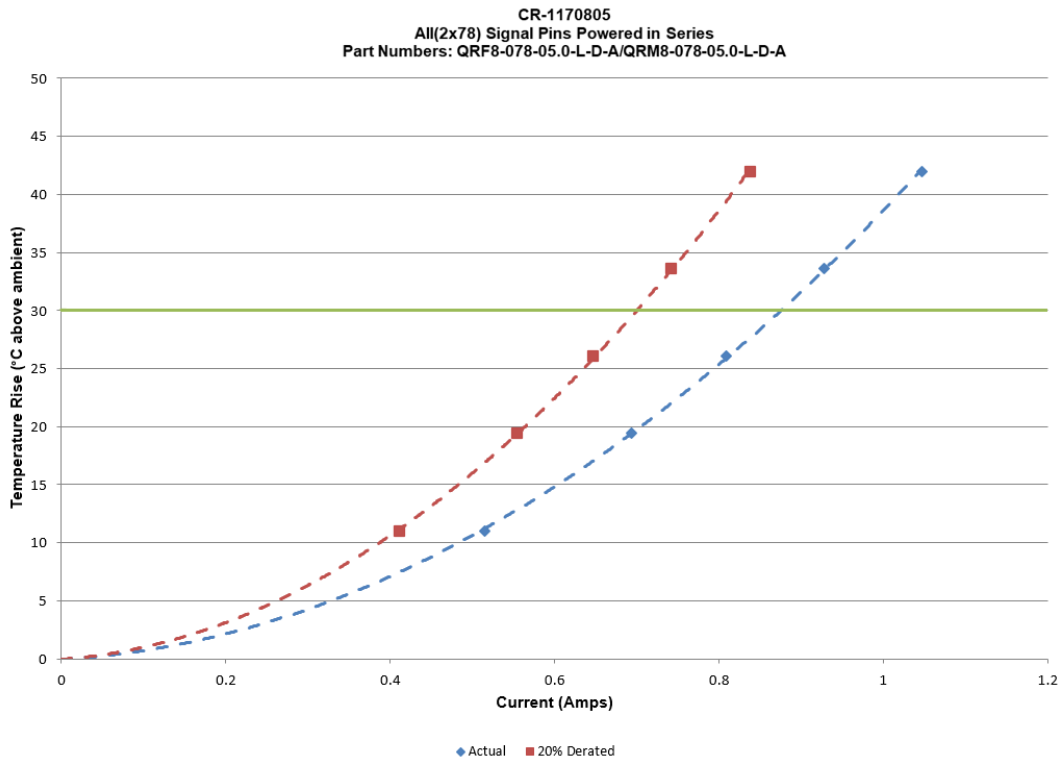
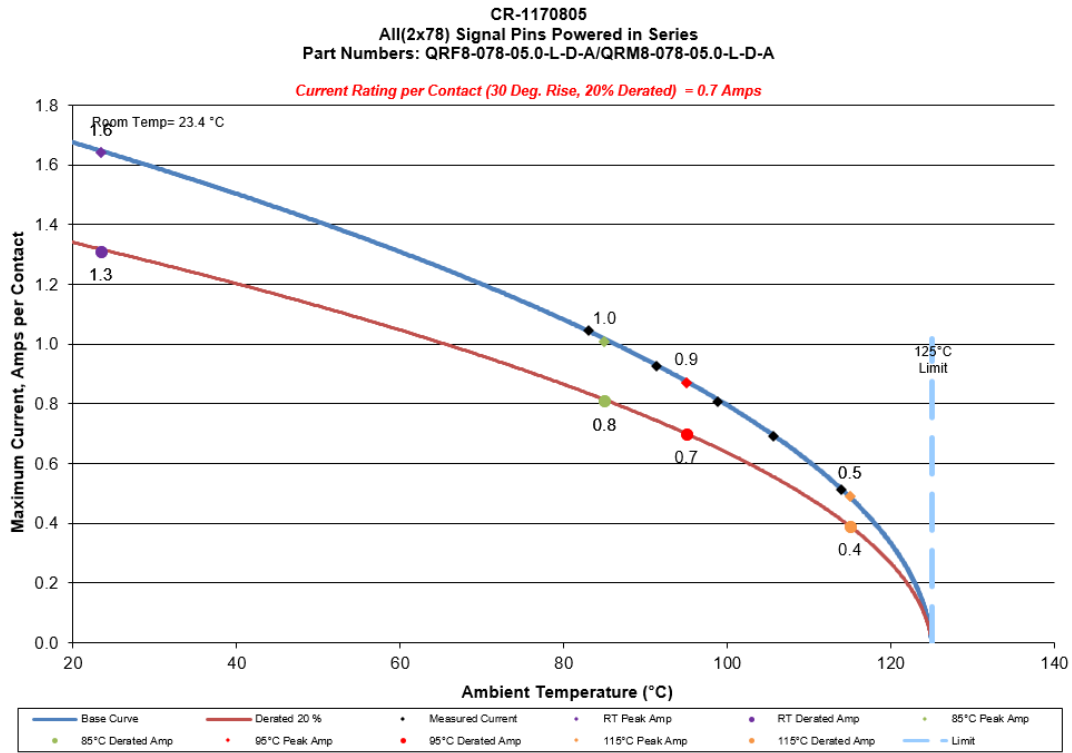


CR-1170805
 8 (2x4) Signal Pins Powered in Series
 Part Numbers: QRF8-078-05.0-L-D-A/QRM8-078-05.0-L-D-A



