Shenzhen Atess Power Technology Co.ltd

Address: 1st floor of building 3 at sector B and 3rd floor of building 9, Henglong industrial park, Shuitian, Baoan District, Shenzhen, China

Power battery reliability test report

Identification model: 27135250 / 100Ah

The purpose of the experiment: To test the full performance of this Battery

Testing department: Testing Center

Test date: 2019-03-01

Inspectors	Review	Ratify
Zhang Qiang	Wu Zongman	Yan Yaqin

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Report summary

battery model	GSP27135250	Rated capacity (Ah)	100	Voltage (V)	/
Internal resistance (mΩ)	/	Appearance size (mm)		28.5mm*136 mm *250mm	
Test items	Test content	Number of batteries	result		determination
1	■Room discharge capacity	1 # -10 #	Room temperature discharge capacity / rated capacity between 100.27-102.76%		qualified
2	■High temperature discharge performance	1 # -2 #	High-temperature discharge capacity / initial capacity between 98.76-99.58%		qualified
3	■Low-temperature discharge performance	1 # -2 #	Low-temperature discharge capacity / initial capacity at 83.56-85.16%		qualified
4	■60 ℃ for 7 days	3 # -6 #	Capacity retention rate is 93.95-94.62% Capacity recovery rate is 98.46-99.39% Thickness swelling at 0.07 - 0.60 %		qualified
5	■Charging and capacity recovery at room temperature	7 # -10 #	Capacity retention rate is 93.82-95.02% Capacity recovery rate is 98.58-99.61% Thickness expansion rate is 0.15-0.26 %		qualified
6	■Room temperature cycle life	11 #	11 # Cycle 2000th week retention rate 82.54%		qualified
7	■Low temperature charge and discharge	13 # -20 #	-5 ℃ discharge capacity / initial capacity at 85.67-86.51 % -10 ℃ discharge capacity / initial capacity at 80.92-81.25 % -15 ° C discharge capacity / initial capacity at 73.98-75.55 % -20 ℃ discharge capacity / initial capacity at 65.83-67.25 % -5 ℃ discharge recovery rate is		qualified

			99.07-99.61 % -10 ℃ discharge recovery rate is 99.59-99.83 % -15 ℃ discharge recovery rate is 99.34-99.73 % -20 ℃ discharge recovery rate is 99.05-99.36 %	
8	■Overdischarge	21 # -22 #	No explosion , no fire	qualified
9	■Overcharge	23 # -24 #	No explosion , no fire	qualified
10	■Short circuit	25 # -26 #	No explosion , no fire	qualified
11	■Drop	27 # -28 #	No explosion, no fire, no leakage	qualified
12	■Heating	29 # -30 #	No explosion , no fire	qualified
13	■Extrusion	31 # -32 #	No explosion , no fire	qualified
14	■Acupuncture	33 # -34 #	No explosion , no fire	qualified
15	■Sea water immersion	35 # -36 #	No explosion , no fire	qualified

Room temperature discharge capacity

Model / Specification	GSP27135250 / 100Ah	**Testing department**	test Center
type of battery	Li-ion 3.2V	**Edition**	A / 6
Test date	2019-03-09	**Production date**	2019-03-12

Test Conditions:

Test equipment: charge and discharge test cabinet

Test environment: (25 ± 5) ℃, humidity 60 ± 20 %, normal atmospheric pressure environment (86 ~ 106Kp a)

Test steps:

① At room temperature , the battery is discharged to a constant current of $1I_1(A)$ to 2.5 V , left to stand for 30 minutes, charged at a constant current of $1I_1(A)$ to 3.65 V , and charged at a constant voltage to $0.05I_1(A)$,Let stand for 30min after charging;

② The battery is discharged to 2.5V at a constant current of $1I_1(A)$ and left for 30 minutes;

③ The charge is cut off when charging from $1I_1(A)$ constant current to 3.65V to constant voltage charging to $0.05I_1(A)$, and let stand for 30 minutes after charging;

④ ② ~ ③ Cycle 3 times .

