

TEST PROGRAM: OPEN CIRCUIT VOLTAGE (OCV) TEST

Objective:

Open Circuit Voltage (OCV) is the difference of electrical potential between positive and negative terminals of a battery without any load connected. The purpose of OCV test is to identify the battery electrical potential capability. This is applied to all chemistry batteries, including primary and rechargeable batteries. In addition, the test result of measuring voltage can be used to determine the SOC (State of Charge) for rechargeable batteries with Li-ion, LiFePO₄, and SLA chemistries. For details, please see the table below:

Voltage Table - Li-ion Rechargeable Battery							
Charge	Pack Voltage						
	3.6V(1S)	7.2V(2S)	10.8V(3S)	14.4V(4S)	18V(5S)	21.6V(6S)	25.2V(7S)
0%	3.31	6.62	9.93	13.24	16.55	19.86	23.17
5%	3.68	7.36	11.04	14.72	18.4	22.08	25.76
10%	3.69	7.38	11.07	14.76	18.45	22.14	25.83
15%	3.71	7.42	11.13	14.84	18.55	22.26	25.97
20%	3.74	7.48	11.22	14.96	18.7	22.44	26.18
25%	3.76	7.52	11.28	15.04	18.8	22.56	26.32
30%	3.78	7.56	11.34	15.12	18.9	22.68	26.46
35%	3.78	7.56	11.34	15.12	18.9	22.68	26.46
40%	3.79	7.58	11.37	15.16	18.95	22.74	26.53
45%	3.81	7.62	11.43	15.24	19.05	22.86	26.67
50%	3.82	7.64	11.46	15.28	19.1	22.92	26.74
55%	3.84	7.68	11.52	15.36	19.2	23.04	26.88
60%	3.88	7.76	11.64	15.52	19.4	23.28	27.16
65%	3.92	7.84	11.76	15.68	19.6	23.52	27.44
70%	3.95	7.9	11.85	15.8	19.75	23.7	27.65
75%	3.98	7.96	11.94	15.92	19.9	23.88	27.86
80%	4	8	12	16	20	24	28
85%	4.05	8.1	12.15	16.2	20.25	24.3	28.35
90%	4.09	8.18	12.27	16.36	20.45	24.54	28.63
95%	4.13	8.26	12.39	16.52	20.65	24.78	28.91
100%	4.18	8.36	12.54	16.72	20.9	25.08	29.26

Voltage Table - LiFePO ₄ Rechargeable Battery					
Charge	Pack Voltage				
	3.3V(1S)	6.6V(2S)	9.9V(3S)	13.2V(4S)	16.5V(5S)
0%	2.96	5.92	8.88	11.84	14.8
5%	3.11	6.22	9.33	12.44	15.55
10%	3.22	6.44	9.66	12.88	16.1
15%	3.23	6.46	9.69	12.92	16.15
20%	3.27	6.54	9.81	13.08	16.35
25%	3.28	6.56	9.84	13.12	16.4
30%-70%	3.3	6.6	9.9	13.2	16.5
75%-90%	3.33	6.66	9.99	13.32	16.65
95%	3.35	6.7	10.05	13.4	16.75
100%	3.42	6.84	10.26	13.68	17.1

Voltage Table - SLA Battery	
Charge	SLA/12V
100%	12.7
75%	12.45
50%	12.25
25%	12.05
0%	11.9

Procedure and Standard:

The standard of open circuit voltage is derived from the datasheet of battery cell manufacture. In particular, the nominal voltage on specification was used as the benchmark during assessment on measured voltage of primary batteries. For rechargeable batteries, further capacity test is necessary to determine whether battery is in good condition.

Equipment:

Digital multimeter such as DM-9080, Fluke 45 Dual Display Multimeter, Tabor Electronic 608A Multimeter, Hioki Battery HiTester.