BCC ELECTRONICS CO., LTD.

Specification

Name	Li-ion Rechargeable Battery
Model	BCC3710-Cell
Specification	3.7V/10Ah CELL
Draft	
Checked	
Approval	

1. SCOPE

This specification defines the characteristics of a lithium-ion rechargeable battery, 10Ah $LiMn_2O_4$ cell.

2. SAFETY STANDARDS AND REGULATIONS

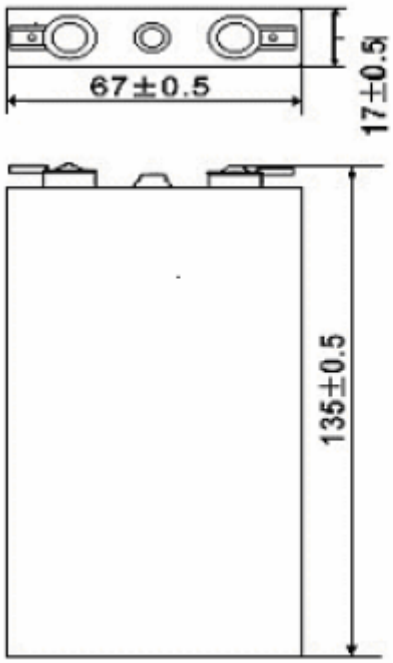
2.1 IEC-61960 Secondary cells and batteries containing alkaline or other non-acid electrolytes-Secondary lithium cells and batteries for portable applications.
2.2 UL1642 Lithium Batteries
2.3 UN ST/SG/AC.10/11/, Transportation of Dangerous Goods.

3. Name

Lithium-ion rechargeable battery. Cathode $LiMn_2O_4$**.** Anode: Graphite； Separator: PP/PE/PP， Electrolyte: $LiPF_6$/EC/DMC/EMC

4. CONSTRUCTION

No.	Item	Specifications
1	Shape	Prismatic
	Dimensions	Thickness：17±0.5mm
2		Width：67±0.5mm
		Overall height：135±0.5 mm
3	Weight	≤370g



5. RATED SPECIFICATIONS

No.	Item	Specifications
1	Rated capacity	10±0.5Ah
2	Nominal voltage	3.7V
3	Internal resistance (AC)	≤6 mΩ
4	Rated charge	Constant 2A and constant 4.2V charge until charging current ≤0.2A at 20℃
5	End of discharge voltage	2.7V
6	Maximum charging current	10A
7	Maximum discharging current	20A
8	Peak current	30A
9	Maximum charging voltage	4.2V
10	Protect voltage of overcharge	4.25V±0.025V (Any cell)
11	Protect voltage of overdischarge	2.7V±0.025V (Any cell)
12	Operating temperature	Charging: 0～45℃ Discharging: -20～55℃

13	Storage temperature	＜1month：-20～55℃ ＜3months：-20～45℃ ＜6months：-20～25℃
14	Storage voltage	3.9V～3.95V
15	Shipping voltage	3.9V～3.95V

6. SAFETY PROTECTION FUNCTION

6.1 Safety Valve

Controlled release of pressure in the event of excessive internal gas build up. Usually caused by incineration of the cell.

6.2 Meltable Separator

Prevents thermal runaway due to external short.

7. PERFORMANCE

7.1 Test Condition

All tests are carried out at an ambient temperature between 15℃and 25℃,at a relative humidity between 45%and 85% expect where otherwise noted.

7.2 Performance

7.2.1 Electrical Performance

Items		Typical	Conditions
Discharge capacity at 20℃	20A	9.75Ah	Discharge capacity to 2.7V after recommended charge
	10A	9.85Ah	
	5A	9.90Ah	
	2A	10.00Ah	
Discharge capacity at 55℃	10A	9.60Ah	Discharge capacity to 2.7V after fully charged cell in 55℃ 5h.
	5A	9.75Ah	
	2A	9.90Ah	
Discharge capacity	55℃	9.90 Ah	Discharge capacity to 2.7V after fully charged cell in 55℃ 5h.

at 2A	0℃	9.80 Ah	Discharge capacity to 2.7V after fully charged cell in 0℃ 16h.
	-10℃	9.70 Ah	Discharge capacity to 2.7V after fully charged cell in -10℃ 16h.
	-20℃	9.50 Ah	Discharge capacity to 2.7V after fully charged cell in -20℃ 16h.