Technical requirements: The discharge capacity should not be lower than the rated capacity, and it should not exceed 110% of the rated capacity.

Test process data:

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Numbering	Rated capacity (Ah)	Discharge capacity in the first week (Ah)	1st week discharge capacity / rated capacity (%)	2nd week discharge capacity (Ah)	2nd week discharge capacity / rated capacity (%)	Week 3 discharge capacity (Ah)	Week 3 discharge capacity / rated capacity (%)
1#	100	102.757	102.76%	102.304	102.30%	102.145	102.15%
2#	100	102.251	102.25%	101.839	101.84%	101.672	101.67%
3 #	100	102.308	102.31%	101.855	101.85%	101.695	101.69%
4 #	100	100.265	100.27%	100.580	100.58%	101.280	101.28%
5 #	100	101.548	101.55%	101.411	101.41%	100.557	100.56%
6 #	100	101.971	101.97%	101.637	101.64%	101.363	101.36%
7 #	100	102.243	102.24%	101.921	101.92%	101.636	101.64%
8#	100	102.673	102.67%	102.368	102.37%	102.061	102.06%
9#	100	102.476	102.48%	102.152	102.15%	101.853	101.85%
10 #	100	102.477	102.48%	102.155	102.15%	101.848	101.85%

Test Results:

Serial number	Check item	situation	Note
1	Battery appearance	√	No deformation, no burst , qualified!
2	battery capacity	√	The room temperature discharge capacity / rated capacity is between 100.27-102.76% , which is judged to be qualified!

High-temperature discharge performance

Model / Specification	GSP27135250 / 100Ah	Testing department	test Center
type of battery	Li-ion 3. 2 V	Edition	A / 6
Test date	2019-03-14	Production date	2019-03-16

Test Conditions:

Test equipment: charge and discharge test cabinet, constant temperature and humidity box

Test environment: (25 ± 5) ℃, humidity 60 ± 20 %, normal atmospheric pressure environment (86 ~ 106Kp a)

Test steps:

① Take the battery after the room temperature discharge capacity test for 1h;

② Store for 5 hours at 55 ℃ ± 2 ℃ ;

③ at 55 ℃ ± 2 ℃ to 1I1(A) constant current discharge to 2.5V; recording temperature discharge capacity (in Ah meter) ; Technical requirements: The discharge capacity is not less than 90 % of the initial capacity .
Test process data:

Numbering	Initial capacity (Ah)	High temperature discharge capacity (Ah)	High-temperature discharge capacity / initial capacity
1#	102.757	102.325	99.58%
2#	102.251	100.983	98.76%

Test Results:

Serial number	Check item	situation	Note
1	battery capacity	√	The high-temperature discharge capacity / initial capacity is 98.76-99.58% , which is judged to be qualified!

Low-temperature discharge performance

Model / Specification	GSP27135250 / 100Ah	Testing department	test Center
type of battery	Li-ion 3.2V	Edition	A / 6
Test date	2019-03-14	Production date	2019-03-16

Test Conditions:

Test equipment: charge and discharge test cabinet, constant temperature and humidity box

Test environment: (25 ± 5) ℃, humidity 60 ± 20 %, normal atmospheric pressure environment (86 ~ 106Kp a)

Test steps:

① Take the battery after the room temperature discharge capacity test for 1h;

② Store at low temperature of -20 ℃ ± 2 ℃ for 24 h;

③ In the environment of -20 ℃ ± 2 ℃ , the battery is discharged at a constant current of 1I1(A) to 2.0 V, and the low-temperature discharge capacity (in Ah) is recorded;

Technical requirements: The discharge capacity is not less than 70 % of the initial capacity .

Test process data:

Numbering	Initial capacity (Ah)	Low-temperature discharge capacity (Ah)	Low-temperature discharge capacity / initial capacity
1#	102.757	85.853	83.55%

2#	102.251	87.077	85.16%

Test Results:

Serial number	Check item	situation	Note
1	battery capacity	√	The low-temperature discharge capacity / initial capacity is 83.56-85.16%, which is judged to be qualified!

