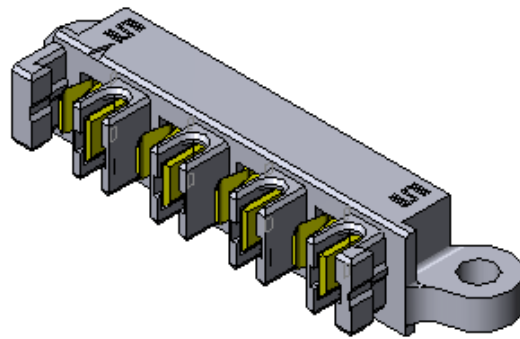




Project Number: Design Verification Test		Tracking Code: TC0953—2993_Report_Rev_2	
Requested by: Brandon Harpenau		Date: 3/1/2010	Product Rev: 0
Part #: UPPT-08-01-01-L-RA-SD		Lot #: 1	Tech: Troy Cook Eng: Eric Mings
Part description: UPPT-08-01-01-L-RA-SD			Qty to test: 125
Test Start: 12/30/2009	Test Completed: 2/12/2010		



Design Verification Test Report

PART DESCRIPTION

UPPT-08-01-01-L-RA-SD

CERTIFICATION

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

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SCOPE

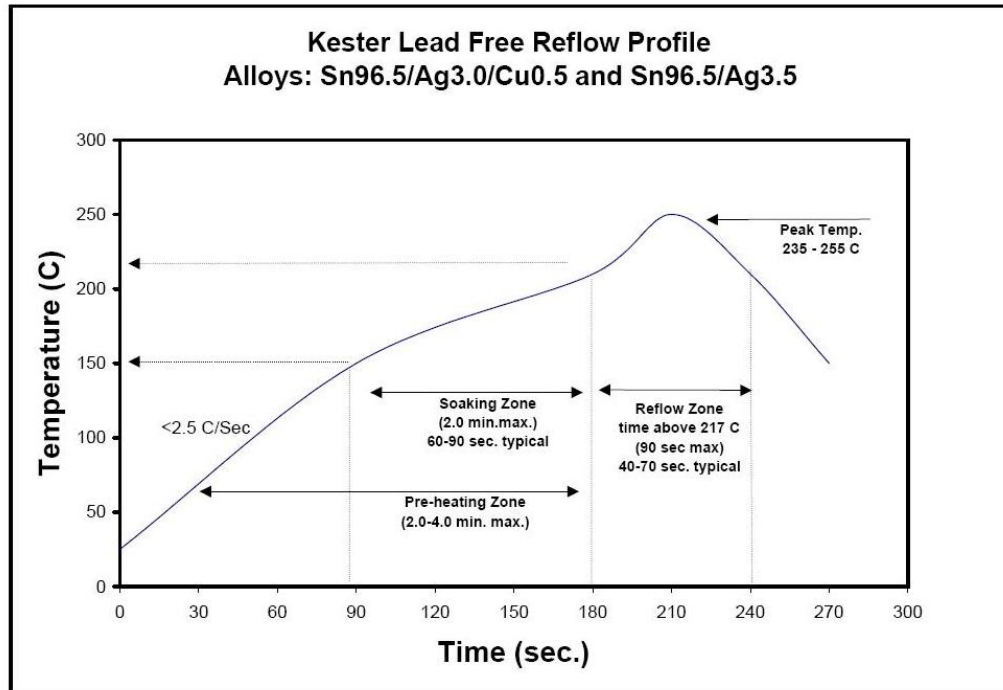
To perform the following tests: Design verification test. See test plan.

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
- 9) Re-Flow Time/Temp: See accompanying profile.
- 10) Samtec Test PCBs used: PCB-102245-TST / PCB-102247-TST / PCB-101973-TST

TYPICAL OVEN PROFILE (Soldering Parts to Test Boards)

FLOWCHARTS**Gas Tight**

TEST STEP	GROUP A 60 Points
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

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 B 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)

* - DWV on group B 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

Mating/Unmating/Gaps/Normal Force/Deflection Force

TEST STEP	GROUP A 10 Boards	GROUP B1 Individual Contacts (8-10 min)	GROUP B2 Individual Contacts (8-10 min)
01	Contact Gaps	Setup Approved	Setup Approved
02	Mating / Unmating	Normal Force (in the body and soldered on PCB unless otherwise specified)	Thermal Aging (Mated)
03	25 Hand Cycles		Normal Force (in the body and soldered on PCB unless otherwise specified)
04	Clean w/Compressed Air		
05	Mating / Unmating		
06	25 Hand Cycles (50 Total)		
07	Clean w/Compressed Air		
08	Mating / Unmating		
09	25 Hand Cycles (75 Total)		
10	Clean w/Compressed Air		
11	Mating / Unmating		
12	25 Hand Cycles (100 Total)		
13	Clean w/Compressed Air		
14	Mating / Unmating		
15	Contact Gaps		
16	Thermal Aging (Mated)		
17	Mating / Unmating		
18	Contact Gaps		
19	Cyclic Humidity (Mated)		
20	Mating / Unmating		

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

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

Contact Gaps/Height - No standard method. Usually measured optically

Durability/Thermal Age/Cyclic Humidity

TEST STEP	GROUP A 60 Points 100 Cycles
01	LLCR-1
02	100 Cycles
03	Clean Mating Interface
04	LLCR-2
05	Thermal Age (Mated and undisturbed)
06	LLCR-3
07	Cyclic Humidity (Mated and undisturbed)
08	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

Current Carrying Capacity

TEST STEP	GROUP A 3 Mated Assemblies 1 CONTACT POWERED	GROUP B 3 Mated Assemblies 2 CONTACTS POWERED	GROUP C 3 Mated Assemblies 3 CONTACTS POWERED	GROUP D 3 Mated Assemblies 4 CONTACTS POWERED	GROUP E 3 Mated Assemblies ALL CONTACTS POWERED
01	CCC	CCC	CCC	CCC	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

CCC, Temp rise = EIA-364-70

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° C
 - c. 95° C
 - d. 115° C
- 8) Typically, neighboring contacts (in close proximity to maximize heat build up) are energized.
- 9) The thermocouple (or temperature measuring probe) will be positioned at a location to sense the maximum temperature in the vicinity of the heat generation area.
- 10) A computer program, *TR 803.exe*, ensures accurate stability for data acquisition.
- 11) Hook-up wire cross section is larger than the cross section of any connector leads/PC board traces, jumpers, etc.
- 12) Hook-up wire length is longer than the minimum specified in the referencing standard.

CONTACT GAPS:

- 1) Gaps above the surrounding plastic surface were measured before and after stressing the contacts (e.g. thermal aging, mechanical cycling, etc.).
- 2) Typically, all contacts on the connector are measured.

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 IN THE HOUSING):

- 1) Reference document: EIA-364-04, *Normal Force Test Procedure for Electrical Connectors*.
- 2) The contacts shall be tested in the connector housing.
- 3) If necessary, a "window" shall be made in the connector body to allow a probe to engage and deflect the contact at the same attitude and distance (plus 0.05 mm [0.002"]) as would occur in actual use.
- 4) The connector housing shall be placed in a holding fixture that does not interfere with or otherwise influence the contact force or deflection.
- 5) Said holding fixture shall be mounted on a floating, adjustable, X-Y table on the base of the Dillon TC², computer controlled test stand with a deflection measurement system accuracy of 5.0 μm (0.0002").
- 6) The nominal deflection rate shall be 5 mm (0.2")/minute.
- 7) Unless otherwise noted a minimum of five contacts shall be tested.
- 8) The force/deflection characteristic to load and unload each contact shall be repeated five times.
- 9) The system shall utilize the TC² software in order to acquire and record the test data.
- 10) The permanent set of each contact shall be measured within the TC² software.
- 11) The acquired data shall be graphed with the deflection data on the X-axis and the force data on the Y-axis and a print out will be stored with the Tracking Code paperwork.

