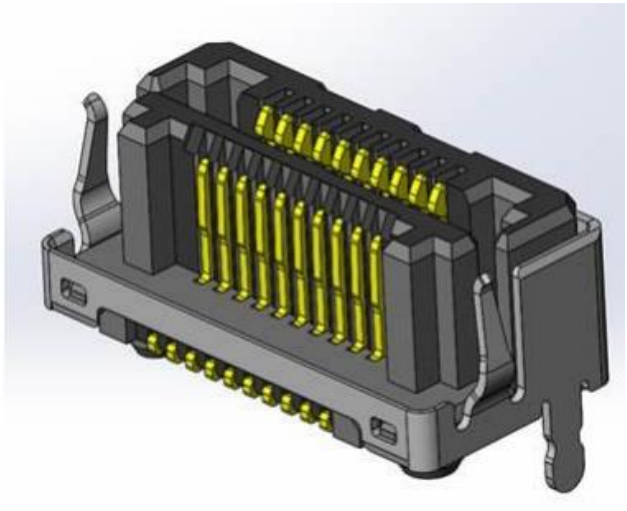
Project Number: Severe Environment Test Report	Tracking Code: 2030871_Report_Rev_1
Requested by: Stephen Brutscher	Date: 6/5/2020
Part #: LSHM-150-06.0-S-DV-A-N-K-TR/LSHM-150-04.0-S-DV-A-N-TR	
Part description: LSHM	Tech: Tony Wagoner
Test Start: 8/25/2019	Test Completed: 10/30/2019



SEVERE ENVIRONMENT TEST REPORT

LSHM

LSHM-150-06.0-S-DV-A-N-K-TR/LSHM-150-04.0-S-DV-A-N-TR

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
11/15/2019	**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: Severe Environment test. Please see test plan.

APPLICABLE DOCUMENTS

Standards: EIA Publication 364; VITA 47.1

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 testing were 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 are visually inspected and cleaned if necessary.
7) Any additional preparation will be noted in the individual test sequences.
8) Solder Information: Lead Free
9) Samtec Test PCBs used: PCB-110051-TST/ PCB-110059-TST

FLOWCHARTS

Mating/Unmating/Durability

Note: With Humidity (Up to 100% RH, 240 hours, 25°C to 65°C)

Note: From MIL-STD-810G: For chamber control purposes, 100% RH implies as close to 100% RH as possible, but not less than 95%.

Group 1		Group 2		Group 3	
LSHM-150-06.0-S-DV-A-N-TR		LSHM-120-06.0-S-DV-A-N-TR		LSHM-105-06.0-S-DV-A-N-TR	
LSHM-150-04.0-S-DV-A-N-TR		LSHM-120-04.0-S-DV-A-N-TR		LSHM-105-04.0-S-DV-A-N-TR	
8 Assemblies		8 Assemblies		8 Assemblies	
50 Positions		20 Positions		5 Positions	
Step	**Description**	**Step**	**Description**	**Step**	**Description**
1.	LLCR (2)	1.	Mating/Unmating Force (3)	1.	Mating/Unmating Force (3)
2.	Mating/Unmating Force (3)	2.	Cycles Quantity = 250 Cycles	2.	Cycles Quantity = 250 Cycles
3.	Cycles Quantity = 250 Cycles	3.	Mating/Unmating Force (3)	3.	Mating/Unmating Force (3)
4.	LLCR (2) Max Delta = 15 mOhm				
5.	Thermal Shock (4)				
6.	LLCR (2) Max Delta = 15 mOhm				
7.	Humidity (1) - Non Standard				
8.	LLCR (2) Max Delta = 15 mOhm				
9.	Mating/Unmating Force (3)				

(1) Humidity = Other
240 Hours
+25°C to +65°C @ 95% RH up to 100% RH

(2) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max

(3) Mating/Unmating Force = EIA-364-13

(4) 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)

