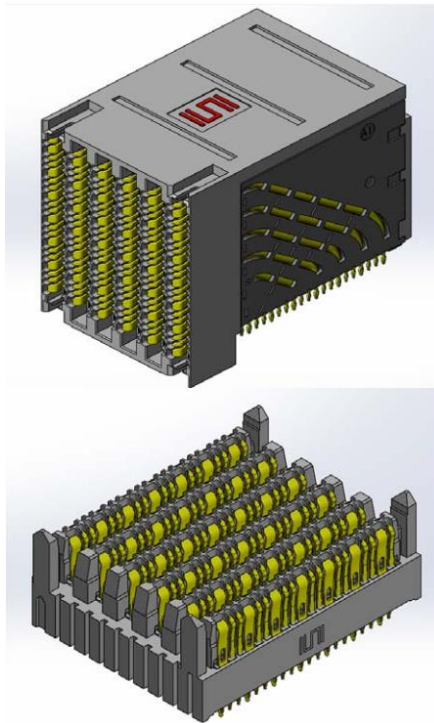




Project Number: Design Qualification Test Report	Tracking Code: 1119711_Report_Rev_1
Requested by: Chad Humphres	Date: 10/27/2017
Part #: EBTF-6-12-2.0-S-RA-1/ EBDM-6-12-2.0-S-RA-1	Tech: Tony Wagoner
Part description: EBTF/EBDM	Qty to test: 32
Test Start: 05/20/2017	Test Completed: 09/20/2017



DESIGN QUALIFICATION TEST REPORT

EBTF/ EBDM

EBTF-6-12-2.0-S-RA-1/ EBDM-6-12-2.0-S-RA-1

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
10/27/2017	1	Initial Issue	PC

CERTIFICATION

All instruments and measuring equipment were calibrated to National Institute for Standards and Technology (NIST) traceable standards according to ISO 10012-1 and ANSI/NCSL 2540-1, as applicable.

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SCOPE

To perform the following tests: Design Qualification test. Please see test plan.

APPLICABLE DOCUMENTS

Standards: EIA Publication 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 and DWV/IR 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 and DWV/IR 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-108051-TST.