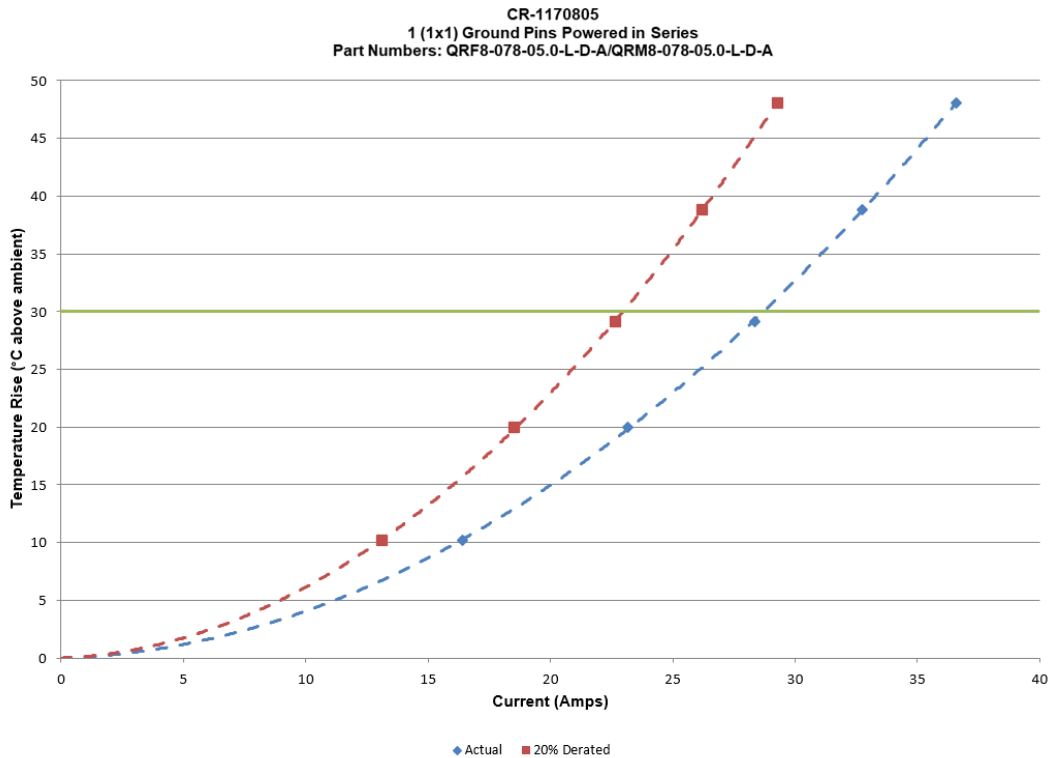
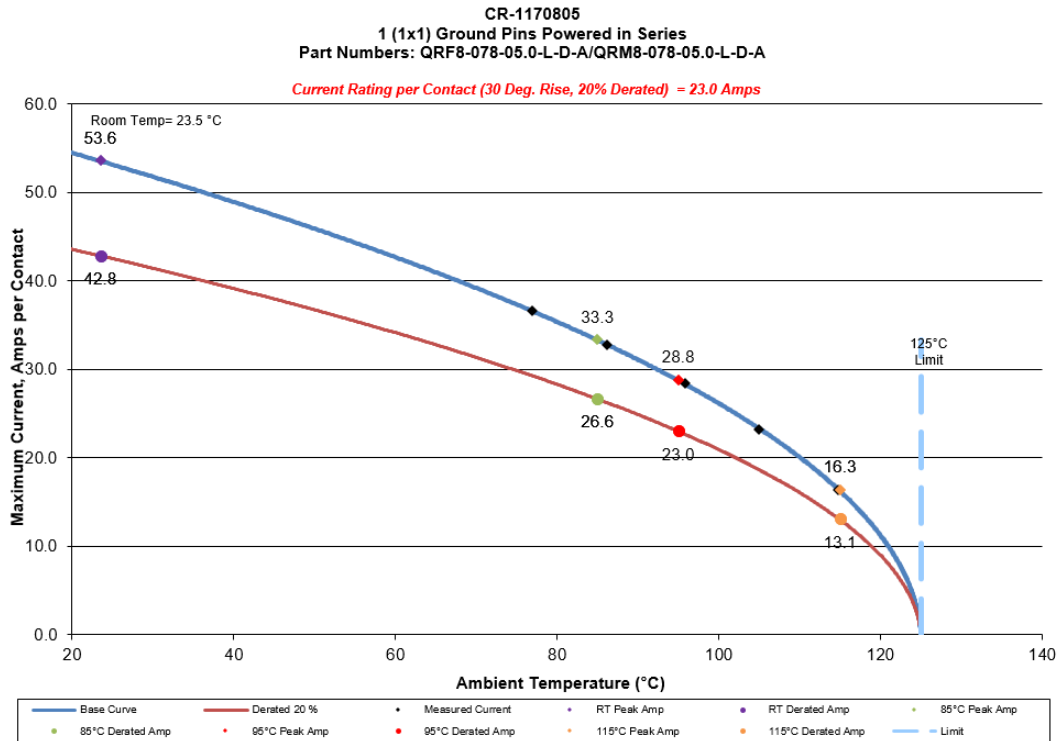
DATA SUMMARIES Continued

