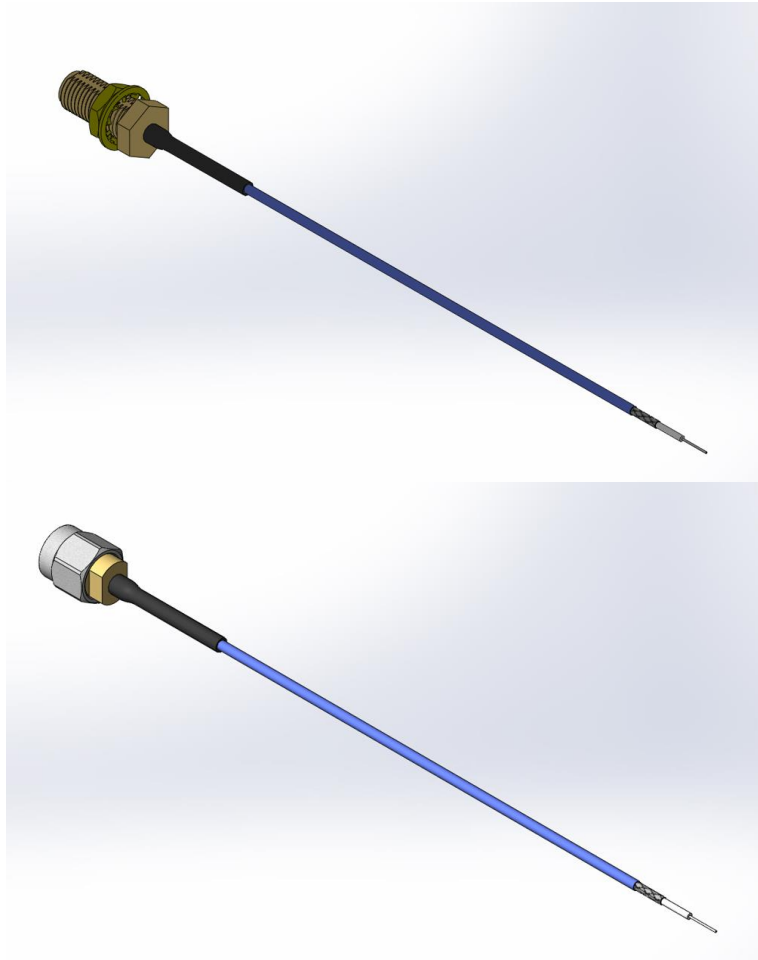




Project Number: Design Qualification Test Report	Tracking Code: 3485882_Report_Rev_1
Requested by: Jenny Chou	Date: 11/28/2022
Part #: RF047-A-01BJ-505050-0152/RF047-A-01SP-505050-0152	
Part description: RF047-A-01BJ / RF047-A-01SP	Tech: Keney Chen
Test Start: 9/19/2022	Test Completed: 10/8/2022



DESIGN QUALIFICATION TEST REPORT

RF047-A-01BJ / RF047-A-01SP
RF047-A-01BJ-505050-0152 /RF047-A-01SP-505050-0152

Tracking Code: 3485882_Report_Rev_1	Part #: RF047-A-01BJ-505050-0152 /RF047-A-01SP-505050-0152
Part description: RF047-A-01BJ / RF047-A-01SP	

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
10/13/2022	1	Initial Issue	KC

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: MIL-PRF-39012.

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) Parts not intended for testing LLCR and DWV/IR are visually inspected and cleaned if necessary.
- 4) Any additional preparation will be noted in the individual test sequences.