FLOWCHARTS

Mating/Unmating/Durability

<u>Group 1</u>		<u>Group 2</u>		<u>Group 3</u>		<u>Group 4</u>	
EBTF-6-12-2.0-S-RA-1 (SAMTEC RAR) 10129181-1011F (AFCI DMO) 4 Assemblies		10123159-1011F (AFCI RAR) 10129181-1011F (AFCI DMO) 4 Assemblies		EBDM-6-12-2.0-S-RA-1 (SAMTEC DMO) EBTF-6-12-2.0-S-RA-1 (SAMTEC RAR) 4 Assemblies		EBDM-6-12-2.0-S-RA-1 (SAMTEC DMO) 10123159-1011F (AFCI RAR) 4 Assemblies	
Step	Description	Step	Description	Step	Description	Step	Description
1.	Contact Gaps	1.	Contact Gaps	1.	Contact Gaps	1.	Contact Gaps
2.	LLCR (2)	2.	LLCR (2)	2.	LLCR (2)	2.	LLCR (2)
3.	Mating/Unmating Force (3)	3.	Mating/Unmating Force (3)	3.	Mating/Unmating Force (3)	3.	Mating/Unmating Force (3)
4.	Cycles Quantity = 25 Cycles	4.	Cycles Quantity = 25 Cycles	4.	Cycles Quantity = 25 Cycles	4.	Cycles Quantity = 25 Cycles
5.	Mating/Unmating Force (3)	5.	Mating/Unmating Force (3)	5.	Mating/Unmating Force (3)	5.	Mating/Unmating Force (3)
6.	Cycles Quantity = 25 Cycles	6.	Cycles Quantity = 25 Cycles	6.	Cycles Quantity = 25 Cycles	6.	Cycles Quantity = 25 Cycles
7.	Mating/Unmating Force (3)	7.	Mating/Unmating Force (3)	7.	Mating/Unmating Force (3)	7.	Mating/Unmating Force (3)
8.	Cycles Quantity = 25 Cycles	8.	Cycles Quantity = 25 Cycles	8.	Cycles Quantity = 25 Cycles	8.	Cycles Quantity = 25 Cycles
9.	Mating/Unmating Force (3)	9.	Mating/Unmating Force (3)	9.	Mating/Unmating Force (3)	9.	Mating/Unmating Force (3)
10.	Cycles Quantity = 25 Cycles	10.	Cycles Quantity = 25 Cycles	10.	Cycles Quantity = 25 Cycles	10.	Cycles Quantity = 25 Cycles
11.	Mating/Unmating Force (3)	11.	Mating/Unmating Force (3)	11.	Mating/Unmating Force (3)	11.	Mating/Unmating Force (3)
12.	Contact Gaps	12.	Contact Gaps	12.	Contact Gaps	12.	Contact Gaps
13.	LLCR (2) Max Delta = 15 mOhm	13.	LLCR (2) Max Delta = 15 mOhm	13.	LLCR (2) Max Delta = 15 mOhm	13.	LLCR (2) Max Delta = 15 mOhm
14.	Thermal Shock (4)	14.	Thermal Shock (4)	14.	Thermal Shock (4)	14.	Thermal Shock (4)
15.	LLCR (2) Max Delta = 15 mOhm	15.	LLCR (2) Max Delta = 15 mOhm	15.	LLCR (2) Max Delta = 15 mOhm	15.	LLCR (2) Max Delta = 15 mOhm
16.	Humidity (1)	16.	Humidity (1)	16.	Humidity (1)	16.	Humidity (1)
17.	LLCR (2) Max Delta = 15 mOhm	17.	LLCR (2) Max Delta = 15 mOhm	17.	LLCR (2) Max Delta = 15 mOhm	17.	LLCR (2) Max Delta = 15 mOhm
18.	Mating/Unmating Force (3)	18.	Mating/Unmating Force (3)	18.	Mating/Unmating Force (3)	18.	Mating/Unmating Force (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) 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) EIA-364-32, *Thermal Shock (Temperature Cycling) Test Procedure for Electrical Connectors*.
- 2) Test Condition 1: -55°C to +85°C
- 3) Test Time: ½ hour dwell at each temperature extreme
- 4) Number of Cycles: 100
- 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: 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.

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.

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. $\leq +5.0$ 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 +2000 mOhms:----- Unstable
 - f. $>+2000$ mOhms:----- Open Failure

RESULTS

Mating – Unmating Forces

Mating-Unmating Durability Group1- EBTF-6-12-2.0-S-RA-1(SAMTEC RAR/10129181-101(AFCI DMO))

- **Initial**
 - **Mating**
 - **Min** -----15.25 Lbs
 - **Max** -----16.11 Lbs
 - **Unmating**
 - **Min** -----10.14 Lbs
 - **Max** -----10.39 Lbs
- **After 25 Cycles**
 - **Mating**
 - **Min** -----15.07 Lbs
 - **Max** -----15.77 Lbs
 - **Unmating**
 - **Min** -----11.28 Lbs
 - **Max** -----11.55 Lbs
- **After 50 Cycles**
 - **Mating**
 - **Min** -----15.33 Lbs
 - **Max** -----16.14 Lbs
 - **Unmating**
 - **Min** -----11.71Lbs
 - **Max** -----12.02Lbs
- **After 75 Cycles**
 - **Mating**
 - **Min** -----15.58Lbs
 - **Max** -----16.28 Lbs
 - **Unmating**
 - **Min** -----12.05 Lbs
 - **Max** -----12.27 Lbs
- **After 100 Cycles**
 - **Mating**
 - **Min** -----15.69 Lbs
 - **Max** -----16.61 Lbs
 - **Unmating**
 - **Min** -----12.41 Lbs
 - **Max** -----12.62 Lbs
- **After Humidity**
 - **Mating**
 - **Min** -----12.69 Lbs
 - **Max** -----13.05 Lbs
 - **Unmating**
 - **Min** ----- 9.59 Lbs
 - **Max** ----- 9.77 Lbs

RESULTS Continued**Mating – Unmating Forces****Mating-Unmating Durability Group2- 10123159-101LF (AFCI DMO)/10129181-101LF (AFCI DMO)**