e. Linear configuration with all adjacent signal conductors/contacts powered



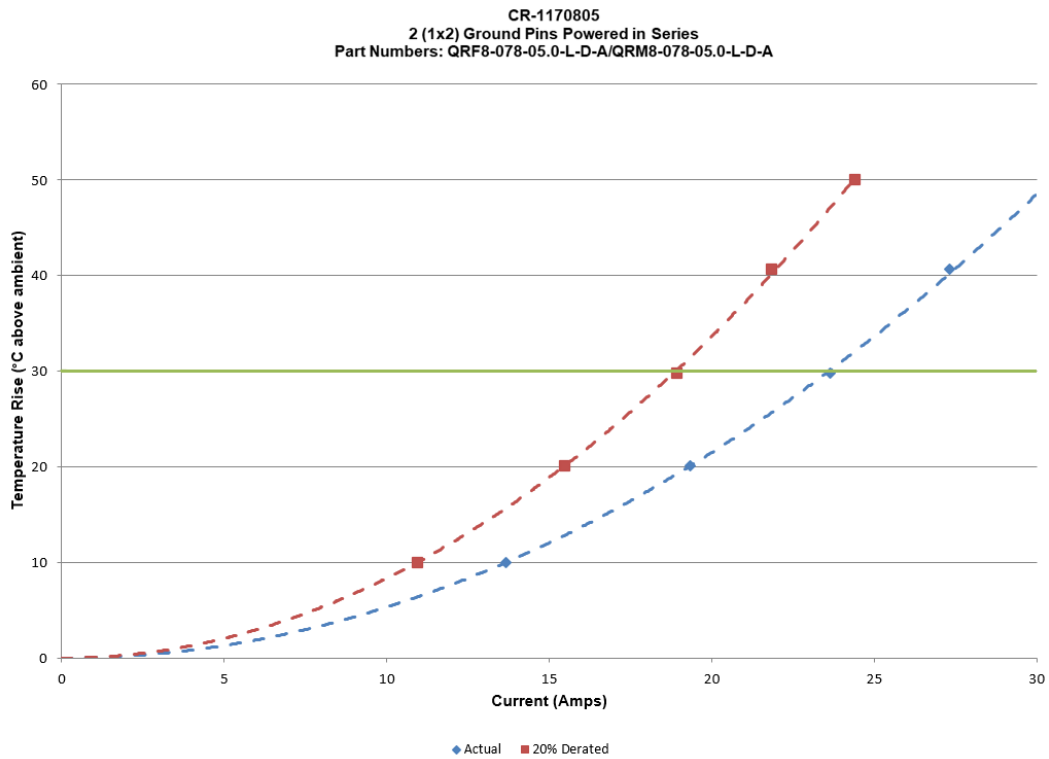
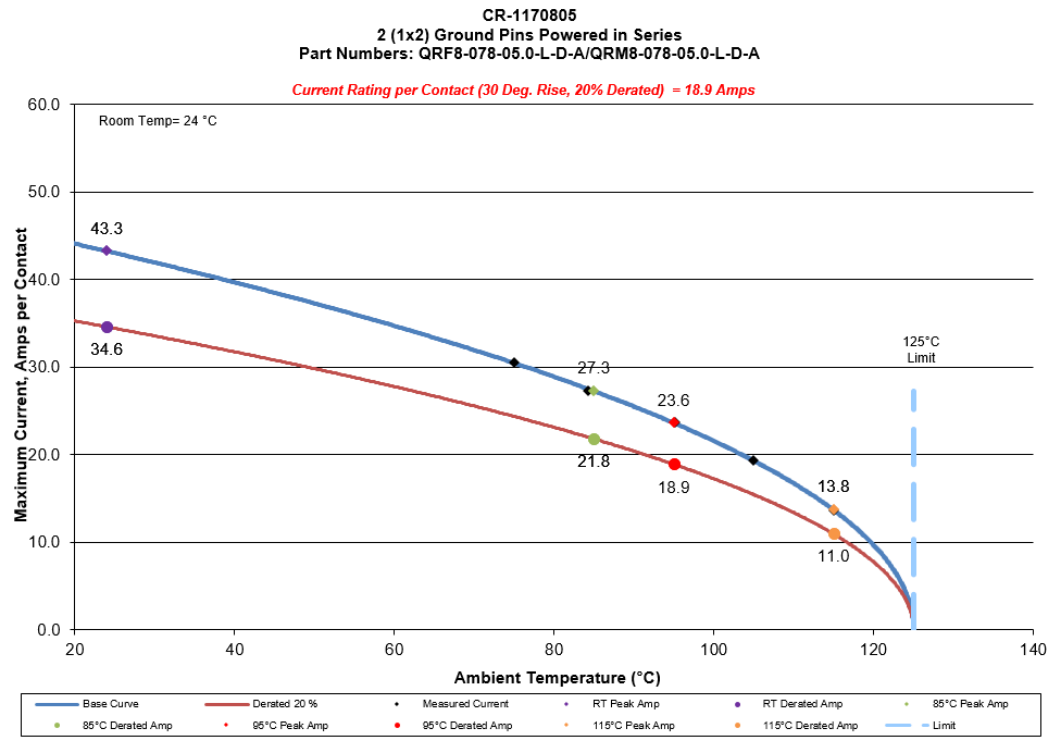
DATA SUMMARIES Continued

