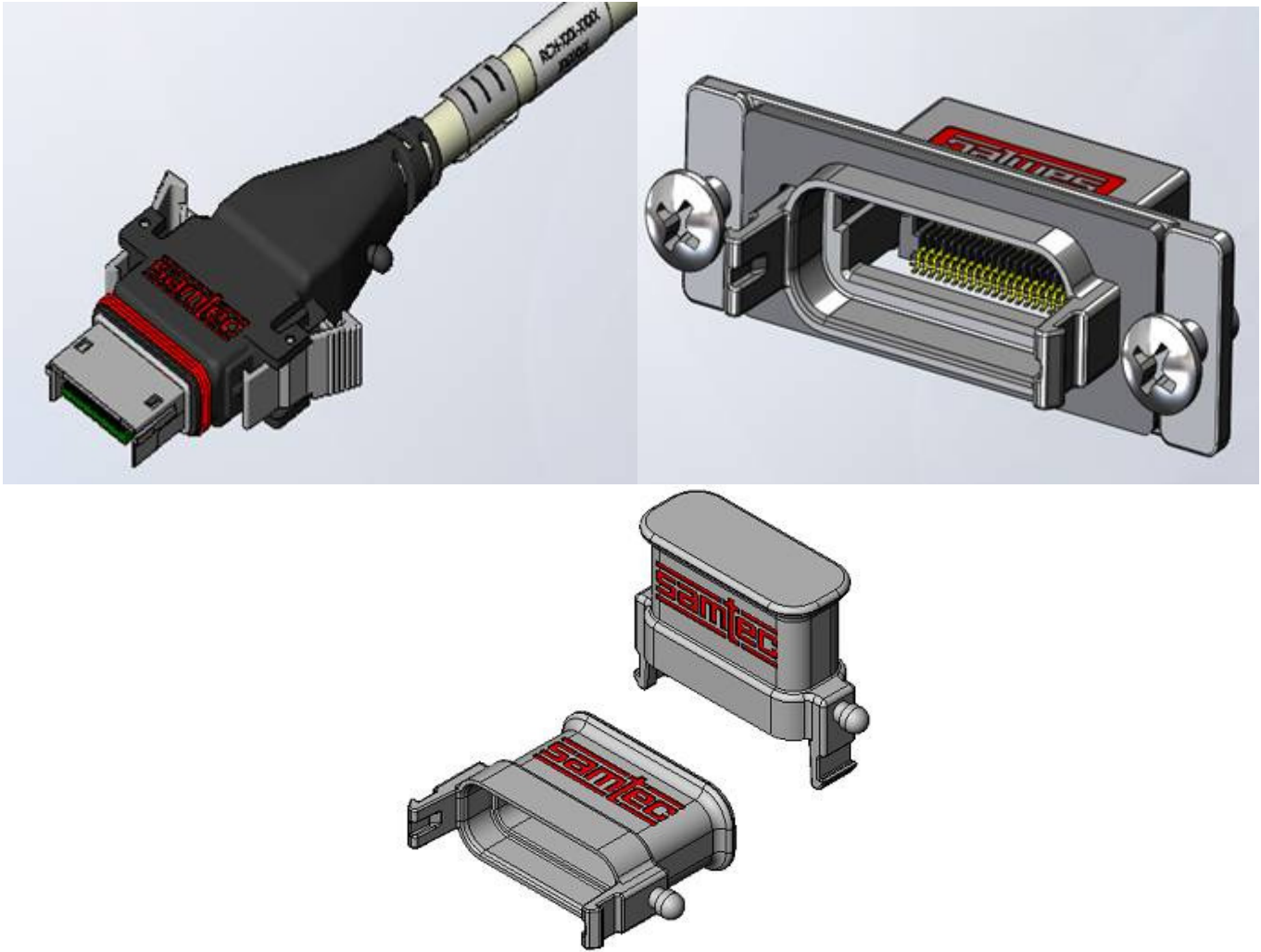




Project Number: Design Qualification Test Report	Tracking Code: 218287_Report_Rev_2
Requested by: Travis Newton	Date: 9/5/2013
Part #: RCH-019-0500/RPBH-019-01 & ERI8-019-S-D-RA	
Part description: RCH/RPBH&ERI8	Tech: Aaron McKim
Test Start: 01/25/2012	Test Completed: 09/14/2012