- **Initial**
 - **Mating**
 - **Min** -----13.59 Lbs
 - **Max** -----15.11 Lbs
 - **Unmating**
 - **Min** ----- 8.97 Lbs
 - **Max** ----- 9.36 Lbs
- **After 25 Cycles**
 - **Mating**
 - **Min** -----13.14 Lbs
 - **Max** -----15.62 Lbs
 - **Unmating**
 - **Min** ----- 9.49 Lbs
 - **Max** -----10.79 Lbs
- **After 50 Cycles**
 - **Mating**
 - **Min** -----13.58 Lbs
 - **Max** -----16.12 Lbs
 - **Unmating**
 - **Min** ----- 9.96 Lbs
 - **Max** -----11.36 Lbs
- **After 75 Cycles**
 - **Mating**
 - **Min** -----13.85 Lbs
 - **Max** -----16.33 Lbs
 - **Unmating**
 - **Min** -----10.39 Lbs
 - **Max** -----11.72 Lbs
- **After 100 Cycles**
 - **Mating**
 - **Min** -----14.14 Lbs
 - **Max** -----16.43 Lbs
 - **Unmating**
 - **Min** -----10.72 Lbs
 - **Max** -----11.97 Lbs
- **After Humidity**
 - **Mating**
 - **Min** -----10.29 Lbs
 - **Max** -----11.82 Lbs
 - **Unmating**
 - **Min** ----- 7.46 Lbs
 - **Max** ----- 8.78 Lbs

RESULTS Continued**Mating – Unmating Forces**

Mating-Unmating Durability Group3-EBDM-6-12-2.0-S-RA-1(SAMTEC DMO) / EBTF-6-12-2.0-S-RA-1(SAMTEC RAR)

- **Initial**
 - **Mating**
 - **Min** -----13.46 Lbs
 - **Max**-----14.10 Lbs
 - **Unmating**
 - **Min** ----- 8.69 Lbs
 - **Max**----- 9.12 Lbs
- **After 25 Cycles**
 - **Mating**
 - **Min** -----13.25 Lbs
 - **Max**-----14.19 Lbs
 - **Unmating**
 - **Min** ----- 9.83 Lbs
 - **Max**-----10.10 Lbs
- **After 50 Cycles**
 - **Mating**
 - **Min** -----13.57Lbs
 - **Max**-----14.52 Lbs
 - **Unmating**
 - **Min** -----10.33 Lbs
 - **Max**-----10.64 Lbs
- **After 75 Cycles**
 - **Mating**
 - **Min** -----13.72 Lbs
 - **Max**-----14.68 Lbs
 - **Unmating**
 - **Min** -----10.57 Lbs
 - **Max**-----10.91 Lbs
- **After 100 Cycles**
 - **Mating**
 - **Min** -----13.69 Lbs
 - **Max**-----14.87 Lbs
 - **Unmating**
 - **Min** -----10.77 Lbs
 - **Max**-----11.13 Lbs
- **After Humidity**
 - **Mating**
 - **Min** -----10.48 Lbs
 - **Max**-----10.84 Lbs
 - **Unmating**
 - **Min** ----- 7.95 Lbs
 - **Max**----- 8.10 Lbs

RESULTS Continued**Mating – Unmating Forces****Mating-Unmating Durability Group4- EBDM-6-12-2.0-S-RA-1(SAMTEC DMO)/10123159-101LF(AFCI RAR):**

- **Initial**
 - **Mating**
 - **Min** -----13.46 Lbs
 - **Max** -----14.80 Lbs
 - **Unmating**
 - **Min** ----- 8.94 Lbs
 - **Max** ----- 9.68 Lbs
- **After 25 Cycles**
 - **Mating**
 - **Min** -----13.03 Lbs
 - **Max** -----14.52 Lbs
 - **Unmating**
 - **Min** ----- 9.31 Lbs
 - **Max** ----- 9.94 Lbs
- **After 50 Cycles**
 - **Mating**
 - **Min** -----13.22 Lbs
 - **Max** -----14.66 Lbs
 - **Unmating**
 - **Min** ----- 9.60 Lbs
 - **Max** -----10.28 Lbs
- **After 75 Cycles**
 - **Mating**
 - **Min** -----13.34 Lbs
 - **Max** -----14.72 Lbs
 - **Unmating**
 - **Min** ----- 9.87 Lbs
 - **Max** -----10.55 Lbs
- **After 100 Cycles**
 - **Mating**
 - **Min** -----13.51 Lbs
 - **Max** -----14.86 Lbs
 - **Unmating**
 - **Min** ----- 9.97 Lbs
 - **Max** -----10.75 Lbs
- **After Humidity**
 - **Mating**
 - **Min** -----10.35 Lbs
 - **Max** -----10.81 Lbs
 - **Unmating**
 - **Min** ----- 7.28 Lbs
 - **Max** ----- 7.80 Lbs