INSULATION RESISTANCE (IR):

To determine the resistance of insulation materials to leakage of current through or on the surface of these materials when a DC potential is applied.

- 1) PROCEDURE:
 - a. Reference document: EIA-364-21, *Insulation Resistance Test Procedure for Electrical Connectors*.
 - b. Test Conditions:
 - i. Between Adjacent Contacts or Signal-to-Ground
 - ii. Electrification Time 2.0 minutes
 - iii. Test Voltage (500 VDC) corresponds to calibration settings for measuring resistances.
- 2) MEASUREMENTS:
- 3) When the specified test voltage is applied (VDC), the insulation resistance shall not be less than 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. $\leq +5.0$ mOhms: ----- Stable
 - b. $+5.1$ to $+10.0$ mOhms:----- Minor
 - c. $+10.1$ to $+15.0$ mOhms: ----- Acceptable
 - d. $+15.1$ to $+50.0$ mOhms: ----- Marginal
 - e. $+50.1$ to $+2000$ 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. $\leq +5.0$ mOhms: ----- Stable
 - b. $+5.1$ to $+10.0$ mOhms:----- Minor
 - c. $+10.1$ to $+15.0$ mOhms: ----- Acceptable
 - d. $+15.1$ to $+50.0$ mOhms: ----- Marginal
 - e. $+50.1$ to $+2000$ 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° 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-----21.4 A per contact with 1 contact powered
- CCC for a 30°C Temperature Rise-----19.8 A per contact with 2 adjacent contacts powered
- CCC for a 30°C Temperature Rise-----17.1 A per contact with 3 adjacent contacts powered
- CCC for a 30°C Temperature Rise-----16.9 A per contact with 4 adjacent contacts powered
- CCC for a 30°C Temperature Rise-----14.1 A per contact with all 8 adjacent contacts powered

Contact Gaps

Contact Gap #1 – 2.09 +.13 / -.00 mm

- **Initial**
 - **Min**-----2.09 mm
 - **Max**-----2.20 mm
- **After 100 Cycles**
 - **Min**-----1.99 mm
 - **Max**-----2.20 mm
- **Thermal**
 - **Min**-----1.93 mm
 - **Max**-----2.21 mm

Contact Gap #2 – 1.69 ±.13 mm

- **Initial**
 - **Min**-----1.52 mm
 - **Max**-----1.66 mm
- **After 100 Cycles**
 - **Min**-----1.54 mm
 - **Max**-----1.67 mm
- **Thermal**
 - **Min**-----1.59 mm
 - **Max**-----1.69 mm

Mating – Unmating Forces

- **Initial**
 - **Mating**
 - **Min** ----- 7.2 Lbs
 - **Max** ----- 16.6 Lbs
 - **Unmating**
 - **Min** ----- 7.7 Lbs
 - **Max** ----- 11.0 Lbs
- **After 25 Cycles**
 - **Mating**
 - **Min** ----- 6.7 Lbs
 - **Max** ----- 9.9 Lbs
 - **Unmating**
 - **Min** ----- 5.8 Lbs
 - **Max** ----- 8.6 Lbs
- **After 50 Cycles**
 - **Mating**
 - **Min** ----- 6.8 Lbs
 - **Max** ----- 10.7 Lbs
 - **Unmating**
 - **Min** ----- 5.6 Lbs
 - **Max** ----- 8.7 Lbs
- **After 75 Cycles**
 - **Mating**
 - **Min** ----- 7.0 Lbs
 - **Max** ----- 11.0 Lbs
 - **Unmating**
 - **Min** ----- 5.7 Lbs
 - **Max** ----- 9.0 Lbs
- **After 100 Cycles**
 - **Mating**
 - **Min** ----- 7.2 Lbs
 - **Max** ----- 11.1 Lbs
 - **Unmating**
 - **Min** ----- 5.9 Lbs
 - **Max** ----- 9.5 Lbs
- **Thermal**
 - **Mating**
 - **Min** ----- 6.2 Lbs
 - **Max** ----- 10.1 Lbs
 - **Unmating**
 - **Min** ----- 5.4 Lbs
 - **Max** ----- 8.3 Lbs
- **Humidity**
 - **Mating**
 - **Min** ----- 4.8 Lbs
 - **Max** ----- 8.1 Lbs
 - **Unmating**
 - **Min** ----- 4.9 Lbs
 - **Max** ----- 6.7 Lbs

Normal Force at .0075" deflection

- **Initial**
 - **Min**----- 293.7 Grams Set ----- .0002"
 - **Max**----- 361.3 Grams Set ----- .0006"
- **Thermal**
 - **Min**----- 322.3 Grams
 - **Max**----- 390.0 Grams

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**----- 50,000 Meg Ω ----- Pass
 - **Unmated** ----- 50,000 Meg Ω ----- Pass

Dielectric Withstanding Voltage minimums, DWV

- **Minimums**
 - **Breakdown Voltage**----- 1,700 VAC
 - **Test Voltage**----- 1,275 VAC
 - **Working Voltage**----- 425 VAC
- **Initial DWV** ----- Passed
- **Thermal DWV**----- Passed
- **Humidity DWV**----- Passed

LLCR Durability (60 LLCR test points)

- **Initial**-----0.4 mOhms Max
- **Durability, 100 Cycles**
 - <= +5.0 mOhms ----- 60 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 ----- 60 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 ----- 60 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

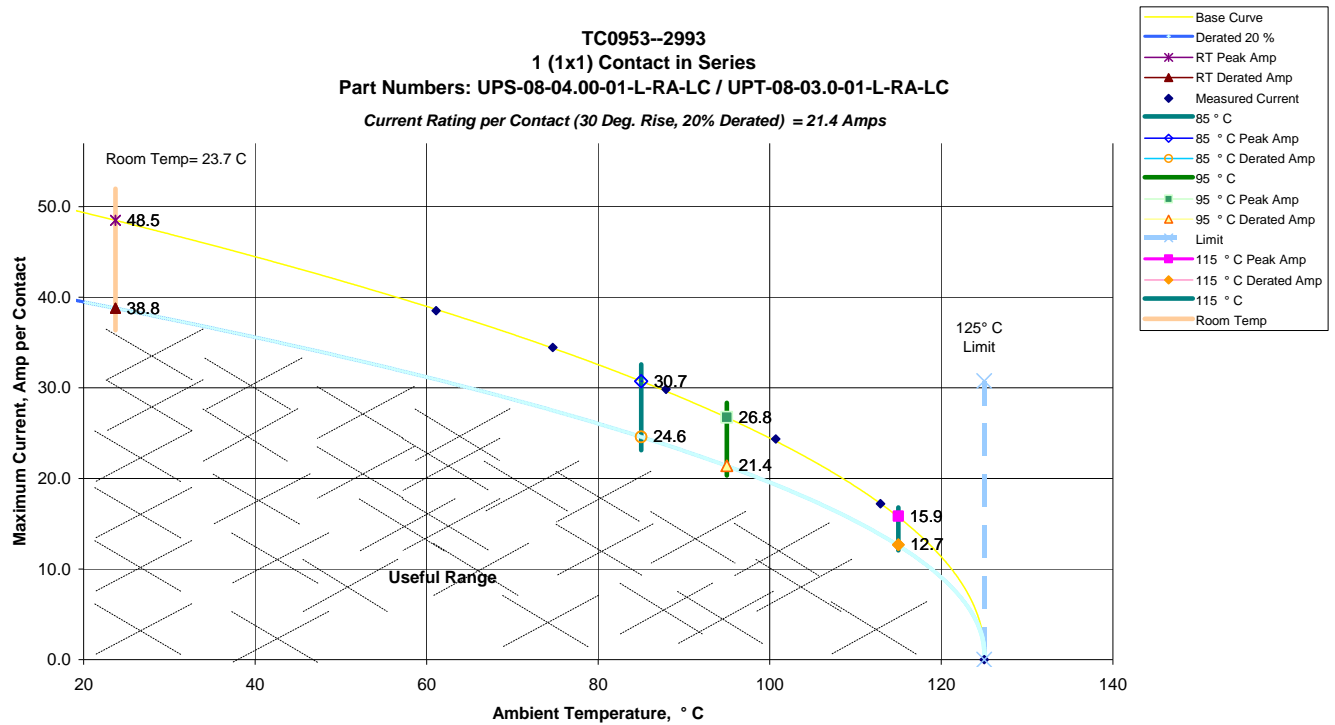
LLCR Gas Tight (60 LLCR test points)

