

문서번호	QAE-EF02-1209	912-PKASMPN45N1122
Prepared	김홍일	
	남익현	Hot
	장승현	
Reviewed	남대호	auch
	이재승	
Approved	정준용	fingangs

## UN Test Report - ASM P/N 45N1122 (47Wh, 11.1V)-



### 1. UN Transportation Regulation Test

Test	Condition	Requirements
Test 1. Altitude Simulation	Storing at (low pressure)11.6kPa for 6hr at 20+/-5℃	
Test 2. Thermal Test	[75±2℃,6hr ↔ -40±2℃,6hr,interval max. 30min] x 10cycle Storing at 20±5℃ for 24h	- Measuring mass before/ after each test
Test 3. Vibration	[7Hz⇔200Hz⇔7Hz, in 15min] x 12 times x 3 direction 1) sinusoidal waveform with a logarithmic sweep 2) 7Hz 18Hz (maintaining 1gn) app. 50Hz (until 8gn) 200Hz (maintaining 8gn), 1.6mm total excursion	<ul> <li>(If M&gt;5g, less than 0.1%)</li> <li>Measuring voltage before/ after each test (more than 90%)</li> <li>No leakage, no venting,</li> </ul>
Test 4. Shock	Half sine shock (peak acceleration : 150gn, pulse duration : 6msec) x 6 ( $\pm$ x, y, z) direction x 3 cycle	no disassembly, no rupture, no fire
Test 5. External Short Circuit	100mΩ ext. short-circuit at 55±2℃ 1hr continue after returning at 55±2℃	- No disassembly, no rupture, no fire (after 6 hours)
Test 6. Impact	Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height	- Temp. monitoring (max. 170 °C)
Test 7. Overcharge	Current = Manufacturer's recommended max. continuous charge current X 2 Voltage 1.If charge voltage ≤ 18V, V (min.) = 2 x (max. charge voltage) or V (min.) = 22V. 2.If charge voltage > 18V, V (min.) = 1.2 x (max. charge voltage)	- No disassembly, no fire (after 7 days)
Test 8. Forced Discharge	Only for Cell, not battery.	- No disassembly, no fire (after 7 days)

\* Tests through T1-T5 shall be conducted in sequence with the same battery.

\* We declare that the above-mentioned test is the result of being checked according to UN Test

(Manual of Test and Criteria ST/SG/AC.10/11/Rev.5)

### 2. Test Procedure



### **3-1. T1-T4 Test Result**

Before					Altii	tude (T	1)			The	rmal (1	Γ2)			Vibra	ation (	T3)	She			lock (T4)		
	Pack NO.	OCV	Mass	OCV	Mass	Residual OCV(%)	Mass Loss(%)	Result	OCV	Mass	Residual OCV(%)	Mass Loss(%)	Result	ocv	Mass	Residual OCV(%)	Mass Loss(%)	Result	OCV	Mass	Residual OCV(%)	Mass Loss(%)	Result

A. 1st cycle fully state

	1	12.570	180.22	12.568	180.16	99.98	0.033	Pass	12.420	180.06	98.82	0.056	Pass	12.395	180.02	99.80	0.022	Pass	12.392	180.01	99.98	0.006	Pass
	2	12.571	181.49	12.570	181.38	99.99	0.061	Pass	12.421	181.31	98.81	0.039	Pass	12.395	181.29	99.79	0.011	Pass	12.394	181.27	99.99	0.011	Pass
Charge	3	12.570	180.39	12.570	180.33	100.00	0.033	Pass	12.420	180.31	98.81	0.011	Pass	12.395	180.27	99.80	0.022	Pass	12.392	180.25	99.98	0.011	Pass
	4	12.569	181.19	12.568	181.12	99.99	0.039	Pass	12.422	181.08	98.84	0.022	Pass	12.396	181.07	99.79	0.006	Pass	12.393	181.06	99.98	0.006	Pass
	Ave.	12.570	180.82	12.569	180.75	99.99	0.041	-	12.421	180.69	98.82	0.032	-	12.395	180.66	99.79	0.015	-	12.393	180.65	99.98	0.008	-

