



Project Number: Design Qualification Test Report		Tracking Code: 151858_Report_Rev_1	
Requested by: Kevin Meredith		Date: 7/23/2011	Product Rev: 0
Part #: RPBU-02-S-A-RA\ DCA-RPBU-02-01-A		Lot #: N/A	Tech: Aaron McKim Eng: Eric Ming
Part description: RPBU			Qty to test: 8
Test Start:5/31/2011	Test Completed: 6/6/2011		



Design Qualification Test Report
RPBU
RPBU-02-S-A-RA\ DCA-RPBU-02-01-A

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) Either an automated cleaning procedure or an ultrasonic cleaning procedure may be used.
- 4) The automated procedure is used with aqueous compatible soldering materials.
- 5) Any additional preparation will be noted in the individual test sequences.

FLOWCHARTS**IP67 Dust & Water**

TEST STEP	GROUP A1	GROUP A2
	5 Connectors 20A o-ring (Cable dust cover)	5 Connectors 20A o-ring (Cable dust cover)
01	Dust Test	Submersion Water Test
02	Check for Dust	Check for Water
03	Forces - Mating / Unmating	
04	25 Cycles, inspect for o-ring roll over	
05	Forces - Mating / Unmating	
06	25 Cycles (50 Total), inspect for o-ring roll over	
07	Forces - Mating / Unmating	
08	25 Cycles (75 Total), inspect for o-ring roll over	
09	Forces - Mating / Unmating	
10	25 Cycles (100 Total), inspect for o-ring roll over	
11	Forces - Mating / Unmating	

TEST STEP	GROUP B1	GROUP B2
	5 Connectors 40A o-ring (Cable dust cover)	5 Connectors 40A o-ring (Cable dust cover)
01	Dust Test	Submersion Water Test
02	Check for Dust	Check for Water
03	Forces - Mating / Unmating	
04	25 Cycles, inspect for o-ring roll over	
05	Forces - Mating / Unmating	
06	25 Cycles (50 Total), inspect for o-ring roll over	
07	Forces - Mating / Unmating	
08	25 Cycles (75 Total), inspect for o-ring roll over	
09	Forces - Mating / Unmating	
10	25 Cycles (100 Total), inspect for o-ring roll over	
11	Forces - Mating / Unmating	

FLOWCHARTS

TEST STEP	GROUP C1	GROUP C2
	5 Connectors 70A o-ring (Cable dust cover)	5 Connectors 70A o-ring (Cable dust cover)
01	Dust Test	Submersion Water Test
02	Check for Dust	Check for Water
03	Forces - Mating / Unmating	
04	25 Cycles, inspect for o-ring roll over	
05	Forces - Mating / Unmating	
06	25 Cycles (50 Total), inspect for o-ring roll over	
07	Forces - Mating / Unmating	
08	25 Cycles (75 Total), inspect for o-ring roll over	
09	Forces - Mating / Unmating	
10	25 Cycles (100 Total), inspect for o-ring roll over	
11	Forces - Mating / Unmating	

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

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 IP67
- 2) SCRES torque specification for SPN-17-01 is 12 IN-LB
- 3) SCPE torque specification for SCN-17-01 is 12 IN-LB

DUST TESTING:

- 1) Reference document: CEI/IEC 60529 Code IP67
- 2) SCRES torque specification for SPN-17-01 is 12 IN-LB
- 3) SCPE torque specification for SCN-17-01 is 12 IN-LB

RESULTS**IP67 Testing (Water & Dust)****Group A1**

Dust	<u>Initial (Before Exposure)</u> No Dust Present	<u>After Exposure</u> No Dust Present
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Group A2

Water	<u>Initial (Before Exposure)</u> No Water Present	<u>After Exposure</u> No Water Present
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Group B1

Dust	<u>Initial (Before Exposure)</u> No Dust Present	<u>After Exposure</u> No Dust Present
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Group B2

Water	<u>Initial (Before Exposure)</u> No Water Present	<u>After Exposure</u> No Water Present
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Group C1

Dust	<u>Initial (Before Exposure)</u> No Dust Present	<u>After Exposure</u> No Dust Present
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Group C2

Dust	<u>Initial (Before Exposure)</u> No Dust Present	<u>After Exposure</u> No Dust Present
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RESULTS Continued**Mating – Unmating Forces****Group A1**

- **Initial**
 - **Mating**
 - **Min** ----- 2.97 Lbs
 - **Max** ----- 5.75 Lbs
 - **Unmating**
 - **Min** ----- 1.14 Lbs
 - **Max** ----- 2.22 Lbs
- **25 Cycles**
 - **Mating**
 - **Min** ----- 2.87 Lbs
 - **Max** ----- 5.35 Lbs
 - **Unmating**
 - **Min** ----- 1.45 Lbs
 - **Max** ----- 2.18 Lbs
- **50 Cycles**
 - **Mating**
 - **Min** ----- 3.05 Lbs
 - **Max** ----- 5.68 Lbs
 - **Unmating**
 - **Min** ----- 1.70 Lbs
 - **Max** ----- 2.31 Lbs
- **75 Cycles**
 - **Mating**
 - **Min** ----- 3.18 Lbs
 - **Max** ----- 4.69 Lbs
 - **Unmating**
 - **Min** ----- 1.56 Lbs
 - **Max** ----- 2.23 Lbs
- **100 Cycles**
 - **Mating**
 - **Min** ----- 3.26 Lbs
 - **Max** ----- 4.39 Lbs
 - **Unmating**
 - **Min** ----- 1.22 Lbs
 - **Max** ----- 2.63 Lbs

