



HEFEI GUOXUAN HIGH-TECH POWER ENERGY Co.,Ltd

No.

Q/GX 021 -2019

Title:

Product Specification of
IFP27175200A-105Ah Lithium-ion Cell

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Product Specification of IFP27175200A-105Ah Lithium-ion Cell

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Preface

This standard is an enterprise standard and uniformly implemented by the company.

The format of this specification is in accordance with the provisions of GB/T 1.1-2009, *standardization work guideline Part 1: Standards Structure and Compilation*.

On the basis of the references of GB/T 31484-2015 *Cycle Life Requirements and Test Methods for Power Cell for Electric Vehicles*, GB/T 31485-2015 *Safety Requirements and Test Methods for Power Cell for Electrical Vehicles*, GB/T 31486-2015 *Electrical Performance Requirements and Test Methods for Power Cell for Electric Vehicle*, and Q/GX 003-2016 *Technical Specification for Lithium-ion Power Cell for Electrical Vehicles*, the standard of *Product Specification of IFP27175200A-105Ah Lithium-ion cell* is prepared within combination of actual and testing conditions of our company. Testing method and criterions are expounded to guide the performance detection for the product of IFP27175200A-105Ah Lithium-ion cell.

Remark: If the referred standards are modified, please take the latest version as standard.

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Modification Record			
Version	Description of Changes	Revision date	Reviser
Q/GX 021-2018	1 st Edition	2018.03.15	Jiajia Jiang
Q/GX 021-2019	Modification of overall format	Release date of this version	Huadong Wang
Q/GX 021-2019	Modification: 2.1Standard technical parameter	Release date of this version	Huadong Wang
Q/GX 021-2019	Modification: 3.2Deviation of cell dimension	Release date of this version	Huadong Wang
Q/GX 021-2019	Modification: 4.1.1 Single cell charging	Release date of this version	Huadong Wang
Q/GX 021-2019	Modification: 4.1.2 Single cell discharging	Release date of this version	Huadong Wang
Q/GX 021-2019	Modification: 4.2.2 Capacity and temperature correlation	Release date of this version	Huadong Wang
Q/GX 021-2019	Modification: 4.5 Endurance performance	Release date of this version	Huadong Wang
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Q/GX 021-2019	Addition: 2.2 Recommended charging specification	Release date of this version	Huadong Wang
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Q/GX 021-2019	Addition: 4.2.4Discharge resistance at different temperature（DCR）	Release date of this version	Huadong Wang
Q/GX 021-2019	Addition: 4.2.5Charge resistance at different temperature（DCR）	Release date of this version	Huadong Wang
Q/GX 021-2019	Addition: 4.3.1Peak power plus discharge at different temperatureand SOC	Release date of this version	Huadong Wang
Q/GX 021-2019	Addition: 4.3.2 Peak power plus feedback at different temperatureand SOC	Release date of this version	Huadong Wang
Q/GX 021-2019	Addition: 4.4.1Maximum allowable pulse discharge power at different Temperature and SOCSOC	Release date of this version	Huadong Wang
Q/GX 021-2019	Addition: 4.4.2 Maximum allowable pulse feedback powerat different Temperature and SOC	Release date of this version	Huadong Wang
Remark: See the text for specific modification.			

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1. Basic Information

1.1 Scope

This specification sheet is provided to customers by HEFEI GUOXUAN HIGH-TECH POWER ENERGY Co. Ltd., describing Lithium ion rechargeable cell properties.

1.2 Application: Electric Vehicles and Energy Storage

1.3 Product type: Lithium ion rechargeable battery

1.4 Model Name: IFP27175200A-105Ah

2. Specification

2.1 Standard Technical Parameters

Item	Parameter	Condition/Notes
2.1.1 Standard Capacity	$\geq 108\text{Ah}$	0.33C
	$\geq 105\text{Ah}$	1C
2.1.2 Nominal Voltage	3.20V	0.33C
	3.14V	1C
2.1.3 Charge/Discharge Voltage Window	2.0~3.65V	$>0^{\circ}\text{C}$
	1.8~3.65V	$\leq 0^{\circ}\text{C}$
2.1.4 Weight	2060g $\pm$ 50g	
2.1.5 Weight Energy density	$\geq 167\text{Wh/kg}$	0.33C/0.33C
2.1.6 Volume Energy density	$\geq 365\text{Wh/L}$	0.33C/0.33C
2.1.7 AC Resistance	$0.4\text{m}\Omega \leq R \leq 0.6\text{m}\Omega$	$25^{\circ}\text{C} \pm 2^{\circ}\text{C}$
2.1.8 DC Resistance	$< 1.5\text{m}\Omega$	50%SOC, $25^{\circ}\text{C} \pm 2^{\circ}\text{C}$

2.2 Recommended Charge specification

Item	Parameter	Condition/Notes
2.2.1 Regular Charge (Slow charge)	52.5A	Constant current
	3.65V	Constant voltage
	5.25A	Cut off condition(terminating)
	$10^{\circ}\text{C} \leq T < 45^{\circ}\text{C}$	Temperature
2.2.2 Step Charge	See appendix A.1	Fast charging strategy at different temperature

