



Project Number: Extended Durability Test Report	Tracking Code: 988118_Report_Rev_1
Requested by: Donnie Baldwin	Date: 6/7/2017
Part #: FFSD-20-S-06.00-01-S-N/EHF-120-01-S-D	
Part description: FFSD/EHF	Tech: Kason He
Test Start: 2/26/2017	Test Completed: 3/30/2017



EXTENDED DURABILITY TEST REPORT

FFSD/EHF
FFSD-20-S-06.00-01-S-N/EHF-120-01-S-D

Tracking Code: 988118_Report_Rev_1	Part #: FFSD-20-S-06.00-01-S-N/EHF-120-01-S-D
Part description: FFSD/EHF	

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
6/5/2017	1	Initial Issue	KH

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-107813-TST-XX.

FLOWCHARTS

Extended Life

Group 1 FFSD-20-S-06.00-01-S-N EHF-120-01-S-D 8 Assemblies 100 Cycles		Group 2 FFSD-20-S-06.00-01-S-N EHF-120-01-S-D 8 Assemblies 250 Cycles		Group 3 FFSD-20-S-06.00-01-S-N EHF-120-01-S-D 8 Assemblies 500 Cycles		Group 4 FFSD-20-S-06.00-01-S-N EHF-120-01-S-D 8 Assemblies 1000 Cycles	
Step	Description	Step	Description	Step	Description	Step	Description
1.	Plating Thickness Verification ⁽⁴⁾	1.	Plating Thickness Verification ⁽⁴⁾	1.	Plating Thickness Verification ⁽⁴⁾	1.	Plating Thickness Verification ⁽⁴⁾
2.	LLCR ⁽²⁾	2.	LLCR ⁽²⁾	2.	LLCR ⁽²⁾	2.	LLCR ⁽²⁾
3.	Cycles Quantity = 100 Cycles	3.	Cycles Quantity = 250 Cycles	3.	Cycles Quantity = 500 Cycles	3.	Cycles Quantity = 1000 Cycles
4.	LLCR ⁽²⁾ Max Delta = 15 mOhm	4.	LLCR ⁽²⁾ Max Delta = 15 mOhm	4.	LLCR ⁽²⁾ Max Delta = 15 mOhm	4.	LLCR ⁽²⁾ Max Delta = 15 mOhm
5.	Thermal Shock ⁽⁵⁾	5.	Thermal Shock ⁽⁵⁾	5.	Thermal Shock ⁽⁵⁾	5.	Thermal Shock ⁽⁵⁾
6.	LLCR ⁽²⁾ Max Delta = 15 mOhm	6.	LLCR ⁽²⁾ Max Delta = 15 mOhm	6.	LLCR ⁽²⁾ Max Delta = 15 mOhm	6.	LLCR ⁽²⁾ Max Delta = 15 mOhm
7.	Humidity ⁽¹⁾	7.	Humidity ⁽¹⁾	7.	Humidity ⁽¹⁾	7.	Humidity ⁽¹⁾
8.	LLCR ⁽²⁾ Max Delta = 15 mOhm	8.	LLCR ⁽²⁾ Max Delta = 15 mOhm	8.	LLCR ⁽²⁾ Max Delta = 15 mOhm	8.	LLCR ⁽²⁾ Max Delta = 15 mOhm
9.	Photos ⁽³⁾	9.	Photos ⁽³⁾	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) 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.

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 +2000 mOhms: ----- Unstable
 - f. >+2000 mOhms:----- Open Failure

RESULTS**LLCR Extended Life Group (192 LLCR test points)****Group 1 –100 cycles**

- **Initial** ----- 55.92 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 ----- 179 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 12 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
- **Humidity**
 - ≤ +5.0 mOhms ----- 146 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 46 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

Group 2 –250 cycles

- **Initial** ----- 55.46 mOhms Max
- **Durability, 250 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 ----- 156 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 30 Points ----- Minor
 - +10.1 to +15.0 mOhms ----- 6 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 ----- 118 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 68 Points ----- Minor
 - +10.1 to +15.0 mOhms ----- 6 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**Group 3 -500 cycles**

- **Initial** ----- 56.48 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 ----- 162 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 30 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 ----- 114 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 77 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

Group 4 -1000 cycles

- **Initial** ----- 54.75 mOhms Max
- **Durability, 1000 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 ----- 175 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 17 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 ----- 112 Points ----- Stable
 - +5.1 to +10.0 mOhms ----- 79 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 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. $\leq +5.0$ 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