60℃ for 7 days

Model / Specification	GSP27135250 / 100Ah	**Testing department**	test Center
type of battery	Li-ion 3.2V	**Edition**	A / 6
Test date	2019-03-16	**Production date**	2019-03-26

Test Conditions:

Test equipment: charge and discharge test cabinet, constant temperature and humidity box

Test environment: (25 ± 5) ℃, humidity 65 ± 20 %, normal atmospheric pressure environment (86 ~ 106Kp a)

Test steps:

① Take the cell after the room temperature discharge capacity test and leave it for 1h, thickness;

② Store for 7 days under high temperature of 60 ℃

③ After recovery 5h at 25 ℃ ± 5 ℃, measured thickness, in $1I_1(A)$ constant current discharge to 2.5 V, and discharge the recording capacity (in Ah meter);

④ Charge with $1I_1(A)$ constant current to 3.65V and constant voltage charge to $0.05I_1(A)$, the charge will be cut off, and let stand for 30min after charging;

⑤ Discharge to 2.5 V wit $1I_1(A)$ constant current ;

⑥ ④ ~ ⑤ Cycle for 3 weeks and record the capacity of the last week;

Capacity retention rate = No. ③ discharge capacity / initial capacity ; capacity recovery rate = No. ⑥ last week's discharge capacity / initial capacity

Thickness expansion ratio = (thickness after 7d-7th thickness before 7d)

Judging standard : Manganese-added system: apacity retention rate ≥ 90%

Non-manganese-based system: Capacity retention rate ≥ 93%

Capacity recovery rate ≥ 95% Capacity recovery rate ≥ 96% Thickness expansion rate ≤ 2%

Test process data record:

Numbering	Initial capacity (Ah)	The third discharge capacity (Ah)	Capacity retention rate	Discharge capacity in the last week (Ah)	Capacity recovery rate	thickness		Expansion rate %
						before	Rear	
3 #	102.308	96.804	94.62%	100.732	98.46%	27.88	27.91	0.11%

4 #	101.280	95.365	94.16%	100.511	99.24%	27.53	27.61	0.29%
5 #	101.548	95.404	93.95%	100.248	98.72%	27.6	27.62	0.07%
6 #	101.971	96.220	94.36%	101.348	99.39%	28.12	28.29	0.60%

Test Results:

Serial number	Check item	situation	Note
1	Capacity maintenance	√	The capacity retention rate is 93.95-94.62%, which is judged as passing!
2	Capacity recovery	√	The capacity recovery rate is 98.46-99.39% , which is judged to be qualified!
3	Thickness expansion	√	Thickness swelling at 0.07 - 0.60 % , determined qualified!

Ability to maintain and restore charge at room temperature

Model / Specification	GSP27135250 / 100Ah	**Testing department**	test Center
type of battery	Li-ion 3.2V	**Edition**	A / 6
Test date	2019-03-18	**Production date**	2019-04-16

Test Conditions:

Test equipment: charge and discharge test cabinet

Test environment: (25 ± 5) ℃, humidity 65 ± 20 %, normal atmospheric pressure environment (86 ~ 106Kp a)

Test steps:

① Take the cell after the room temperature discharge capacity test and leave it for 1h, and measure the thickness;

② Store it at 25 ℃ ± 5 ℃ for 28 days and measure the thickness ;

③ In . 1 the $1I_1(A)$ constant current discharge to 2.5 V , and record the discharge capacity (in Ah meter);

④ Charge with $1I_1(A)$ constant current to 3.65V and constant voltage charge to $0.05I_1(A)$, the charge will be cut off , and let stand for 30min after charging;

⑤ Discharge to 2.5 V with $1I_1(A)$ constant current ,

⑥ ④ ~ ⑤ Cycle for 3 weeks and record the capacity of the last week;

Capacity retention rate = No. ③ discharge capacity / initial capacity

Capacity recovery rate = discharge capacity in the last week of ⑥ / initial capacity

