

# Li-ion Cylindrical Battery Specification

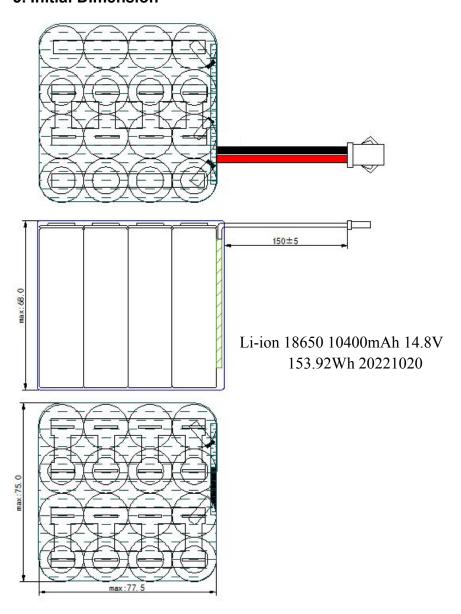
MODEL	18650-4S4P-100M
Nominal Capacity	<b>10.4A</b> h



# 2 .Scope

This specification describes the basic performance, technical requirement, testing method, warning and caution of the Li- ion Cylindrical rechargeable battery. The specification only applies to Akyga Battery.

## 3. Initial Dimension



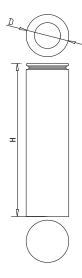


4.Battery pack Specifications

	by pack of	pecifications			
NO		Item	Specifications		
4.1	Typical Capacity		10.4Ah @ 0.2C Discharge		
4.1	Minimum c	apacity	10.2Ah @ 0.2C Discharge		
4.2	Nominal vo	oltage	14.80V		
		Max input voltage	26.0V±0.05V		
4.3	Charge	Max Charge voltage	16.80V±0.05V		
		Standard charge current	5200mA		
		Max Charge current	6000mA		
		Min Discharge voltage	10.8V ± 0.08(PCB End-of-charge Voltage )		
4.4	Discharge	Fast Discharge current	6000mA		
		Max continuous discharge current	6000mA		
4.5	Initial Impedance		Max:150mΩ		
4.6	Weight		Approx 748g		
4.7	Operating to	emperature	Charging $0^{\circ}\text{C} \sim 45^{\circ}\text{C}$ Discharging $-20^{\circ}\text{C} \sim 60^{\circ}\text{C}$		
4.8	Storage tem	perature	-5°C~35°C		
4.9	Storage Humidity ≤75% RH		≤75% RH		
4.10	Appearance	Appearance Without scratch, distortion, contamination and leakag			
4.11	Standard en	vironmental condition	Temperature : $25\pm3^{\circ}$ C Humidity : $45-75\%$ RH Atmospheric Pressure : $86-106$ KPA		

# 5. Cell Dimensions

Max(H) 65.2mm	Max (D)18.5 (mm)	
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6.Cell Specifications

NO.		Item		Specifications		
	Normal	capacity		2600mAh @ 0.2C Discharge		
6.1 Minimum capacity			2550mAh@0.2C (Discharge the cell from 4.2V to 2.75V by 0.2C current)			
6.2 Nominal voltage			3.70V			
6.3	Standar	d Charge		CC/CV,0.5C5A, 4	20V	
6.4	Standar	d Discharge		CC,0.2C5A, 2.75V		
6.5	End-of-	charge Voltage		4.20V±0.05V		
6.6	End-of-	charge Current		0.02C5A (At CV	(mode)	
6.7	End-of-	discharge Voltage		2.75V±0.05V		
6.8	Chargin	g Time		3 hours (standard		
6.9	Max cha	arge current (cont	inuous)	2.6A(45°C>T≥20 1.3A(20°C>T≥10 0.52A(10°C>T≥0	$\stackrel{\frown}{\mathbb{C}}$	
6.10	Max discharge current (continuous)		7.8A(45°C>T≥0°C) 2.6A (20°C>T≥10°C) 1.3A (10°C>T≥0°C)			
6.11	Max pu	Max pulse discharge current (<10s) $13A(25\pm3^{\circ}C)$				
6.12	Initial Impedance			Max:32mΩ		
6.13	Weight			Approx 45.5	g	
6.14	Operating temperature		Charging Discharging	0°C~45°C -20°C~60°C		
6.15	Storage temperature		-5°C~35°C			
6.16	Storage Humidity		≤75% RH			
6.17	Appeara	ance		Without scratch di	istortion contamin	ation and leakage
6.18	Standard environmental condition		Temperature : 25±3℃ Humidity : 45-75%RH Atmospheric Pressure : 86-106 KPA			
6.19	Tempe	rature Dependen	ce of Discharge @ 0.			
			Discharge temp	erature 放		
-20	)°C	-10℃	0℃	15℃	25℃	40℃
≥6	50%	≥70%	≥80%	≥90%	≥100%	≥100%