f. Linear configuration with 1 adjacent ground conductors/contacts powered



DATA SUMMARIES Continued

g. Linear configuration with 2 adjacent ground conductors/contacts powered

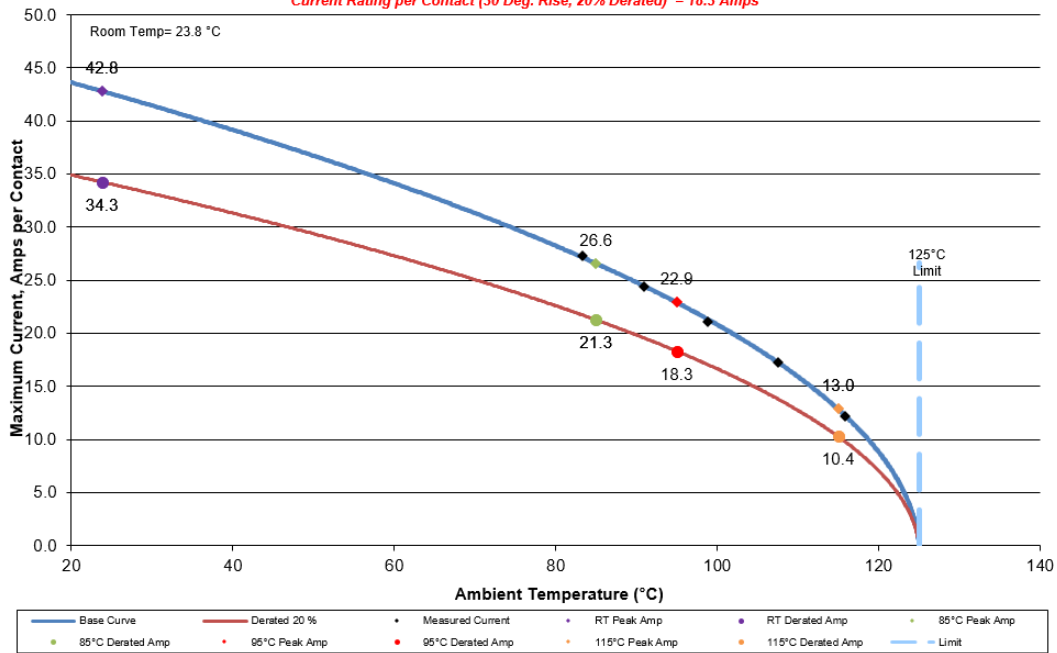


DATA SUMMARIES Continued

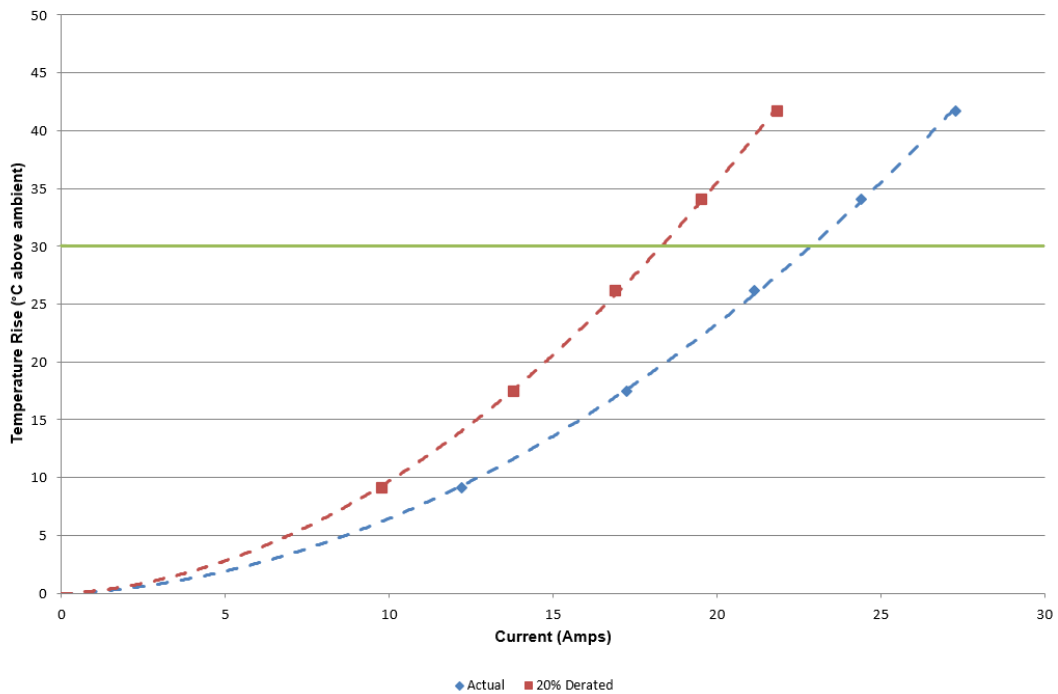
h. Linear configuration with 3 adjacent ground conductors/contacts powered

CR-1170805
 3 (1x3) Ground Pins Powered in Series
 Part Numbers: QRF8-078-05.0-L-D-A/QRM8-078-05.0-L-D-A

Current Rating (30 Deg. Rise, 20% Derated) = 18.3 Amps



CR-1170805
 3 (1x3) Ground Pins Powered in Series
 Part Numbers: QRF8-078-05.0-L-D-A/QRM8-078-05.0-L-D-A



DATA SUMMARIES Continued

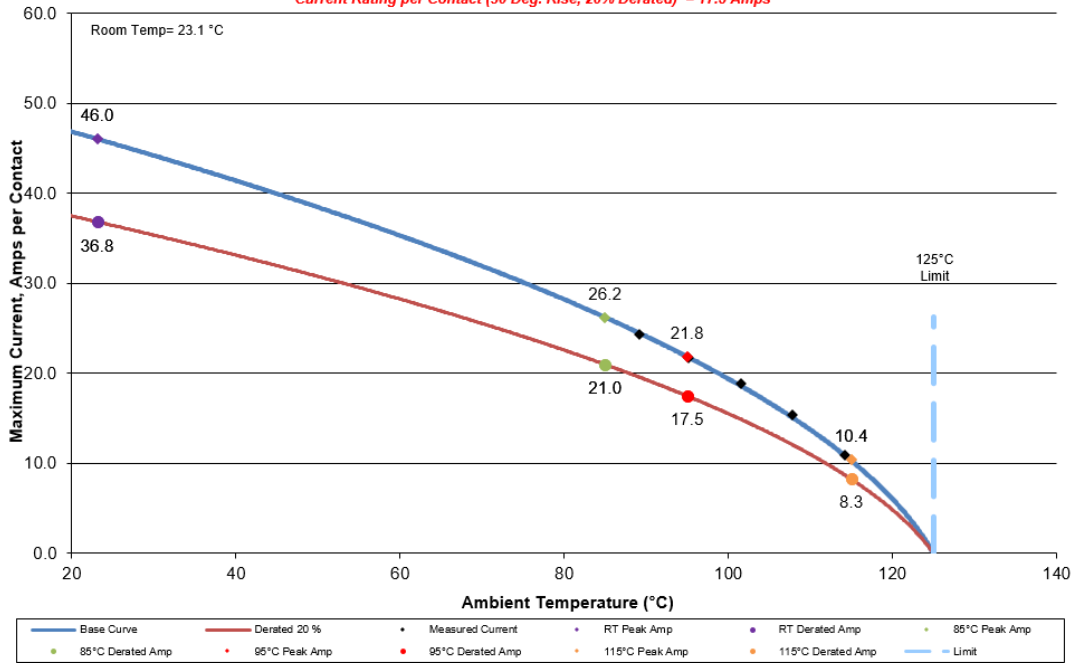
i. Linear configuration with All adjacent signal and ground conductors/contacts powered

