Inventus Power, Inc. -Technical Center
Safety Laboratory
5th Floor Western, Changhua Building No.921 Xingye Road,
Nancun Town, Panyu, Guangzhou City, Guangdong 511442,
P.R.China

No.:TR-DCAL-10-6219.012

UN38.3 Test Report

Tested According to UN Manual of Tests and Criteria, Part III, Subsection 38.3, Rev.7,Amend1

Product Name:	**RECHARGEABLE LI-ION BATTERY**
Battery Model:	**82-90005-04**
Cell Model:	**UR18650FB**
Manufacturer:	**Inventus Power, Inc.**
Consignor:	**Inventus Power, Inc. – Technical Center**
Total Pages:	**13**

辉碧电子（东莞）有限公司广州分公司
安规专用章

辉碧电子（东莞）有限公司广州分公司

Inventus Power, Inc. – Technical Center

Test Report

Product Name	RECHARGEABLE LI-ION BATTERY		
Battery Model	82-90005-04		
Rating	3.7V MIN: 4600mAh/17.02Wh TYP: 4800mAh/17.76Wh		
Consignor	Inventus Power, Inc. – Technical Center		
Manufacturer	Inventus Power, Inc.		
Factory	ICC ELECTRONICS (DONGGUAN) LTD.		
Project Number	6219.012	Structure	1 S 2 P
Sample Number	☒Battery ☐Single Cell Battery	6219.012-1-01 ~ 6219.012-1-16	
	Cell	6219.012-1-17 ~ 6219.012-1-46	
Received Date	2024-11-04	Test Date	2024-11-05 ~ 2024-11-18
Test Standard	ST/SG/AC.10/11/Rev.7/Amend1/Section 38.3		
Laboratory Address	5th Floor Western, Changhua Building No.921 Xingye Road, Nancun Town, Panyu, Guangzhou City, Guangdong 511442, P.R. China		
Conclusion	The samples have passed the test items of UNITED NATIONS" Recommendations on the TRANSPORT OF DANGEROUS GOODS" Manual of Tests and Criteria ST/SG/AC.10/11/Rev.7/Amend1/Section 38.3 **Issue Date: 2024-11-18**		
Remark	/		

Approved by: Li Gang **Reviewed by:** [signature] **Tested by:** [signature]

Approver Title: Compliance & Qualification Engineering Manager

Summary of UN38.3 Test

No.	Test Item	Description	Results	Conclusion	Remark
T.1	Altitude Simulation	UN Manual of Tests and Criteria ST/SG/AC.10/11/Rev.7/Amend1/Section 38.3 Test T.1	See T.1: Altitude Simulation	PASS	/
T.2	Thermal Test	UN Manual of Tests and Criteria ST/SG/AC.10/11/Rev.7/Amend1/Section 38.3 Test T.2	See T.2: Thermal Test	PASS	/
T.3	Vibration	UN Manual of Tests and Criteria ST/SG/AC.10/11/Rev.7/Amend1/Section 38.3 Test T.3	See T.3: Vibration	PASS	/
T.4	Shock	UN Manual of Tests and Criteria ST/SG/AC.10/11/Rev.7/Amend1/Section 38.3 Test T.4	See T.4: Shock	PASS	/
T.5	External Short Circuit	UN Manual of Tests and Criteria ST/SG/AC.10/11/Rev.7/Amend1/Section 38.3 Test T.5	See T.5: External Short Circuit	PASS	/
T.6	Impact	UN Manual of Tests and Criteria ST/SG/AC.10/11/Rev.7/Amend1/Section 38.3 Test T.6	See T.6: Impact	PASS	/
T.7	Overcharge	UN Manual of Tests and Criteria ST/SG/AC.10/11/Rev.7/Amend1/Section 38.3 Test T.7	See T.7: Overcharge	PASS	/
T.8	Forced Discharge	UN Manual of Tests and Criteria ST/SG/AC.10/11/Rev.7/Amend1/Section 38.3 Test T.8	See T.8: Forced Discharge	PASS	/
Description of the sampling procedure		/			
Description of the deviation from the standard, if any		/			
Overall status		/			

T.1: Altitude Simulation

Method: Test batteries shall be stored at a pressure of 11.6 kPa or less for at least six hours at ambient temperature(20±5℃).