RESULTS Continued**LLCR Mating/Unmating Durability Group (96 LLCR test points)****Group1-EBTF-6-12-2.0-S-RA-1(SAMTEC RAR/10129181-101(AFCI DMO)****Row 1**

- **Initial ----- 60.12 mOhms Max**

Row 2

- **Initial ----- 44.80 mOhms Max**

Row 3

- **Initial ----- 33.64 mOhms Max**

Row 4 Ground

- **Initial -----2.00 mOhms Max**
- **Durability, 100 Cycles**
 - **<= +5.0 mOhms -----96 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 -----95 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 +2000 mOhms -----0 Points ----- Unstable**
 - **>+2000 mOhms -----0 Points ----- Open Failure**
- **Humidity**
 - **<= +5.0 mOhms -----96 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**

RESULTS Continued**LLCR Mating/Unmating Durability Group (96 LLCR test points)****Group2- 10123159-101LF (AFCI DMO)/10129181-101LF (AFCI DMO)****Row 1**

- **Initial** ----- **61.68 mOhms Max**

Row 2

- **Initial** ----- **50.04 mOhms Max**

Row 3

- **Initial** ----- **34.74 mOhms Max**

Row 4 Ground

- **Initial** ----- **2.18 mOhms Max**
- **Durability, 100 Cycles**
 - **<= +5.0 mOhms** ----- **96 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** ----- **95 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 +2000 mOhms** ----- **0 Points** ----- **Unstable**
 - **>+2000 mOhms** ----- **0 Points** ----- **Open Failure**
- **Humidity**
 - **<= +5.0 mOhms** ----- **95 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 +2000 mOhms** ----- **0 Points** ----- **Unstable**
 - **>+2000 mOhms** ----- **0 Points** ----- **Open Failure**

RESULTS Continued**LLCR Mating/Unmating Durability Group (96 LLCR test points)**

Group3-EBDM-6-12-2.0-S-RA-1(SAMTEC DMO) / EBTF-6-12-2.0-S-RA-1(SAMTEC RAR)

Row 1

- Initial ----- 61.25 mOhms Max

Row 2

- Initial ----- 49.77 mOhms Max

Row 3

- Initial ----- 36.77 mOhms Max

Row 4 Ground

- Initial ----- 1.96 mOhms Max
- Durability, 100 Cycles
 - <= +5.0 mOhms ----- 94 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 2 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 ----- 93 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 3 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 ----- 95 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 +2000 mOhms ----- 0 Points ----- Unstable
 - >+2000 mOhms ----- 0 Points ----- Open Failure

RESULTS Continued**LLCR Mating/Unmating Durability Group (96 LLCR test points)****Group4- EBDM-6-12-2.0-S-RA-1(SAMTEC DMO)/10123159-101LF (AFCI RAR):****Row 1**

- **Initial ----- 61.35 mOhms Max**

Row 2

- **Initial ----- 50.90 mOhms Max**

Row 3

- **Initial ----- 34.98 mOhms Max**

Row 4 Ground

- **Initial -----2.16 mOhms Max**
- **Durability, 100 Cycles**
 - **<= +5.0 mOhms -----96 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 -----96 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 -----93 Points ----- Stable**
 - **+5.1 to +10.0 mOhms -----3 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**

DATA SUMMARIES**MATING-UNMATING FORCE:****Mating-Unmating Durability Group1 - EBTF-6-12-2.0-S-RA-1(SAMTEC RAR/10129181-101(AFCI DMO))**

