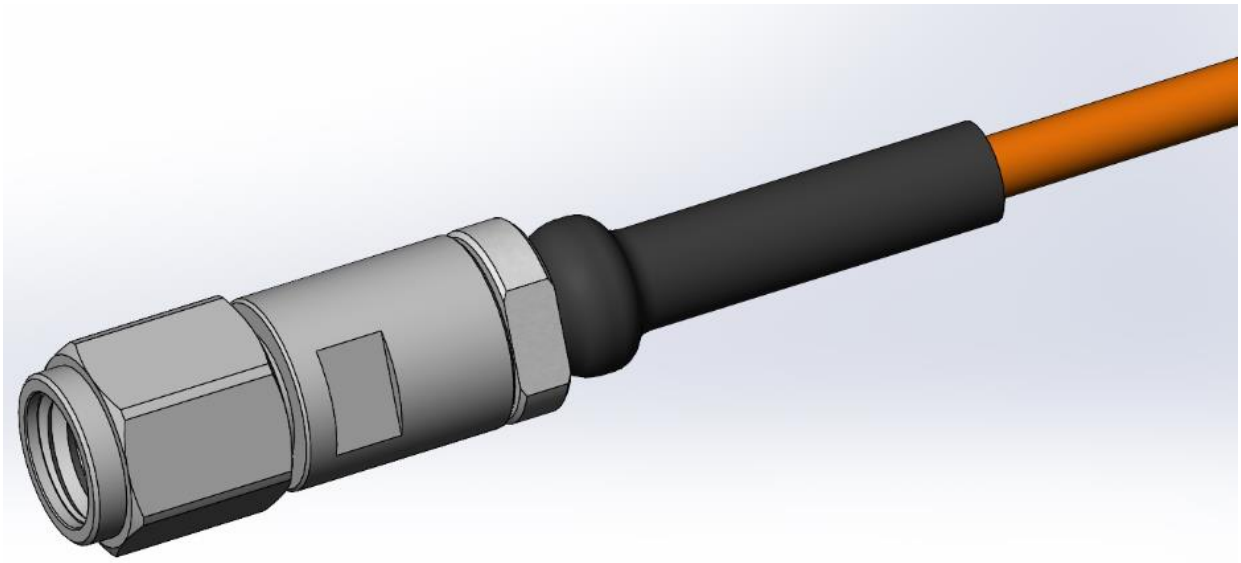
Project Number: Design Qualification Test Report	Tracking Code: CR-1225501_Report_Rev_1
Requested by: Joe Huang	Date: 6/5/2025
Part #: LL095-10SP-505050-0305	
Part description: LL095-10SP	Tech: Keney Chen
Test Start: 2/14/2025	Test Completed: 2/21/2025



DESIGN QUALIFICATION TEST REPORT

LL095-10SP
LL095-10SP-505050-0305

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
3/4/2025	**1**	**Initial Issue**	**KC**

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: 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

LL095-10SP-505050-0305

LL110-10BJ-505050-0305

5 Assemblies

Step	Description
1.	IR (2) - Non Standard
2.	DWV at Test Voltage (1) - Non Standard Test Voltage = 500 VAC
3.	LLCR (3) - Non Standard *Note: Signal and ground.*
4.	Thermal Shock (4) - Non Standard
5.	IR (2) - Non Standard
6.	DWV at Test Voltage (1) - Non Standard Test Voltage = 500 VAC
7.	LLCR (3) - Non Standard Max Delta = 15 mOhm *Note: Signal and ground.*

(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 = 500V DC, 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
Test Condition = I (-65°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

Mating/Unmating/Durability

Group 1
LL095-10SP-505050-0305
LL110-10BJ-505050-0305
5 Assemblies

Step	Description
1.	Interface Gaging
2.	DWV at Test Voltage (1) - Non Standard DWV = 500 VAC
3.	LLCR (2) - Non Standard *Note: Signal and ground.*
4.	Cycles Quantity = 500 Cycles *Note: By hand. Torque each time to 4 in-lbs. Rotate plug coupling nut only. Do not rotate entire assembly. MIL-PRF-39012, Paragraph. 4.6.12*
5.	LLCR (2) - Non Standard Max Delta = 15 mOhm *Note: Signal and ground.*
6.	Interface Gaging

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(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) 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

Cable Pull

Group 1
LL095-10SP-505050-0305

5 Assemblies

Step	Description
1.	Cable Retention (2) - Non Standard *Note: Pull-to-destruct.*

Group 2
LL095-10SP-505050-0305

5 Assemblies

Step	Description
1.	Interface Gaging
2.	LLCR (3) - Non Standard *Note: Signal and ground.*
3.	Cable Retention (1) - Non Standard *Note: Apply 7 pounds (3.17 kg) for Cable Retention test.*
4.	LLCR (3) - Non Standard *Note: Signal and ground.*
5.	Interface Gaging

(1) Cable Retention = Other
Apply 5 pounds (2.3 kg) for Cable Retention test.
MIL-PRF-30192, Paragraph 4.6.21

(2) Cable Retention = Other
Pull-to-destruct.
MIL-PRF-30192, 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.