Result:

Sample No.	Sample condition	Before test		After test		Mass loss (%)	Residual OCV (%)	Result
		Mass (g)	OCV (V)	Mass (g)	OCV (V)			
6219.012-1-01	1st CYC, Fully Charged State	132.357	4.187	132.348	4.181	0.007	99.857	O
6219.012-1-02		132.543	4.199	132.533	4.196	0.008	99.929	O
6219.012-1-03		132.828	4.191	132.813	4.189	0.011	99.952	O
6219.012-1-04		132.375	4.189	132.364	4.185	0.008	99.905	O
6219.012-1-05	25th CYC, Fully Charged State	132.352	4.196	132.333	4.195	0.014	99.976	O
6219.012-1-06		132.424	4.199	132.400	4.197	0.018	99.952	O
6219.012-1-07		132.297	4.198	132.284	4.197	0.010	99.976	O
6219.012-1-08		132.977	4.188	132.962	4.181	0.011	99.833	O

Note:
L-Leakage; V-Venting; D-Disassembly; R-Rupture; F-Fire;
O-No Leakage, No Venting, No Disassembly, No Rupture & No Fire;

T.2: Thermal Test

Method: Test batteries are to be stored for at least six hours at a test temperature equal to 72±2 ℃, followed by storage for at least six hours at a test temperature equal to -40± 2 ℃. The maximum time interval between test temperature extremes is 30 minutes. This procedure is to be repeated until total 10 cycles are complete, after which all test batteries are to be stored for 24 hours at ambient temperature (20±5℃). For large batteries the duration of exposure to the test temperature extremes should be at least 12 hours.

Result:

Sample No.	Sample condition	Before test		After test		Mass loss (%)	Residual OCV (%)	Result
		Mass (g)	OCV (V)	Mass (g)	OCV (V)			
6219.012-1-01	1st CYC, Fully Charged State	132.348	4.181	132.322	4.148	0.020	99.211	O
6219.012-1-02		132.533	4.196	132.517	4.160	0.012	99.142	O
6219.012-1-03		132.813	4.189	132.784	4.155	0.022	99.188	O
6219.012-1-04		132.364	4.185	132.347	4.152	0.013	99.211	O
6219.012-1-05	25th CYC, Fully Charged State	132.333	4.195	132.315	4.160	0.014	99.166	O
6219.012-1-06		132.400	4.197	132.380	4.160	0.015	99.118	O
6219.012-1-07		132.284	4.197	132.253	4.161	0.023	99.142	O
6219.012-1-08		132.962	4.181	132.932	4.137	0.023	98.948	O

Note:
L-Leakage; V-Venting; D-Disassembly; R-Rupture; F-Fire;
O-No Leakage, No Venting, No Disassembly, No Rupture & No Fire;

T.3: Vibration

Method: The vibration shall be a sinusoidal waveform with a logarithmic sweep 7 Hz and 200 Hz and back to 7Hz traversed in 15 minutes. This cycle shall be repeated 12 times for a total of 3 hours for each of three mutually perpendicular mounting positions of the battery. One of the directions of vibration must be perpendicular to terminal face.

Result:

Sample No.	Sample condition	Before test		After test		Mass loss (%)	Residual OCV (%)	Result
		Mass (g)	OCV (V)	Mass (g)	OCV (V)			
6219.012-1-01	1st CYC, Fully Charged State	132.322	4.148	132.318	4.148	0.003	100.000	O
6219.012-1-02		132.517	4.160	132.515	4.160	0.002	100.000	O
6219.012-1-03		132.784	4.155	132.781	4.155	0.002	100.000	O
6219.012-1-04		132.347	4.152	132.344	4.152	0.002	100.000	O
6219.012-1-05	25th CYC, Fully Charged State	132.315	4.160	132.312	4.160	0.002	100.000	O
6219.012-1-06		132.380	4.160	132.375	4.160	0.004	100.000	O
6219.012-1-07		132.253	4.161	132.251	4.161	0.002	100.000	O
6219.012-1-08		132.932	4.137	132.928	4.137	0.003	100.000	O

Note:
L-Leakage; V-Venting; D-Disassembly; R-Rupture; F-Fire;
O-No Leakage, No Venting, No Disassembly, No Rupture & No Fire;

T.4: Shock

Method: Each battery shall be subjected to three shocks in the positive direction and to three shocks in the negative direction in each of three mutually perpendicular mounting positions of the battery for a total of 18 shocks.