Group 1-100 cycles

LLCR Measurement Summaries by Pin Type				
Date	2/27/2017	3/3/2017	3/9/2017	3/30/2017
Room Temp (Deg C)	20	22	22	24
Rel Humidity (%)	56	44	57	64
Technician	Kason He	Kason He	Kason He	Kason He
mOhm values	Actual Initial	Delta 100 Cycles	Delta Therm Shck	Delta Humidity
Pin Type 1: Signal				
Average	52.80	0.44	2.00	3.43
St. Dev.	0.69	0.33	1.69	1.88
Min	51.34	0.00	0.05	0.16
Max	55.92	2.21	10.69	8.60
Summary Count	192	192	192	192
Total Count	192	192	192	192

LLCR Delta Count by Category						
mOhms	Stable	Minor	Acceptable	Marginal	Unstable	Open
	≤ 5	>5 & ≤ 10	>10 & ≤ 15	>15 & ≤ 50	>50 & ≤ 1000	>1000
100 Cycles	192	0	0	0	0	0
Therm Shck	179	12	1	0	0	0
Humidity	146	46	0	0	0	0

DATA SUMMARIES Continued**Group 2-250 cycles**

LLCR Measurement Summaries by Pin Type				
Date	2/28/2017	3/3/2017	3/9/2017	3/30/2017
Room Temp (Deg C)	21	22	22	23
Rel Humidity (%)	56	44	57	64
Technician	Kason He	Kason He	Kason He	Kason He
mOhm values	Actual Initial	Delta 250 Cycles	Delta Therm Shck	Delta Humidity
Pin Type 1: Signal				
Average	52.92	0.43	3.21	4.88
St. Dev.	0.69	0.31	2.66	2.51
Min	51.07	0.00	0.04	0.87
Max	55.46	1.79	14.51	13.04
Summary Count	192	192	192	192
Total Count	192	192	192	192

LLCR Delta Count by Category						
mOhms	Stable	Minor	Acceptable	Marginal	Unstable	Open
	<=5	>5 & <=10	>10 & <=15	>15 & <=50	>50 & <=1000	>1000
250 Cycles	192	0	0	0	0	0
Therm Shck	156	30	6	0	0	0
Humidity	118	68	6	0	0	0

DATA SUMMARIES Continued**Group 3-500 cycles**

LLCR Measurement Summaries by Pin Type				
Date	2/28/2017	3/3/2017	3/9/2017	3/30/2017
Room Temp (Deg C)	21	22	22	23
Rel Humidity (%)	56	44	57	64
Technician	Kason He	Kason He	Kason He	Kason He
mOhm values	Actual Initial	Delta 500 Cycles	Delta Therm Shck	Delta Humidity
Pin Type 1: Signal				
Average	52.94	0.28	3.21	4.56
St. Dev.	0.68	0.22	1.73	2.11
Min	51.34	0.00	0.18	0.01
Max	56.48	1.44	9.33	10.24
Summary Count	192	192	192	192
Total Count	192	192	192	192

LLCR Delta Count by Category						
mOhms	Stable	Minor	Acceptable	Marginal	Unstable	Open
	<=5	>5 & <=10	>10 & <=15	>15 & <=50	>50 & <=1000	>1000
500 Cycles	192	0	0	0	0	0
Therm Shck	162	30	0	0	0	0
Humidity	114	77	1	0	0	0

DATA SUMMARIES Continued**Group 4-1000 cycles**

LLCR Measurement Summaries by Pin Type				
Date	2/26/2017	3/3/2017	3/9/2017	3/30/2017
Room Temp (Deg C)	18	22	22	23
Rel Humidity (%)	56	44	57	64
Technician	Kason He	Kason He	Kason He	Kason He
mOhm values	Actual	Delta	Delta	Delta
	Initial	1000 Cycles	Therm Shck	Humidity
Pin Type 1: Signal				
Average	52.31	1.07	2.48	4.69
St. Dev.	0.75	0.74	1.80	2.27
Min	50.68	0.00	0.02	0.04
Max	54.75	3.45	8.95	14.29
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
1000 Cycles	192	0	0	0	0	0
Therm Shck	175	17	0	0	0	0
Humidity	112	79	1	0	0	0

EQUIPMENT AND CALIBRATION SCHEDULES**Equipment #:** HZ-THC-01**Description:** Humidity transmitter**Manufacturer:** Thermtron**Model:** SM-8-8200**Serial #:** 38846**Accuracy:** Last Cal: 2/28/2016, Next Cal: 2/27/2017**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: 06/28/2016, Next Cal: 06/27/2017

Equipment #: HZ-MO-05**Description:** Micro-ohmmeter**Manufacturer:** Keithley**Model:** 3706**Serial #:** 1285188**Accuracy:** Last Cal: 11/15/2016, Next Cal: 11/14/2017