BATTERY PRODUCT SPECIFICATION

Model NO		**INR18650-35E 7.2V 3.4Ah 2S1P**
Product Name		
Part Number		**NUE21SSS35E3X5AB/GB-MT2S1P**
ISSUED BY	APPROVED BY	Customer confirmation
Alan	Vin	

1.0 Modified List

Product Modified Record List

Revision	Date	Mark	Modified content	Approved by
A0	2019/4/9	/	First Release	VIN ZHENG

2.0 Scope

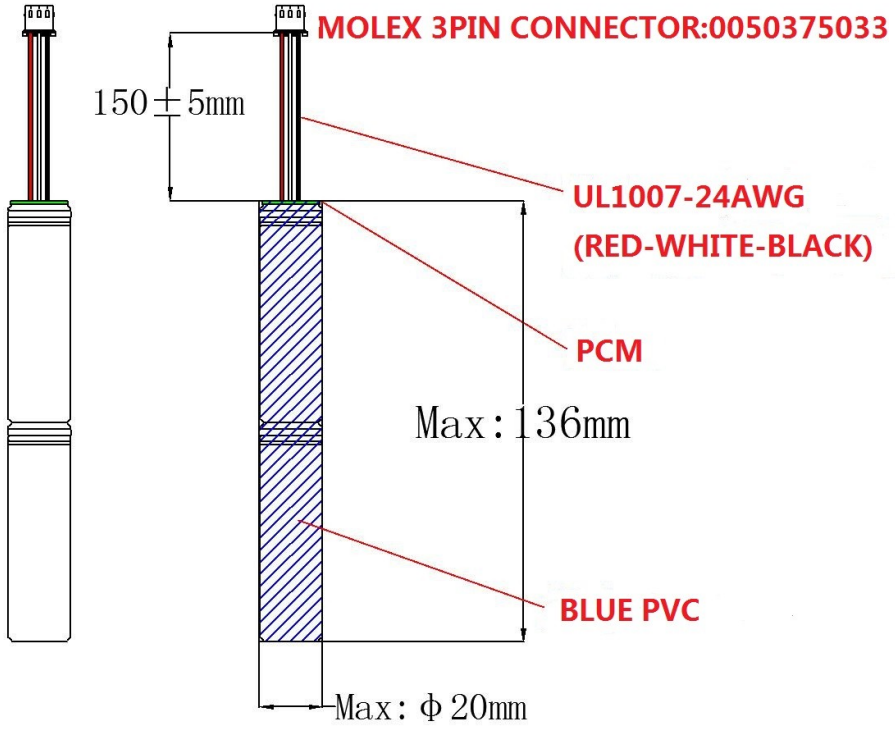
This specification specifies the parameters, testing methods and precautions of the lithium battery pack. It is suitable for the lithium batteries produced by NuEnergy Storage Technologies.

3.0 Battery Pack specifications

Cell	Model	SAMSUNG INR18650-35E
	Capacity	3400mAh
	Rated Voltage	3.6V
	Pack Standard	A. Capacity Difference ≤ 5% B. Resistance Difference ≤ 3mΩ C. Voltage deviation ≤ 10mv
Pack Index	* Pack Method	2S1P
	* Rated Capacity	3400mAh
	* Minimal Capacity 0.2C	3350mAh
	* Nominal Voltage	7.2V
	* End-off Discharge voltage	2.8±0.05V
	* Max. Charge Voltage	8.4V
	* Charge Current	3.5-4A
	* Maximum continuous discharge current	3.5-4A
	* Over current value	6-12A
	* Over current protection delay time	8-16ms
	* Short circuit recovery conditions	Disconnect the load automatic recovery
	* Short circuit protection time	150-500us
	* Internal resistance	R_{DS}≤200mΩ
	* Charge and discharge wires	Molex 3pin connector: 0050375033 UL1007-24AWG-RED/WHITE/BLACK Wire Length: 150±5mm
	* Max Dimension	φ20mm*L136mm
	* Working environment temperature	Charge 0℃ 45℃ Discharge -20℃ 60℃

Pack Index	* Storage Temperature and humidity	1 year: -25~25°C RH≦75% 3 months: -25~28°C RH≦75% 1 month: -25~35°C RH≦75%
	Max Weight	110g

