

Nº B7-A2Z0-0081

Wir	We	Nous
BARTEC GmbH Max-Eyth-Straße 16 97980 Bad Mergentheim Germany		
erklären, dass der Akku	declare that the battery	attestons que le la batterie

BARTEC Type B7-A2Z0-0081

auf den sich diese Erklärung bezieht den Anforderungen des folgenden Handbuch entspricht Handbuch der Tests und Kriterien der Vereinten Nationen Abschnitt 38.3	to which this declaration relates is in accordance with the provision of the following manual Manual of Tests and Criteria of the United Nations Section 38.3	se référant à cette attestation correspond aux dispositions des manuels suivants Manuel des tests et critères des Nations unies la section 38.3
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Wir erklären das der Akku vom genannten BARTEC Typ baugleich ist zum Akku vom Lieferanten	We declare that the battery of the named BARTEC type is identical in construction to the battery from the supplier	Nous déclarons que la batterie de type BARTEC est de construction identique à la batterie du fournisseur
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Supplier name: Zebra Technologies
Sub supplier of Zebra Technologies: Inventus Power, Inc.

Supplier Type: BT-000418

Bad Mergentheim, 28.01.2022


Approved

i.A. Sarah Springer

Product Manager Enterprise Mobility


Reviewed

i.A. Ralph Lanig

Project Manager

Separator sheet

Battery B7-A2Z0-0081 for

Mobile Computer MC27^{ex}-NI

Type B7-A2N*-.****/*****

UN38.3 Lithium Battery Test Report

Inventus Power, Inc.

Report Number:

TR-DCAL-10-8563

Date: 2020-05-08

UN38.3 Test Report

Tested According to UN Manual of Tests and Criteria, Part

III, subsection 38.3, Rev 6,Amend1

Name of Sample:	RECHARGEABLE LI-ION BATTERY
Pack Model/Type:	BT-000418
Pack Manufacturer:	ZEBRA TECHNOLOGIES CORP.
Cell Model/Type:	LG #INR18650MJ1
Rated Capacity:	Min. 3300mAh TYP. 3500mAh
Report No.:	TR-DCAL-10-8563
Applicant:	Inventus Power, Inc.–Technical Center
Total Pages:	13

All applicable tests according to the above standard(s) have been carried out.

Test results are valid only for the tested samples.

This Test Report can be reproduced only in whole.

General Information

Sample Name	RECHARGEABLE LI-ION BATTERY		
Model/Type	BT-000418		
Applicant	Inventus Power, Inc.-Technical Center		
Manufacturer	ZEBRA TECHNOLOGIES CORP.		
Factory	ICC Electronics (Dongguan) Ltd		
Project Number	8563	Receive Date	2020-04-01
Sample Number	8563-1-01~8563-1-48	Structure	1S1P
Test place	5th Floor Western, Changhua Building No.921 Xingye Road, Nancun Town, Panyu, Guangzhou City, Guangdong 511442, P.R. China		
Test Standard	ST/SG/AC.10/11/Rev.6, Amend1/Section 38.3		
Test Date	2020-4-1~2020-04-17		
Conclusion	PASS		
Remark	/		

Tested By: Jade Hu

Approved By: Li Gang

Date: 2020.5.8

Date: 2020.5.8

Summary of UN38.3 Test

No.	Test Item	Description	Results	Note
T1	Altitude Simulation	simulate air transport under low-pressure conditions.	PASS	/
T2	Thermal Test	assess battery seal integrity and internal electrical connections.	PASS	/
T3	Vibration	simulate vibration during transport.	PASS	/
T4	Shock	simulate possible impacts during transport.	PASS	/
T5	External Short Circuit	simulate an external short circuit.	PASS	/
T6	Impact/Crush	simulate an impact/ simulate a crush	PASS	/
T7	Overcharge	evaluate the ability of a rechargeable battery to withstand an overcharge condition.	PASS	/
T8	Forced Discharge	evaluate the ability of a primary or a rechargeable cell to withstand a forced discharge condition	PASS	/
Description of the sampling procedure		/		
Description of the deviation from the standard, if any		/		
Overall status		/		

