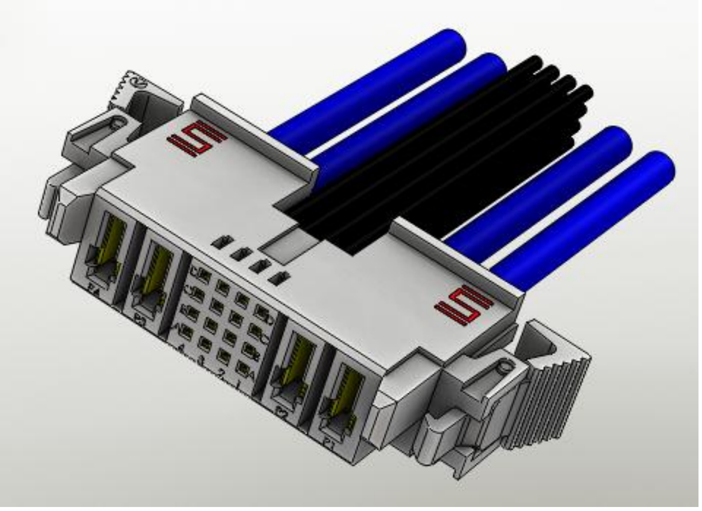
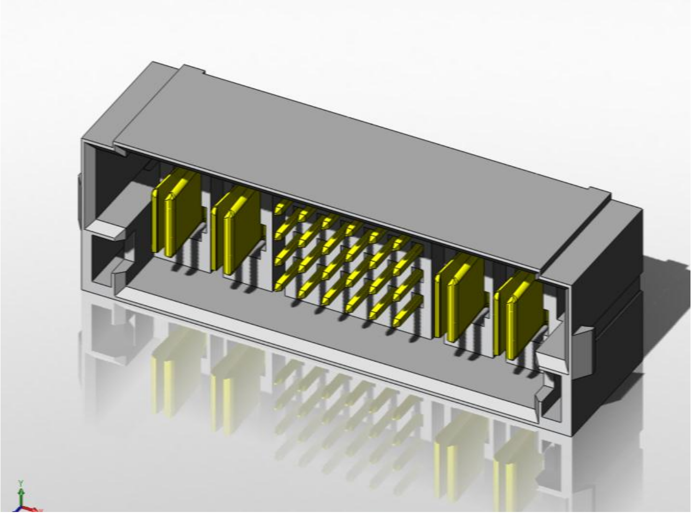
Project Number: Design Qualification Test Report	Tracking Code: 118439_Report_Rev_1		
Requested by: John Reid	Date: 3/15/2013	Product Rev:	
Part #: MPCC-2-24-2-L-44-04.00-D-NUS/ MPTC-2-24-2-6.30-01-L-V	Lot #: N/A	Tech: Troy Cook	Eng: Eric Mings
Part description: MPCC/MPTC		Qty to test: 30	
Test Start: 1/20/2011	Test Completed: 2/21/2011		





Design Qualification Test Report

MPCC/MPTC

MPCC-2-24-2-L-44-04.00-D-NUS/ MPTC-2-24-2-6.30-01-L-V

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
3/12/2013	**1**	**Initial Issue**	**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.

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SCOPE

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

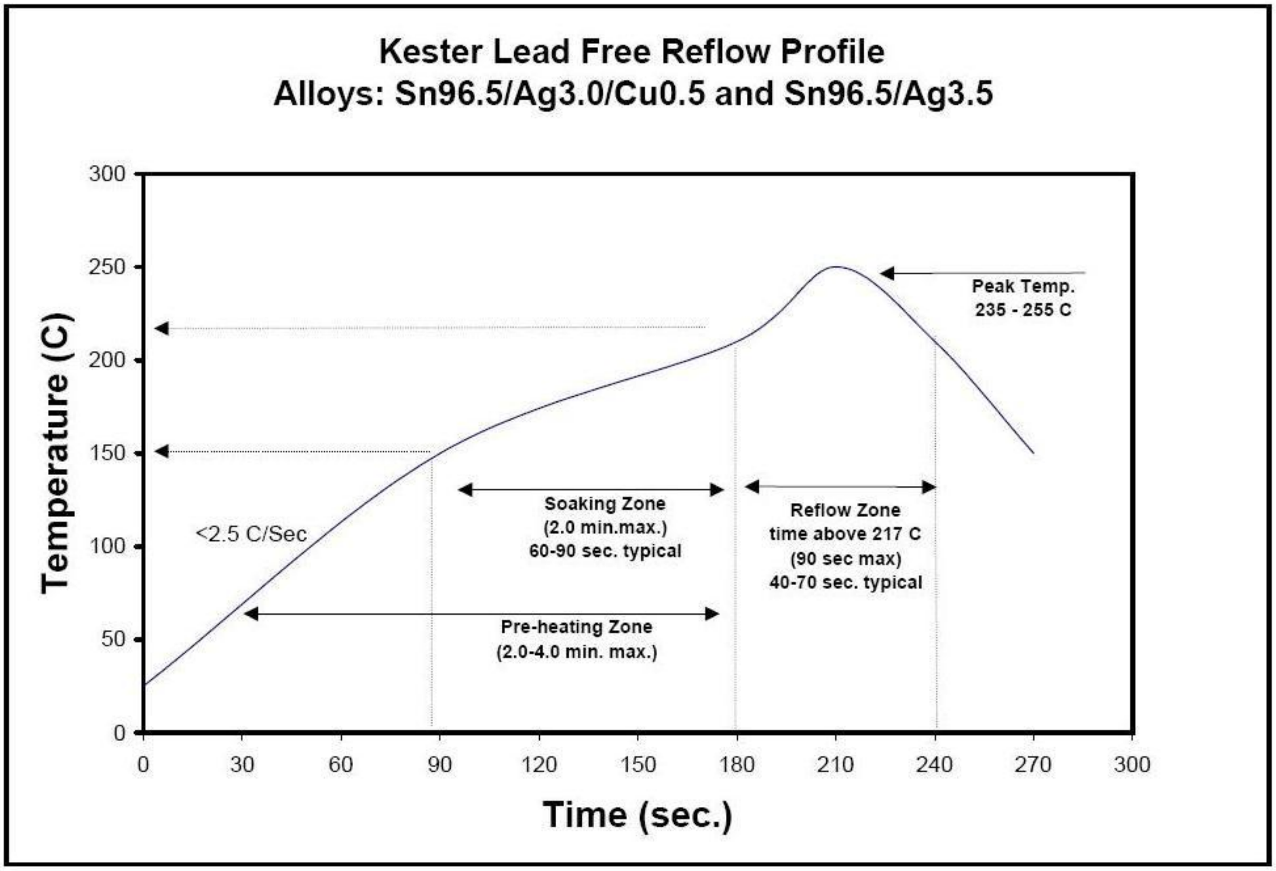
APPLICABLE DOCUMENTS

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) Re-Flow Time/Temp: See accompanying profile.
10) Samtec Test PCBs used: PCB-102697-TST-01-A

TYPICAL OVEN PROFILE (Soldering Parts to Test Boards)



FLOWCHARTS

Durability/Mating/Unmating/Gaps

TEST STEP	GROUP B1 8 Boards (largest position submitted)
01	Contact Gaps
02	LLCR-1
03	Forces - Mating / Unmating
04	25 Cycles
05	Forces - Mating / Unmating
06	25 Cycles (50 Total)
07	Forces - Mating / Unmating
08	25 Cycles (75 Total)
09	Forces - Mating / Unmating
10	25 Cycles (100 Total)
11	Forces - Mating / Unmating
12	Clean w/Compressed Air
13	Contact Gaps
14	LLCR-2
15	Thermal Shock (Mated and Undisturbed)
16	LLCR-3
17	Cyclic Humidity (Mated and Undisturbed)
18	LLCR-4
19	Forces - Mating / Unmating