- **Initial**-----0.5 mOhms Max
- **Gas-Tight**
 - <= +5.0 mOhms ----- 60 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

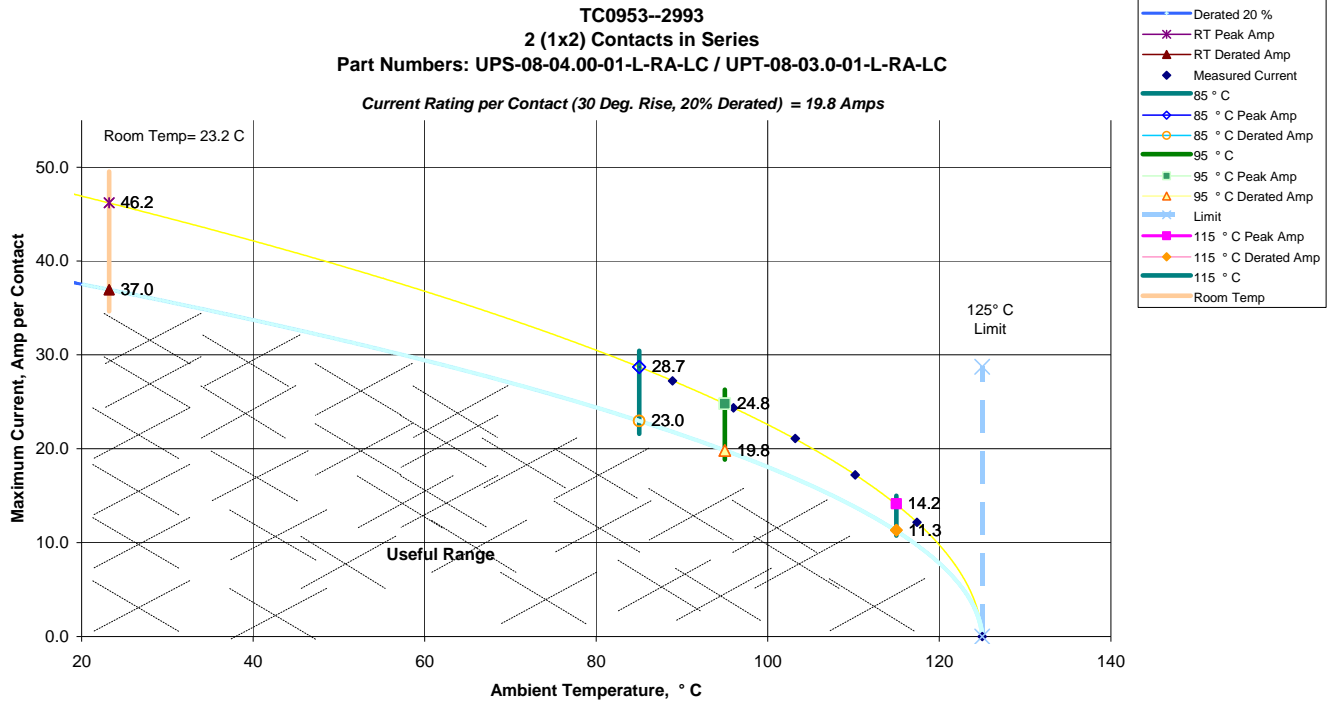
DATA SUMMARIES

TEMPERATURE RISE (Current Carrying Capacity, CCC):

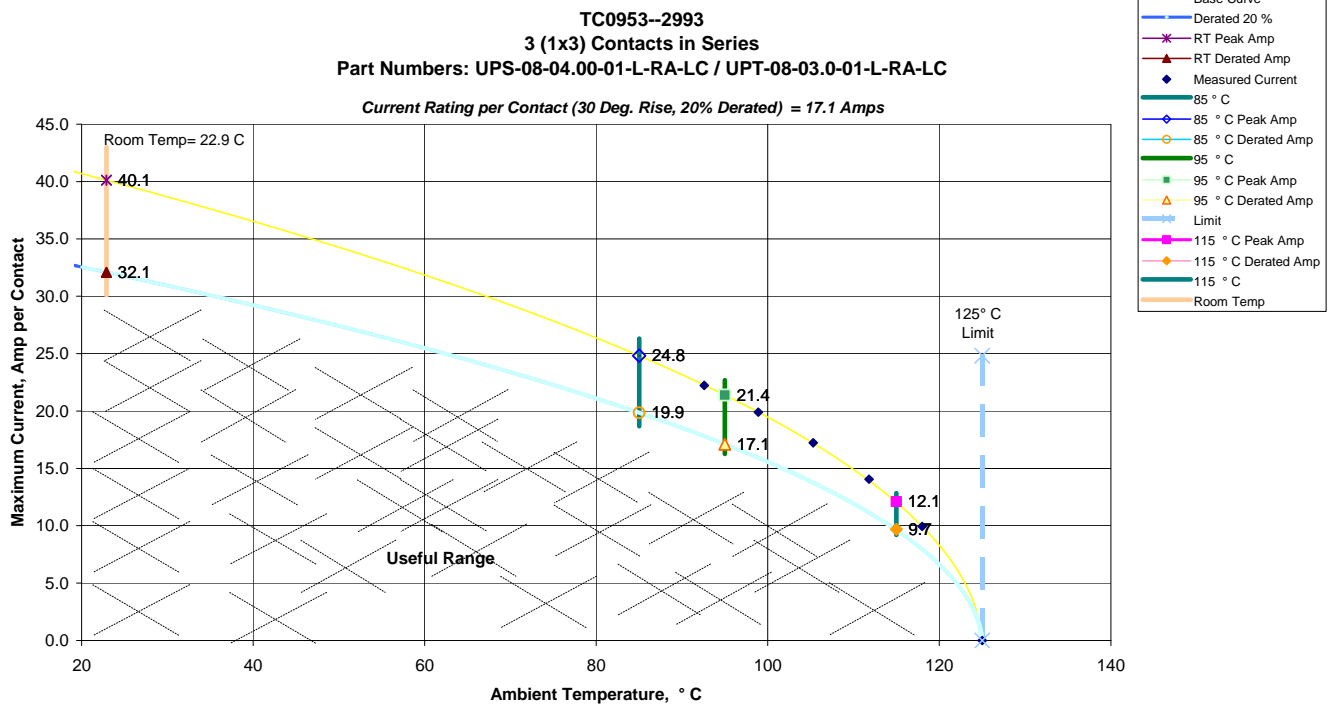
- 1) High quality thermocouples whose temperature slopes track one another were used for temperature monitoring.
- 2) The thermocouples were placed at a location to sense the maximum temperature generated during testing.
- 3) Temperature readings recorded are those for which three successive readings,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