4.0 Battery Appearance:



BOM of Main Components			
No.	Component	Specification	Unit
1	Cell	Samsung INR18650-35E	2pcs
2	PCM	/	1pcs
3	Connector	Molex 3pin connector: 0050375033 UL1007-24AWG (RED/WHITE/BLACK) Wire Length 150±5mm	1pcs connector 3pcs wires
4	PVC Blue PVC	T:0.1mm*pitch circle diameter:32mm	1pcs

5.0 battery performance

5.1 electric characteristics

No	Item	Standard	Test method
1	Discharge characteristics	0.2C ≥ 100 1C ≥ 95	a) After standard charged, rest for 30min and then discharge at 0.2C and 1C to the end-off discharge voltage respectively. b) Capacity (Ah) can be calculated by Discharging current and discharging time and expressed as the percentage of nominal capacity. (Cycled by 3 times, when one of the three reaches the standard, it will meet the standard.)
2	Normal Storage Performance	Residual capacity≥ nominal capacity*80% Recovery capacity≥ nominal capacity*90%	Stored for 28 days after standard charge, discharge at 0.2C to the end-off discharge voltage, then test the residual capacity. Test the recovery capacity at 0.2C, if one of the three cycles can reach the standard, it represents the battery has reached the standard.
3	Cycle life	capacity≥ nominal capacity *80%	Conduct 0.2C charge/0.2C discharge for 300 continuous cycles, and then test capacity.

5.2 Mechanical characteristics

NO	Item	Standard	Test method
1	Vibration	The battery shall not rupture, smoke, catch fire, vent or leak and voltage of each cell should not be lower than 3.0V.	After standard charge, fixed the cell in vibration table and subjected to vibration cycling that the frequency is at the rate of 1Hz per minute between 10Hz~ 55Hz, the excursion of the vibration is 1.6mm. The cell shall be vibrated for 30 minutes per axis of XYZ axes. The change of vibration frequency is 1Hz per minute.
2	Impacting Testing		After vibration, the battery will be impacted 1000±10 times (60±20 times per minute) with the acceleration of 100m/s2 and the pulse lasting time is 16ms.

5.3 safety characteristics

NO	Item	Standard	Test method
1	Overcharge Performance	No fire, No explosion	After standard charge, charge at 3C till the voltage of each battery reaches 5.0V, then observe the appearance of the battery.
2	Over Discharge Performance		After Standard charge, then discharge with 0.2Cto 2.0V/cell, and then keeps on discharging for 24h loaded with 30Ω.

No	Item	Standard	Test method
3	Short Circuit at Room Temperature	No fire, No explosion	After standard charge let the battery be located in a fume hood and short-circuited by connecting the positive and negative terminals with an external load of less than 50mΩ till the battery case temperature has returned to near ambient temperature.

5.4 Adaptation to Environment Characteristic

NO	Item	Standard	Test method
1	Low and high temperature testing	60% at -10℃ 100% at 20℃ 96% at 55℃	Measure capacity with constant discharge current 0.2C to each cell 2.0V cut-off at each temperature after standard charge at 25℃, Percentage as an index of the capacity compared with 100% at 25℃
2	Constant humidity temperature	Recovery capacity ≥ 85%	After Standard Charge, keep the battery at 20±5℃ for 28days 0.2C to 2.0V.

Note: The definitions of some nomenclatures of this specification

(1) Standard charge: 0.2C charge at 20℃±5℃ to the limit voltage, then change to charge with constant voltage till the current less than or equal to 0.02C

(2) Residual Capacity: The first discharge capacity after being tested by the specific procedure.

(3) Standard cycle: charge at 0.2C then rest for 60min, discharge at 0.2C to the cut-off voltage.

(4) Recovery Capacity: The discharge capacity by implementing charge-discharge cycle repeatedly after being tested by the specific procedure.

(5) All batteries tested above are within a month after delivery unless there are other regulations.

