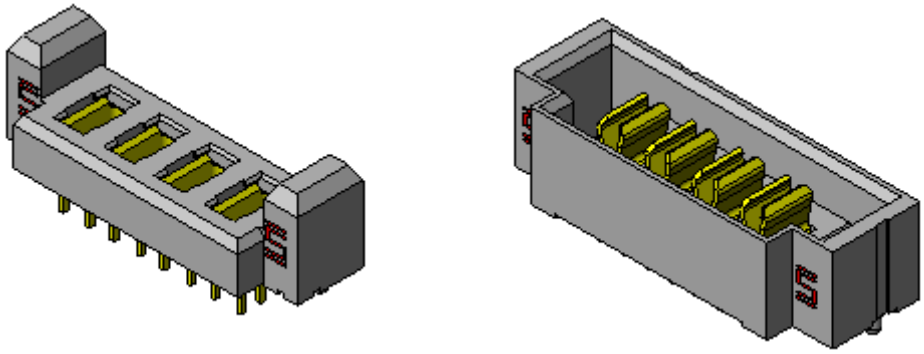
Project Number: Design Verification Test	Tracking Code: TC0923—2522_Report_Rev_2		
Requested By: John Reid	Date: 5/30/2013	Product Rev: 6/02/09	
Part #: UPT-08-03.0-01-L-V-LC / UPS-08-04.0-01-L-V-LC	Lot #: 6/02/09	Tech: Troy Cook Rodney Riley Gary Lomax	Eng: Eric Mings Mark Shireman
Part Description: Micro Power Terminal / Socket			Qty to Test: 55
Test Start: 06/02/2009	Test Completed: 8/20/2009		



Design Verification Test Report

PART DESCRIPTION

UPT-08-03.0-01-L-V-LC / UPS-08-04.0-01-L-V-LC

REVISION HISTORY

DATE	REV. NUM.	DESCRIPTION	ENG
2009	1	Initial Issue	
5/6/2013	2	Add second CCC Temperature Rise Graphs	CE

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 verification test. 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 Wave Solder
9) Samtec Test PCBs used: PCB-101688-TST / PCB-101689-TST / PCB-101849-TST

FLOWCHARTS

Gas Tight

TEST STEP	GROUP A (Gold) 80 Points (min) 10 parts
01	LLCR-1
02	Gas Tight
03	LLCR-2

Gas Tight = EIA-364-36A

LLCR = EIA-364-23, LLCR

use Keithley 580 in the dry circuit mode, 10 mA Max

Current Carrying Capacity

TEST STEP	GROUP A (Gold) 3 Mated Assemblies 1 CONTACT POWERED	GROUP B (Gold) 3 Mated Assemblies 2 CONTACTS POWERED	GROUP C (Gold) 3 Mated Assemblies 3 CONTACTS POWERED	GROUP D (Gold) 3 Mated Assemblies 4 CONTACTS POWERED	GROUP E (Gold) 3 Mated Assemblies ALL CONTACTS POWERED
01	CCC	CCC	CCC	CCC	CCC & Contact Resistance

(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

CCC, Temp rise = EIA-364-70

Mating/Unmating/Gaps/Normal Force/Deflection Force

TEST STEP	GROUP A (Gold) 10 Boards (each position submitted)	GROUP B1 Individual Contacts (10) min	GROUP B2 Individual Contacts (10) min
01	Mating Unmating Force	**Setup Approve**	**Setup Approve**
02	Data Review	Normal Force	Thermal Aging (Mated)
03	100 Cycles	Data Review	Normal Force
04	Clean w/Compressed Air		
05	Mating Unmating Force		
06	Data Review		
07	Thermal Aging (Mated)		
08	Mating Unmating Force		
09	Data Review		
10	Humidity (Mated)		
11	Mating Unmating Force		

Thermal Aging = EIA-364-17, Test Condition 4, 105 deg 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
Mating/Un-Mating Forces = EIA-364-13
Normal Force = EIA-364-04
(Perpendicular) displacement Force = 12.7 mm/min +/- 6 mm/min
Spec is 50 N @ 1 mm displacement

IR / DWV

TEST STEP	GROUP A 2 Mated Sets Break Down - Pin to Pin	GROUP B 2 Unmated of Part # Being Tested Break Down - Pin to Pin	GROUP C 2 Unmated of Mating Part # Break Down - Pin to Pin	GROUP D 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 Aging (both sets unmated)
03				IR & DWV at test voltage (on both mated sets and on each connector unmated)
04				Cyclic Humidity (both sets unmated)
05				IR & DWV at test voltage (on both mated sets and on each connector unmated)

Thermal Aging = EIA-364-17, Test Condition 4, 105 deg 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

Durability/Thermal Age/Cyclic Humidity

TEST STEP	GROUP A 80 Points 100 Cycles
01	LLCR-1
02	Data Review
03	100 Cycles
04	Clean w/ Compressed Air
05	LLCR-2
06	Data Review
07	Thermal Age
08	LLCR-3
09	Data Review
10	Cyclic Humidity
11	LLCR-4

Thermal Aging = EIA-364-17, Test Condition 4, 105 deg 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
LLCR = EIA-364-23, LLCR
use Keithley 580 in the dry circuit mode, 10 mA Max

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

THERMAL:

1) EIA-364-17, *Temperature Life with or without Electrical Load Test Procedure for Electrical Connectors.*
2) Test Condition 4 at 105° C.
3) Test Time Condition B for 250 hours.
4) All test samples are pre-conditioned at ambient.
5) All test samples are exposed to environmental stressing in the mated condition.

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.

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.

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.

NORMAL FORCE (FOR CONTACTS TESTED OUTSIDE THE HOUSING):

1) Reference document: EIA-364-04, *Normal Force Test Procedure for Electrical Connectors*.
2) The contacts shall be tested in the loose state, *not* inserted in connector housing.
3) The contacts shall be prepared to allow access to the spring member at the same attitude and deflection level as would occur in actual use.
4) In the event that portions of the contact prevent insertion of the test probe and/or deflection of the spring member under evaluation, said material shall be removed leaving the appropriate contact surfaces exposed.
5) In the case of multi-tine contacts, each tine shall be tested independently on separate samples as required.
6) The connector housing shall be simulated, if required, in order to provide an accurate representation of the actual contact system performance.
7) A holding fixture shall be fashioned to allow the contact to be properly deflected.
8) 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 μm (0.0002").
9) The probe shall be attached to a Dillon P/N 49761-0105, 5 N (1.1 Lb) load cell providing an accuracy of ± 0.2%.
10) The nominal deflection rate shall be 5 mm (0.2")/minute.
11) Unless otherwise noted a minimum of five contacts shall be tested.
12) The force/deflection characteristic to load and unload each contact shall be repeated five times.
13) The system shall utilize the TC^2 software in order to acquire and record the test data.
14) The permanent set of each contact shall be measured within the TC^2 software.
15) 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. 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).

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

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 +2000 mOhms: ---------- Unstable
    f. >+2000 mOhms:---------- Open Failure
4) Procedure:
    a. Reference document: EIA-364-36, *Test Procedure for Determination of Gas-Tight Characteristics for Electrical Connectors, Sockets and/or Contact Systems*.
    b. Test Conditions:
        i. Class II--- Mated pairs of contacts assembled to their plastic housings.
        ii. Reagent grade Nitric Acid shall be used of sufficient volume to saturate the test chamber
        iii. The ratio of the volume of the test chamber to the surface area of the acid shall be 10:1.
        iv. The chamber shall be saturated with the vapor for at least 15 minutes before samples are added.
        v. Exposure time, 55 to 65 minutes.
        vi. The samples shall be no closer to the chamber walls than 1 inches and no closer to the surface of the acid than 3 inches.
        vii. The samples shall be dried after exposure for a minimum of 1 hour.
        viii. Drying temperature 50^{o} C
        ix. The final LLCR shall be conducted within 1 hour after drying.