7.2.2 Storage Performance

Items			Typical	Conditions
		DOD		
Capacity retention	20℃ 28 days	0%	87%	Rated discharge capacity after storage. Ah capacity ratio to before storage at rated discharge.(Storage: after recommended charge, i.e. 0% Depth of Discharge)
	45℃ 28 days	0%	88%	
	55℃ 24h	0%	95%	
	55℃ 28days	0%	83%	
Capacity recovery	20℃ 28days	0%	95%	Rated discharge capacity after storage, rated discharge then recommended charge. Ah capacity ratio to before storage at rated discharge.
		50%	99%	
		100%	100%	
	20℃ 3months	0%	TBD	
		50%	TBD	
		100%	TBD	
	20℃ 6months	0%	TBD	
		50%	TBD	
		100%	TBD	
	45℃ 28days	0%	96%	
		50%	99%	
		100%	100%	
	45℃ 3months	0%	TBD	
		50%	TBD	
		100%	TBD	

	55℃ 24h	0%	98%	
		50%	99%	
		100%	100%	
	55℃ 28days	0%	TBD	
		50%	TBD	
		100%	TBD	

7.2.3 Cycle Life

Items		Typical	Conditions
20℃ 10A	C100	91%	Discharge capacity at 20℃ on cycle100, 200, and300. Ah capacity ratio to initial Ah capacity.
	C200	86%	
	C300	78%	
20℃ 5A	C100	93%	
	C200	87%	
	C300	82%	
20℃ 2A	C100	94%	
	C200	90%	
	C300	85%	
45℃ 10A	C100	92%	Discharge capacity at 45℃ on cycle100, 200, and300. Ah capacity ratio to initial Ah capacity.
	C200	82%	
	C300	TBD	
45℃ 5A	C100	94%	
	C200	88%	
	C300	TBD	
45℃ 2A	C100	95%	
	C200	89%	
	C300	TBD	
0℃ 5A	C100	91%	Discharge capacity at 0℃ on cycle100, 200, and300. Ah capacity ratio to initial Ah capacity
	C200	85%	
	C300	TBD	

7.2.4 Quick Reference Guide: Typical Capacity of Fresh Cells

Discharge Temperature(℃)	Capacity(Ah) at Various Discharge Rate		
	2A	5A	10A
-20	9.5	9.45	9.40
-10	9.7	9.50	9.48
0	9.8	9.65	9.63
20	10.00	9.90	9.85
45	10.00	9.95	9.90
55	9.90	9.95	9.75

For typical discharge curves at various discharge rates refer to Figue1.
For typical discharge curves at various ambient temperatures refer to Figure2.

7.2.5 Environmental Performance

Items	Criteria	Typical	Conditions
Thermal Shock	No fire or explosion.	No fire or explosion.	Storage:75℃ for 48h,followed by -20℃ for 6h,followed by 21℃ for ≥24h.(IEC)
Drop Proof	No leakage, weight loss, distortion or out gassing	No leakage, weight loss, distortion or out gassing	Drop from a height of 90cm onto a concrete floor 3 times each for bottom, side and header orientations.
Vibration Proof	No leakage, weight loss, distortion or out gassing	No leakage, weight loss, distortion or out gassing	Subject to 10-55Hz vibration at an acceleration of 3g for three axes. Rate of change of vibration:1Hz/min.
High Temp. Storage	No fire or explosion	No fire or explosion	Rated discharge capacity after leaving at 85℃ for 10h.
Wet Proof	No fire or explosion No leakage	No fire or explosion No leakage	65℃/95%RH for 96h.

