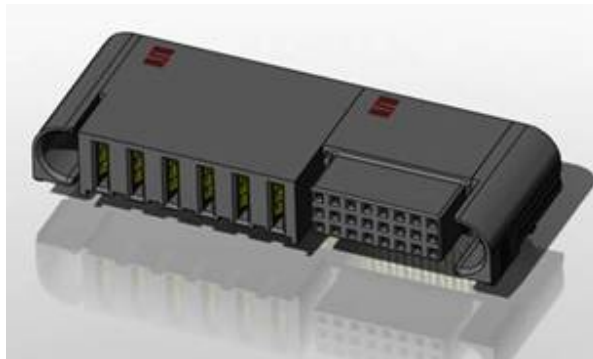
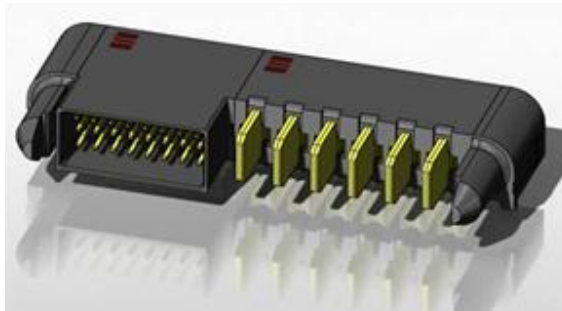




Project Number: Design Qualification Test Report	Tracking Code: 249309_Report_Rev_2
Requested by: Steven Xu	Date: 3/23/2016
Part #: ET60S-00-24-06-L-RT1-GP/ET60T-00-24-06-L-RT1-GP	
Part description: ET60S/ET60T	Tech: Kason He
Test Start: 3/28/2013	Test Completed: 6/22/2013



DESIGN QUALIFICATION TEST REPORT

ET60S/ET60T

ET60S-00-24-06-L-RT1-GP/ET60T-00-24-06-L-RT1-GP

Tracking Code: 249309_Report_Rev_2	Part #: ET60S-00-24-06-L-RT1-GP/ET60T-00-24-06-L-RT1-GP
Part description: ET60S/ET60T	

REVISION HISTORY

DATE	REV.NUM.	DESCRIPTION	ENG
3/23/2016	2	Add the environmental test data	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 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-103697-TST

FLOWCHARTS**Durability/Mating/Unmating/Gaps**

TEST STEP	GROUP B1 8 Boards (largest position submitted)
01	LLCR-1
02	Forces - Mating / Unmating
03	500 Cycles
04	Forces - Mating / Unmating
05	LLCR-2
06	Thermal Shock (Mated and Undisturbed)
07	LLCR-3
08	Cyclic Humidity (Mated and Undisturbed)
09	LLCR-4

Thermal Shock = EIA-364-32, Table II, Test Condition I:

-55°C to +85°C 1/2 hour dwell, 100 cycles

Humidity = EIA-364-31, Test Condition B (240 Hours)

and Method III (+25°C to +65°C @ 90% RH to 98% RH)

ambient pre-condition and delete steps 7a and 7b

Mating / Unmating Forces = EIA-364-13

LLCR = EIA-364-23, LLCR

20 mV Max, 100 mA Max

Use Keithley 580 or 3706 in 4 wire dry circuit mode

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

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.

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.

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. <= +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

