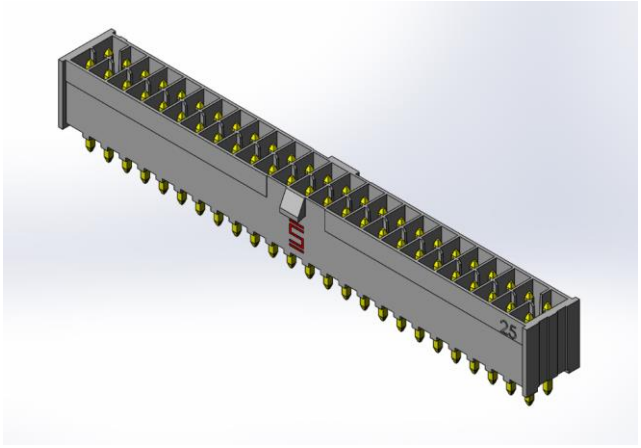
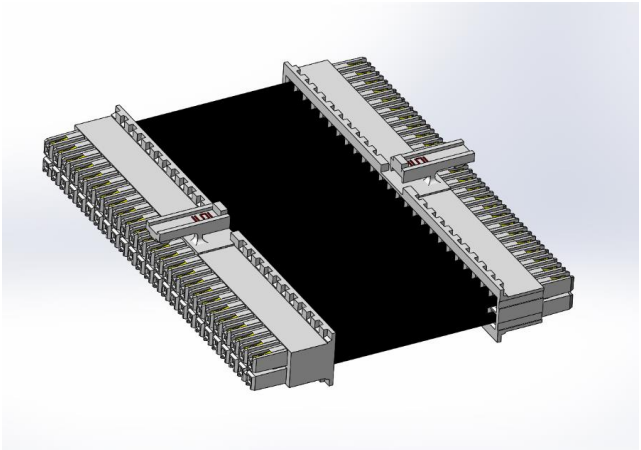
Project Number: Design Qualification Test Report	Tracking Code: 2189728_Report_Rev_2
Requested by: Chad Humphres	Date: 5/25/2022
Part #: MMSD-25-20-L-12.00-D-K-LUS/IPL1-125-01-LM-D-K	Tech: Scott Rollefstad
Part description: MMSD/IPL1	Qty to test: 100
Test Start: 1/30/2021	Test Completed: 03/30/2021





Design Qualification Test Report

MMSD/IPL1
MMSD-25-20-L-12.00-D-K-LUS/IPL1-125-01-LM-D-K

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
6/9/2021	**1**	**Initial Issue**	**PC**
1/7/2022	**2**	**Updated the Mating Unmating Durability group**	**PC**

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) Samtec Test PCBs used: PCB-103826-TST-XX, PCB-103827-TST-XX.

FLOWCHARTS

Gas Tight

Group 1
MMSD-25-20-L-6.00-S
IPL1-125-01-LM-D-K
8 Assemblies

Note: ENG-215287-02 (Nylon, UL94 V0)

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

Group 1
MMSD-25-20-L-6.00-S
IPL1-125-01-LM-D-K
8 Contacts Minimum
Signal Without Thermals
Note: ENG-215287-02 (Nylon, UL94 V0)

Step	Description
1.	Contact Gaps
2.	Normal Force (1) Deflection = 0.013 " Expected Force at Max Deflection = 208 g

Group 2
MMSD-25-20-L-6.00-S
IPL1-125-01-LM-D-K
8 Contacts Minimum
Signal With Thermals
Note: ENG-215287-02 (Nylon, UL94 V0)

Step	Description
1.	Contact Gaps
2.	Thermal Age (2)
3.	Contact Gaps
4.	Normal Force (1) Deflection = 0.013 " Expected Force at Max Deflection = 208 g

(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
MMSD-25-20-L-6.00-S
IPL1-125-01-LM-D-K
8 Assemblies

Note: ENG-215287-02 (Nylon, UL94 V0)

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

Group 1 MMSD-15-20-L-12.00-S-K IPL1-115-01-LM-D-K 8 Assemblies		Group 2 MMSD-02-20-L-12.00-S-K IPL1-102-01-LM-D-K 8 Assemblies		Group 3 MMSD-25-20-L-12.00-S-K IPL1-125-01-LM-D-K 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)				

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(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
MMSD-25-20-L-6.00-S
IPL1-125-01-LM-D-K
2 Assemblies

Note: ENG-215287-02 (Nylon, UL94 V0)

Step	Description
1.	IR (3)
2.	DWV at Test Voltage (1) Test Voltage = 900 V
3.	Thermal Shock (4)
4.	IR (3)
5.	DWV at Test Voltage (1) Test Voltage = 900 V
6.	Humidity (2)
7.	IR (3)
8.	DWV at Test Voltage (1) Test Voltage = 900 V

Row-to-Row

Group 2
MMSD-25-20-L-6.00-S
IPL1-125-01-LM-D-K
2 Assemblies

Note: ENG-215287-02 (Nylon, UL94 V0)

Step	Description
1.	IR (3)
2.	DWV at Test Voltage (1) Test Voltage = 900 V
3.	Thermal Shock (4)
4.	IR (3)
5.	DWV at Test Voltage (1) Test Voltage = 900 V
6.	Humidity (2)
7.	IR (3)
8.	DWV at Test Voltage (1) Test Voltage = 900 V

(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) 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

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

(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

Current Carrying Capacity

Group 1
MMSD-25-20-L-12.00-D-LUS
IPL1-125-01-LM-D-K
2 Pins Powered
Signal
Note: ENG-215287-01 (Nylon, UL94 V0)

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

Group 2
MMSD-25-20-L-12.00-D-LUS
IPL1-125-01-LM-D-K
4 Pins Powered
Signal
Note: ENG-215287-01 (Nylon, UL94 V0)

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

Group 3
MMSD-25-20-L-12.00-D-LUS
IPL1-125-01-LM-D-K
6 Pins Powered
Signal
Note: ENG-215287-01 (Nylon, UL94 V0)

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

Group 4
MMSD-25-20-L-12.00-D-LUS
IPL1-125-01-LM-D-K
8 Pins Powered
Signal
Note: ENG-215287-01 (Nylon, UL94 V0)

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

Group 5
MMSD-25-20-L-12.00-D-LUS
IPL1-125-01-LM-D-K
50 Pins Powered
Signal
Note: ENG-215287-01 (Nylon, UL94 V0)

Step	Description
1.	CCC (1) Rows = 2 Number of Positions = 25

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

Mechanical Shock/Random Vibration/LLCR

Group 1
MMSD-25-20-L-12.00-S
IPL1-125-01-LM-D-K
8 Assemblies

Note: ENG-215287-03 (Nylon, UL94 V0)

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)

FLOWCHARTS Continued

Mechanical Shock/Random Vibration/Event Detection

Group 1
MMSD-25-20-L-12.00-S
IPL1-125-01-LM-D-K
60 Points

Note: ENG-215287-03 (Nylon, UL94 V0)

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)

Cable Pull

Group 1
MMSD-25-20-L-12.00-D-LUS
IPL1-125-01-LM-D-K
5 Assemblies
0 Degrees
Note: ENG-215287-01 (Nylon, UL94 V0)

Step	Description
1.	Cable Pull (1)

Group 2
MMSD-25-20-L-12.00-D-LUS
IPL1-125-01-LM-D-K
5 Assemblies
90 Degrees Towards Short Axis Of Part
Note: ENG-215287-01 (Nylon, UL94 V0)

Step	Description
1.	Cable Pull (1)

Group 3
MMSD-25-20-L-12.00-D-LUS
IPL1-125-01-LM-D-K
5 Assemblies
90 Degrees Towards Long Axis Of Part
Note: ENG-215287-01 (Nylon, UL94 V0)

Step	Description
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

Group 1
MMSD-25-20-L-12.00-D-LUS
IPL1-125-01-LM-D-K
8 Assemblies
Flat Cable
Note: ENG-215287-01 (Nylon, UL94 V0)

Step	Description
1.	IR (3)
2.	DWV at Test Voltage (2) Test Voltage = 900 V
3.	Cable Flex (1)
4.	Visual Inspection
5.	IR (3)
6.	DWV at Test Voltage (2) Test Voltage = 900 V

(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

Latch Pull Test

Group 1
IPD1-25-D
T-32046-05
8 Assemblies
Note: ENG-215140-02-B (Nylon, UL94 V0)

Step	Description
1.	Cycles Quantity = 250 Cycles *Note: Must be cycled on listed mating part*
2.	Cable Pull (1) - Non Standard

Group 2
IPD1-25-D
T-32046-05
8 Assemblies
Note: ENG-215140-02-B (Nylon, UL94 V0)

Step	Description
1.	Thermal Age (2)
2.	Cycles Quantity = 250 Cycles *Note: Must be cycled on listed mating part*
3.	Cable Pull (1) - Non Standard

(1) Cable Pull = Other
Measure and Record Force Required to Failure
Failure = Mechanical failure

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

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: -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:

1) EIA-364-17, *Temperature Life with or without Electrical Load Test Procedure for Electrical Connectors.*
2) Test Condition :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.