Result:

Sample No.	Sample condition	Before test		After test		Mass loss (%)	Residual OCV (%)	Result
		Mass (g)	OCV (V)	Mass (g)	OCV (V)			
6219.012-1-01	1st CYC, Fully Charged State	132.318	4.148	132.318	4.148	0.000	100.000	O
6219.012-1-02		132.515	4.160	132.515	4.159	0.000	99.976	O
6219.012-1-03		132.781	4.155	132.779	4.155	0.002	100.000	O
6219.012-1-04		132.344	4.152	132.341	4.152	0.002	100.000	O
6219.012-1-05	25th CYC, Fully Charged State	132.312	4.160	132.310	4.160	0.002	100.000	O
6219.012-1-06		132.375	4.160	132.375	4.160	0.000	100.000	O
6219.012-1-07		132.251	4.161	132.248	4.160	0.002	99.976	O
6219.012-1-08		132.928	4.137	132.924	4.136	0.003	99.976	O

Note:
L-Leakage; V-Venting; D-Disassembly; R-Rupture; F-Fire;
O-No Leakage, No Venting, No Disassembly, No Rupture & No Fire;

T.5: External short circuit

Method: The battery to be tested shall be heated for a period of time necessary to reach a homogeneous stabilized temperature of 57±4℃, then the battery at 57±4℃ shall be subjected to one short circuit condition with a total external resistance of less than 0.1 ohm.

Result:

Sample No.	Sample condition	Before test	After test	Result
		Voltage (V)	Max. External Temperature (℃)	
6219.012-1-01	1st CYC, Fully Charged State	4.148	57.3	O
6219.012-1-02		4.159	56.9	O
6219.012-1-03		4.155	57.0	O
6219.012-1-04		4.152	57.3	O
6219.012-1-05	25th CYC, Fully Charged State	4.160	57.0	O
6219.012-1-06		4.160	57.0	O
6219.012-1-07		4.160	57.0	O
6219.012-1-08		4.136	57.0	O

Note:
D-Disassembly; R-Rupture; F-Fire;
O-No Disassembly, No Rupture & No Fire;

T.6: Impact / Crush

☒ **Impact Method:** This test sample cell or component cell is to be placed on a flat smooth surface. A 15.8 mm±0.1 mm diameter bar is to be placed across the center of the sample. A 9.1kg mass is to be dropped from a height of 61±2.5cm onto the sample. The test sample is to be impacted with its longitudinal axis parallel to the flat surface and perpendicular to the longitudinal axis of the 15.8 mm ± 0.1mm diameter curved surface lying across the center of the test sample. Each sample is to be subjected to only a single impact.

☐ **Crush Method:** A cell or component cell is to be crushed between two flat surfaces. The crushing is to be gradual with a speed of approximately 1.5 cm/s at the first point of contact. The crushing is to be continued until the first of the three options below is reached.

☐The applied force reaches 13 kN ± 0.78 kN.

☐The voltage of the cell drops by at least 100 mV.

☐The cell is deformed by 50% or more of its original thickness.

A prismatic or pouch cell shall be crushed by applying the force to the widest side. A button/coin cell shall be crushed by applying the force on its flat surfaces. Each sample is to be subjected to one crush only.

Result:

Sample No.	Sample condition	Before test	After test	Result
		Voltage (V)	Max. External Temperature (℃)	
6219.012-1-17	1st CYC, 50% Charged State	3.855	111.5	O
6219.012-1-18		3.861	96.9	O
6219.012-1-19		3.853	112.8	O
6219.012-1-20		3.854	65.7	O
6219.012-1-21		3.853	31.4	O
6219.012-1-22	25th CYC, 50% Charged State	3.855	78.1	O
6219.012-1-23		3.852	117.0	O
6219.012-1-24		3.852	111.7	O
6219.012-1-25		3.858	70.1	O
6219.012-1-26		3.857	44.9	O

Note:
D-Disassembly; F-Fire;
O-No Disassembly & No Fire;

T.7: Overcharge

Method: The charge current shall be twice the manufacture's recommended maximum continuous charge current. The minimum voltage of the test shall be follows:

☒ When the manufacturer's recommended charge voltage is not more than 18V, the minimum voltage of the test shall be the lesser of two times the maximum charge voltage of the battery or 22V.

☐ When the manufacturer's recommended charge voltage is more than 18V, the minimum voltage of the test shall be 1.2 times the maximum charge voltage.

Tests are to be conducted at ambient temperature. The duration of the test shall be 24 hours.

Result:

Sample No.	Sample condition	Before test	Test condition		Result
		Voltage (V)	Voltage (V)	Current (A)	
6219.012-1-09	1st CYC, Fully Charged State	4.190	8.46	3.20	O
6219.012-1-10		4.192			O
6219.012-1-11		4.188			O
6219.012-1-12		4.189			O
6219.012-1-13	25th CYC, Fully Charged State	4.196			O
6219.012-1-14		4.194			O
6219.012-1-15		4.188			O
6219.012-1-16		4.190			O
Note: D-Disassembly; F-Fire; O-No Disassembly & No Fire.					

