

Model/ Device ID : AS10D61

Test Report of IATA/UN Transportation
revised by the Recommendations on the Transport of Dangerous Goods,
Manual of Test and Criteria

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Pack Specification

Revision 0.0

Model Name/ Device ID: AS10D61

Nominal voltage: 11.1V

Rated capacity: 4,400mAh

Wh Capacity: 48,000mWh

Lithium equivalent content: 3S2P

Date of issue: 2009. 10. 30

Pack Test Program

Revision 0.0

Test Item	Test Method	Criteria	Fresh			50 cycled	
			100 %	50%	0 %	100 %	0%
T-1 Altitude Simulation ↓ T-2 Thermal test ↓ T-3 Vibration ↓ T-4 Shock ↓ T-5 External short circuit	11.6kPa for 6Hr at 20±5℃ 75±2℃ for 6Hr ↔ -40±2℃ for 6Hrs (Transfer time : 30min), 10cycle 7Hz → 200Hz → 7Hz in 15min, 12cycle for 3Hr, 3 direction Half-sine shock of peak acceleration 150g, duration 6ms 3(pos.)shocks → 3(neg.)shocks, 3direction, Total 18shocks Wire: Less 0.1ohm, Case temp. : 55±2℃ for 1Hr or temp. return	No mass loss (not exceed 0.1%) No leakage No venting No disassembly No rupture No fire OCV > 90% of the initial voltage IR increase > 10% of previous test Not exceed 170℃ No disassembly No rupture No fire within 6Hrs	4	-	4	4	4
T-6 Impact (Cells in a pack)	Flat surface, 15.8mm bar, weight:9.1Kg, Height : 61±2.5cm	No disassembly No rupture	-	5	-	-	5
T-7 Overcharge	Current: 2xRapid charge current Charge Voltage Under 18V : 2xV(Max Voltage) or 22V Over 18V : 1.2xV(Max Voltage) Test Time 24hrs	No disassembly No fire within 7days	4	-	-	4	-
Packaging test	1 time / 1.2m drop on a concrete surface		1 box as same condition with shipment				

■ Tests T-1 through T-5 shall be conducted in sequence with the same call

■ For test 6, test should be conducted for cells in a pack

Model name: AS10D61

T-1~T-5) Transportation Test (Fresh Pack-100%)

Revision 0.0

Fresh Pack (100% SOC)				After T-1						After T-2						After T-3					
No	Weight	OCV	IR	Weight	Mass	↓	OCV	IR	↑	Weight	Mass	↓	OCV	IR	↑	Weight	Mass	↓	OCV	IR	↑
	(g)	(V)	mΩ	(g)	loss	(%)	(V)	mΩ	(%)	(g)	loss	(%)	(V)	mΩ	(%)	(g)	loss	(%)	(V)	mΩ	(%)
1	302.1	12.3	110.7	302.1	0.0	0.0	12.3	110.8	0.0	302.2	0.0	0.0	12.2	109.5	-1.1	302.1	0.0	0.0	12.2	110.3	0.6
2	302.2	12.3	106.7	302.2	0.0	0.0	12.3	107.1	0.3	302.2	0.0	0.0	12.2	108.5	1.3	302.2	0.0	0.0	12.2	107.4	-1.0
3	302.6	12.3	104.2	302.6	0.0	0.0	12.3	104.4	0.1	302.6	0.0	0.0	12.2	106.2	1.8	302.6	0.0	0.0	12.2	107.2	0.9
4	302.3	12.3	104.4	302.3	0.0	0.0	12.3	104.6	0.1	302.3	0.0	0.0	12.2	106.8	2.2	302.3	0.0	0.0	12.2	107.7	0.8
AVG	302.3	12.3	106.5	302.3	0.0	0.0	12.3	106.7	0.2	302.3	0.0	0.0	12.2	107.8	1.0	302.3	0.0	0.0	12.2	108.1	0.3
	After T-4						After T-5		Result												
No	Weight	Mass	↓	OCV	IR	↑	Max Temp														
	(g)	loss	(%)	(V)	mΩ	(%)	(°C)														
1.0	302.2	-0.1	0.0	12.2	111.1	0.7	53.000		OK												
2.0	302.1	0.2	0.0	12.2	107.6	0.2	53.000		OK												
3.0	302.6	0.0	0.0	12.2	107.2	0.0	54.000		OK												
4.0	302.3	0.0	0.0	12.2	107.9	0.3	54.000		OK												
AVG	302.3	0.0	0.0	12.2	108.5	0.3	53.500		OK												