RESULTS

Temperature Rise, CCC at a 20% de-rating

- **CCC for a 30°C Temperature Rise ----------23.0 A per contact with 1 contact powered**
- **CCC for a 30°C Temperature Rise ----------18.6 A per contact with 2 adjacent contacts powered**
- **CCC for a 30°C Temperature Rise ----------17.5 A per contact with 3 adjacent contacts powered**
- **CCC for a 30°C Temperature Rise ----------16.7 A per contact with 4 adjacent contacts powered**
- **CCC for a 30°C Temperature Rise ----------14.0 A per contact with all adjacent contacts powered**

Mating – Unmating Forces

- **Initial**
  - **Mating**
    - **Min ---------- 4.83 Lbs**
    - **Max---------- 6.25 Lbs**
  - **Unmating**
    - **Min ---------- 3.24 Lbs**
    - **Max---------- 4.26 Lbs**
- **After 100 Cycles**
  - **Mating**
    - **Min ---------- 4.68 Lbs**
    - **Max---------- 5.59 Lbs**
  - **Unmating**
    - **Min ---------- 3.54 Lbs**
    - **Max---------- 4.82 Lbs**
- **Thermal**
  - **Mating**
    - **Min ---------- 3.69 Lbs**
    - **Max---------- 5.16 Lbs**
  - **Unmating**
    - **Min ---------- 2.96 Lbs**
    - **Max---------- 3.62 Lbs**
- **Humidity**
  - **Mating**
    - **Min ---------- 3.16 Lbs**
    - **Max---------- 4.32 Lbs**
  - **Unmating**
    - **Min ---------- 3.09 Lbs**
    - **Max---------- 3.71 Lbs**

Normal Force at .008" deflection

- **Initial**
  - **Min---------- 772.00 g Set ----- 0.0001"**
  - **Max ----------1016.90 g Set ----- 0.0011"**
- **Thermal**
  - **Min---------- 706.20 g**
  - **Max ----------1206.30 g**

Insulation Resistance minimums, IR

- **Initial**
  - **Mated----------100,000 Meg Ω ---------- Pass**
  - **Unmated ----------100,000 Meg Ω ---------- Pass**
- **Thermal**
  - **Mated----------100,000 Meg Ω ---------- Pass**
  - **Unmated ----------100,000 Meg Ω ---------- Pass**
- **Humidity**
  - **Mated----------100,000 Meg Ω ---------- Pass**
  - **Unmated ----------100,000 Meg Ω ---------- Pass**

Dielectric Withstanding Voltage minimums, DWV

- **Minimums**
  - **Breakdown Voltage---------- 1750 VAC**
  - **Test Voltage ---------- 1313 VAC**
  - **Working Voltage ----------438 VAC**
- **Initial DWV ----------Passed**
- **Thermal DWV----------Passed**
- **Humidity DWV----------Passed**

LLCR Durability (88 LLCR test points)

- **Initial ----------1.4 mOhms Max**
- **Durability, 100 Cycles**
  - **<= +5.0 mOhms ----------88 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**
- **Thermal**
  - **<= +5.0 mOhms ----------88 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**
- **Humidity**
  - **<= +5.0 mOhms ----------88 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**

LLCR Gas Tight (80 LLCR test points)

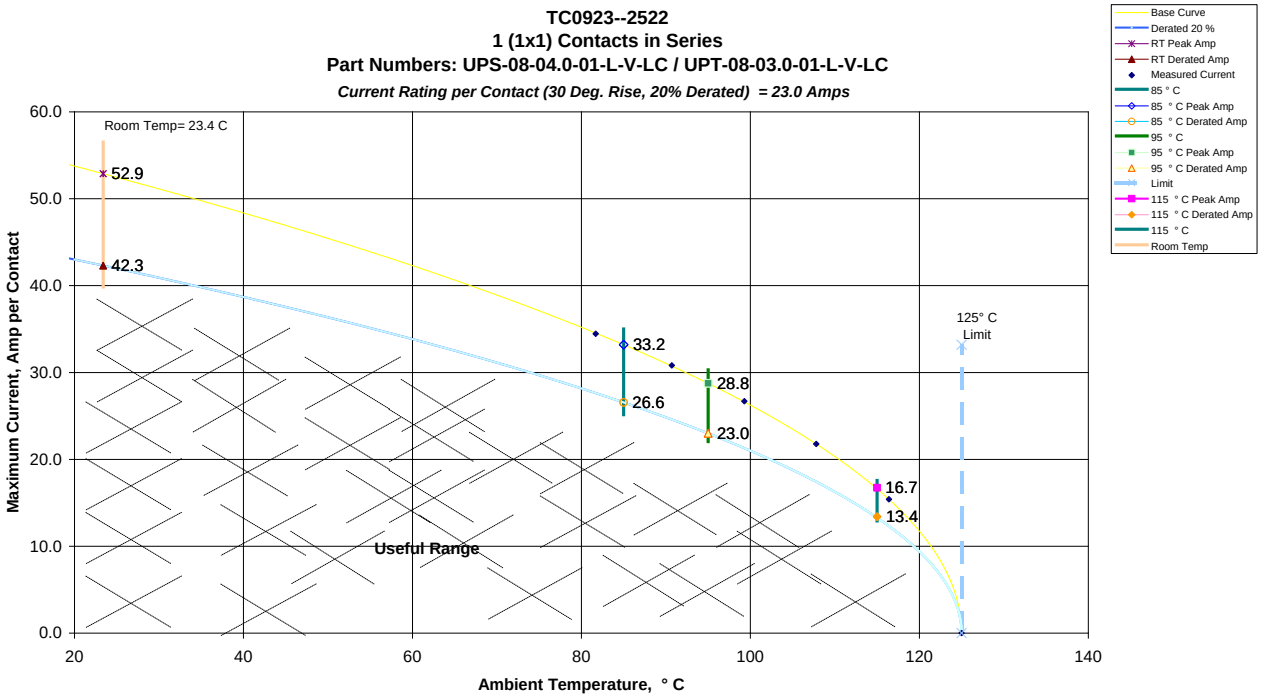
- **Initial ----------1.0 mOhms Max**
- **Gas-Tight**
  - **<= +5.0 mOhms ----------80 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------0 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ----------0 Points ---------- Marginal**
  - **+50.1 to +2000 mOhms ----------0 Points ---------- Unstable**
  - **>+2000 mOhms ----------0 Points ---------- Open Failure**

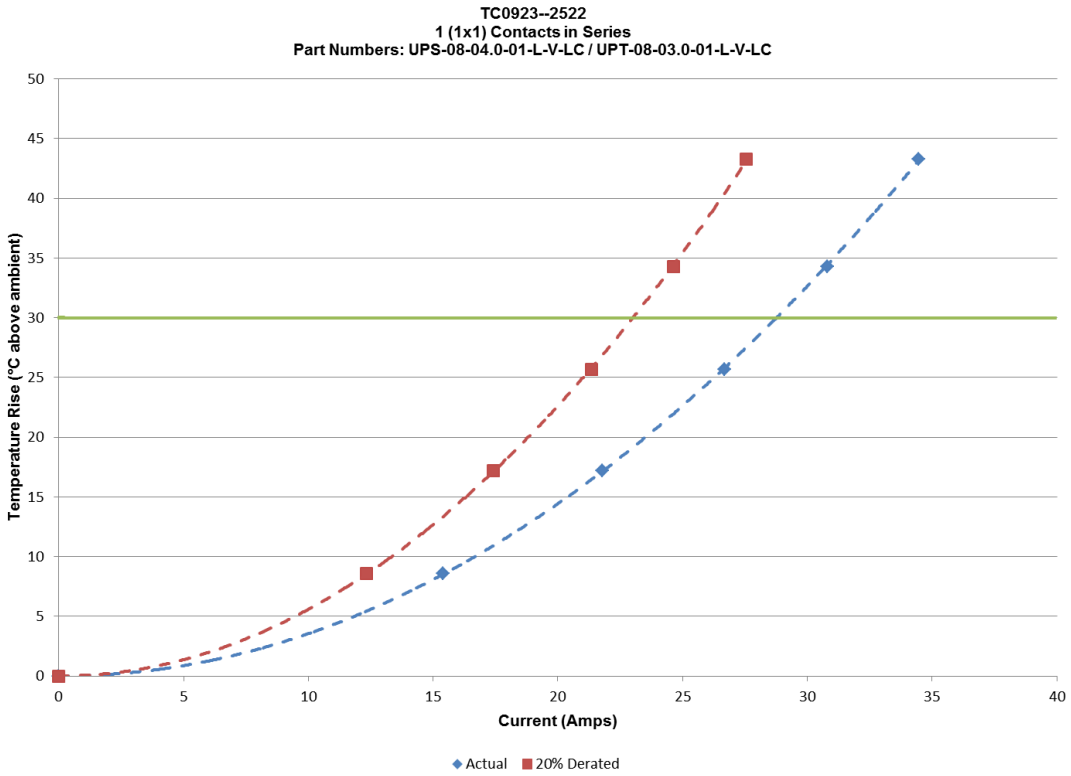
DATA SUMMARIES

TEMPERATURE RISE (Current Carrying Capacity, CCC):