	Initial				25 Cycles			
	Mating		Unmating		Mating		Unmating	
	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)
Minimum	67.83	15.25	45.12	10.14	67.04	15.07	50.17	11.28
Maximum	71.65	16.11	46.21	10.39	70.16	15.77	51.36	11.55
Average	69.82	15.70	45.86	10.31	69.00	15.51	50.95	11.45
St Dev	1.60	0.36	0.51	0.11	1.40	0.31	0.55	0.12
Count	4	4	4	4	4	4	4	4
	50 Cycles				75 Cycles			
	Mating		Unmating		Mating		Unmating	
	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)
Minimum	68.17	15.33	52.09	11.71	69.30	15.58	53.61	12.05
Maximum	71.78	16.14	53.45	12.02	72.41	16.28	54.59	12.27
Average	70.28	15.80	52.88	11.89	71.01	15.96	54.16	12.18
St Dev	1.54	0.35	0.59	0.13	1.28	0.29	0.42	0.09
Count	4	4	4	4	4	4	4	4
	100 Cycles				After Humidity			
	Mating		Unmating		Mating		Unmating	
	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)
Minimum	69.80	15.69	55.20	12.41	56.43	12.69	42.67	9.59
Maximum	73.86	16.61	56.14	12.62	58.02	13.05	43.43	9.77
Average	72.09	16.21	55.57	12.49	57.12	12.84	43.11	9.69
St Dev	1.71	0.38	0.41	0.09	0.68	0.15	0.33	0.07
Count	4	4	4	4	4	4	4	4

DATA SUMMARIES**MATING-UNMATING FORCE:****Mating-Unmating Durability Group2- 10123159-101LF (AFCI DMO)/10129181-101LF (AFCI DMO)**

	Initial				25 Cycles			
	Mating		Unmating		Mating		Unmating	
	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)
Minimum	60.43	13.59	39.89	8.97	58.46	13.14	42.22	9.49
Maximum	67.19	15.11	41.64	9.36	69.46	15.62	47.98	10.79
Average	63.54	14.28	40.80	9.17	62.83	14.13	44.27	9.95
St Dev	2.80	0.63	0.72	0.16	4.75	1.07	2.57	0.58
Count	4	4	4	4	4	4	4	4
	50 Cycles				75 Cycles			
	Mating		Unmating		Mating		Unmating	
	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)
Minimum	60.39	13.58	44.30	9.96	61.60	13.85	46.23	10.39
Maximum	71.71	16.12	50.53	11.36	72.62	16.33	52.11	11.72
Average	64.69	14.54	46.79	10.52	66.07	14.85	48.63	10.93
St Dev	4.93	1.11	2.66	0.60	4.74	1.07	2.51	0.56
Count	4	4	4	4	4	4	4	4
	100 Cycles				After Humidity			
	Mating		Unmating		Mating		Unmating	
	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)
Minimum	62.91	14.14	47.68	10.72	45.77	10.29	33.17	7.46
Maximum	73.09	16.43	53.26	11.97	52.56	11.82	39.04	8.78
Average	67.17	15.10	50.33	11.31	48.17	10.83	35.33	7.94
St Dev	4.34	0.98	2.35	0.53	3.00	0.67	2.56	0.58
Count	4	4	4	4	4	4	4	4

DATA SUMMARIES**MATING-UNMATING FORCE:****Mating-Unmating Durability Group3-EBDM-6-12-2.0-S-RA-1(SAMTEC DMO) / EBTF-6-12-2.0-S-RA-1(SAMTEC RAR)**