2.3 Working Temperature Range

Item	Parameter	Condition/Notes
2.3.1 Optimum working Temperature	$10 \sim 35^{\circ}\text{C}$	
2.3.2 Charge temperature range	$0 \sim 55^{\circ}\text{C}$	Charging current, see appendix A.1
2.3.3 Discharge temperature range	$-30 \sim 60^{\circ}\text{C}$	The highest cell temperature $\leq 60^{\circ}\text{C}$

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3. Appearance and Dimension 3.1 Appearance Without scratches, cracks, rust, discoloration or electrolyte leakage, no other appearance defects affecting cell normal operation 3.2 Dimension Thickness: (27.2±0.5)mm (including outer film thickness, 5%SOC, binding force 10kgf) Width: (175±0.3)mm Height: (200±0.3)mm (excluding terminals) 4. Performance Specification 4.1 Standard testing condition 4.1.1 Single cell charging At room temperature(25℃±2℃), discharge at 52.5A to 2.0V, standing for 30min, then charge at 52.5A to 3.65V followed by constant voltage charging until current drops down to 5.25A, standing for 30min. 4.1.2 Single cell discharging At room temperature (25℃±2℃), discharge at 52.5A to 2.0V, standing for 30min. 4.2 Electrical Properties <table><tr><th>Item</th><th>Parameter</th><th>Condition/Notes</th></tr><tr><td>4.2.1 Initial Capacity</td><td>≥105Ah</td><td>Charge and discharge as per 4.1.1 and 4.1.2</td></tr><tr><td>4.2.2 Capacity and temperature correlation</td><td>0℃, ≥85%Initial Capacity -10℃, ≥75%Initial Capacity -20℃, ≥70%Initial Capacity -30℃, ≥55%Initial Capacity 25℃, 100% Initial Capacity 55℃, ≥100% Initial Capacity</td><td>At 25℃±2℃,charge as per 4.1.1, discharge at 1C to 2.0V at testing temperature (to 1.8V at or below 0℃) .</td></tr><tr><td>4.2.3 SOC-OCV Table</td><td>See appendix A.4</td><td>Charge as per 4.1.1, then discharge for 5% capacity at 1C (The capacity is obtained by discharging at 1C to certain cut-off voltage as ([-30℃-0℃) 2.0 [0℃-10℃) 2.3 [10℃-55℃] 2.5) , standing for 1h, repeat 20 times, record voltage after standing.</td></tr></table>				Item	Parameter	Condition/Notes	4.2.1 Initial Capacity	≥105Ah	Charge and discharge as per 4.1.1 and 4.1.2	4.2.2 Capacity and temperature correlation	0℃, ≥85%Initial Capacity -10℃, ≥75%Initial Capacity -20℃, ≥70%Initial Capacity -30℃, ≥55%Initial Capacity 25℃, 100% Initial Capacity 55℃, ≥100% Initial Capacity	At 25℃±2℃,charge as per 4.1.1, discharge at 1C to 2.0V at testing temperature (to 1.8V at or below 0℃) .	4.2.3 SOC-OCV Table	See appendix A.4	Charge as per 4.1.1, then discharge for 5% capacity at 1C (The capacity is obtained by discharging at 1C to certain cut-off voltage as ([-30℃-0℃) 2.0 [0℃-10℃) 2.3 [10℃-55℃] 2.5) , standing for 1h, repeat 20 times, record voltage after standing.
Item	Parameter	Condition/Notes													
4.2.1 Initial Capacity	≥105Ah	Charge and discharge as per 4.1.1 and 4.1.2													
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4.2.3 SOC-OCV Table	See appendix A.4	Charge as per 4.1.1, then discharge for 5% capacity at 1C (The capacity is obtained by discharging at 1C to certain cut-off voltage as ([-30℃-0℃) 2.0 [0℃-10℃) 2.3 [10℃-55℃] 2.5) , standing for 1h, repeat 20 times, record voltage after standing.													

