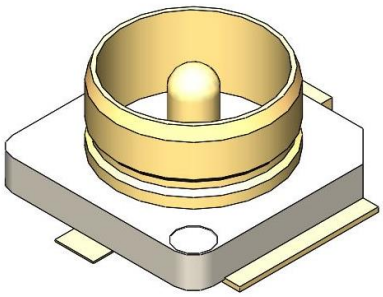
Project Number: Design Qualification Test Report	Tracking Code: 404787_Report_Rev_1
Requested by: John Liao	Date: 5/10/2016
Part #: RF047-10SP9-10SP9-0305/RSP-122811-01	Tech: Kason He
Part description: RF047/RSP	Qty to test: 50
Test Start: 10/20/2014	Test Completed: 11/30/2014



DESIGN QUALIFICATION TEST REPORT

RF047-10SP9-10SP9-0305/RSP-122811-01
RF047/RSP

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
07/30/2015	**1**	**Initial Issue**	**PC**

CERTIFICATION

All instruments and measuring equipment were calibrated to National Institute for Standards and Technology (NIST) traceable standards according to IS0 10012-l and ANSI/NCSL 2540-1, as applicable.

SCOPE

To perform the following tests: Design 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) Samtec Test PCBs used: PCB-104382-TST-XX, PCB-104383-TST-XX.

FLOWCHARTS

Gas Tight

Group 1
RF047-10SP9-10SP9-0305
RSP-122811-01
8 Assemblies

Step	Description
1.	LLCR (2) **Max Delta = 15 mOhm**
2.	Gas Tight (1)
3.	LLCR (2) **Max Delta = 15 mOhm**

(1) Gas Tight = EIA-364-36

(2) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max

Thermal Aging

Group 1
RF047-10SP9-10SP9-0305
RSP-122811-01
8 Assemblies

Step	Description
1.	Contact Gaps
2.	Mating/Unmating Force (2)
3.	LLCR (1) **Max Delta = 15 mOhm**
4.	Thermal Age (3)
5.	LLCR (1) **Max Delta = 15 mOhm**
6.	Mating/Unmating Force (2)
7.	Contact Gaps

(1) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max

(2) Mating/Unmating Force = EIA-364-13

(3) Thermal Age = EIA-364-17
Test Condition = 4 (105°C)
Time Condition = B (250 Hours)

FLOWCHARTS Continued

Normal Force

Group 1
HMHF1-P-C-X-ST-C47-SKT

8 Contacts Minimum
Signal Without Thermals

Step	Description
1.	Contact Gaps
2.	Normal Force (1) Deflection = 0.003937 " Expected Force at Max Deflection = 20 g

Group 2
HMHF1-P-C-X-ST-C47-CBDY

8 Contacts Minimum
Ground Without Thermals

Step	Description
1.	Contact Gaps
2.	Normal Force (1) Deflection = 0.005905 " Expected Force at Max Deflection = 40 g

Group 3
HMHF1-P-C-X-ST-C47-SKT
RSP-122811-01
8 Contacts Minimum
Signal With Thermals

Step	Description
1.	Contact Gaps
2.	Thermal Age (2)
3.	Contact Gaps
4.	Normal Force (1) Deflection = 0.003937 " Expected Force at Max Deflection = 20 g

Group 4
HMHF1-P-C-X-ST-C47-CBDY
RSP-122811-01
8 Contacts Minimum
Ground With Thermals

Step	Description
1.	Contact Gaps
2.	Thermal Age (2)
3.	Contact Gaps
4.	Normal Force (1) Deflection = 0.005905 " Expected Force at Max Deflection = 40 g

(1) Normal Force = EIA-364-04

(2) Thermal Age = EIA-364-17
Test Condition = 4 (105°C)
Time Condition = B (250 Hours)

FLOWCHARTS Continued

Mating/Unmating/Durability

Group 1
RF047-10SP9-10SP9-0305
RSP-122811-01
8 Assemblies

Note: 500 cycles test. After each 125 cycles test, changing PCB connector (RSP-122811-01).
cycled by machine.

Step	Description
1.	Contact Gaps
2.	LLCR (2) Max Delta = 15 mOhm
3.	Mating/Unmating Force (3)
4.	Cycles Quantity = 125 Cycles *Note:*
5.	Mating/Unmating Force (3)
6.	Cycles Quantity = 125 Cycles *Note: Using new PCB connector (RSP-122811-01) for following 125 cycles test*
7.	Mating/Unmating Force (3)
8.	Cycles Quantity = 125 Cycles *Note: Using new PCB connector (RSP-122811-01) for following 125 cycles test*
9.	Mating/Unmating Force (3)
10.	Cycles Quantity = 125 Cycles *Note: Using new PCB connector (RSP-122811-01) for following 125 cycles test*
11.	Mating/Unmating Force (3)
12.	Contact Gaps

FLOWCHARTS Continued

13. LLCR (2)
    Max Delta = 15 mOhm
14. Thermal Shock (4)
15. LLCR (2)
    Max Delta = 15 mOhm
16. Humidity (1)
17. LLCR (2)
    Max Delta = 15 mOhm
18. Mating/Unmating Force (3)