**Design Qualification Test Report
Dust & Water
RCH/RPBH&ERI8
RCH-019-0500/RPBH-019-01 & ERI8-019-S-D-RA
DC-RCH-019/RCH-019-0500**

REVISION HISTORY

DATA	REV.NUM.	DESCRIPTION	ENG
08/12/2013	1	Initial Issue	KH
09/05/2013	2	Update the test result	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. 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) Either an automated cleaning procedure or an ultrasonic cleaning procedure may be used.
- 4) Any additional preparation will be noted in the individual test sequences.

FLOWCHARTS**IP67 Dust & Water**

TEST STEP	GROUP A1 6 Mated Connectors	GROUP A2 6 Mated Connectors	GROUP C1 6 Connectors	GROUP C2 6 Connectors
			(Mating Part dust cover)	(Mating Part dust cover)
01	Dust Test	Submersion Water Test	Dust Test	Submersion Water Test
02	Check for Dust	Check for Water	Check for Dust	Check for Water
03	100 Cycles	100 Cycles	100 Cycles	100 Cycles
04	Dust Test	Submersion Water Test	Dust Test	Submersion Water Test
05	Check for Dust	Check for Water	Check for Dust	Check for Water

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

IP67 Dust & Water

TEST STEP	GROUP A1 6 Mated Connectors (Dust cap to RCH)	GROUP A2 6 Mated Connectors (Dust cap to RCH)
01	Dust Test	Submersion Water Test
02	Check for Dust	Check for Water

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

Mating/Unmating Basic

TEST STEP	GROUP B2 8 Boards
01	Forces - Mating / Unmating
02	25 Cycles
03	Forces - Mating / Unmating
04	25 Cycles (50 Total)
05	Forces - Mating / Unmating
06	25 Cycles (75 Total)
07	Forces - Mating / Unmating
08	25 Cycles (100 Total)
09	Forces - Mating / Unmating

Mating / Unmating Forces = EIA-364-13

FLOWCHARTS Continue**IP68 Dust & Water**

TEST STEP	GROUP G1 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

Dust/Water Testing = Per CEI/IEC 60529 Code IP68

For this test you have to use the pressure chamber

New parts should be used for each depth tested

Stop testing once parts fail

* It is not necessary to perform the dust portion of this test if IP67 testing has been performed

ATTRIBUTE DEFINITIONS

The following is a brief, simplified description of attributes.

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.

WATER TESTING:

- 1) Reference document: CEI/IEC 60529 Code IPX7 and IPX8
- 2) RPBH torque specification for MS-632-375-P-P-S: 50 IN-OZ.

DUST TESTING:

- 1) Reference document: CEI/IEC 60529 Code IP6X
- 2) RPBH torque specification for MS-632-375-P-P-S: 50 IN-OZ.

