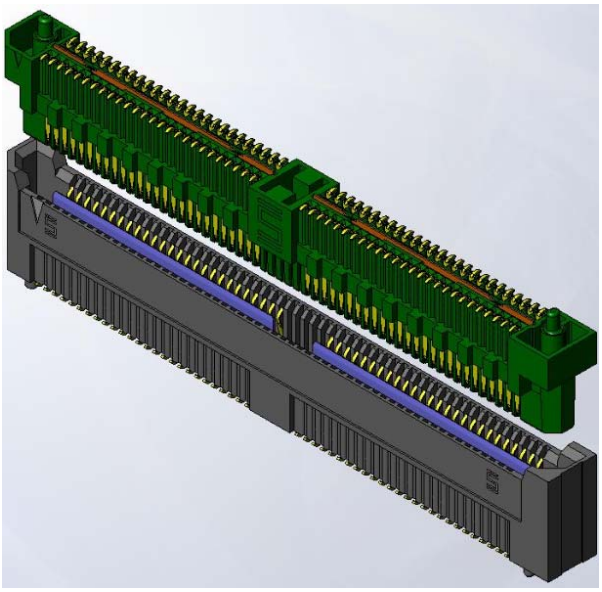
Project Number: Design Verification Test	Tracking Code: TC0931—2645_Report_Rev_1		
Requested by: Neal Patterson	Date: 2/22/2010	Product Rev: 1	
Part #: QRF8-052-07.0-L-D-A / QRM8-052-05.0-L-D-A	Lot #: na	Tech: Rodney Riley Troy Cook	Eng: Eric Mings Mark Shireman
Part description: QRF8 -07.0			Qty to test: 25
Test Start: 07/28/2009	Test Completed: 10/14/2009		



Design Verification Test

PART DESCRIPTION

QRF8-052-07.0-L-D-A / QRM8-052-05.0-L-D-A

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: Gas Tight, Mating / Unmating, and Normal Force. See test plan.

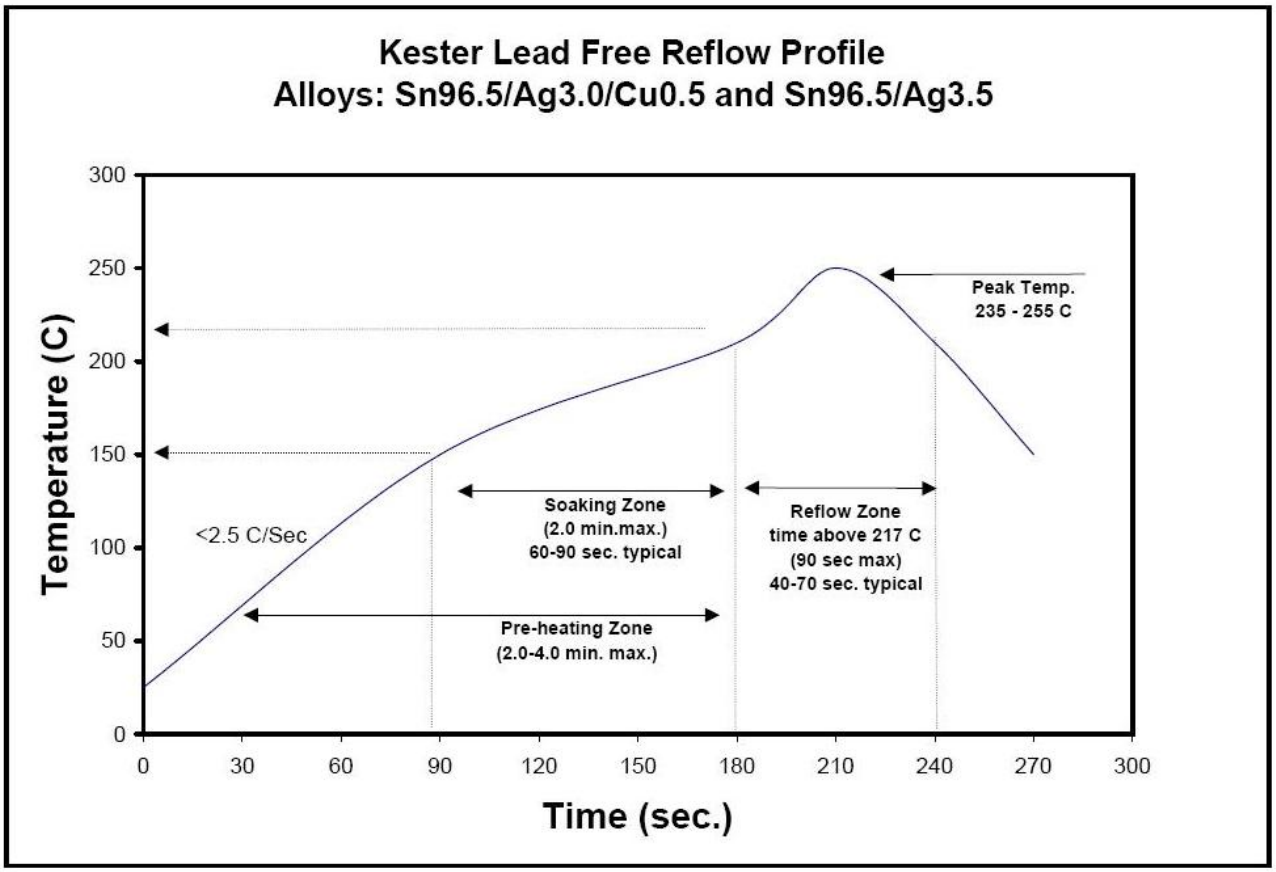
APPLICABLE DOCUMENTS

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-101611-TST

TYPICAL OVEN PROFILE (Soldering Parts to Test Boards)