RESULTS Continued**Mating – Unmating Forces****Group B1**

- **Initial**
 - **Mating**
 - **Min** ----- 3.84 Lbs
 - **Max** ----- 4.67 Lbs
 - **Unmating**
 - **Min** ----- 1.73 Lbs
 - **Max** ----- 2.18 Lbs
- **25 Cycles**
 - **Mating**
 - **Min** ----- 3.80 Lbs
 - **Max** ----- 4.47 Lbs
 - **Unmating**
 - **Min** ----- 1.77 Lbs
 - **Max** ----- 2.11 Lbs
- **50 Cycles**
 - **Mating**
 - **Min** ----- 3.78 Lbs
 - **Max** ----- 4.43 Lbs
 - **Unmating**
 - **Min** ----- 1.17 Lbs
 - **Max** ----- 2.47 Lbs
- **75 Cycles**
 - **Mating**
 - **Min** ----- 4.36 Lbs
 - **Max** ----- 4.93 Lbs
 - **Unmating**
 - **Min** ----- 1.94 Lbs
 - **Max** ----- 2.58 Lbs
- **100 Cycles**
 - **Mating**
 - **Min** ----- 4.03 Lbs
 - **Max** ----- 4.78 Lbs
 - **Unmating**
 - **Min** ----- 1.24 Lbs
 - **Max** ----- 2.36 Lbs

RESULTS Continued**Mating – Unmating Forces****Group C1**

- **Initial**
 - **Mating**
 - **Min** ----- 5.55 Lbs
 - **Max** ----- 7.03 Lbs
 - **Unmating**
 - **Min** ----- 3.34 Lbs
 - **Max** ----- 3.77 Lbs
- **25 Cycles**
 - **Mating**
 - **Min** ----- 5.24 Lbs
 - **Max** ----- 7.46 Lbs
 - **Unmating**
 - **Min** ----- 3.21 Lbs
 - **Max** ----- 4.20 Lbs
- **50 Cycles**
 - **Mating**
 - **Min** ----- 5.58 Lbs
 - **Max** ----- 7.32 Lbs
 - **Unmating**
 - **Min** ----- 3.39 Lbs
 - **Max** ----- 4.09 Lbs
- **75 Cycles**
 - **Mating**
 - **Min** ----- 5.47 Lbs
 - **Max** ----- 6.98 Lbs
 - **Unmating**
 - **Min** ----- 3.46 Lbs
 - **Max** ----- 4.11 Lbs
- **100 Cycles**
 - **Mating**
 - **Min** ----- 5.50 Lbs
 - **Max** ----- 7.74 Lbs
 - **Unmating**
 - **Min** ----- 3.61 Lbs
 - **Max** ----- 4.25 Lbs

DATA SUMMARIES**MATING/UNMATING:****Group A1**

	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	13.19	2.97	5.07	1.14	12.78	2.87	6.44	1.45
Maximum	25.56	5.75	9.86	2.22	23.81	5.35	9.68	2.18
Average	18.88	4.24	7.42	1.67	17.63	3.96	7.98	1.79
St Dev	4.78	1.07	1.74	0.39	4.81	1.08	1.21	0.27
Count	5	5	5	5	5	5	5	5
	After 50 Cycles				After 75 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	13.56	3.05	7.54	1.70	14.15	3.18	6.93	1.56
Maximum	25.28	5.68	10.27	2.31	20.85	4.69	9.90	2.23
Average	17.91	4.03	8.76	1.97	17.46	3.92	8.53	1.92
St Dev	4.55	1.02	1.25	0.28	2.69	0.61	1.24	0.28
Count	5	5	5	5	5	5	5	5
	After 100 Cycles							
	Mating		Unmating					
	Newton's	Force (Lbs)	Newton's	Force (Lbs)				
Minimum	14.50	3.26	5.44	1.22				
Maximum	19.54	4.39	11.70	2.63				
Average	16.38	3.68	8.50	1.91				
St Dev	1.90	0.43	2.46	0.55				
Count	5	5	5	5				