Thermal Shock = EIA-364-32, Table II, Test Condition I:
-55^{o}C to +85^{o}C 1/2 hour dwell, 100 cycles
Humidity = EIA-364-31, Test Condition B (240 Hours)
and Method III (+25°C to +65°C @ 90% RH to 98% RH)
ambient pre-condition and delete steps 7a and 7b
Mating / Unmating Forces = EIA-364-13
Contact Gaps / Height - No standard method. Usually measured optically.
Gaps to be taken on a minimum of 20% of each part tested
LLCR = EIA-364-23, LLCR
20 mV Max, 100 mA Max
Use Keithley 580 or 3706 in 4 wire dry circuit mode

FLOWCHARTS Continued

IR & DWV

TEST STEP	GROUP A1 2 Mated Sets Break Down Pin-to-Pin	GROUP A2 2 Unmated of Part # Being Tested Break Down Pin-to-Pin	GROUP A3 2 Unmated of Mating Part # Break Down Pin-to-Pin	GROUP B1 2 Mated Sets Pin-to-Pin
01	DWV/Break Down Voltage	DWV/Break Down Voltage	DWV/Break Down Voltage	IR & DWV at test voltage (on both mated sets and on each connector unmated)
02				Thermal Shock (Mated and Undisturbed)
03				IR & DWV at test voltage (on both mated sets and on each connector unmated)
04				Cyclic Humidity (Mated and Undisturbed)
05				IR & DWV at test voltage (on both mated sets and on each connector unmated)

TEST STEP	GROUP C1 2 Mated Sets Break Down Row-to-Row	GROUP C2 2 Unmated of Part # Being Tested Break Down Row-to-Row	GROUP C3 2 Unmated of Mating Part # Break Down Row-to-Row	GROUP D1 2 Mated Sets Row-to-Row
01	DWV/Break Down Voltage	DWV/Break Down Voltage	DWV/Break Down Voltage	IR & DWV at test voltage (on both mated sets and on each connector unmated)
02				Thermal Shock (Mated and Undisturbed)
03				IR & DWV at test voltage (on both mated sets and on each connector unmated)
04				Cyclic Humidity (Mated and Undisturbed)
05				IR & DWV at test voltage (on both mated sets and on each connector unmated)

FLOWCHARTS Continued

TEST STEP	GROUP G1 2 Mated Sets Break Down - Signal Pin to Power Pin	GROUP G2 2 Unmated of Part # Being Tested Break Down - Signal Pin to Power Pin	GROUP G3 2 Unmated of Mating Part # Break Down - Signal Pin to Power Pin	GROUP H1 2 Mated Sets Signal Pin to Power Pin
01	DWV/Break Down Voltage	DWV/Break Down Voltage	DWV/Break Down Voltage	IR & DWV at test voltage (on both mated sets and on each connector unmated)
02				Thermal Shock (Mated and Undisturbed)
03				IR & DWV at test voltage (on both mated sets and on each connector unmated)
04				Cyclic Humidity (Mated and Undisturbed)
05				IR & DWV at test voltage (on both mated sets and on each connector unmated)

DWV on group B1 to be performed at Test Voltage
DWV test voltage is equal to 75% of the lowest break down voltage from group A1, A2 or A3
Thermal Aging = EIA-364-17, Test Condition 4 (105°C)
Time Condition 'B' (250 Hours)
Humidity = EIA-364-31, Test Condition B (240 Hours)
and Method III (+25°C to +65°C @ 90% RH to 98% RH)
ambient pre-condition and delete steps 7a and 7b
IR = EIA-364-21
DWV = EIA-364-20, Test Condition 1

FLOWCHARTS Continued

Current Carrying Capacity - Power Pins

TEST STEP	GROUP A1 3 Mated Assemblies 1 POWER CONTACT POWERED	GROUP A2 3 Mated Assemblies 2 POWER CONTACTS POWERED	GROUP A3 3 Mated Assemblies 3 POWER CONTACTS POWERED	GROUP A4 3 Mated Assemblies ALL POWER CONTACTS POWERED
01	CCC	CCC	CCC	CCC

Current Carrying Capacity - Signal Pins

TEST STEP	GROUP B1 3 Mated Assemblies 1 VERTICAL ROW - SIGNAL PINS POWERED	GROUP B2 3 Mated Assemblies 2 ADJACENT VERTICAL ROWS - SIGNAL PINS POWERED	GROUP B3 3 Mated Assemblies 3 ADJACENT VERTICAL ROWS - SIGNAL PINS POWERED	GROUP B4 3 Mated Assemblies 4 ADJACENT VERTICAL ROWS - SIGNAL PINS POWERED	GROUP B5 3 Mated Assemblies ALL SIGNAL PINS POWERED
01	CCC	CCC	CCC	CCC	CCC

Current Carrying Capacity - Signal Pins & Power Pins

TEST STEP	* GROUP C1 3 Mated Assemblies ALL SIGNAL PINS & ALL POWER PINS POWERED
01	CCC

(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

Connector Pull

TEST STEP	GROUP A1 5 Pieces SIG 0°	GROUP B1 5 Pieces SIG 90°
01	Pull test, Continuity	Pull test, Continuity

Monitor continuity and pull; record forces when continuity fails.

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.

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.

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

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)..

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. 80^{o} C
    c. 95^{o} C
    d. 115^{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

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 +2000 mOhms: ------------------- Unstable
    f. >+2000 mOhms:------------------------------ Open Failure

CONNECTOR PULL:

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

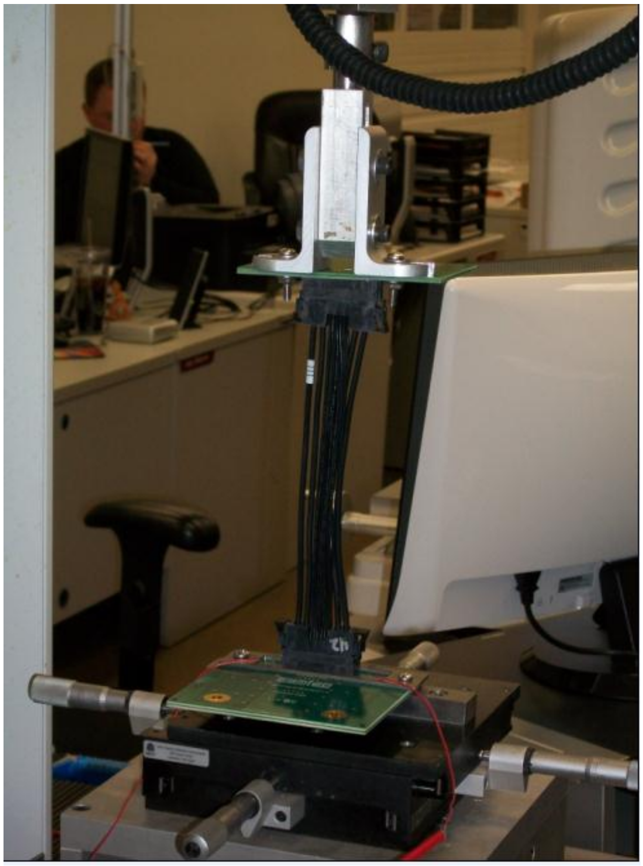


Fig. 1
(Typical set-up, actual part not depicted.)
0° Connector pull, notice the electrical continuity hook-up wires

RESULTS

Temperature Rise, CCC at a 20% de-rating

Signal pin:

- **CCC for a 30°C Temperature Rise ---------------3.4 A per contact with 4 adjacent contacts powered**
- **CCC for a 30°C Temperature Rise ---------------2.6 A per contact with 8 adjacent contacts powered**
- **CCC for a 30°C Temperature Rise ---------------2.2 A per contact with 12 adjacent contacts powered**
- **CCC for a 30°C Temperature Rise ---------------2.0 A per contact with 16 adjacent contacts powered**
- **CCC for a 30°C Temperature Rise ---------------1.8 A per contact with all adjacent contacts powered-measure at contact interface**