FLOWCHARTS

Gas Tight

TEST STEP	GROUP A 200 Points (min)
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

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 Approve	Setup Approve
02	Mating / Unmating	Normal Force (in the body unless otherwise specified)	Thermal Aging (Mated)
03	25 Cycles		Normal Force
04	Clean w/Compressed Air		
05	Mating / Unmating		
06	25 Cycles (50 Total)		
07	Clean w/Compressed Air		
08	Mating / Unmating		
09	25 Cycles (75 Total)		
10	Clean w/Compressed Air		
11	Mating / Unmating		
12	25 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		
21	Contact Gaps		

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

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.

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 TC^2, computer controlled test stand with a deflection measurement system accuracy of 5.0 µm (0.0002”).
6) The nominal deflection rate shall be 5 mm (0.2”)/minute.
7) Unless otherwise noted a minimum of five contacts shall be tested.
8) The force/deflection characteristic to load and unload each contact shall be repeated five times.
9) The system shall utilize the TC^2 software in order to acquire and record the test data.
10) The permanent set of each contact shall be measured within the TC^2 software.
11) The acquired data shall be graphed with the deflection data on the X-axis and the force data on the Y-axis and a print out will be stored with the Tracking Code paperwork.

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

LLCR Gas Tight (207 Signal LLCR test points)

- **Initial ---------- 27.5 mOhms Max**
- **Gas-Tight**
  - **<= +5.0 mOhms ---------- 206 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ---------- 1 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 (18 Ground LLCR test points)

- **Initial ---------- 3.7 mOhms Max**
- **Gas-Tight**
  - **<= +5.0 mOhms ---------- 18 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**

Normal Force at .015” deflection

- **Initial**
  - **Min ---------- 74.30 g Set -------.0016”**
  - **Max ---------- 82.00 g Set -------.0021”**
- **Thermal**
  - **Min ---------- 80.70 g**
  - **Max ---------- 86.70 g**

Contact Gaps

- **Initial**
  - **Min ---------- 1.30 mm**
  - **Max ---------- 1.42 mm**
- **After 100 Cycles**
  - **Min ---------- 1.35 mm**
  - **Max ---------- 1.48 mm**
- **Thermal**
  - **Min ---------- 1.52 mm**
  - **Max ---------- 1.72 mm**
- **Humidity**
  - **Min ---------- 1.56 mm**
  - **Max ---------- 1.82 mm**

Mating – Unmating Forces

- **Initial**
  - **Mating**
    - **Min ---------- 4.85 Lbs**
    - **Max---------- 5.54 Lbs**
  - **Unmating**
    - **Min ---------- 2.11 Lbs**
    - **Max---------- 2.79 Lbs**
- **After 25 Cycles**
  - **Mating**
    - **Min ---------- 4.39 Lbs**
    - **Max---------- 5.84 Lbs**
  - **Unmating**
    - **Min ---------- 2.42 Lbs**
    - **Max---------- 3.30 Lbs**
- **After 50 Cycles**
  - **Mating**
    - **Min ---------- 4.61 Lbs**
    - **Max---------- 5.90 Lbs**
  - **Unmating**
    - **Min ---------- 2.78 Lbs**
    - **Max---------- 3.46 Lbs**
- **After 75 Cycles**
  - **Mating**
    - **Min ---------- 4.64 Lbs**
    - **Max---------- 5.95 Lbs**
  - **Unmating**
    - **Min ---------- 3.02 Lbs**
    - **Max---------- 3.66 Lbs**
- **After 100 Cycles**
  - **Mating**
    - **Min ---------- 4.80 Lbs**
    - **Max---------- 6.11 Lbs**
  - **Unmating**
    - **Min ---------- 3.11 Lbs**
    - **Max---------- 3.58 Lbs**
- **Thermal**
  - **Mating**
    - **Min ---------- 2.46 Lbs**
    - **Max---------- 2.97 Lbs**
  - **Unmating**
    - **Min ---------- 1.51 Lbs**
    - **Max---------- 2.22 Lbs**
- **Humidity**
  - **Mating**
    - **Min ---------- 2.28 Lbs**
    - **Max---------- 2.61 Lbs**
  - **Unmating**
    - **Min ---------- 1.64 Lbs**
    - **Max---------- 2.26 Lbs**

DATA SUMMARIES

GAS TIGHT:

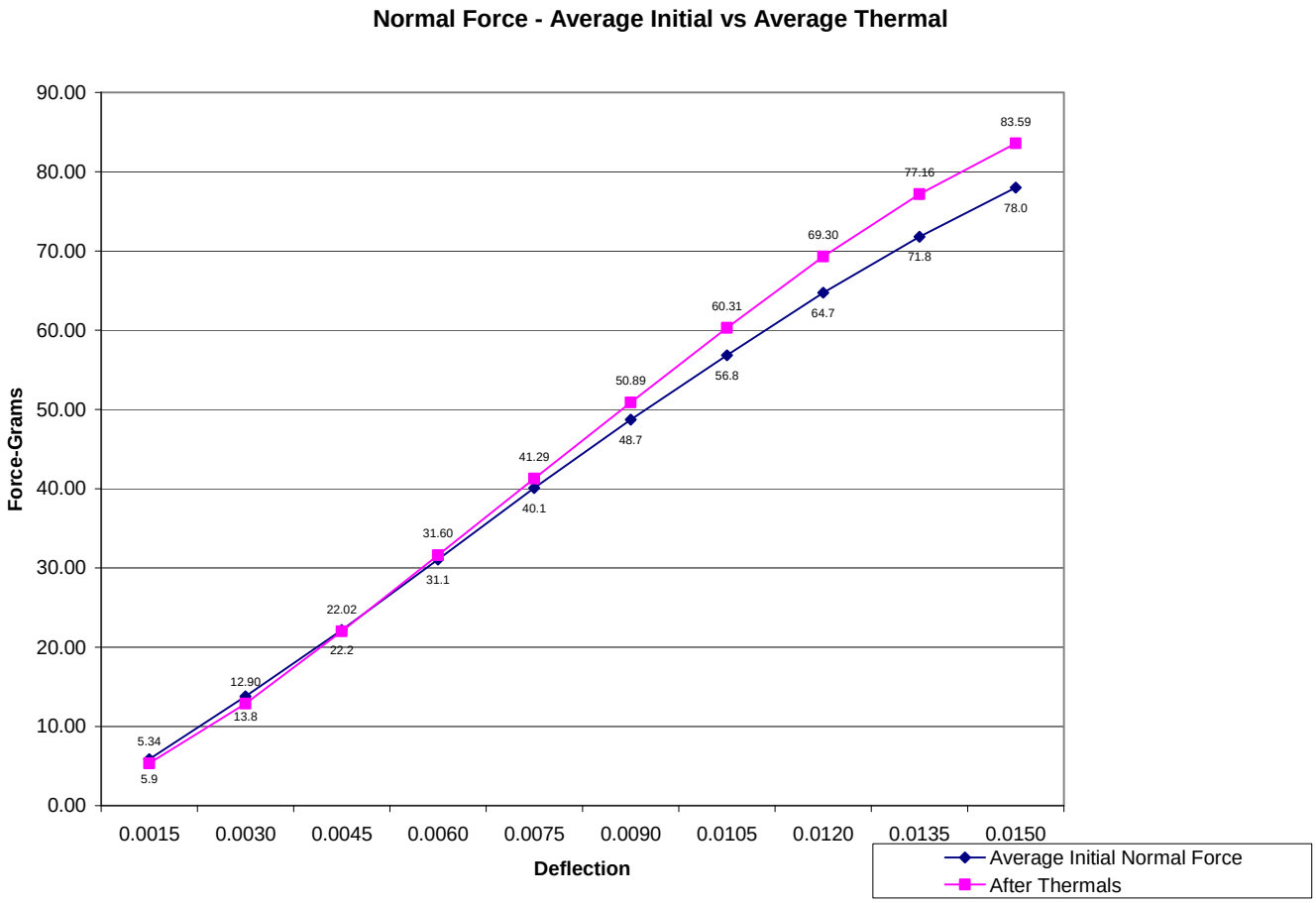
1) A total of 225 points were measured.
2) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets.*
3) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
4) The following guidelines are used to categorize the changes in LLCR as a result 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

	SIGNALS	
Date	8/25/2009	8/26/2009
Room Temp C	24	24
RH	40%	39%
Name	RILEY	RILEY
mOhm values	**Actual Initial**	**Delta Gas Tight**
Average	19.6	-0.4
St. Dev.	1.6	1.2
Min	17.2	-8.0
Max	27.5	3.8
Count	207	207

	GROUNDS	
Date	8/25/2009	8/26/2009
Room Temp C	24	24
RH	40%	39%
Name	RILEY	RILEY
mOhm values	**Actual Initial**	**Delta Gas Tight**
Average	3.3	-0.1
St. Dev.	0.2	0.1
Min	2.8	-0.4
Max	3.7	0.1
Count	18	18

NORMAL FORCE (FOR CONTACTS TESTED IN THE HOUSING): ADD CHART

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



Initial	Deflections in inches Forces in Grams										
	0.0015	**0.0030**	**0.0045**	**0.0060**	**0.0075**	**0.0090**	**0.0105**	**0.0120**	**0.0135**	**0.0150**	***SET***
Averages	5.86	13.80	22.15	31.06	40.09	48.72	56.83	64.73	71.78	77.98	0.0019
Min	3.30	10.70	19.30	27.50	35.90	44.10	52.20	60.30	67.70	74.30	0.0016
Max	7.10	15.70	24.90	34.80	44.00	53.00	61.30	68.90	75.70	82.00	0.0021
St. Dev	1.130	1.599	2.028	2.501	2.829	3.086	3.096	2.964	2.900	2.753	0.0001
Count	10	10	10	10	10	10	10	10	10	10	10

After Thermals	Deflections in inches Forces in Grams										
	0.0015	**0.0030**	**0.0045**	**0.0060**	**0.0075**	**0.0090**	**0.0105**	**0.0120**	**0.0135**	**0.0150**	***SET***
Averages	5.34	12.90	22.02	31.60	41.29	50.89	60.31	69.30	77.16	83.59	0.0018
Min	2.60	8.50	16.20	26.00	36.20	46.10	56.50	66.30	74.30	80.70	0.0009
Max	6.70	15.90	25.60	35.60	45.50	53.80	62.80	71.00	79.90	86.70	0.0023
St. Dev	1.140	1.941	2.591	2.652	2.578	2.098	1.714	1.398	1.742	1.967	0.0005
Count	10	10	10	10	10	10	10	10	10	10	10

