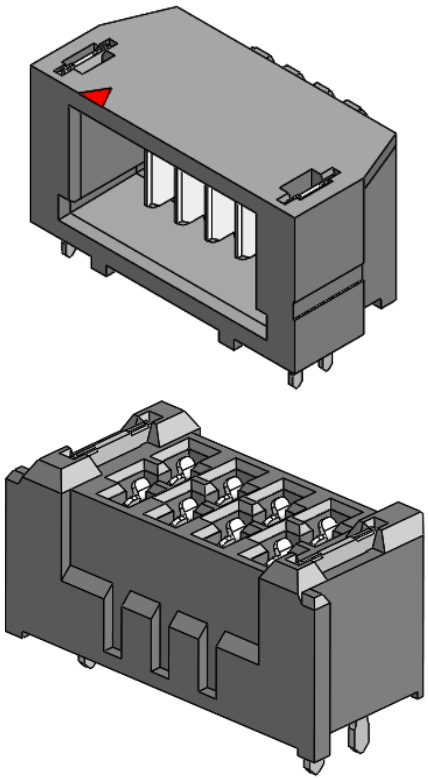
Project Number: Design Qualification Test Report	Tracking Code: 2410699_Report_Rev_2
Requested by: Leo Lee	Date: 6/30/2021
Part #: UMPT-04-01-T-RA-WT-TR/UMPS-04-05.5-T-V-S-W-TR	
Part description: UMPS/UMPT	Tech: Kason He
Test Start: 5/26/2020	Test Completed: 6/28/2020



DESIGN QUALIFICATION TEST REPORT

UMPS/UMPT
UMPT-04-01-T-RA-WT-TR/UMPS-04-05.5-T-V-S-W-TR

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
8/13/2020	**1**	**Initial Issue**	**KH**
6/29/2021	**2**	**Updated the part number**	**KH**

CERTIFICATION

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

SCOPE

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

APPLICABLE DOCUMENTS

Standards: EIA Publication 364

TEST SAMPLES AND PREPARATION

1) All materials were manufactured in accordance with the applicable product specification.
2) All test samples were identified and encoded to maintain traceability throughout the test sequences.
3) After soldering, the parts to be used for LLCR and DWV/IR testing were cleaned according to TLWI-0001.
4) Either an automated cleaning procedure or an ultrasonic cleaning procedure may be used.
5) The automated procedure is used with aqueous compatible soldering materials.
6) Parts not intended for testing LLCR and DWV/IR are visually inspected and cleaned if necessary.
7) Any additional preparation will be noted in the individual test sequences.
8) Solder Information: Lead free
9) Samtec Test PCBs used: PCB-110858-TST/PCB-110859-TST/PCB-110860-TST/PCB-110876-TST

FLOWCHARTS

Mating/Unmating/Durability

Group 1 UMPS-04-05.5-T-V-S-W-TR UMPT-04-01-T-RA-WT-TR 8 Assemblies		Group 2 UMPS-02-05.5-T-V-S-W-TR UMPT-02-01-T-RA-WT-TR 8 Assemblies		Group 3 UMPS-10-05.5-T-V-S-W-TR UMPT-10-01-T-RA-WT-TR 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 UMPS-04-05.5-T-V-S-W-TR UMPT-04-01-T-RA-WT-TR 2 Assemblies		Group 2 UMPS-04-05.5-T-V-S-W-TR 2 Assemblies		Group 3 UMPT-04-01-T-RA-WT-TR 2 Assemblies		Group 4 UMPS-04-05.5-T-V-S-W-TR UMPT-04-01-T-RA-WT-TR 2 Assemblies	
Step	**Description**	**Step**	**Description**	**Step**	**Description**	**Step**	**Description**
1.	DWV Breakdown (2)	1.	DWV Breakdown (2)	1.	DWV Breakdown (2)	1.	IR (4)
						2.	DWV at Test Voltage (1)
						3.	Thermal Shock (5)
						4.	IR (4)
						5.	DWV at Test Voltage (1)
						6.	Humidity (3)
						7.	IR (4)
						8.	DWV at Test Voltage (1)

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

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

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

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

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

FLOWCHARTS Continued

Current Carrying Capacity

Group 1
UMPS-10-05.5-T-V-S-W-TR
UMPT-10-01-T-RA-WT-TR
1 Pins Powered
Power

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

Group 2
UMPS-10-05.5-T-V-S-W-TR
UMPT-10-01-T-RA-WT-TR
2 Pins Powered
Power

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

Group 3
UMPS-10-05.5-T-V-S-W-TR
UMPT-10-01-T-RA-WT-TR
3 Pins Powered
Power

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

Group 4
UMPS-10-05.5-T-V-S-W-TR
UMPT-10-01-T-RA-WT-TR
4 Pins Powered
Power

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

Group 5
UMPS-10-05.5-T-V-S-W-TR
UMPT-10-01-T-RA-WT-TR
10 Pins Powered
Power

Step	Description
1.	CCC (1) Rows = 1 Number of Positions = 10

(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

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.

HUMIDITY:

1) Reference document: EIA-364-31, *Humidity Test Procedure for Electrical Connectors.*
2) Test Condition B, 240 Hours.
3) Method III, +25° C to + 65° C, 90% to 98% Relative Humidity excluding sub-cycles 7a and 7b.
4) All samples are pre-conditioned at ambient.
5) All test samples are exposed to environmental stressing in the mated condition.

MATING/UNMATING:

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

TEMPERATURE RISE (Current Carrying Capacity, CCC):

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

ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes.

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

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. 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).

RESULTS

Temperature Rise, CCC at a 20% de-rating

- **CCC for a 30°C Temperature Rise----------18.4 A per contact with 1 contact (1x1) powered**
- **CCC for a 30°C Temperature Rise----------17.2 A per contact with 2 contacts (1x2) powered**
- **CCC for a 30°C Temperature Rise----------14.4 A per contact with 3 contacts (1x3) powered**
- **CCC for a 30°C Temperature Rise----------14.0 A per contact with 4 contacts (1x4) powered**
- **CCC for a 30°C Temperature Rise----------8.9 A per contact with 10 contacts (1x10) powered**