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 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

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 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.

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 5000 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. Rate of Application 500 V/Sec
        iii. 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:
    c. Ambient
    d. 65^{o} C
    e. 75^{o} C
    f. 95^{o} 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.

LLCR:

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

GAS TIGHT:

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

1) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
2) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
3) The following guidelines are used to categorize the changes in LLCR as a result from stressing
    a. <= +5.0 mOhms: ----------Stable
    b. +5.1 to +10.0 mOhms:----------Minor
    c. +10.1 to +15.0 mOhms: ----------Acceptable
    d. +15.1 to +50.0 mOhms: ----------Marginal
    e. +50.1 to +1000 mOhms: ----------Unstable
    f. >+1000 mOhms:----------Open Failure
4) Procedure:
    g. Reference document: EIA-364-36, *Test Procedure for Determination of Gas-Tight Characteristics for Electrical Connectors, Sockets and/or Contact Systems*.
    h. 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.

CABLE PULL:

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

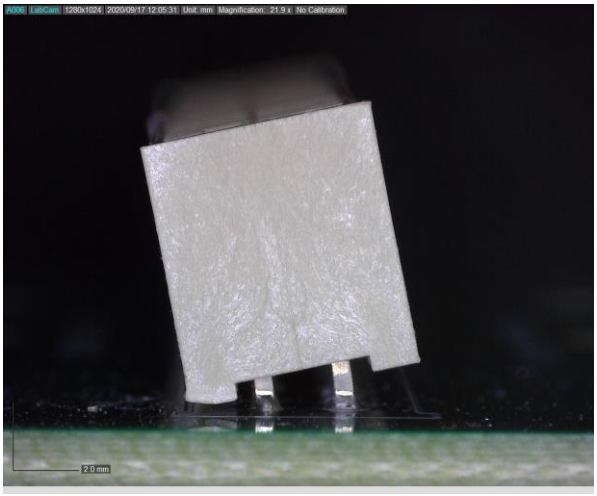


Fig. 1
90° Connector pull, Connector on Board fail.

CABLE FLEX:

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

Latch Cycling/Pull:

a) Record force to mate cable/connector assembly with latch.
b) Pull connector to force and record if latch fails.

Fig. 3
(Setup picture)

RESULTS

Temperature Rise, CCC at a 20% de-rating

MMSD-25-20-L-12.00-D-LUS/ IPL1-125-01-LM-D-K

- **CCC for a 30°C Temperature Rise----------5.1 A per contact with 2 contacts (2x1) powered**
- **CCC for a 30°C Temperature Rise----------4.1 A per contact with 4 contacts (2x2) powered**
- **CCC for a 30°C Temperature Rise----------3.7 A per contact with 6 contacts (2x3) powered**
- **CCC for a 30°C Temperature Rise----------3.5 A per contact with 8 contacts (2x4) powered**
- **CCC for a 30°C Temperature Rise----------2.4 A per contact with 32 contacts (2x16) powered**

Mating – Unmating Forces

Mating-Unmating Durability Group (MMSD-15-20-L-12.00-S-K/ IPL1-115-01-LM-D-K)

- **Initial**
  - **Mating**
    - **Min ---------- 3.11 Lbs**
    - **Max---------- 5.16 Lbs**
  - **Unmating**
    - **Min ---------- 2.22 Lbs**
    - **Max---------- 2.98 Lbs**
- **After 25 Cycles**
  - **Mating**
    - **Min ---------- 3.87 Lbs**
    - **Max---------- 5.32 Lbs**
  - **Unmating**
    - **Min ---------- 2.93 Lbs**
    - **Max---------- 4.25 Lbs**
- **After 50 Cycles**
  - **Mating**
    - **Min ---------- 4.52 Lbs**
    - **Max---------- 6.15 Lbs**
  - **Unmating**
    - **Min ---------- 3.40 Lbs**
    - **Max---------- 4.80 Lbs**
- **After 75 Cycles**
  - **Mating**
    - **Min ---------- 5.08 Lbs**
    - **Max---------- 6.56 Lbs**
  - **Unmating**
    - **Min ---------- 3.74 Lbs**
    - **Max---------- 5.12 Lbs**
- **After 100 Cycles**
  - **Mating**
    - **Min ---------- 5.42 Lbs**
    - **Max---------- 6.93 Lbs**
  - **Unmating**
    - **Min ---------- 4.08 Lbs**
    - **Max---------- 5.40 Lbs**
- **Humidity**
  - **Mating**
    - **Min ---------- 3.76 Lbs**
    - **Max---------- 5.96 Lbs**
  - **Unmating**
    - **Min ---------- 2.42 Lbs**
    - **Max---------- 4.30 Lbs**

RESULTS Continued

Thermal Aging Group (MMSD-25-20-L-6.00-S/ IPL1-125-01-LM-D-K)

- **Initial**
  - **Mating**
    - **Min ----------12.82 lbs**
    - **Max----------12.92 lbs**
  - **Unmating**
    - **Min ----------13.61 lbs**
    - **Max----------14.07 lbs**
- **After Thermal**
  - **Mating**
    - **Min ---------- 3.93 lbs**
    - **Max---------- 7.58 lbs**
  - **Unmating**
    - **Min ---------- 2.73 lbs**
    - **Max---------- 5.89 lbs**

Mating-Unmating Basic Group (MMSD-02-20-L-12.00-S-K/ IPL1-102-01-LM-D-K)

- **Initial**
  - **Mating**
    - **Min ---------- 0.28 Lbs**
    - **Max---------- 0.39 Lbs**
  - **Unmating**
    - **Min ---------- 0.23 Lbs**
    - **Max---------- 0.34 Lbs**
- **After 25 Cycles**
  - **Mating**
    - **Min ---------- 0.36 Lbs**
    - **Max---------- 0.49 Lbs**
  - **Unmating**
    - **Min ---------- 0.30 Lbs**
    - **Max---------- 0.43 Lbs**
- **After 50 Cycles**
  - **Mating**
    - **Min ---------- 0.40 Lbs**
    - **Max---------- 0.54 Lbs**
  - **Unmating**
    - **Min ---------- 0.33 Lbs**
    - **Max---------- 0.48 Lbs**
- **After 75 Cycles**
  - **Mating**
    - **Min ---------- 0.43 Lbs**
    - **Max---------- 0.60 Lbs**
  - **Unmating**
    - **Min ---------- 0.34 Lbs**
    - **Max---------- 0.48 Lbs**
- **After 100 Cycles**
  - **Mating**
    - **Min ---------- 0.45 Lbs**
    - **Max---------- 0.62 Lbs**
  - **Unmating**
    - **Min ---------- 0.27 Lbs**
    - **Max---------- 0.51 Lbs**

RESULTS Continued

Mating-Unmating Basic Group (MMSD-25-20-L-12.00-S-K/ IPL1-125-01-LM-D-K)

- **Initial**
  - **Mating**
    - **Min ---------- 5.36 Lbs**
    - **Max---------- 8.10 Lbs**
  - **Unmating**
    - **Min ---------- 3.40 Lbs**
    - **Max---------- 5.50 Lbs**
- **After 25 Cycles**
  - **Mating**
    - **Min ---------- 5.78 Lbs**
    - **Max---------- 8.93 Lbs**
  - **Unmating**
    - **Min ---------- 4.08 Lbs**
    - **Max---------- 6.40 Lbs**
- **After 50 Cycles**
  - **Mating**
    - **Min ---------- 6.72 Lbs**
    - **Max---------- 9.68 Lbs**
  - **Unmating**
    - **Min ---------- 4.93 Lbs**
    - **Max---------- 6.74 Lbs**
- **After 75 Cycles**
  - **Mating**
    - **Min ---------- 7.73 Lbs**
    - **Max----------10.41 Lbs**
  - **Unmating**
    - **Min ---------- 5.34 Lbs**
    - **Max---------- 7.16 Lbs**
- **After 100 Cycles**
  - **Mating**
    - **Min ---------- 8.28 Lbs**
    - **Max----------11.92 Lbs**
  - **Unmating**
    - **Min ---------- 5.33 Lbs**
    - **Max---------- 7.77 Lbs**