CR-1170805

Signal and Ground Pins Powered in Series

Part Numbers: QRF8-078-05.0-L-D-A/QRM8-078-05.0-L-D-A

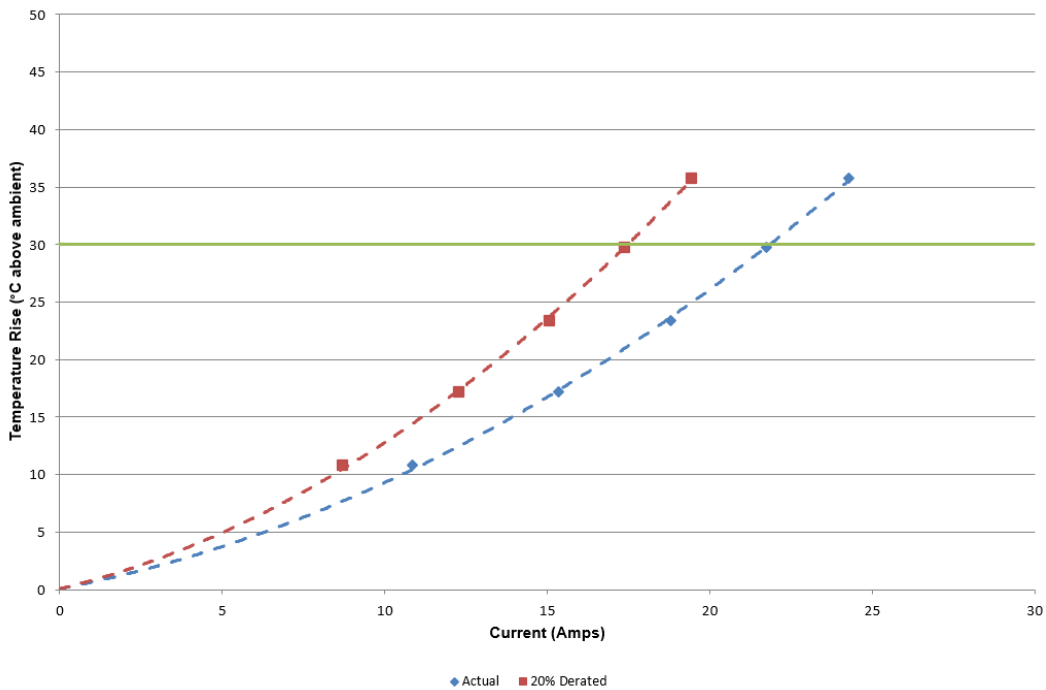
Current Rating per Contact (30 Deg. Rise, 20% Derated) = 17.5 Amps



CR-1170805

Signal and Ground Pins Powered in Series

Part Numbers: QRF8-078-05.0-L-D-A/QRM8-078-05.0-L-D-A



DATA SUMMARIES Continued**MATING-UNMATING FORCE:****Thermal Aging Group**

	Initial				After Thermals			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	19.17	4.31	17.21	3.87	9.87	2.22	7.83	1.76
Maximum	25.75	5.79	22.42	5.04	14.01	3.15	10.32	2.32
Average	22.23	5.00	18.99	4.27	11.93	2.68	8.92	2.01
St Dev	2.40	0.54	1.74	0.39	1.74	0.39	0.87	0.19
Count	8	8	8	8	8	8	8	8

Mating-Unmating Durability Group

	Initial				25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	16.24	3.65	14.28	3.21	17.04	3.83	15.61	3.51
Maximum	24.02	5.40	18.99	4.27	25.18	5.66	21.97	4.94
Average	19.79	4.45	16.18	3.64	20.99	4.72	17.81	4.01
St Dev	2.90	0.65	1.60	0.36	2.95	0.66	2.11	0.47
Count	8	8	8	8	8	8	8	8
	50 Cycles				75 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	17.84	4.01	16.64	3.74	18.46	4.15	17.39	3.91
Maximum	26.15	5.88	23.04	5.18	27.36	6.15	24.15	5.43
Average	21.46	4.83	18.62	4.19	22.22	5.00	19.44	4.37
St Dev	3.04	0.68	2.21	0.50	3.23	0.73	2.34	0.53
Count	8	8	8	8	8	8	8	8
	100 Cycles				After Humidity			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	19.30	4.34	17.88	4.02	10.50	2.36	7.78	1.75
Maximum	28.24	6.35	24.95	5.61	12.10	2.72	9.92	2.23
Average	23.07	5.19	20.17	4.54	11.21	2.52	8.98	2.02
St Dev	3.26	0.73	2.42	0.55	0.54	0.12	0.66	0.15
Count	8	8	8	8	8	8	8	8

DATA SUMMARIES Continued**MATING-UNMATING FORCE:****Mating-Unmating Basic (QRF8-026-05.0-L-D-A/QRM8-026-05.0-L-D-A)**

	Initial				25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	8.05	1.81	7.21	1.62	8.32	1.87	8.45	1.90
Maximum	10.85	2.44	8.67	1.95	11.43	2.57	9.92	2.23
Average	9.49	2.13	8.07	1.82	10.13	2.28	9.14	2.06
St Dev	0.91	0.20	0.50	0.11	1.03	0.23	0.53	0.12
Count	8	8	8	8	8	8	8	8
	50 Cycles				75 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	9.52	2.14	8.50	1.91	9.70	2.18	8.58	1.93
Maximum	11.83	2.66	9.74	2.19	12.23	2.75	10.01	2.25
Average	10.54	2.37	9.27	2.08	10.80	2.43	9.47	2.13
St Dev	0.86	0.19	0.54	0.12	0.92	0.21	0.60	0.14
Count	8	8	8	8	8	8	8	8
	100 Cycles							
	Mating		Unmating					
	Newton's	Force (Lbs)	Newton's	Force (Lbs)				
Minimum	9.70	2.18	8.76	1.97				
Maximum	12.72	2.86	10.45	2.35				
Average	11.10	2.50	9.87	2.22				
St Dev	1.01	0.23	0.58	0.13				
Count	8	8	8	8				

DATA SUMMARIES Continued**MATING-UNMATING FORCE:****Mating-Unmating Basic (QRF8-078-05.0-L-D-A/QRM8-078-05.0-L-D-A)**

	Initial				25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	24.46	5.50	14.86	3.34	21.97	4.94	16.46	3.70
Maximum	33.00	7.42	22.15	4.98	31.18	7.01	23.13	5.20
Average	27.63	6.21	19.15	4.31	25.65	5.77	20.17	4.53
St Dev	2.91	0.65	2.21	0.50	3.29	0.74	2.31	0.52
Count	8	8	8	8	8	8	8	8
	50 Cycles				75 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	22.20	4.99	16.77	3.77	22.64	5.09	17.48	3.93
Maximum	30.69	6.90	24.11	5.42	31.09	6.99	24.78	5.57
Average	25.78	5.80	20.95	4.71	26.19	5.89	21.74	4.89
St Dev	2.94	0.66	2.53	0.57	2.89	0.65	2.55	0.57
Count	8	8	8	8	8	8	8	8
	100 Cycles							
	Mating		Unmating					
	Newton's	Force (Lbs)	Newton's	Force (Lbs)				
Minimum	23.13	5.20	18.10	4.07				
Maximum	31.49	7.08	25.40	5.71				
Average	26.69	6.00	22.31	5.02				
St Dev	2.82	0.63	2.60	0.58				
Count	8	8	8	8				

DATA SUMMARIES Continued

NORMAL FORCE (FOR CONTACTS TESTED IN THE HOUSING):