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4.2.4 Discharge DCR at different temperature and SOC		See appendix A.5	1. Charge the Lithium-ion cell as per section 4.1.1 2. Discharge at 1C to adjust SOC at different temperature as per 4.1.2. 3. standing for 1h. 4. Measure the DCR under the condition of discharge at 3C for 30s, stand for 40s, charge at 2.25C for 15s or the condition of discharge at 5C for 10s, stand for 40s, charge at 3.75C for 10s. 5. The discharge resistance is the difference between the open circuit voltage and the discharge end voltage divided by the current, tested SOC is 5%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 95%.		
4.2.5 Charge DCR at different temperature and SOC		See appendix A.6	1. Charge the Lithium-ion cell as per section 4.1.1 2. Discharge at 1C to adjust SOC at different temperature as per 4.1.2. 3. standing for 1h. 4. Measure the DCR under the condition of discharge at 3C for 30s, stand for 40s, charge at 2.25C for 15s or the condition of discharge at 5C for 10s, stand for 40s, charge at 3.75C for 10s. 5. The charging resistance is difference between the charging terminal voltage and the open circuit voltage divided by the current, tested SOC at 5%, 10%, 20%, 30%, 40%, 50%, 60%, 70%, 80%, 90%, 95%.		
4.3 Maximum plus power（Ultimate capacity value）					
Item		Parameter		Condition/Notes	
4.3.1 Peak power pluse discharge at different temperature and SOC		See appendix A.7		According to the DCR and the maximum pulse charging current calculated from the test data of 4.2.4, the pulse discharge power at the lowest limit voltage specified at different temperature.	
4.3.2 Peak power pluse feedback at different temperature and SOC		See appendix A.8		According to the DCR and the maximum pulse charging current calculated from the test data of 4.2.5, the pulse feedback power at the upper charging voltage of 3.65v was calculated.	
4.4 Maximum allowable pulse charge power（Use allowable values）					
Item		Parameter		Condition/Notes	
4.4.1 Maximum allowable pulse discharge power at different Temperature and SOC		See appendix A.9		According to 4.3.1 maximum pulse discharge multiplier capacity of the cell and temperature protection of the discharge process, the upper limit of the pulse discharge power of the cell is limited.	

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4.4.2 Maximum allowable pulse feedback power at different Temperature and SOC		See appendix A.10	According to 4.3.2 maximum pulse charging capacity of the cell, the upper limit of the feedback power of the cell is limited in consideration of the reliable upper limit voltage and temperature protection of the charging process of the cell under the high voltage.		
4.5 Endurance performance					
Item		Parameter		Condition/Notes	
4.5.1 Room Temperature SOC Retention Rate		≥95%		25℃, 28 days, 100%SOC	
4.5.2 Room Temperature Capacity Recovery Rate		≥96%			
4.5.3 High Temperature SOC Retention Rate		≥94%		55℃, 7 days, 100%SOC	
4.5.4 High Temperature Capacity Recovery Rate		≥95%			
4.5.5 Storage Capacity Recovery Rate		>94%		45℃, 50%SOC, 28 days	
4.5.6 High Temperature Cycle Life		800 times		80% capacity retention rate; 55℃, charge at 0.5C; discharge at 1C	
4.5.7 High Temperature Cycle Life		1000 times		80% capacity retention rate; 45℃, charge at 0.5C; discharge at 1C	
4.5.8 Room Temperature Cycle Life		3000 times		80% capacity retention rate; 25℃, 45℃, charge at 0.5C; discharge at 0.5C	
4.5.9 Calendar Life		8years		80% capacity retention rate, ,25℃ , 50%SOC	
4.6 Specification of Safety Test					
Item		Specification		Remarks	
4.6.1 Over discharging		The single cell (The single cell is restrained by steel clamp) was charged according to the method of 4.1.1, and the single cell was discharged with a current of 1 I1 (A) for 90 min and observed for 1 h.		No explosion, no fire, no leakage	
4.6.2 Over charging		The single cell (The single cell is restrained by steel clamp) is charged according to the method of 4.1.1, and is charged with a constant current of 1 I1 (A) until the voltage reaches 1.5 times of the charging end voltage specified in the technical conditions of the enterprise or the charging time reaches 1 h, and the charging is stopped, and 1 h is observed.		No explosion, no fire	

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4.6.3 Short circuiting	The single cell (The single cell is restrained by steel clamp) is charged according to the method of 4.1.1, and the cathode and anode terminals of the single cell are externally short-circuited for 10 min, and the external line resistance should be less than 5 mΩ, and observed for 1 h.	No explosion, no fire	
4.6.4 Drop test	The single battery is charged according to the method of 4.1.1. The positive and negative terminals of the single battery are freely dropped from the height of 1.5 m onto the concrete floor and observed for 1 h.	No explosion, no fire, no leakage	
4.6.5 Heating	The single battery (The single cell is restrained by steel clamp) is charged according to the method of 4.1.1, and the temperature box was raised from room temperature to 130 °C ± 2 °C at a rate of 5 °C / min. After maintaining this temperature for 30 min, the heating was stopped and observed for 1 h.	No explosion, no fire	
4.6.6 Nail Penetration	The single cell (The single cell is restrained by steel clamp) is charged according to the method of 4.1.1, and the high temperature resistant steel needle with a diameter of 5mm~8mm is used to penetrate from the direction perpendicular to the battery plate at a speed of (25±5) mm/s, and the penetration position should be close to the surface. In the geometric center, the steel needle stays in the battery and is observed for 1 h.	No explosion, no fire	
4.6.7 Crushing	The single cell is charged according to the method of 4.1.1; Test according to the following conditions: a) extrusion direction: apply pressure perpendicular to the battery plate; b) extruded plate form: a semi-cylindrical body with a radius of 75 mm, the length (L) of the semi-cylindrical body is larger than the size of the battery to be squeezed; c) extrusion speed: (2 ± 1) mm / s; d) degree of extrusion: after the voltage reaches 0V or the deformation amount reaches 15% or the pressing force reaches 100KN, the extrusion is stopped and kept for 10 minutes; And observe 1h.	No explosion, no fire	
4.6.8 Seawater Soak Test	The single cell is charged according to the method of 4.1.1, and the single cell is immersed in a 3.5% NaCl solution (mass fraction, simulating seawater composition under normal temperature) for 2 hours, and the water depth should not completely pass through the single cell.	No explosion, no fire	

