



DOUBLE SUGAR SHOT
BATTERY CHARACTERIZATION UNDER VACUUM
3.7 VOLT GO PRO LITHIUM BATTERY TEST

REV. 2012/1/6

1. Introduction

Following the Battery Characterization under Vacuum Test Plan a 3.7 volt lithium battery for the Go Pro camera 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. The battery will be recharged for each electrical load tested. Each test will then be repeated with no vacuum applied to compare the results.

2. Equipment

3.7V Go Pro Lithium Battery



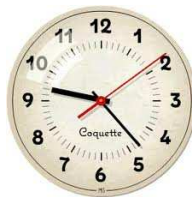
Vacuum Chamber



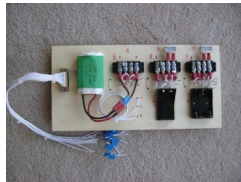
Multi-Meters



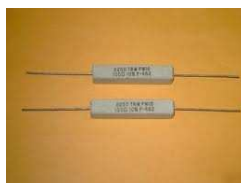
Clock



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 one minute intervals. Each simulated load will be tested with a vacuum and with out vacuum in the same manner.

4. Test Performance

"GO PRO" Battery test with 100 ohm load				
Time (minutes)	Voltage	Current (amperage)	Vacuum (inches)	Power (W)
0	3.99	0.04	1	0.16
0.5	3.98	0.04	18	0.16
1	3.98	0.04	27	0.16
1.5	3.98	0.04	28.5	0.16
2	3.98	0.04	29	0.16
2.5	3.98	0.04	29	0.16
3	3.98	0.04	29	0.16
3.5	3.98	0.04	17	0.16
4	3.98	0.04	11	0.16
4.5	3.98	0.04	3	0.16
5	3.98	0.04	1	0.16

"GO PRO" Battery test with 100 ohm load NO VACUUM				
Time (minutes)	Voltage	Current (amperage)	Vacuum (inches)	Power (W)
0	3.93	0.04	0	0.16
0.5	3.93	0.04	0	0.16
1	3.93	0.04	0	0.16
1.5	3.93	0.04	0	0.16
2	3.93	0.04	0	0.16
2.5	3.92	0.04	0	0.16
3	3.92	0.04	0	0.16
3.5	3.92	0.04	0	0.16
4	3.92	0.04	0	0.16
4.5	3.92	0.04	0	0.16
5	3.92	0.04	0	0.16

"GO PRO" Battery test with 33 ohm load				
Time (minutes)	Voltage	Current (amperage)	Vacuum (inches)	Power (W)
0	3.96	0.12	1	0.48
0.5	3.96	0.12	15	0.48
1	3.96	0.12	25	0.48
1.5	3.95	0.12	28	0.47
2	3.95	0.12	29	0.47
2.5	3.95	0.12	29	0.47
3	3.95	0.12	29	0.47
3.5	3.95	0.12	24	0.47
4	3.95	0.12	15.5	0.47
4.5	3.95	0.12	9	0.47
5	3.95	0.12	1	0.47

"GO PRO" Battery test with 33 ohm load NO VACUUM				
Time (minutes)	Voltage	Current (amperage)	Vacuum (inches)	Power (W)
0	3.90	0.12	1	0.47
0.5	3.89	0.12	1	0.47
1	3.89	0.12	1	0.47
1.5	3.89	0.12	1	0.47
2	3.88	0.12	1	0.47
2.5	3.88	0.12	1	0.47
3	3.88	0.12	1	0.47
3.5	3.88	0.12	1	0.47
4	3.87	0.12	1	0.46
4.5	3.87	0.12	1	0.46
5	3.87	0.12	1	0.46

"GO PRO" Battery test with 10 ohm load				
Time (minutes)	Voltage	Current (amperage)	Vacuum (inches)	Power (W)
0	3.86	0.37	1	1.43
0.5	3.85	0.37	15	1.42
1	3.85	0.36	26	1.39
1.5	3.84	0.36	28.5	1.38
2	3.84	0.36	29	1.38
2.5	3.84	0.36	29	1.38
3	3.83	0.36	29	1.38
3.5	3.83	0.36	24	1.38
4	3.83	0.36	15	1.38
4.5	3.83	0.36	9	1.38
5	3.83	0.36	1	1.38

"GO PRO" Battery test with 10 ohm load NO VACUUM				
Time (minutes)	Voltage	Current (amperage)	Vacuum (inches)	Power (W)
0	4.07	0.38	0	1.55
0.5	4.05	0.38	0	1.54
1	4.04	0.38	0	1.54
1.5	4.04	0.38	0	1.54
2	4.03	0.38	0	1.53
2.5	4.03	0.38	0	1.53
3	4.02	0.38	0	1.53
3.5	4.02	0.38	0	1.53
4	4.02	0.38	0	1.53
4.5	4.01	0.38	0	1.52
5	4.01	0.38	0	1.52

5. Results

This battery performed very consistently under all load and vacuum conditions with almost no voltage changes occurring in during the 100 and 33 ohm testing and very small amount during the 10 ohm load. Current only changed in one test, the 10 ohm under vacuum, and on that test it only went down .01 amps this change occurred within the first minute of the test. No physical changes to this battery occurred during the testing.