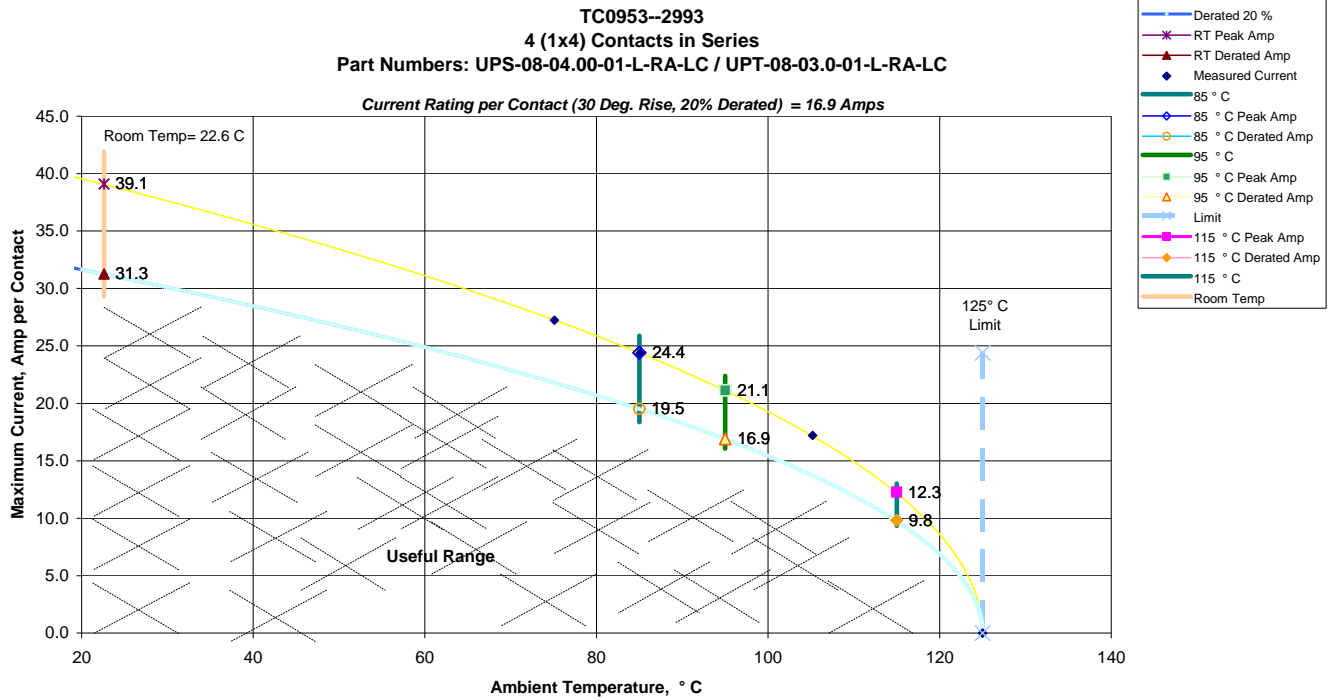
b. Linear configuration with 2 adjacent contacts powered



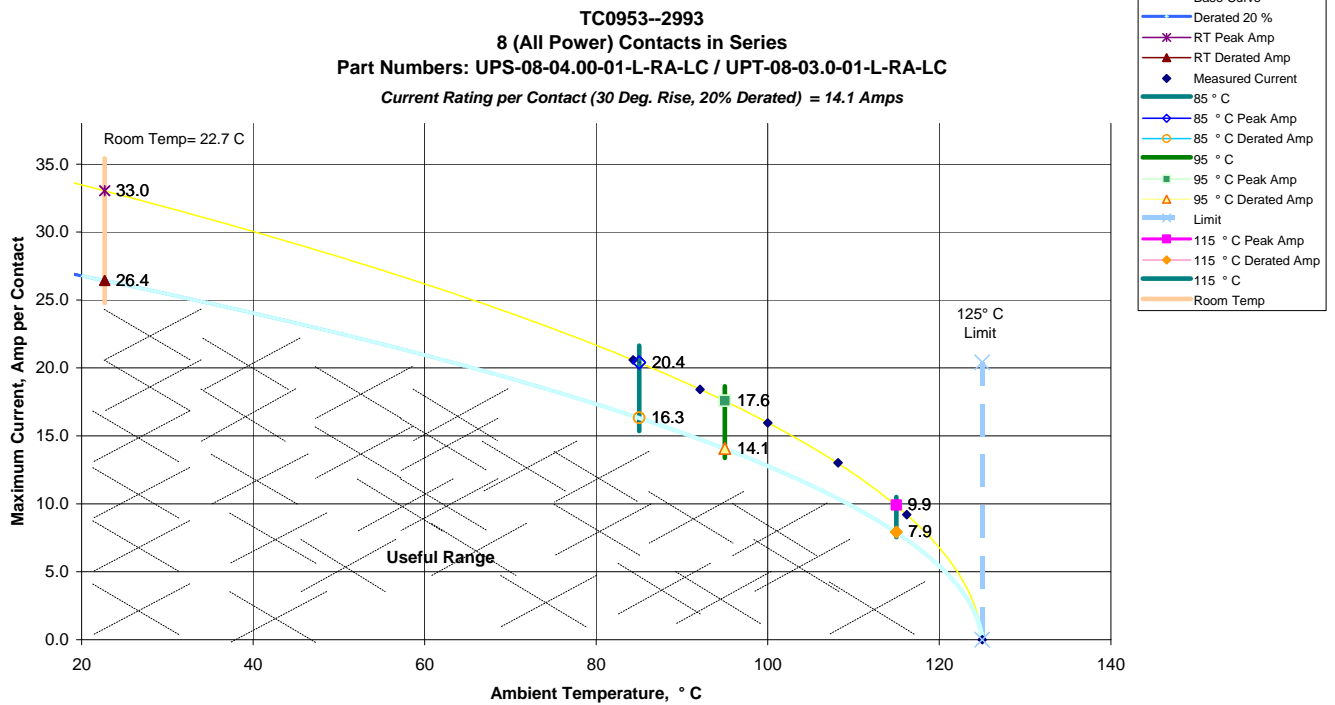
c. Linear configuration with 3 adjacent contacts powered



d. Linear configuration with 4 adjacent contacts powered



e. Linear configuration with all adjacent contacts powered



CONTACT GAPS:**Contact Gap #1 – 2.09 +.13 / -.00 mm**

Initial		After 100 Cycles		After Thermal	
Units:	mm	Units:	mm	Units:	mm
<i>Minimum</i>	2.0900	<i>Minimum</i>	1.9900	<i>Minimum</i>	1.9300
<i>Maximum</i>	2.2000	<i>Maximum</i>	2.2040	<i>Maximum</i>	2.1100
<i>Average</i>	2.1668	<i>Average</i>	2.1433	<i>Average</i>	2.0466
<i>St. Dev.</i>	0.0242	<i>St. Dev.</i>	0.0427	<i>St. Dev.</i>	0.0303
<i>Count</i>	56	<i>Count</i>	56	<i>Count</i>	56