●Sample : Fresh pack, 100% Charged – 4 Ea

T-1~T-5) Transportation Test (Fresh Pack-0%)

Revision 0.0

Fresh Pack (0% SOC)				After T-1						After T-2						After T-3					
No	Weight	OCV	IR	Weight	Mass	↓	OCV	IR	↑	Weight	Mass	↓	OCV	IR	↑	Weight	Mass	↓	OCV	IR	↑
	(g)	(V)	mΩ	(g)	loss	(%)	(V)	mΩ	(%)	(g)	loss	(%)	(V)	mΩ	(%)	(g)	loss	(%)	(V)	mΩ	(%)
1	302.4	9.8	106.7	302.4	0.0	0.0	9.8	106.8	0.1	302.4	0.0	0.0	9.3	107.3	0.4	302.4	0.0	0.0	9.2	107.6	0.3
2	302.3	9.8	107.3	302.3	0.0	0.0	9.8	107.5	0.2	302.3	0.0	0.0	9.3	108.5	1.0	302.3	0.0	0.0	9.2	108.8	0.2
3	302.5	9.8	108.9	302.5	0.0	0.0	9.8	108.9	0.0	302.5	0.0	0.0	9.3	109.3	0.3	302.5	0.0	0.0	9.2	108.9	-0.4
4	302.3	9.8	108.5	302.3	0.0	0.0	9.8	108.7	0.2	302.3	0.0	0.0	9.3	108.8	0.1	302.3	0.0	0.0	9.2	108.9	0.2
AVG	302.3	9.8	107.9	302.3	0.0	0.0	9.8	108.0	0.1	302.4	0.0	0.0	9.3	108.5	0.4	302.3	0.0	0.0	9.2	108.5	0.1

After T-4							After T-5	Result
No	Weight	Mass	↓	OCV	IR	↑	Max Temp	
	(g)	loss	(%)	(V)	mΩ	(%)	(℃)	
1.0	302.4	0.0	0.0	9.1	110.2	2.5	53.000	OK
2.0	302.3	0.0	0.0	9.1	109.6	0.7	53.000	OK
3.0	302.4	0.0	0.0	9.0	110.5	1.5	53.000	OK
4.0	302.2	0.0	0.0	9.1	109.3	0.3	53.000	OK
AVG	302.3	0.0	0.0	9.1	109.9	1.2	53.000	OK

●Sample : Fresh pack, 0% Charged – 4 Ea

T-1~T-5) Transportation Test (50 cycled pack-100%)

