



Project Number: Extended Life Test Report	Tracking Code: CR-971605_Report_Rev_1
Requested by: Tyler Lang	Date: 1/23/2024
Part #: B1SDT-30-28-H-06.0/P1M-30-L1-S-D-RA-TR	
Part description: B1SDT / P1M	Tech: Aaron McKim
Test Start: 8/25/2023	Test Completed: 10/19/2023



EXTENDED LIFE TEST REPORT
B1SDT / P1M
B1SDT-30-28-H-06.0/P1M-30-L1-S-D-RA-TR

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
1/23/2024	1	Initial test	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.

All contents contained herein are the property of Samtec. No portion of this report, in part or in full shall be reproduced without prior written approval of Samtec.

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 testing was cleaned according to CO-SC-WI-3029.
- 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
- 9) Samtec Test PCBs used: PCB-111718-TST.

FLOWCHARTS

Extended Life

Note: Only 1 plating verification sample needed between all groups

<u>Group 1</u>		<u>Group 2</u>		<u>Group 3</u>		<u>Group 4</u>	
B1SDT-30-28-H-06.0 P1M-30-L1-S-D-RA-TR 8 Assemblies 500 Cycles		B1SDT-30-28-H-06.0 P1M-30-L1-S-D-RA-TR 8 Assemblies 1000 Cycles		B1SDT-30-28-H-06.0 P1M-30-L1-S-D-RA-TR 8 Assemblies 2500 Cycles		B1SDT-30-28-H-06.0 P1M-30-L1-S-D-RA-TR 8 Assemblies 5000 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 = 500 Cycles	3.	Cycles Quantity = 1000 Cycles	3.	Cycles Quantity = 2500 Cycles	3.	Cycles Quantity = 5000 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)
				10.	SEM Analysis	10.	SEM Analysis
					<i>Note: Wear track analysis</i>		<i>Note: Wear track analysis</i>

(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.

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 $+1000$ mOhms: -----Unstable
 - f. $>+1000$ mOhms:-----Open Failure

RESULTS**LLCR Extended Life (192 LLCR test points)****500 Cycles**

- **Initial** ----- 39.28 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 +1000 mOhms-----0 Points ----- Unstable
 - >+1000 mOhms-----0 Points ----- Open Failure
- **Thermal**
 - <= +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 +1000 mOhms-----0 Points ----- Unstable
 - >+1000 mOhms-----0 Points ----- Open Failure
- **Humidity**
 - <= +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 +1000 mOhms-----0 Points ----- Unstable
 - >+1000 mOhms -----0 Points ----- Open Failure

1000 Cycles

- **Initial** ----- 40.39 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 +1000 mOhms-----0 Points ----- Unstable
 - >+1000 mOhms-----0 Points ----- Open Failure
- **Thermal**
 - <= +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 +1000 mOhms-----0 Points ----- Unstable
 - >+1000 mOhms-----0 Points ----- Open Failure
- **Humidity**
 - <= +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 +1000 mOhms-----0 Points ----- Unstable
 - >+1000 mOhms -----0 Points ----- Open Failure

RESULTS Continued**2500 Cycles**

- **Initial** ----- 40.11 mOhms Max
- **Durability, 2500 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 +1000 mOhms-----0 Points ----- Unstable
 - >+1000 mOhms -----0 Points ----- Open Failure
- **Thermal**
 - <= +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 +1000 mOhms-----0 Points ----- Unstable
 - >+1000 mOhms -----0 Points ----- Open Failure
- **Humidity**
 - <= +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 +1000 mOhms-----0 Points ----- Unstable
 - >+1000 mOhms -----0 Points ----- Open Failure