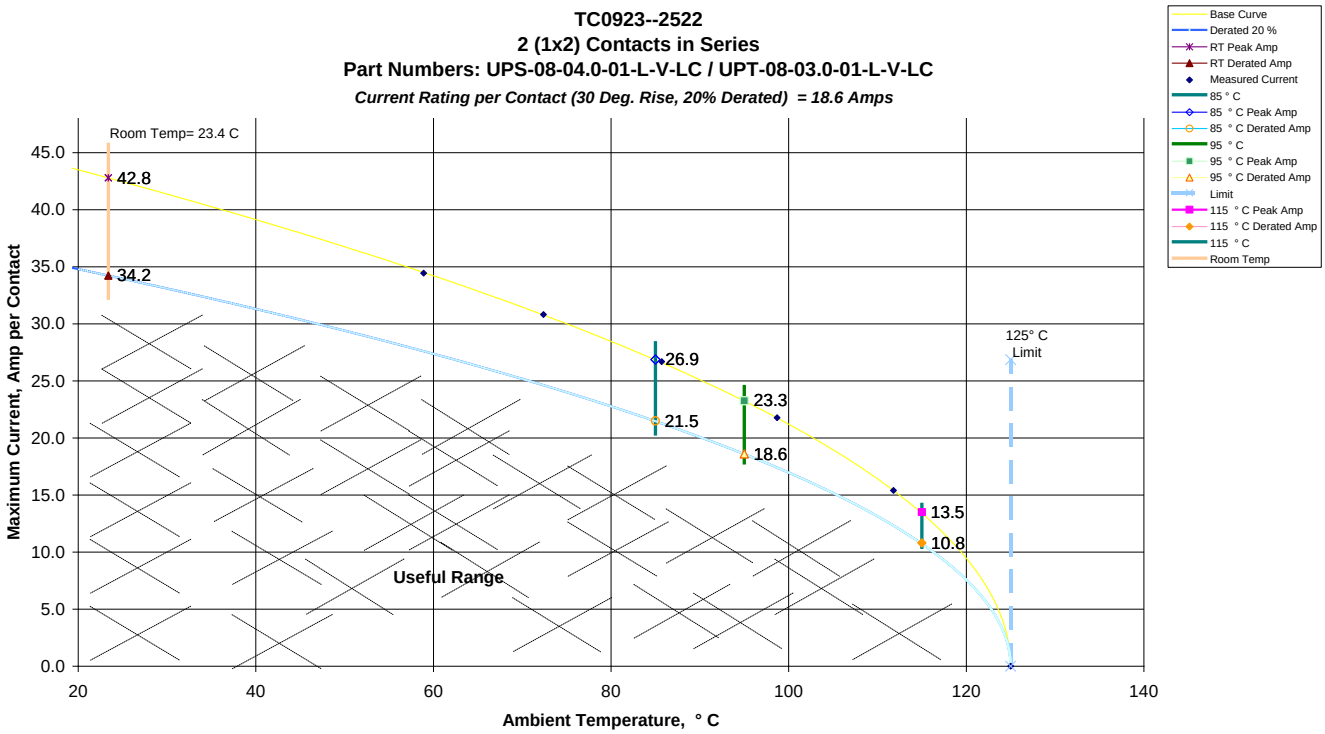
1) High quality thermocouples whose temperature slopes track one another were used for temperature monitoring.
2) The thermocouples were placed at a location to sense the maximum temperature generated during testing.
3) Temperature readings recorded are those for which three successive readings, 15 minutes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

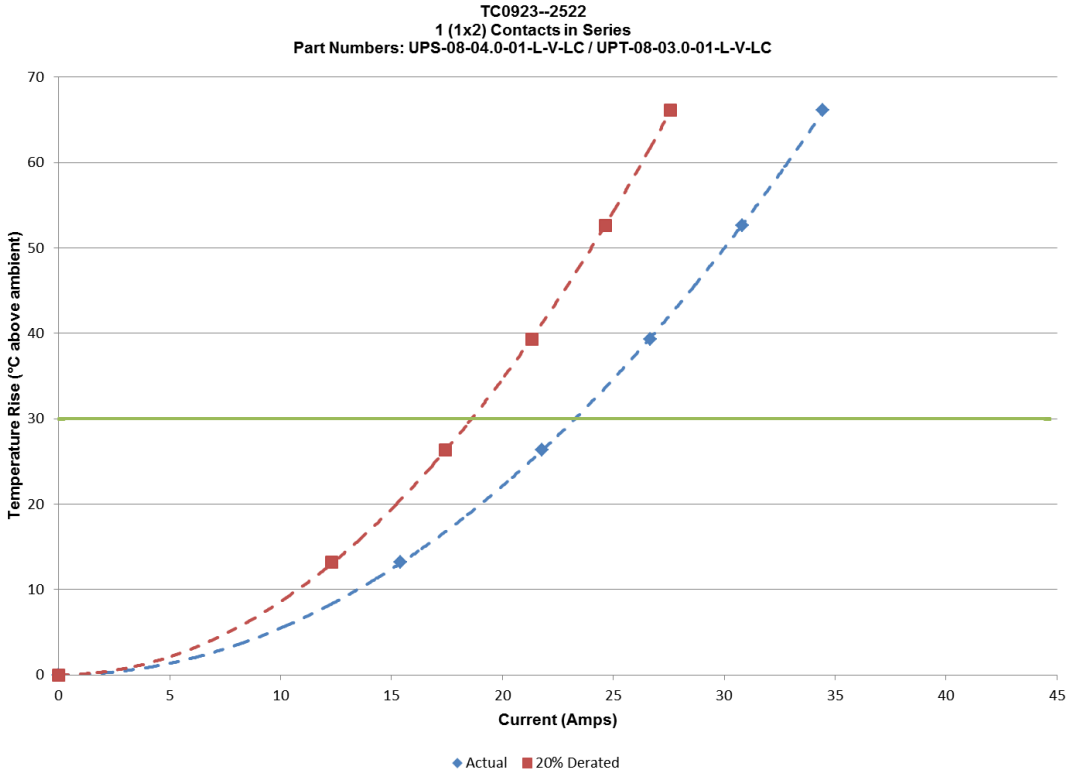
a. Linear configuration with 1 conductor/contact powered



