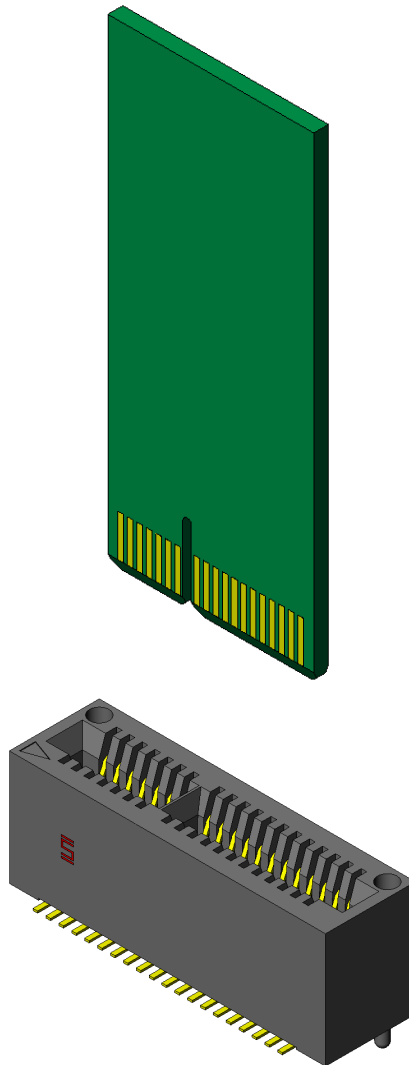




Project Number: Design Qualification Test Report	Tracking Code: 224243_Report_Rev_2
Requested by: Eric Mings	Date: 11/20/2013
Part #: MEC1-140-02-S-D-A/Edge card	Tech: Peter Chen
Part description: MEC1/Edge Card	Qty to test: 60
Test Start: 1/15/2013	Test Completed: 3/11/2013



Design Qualification Test Report

MEC1/Edge Card

MEC1-140-02-S-D-A/Edge card

Tracking Code: 224243_Report_Rev_2	Part #: MEC1-140-02-S-D-A/Edge card
Part description: MEC1/Edge Card	

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
04/30/2013	1	Initial issue	PC
11/19/2013	2	Updated the Extended life data	PC

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

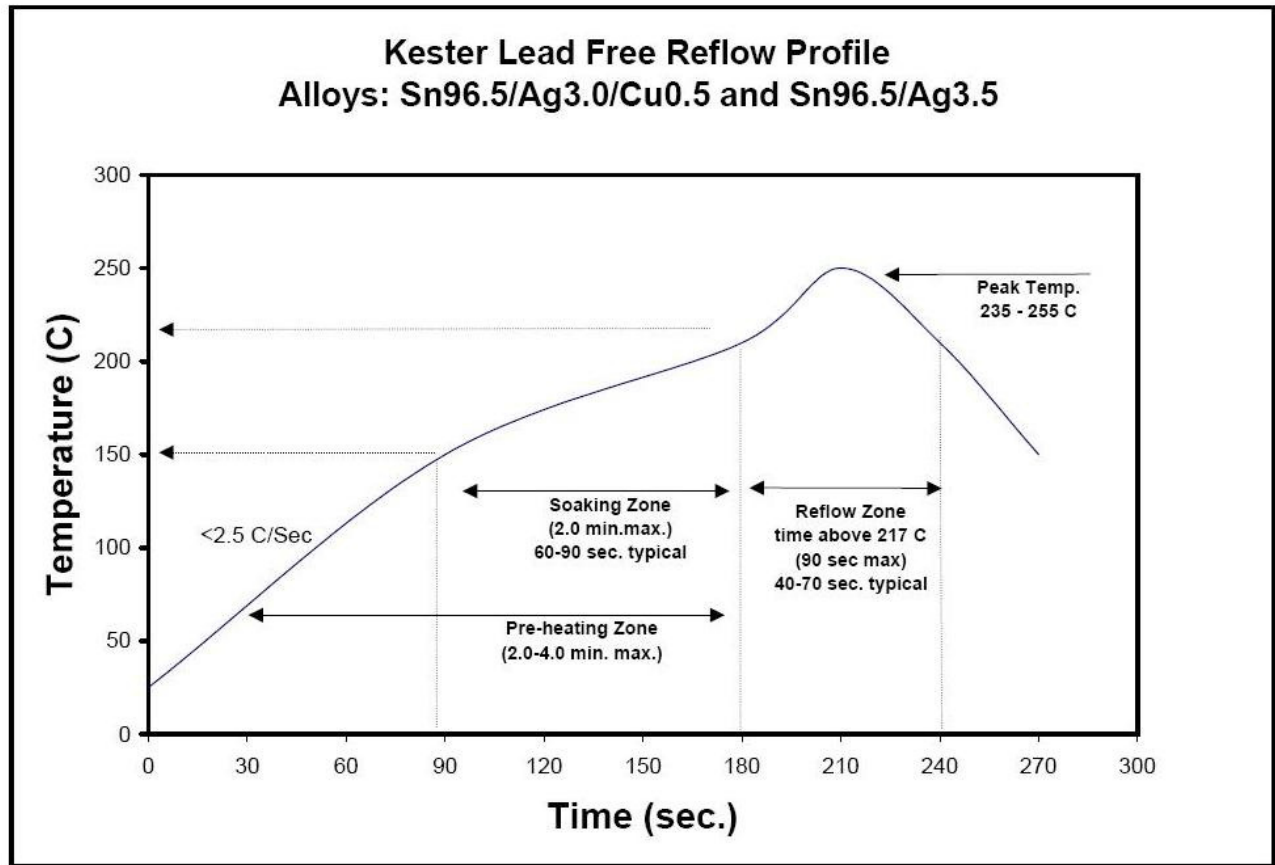
To perform the following tests: Design Qualification Test, Please see test plan.