#### B. 50th cycle fully state

	5	12.469	178.34	12.465	178.33	99.97	0.006	Pass	12.320	178.28	98.84	0.028	Pass	12.310	178.21	99.92	0.039	Pass	12.308	178.11	99.98	0.056	Pass
	6	12.470	178.29	12.458	178.27	99.90	0.011	Pass	12.315	178.22	98.85	0.028	Pass	12.310	178.19	99.96	0.017	Pass	12.309	178.17	99.99	0.011	Pass
Charge	7	12.469	179.39	12.469	179.36	100.00	0.017	Pass	12.342	179.30	98.98	0.033	Pass	12.326	179.27	99.87	0.017	Pass	12.310	179.21	99.87	0.033	Pass
	8	12.468	178.46	12.465	178.44	99.98	0.011	Pass	12.325	178.40	98.88	0.022	Pass	12.324	178.38	99.99	0.011	Pass	12.321	178.32	99.98	0.034	Pass
	Ave.	12.469	178.62	12.464	178.60	99.96	0.011	-	12.326	178.55	98.89	0.028	-	12.318	178.51	99.94	0.021	-	12.312	178.45	99.96	0.034	-

# 3-2. T5/T7 Test Result

	EXT.Short Circuit (T5)											
	Pack NO.	Initial OCV(V)	Max. Temp (℃)	Result								
A. <u>1st cycle fully sta</u>	te											
	1	12.392	56.21	Pass								
	2	12.394	55.38	Pass								
Charge	3	12.392	56.24	Pass								
	4	12.393	56.02	Pass								
	MAX.	12.394	56.24	-								

Test Condition
- 100m $\Omega$ ext. short-circuit at 55 $\pm2^\circ\!C$

	Ove	er Charge (T7)		
	Pack NO.	Initial OCV(V)	Max. Temp (℃)	Result
A. 1st cycle fully sta	te	-	_	
	9	12.568	25.31	Pass
	10	12.565	25.59	Pass
Charge	11	12.566	24.41	Pass
	12	12.568	24.29	Pass
	MAX.	12.568	25.59	-

#### **Test Condition**

- Max. Charge Current : 4200 mA - CC/CV 2Imax(8400mA) 22V cut-off 24Hr



		LAT.0		5)	
		Pack NO.	Initial OCV(V)	Max. Temp (℃)	Result
E	8. 50th cycle fully sta	ite	-	-	
		5	12.308	56.13	Pass
		6	12.309	55.30	Pass
	Charge	7	12.310	55.18	Pass
		8	12.321	56.01	Pass
		MAX.	12.321	56.13	-

EVT Short Circuit (TE)

Requirement	Requirement
- Temperature < 170 ( $^{\circ}$ ) - No disassembly, no rupture, no fire within 6 hours	ture, no fire within 6 hours

	Over Charge (T7)											
	Pack NO.	Initial OCV(V)	Max. Temp (℃)	Result								
B. 50th cycle fully sta	<u>ate</u>	-	_	-								
	13	12.465	24.89	Pass								
	14	12.466	25.41	Pass								
Charge	15	12.459	25.32	Pass								
	16	12.462	25.53	Pass								
	MAX.	12.466	25.53	-								

Requirement						
- No disassembly, no fire within 7 day						

# 3-3. T6 Test Result (ICP616484L1)

Impact (T6)					
	Pack NO.	Initial OCV(V)	Max. Temp (℃)	Result	

#### A. 1st cycle 50% charged state

#### Direction

Flat	1	3.791	62.34	Pass
	2	3.792	62.12	Pass
	3	3.791	70.91	Pass
	4	3.791	69.31	Pass
	5	3.791	63.10	Pass
Vertical	6	3.788	88.13	Pass
	7	3.791	92.63	Pass
	8	3.789	111.12	Pass
	9	3.790	99.31	Pass
	10	3.791	106.31	Pass
MAX.		3.792	111.12	-

#### **Test Condition** - Φ=15.8mm bar, 9.1kg mass, 61±2.5cm height

#### Requirement

- Temperature < 170 (℃)
- No disassembly, no rupture, no fire within 6 hours



### 4. Sample Image