FLOWCHARTS Continued

Mechanical Shock/Random Vibration/LLCR

Group 1 LSHM-150-06.0-S-DV-A-N-TR LSHM-150-04.0-S-DV-A-N-TR 8 Assemblies VITA 47.1 (V To V)		Group 2 LSHM-150-06.0-S-DV-A-N-TR LSHM-150-01-S-DH-A-N-TR 8 Assemblies VITA 47.1 (DH To V)	
Step	**Description**	**Step**	**Description**
1.	LLCR (1)	1.	LLCR (1)
2.	Mechanical Shock (2) • Non Standard	2.	Mechanical Shock (2) • Non Standard
3.	Random Vibration (3) • Non Standard *Note: Conditions:* *1) 5 Hz to 100 Hz, PSD increasing at 3dB/octave* *2) 100 Hz to 1000 Hz 0.10 g^2/Hz* *3) 1000 Hz to 2000 HzPSD decreasing at 3dB/octave*	3.	Random Vibration (3) • Non Standard *Note: Conditions:* *1) 5 Hz to 100 Hz, PSD increasing at 3dB/octave* *2) 100 Hz to 1000 Hz 0.10 g^2/Hz* *3) 1000 Hz to 2000 HzPSD decreasing at 3dB/octave*
4.	LLCR (1) Max Delta ■ 15 mOhm	4.	LLCR (1) Max Delta ■ 15 mOhm

(1) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max

(2) Mechanical Shock = Other
40G, 11 milliseconds, Half Sine
Number of Shocks = 3 Per Direction, Per Axis, 18 Total
Operating Shock Class OS2

(3) Random Vibration = Other
12 G 'RMS', 5Hz to 2000Hz, 1 Hours/Axis
Vibration Class V3 VITA 47.1

Mechanical Shock/Random Vibration/Event Detection

Group 1 LSHM-150-06.0-S-DV-A-N-TR LSHM-150-04.0-S-DV-A-N-TR 8 Assemblies VITA 47.1 (V To V)		Group 2 LSHM-150-06.0-S-DV-A-N-TR LSHM-150-01-S-DH-A-N-TR 8 Assemblies VITA 47.1 (DH To V)	
Step	**Description**	**Step**	**Description**
1.	Nanosecond Event Detection (Mechanical Shock) (1) • Non Standard	1.	Nanosecond Event Detection (Mechanical Shock) (1) • Non Standard
2.	Nanosecond Event Detection (Random Vibration) (2) • Non Standard *Note: Conditions:* *1) 5 Hz to 100 Hz, PSD increasing at 3dB/octave* *2) 100 Hz to 1000 Hz 0.10 g^2/Hz* *3) 1000 Hz to 2000 HzPSD decreasing at 3dB/octave*	2.	Nanosecond Event Detection (Random Vibration) (2) • Non Standard *Note: Conditions:* *1) 5 Hz to 100 Hz, PSD increasing at 3dB/octave* *2) 100 Hz to 1000 Hz 0.10 g^2/Hz* *3) 1000 Hz to 2000 HzPSD decreasing at 3dB/octave*

(1) Nanosecond Event Detection (Mechanical Shock) = Other
Use EIA-364-87 for Nanosecond Event Detection:
Test Condition = F (50 nanoseconds at 10 ohms)
40G, 11 milliseconds, Half Sine

(2) Nanosecond Event Detection (Random Vibration) = Other
Use EIA-364-87 for Nanosecond Event Detection:
Test Condition = F (50 nanoseconds at 10 ohms)
Random Vibration: 12 G 'RMS', 5Hz to 2000Hz, 1 Hours/Axis, Vibration Class V3 VITA 47.1

FLOWCHARTS Continued

Temperature Cycling

Group 1

LSHM-150-06.0-S-DV-A-N-TR

LSHM-150-04.0-S-DV-A-N-TR

8 Assemblies

500 Thermal Cycles

Note: Reference MIL-STD-202G, Method 107, Thermal Shock

Step	Description
1.	Continuity (Initial)
2.	Temperature Cycles (1) • Non Standard Cycles ■ 500 Cycles Continuity ■ Monitor for 1 MicroSecond Interruptions Throughout
3.	Continuity (Following Last Cycle)

(1) Temperature Cycles = Other
Max Temperature = 125° C
Min Temperature = -65° C
Dwell Time = 30 minutes at each extreme
Ramp Rate = 10° C/min
VITA 47.1

