Project Number: Design Qualification Test Report	Tracking Code: 138887_Report_Rev_2			
Requested by: James Borgelt	Date: 6/29/2012	Product Rev: 0		
Part #: ACP-16-03-H-00.35-T-S-M-2\ACR-16-03-H-00.35-S-S1-M-2	Lot #: N/A	Tech: Aaron McKim	Eng: Eric Mings	
Part description: ACP\ACR		Qty to test: 10		
Test Start: 04/25/2011	Test Completed: 05/12/2011			

Design Qualification Test Report

ACP-16-03-H-00.35-T-S-M-2
ACR-16-03-H-00.35-S-S1-M-2

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) Samtec Test PCBs used: PCB-103219-TST-XX

FLOWCHARTS

Mechanical Shock / Vibration / LLCR

TEST STEP	GROUP A1 4 Assemblies
01	LLCR-1
02	Shock
03	Vibration
04	LLCR-2

Mechanical Shock = EIA 364-27 Half Sine,

100 g's, 6 milliSeconds (Condition "C") each axis

Vibration = EIA 364-28, Random Vibration

7.56 g RMS, Condition VB --- 2 hours/axis

LLCR = EIA-364-23, LLCR

20 mV Max, 100 mA Max

Use Keithley 580 or 3706 in 4 wire dry circuit mode

Shock / Vibration / nanoSecond Event Detection

TEST STEP	GROUP A1 4 Assemblies or 60 Points
01	Event Detection, Shock
02	Event Detection, Vibration

Mechanical Shock = EIA 364-27 Half Sine,

100 g's, 6 milliSeconds (Condition "C") each axis

Vibration = EIA 364-28, Random Vibration

7.56 g RMS, Condition VB --- 2 hours/axis

Event detection requirement during Shock / Vibration is 50 nanoseconds minimum

FLOWCHARTS Continued

IP67 Dust & Water

TEST STEP	GROUP A1 6 Mated Connectors	GROUP A2 6 Mated Connectors	GROUP B1 6 Connectors (Cable Dust Cover)
01	Dust Test	Submersion Water Test	Dust Test
02	Check for Dust	Check for Water	Check for Dust

TEST STEP	GROUP B2 6 Connectors (Cable Dust Cover)	GROUP C1 6 Connectors (Mating Part Dust Cover)	GROUP C2 6 Connectors (Mating Part Dust Cover)
01	Submersion Water Test	Dust Test	Submersion Water Test
02	Check for Water	Check for Dust	Check for Water

Dust/Water Testing = Per CEI/IEC 60529 Code IP67

IPX8 Water

TEST STEP	GROUP A1 3 Mated Connectors For Each Depth Tested (27 Total Mated Connectors)
01	2M for 30 Minutes
02	Check for Water
03	3M for 30 Minutes
04	Check for Water
05	4M for 30 Minutes
06	Check for Water
07	5M for 30 Minutes
08	Check for Water
09	6M for 30 Minutes
10	Check for Water
11	7M for 30 Minutes
12	Check for Water
13	8M for 30 Minutes
14	Check for Water
15	9M for 30 Minutes
16	Check for Water
17	10M for 30 Minutes
18	Check for Water

Water Testing = Per CEI/IEC 60529 Code IPX8

For this test you have to use the pressure chamber

New parts should be used for each depth tested

Stop testing once parts fail

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

WATER TESTING:

1) Reference document: CEI/IEC 60529 Code IPX7 and IPX8
2) ACR torque specification for ACPN-16-M is 15 IN-LB
3) ACP torque specification for ACCN-16-M onto ACCFS-16-M-X is 10 IN-LB

DUST TESTING:

1) Reference document: CEI/IEC 60529 Code IP6X
2) ACR torque specification for ACPN-16-M is 15 IN-LB
3) ACP torque specification for ACCN-16-M onto ACCFS-16-M-X is 10 IN-LB

MECHANICAL SHOCK (Specified Pulse):

1) Reference document: EIA-364-27, *Mechanical Shock Test Procedure for Electrical Connectors*
2) Test Condition C
3) Peak Value: 100 G
4) Duration: 6 Milliseconds
5) Wave Form: Half Sine
6) Velocity: 12.3 ft/s
7) Number of Shocks: 3 Shocks / Direction, 3 Axis (18 Total)

VIBRATION:

1) Reference document: EIA-364-28, *Vibration Test Procedure for Electrical Connectors*
2) Test Condition V, Letter B
3) Power Spectral Density: 0.04 G^2 / Hz
4) G 'RMS': 7.56
5) Frequency: 50 to 2000 Hz
6) Duration: 2.0 Hours per axis (3 axis total)