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 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-104112-TST, PCB-104113-TST

TYPICAL OVEN PROFILE (Soldering Parts to Test Boards)

FLOWCHARTS**Gas Tight**

TEST STEP	GROUP A1 8 boards 0.056" thick edge card(Min)
01	LLCR-1
02	Gas Tight
03	LLCR-2

Gas Tight = EIA-364-36A

LLCR = EIA-364-23, LLCR

20 mV Max, 100 mA Max

Use Keithley 580 or 3706 in 4 wire dry circuit mode

Thermal Aging

TEST STEP	GROUP A1 8 Boards Thermal Aging (Mated) 0.056" thick edge card(Min)	GROUP A2 8 Boards Thermal Aging (Mated) 0.068" thick edge card(Max)
01	Contact Gaps	Contact Gaps
02	Measure & Record PCB Thickness	Measure & Record PCB Thickness
03	Forces - Mating / Unmating	Forces - Mating / Unmating
04	LLCR-1	LLCR-1
05	Thermal Aging (Mated and Undisturbed)	Thermal Aging (Mated and Undisturbed)
06	LLCR-2	LLCR-2
07	Forces - Mating / Unmating	Forces - Mating / Unmating
08	Contact Gaps	Contact Gaps

Thermal Aging = EIA-364-17, Test Condition 4 (105°C)

Time Condition 'B' (250 Hours)

Mating / Unmating Forces = EIA-364-13

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

Gaps to be taken on a minimum of 20% of each part tested

LLCR = EIA-364-23, LLCR

20 mV Max, 100 mA Max

Use Keithley 580 or 3706 in 4 wire dry circuit mode

FLOWCHARTS Continued**Durability/Mating/Unmating/Gaps**

TEST STEP	GROUP A1 8 Boards (middle position submitted) 0.056" thick edge card(Min)	GROUP A2 8 Boards (middle position submitted) 0.068" thick edge card(Max)
01	Contact Gaps	Contact Gaps
02	Measure & Record PCB Thickness	Measure & Record PCB Thickness
03	LLCR-1	LLCR-1
04	Forces - Mating / Unmating	Forces - Mating / Unmating
05	25 Cycles	25 Cycles
06	Forces - Mating / Unmating	Forces - Mating / Unmating
07	25 Cycles (50 Total)	25 Cycles (50 Total)
08	Forces - Mating / Unmating	Forces - Mating / Unmating
09	25 Cycles (75 Total)	25 Cycles (75 Total)
10	Forces - Mating / Unmating	Forces - Mating / Unmating
11	25 Cycles (100 Total)	25 Cycles (100 Total)
12	Forces - Mating / Unmating	Forces - Mating / Unmating
13	Clean w/Compressed Air	Clean w/Compressed Air
14	Contact Gaps	Contact Gaps
15	LLCR-2	LLCR-2
16	Thermal Shock (Mated and Undisturbed)	Thermal Shock (Mated and Undisturbed)
17	LLCR-3	LLCR-3
18	Cyclic Humidity (Mated and Undisturbed)	Cyclic Humidity (Mated and Undisturbed)
19	LLCR-4	LLCR-4
20	Forces - Mating / Unmating	Forces - Mating / Unmating