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(1) Humidity = EIA-364-31
Test Condition = B (240 Hours)
Test Method = III (+25°C to +65°C @ 90% RH to 98% RH)
Test Exceptions: ambient pre-condition and delete steps 7a and 7b

(2) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max

(3) Mating/Unmating Force = EIA-364-13

(4) Thermal Shock = EIA-364-32
Exposure Time at Temperature Extremes = 1/2 Hour
Method A, Test Condition = I (-55°C to +85°C)
Test Duration = A-3 (100 Cycles)

FLOWCHARTS Continued

IR/DWV

Pin-to-Ground

Group 1
RF047-10SP9-10SP9-0305
RSP-122811-01
2 Assemblies

Step	Description
1.	DWV Breakdown (2)

Group 2
RF047-10SP9-10SP9-0305
2 Assemblies

Step	Description
1.	DWV Breakdown (2)

Group 3
RSP-122811-01
2 Assemblies

Step	Description
1.	DWV Breakdown (2)

Group 4
RF047-10SP9-10SP9-0305
RSP-122811-01
2 Assemblies

Step	Description
1.	IR (4)
2.	DWV at Test Voltage (1)
3.	Thermal Shock (5)
4.	IR (4)
5.	DWV at Test Voltage (1)
6.	Humidity (3)
7.	IR (4)
8.	DWV at Test Voltage (1)

Group 5
RF047-10RP9-10RP9-0305
RSP-122811-01
2 Assemblies

Step	Description
1.	DWV Breakdown (2)

Group 6
RF047-10RP9-10RP9-0305
2 Assemblies

Step	Description
1.	DWV Breakdown (2)

Group 7
RSP-122811-01
2 Assemblies

Note: Same as Group 3.2

Step	Description
1.	DWV Breakdown (2)

Group 8
RF047-10RP9-10RP9-0305
RSP-122811-01
2 Assemblies

Step	Description
1.	IR (4)
2.	DWV at Test Voltage (1)
3.	Thermal Shock (5)
4.	IR (4)
5.	DWV at Test Voltage (1)
6.	Humidity (3)
7.	IR (4)
8.	DWV at Test Voltage (1)

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(1) DWV at Test Voltage = EIA-364-20
Test Condition = 1 (Sea Level)
DWV test voltage is equal to 75% of the lowest breakdown voltage
Test voltage applied for 60 seconds

(2) DWV Breakdown = EIA-364-20
Test Condition = 1 (Sea Level)
DWV test voltage is equal to 75% of the lowest breakdown voltage
Test voltage applied for 60 seconds

(3) Humidity = EIA-364-31
Test Condition = B (240 Hours)
Test Method = III (+25°C to +65°C @ 90% RH to 98% RH)
Test Exceptions: ambient pre-condition and delete steps 7a and 7b

(4) IR = EIA-364-21
Test Condition = 500 Vdc, 2 Minutes Max

(5) Thermal Shock = EIA-364-32
Exposure Time at Temperature Extremes = 1/2 Hour
Method A, Test Condition = I (-55°C to +85°C)
Test Duration = A-3 (100 Cycles)

FLOWCHARTS Continued

Mechanical Shock/Random Vibration/LLCR

Group 1
RF047-10SP9-10SP9-0305
RSP-122811-01
8 Assemblies

Step	Description
1.	LLCR (1) Max Delta = 15 mOhm
2.	Mechanical Shock (2)
3.	Random Vibration (3)
4.	LLCR (1) Max Delta = 15 mOhm

(1) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max

(2) Mechanical Shock = EIA-364-27
Test Condition = C (100 G Peak, 6 milliseconds, Half Sine)
Number of Shocks = 3 Per Direction, Per Axis, 18 Total

(3) Random Vibration = EIA-364-28
Condition = VB (7.56 gRMS Average, 2 Hours/Axis)

Mechanical Shock/Random Vibration/Event Detection

Group 1
RF047-10SP9-10SP9-0305
RSP-122811-01
8 Assemblies

Step	Description
1.	Nanosecond Event Detection (Mechanical Shock) (1)
2.	Nanosecond Event Detection (Random Vibration) (2)

(1) Nanosecond Event Detection (Mechanical Shock)
Use EIA-364-87 for Nanosecond Event Detection:
Test Condition = F (50 nanoseconds at 10 ohms)
Use EIA-364-27 for Mechanical Shock:
Test Condition = C (100 G Peak, 6 milliseconds, Half Sine)
Number of Shocks = 3 Per Direction, Per Axis, 18 Total

(2) Nanosecond Event Detection (Random Vibration)
Use EIA-364-87 for Nanosecond Event Detection:
Test Condition = F (50 nanoseconds at 10 ohms)
Use EIA-364-28 for Random Vibration:
Condition = VB (7.56 gRMS Average, 2 Hours/Axis)

FLOWCHARTS Continued

Cable Pull

Group 1		Group 2	
RF047-10SP9-10SP9-0305		RF047-10SP9-10SP9-0305	
RSP-122811-01		RSP-122811-01	
5 Assemblies		5 Assemblies	
0 Degrees		90 Degrees	
Step	**Description**	**Step**	**Description**
1.	Cable Pull (1)	1.	Cable Pull (1)

(1) Cable Pull = EIA-364-38
Measure and Record Force Required to Failure
Failure = Discontinuity >1 microsecond at 10 ohms

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 G^2 / 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.