Mating – Unmating Forces

Mating-Unmating Durability Group（UMPS-04-05.5-T-V-S-W-TR/UMPT-04-01-T-RA-WT-TR）

- **Initial**
  - **Mating**
    - **Min ---------- 5.43 Lbs**
    - **Max---------- 6.49 Lbs**
  - **Unmating**
    - **Min ---------- 4.37 Lbs**
    - **Max---------- 5.71 Lbs**
- **After 25 Cycles**
  - **Mating**
    - **Min ---------- 5.06 Lbs**
    - **Max---------- 6.31 Lbs**
  - **Unmating**
    - **Min ---------- 3.41 Lbs**
    - **Max---------- 4.64 Lbs**
- **After 50 Cycles**
  - **Mating**
    - **Min ---------- 5.02 Lbs**
    - **Max---------- 5.54 Lbs**
  - **Unmating**
    - **Min ---------- 2.84 Lbs**
    - **Max---------- 4.09 Lbs**
- **After 75 Cycles**
  - **Mating**
    - **Min ---------- 4.89 Lbs**
    - **Max---------- 5.53 Lbs**
  - **Unmating**
    - **Min ---------- 2.90 Lbs**
    - **Max---------- 4.09 Lbs**
- **After 100 Cycles**
  - **Mating**
    - **Min ---------- 4.76 Lbs**
    - **Max---------- 5.50 Lbs**
  - **Unmating**
    - **Min ---------- 3.01 Lbs**
    - **Max---------- 4.14 Lbs**
- **Humidity**
  - **Mating**
    - **Min ---------- 2.19 Lbs**
    - **Max---------- 3.32 Lbs**
  - **Unmating**
    - **Min ---------- 2.16 Lbs**
    - **Max---------- 3.45 Lbs**

RESULTS Continued

Mating-Unmating Basic（UMPS-02-05.5-T-V-S-W-TR/UMPT-02-01-T-RA-WT-TR）

- **Initial**
  - **Mating**
    - **Min ---------- 3.19 Lbs**
    - **Max---------- 3.82 Lbs**
  - **Unmating**
    - **Min ---------- 2.71 Lbs**
    - **Max---------- 3.41 Lbs**
- **After 25 Cycles**
  - **Mating**
    - **Min ---------- 2.72 Lbs**
    - **Max---------- 3.46 Lbs**
  - **Unmating**
    - **Min ---------- 2.03 Lbs**
    - **Max---------- 2.69 Lbs**
- **After 50 Cycles**
  - **Mating**
    - **Min ---------- 2.62 Lbs**
    - **Max---------- 3.44 Lbs**
  - **Unmating**
    - **Min ---------- 1.94 Lbs**
    - **Max---------- 2.59 Lbs**
- **After 75 Cycles**
  - **Mating**
    - **Min ---------- 2.69 Lbs**
    - **Max---------- 3.46 Lbs**
  - **Unmating**
    - **Min ---------- 2.05 Lbs**
    - **Max---------- 2.74 Lbs**
- **After 100 Cycles**
  - **Mating**
    - **Min ---------- 2.62 Lbs**
    - **Max---------- 3.62 Lbs**
  - **Unmating**
    - **Min ---------- 2.05 Lbs**
    - **Max---------- 2.68 Lbs**

RESULTS Continued

Mating-Unmating Basic （UMPS-10-05.5-T-V-S-W-TR/UMPT-10-01-T-RA-WT-TR）

- **Initial**
  - **Mating**
    - **Min ----------12.60 Lbs**
    - **Max----------14.48 Lbs**
  - **Unmating**
    - **Min ----------11.21 Lbs**
    - **Max----------14.03 Lbs**
- **After 25 Cycles**
  - **Mating**
    - **Min ----------13.31 Lbs**
    - **Max----------14.20 Lbs**
  - **Unmating**
    - **Min ----------10.39 Lbs**
    - **Max----------11.61 Lbs**
- **After 50 Cycles**
  - **Mating**
    - **Min ----------13.27 Lbs**
    - **Max----------14.40 Lbs**
  - **Unmating**
    - **Min ----------10.21 Lbs**
    - **Max----------10.95 Lbs**
- **After 75 Cycles**
  - **Mating**
    - **Min ----------13.13 Lbs**
    - **Max----------14.56 Lbs**
  - **Unmating**
    - **Min ----------10.38 Lbs**
    - **Max----------10.86 Lbs**
- **After 100 Cycles**
  - **Mating**
    - **Min ----------13.13 Lbs**
    - **Max----------14.28 Lbs**
  - **Unmating**
    - **Min ----------10.46 Lbs**
    - **Max----------11.22 Lbs**

RESULTS Continued

Insulation Resistance minimums, IR

Pin to Pin

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

Dielectric Withstanding Voltage minimums, DWV

- **Minimums**
  - **Breakdown Voltage ---------- 1932 VAC**
  - **Test Voltage ---------- 1450 VAC**
  - **Working Voltage ---------- 480 VAC**

Pin to Pin

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

RESULTS Continued

LLCR Mating/Unmating Durability Group (32 LLCR test points)

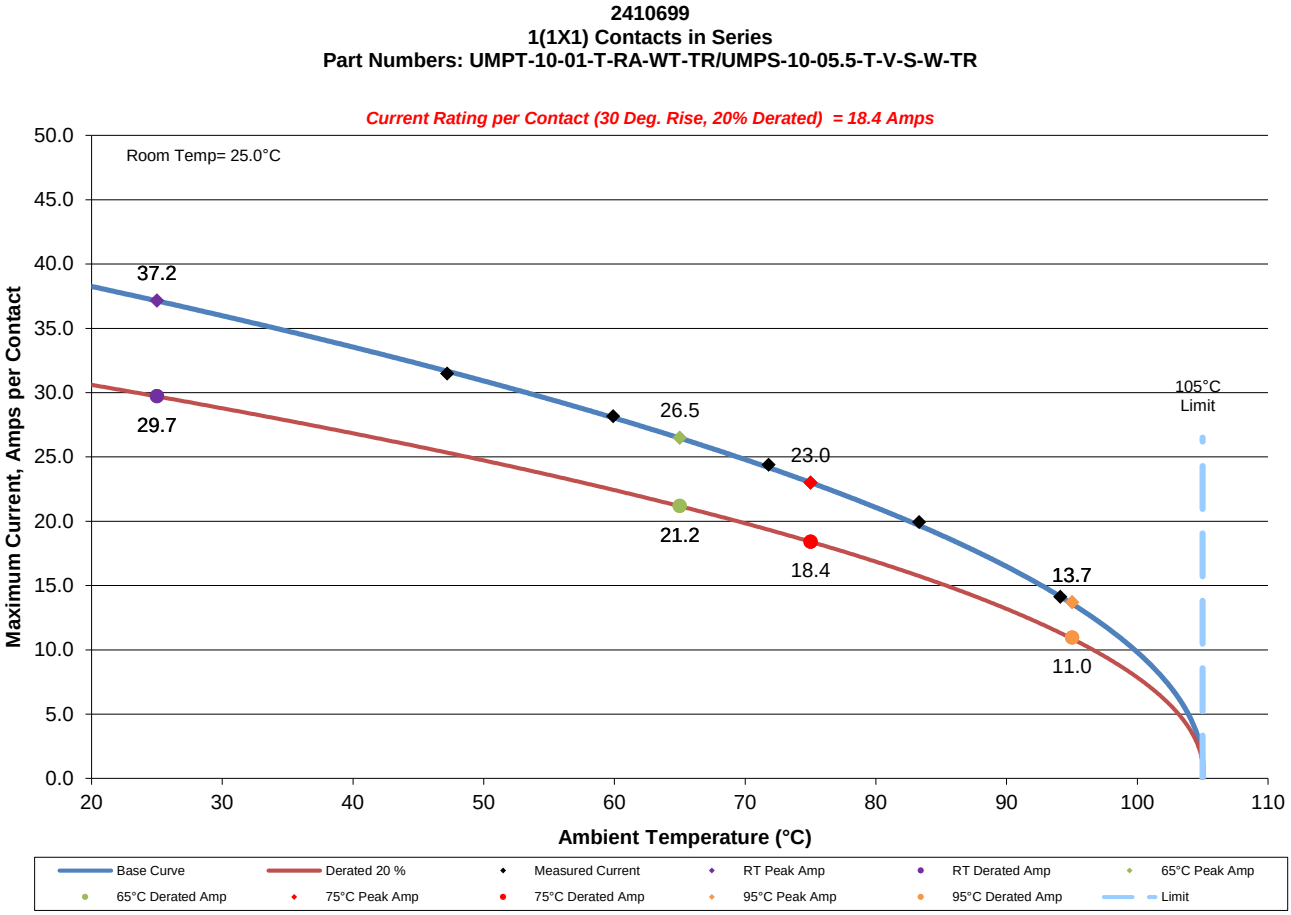
- **Initial ---------- 1.08 mOhms Max**
- **Durability, 100 Cycles**
  - **<= +5.0 mOhms ---------- 32 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**
- **Thermal Shock**
  - **<= +5.0 mOhms ---------- 32 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 ---------- 32 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+1000 mOhms ---------- 0 Points ---------- Open Failure**