Normal Force at 0.007 Inch deflection

- **Initial**
  - **Min ---------- 114.90 gf Set ----- 0.0000 inch**
  - **Max ---------- 129.60 gf Set ----- 0.0014 inch**
- **Thermal**
  - **Min ----------93.60 gf Set ----- 0.0026 inch**
  - **Max ---------- 101.72 gf Set ----- 0.0025 inch**

RESULTS Continued

Cable Pull force

MMSD-25-20-L-12.00-D-LUS /IPL1-125-01-LM-D-K

- **0° Pull**
  - **Min----------11.64 lbs**
  - **Max ----------14.67 lbs**
- **90° Pull Degrees Towards Short Axis of Part**
  - **Min----------40.05 lbs**
  - **Max ----------55.10 lbs**
- **90° Pull Degrees Towards Long Axis of Part**
  - **Min----------12.36 lbs**
  - **Max ----------28.48 lbs**

Latch Cycling/Pull:

Group 1-Pull Test (IPD1-25-D/ T-32046-05)

- **Min----------10.69 lbs**
- **Max ----------17.56 lbs**

Group 2-Pull Test (IPD1-25-D/ T-32046-05)

- **Min---------- 9.55 lbs**
- **Max ----------12.71 lbs**

Cable Flex:

MMSD-25-20-L-12.00-D-LUS/IPL1-125-01-LM-D-K

Insulation Resistance minimums, IR

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**

Dielectric Withstanding Voltage minimums, DWV

- **Test Voltage ----------900 VAC**

Pin to Pin

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

Row to Row

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

RESULTS Continued

LLCR Gas Tight (192 signal LLCR test points)

MMSD-25-20-L-6.00-S /IPL1-125-01-LM-D-K

- **Initial ---------- 11.43 mOhms Max**
- **Gas-Tight**
  - **<= +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**

LLCR Thermal Aging (192 signal LLCR test points)

MMSD-25-20-L-6.00-S/IPL1-125-01-LM-D-K

- **Initial ---------- 11.48 mOhms Max**
- **Thermal Aging**
  - **<= +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**

LLCR Mating/Unmating Durability Group (192 LLCR test points)

MMSD-15-20-L-12.00-S-K/ IPL1-115-01-LM-D-K

- **Initial ---------- 15.09 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 ---------- 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**
- **Humidity**
  - **<= +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 Shock Vib (192 signal LLCR test points)

MMSD-25-20-L-12.00-S /IPL1-125-01-LM-D-K

- **Initial ---------- 16.11mOhms Max**
- **S&V**
  - **<= +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:

MMSD-25-20-L-12.00-S /IPL1-125-01-LM-D-K

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

Insulation Resistance minimums, IR

MMSD-25-20-L-6.00-S /IPL1-125-01-LM-D-K

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**

RESULTS Continued

Dielectric Withstanding Voltage minimums, DWV

MMSD-25-20-L-6.00-S /IPL1-125-01-LM-D-K

- **Minimums**
  - **Breakdown Voltage---------- 1200 VAC**
  - **Test Voltage ----------900 VAC**
  - **Working Voltage ----------300 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**

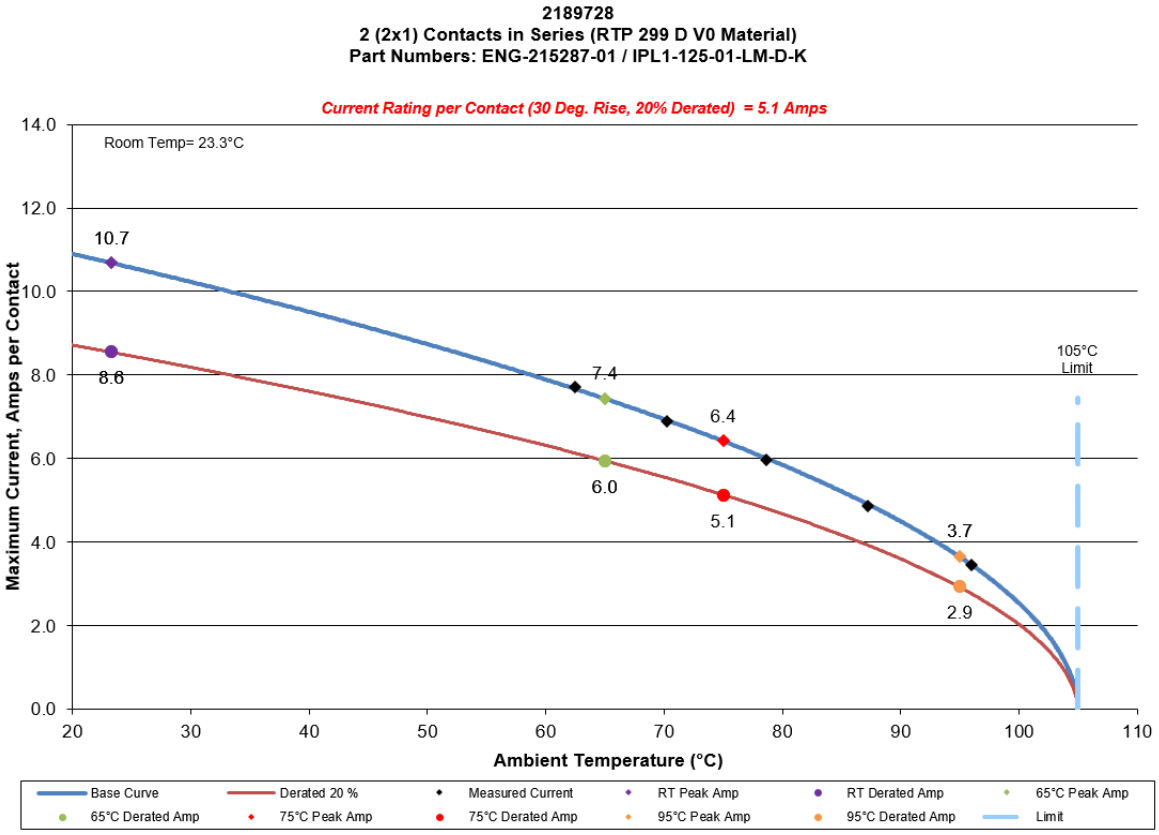
DATA SUMMARIES

TEMPERATURE RISE (Current Carrying Capacity, CCC):

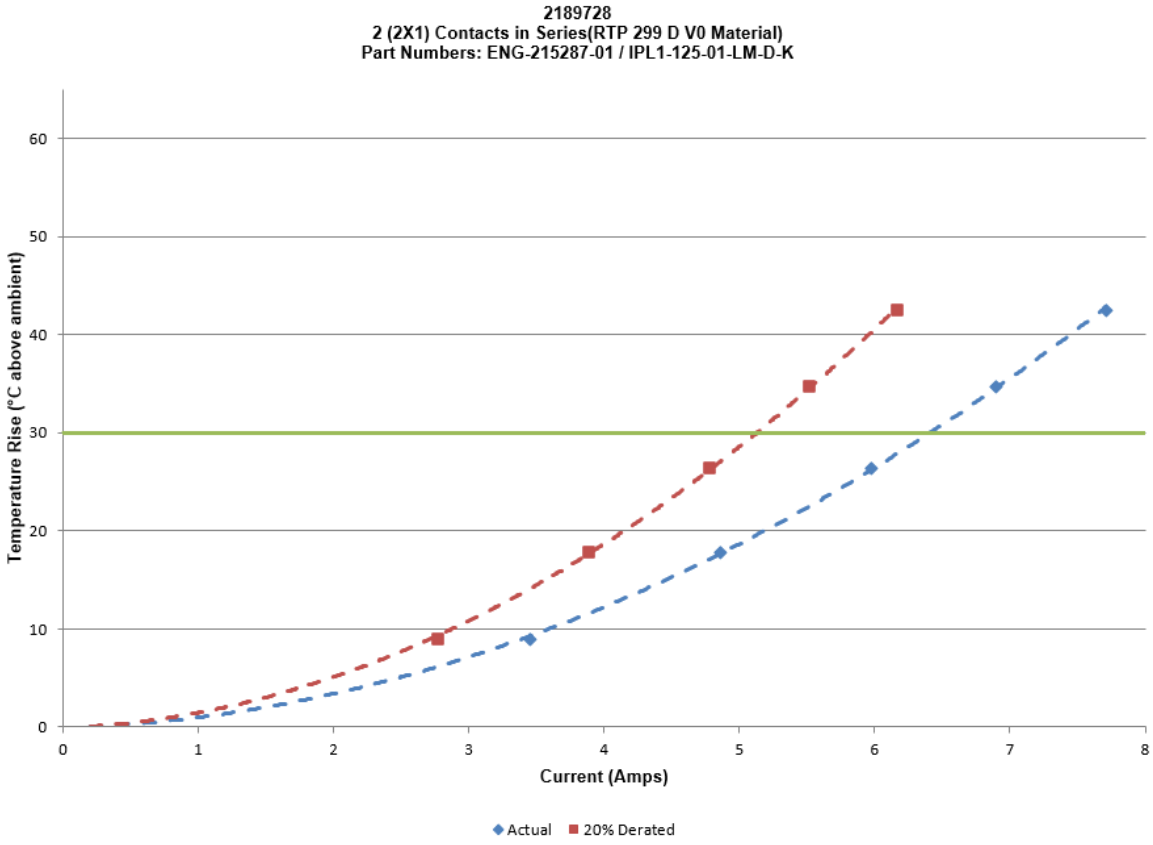
1) High quality thermocouples whose temperature slopes track one another were used for temperature monitoring.
2) The thermocouples were placed at a location to sense the maximum temperature generated during testing.
3) Temperature readings recorded are those for which three successive readings, 15 minutes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