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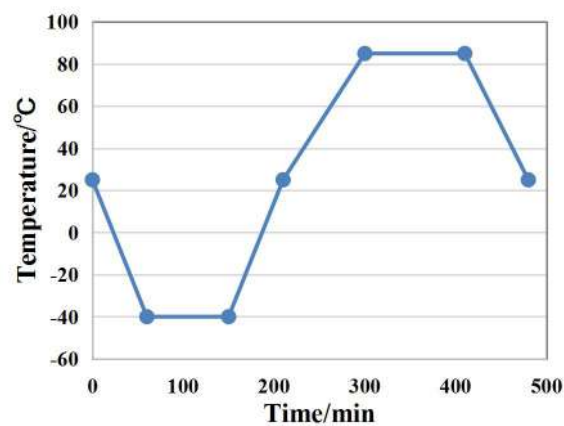
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 4.6.9
 Temperature
 Cycle Test

The single cell is charged according to the method of 4.1.1. The single cell is placed in the temperature box, and the temperature of the temperature box is adjusted according to the following table. The number of cycles is 5 times and observed for 1 hour.

Temp ℃	Time increasing min	cumulativ e time min	Temperature change rate℃ /min
25	0	0	0
-40	60	60	13/12
-40	90	150	0
25	60	210	13/12
85	90	300	2/3
85	110	410	0
25	70	480	6/7


 No explosion, no
 fire, no leakage

 4.6.10 Low
 Pressure Test

The single cell is charged according to the method of 4.1.1, the single cell is placed in the low pressure box, the air pressure in the test chamber is adjusted to 11.6KPa, the temperature is room temperature, and it is allowed to stand for 6h, and observed for 1h.

 No explosion, no
 fire, no leakage

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5. Cautions

Warning for the use of lithium ion rechargeable cells. Improper handling may cause the cell to heat up, cause fire and degrade performance. Be sure to read the following terms carefully.

Precautions

- When using a device equipped with a battery, refer to the user manual before use.
- Check the orientation of the cathode and anode terminals before packaging.
- The terminal or wire is connected to the cell module, pay attention to the insulation to prevent short circuit.
- Store the cell in a cool dry place ($\leq 35^{\circ}\text{C}$, 30%~50%SOC, charge and discharge once every 3 months) when not in use for a long time.
- Do not place the cell in direct sunlight or heat source to prevent high temperature of the cell.
- Do not wear metal accessories (such as rings, watches, accessories, etc.) when handling cell units..
- Do not place the cell outside the operating temperature range specified in this document.

Prohibited Items

- Do not charge more than the maximum charge rate.
- Do not disassemble or modify the Cell.
- Do not throw or hit the battery.
- Do not pierce the battery with a sharp object. (eg nails, knives, pens, electric drills)
- Do not mix with other cell or module units.
- Do not over-squeeze the battery during use.
- Do not use both new and old cell in PACK.
- Do not place the cell at a temperature higher than 60°C .
- Do not put the cell in a microwave or high pressure container.
- Do not connect the positive and negative terminals with conductive materials. (eg metal, wire)
- Do not allow to wet or immerse the cell in water or sea water.
- Do not use the cell in any way other than the manufacturer's written agreement.
- Do not connect the cells in series to prevent the insulation of “Can”.
- The placement of the cell in the vehicle must ensure that the height of cell is perpendicular to the direction of the vehicle.