DATA SUMMARIES

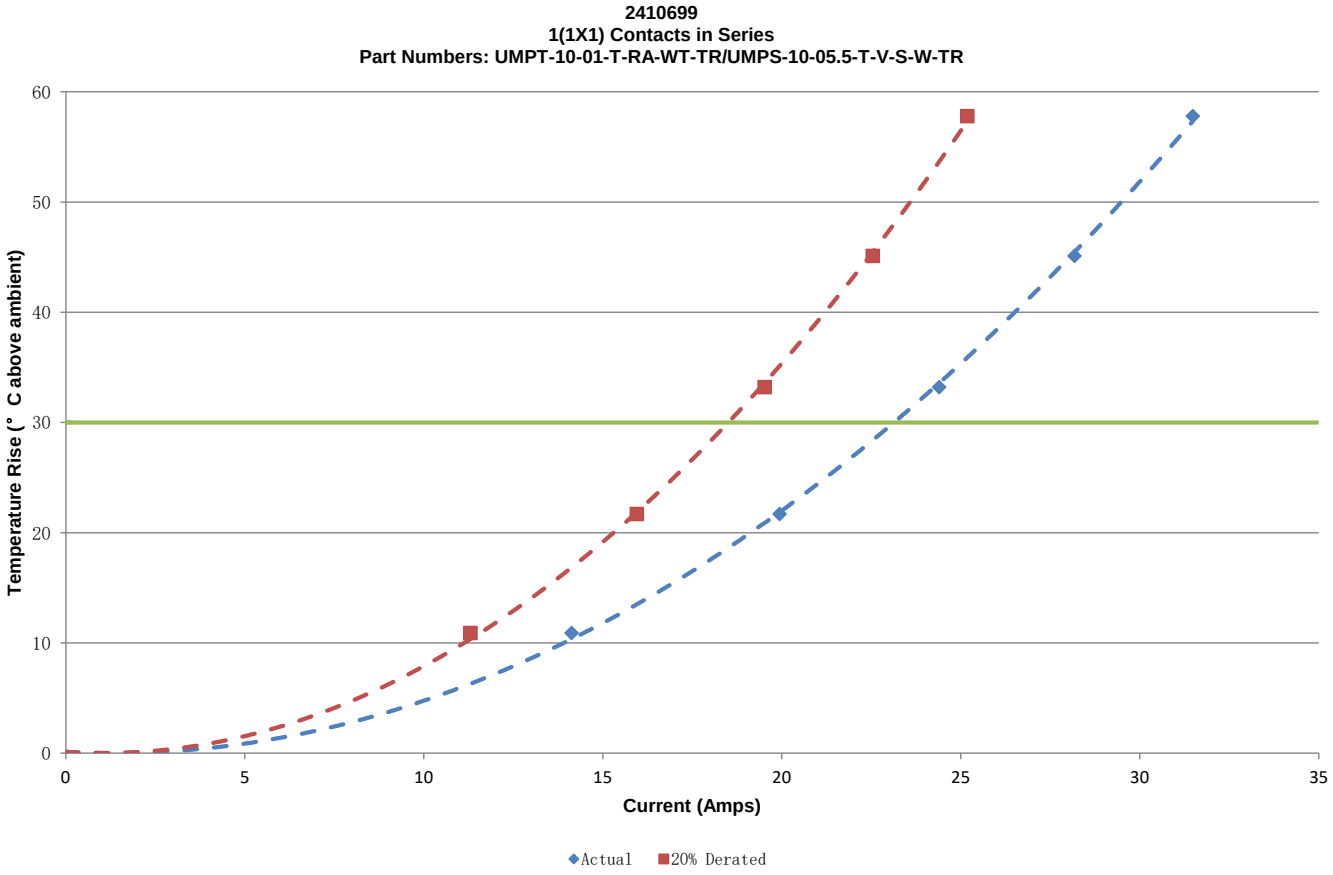
TEMPERATURE RISE (Current Carrying Capacity, CCC):