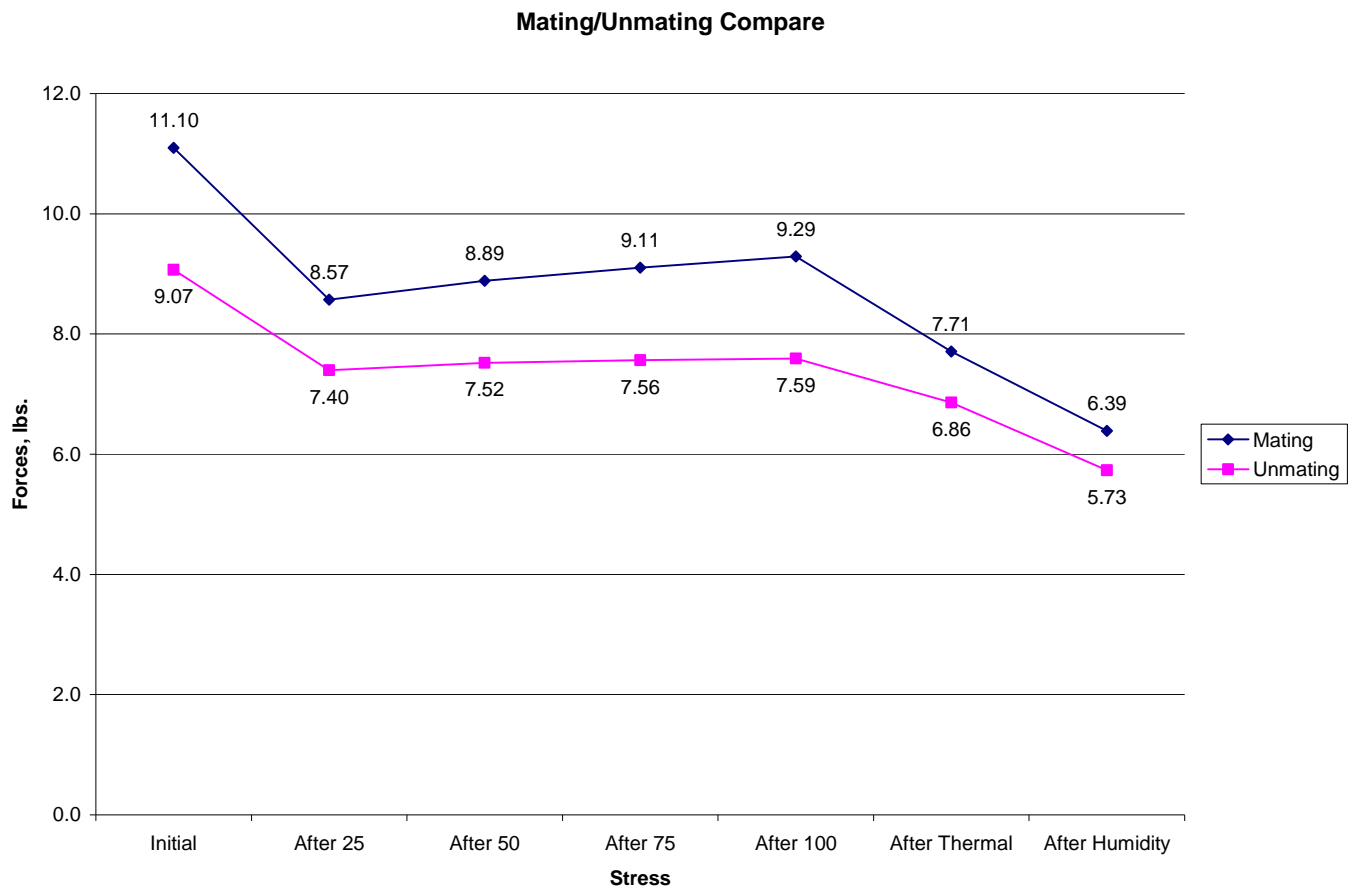
Contact Gap #2 – 1.69 ±.13 mm

Initial		After 100 Cycles		After Thermal	
Units:	mm	Units:	mm	Units:	mm
<i>Minimum</i>	1.5160	<i>Minimum</i>	1.5380	<i>Minimum</i>	1.5860
<i>Maximum</i>	1.6640	<i>Maximum</i>	1.6660	<i>Maximum</i>	1.6880
<i>Average</i>	1.5872	<i>Average</i>	1.6040	<i>Average</i>	1.6388
<i>St. Dev.</i>	0.0342	<i>St. Dev.</i>	0.0282	<i>St. Dev.</i>	0.0229
<i>Count</i>	56	<i>Count</i>	56	<i>Count</i>	56

MATING/UNMATING:

	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	31.80	7.15	34.21	7.69	29.98	6.74	25.84	5.81
Maximum	73.93	16.62	48.71	10.95	43.99	9.89	38.39	8.63
Average	49.36	11.10	40.33	9.07	38.13	8.57	32.91	7.40
St Dev	12.25	2.75	5.39	1.21	4.51	1.01	3.91	0.88
Count	10	10	10	10	10	10	10	10
	After 50 Cycles				After 75 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	30.42	6.84	25.00	5.62	31.31	7.04	25.18	5.66
Maximum	47.42	10.66	38.83	8.73	48.88	10.99	39.94	8.98
Average	39.52	8.89	33.45	7.52	40.51	9.11	33.64	7.56
St Dev	5.37	1.21	4.23	0.95	6.15	1.38	5.24	1.18
Count	10	10	10	10	10	10	10	10
	After 100 Cycles				After Thermals			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	31.85	7.16	26.07	5.86	27.35	6.15	24.00	5.40
Maximum	49.51	11.13	42.34	9.52	44.87	10.09	36.86	8.29
Average	41.33	9.29	33.76	7.59	34.30	7.71	30.51	6.86
St Dev	5.81	1.31	5.57	1.25	5.25	1.18	3.92	0.88
Count	10	10	10	10	10	10	10	10
	After Humidity							
	Mating		Unmating					
	Newton's	Force (Lbs)	Newton's	Force (Lbs)				
Minimum	21.36	4.80	21.91	4.93				
Maximum	36.14	8.13	29.63	6.66				
Average	28.41	6.39	25.50	5.73				
St Dev	4.68	1.05	2.55	0.57				
Count	10	10	10	10				

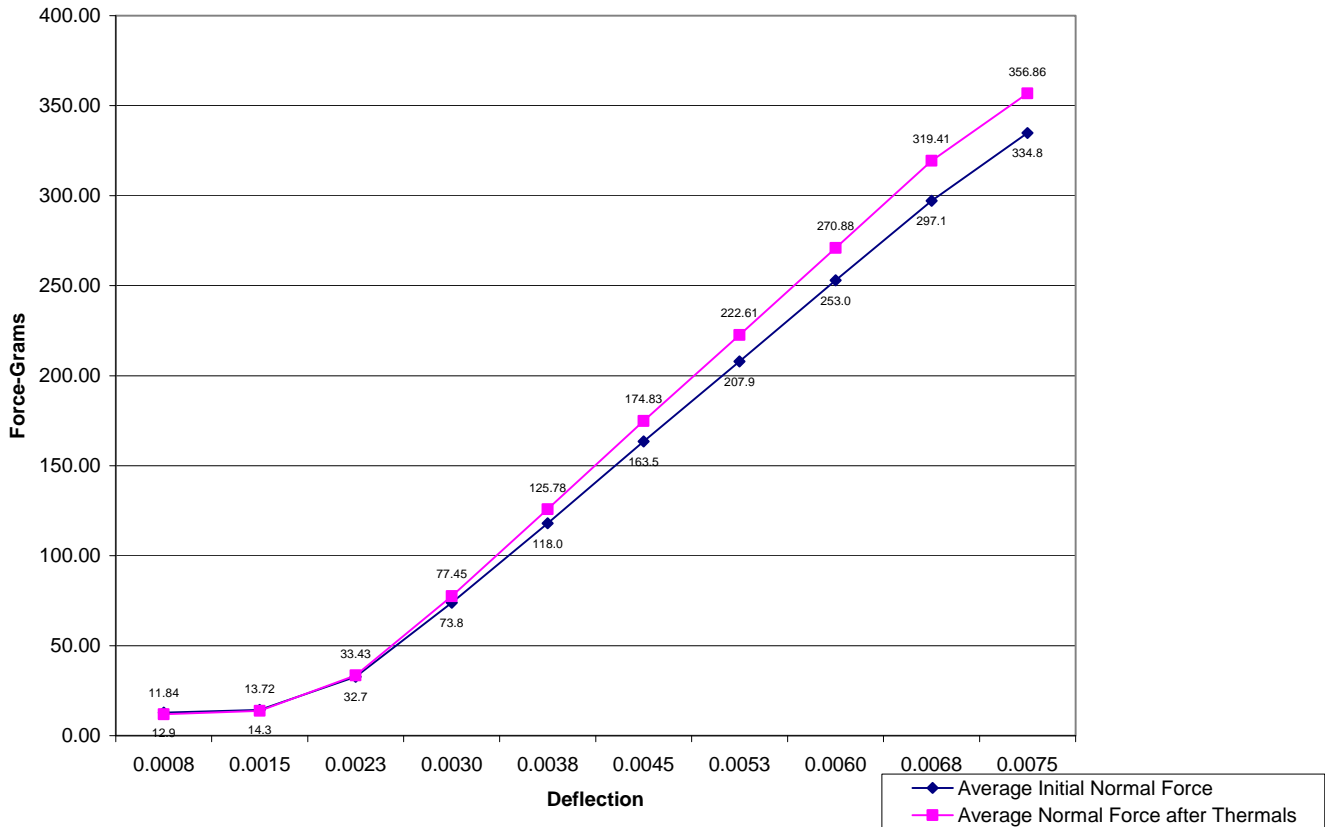
MATING/UNMATING CHART:



NORMAL FORCE (FOR CONTACTS TESTED IN THE HOUSING):

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

Normal Force - Average Initial vs Average Thermal



Initial	Deflections in inches Forces in Grams										
	<u>0.0008</u>	<u>0.0015</u>	<u>0.0023</u>	<u>0.0030</u>	<u>0.0038</u>	<u>0.0045</u>	<u>0.0053</u>	<u>0.0060</u>	<u>0.0068</u>	<u>0.0075</u>	<i>SET</i>
Averages	12.88	14.33	32.71	73.83	118.04	163.52	207.88	253.00	297.11	334.81	0.0004
Min	11.40	12.10	20.80	56.20	99.40	140.70	179.00	218.50	255.60	293.70	0.0002
Max	15.00	20.00	47.40	89.60	134.30	181.50	228.90	277.10	323.70	361.30	0.0006
St. Dev	1.353	2.226	8.513	11.524	13.452	15.564	17.948	19.861	22.861	22.538	0.0001
Count	10	10	10	10	10	10	10	10	10	10	10

After Thermals	Deflections in inches Forces in Grams										
	<u>0.0008</u>	<u>0.0015</u>	<u>0.0023</u>	<u>0.0030</u>	<u>0.0038</u>	<u>0.0045</u>	<u>0.0053</u>	<u>0.0060</u>	<u>0.0068</u>	<u>0.0075</u>	<i>SET</i>
Averages	11.84	13.72	33.43	77.45	125.78	174.83	222.61	270.88	319.41	356.86	0.0004
Min	9.40	10.00	25.50	55.20	98.10	144.40	189.70	234.60	279.60	322.30	0.0001
Max	14.00	19.00	51.10	103.10	156.50	208.00	256.30	309.10	359.90	390.00	0.0006
St. Dev	1.289	2.717	9.148	14.480	17.368	19.476	21.040	24.125	26.569	23.579	0.0002
Count	10	10	10	10	10	10	10	10	10	10	10

INSULATION RESISTANCE (IR):

Minimum	Pin to Pin		
	Mated	Unmated	Unmated
	UPPT/UPPT	UPPT	UPPT
Initial	100000	100000	Not Tested
Thermal	100000	100000	Not Tested
Humidity	50000	50000	Not Tested

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	UPPT/UPPT
Break Down Voltage	1700
Test Voltage	1275
Working Voltage	425

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

LLCR:

- 1) A total of 60 points were measured.
- 2) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
- 3) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
- 4) The following guidelines are used to categorize the changes in LLCR as a result from stressing.
 - a. $\leq +5.0$ mOhms: ----- Stable
 - b. $+5.1$ to $+10.0$ mOhms:----- Minor
 - c. $+10.1$ to $+15.0$ mOhms: ----- Acceptable
 - d. $+15.1$ to $+50.0$ mOhms: ----- Marginal
 - e. $+50.1$ to $+2000$ mOhms ----- Unstable
 - f. $>+2000$ mOhms:----- Open Failure

Date	1/8/2010	1/13/2010	1/26/2010	2/12/2010
Room Temp C	21.8	21.4	22	18.6
RH	22%	16%	42%	20%
Name	Troy Cook	Troy Cook	Troy Cook	Troy Cook
mOhm values	Actual Initial	Delta 100 Cycles	Delta Thermal	Delta Humidity
Average	0.4	0.1	0.1	0.1
St. Dev.	0.0	0.0	0.1	0.1
Min	0.3	0.0	0.0	-0.1
Max	0.4	0.3	0.4	0.2
Count	60	60	60	60

GAS TIGHT:

- 1) A total of 60 points were measured.
- 2) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
- 3) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
- 4) The following guidelines are used to categorize the changes in LLCR as a result from stressing.
 - a. $\leq +5.0$ mOhms: ----- Stable
 - b. $+5.1$ to $+10.0$ mOhms:----- Minor
 - c. $+10.1$ to $+15.0$ mOhms: ----- Acceptable
 - d. $+15.1$ to $+50.0$ mOhms: ----- Marginal
 - e. $+50.1$ to $+2000$ mOhms: ----- Unstable
 - f. $>+2000$ mOhms:----- Open Failure

Date	1/8/2010	1/12/2010
Room Temp C	22.1	22.8
RH	21%	26%
Name	Troy Cook	Troy Cook
mOhm values	Actual Initial	Delta Gas Tight
Average	0.4	0.0
St. Dev.	0.0	0.0
Min	0.3	-0.1
Max	0.5	0.0
Count	60	60

DATA**CONTACT GAPS:****Contact Gap #1 – 2.09 +.13 / -.00 mm**

Initial							
Units: mm							
Pos.#	B1	B2	B3	B4	B5	B6	B7
1a	2.1080	2.1960	2.1780	2.1400	2.1880	2.1700	2.1280
1b	2.1260	2.1360	2.1800	2.1380	2.1940	2.1660	2.1800
1c	2.0900	2.1760	2.1380	2.1820	2.1600	2.1560	2.1760
1d	2.1280	2.1980	2.1680	2.1800	2.1580	2.1560	2.1660
2a	2.1640	2.2000	2.1620	2.1860	2.1580	2.1720	2.1880
2b	2.1780	2.1420	2.1500	2.1680	2.1760	2.1600	2.1920
2c	2.1680	2.1720	2.1760	2.1900	2.2000	2.1260	2.1800
2d	2.1880	2.1800	2.1860	2.1860	2.1480	2.1860	2.1960
After 100 Cycles							
Units: mm							
Pos.#	B1	B2	B3	B4	B5	B6	B7
1a	2.1100	2.1560	2.1640	2.1280	2.1300	2.1660	2.1800
1b	2.1520	2.1120	2.1660	2.1380	2.1600	2.1420	2.1800
1c	2.2040	2.1500	2.1000	2.1700	2.1940	2.1200	2.1660
1d	2.1540	2.1500	1.9960	2.1400	2.1640	2.1480	2.1880
2a	2.1340	2.1580	2.1060	2.1600	2.1640	2.1240	2.1680
2b	2.1320	2.1120	2.1200	2.1600	2.1580	2.1620	2.1740
2c	2.1340	2.1620	2.1680	2.1620	2.1740	2.1800	2.1700
2d	2.0260	2.1440	2.1740	1.9900	2.0520	2.1520	2.1780
After Thermal							
Units: mm							
Pos.#	B1	B2	B3	B4	B5	B6	B7
1a	2.0440	2.0620	1.9420	2.0660	1.9300	2.0200	2.0660
1b	2.1100	2.0580	2.0260	2.0540	2.0480	2.0520	2.0700
1c	2.0300	2.0380	2.0740	2.0380	2.0620	2.0520	2.0580
1d	2.0100	2.0700	2.0760	2.0260	2.0580	2.0460	2.0280
2a	1.9760	2.0520	2.0580	2.0580	2.0560	2.0220	2.0680
2b	2.0420	2.0620	2.0560	2.0680	2.0680	2.0220	2.0560
2c	2.0520	2.0220	2.0360	2.0580	2.0660	2.0500	2.0700
2d	2.0620	2.0780	2.0060	2.0640	2.0440	2.0520	2.0700