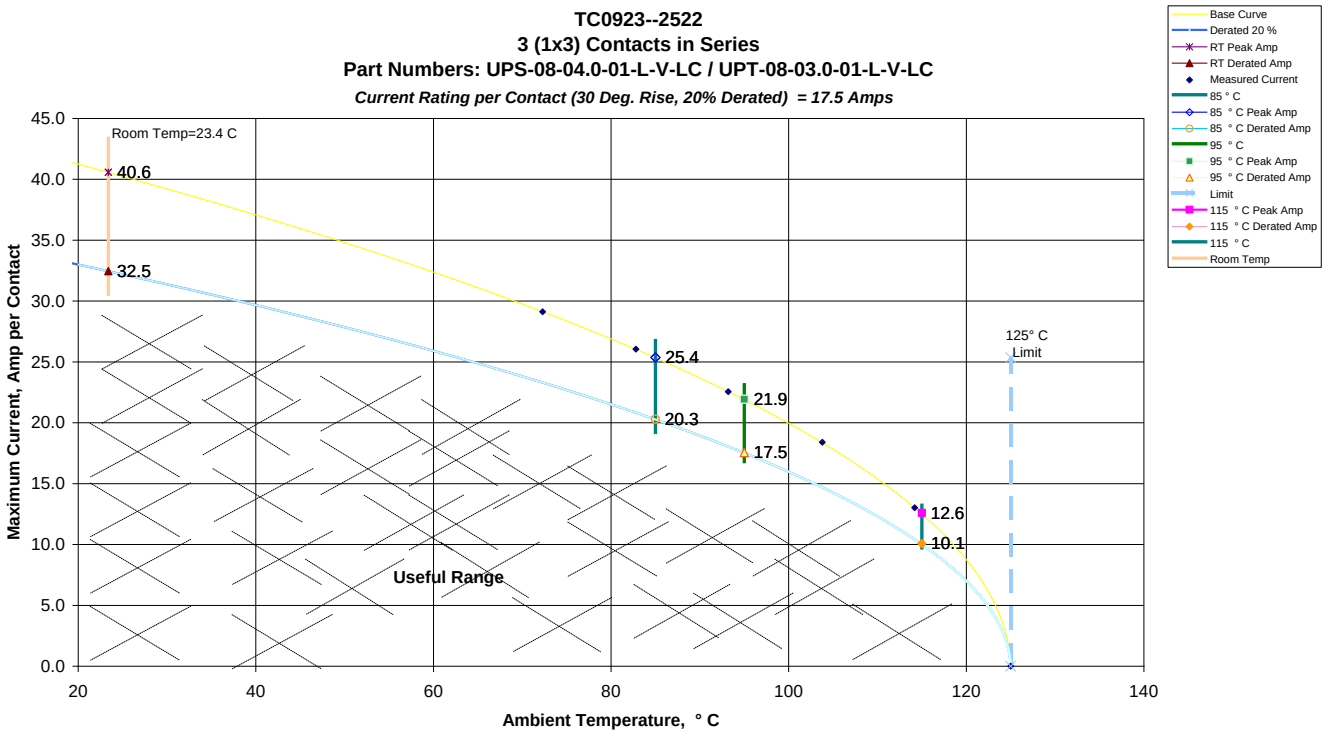


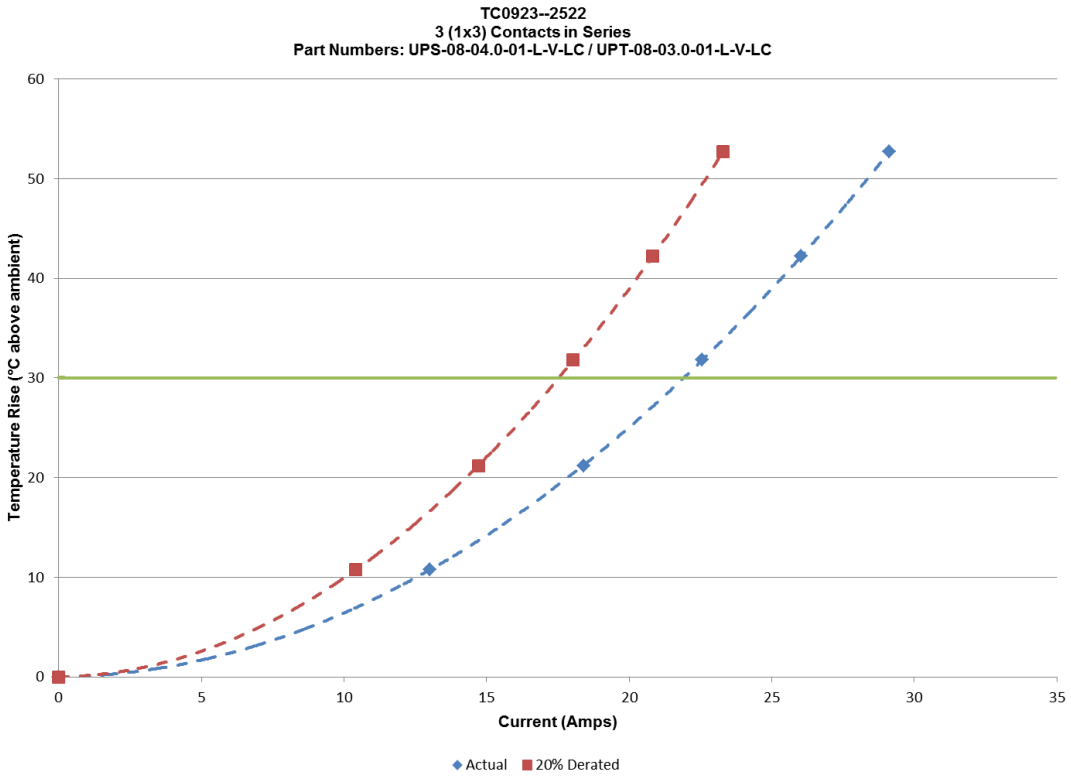
b. Linear configuration with 2 adjacent conductors/contacts powered