7.3 Safety Performance

7.3.1 Environmental Endurance Performance

Item	Criteria	Typical	Conditions
Heating 150 ℃	No fire or explosion	No fire or explosion	UL1642 standard

7.3.2 Electrical Endurance Performance

Item	Criteria	Typical	Conditions
Short circuit	No fire or Explosion Temp<150℃	No fire or Explosion Temp<150℃	Fully charged. External circuit resistance is<100mΩ
Overcharge	No fire or explosion	No fire or explosion	Charging at a constant current of 30A to 10V from fully charged state, then charging at constant voltage 10V.
Crush	No fire or explosion	No fire or explosion	Fully charged. crush between two flat plates. Applied force is about 13KN
Impact	No fire or explosion	No fire or explosion	Fully charged. Impact by Φ15.8mm bar of 9.1Kg weight dropped from 61cm height on the flat surface.
Penetration	No fire or explosion	No fire or explosion	Φ5mm nail penetrates the cell vertically

8. REGULATORY COMPLIANCE

8.1 UL1642 recognized component
8.2 Exempt form UN ST/SG/AC.10/11/Rev3, Transportation of Dangerous Goods

9. SAFETY NOTES AND PRECAUTIONS

- Do not disassemble the battery.
- Keep away from the children.
- Do not expose the battery to water or salt water, and should place the battery in cool and dry environment.
- Do not place the battery in high-temperature locations, such as fire, heater, etc.
- Do not connect the positive terminal and the negative terminal of the battery.
- Do not connect the positive terminal and the negative terminal of the battery to each other with any metal objects.
- Do not knock, strike, step on the battery.
- Do not solder directly onto the battery and pierce the battery with nails or other edge tools.
- In the event that the battery leaks and the fluid gets into one’s eye, do not rub the eye. Rinse well with water.
- Immediately discontinue use of the battery, if, while the battery emits an unusual smell, feels hot, changes color, changes shape, or appears abnormal in any other way.

While Charging

- When charging the battery, please use specified battery charger.
- Do not directly connect the battery with power supply outlet.
- Immediately discontinue use of the battery, if, while the battery emits an unusual smell, feels hot, changes color, changes shape, or appears abnormal in any other way, while charging the battery.
- Do not attach directly the batteries to a car's cigarette lighter.
- Please charge the battery at stated temperature range.

While Discharging

- Please discharge the battery at stated temperature range.
- Do not discharge the battery with unspecified equipment.
- Using the battery at high temperature may also result in a loss of performance and a shortened life expectancy.
- Do not use the battery at the places of strong static and magnetic field.

Data in this document is subject to change without notice.

Figure 1. Typical Discharge Curves at Various Discharge Rates

Charge method: Recommended charge as defined in section 5.0
Discharge method: Constant current discharge at the rate indicated above and at 20℃ & 55℃