Non-Operating Class Temperature

VITA 47.1

Group 1

LSHM-150-06.0-S-DV-A-N-TR

LSHM-150-04.0-S-DV-A-N-TR

8 Assemblies

Non-Operating Class Temperature

Step	Description
1.	LLCR (1) Max Delta ■ 15 mOhm
2.	Temperature Cycle Temperature Cycle ■ -55°C to 105°C Cycles ■ 100
3.	LLCR (1) Max Delta ■ 15 mOhm
4.	Temperature Cycle Cycles ■ 100 Temperature Cycles ■ -65°C to 125°C
5.	LLCR (1) Max Delta ■ 15 mOhm

(1) LLCR = EIA-364-23
Open Circuit Voltage = 20 mV Max
Test Current = 100 mA Max

FLOWCHARTS Continued

DWV @ Altitude

Pin to Pin

Group 1
LSHM-150-06.0-S-DV-A-N-TR
LSHM-150-04.0-S-DV-A-N-TR
3 Assemblies
Custom Group

Step	Description
1.	DWV at Test Voltage (1) - Non Standard *Note: Test Voltage to be 300 VAC*

Row to Row

Group 2
LSHM-150-06.0-S-DV-A-N-TR
LSHM-150-04.0-S-DV-A-N-TR
3 Assemblies
Custom Group

Step	Description
1.	DWV at Test Voltage (2) - Non Standard *Note: Test Voltage to be 300 VAC*

(1) DWV at Test Voltage = Other
Test Condition IV= 70,000 ft
DWV test voltage is equal to 75% of the lowest breakdown voltage
Test voltage applied for 60 seconds

(2) DWV at Test Voltage = Other
Test Condition IV= 70,000 ft
DWV test voltage is equal to 75% of the lowest breakdown voltage
Test voltage applied for 60 seconds

Electrostatic Discharge (ESD)

Group 1
LSHM-150-06.0-S-DV-A-N-TR
LSHM-150-04.0-S-DV-A-N-TR
8 Assemblies
EN61000-4-2

Step	Description
1.	Exposure To 5kV, 10kV, 15kV, Repeat 10 Times *Note: The connector shall not be susceptable to damage by ESD events from 0 to 15kV as discharged from a 150 pf capacitor through a 330 ohm resistor.*

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

TEMPERATURE CYCLES:

1) OTHER, *Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors.*
2) Test Condition: -65°C to +125°C
3) Test Time: ½ hour dwell at each temperature extreme
4) Test Duration: 500 Cycles
5) All test samples are pre-conditioned at ambient.
6) All test samples are exposed to environmental stressing in the mated condition.

TEMPERATURE CYCLES:

7) OTHER, *Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors.*
8) Test Condition: -55°C to +105°C and -65°C to +125°C
9) Test Time: ½ hour dwell at each temperature extreme
10) Test Duration:100 Cycles
11) All test samples are pre-conditioned at ambient.
12) All test samples are exposed to environmental stressing in the mated condition.

THERMAL SHOCK:

1) EIA-364-32, *Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors.*
2) Test Condition I: -55°C to +85°C
3) Test Time: ½ hour dwell at each temperature extreme
4) Test Duration: 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.

HUMIDITY:

1) Reference document: Other, *Humidity Test Procedure for Electrical Connectors.*
2) Test Condition, 240 Hours.
3) Method, +25° C to + 65° C, 95% to 100% Relative Humidity excluding sub-cycles 7a.
4) All samples are pre-conditioned at ambient.
5) All test samples are exposed to environmental stressing in the mated condition.

MATING/UNMATING:

1) Reference document: EIA-364-13, *Mating and Unmating Forces Test Procedure for Electrical Connectors*.
2) The full insertion position was to within 0.003" to 0.004" of the plug bottoming out in the receptacle to prevent damage to the system under test.
3) One of the mating parts is secured to a floating X-Y table to prevent damage during cycling.