TEST EQUIPMENT INFORMATION

Equipment Name	Model Name	Instr. Code	Last Cal. Date	Next Cal. Date
Digital Multimeter	34401A	04	2019-11-20	2020-11-19
Vacuum Box	T-TRD-C-36	55	2019-11-20	2020-11-19
Type J Thermocouple	TT-J-30-SLE	61&62	2019-6-29	--
DC low resistance tester	JK2511	66	2019-11-20	2020-11-19
Battery short circuit wire	--	89	--	--
Impact Test Bench	CL-20/KCL-2000	98	2019-11-20	2020-11-19
Vibration Test Bench	DC-300-3	99	2019-11-20	2020-11-19
Battery Impact Tester	GX-5066	103	2019-11-20	2020-11-19
Battery Short Circuit Tester	BE-1000W	117	--	--
DC Source	PWR400L	146	2019-11-20	2020-11-19
DC Source	PWR400L	147	2019-11-20	2020-11-19
DC Source	PWR400L	148	2019-11-20	2020-11-19
DC Source	PWR400L	149	2019-11-20	2020-11-19
E-load	PLZ164W	150	2019-11-20	2020-11-19
E-load	PLZ334W	151	2019-11-20	2020-11-19
E-load	PLZ405W	153	2019-11-20	2020-11-19
Thermo-hygrometers	JB913	160	2019-06-11	2020-06-10
Cold and Heat Shock Box	J-MTCT-30-CF	166	2019-11-20	2020-11-19
Electrical Scale	YHC	167	2019-06-11	2020-06-10
Data Acquisition	34972A	173	2019-11-20	2020-11-19
Data Acquisition Card	34901A	175	2019-11-20	2020-11-19

T1: Altitude Simulation

Pack Model: BT-000418

Cell Model: LG# INR18650MJ1

Method: The batteries shall be stored at a pressure of 11.6Kpa or less for at least 6 hours at ambient temperature ($20\pm 5^{\circ}\text{C}$). Each battery was inspected for leak of electrolyte.

Charge Method: 1300 mA @ CV= 4.2 V up to 120 mA cutoff

Discharge Method: 1600 mA up to 3.0 V

Result:

Sample No.	Before test		After test			
	Mass	Voltage	Mass	Mass loss	Voltage	Voltage percentage(%)
	(g)	(V)	(g)	(%)	(V)	not less than 90%
8563-1-01	79.102	4.199	79.100	0.003	4.196	99.929
8563-1-02	78.826	4.187	78.786	0.051	4.184	99.928
8563-1-03	78.978	4.182	78.951	0.034	4.182	100.000
8563-1-04	78.824	4.195	78.824	0.000	4.193	99.952
8563-1-05	79.084	4.197	79.072	0.015	4.195	99.952
8563-1-06	79.106	4.179	79.101	0.006	4.177	99.952
8563-1-07	79.095	4.186	79.085	0.013	4.184	99.952
8563-1-08	79.078	4.183	79.078	0.000	4.182	99.976
8563-1-09	79.104	4.192	79.098	0.008	4.191	99.976
8563-1-10	79.089	4.183	79.082	0.009	4.182	99.976
Leakage (Yes/No)			No			
Venting (Yes/No)			No			
Disassembly (Yes/No)			No			
Rupture (Yes/No)			No			
Fire (Yes/No)			No			
Result			Pass			

T2: Thermal Test

Pack Model: BT-000418

Cell Model: LG# INR18650MJ1

Method: Batteries are subjected to thermal shock of $-40\pm 2^{\circ}\text{C}/72\pm 2^{\circ}\text{C}$, 6 hours dwell in each temperature, total of 10 cycles. The maximum time interval between test temperature extremes is 30 minutes.

Each battery was then stored for 24 hours at ambient temperature ($20\pm 5^{\circ}\text{C}$) before final inspection for leakage of electrolyte, mass and OCV was measured.

Charge Method: 1300 mA @ CV= 4.2 V up to 120 mA cutoff

Discharge Method: 1600 mA up to 3.0 V

Result:

Sample No.	Before test		After test			
	Mass	Voltage	Mass	Mass loss	Voltage	Voltage percentage(%)
	(g)	(V)	(g)	(%)	(V)	not less than 90%
8563-1-01	79.100	4.196	79.082	0.023	4.135	98.546
8563-1-02	78.786	4.184	78.775	0.014	4.126	98.614
8563-1-03	78.951	4.182	78.947	0.005	4.107	98.207
8563-1-04	78.824	4.193	78.819	0.006	4.113	98.092
8563-1-05	79.072	4.195	79.068	0.005	4.128	98.403
8563-1-06	79.101	4.177	79.100	0.001	4.116	98.540
8563-1-07	79.085	4.184	79.075	0.013	4.109	98.207
8563-1-08	79.078	4.182	79.069	0.011	4.102	98.087
8563-1-09	79.098	4.191	79.095	0.004	4.113	98.139
8563-1-10	79.082	4.182	79.045	0.047	4.008	95.839
Leakage (Yes/No)			No			
Venting (Yes/No)			No			
Disassembly (Yes/No)			No			
Rupture (Yes/No)			No			
Fire (Yes/No)			No			
Result			Pass			

T3: Vibration

Pack Model: BT-000418

Cell Model: LG# INR18650MJ1

Method: The vibration shall be a sinusoidal waveform with a logarithmic sweep 7-200-7Hz in 15 minutes, 3 hours for each of three mutually perpendicular mounting positions of the batteries.