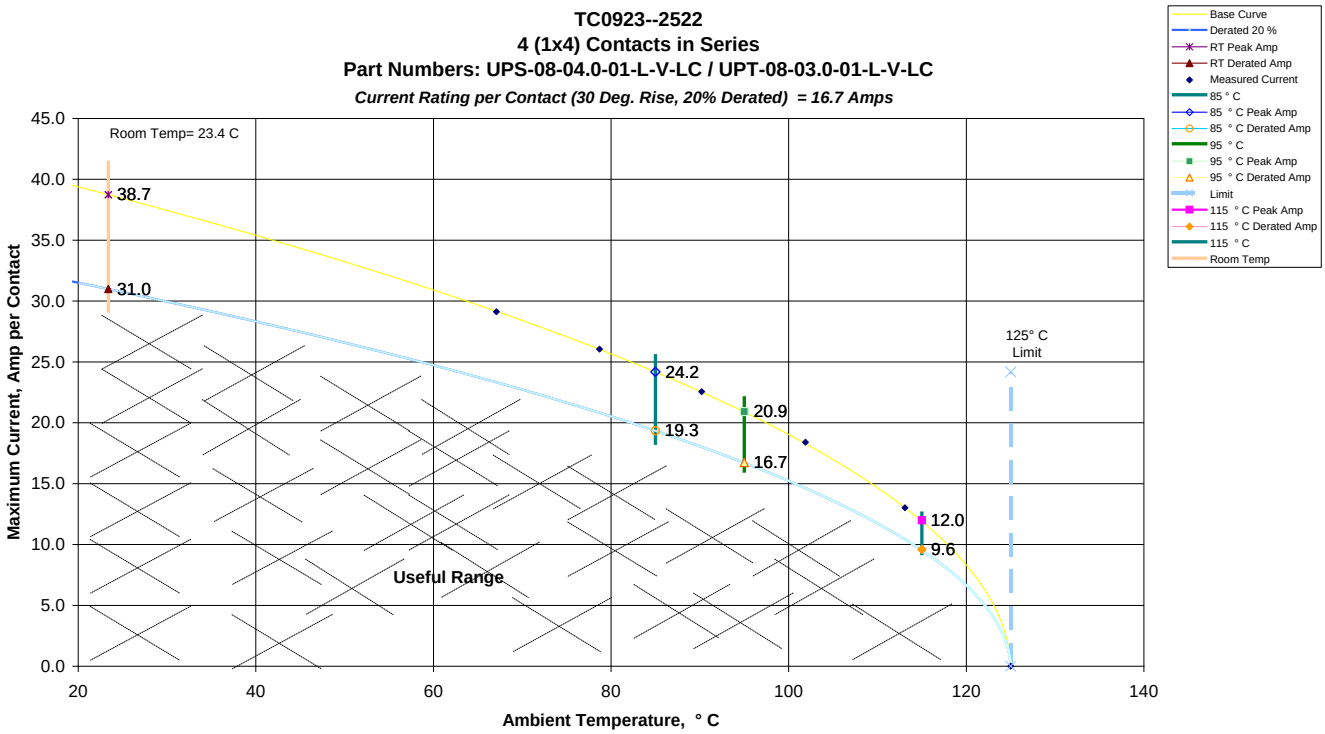


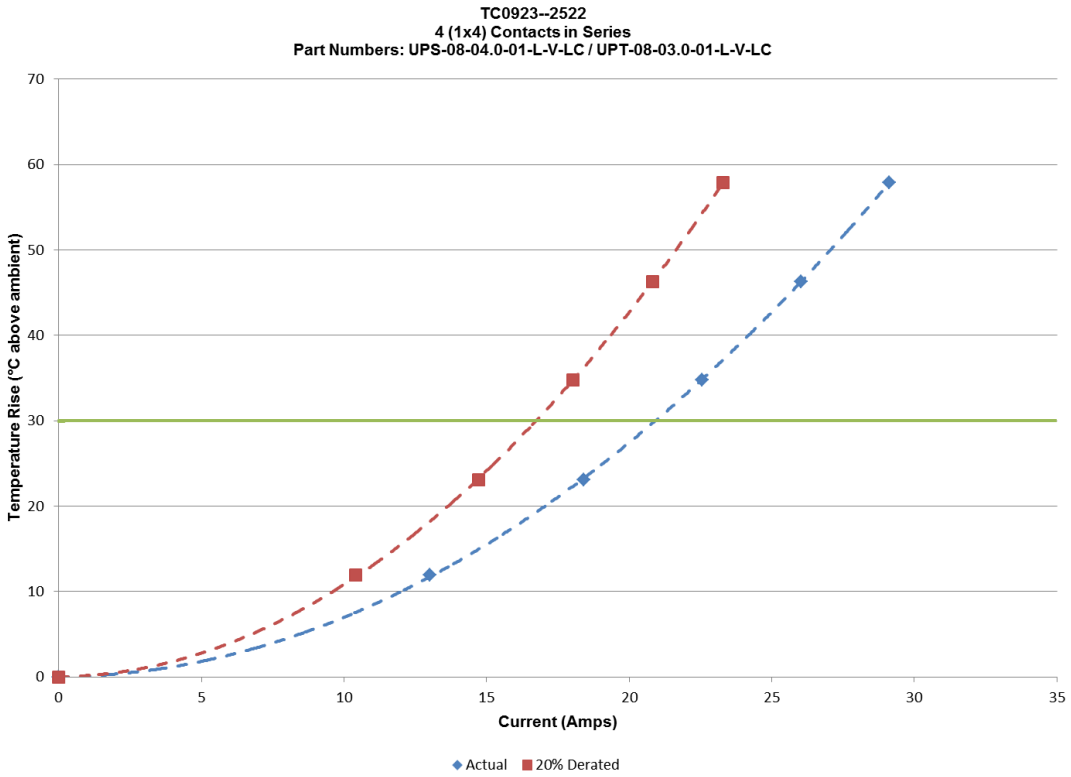
c. Linear configuration with 3 adjacent conductors/contacts powered



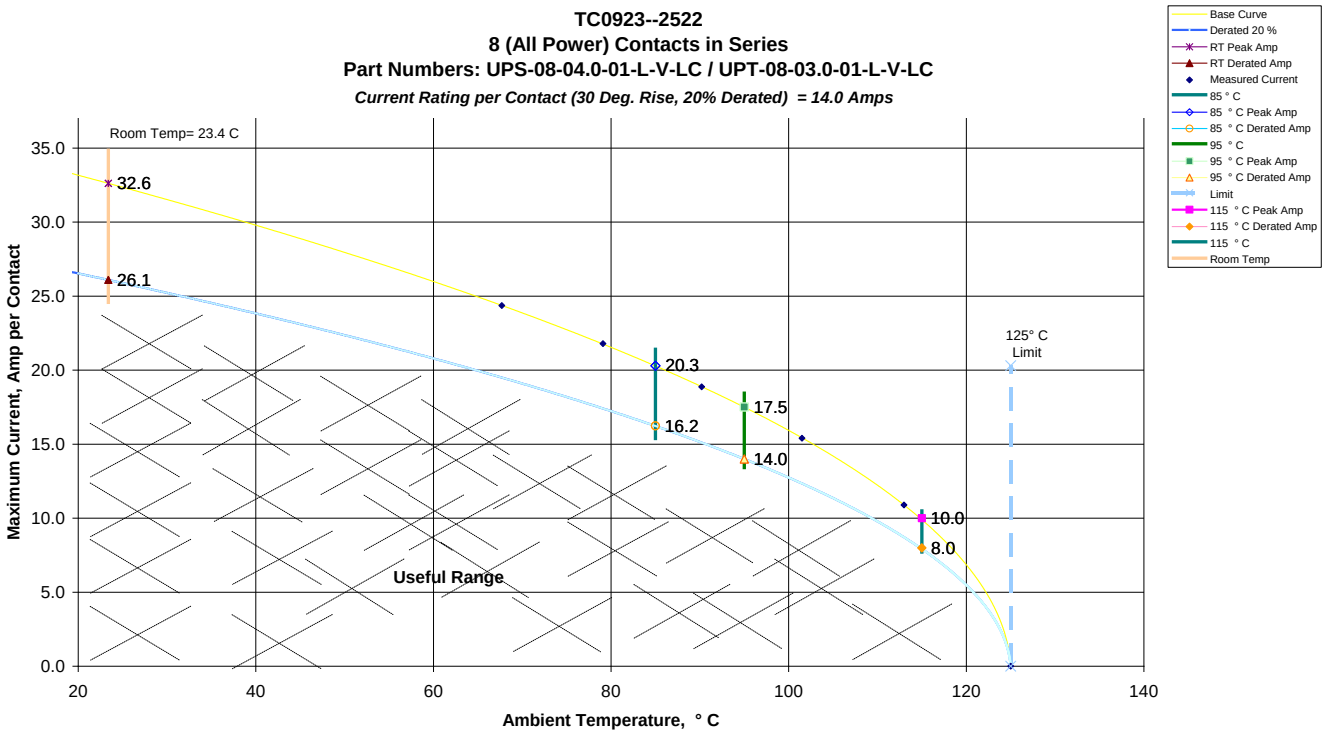


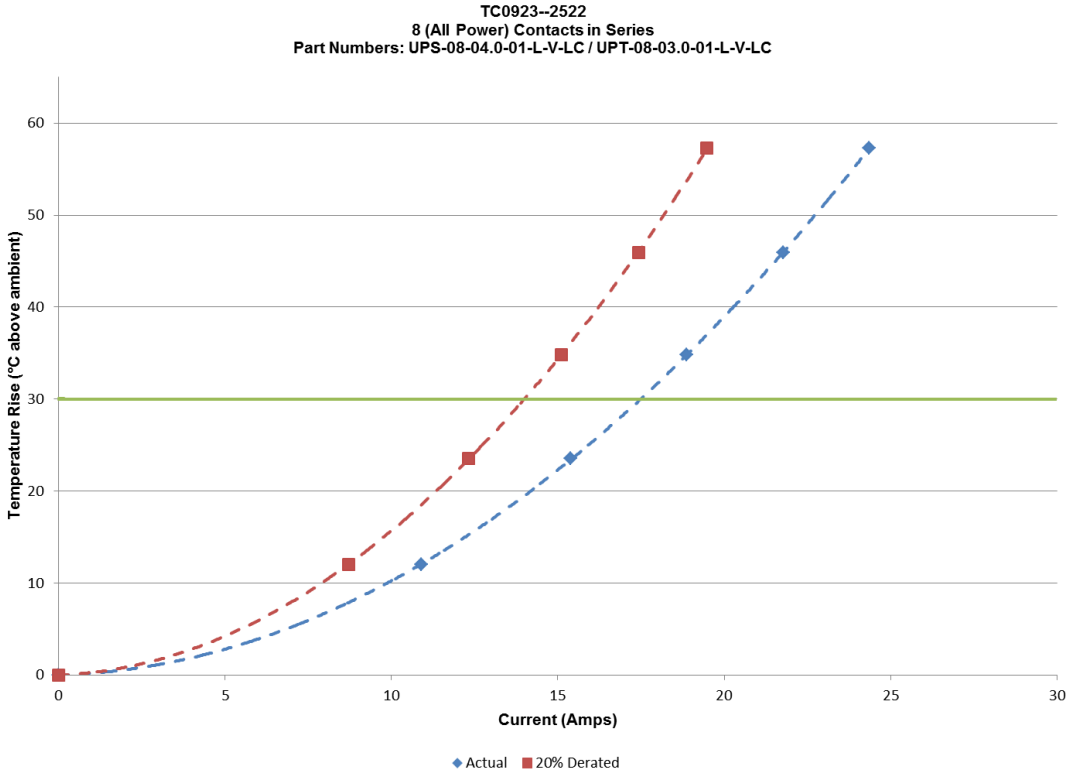
d. Linear configuration with 4 adjacent conductors/contacts powered