MECHANICAL SHOCK (Specified Pulse):

1) Reference document: other, *Mechanical Shock Test Procedure for Electrical Connectors*
2) Test Condition: OS2
3) Peak Value: 40 G
4) Duration: 11 Milliseconds
5) Wave Form: Half Sine
6) Number of Shocks: 3 Shocks / Direction, 3 Axis (18 Total)

VIBRATION:

1) Reference document: other, *Vibration Test Procedure for Electrical Connectors*
2) Test Condition: V3 vita 47.1
3) Power Spectral Density: 0.1 G^2 / Hz
4) G 'RMS': 12
5) Frequency: 5 to 2000 Hz
6) Duration: 1 Hours per axis (3 axis total)

ATTRIBUTE DEFINITIONS Continued

The following is a brief, simplified description of attributes

NANOSECOND-EVENT DETECTION:

1) Reference document: EIA-364-87, *Nanosecond-Event Detection for Electrical Connectors*
2) Prior to test, the samples were characterized to assure the low nanosecond event being monitored will trigger the detector.
3) After characterization it was determined the test samples could be monitored for 50 nanosecond events

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 mOhms: ---------- Minor
    c. +10 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

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 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: other, *Withstanding Voltage Test Procedure for Electrical Connectors*.
    b. Test Conditions IV=70000 ft
    c. Test voltage applied for 60 seconds.

ELECTROSTATIC DISCHARGE:

1) Reference Document: EN61000-4-2, VITA 47
2) Connector shall not be susceptible to damage by electrostatic discharge (ESD) events from 0 to 15kV as discharged from a 150-pf capacitor through a 330-ohm resistor
3) Any damage shall be noted

RESULTS

Mating – Unmating Forces

Mating Unmating Durability Group (LSHM-150-06.0-S-DV-A-N-K-TR/LSHM-150-04.0-S-DV-A-N-TR)

- **Initial**
  - **Mating**
    - **Min ----------18.65 lbs**
    - **Max----------20.85 lbs**
  - **Unmating**
    - **Min ----------20.61 lbs**
    - **Max----------24.17 lbs**
- **After 250 Cycles**
  - **Mating**
    - **Min ----------24.99 lbs**
    - **Max----------29.32 lbs**
  - **Unmating**
    - **Min ----------25.45 lbs**
    - **Max----------29.34 lbs**
- **After Humidity**
  - **Mating**
    - **Min ---------- 9.48 lbs**
    - **Max----------12.89 lbs**
  - **Unmating**
    - **Min ---------- 9.87 lbs**
    - **Max----------14.27 lbs**

Mating Unmating Basic Group (LSHM-120-06.0-S-DV-A-N-K-TR/LSHM-120-04.0-S-DV-A-N-TR)

- **Initial**
  - **Mating**
    - **Min ---------- 7.78 lbs**
    - **Max---------- 8.65 lbs**
  - **Unmating**
    - **Min ---------- 8.75 lbs**
    - **Max----------10.60 lbs**
- **After 250 Cycles**
  - **Mating**
    - **Min ---------- 9.98 lbs**
    - **Max----------12.25 lbs**
  - **Unmating**
    - **Min ----------10.46 lbs**
    - **Max----------12.11 lbs**

Mating Unmating Basic Group (LSHM-105-06.0-S-DV-A-N-K-TR/LSHM-105-04.0-S-DV-A-N-TR)

- **Initial**
  - **Mating**
    - **Min ---------- 2.31 lbs**
    - **Max---------- 2.98 lbs**
  - **Unmating**
    - **Min ---------- 2.81 lbs**
    - **Max---------- 2.50 lbs**
- **After 250 Cycles**
  - **Mating**
    - **Min ---------- 2.52 lbs**
    - **Max---------- 3.26 lbs**
  - **Unmating**
    - **Min ---------- 3.10 lbs**
    - **Max---------- 3.75 lbs**

RESULTS Continued

Temperature Cycling

Continuity Initial

- **No Interruptions ----------Passed**

Continuity Following 500 Cycles

- **No Interruptions ----------Passed**

DWV @ Altitude

- **Minimums**
  - **Test Voltage ----------300 VAC**
  - **Altitude Tested ----------70000 ft**

Pin to Pin

- **DWV----------Passed**

Row to Row

- **DWV----------Passed**

Electrostatic Discharge

5kV

- **No Damage ----------Passed**

10kV

- **No Damage ----------Passed**

15kV

- **No Damage ----------Passed**

RESULTS Continued

LLCR Mating Unmating Durability Group (192 LLCR test points)