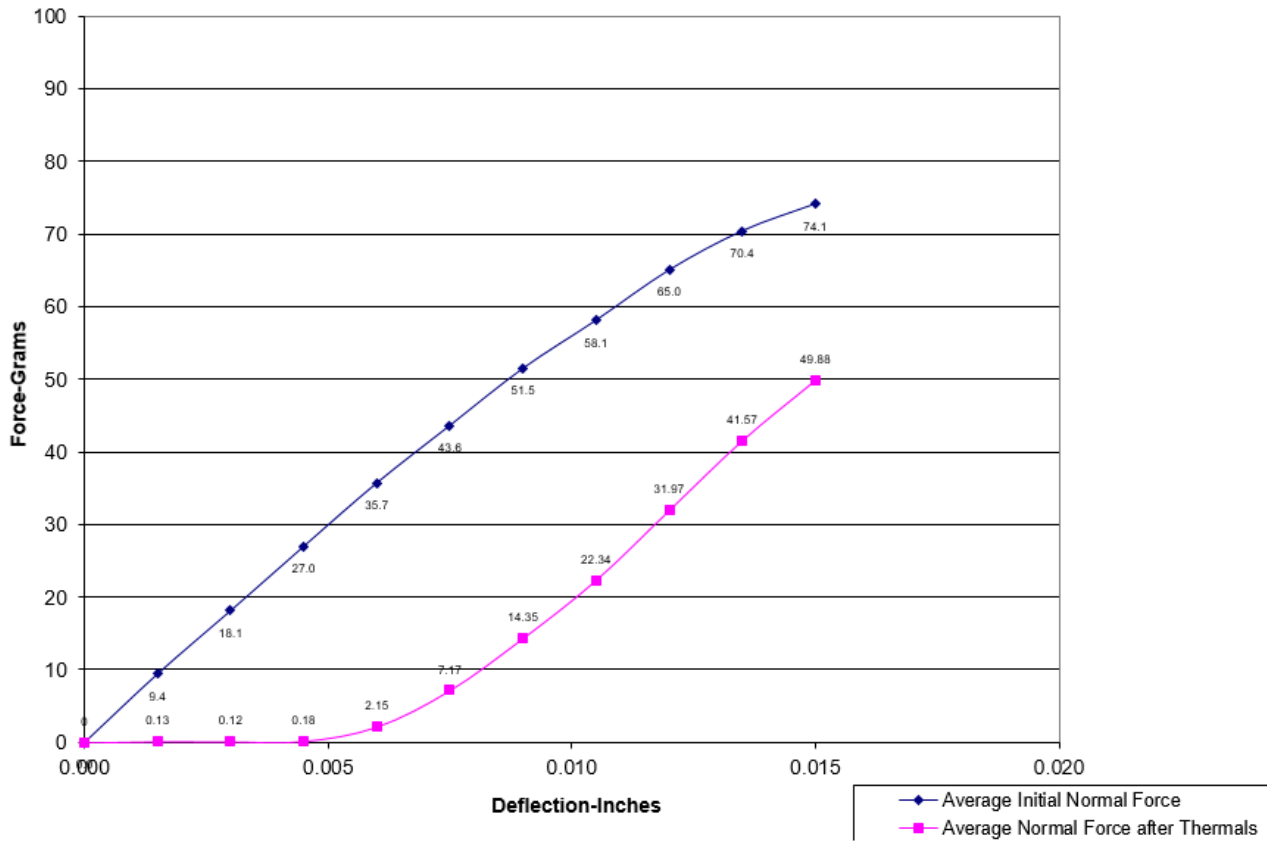
- 1) Calibrated force gauges are used along with computer controlled positioning equipment.
- 2) For Normal force 8-10 measurements are taken and the averages reported.

Signal Pin:

Initial	Deflections in inches Forces in Grams										
	<u>0.0015</u>	<u>0.0030</u>	<u>0.0045</u>	<u>0.0060</u>	<u>0.0075</u>	<u>0.0090</u>	<u>0.0105</u>	<u>0.0120</u>	<u>0.0135</u>	<u>0.0150</u>	<i>SET</i>
Averages	9.43	18.13	26.98	35.69	43.60	51.46	58.07	64.98	70.35	74.07	0.0017
Min	7.50	16.30	25.10	33.20	39.90	46.20	51.30	56.90	61.10	65.30	0.0013
Max	10.30	19.50	28.80	38.00	46.70	55.70	63.60	71.60	77.50	81.30	0.0020
St. Dev	0.783	0.933	1.091	1.350	1.698	2.307	3.065	3.762	4.335	3.969	0.0003
Count	12	12	12	12	12	12	12	12	12	12	12

After Thermals	Deflections in inches Forces in Grams										
	<u>0.0015</u>	<u>0.0030</u>	<u>0.0045</u>	<u>0.0060</u>	<u>0.0075</u>	<u>0.0090</u>	<u>0.0105</u>	<u>0.0120</u>	<u>0.0135</u>	<u>0.0150</u>	<i>SET</i>
Averages	0.13	0.12	0.18	2.15	7.17	14.35	22.34	31.97	41.57	49.88	0.0061
Min	0.00	-0.10	0.00	0.00	1.90	8.60	15.10	23.70	33.90	43.10	0.0053
Max	0.30	0.30	0.60	6.10	11.90	19.50	28.00	37.90	47.40	57.20	0.0075
St. Dev	0.144	0.147	0.186	1.943	3.311	3.836	4.508	4.879	4.854	4.725	0.0007
Count	12	12	12	12	12	12	12	12	12	12	12