NORMAL FORCE (FOR CONTACTS TESTED OUTSIDE THE HOUSING):

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

INSULATION RESISTANCE (IR):

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

1) PROCEDURE:
    a. Reference document: EIA-364-21, *Insulation Resistance Test Procedure for Electrical Connectors*.
    b. Test Conditions:
        i. Between Adjacent Contacts or Signal-to-Ground
        ii. Electrification Time 2.0 minutes
        iii. Test Voltage (500 VDC) corresponds to calibration settings for measuring resistances.
2) MEASUREMENTS:
3) When the specified test voltage is applied (VDC), the insulation resistance shall not be less than 1000 megohms.

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

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).

CABLE PULL:

1) Secure cable near center and pull on connector
    a. At 90°, right angle to cable
    b. At 0°, in-line with cable

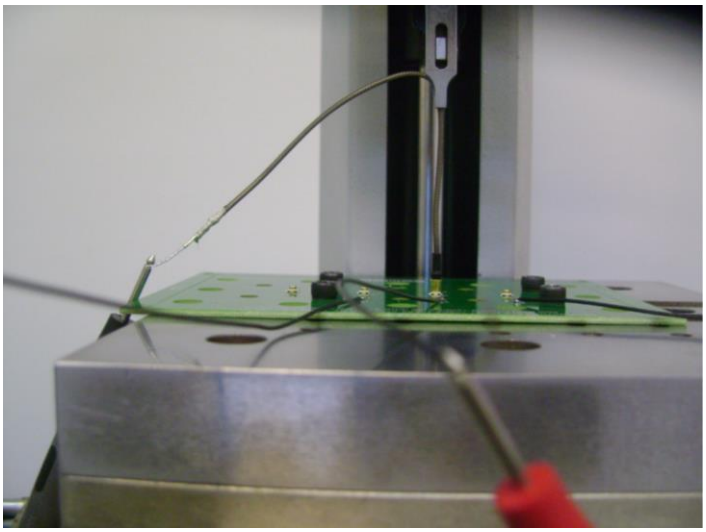


Fig. 1
0° Connector pull, notice the electrical continuity hook-up wires.

RESULTS

Mating/Unmating Forces: Thermal Aging Group

- **Initial**
  - **Mating**
    - **Min ---------- 2.29 Lbs**
    - **Max---------- 2.70 Lbs**
  - **Unmating**
    - **Min ---------- 2.55 Lbs**
    - **Max---------- 2.93 Lbs**
- **After Thermal**
  - **Mating**
    - **Min ---------- 2.35 Lbs**
    - **Max---------- 2.55 Lbs**
  - **Unmating**
    - **Min ---------- 3.09 Lbs**
    - **Max---------- 3.61 Lbs**

Mating/Unmating Forces: Mating/Unmating Durability Group

- **Initial**
  - **Mating**
    - **Min ---------- 2.47 Lbs**
    - **Max---------- 2.74 Lbs**
  - **Unmating**
    - **Min ---------- 2.84 Lbs**
    - **Max---------- 3.44 Lbs**
- **After 125 Cycles**
  - **Mating**
    - **Min ---------- 2.86 Lbs**
    - **Max---------- 4.24 Lbs**
  - **Unmating**
    - **Min ---------- 3.39 Lbs**
    - **Max---------- 4.53 Lbs**
- **After 250 Cycles**
  - **Mating**
    - **Min ---------- 2.75 Lbs**
    - **Max---------- 4.83 Lbs**
  - **Unmating**
    - **Min ---------- 3.55 Lbs**
    - **Max---------- 4.85 Lbs**
- **After 375 Cycles**
  - **Mating**
    - **Min ---------- 3.02 Lbs**
    - **Max---------- 4.79 Lbs**
  - **Unmating**
    - **Min ---------- 3.72 Lbs**
    - **Max---------- 4.82 Lbs**
- **After 500 Cycles**
  - **Mating**
    - **Min ---------- 3.59 Lbs**
    - **Max---------- 4.25 Lbs**
  - **Unmating**
    - **Min ---------- 3.07 Lbs**
    - **Max---------- 4.84 Lbs**

RESULTS Continued

- **After Humidity**
  - **Mating**
    - **Min ---------- 2.04 Lbs**
    - **Max---------- 2.32 Lbs**
  - **Unmating**
    - **Min ---------- 2.41 Lbs**
    - **Max---------- 2.83 Lbs**

Normal force:

Signal pin at 0.0015 Inch deflections

- **Initial**
  - **Min---------- 126.50 gf Set ----- 0.0000 Inch**
  - **Max ---------- 133.65 gf Set ----- 0.0001 Inch**
- **Thermal**
  - **Min----------96.50 gf Set----- 0.0000 Inch**
  - **Max ---------- 113.14 gf Set----- 0.0002 Inch**

Ground pin at 0.0036 Inch deflections

- **Initial**
  - **Min---------- 238.30 gf Set ----- 0.0001 Inch**
  - **Max ---------- 263.12 gf Set ----- 0.0003 Inch**
- **Thermal**
  - **Min---------- 205.30 gf Set----- 0.0003 Inch**
  - **Max ---------- 230.34 gf Set----- 0.0005 Inch**

Cable pull force:

- **0° Pull**
  - **Min ---------- 2.14 Lbs**
  - **Max---------- 2.82 Lbs**
- **90° Pull**
  - **Min ---------- 0.30 Lbs**
  - **Max---------- 0.47 Lbs**

Insulation Resistance minimums, IR

RF047-10SP9-10SP9-0305/RSP-122811-01

Pin to Ground

- **Initial**
  - **Mated----------10000 Meg Ω ---------- Passed**
  - **Unmated ----------10000 Meg Ω ---------- Passed**
- **Thermal Shock**
  - **Mated----------10000 Meg Ω ---------- Passed**
  - **Unmated ----------10000 Meg Ω ---------- Passed**
- **Humidity**
  - **Mated----------10000 Meg Ω ---------- Passed**
  - **Unmated ----------10000 Meg Ω ---------- Passed**

RESULTS Continued

RF047-10RP9-10RP9-0305/RSP-122811-01

Pin to Ground

- **Initial**
  - **Mated ---------- 8769 Meg Ω ---------- Passed**
  - **Unmated ---------- 10000 Meg Ω ---------- Passed**
- **Thermal Shock**
  - **Mated ---------- 10000 Meg Ω ---------- Passed**
  - **Unmated ---------- 10000 Meg Ω ---------- Passed**
- **Humidity**
  - **Mated ---------- 10000 Meg Ω ---------- Passed**
  - **Unmated ---------- 10000 Meg Ω ---------- Passed**

Dielectric Withstanding Voltage minimums, DWV

- **Minimums**
  - **Breakdown Voltage ---------- 750VAC**
  - **Test Voltage ---------- 565 VAC**
  - **Working Voltage ---------- 185 VAC**

Pin to Ground

- **Initial DWV ---------- Passed**
- **Thermal DWV ---------- Passed**
- **Humidity DWV ---------- Passed**

LLCR Gas Tight (20 LLCR test points)

Signal pin:

- **Initial ---------- 37.57 mOhms Max**

Ground pin:

- **Initial ---------- 14.03 mOhms Max**
- **Gas-Tight**
  - **<= +5.0 mOhms ---------- 20 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 Thermal Aging (20 LLCR test points)

Signal pin:

- **Initial ---------- 37.39 mOhms Max**

Ground pin:

- **Initial ---------- 14.01 mOhms Max**
- **Thermal Aging**
  - **<= +5.0 mOhms ---------- 20 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

LLCR Durability (20 LLCR test points)

Signal pin:

- **Initial ---------- 37.04 mOhms Max**

Ground pin:

- **Initial ---------- 14.20 mOhms Max**
- **Durability, 500 Cycles**
  - **<= +5.0 mOhms ---------- 20 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 ---------- 20 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 ---------- 20 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 Shock & Vibration (16 LLCR test points)

Signal pin:

- **Initial ---------- 73.61 mOhms Max**

Ground pin:

- **Initial ---------- 26.23 mOhms Max**
- **Shock &Vibration**
  - **<= +5.0 mOhms ---------- 16 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**

Mechanical Shock & Random Vibration:

- **Shock**
  - **No Damage---------- ---------- Pass**
  - **50 Nanoseconds---------- ---------- Pass**
- **Vibration**
  - **No Damage---------- ---------- Pass**
  - **50 Nanoseconds---------- ---------- Pass**

DATA SUMMARIES

Mating\Unmating Force: Thermal Aging Group

	Initial				After Thermals			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	10.19	2.29	11.34	2.55	10.45	2.35	13.74	3.09
Maximum	12.01	2.70	13.03	2.93	11.34	2.55	16.06	3.61
Average	11.21	**2.52**	12.51	**2.81**	10.83	**2.43**	14.79	**3.33**
St Dev	0.59	0.13	0.51	0.12	0.30	0.07	0.77	0.17
Count	10	10	10	10	10	10	10	10