CONTACT GAPS:

Initial		After 100 Cycles		After Thermal		After Humidity	
Units:	mm	Units:	mm	Units:	mm	Units:	mm
Minimum	1.30	***Minimum***	1.35	***Minimum***	1.52	***Minimum***	1.56
Maximum	1.42	***Maximum***	1.48	***Maximum***	1.72	***Maximum***	1.82
Average	1.36	***Average***	1.42	***Average***	1.62	***Average***	1.69
St. Dev.	0.0254	***St. Dev.***	0.0232	***St. Dev.***	0.0489	***St. Dev.***	0.0641
Count	260	***Count***	260	***Count***	260	***Count***	260

MATING/UNMATING:

	Initial				After 25 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)
Minimum	77.60	4.85	33.76	2.11	70.24	4.39	38.72	2.42
Maximum	88.64	5.54	44.64	2.79	93.44	5.84	52.80	3.30
Average	82.99	**5.19**	38.35	**2.40**	84.72	**5.30**	47.57	**2.97**
	After 50 Cycles				After 75 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)
Minimum	73.76	4.61	44.48	2.78	74.24	4.64	48.32	3.02
Maximum	94.40	5.90	55.36	3.46	95.20	5.95	58.56	3.66
Average	88.19	**5.51**	50.83	**3.18**	88.86	**5.55**	52.56	**3.29**
	After 100 Cycles				After Thermals			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)
Minimum	76.80	4.80	49.76	3.11	39.36	2.46	24.16	1.51
Maximum	97.76	6.11	57.28	3.58	47.52	2.97	35.52	2.22
Average	90.14	**5.63**	53.22	**3.33**	42.91	**2.68**	27.82	**1.74**
	After Humidity							
	Mating		**Unmating**					
	Force (Oz)	Force (Lbs)	Force (Oz)	Force (Lbs)				
Minimum	36.48	2.28	26.24	1.64				
Maximum	41.76	2.61	36.16	2.26				
Average	39.44	**2.47**	30.40	**1.90**				

DATA

GAS TIGHT:

SIGNALS

	mOhm values	Actual	Delta
Board	Position	Initial	Gas Tight
1	P1	19.46	-0.22
1	P2	17.86	0.41
1	P3	18.44	0.50
1	P4	17.56	1.21
1	P5	18.09	-0.22
1	P6	17.59	1.84
1	P7	18.33	0.89
1	P8	19.41	-0.11
1	P9	18.72	0.92
1	P10	19.40	1.23
1	P11	18.64	1.35
1	P12	18.67	1.09
1	P13	18.01	0.91
1	P16	18.17	1.91
1	P17	18.10	1.35
1	P18	17.85	0.86
1	P19	17.59	0.60
1	P20	17.48	0.75
1	P21	18.21	0.16
1	P22	17.91	0.97
1	P23	18.15	1.98
1	P24	17.26	0.66
1	P25	17.54	-0.03
2	P1	20.90	0.45
2	P2	20.20	0.10
2	P3	20.40	-0.72
2	P4	20.07	-0.34
2	P5	18.81	-0.02
2	P6	20.10	-1.82
2	P7	20.42	-0.87
2	P8	20.88	-1.23
2	P9	27.51	-8.01
2	P10	22.10	1.00
2	P11	24.50	-4.83
2	P12	21.90	-2.00
2	P13	19.90	-0.84
2	P16	23.10	-3.13
2	P17	21.30	-1.72
2	P18	20.55	-1.25
2	P19	19.89	-1.09

2	P20	19.97	-1.35
2	P21	19.20	0.00
2	P22	19.64	-0.23
2	P23	21.30	-2.16
2	P24	19.81	1.22
2	P25	18.42	0.92
3	P1	19.29	0.84
3	P2	19.06	-0.35
3	P3	18.74	-0.90
3	P4	19.94	-1.81
3	P5	19.71	-2.01
3	P6	17.81	-0.06
3	P7	17.96	-0.28
3	P8	18.20	0.19
3	P9	18.02	0.66
3	P10	20.88	-1.11
3	P11	19.47	-0.93
3	P12	20.60	-1.89
3	P13	18.91	0.04
3	P16	18.89	0.55
3	P17	19.80	-0.92
3	P18	18.44	-0.56
3	P19	17.16	-0.06
3	P20	17.20	0.09
3	P21	18.83	-0.89
3	P22	18.88	-0.03
3	P23	18.84	-0.33
3	P24	17.87	0.40
3	P25	17.84	0.66
4	P1	18.84	0.51
4	P2	18.81	1.05
4	P3	19.71	-0.01
4	P4	18.54	0.84
4	P5	18.38	-0.19
4	P6	17.71	0.24
4	P7	18.34	-0.04
4	P8	19.36	-0.71
4	P9	18.91	0.20
4	P10	21.70	-2.73
4	P11	20.15	-1.51
4	P12	19.30	-0.16
4	P13	18.55	0.65
4	P16	20.65	-0.86
4	P17	19.11	-0.17
4	P18	18.61	-0.10
4	P19	19.13	-1.04
4	P20	17.86	0.01
4	P21	18.56	0.11
4	P22	21.23	-1.66