FLOWCHARTS**IR/DWV****Pin-to-Ground**Group 1

RF047-A-01SP-505050-0152

RF047-A-01BJ-505050-0152

4 Assemblies

Step	Description
1.	Interface Gaging MAX. CONTACT DEPTH = 0.008 "
2.	IR ⁽²⁾ - Non Standard
3.	DWV at Test Voltage ⁽¹⁾ - Non Standard Test Voltage = 500 V
4.	LLCR ⁽³⁾ - Non Standard <i>Note: Signal and ground.</i>
5.	Thermal Shock ⁽⁴⁾ - Non Standard
6.	IR ⁽²⁾ - Non Standard
7.	DWV at Test Voltage ⁽¹⁾ - Non Standard Test Voltage = 500 V
8.	LLCR ⁽³⁾ - Non Standard <i>Note: Signal and ground.</i>
9.	Interface Gaging MAX. CONTACT DEPTH = 0.008 "

(1) DWV at Test Voltage = Other

Test Condition = 1 (Sea Level) Test voltage applied for 60 seconds
MIL-PRF-39012, Paragraph 4.6.14 per MIL-STD-202-301

(2) IR = Other

Test Condition = 500 Vdc, 2 Minutes Max
MIL-PRF-39012, Paragraph 4.6.8 per MIL-STD-202-302

(3) LLCR = Other

Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max
MIL-PRF-39012, Paragraph 4.6.13 except current to be 100mA nominal and voltage to be 20 mV maximum.

(4) Thermal Shock = Other

Exposure Time at Temperature Extremes = 1/2 Hour
Method A, Test Condition = I (-55°C to +125°C)
Test Duration = test condition B except 10 cycles instead of 5.
MIL-PRF-39012, Paragraph. 4.6.17 per MIL-STD-202-107

FLOWCHARTS Continued**Cable Pull**

Group 1
RF047-A-01SP-505050-0152

2 Assemblies
0 Degrees

Step	Description
1.	Cable Retention (2) - Non Standard <i>Note: Pull-to-destruct.</i>

Group 2
RF047-A-01BJ-505050-0152

2 Assemblies
0 Degrees

Step	Description
1.	Cable Retention (2) - Non Standard <i>Note: Pull-to-destruct.</i>

Group 3
RF047-A-01SP-505050-0152
RF047-A-01BJ-505050-0152

4 Assemblies
0 Degrees

Step	Description
1.	Interface Gaging MAX CONTACT DEPTH = 0.008 "
2.	LLCR (3) - Non Standard <i>Note: Signal and ground.</i>
3.	Cable Retention (1) - Non Standard APPLIED FORCE = 5 lbs
4.	LLCR (3) - Non Standard <i>Note: Signal and ground.</i>
5.	Interface Gaging MAX CONTACT DEPTH = 0.008 "

-
- (1) Cable Retention = Other
Apply 5 pounds (2.26kg) for Cable Retention test.
MIL-PRF-39012, Paragraph 4.6.21
- (2) Cable Retention = Other
Pull-to-destruct.
MIL-PRF-39012, Paragraph 4.6.21
- (3) LLCR = Other
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max
MIL-PRF-39012, Paragraph 4.6.13 except current to be 100mA nominal and voltage to be 20 mV maximum.

FLOWCHARTS Continued**Center Contact Retention***Note: Testing to be done on uncabled assembly*Group 1

PRF01-P-C-EG-047A-SD

4 Assemblies

Custom Group

Step	Description
1.	Interface Gaging Max Contact Depth = 0.008 "
2.	Contact Retention Min Retention Force = 4.0 lbs <i>Note: apply force axially from cable side of assembly</i>
3.	Interface Gaging Min Contact Depth = 0.000 "

Group 2

PRF01-J-C-EG-047A-BD

4 Assemblies

Custom Group

Step	Description
1.	Interface Gaging Max Contact Depth = 0.008 "
2.	Contact Retention Min Retention Force = 4.0 lbs <i>Note: apply force axially from cable side of assembly</i>
3.	Interface Gaging Min Contact Depth = 0.000 "

FLOWCHARTS Continued**Mating/Unmating/Durability**Group 1

RF047-A-01SP-505050-0152

RF047-A-01BJ-505050-0152

4 Assemblies

Step	Description
1.	Interface Gaging MAX CONTACT DEPTH = 0.008 "
2.	LLCR (1) - Non Standard <i>Note: initial LLCR measurement before mating cycles. Signal and ground</i>
3.	Cycles Quantity = 500 Cycles <i>Note: By hand, Torque each time to 8 in-lbs. Rotate plug coupling nut only. Do not rotate entire assembly. MIL-PRF-39012, Paragraph 4.6.12</i>
4.	LLCR (1) - Non Standard Max Delta = 15 mOhm
5.	Interface Gaging MAX CONTACT DEPTH = 0.008 "

(1) LLCR = Other

Open Circuit Voltage = 20 mV Max

Test Current = 100 mA Max

MIL-PRF-39012, Paragraph 4.6.13 except current to be 100mA nominal and voltage to be 20 mV maximum.