Mating\Unmating Force: Mating\Unmating Durability Group

	Initial				After 125 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	10.99	2.47	12.63	2.84	12.72	2.86	15.08	3.39
Maximum	12.19	2.74	15.30	3.44	18.86	4.24	20.15	4.53
Average	11.55	**2.60**	14.10	**3.17**	14.92	**3.35**	17.73	**3.99**
St Dev	0.34	0.08	0.87	0.20	1.85	0.42	1.68	0.38
Count	10	10	10	10	10	10	10	10
	After 250 Cycles				After 375 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	12.23	2.75	15.79	3.55	13.43	3.02	16.55	3.72
Maximum	21.48	4.83	21.57	4.85	21.31	4.79	21.44	4.82
Average	17.10	**3.85**	18.41	**4.14**	16.62	**3.74**	18.36	**4.13**
St Dev	2.94	0.66	1.99	0.45	2.32	0.52	1.41	0.32
Count	10	10	10	10	10	10	10	10
	After 500 Cycles				After Humidity			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	15.97	3.59	13.66	3.07	9.07	2.04	10.72	2.41
Maximum	18.90	4.25	21.53	4.84	10.32	2.32	12.59	2.83
Average	17.19	**3.87**	17.74	**3.99**	9.64	**2.17**	11.59	**2.61**
St Dev	1.00	0.22	2.13	0.48	0.41	0.09	0.52	0.12
Count	10	10	10	10	10	10	10	10

DATA SUMMARIES Continued

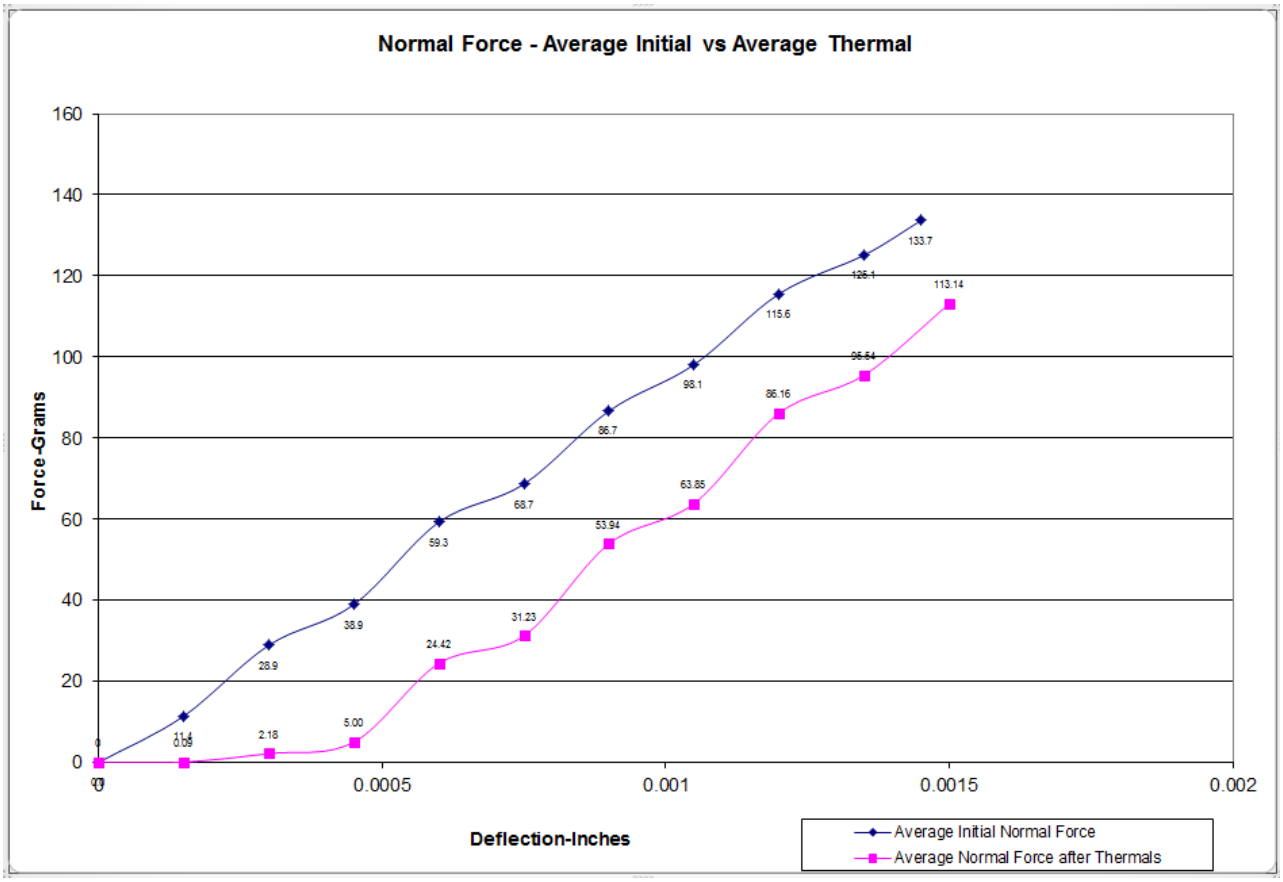
NORMAL FORCE (FOR CONTACTS TESTED OUTSIDE THE HOUSING):

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

Signal pin:

Initial	Deflections in inches Forces in Grams										
	0.0002	**0.0003**	**0.0005**	**0.0006**	**0.0008**	**0.0009**	**0.0011**	**0.0012**	**0.0014**	**0.0015**	***SET***
Averages	11.41	28.90	38.90	59.26	68.65	86.69	98.12	115.59	125.14	133.65	0.0001
Min	5.30	22.20	31.30	47.80	55.60	70.40	87.60	100.70	110.50	126.50	0.0000
Max	20.50	33.10	45.60	70.70	85.00	100.80	110.90	128.60	142.50	145.20	0.0001
St. Dev	4.521	3.172	4.802	6.424	8.907	9.502	8.423	9.374	10.569	6.344	0.0001
Count	10	10	10	10	10	10	10	10	10	10	10

After Thermals	Deflections in inches Forces in Grams										
	0.0002	**0.0003**	**0.0005**	**0.0006**	**0.0008**	**0.0009**	**0.0011**	**0.0012**	**0.0014**	**0.0015**	***SET***
Averages	0.09	2.18	5.00	24.42	31.23	53.94	63.85	86.16	95.54	113.14	0.0002
Min	-0.40	-0.40	-0.20	12.30	20.50	39.40	53.60	68.60	79.20	96.50	0.0000
Max	0.90	16.10	22.40	45.30	45.30	64.30	76.50	95.10	105.70	125.30	0.0003
St. Dev	0.354	5.084	7.586	9.873	7.746	8.551	7.838	7.835	7.348	8.679	0.0001
Count	10	10	10	10	10	10	10	10	10	10	10

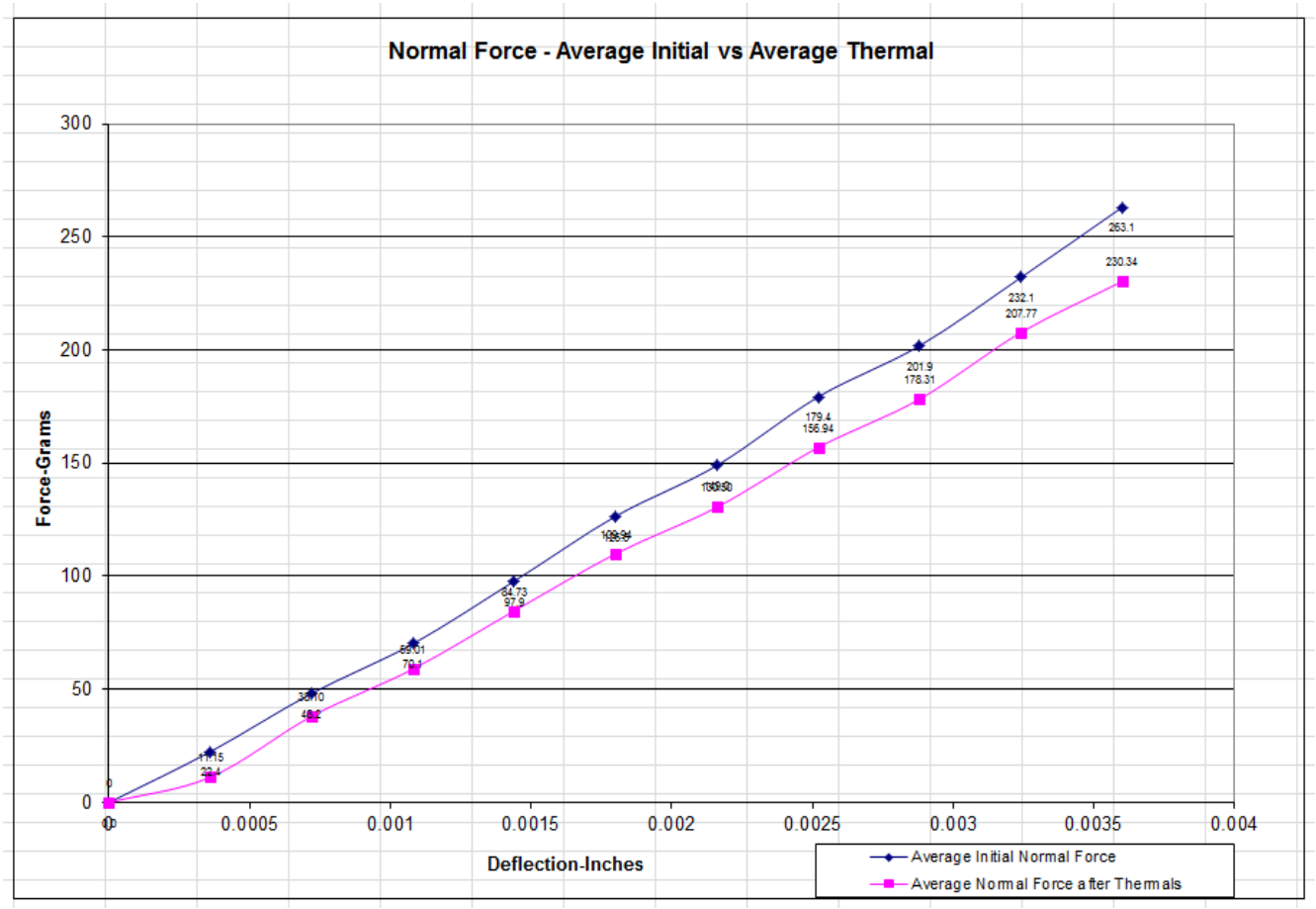


DATA SUMMARIES Continued

Ground pin:

Initial	Deflections in inches Forces in Grams										
	0.0004	**0.0007**	**0.0011**	**0.0014**	**0.0018**	**0.0022**	**0.0025**	**0.0029**	**0.0032**	**0.0036**	***SET***
Averages	22.42	48.23	70.13	97.88	126.51	148.98	179.35	201.90	232.11	263.12	0.0003
Min	16.10	40.40	64.20	86.40	117.70	135.40	166.40	184.30	213.70	238.30	0.0001
Max	40.60	57.70	78.90	112.60	142.80	166.10	205.50	225.10	263.60	296.10	0.0005
St. Dev	6.916	5.189	4.691	6.980	7.295	8.394	11.029	11.666	14.817	17.533	0.0001
Count	10	10	10	10	10	10	10	10	10	10	10

After Thermals	Deflections in inches Forces in Grams										
	0.0004	**0.0007**	**0.0011**	**0.0014**	**0.0018**	**0.0022**	**0.0025**	**0.0029**	**0.0032**	**0.0036**	***SET***
Averages	11.15	38.10	59.01	84.73	109.94	130.50	156.94	178.31	207.77	230.34	0.0005
Min	-0.10	12.80	36.60	55.40	77.40	103.30	127.10	150.10	181.20	205.30	0.0003
Max	27.90	56.60	77.20	100.60	140.50	160.00	193.60	222.40	258.50	257.50	0.0008
St. Dev	10.168	13.693	11.596	12.587	15.554	15.525	18.091	20.649	23.467	20.110	0.0001
Count	10	10	10	10	10	10	10	10	10	10	10



DATA SUMMARIES Continued

Cable pull force:

0° Pull

	Force (lbs)
Minimum	**2.14**
Maximum	2.82
Average	2.49

90° Pull

	Force (lbs)
Minimum	**0.30**
Maximum	0.47
Average	0.36

INSULATION RESISTANCE (IR):

	Pin to Ground (10SP9)		
	Mated	Unmated	Unmated
Minimum	**RF047/RSP**	**RF047**	**RSP**
Initial	10000	10000	10000
Thermal	10000	10000	10000
Humidity	10000	10000	10000

	Pin to Ground (10RP9)		
	Mated	Unmated	Unmated
Minimum	**RF047/RSP**	**RF047**	**RSP**
Initial	8769	10000	10000
Thermal	10000	10000	10000
Humidity	10000	10000	10000

DATA SUMMARIES Continued

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	**RF047/RSP**
Break Down Voltage	750
Test Voltage	565
Working Voltage	185

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

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

DATA SUMMARIES Continued

LLCR Durability:

1) A total of 20 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

LLCR Measurement Summaries by Pin Type				
Date	10/24/2014	10/31/2014	11/6/2014	11/17/2014
Room Temp (Deg C)	23	23	22	21
Rel Humidity (%)	51	51	48	51
Technician	Kason He	Kason He	Kason He	Kason He
mOhm values	**Actual Initial**	**Delta 500 Cycles**	**Delta Them Shck**	**Delta Humidity**
	Pin Type 1: Ground			
Average	13.89	0.57	0.41	0.57
St. Dev.	0.20	0.29	0.29	0.50
Min	13.60	0.09	0.06	0.09
Max	14.20	1.05	0.96	1.87
Summary Count	10	10	10	10
Total Count	10	10	10	10
	Pin Type 2: Signal			
Average	36.75	0.51	0.40	0.28
St. Dev.	0.28	0.44	0.37	0.41
Min	36.31	0.05	0.01	0.00
Max	37.04	1.60	1.13	1.39
Summary Count	10	10	10	10
Total Count	10	10	10	10

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
500 Cycles	**20**	**0**	**0**	**0**	**0**	**0**
Them Shck	**20**	**0**	**0**	**0**	**0**	**0**
Humidity	**20**	**0**	**0**	**0**	**0**	**0**

DATA SUMMARIES Continued

LLCR Thermal Aging:

1) A total of 20 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

	LLCR Measurement Summaries by Pin Type			
Date	10/24/2014	11/6/2014		
Room Temp (Deg C)	23	22		
Rel Humidity (%)	51	48		
Technician	Kason He	Kason He		
mOhm values	**Actual Initial**	**Delta Thermal**	**Delta**	**Delta**
	Pin Type 1: Ground			
Average	13.64	0.60		
St. Dev.	0.22	0.15		
Min	13.35	0.43		
Max	14.01	0.89		
Summary Count	10	10		
Total Count	10	10		
	Pin Type 2: Signal			
Average	36.78	0.21		
St. Dev.	0.33	0.14		
Min	36.20	0.02		
Max	37.39	0.44		
Summary Count	10	10		
Total Count	10	10		

