Project Number: Design Qualification Test Report	Tracking Code: CR-1124802_Report_Rev_1
Requested by: Tom Yahav	Date: 8/8/2024
Part #: LL043-24SP-505050-1000	
Part description: LL043	Tech: Tony Wagoner
Test Start: 7/22/2024	Test Completed: 7/30/2024

DESIGN QUALIFICATION TEST REPORT

LL043
LL043-24SP-505050-1000

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
8/9/2024	**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) The automated procedure is used with aqueous compatible soldering materials.
4) Parts not intended for testing LLCR and DWV/IR are visually inspected and cleaned if necessary.
5) Any additional preparation will be noted in the individual test sequences.

FLOWCHARTS

IR/DWV

Pin-to-Ground

Group 1

LL043-24SP-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 LL043-24SP-505050-0152 4 Assemblies 0 Degrees		Group 2 LL043-24SP-505050-0152 4 Assemblies 0 Degrees	
Step	**Description**	**Step**	**Description**
1.	Cable Retention (2) - Non Standard *Note: Pull-to-destruct.*	1.	Length & Mass
		2.	Interface Gaging
		3.	LLCR (3) - Non Standard *Note: Signal and ground.*
		4.	Cable Retention (1) - Non Standard *Note: Apply 15 pounds (6.8 kg) for Cable Retention test.*
		5.	LLCR (3) - Non Standard *Note: Signal and ground.*
		6.	Interface Gaging

(1) Cable Retention = Other
Apply 15 pounds (6.8 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.

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) Test condition = 500V DC, 2 Minutes Max, MIL-PRF-39012, Paragraph.4.6.8 per MIL-STD-202-302.

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) Other test condition=1 (see level) test voltage applied for 60 seconds MIL-PRF-39012, Paragraph.4.6.14 per MIL-STD-202-301.

LLCR:

1) MIL-PRF-39012, paragraph 4.6.13 except current to be 100mA 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

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

CABLE PULL

1) Group 1 Cable Retention = Other Pull-to-destruct. MIL-PRF-30192, Paragraph 4.6.21
2) Group 2 Apply 15 pounds (6.8 kg) for Cable Retention test.MIL-PRF-39012, Paragraph 4.6.21

Fig 1 Cable Pull

RESULTS

Interface Gaging

IR\DWV Group

- **Initial**
  - **Min ---------- 0.066 mm (0.00260 inch)**
  - **Max---------- 0.067 mm (0.00264 inch)**
- **After Thermal Shock**
  - **Min ---------- 0.065 mm (0.00256 inch)**
  - **Max---------- 0.066 mm (0.00260 inch)**

Cable Pull Group 2

- **Initial**
  - **Min ---------- 0.066 mm (0.00260 inch)**
  - **Max---------- 0.067 mm (0.00264 inch)**
- **After retention**
  - **Min ---------- 0.065 mm (0.00256 inch)**
  - **Max---------- 0.066 mm (0.00260 inch)**

Cable Pull

Cable Pull Group 1

- **Min----------44.59 lbs**
- **Max ----------52.21 lbs**

Insulation Resistance minimums, IR

Pin to Ground

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

Dielectric Withstanding Voltage minimums, DWV

- **Test Voltage ----------500 VAC**

Pin to Ground

- **Thermal Shock DWV ----------Passed**

RESULTS Continued

LLCR IR\DWV Group (4 signal and 4 ground LLCR test points)

LL043-24SP-505050-1000

Signal Pin

- **Initial ---------- 33.77 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**

Ground Pin

- **Initial ---------- 31.74 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 Group (4 signal and 4 ground LLCR test points)

LL043-24SP-505050-0152

Signal Pin

- **Initial ---------- 5.97 mOhms Max**
- **Cable 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**

Ground Pin

- **Initial ---------- 4.89 mOhms Max**
- **Cable 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

Interface Gaging

IR\DWV Group:

Interface Gaging			
Sample #	**Initial**	**Thermal Shock**	**Delta**
1	0.067	0.066	0.0006
2	0.066	0.065	0.0009
3	0.067	0.066	0.0010
4	0.067	0.066	0.0011

Cable Pull Group 2:

Interface Gaging			
Sample #	**Initial**	**After15 Push**	**Delta**
9	0.067	0.066	0.0008
10	0.067	0.065	0.0011
11	0.066	0.066	0.0003
12	0.066	0.066	0.0003

Cable Pull

Cable Pull Group 1:

	Force (lbs)
Minimum	**44.59**
Maximum	52.21
Average	49.04

INSULATION RESISTANCE (IR):

	Pin to Ground
	Mated
Minimum	**LL043**
Initial	45000
Thermal Shock	45000

DIELECTRIC WITHSTANDING VOLTAGE (DWV):

Voltage Rating Summary	
Minimum	**LL043**
Test Voltage	**500**

Pin to Ground	
After Thermal Shock	Passed

DATA SUMMARIES Continued

LLCR IR\DWV Group:

1) A total of 4 signal and 4 ground points were measured.
2) MIL-PRF-39012, paragraph 4.6.13 except current to be 100mA nominal and voltage to be 20 mV maximum.
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

LL043-24SP-505050-1000

LLCR Measurement Summaries by Pin Type				
Date	2024/7/29	2024/7/30		
Room Temp (Deg C)	22	22		
Rel Humidity (%)	55	55		
Technician	Tony Wagoner	Tony Wagoner		
mOhm values	Actual **Initial**	**Delta Thermal Shock**		
Pin Type: Signal 1				
Average	33.67	0.22		
St. Dev.	0.07	0.17		
Min	33.6	0.04		
Max	33.77	0.44		
Summary Count	4	4		
Total Count	4	4		
Pin Type: GND 1				
Average	31.64	0.04		
St. Dev.	0.11	0.04		
Min	31.52	0		
Max	31.74	0.09		
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**
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, paragraph 4.6.13 except current to be 100mA nominal and voltage to be 20 mV maximum.
3) A computer program, *LLCR 221.exe*, ensures repeatability for data acquisition.
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   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

LL043-24SP-505050-0152

LLCR Measurement Summaries by Pin Type				
Date	2024/7/29	2024/7/29		
Room Temp (Deg C)	22	22		
Rel Humidity (%)	55	55		
Technician	Tony Wagoner	Tony Wagoner		
mOhm values	Actual **Initial**	**Delta After Ret 15lb.**		
Pin Type: Signal 1				
Average	5.95	0.03		
St. Dev.	0.01	0.02		
Min	5.94	0.01		
Max	5.97	0.05		
Summary Count	4	4		
Total Count	4	4		
Pin Type: GND 1				
Average	4.51	0.06		
St. Dev.	0.27	0.06		
Min	4.26	0.02		
Max	4.89	0.15		
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**
Cable Retention (15lbs)	**8**	**0**	**0**	**0**	**0**	**0**

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: MO-01
Description: Micro-Ohmeter
Manufacturer: Keithley
Model: 580
Serial #: 772740
Accuracy: See Manual
… Last Cal: 2/29/2024, Next Cal: 2/29/2025

Equipment #: HPT-01
Description: Hipot Safety Tester
Manufacturer: Vitrek
Model: V73
Serial #: 019808
Accuracy:
… Last Cal: 05/11/2024, Next Cal: 05/11/2025

Equipment #: TSC-01
Description: Vertical Thermal Shock Chamber
Manufacturer: Cincinnatti Sub Zero
Model: VTS-3-6-6-SC/AC
Serial #: 10-VT14993
Accuracy: See Manual
… Last Cal: 06/12/2024, Next Cal: 06/30/2025

Equipment #: TCT-06
Description: Test Resources test stand
Manufacturer: Test Resources
Model: 100R250-12
Serial #: 0710016-01
Accuracy: Speed Accuracy: +/- 5% of indicated speed; Displacement: +/- 5 micrometers.
… Last Cal: 05/03/2024, Next Cal: 05/03/2025