Power pin:

- **CCC for a 30°C Temperature Rise ---------------23.2 A per contact with 1 adjacent contacts powered**
- **CCC for a 30°C Temperature Rise ---------------19.6 A per contact with 2 adjacent contacts powered**
- **CCC for a 30°C Temperature Rise ---------------15.5 A per contact with 3 adjacent contacts powered**
- **CCC for a 30°C Temperature Rise ---------------14.5 A per contact with all adjacent contacts powered-measure at contact interface**

Signal & Power pin:

- **CCC for a 30°C Temperature Rise ---------------13.3 A per contact with all adjacent contacts powered**

RESULTS Continued

Mating & Unmating force

Mating&Unmating durability:

- **Initial**
    - **Mating**
        - **Min --------------------------------------- 5.8 Lbs**
        - **Max--------------------------------------- 7.6 Lbs**
    - **Unmating**
        - **Min -------------------------------------10.0 Lbs**
        - **Max--------------------------------------12.9 Lbs**
- **After 25 Cycles**
    - **Mating**
        - **Min --------------------------------------- 7.0 Lbs**
        - **Max--------------------------------------- 9.5 Lbs**
    - **Unmating**
        - **Min -------------------------------------11.5 Lbs**
        - **Max--------------------------------------15.0 Lbs**
- **After 50 Cycles**
    - **Mating**
        - **Min --------------------------------------- 7.5 Lbs**
        - **Max--------------------------------------10.4 Lbs**
    - **Unmating**
        - **Min -------------------------------------12.5 Lbs**
        - **Max--------------------------------------16.4 Lbs**
- **After 75 Cycles**
    - **Mating**
        - **Min --------------------------------------- 8.1 Lbs**
        - **Max--------------------------------------11.1 Lbs**
    - **Unmating**
        - **Min -------------------------------------13.3 Lbs**
        - **Max--------------------------------------17.2 Lbs**
- **After 100 Cycles**
    - **Mating**
        - **Min --------------------------------------- 8.6 Lbs**
        - **Max--------------------------------------11.6 Lbs**
    - **Unmating**
        - **Min -------------------------------------14.0 Lbs**
        - **Max--------------------------------------17.8 Lbs**
- **After Humidity**
    - **Mating**
        - **Min --------------------------------------- 5.5 Lbs**
        - **Max--------------------------------------- 8.2 Lbs**
    - **Unmating**
        - **Min --------------------------------------- 5.2 Lbs**
        - **Max--------------------------------------- 9.1 Lbs**

Connector pull force

0° pull

- **Min---20.0 Lbs**
- **Max --25.0 Lbs**

90° X-driection

- **Min---20.0 Lbs**
- **Max --23.5 Lbs**

RESULTS Continued

LLCR Durability (170 signal pin and 70 power pin LLCR test points)

Signal Pin

- **Initial ---------- 33.1 mOhms Max**
- **After 100 Cycles**
  - **<= +5.0 mOhms ---------- 170 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 +2000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+2000 mOhms ---------- 0 Points ---------- Open Failure**
- **After thermal shock**
  - **<= +5.0 mOhms ---------- 167 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 1 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 2 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 0 Points ---------- Marginal**
  - **+50.1 to +2000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+2000 mOhms ---------- 0 Points ---------- Open Failure**
- **After humidity**
  - **<= +5.0 mOhms ---------- 166 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 3 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ---------- 0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ---------- 1 Points ---------- Marginal**
  - **+50.1 to +2000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+2000 mOhms ---------- 0 Points ---------- Open Failure**

Power Pin

- **Initial ---------- 2.7 mOhms Max**
- **After 100 Cycles**
  - **<= +5.0 mOhms ---------- 70 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 +2000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+2000 mOhms ---------- 0 Points ---------- Open Failure**
- **After thermal shock**
  - **<= +5.0 mOhms ---------- 70 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 +2000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+2000 mOhms ---------- 0 Points ---------- Open Failure**
- **After humidity**
  - **<= +5.0 mOhms ---------- 70 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 +2000 mOhms ---------- 0 Points ---------- Unstable**
  - **>+2000 mOhms ---------- 0 Points ---------- Open Failure**

RESULTS Continued

Insulation Resistance minimums, IR

Pin-Pin (signal pin)

- **Initial**
    - **Mated**-- **100000Meg Ω** ------------------------ **Pass**
    - **Unmated** --- **100000Meg Ω** ------------------------ **Pass**
- **Thermal**
    - **Mated**---**25000Meg Ω** ------------------------ **Pass**
    - **Unmated** --**25000Meg Ω** ------------------------ **Pass**
- **Humidity**
    - **Mated**-- **100000Meg Ω** ------------------------ **Pass**
    - **Unmated** --**25000Meg Ω** ------------------------ **Pass**

Pin-Pin (power pin)

- **Initial**
    - **Mated**-- **100000Meg Ω** ------------------------ **Pass**
    - **Unmated** --- **100000Meg Ω** ------------------------ **Pass**
- **Thermal**
    - **Mated**---**50000Meg Ω** ------------------------ **Pass**
    - **Unmated** --- **100000Meg Ω** ------------------------ **Pass**
- **Humidity**
    - **Mated**-- **100000Meg Ω** ------------------------ **Pass**
    - **Unmated** --- **100000Meg Ω** ------------------------ **Pass**

Row-Row (signal pin)

- **Initial**
    - **Mated**-- **100000Meg Ω** ------------------------ **Pass**
    - **Unmated** --- **100000Meg Ω** ------------------------ **Pass**
- **Thermal**
    - **Mated**---**50000Meg Ω** ------------------------ **Pass**
    - **Unmated** --- **100000Meg Ω** ------------------------ **Pass**
- **Humidity**
    - **Mated**---**15000Meg Ω** ------------------------ **Pass**
    - **Unmated** --**25000Meg Ω** ------------------------ **Pass**

Signal-power

- **Initial**
    - **Mated**-- **100000Meg Ω** ------------------------ **Pass**
    - **Unmated** --- **100000Meg Ω** ------------------------ **Pass**
- **Thermal**
    - **Mated**---**50000Meg Ω** ------------------------ **Pass**
    - **Unmated** --- **100000Meg Ω** ------------------------ **Pass**
- **Humidity**
    - **Mated**-- **100000Meg Ω** ------------------------ **Pass**
    - **Unmated** --- **100000Meg Ω** ------------------------ **Pass**

RESULTS Continued

Dielectric Withstanding Voltage minimums, DWV

- **Minimums**
  - **Breakdown Voltage-------------------------------- 1000VAC**
  - **Test Voltage --750VAC**
  - **Working Voltage ------------------------------------250VAC**

Pin - pin(signal pin)

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

Pin - pin (power pin)

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

Row-Row (signal pin)

