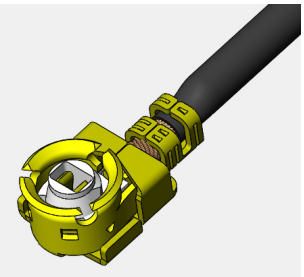
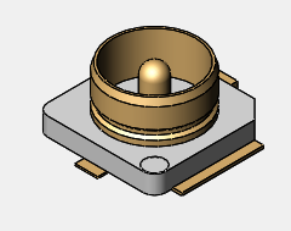
Project Number: Design Qualification Test Report	Tracking Code: 379848_Report_Rev_1
Requested by: Tori Meek	Date: 01/21/2015
Part #: MH081-MH3RP-MH3RP-0305/RSP-122811-02	
Part description: MH081/RSP	Tech: Aaron McKim
Test Start:11/14/2014	Test Completed: 12/04/2014





DESIGN QUALIFICATION TEST REPORT

MH081/RSP
MH081-MH3RP-MH3RP-0305/RSP-122811-02

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
01/21/2015	**1**	**Initial Issue**	**KH**

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: 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-104382-TST

FLOWCHARTS

Mating/Unmating/Durability

Group 1
MH081-MH3RP-MH3RP-0305
RSP-122811-02
8 Assemblies

Step	Description
1.	Contact Gaps
2.	LLCR (2)
3.	Mating/Unmating Force (3)
4.	Cycles Quantity = 10 Cycles *Note: W.FL connector is industry rated to 10 cycles.*
5.	Mating/Unmating Force (3)
6.	Contact Gaps
7.	LLCR (2) Max Delta = 15 mOhm
8.	Thermal Shock (4) - Non Standard
9.	LLCR (2) Max Delta = 15 mOhm
10.	Humidity (1)
11.	LLCR (2) Max Delta = 15 mOhm
12.	Mating/Unmating Force (3)

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

(4) Thermal Shock = Other
Exposure Time at Temperature Extremes = 1/2 Hour
Method A, Test Condition = -40°C to +90°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 : -40°C to +90°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. <= +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 ---------- 1.69 Lbs**
    - **Max---------- 2.01 Lbs**
  - **Unmating**
    - **Min ---------- 1.83 Lbs**
    - **Max---------- 2.25 Lbs**
- **After 10 Cycles**
  - **Mating**
    - **Min ---------- 1.93 Lbs**
    - **Max---------- 2.40 Lbs**
  - **Unmating**
    - **Min ---------- 1.99 Lbs**
    - **Max---------- 2.35 Lbs**
- **After Humidity**
  - **Mating**
    - **Min ---------- 1.55 Lbs**
    - **Max---------- 1.91 Lbs**
  - **Unmating**
    - **Min ---------- 1.69 Lbs**
    - **Max---------- 1.95 Lbs**

RESULTS Continued

LLCR Durability (8 Signal and 8 Ground LLCR test points)

Signal

- **Initial ---------- 195.45 mOhms Max**
- **Durability,10 Cycles**
  - **<= +5.0 mOhms ---------- 8 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 ---------- 7 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 ---------- 8 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**

Ground

- **Initial ---------- 36.78 mOhms Max**
- **Durability, 10 Cycles**
  - **<= +5.0 mOhms ---------- 8 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 ---------- 8 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 ---------- 8 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**

DATA SUMMARIES

Mating/Unmating Force

	Initial				10 Cycles			
	Mating		**Unmating**		**Mating**		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	7.52	1.69	8.14	1.83	8.58	1.93	8.85	1.99
Maximum	8.94	2.01	10.01	2.25	10.68	2.40	10.45	2.35
Average	8.21	**1.85**	8.63	**1.94**	9.36	**2.11**	9.85	**2.22**
St Dev	0.51	0.11	0.64	0.14	0.65	0.15	0.61	0.14
Count	8	8	8	8	8	8	8	8

	After Humidity			
	Mating		**Unmating**	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	6.89	1.55	7.52	1.69
Maximum	8.50	1.91	8.67	1.95
Average	7.72	**1.74**	8.02	**1.80**
St Dev	0.52	0.12	0.40	0.09
Count	8	8	8	8

DATA SUMMARIES Continued

LLCR Durability

1). A total of 8 signal and 8 ground 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 +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	2014/11/14	2014/11/19	2014/11/24	2014/12/4
Room Temp (Deg C)	21	22	21	22
Rel Humidity (%)	23	21	47	36
Technician	Aaron McKim	Aaron McKim	Aaron McKim	Aaron McKim
mOhm values	**Actual Initial**	**Delta 10 Cycles**	**Delta Therm Shck**	**Delta Humidity**
	Pin Type 1: Signal			
Average	191.86	0.99	2.19	1.74
St. Dev.	2.16	0.60	1.62	1.18
Min	188.92	0.34	0.47	0.13
Max	195.45	2.13	5.87	4.26
Summary Count	8	8	8	8
Total Count	8	8	8	8
	Pin Type 2: Ground			
Average	32.84	0.68	0.70	0.45
St. Dev.	1.51	0.52	0.63	0.28
Min	31.80	0.09	0.09	0.14
Max	36.78	1.92	2.21	1.03
Summary Count	8	8	8	8
Total Count	8	8	8	8

LLCR Delta Count by Category						
	Stable	**Minor**	**Acceptable**	**Marginal**	**Unstable**	**Open**
mOhms	**<=5**	**>5 & <=10**	**>10 & <=15**	**>15 & <=50**	**>50 & <=1000**	**>1000**
10 Cycles	**16**	**0**	**0**	**0**	**0**	**0**
Therm Shck	**15**	**1**	**0**	**0**	**0**	**0**
Humidity	**16**	**0**	**0**	**0**	**0**	**0**

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: MO-11
Description: Switch/Multimeter
Manufacturer: Keithley
Model: 3706
Serial #: 120169
Accuracy: See Manual
… Last Cal: 09/11/2014, Next Cal: 09/11/2015

Equipment #: TCT-04
Description: Dillon Quantrol TC2 Test Stand
Manufacturer: Dillon Quantrol
Model: TC2
Serial #: 04-1041-04
Accuracy: Speed Accuracy: +/- 5% of indicated speed; Displacement: +/- 5 micrometers.
… Last Cal: 05/29/2014, Next Cal: 05/29/2015

Equipment #: THC-02
Description: Temperature/Humidity Chamber
Manufacturer: Thermotron
Model: SE-1000-6-6
Serial #: 31808
Accuracy: See Manual
… Last Cal: 09/09/2014, Next Cal: 09/09/2015

Equipment #: TSC-01
Description: Vertical Thermal Shock Chamber
Manufacturer: Cincinnatti Sub Zero
Model: VTS-3-6-6-SC/AC
Serial #: 10-VT14993
Accuracy: See Manual
… Last Cal: 06/30/2014, Next Cal: 06/30/2015