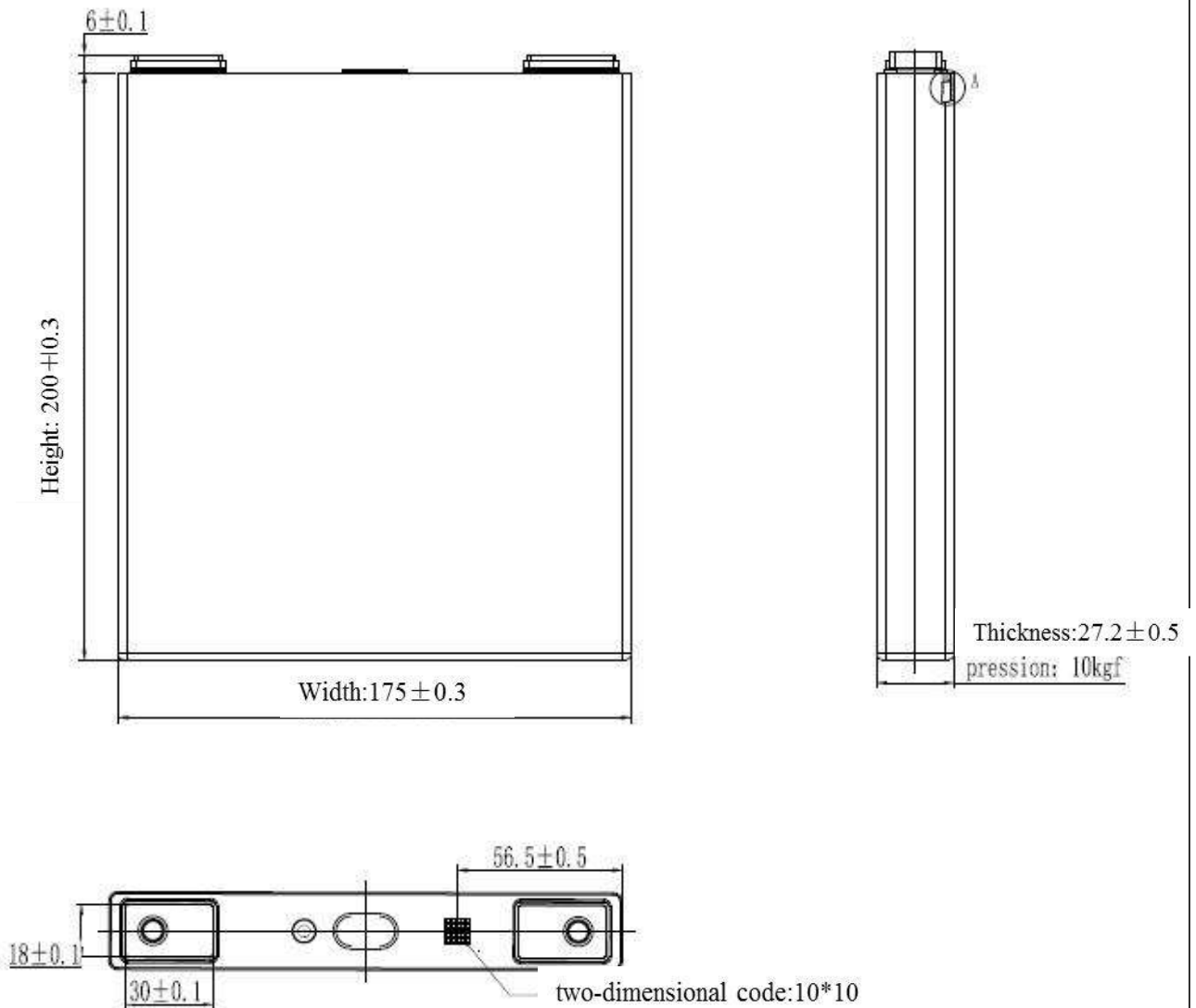
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6. Outline Drawings



Over Cell Dimension

Remark: The dimensions are shown in millimeters (mm) .

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Appendix

A.1 Step charge Table (Step charge matrix table)

Procedure	Temperature	<0℃	0℃≤ T<5℃	5℃≤ T<15℃	15℃≤ T<25℃	25℃≤ T<45℃	45℃≤ T<50℃	50℃≤ T<55℃
1	Charge current (C)	Forbid charging	0.15	0.5	0.6	0.6	0.5	0.33
	Jumping voltage (V)	/	3.62	3.50	3.40	3.40	3.55	3.60
2	Charge current (C)	Forbid charging	0.1	0.3	0.5	0.5	0.25	0.1
	Jumping voltage (V)	/	3.65	3.60	3.50	3.60	3.62	3.65
3	Charge current (C)	Forbid charging	/	0.2	0.2	0.2	0.1	/
	Cutoff voltage (V)	/	/	3.65	3.65	3.65	3.65	/

A.2 Single Cell failure Threshold (Recommended Value)

A.2.1 Single Cell Failure Threshold (BMS)

Cell Model	Numeric value	Description	Reference
Single cell overvoltage critical alarm threshold V	3.8	When the overvoltage exceeds the alarm threshold during charging, it will affect the cycle life of the cell. User charging is not allowed to exceed this voltage value.	Power must be turned off
Single cell overvoltage general alarm threshold V	3.7	Critical value of overvoltage during charging	Power must be turned off over 5s
Maximum working voltage V	3.65	Maximum limit of normal operation	
Single under voltage critical alarm threshold V	[-30℃-0℃) 1.8 [0℃-55℃) 2.0	When the under-voltage exceeds the alarm threshold during discharge, it will affect the cycle life of the cell. The user discharge must not exceed this voltage value	
Single under voltage general alarm threshold V	[-30℃-0℃) 1.9 [0℃-55℃) 2.2	When the under voltage exceeds the alarm threshold during discharge, it will affect the cycle life of the battery. The user discharge must not exceed this voltage value.	
Minimum operating voltage V	[-30℃-0℃) 2.0 [0℃-55℃) 2.3	Minimum threshold for normal operation	
Battery temperature is too high, general alarm threshold °C	55	Battery operating temperature above this temperature will limit cell power	

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Battery temperature is too high, critical alarm threshold °C	60	If the cell temperature exceeds this alarm threshold, it will affect the cell safety performance. The user should not exceed this temperature when using it.	
Cell temperature is too low, general alarm threshold °C	-20	Cell operating temperature below this temperature will limit cell power	
Battery temperature is too low, critical alarm threshold °C	-30	If the cell temperature is lower than this alarm threshold, it will affect the safety performance of the cell. The user should not use it below this temperature.	

