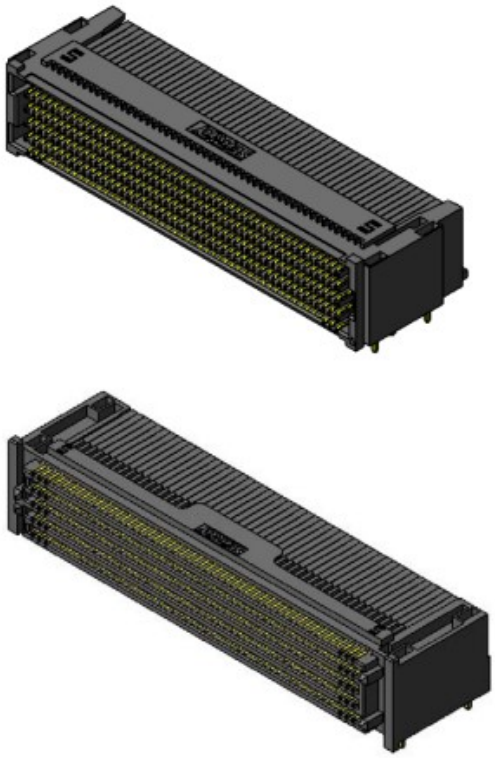
Project: Extended Life Qualification Test Report	Tracking Code: CR-1063202_Report_Rev_1
Requested by: Xuan Dong	Date: 8/8/2025
Part #: SEAF-50-01-S-10-2-RA-K-TR/ SEAM-50-01-S-10-2-RA-K-TR	Tech: Tony Wagoner
Part description: SEAF / SEAM	
Test Start: 3/25/2024	Test Completed: 7/15/2024



Extended Life Qualification Test Report

SEAF / SEAM
SEAF-50-01-S-10-2-RA-K-TR/ SEAM-50-01-S-10-2-RA-K-TR

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
1/7/2025	**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-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 was 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 is visually inspected and cleaned if necessary.
7) Any additional preparation will be noted in the individual test sequences.
8) Solder Information: Lead Free

FLOWCHARTS

Extended Life

Group 3		Group 4	
SEAF-50-01-S-10-2-RA-K-TR		SEAF-50-01-S-10-2-RA-K-TR	
SEAM-50-01-S-10-2-RA-K-TR		SEAM-50-01-S-10-2-RA-K-TR	
8 Assemblies		8 Assemblies	
500 Cycles		1000 Cycles	
Step	**Description**	**Step**	**Description**
1.	Plating Thickness Verification (4)	1.	Plating Thickness Verification (4)
2.	LLCR (2)	2.	LLCR (2)
3.	Cycles Quantity = 500 Cycles	3.	Cycles Quantity = 1000 Cycles
4.	LLCR (2) Max Delta = 15 mOhm	4.	LLCR (2) Max Delta = 15 mOhm
5.	Thermal Shock (5)	5.	Thermal Shock (5)
6.	LLCR (2) Max Delta = 15 mOhm	6.	LLCR (2) Max Delta = 15 mOhm
7.	Humidity (1)	7.	Humidity (1)
8.	LLCR (2) Max Delta = 15 mOhm	8.	LLCR (2) Max Delta = 15 mOhm
9.	Photos (3)	9.	Photos (3)

(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) Photos
Attach 2-3 photos of contact area

(4) Plating Thickness Verification
Measure, verify, and document plating thickness on both male and female (one group only)
Plating thickness to be measured on loose pins used during assembly

(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)

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 +85°C)
3) Test Time: ½ hour dwell at each temperature extreme
4) Test Duration: Test condition A-3 = 100 Cycles.
5) All test samples are pre-conditioned at ambient.
6) All test samples are exposed to environmental stressing in the mated condition.

LLCR:

1) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
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

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.

RESULTS

LLCR Extended Life Group (192 LLCR test points)

500 cycles

Signal type 1

- **Initial ---------- 10.21 mOhms Max**

Signal type 2

- **Initial ---------- 14.15 mOhms Max**

Signal type 3

- **Initial ---------- 19.17 mOhms Max**

Signal type 4

- **Initial ---------- 25.53 mOhms Max**
- **Durability, 500 Cycles**
  - **<= +5.0 mOhms ---------- 192 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 Shock**
  - **<= +5.0 mOhms ---------- 192 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 ---------- 188 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------3 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------1 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 Extended Life Group (192 LLCR test points)

1000 cycles

Signal type 1

- **Initial ---------- 10.56 mOhms Max**

Signal type 2

- **Initial ---------- 14.85 mOhms Max**

Signal type 3

- **Initial ---------- 19.47 mOhms Max**

Signal type 4

- **Initial ---------- 25.39 mOhms Max**
- **Durability, 100 Cycles**
  - **<= +5.0 mOhms ---------- 192 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 Shock**
  - **<= +5.0 mOhms ---------- 192 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 ---------- 189 Points ---------- Stable**
  - **+5.1 to +10.0 mOhms ----------2 Points ---------- Minor**
  - **+10.1 to +15.0 mOhms ----------1 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**