	Initial				25 Cycles			
	Mating		Unmating		Mating		Unmating	
	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)
Minimum	59.85	13.46	38.64	8.69	58.95	13.25	43.73	9.83
Maximum	62.70	14.10	40.55	9.12	63.11	14.19	44.92	10.10
Average	61.52	13.83	39.84	8.96	61.26	13.77	44.44	9.99
St Dev	1.20	0.27	0.87	0.20	1.83	0.41	0.51	0.11
Count	4	4	4	4	4	4	4	4
	50 Cycles				75 Cycles			
	Mating		Unmating		Mating		Unmating	
	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)
Minimum	60.36	13.57	45.94	10.33	61.02	13.72	47.01	10.57
Maximum	64.58	14.52	47.31	10.64	65.27	14.68	48.51	10.91
Average	62.72	14.10	46.67	10.49	63.29	14.23	47.96	10.78
St Dev	1.75	0.39	0.57	0.13	1.76	0.39	0.66	0.15
Count	4	4	4	4	4	4	4	4
	100 Cycles				After Humidity			
	Mating		Unmating		Mating		Unmating	
	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)
Minimum	60.89	13.69	47.91	10.77	46.60	10.48	35.37	7.95
Maximum	66.16	14.87	49.51	11.13	48.23	10.84	36.01	8.10
Average	63.86	14.36	48.85	10.98	47.74	10.73	35.68	8.02
St Dev	2.19	0.49	0.70	0.16	0.77	0.17	0.26	0.06
Count	4	4	4	4	4	4	4	4

DATA SUMMARIES**MATING-UNMATING FORCE:****Mating-Unmating Durability Group4- EBDM-6-12-2.0-S-RA-1(SAMTEC DMO)/10123159-101LF (AFCI RAR):**

	Initial				25 Cycles			
	Mating		Unmating		Mating		Unmating	
	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)
Minimum	59.88	13.46	39.76	8.94	57.95	13.03	41.39	9.31
Maximum	65.83	14.80	43.07	9.68	64.58	14.52	44.21	9.94
Average	62.28	14.00	41.36	9.30	60.67	13.64	42.97	9.66
St Dev	2.58	0.58	1.42	0.32	2.79	0.63	1.33	0.30
Count	4	4	4	4	4	4	4	4
	50 Cycles				75 Cycles			
	Mating		Unmating		Mating		Unmating	
	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)
Minimum	58.78	13.22	42.71	9.60	59.31	13.34	43.91	9.87
Maximum	65.19	14.66	45.74	10.28	65.45	14.72	46.91	10.55
Average	61.65	13.86	44.67	10.04	61.84	13.90	45.76	10.29
St Dev	2.70	0.61	1.42	0.32	2.63	0.59	1.40	0.31
Count	4	4	4	4	4	4	4	4
	100 Cycles				After Humidity			
	Mating		Unmating		Mating		Unmating	
	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)	New tons	Force (Lbs)
Minimum	60.08	13.51	44.33	9.97	46.02	10.35	32.38	7.28
Maximum	66.11	14.86	47.83	10.75	48.10	10.81	34.70	7.80
Average	62.89	14.14	46.53	10.46	47.12	10.59	33.67	7.57
St Dev	2.48	0.56	1.61	0.36	0.92	0.21	1.09	0.25
Count	4	4	4	4	4	4	4	4

DATA SUMMARIES**LLCR Mating/Unmating Durability Group**

- 1). A total of 96 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. $\leq +5.0$ 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 $+2000$ mOhms ----- Unstable
 - f. $> +2000$ mOhms: ----- Open Failure

Group1- EBTF-6-12-2.0-S-RA-1(SAMTEC RAR) /10129181-101(AFCI DMO)

LLCR Measurement Summaries by Pin Type				
Date	2017/8/22	2017/8/23	2017/8/28	2017/9/7
Room Temp (Deg C)	23	23	23	23
Rel Humidity (%)	46	43	43	39
Technician	Tony Wagoner	Tony Wagoner	Tony Wagoner	Tony Wagoner
mOhm values	Actual	Delta	Delta	Delta
	Initial	100 Cycles	Therm Shck	Humidity
Pin Type 1: Row 1				
Average	53.66	0.34	0.55	0.70
St. Dev.	5.30	0.26	0.48	0.46
Min	45.06	0.02	0.05	0.11
Max	60.12	0.80	2.10	1.76
Summary Count	20	20	20	20
Total Count	20	20	20	20
Pin Type 2: Row 2				
Average	40.20	0.20	0.28	0.29
St. Dev.	3.79	0.12	0.22	0.19
Min	33.83	0.01	0.03	0.05
Max	44.80	0.45	0.79	0.73
Summary Count	20	20	20	20
Total Count	20	20	20	20
Pin Type 3: Row 3				
Average	28.81	0.25	0.91	0.85
St. Dev.	4.14	0.17	1.19	1.05
Min	20.89	0.01	0.05	0.03
Max	33.64	0.68	5.00	4.47
Summary Count	20	20	20	20
Total Count	20	20	20	20
Pin Type 4: Ground				
Average	1.69	0.03	0.09	0.08
St. Dev.	0.19	0.03	0.07	0.06
Min	1.38	0.00	0.00	0.00
Max	2.00	0.14	0.37	0.21
Summary Count	36	36	36	36
Total Count	36	36	36	36