Contact Gap #2 – 1.69 ±.13 mm

Initial							
Units: mm							
Pos.#	B1	B2	B3	B4	B5	B6	B7
1a	1.6180	1.5800	1.6100	1.5680	1.6100	1.5160	1.5660
1b	1.6100	1.5540	1.6420	1.5640	1.5580	1.5500	1.5720
1c	1.5320	1.5580	1.5800	1.6100	1.6640	1.5880	1.6060
1d	1.6460	1.6240	1.6140	1.5600	1.5320	1.5280	1.6020
2a	1.6280	1.6140	1.5680	1.6320	1.5560	1.5840	1.6460
2b	1.5780	1.6040	1.5400	1.5720	1.5800	1.6280	1.5760
2c	1.6160	1.6120	1.6060	1.5540	1.5800	1.5680	1.5700
2d	1.5780	1.6120	1.6120	1.6020	1.5480	1.5320	1.6240
After 100 Cycles							
Units: mm							
Pos.#	B1	B2	B3	B4	B5	B6	B7
1a	1.6120	1.5940	1.6240	1.6080	1.6020	1.6080	1.6480
1b	1.6120	1.5720	1.6480	1.6000	1.6000	1.6440	1.6160
1c	1.5380	1.5600	1.5840	1.6320	1.6040	1.6000	1.5980
1d	1.6300	1.6420	1.6300	1.5980	1.5920	1.5720	1.6340
2a	1.6240	1.6200	1.5900	1.6240	1.5500	1.6000	1.6420
2b	1.5820	1.6140	1.5540	1.5800	1.5860	1.5920	1.5820
2c	1.6080	1.6160	1.6120	1.6660	1.6140	1.6320	1.5800
2d	1.5460	1.6040	1.6080	1.5580	1.5700	1.6340	1.6320
After Thermal							
Units: mm							
Pos.#	B1	B2	B3	B4	B5	B6	B7
1a	1.6660	1.6680	1.6440	1.6320	1.6080	1.6020	1.6500
1b	1.6120	1.6160	1.6200	1.6400	1.6860	1.6360	1.6400
1c	1.6560	1.6180	1.6860	1.6320	1.6200	1.6080	1.6280
1d	1.6560	1.6400	1.6620	1.6540	1.6600	1.5860	1.6320
2a	1.6300	1.6380	1.6500	1.6560	1.6140	1.6120	1.6600
2b	1.6560	1.6440	1.6460	1.6160	1.6300	1.6260	1.6280
2c	1.6440	1.6420	1.6100	1.6280	1.6280	1.6660	1.6380
2d	1.6720	1.6560	1.6140	1.6780	1.6100	1.6340	1.6880

MATING/UNMATING:

Sample#	Initial		After 25 Cycles		After 50 Cycles		After 75 Cycles		After 100 Cycles		After Thermals		After Humidity	
	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating
1	7.15	8.77	6.74	6.81	6.84	6.88	7.04	5.85	7.16	5.94	6.15	5.40	5.85	5.08
2	8.29	7.77	7.93	7.77	8.14	8.29	8.45	8.36	8.67	8.51	6.86	7.01	5.41	5.98
3	9.50	7.95	8.33	7.52	8.82	7.80	9.13	7.84	9.17	7.83	8.33	7.53	7.05	6.19
4	9.98	10.15	8.05	7.58	8.50	7.06	8.94	8.02	8.77	7.03	6.97	6.32	6.46	5.86
5	10.47	7.69	8.49	6.80	8.82	7.27	9.14	6.87	9.20	7.00	7.09	7.36	5.79	5.99
6	13.53	9.57	9.83	7.81	10.13	7.99	10.55	8.18	10.44	8.06	10.09	8.29	7.34	5.18
7	12.07	10.64	9.86	8.63	10.66	8.60	10.95	8.90	11.13	9.18	7.29	7.55	8.13	6.66
8	10.56	9.05	8.19	6.69	8.42	6.96	8.55	6.97	9.38	6.98	8.19	6.61	4.80	4.93
9	16.62	8.13	8.42	5.81	8.03	5.62	7.33	5.66	7.87	5.86	7.13	5.73	5.68	5.30
10	12.80	10.95	9.89	8.56	10.49	8.73	10.99	8.98	11.13	9.52	9.01	6.81	7.37	6.15

NORMAL FORCE (FOR CONTACTS TESTED IN THE HOUSING):**INITIAL**

Initial Sample #	Deflections in inches, Forces in Grams										
	<u>0.0008</u>	<u>0.0015</u>	<u>0.0023</u>	<u>0.0030</u>	<u>0.0038</u>	<u>0.0045</u>	<u>0.0053</u>	<u>0.0060</u>	<u>0.0068</u>	<u>0.0075</u>	<i>SET</i>
1	15.0	20.0	47.4	89.6	132.8	179.4	224.4	270.0	315.5	347.9	0.0004
2	11.6	13.1	20.8	56.2	99.4	142.9	187.4	233.6	275.8	312.2	0.0005
3	14.7	14.9	27.0	64.2	105.5	148.9	191.0	232.6	273.9	313.3	0.0003
4	13.3	13.4	27.7	62.4	100.3	140.7	179.0	218.5	255.6	293.7	0.0006
5	11.9	14.0	38.7	84.1	133.0	181.5	228.9	277.1	323.7	361.3	0.0003
6	11.4	15.1	34.8	79.9	127.3	176.6	226.3	272.4	321.2	359.5	0.0005
7	11.7	12.1	30.8	71.8	115.6	159.6	201.6	246.5	290.3	327.9	0.0004
8	13.1	12.8	31.7	73.6	117.5	164.2	208.7	253.9	298.4	336.9	0.0005
9	12.0	13.1	43.8	88.9	134.3	179.5	224.2	269.4	313.9	352.2	0.0002
10	14.1	14.8	24.4	67.6	114.7	161.9	207.3	256.0	302.8	343.2	0.0005

AFTER THERMAL

After Thermals Sample #	Deflections in inches, Forces in Grams										
	<u>0.0008</u>	<u>0.0015</u>	<u>0.0023</u>	<u>0.0030</u>	<u>0.0038</u>	<u>0.0045</u>	<u>0.0053</u>	<u>0.0060</u>	<u>0.0068</u>	<u>0.0075</u>	<i>SET</i>
1	12.1	12.7	27.6	55.2	98.1	144.4	189.7	234.6	279.6	322.3	0.0005
2	12.2	13.1	29.0	71.5	118.8	166.2	212.0	256.2	302.0	337.9	0.0003
3	14.0	19.0	30.6	77.9	128.8	181.3	231.9	281.8	331.5	368.9	0.0003
4	10.0	14.3	30.5	72.2	117.6	163.0	210.3	255.7	302.1	341.1	0.0003
5	12.4	13.5	49.2	103.1	156.5	208.0	256.3	309.1	358.4	389.5	0.0005
6	12.1	17.7	51.1	101.3	153.2	205.1	255.8	308.2	359.9	390.0	0.0002
7	12.3	11.7	29.8	77.2	123.3	172.2	219.0	265.6	311.7	350.1	0.0004
8	12.2	13.1	25.5	69.2	119.5	167.9	215.5	263.6	310.8	352.1	0.0006
9	11.7	12.1	26.7	74.4	125.3	177.7	227.9	281.0	338.1	378.6	0.0005
10	9.4	10.0	34.3	72.5	116.7	162.5	207.7	253.0	300.0	338.1	0.0001

INSULATION RESISTANCE (IR):

Initial Insulation Resistance			
Measured In Meg Ohms			
Pin to Pin			
	Mated	Unmated	
	x	x	
Sample#	UPPT/UPPT	UPPT	UPPT
1	100000	100000	
2	100000	100000	

Thermal Insulation Resistance			
Measured In Meg Ohms			
Pin to Pin			
	Mated	Unmated	
	x	x	
Sample#	UPPT/UPPT	UPPT	UPPT
1	100000	100000	
2	100000	100000	