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

    a. Linear configuration with 1 adjacent conductors/contacts powered

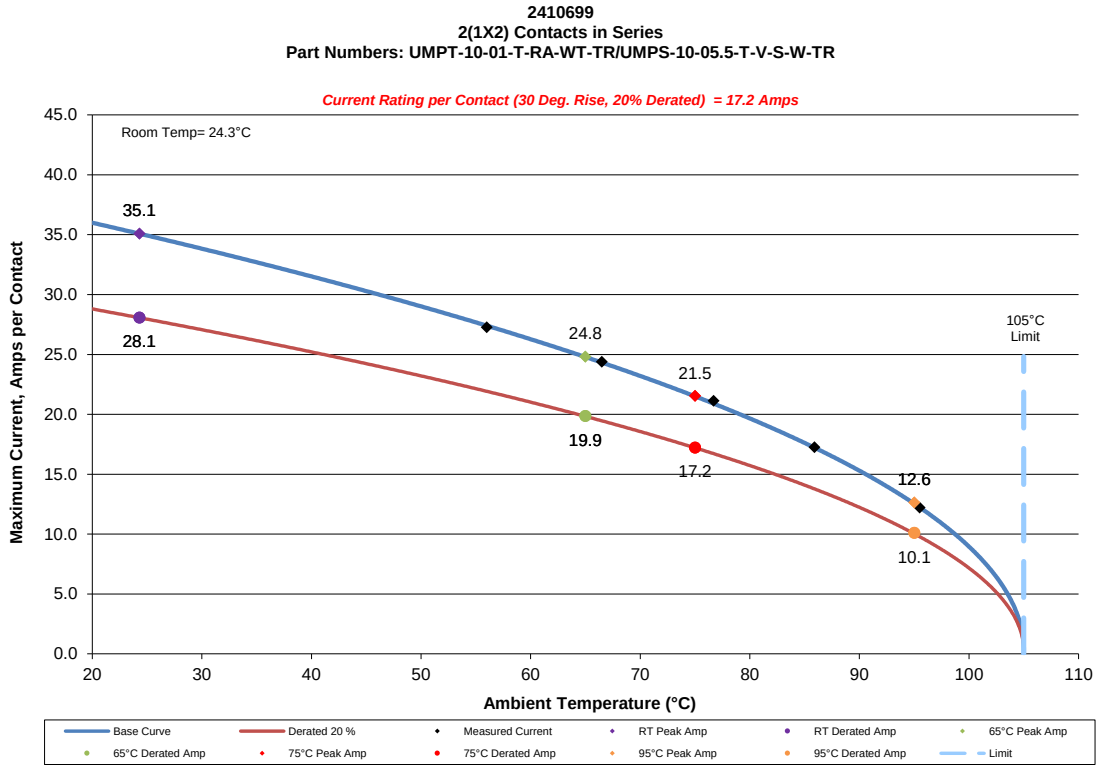


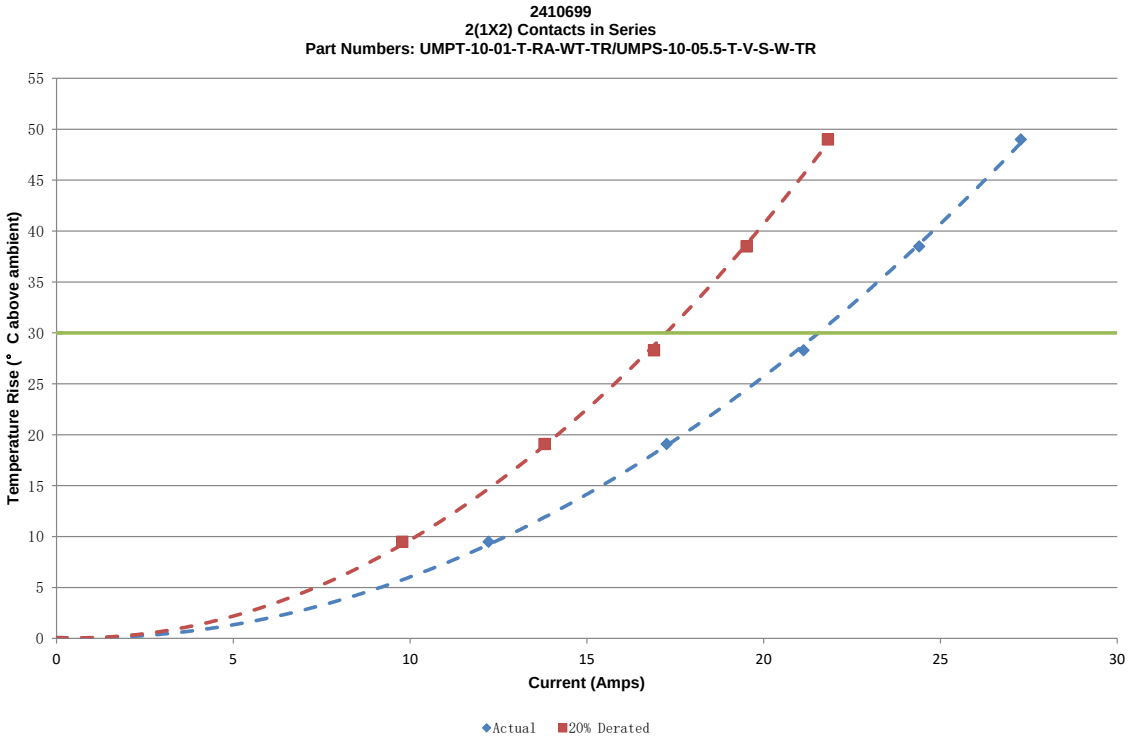
DATA SUMMARIES Continued



DATA SUMMARIES Continued

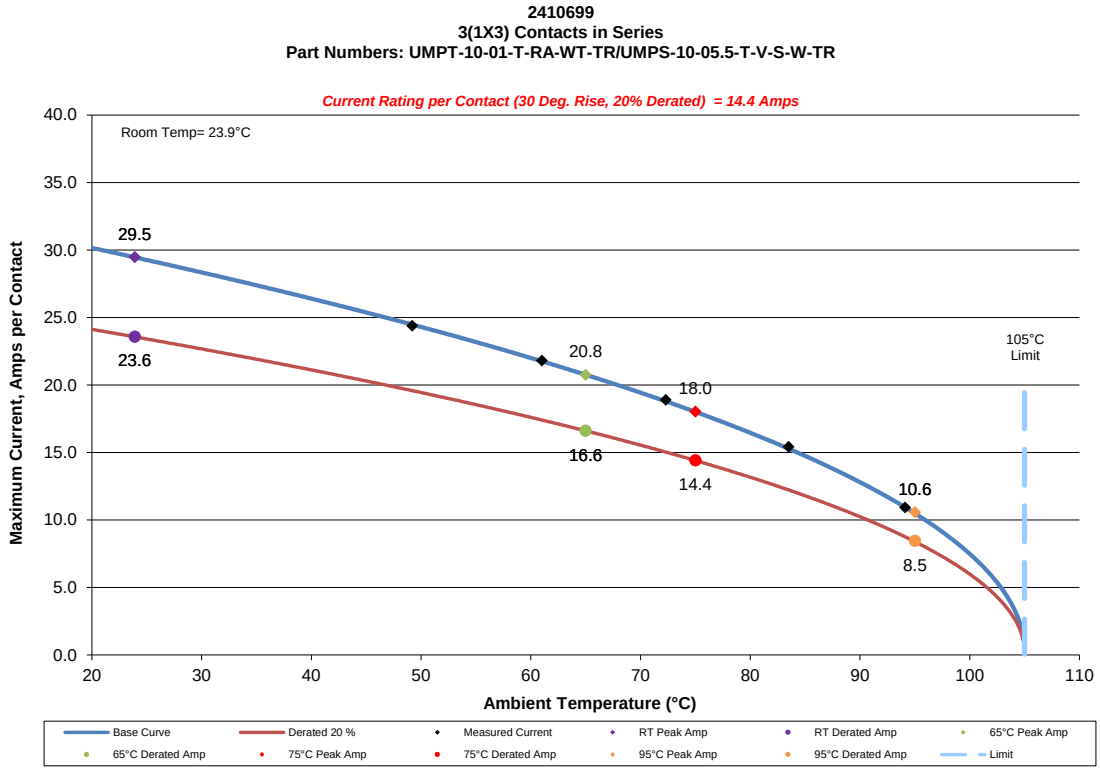
b. Linear configuration with 2 adjacent conductors/contacts powered