T.8: Forced Discharge

Method: Each cell shall be forced discharged at ambient temperature by connecting it in series with a 12 Vdc. power supply at an initial current equal to the maximum discharge current specified by the manufacturer.
The specified discharge current is to be obtained by connecting a resistive load of the appropriate size and rating in series with the test cell. Each cell shall be forced discharged for a time interval (in hours) equal to its rated capacity divided by the initial test current (in ampere).

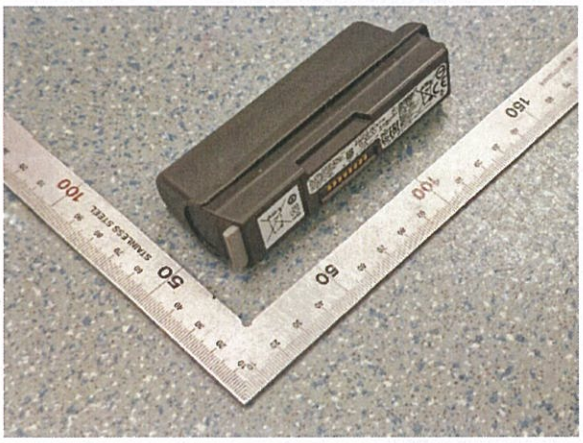
Result:

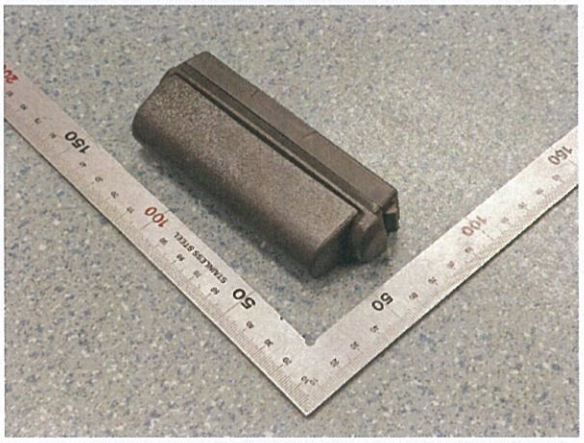
Sample No.	Sample condition	Before test	Result
		Voltage (V)	
6219.012-1-27	1st CYC, Fully Discharged State	3.347	O
6219.012-1-28		3.335	O
6219.012-1-29		3.336	O
6219.012-1-30		3.362	O
6219.012-1-31		3.351	O
6219.012-1-32		3.357	O
6219.012-1-33		3.348	O
6219.012-1-34		3.350	O
6219.012-1-35		3.353	O
6219.012-1-36		3.350	O
6219.012-1-37	25th CYC, Fully Discharged State	3.355	O
6219.012-1-38		3.354	O
6219.012-1-39		3.354	O
6219.012-1-40		3.361	O
6219.012-1-41		3.359	O
6219.012-1-42		3.361	O
6219.012-1-43		3.356	O
6219.012-1-44		3.351	O
6219.012-1-45		3.355	O
6219.012-1-46		3.359	O

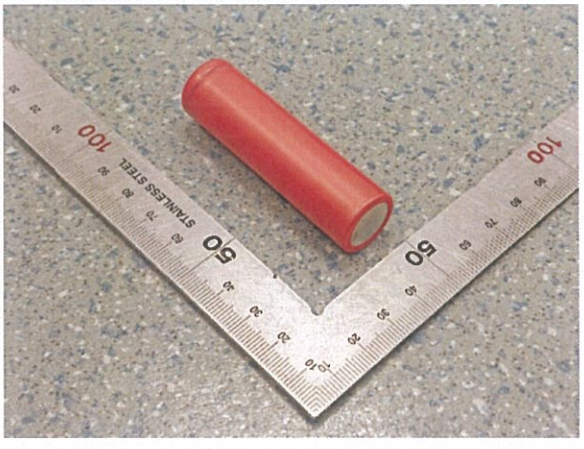
Note:
D-Disassembly; F-Fire;
O-No Disassembly & No Fire.

Sample Photos

PACK(82-90005-04 3.7V MIN:4600mAh/17.02Wh TYP:4800mAh/17.76Wh)







Statement

1. All applicable tests according to the above standard(s) have been carried out.
2. Test results are valid only for the tested samples.
3. The test report is invalid without the official stamp.
4. Nobody is allowed to photocopy or partly photocopy this test report without written permission.
5. The test report is invalid without the signatures of Approver, Reviewer and Testing engineer.
6. The test report is invalid if altered.