MMSD-25-20-L-12.00-D-LUS/ IPL1-125-01-LM-D-K

a. Linear configuration with 2 adjacent power conductors/contacts powered

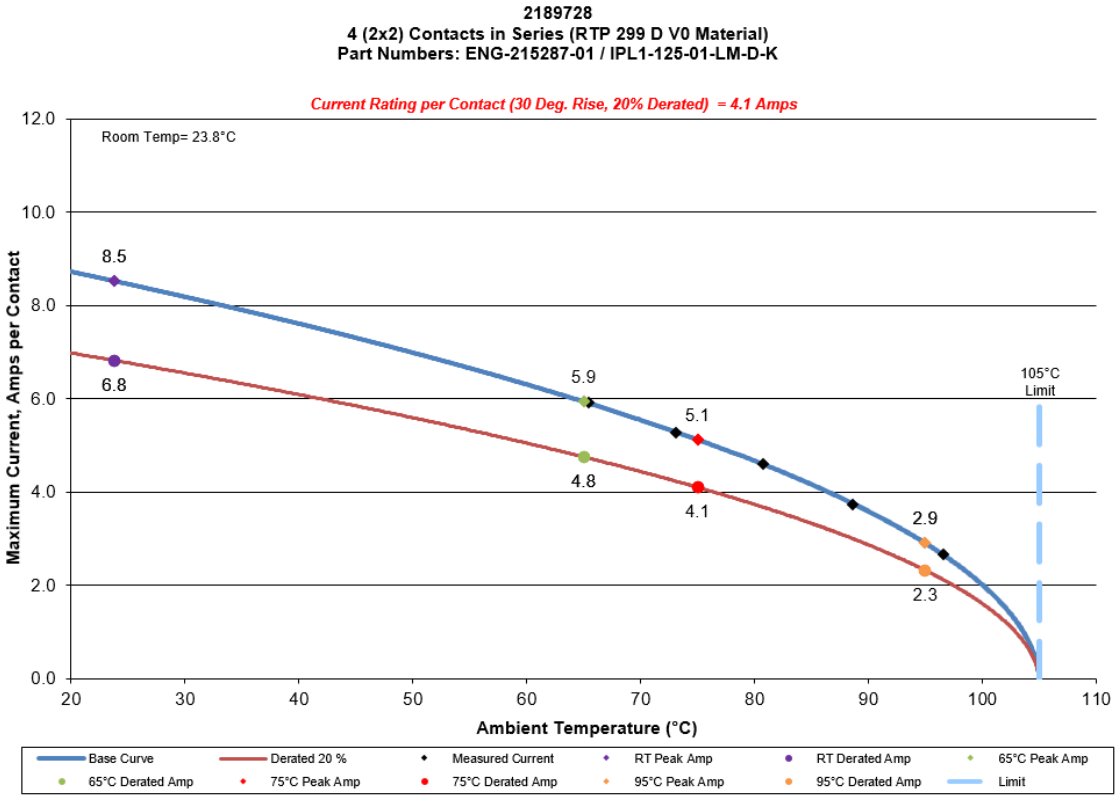


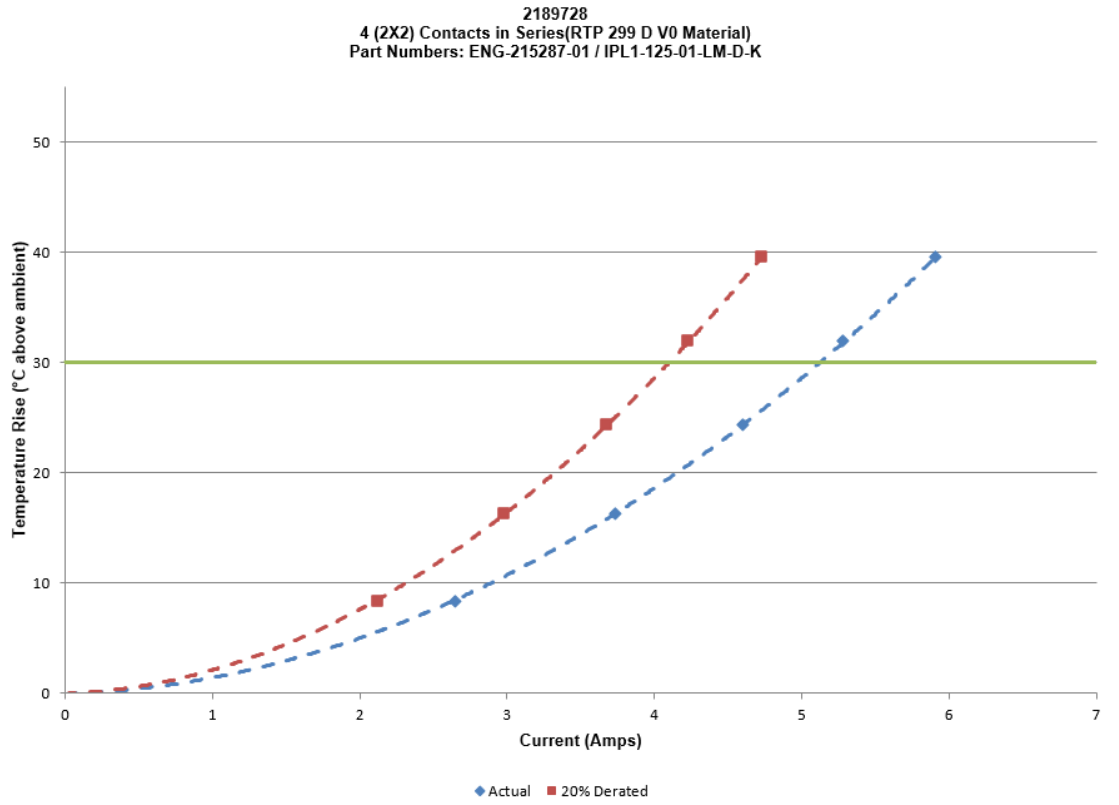
DATA SUMMARIES



DATA SUMMARIES

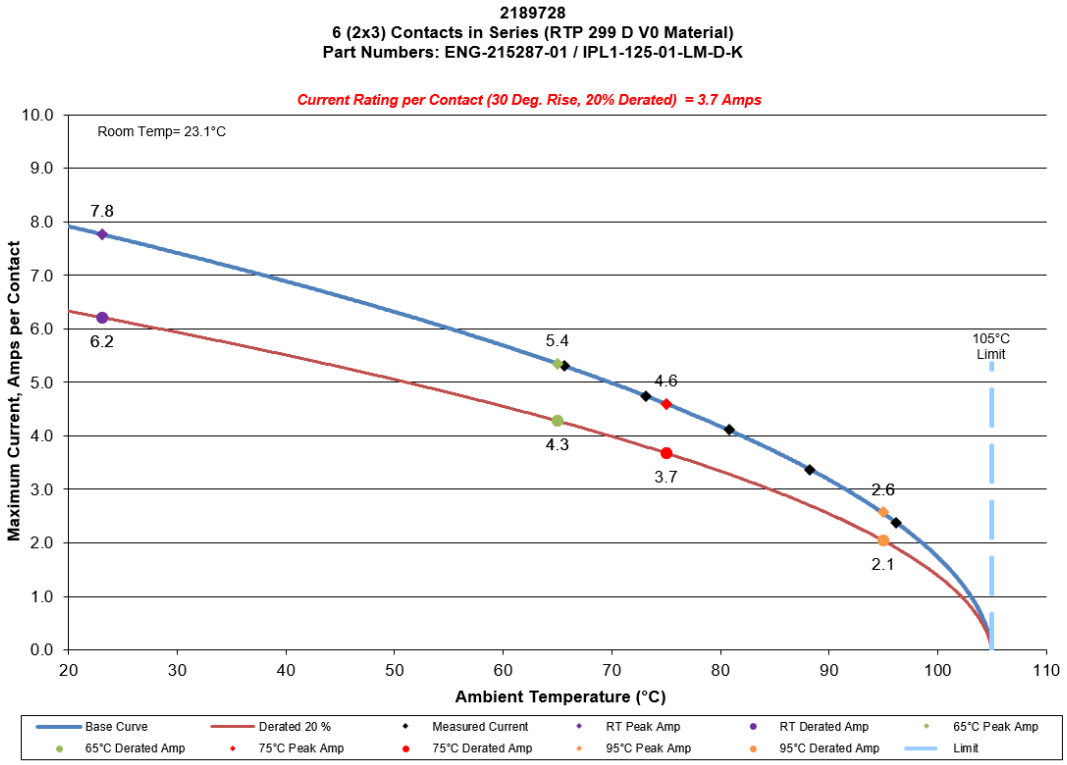
b. Linear configuration with 4 adjacent power conductors/contacts powered