Humidity Insulation Resistance			
Measured In Meg Ohms			
Pin to Pin			
	Mated	Unmated	
	x	x	
Sample#	UPPT/UPPT	UPPT	UPPT
1	50000	100000	
2	50000	50000	

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Initial DWV	
Test Voltage= 1275	

Pin to Pin			
Mated		Unmated	
Sample#	UPPT/UPPT	UPPT	UPPT
1	1275	1275	
2	1275	1275	

Thermal Test Voltage	
Test Voltage= 1275	

Pin to Pin			
Mated		Unmated	
Sample#	UPPT/UPPT	UPPT	UPPT
1	1275	1275	
2	1275	1275	

Humidity Test Voltage	
Test Voltage= 1275	

Pin to Pin			
Mated		Unmated	
Sample#	UPPT/UPPT	UPPT	UPPT
1	1275	1275	
2	1275	1275	

LLCR:

	mOhm values	Actual	Delta	Delta	Delta
Board	Position	Initial	100 Cycles	Thermal	Humidity
1	P1	0.4	0.3	0.4	0.2
1	P2	0.4	0.1	0.1	0.1
1	P3	0.4	0.1	0.1	0.1
1	P4	0.4	0.0	0.1	0.1
1	P5	0.4	0.1	0.2	0.1
1	P6	0.4	0.1	0.1	0.2
2	P1	0.4	0.0	0.1	0.2
2	P2	0.4	0.1	0.2	0.2
2	P3	0.4	0.1	0.2	0.2
2	P4	0.4	0.1	0.1	0.0
2	P5	0.4	0.0	0.1	0.2
2	P6	0.4	0.1	0.2	0.2
3	P1	0.4	0.1	0.2	0.1
3	P2	0.3	0.1	0.2	0.2
3	P3	0.4	0.1	0.1	0.1
3	P4	0.3	0.0	0.1	0.1
3	P5	0.3	0.1	0.1	0.1
3	P6	0.4	0.0	0.1	0.1
4	P1	0.4	0.1	0.2	0.1
4	P2	0.4	0.0	0.0	0.0
4	P3	0.4	0.0	0.1	0.1
4	P4	0.4	0.0	0.1	0.0
4	P5	0.4	0.0	0.1	0.1
4	P6	0.4	0.0	0.0	0.0
5	P1	0.4	0.0	0.0	0.0
5	P2	0.3	0.1	0.2	0.2
5	P3	0.4	0.1	0.1	0.1
5	P4	0.4	0.0	0.1	0.1
5	P5	0.4	0.1	0.1	0.1
5	P6	0.4	0.1	0.1	0.1
6	P1	0.4	0.0	0.0	0.1
6	P2	0.4	0.1	0.1	0.1
6	P3	0.4	0.1	0.1	0.1
6	P4	0.4	0.1	0.1	0.1
6	P5	0.4	0.1	0.1	0.0
6	P6	0.4	0.0	0.1	0.1
7	P1	0.4	0.2	0.2	0.1
7	P2	0.3	0.1	0.1	0.1
7	P3	0.3	0.1	0.1	0.1
7	P4	0.3	0.1	0.1	0.1
7	P5	0.3	0.1	0.1	0.0
7	P6	0.3	0.1	0.1	0.1
8	P1	0.4	0.2	0.2	0.2

8	P2	0.4	0.0	0.1	0.0
8	P3	0.4	0.1	0.1	0.1
8	P4	0.4	0.0	0.0	0.0
8	P5	0.4	0.0	0.0	0.0
8	P6	0.4	0.0	0.0	0.0
9	P1	0.4	0.0	0.0	0.0
9	P2	0.4	0.0	0.1	0.0
9	P3	0.4	0.0	0.0	0.0
9	P4	0.4	0.0	0.0	-0.1
9	P5	0.4	0.0	0.0	0.0
9	P6	0.4	0.0	0.0	-0.1
10	P1	0.4	0.1	0.1	-0.1
10	P2	0.4	0.1	0.1	-0.1
10	P3	0.4	0.1	0.1	0.0
10	P4	0.4	0.1	0.1	0.1
10	P5	0.3	0.1	0.1	0.1
10	P6	0.4	0.1	0.2	0.1

GAS TIGHT:

	mOhm values	Actual	Delta
Board	Position	Initial	Gas Tight
1	P1	0.4	0.0
1	P2	0.4	0.0
1	P3	0.4	0.0
1	P4	0.4	0.0
1	P5	0.4	0.0
1	P6	0.4	0.0
2	P1	0.4	0.0
2	P2	0.4	0.0
2	P3	0.4	0.0
2	P4	0.4	0.0
2	P5	0.3	0.0
2	P6	0.4	0.0
3	P1	0.4	0.0
3	P2	0.3	0.0
3	P3	0.3	0.0
3	P4	0.3	0.0
3	P5	0.3	0.0
3	P6	0.4	0.0
4	P1	0.4	0.0
4	P2	0.4	0.0
4	P3	0.4	0.0
4	P4	0.4	0.0
4	P5	0.3	0.0
4	P6	0.4	0.0
5	P1	0.4	0.0
5	P2	0.4	0.0
5	P3	0.4	0.0
5	P4	0.4	0.0
5	P5	0.4	0.0
5	P6	0.4	0.0
6	P1	0.4	0.0
6	P2	0.4	0.0
6	P3	0.4	0.0
6	P4	0.4	0.0
6	P5	0.4	0.0
6	P6	0.4	0.0
7	P1	0.4	0.0
7	P2	0.4	0.0
7	P3	0.3	0.0
7	P4	0.4	0.0
7	P5	0.3	0.0
7	P6	0.4	0.0
8	P1	0.5	-0.1

8	P2	0.4	0.0
8	P3	0.4	0.0
8	P4	0.4	0.0
8	P5	0.4	0.0
8	P6	0.4	0.0
9	P1	0.4	0.0
9	P2	0.4	0.0
9	P3	0.4	0.0
9	P4	0.4	0.0
9	P5	0.4	0.0
9	P6	0.4	0.0
10	P1	0.4	0.0
10	P2	0.4	0.0
10	P3	0.4	0.0
10	P4	0.4	0.0
10	P5	0.4	0.0
10	P6	0.4	0.0

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

... Last Cal: 08/09/2008, Next Cal: 08/08/2009

Equipment #: TCT-05**Description:** TCT-225 Frame with TLC Console**Manufacturer:** Chatillon**Model:** TCD-225-0200**Serial #:** TC 0071**Accuracy:** See Manual See Manual

... Last Cal: 7/14/2008, Next Cal: 7/14/2009

Equipment #: LC-500N-3**Description:** 500 N icell load cell for Dillon Test Stand**Manufacturer:** Mecmesin (Dillon/Quantrol)**Model:** ILC**Serial #:** 08-0035-02**Accuracy:** .10% of Capacity

... Last Cal: 01/05/2009, Next Cal: 01/05/2010

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 #: LCI-05**Description:** Load Cell for Test Resources**Manufacturer:** Interface**Model:** 3 Lb Load Cell**Serial #:** 252263**Accuracy:** See Manual See Manual

... Last Cal: 05/09/2009, Next Cal: 05/09/2010

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

Equipment #: OV-03**Description:** Cascade Tek Forced Air Oven**Manufacturer:** Cascade Tek**Model:** TFO-5**Serial #:** 0500100**Accuracy:** Temp. Stability: +/- .1C/C change in ambient Temp. Stability: +/- .1C/C change in ambient
... Last Cal: 06/17/2009, Next Cal: 06/17/2010**Equipment #:** THC-04**Description:** Temperature/Humidity Chamber**Manufacturer:** Thermotron**Model:** SM-8-3800**Serial #:** 37782**Accuracy:** See Manual

... Last Cal: 04/07/2009, Next Cal: 04/07/2010

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

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