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

THERMAL SHOCK:

- 1) MIL-PRF-39012, paragraph. 4.6.17 per MIL-STD-202-107.
- 2) Test Condition I: -55°C to +125°C
- 3) Test Time: ½ hour dwell at each temperature extreme
- 4) Test Duration: test condition B except 10 cycles instead of 5.
- 5) All test samples are pre-conditioned at ambient.
- 6) All test samples are exposed to environmental stressing in the mated condition.

LLCR:

- 1) MIL-PRF-39012, Paragraph 4.6.13 except current to be 100 mA nominal and voltage to be 20 mV maximum.
- 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 $+1000$ mOhms: -----Unstable
 - f. $>+1000$ mOhms:-----Open Failure

CABLE RETENTION:

- 1) Apply 5 pounds (2.3 kg) for cable retention test.
- 2) Pull to destruct.
- 3) MIL-PRF-30192, paragraph. 4.6.21.

MATING/UNMATING:

- 1) MIL-PRF-30192, paragraph. 4.6.12.
- 2) By hand. Torque each time to 8 in-lbs.

Center Contact Retention:

- 1) Apply 4 pounds force axially from cable side of assembly

ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes

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: MIL-PRF-39012, paragraph. 4.6.8 per MIL-STD-202-302.
 - 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.

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: MIL-PRF-39012, paragraph. 4.6.14 per MIL-STD-202-301.
 - b. Test Conditions:
 - i. Between Adjacent Contacts or Signal-to-Ground
 - ii. Barometric Test Condition 1(Sea Level) Test voltage applied for 60 seconds.
 - 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).

RESULTS

Cable Pull force

- 0° Pull
 - Group 1 RF047-A-01BJ-505050-0152
 - Min -----10.211 lbs
 - Max -----12.082 lbs
 - Group 2 RF047-A-01SP-505050-0152
 - Min -----10.667 lbs
 - Max -----11.350 lbs

Insulation Resistance minimums, IR

Pin to Ground

- Initial
 - Mated -----45000 Meg Ω ----- Passed
- Thermal Shock
 - Mated -----45000 Meg Ω ----- Passed

Dielectric Withstanding Voltage minimums, DWV

- Minimums
 - Test Voltage -----500 VAC

Pin to Ground

- Initial DWV -----Passed
- Thermal DWV -----Passed

RESULTS Continued**Interface Gaging****IR/DWV Group****01SP****Initial**

- **Min** ----- 0.0008 inch (0.02mm)
- **Max** ----- 0.0012 inch (0.03mm)

After Thermal Shock

- **Min** ----- 0.0004 inch (0.01mm)
- **Max** ----- 0.0016 inch (0.04mm)

01BJ**Initial**

- **Min** ----- 0.0004 inch (0.01mm)
- **Max** ----- 0.0008 inch (0.02mm)

After Thermal Shock

- **Min** ----- 0.0004 inch (0.01mm)
- **Max** ----- 0.0008 inch (0.02mm)

Cable Pull Group**01SP****Initial**

- **Min** ----- 0.0004 inch (0.01mm)
- **Max** ----- 0.0012 inch (0.03mm)

After Retention

- **Min** ----- 0.0004 inch (0.01mm)
- **Max** ----- 0.0012 inch (0.03mm)

01BJ**Initial**

- **Min** ----- 0.0004 inch (0.01mm)
- **Max** ----- 0.0008 inch (0.02mm)

After Retention

- **Min** ----- 0.0012 inch (0.03mm)
- **Max** ----- 0.0024 inch (0.06mm)