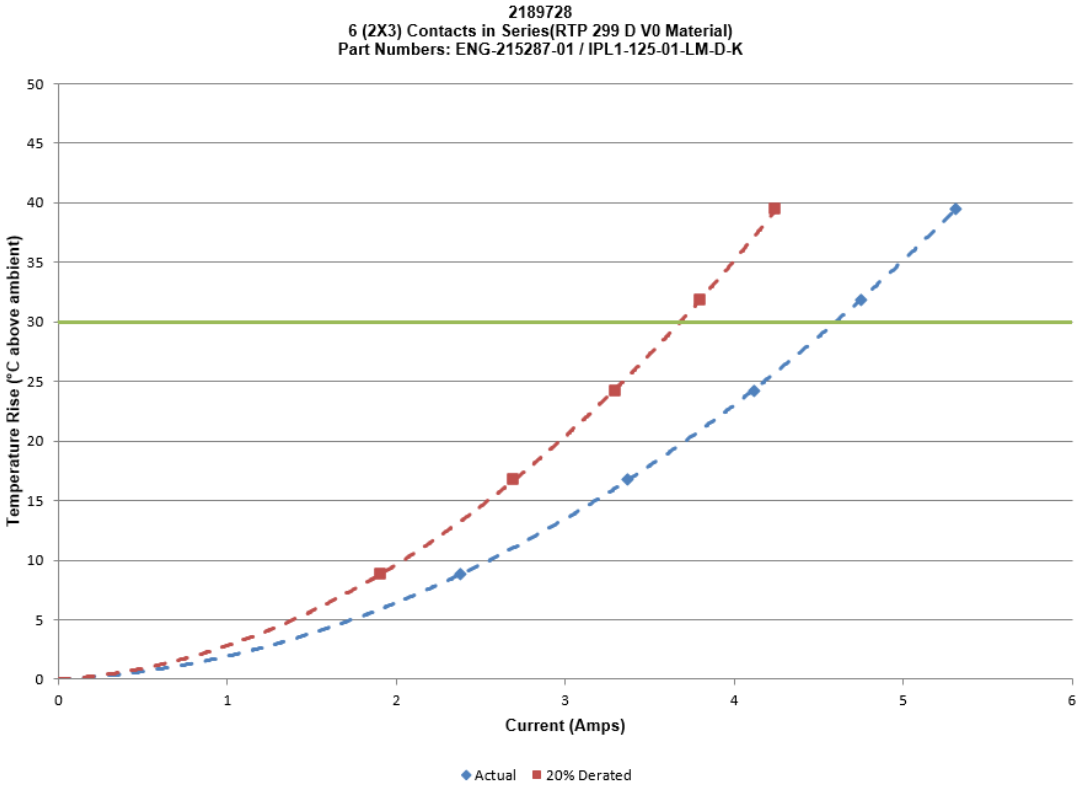




DATA SUMMARIES

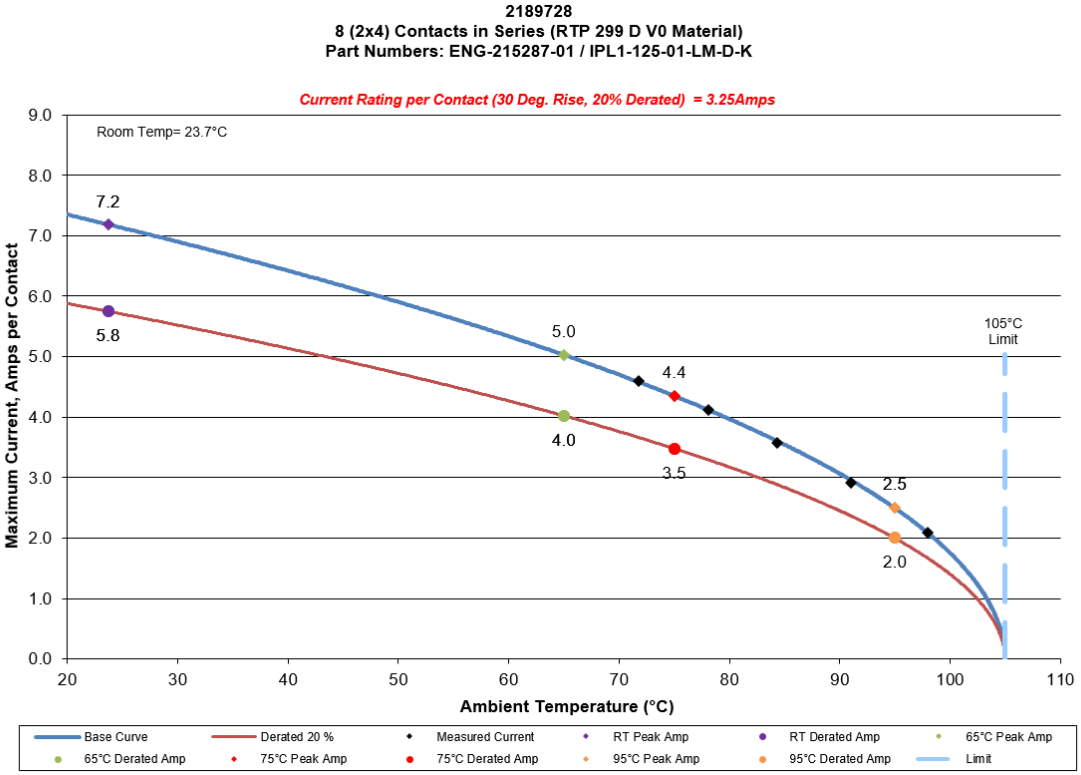
c. Linear configuration with 6 adjacent power conductors/contacts powered