RESULTS

Mating – Unmating Forces RCH-019-0500/RPBH-019-01 & ERI8-019-S-D-RA

- **Initial**
 - **Mating**
 - **Min** ----- 6.26 Lbs
 - **Max** ----- 9.05 Lbs
 - **Unmating**
 - **Min** ----- 1.72 Lbs
 - **Max** ----- 4.27 Lbs
- **After 25 Cycles**
 - **Mating**
 - **Min** ----- 6.48 Lbs
 - **Max** ----- 9.04 Lbs
 - **Unmating**
 - **Min** ----- 1.75 Lbs
 - **Max** ----- 4.40 Lbs
- **After 50 Cycles**
 - **Mating**
 - **Min** ----- 6.34 Lbs
 - **Max** ----- 9.14 Lbs
 - **Unmating**
 - **Min** ----- 1.82 Lbs
 - **Max** ----- 4.01 Lbs
- **After 75 Cycles**
 - **Mating**
 - **Min** ----- 6.37 Lbs
 - **Max** ----- 9.27 Lbs
 - **Unmating**
 - **Min** ----- 1.78 Lbs
 - **Max** ----- 4.18 Lbs
- **After 100 Cycles**
 - **Mating**
 - **Min** ----- 6.34 Lbs
 - **Max** ----- 7.42 Lbs
 - **Unmating**
 - **Min** ----- 1.81 Lbs
 - **Max** ----- 3.91 Lbs

RESULTS Continue**IP67 Testing (Water & Dust)****Group A1****RCH-019-2000/RPBH-019-01&ERI8-019-S-D-RA (Mating Part dust cover)**

	<u>Initial (Before Exposure)</u> No Dust Present	<u>After Exposure</u> No Dust Present
Dust	<u>After 100 cycles (Before Exposure)</u> No Dust Present	<u>After Exposure</u> No Dust Present

Group A2**RCH-019-2000/RPBH-019-01&ERI8-019-S-D-RA (Mating Part dust cover)**

	<u>Initial (Before Exposure)</u> No Water Present	<u>After Exposure</u> No Water Present
Water	<u>After 100 cycles (Before Exposure)</u> No Water Present	<u>After Exposure</u> No Water Present

Group C1**DC-RCH-019/RPBH-019-01 (Mated cover)**

	<u>Initial (Before Exposure)</u> No Dust Present	<u>After Exposure</u> No Dust Present
Dust	<u>After 100 cycles (Before Exposure)</u> No Dust Present	<u>After Exposure</u> No Dust Present

Group C2**DC-RCH-019/RPBH-019-01 (Mated cover)**

	<u>Initial (Before Exposure)</u> No Water Present	<u>After Exposure</u> No Water Present
Water	<u>After 100 cycles (Before Exposure)</u> No Water Present	<u>After Exposure</u> No Water Present

Group A1**DC-RCH-019/RCH-019-0500 (Dust cap to RCH)**

	<u>Initial (Before Exposure)</u> No Dust Present	<u>After Exposure</u> No Dust Present
Dust		

Group A2**DC-RCH-019/RCH-019-0500 (Dust cap to RCH)**

	<u>Initial (Before Exposure)</u> No Water Present	<u>After Exposure</u> No Water Present
Water		

IPX8 Testing (Water)**RCH-019-0500/RPBH-019-01 & ERI8-019-S-D-RA****Group G1 (9 m)**

	<u>Initial (Before Exposure)</u> No Water Present	<u>After Exposure</u> No Water Present
Water		

DATA SUMMARIES

Mating/Unmating Basic RCH-019-0500/RPBH-019-01 & ERI8-019-S-D-RA

	Initial				25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	27.84	6.26	7.65	1.72	28.82	6.48	7.78	1.75
Maximum	40.25	9.05	18.99	4.27	40.21	9.04	19.57	4.40
Average	33.32	7.49	12.74	2.86	33.90	7.62	13.03	2.93
St Dev	5.17	1.16	4.01	0.90	4.93	1.11	4.18	0.94
Count	8	8	8	8	8	8	8	8
	50 Cycles				75 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	28.20	6.34	8.10	1.82	28.33	6.37	7.92	1.78
Maximum	40.65	9.14	17.84	4.01	41.23	9.27	18.59	4.18
Average	33.68	7.57	12.66	2.85	33.47	7.52	12.78	2.87
St Dev	5.18	1.16	3.95	0.89	5.08	1.14	4.00	0.90
Count	8	8	8	8	8	8	8	8
	100 Cycles							
	Mating		Unmating					
	Newton's	Force (Lbs)	Newton's	Force (Lbs)				
Minimum	28.20	6.34	8.05	1.81				
Maximum	39.01	8.77	17.39	3.91				
Average	32.99	7.42	12.57	2.83				
St Dev	4.49	1.01	3.78	0.85				
Count	8	8	8	8				