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

Mating / Unmating Forces = EIA-364-13

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

Gaps to be taken on a minimum of 20% of each part tested

LLCR = EIA-364-23, LLCR

20 mV Max, 100 mA Max

Use Keithley 580 or 3706 in 4 wire dry circuit mode

FLOWCHARTS Continued**Mechanical Shock / Vibration / LLCR**

TEST STEP	GROUP A1 8 boards 0.056" thick edge card(Min)	GROUP A2 8 boards 0.068" thick edge card(Max)
01	LLCR-1	LLCR-1
02	Shock	Shock
03	Vibration	Vibration
04	LLCR-2	LLCR-2

Mechanical Shock = EIA 364-27 Half Sine,

100 g's, 6 milliSeconds (Condition "C") each axis

Vibration = EIA 364-28, Random Vibration

7.56 g RMS, Condition VB -- 2 hours/axis

LLCR = EIA-364-23, LLCR

20 mV Max, 100 mA Max

Use Keithley 580 or 3706 in 4 wire dry circuit mode

Shock / Vibration / nanoSecond Event Detection

TEST STEP	GROUP A1 60 Points 0.056" thick edge card(Min)
01	Event Detection, Shock
02	Event Detection, Vibration

Mechanical Shock = EIA 364-27 Half Sine,

100 g's, 6 milliSeconds (Condition "C") each axis

Vibration = EIA 364-28, Random Vibration

7.56 g RMS, Condition VB -- 2 hours/axis

Event detection requirement during Shock / Vibration is 50 nanoseconds minimum

Tracking Code: 224243_Report_Rev_2	Part #: MEC1-140-02-S-D-A/Edge card
Part description: MEC1/Edge Card	

FLOWCHARTS Continued

Extended Life

TEST STEP	GROUP B1 8 Boards 0.068" thick edge card(Max) 250 Cycles	GROUP C1 8 Boards 0.068" thick edge card(Max) 500 Cycles
01	* Plating Thickness Verification	* Plating Thickness Verification
02	LLCR-1	LLCR-1
03	250 Cycles	500 Cycles
04	Clean Mating Interface	Clean Mating Interface
05	LLCR-2	LLCR-2
10	*** Photos of Contact Area	*** Photos of Contact Area

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.

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.

MECHANICAL SHOCK (Specified Pulse):

- 1) Reference document: EIA-364-27, *Mechanical Shock Test Procedure for Electrical Connectors*
- 2) Test Condition C
- 3) Peak Value: 100 G
- 4) Duration: 6 Milliseconds
- 5) Wave Form: Half Sine
- 6) Velocity: 12.3 ft/s
- 7) Number of Shocks: 3 Shocks / Direction, 3 Axis (18 Total)

VIBRATION:

- 1) Reference document: EIA-364-28, *Vibration Test Procedure for Electrical Connectors*
- 2) Test Condition V, Letter B
- 3) Power Spectral Density: 0.04 G² / Hz
- 4) G 'RMS': 7.56
- 5) Frequency: 50 to 2000 Hz
- 6) Duration: 2.0 Hours per axis (3 axis total)

NANOSECOND-EVENT DETECTION:

- 1) Reference document: EIA-364-87, *Nanosecond-Event Detection for Electrical Connectors*
- 2) Prior to test, the samples were characterized to assure the low nanosecond event being monitored will trigger the detector.
- 3) After characterization it was determined the test samples could be monitored for 50 nanosecond events

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

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

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**Mating /unmating force****Thermal aging:****MEC1-140-02-S-D-A/Edge card -0.056"**

- **Initial**
 - **Mating**
 - **Min** ----- 3.13 Lbs
 - **Max** ----- 3.76 Lbs
 - **Unmating**
 - **Min** ----- 2.74 Lbs
 - **Max** ----- 3.16 Lbs
- **After thermal aging**
 - **Mating**
 - **Min** ----- 2.60 Lbs
 - **Max** ----- 3.56 Lbs
 - **Unmating**
 - **Min** ----- 2.25 Lbs
 - **Max** ----- 3.35 Lbs

MEC1-140-02-S-D-A/Edge card -0.068"