The logarithmic frequency sweep is as follows: from 7Hz a peak acceleration of 1g is maintained until 18Hz is reached. The amplitude is then maintained at 0.8mm (1.6mm total excursion) and the frequency increased until a peak acceleration of 8g occurs (approximately 50Hz). A peak acceleration of 8g is then maintained until the frequency is increased to 200Hz.

Charge Method: 1300 mA @ CV= 4.2 V up to 120 mA cutoff

Discharge Method: 1600 mA up to 3.0 V

Result:

Sample No.	Before test		After test			
	Mass	Voltage	Mass	Mass loss	Voltage	Voltage percentage(%)
	(g)	(V)	(g)	(%)	(V)	not less than 90%
8563-1-01	79.082	4.135	79.091	0.000	4.132	99.927
8563-1-02	78.775	4.126	78.785	0.000	4.119	99.830
8563-1-03	78.947	4.107	78.949	0.000	4.099	99.805
8563-1-04	78.819	4.113	78.825	0.000	4.104	99.781
8563-1-05	79.068	4.128	79.071	0.000	4.116	99.709
8563-1-06	79.100	4.116	79.112	0.000	4.107	99.781
8563-1-07	79.075	4.109	79.085	0.000	4.103	99.854
8563-1-08	79.069	4.102	79.073	0.000	4.100	99.951
8563-1-09	79.095	4.113	79.099	0.000	4.104	99.781
8563-1-10	79.045	4.008	79.051	0.000	4.003	99.875
Leakage (Yes/No)			No			
Venting (Yes/No)			No			
Disassembly (Yes/No)			No			
Rupture (Yes/No)			No			
Fire (Yes/No)			No			
Result			Pass			

T4: Shock

Pack Model: BT-000418

Cell Model: LG# INR18650MJ1

Method: The shock shall be a half-sine shock of peak acceleration of 150g for 6ms. Battery shall be subjected to 3 shocks in the positive direction followed by 3 shocks in the negative direction of 3 mutually perpendicular mounting position.

Total of 18 shocks.

Charge Method: 1300 mA @ CV= 4.2 V up to 120 mA cutoff

Discharge Method: 1600 mA up to 3.0 V

Result:

Sample No.	Before test		After test			
	Mass	Voltage	Mass	Mass loss	Voltage	Voltage percentage(%)
	(g)	(V)	(g)	(%)	(V)	not less than 90%
8563-1-01	79.091	4.132	79.095	0.000	4.128	99.903
8563-1-02	78.785	4.119	78.791	0.000	4.105	99.660
8563-1-03	78.949	4.099	78.952	0.000	4.099	100.000
8563-1-04	78.825	4.104	78.825	0.000	4.102	99.951
8563-1-05	79.071	4.116	79.081	0.000	4.109	99.830
8563-1-06	79.112	4.107	79.111	0.000	4.106	99.976
8563-1-07	79.085	4.103	79.087	0.000	4.101	99.951
8563-1-08	79.073	4.100	79.075	0.000	4.100	100.000
8563-1-09	79.099	4.104	79.102	0.000	4.102	99.951
8563-1-10	79.051	4.003	79.058	0.000	4.003	100.000
Leakage (Yes/No)			No			
Venting (Yes/No)			No			
Disassembly (Yes/No)			No			
Rupture (Yes/No)			No			
Fire (Yes/No)			No			
Result			Pass			

T5: External short circuit

Pack Model: BT-000418

Cell Model: LG# INR18650MJ1

Method: The battery to be tested shall be temperature stabilized so that its external case temperature reaches $57\pm4^{\circ}\text{C}$ and then the battery shall be subjected to a short circuit condition with a total external resistance of less than 0.1 ohm at $57\pm4^{\circ}\text{C}$. This short circuit condition is continued for at least one hour after the battery external case temperature has returned to $57\pm4^{\circ}\text{C}$. The battery must be observed for a further 6 hours for the test to be concluded.