Normal Force - Average Initial vs Average Thermal



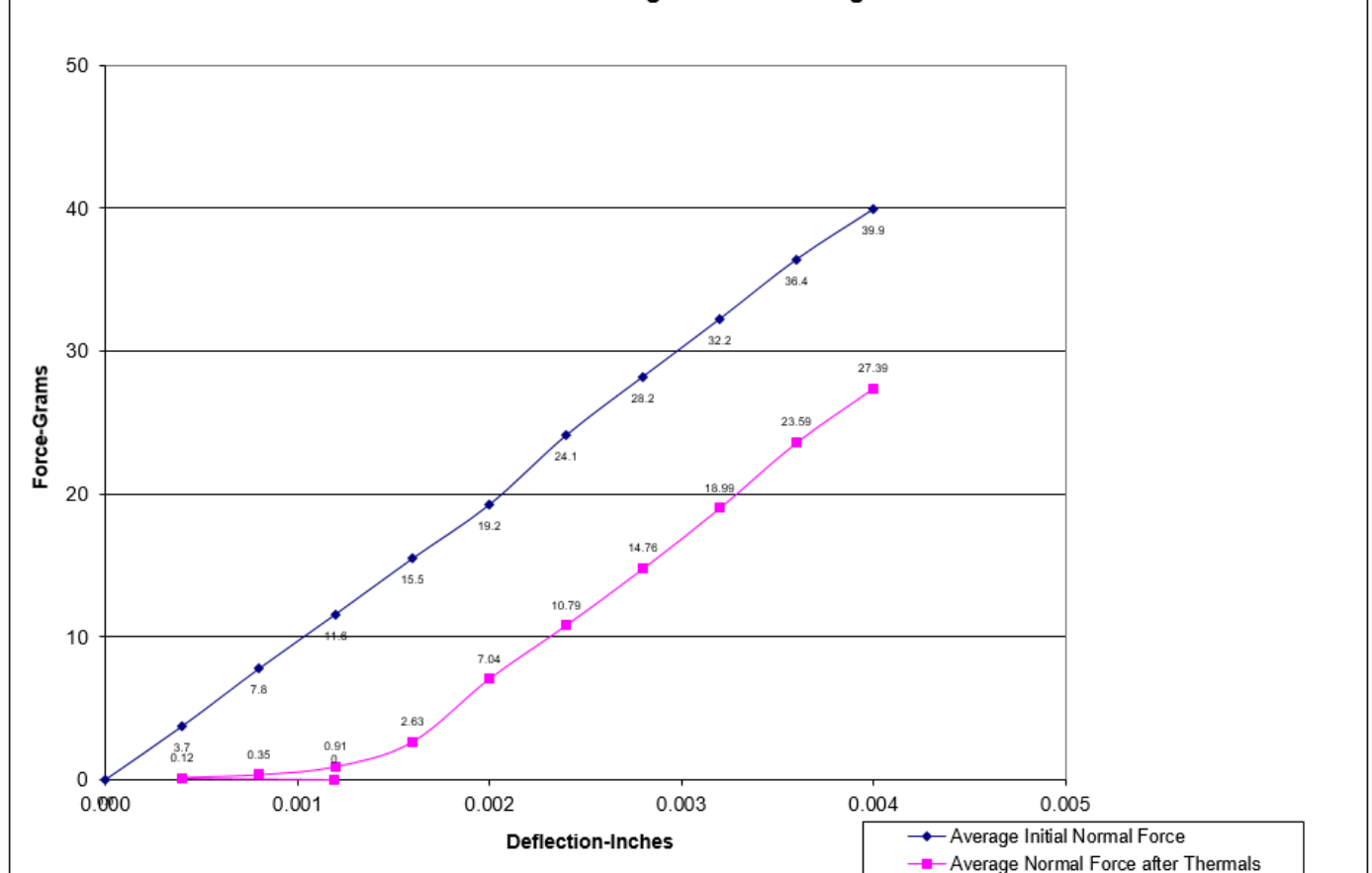
DATA SUMMARIES Continued**NORMAL FORCE (FOR CONTACTS TESTED IN THE HOUSING):**

- 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.

Ground Pin:

Initial	Deflections in inches Forces in Grams										
	<u>0.0004</u>	<u>0.0008</u>	<u>0.0012</u>	<u>0.0016</u>	<u>0.0020</u>	<u>0.0024</u>	<u>0.0028</u>	<u>0.0032</u>	<u>0.0036</u>	<u>0.0040</u>	<i>SET</i>
Averages	3.74	7.77	11.58	15.48	19.24	24.10	28.21	32.24	36.42	39.93	0.0002
Min	1.50	3.90	7.70	10.80	14.30	18.00	22.40	26.40	30.70	34.20	-0.0001
Max	5.60	10.80	14.90	20.00	25.70	30.30	34.70	39.70	45.40	48.10	0.0013
St. Dev	1.148	2.016	2.146	2.653	2.952	3.792	3.590	3.984	4.740	4.655	0.0004
Count	12	12	12	12	12	12	12	12	12	12	12

After Thermals	Deflections in inches Forces in Grams										
	<u>0.0004</u>	<u>0.0008</u>	<u>0.0012</u>	<u>0.0016</u>	<u>0.0020</u>	<u>0.0024</u>	<u>0.0028</u>	<u>0.0032</u>	<u>0.0036</u>	<u>0.0040</u>	<i>SET</i>
Averages	0.12	0.35	0.91	2.63	7.04	10.79	14.76	18.99	23.59	27.39	0.0020
Min	0.00	0.00	0.00	0.00	2.50	7.70	11.40	14.40	17.40	21.70	0.0014
Max	0.30	3.30	7.70	10.00	13.10	15.70	19.00	24.20	28.00	31.80	0.0024
St. Dev	0.147	0.936	2.183	3.189	3.083	2.655	2.651	3.118	3.073	3.011	0.0003
Count	12	12	12	12	12	12	12	12	12	12	12

Normal Force - Average Initial vs Average Thermal

DATA SUMMARIES Continued**INSULATION RESISTANCE (IR):**

	Pin to Pin		
	Mated	Unmated	Unmated
Minimum	QRF8/QRM8	QRF8	QRM8
Initial	45000	45000	45000
Thermal	45000	45000	45000
Humidity	45000	45000	45000

	Row to Row		
	Mated	Unmated	Unmated
Minimum	QRF8/QRM8	QRF8	QRM8
Initial	45000	45000	45000
Thermal	45000	45000	45000
Humidity	45000	45000	45000

	Pin to Ground		
	Mated	Unmated	Unmated
Minimum	QRF8/QRM8	QRF8	QRM8
Initial	45000	45000	45000
Thermal	45000	45000	45000
Humidity	45000	45000	45000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	MMS/TMMH
Break Down Voltage	918
Test Voltage	689
Working Voltage	230