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	≤ 5	$> 5 \ \& \ \leq 10$	$> 10 \ \& \ \leq 15$	$> 15 \ \& \ \leq 50$	$> 50 \ \& \ \leq 1000$	> 1000
100 Cycles	96	0	0	0	0	0
Therm Shck	95	1	0	0	0	0
Humidity	96	0	0	0	0	0

DATA SUMMARIES**Group2- 10123159-101LF (AFCI DMO)/10129181-101LF (AFCI DMO)**

LLCR Measurement Summaries by Pin Type				
Date	2017/5/24	2017/6/11	2017/6/16	2017/7/3
Room Temp (Deg C)	22	23	22	22
Rel Humidity (%)	41	43	48	45
Technician	Tony Wagoner	Tony Wagoner	Tony Wagoner	Tony Wagoner
mOhm values	Actual	Delta	Delta	Delta
	Initial	100 Cycles	Therm Shck	Humidity
Pin Type 1: Row 1				
Average	55.05	0.38	0.97	1.17
St. Dev.	5.78	0.51	0.52	0.94
Min	44.27	0.00	0.16	0.07
Max	61.68	2.19	2.16	3.16
Summary Count	20	20	20	20
Total Count	20	20	20	20
Pin Type 2: Row 2				
Average	42.28	0.34	0.86	1.27
St. Dev.	5.08	0.24	0.45	0.94
Min	34.00	0.02	0.22	0.09
Max	50.04	0.85	1.75	4.14
Summary Count	20	20	20	20
Total Count	20	20	20	20
Pin Type 3: Row 3				
Average	30.11	0.53	1.46	1.78
St. Dev.	4.65	0.80	1.32	1.57
Min	21.01	0.02	0.32	0.10
Max	34.74	2.92	6.15	5.63
Summary Count	20	20	20	20
Total Count	20	20	20	20
Pin Type 4: Ground				
Average	1.79	0.05	0.07	0.16
St. Dev.	0.21	0.06	0.07	0.14
Min	1.34	0.00	0.00	0.00
Max	2.18	0.33	0.34	0.72
Summary Count	36	36	36	36
Total Count	36	36	36	36

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	<=5	>5 & <=10	>10 & <=15	>15 & <=50	>50 & <=1000	>1000
100 Cycles	96	0	0	0	0	0
Therm Shck	95	1	0	0	0	0
Humidity	95	1	0	0	0	0

DATA SUMMARIES**Group3-EBDM-6-12-2.0-S-RA-1(SAMTEC DMO) / EBTF-6-12-2.0-S-RA-1(SAMTEC RAR)**

LLCR Measurement Summaries by Pin Type				
Date	2017/5/24	2017/6/11	2017/6/16	2017/7/3
Room Temp (Deg C)	22	23	22	22
Rel Humidity (%)	41	43	48	45
Technician	Tony Wagoner	Tony Wagoner	Tony Wagoner	Tony Wagoner
mOhm values	Actual	Delta	Delta	Delta
	Initial	100 Cycles	Therm Shck	Humidity
Pin Type 1: Row 1				
Average	56.13	1.36	1.80	1.25
St. Dev.	3.90	1.12	1.14	1.10
Min	47.89	0.01	0.12	0.09
Max	61.25	4.53	5.53	4.76
Summary Count	20	20	20	20
Total Count	20	20	20	20
Pin Type 2: Row 2				
Average	43.14	1.09	1.33	1.34
St. Dev.	4.65	1.04	1.26	0.97
Min	37.39	0.03	0.01	0.00
Max	49.77	3.54	4.04	2.88
Summary Count	20	20	20	20
Total Count	20	20	20	20
Pin Type 3: Row 3				
Average	31.19	0.97	1.24	1.16
St. Dev.	3.69	1.77	1.88	1.50
Min	22.99	0.03	0.05	0.02
Max	36.77	6.13	6.73	5.93
Summary Count	20	20	20	20
Total Count	20	20	20	20
Pin Type 4: Ground				
Average	1.68	0.05	0.59	0.17
St. Dev.	0.20	0.03	1.09	0.16
Min	1.29	0.00	0.00	0.00
Max	1.96	0.14	4.91	0.65
Summary Count	36	36	36	36
Total Count	36	36	36	36