Charge Method: 1300 mA @ CV= 4.2 V up to 120 mA cutoff

Discharge Method: 1600 mA up to 3.0 V

Result:

Sample No.	Before test		After test			
	Sample condition	Voltage	Maximum external temperature(°C) less than 170°C	Disassembly (Yes/No)	Rupture (Yes/No)	Fire (Yes/No)
		(V)				
8563-1-01	at first cycle, in fully charged states	4.128	57.30	No	No	No
8563-1-02		4.105	57.28	No	No	No
8563-1-03		4.099	57.53	No	No	No
8563-1-04		4.102	57.11	No	No	No
8563-1-05		4.109	56.12	No	No	No
8563-1-06	after 25 cycles ending in fully charged states	4.106	56.66	No	No	No
8563-1-07		4.101	56.00	No	No	No
8563-1-08		4.100	56.00	No	No	No
8563-1-09		4.102	55.85	No	No	No
8563-1-10		4.003	55.80	No	No	No
Result			Pass			

T6: Impact / Crush

Pack Model: BT-000418

Cell Model: LG# INR18650MJ1

Impact Method: This test sample cell or component cell is to be placed on a flat smooth surface. A 15.8 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 ± 2.5 cm 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 $15.8 \text{ mm} \pm 0.1 \text{ mm}$ diameter curved surface lying across the center of the test sample. Each sample is to be subjected to only a single impact. Cells external temperature not exceed 170°C .

No disassembly, no fire within six hours of this test.

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 $13 \text{ kN} \pm 0.78 \text{ kN}$.

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 external temperature do not exceed 170°C .

No disassembly, no fire within six hours of this test.

Chose Method for this test: Impact

Charge Method: 1700 mA @ CV= 4.25 V up to 50 mA cutoff

Discharge Method: 680 mA up to 2.5 V

Result:

Sample No.	Before test		After test			
	Sample condition	Voltage	Maximum external temperature($^\circ\text{C}$)	Disassembly	Fire	Result
		(V)	less than 170°C	(Yes/No)	(Yes/No)	(pass/fail)
8563-1-19	first cycle at 50% of the design rated capacity	3.715	26.84	No	No	Pass
8563-1-20		3.716	31.42	No	No	Pass
8563-1-21		3.715	28.49	No	No	Pass
8563-1-22		3.711	24.74	No	No	Pass
8563-1-23		3.716	25.19	No	No	Pass
8563-1-24	After 25 cycles at 50% of the design rated capacity	3.713	25.38	No	No	Pass
8563-1-25		3.715	23.70	No	No	Pass
8563-1-26		3.714	25.06	No	No	Pass
8563-1-27		3.713	26.61	No	No	Pass
8563-1-28		3.715	28.04	No	No	Pass

T7: Overcharge

Pack Model: BT-000418

Cell Model: LG# INR18650MJ1

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

- (a) 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.
- (b) 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.

Charge Method: 1300 mA @ CV= 4.2 V up to 120 mA cutoff

Discharge Method: 1600 mA up to 3.0 V

Result:

Sample No.	Before test		Test condition			
	Sample condition	Voltage	Voltage	Current		
		(V)	(V)	(A)		
8563-1-11	at first cycle, in fully charged states	4.198	8.5	3.4		
8563-1-12		4.195				
8563-1-13		4.189				
8563-1-14		4.197				
8563-1-15	after 25 cycles ending in fully charged states	4.192				
8563-1-16		4.197				
8563-1-17		4.195				
8563-1-18		4.192				
Battery Status within 7 days of the test		Disassembly (Yes/No)		No		
		Fire (Yes/No)		No		
Result		Pass				

T8: Forced Discharge

Pack Model: BT-000418

Cell Model: LG# INR18650MJ1

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).

Test Original Current: 10.0 A

Test Period: 21 min

Result:

Sample No.	Before test		After test		
	Sample condition	Voltage (V)	Disassembly (Yes/No)	Fire (Yes/No)	Result (pass/fail)
8563-1-29	at first cycle in fully discharged	3.135	No	No	pass
8563-1-30		3.144	No	No	pass
8563-1-31		3.129	No	No	pass
8563-1-32		3.133	No	No	pass
8563-1-33		3.129	No	No	pass
8563-1-34		3.114	No	No	pass
8563-1-35		3.132	No	No	pass
8563-1-36		3.144	No	No	pass
8563-1-37		3.137	No	No	pass
8563-1-38		3.125	No	No	pass
8563-1-39	after 25 cycles ending in fully discharged	3.125	No	No	pass
8563-1-40		3.132	No	No	pass
8563-1-41		3.128	No	No	pass
8563-1-42		3.131	No	No	pass
8563-1-43		3.125	No	No	pass
8563-1-44		3.112	No	No	pass
8563-1-45		3.131	No	No	pass
8563-1-46		3.112	No	No	pass
8563-1-47		3.128	No	No	pass
8563-1-48		3.123	No	No	pass

Sample Picture

Pack Model: BT-000418

Cell Model: LG# INR18650MJ1