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

Signal-power

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

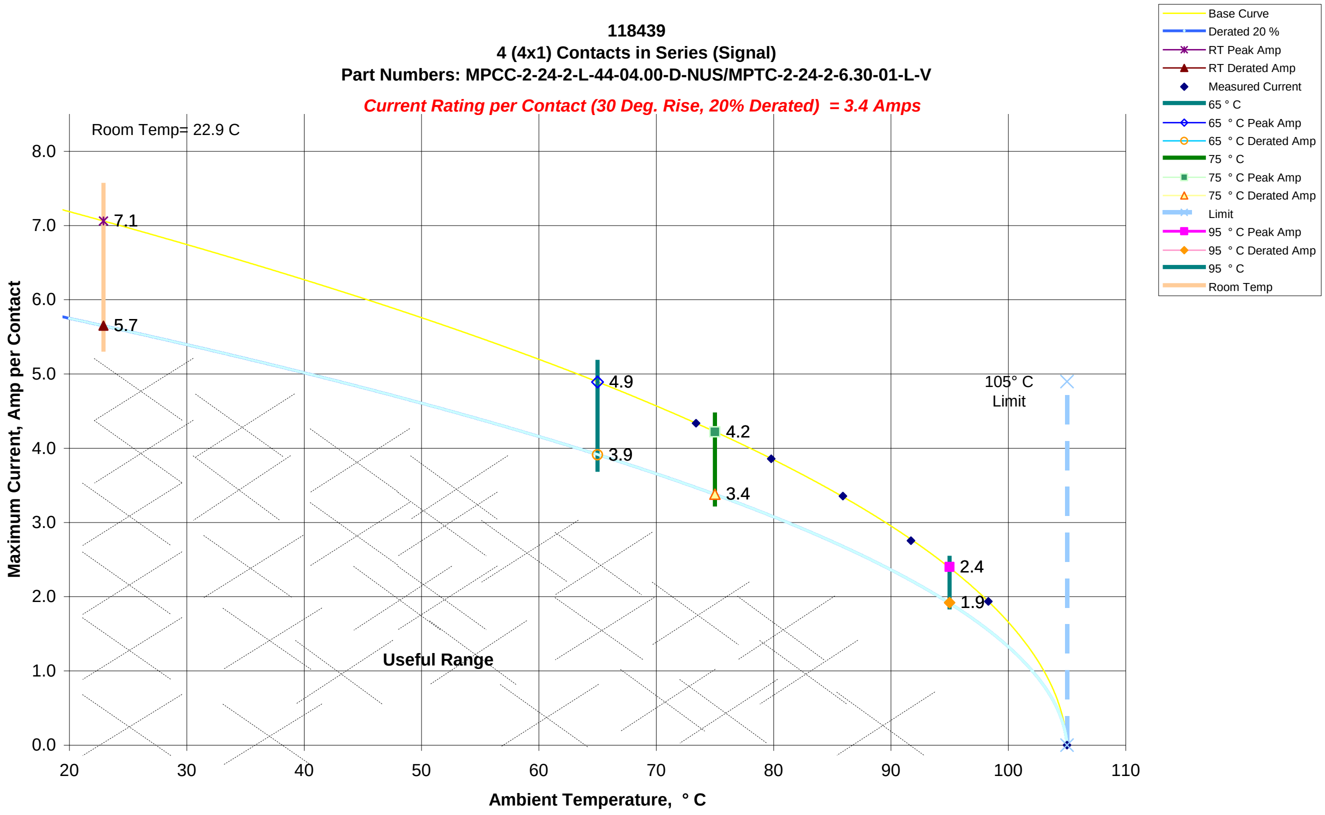
DATA SUMMARIES

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:

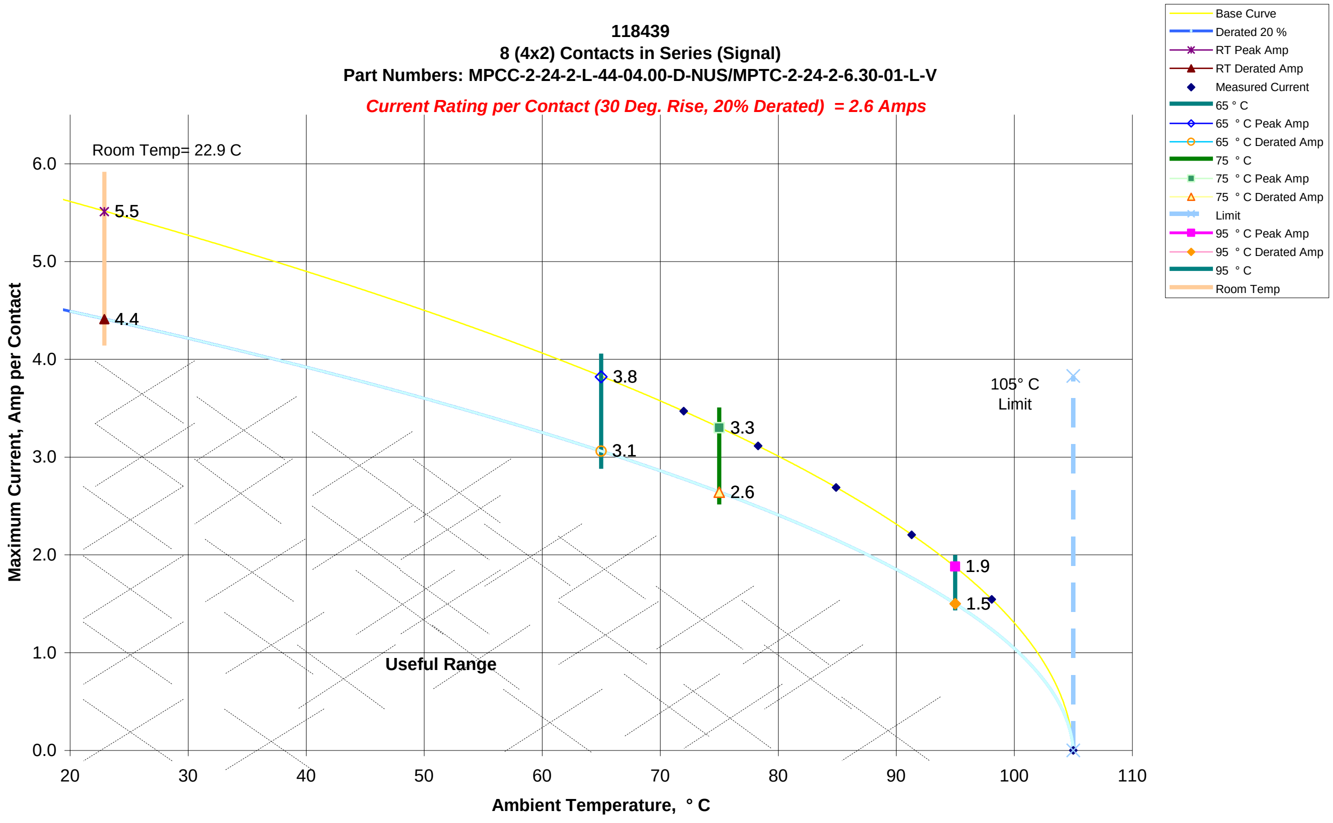
Signal pin:

a. Linear configuration with 4 adjacent conductors/contacts powered

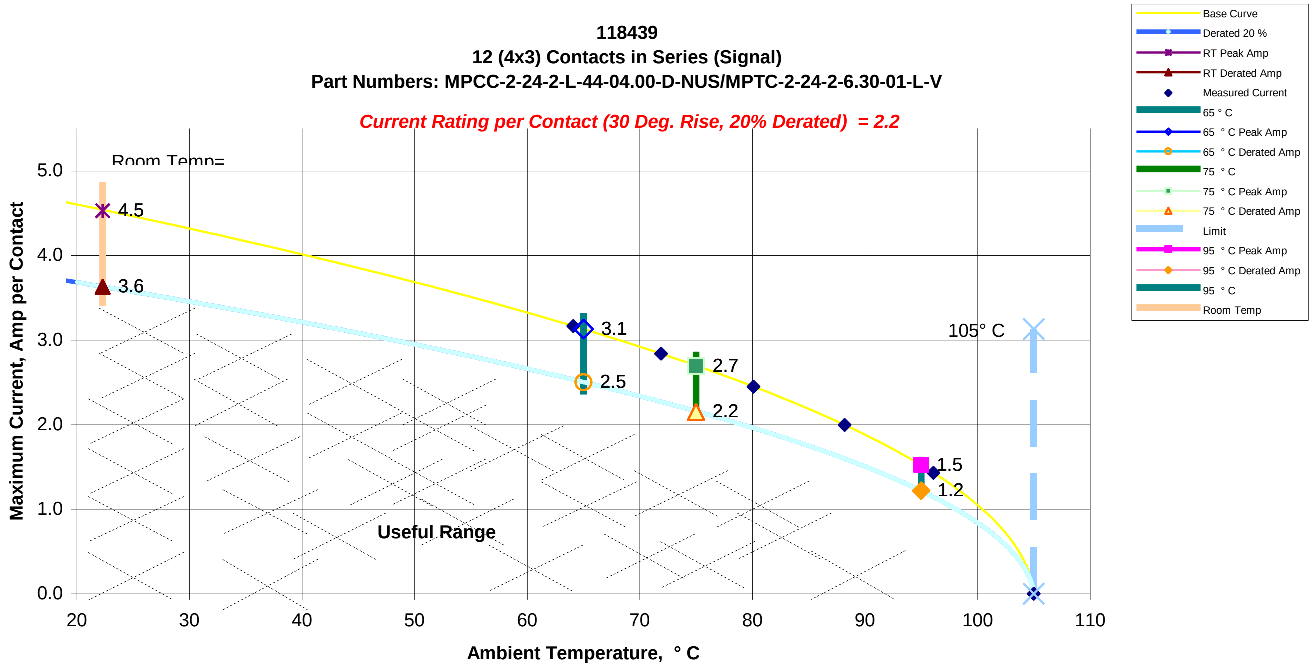


DATA SUMMARIES Continued

b. Linear configuration with 8 adjacent conductors/contacts powered

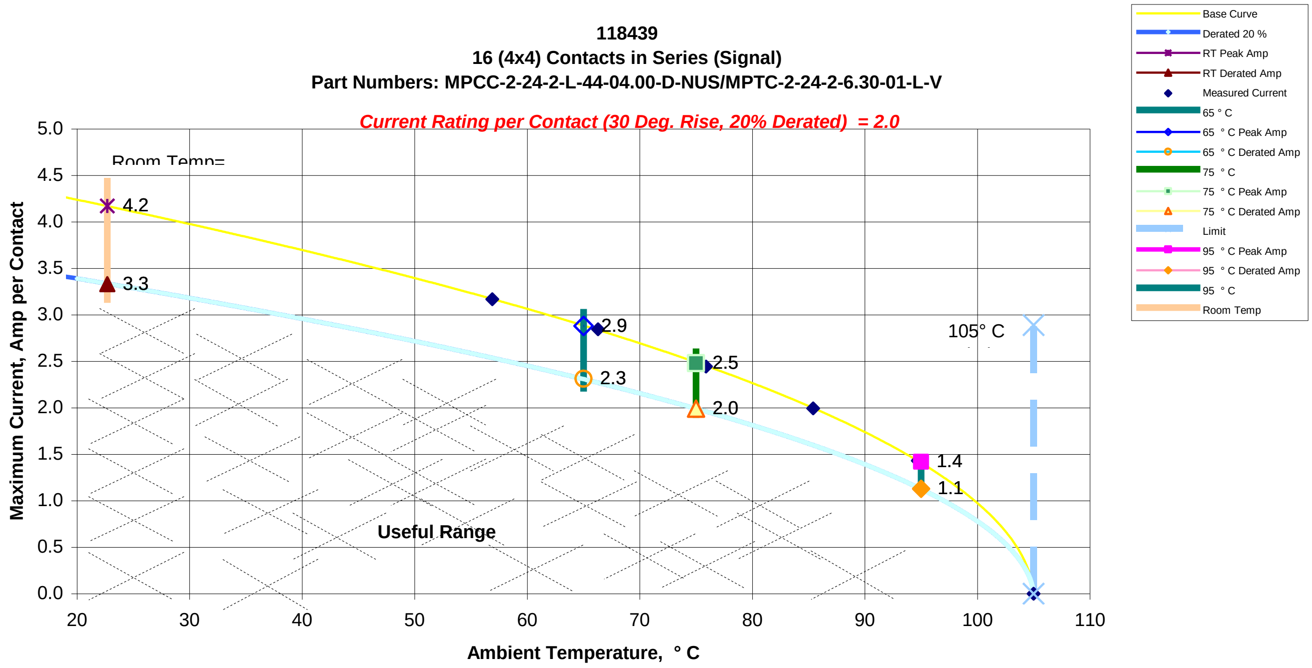


c. Linear configuration with 12 adjacent conductors/contacts powered

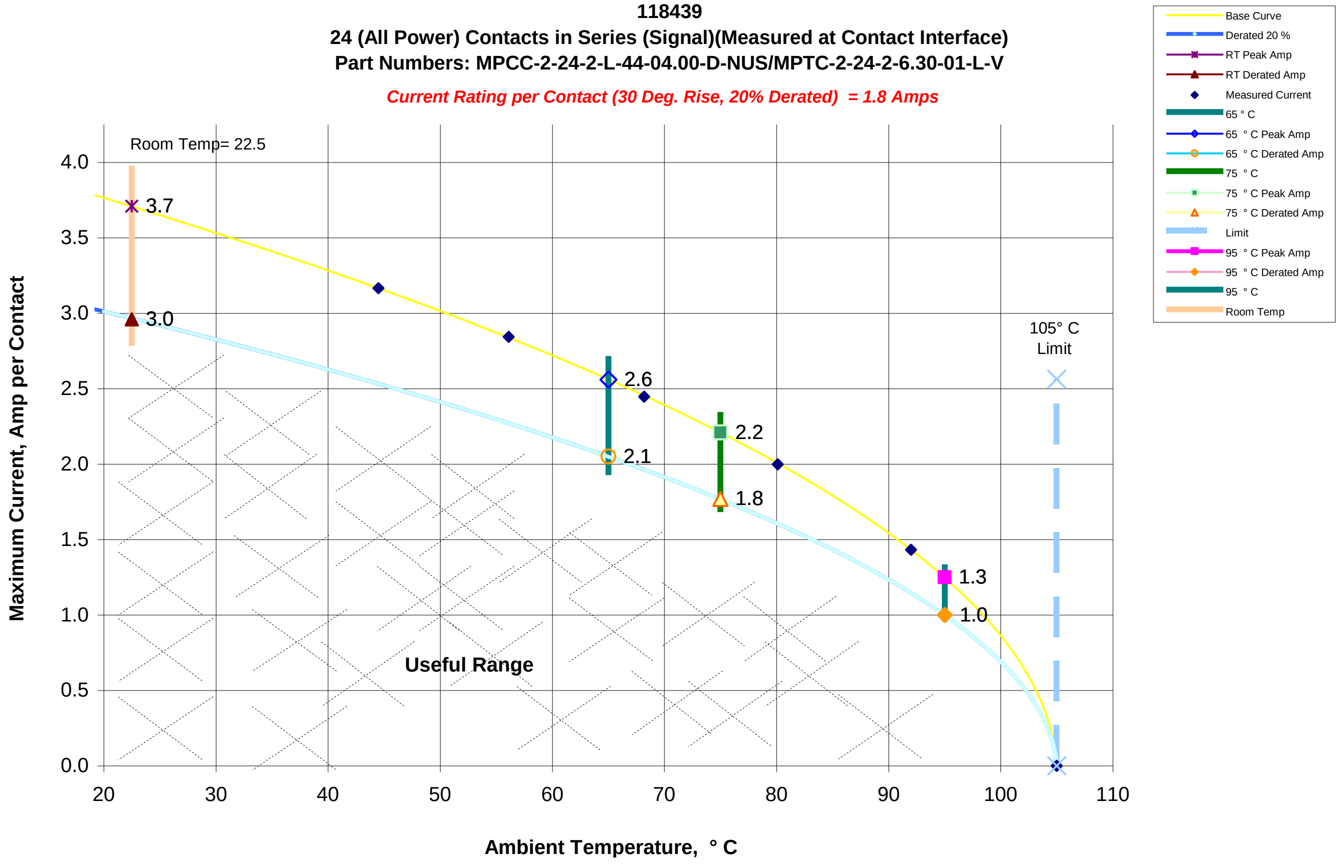