Revision 0.0

50 cycled (100% SOC)				After T-1						After T-2						After T-3						
No	Weight	OCV	IR	Weight	Mass	↓	OCV	IR	↑	Weight	Mass	↓	OCV	IR	↑	Weight	Mass	↓	OCV	IR	↑	
	(g)	(V)	mΩ	(g)	loss	(%)	(V)	mΩ	(%)	(g)	loss	(%)	(V)	mΩ	(%)	(g)	loss	(%)	(V)	mΩ	(%)	
1	302.4	12.3	105.2	302.4	0.0	0.0	12.3	105.4	0.2	302.4	0.0	-0.1	12.2	106.5	1.1	302.4	0.0	0.0	12.2	107.5	0.9	
2	302.3	12.3	105.8	302.3	0.0	0.0	12.3	105.9	0.2	302.3	0.0	-0.1	12.2	106.4	0.4	302.3	0.0	0.0	12.2	107.4	1.0	
3	302.3	12.3	105.8	302.3	0.0	0.0	12.3	106.0	0.2	302.3	0.0	-0.1	12.2	107.1	1.1	302.3	0.0	0.0	12.2	108.2	1.0	
4	302.7	12.3	106.0	302.7	0.0	0.0	12.3	106.4	0.3	302.7	0.0	-0.1	12.2	107.3	0.9	302.7	0.0	0.0	12.2	108.5	1.1	
AVG	302.4	12.3	105.7	302.4	0.0	0.0	12.3	105.9	0.2	302.4	0.0	-0.1	12.2	106.8	0.9	302.4	0.0	0.0	12.2	107.9	1.0	
	After T-4						After T-5															
No	Weight	Mass	↓	OCV	IR	↑	Max Temp															Result
	(g)	loss	(%)	(V)	mΩ	(%)	(℃)															
1.0	302.4	0.0	0.0	12.2	109.4	1.8	54.000															OK
2.0	302.3	0.0	0.0	12.2	111.7	4.0	53.000			OK												
3.0	302.3	0.0	0.0	12.2	107.3	-0.8	53.000			OK												
4.0	302.7	0.0	0.0	12.2	109.4	0.9	53.000			OK												
AVG	302.4	0.0	0.0	12.2	109.5	1.5	53.250			OK												

●Sample : 50Cycled pack, 100% Charged – 4 Ea

T-1~T-5) Transportation Test (50 cycled pack-0%)

Revision 0.0

50 cycled Pack (0% SOC)				After T-1						After T-2						After T-3					
No	Weight	OCV	IR	Weight	Mass	↓	OCV	IR	↑	Weight	Mass	↓	OCV	IR	↑	Weight	Mass	↓	OCV	IR	↑
	(g)	(V)	mΩ	(g)	loss	(%)	(V)	mΩ	(%)	(g)	loss	(%)	(V)	mΩ	(%)	(g)	loss	(%)	(V)	mΩ	(%)
1	302.4	9.8	107.4	302.4	0.0	0.0	9.8	107.6	0.1	302.4	0.0	0.0	9.3	108.3	0.6	302.4	0.0	0.0	9.2	108.5	0.2
2	302.3	9.8	110.4	302.3	0.0	0.0	9.8	110.5	0.0	302.3	0.0	0.0	9.3	110.7	0.2	302.3	0.0	0.0	9.2	110.8	0.1
3	302.3	9.8	106.7	302.3	0.0	0.0	9.8	106.8	0.1	302.3	0.0	0.0	9.3	107.3	0.4	302.3	0.0	0.0	9.2	107.7	0.4
4	302.7	9.8	109.9	302.7	0.0	0.0	9.8	110.0	0.1	302.8	0.0	0.0	9.3	110.3	0.3	302.7	0.0	0.0	9.2	110.6	0.2
AVG	302.4	9.8	108.6	302.4	0.0	0.0	12.4	108.7	0.1	302.4	0.0	0.0	9.3	109.1	0.4	302.4	0.0	0.0	9.2	109.4	0.2
	After T-4						After T-5		Result												
No	Weight	Mass	↓	OCV	IR	↑	Max Temp														
	(g)	loss	(%)	(V)	mΩ	(%)	(℃)														
1.0	302.4	0.0	0.0	9.1	110.4	1.7	53.000		OK												
2.0	302.3	0.0	0.0	9.1	111.2	0.4	53.000		OK												
3.0	302.2	-0.1	0.0	9.1	107.9	0.3	53.000		OK												
4.0	302.7	0.0	0.0	9.1	109.9	-0.6	53.000		OK												
AVG	302.4	0.0	0.0	9.1	109.9	0.4	53.000		OK												

●Sample : 50 cycled, 0% Charged – 4 Ea

T-6) Impact Test (ICR18650 22F)