- **Initial**
 - **Mating**
 - **Min** ----- 8.79 Lbs
 - **Max** ----- 11.12 Lbs
 - **Unmating**
 - **Min** ----- 9.25 Lbs
 - **Max** ----- 12.91 Lbs
- **After thermal aging**
 - **Mating**
 - **Min** ----- 5.04 Lbs
 - **Max** ----- 6.43 Lbs
 - **Unmating**
 - **Min** ----- 5.46 Lbs
 - **Max** ----- 7.74 Lbs

RESULTS Continued**Mating&Unmating durability:**

MEC1-140-02-S-D-A/Edge card -0.056"

- **Initial**
 - **Mating**
 - Min ----- 3.19 Lbs
 - Max----- 3.81 Lbs
 - **Unmating**
 - Min ----- 2.54 Lbs
 - Max----- 4.32 Lbs
- **After 25 Cycles**
 - **Mating**
 - Min ----- 3.24 Lbs
 - Max----- 4.01 Lbs
 - **Unmating**
 - Min ----- 2.70 Lbs
 - Max----- 4.35 Lbs
- **After 50 Cycles**
 - **Mating**
 - Min ----- 3.56 Lbs
 - Max----- 4.12 Lbs
 - **Unmating**
 - Min ----- 2.95 Lbs
 - Max----- 4.42 Lbs
- **After 75 Cycles**
 - **Mating**
 - Min ----- 3.70 Lbs
 - Max----- 4.23 Lbs
 - **Unmating**
 - Min ----- 3.12 Lbs
 - Max----- 4.47 Lbs
- **After 100 Cycles**
 - **Mating**
 - Min ----- 3.80 Lbs
 - Max----- 4.25 Lbs
 - **Unmating**
 - Min ----- 3.23 Lbs
 - Max----- 4.56 Lb
- **After Humidity**
 - **Mating**
 - Min ----- 2.92 Lbs
 - Max----- 4.03 Lbs
 - **Unmating**
 - Min ----- 3.01 Lbs
 - Max----- 3.55 Lbs

RESULTS Continued**Mating&Unmating durability:**

MEC1-140-02-S-D-A/Edge card -0.068"

- **Initial**
 - **Mating**
 - Min ----- 7.51 Lbs
 - Max----- 9.80 Lbs
 - **Unmating**
 - Min ----- 7.66 Lbs
 - Max----- 9.21 Lbs
- **After 25 Cycles**
 - **Mating**
 - Min ----- 8.42 Lbs
 - Max-----10.12 Lbs
 - **Unmating**
 - Min ----- 8.58 Lbs
 - Max-----10.58 Lbs
- **After 50 Cycles**
 - **Mating**
 - Min ----- 9.30 Lbs
 - Max-----11.03 Lbs
 - **Unmating**
 - Min ----- 9.85 Lbs
 - Max-----11.98 Lbs
- **After 75 Cycles**
 - **Mating**
 - Min -----10.06 Lbs
 - Max-----11.45 Lbs
 - **Unmating**
 - Min -----10.47 Lbs
 - Max-----12.83 Lbs
- **After 100 Cycles**
 - **Mating**
 - Min -----10.32 Lbs
 - Max-----12.23 Lbs
 - **Unmating**
 - Min -----10.87 Lbs
 - Max-----13.17 Lb
- **After Humidity**
 - **Mating**
 - Min ----- 6.03 Lbs
 - Max----- 7.26 Lbs
 - **Unmating**
 - Min ----- 6.92 Lbs
 - Max----- 8.36 Lbs

RESULTS Continued**LLCR Durability (192 signal pin LLCR test points)****0.056" thick edge card**

- **Initial** ----- 20.42 mOhms Max
- **After 100 Cycles**
 - <= +5.0 mOhms ----- 189 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 3 Points ----- Minor
 - +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
 - +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
 - +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - >+2000 mOhms ----- 0 Points ----- Open Failure
- **After thermal shock**
 - <= +5.0 mOhms ----- 178 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 14 Points ----- Minor
 - +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
 - +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
 - +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - >+2000 mOhms ----- 0 Points ----- Open Failure
- **After humidity**
 - <= +5.0 mOhms ----- 148 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 41 Points ----- Minor
 - +10.1 to +15.0 mOhms ----- 2 Points ----- Acceptable
 - +15.1 to +50.0 mOhms ----- 1 Points ----- Marginal
 - +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - >+2000 mOhms ----- 0 Points ----- Open Failure