DATA SUMMARIES Continued

LLCR Thermal Aging Group

- 1) A total of 192 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. $\leq +5.0$ 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	10/12/2024	11/1/2024		
Room Temp (Deg C)	22	22		
Rel Humidity (%)	50	50		
Technician	Keney Chen	Keney Chen		
mOhm values	Actual	Delta	Delta	Delta
	Initial	Thermal		
Pin Type 1: Signal				
Average	16.57	1.77		
St. Dev.	0.68	1.33		
Min	15.28	0.01		
Max	19.16	6.69		
Summary Count	192	192		
Total Count	192	192		

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	≤ 5	$>5 \ \& \ \leq 10$	$>10 \ \& \ \leq 15$	$>15 \ \& \ \leq 50$	$>50 \ \& \ \leq 1000$	>1000
Thermal	185	7	0	0	0	0

DATA SUMMARIES Continued**LLCR Mating/Unmating Durability Group**

- 1). A total of 192 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. $\leq +5.0$ 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	10/10/2024	10/12/2024	10/21/2024	11/1/2024
Room Temp (Deg C)	22	22	22	22
Rel Humidity (%)	50	50	50	50
Technician	Keney Chen	Keney Chen	Keney Chen	Keney Chen
mOhm values	Actual Initial	Delta 100 Cycles	Delta Therm Shck	Delta Humidity
Pin Type 1: Signal				
Average	16.84	0.52	1.71	1.78
St. Dev.	0.79	0.47	1.35	1.5
Min	14	0.01	0.01	0
Max	19.67	2.48	6.35	7.53
Summary Count	192	192	192	192
Total Count	192	192	192	192

LLCR Delta Count by Category						
mOhms	Stable	Minor	Acceptable	Marginal	Unstable	Open
	≤ 5	>5 & ≤ 10	>10 & ≤ 15	>15 & ≤ 50	>50 & ≤ 1000	>1000
100 Cycles	192	0	0	0	0	0
Therm Shck	186	6	0	0	0	0
Humidity	185	7	0	0	0	0

DATA SUMMARIES Continued

LLCR Gas Tight Group

- 1) A total of 192 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. $\leq +5.0$ 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	10/10/2024	10/12/2024		
Room Temp (Deg C)	22	22		
Rel Humidity (%)	50	50		
Technician	Keney Chen	Keney Chen		
mOhm values	Actual Initial	Delta Acid Vapor	Delta	Delta
Pin Type 1: Signal				
Average	16.45	0.59		
St. Dev.	0.77	0.55		
Min	14.93	0		
Max	20.54	3.03		
Summary Count	192	192		
Total Count	192	192		

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	≤ 5	$>5 \ \& \ \leq 10$	$>10 \ \& \ \leq 15$	$>15 \ \& \ \leq 50$	$>50 \ \& \ \leq 1000$	>1000
Acid Vapor	192	0	0	0	0	0

DATA SUMMARIES Continued**LLCR Shock & Vibration Group**

- 1) A total of 192 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. $\leq +5.0$ 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	10/24/2024	2/14/2025		
Room Temp (Deg C)	22	21		
Rel Humidity (%)	41	34		
Technician	Brian Stemle	Brian Stemle		
mOhm values	Actual Initial	Delta Shock-Vib		
Pin Type: Signal 1				
Average	16.57	0.65		
St. Dev.	0.64	0.45		
Min	15.31	0.01		
Max	18.65	2.67		
Summary Count	192	192		
Total Count	192	192		

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	≤ 5	>5 & ≤ 10	>10 & ≤ 15	>15 & ≤ 50	>50 & ≤ 1000	>1000
Shock-Vib	192	0	0	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: 4/25/2024, Next Cal: 4/24/2025**Equipment #:** HZ-OV-01**Description:** Oven**Manufacturer:** Huida**Model:** CS101-1E**Serial #:** CS101-1E-B**Accuracy:** Last Cal: 12/12/2024, Next Cal: 12/11/2025**Equipment #:** HZ-THC-01**Description:** Humidity transmitter**Manufacturer:** Thermtron**Model:** SM-8-8200**Serial #:** 38846**Accuracy:** Last Cal: 2/27/2024, Next Cal: 2/26/2025**Equipment #:** HZ-HPM-01**Description:** NA9636H**Manufacturer:** Ainuo**Model:** 6031A**Serial #:** 089601091**Accuracy:** Last Cal: 3/6/2024, Next Cal: 3/5/2025**Equipment #:** HZ-MO-05**Description:** Micro-ohmmeter**Manufacturer:** Keithley**Model:** 3706**Serial #:** 1285188**Accuracy:** Last Cal: 11/14/2024, Next Cal: 11/13/2025**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: 06/26/2024, Next Cal: 06/25/2025

Equipment #: HZ-MO-01**Description:** Multimeter /Data Acquisition System**Manufacturer:** Keithley**Model:** 2700**Serial #:** 1199807**Accuracy:** See Manual

... Last Cal: 07/01/2024, Next Cal: 06/30/2025

EQUIPMENT AND CALIBRATION SCHEDULES Continued**Equipment #:** PS-09**Description:** 50 Amp Power Supply**Manufacturer:** Agilent**Model:** AT-6032A**Serial #:** US38322853**Accuracy:** See Manual

... Last Cal: 07/02/2024, Next Cal: 07/01/2025

Equipment #: MO-9**Description:** Switch/Multimeter**Manufacturer:** Keithley**Model:** 2750**Serial #:** WDC-874817**Accuracy:** See Manual

... Last Cal: 08/21/2024, Next Cal: 08/21/2025

Equipment #: MO-11**Description:** Switch/Multimeter**Manufacturer:** Keithley**Model:** 3706**Serial #:** 120169**Accuracy:** See Manual

... Last Cal: 08/21/2024, Next Cal: 08/21/2025

Equipment #: SVC-01**Description:** Shock & Vibration Table**Manufacturer:** Data Physics**Model:** LE-DSA-10-20K**Serial #:** 10037**Accuracy:** See Manual

... Last Cal: 11/31/2024, Next Cal: 11/31/2025

Equipment #: ACLM-01**Description:** Accelerometer**Manufacturer:** PCB Piezotronics**Model:** 352C03**Serial #:** 115819**Accuracy:** See Manual

... Last Cal: 07/09/2024, Next Cal: 07/09/2025

Equipment #: ED-03**Description:** Event Detector**Manufacturer:** Analysis Tech**Model:** 32EHD**Serial #:** 1100604**Accuracy:** See Manual

... Last Cal: 06/04/2024, Next Cal: 06/04/2025