Thickness expansion ratio = (thickness after 28d-28th thickness before) / thickness 28d

Judging standard : Manganese-added system: Capacity retention rate ≥ 90%

Non-manganese-based system: Capacity retention rate ≥ 93%

Capacity recovery rate ≥ 95% Capacity recovery rate ≥ 96% Thickness expansion rate ≤ 2%

Test process data record:

Numbering	Initial capacity (Ah)	The third discharge capacity(Ah)	Charge retention rate	Discharge capacity in the last week (Ah)	Capacity recovery rate	thickness		Expansion rate%
						before	Rear	
7 #	102.243	96.292	94.18%	100.791	98.58%	27.18	27.22	0.15%
8#	102.673	96.893	94.37%	102.016	99.36%	27.36	27.40	0.15%
9#	102.476	96.143	93.82%	102.076	99.61%	27.20	27.25	0.18%
10 #	102.477	97.373	95.02%	101.135	98.69%	27.18	27.25	0.26%

Test Results:

Serial number	Check item	situation	Note
1	Capacity maintenance	√	The capacity retention rate is 93.82-95.02%, which is judged to be qualified!
2	Capacity recovery	√	The capacity recovery rate is 98.58-99.61% , which is judged to be qualified!
3	Thickness expansion	√	The thickness expansion rate is in the range of 0.15-0.26% .

Cycle temperature life

Model / Specification	GSP27135250F/100Ah	Testing department	test Center
type of battery	Li-ion 3.2V	Edition	A / 6
Test date	2019-04-02	Production date	2020-04-04

Test Conditions:

Test purpose: test battery cycle life

Test equipment: charge and discharge test cabinet

Test environment: (2 5 ± 5) ℃, humidity 60 ± 20 % RH , normal atmospheric pressure environment (86 ~ 106Kp a)

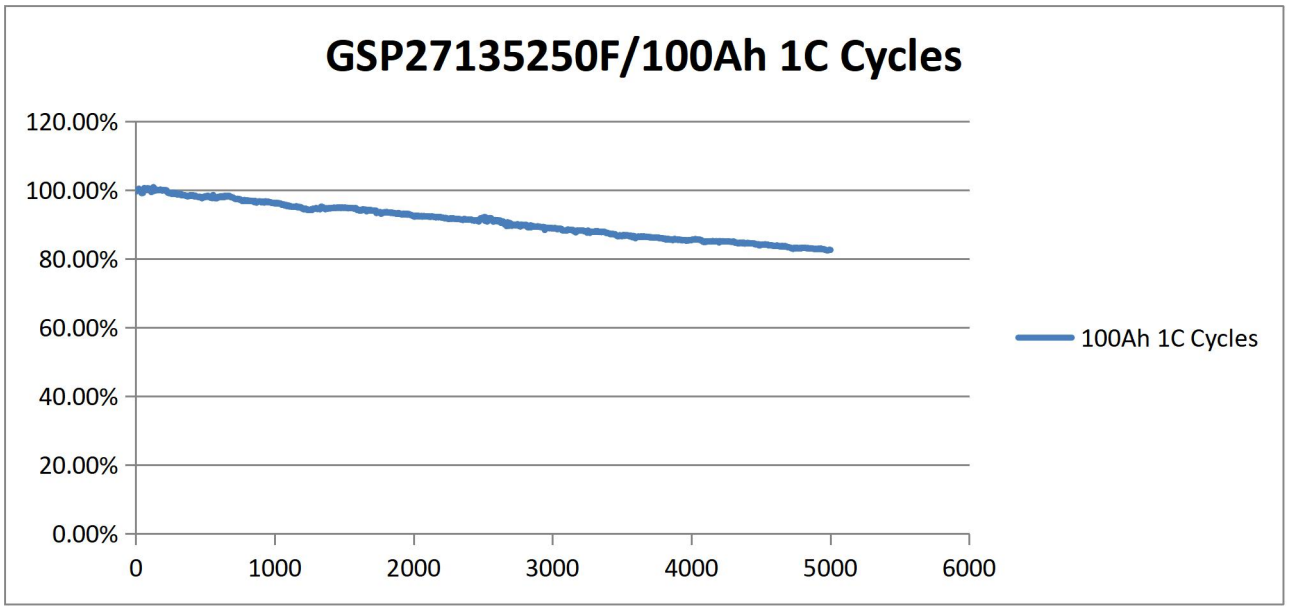
Test steps:

① Under the condition of 25 ℃ ± 5 ℃, the battery is discharged at a constant current of 100A to a termination voltage of 2.5V, left for 30 minutes, and then charged at a constant current of 100A to the charging limit

After the voltage is 3.65V, turn to constant voltage charging. When the current is less than or equal to 5A, the charging will be terminated. After charging, let it stand for 30min. The battery is charged and discharged cyclically according to the steps ①, and the test is terminated until the battery circulates 5000 weeks.

Technical requirements: the number of cycles 5000 weeks retention rate of ≥ 80%.

Cycle graph:



27135250F-100Ah-1C.xlsx

Low-temperature charge and discharge

Model / Specification	GSP27135250 / 100Ah	Testing department	test Center
type of battery	Li-ion 3.2V	Edition	A / 6
Test date	2019-04-10	Production date	2019-04-18

Test Conditions:

Test equipment: charge and discharge test cabinet , low temperature box

Test environment: (25 ± 5) ℃, humidity 65 ± 20 %, normal atmospheric pressure environment (86 ~ 106Kp a)

Test steps:

① At room temperature , when the battery is discharged at a constant current of $0.15I_1(A)$ to a termination voltage of 2.5 V, it is left for 30 minutes. After the constant current is charged to 3.65 V at $0.15I_1(A)$, it is charged to $0.05I_1(A)$ at a constant voltage . After the charge is stopped , leave it for 30 minutes, and discharge it to 2.5V with a constant current of $1I_1(A)$, and record the discharge capacity ;

② Put the battery in the environment of -5 ℃, -10 ℃, -15 ℃, and -20 ℃ for 4h;

③ In the environment of -5 ℃, -10 ℃, -15 ℃, and -20 ℃ , the charge is cut off when the constant current is charged to 3.65V with a current of $0.15I_1(A)$, and the voltage is changed to $0.05I_1(A)$ at a constant voltage. , put home for 30 min , to $1I_1(A)$ constant current discharge to 2. 0 V , the recording charge and discharge capacities.

④ Leave at room temperature for 16h, charge with $0.5I_1(A)$ constant current to 3.65V, turn to constant voltage and charge to $0.05I_1(A)$, then charge will stop, leave it for 30 minutes, and discharge with $0.15I_1(A)$ constant current to 2.5 V , record the discharge capacity.

Technical requirements: -5°C discharge capacity / initial capacity ≥85%;

-10°C discharge capacity / initial capacity ≥78%;

-15°C discharge capacity / initial capacity ≥70%;

-20°C discharge capacity / initial capacity ≥60%.

Recovery rate ≥99%

Test process data record:

Numbering		Initial capacity (Ah)	Constant current charging capacity(Ah)	Charging capacity (Ah)	Discharge capacity (Ah)	Constant current ratio (%)	Discharge capacity / initial capacity (%)	Normal temperature capacity (Ah)	Recovery rate%
-5 ℃	13#	100.953	94.805	100.504	87.335	94.33%	86.51%	100.014	99.07%
	14#	101.023	94.365	100.828	86.547	93.59%	85.67%	100.629	99.61%
-10 ℃	15#	101.304	93.809	101.317	82.309	92.59%	81.25%	100.889	99.59%
	16#	101.708	85.121	91.381	82.303	93.15%	80.92%	101.535	99.83%
-15 ℃	17#	102.060	80.573	87.220	77.107	92.38%	75.55%	101.784	99.73%
	18#	101.143	77.831	83.277	74.825	93.46%	73.98%	100.475	99.34%
-20 ℃	19#	101.764	63.149	69.895	68.436	90.35%	67.25%	101.113	99.36%
	20#	101.579	63.011	68.616	66.869	91.83%	65.83%	100.614	99.05%