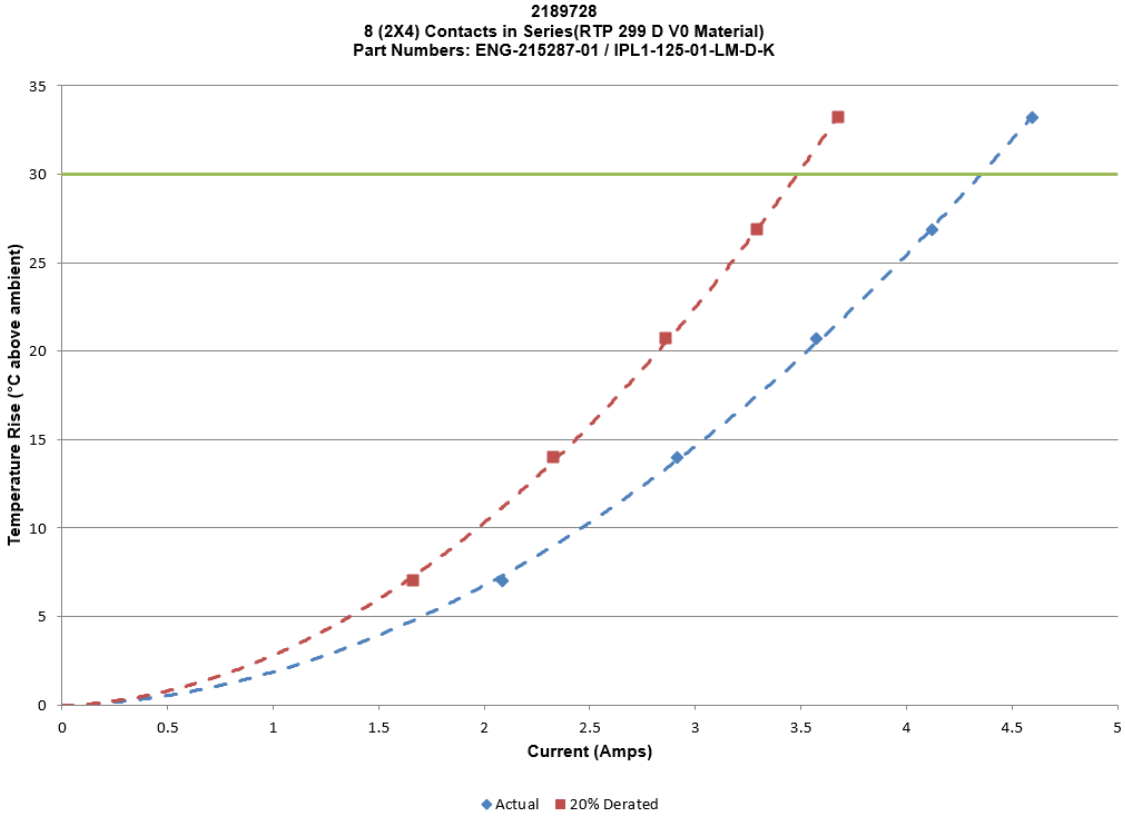




DATA SUMMARIES

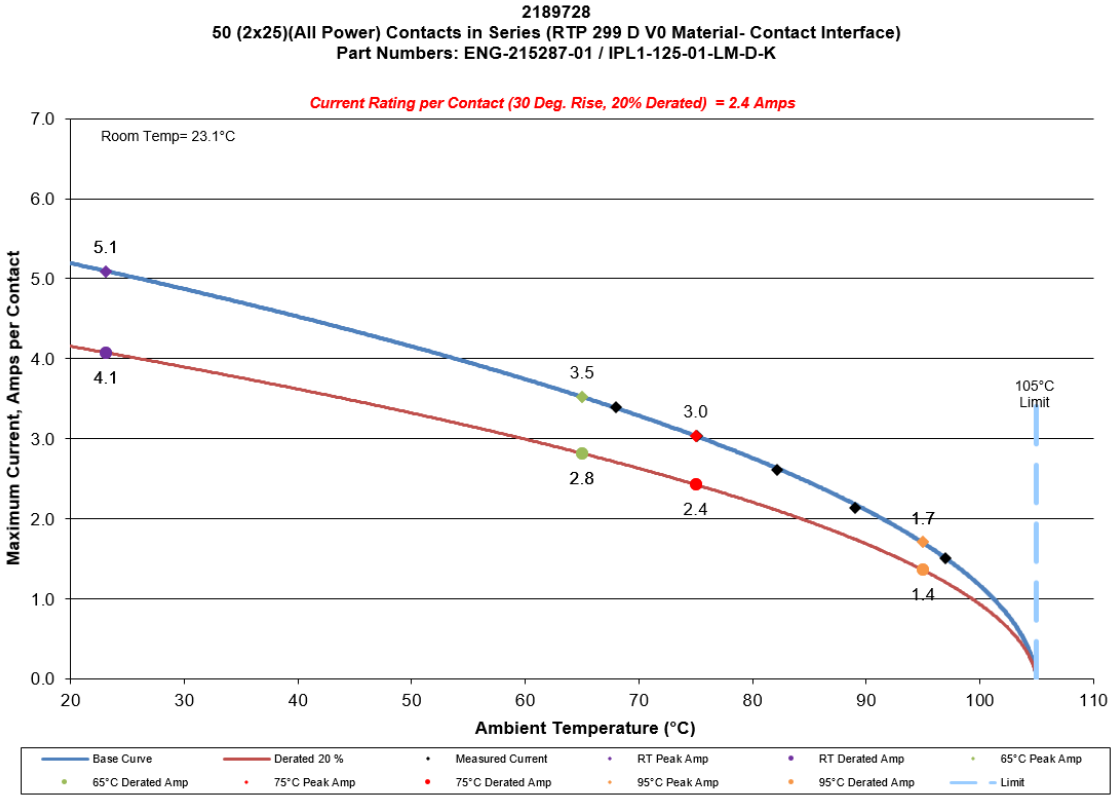
d. Linear configuration with 8 adjacent power conductors/contacts powered

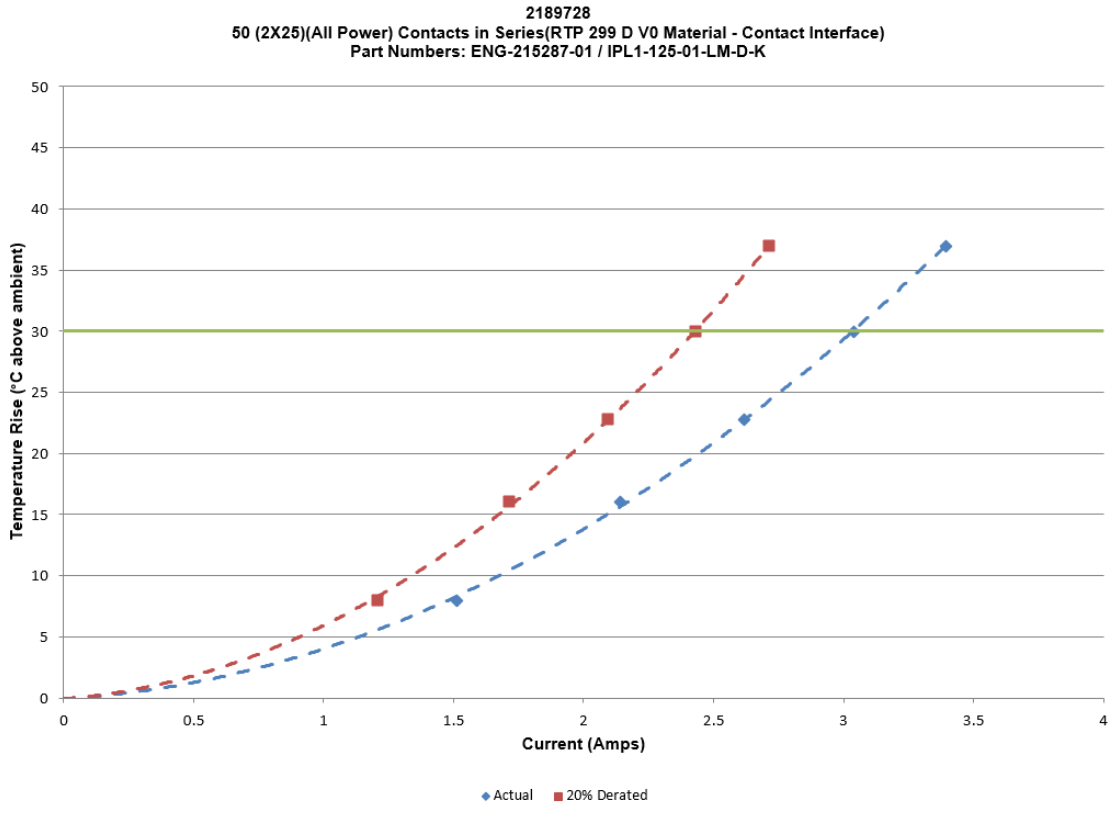




DATA SUMMARIES

e. Linear configuration with 50 adjacent power conductors/contacts powered





DATA SUMMARIES

MATING/UNMATING:

Mating/Unmating/Durability

MMSD-15-20-L-12.00-S-K/ IPL1-115-01-LM-D-K

	Initial				25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	13.83	3.11	9.87	2.22	17.21	3.87	13.03	2.93
Maximum	22.95	5.16	13.26	2.98	23.66	5.32	18.90	4.25
Average	16.85	**3.79**	11.58	**2.60**	20.66	**4.64**	15.40	**3.46**
St Dev	2.91	0.65	1.17	0.26	2.17	0.49	1.83	0.41
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	20.10	4.52	15.12	3.40	22.60	5.08	16.64	3.74
Maximum	27.36	6.15	21.35	4.80	29.18	6.56	22.77	5.12
Average	23.58	**5.30**	17.17	**3.86**	25.40	**5.71**	18.29	**4.11**
St Dev	2.35	0.53	1.90	0.43	2.37	0.53	1.94	0.44
Count	8	8	8	8	8	8	8	8

	100 Cycles				After Humidity			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	24.11	5.42	18.15	4.08	16.72	3.76	10.76	2.42
Maximum	30.82	6.93	24.02	5.40	26.51	5.96	19.13	4.30
Average	27.22	**6.12**	19.55	**4.40**	21.74	**4.89**	14.67	**3.30**
St Dev	2.25	0.51	1.89	0.43	3.78	0.85	2.65	0.60
Count	8	8	8	8	8	8	8	8