e. Linear configuration with all adjacent conductors/contacts powered



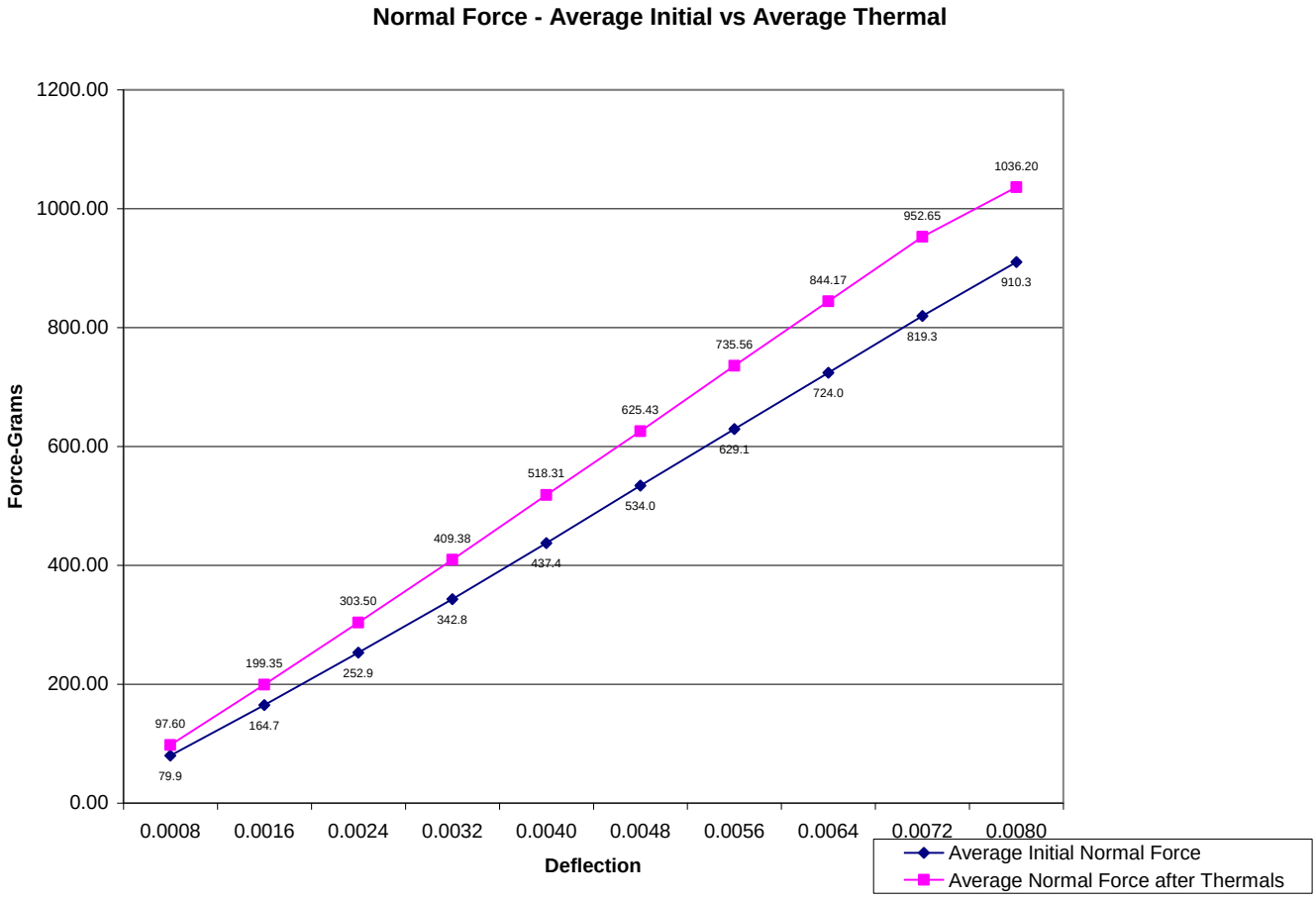


MATING/UNMATING:

	Initial				After 100 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)
Minimum	77.28	4.83	51.84	3.24	74.88	4.68	56.64	3.54
Maximum	100.00	6.25	68.16	4.26	89.44	5.59	77.12	4.82
Average	86.54	**5.41**	58.94	**3.68**	83.04	**5.19**	64.82	**4.05**
	After Thermals				After Humidity			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)
Minimum	59.04	3.69	47.36	2.96	50.56	3.16	49.44	3.09
Maximum	82.56	5.16	57.92	3.62	69.12	4.32	59.36	3.71
Average	67.95	**4.25**	52.90	**3.31**	60.75	**3.80**	54.11	**3.38**

NORMAL FORCE (FOR CONTACTS TESTED OUTSIDE THE HOUSING):

1) Calibrated force gauges are used along with computer controlled positioning equipment.
2) Typically, 8-10 readings are taken and the averages reported.



Initial	Deflections in inches Forces in Grams										
	0.0008	**0.0016**	**0.0024**	**0.0032**	**0.0040**	**0.0048**	**0.0056**	**0.0064**	**0.0072**	**0.0080**	***SET***
Averages	79.93	164.68	252.91	342.78	437.44	534.01	629.14	724.00	819.29	910.28	0.0004
Min	13.20	88.20	143.30	205.80	299.00	403.70	506.70	618.50	693.30	772.00	0.0001
Max	116.50	223.70	323.80	429.50	532.70	632.40	729.90	826.10	922.40	1016.90	0.0011
St. Dev	33.465	49.270	61.326	72.521	76.250	78.851	81.905	83.069	83.437	88.371	0.0003
Count	8	8	8	8	8	8	8	8	8	8	8

After Thermals	Deflections in inches Forces in Grams										
	0.0008	**0.0016**	**0.0024**	**0.0032**	**0.0040**	**0.0048**	**0.0056**	**0.0064**	**0.0072**	**0.0080**	***SET***
Averages	97.60	199.35	303.50	409.38	518.31	625.43	735.56	844.17	952.65	1036.20	0.0003
Min	50.00	110.00	181.60	255.20	331.20	403.50	478.80	551.70	626.40	706.20	0.0001
Max	126.60	255.40	385.10	511.10	643.70	770.20	899.90	1025.50	1150.40	1206.30	0.0010
St. Dev	22.772	43.041	59.416	75.799	94.014	112.150	129.434	147.519	164.253	156.576	0.0003
Count	12	12	12	12	12	12	12	12	12	12	12

INSULATION RESISTANCE (IR):

	Pin to Pin		
	Mated	Unmated	Unmated
Minimum	**UPS/UPT**	**UPS**	**UPT**
Initial	100000	100000	100000
Thermal	100000	100000	100000
Humidity	100000	100000	100000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	**UPS/UPT**
Break Down Voltage	1750
Test Voltage	1313
Working Voltage	438

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

LLCR:

1) A total of 88 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

Date	Jun. 25 2009	Jun. 26 2009	Jul. 13 2009	Jul. 23 2009
Room Temp C	24	24	23.6	23
RH	41%	40%	52%	41%
Name	Troy Cook	RILEY	Troy Cook	Lomax
mOhm values	**Actual Initial**	**Delta 100 Cycles**	**Delta Thermal**	**Delta Humidity**
Average	0.7	0.0	0.0	0.0
St. Dev.	0.2	0.1	0.1	0.1
Min	0.4	-0.6	-0.6	-0.7
Max	1.4	0.2	0.6	0.3
Count	88	88	88	88

GAS TIGHT:

1) A total of 80 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

Date	Jun. 25 2009	Jul. 15 2009
Room Temp C	24	24
RH	40%	43%
Name	Bryan Seger	RILEY
mOhm values	**Actual Initial**	**Delta Gas Tight**
Average	0.6	0.0
St. Dev.	0.1	0.1
Min	0.4	-0.3
Max	1.0	0.2
Count	80	80

