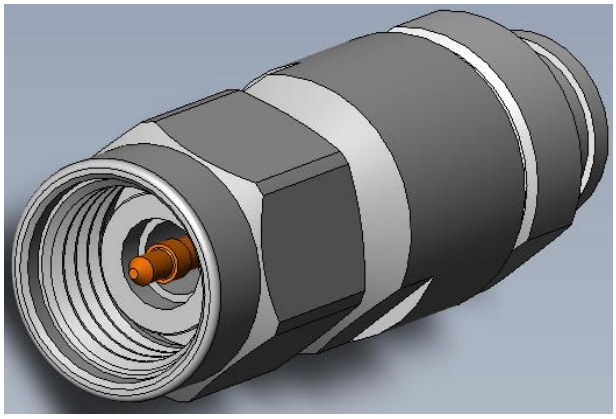
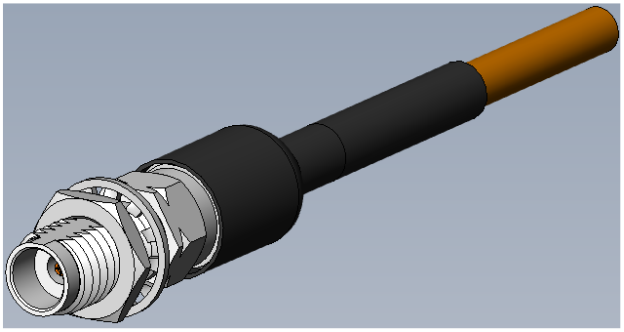
Project Number: Design Qualification Test Report	Tracking Code: CR-1171402_Report_Rev_1
Requested by: Tom Yahav	Date: 11/22/2024
Part #: LL043-92SP-505050-0152/LL043-92BJ-505050-0152	
Part description: LL043	Tech: Kason He
Test Start: 11/11/2024	Test Completed: 11/19/2024





DESIGN QUALIFICATION TEST REPORT

LL043
LL043-92SP-92SP-0152\LL043-92BJ-92BJ-0152

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
11/22/2024	**1**	**Initial Issue**	**KH**

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

LL043-92SP-505050-1000

LL043-92BJ-505050-1000

4 Assemblies

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

(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

Cable Pull

Group 1
LL043-92SP-505050-0152

4 Assemblies
0 Degrees

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

Group 2
LL043-92BJ-505050-0152

4 Assemblies
0 Degrees

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

Group 3
LL043-92SP-505050-0152
LL043-92BJ-505050-0152
4 Assemblies
0 Degrees

Step	Description
1.	Length & Mass
2.	Interface Gaging
3.	LLCR (3) - Non Standard *Note: Signal and ground.*
4.	Cable Retention (1) - Non Standard *Note: Apply 5 pounds (2.3 kg) for Cable Retention test.*
5.	LLCR (3) - Non Standard *Note: Signal and ground.*
6.	Interface Gaging

(1) Cable Retention = Other
Apply 10 pounds (4.6 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-PRF-39012, paragraph. 4.6.17 per MIL-STD-202-107.
2) Test Condition I: -65℃ to +125℃
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. <= +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.

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 LL043-92SP-505050-0152

- **Min ----------43.36 lbs**
- **Max ----------50.30 lbs**

Group 2 LL043-92BJ-505050-0152

- **Min ----------43.28 lbs**
- **Max ----------48.13 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

Length & Mass

IR/DWV Group

Length

92SP

- **Min ----------1005.00 mm**
- **Max ----------1006.00 mm**

92BJ

- **Min ----------1005.00 mm**
- **Max ----------1006.00 mm**

Mass

92SP

- **Min ----------39.35 g**
- **Max ----------39.47 g**

92BJ

- **Min ----------37.88 g**
- **Max ----------37.92 g**

Cable Pull Group

Length

92SP

- **Min ---------- 154.00 mm**
- **Max ---------- 155.00 mm**

92BJ

- **Min ---------- 155.00 mm**
- **Max ---------- 156.00 mm**

Mass

92SP

- **Min ----------11.84 g**
- **Max ----------11.90 g**

92BJ

- **Min ----------10.19 g**
- **Max ----------10.26 g**

RESULTS Continued

Interface Gaging

IR/DWV Group

92SP

Initial

- **Min ---------- 0.0005 in**
- **Max ---------- 0.0015 in**

After Thermal Shock

- **Min ---------- 0.0005 in**
- **Max ---------- 0.0020 in**

92BJ

Initial

- **Min ---------- 0.0005 in**
- **Max ---------- 0.0010 in**

After Thermal Shock

- **Min ---------- 0.0005 in**
- **Max ---------- 0.0015 in**

Cable Pull Group

92SP

Initial

- **Min ---------- 0.0005 in**
- **Max ---------- 0.0015 in**

After Retention

- **Min ---------- 0.0005 in**
- **Max ---------- 0.0020 in**

92BJ

Initial

- **Min ---------- 0.0005 in**
- **Max ---------- 0.0015 in**

After Retention

- **Min ---------- 0.0005 in**
- **Max ---------- 0.0010 in**

RESULTS Continued

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

Ground pin

- **Initial ---------- 65.34 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 ---------- 66.96 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 ---------- 12.68 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 ---------- 11.66 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**