The discharge capacity and rate only applies to single electrical cores



## **7 Cell General Performance**

No.	Item	Test Methods and Condition	Criteria
7.1	0.2C Capacity	After standard charging, rest battery for 10min, then discharging at 0.2C to voltage 2.75V, recording the discharging time.	≥294min
7.2	Cycle Life	Constant current 0.5C charge to 4.2V, then constant voltage charge to current declines to 0.01C, rest 10min, constant current 3C discharge to 2.75V, rest 20min. Repeat above steps till continuously discharging capacity Higher than 80% of the Initial Capacities of the Cells	≥300cycles
7.3	Capability of keeping electricity	$25\pm3^{\circ}\text{C}$ , After standard charging, rest the battery 28days, discharging at 0.2C to voltage 2.75V, recording the discharging time.	≥240min

# **8 Cell Environment Performance**

No.	Item	Test Methods and Condition	Criteria
8.1	Discharge at high temperature	After standard charging, rest the cells 4h at $60\pm2^\circ\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!\!$	≽54min
8.2	Discharge at low temperature	After standard charging, rest the cells for 4h at -20 $\pm$ 2 $^{\circ}$ C, then discharging at 0.2C to voltage 2.75V, recording the discharging time.	≥180min
8.3	Thermal shock	Put the cells in the oven. The temperature of the oven is to be raised at $5\pm2^\circ \text{C}$ per minute to a temperature of $130\pm2^\circ \text{C}$ and remains 30 minutes.	No fire or explosion



# 9 Cell Safe Characteristic

No.	Item	Test Methods and Condition	Criteria
9.1	Over charge testing	At $25\pm3$ °C , charging cells with constant current 2C to voltage 5.0V, Stop test till cells temperature $10$ °C lower than max temperature.	No fire or explosion
9.2	Forced discharge	At $25\pm3^\circ\!\!\!\mathrm{C}$ , discharge to the termination voltage according to the standard discharge requirements, and then reverse charge at 1C current for 90 minutes	No fire or explosion
9.3	Short-circuit testing	After being charged according to standard, place it in an environment of $25\pm5^{\circ}$ and $55\pm5^{\circ}$ , and then connect the positive and negative extremes with a wire to ensure that all the external resistance is $80\pm20$ m $\Omega$ . The battery temperature drops to 20% lower than the peak value or the short circuit time reaches 24h.	No fire or explosion
9.4	Vibration test	Standard charged and fixed on the vibration table and subjected to vibration cycling that the frequency is to be varied at the rate of 1Hz per minute between 10Hz and 55Hz, battery is to be subjected to simple harmonic motion with an amplitude of 0.8 mm (0.03 in) [1.6mm (0.06 in) total maximum excursion]The cells shall be vibrated for 90 -100minutes per axis of X, Y axes.	No remarkable damage No smoking No explosion
9.5	Free drop test	Each fully charged cell is dropped three times from a height of 1,0m onto aconcrete floor. The cells are dropped so as to obtain impacts in randomorientations.	No fire \ No \ explosion
9.6	Altitude/Low Pressure simulation test	Standard charged and stored for 6 hours in an vacuum environment with pressure of less than 11.6kPa and temperature of $25\pm3^{\circ}\text{C}$ .	no leakage, no fire, no explosion

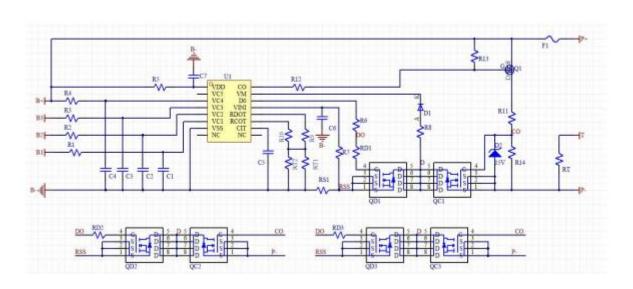
<sup>\*</sup> Above testing of safe characteristic must be with protective equipment



# **10.Protective circuits**

# 10.1 PCM Standard

item	Min.	Type value	Max.	Unit
Overcharge detection voltage	4. 200	4. 225	4. 250	v
Overcharge release voltage	4. 075	4. 125	4. 175	v
Overdischarge detection voltage	2. 620	2. 700	2. 780	V
Overdischarge release voltage	2. 900	3, 000	3, 100	v
Discharging overcurrent detection voltage	0. 095	0. 100	0. 105	v
Discharging overcurrent detection current	7.0	10. 0	13. 0	A
Overcharge detection delay time	500	1000	1500	ms
Overdischarge detection delay time	500	1000	1500	ms
ischarging overcurrent detection delay time	500	1000	1500	ms
Short detection delay time	1	280	1	us
Normal current consumption	/	25	30	uA
Current consumption (Power down)	1	5	1	uA
Impedance (B-,P-)	1	7	30	mΩ
Max continuous discharge current	/	/	6.0	A
Mil Steenmil	40	45	50	c
2000 C C C C C C C C C C C C C C C C C C	70	75	80	rc
Operating temperature	-20		+55	c
Recommendatory storage condition	Temperature	range: -5~+35℃	Humidity:	0%~75%RH
OV battery charge nunction		Avai lal	ole	