A.2.2 Cell Information for Pack Design

Cell Model	Symbol	Numerical value (5%SOC)	Suggestions	Reference
Maximum allowable pressure	Fmax	TBD		250kgf, 5%SOC
Minimum required pressure	Fmin	TBD		50kgf, 5%SOC

A.3 Cycle Life at Certain Condition

A.3.1 Room Temperature Cycle Life

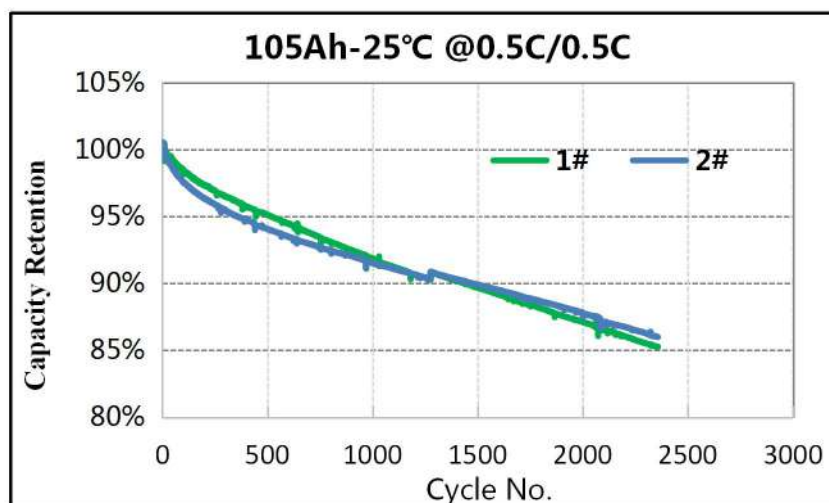
Test Conditions

Charging: charge at 0.5C to 3.65V, then charging at constant voltage to cutoff current 0.05c;

Discharge: 0.5C discharge to cutoff voltage 2.0V

Temperature: 25 ° C

Rest time: 30 min after charging/discharging



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A.4 SOC-OCV table

T	-30℃	-20℃	-10℃	0℃	10℃	25℃	45℃	55℃
DOD	Voltage/V	Voltage/V	Voltage/V	Voltage/V	Voltage/V	Voltage/V	Voltage/V	Voltage/V
0%	3.392	3.370	3.366	3.401	3.402	3.384	3.395	3.406
5%	3.341	3.321	3.320	3.326	3.325	3.329	3.332	3.335
10%	3.291	3.299	3.308	3.317	3.324	3.328	3.330	3.332
15%	3.288	3.298	3.308	3.318	3.325	3.328	3.330	3.331
20%	3.286	3.297	3.307	3.318	3.325	3.328	3.329	3.331
25%	3.284	3.295	3.305	3.318	3.324	3.327	3.329	3.331
30%	3.282	3.292	3.301	3.314	3.324	3.327	3.329	3.331
35%	3.280	3.289	3.296	3.306	3.322	3.326	3.328	3.330
40%	3.278	3.286	3.291	3.296	3.310	3.318	3.320	3.321
45%	3.276	3.284	3.287	3.288	3.294	3.297	3.300	3.302
50%	3.274	3.280	3.283	3.283	3.286	3.290	3.294	3.298
55%	3.273	3.278	3.280	3.281	3.284	3.288	3.293	3.297
60%	3.271	3.275	3.277	3.279	3.283	3.288	3.292	3.297
65%	3.269	3.273	3.275	3.279	3.283	3.287	3.292	3.296
70%	3.268	3.271	3.273	3.277	3.282	3.285	3.285	3.285
75%	3.266	3.269	3.271	3.273	3.280	3.275	3.271	3.267
80%	3.262	3.267	3.268	3.265	3.271	3.256	3.254	3.251
85%	3.260	3.263	3.263	3.252	3.253	3.228	3.227	3.225
90%	3.257	3.258	3.254	3.231	3.228	3.209	3.208	3.208
95%	3.253	3.252	3.239	3.210	3.205	3.152	3.153	3.154
100%	3.211	3.242	3.214	3.184	3.195	2.779	2.682	2.586