- **Initial ---------- 23.24 mOhms Max**
- **Durability, 250 Cycles**
  - **<= +5.0 mOhms ---------- 192 Points ---------- Stable**
  - **+5.1 to +10 mOhms ----------0 Points ---------- Minor**
  - **+10 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**
- **Thermal Shock**
  - **<= +5.0 mOhms ---------- 192 Points ---------- Stable**
  - **+5.1 to +10 mOhms ----------0 Points ---------- Minor**
  - **+10 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**
- **Humidity**
  - **<= +5.0 mOhms ---------- 192 Points ---------- Stable**
  - **+5.1 to +10 mOhms ----------0 Points ---------- Minor**
  - **+10 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 Vibration and Mechanical Shock Group (192 LLCR test points)

Group 1 LSHM-150-06.0-S-DV-A-N-TR/LSHM-150-04.0-S-DV-A-N-TR (V to V)

- **Initial ---------- 30.19 mOhms Max**
- **Shock and Vibe**
  - **<= +5.0 mOhms ---------- 192 Points ---------- Stable**
  - **+5.1 to +10 mOhms ----------0 Points ---------- Minor**
  - **+10 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**

Mechanical Shock & Random Vibration:

- **Shock**
  - **No Damage---------- ---------- Pass**
  - **50 Nanoseconds---------- ---------- Pass**
- **Vibration**
  - **No Damage---------- ---------- Pass**
  - **50 Nanoseconds---------- ---------- Pass**

Group 2 LSHM-150-06.0-S-DV-A-N-TR/LSHM-150-01-S-DH-A-N-TR (DH to V)

- **Initial ---------- 25.51 mOhms Max**
- **Shock and Vibe**
  - **<= +5.0 mOhms ---------- 189 Points ---------- Stable**
  - **+5.1 to +10 mOhms ----------2 Points ---------- Minor**
  - **+10 to +15.0 mOhms----------1 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**

Mechanical Shock & Random Vibration:

- **Shock**
  - **No Damage---------- ---------- Pass**
  - **50 Nanoseconds---------- ---------- Pass**
- **Vibration**
  - **No Damage---------- ---------- Pass**
  - **50 Nanoseconds---------- ---------- Pass**

RESULTS Continued

LLCR Non-Operating Class Temperature Group (192 LLCR test points)

- **Initial ---------- 27.65 mOhms Max**
- **Temperature Cycle1 (-55°C to +105°C)**
  - **<= +5.0 mOhms ---------- 189 Points ---------- Stable**
  - **+5.1 to +10 mOhms ----------3 Points ---------- Minor**
  - **+10 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**
- **Temperature Cycle2 (-65°C to +125°C)**
  - **<= +5.0 mOhms ---------- 189 Points ---------- Stable**
  - **+5.1 to +10 mOhms ----------3 Points ---------- Minor**
  - **+10 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

MATING/UNMATING:

Mating Unmating Durability Group

LSHM-150-06.0-S-DV-A-N-TR/LSHM-150-04.0-S-DV-A-N-TR

	Initial				250 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	82.96	18.65	91.67	20.61	111.16	24.99	113.20	25.45
Maximum	92.61	20.82	107.51	24.17	130.42	29.32	130.50	29.34
Average	86.30	**19.40**	99.55	**22.38**	121.31	**27.27**	119.60	**26.89**
St Dev	3.26	0.73	5.64	1.27	7.96	1.79	5.52	1.24
Count	8	8	8	8	8	8	8	8

	After Humidity			
	Mating		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	42.17	9.48	43.90	9.87
Maximum	57.33	12.89	63.47	14.27
Average	50.71	**11.40**	54.39	**12.23**
St Dev	5.73	1.29	6.87	1.54
Count	8	8	8	8

Mating Unmating Basic Group

LSHM-120-06.0-S-DV-A-N-TR/LSHM-120-04.0-S-DV-A-N-TR

	Initial				250 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	34.61	7.78	38.92	8.75	44.39	9.98	46.53	10.46
Maximum	38.48	8.65	47.15	10.60	54.49	12.25	53.87	12.11
Average	36.21	**8.14**	44.01	**9.89**	48.44	**10.89**	50.06	**11.26**
St Dev	1.52	0.34	3.18	0.72	3.22	0.72	2.50	0.56
Count	8	8	8	8	8	8	8	8