4	P23	19.14	0.01
4	P24	18.71	-0.03
4	P25	18.47	-0.34
5	P1	20.47	-1.27
5	P2	18.99	-0.15
5	P3	20.30	-1.40
5	P4	19.21	-0.91
5	P5	18.15	-0.06
5	P6	18.33	-0.71
5	P7	18.67	-1.01
5	P8	18.36	1.00
5	P9	20.32	-1.19
5	P10	20.54	-1.43
5	P11	19.88	-0.51
5	P12	19.35	0.44
5	P13	20.80	-1.43
5	P16	19.80	-0.22
5	P17	19.20	-0.11
5	P18	19.45	-1.13
5	P19	18.54	-0.27
5	P20	17.59	-0.09
5	P21	19.17	0.72
5	P22	18.74	-0.25
5	P23	20.69	-1.50
5	P24	18.79	-0.52
5	P25	18.49	-0.33
6	P1	21.00	-0.75
6	P2	20.80	-0.28
6	P3	19.74	-0.70
6	P4	19.80	-0.55
6	P5	18.76	-0.06
6	P6	18.39	0.10
6	P7	19.22	-0.22
6	P8	20.30	-0.13
6	P9	20.59	-0.76
6	P10	21.70	-1.03
6	P11	21.42	-0.22
6	P12	20.00	0.34
6	P13	19.68	0.49
6	P16	21.89	-0.86
6	P17	19.75	-0.52
6	P18	19.10	-0.22
6	P19	18.62	-1.07
6	P20	20.01	-1.17
6	P21	20.53	-0.43
6	P22	20.02	1.94
6	P23	22.40	1.02
6	P24	20.30	0.08
6	P25	17.88	0.18

7	P1	19.80	0.14
7	P2	20.34	-1.17
7	P3	19.32	-1.22
7	P4	18.44	0.02
7	P5	19.41	-1.13
7	P6	17.91	-0.55
7	P7	19.19	-0.74
7	P8	18.32	0.11
7	P9	19.14	-0.19
7	P10	19.42	-1.03
7	P11	20.04	-1.51
7	P12	20.78	-2.05
7	P13	19.76	-1.50
7	P16	22.20	-2.55
7	P17	20.80	-1.98
7	P18	19.30	-0.60
7	P19	18.19	0.12
7	P20	19.78	-1.75
7	P21	20.37	-1.04
7	P22	19.50	-0.92
7	P23	19.84	1.66
7	P24	18.73	0.04
7	P25	19.35	0.06
8	P1	18.46	0.58
8	P2	19.99	-1.40
8	P3	18.34	-0.26
8	P4	20.60	-0.19
8	P5	18.91	-0.24
8	P6	17.98	-0.63
8	P7	18.32	-0.13
8	P8	19.74	-1.17
8	P9	19.16	-1.00
8	P10	19.16	0.09
8	P11	20.39	-2.10
8	P12	18.57	0.07
8	P13	19.14	-0.24
8	P16	19.63	0.48
8	P17	18.34	0.31
8	P18	19.46	-1.53
8	P19	19.54	-1.65
8	P20	18.44	-0.72
8	P21	18.46	0.22
8	P22	19.76	-1.09
8	P23	19.76	-1.21
8	P24	18.44	0.66
8	P25	20.25	1.64
9	P1	20.63	-0.31
9	P2	21.60	0.43
9	P3	21.90	1.08

9	P4	20.16	-0.60
9	P5	18.48	-0.23
9	P6	20.08	-1.35
9	P7	19.80	0.32
9	P8	19.80	0.10
9	P9	24.20	0.33
9	P10	25.92	3.78
9	P11	24.20	-3.56
9	P12	27.03	-2.21
9	P13	18.95	-0.22
9	P16	24.70	-3.85
9	P17	20.43	-0.93
9	P18	20.90	-1.46
9	P19	18.91	-0.57
9	P20	20.64	-0.58
9	P21	19.25	-0.82
9	P22	19.76	-0.67
9	P23	19.50	1.39
9	P24	23.75	-3.08
9	P25	17.63	0.30

GROUNDS

	mOhm values	**Actual**	**Delta**
Board	**Position**	**Initial**	**Gas Tight**
1	P14	2.8	-0.1
1	P15	3.6	-0.4
2	P14	3.2	0.0
2	P15	3.6	-0.2
3	P14	3.5	-0.4
3	P15	3.3	-0.2
4	P14	3.5	-0.3
4	P15	3.3	-0.2
5	P14	3.3	-0.1
5	P15	3.1	-0.2
6	P14	3.2	0.0
6	P15	3.7	-0.2
7	P14	3.3	0.0
7	P15	3.3	0.0
8	P14	2.9	0.0
8	P15	3.2	-0.1
9	P14	2.9	0.1
9	P15	3.1	0.0

NORMAL FORCE (FOR CONTACTS TESTED IN THE HOUSING):

INITIAL:

Initial	Deflections in inches, Forces in Grams										
Sample #	**0.0015**	**0.0030**	**0.0045**	**0.0060**	**0.0075**	**0.0090**	**0.0105**	**0.0120**	**0.0135**	**0.0150**	***SET***
1	5.3	12.6	20.2	28.6	37.6	46.1	54.3	62.2	68.9	75.0	0.0018
2	5.9	13.5	21.0	29.2	38.2	47.0	55.3	63.5	70.3	76.2	0.0017
3	5.2	12.3	19.5	27.5	35.9	44.1	52.2	60.3	67.7	74.3	0.0016
4	5.4	13.4	22.4	31.4	40.2	49.0	57.2	65.0	72.4	78.8	0.0019
5	6.4	14.7	23.0	32.1	40.5	48.5	56.3	64.2	71.0	77.3	0.0019
6	6.4	14.7	23.0	32.1	40.5	48.5	56.3	64.2	71.0	77.3	0.0019
7	3.3	10.7	19.3	28.3	37.3	46.0	54.2	62.2	69.8	76.3	0.0019
8	7.0	15.6	24.9	34.8	44.0	52.7	60.8	68.7	75.5	81.3	0.0019
9	6.6	14.8	23.9	33.6	43.2	53.0	61.3	68.9	75.7	82.0	0.0018
10	7.1	15.7	24.3	33.0	43.5	52.3	60.4	68.1	75.5	81.3	0.0021