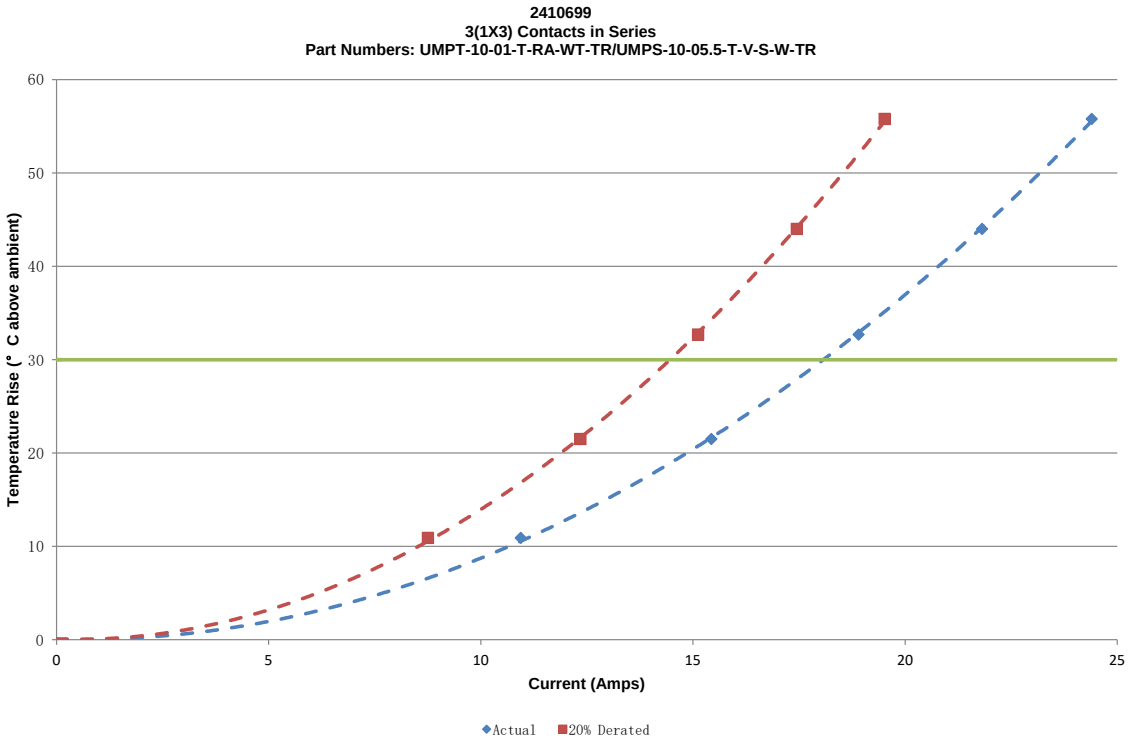




DATA SUMMARIES Continued

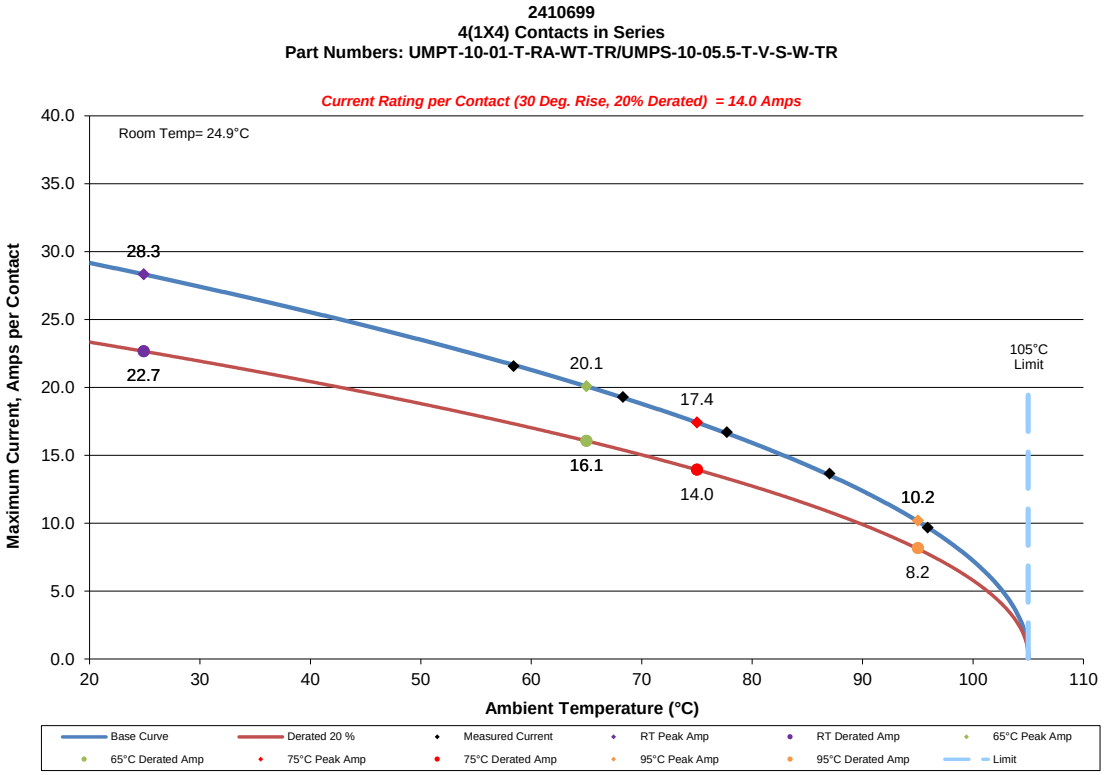
c. Linear configuration with 3 adjacent conductors/contacts powered