DATA SUMMARIES Continued

d. Linear configuration with 16 adjacent conductors/contacts powered



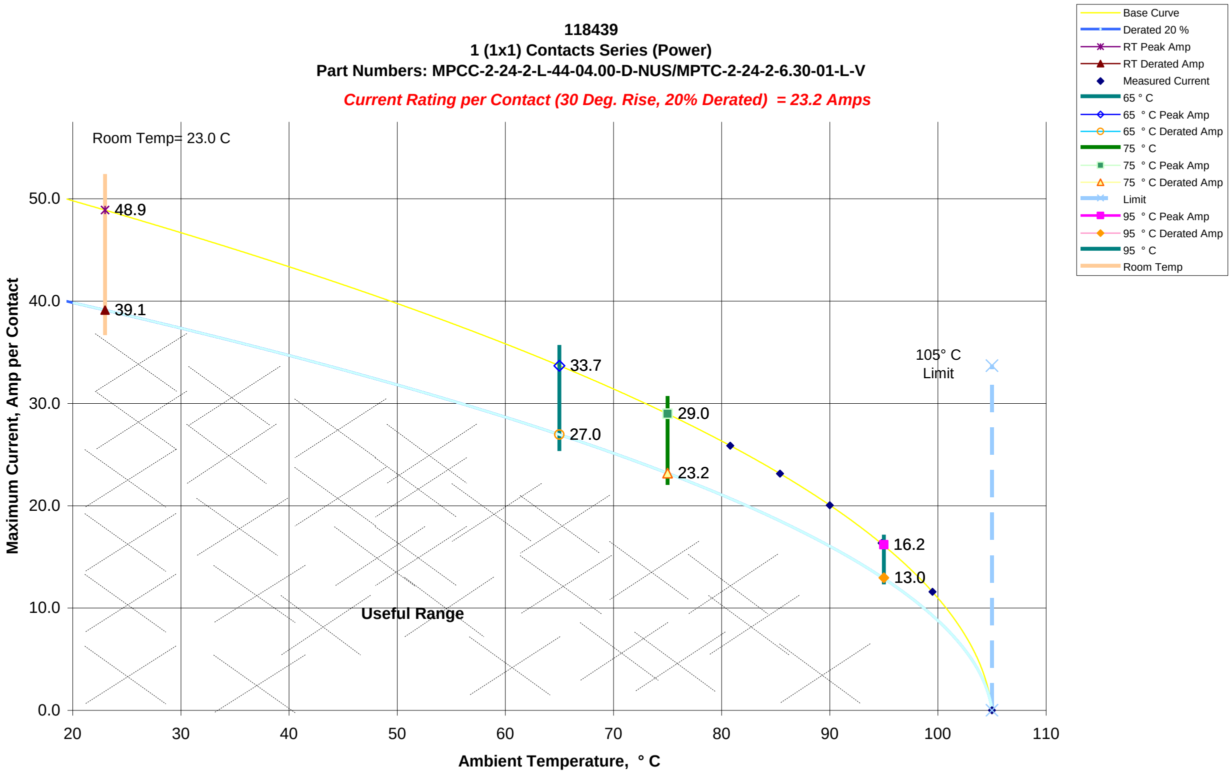
e. Linear configuration with all adjacent conductors/contacts powered-measured at contact interface



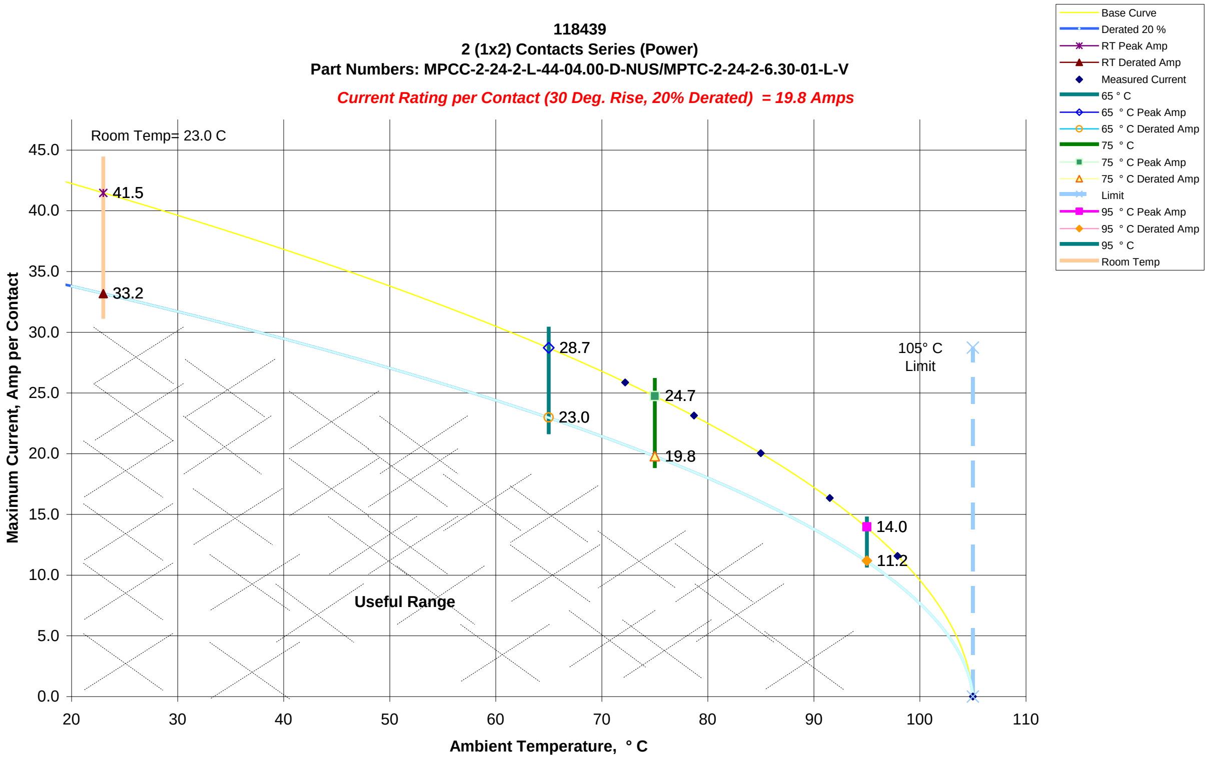
DATA SUMMARIES Continued

Power pin:

f. Linear configuration with 1 adjacent conductors/contacts powered

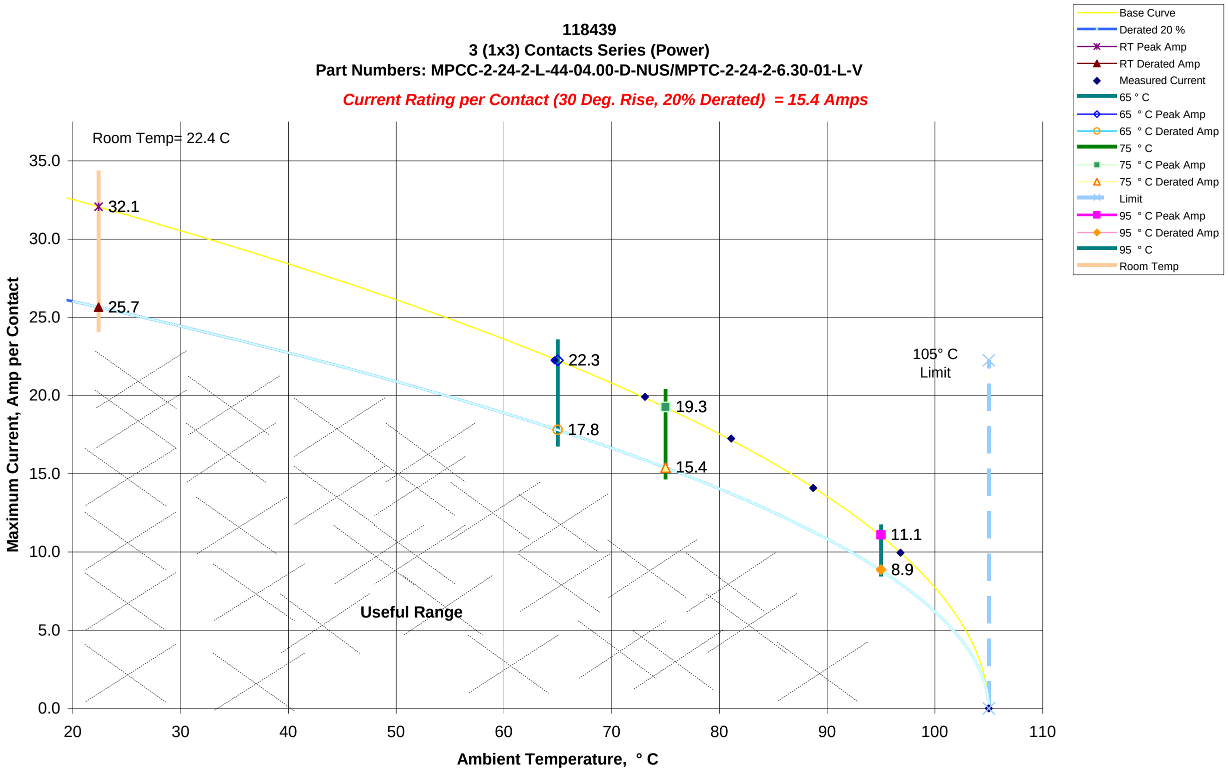


g. Linear configuration with 2 adjacent conductors/contacts powered

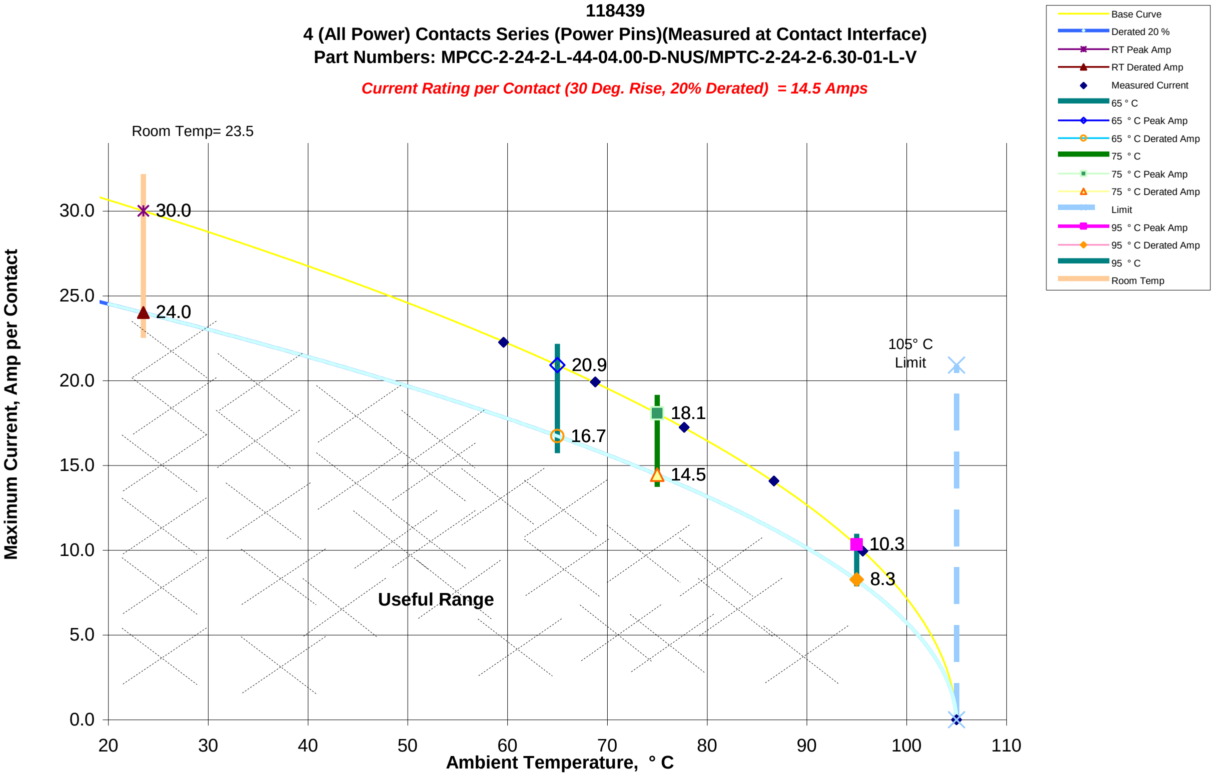


DATA SUMMARIES Continued

h. Linear configuration with 3 adjacent conductors/contacts powered



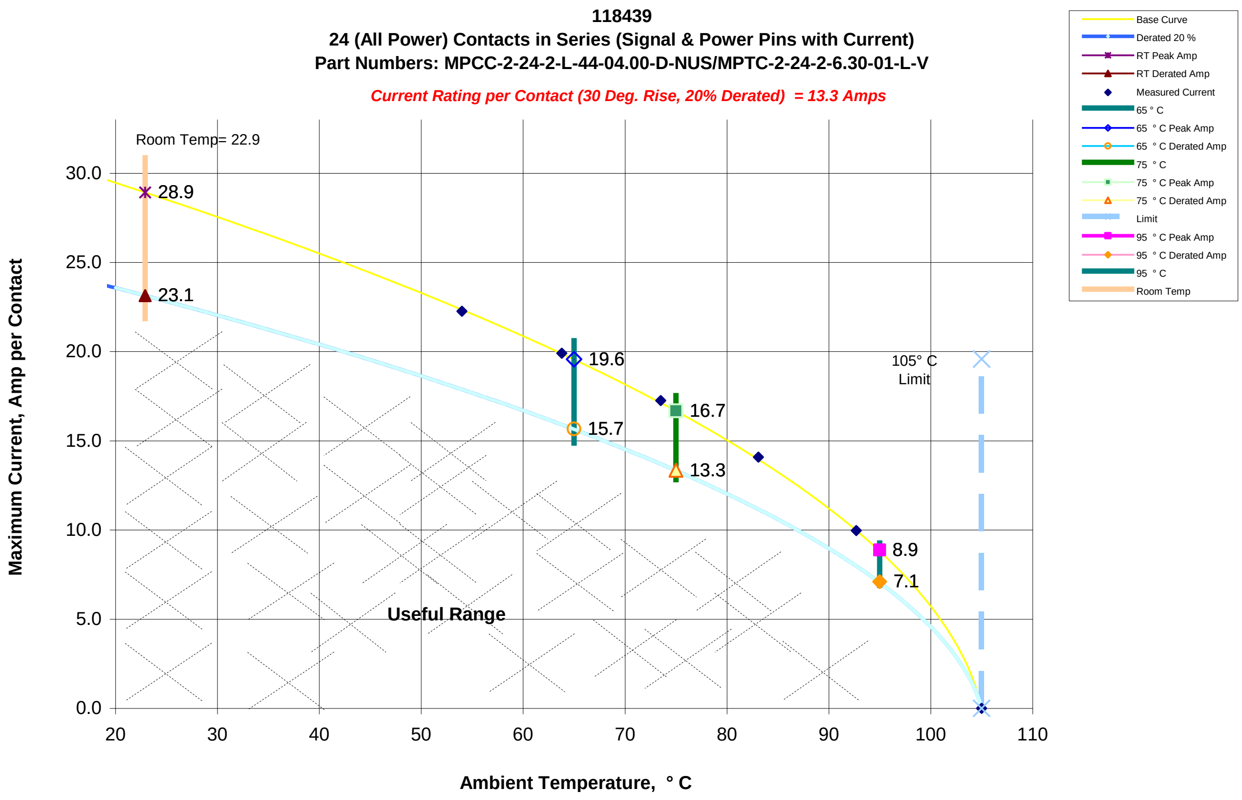
i. Linear configuration with all adjacent conductors/contacts powered-measured at contact interface



