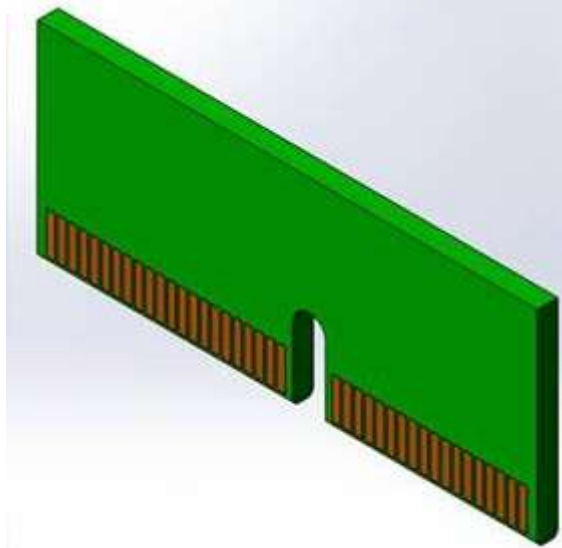
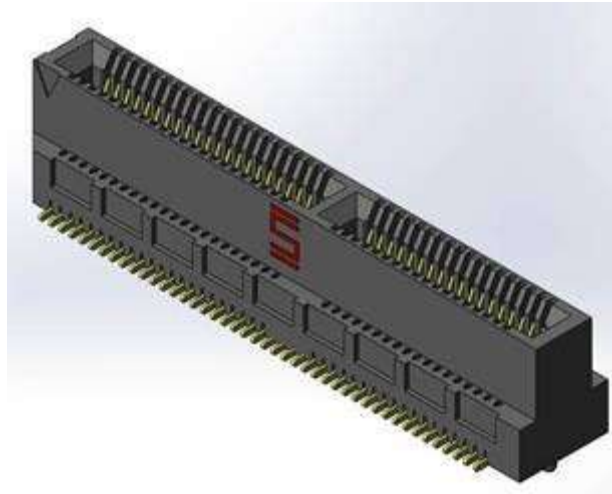




Project Number: Extended Life Test Report	Tracking Code: 245366_Report_Rev_1
Requested by: Catie Eichhorn	Date: 12/23/2013
Part #: MEC8-140-02-S-DV-A/EDGE CARD	
Part description: MEC8/EDGE CARD	Tech: Kason He
Test Start: 08/15/2013	Test Completed: 10/25/2013