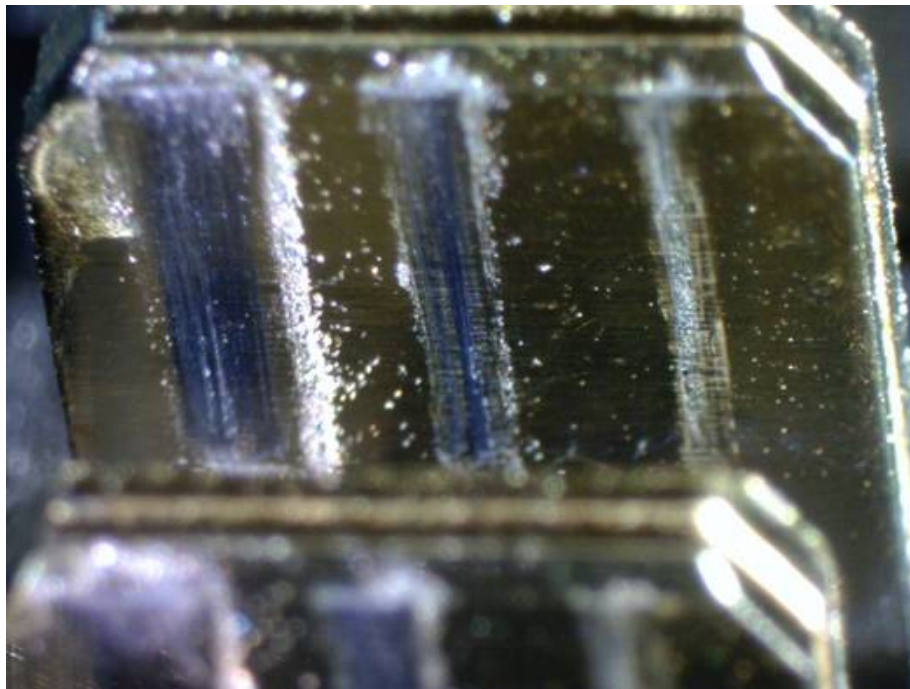
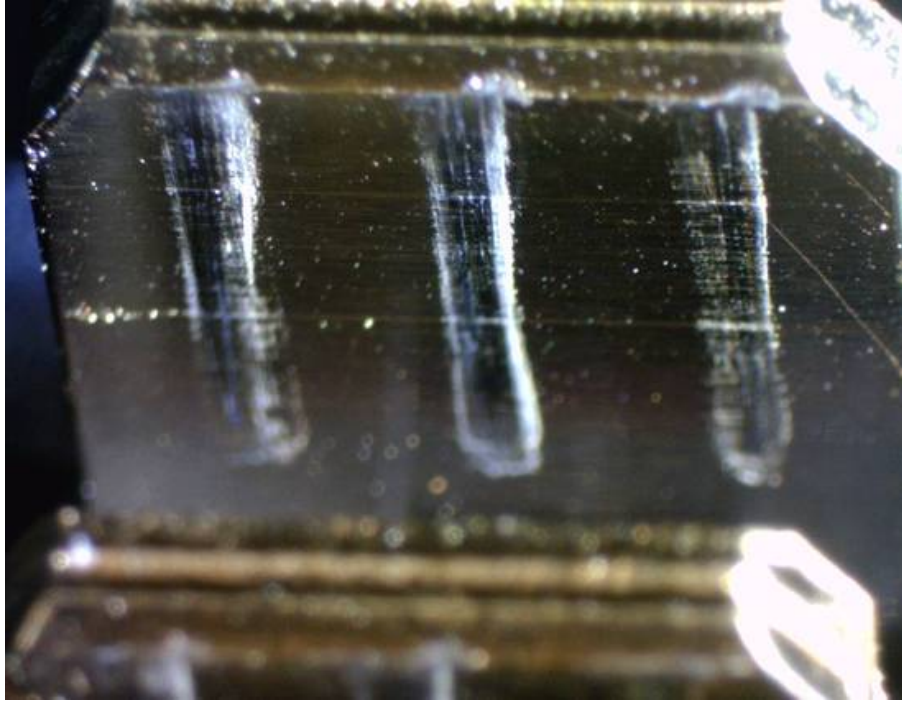
RESULTS**Mating\Unmating Forces**

- **Initial**
 - **Mating**
 - **Min** ----- 5.56 Lbs
 - **Max** ----- 6.46 Lbs
 - **Unmating**
 - **Min** ----- 4.43 Lbs
 - **Max** ----- 7.23 Lbs
- **After 500 Cycles**
 - **Mating**
 - **Min** -----10.77 Lbs
 - **Max** -----19.22 Lbs
 - **Unmating**
 - **Min** -----11.93 Lbs
 - **Max** -----17.97 Lbs

LLCR Durability: (192 LLCR test points)

- **Initial Signal pin** ----- 13.33mOhms Max
- **Initial Power pin** -----0.26mOhms 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**
 - **<= +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** ----- 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

RESULTS Continued



DATA SUMMARIES**Mating\Unmating Force**

	Initial				After 500 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	24.73	5.56	19.70	4.43	47.90	10.77	53.06	11.93
Maximum	28.73	6.46	32.16	7.23	87.71	19.72	79.93	17.97
Average	26.83	6.03	24.86	5.59	67.00	15.06	64.98	14.61
St Dev	1.78	0.40	4.33	0.97	14.64	3.29	10.53	2.37
Count	8	8	8	8	8	8	8	8

DATA SUMMARIES Continued**LLCR Durability:**

- 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

LLCR Measurement Summaries by Pin Type				
Date	3/28/2013	3/29/2013	5/28/2013	6/22/2013
Room Temp (Deg C)	22	22	23	24
Rel Humidity (%)	60	60	58	53
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	11.11	0.22	1.36	0.62
St. Dev.	1.50	0.18	1.25	0.52
Min	7.65	0.00	0.00	0.00
Max	13.33	0.85	3.89	3.08
Summary Count	144	144	144	144
Total Count	144	144	144	144
Pin Type 2: Power				
Average	0.23	0.02	0.02	0.02
St. Dev.	0.01	0.01	0.01	0.01
Min	0.20	0.00	0.00	0.00
Max	0.26	0.05	0.05	0.06
Summary Count	48	48	48	48
Total Count	48	48	48	48

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	192	0	0	0	0	0
Humidity	192	0	0	0	0	0

EQUIPMENT AND CALIBRATION SCHEDULES**Equipment #:** HZ-TCT-01**Description:** Normal force analyzer**Manufacturer:** Mecmesin Multitester**Model:** Mecmesin Multitester 2.5-i**Serial #:** 08-1049-04**Accuracy:** Last Cal: 4/27/2012, Next Cal: 4/26/2013**Equipment #:** HZ-MO-05**Description:** Micro-ohmmeter**Manufacturer:** Keithley**Model:** 3706**Serial #:** 1285188**Accuracy:** Last Cal: 11/15/2012, Next Cal: 11/14/2013**Equipment #:** HZ-THC-01**Description:** Humidity transmitter**Manufacturer:** Thermtron**Model:** SM-8-8200**Serial #:** 38846**Accuracy:** Last Cal: 2/26/2013, Next Cal: 2/25/2014**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: 06/25/2012, Next Cal: 06/24/2013