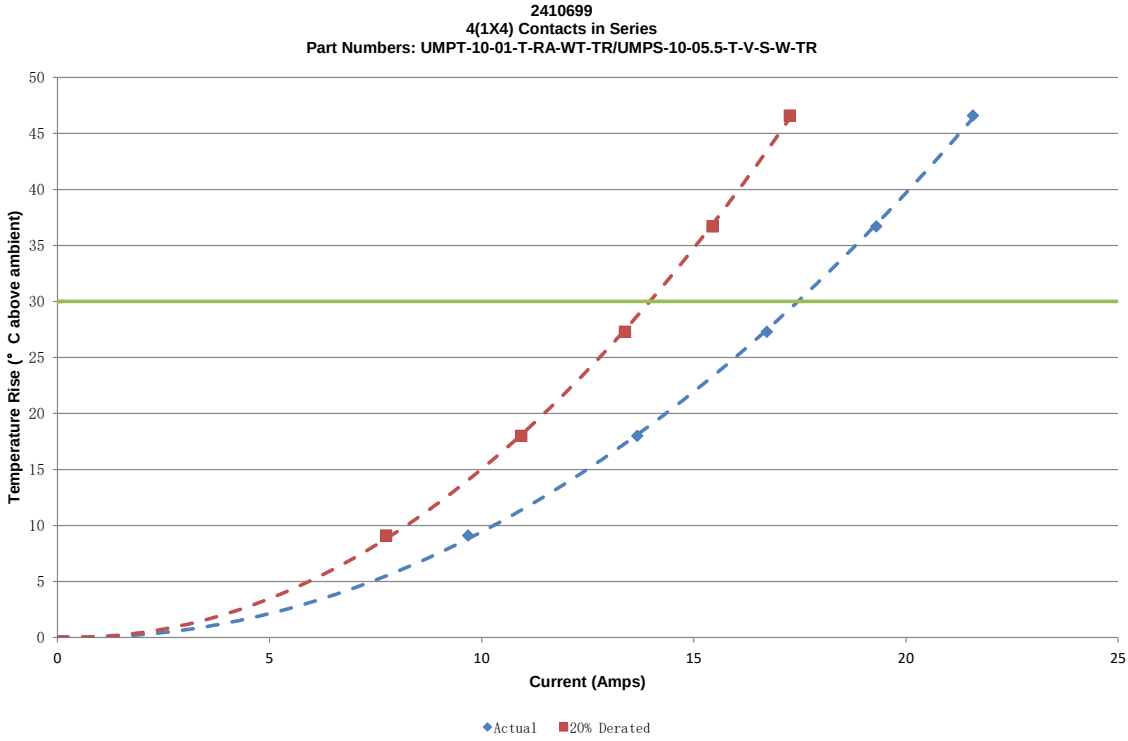




DATA SUMMARIES Continued

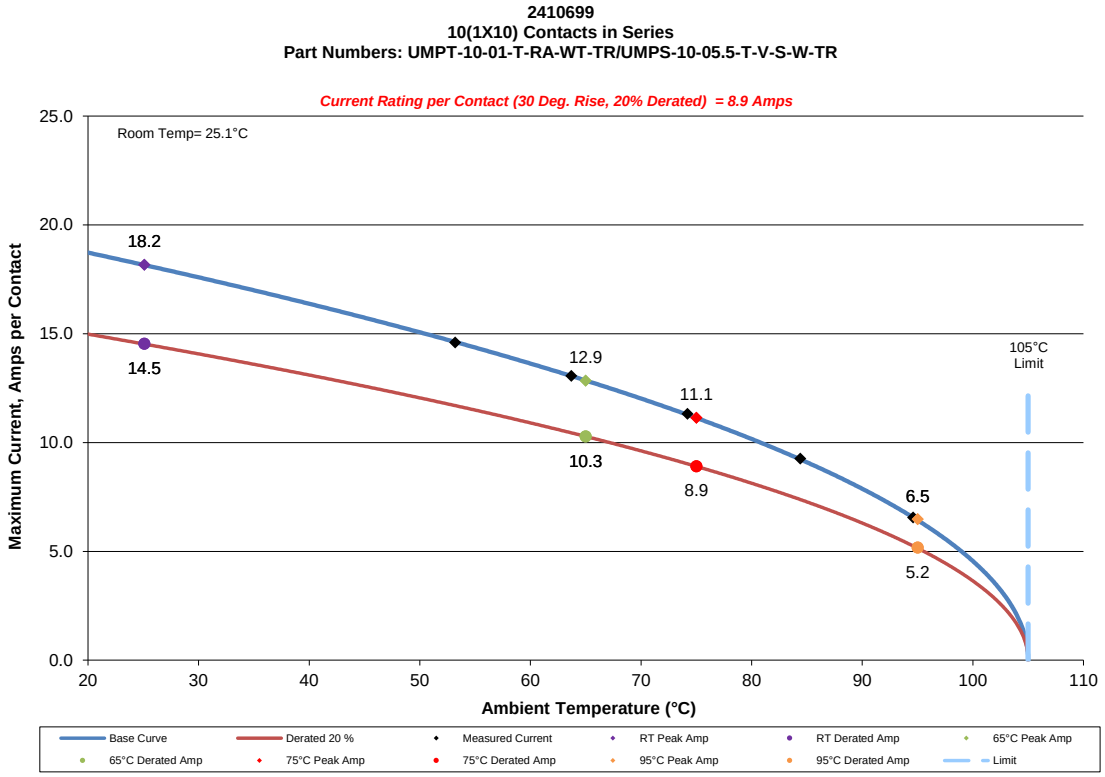
d. Linear configuration with 4 adjacent conductors/contacts powered

