



DOUBLE SUGAR SHOT
BATTERY CHARACTERIZATION UNDER VACUUM
11.1 VOLT LITHIUM-POLYMER BATTERIES TEST

REV. 2011/12/29

1. Introduction

Following the Battery Characterization under Vacuum Test Plan one 11.1 volt lithium-polymer battery will be subjected to various simulated electrical loads and a vacuum of at least 29 inches for one minute and then returned to ambient pressure. Each test will then be repeated with no vacuum applied to compare the results.

2. Equipment

11.1 V Lithium-Polymer Battery



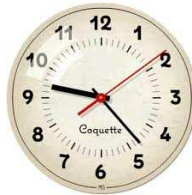
Vacuum Chamber



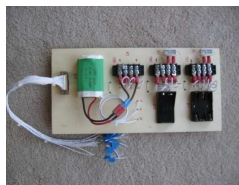
Multi-Meters



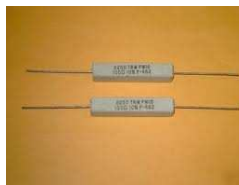
Clock



Test Bed



Simulated Electrical Loads



3. Procedure

With both multi-meters off and the switch in the “current loop” off the battery will be placed in the battery holder and the simulated electrical load will be installed. The test bed will be slid into the vacuum chamber and the chamber will be sealed. When testing is ready to begin the multi-meters will be turned on, the vacuum pump will be activated, and the switch in the “current loop” turned on. At this point the voltage, current, and vacuum will be documented and clock started. Readings were taken in 30 second intervals. Each simulated load will be tested with a vacuum and with out vacuum in the same manner.

4. Test Performance

"11.1V Li-Po" Battery test with 100 ohm load				
Time (minutes)	Voltage	Current (amperage)	Vacuum (inches)	Power (W)
0	11.89	0.12	1	1.43
0.5	11.88	0.12	15	1.43
1	11.86	0.12	25	1.42
1.5	11.86	0.12	28	1.42
2	11.85	0.12	29	1.42
2.5	11.84	0.12	29	1.42
3	11.84	0.12	29	1.42
3.5	11.84	0.12	19	1.42
4	11.84	0.12	11	1.42
4.5	11.84	0.12	5	1.42
5	11.84	0.12	1	1.42

"11.1V Li-Po" Battery test with 100 ohm load NO VACUUM				
Time (minutes)	Voltage	Current (amperage)	Vacuum (inches)	Power (W)
0	11.73	0.12	0	1.41
0.5	11.72	0.12	0	1.41
1	11.71	0.12	0	1.41
1.5	11.71	0.12	0	1.41
2	11.71	0.12	0	1.41
2.5	11.71	0.12	0	1.41
3	11.71	0.12	0	1.41
3.5	11.71	0.12	0	1.41
4	11.71	0.12	0	1.41
4.5	11.70	0.12	0	1.40
5	11.70	0.12	0	1.40

"11.1V Li-Po" Battery test with 33 ohm load				
Time (minutes)	Voltage	Current (amperage)	Vacuum (inches)	Power (W)
0	11.77	0.35	1	4.12
0.5	11.73	0.34	15	3.99
1	11.70	0.34	25.5	3.98
1.5	11.68	0.34	28.5	3.97
2	11.66	0.34	29	3.96
2.5	11.66	0.34	29	3.96
3	11.65	0.34	29	3.96
3.5	11.63	0.34	23	3.95
4	11.63	0.34	17	3.95
4.5	11.63	0.34	11	3.95
5	11.64	0.34	1	3.96

"11.1V Li-Po" Battery test with 33 ohm load NO VACUUM				
Time (minutes)	Voltage	Current (amperage)	Vacuum (inches)	Power (W)
0	11.71	0.34		3.98
0.5	11.67	0.34		3.97
1	11.65	0.34		3.96
1.5	11.64	0.34		3.96
2	11.63	0.34		3.95
2.5	11.63	0.34		3.95
3	11.62	0.34		3.95
3.5	11.62	0.34		3.95
4	11.61	0.34		3.95
4.5	11.61	0.34		3.95
5	11.60	0.34		3.94

5. Results

a. 100 ohm load

The 11.1 volt lithium-polymer battery provided consistent current throughout each of the load tests between vacuum and no vacuum. Voltage did drop by .05 volts under vacuum and by .03 at ambient pressure. No physical changes to the batteries were experienced during this test.

b. 33 ohm load

Again no change in current and a small loss of voltage occurred during this test. Under vacuum voltage went down .13 volts and at ambient pressure it went down .11 volts. Again no physical changes occurred during this test.

There had been some concern expressed over the possibility of this battery leaking or even bursting due to its chemical make up. This battery was left on the test bed for several of the other battery test that took place and no such leaking or deformation of any kind has been experienced.