Thermal Aging Group

MMSD-25-20-L-6.00-S /IPL1-125-01-LM-D-K

	Initial				After Thermals			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	57.02	12.82	60.52	13.61	17.48	3.93	12.14	2.73
Maximum	57.47	12.92	62.56	14.07	33.72	7.58	26.21	5.89
Average	57.30	**12.88**	61.40	**13.80**	26.45	**5.95**	20.71	**4.66**
St Dev	0.15	0.03	0.80	0.18	4.95	1.11	4.59	1.03
Count	8	8	8	8	8	8	8	8

DATA SUMMARIES Continued

Mating/Unmating/Basic Group

MMSD-02-20-L-12.00-S-K/ IPL1-102-01-LM-D-K

	Initial				25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	1.25	0.28	1.02	0.23	1.60	0.36	1.33	0.30
Maximum	1.73	0.39	1.51	0.34	2.18	0.49	1.91	0.43
Average	1.57	0.35	1.28	0.29	1.91	0.43	1.62	0.36
St Dev	0.17	0.04	0.19	0.04	0.20	0.04	0.21	0.05
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	1.78	0.40	1.47	0.33	1.91	0.43	1.51	0.34
Maximum	2.40	0.54	2.14	0.48	2.67	0.60	2.14	0.48
Average	2.17	0.49	1.81	0.41	2.39	0.54	1.86	0.42
St Dev	0.23	0.05	0.22	0.05	0.23	0.05	0.20	0.05
Count	8	8	8	8	8	8	8	8

	100 Cycles			
	Mating		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	2.00	0.45	1.20	0.27
Maximum	2.76	0.62	2.27	0.51
Average	2.50	0.56	2.00	0.45
St Dev	0.23	0.05	0.35	0.08
Count	8	8	8	8

DATA SUMMARIES Continued

MMSD-25-20-L-12.00-S-K/ IPL1-125-01-LM-D-K

	Initial				25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	23.84	5.36	15.12	3.40	25.71	5.78	18.15	4.08
Maximum	36.03	8.10	24.46	5.50	39.72	8.93	28.47	6.40
Average	29.11	6.54	18.88	4.24	31.51	7.09	22.47	5.05
St Dev	4.73	1.06	3.17	0.71	4.68	1.05	3.67	0.82
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	29.89	6.72	21.93	4.93	34.38	7.73	23.75	5.34
Maximum	43.06	9.68	29.98	6.74	46.30	10.41	31.85	7.16
Average	34.79	7.82	25.11	5.65	38.81	8.73	26.97	6.06
St Dev	4.30	0.97	3.00	0.67	3.64	0.82	3.26	0.73
Count	8	8	8	8	8	8	8	8

	100 Cycles			
	Mating		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	36.83	8.28	23.71	5.33
Maximum	53.02	11.92	34.56	7.77
Average	44.54	10.01	28.82	6.48
St Dev	5.15	1.16	4.02	0.90
Count	8	8	8	8

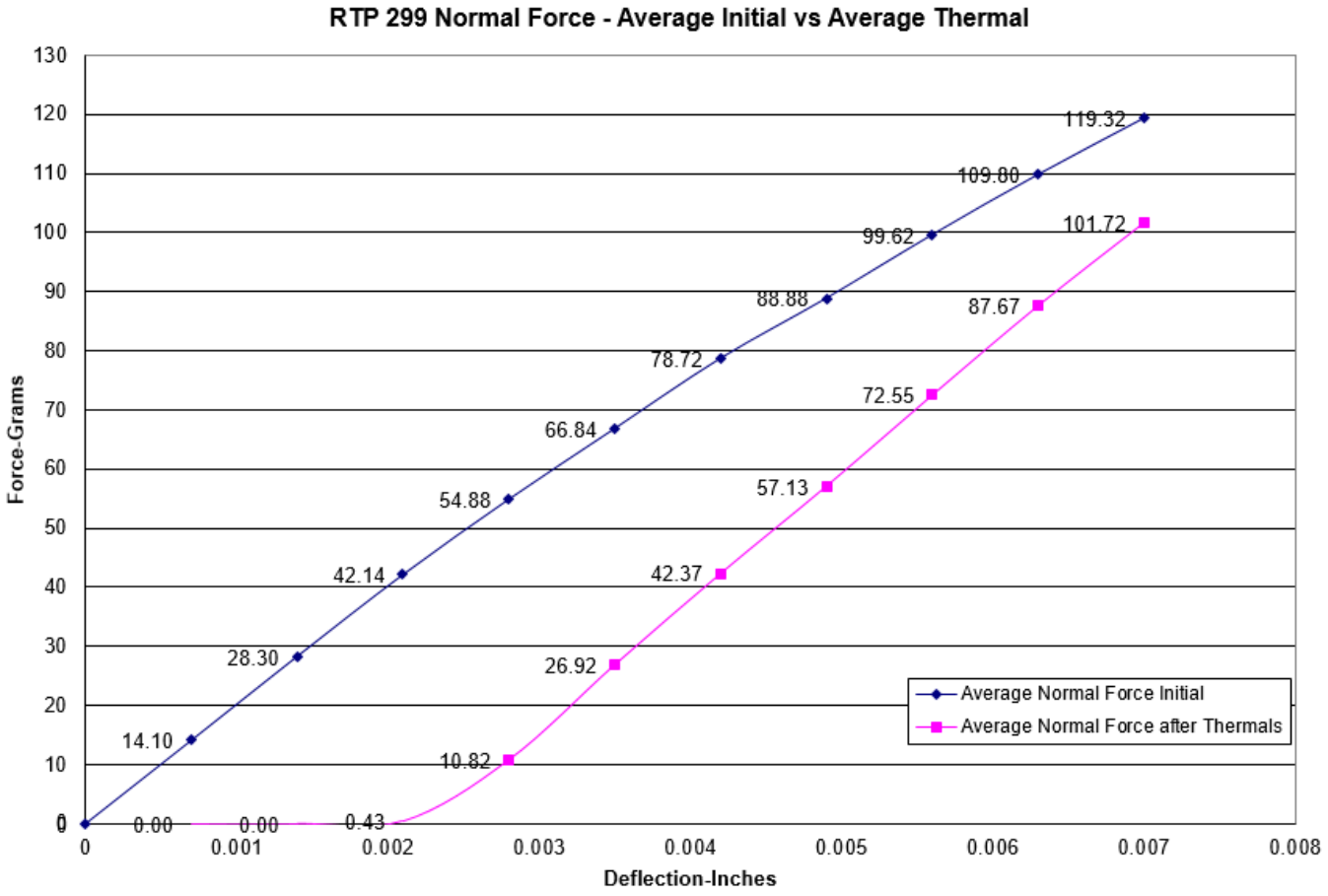
DATA SUMMARIES Continued

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.

Initial	Deflections in inches Forces in Grams										
	0.0007	**0.0014**	**0.0021**	**0.0028**	**0.0035**	**0.0042**	**0.0049**	**0.0056**	**0.0063**	**0.0070**	***SET***
Averages	14.10	28.30	42.14	54.88	66.84	78.72	88.88	99.62	109.80	119.32	0.0008
Min	13.50	26.30	39.50	52.50	63.20	76.00	85.80	96.10	105.30	114.90	0.0000
Max	14.80	30.30	45.00	57.50	70.80	82.30	91.80	104.80	118.30	129.60	0.0014
St. Dev	0.648	1.619	2.228	2.391	3.202	2.684	2.689	3.561	5.277	6.055	0.0005
Count	5	5	5	5	5	5	5	5	5	5	5

After Thermals	RTP 299 Deflections in inches Forces in Grams										
	0.0007	**0.0014**	**0.0021**	**0.0028**	**0.0035**	**0.0042**	**0.0049**	**0.0056**	**0.0063**	**0.0070**	***SET***
Averages	0.00	0.00	0.43	10.82	26.92	42.37	57.13	72.55	87.67	101.72	0.0026
Min	0.00	0.00	0.00	3.90	18.60	35.50	50.40	67.50	82.10	93.60	0.0026
Max	0.00	0.00	2.60	19.90	37.00	51.10	66.60	81.30	94.40	108.80	0.0270
St. Dev	0.000	0.000	1.061	5.955	6.303	5.082	5.291	4.926	4.866	5.900	0.0026
Count	6	6	6	6	6	6	6	6	6	6	6