RESULTS Continued**Durability Group****01SP****Initial**

- **Min** ----- **0.0008 inch (0.02mm)**
- **Max** ----- **0.0012 inch (0.03mm)**

After 500 Cycles

- **Min** ----- **0.0004 inch (0.01mm)**
- **Max** ----- **0.0008 inch (0.02mm)**

01BJ**Initial**

- **Min** ----- **0.0004 inch (0.01mm)**
- **Max** ----- **0.0008 inch (0.02mm)**

After 500 Cycles

- **Min** ----- **0.0004 inch (0.01mm)**
- **Max** ----- **0.0016 inch (0.04mm)**

Center Contact Retention Group**01SP****Initial**

- **Min** ----- **0.0012 inch (0.03mm)**
- **Max** ----- **0.0016 inch (0.04mm)**

After Retention

- **Min** ----- **0.0008 inch (0.02mm)**
- **Max** ----- **0.0016 inch (0.04mm)**

01BJ**Initial**

- **Min** ----- **0.0004 inch (0.01mm)**
- **Max** ----- **0.0020 inch (0.05mm)**

After Retention

- **Min** ----- **0.0012 inch (0.03mm)**
- **Max** ----- **0.0020 inch (0.05mm)**

RESULTS Continued

LLCR IR/DWV (4 ground and 4 signal LLCR test points)

Ground pin

- **Initial** ----- 30.21 mOhms Max
- **Thermal Shock**
 - <= +5.0 mOhms-----4 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 +1000 mOhms-----0 Points ----- Unstable
 - >+1000 mOhms-----0 Points ----- Open Failure

Signal pin

- **Initial** ----- 78.73 mOhms Max
- **Thermal Shock**
 - <= +5.0 mOhms-----4 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 +1000 mOhms-----0 Points ----- Unstable
 - >+1000 mOhms-----0 Points ----- Open Failure

LLCR Cable Pull (4 ground and 4 signal LLCR test points)

Ground pin

- **Initial** ----- 30.21 mOhms Max
- **After 5lb Retention**
 - <= +5.0 mOhms-----4 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 +1000 mOhms-----0 Points ----- Unstable
 - >+1000 mOhms-----0 Points ----- Open Failure

Signal pin

- **Initial** ----- 79.54 mOhms Max
- **After 5lb Retention**
 - <= +5.0 mOhms-----4 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 +1000 mOhms-----0 Points ----- Unstable
 - >+1000 mOhms-----0 Points ----- Open Failure

RESULTS Continued

Mating/Unmating Durability (4 ground and 4 signal LLCR test points)

Ground pin

- **Initial** ----- 29.54 mOhms Max
- **After 500 Cycles**
 - **<= +5.0 mOhms**-----4 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 +1000 mOhms**-----0 Points ----- Unstable
 - **>+1000 mOhms**-----0 Points ----- Open Failure

Signal pin

- **Initial** ----- 79.81 mOhms Max
- **After 500 Cycles**
 - **<= +5.0 mOhms**-----4 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 +1000 mOhms**-----0 Points ----- Unstable
 - **>+1000 mOhms**-----0 Points ----- Open Failure

DATA SUMMARIES**INSULATION RESISTANCE (IR):**

		Pin to Ground
		Mated
Minimum		RF047-A-01SP/RF047-A-01BJ
Initial		45000
Thermal Shock		45000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):**IR/DWV Group**

Voltage Rating Summary	
Minimum	RF047-A-01SP/RF047-A-01BJ
Test Voltage	500

Pin to Ground	
Initial Test Voltage	Pass
After Thermal Shock Test Voltage	Pass

Cable Pull Force:**0° Pull****Group 1 RF047-A-01SP-505050-0152**

	Force (lbs)
Minimum	10.67
Maximum	11.35
Average	11.01

Group 2 RF047-A-01BJ-505050-0152

	Force (lbs)
Minimum	10.21
Maximum	12.08
Average	11.15

DATA SUMMARIES Continued**LLCR IR/DWV:**

- 1) A total of 4 signal and 4 ground points were measured.
- 2) MIL-PRF-39012, *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 $+1000$ mOhms: -----Unstable
 - f. $>+1000$ mOhms:-----Open Failure