DATA

MATING/UNMATING:

	Initial		After 100 Cycles		After Thermals		After Humidity	
Sample#	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating
1	5.03	3.77	5.40	4.82	3.86	3.62	3.84	3.60
2	5.67	4.26	5.26	3.87	3.95	3.42	4.14	3.71
3	5.24	3.56	4.94	4.24	4.25	3.43	3.88	3.65
4	4.87	3.57	4.97	3.99	3.77	3.32	3.16	3.22
5	4.83	3.36	4.92	4.20	3.69	3.29	3.44	3.13
6	5.58	3.59	5.59	3.54	4.82	3.34	3.77	3.47
7	6.25	4.22	5.53	4.01	4.07	3.38	3.61	3.09
8	5.92	3.72	4.68	3.72	4.90	3.20	4.32	3.12
9	5.37	3.24	5.26	3.82	4.00	2.96	4.07	3.39
10	5.33	3.55	5.35	4.30	5.16	3.10	3.74	3.44

NORMAL FORCE (FOR CONTACTS TESTED OUTSIDE THE HOUSING):

Initial — **Deflections in inches, Forces in Grams**

Sample #	**0.0008**	**0.0016**	**0.0024**	**0.0032**	**0.0040**	**0.0048**	**0.0056**	**0.0064**	**0.0072**	**0.0080**	***SET***
1	48.0	94.0	143.3	205.8	299.0	403.7	506.7	619.7	735.3	819.2	0.0001
2	116.5	223.7	323.8	429.5	532.7	632.4	729.9	822.1	916.0	1003.9	0.0005
3	104.8	205.3	308.0	408.7	512.8	618.5	723.2	826.1	922.4	1016.9	0.0004
4	13.2	88.2	186.7	283.3	383.3	476.7	574.1	667.2	768.1	858.7	0.0011
5	93.2	181.5	271.0	361.7	454.8	552.5	646.7	740.1	834.8	934.6	0.0002
6	93.3	191.4	289.9	382.5	478.7	580.0	679.3	776.5	873.1	972.2	0.0003
7	84.6	168.9	259.2	352.7	443.3	537.3	628.4	721.8	811.3	904.7	0.0003
8	85.8	164.4	241.4	318.0	394.9	471.0	544.8	618.5	693.3	772.0	0.0004

After Thermals — **Deflections in inches, Forces in Grams**

Sample #	**0.0008**	**0.0016**	**0.0024**	**0.0032**	**0.0040**	**0.0048**	**0.0056**	**0.0064**	**0.0072**	**0.0080**	***SET***
1	126.6	251.9	364.0	480.3	600.4	712.5	827.9	949.3	1063.6	1131.1	0.0004
2	62.6	144.6	241.5	345.0	455.3	564.0	687.0	803.9	925.4	1040.9	0.0001
3	50.0	110.0	181.6	255.2	331.2	403.5	478.8	551.7	626.4	706.2	0.0005
4	91.6	176.8	263.1	342.0	418.4	495.2	572.5	648.2	725.7	808.5	0.0010
5	115.7	232.7	363.5	485.0	613.9	743.5	866.8	996.2	1116.3	1177.2	0.0002
6	96.7	189.5	283.8	379.6	478.6	577.9	682.1	789.2	890.8	993.5	0.0001
7	109.5	223.1	334.5	451.9	571.2	686.2	807.8	925.3	1048.9	1129.1	0.0002
8	122.4	255.4	385.1	511.1	643.7	770.2	899.9	1025.5	1150.4	1206.3	0.0002
9	108.0	224.3	345.5	469.6	591.8	719.0	842.1	963.9	1084.5	1163.1	0.0004
10	92.1	188.3	285.6	383.3	478.9	578.3	685.0	789.3	893.8	1001.1	0.0001
11	105.5	213.0	319.9	440.9	569.8	694.3	824.0	943.3	1066.9	1146.6	0.0002
12	90.5	182.6	273.9	368.7	466.5	560.5	652.8	744.2	839.1	930.8	0.0001

INSULATION RESISTANCE (IR):

Initial Insulation Resistance
Measured In Meg Ohms

	Pin to Pin		
	Mated	Unmated	
	X	X	X
Sample#	UPS/UPT	UPS	UPT
1	100000	100000	100000
2	100000	100000	100000

Thermal Insulation Resistance
Measured In Meg Ohms

	Pin to Pin		
	Mated	Unmated	
	X	X	X
Sample#	UPS/UPT	UPS	UPT
1	100000	100000	100000
2	100000	100000	100000

Thermal Insulation Resistance
Measured In Meg Ohms

	Pin to Pin		
	Mated	Unmated	
	X	X	X
Sample#	UPS/UPT	UPS	UPT
1	100000	100000	100000
2	100000	100000	100000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Initial DWV
Test Voltage= 1313

	Pin to Pin		
	Mated	Unmated	
Sample#	UPS/UPT	UPS	UPT
1	1313	1313	1313
2	1313	1313	1313

Thermal Test Voltage
Test Voltage= 1313

	Pin to Pin		
	Mated	Unmated	
Sample#	UPS/UPT	UPS	UPT
1	1313	1313	1313
2	1313	1313	1313

Humidity Test Voltage
Test Voltage= 1313

	Pin to Pin		
	Mated	Unmated	
Sample#	UPS/UPT	UPS	UPT
1	1313	1313	1313
2	1313	1313	1313

LLCR:

Board	mOhm values Position	Actual Initial	Delta 100 Cycles	Delta Thermal	Delta Humidity
1	P1	0.9	-0.3	0.1	-0.2
1	P2	0.9	-0.4	-0.2	-0.4
1	P3	0.5	-0.1	0.0	0.1
1	P4	0.7	-0.1	0.0	-0.1
1	P5	0.7	-0.1	0.0	0.0
1	P6	0.7	-0.1	0.0	0.0
1	P7	0.7	-0.1	0.0	-0.1
1	P8	0.7	0.1	0.0	-0.1
2	P1	0.5	-0.1	0.0	0.0
2	P2	0.5	0.0	0.1	0.1
2	P3	0.4	0.0	0.0	0.0
2	P4	1.0	-0.1	-0.1	-0.2
2	P5	1.0	0.0	-0.1	0.0
2	P6	0.8	0.0	0.0	0.1
2	P7	0.9	-0.1	0.1	0.0
2	P8	1.3	-0.1	-0.1	-0.5
3	P1	0.6	0.0	0.1	0.1
3	P2	0.5	-0.1	-0.1	-0.1
3	P3	0.5	0.0	0.0	0.0
3	P4	0.7	0.0	0.1	0.0
3	P5	0.6	0.0	0.1	0.0
3	P6	0.7	0.0	0.0	0.0
3	P7	0.8	0.0	-0.1	-0.1
3	P8	0.7	0.0	0.0	0.1
4	P1	0.4	0.0	0.1	0.3
4	P2	0.4	0.0	0.1	0.1
4	P3	0.4	0.0	0.0	0.1
4	P4	0.7	0.0	0.1	-0.2
4	P5	0.7	0.0	0.0	0.1
4	P6	0.8	-0.1	-0.1	-0.1
4	P7	0.7	0.1	0.0	0.0
4	P8	0.7	-0.1	-0.1	-0.1
5	P1	0.5	-0.1	0.0	-0.1
5	P2	0.4	0.0	0.1	0.1
5	P3	0.4	0.0	0.0	0.0
5	P4	0.5	0.0	0.1	0.0
5	P5	0.6	0.0	0.3	0.2
5	P6	0.5	0.0	0.0	0.0
5	P7	0.7	0.0	0.0	0.0
5	P8	0.7	0.0	0.0	0.0
6	P1	0.5	-0.1	0.1	0.0
6	P2	0.5	0.1	0.3	0.1
6	P3	0.7	0.2	0.3	0.0