	Mo			W
and the same of th	0402, 0. 1uF, ±10%, X7R, 50V	10	C1~C6, C11~C14	English side
	0805, 1uF, 50V, ±10%, X7R, R0HS	1	C7	Many Conso
	1N4148WS, SOD-323, ROHS,	1	D1	
FUSE	12H 20A24V, 1206, 20A, 24V, HF,	1	F1	in
	MMBT5401, SOT-23-3, ROHS,	1	Q1	
MOS	PAN3030PA, PDFN3. 3*3. 3 -8L, ROHS,	4	QC1, QD1 QC2, QD2	-
WELL	0402, 1K, ±5%, 1/16W, ROHS	6	R1, R2, R3, R4, R6, R7	
	0805, 1K, ±5%, 1/8W, ROHS	1	R5	
	0402, 51K, 5%, 1/16W, ROHS	1	R8	
	0402, 19. 1K, 1%, 1/16W, ROHS	1	R9	
5.0	0402, 48. 7K, 1%, 1/16W, ROHS	1	R10	10000
	0402, 1M, ± 5%, 1/16W, ROHS	1	R11	-
	0402, 2M, ± 5%, 1/16W, ROHS	2	R12, R13	
A.V	0402, 3M, ± 5%, 1/16W, ROHS	1	R14	1
500	0402, 47R, ±5%, 1/16W, ROHS	3	RD1, RD2	Same and a second
The Control of the Co	10K, 1%, B=3435, L=80mm, 1.5mm, ROHS,	1	RT2	
	RLM25FEER004, 2512, 10mR, ±1%, 2W, HF,	1	RS1	
IC	CW1243ALJP, 4 IC, SOP-16, ROHS,	1	U1	12 000
No.	5*3*0.3 ROHS	5	B-, B1, B2, B3, B+	1
PCB	4S-CW1243ALJP-006, 60. 0*17. 5*1. 2mm FR4, 1. 0 , ROHS	1	PCB	1

## 11. CAUTIONS IN USE

To ensure proper use of the battery please read the manual carefully before using it. Handling

- Do not expose to, dispose of the battery in fire.
- Do not put the battery in a charger or equipment with wrong terminals connected.
- Avoid shorting the battery
- Avoid excessive physical shock or vibration.
- Do not disassemble or deform the battery.
- Do not immerse in water.
- Do not use the battery mixed with other different make, type, or model batteries.



• Keep out of the reach of children.

charge and discharge

- Battery must be charged in appropriate charger only.
- Never use a modified or damaged charger.
- Do not leave battery in charger over 24 hours.

#### . storage

• Store the battery in a cool, dry and well-ventilated area.

#### . disposal

• Regulations vary for different countries. Dispose of in accordance with local regulations.

## 12. Battery operation instruction

## 12.1 Charging 充电

Charging current Cannot surpass the biggest charging current which in this specification book stipulated.

Charging voltage: Does not have to surpass the highest amount which in this specification book stipulated to decide the voltage.

Charge temperature: The battery must carry on the charge in the ambient temperature scope which this specification book stipulated.

Uses the constant electric current and the constant voltage way charge, the prohibition reverse charges. If the battery positive electrode and the cathode meet instead, can damage the battery  $_{\circ}$ 

#### 12.2 Discharging current

The discharging current does not have to surpass this specification book stipulation the biggest discharging current, the oversized electric current electric discharge can cause the battery capacity play to reduce and to cause the battery heat.

#### 12.3 discharge temperature

The battery discharge must carry on in the ambient temperature scope which this specification book stipulated

### **12.4** Over-discharges

After the short time excessively discharges charges immediately cannot affect the use, but the long time excessively discharges can cause the battery the performance, battery function losing. The battery long-term has not used, has the possibility to be able to be at because of its automatic flashover characteristic certain excessively discharges the condition, for prevented excessively discharges the occurrence, the battery should maintain the certain electric quantity.



#### 10.5 Storing the Batteries

The battery should store in the product specification book stipulation temperature range. If has surpasses above for six months the long time storage, suggested you should carry on additional charge to the battery.

## 13. Period of Warranty

The period of warranty is one year from the date of shipment. guarantees to give a replacement in case of cells with defects proven due to manufacturing process instead of the customers abuse and misuse

#### 14. Other The Chemical Reaction

Because batteries utilize a chemical reaction, battery performance will deteriorate over time even if stored for a long period of time without being used. In addition, if the various usage conditions such as charge, discharge, ambient temperature, etc. are not maintained within the specified ranges the life expectancy of the battery may be shortened or the device in which the battery is used may be damaged by electrolyte leakage. If the batteries cannot maintain a charge for long periods of time, even when they are charged correctly, this may indicate it is time to change the battery.

#### 15.Note:

Any other items which are not covered in this specification shall be agreed by both parties.