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

THERMAL SHOCK:

1) MIL-STD-202-107, Test Condition B, *Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors.*
2) Test Condition 1: -65°C to +125°C
3) Test Time: ½ hour dwell at each temperature extreme
4) Number of Cycles: 10
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 100mA nominal and voltage to be 20mV 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. <= +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

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: At sea level per DSCC 10020.
    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

- **Min----------11.20 lbs**
- **Max ----------13.22 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**

Interface Gaging

Mating/Unmating Durability Group

Initial

- **Min---------- 0.0020 inch**
- **Max ---------- 0.0030 inch**

After Thermal Shock

- **Min---------- 0.0025 inch**
- **Max ---------- 0.0030 inch**

Cable Pull Group

Initial

- **Min---------- 0.0010 inch**
- **Max ---------- 0.0020 inch**

After Retention

- **Min---------- 0.0015 inch**
- **Max ---------- 0.0020 inch**

RESULTS Continued

LLCR IR/DWV (5 ground and 5 signal LLCR test points)

Ground pin

- **Initial ---------- 72.88 mOhms Max**
- **Thermal Shock**
  - **<= +5.0 mOhms----------5 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 ----------137.99 mOhms Max**
- **Thermal Shock**
  - **<= +5.0 mOhms----------5 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 (5 ground and 5 signal LLCR test points)

Ground pin

- **Initial ---------- 36.53 mOhms Max**
- **After 5lb Retention**
  - **<= +5.0 mOhms----------5 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 ---------- 66.02 mOhms Max**
- **After 5lb Retention**
  - **<= +5.0 mOhms----------5 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

LLCR Mating/Unmating Durability Group (5 ground and 5 signal LLCR test points)

Ground pin

- **Initial ---------- 73.94 mOhms Max**
- **After 500 Cycles**
  - **<= +5.0 mOhms----------4 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms----------1 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------0 Points ---------- Acceptable**
  - **+15.1 to +50.0 mOhms ----------0 Points ---------- Marginal**
  - **+50.1 to +1000 mOhms----------0 Points ---------- Unstable**
  - **>+1000 mOhms----------0 Points ---------- Open Failure**

Signal pin

- **Initial ----------138.99 mOhms Max**
- **After 500 Cycles**
  - **<= +5.0 mOhms----------5 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	**10SP-10BJ**
Initial	45000
Thermal Shock	45000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

IR/DWV Group

Voltage Rating Summary	
Minimum	**10SP-10BJ**
Test Voltage	500

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

Cable Pull Force:

	Force (lbs)
Minimum	**11.20**
Maximum	13.22
Average	12.23

DATA SUMMARIES Continued

LLCR IR/DWV:

1) A total of 5 signal and 5 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. <= +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	2/14/2025	2/20/2025		
Room Temp (Deg C)	22	22		
Rel Humidity (%)	50	50		
Technician	Keney Chen	Keney Chen		
mOhm values	Actual **Initial**	**Delta** **Thermal Shock**		
	Pin Type: Signal 1			
Average	137.602	0.272		
St. Dev.	0.4239	0.2286		
Min	136.94	0.1		
Max	137.99	0.62		
Summary Count	5	5		
Total Count	5	5		
	Pin Type: GND 1			
Average	71.534	0.956		
St. Dev.	0.8850	0.5684		
Min	70.42	0.11		
Max	72.88	1.52		
Summary Count	5	5		
Total Count	5	5		

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	**10**	**0**	**0**	**0**	**0**	**0**

DATA SUMMARIES Continued

LLCR Cable Pull:

1) A total of 5 signal and 5 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. <= +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	2/14/2025	2/19/2025		
Room Temp (Deg C)	20	20		
Rel Humidity (%)	50	50		
Technician	Keney Chen	Keney Chen		
mOhm values	**Actual** **Initial**	**Delta** **after 7lb Retention**		
	Pin Type: Signal 1			
Average	64.16	0.47		
St. Dev.	1.13	0.36		
Min	63.38	0.15		
Max	66.02	1.04		
Summary Count	5	5		
Total Count	5	5		
	Pin Type: GND 1			
Average	36.22	0.23		
St. Dev.	0.29	0.09		
Min	35.82	0.08		
Max	36.53	0.31		
Summary Count	5	5		
Total Count	5	5		

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
After 7lb Retention	**10**	**0**	**0**	**0**	**0**	**0**

DATA SUMMARIES Continued

LLCR Mating/Unmating Durability Group:

1) A total of 5 signal and 5 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. <= +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	2/14/2025	2/20/2025		
Room Temp (Deg C)	22	22		
Rel Humidity (%)	50	50		
Technician	Richard Ison	Richard Ison		
mOhm values	Actual **Initial**	**Delta 500 Cycles**		
	Pin Type: Signal 1			
Average	138.484	0.94		
St. Dev.	0.4164	0.5437		
Min	138.01	0.37		
Max	138.99	1.66		
Summary Count	5	5		
Total Count	5	5		
	Pin Type: GND 1			
Average	71.824	2.922		
St. Dev.	1.4806	1.9588		
Min	70.53	0.05		
Max	73.94	5.52		
Summary Count	5	5		
Total Count	5	5		

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
500 Cycles	**9**	**1**	**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: 3/4/2024, Next Cal: 3/3/2025

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: 04/16/2024, Next Cal: 04/15/2025

Equipment #: DG-HPT-01
Description: Hipot Safety Tester
Manufacturer: Vitrek
Model: V73
Serial #: 025866
Accuracy:
… Last Cal: 04/16/2024, Next Cal: 04/15/2025

Equipment #: HZ-MO-05
Description: Micro-ohmmeter
Manufacturer: Keithley
Model: 3706
Serial #: 1285188
Accuracy: Last Cal: 12/17/2024, Next Cal: 12/16/2025