DATA SUMMARIES

INSULATION RESISTANCE (IR):

	Pin to Ground
	Mated
Minimum	92SP/92BJ
Initial	45000
Thermal Shock	45000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	92SP/92BJ
Test Voltage	500

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

Cable Pull Force:

0° Pull

Group 1 LL043-92SP-505050-0152

	Force (lbs)
Minimum	43.36
Maximum	50.30
Average	46.20

Group 2 LL043-92BJ-505050-0152

	Force (lbs)
Minimum	43.28
Maximum	48.13
Average	45.37

DATA SUMMARIES Continued

LENGTH & MASS

IR/DWV Group

92SP	Length (mm)	Mass (g)
1	1005.00	39.45
2	1006.00	39.47
3	1005.00	39.40
4	1005.00	39.35

92BJ	Length (mm)	Mass (g)
1	1006.00	37.92
2	1006.00	37.88
3	1005.00	37.88
4	1006.00	37.88

Cable Pull Group

Group 3		
92SP	Length (mm)	Mass (g)
1	154.00	11.85
2	155.00	11.90
3	155.00	11.84
4	155.00	11.87

Group 3		
92BJ	Length (mm)	Mass (g)
1	156.00	10.24
2	155.00	10.24
3	156.00	10.26
4	155.00	10.19

DATA SUMMARIES Continued

INTERFACE GAGING

IR/DWV Group

Gaging (0.000 /0.003) (inch)			
92SP	Initial	Post Ther Shock	Delta
1	0.0005	0.0015	0.0010
2	0.0010	0.0005	0.0005
3	0.0015	0.0020	0.0005
4	0.0010	0.0005	0.0005

Gaging (0.000 /0.003) (inch)			
92BJ	Initial	Post Ther Shock	Delta
1	0.0010	0.0015	0.0005
2	0.0010	0.0005	0.0005
3	0.0005	0.0010	0.0005
4	0.0005	0.0015	0.0010

Cable Pull Group

Gaging (0.000 /0.003) (inch)			
92SP	Initial	Retention	Delta
1	0.0005	0.0005	0.0000
2	0.0010	0.0015	0.0005
3	0.0015	0.0020	0.0005
4	0.0010	0.0020	0.0010

Gaging (0.000 /0.003) (inch)			
92BJ	Initial	Retention	Delta
1	0.0010	0.0010	0.0000
2	0.0015	0.0010	0.0005
3	0.0005	0.0010	0.0005
4	0.0005	0.0005	0.0000

DATA SUMMARIES Continued

LLCR IR/DWV:

1) A total of 4 signal and 4 ground 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 +1000 mOhms: ----------Unstable
   f. >+1000 mOhms:----------Open Failure

LLCR Measurement Summaries by Pin Type				
Date	11/11/2024	11/19/2024		
Room Temp (Deg C)	22	22		
Rel Humidity (%)	50	55		
Technician	Kason He	Kason He		
mOhm values	Actual **Initial**	**Delta** **Thermal Shock**		
Pin Type: Signal 1				
Average	66.375	0.4575		
St. Dev.	0.4090	0.1624		
Min	66.04	0.23		
Max	66.96	0.61		
Summary Count	4	4		
Total Count	4	4		
Pin Type: GND 1				
Average	64.895	0.3325		
St. Dev.	0.4070	0.3438		
Min	64.53	0.02		
Max	65.34	0.64		
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) 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 +1000 mOhms: ----------Unstable
   f. >+1000 mOhms:----------Open Failure

LLCR Measurement Summaries by Pin Type				
Date	11/11/2024	11/11/2024		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	50	50		
Technician	Kason He	Kason He		
mOhm values	Actual **Initial**	**Delta 5lb Retention**		
Pin Type: Signal 1				
Average	11.54	0.05		
St. Dev.	0.09	0.02		
Min	11.44	0.04		
Max	11.66	0.07		
Summary Count	4	4		
Total Count	4	4		
Pin Type: GND 1				
Average	11.34	0.03		
St. Dev.	1.36	0.03		
Min	10.06	0		
Max	12.68	0.06		
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**

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: 3/5/2024, Next Cal: 3/4/2025

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: 1/2/2024, Next Cal: 1/1/2025