LSHM-105-06.0-S-DV-A-N-TR/LSHM-105-04.0-S-DV-A-N-TR

	Initial				250 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	10.27	2.31	12.50	2.81	11.21	2.52	13.79	3.10
Maximum	13.26	2.98	15.57	3.50	14.50	3.26	16.68	3.75
Average	11.60	**2.61**	14.17	**3.19**	13.43	**3.02**	15.39	**3.46**
St Dev	1.11	0.25	1.07	0.24	1.02	0.23	1.11	0.25
Count	8	8	8	8	8	8	8	8

DATA SUMMARIES Continued

Temperature Cycling

Temperature Cycling Event Detection Summary	
Contacts tested	800
Test Conditions	Continuity (Monitor for 1 Microsecond Interruptions Throughout)
Temperature	Min Temp = -65°C / Max Temp = 125°C
Dwell Time	30 Minutes at each Extreme
Ramp Rate	10°C/min
Total Events	0

DWV @ Altitude

Altitude Tested = 70,000 feet	
Test Voltage= 300	
Pin to Pin	Row to Row
Mated	Mated
Passed	Passed
Passed	Passed
Passed	Passed

Electrostatic Discharge

Electrostatic Discharge (ESD) Summary	
Assemblies tested	8
Test Conditions	Exposure to 5kV, 10kV, and 15kV (Repeated 10 Times)
5kV	No Damage
10kV	No Damage
15kV	No Damage
Pass/Fail	Pass

DATA SUMMARIES Continued

LLCR Mating Unmating Durability Group:

1) A total of 192 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 +7.5 mOhms:---------- Minor
   c. +7.6 to +10.0 mOhms: ---------- Acceptable
   d. +10.1 to +50.0 mOhms: ---------- Marginal
   e. +50.1 to +1000 mOhms---------- Unstable
   f. >+1000 mOhms: ---------- Open Failure

LLCR Measurement Summaries by Pin Type				
Date	8/29/2019	8/30/2019	9/10/2019	9/23/2019
Room Temp (Deg C)	22	23	23	23
Rel Humidity (%)	48	48	49	51
Technician	Tony Wagoner	Tony Wagoner	Tony Wagoner	Tony Wagoner
mOhm values	**Actual Initial**	**Delta 250 Cycles**	**Delta Therm Shck**	**Delta Humidity**
	Pin Type 1: Signal			
Average	20.93	0.96	1.08	1.21
St. Dev.	1.01	0.69	0.84	0.86
Min	18.61	0.00	0.01	0.01
Max	23.24	3.84	4.88	4.83
Summary Count	192	192	192	192
Total Count	192	192	192	192

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

DATA SUMMARIES Continued

LLCR Vibration and Mechanical Shock Group:

1) A total of 192 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 +7.5 mOhms:---------- Minor
   c. +7.6 to +10.0 mOhms: ---------- Acceptable
   d. +10.1 to +50.0 mOhms: ---------- Marginal
   e. +50.1 to +1000 mOhms---------- Unstable
   f. >+1000 mOhms: ---------- Open Failure

Group 1 SFM-150-02-S-D/TFM-150-02-S-D (V to V)

	LLCR Measurement Summaries by Pin Type			
Date	9/21/2019	9/23/2019		
Room Temp (Deg C)	23	23		
Rel Humidity (%)	51	51		
Technician	John Crawford	Tony Wagoner		
mOhm values	**Actual Initial**	**Delta Shock-Vib**	**Delta**	**Delta**
	Pin Type 1: Signal			
Average	22.46	0.77		
St. Dev.	1.72	1.04		
Min	19.93	0.00		
Max	30.19	6.19		
Summary Count	192	192		
Total Count	192	192		

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=7.5**	**>7.6 & <=10**	**>10.1& <=50**	**>50 & <=1000**	**>1000**
Shock-Vib	**192**	**0**	**0**	**0**	**0**	**0**

Nanosecond Event Detection:

Shock and Vibration Event Detection Summary	
Contacts tested	60
Test Condition	F, 40g's, 11ms, Half-Sine
Shock Events	0
Test Condition	V3 VITA 47.1, 12 G 'RMS', 5Hz to 2000Hz
Vibration Events	0
Total Events	0