DATA SUMMARIES

LLCR Extended Life

1). A total of 192 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 +1000 mOhms ----------Unstable
   f. >+1000 mOhms: ----------Open Failure

500 Cycles

	LLCR Measurement Summaries by Pin Type			
Date	6/12/2024	6/18/2024	7/1/2024	7/12/2024
Room Temp (Deg C)	22	22	22	22
Rel Humidity (%)	44	53	48	54
Technician	Tony Wagoner	Matthew Gramlin	Tony Wagoner	Richard Ison
mOhm values	Actual **Initial**	**Delta 500 Cycles**	**Delta Therm Shck**	**Delta Humidity**
	Pin Type: Signal 1			
Average	8.74	0.31	0.35	1.39
St. Dev.	0.69	0.27	0.26	2
Min	7.45	0	0	0.12
Max	10.21	1.22	1.07	11.16
Summary Count	32	32	32	32
Total Count	32	32	32	32
	Pin Type: Signal 2			
Average	12.46	0.34	0.33	1.05
St. Dev.	1.1	0.22	0.24	0.9
Min	10.07	0	0	0.02
Max	14.15	0.9	1.13	5.05
Summary Count	56	56	56	56
Total Count	56	56	56	56
	Pin Type: Signal 3			
Average	16.78	0.32	0.32	0.45
St. Dev.	1.26	0.25	0.33	0.37
Min	14.76	0.01	0.02	0.01
Max	19.17	1.11	1.91	2.11
Summary Count	64	64	64	64
Total Count	64	64	64	64
	Pin Type: Signal 4			
Average	23.26	0.34	0.42	0.94
St. Dev.	1.75	0.4	0.34	1.29
Min	20.11	0	0.01	0
Max	25.53	1.77	1.41	5.36

Summary Count	40	40	40	40
Total Count	40	40	40	40

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	<=5	>5 & <=10	>10 & <=15	>15 & <=50	>50 & <=1000	>1000
500 Cycles	192	0	0	0	0	0
Therm Shck	192	0	0	0	0	0
Humidity	188	3	1	0	0	0

DATA SUMMARIES Continued

1000 Cycles

	LLCR Measurement Summaries by Pin Type			
Date	6/12/2024	6/20/2024	7/5/2024	7/23/2024
Room Temp (Deg C)	22	22	22	22
Rel Humidity (%)	41	55	55	54
Technician	Tony Wagoner	Tony Wagoner	Richard Ison	Tony Wagoner
mOhm values	Actual **Initial**	**Delta 1000 Cycles**	**Delta Therm Shck**	**Delta Humidity**
	Pin Type: Signal 1			
Average	8.77	0.41	0.39	1.74
St. Dev.	0.76	0.21	0.29	3.08
Min	7.64	0.02	0	0.02
Max	10.56	1	1.31	14.93
Summary Count	32	32	32	32
Total Count	32	32	32	32
	Pin Type: Signal 2			
Average	12.59	0.46	0.49	0.66
St. Dev.	1.16	0.35	0.38	0.6
Min	9.99	0.03	0.01	0.04
Max	14.85	1.77	1.46	3.6
Summary Count	56	56	56	56
Total Count	56	56	56	56
	Pin Type: Signal 3			
Average	16.85	0.36	0.49	0.59
St. Dev.	1.26	0.29	0.34	0.59
Min	14.86	0	0.02	0
Max	19.47	1.28	1.43	4.24
Summary Count	64	64	64	64
Total Count	64	64	64	64
	Pin Type: Signal 4			
Average	23.31	0.39	0.71	0.63
St. Dev.	1.76	0.34	0.38	0.7
Min	20.12	0.01	0.1	0
Max	25.39	1.38	1.43	3.25
Summary Count	40	40	40	40
Total Count	40	40	40	40

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
1000 Cycles	**192**	**0**	**0**	**0**	**0**	**0**
Therm Shck	**192**	**0**	**0**	**0**	**0**	**0**
Humidity	**189**	**2**	**1**	**0**	**0**	**0**

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: TCT-04
Description: Dillon Quantrol TC21 25-1000 mm/min series test stand
Manufacturer: Dillon Quantrol
Model: TC2 I series test stand
Serial #: 04-1041-04
Accuracy: Speed Accuracy: +/- 5% of indicated speed; Speed Accuracy: +/- 5% of indicated speed;
… Last Cal: 05/29/2024, Next Cal: 05/29/2025

Equipment #: THC-01
Description: Humidity transmitter
Manufacturer: Thermtron
Model: SM-8-8200
Serial #: 38846
Accuracy: Last Cal: 2/28/2024, Next Cal: 2/27/2025

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

Equipment #: MO-04
Description: Multimeter /Data Acquisition System
Manufacturer: Keithley
Model: 2700
Serial #: 0798688
Accuracy: See Manual
… Last Cal: 04/30/2024, Next Cal: 04/30/2025