DATA SUMMARIES Continued

Signal & power pin:

j. Linear configuration with all adjacent conductors/contacts powered



DATA SUMMARIES

MATING/UNMATING FORCE:

	Initial				After 25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	25.79	5.80	44.65	10.04	31.03	6.98	51.04	11.48
Maximum	33.97	7.64	57.45	12.92	42.13	9.47	66.25	14.89
Average	30.33	**6.82**	52.14	**11.72**	35.41	**7.96**	58.51	**13.15**
St Dev	2.49	0.56	4.64	1.04	3.16	0.71	5.09	1.14
Count	10	10	10	10	10	10	10	10

	After 50 Cycles				After 75 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	33.48	7.53	55.55	12.49	36.03	8.10	59.27	13.32
Maximum	46.14	10.37	72.85	16.38	49.48	11.12	76.67	17.24
Average	39.36	**8.85**	63.98	**14.38**	41.94	**9.43**	68.15	**15.32**
St Dev	4.49	1.01	6.05	1.36	5.15	1.16	6.50	1.46
Count	10	10	10	10	10	10	10	10

	After 100 Cycles				After Humidity			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	38.20	8.59	62.42	14.03	24.63	5.54	23.05	5.18
Maximum	51.52	11.58	79.34	17.84	36.50	8.21	40.30	9.06
Average	44.51	**10.01**	71.28	**16.02**	27.87	**6.27**	30.25	**6.80**
St Dev	5.11	1.15	6.47	1.45	3.64	0.82	5.44	1.22
Count	10	10	10	10	10	10	10	10

Connector pull force

0° Pull

	Force (lbs)
Minimum	20.0
Maximum	25.0
Average	**23.2**

90 °-directions

	Force (lbs)
Minimum	20.0
Maximum	23.5
Average	**22.2**

DATA SUMMARIES Continued

INSULATION RESISTANCE (IR):

	Pin to Pin (Signal)		
	Mated	Unmated	Unmated
Minimum	**MPCC/MPTC**	**MPCC**	**MPTC**
Initial	100000	100000	Not Tested
Thermal	25000	25000	Not Tested
Humidity	100000	50000	25000

	Pin to Pin (Power)		
	Mated	Unmated	Unmated
Minimum	**MPCC/MPTC**	**MPCC**	**MPTC**
Initial	100000	100000	Not Tested
Thermal	50000	100000	Not Tested
Humidity	100000	100000	100000

	Row to Row (Signal)		
	Mated	Unmated	Unmated
Minimum	**MPCC/MPTC**	**MPCC**	**MPTC**
Initial	100000	100000	Not Tested
Thermal	50000	100000	Not Tested
Humidity	15000	25000	50000

	Signal to Power		
	Mated	Unmated	Unmated
Minimum	**MPCC/MPTC**	**MPCC**	**MPTC**
Initial	100000	100000	Not Tested
Thermal	50000	100000	Not Tested
Humidity	100000	100000	100000

DATA SUMMARIES Continued

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	**MPCC/MPTC**
Break Down Voltage	1000
Test Voltage	750
Working Voltage	250

Pin to Pin (Signal)	
Initial Test Voltage	Passed
After Thermal Test Voltage	Passed
After Humidity Test Voltage	Passed

Pin to Pin (Power)	
Initial Test Voltage	Passed
After Thermal Test Voltage	Passed
After Humidity Test Voltage	Passed

Row to Row (Signal)	
Initial Test Voltage	Passed
After Thermal Test Voltage	Passed
After Humidity Test Voltage	Passed

Signal to Power	
Initial Test Voltage	Passed
After Thermal Test Voltage	Passed
After Humidity Test Voltage	Passed

DATA SUMMARIES Continued

LLCR Durabiltiy:

1) A total of 240 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 +2000 mOhms ------------------- Unstable
    f. >+2000 mOhms:----------------------------- Open Failure

Signal pin:

Date	1/12/2011	1/28/2011	2/7/2011	2/17/2011
Room Temp C	23	23	23	23
RH	27%	27%	27%	34%
Name	Troy Cook	Troy Cook	Troy Cook	Troy Cook
mOhm values	**Actual Initial**	**Delta 100 Cycles**	**Delta Thermal**	**Delta Humidity**
Average	31.3	0.2	0.8	1.2
St. Dev.	0.5	0.6	1.7	2.6
Min	30.5	-0.9	-0.6	-0.7
Max	33.1	3.4	14.1	30.4
Count	170	170	170	170

How many samples are being tested?	10
How many contacts are on each board?	17

	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
100 Cycles	170	0	0	0	0	0
Thermal	167	1	2	0	0	0
Humidity	166	3	0	1	0	0

DATA SUMMARIES Continued

Power pin:

Date	1/12/2011	1/28/2011	2/7/2011	2/17/2011
Room Temp C	23	23	23	23
RH	27%	27%	27%	34%
Name	Troy Cook	Troy Cook	Troy Cook	Troy Cook
mOhm values	**Actual Initial**	**Delta 100 Cycles**	**Delta Thermal**	**Delta Humidity**
Average	2.5	0.1	0.1	0.5
St. Dev.	0.1	0.2	0.1	0.7
Min	2.3	-0.1	-0.1	0.0
Max	2.7	1.8	1.0	4.8
Count	70	70	70	70

How many samples are being tested?	10
How many contacts are on each board?	7

	Stable	Minor	Acceptable	Marginal	Unstable	Open
100 Cycles	70	0	0	0	0	0
Thermal	70	0	0	0	0	0
Humidity	70	0	0	0	0	0

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: MO-05
Description: Micro-ohmmeter
Manufacturer: Keithley
Model: 3706
Serial #: 297288
Accuracy: Last Cal: 2012-8-21, Next Cal: 2013-8-21

Equipment #: TCT-01
Description: Normal force analyzer
Manufacturer: Mecmesin Multitester
Model: Mecmesin Multitester 2.5-i
Serial #: 08-1049-04
Accuracy: Last Cal: 2012-4-28, Next Cal: 2013-4-27

Equipment #: THC-01
Description: Humidity transmitter
Manufacturer: Thermtron
Model: HMM30C
Serial #: D0240037
Accuracy: Last Cal: 2013-3-3, Next Cal: 2014-3-2

Equipment #: MO-01
Description: Micro-ohmmeter
Manufacturer: Keithley
Model: 2700
Serial #: 1199807
Accuracy: Last Cal: 2012-4-28, Next Cal: 2013-4-27

Equipment #: PS-01
Description: Power Supply
Manufacturer: Agilent
Model: 6031A
Serial #: MY41000982
Accuracy: Last Cal: 2012-4-28, Next Cal: 2013-4-27

Equipment #: TSC-01
Description: Thermal Shock transmitter
Manufacturer: CSZ
Model: 10-VT14994
Serial #: VTS-3-6-6-SC/AC
Accuracy: Last Cal: 2011-11-1, Next Cal: 2012-11-1