DATA SUMMARIES Continued

Group 1 SFM-150-02-S-D/TFM-150-02-S-DH (DH to V)

	LLCR Measurement Summaries by Pin Type			
Date	10/31/2019	11/4/2019		
Room Temp (Deg C)	23	22		
Rel Humidity (%)	43	38		
Technician	Tony Wagoner	Tony Wagoner		
mOhm values	**Actual Initial**	**Delta Shock-Vib**	**Delta**	**Delta**
	Pin Type 1: Signal			
Average	23.45	0.89		
St. Dev.	1.22	1.28		
Min	20.50	0.00		
Max	25.51	11.06		
Summary Count	192	192		
Total Count	192	192		

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
Shock-Vib	**189**	**2**	**1**	**0**	**0**	**0**

Nanosecond Event Detection:

Shock and Vibration Event Detection Summary	
Contacts tested	60
Test Condition	F, 40g's, 11ms, Half-Sine
Shock Events	0
Test Condition	V3 VITA 47.1, 12 G 'RMS', 5Hz to 2000Hz
Vibration Events	0
Total Events	0

DATA SUMMARIES Continued

LLCR Non-Operating Class Temperature Group:

1) A total of 192 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 +7.5 mOhms:---------- Minor
   c. +7.6 to +10.0 mOhms: ---------- Acceptable
   d. +10.1 to +50.0 mOhms: ---------- Marginal
   e. +50.1 to +1000 mOhms---------- Unstable
   f. >+1000 mOhms: ---------- Open Failure

	LLCR Measurement Summaries by Pin Type		
Date	8/30/2019	9/30/2019	10/5/2019
Room Temp (Deg C)	23	22	22
Rel Humidity (%)	48	50	40
Technician	Tony Wagoner	Tony Wagoner	Tony Wagoner
mOhm values	**Actual Initial**	**Delta Temp Cycle1**	**Delta Temp Cycle 2**
	Pin Type 1: Signal		
Average	21.55	1.12	1.12
St. Dev.	1.61	1.15	1.16
Min	19.44	0.00	0.02
Max	27.65	6.50	6.65
Summary Count	192	192	192
Total Count	192	192	192

LLCR Delta Count by Category - Signal						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
Temp Cycle 1	**189**	**3**	**0**	**0**	**0**	**0**
Temp Cycle 2	**189**	**3**	**0**	**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: 05/29/2019, Next Cal: 05/29/2020

Equipment #: MO-11
Description: Switch/Multimeter
Manufacturer: Keithley
Model: 3706
Serial #: 120169
Accuracy: See Manual
… Last Cal: 09/11/2019, Next Cal: 09/11/2020

Equipment #: THC-05
Description: Temperature/Humidity Chamber (Chamber Room)
Manufacturer: Thermotron
Model: SM-8-3800
Serial #: 05 23 00 02
Accuracy: See Manual
… Last Cal: 11/14/2019, Next Cal: 05/31/2020

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: 06/30/2019, Next Cal: 06/30/2020

Equipment #: HPT-01
Description: Hipot Safety Tester
Manufacturer: Vitrek
Model: V73
Serial #: 019808
Accuracy:
… Last Cal: 05/15/2019, Next Cal: 05/15/2020

Equipment #: OV-05
Description: Forced Air Oven, 5 Cu. Ft., 120 V (Chamber Room)
Manufacturer: Sheldon Mfg.
Model: CE5F
Serial #: 02008008
Accuracy: +/- 5 deg. C
… Last Cal: 02/05/2019, Next Cal: 02/05/2020

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: SVC-01
Description: Shock & Vibration Table
Manufacturer: Data Physics
Model: LE-DSA-10-20K
Serial #: 10037
Accuracy: See Manual
… Last Cal: 04/22/2019, Next Cal: 04/22/2020

Equipment #: ACLM-01
Description: Accelerometer
Manufacturer: PCB Piezotronics
Model: 352C03
Serial #: 115819
Accuracy: See Manual
… Last Cal: 07/18/2019, Next Cal: 07/18/2020

Equipment #: ED-03
Description: Event Detector
Manufacturer: Analysis Tech
Model: 32EHD
Serial #: 1100604
Accuracy: See Manual
… Last Cal: 10/31/2019, Next Cal: 10/31/2020