AFTER THERMALS:

After Thermals	Deflections in inches, Forces in Grams										
Sample #	**0.0015**	**0.0030**	**0.0045**	**0.0060**	**0.0075**	**0.0090**	**0.0105**	**0.0120**	**0.0135**	**0.0150**	***SET***
1	4.9	12.5	21.8	30.7	39.9	49.5	59.6	69.2	76.7	82.0	0.0009
2	2.6	8.5	16.2	26.0	36.2	46.1	56.5	66.3	74.3	80.7	0.0011
3	4.9	12.0	20.5	30.2	40.9	50.8	60.7	69.2	76.5	82.6	0.0017
4	5.5	12.3	20.9	30.5	39.9	51.3	60.9	69.3	76.8	82.8	0.0018
5	5.1	12.6	21.5	30.7	39.9	50.2	60.2	67.8	75.3	82.2	0.0020
6	6.2	13.7	23.3	33.2	42.7	52.2	62.8	71.0	78.4	85.2	0.0020
7	5.4	13.5	23.0	32.4	41.8	50.8	59.3	69.3	76.5	82.8	0.0022
8	5.8	13.4	22.8	32.4	42.1	51.4	59.9	69.9	77.8	84.9	0.0021
9	6.7	15.9	25.6	35.6	45.5	53.8	61.9	70.8	79.4	86.0	0.0023
10	6.3	14.6	24.6	34.3	44.0	52.8	61.3	70.2	79.9	86.7	0.0020

CONTACT GAPS:

Initial					
Units:	mm				
Pos.#	**B1**	**B2**	**B3**	**B4**	**B5**
1	1.35	1.34	1.35	1.36	1.36
2	1.32	1.31	1.31	1.31	1.33
3	1.32	1.31	1.30	1.31	1.32
4	1.33	1.32	1.30	1.30	1.34
5	1.34	1.34	1.33	1.30	1.33
6	1.34	1.34	1.33	1.33	1.35
7	1.38	1.37	1.34	1.34	1.38
8	1.38	1.37	1.34	1.35	1.39
9	1.38	1.40	1.37	1.37	1.39
10	1.39	1.39	1.37	1.37	1.39
11	1.38	1.39	1.36	1.36	1.40
12	1.39	1.40	1.37	1.39	1.42
13	1.40	1.42	1.39	1.40	1.42
14	1.40	1.41	1.39	1.39	1.40
15	1.41	1.42	1.40	1.41	1.42
16	1.39	1.38	1.37	1.36	1.40
17	1.40	1.41	1.37	1.36	1.39
18	1.39	1.39	1.36	1.37	1.40
19	1.38	1.38	1.36	1.36	1.40
20	1.39	1.39	1.36	1.37	1.39
21	1.38	1.41	1.36	1.36	1.39
22	1.39	1.40	1.37	1.38	1.40
23	1.36	1.38	1.36	1.36	1.38
24	1.37	1.38	1.37	1.37	1.38
25	1.36	1.38	1.37	1.37	1.37
26	1.36	1.36	1.38	1.38	1.36
27	1.38	1.37	1.39	1.36	1.37
28	1.34	1.35	1.33	1.35	1.35
29	1.33	1.34	1.32	1.34	1.35
30	1.34	1.36	1.32	1.35	1.37
31	1.34	1.36	1.35	1.34	1.36
32	1.36	1.36	1.35	1.35	1.37
33	1.38	1.37	1.37	1.38	1.39
34	1.37	1.36	1.37	1.39	1.38
35	1.37	1.38	1.39	1.39	1.39
36	1.37	1.39	1.38	1.38	1.38
37	1.35	1.35	1.35	1.37	1.38
38	1.34	1.36	1.35	1.36	1.38
39	1.37	1.38	1.37	1.38	1.39
40	1.37	1.38	1.37	1.38	1.38
41	1.34	1.36	1.34	1.36	1.37
42	1.37	1.37	1.36	1.37	1.39
43	1.37	1.37	1.36	1.37	1.37

44	1.37	1.38	1.35	1.38	1.37
45	1.35	1.35	1.35	1.35	1.37
46	1.34	1.35	1.34	1.35	1.36
47	1.33	1.33	1.33	1.33	1.35
48	1.35	1.37	1.35	1.36	1.37
49	1.33	1.33	1.32	1.33	1.34
50	1.31	1.33	1.31	1.32	1.33
51	1.34	1.34	1.34	1.35	1.34
52	1.36	1.40	1.35	1.37	1.36