A.5 Discharge DCR at Different Temperature and SOC

Discharge @5C 10s, DCR/mΩ								
T/SOC	-30℃	-20℃	-10℃	0℃	10℃	25℃	45℃	55℃
5%	3.385	3.221	3.069	3.004	2.306	1.265	0.829	0.611
10%	3.388	3.221	3.089	2.994	2.256	1.150	0.778	0.592
20%	3.392	3.227	3.123	2.729	2.051	1.035	0.727	0.573
30%	3.397	3.145	2.976	2.356	1.806	0.982	0.706	0.568
40%	3.400	2.855	2.677	2.032	1.597	0.944	0.687	0.559
50%	3.407	2.758	2.423	1.860	1.482	0.915	0.668	0.545
60%	3.424	2.597	2.282	1.771	1.431	0.920	0.677	0.555
70%	3.435	2.461	2.202	1.721	1.396	0.909	0.676	0.560
80%	3.402	2.374	2.157	1.700	1.377	0.892	0.663	0.549
90%	3.275	2.320	2.122	1.672	1.351	0.870	0.649	0.538
95%	3.148	2.266	2.087	1.644	1.325	0.848	0.635	0.527

A.6 Regeneration DCR at Different Temperature and SOC

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charge @3.75C 10s ,DCR/mΩ

T/SOC	0℃	25℃	35℃	45℃
5%	2.908	0.939	0.813	0.688
10%	2.639	0.940	0.815	0.690
20%	2.101	0.943	0.819	0.695
30%	1.628	0.939	0.811	0.682
40%	1.543	0.932	0.805	0.678
50%	1.514	0.924	0.796	0.667
60%	1.486	0.956	0.826	0.695
70%	1.459	0.952	0.822	0.692
80%	1.440	0.940	0.809	0.678
90%	1.423	0.928	0.798	0.668
95%	1.406	0.916	0.787	0.658

A.7 Peak power pulse discharge at different temperatures and SOC

Peak power pulse discharge@10s /W								
T/SOC	-30℃	-20℃	-10℃	0℃	10℃	25℃	45℃	55℃
5%	739.0	779.8	806.8	810.0	1040.4	1823.4	2805.1	3786.9
10%	739.8	780.1	807.4	818.4	1340.4	2123.4	3105.1	4086.9
20%	740.1	780.4	808.1	915.2	1532.8	2459.2	3449.0	4438.8
30%	740.3	803.0	820.9	1082.9	1698.3	2621.4	3651.1	4680.8
40%	740.6	890.3	906.1	1260.8	1848.0	2728.8	3767.5	4806.1
50%	741.0	924.6	1010.7	1381.0	1958.9	2825.7	3880.2	4934.6
60%	741.7	985.9	1086.5	1458.5	2025.2	2875.2	3905.0	4934.8
70%	742.2	1045.1	1138.5	1515.3	2077.7	2921.4	3936.4	4951.5
80%	753.2	1089.0	1173.3	1547.3	2119.8	2978.6	4012.6	5046.5
90%	786.7	1119.3	1197.5	1572.8	2164.9	3052.9	4106.1	5159.3
95%	788.4	1120.8	1198.7	1574.1	2167.2	3056.6	4110.8	5164.9

A.8 Peak power pulse feedback at different temperatures and SOC

Peak power pulse feedback@10s /W				
T/SOC	10℃	25℃	45℃	55℃
10%	1187.3	1838.3	2165.5	2492.8
20%	1134.7	1631.1	1941.2	2251.3
30%	1058.9	1565.4	1828.1	2090.9
40%	1041.4	1554.3	1802.7	2051.0
50%	1033.3	1542.4	1796.2	2050.0
60%	1026.6	1434.3	1670.3	1906.4
70%	1020.7	1407.1	1627.9	1848.7
80%	1016.1	1399.9	1624.4	1848.9
90%	1013.1	1391.3	1619.0	1846.8

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A.9 Maximum allowable pulse discharge power/rate at different temperature and SOC

Maximum allowable pulse discharge power @10s /W								
T/SOC	-30℃	-20℃	-10℃	0℃	10℃	25℃	45℃	55℃
0%~10%	26.25	52.5	131.3	606.8	807.4	1211.7	525.0	262.5
10%~20%	131.3	131.3	131.3	702.0	915.8	1275.6	525.0	262.5
20%~30%	131.3	131.3	210.0	805.1	1024.4	1312.5	525.0	262.5
30%~40%	131.3	210.0	262.5	849.5	1066.1	1307.7	525.0	262.5
40%~50%	131.3	210.0	262.5	889.9	1101.3	1312.5	525.0	262.5
50%~60%	210.0	210.0	315.0	912.3	1124.6	1308.0	525.0	262.5
60%~70%	210	262.5	315	889.4	1098	1283.7	525	262.5
70%~80%	210	262.5	315	848.1	1049.6	1234.4	525	262.5
80%~90%	183.8	236.3	288.8	787.5	971.3	1233.8	525	262.5

Remark: For SOC is the range of interval, the left interval is the closed interval, and the right interval is the open interval. For example: 10%~20% is $10\% \leq \text{SOC} < 20\%$.