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
Thermal	**20**	**0**	**0**	**0**	**0**	**0**

DATA SUMMARIES Continued

LLCR Gas Tight:

1) A total of 20 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

LLCR Measurement Summaries by Pin Type				
Date	10/21/2014	10/23/2014		
Room Temp (Deg C)	22	23		
Rel Humidity (%)	48	49		
Technician	Kason He	Kason He		
mOhm values	**Actual Initial**	**Delta Acid Vapor**	**Delta**	**Delta**
	Pin Type 1: Ground			
Average	13.53	0.27		
St. Dev.	0.40	0.15		
Min	12.83	0.00		
Max	14.03	0.51		
Summary Count	10	10		
Total Count	10	10		
	Pin Type 2: Signal			
Average	36.55	0.38		
St. Dev.	0.47	0.28		
Min	36.07	0.03		
Max	37.57	0.87		
Summary Count	10	10		
Total Count	10	10		

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
Acid Vapor	**20**	**0**	**0**	**0**	**0**	**0**

DATA SUMMARIES Continued

LLCR Shock &Vibration:

1). A total of 16 points were measured.
2). EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets.*
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

	LLCR Measurement Summaries by Pin Type			
Date	11/18/2014	12/2/2014		
Room Temp (Deg C)	22	21		
Rel Humidity (%)	21	34		
Technician	Troy Cook	Troy Cook		
mOhm values	**Actual Initial**	**Delta Shock-Vib**	**Delta**	**Delta**
	Pin Type 1: GROUND			
Average	24.35	0.49		
St. Dev.	1.19	0.35		
Min	22.91	0.17		
Max	26.23	1.26		
Summary Count	8	8		
Total Count	8	8		
	Pin Type 2: SIGNAL			
Average	72.36	0.83		
St. Dev.	0.92	0.20		
Min	70.24	0.50		
Max	73.61	1.11		
Summary Count	8	8		
Total Count	8	8		

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
Shock-Vib	**16**	**0**	**0**	**0**	**0**	**0**

Nanosecond Event Detection:

Shock and Vibration Event Detection Summary	
Contacts tested	16
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

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: HZ-HPM-01
Description: IR/DWV Tester
Manufacturer: AN9636H
Model: AN9636H
Serial #: 089601091
Accuracy: Last Cal: 2015-7-6, Next Cal: 2016-7-5

Equipment #: HZ-TCT-01
Description: Normal force analyzer
Manufacturer: Mecmesin Multitester
Model: Mecmesin Multitester 2.5-i
Serial #: 08-1049-04
Accuracy: Last Cal: 2015-4-28, Next Cal: 2016-4-27

Equipment #: HZ-OV-01
Description: Oven
Manufacturer: Huida
Model: CS101-1E
Serial #: CS101-1E-B
Accuracy: Last Cal: 2014-12-14, Next Cal: 2015-12-13

Equipment #: HZ-THC-01
Description: Humidity transmitter
Manufacturer: Thermtron
Model: HMM30C
Serial #: D0240037
Accuracy: Last Cal: 2015-3-3, Next Cal: 2016-3-2

Equipment #: HZ-TSC-01
Description: Thermal Shock transmitter
Manufacturer: CSZ
Model: 10-VT14994
Serial #: VTS-3-6-6-SC/AC
Accuracy: Last Cal: 2014-11-1, Next Cal: 2015-11-1

Equipment #: HZ-MO-05
Description: Micro-ohmmeter
Manufacturer: Keithley
Model: 3706
Serial #: 297288
Accuracy: Last Cal: 2014-8-6, Next Cal: 2015-8-5

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: MO-02
Description: Multimeter /Data Acquisition System
Manufacturer: Keithley
Model: 2700
Serial #: 0780546
Accuracy: Last Cal: 2015-6-16, Next Cal: 2016-6-16

Equipment #: PS-01
Description: Power Supply
Manufacturer: Hewlett Packard
Model: 6033A
Serial #: 3329A-07330
Accuracy: Last Cal: 2015-6-12, Next Cal: 2016-6-12

Equipment #: PS-02
Description: Power Supply
Manufacturer: Hewlett Packard
Model: 6033A
Serial #: 2847A-04167
Accuracy: Last Cal: 2015-6-12, Next Cal: 2016-6-12

Equipment #: SVC-01
Description: Shock & Vibration Table
Manufacturer: Data Physics
Model: LE-DSA-10-20K
Serial #: 10037
Accuracy: See Manual
… Last Cal: 2014-11-31, Next Cal: 2015-11-31

Equipment #: ACLM-01
Description: Accelerometer
Manufacturer: PCB Piezotronics
Model: 352C03
Serial #: 115819
Accuracy: See Manual
… Last Cal: 2015-07-9, Next Cal: 2016-7-9

Equipment #: ED-03
Description: Event Detector
Manufacturer: Analysis Tech
Model: 32EHD
Serial #: 1100604
Accuracy: See Manual
… Last Cal: 20154-06-4, Next Cal: 2016-06-4