5000 Cycles

- **Initial** ----- 39.9 mOhms Max
- **Durability, 5000 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 +1000 mOhms-----0 Points ----- Unstable
 - >+1000 mOhms -----0 Points ----- Open Failure
- **Thermal**
 - <= +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 +1000 mOhms-----0 Points ----- Unstable
 - >+1000 mOhms -----0 Points ----- Open Failure
- **Humidity**
 - <= +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 +1000 mOhms-----0 Points ----- Unstable
 - >+1000 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) 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 $+1000$ mOhms: -----Unstable
 - f. $>+1000$ mOhms: -----Open Failure

500 Cycles

LLCR Measurement Summaries by Pin Type				
Date	8/30/2023	9/20/2023	9/29/2023	10/19/2023
Room Temp (Deg C)	22	23	23	22
Rel Humidity (%)	52	46	54	43
Technician	Aaron McKim	Aaron McKim	Aaron McKim	Aaron McKim
mOhm values				
	Actual Initial	Delta Cycles	Delta Therm Shck	Delta Humidity
Pin Type: Signal 1				
Average	37.41	0.31	0.3	0.34
St. Dev.	0.93	0.57	0.44	0.5
Min	34.08	0	0	0
Max	39.28	3.68	3.56	3.72
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	$>5 \ \& \ \leq 10$	$>10 \ \& \ \leq 15$	$>15 \ \& \ \leq 50$	$>50 \ \& \ \leq 1000$	>1000
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**1000 Cycles**

LLCR Measurement Summaries by Pin Type				
Date	8/30/2023	9/15/2023	9/22/2023	10/3/2023
Room Temp (Deg C)	22	23	22	22
Rel Humidity (%)	52	46	48	50
Technician	Aaron McKim	Aaron McKim	Aaron McKim	Aaron McKim
mOhm values	Actual Initial	Delta Cycles	Delta Therm Shck	Delta Humidity
Pin Type: Signal 1				
Average	37.94	0.37	1.12	0.38
St. Dev.	0.99	0.59	0.75	0.53
Min	34.32	0	0.01	0
Max	40.39	4.03	3.72	3.52
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
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

2500 Cycles

LLCR Measurement Summaries by Pin Type				
Date	8/30/2023	9/11/2023	9/18/2023	9/28/2023
Room Temp (Deg C)	22	22	22	22
Rel Humidity (%)	53	55	50	55
Technician	Aaron McKim	Aaron McKim	Aaron McKim	Aaron McKim
mOhm values	Actual	Delta	Delta	Delta
	Initial	Cycles	Therm Shck	Humidity
Pin Type: Signal 1				
Average	38.15	0.41	0.5	0.46
St. Dev.	0.96	0.61	0.59	0.56
Min	34.57	0	0	0
Max	40.11	3.4	3.17	3.93
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
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

5000 Cycles

LLCR Measurement Summaries by Pin Type				
	8/30/2023	9/22/2023	9/29/2023	10/19/2023
Date	8/30/2023	9/22/2023	9/29/2023	10/19/2023
Room Temp (Deg C)	22	22	23	22
Rel Humidity (%)	53	49	54	43
Technician	Aaron McKim	Aaron McKim	Aaron McKim	Aaron McKim
mOhm values	Actual	Delta	Delta	Delta
	Initial	Cycles	Therm Shck	Humidity
Pin Type: Signal 1				
Average	38.03	0.4	0.38	0.43
St. Dev.	0.91	0.48	0.54	0.6
Min	34.6	0	0	0
Max	39.9	3.23	4.2	4.16
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
Cycles	192	0	0	0	0	0
Therm Shck	192	0	0	0	0	0
Humidity	192	0	0	0	0	0

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: TCT-01

Description: Normal force analyzer

Manufacturer: Mecmesin Multitester

Model: Mecmesin Multitester 2.5-i

Serial #: 08-1049-04

Accuracy: Last Cal: 4/26/2023, Next Cal: 4/25/2024

Equipment #: MO-05

Description: Micro-ohmmeter

Manufacturer: Keithley

Model: 3706

Serial #: 1285188

Accuracy: Last Cal: 11/15/2022, Next Cal: 11/14/2023