NANOSECOND-EVENT DETECTION:

1) Reference document: EIA-364-87, *Nanosecond-Event Detection for Electrical Connectors*
2) Prior to test, the samples were characterized to assure the low nanosecond event being monitored will trigger the detector.
3) After characterization it was determined the test samples could be monitored for 50 nanosecond events

LLCR:

1) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets*.
2) 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 Mechanical Shock & Vibration (32 LLCR test points)

- **Initial ---------- 9.7 mOhms Max**
- **After Shock& Vibration**
  - **<= +5.0 mOhms ---------- 32 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**

Mechanical Shock & Random Vibration:

- **Shock**
  - **No Damage ---------- ---------- Passed**
  - **50 Nanoseconds ---------- ---------- Passed**
- **Vibration**
  - **No Damage ---------- ---------- Passed**
  - **50 Nanoseconds ---------- ---------- Passed**

RESULTS Continued

IP67 Dust & Water

Group A1 – ACP/ACR Mated

	Initial (Before Exposure)	After Exposure
Dust	**No Dust Present**	**No Dust Present**

Group A2 – ACP/ACR Mated

	Initial (Before Exposure)	After Exposure
Water	**No Water Present**	**No Water Present**

Group B1 – ACP with dust cover

	Initial (Before Exposure)	After Exposure
Dust	**No Dust Present**	**No Dust Present**

Group B2 – ACP with dust cover

	Initial (Before Exposure)	After Exposure
Water	**No Water Present**	**No Water Present**

Group C1 – ACR with dust cover

	Initial (Before Exposure)	After Exposure
Dust	**No Dust Present**	**No Dust Present**

Group C2 – ACP with dust cover

	Initial (Before Exposure)	After Exposure
Water	**No Water Present**	**No Water Present**

IPX8 Water

Group A1 (10M)

	Initial (Before Exposure)	After Exposure
Water	**No Water Present**	**No Water Present**

DATA SUMMARIES

LLCR Shock/Vibration:

1) A total of 32 points were measured.
2) EIA-364-23, *Low Level Contact Resistance Test Procedure for Electrical Connectors and Sockets.*
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

Date	4/27/2011	4/29/2011
Room Temp C	23	23
RH	55%	39%
Name	Tony Wagoner	Tony Wagoner
mOhm values	**Actual Initial**	**Delta Shock / Vibe**
Average	8.7	0.1
St. Dev.	0.2	0.2
Min	8.4	-0.3
Max	9.7	0.9
Count	32	32

How many samples are being tested?	4
How many contacts are on each board?	8

	Stable	Minor	Acceptable	Marginal	Unstable	Open
Shock / Vibe	32	0	0	0	0	0

Event Detection:

Shock and Vibration Event Detection Summary	
Contacts tested	60
Test Condition	C, 100g's, 6ms, Half-Sine
Shock Events	0
Test Condition	V-B, 7.56 rms g
Vibration Events	0
Total Events	0

EQUIPMENT AND CALIBRATION SCHEDULES

Equipment #: MO-04
Description: Multimeter /Data Acquisition System
Manufacturer: Keithley
Model: 2700
Serial #: 0798688
Accuracy: See Manual
… Last Cal: 04/30/2011, Next Cal: 04/30/2012

Equipment #: SVC-01
Description: Shock & Vibration Table
Manufacturer: Data Physics
Model: LE-DSA-10-20K
Serial #: 10037
Accuracy: See Manual
… Last Cal: 11/31/2010, Next Cal: 11/31/2011

Equipment #: ED-03
Description: Event Detector
Manufacturer: Analysis Tech
Model: 32EHD
Serial #: 1100604
Accuracy: See Manual
… Last Cal: 06/04/2011, Next Cal: 06/04/2012

Equipment #: ACLM-01
Description: Accelerometer
Manufacturer: PCB Piezotronics
Model: 352C03
Serial #: 115819
Accuracy: See Manual
… Last Cal: 07/09/2011, Next Cal: 07/09/2012

Equipment #: IPX8-01
Description: IPX8 Water Pressure test Chamber
Manufacturer: Samtec Machine
Model: N/A
Serial #: N/A
Accuracy: No Calibration Required

EQUIPMENT AND CALIBRATION SCHEDULES Continued

Equipment #: IP6X-02
Description: IP6X Dust Tester
Manufacturer: Samtec Machine
Model: N/A
Serial #: N/A
Accuracy: No Calibration Required

Equipment #: IPX7-01
Description: IPX7 1 Meter Water Tester
Manufacturer: Samtec Machine
Model: N/A
Serial #: N/A
Accuracy: No Calibration Required