Revision 0.0

Fresh cell(50% SOC)		After T-6		Result
Cell No	OCV(V)	Max Temp(°C)	Test Result	
1	3.68	20.0	No Leakage	OK
2	3.68	20.0	No Leakage	OK
3	3.68	20.0	No Leakage	OK
4	3.68	20.0	No Leakage	OK
5	3.68	20.0	No Leakage	OK
AVG	3.68	20.00		OK
Max.	3.68	20.00		OK
Min.	3.68	20.00		OK

50cycled cell(0% SOC)		After T-6		Result
Cell No	OCV(V)	Max Temp(°C)	Test Result	
1	3.13	20	No Leakage	OK
2	3.14	20	No Leakage	OK
3	3.14	20	No Leakage	OK
4	3.15	20	No Leakage	OK
5	3.15	20	No Leakage	OK
AVG	3.14	20.00		OK
Max.	3.15	20.00		OK
Min.	3.13	20.00		OK

R05F Cell UN Test Report

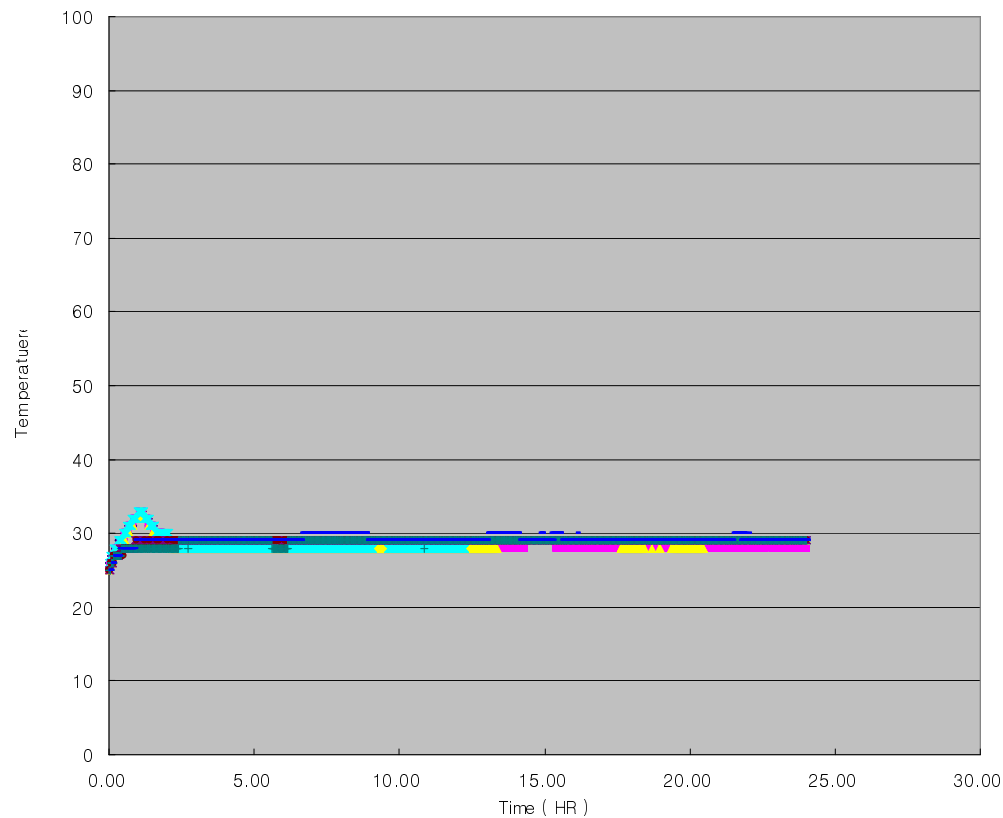


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- Test method: Drop 9.1kg mass from 61cm height with 15.8mm diameter bar.
- Sample : Fresh Cell – 5 Ea / 50 cycled Cell – 5 Ea
- Test results: All Leakage only .