After 100 Cycles

Units: mm

Pos.#	**B1**	**B2**	**B3**	**B4**	**B5**
1	1.45	1.45	1.44	1.45	1.47
2	1.40	1.39	1.40	1.40	1.42
3	1.39	1.39	1.38	1.38	1.41
4	1.38	1.39	1.37	1.37	1.40
5	1.39	1.39	1.37	1.35	1.39
6	1.38	1.39	1.38	1.37	1.40
7	1.41	1.40	1.39	1.38	1.43
8	1.42	1.41	1.39	1.39	1.44
9	1.43	1.43	1.42	1.41	1.45
10	1.42	1.43	1.42	1.40	1.45
11	1.41	1.43	1.40	1.40	1.46
12	1.43	1.44	1.41	1.42	1.48
13	1.45	1.46	1.44	1.44	1.47
14	1.45	1.45	1.44	1.43	1.47
15	1.43	1.44	1.43	1.44	1.47
16	1.43	1.43	1.42	1.41	1.45
17	1.44	1.45	1.42	1.39	1.44
18	1.43	1.42	1.41	1.41	1.44
19	1.43	1.43	1.42	1.41	1.46
20	1.43	1.42	1.42	1.41	1.45
21	1.42	1.44	1.41	1.42	1.43
22	1.43	1.46	1.44	1.44	1.46
23	1.42	1.44	1.43	1.42	1.44
24	1.44	1.44	1.44	1.43	1.45
25	1.45	1.46	1.46	1.45	1.46
26	1.45	1.47	1.48	1.46	1.47
27	1.46	1.45	1.46	1.45	1.46
28	1.41	1.42	1.42	1.41	1.43
29	1.41	1.41	1.41	1.41	1.44
30	1.40	1.42	1.40	1.41	1.43
31	1.40	1.41	1.40	1.40	1.42
32	1.41	1.41	1.41	1.40	1.44
33	1.41	1.42	1.42	1.43	1.44
34	1.42	1.41	1.42	1.44	1.44
35	1.41	1.42	1.43	1.43	1.46
36	1.41	1.43	1.42	1.43	1.45
37	1.39	1.40	1.40	1.41	1.44

38	1.38	1.40	1.40	1.40	1.44
39	1.42	1.42	1.42	1.43	1.45
40	1.41	1.41	1.41	1.43	1.43
41	1.39	1.40	1.39	1.41	1.44
42	1.41	1.41	1.41	1.41	1.45
43	1.41	1.42	1.41	1.42	1.44
44	1.41	1.42	1.41	1.43	1.43
45	1.40	1.41	1.40	1.41	1.44
46	1.40	1.41	1.39	1.41	1.43
47	1.40	1.40	1.40	1.40	1.43
48	1.41	1.43	1.41	1.43	1.45
49	1.41	1.41	1.40	1.42	1.43
50	1.41	1.43	1.40	1.42	1.43
51	1.43	1.42	1.43	1.44	1.44
52	1.45	1.46	1.43	1.46	1.45

After Thermal

Units: mm

Pos.#	**B1**	**B2**	**B3**	**B4**	**B5**
1	1.56	1.58	1.56	1.57	1.58
2	1.52	1.54	1.52	1.53	1.55
3	1.55	1.56	1.53	1.54	1.55
4	1.55	1.57	1.55	1.56	1.58
5	1.57	1.59	1.57	1.55	1.58
6	1.59	1.60	1.60	1.59	1.59
7	1.59	1.61	1.57	1.59	1.61
8	1.65	1.64	1.63	1.63	1.63
9	1.64	1.65	1.65	1.65	1.64
10	1.67	1.66	1.66	1.67	1.66
11	1.63	1.65	1.63	1.63	1.66
12	1.66	1.68	1.67	1.67	1.68
13	1.70	1.71	1.70	1.71	1.70
14	1.68	1.68	1.70	1.70	1.68
15	1.70	1.71	1.71	1.72	1.71
16	1.65	1.66	1.65	1.66	1.66
17	1.69	1.68	1.67	1.67	1.66
18	1.64	1.63	1.63	1.64	1.64
19	1.65	1.65	1.65	1.65	1.66
20	1.66	1.65	1.63	1.65	1.66
21	1.64	1.64	1.62	1.64	1.61
22	1.64	1.67	1.66	1.66	1.67
23	1.59	1.62	1.60	1.61	1.60
24	1.55	1.59	1.55	1.58	1.59
25	1.59	1.62	1.60	1.59	1.60
26	1.55	1.57	1.57	1.57	1.58
27	1.55	1.56	1.56	1.55	1.57
28	1.54	1.57	1.52	1.54	1.55
29	1.55	1.56	1.56	1.58	1.59
30	1.57	1.60	1.56	1.59	1.58
31	1.58	1.60	1.59	1.59	1.58

32	1.62	1.61	1.61	1.62	1.62
33	1.64	1.64	1.63	1.65	1.66
34	1.63	1.64	1.62	1.66	1.63
35	1.65	1.67	1.68	1.69	1.67
36	1.65	1.69	1.69	1.68	1.68
37	1.64	1.65	1.67	1.65	1.67
38	1.65	1.66	1.67	1.68	1.68
39	1.69	1.66	1.68	1.68	1.66
40	1.68	1.67	1.67	1.67	1.65
41	1.67	1.66	1.66	1.68	1.66
42	1.69	1.70	1.69	1.70	1.70
43	1.66	1.66	1.66	1.68	1.65
44	1.66	1.67	1.66	1.68	1.66
45	1.63	1.64	1.64	1.64	1.64
46	1.60	1.63	1.61	1.63	1.62
47	1.60	1.61	1.61	1.61	1.61
48	1.63	1.65	1.63	1.63	1.64
49	1.59	1.57	1.57	1.58	1.59
50	1.55	1.57	1.56	1.56	1.58
51	1.56	1.56	1.55	1.56	1.56
52	1.53	1.57	1.52	1.54	1.57