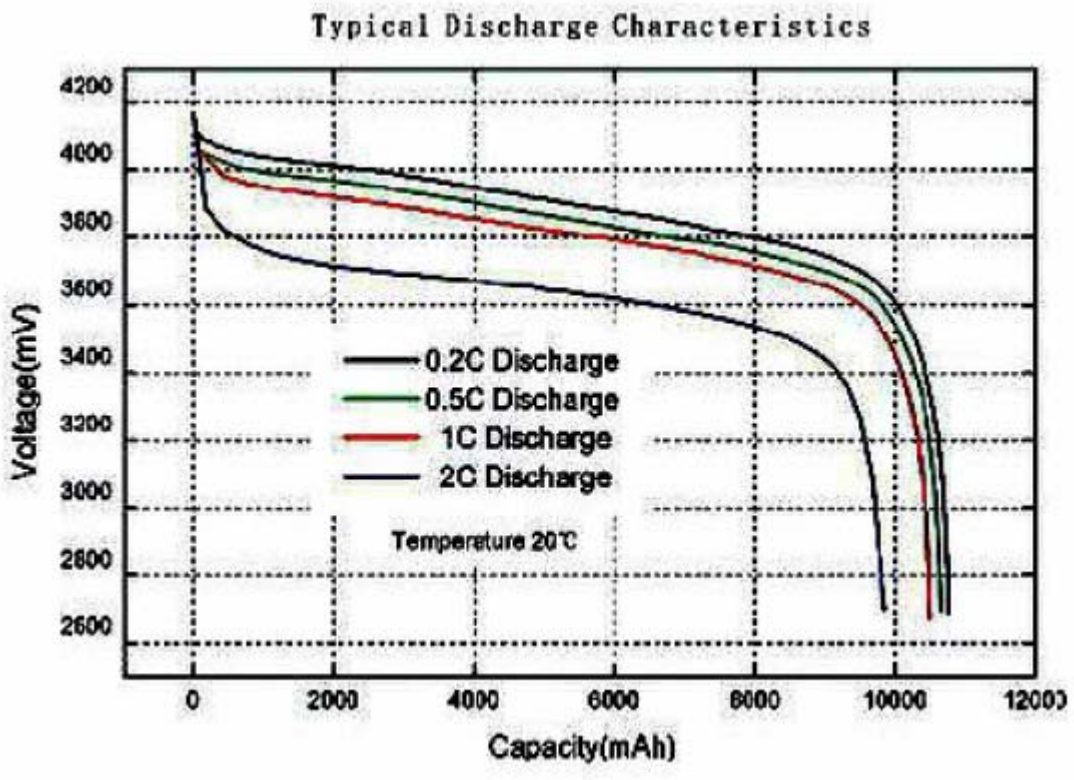


Figure 2. Typical Discharge Curves at Various Ambient Temperatures.

Charge method: Recommended charge as defined in section5.0, at 20℃
Discharge method: Constant 2A discharge at the temperature indicated above

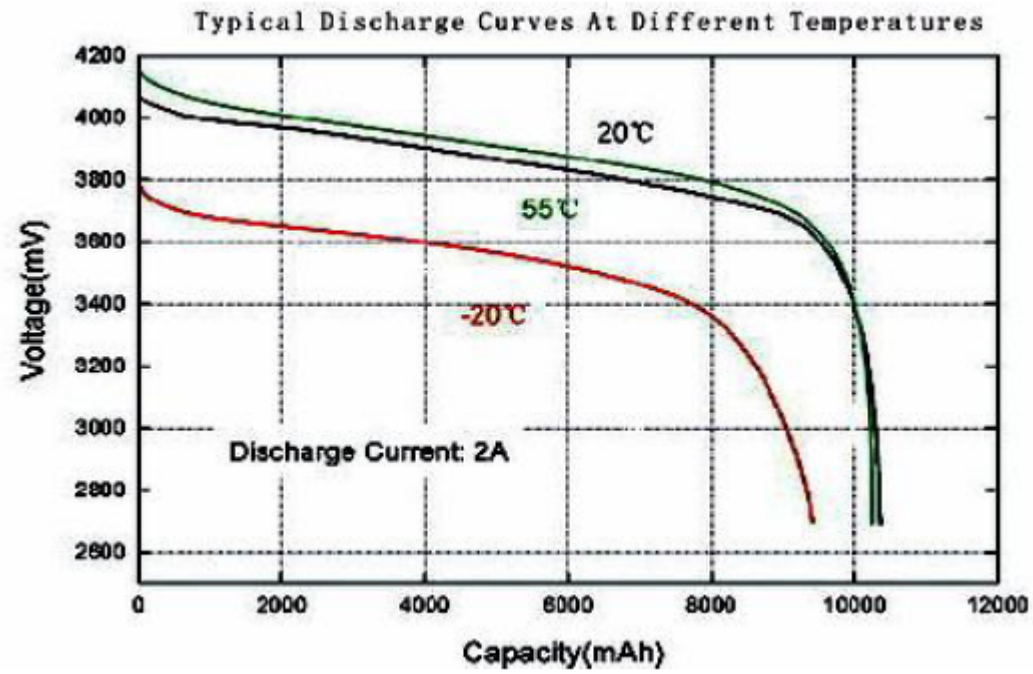


Figure 3. Typical Cycle life Cures at 20℃ Temperature

Charge method: Recommended charge as defined in section5.0, at 20℃
Discharge method: Constant 2A or 10A discharge at 20℃ temperature