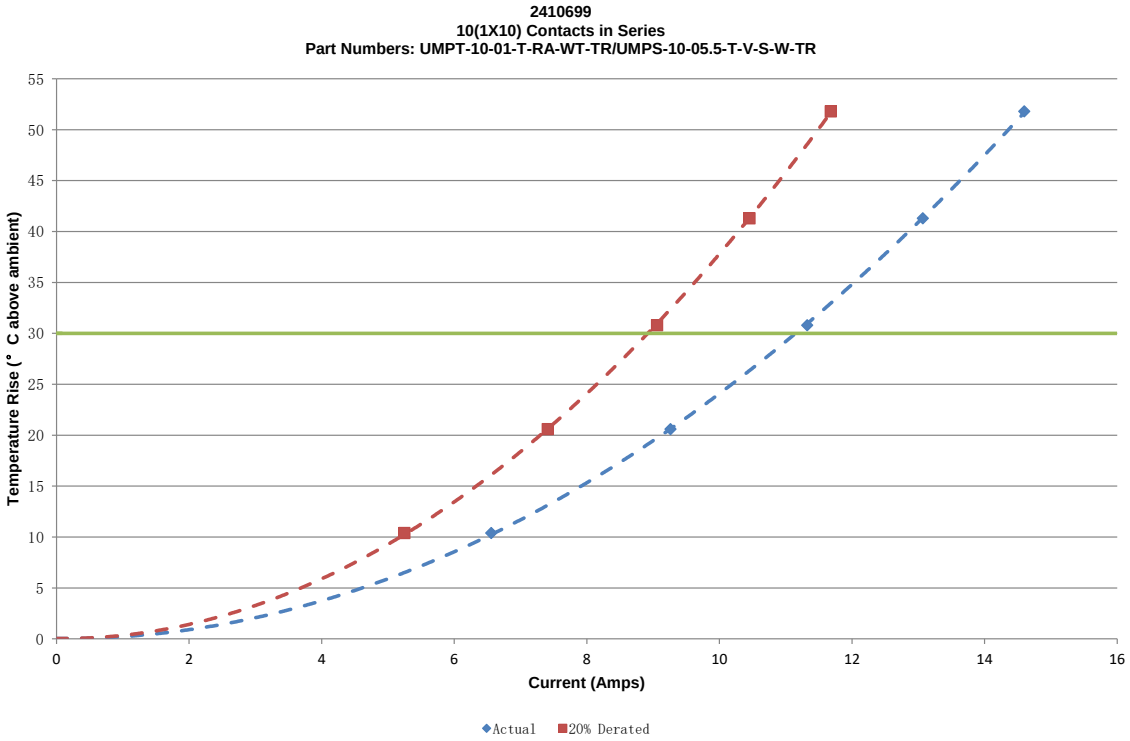




DATA SUMMARIES Continued

e. Linear configuration with all adjacent conductors/contacts powered





DATA SUMMARIES Continued

MATING-UNMATING FORCE:

Mating-Unmating Durability Group (UMPS-04-05.5-T-V-S-W-TR/UMPT-04-01-T-RA-WT-TR)

	Initial				25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	24.15	5.43	19.44	4.37	22.51	5.06	15.17	3.41
Maximum	28.87	6.49	25.40	5.71	28.07	6.31	20.64	4.64
Average	25.76	**5.79**	23.15	**5.21**	23.79	**5.35**	19.02	**4.28**
St Dev	1.61	0.36	1.92	0.43	1.83	0.41	1.69	0.38
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	22.33	5.02	12.63	2.84	21.75	4.89	12.90	2.90
Maximum	24.64	5.54	18.19	4.09	24.60	5.53	18.19	4.09
Average	23.34	**5.25**	17.16	**3.86**	23.26	**5.23**	17.11	**3.85**
St Dev	0.92	0.21	1.85	0.42	0.94	0.21	1.73	0.39
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	21.17	4.76	13.39	3.01	9.74	2.19	9.61	2.16
Maximum	24.46	5.50	18.41	4.14	14.77	3.32	15.35	3.45
Average	22.80	**5.13**	17.11	**3.85**	11.69	**2.63**	12.41	**2.79**
St Dev	1.04	0.23	1.68	0.38	1.52	0.34	1.60	0.36
Count	8	8	8	8	8	8	8	8

DATA SUMMARIES Continued

Mating-Unmating Basic (UMPS-02-05.5-T-V-S-W-TR/UMPT-02-01-T-RA-WT-TR)

	Initial				After 25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	14.19	3.19	12.05	2.71	12.10	2.72	9.03	2.03
Maximum	16.99	3.82	15.17	3.41	15.39	3.46	11.97	2.69
Average	15.56	**3.50**	13.56	**3.05**	14.11	**3.17**	10.83	**2.44**
St Dev	1.14	0.26	0.97	0.22	0.97	0.22	1.08	0.24
Count	8	8	8	8	8	8	8	8

	After 50 Cycles				After 75 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	11.65	2.62	8.63	1.94	11.97	2.69	9.12	2.05
Maximum	15.30	3.44	11.52	2.59	15.39	3.46	12.19	2.74
Average	13.92	**3.13**	10.20	**2.29**	14.38	**3.23**	10.41	**2.34**
St Dev	1.23	0.28	1.02	0.23	1.17	0.26	1.01	0.23
Count	8	8	8	8	8	8	8	8

	After 100 Cycles			
	Mating		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	11.65	2.62	9.12	2.05
Maximum	16.10	3.62	11.92	2.68
Average	14.23	**3.20**	10.48	**2.36**
St Dev	1.41	0.32	0.99	0.22
Count	8	8	8	8

DATA SUMMARIES Continued

Mating-Unmating Basic (UMPS-10-05.5-T-V-S-W-TR/UMPT-10-01-T-RA-WT-TR)