Maximum pulse discharge rate @10s/C								
T/SOC	-30℃	-20℃	-10℃	0℃	10℃	25℃	45℃	55℃
0%~10%	0.1	0.2	0.5	2.3	3.1	4.6	2.0	1.0
10%~20%	0.5	0.5	0.5	2.7	3.5	4.9	2.0	1.0
20%~30%	0.5	0.5	0.8	3.1	3.9	5.0	2.0	1.0
30%~40%	0.5	0.8	1.0	3.2	4.1	5.0	2.0	1.0
40%~50%	0.5	0.8	1.0	3.4	4.2	5.0	2.0	1.0
50%~60%	0.8	0.8	1.2	3.5	4.3	5.0	2.0	1.0
60%~70%	0.8	1.0	1.2	3.4	4.2	4.9	2.0	1.0
70%~80%	0.8	1.0	1.2	3.2	4.0	4.7	2.0	1.0
80%~90%	0.7	0.9	1.1	3.0	3.7	4.7	2.0	1.0

Remark: For SOC is the range of interval, the left interval is the closed interval, and the right interval is the open interval. For example: 10%~20% is $10\% \leq \text{SOC} < 20\%$.

A.10 Maximum allowable pulse feedback power/rate at different temperature and SOC

Maximum pulse feedback power@10s/W							
T/SOC	-10℃	-5℃	0℃	10℃	25℃	45℃	55℃
0%~10%	110.3	183.8	220.5	367.5	735.0	735.0	367.5
10%~20%	73.5	110.3	220.5	367.5	735.0	735.0	367.5
20%~30%	73.5	110.3	183.8	367.5	735.0	735.0	294.0
30%~40%	73.5	110.3	183.8	367.5	551.3	735.0	294.0
40%~50%	73.5	110.3	110.3	294.0	551.3	561.0	294.0
50%~60%	73.5	73.5	110.3	294.0	441.0	551.3	183.8
60%~70%	36.8	73.5	73.5	183.8	441.0	441.0	183.8

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70%~80%	36.8	73.5	73.5	183.8	441.0	441.0	183.8
80%~90%	36.8	36.8	73.5	110.3	294.0	367.5	183.8

Remark: For SOC is the range of interval, the left interval is the closed interval, and the right interval is the open interval. For example: 10%~20% is $10\% \leq \text{SOC} < 20\%$.

Maximum pulse feedback rate@10s /C							
T/SOC	-10℃	-5℃	0℃	10℃	25℃	45℃	55℃
0%~10%	0.3	0.5	0.6	1.0	2.0	2.0	1.0
10%~20%	0.2	0.3	0.6	1.0	2.0	2.0	1.0
20%~30%	0.2	0.3	0.5	1.0	2.0	2.0	0.8
30%~40%	0.2	0.3	0.5	1.0	1.5	2.0	0.8
40%~50%	0.2	0.3	0.3	0.8	1.5	1.5	0.8
50%~60%	0.2	0.2	0.3	0.8	1.2	1.5	0.5
60%~70%	0.1	0.2	0.2	0.5	1.2	1.2	0.5
70%~80%	0.1	0.2	0.2	0.5	1.2	1.2	0.5
80%~90%	0.1	0.1	0.2	0.3	0.8	1.0	0.5

Remark: For SOC is the range of interval, the left interval is the closed interval, and the right interval is the open interval. For example: 10%~20% is $10\% \leq \text{SOC} < 20\%$.

Remark: The high/low of the pulse feedback current must strictly comply with all charging states and cell temperature listed in the table below. Violation of pulse feedback conditions may result in permanent damage to the cell and decrease of service life.

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Environmental declaration of IFP27175200A-105Ah Lithium battery product

In accordance with EU directive 2015/863, battery instruction requirements in 2006-66-EC, as shown in the following table, a total of 10 substances are included in the RSL, for example Cadmium、Lead 、Mercury、Hexavalent chromium、Polybrominated biphenyls (PBB)、Polybrominated diphenyl ethers (PBDE) and phthalate (PAEs).

Table A.11 List of 10 restricted substances

RoHS restricted substance	The highest limit (PPM)	Discription
Cadmium(Cd)	20	2006-66-EC Directive Requirement
Lead (Pb)	40	2006-66-EC Directive Requirement
Mercury (Hg)	5	2006-66-EC Directive Requirement
Hexavalent chromium (Cr ⁶⁺)	1000	RoHS 1.0 limited substance
Polybrominated biphenyls (PBB)	1000	RoHS 1.0 limited substance
Polybrominated diphenyl ethers (PBDE)	1000	RoHS 1.0 limited substance
Diphthalate (2-ethylhexyl) ester (DEHP- Di(2-ethylhexyl)Phthalate)	1000	Added restricted substances in RoHS 2.0
Benzyl butyl phthalate (BBP- Benzyl Butyl Phthalate)	1000	Added New restricted substances of RoHS 2.0
Dibutyl phthalate (DBP-Di-n-butyl Phtalate)	1000	Added New restricted substances in RoHS 2.0
Diisobutyl phthalate (DIBP-Diiso butyl Phthalate)	1000	Added New restricted substances in RoHS 2.0

Execute immediately from release date.