After Humidity

Units: mm

Pos.#	**B1**	**B2**	**B3**	**B4**	**B5**
1	1.45	1.45	1.44	1.45	1.47
2	1.40	1.39	1.40	1.40	1.42
3	1.39	1.39	1.38	1.38	1.41
4	1.38	1.39	1.37	1.37	1.40
5	1.39	1.39	1.37	1.35	1.39
6	1.38	1.39	1.38	1.37	1.40
7	1.41	1.40	1.39	1.38	1.43
8	1.42	1.41	1.39	1.39	1.44
9	1.43	1.43	1.42	1.41	1.45
10	1.42	1.43	1.42	1.40	1.45
11	1.41	1.43	1.40	1.40	1.46
12	1.43	1.44	1.41	1.42	1.48
13	1.45	1.46	1.44	1.44	1.47
14	1.45	1.45	1.44	1.43	1.47
15	1.43	1.44	1.43	1.44	1.47
16	1.43	1.43	1.42	1.41	1.45
17	1.44	1.45	1.42	1.39	1.44
18	1.43	1.42	1.41	1.41	1.44
19	1.43	1.43	1.42	1.41	1.46
20	1.43	1.42	1.42	1.41	1.45
21	1.42	1.44	1.41	1.42	1.43
22	1.43	1.46	1.44	1.44	1.46
23	1.42	1.44	1.43	1.42	1.44
24	1.44	1.44	1.44	1.43	1.45
25	1.45	1.46	1.46	1.45	1.46

26	1.45	1.47	1.48	1.46	1.47
27	1.46	1.45	1.46	1.45	1.46
28	1.41	1.42	1.42	1.41	1.43
29	1.41	1.41	1.41	1.41	1.44
30	1.40	1.42	1.40	1.41	1.43
31	1.40	1.41	1.40	1.40	1.42
32	1.41	1.41	1.41	1.40	1.44
33	1.41	1.42	1.42	1.43	1.44
34	1.42	1.41	1.42	1.44	1.44
35	1.41	1.42	1.43	1.43	1.46
36	1.41	1.43	1.42	1.43	1.45
37	1.39	1.40	1.40	1.41	1.44
38	1.38	1.40	1.40	1.40	1.44
39	1.42	1.42	1.42	1.43	1.45
40	1.41	1.41	1.41	1.43	1.43
41	1.39	1.40	1.39	1.41	1.44
42	1.41	1.41	1.41	1.41	1.45
43	1.41	1.42	1.41	1.42	1.44
44	1.41	1.42	1.41	1.43	1.43
45	1.40	1.41	1.40	1.41	1.44
46	1.40	1.41	1.39	1.41	1.43
47	1.40	1.40	1.40	1.40	1.43
48	1.41	1.43	1.41	1.43	1.45
49	1.41	1.41	1.40	1.42	1.43
50	1.41	1.43	1.40	1.42	1.43
51	1.43	1.42	1.43	1.44	1.44
52	1.45	1.46	1.43	1.46	1.45

MATING/UNMATING:

	Initial		After 25 Cycles		After 50 Cycles		After 75 Cycles		After 100 Cycles		After Thermals		After Humidity	
Sample#	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating
1	4.85	2.11	5.20	2.91	5.47	3.10	5.70	3.21	5.76	3.21	2.66	1.56	2.61	1.77
2	5.27	2.79	5.84	3.30	5.90	3.27	5.62	3.27	5.74	3.29	2.77	1.80	2.50	1.83
3	5.12	2.29	5.29	3.03	5.53	3.01	5.60	3.11	5.51	3.11	2.76	1.66	2.38	1.64
4	5.23	2.27	4.97	2.95	5.61	3.34	5.67	3.35	5.69	3.42	2.97	1.65	2.42	1.78
5	4.86	2.40	4.39	2.42	4.61	2.78	4.64	3.02	4.80	3.21	2.57	1.52	2.37	1.86
6	5.53	2.55	5.30	2.96	5.69	3.28	5.72	3.35	5.73	3.47	2.82	2.00	2.55	2.26
7	5.54	2.34	5.70	3.07	5.90	3.32	5.95	3.37	6.11	3.52	2.52	1.91	2.55	1.94
8	5.11	2.29	5.53	2.98	5.52	3.19	5.43	3.36	5.58	3.28	2.47	1.56	2.52	1.90
9	5.04	2.19	5.13	2.84	5.32	3.02	5.42	3.15	5.59	3.17	2.46	1.51	2.28	2.03
10	5.32	2.74	5.60	3.27	5.57	3.46	5.79	3.66	5.83	3.58	2.82	2.22	2.47	1.99

EQUIPMENT AND CALIBRATION SCHEDULES

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 #: MV-05
Description: 6" x 6" Video Measuring Machine
Manufacturer: Micro-Vu
Model: M3010838
Serial #: V9344
Accuracy: See Manual
… Last Cal: 02/10/2009, Next Cal: 02/10/2010

Equipment #: MV-08
Description: 6" x 6" Video Measuring Machine
Manufacturer: Micro-Vu
Model: M3010898
Serial #: V9472
Accuracy: See Manual
… Last Cal: 02/10/2009, Next Cal: 02/10/2010

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
… Last Cal: 06/17/2009, Next Cal: 06/17/2010

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 #: 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 #: 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 #: 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