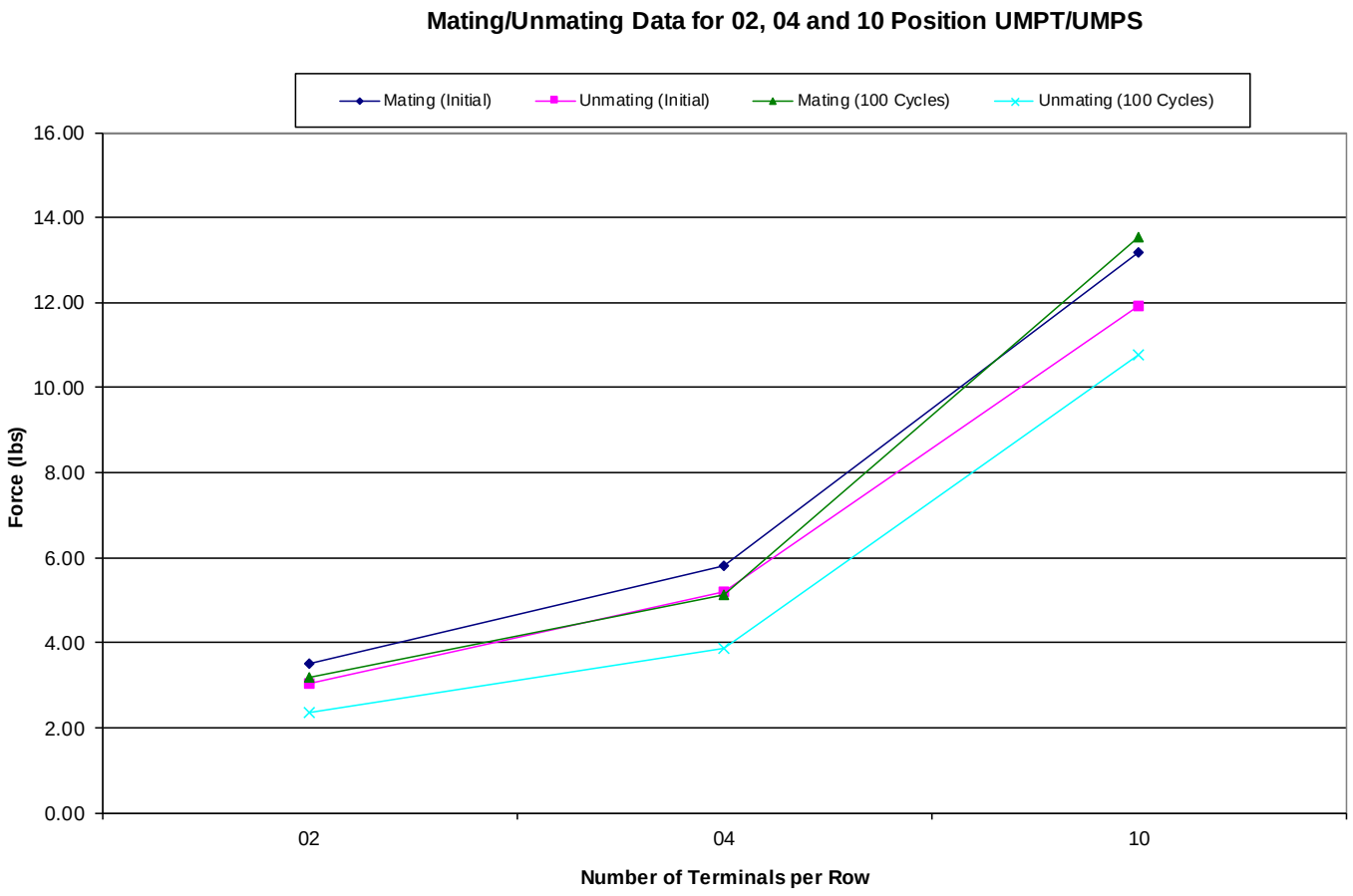
	Initial				After 25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	56.04	12.60	49.86	11.21	59.20	13.31	46.21	10.39
Maximum	64.41	14.48	62.41	14.03	63.16	14.20	51.64	11.61
Average	58.51	**13.16**	53.01	**11.92**	61.07	**13.73**	49.30	**11.08**
St Dev	2.71	0.61	3.98	0.90	1.43	0.32	1.73	0.39
Count	8	8	8	8	8	8	8	8

	After 50 Cycles				After 75 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	59.02	13.27	45.41	10.21	58.40	13.13	46.17	10.38
Maximum	64.05	14.40	48.71	10.95	64.76	14.56	48.31	10.86
Average	61.78	**13.89**	46.99	**10.57**	61.57	**13.84**	47.29	**10.63**
St Dev	1.66	0.37	1.25	0.28	2.37	0.53	0.76	0.17
Count	8	8	8	8	8	8	8	8

	After 100 Cycles			
	Mating		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	58.40	13.13	46.53	10.46
Maximum	63.52	14.28	49.91	11.22
Average	60.23	**13.54**	47.85	**10.76**
St Dev	1.72	0.39	1.25	0.28
Count	8	8	8	8

DATA SUMMARIES Continued

Mating-Unmating Comparison



DATA SUMMARIES Continued

INSULATION RESISTANCE (IR):

	Pin to Pin		
	Mated	Unmated	Unmated
Minimum	**UMPS/UMPT**	**UMPS**	**UMPT**
Initial	45000	45000	45000
Thermal	45000	45000	45000
Humidity	45000	45000	45000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	**UMPS/UMPT**
Break Down Voltage	1932
Test Voltage	1450
Working Voltage	480

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

DATA SUMMARIES Continued

LLCR Mating/Unmating Durability Group

1). A total of 32 points were measured.
2). EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets.*
3). A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
4). The following guidelines are used to categorize the changes in LLCR as a result from stressing.
   a. <= +5.0 mOhms:----------Stable
   b. +5.1 to +10.0 mOhms:----------Minor
   c. +10.1 to +15.0 mOhms:----------Acceptable
   d. +15.1 to +50.0 mOhms:----------Marginal
   e. +50.1 to +1000 mOhms----------Unstable
   f. > +1000 mOhms:----------Open Failure

LLCR Measurement Summaries by Pin Type				
Date	6/8/2020	6/11/2020	6/16/2020	6/28/2020
Room Temp (Deg C)	22	22	22	22
Rel Humidity (%)	52	50	52	50
Technician	Kason He	Kason He	Kason He	Kason He
mOhm values	**Actual Initial**	**Delta 100 Cycles**	**Delta Therm Shck**	**Delta Humidity**
	Pin Type 1: Signal			
Average	0.94	0.28	0.24	0.62
St. Dev.	0.05	0.10	0.10	0.29
Min	0.86	0.13	0.05	0.20
Max	1.08	0.65	0.53	1.42
Summary Count	32	32	32	32
Total Count	32	32	32	32

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
100 Cycles	**32**	**0**	**0**	**0**	**0**	**0**
Therm Shck	**32**	**0**	**0**	**0**	**0**	**0**
Humidity	**32**	**0**	**0**	**0**	**0**	**0**

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: HZ-TCT-01
Description: Normal force analyzer
Manufacturer: Mecmesin Multitester
Model: Mecmesin Multitester 2.5-i
Serial #: 08-1049-04
Accuracy: Last Cal: 3/5/2020, Next Cal: 3/4/2021

Equipment #: DG-THC-01
Description: Humidity transmitter
Manufacturer: Thermtron
Model: SM-8-8200
Serial #: 50613
Accuracy: Last Cal: 12/4/2019, Next Cal: 12/3/2020

Equipment #: HZ-TSC-01
Description: Vertical Thermal Shock Chamber
Manufacturer: Cincinnatti Sub Zero
Model: VTS-3-6-6-SC/AC
Serial #: 10-VT14994
Accuracy: See Manual
… Last Cal: 04/16/2020, Next Cal: 04/15/2021

Equipment #: DG-HPT-01
Description: Hipot Safety Tester
Manufacturer: Vitrek
Model: V73
Serial #: 025866
Accuracy:
… Last Cal: 04/16/2020, Next Cal: 04/15/2021

Equipment #: HZ-MO-05
Description: Micro-ohmmeter
Manufacturer: Keithley
Model: 3706
Serial #: 1285188
Accuracy: Last Cal: 1/2/2020, Next Cal: 1/1/2021

Equipment #: HZ-MO-01
Description: Micro-ohmmeter
Manufacturer: Keithley
Model: 2700
Serial #: 1199807
Accuracy: Last Cal: 05/19/2020, Next Cal: 05/18/2021

Equipment #: HZ-PS-01
Description: Power Supply
Manufacturer: Agilent
Model: 6031A
Serial #: MY41000982
Accuracy: Last Cal: 04/16/2020, Next Cal: 04/15/2021