0.068" thick edge card

- **Initial** ----- 13.47 mOhms Max
- **After 100 Cycles**
 - <= +5.0 mOhms ----- 190 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 2 Points ----- Minor
 - +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
 - +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
 - +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - >+2000 mOhms ----- 0 Points ----- Open Failure
- **After thermal shock**
 - <= +5.0 mOhms ----- 178 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 14 Points ----- Minor
 - +10.1 to +15.0 mOhms ----- 0 Points ----- Acceptable
 - +15.1 to +50.0 mOhms ----- 0 Points ----- Marginal
 - +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - >+2000 mOhms ----- 0 Points ----- Open Failure
- **After humidity**
 - <= +5.0 mOhms ----- 145 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 45 Points ----- Minor
 - +10.1 to +15.0 mOhms ----- 1 Points ----- Acceptable
 - +15.1 to +50.0 mOhms ----- 1 Points ----- Marginal
 - +50.1 to +2000 mOhms ----- 0 Points ----- Unstable
 - >+2000 mOhms ----- 0 Points ----- Open Failure

RESULTS Continued**LLCR Thermal Aging (192 signal pin LLCR test points)****0.056" thick edge card**

- Initial ----- 19.36 mOhms Max
- Thermal Aging
 - <= +5.0 mOhms ----- 178 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 14 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

0.068" thick edge card

- Initial ----- 13.89 mOhms Max
- Thermal Aging
 - <= +5.0 mOhms ----- 173 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 19 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 (192 signal pin LLCR test points)**0.056" thick edge card**

- Initial ----- 20.18 mOhms Max
- Gas-Tight
 - <= +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

LLCR Mechanical Shock & Vibration (192 signal pin LLCR test points)**0.056" thick edge card**

- Initial ----- 22.20 mOhms Max
- Shock&Vibration
 - <= +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

0.068" thick edge card

- Initial ----- 14.39 mOhms Max
- Shock&Vibration
 - <= +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

RESULTS Continued

Mechanical Shock & Random Vibration:

- Shock
 - No Damage----- Passed
 - 50 Nanoseconds----- Passed
- Vibration
 - No Damage----- Passed
 - 50 Nanoseconds----- Passed

LLCR Extended Life (192 signal pin LLCR test points)

250 cycles

- Initial ----- 14.29 mOhms Max
- After 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

500 cycles

- Initial ----- 13.76 mOhms Max
- After 500 Cycles
 - <= +5.0 mOhms ----- 190 Points ----- Stable
 - +5.1 to +10.0 mOhms -----2 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**MATING/UNMATING FORCE:**

Thermal aging:

MEC1-140-02-S-D-A/Edge Card-0.056"

	Initial				After Thermals			
	Mating		Unmating		Mating		Unmating	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	13.92	3.13	12.19	2.74	11.56	2.60	10.01	2.25
Maximum	16.72	3.76	14.06	3.16	15.83	3.56	14.90	3.35
Average	15.33	3.45	12.75	2.87	13.73	3.09	12.81	2.88
St Dev	1.08	0.24	0.66	0.15	1.58	0.36	1.53	0.34
Count	8	8	8	8	8	8	8	8

MEC1-140-02-S-D-A/Edge Card-0.068"

	Initial				After Thermals			
	Mating		Unmating		Mating		Unmating	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	39.10	8.79	41.14	9.25	22.42	5.04	24.29	5.46
Maximum	49.46	11.12	57.42	12.91	28.60	6.43	34.43	7.74
Average	43.32	9.74	50.60	11.38	25.72	5.78	29.66	6.67
St Dev	3.63	0.82	5.17	1.16	1.89	0.42	3.35	0.75
Count	8	8	8	8	8	8	8	8

DATA SUMMARIES Continued**Mating/Unmating durability:**

MEC1-140-02-S-D-A/Edge Card-0.056"

	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	14.19	3.19	11.30	2.54	14.41	3.24	12.01	2.70
Maximum	16.95	3.81	19.22	4.32	17.84	4.01	19.35	4.35
Average	14.96	3.36	14.43	3.25	15.73	3.54	15.13	3.40
St Dev	1.01	0.23	2.60	0.58	1.04	0.23	2.37	0.53
Count	8	8	8	8	8	8	8	8
	After 50 Cycles				After 75 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	15.83	3.56	13.12	2.95	16.46	3.70	13.88	3.12
Maximum	18.33	4.12	19.66	4.42	18.82	4.23	19.88	4.47
Average	16.62	3.74	15.75	3.54	17.22	3.87	16.31	3.67
St Dev	0.83	0.19	2.21	0.50	0.74	0.17	2.06	0.46
Count	8	8	8	8	8	8	8	8
	After 100 Cycles				After Humidity			
	Mating		Unmating		Mating		Unmating	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	16.90	3.80	14.37	3.23	12.99	2.92	13.39	3.01
Maximum	18.90	4.25	20.28	4.56	17.93	4.03	15.79	3.55
Average	17.69	3.98	16.89	3.80	15.23	3.42	14.51	3.26
St Dev	0.60	0.13	1.89	0.43	1.88	0.42	0.74	0.17
Count	8	8	8	8	8	8	8	8