6	P4	0.8	0.0	0.0	0.0
6	P5	0.9	-0.1	-0.1	-0.1
6	P6	1.0	0.0	-0.1	0.0
6	P7	0.7	0.0	0.0	0.0
6	P8	0.8	-0.1	0.0	-0.1
7	P1	0.4	0.1	0.3	0.2
7	P2	0.7	-0.1	0.0	-0.1
7	P3	0.5	0.0	0.0	0.0
7	P4	0.7	0.0	0.0	0.0
7	P5	0.8	0.0	0.1	0.1
7	P6	0.8	0.0	0.1	0.1
7	P7	0.6	0.0	0.0	0.0
7	P8	0.7	-0.1	0.0	0.0
8	P1	0.6	0.1	0.0	0.0
8	P2	0.6	0.1	0.0	0.0
8	P3	1.4	-0.6	-0.6	-0.7
8	P4	0.5	0.2	0.2	0.2
8	P5	0.8	0.0	0.2	0.1
8	P6	1.0	-0.1	0.1	0.0
8	P7	0.9	0.0	0.6	0.2
8	P8	0.7	0.0	-0.1	-0.1
9	P1	0.5	0.1	0.1	0.1
9	P2	0.5	0.0	0.2	0.1
9	P3	0.6	-0.1	0.0	-0.1
9	P4	0.6	0.0	0.0	0.0
9	P5	0.7	0.0	0.2	0.1
9	P6	0.7	-0.1	0.2	0.0
9	P7	0.5	0.0	0.2	0.0
9	P8	0.8	0.0	0.0	-0.1
10	P1	0.5	-0.1	-0.1	0.0
10	P2	0.4	0.0	0.1	0.1
10	P3	0.6	0.0	-0.1	-0.1
10	P4	0.5	0.0	0.0	0.0
10	P5	0.8	-0.1	0.0	0.0
10	P6	0.8	0.0	0.0	0.0
10	P7	0.8	0.0	0.0	0.0
10	P8	0.5	0.0	0.0	0.0
11	P1	0.4	0.1	0.3	0.2
11	P2	0.5	0.0	0.1	0.0
11	P3	0.5	0.1	0.1	0.0
11	P4	0.6	0.1	0.2	0.1
11	P5	0.7	0.0	0.1	0.0
11	P6	0.7	0.0	0.1	0.0
11	P7	0.5	0.0	0.0	0.0
11	P8	0.5	-0.1	0.0	-0.1

GAS TIGHT:

	mOhm values	Actual	Delta
Board	Position	Initial	Gas Tight
1	P1	0.9	-0.3
1	P2	0.5	0.0
1	P3	0.5	-0.1
1	P4	0.7	0.0
1	P5	0.7	-0.1
1	P6	0.7	-0.1
1	P7	0.5	-0.1
1	P8	0.6	0.0
2	P1	0.4	0.0
2	P2	0.5	0.0
2	P3	0.6	-0.2
2	P4	0.5	0.0
2	P5	0.6	0.0
2	P6	0.5	0.0
2	P7	0.5	0.1
2	P8	0.5	0.0
3	P1	0.7	-0.1
3	P2	0.4	0.0
3	P3	0.5	0.0
3	P4	0.5	0.0
3	P5	0.5	0.0
3	P6	0.7	-0.1
3	P7	0.8	0.0
3	P8	0.5	0.1
4	P1	0.4	0.0
4	P2	0.5	-0.1
4	P3	0.5	-0.1
4	P4	0.7	0.0
4	P5	0.4	0.0
4	P6	0.6	-0.1
4	P7	0.7	0.0
4	P8	0.6	0.0
5	P1	0.5	0.0
5	P2	0.5	-0.1
5	P3	0.7	0.0
5	P4	0.8	-0.1
5	P5	0.9	-0.1
5	P6	0.8	0.0
5	P7	1.0	0.0
5	P8	0.7	0.1
6	P1	0.5	0.0
6	P2	0.6	-0.1
6	P3	0.6	-0.1

6	P4	0.8	0.0
6	P5	0.7	0.2
6	P6	0.6	0.0
6	P7	0.7	-0.1
6	P8	0.8	-0.2
7	P1	0.4	0.1
7	P2	0.6	0.1
7	P3	0.7	-0.1
7	P4	0.7	0.0
7	P5	0.9	0.1
7	P6	0.9	-0.1
7	P7	0.6	0.2
7	P8	0.7	0.0
8	P1	0.5	0.0
8	P2	0.6	-0.2
8	P3	0.6	0.0
8	P4	0.7	0.0
8	P5	0.7	0.0
8	P6	0.7	0.0
8	P7	0.9	0.0
8	P8	0.7	0.0
9	P1	0.4	0.0
9	P2	0.6	-0.1
9	P3	0.5	0.1
9	P4	0.7	0.0
9	P5	0.4	0.0
9	P6	0.6	0.1
9	P7	0.6	0.0
9	P8	0.7	0.0
10	P1	0.5	0.0
10	P2	0.4	0.0
10	P3	0.6	-0.2
10	P4	0.5	0.0
10	P5	0.6	0.0
10	P6	0.5	-0.1
10	P7	0.9	-0.1
10	P8	0.7	0.0

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: MO-03
Description: Multimeter /Data Acquisition System
Manufacturer: Keithley
Model: 2700
Serial #: 0791975
Accuracy: See Manual
… Last Cal: 06/16/09, Next Cal: 06/16/2010

Equipment #: MO-01
Description: Micro-Ohmeter
Manufacturer: Keithley
Model: 580
Serial #: 0772740
Accuracy: See Manual
… Last Cal: 06/16/09, Next Cal: 06/16/2010

Equipment #: MO-06
Description: Micro-Ohmeter
Manufacturer: Keithley
Model: 580
Serial #: 1110525
Accuracy: See Manual
… Last Cal: 06/16/2009, Next Cal: 06/16/2010

Equipment #: MO-07
Description: Multimeter / Data Acquistion System
Manufacturer: Keithley
Model: 2700
Serial #: 1116559
Accuracy: See Manual
… Last Cal: 6/16/2009, Next Cal: 6/16/2010

Equipment #: MO-04
Description: Multimeter /Data Acquisition System
Manufacturer: Keithley
Model: 2700
Serial #: 0798688
Accuracy: See Manual
… Last Cal: 04/06/09, Next Cal: 04/06/2010

Equipment #: RS-09
Description: Current Shunt
Manufacturer: Empro
Model: HA10050
Serial #: HA10050-1
Accuracy: +/- 0.25% of RDG
… Last Cal: 05/14/2009, Next Cal: 05/14/2010

Equipment #: TCT-04
Description: Dillon Quantrol TC21 25-1000 mm/min series test stand
Manufacturer: Dillon Quantrol
Model: TC2 I series test stand
Serial #: 04-1041-04
Accuracy: Speed Accuracy: +/- 5% of indicated speed; Speed Accuracy: +/- 5% of indicated speed;
… Last Cal: 5/12/2009, Next Cal: 5/12/2010

Equipment #: OV-5
Description: Forced Air Oven, 5 Cu. Ft., 120 V
Manufacturer: Sheldon Mfg.
Model: CE5F
Serial #: 02008008
Accuracy: +/- 5 deg. C
… Last Cal: 02/19/2009, Next Cal: 02/19/2010

Equipment #: THC-01
Description: Temperature/Humidity Chamber
Manufacturer: Thermotron
Model: SM-8-7800
Serial #: 30676
Accuracy: See Manual
… Last Cal: 04/07/2009, Next Cal: 04/07/2010

Equipment #: OV-03
Description: Cascade Tek Forced Air Oven
Manufacturer: Cascade Tek
Model: TFO-5
Serial #: 0791975
Accuracy: Temp. Stability: +/-.1C/C change in ambient
… Last Cal: 06/17/2009, Next Cal: 06/17/2010

Equipment #: TCT-06
Description: Test Resources test stand
Manufacturer: Test Resources
Model:
Serial #:
Accuracy: Speed Accuracy: +/- 5% of indicated speed; Displacement: +/- 5 micrometers.
… Last Cal: 05/07/2009, Next Cal: 05/07/2010

Equipment #: HPM-01
Description: Hipot Megommeter
Manufacturer: Hipotronics
Model: H306B-A
Serial #: M9905004
Accuracy: 2 % Full Scale Accuracy
… Last Cal: 11/24/08, Next Cal: 11/24/09