LLCR Measurement Summaries by Pin Type				
Date	9/26/2022	9/29/2022		
Room Temp (Deg C)	22	22		
Rel Humidity (%)	50	50		
Technician	Keney Chen	Keney Chen		
mOhm values	Actual	Delta		
	Initial	Thermal Shock		
Pin Type: Signal 1				
Average	78.42	0.57		
St. Dev.	0.43	0.36		
Min	77.81	0.04		
Max	78.73	0.81		
Summary Count	4	4		
Total Count	4	4		
Pin Type: GND 1				
Average	29.60	1.01		
St. Dev.	0.49	0.37		
Min	29.01	0.5		
Max	30.21	1.33		
Summary Count	4	4		
Total Count	4	4		

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	≤ 5	>5 & ≤ 10	>10 & ≤ 15	>15 & ≤ 50	>50 & ≤ 1000	>1000
After Thermal Shock	8	0	0	0	0	0

DATA SUMMARIES Continued**LLCR Cable Pull:**

- 1) A total of 4 signal and 4 ground points were measured.
- 2) MIL-PRF-39012, *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 $+1000$ mOhms: -----Unstable
 - f. $>+1000$ mOhms: -----Open Failure

LLCR Measurement Summaries by Pin Type

Date	9/28/2022	9/30/2022		
Room Temp (Deg C)	20	20		
Rel Humidity (%)	50	50		
Technician	Keney Chen	Keney Chen		
mOhm values	Actual Initial	Delta after 5lb Retention		
Pin Type: Signal 1				
Average	78.75	0.59		
St. Dev.	0.67	0.22		
Min	77.94	0.35		
Max	79.54	0.87		
Summary Count	4	4		
Total Count	4	4		
Pin Type: GND 1				
Average	29.68	0.17		
St. Dev.	0.36	0.08		
Min	29.42	0.07		
Max	30.21	0.25		
Summary Count	4	4		
Total Count	4	4		

LLCR Delta Count by Category

	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	≤ 5	>5 & ≤ 10	>10 & ≤ 15	>15 & ≤ 50	>50 & ≤ 1000	>1000
After 5lb Retention	8	0	0	0	0	0

DATA SUMMARIES Continued

Mating/Unmating Durability:

- 1) A total of 4 signal and 4 ground points were measured.
- 2) MIL-PRF-39012, *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 $+1000$ mOhms: -----Unstable
 - f. $>+1000$ mOhms: -----Open Failure

LLCR Measurement Summaries by Pin Type				
Date	9/19/2022	9/22/2022		
Room Temp (Deg C)	22	22		
Rel Humidity (%)	50	50		
Technician	Keney Chen	Keney Chen		
mOhm values	Actual Initial	Delta 500 CYCLES		
Pin Type: Signal 1				
Average	78.86	0.50		
St. Dev.	0.64	0.73		
Min	78.47	0.10		
Max	79.81	1.60		
Summary Count	4	4		
Total Count	4	4		
Pin Type: GND 1				
Average	29.03	1.72		
St. Dev.	0.55	0.80		
Min	28.51	0.85		
Max	29.54	2.78		
Summary Count	4	4		
Total Count	4	4		

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	≤ 5	>5 & ≤ 10	>10 & ≤ 15	>15 & ≤ 50	>50 & ≤ 1000	>1000
500 Cycles	8	0	0	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: 3/4/2022, Next Cal: 3/3/2023**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: 04/16/2022, Next Cal: 04/15/2023

Equipment #: DG-HPT-01**Description:** Hipot Safety Tester**Manufacturer:** Vitrek**Model:** V73**Serial #:** 025866**Accuracy:**

... Last Cal: 04/16/2022, Next Cal: 04/15/2023

Equipment #: HZ-MO-05**Description:** Micro-ohmmeter**Manufacturer:** Keithley**Model:** 3706**Serial #:** 1285188**Accuracy:** Last Cal: 12/17/2021, Next Cal: 12/16/2022