DATA SUMMARIES Continued**Group B1**

	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	17.06	3.84	7.68	1.73	16.88	3.80	7.86	1.77
Maximum	20.77	4.67	9.68	2.18	19.89	4.47	9.38	2.11
Average	18.98	4.27	8.78	1.97	18.40	4.14	8.54	1.92
St Dev	1.46	0.33	0.88	0.20	1.31	0.29	0.70	0.16
Count	5	5	5	5	5	5	5	5
	After 50 Cycles				After 75 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)	Newtons	Force (Lbs)
Minimum	16.81	3.78	5.21	1.17	19.40	4.36	8.64	1.94
Maximum	19.70	4.43	11.00	2.47	21.91	4.93	11.48	2.58
Average	18.13	4.08	8.51	1.91	20.65	4.64	9.64	2.17
St Dev	1.06	0.24	2.33	0.52	0.98	0.22	1.12	0.25
Count	5	5	5	5	5	5	5	5
	After 100 Cycles							
	Mating		Unmating					
	Newtons	Force (Lbs)	Newtons	Force (Lbs)				
Minimum	17.91	4.03	5.53	1.24				
Maximum	21.26	4.78	10.51	2.36				
Average	19.56	4.40	8.59	1.93				
St Dev	1.31	0.29	1.84	0.41				
Count	5	5	5	5				

DATA SUMMARIES Continued**Group C1**

	Initial				After 25 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	24.69	5.55	14.86	3.34	23.29	5.24	14.30	3.21
Maximum	31.27	7.03	16.77	3.77	33.16	7.46	18.66	4.20
Average	28.23	6.35	15.82	3.56	27.27	6.13	16.16	3.63
St Dev	2.74	0.62	0.77	0.17	3.81	0.86	1.58	0.36
Count	5	5	5	5	5	5	5	5
	After 50 Cycles				After 75 Cycles			
	Mating		Unmating		Mating		Unmating	
	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)	Newton's	Force (Lbs)
Minimum	24.82	5.58	15.07	3.39	24.31	5.47	15.39	3.46
Maximum	32.54	7.32	18.20	4.09	31.02	6.97	18.29	4.11
Average	27.78	6.24	16.79	3.77	27.65	6.22	16.66	3.75
St Dev	2.93	0.66	1.37	0.31	2.57	0.58	1.20	0.27
Count	5	5	5	5	5	5	5	5
	After 100 Cycles							
	Mating		Unmating					
	Newton's	Force (Lbs)	Newton's	Force (Lbs)				
Minimum	24.48	5.50	16.04	3.61				
Maximum	34.42	7.74	18.92	4.25				
Average	28.84	6.48	17.68	3.97				
St Dev	3.92	0.88	1.28	0.29				
Count	5	5	5	5				

DATA**MATING/UNMATING:****Group A1**

Sample#	Initial		After 25 Cycles		After 50 Cycles		After 75 Cycles		After 100 Cycles	
	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating
1	2.97	1.14	2.87	1.45	3.52	1.70	3.78	1.70	3.69	1.68
2	3.80	1.58	3.21	1.65	3.05	1.72	3.18	2.23	3.58	2.63
3	3.86	1.80	3.52	1.85	3.62	1.90	3.60	2.03	3.49	1.73
4	4.86	2.22	4.86	2.18	4.26	2.31	4.69	2.08	4.39	2.29
5	5.75	1.61	5.35	1.85	5.68	2.22	4.38	1.56	3.26	1.22

Group B1

Sample#	Initial		After 25 Cycles		After 50 Cycles		After 75 Cycles		After 100 Cycles	
	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating
11	3.84	1.73	3.80	1.77	4.07	2.04	4.69	2.17	4.03	2.06
12	4.25	2.18	4.03	2.11	4.43	2.47	4.93	2.58	4.57	2.36
13	4.49	2.11	4.42	2.07	4.13	2.27	4.36	2.16	4.22	2.03
14	4.67	1.81	3.97	1.82	3.96	1.17	4.74	1.99	4.40	1.24
15	4.09	2.05	4.47	1.83	3.78	1.62	4.49	1.94	4.78	1.97

Group C1

Sample#	Initial		After 25 Cycles		After 50 Cycles		After 75 Cycles		After 100 Cycles	
	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating	Mating	Unmating
21	5.55	3.77	5.53	4.20	5.58	4.09	5.47	4.11	5.50	4.07
22	6.87	3.62	6.20	3.66	5.97	3.51	6.28	3.61	6.15	3.61
23	6.29	3.34	6.23	3.57	6.36	3.97	6.49	3.94	6.99	4.25
24	5.99	3.43	5.24	3.21	6.01	3.39	5.88	3.46	6.03	3.74
25	7.03	3.63	7.46	3.53	7.32	3.92	6.97	3.61	7.74	4.21

DATA Continued**IP67 Testing (Water & Dust)****Group A1**

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

Group A2

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

Group B1

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

Group B2

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

DATA SUMMARIES Continued**Group C1**

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

Group C2

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

EQUIPMENT AND CALIBRATION SCHEDULES**Equipment #:** TCT-01**Description:** Normal force analyzer**Manufacturer:** Mecmesin Multitester**Model:** Mecmesin Multitester 2.5-i**Serial #:** 04-1041-04**Accuracy:** Last Cal: 2011-5-21, Next Cal: 2012-5-20**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 #:** DUST-01**Description:** IP-X6 Dust Tester**Manufacturer:** Samtec Machine**Model:** N/A**Serial #:** N/A**Accuracy:** No Calibration Required