DATA SUMMARIES Continued

MMSD-25-20-L-6.00-S /IPL1-125-01-LM-D-K

0° Pull

	Force (lbs)
Minimum	11.64
Maximum	14.67
Average	13.52

90° Pull Degrees Towards Short Axis of Part

	Force (lbs)
Minimum	40.05
Maximum	55.10
Average	49.08

90° Pull Degrees Towards Long Axis of Part

	Force (lbs)
Minimum	12.36
Maximum	28.48
Average	22.91

Latch Cycling/Pull

Group 1-Pull Test (IPD1-25-D/T-32046-05)

	Force (lbs)
Minimum	10.69
Maximum	17.56
Average	12.62

Group 2-Pull Test (IPD1-25-D/T-32046-05)

	Force (lbs)
Minimum	9.55
Maximum	12.71
Average	10.59

DATA SUMMARIES Continued

Cable Flex:

MMSD-25-20-L-6.00-S /IPL1-125-01-LM-D-K

Insulation Resistance minimums, IR

Pin to Pin	
Mated	
Minimum	
Initial	45000
After 500 Flex Cycles	45000

Row to Row	
Mated	
Minimum	
Initial	45000
After 500 Flex Cycles	45000

Dielectric Withstanding Voltage minimums, DWV

Voltage Rating Summary	
Minimum	
Break Down Voltage	1200
Test Voltage	900
Working Voltage	300

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

INSULATION RESISTANCE (IR):

MMSD-25-20-L-6.00-S /IPL1-125-01-LM-D-K

	Pin to Pin		
	Mated	Unmated	Unmated
Minimum	**MMSD/LPL1**	**MMSD**	**LPL1**
Initial	45000	45000	45000
Thermal	45000	45000	45000
Humidity	45000	45000	45000

	Row to Row		
	Mated	Unmated	Unmated
Minimum	**MMSD/LPL1**	**MMSD**	**LPL1**
Initial	45000	45000	45000
Thermal	45000	45000	45000
Humidity	45000	45000	45000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

MMSD-25-20-L-6.00-S /IPL1-125-01-LM-D-K

Voltage Rating Summary	
Minimum	**MMSD/LPL1**
Break Down Voltage	1200
Test Voltage	900
Working Voltage	300

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

DATA SUMMARIES Continued

LLCR GAS TIGHT:

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. <= +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

MMSD-25-20-L-6.00-S /IPL1-125-01-LM-D-K

	LLCR Measurement Summaries by Pin Type			
Date	1/31/2020	2/12/2020		
Room Temp (Deg C)	22	23		
Rel Humidity (%)	25	28		
Technician	Scott Rollefstad	Scott Rollefstad		
mOhm values	**Actual Initial**	**Delta Acid Vapor**	**Delta**	**Delta**
	Pin Type 1: Signal			
Average	9.74	0.35		
St. Dev.	0.56	0.29		
Min	8.59	0.00		
Max	11.43	1.39		
Summary Count	168	168		
Total Count	168	168		

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
Acid Vapor	**192**	**0**	**0**	**0**	**0**	**0**

DATA SUMMARIES Continued

LLCR Thermal aging

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. <= +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

MMSD-25-20-L-6.00-S /IPL1-125-01-LM-D-K

	LLCR Measurement Summaries by Pin Type			
Date	2/21/2020	3/3/2020		
Room Temp (Deg C)	22	22		
Rel Humidity (%)	35	44		
Technician	Scott Rollefstad	Scott Rollefstad		
mOhm values	**Actual Initial**	**Delta Thermal**	**Delta**	**Delta**
	Pin Type 1: Signal			
Average	9.77	0.75		
St. Dev.	0.58	0.49		
Min	8.43	0.00		
Max	11.48	2.41		
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**
Thermal	**192**	**0**	**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. <= +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

MMSD-15-20-L-12.00-S-K/ IPL1-115-01-LM-D-K

	LLCR Measurement Summaries by Pin Type			
Date	10/28/2021	11/10/2021	11/15/2021	12/9/2021
Room Temp (Deg C)	22	22	23	23
Rel Humidity (%)	39	42	37	37
Technician	Scott Rollefstad	Scott Rollefstad	Scott Rollefstad	Scott Rollefstad
mOhm values	Actual **Initial**	**Delta Cycles**	**Delta Therm Shck**	**Delta Humidity**
	Pin Type: Signal 1			
Average	14.13	0.37	0.72	0.62
St. Dev.	0.35	0.35	0.59	0.49
Min	13.28	0	0.01	0.01
Max	15.09	1.96	2.32	2.23
Summary Count	192	192	192	192
Total Count	192	192	192	192

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
Cycles	**192**	**0**	**0**	**0**	**0**	**0**
Therm Shck	**192**	**0**	**0**	**0**	**0**	**0**
Humidity	**192**	**0**	**0**	**0**	**0**	**0**

DATA SUMMARIES Continued

LLCR Shock Vib:

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. <= +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

MMSD-25-20-L-12.00-S /IPL1-125-01-LM-D-K

	LLCR Measurement Summaries by Pin Type			
Date	1/31/2020	2/17/2020		
Room Temp (Deg C)	22	23		
Rel Humidity (%)	26	36		
Technician	Scott Rollefstad	Scott Rollefstad		
mOhm values	**Actual Initial**	**Delta Shock/Vib**	**Delta**	**Delta**
	Pin Type 1: Signal			
Average	14.16	0.47		
St. Dev.	0.53	0.42		
Min	13.13	0.01		
Max	16.11	2.14		
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**

Shock Vibration Event Detection:

MMSD-25-20-L-12.00-S /IPL1-125-01-LM-D-K

Shock and Vibration Event Detection Summary	
Contacts tested	192
Test Condition	C, 30g's, 6ms, Half-Sine
Shock Events	0
Test Condition	V-B, 7.56g rms
Vibration Events	0
Total Events	0

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: HPM-01
Description: Hipot Megommeter
Manufacturer: Hipotronics
Model: H306B-A
Serial #: M9905004
Accuracy: 2 % Full Scale Accuracy
… Last Cal: 05/24/2020, Next Cal: 08/24/2021

Equipment #: TCT-06
Description: Test Resources test stand
Manufacturer: Test Resources
Model: 100R250-12
Serial #: 0710016-01
Accuracy: Speed Accuracy: +/- 5% of indicated speed; Displacement: +/- 5 micrometers.
… Last Cal: 05/03/2020, Next Cal: 05/03/2021

Equipment #: MO-04
Description: Multimeter /Data Acquisition System
Manufacturer: Keithley
Model: 2700
Serial #: 0798688
Accuracy: See Manual
… Last Cal: 04/30/2020, Next Cal: 04/30/2021

Equipment #: OV-05
Description: Forced Air Oven, 5 Cu. Ft., 120 V (Chamber Room)
Manufacturer: Sheldon Mfg.
Model: CE5F
Serial #: 02008008
Accuracy: +/- 5 deg. C
… Last Cal: 02/18/2020, Next Cal: 02/18/2021

Equipment #: THC-01
Description: Temperature/Humidity Chamber (Chamber Room)
Manufacturer: Thermotron
Model: SM-8-7800
Serial #: 30676
Accuracy: See Manual
… Last Cal: 10/24/2020, Next Cal: 10/24/2021

Equipment #: TSC-01
Description: Vertical Thermal Shock Chamber
Manufacturer: Cincinnati Sub Zero
Model: VTS-3-6-6-SC/AC
Serial #: 10-VT14993
Accuracy: See Manual
… Last Cal: 06/30/2020, Next Cal: 06/30/2021

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: MO-02
Description: Multimeter /Data Acquisition System
Manufacturer: Keithley
Model: 2700
Serial #: 0780546
Accuracy: Last Cal: 6/16/2018, Next Cal: 6/16/2019

Equipment #: PS-01
Description: Power Supply
Manufacturer: Hewlett Packard
Model: 6033A
Serial #: 3329A-07330
Accuracy: Last Cal: 6/12/2020, Next Cal: 6/12/2021

Equipment #: PS-02
Description: Power Supply
Manufacturer: Hewlett Packard
Model: 6033A
Serial #: 2847A-04167
Accuracy: Last Cal: 6/12/2020, Next Cal: 6/12/2021

Equipment #: SVC-01
Description: Shock & Vibration Table
Manufacturer: Data Physics
Model: LE-DSA-10-20K
Serial #: 10037
Accuracy: See Manual
… Last Cal: 11/30/2020, Next Cal: 11/30/2021

Equipment #: ACLM-01
Description: Accelerometer
Manufacturer: PCB Piezotronics
Model: 352C03
Serial #: 115819
Accuracy: See Manual
… Last Cal: 7/9/2020, Next Cal: 7/9/2021

Equipment #: ED-03
Description: Event Detector
Manufacturer: Analysis Tech
Model: 32EHD
Serial #: 1100604
Accuracy: See Manual
… Last Cal: 6/4/2020, Next Cal: 6/4/2021