DATA SUMMARIES Continued**MEC1-140-02- S -D-A/Edge Card-0.068"**

	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	33.40	7.51	34.07	7.66	37.45	8.42	38.16	8.58
Maximum	43.59	9.80	40.97	9.21	45.01	10.12	47.06	10.58
Average	38.64	8.69	38.82	8.73	42.61	9.58	43.72	9.83
St Dev	3.69	0.83	2.22	0.50	3.00	0.67	3.06	0.69
Count	8	8	8	8	8	8	8	8
	After 50 Cycles				After 75 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	41.37	9.30	43.81	9.85	44.75	10.06	46.57	10.47
Maximum	49.06	11.03	53.29	11.98	50.93	11.45	57.07	12.83
Average	45.87	10.31	48.80	10.97	48.97	11.01	52.48	11.80
St Dev	2.68	0.60	2.94	0.66	2.46	0.55	3.25	0.73
Count	8	8	8	8	8	8	8	8
	After 100 Cycles				After Humidity			
	Mating		Unmating		Mating		Unmating	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	45.90	10.32	48.35	10.87	26.82	6.03	30.78	6.92
Maximum	54.40	12.23	58.58	13.17	32.29	7.26	37.19	8.36
Average	50.84	11.43	54.18	12.18	29.89	6.72	33.82	7.60
St Dev	2.74	0.62	3.41	0.77	1.69	0.38	2.36	0.53
Count	8	8	8	8	8	8	8	8

DATA SUMMARIES Continued**LLCR Durability:**

- 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

0.056" Card:

LLCR Measurement Summaries by Pin Type				
Date	1/10/2013	1/23/2013	1/28/2013	3/11/2013
Room Temp (Deg C)	23	21	21	23
Rel Humidity (%)	51	56	46	54
Technician	Peter Chen	Peter Chen	Peter Chen	Peter Chen
mOhm values	Actual Initial	Delta 100 Cycles	Delta Therm Shck	Delta Humidity
Pin Type 1: Signal				
Average	16.39	1.18	1.77	3.78
St. Dev.	1.03	1.22	1.66	1.99
Min	14.57	0.00	0.00	0.27
Max	20.42	5.83	8.18	15.50
Summary Count	192	192	192	192
Total Count	192	192	192	192

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	≤ 5	>5 & ≤ 10	>10 & ≤ 15	>15 & ≤ 50	>50 & ≤ 1000	>1000
100 Cycles	189	3	0	0	0	0
Therm Shck	178	14	0	0	0	0
Humidity	148	41	2	1	0	0

DATA SUMMARIES Continued**0.068" Card:**

LLCR Measurement Summaries by Pin Type				
Date	1/10/2013	1/23/2013	1/28/2013	3/11/2013
Room Temp (Deg C)	23	21	21	23
Rel Humidity (%)	51	56	54	54
Technician	Peter Chen	Peter Chen	Peter Chen	Peter Chen
mOhm values	Actual Initial	Delta 100 Cycles	Delta Therm Shck	Delta Humidity
Pin Type 1: Signal				
Average	12.15	1.61	2.67	4.03
St. Dev.	0.41	1.11	1.31	1.86
Min	11.32	0.06	0.70	0.89
Max	13.47	5.29	5.93	18.88
Summary Count	192	192	192	192
Total Count	192	192	192	192

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	<=5	>5 & <=10	>10 & <=15	>15 & <=50	>50 & <=1000	>1000
100 Cycles	190	2	0	0	0	0
Therm Shck	178	14	0	0	0	0
Humidity	145	45	1	1	0	0

DATA SUMMARIES Continued**LLCR thermal aging**

- 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

0.056" Card:

LLCR Measurement Summaries by Pin Type				
Date	1/11/2013	1/21/2013		
Room Temp (Deg C)	23	21		
Rel Humidity (%)	54	59		
Technician	Peter Chen	Peter Chen		
mOhm values	Actual Initial	Delta Thermal	Delta	Delta
Pin Type 1: Signal				
Average	16.45	2.11		
St. Dev.	0.82	1.61		
Min	14.36	0.02		
Max	19.36	6.84		
Summary Count	192	192		
Total Count	192	192		

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	≤ 5	>5 & ≤ 10	>10 & ≤ 15	>15 & ≤ 50	>50 & ≤ 1000	>1000
Thermal	178	14	0	0	0	0

DATA SUMMARIES Continued**0.068" Card:**

<i>LLCR Measurement Summaries by Pin Type</i>				
Date	1/11/2013	1/21/2013		
Room Temp (Deg C)	23	21		
Rel Humidity (%)	54	59		
Technician	Peter Chen	Peter Chen		
mOhm values	Actual Initial	Delta Thermal	Delta	Delta
Pin Type 1: Signal				
Average	12.23	2.72		
St. Dev.	0.45	1.64		
Min	11.41	0.18		
Max	13.89	6.65		
Summary Count	192	192		
Total Count	192	192		

<i>LLCR Delta Count by Category</i>						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	<=5	>5 & <=10	>10 & <=15	>15 & <=50	>50 & <=1000	>1000
Thermal	173	19	0	0	0	0

DATA SUMMARIES Continued**LLCR GAS TIGHT:**

- 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	1/11/2013	1/15/2013		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	54	56		
Technician	Peter Chen	Peter Chen		
mOhm values	Actual	Delta	Delta	Delta
	Initial	Acid Vapor		
Pin Type 1: Signal				
Average	16.78	0.87		
St. Dev.	1.20	0.75		
Min	14.58	0.03		
Max	20.18	3.46		
Summary Count	192	192		
Total Count	192	192		

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	≤ 5	$>5 \text{ \& } \leq 10$	$>10 \text{ \& } \leq 15$	$>15 \text{ \& } \leq 50$	$>50 \text{ \& } \leq 1000$	>1000
Acid Vapor	192	0	0	0	0	0

DATA SUMMARIES Continued**LLCR Mechanical Shock & Vibration:**

- 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

0.056" Card:

LLCR Measurement Summaries by Pin Type				
Date	3/4/2013	4/19/2013		
Room Temp (Deg C)	24	22		
Rel Humidity (%)	33	40		
Technician	Tony Wagoner	Tony Wagoner		
mOhm values	Actual Initial	Delta Shock-Vib	Delta	Delta
Pin Type 1: Signal				
Average	17.42	1.14		
St. Dev.	1.51	0.84		
Min	14.50	0.01		
Max	22.20	4.30		
Summary Count	192	192		
Total Count	192	192		

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	≤ 5	$>5 \text{ \& } \leq 10$	$>10 \text{ \& } \leq 15$	$>15 \text{ \& } \leq 50$	$>50 \text{ \& } \leq 1000$	>1000
Shock-Vib	192	0	0	0	0	0

DATA SUMMARIES Continued**0.068" Card:**

<i>LLCR Measurement Summaries by Pin Type</i>				
Date	3/4/2013	4/17/2013		
Room Temp (Deg C)	23	24		
Rel Humidity (%)	31	40		
Technician	Tony Wagoner	Aaron McKim		
mOhm values	Actual	Delta	Delta	Delta
	Initial	Shock-Vib		
Pin Type 1: Signal				
Average	12.27	0.14		
St. Dev.	0.51	0.14		
Min	11.41	0.00		
Max	14.39	0.85		
Summary Count	192	192		
Total Count	192	192		

<i>LLCR Delta Count by Category</i>						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	<=5	>5 & <=10	>10 & <=15	>15 & <=50	>50 & <=1000	>1000
Shock-Vib	192	0	0	0	0	0

Shock Vibration Event Detection

Shock and Vibration Event Detection Summary	
Contacts tested	30
Test Condition	C, 100g's, 6ms, Half-Sine
Shock Events	0
Test Condition	V-B, 7.56 rms g
Vibration Events	0
Total Events	0

DATA SUMMARIES Continued**LLCR Extended Life:**

- 5) A total of 192 points were measured
- 6) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
- 7) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
- 8) The following guidelines are used to categorize the changes in LLCR as a result from stressing.
 - g. $\leq +5.0$ mOhms:----- Stable
 - h. $+5.1$ to $+10.0$ mOhms:----- Minor
 - i. $+10.1$ to $+15.0$ mOhms:----- Acceptable
 - j. $+15.1$ to $+50.0$ mOhms:----- Marginal
 - k. $+50.1$ to $+2000$ mOhms:----- Unstable
 - l. $>+2000$ mOhms:----- Open Failure