EXTENDED LIFE TEST REPORT
MEC8/EDGE CARD
MEC8-140-02-S-DV-A/EDGE CARD

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

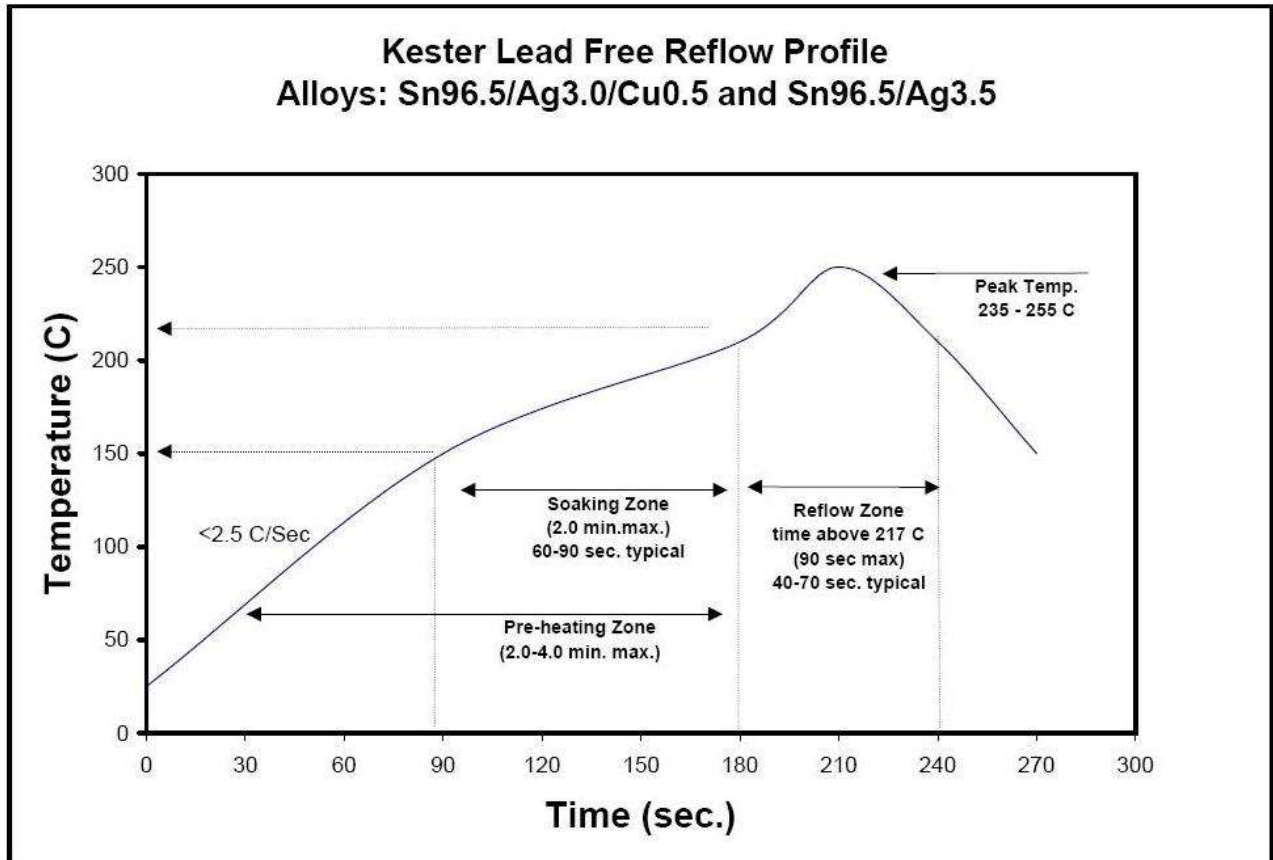
To perform the following tests: Design Qualification test. Please see test plan.

APPLICABLE DOCUMENTS

Standards: EIA Publication 364

TEST SAMPLES AND PREPARATION

- 1) All materials were manufactured in accordance with the applicable product specification.
- 2) All test samples were identified and encoded to maintain traceability throughout the test sequences.
- 3) After soldering, the parts to be used for LLCR 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 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-104302-TST

TYPICAL OVEN PROFILE (Soldering Parts to Test Boards)

FLOWCHARTS

Extended Life

TEST STEP	GROUP 1 8 Assemblies (.068" Thick Mating Card) 100 Cycles	GROUP 2 8 Assemblies (.068" Thick Mating Card) 250 Cycles	GROUP 3 8 Assemblies (.068" Thick Mating Card) 500 Cycles	GROUP 4 8 Assemblies (.068" Thick Mating Card) 1,000 Cycles
01	* Plating Thickness Verification	* Plating Thickness Verification	* Plating Thickness Verification	* Plating Thickness Verification
02	LLCR-1	LLCR-1	LLCR-1	LLCR-1
03	100 Cycles	250 Cycles	500 Cycles	1,000 Cycles
04	Clean Mating Interface	Clean Mating Interface	Clean Mating Interface	Clean Mating Interface
05	LLCR-2	LLCR-2	LLCR-2	LLCR-2
06	Thermal Shock (Mated and undisturbed)	Thermal Shock (Mated and undisturbed)	Thermal Shock (Mated and undisturbed)	Thermal Shock (Mated and undisturbed)
07	LLCR-3	LLCR-3	LLCR-3	LLCR-3
08	Cyclic Humidity (Mated and undisturbed)	Cyclic Humidity (Mated and undisturbed)	Cyclic Humidity (Mated and undisturbed)	Cyclic Humidity (Mated and undisturbed)
09	LLCR-4	LLCR-4	LLCR-4	LLCR-4
10	*** Photos of Contact Area	*** Photos of Contact Area	*** Photos of Contact Area	*** Photos of Contact Area

Thermal Shock = EIA-364-32, Table II, Test Condition I:

-55°C to +85°C 1/2 hour dwell, 100 cycles

Humidity = EIA-364-31, Test Condition 'B' (240 Hours)

and Method III (+25°C to +65°C @ 90% RH to 98% RH)

ambient pre-condition and delete steps 7a and 7b

LLCR = EIA-364-23, LLCR

20 mV Max, 100 mA Max

Use Keithley 580 or 3706 in 4 wire dry circuit mode

* Measure, verify, and document plating thickness on both male and female (one group only)

** Plating thickness to be measured on loose pins used during assembly. Pins to be provided by requestor.

*** Save 2-3 photos of contact area in project folder for each group

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

THERMAL SHOCK:

- 1) EIA-364-32, *Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors*.
- 2) Test Condition 1: -55°C to +85°C
- 3) Test Time: ½ hour dwell at each temperature extreme
- 4) Number of Cycles: 100
- 5) All test samples are pre-conditioned at ambient.
- 6) All test samples are exposed to environmental stressing in the mated condition.

HUMIDITY:

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

MATING/UNMATING:

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

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

RESULTS**LLCR Durability: (192 points)****100 cycles group**

- **Initial** ----- 17.43 mOhms Max
- **Durability, 100 Cycles**
 - <= +5.0 mOhms ----- 192 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 ----- 192 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 ----- 184 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 8 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 Durability: (192 points)**250 cycles group**

- **Initial** ----- 16.20 mOhms Max
- **Durability, 250 Cycles**
 - <= +5.0 mOhms ----- 192 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 ----- 192 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 ----- 188 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 4 Points ----- Minor
 - +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
 - +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
 - +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - >+2000 mOhms ----- 0 Points ----- Open Failure

RESULTS**LLCR Durability: (192 points)****500 cycles group**

- **Initial** ----- 16.54 mOhms Max
- **Durability, 500 Cycles**
 - <= +5.0 mOhms ----- 192 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 ----- 192 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 ----- 174 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 18 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 Durability: (192 points)**1000 cycles group**

- **Initial** ----- 16.40 mOhms Max
- **Durability, 1000 Cycles**
 - <= +5.0 mOhms ----- 192 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 ----- 186 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 6 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 ----- 173 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 18 Points ----- Minor
 - +10.1 to +15.0 mOhms ----- 1 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**LLCR Durability: 100 cycles group**

- 1) A total of 192 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

LLCR Measurement Summaries by Pin Type				
Date	8/15/2013	8/27/2013	9/9/2013	9/22/2013
Room Temp (Deg C)	24	23	22	25
Rel Humidity (%)	55	56	57	55
Technician	Kason He	Kason He	Kason He	Kason He
mOhm values	Actual Initial	Delta 100 Cycles	Delta Therm Shck	Delta Humidity
Pin Type 1: Signal				
Average	15.20	0.34	0.42	1.28
St. Dev.	0.33	0.30	0.53	1.52
Min	14.51	0.00	0.00	0.02
Max	17.43	2.17	3.45	8.27
Summary Count	192	192	192	192
Total Count	192	192	192	192

LLCR Delta Count by Category						
mOhms	Stable	Minor	Acceptable	Marginal	Unstable	Open
	≤ 5	>5 & ≤ 10	>10 & ≤ 15	>15 & ≤ 50	>50 & ≤ 1000	>1000
100 Cycles	192	0	0	0	0	0
Therm Shck	192	0	0	0	0	0
Humidity	184	8	0	0	0	0

DATA SUMMARIES Continued**LLCR Durability: 250 cycles group**

- 1) A total of 192 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

LLCR Measurement Summaries by Pin Type				
Date	8/15/2013	8/29/2013	9/9/2013	9/22/2013
Room Temp (Deg C)	24	23	22	25
Rel Humidity (%)	55	56	57	55
Technician	Kason He	Kason He	Kason He	Kason He
mOhm values	Actual Initial	Delta 250 Cycles	Delta Therm Shck	Delta Humidity
Pin Type 1: Signal				
Average	15.09	0.38	0.59	1.10
St. Dev.	0.40	0.32	0.50	1.31
Min	14.36	0.00	0.00	0.00
Max	16.20	2.75	4.51	8.09
Summary Count	192	192	192	192
Total Count	192	192	192	192