T-7) Over charge Test

Revision 0.0



- Test method : 2C, 22V, 24Hrs charge
→ 7days storage
- ※ Max charge current : 1C
- Sample : Fresh Pack(100% charged) – 4Ea
50cycled Pack(100% charged) – 4Ea
- Test results : All no Leakage
- Protection circuit module
: Over charge detection

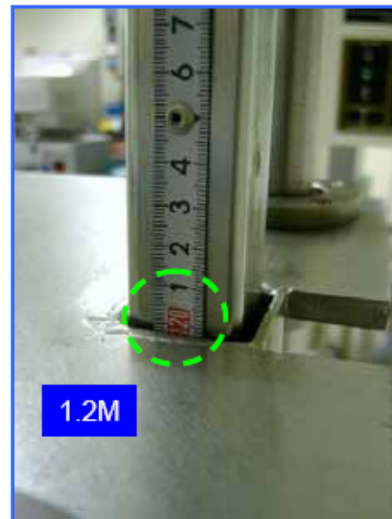


P-1) Packaging Drop (1.2m) Test

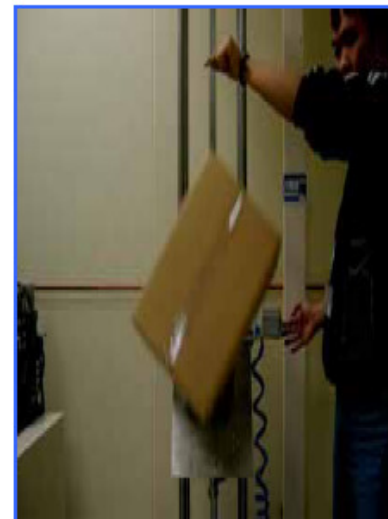
- Test Procedure : 1.2m drop in weakest orientation
- Test Method : One Corner/ Three Edge/ Six Flat (Total Ten Times)
- Criteria : No damage to Packs / No shifting of Packs / No release of Packs
- Result : **Acceptable**



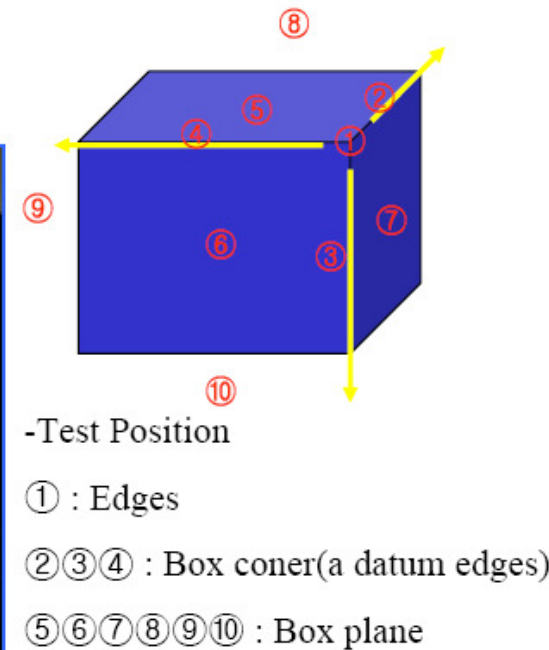
Test machine



Height Setting



Drop



Drop Point

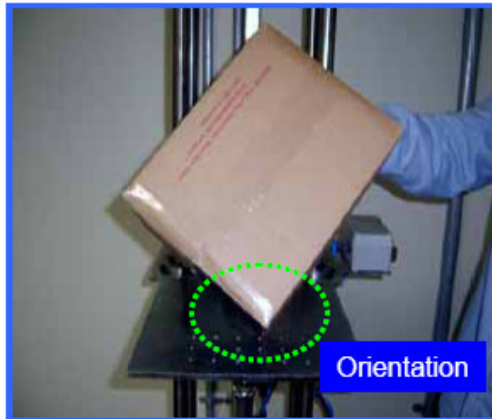


P-1) Packaging Drop (1.2m) Test

Before test



On testing



After test