DATA SUMMARIES Continue**IP67 Testing (Water & Dust) DC-RCH-019/RCH-019-0500****Group A1 Dust test****RCH-019-2000/RPBH-019-01&ERI8-019-S-D-RA (Mating Part dust cover)****Initial**

<u>Sample #</u>	<u>Visual Inspection</u>
1	PASS
2	PASS
3	PASS
4	PASS
5	PASS
6	PASS

After 100 cycles

<u>Sample #</u>	<u>Visual Inspection</u>
1	PASS
2	PASS
3	PASS
4	PASS
5	PASS
6	PASS

Group A2 Water test**RCH-019-2000/RPBH-019-01&ERI8-019-S-D-RA (Mating Part dust cover)****Initial**

<u>Sample #</u>	<u>Visual Inspection</u>
1	PASS
2	PASS
3	PASS
4	PASS
5	PASS
6	PASS

After 100 cycles

<u>Sample #</u>	<u>Visual Inspection</u>
1	PASS
2	PASS
3	PASS
4	PASS
5	PASS
6	PASS

DATA SUMMARIES Continue**Group C1 Dust test****DC-RCH-019/RPBH-019-01 (Mated cover)****Initial**

<u>Sample #</u>	<u>Visual Inspection</u>
1	PASS
2	PASS
3	PASS
4	PASS
5	PASS
6	PASS

After 100 cycles

<u>Sample #</u>	<u>Visual Inspection</u>
1	PASS
2	PASS
3	PASS
4	PASS
5	PASS
6	PASS

Group C2 Water test**DC-RCH-019/RPBH-019-01 (Mated cover)****Initial**

<u>Sample #</u>	<u>Visual Inspection</u>
1	PASS
2	PASS
3	PASS
4	PASS
5	PASS
6	PASS

After 100 cycles

<u>Sample #</u>	<u>Visual Inspection</u>
1	PASS
2	PASS
3	PASS
4	PASS
5	PASS
6	PASS

DATA SUMMARIES Continue**Group A1 Dust****DC-RCH-019/RCH-019-0500 (Dust cap to RCH)**

<u>Sample #</u>	<u>Visual Inspection</u>
001	PASS
002	PASS
003	PASS
004	PASS
005	PASS
006	PASS

Group A2 Water**DC-RCH-019/RCH-019-0500 (Dust cap to RCH)**

<u>Sample #</u>	<u>Visual Inspection</u>
001	PASS
002	PASS
003	PASS
004	PASS
005	PASS
006	PASS

IPX8 Testing (Water)**RCH-019-0500/RPBH-019-01 & ERI8-019-S-D-RA****Group G1 (9 m)**

<u>Sample #</u>	<u>Visual Inspection at 9 Meters</u>
1	PASS
2	PASS
3	PASS

EQUIPMENT AND CALIBRATION SCHEDULES**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: 05/21/2012, Next Cal: 05/21/2013**Equipment #:** WATER-01**Description:** IP-67 1.0 Meter Water Column Chamber**Manufacturer:** Samtec Machine**Model:** N/A**Serial #:** N/A**Accuracy:** No Calibration Required**Equipment #:** WATER-02**Description:** IP-68 Water Depth Chamber**Manufacturer:** Samtec Machine**Model:** N/A**Serial #:** N/A**Accuracy:** No Calibration Required**Equipment #:** DUST-01**Description:** IP-6X Dust Tester**Manufacturer:** Samtec Machine**Model:** N/A**Serial #:** N/A**Accuracy:** No Calibration Required