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	<=5	>5 & <=10	>10 & <=15	>15 & <=50	>50 & <=1000	>1000
100 Cycles	94	2	0	0	0	0
Therm Shck	93	3	0	0	0	0
Humidity	95	1	0	0	0	0

DATA SUMMARIES**Group4- EBDM-6-12-2.0-S-RA-1(SAMTEC DMO)/10123159-101LF (AFCI RAR):**

LLCR Measurement Summaries by Pin Type				
Date	2017/5/24	2017/6/11	2017/6/16	2017/7/3
Room Temp (Deg C)	22	23	22	22
Rel Humidity (%)	41	43	48	45
Technician	Tony Wagoner	Tony Wagoner	Tony Wagoner	Tony Wagoner
mOhm values	Actual	Delta	Delta	Delta
	Initial	100 Cycles	Therm Shck	Humidity
Pin Type 1: Row 1				
Average	55.57	0.27	0.47	1.32
St. Dev.	5.26	0.18	0.35	1.87
Min	45.46	0.01	0.03	0.03
Max	61.35	0.73	1.26	8.56
Summary Count	20	20	20	20
Total Count	20	20	20	20
Pin Type 2: Row 2				
Average	43.72	0.22	0.36	0.76
St. Dev.	4.84	0.19	0.27	0.57
Min	37.14	0.04	0.06	0.03
Max	50.90	0.79	1.08	1.79
Summary Count	20	20	20	20
Total Count	20	20	20	20
Pin Type 3: Row 3				
Average	30.91	0.44	0.61	1.76
St. Dev.	4.54	0.41	0.53	2.47
Min	21.67	0.06	0.01	0.02
Max	34.98	1.87	1.91	9.14
Summary Count	20	20	20	20
Total Count	20	20	20	20
Pin Type 4: Ground				
Average	1.84	0.06	0.13	0.13
St. Dev.	0.20	0.06	0.13	0.14
Min	1.50	0.00	0.00	0.01
Max	2.16	0.26	0.69	0.61
Summary Count	36	36	36	36
Total Count	36	36	36	36

LLCR Delta Count by Category						
	Stable	Minor	Acceptable	Marginal	Unstable	Open
mOhms	<=5	>5 & <=10	>10 & <=15	>15 & <=50	>50 & <=1000	>1000
100 Cycles	96	0	0	0	0	0
Therm Shck	96	0	0	0	0	0
Humidity	93	3	0	0	0	0

EQUIPMENT AND CALIBRATION SCHEDULES**Equipment #:** TCT-01**Description:** Test Stand**Manufacturer:** Chatillon**Model:** TCD-1000**Serial #:** 05 23 00 02**Accuracy:** Speed Accuracy: +/-5% of max speed; Displacement: +/- .5% or +/- .005, whichever is greater.

... Last Cal: 08/24/2017 Next Cal: 08/24/2018

Equipment #: THC-02**Description:** Temperature/Humidity Chamber (SJR Room – Unit #1)**Manufacturer:** Thermotron**Model:** SE-1000-6-6**Serial #:** 31808**Accuracy:** See Manual

... Last Cal: 11/04/2016, Next Cal: 11/04/2017

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: 05/03/2017, Next Cal: 05/03/2018

Equipment #: MO-03**Description:** Multimeter /Data Acquisition System**Manufacturer:** Keithley**Model:** 2700**Serial #:** 0791975**Accuracy:** See Manual

... Last Cal: 05/24/2017, Next Cal: 05/24/2018