250 cycles:

LLCR Measurement Summaries by Pin Type			
Date	8/15/2013	8/16/2013	
Room Temp (Deg C)	23	23	
Rel Humidity (%)	53	56	
Technician	Peter Chen	Peter Chen	
mOhm values	Actual	Delta	
	Initial	250 Cycles	
Pin Type 1: Signal			
Average	18.39	1.34	
St. Dev.	1.04	0.93	
Min	16.33	0.02	
Max	22.63	4.90	
Summary Count	192	192	
Total Count	192	192	

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

DATA SUMMARIES Continued**500 cycles:**

LLCR Measurement Summaries by Pin Type			
Date	8/15/2013	8/19/2013	
Room Temp (Deg C)	23	23	
Rel Humidity (%)	53	56	
Technician	Peter Chen	Peter Chen	
mOhm values	Actual	Delta	
	Initial	500 Cycles	
Pin Type 1: Signal			
Average	18.42	1.28	
St. Dev.	1.04	0.80	
Min	16.76	0.03	
Max	21.85	4.39	
Summary Count	192	192	
Total Count	192	192	

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	<=5	>5 & <=10	>10 & <=15	>15 & <=50	>50 & <=1000	>1000
500 Cycles	192	0	0	0	0	0

EQUIPMENT AND CALIBRATION SCHEDULES**Equipment #:** HZ-MO-05**Description:** Digital Multimeter**Manufacturer:** Keithley**Model:** 3706**Serial #:** 1285188**Accuracy:** Last Cal: 2012-8-18, Next Cal: 2013-8-18**Equipment #:** HZ-TCT-01**Description:** Normal force analyzer**Manufacturer:** Mecmesin Multitester**Model:** Mecmesin Multitester 2.5-i**Serial #:** 08-1049-04**Accuracy:** Last Cal: 2012-4-28, Next Cal: 2013-4-27**Equipment #:** HZ-OV-01**Description:** Oven**Manufacturer:** Huida**Model:** CS101-1E**Serial #:** CS101-1E-B**Accuracy:** Last Cal: 2011-12-14, Next Cal: 2012-12-13**Equipment #:** HZ-THC-01**Description:** Humidity transmitter**Manufacturer:** Thermtron**Model:** HMM30C**Serial #:** D0240037**Accuracy:** Last Cal: 2013-3-3, Next Cal: 2014-3-2**Equipment #:** HZ-HPM-01**Description:** IR/DWV Tester**Manufacturer:** AN9636H**Model:** AN9636H**Serial #:** 089601091**Accuracy:** Last Cal: 2012-7-6, Next Cal: 2013-7-5**Equipment #:** HZ-MO-01**Description:** Micro-ohmmeter**Manufacturer:** Keithley**Model:** 2700**Serial #:** 1199807**Accuracy:** Last Cal: 2012-4-28, Next Cal: 2013-4-27

EQUIPMENT AND CALIBRATION SCHEDULES Continued**Equipment #:** HZ-PS-01**Description:** Power Supply**Manufacturer:** Agilent**Model:** 6031A**Serial #:** MY41000982**Accuracy:** Last Cal: 2012-4-28, Next Cal: 2013-4-27**Equipment #:** HZ-TSC-01**Description:** Thermal Shock transmitter**Manufacturer:** CSZ**Model:** 10-VT14994**Serial #:** VTS-3-6-6-SC/AC**Accuracy:** Last Cal: 2012-11-1, Next Cal: 2013-11-1**Equipment #:** SVC-01**Description:** Shock & Vibration Table**Manufacturer:** Data Physics**Model:** LE-DSA-10-20K**Serial #:** 10037**Accuracy:** See Manual

... Last Cal: 2012-11-31, Next Cal: 2013-11-31

Equipment #: ACLM-01**Description:** Accelerometer**Manufacturer:** PCB Piezotronics**Model:** 352C03**Serial #:** 115819**Accuracy:** See Manual

... Last Cal: 2012-7-9, Next Cal: 2013-7-9

Equipment #: ED-03**Description:** Event Detector**Manufacturer:** Analysis Tech**Model:** 32EHD**Serial #:** 1100604**Accuracy:** See Manual

... Last Cal: 2012-6-4, Next Cal: 2013-6-4