LLCR Delta Count by Category						
mOhms	Stable	Minor	Acceptable	Marginal	Unstable	Open
	≤ 5	>5 & ≤ 10	>10 & ≤ 15	>15 & ≤ 50	>50 & ≤ 1000	>1000
250 Cycles	192	0	0	0	0	0
Therm Shck	192	0	0	0	0	0
Humidity	188	4	0	0	0	0

DATA SUMMARIES Continued**LLCR Durability: 500 cycles group**

- 1) A total of 192 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

LLCR Measurement Summaries by Pin Type				
Date	8/15/2013	8/30/2013	9/9/2013	9/22/2013
Room Temp (Deg C)	24	23	22	25
Rel Humidity (%)	55	53	57	55
Technician	Kason He	Kason He	Kason He	Kason He
mOhm values	Actual Initial	Delta 500 Cycles	Delta Therm Shck	Delta Humidity
Pin Type 1: Signal				
Average	15.11	0.35	0.66	1.67
St. Dev.	0.34	0.34	0.59	1.86
Min	14.43	0.00	0.00	0.01
Max	16.54	2.98	3.21	8.20
Summary Count	192	192	192	192
Total Count	192	192	192	192

LLCR Delta Count by Category						
mOhms	Stable	Minor	Acceptable	Marginal	Unstable	Open
	≤ 5	>5 & ≤ 10	>10 & ≤ 15	>15 & ≤ 50	>50 & ≤ 1000	>1000
500 Cycles	192	0	0	0	0	0
Therm Shck	192	0	0	0	0	0
Humidity	174	18	0	0	0	0

DATA SUMMARIES Continued**LLCR Durability: 1000 cycles group**

- 1) A total of 192 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

LLCR Measurement Summaries by Pin Type				
Date	8/15/2013	9/2/2013	9/18/2013	10/25/2013
Room Temp (Deg C)	24	22	23	22
Rel Humidity (%)	55	57	53	44
Technician	Kason He	Kason He	Kason He	Kason He
mOhm values	Actual Initial	Delta 1000 Cycles	Delta Therm Shck	Delta Humidity
Pin Type 1: Signal				
Average	15.14	0.38	0.84	2.05
St. Dev.	0.34	0.45	1.35	2.05
Min	14.48	0.00	0.00	0.05
Max	16.40	3.54	7.33	12.18
Summary Count	192	192	192	192
Total Count	192	192	192	192

LLCR Delta Count by Category						
mOhms	Stable	Minor	Acceptable	Marginal	Unstable	Open
	≤ 5	>5 & ≤ 10	>10 & ≤ 15	>15 & ≤ 50	>50 & ≤ 1000	>1000
1000 Cycles	192	0	0	0	0	0
Therm Shck	186	6	0	0	0	0
Humidity	173	18	1	0	0	0

EQUIPMENT AND CALIBRATION SCHEDULES**Equipment #:** HZ-TCT-01**Description:** Normal force analyzer**Manufacturer:** Mecmesin Multitester**Model:** Mecmesin Multitester 2.5-i**Serial #:** 08-1049-04**Accuracy:** Last Cal: 4/26/2013, Next Cal: 4/25/2014**Equipment #:** HZ-MO-05**Description:** Micro-ohmmeter**Manufacturer:** Keithley**Model:** 3706**Serial #:** 1285188**Accuracy:** Last Cal: 11/15/2012, Next Cal: 11/14/2013**Equipment #:** HZ-THC-01**Description:** Humidity transmitter**Manufacturer:** Thermtron**Model:** SM-8-8200**Serial #:** 38846**Accuracy:** Last Cal: 2/28/2013, Next Cal: 2/27/2014**Equipment #:** HZ-TSC-01**Description:** Vertical Thermal Shock Chamber**Manufacturer:** Cincinnatti Sub Zero**Model:** VTS-3-6-6-SC/AC**Serial #:** 10-VT14994**Accuracy:** See Manual

... Last Cal: 06/27/2013, Next Cal: 06/26/2014