6.0 Standard environmental test condition

Unless otherwise specified, all tests stated in this Product Specification are conducted at below conditions:

Temperature: 20±5℃

Humidity: 25-85 RH

7.0 Battery Required Protection Functions

To insure the safety, charger and the protection circuit should be satisfied the items below. Please use safety device with the temperature fuse at the same time. The standard charge method is CC/CV (constant current/constant voltage)

7.1 Charge Protection

Name	Item	Value	Range	Unit
Over-voltage/single cell	OV	4.25	±0.025	V
	Charge Recovery	4.05	±0.05	V
	Delay Time	0.7-1.3	——	S

7.2 Discharge Protection

Name	Item	Value	Range	Unit
Discharge current/single cell	Continuous Discharge current	≤ 4	——	A

Name	Item	Value	Range	Unit
Over-voltage/ single cell	Over-discharge Voltage	2.80	±0.05	V
	Discharge Recovery	3.0	±0.10	V
	Delay Time	89-167	——	mS
Over Current	OC	6-12	——	A
	OC Delay Time	8-16	——	mS
Short Circuit	SC	External short circuit	/	A
	Delay Time	150-500	——	us
	Recovery Condition	Cut off load		

8.0 Use of Battery

（1）Before using it, you should read the battery and charger specification carefully to prevent the risk caused by battery and charger.

（2）Battery used as storage power should be matched with controller or related equipment. Because the battery pack is matched with protection board, you cannot drive the pure inductance equipment (applied equipment or testing equipment) otherwise you could damage the whole system.

9.0 Battery charging

When charging the battery, please use specified chargers.

The output of the charger must meet the parameter requirement of the battery pack.

10.0 Storage and Others

Storage battery environment: press 3.0 Battery Pack specifications--Storage Temperature and humidity requirements. The charge is maintained every 6 months during storage, and the storage voltage is 3.7-3.8V.

11.0 Warranty period & Product Liability

(1) The guarantee period is valid for 1 years from the date of manufacture (spurt / mark)

(2) NuEnergy Storage Technologies is not responsible for the incident caused by not obeying the specifications.

(3) When the revision of this specification is updated, NuEnergy Storage Technologies are not subject to further notice

12.0 Cautions in using battery.

(1) When the voltage between the two electrodes is over 36V, the safe voltage of human beings, you should not touch them with your body.

(2) Do not immerse the battery in water or seawater and keep the battery in a cool dry surrounding if it stands by.

(3) Do not use or leave the battery near a heat source as fire or heater

(4) Do not discard the battery in fire or a heater.

(5) Use the battery charger specifically for that purpose when recharging.

(6) Do not reverse the positive and negative terminals when using.

(7) Do not connect the battery electrodes to an electrical outlet.

(8) Do not short-circuit the battery by directly connecting the positive and negative terminals with metal objects.

(9) Do not transport or store the battery together with metal objects such as hairpins, necklaces, etc.

(10) Do not strike, trample or throw the battery.

(11) Do not directly solder the battery and pierce the battery with a nail or other sharp objects.

(12) Do not use or leave the battery at high temperature (for example, at strong direct sunlight or in a vehicle in extremely hot weather). Otherwise, it can overheat or fire or its performance will be degenerate, and its service life will be decreased

(13) Do not use the battery in a location where static electricity and magnetic field is great, otherwise, the safety devices may be damaged, causing hidden trouble of safety.

(14) If the battery leaks and the electrolyte get into the eyes, do not rub the eyes, instead, rinse the eyes with clean water, and immediately seek medical attention. Otherwise, it may injure eyes.

(15) If the battery gives off strange odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or battery charger and stop using it.

(16) In case the battery terminals are dirty, clean the terminals with a dry cloth before use. Otherwise poor performance may occur due to the poor connection with the instrument.

(17) Be aware discarded batteries may cause fire or explosion; tape the battery terminals to insulate them

(18) Batteries should be placed away from children to prevent children from touching batteries

13.0 Free-responsibility declaration

Before using the battery, you should read the specifications, usage instruction and some attentions carefully to learn its application method and areas. If the phenomenon such as error using method or wrong circuit connection or input power data, working index are in consisted with the specifications happen and cause damage to production, circuit and its accessories, we are not responsible for it.

Matters not mentioned in the specification shall be determined by mutual agreement

The final explanation right belongs to NuEnergy Storage Technologies.