Test Results:

Serial number	Check item	situation	Note
1	Discharge capacity/ initial capacity	√	-5℃ low temperature discharge capacity / initial capacity is 85.67-86.51 %; judged to be qualified! -10℃ discharge temperature discharge capacity / initial capacity at 80.92-81.25 %; determining eligibility! -15℃ discharge temperature discharge capacity / initial capacity at 73.98-75.55 %; determining eligibility! - 20℃ discharge temperature discharge capacity / initial capacity at 65.83-67.25 %; determining eligibility!
2	Recovery rate	√	The -5 ℃ discharge recovery rate is 99.07-99.61 %, which is judged to be qualified! The discharge recovery rate of -10 ℃ is 99.59-99.83 %, which is judged to be qualified! The discharge recovery rate at -15 ℃ is 99.34-99.73 %, which is judged to be qualified! The discharge recovery rate at -20 ℃ is 99.05-99.36 %, which is judged to

			be qualified!

Over-discharge power

Model / Specification	GSP27135250 / 100Ah	**Testing department**	test Center
type of battery	Li-ion 3.2V	**Edition**	A / 6
Test date	2019-04-11	**Production date**	2019-04-12

Test Conditions:

Test equipment: charge and discharge test cabinet

Test environment: (25 ± 5) ℃, humidity 60 ± 20 %, normal atmospheric pressure environment (86 ~ 106Kpa)

: Test step rt under , batteries $1I_1(A)$ discharging constant current to 2.5V, standing 30min, to $1I_1(A)$ constant current charging to 3.65V revolutions constant voltage charging to $0.05I_1(A)$ when Charging ends, and stand for 60 minutes after charging ;

① Record the voltage and internal resistance of the battery before the test

② Discharge with $1I_1(A)$ constant current for 90 min:

③After the test, observe for 1h

Technical requirements: No fire, no explosion , no leakage .

Test Data:

Numbering	**Voltage (v)**	**Internal resistance (mΩ)**	**phenomenon**	**Note**
twenty one#	3.377	0.65	No fire, no explosion , no leakage	qualified
twenty two#	3.358	0.50	No fire, no explosion , no leakage	qualified

Test Results:

Serial number	Check item	situation	Note
1	Safety performance	√	The battery does not ignite, does not explode , does not leak , and is qualified!

Over-charging electric

Model / Specification	GSP27135250 / 100Ah	**Testing department**	test Center

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type of battery	Li-ion 3.2V	Edition	A / 6
Test date	2019-04-11	Production date	2019-04-12

Test Conditions:

Test equipment: charge and discharge test cabinet, explosion-proof box

Test environment: (25 ± 5) ℃, humidity 60 ± 20 %, normal atmospheric pressure environment (86 ~ 106Kpa)

: Test step rt under , batteries $1I_1(A)$ discharging constant current to 2.5 V, left to stand 30min, to $1I_1(A)$ constant current charging to 3.65V revolutions constant voltage charging to $0.05I_1(A)$ when Charging ends, and stand for 60 minutes after charging ;

① Record the voltage and internal resistance of the battery before the test

② Charging with $1I_1(A)$ constant current until the voltage reaches 1.5 times the charging termination voltage (5.5 V) specified in the technical conditions or the charging time stops after 1 h

③ After the test, continue to observe the battery for 1h at room temperature.

Technical requirements: The battery does not fire and does not explode.

Test Data:

Numbering	Voltage (v)	Internal resistance (mΩ)	The highest temperature (℃)	phenomenon	Note
twenty three#	3.372	0.55	53	No fire, no explosion	qualified
twenty four#	3.300	0.51	51	No fire, no explosion	qualified

Test Results:

Serial number	Check item	situation	Note
1	Safety performance	√	Battery not fire, not an explosion , for determining eligibility!

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Short road

Model / Specification	GSP27135250 / 100Ah	**Testing department**	test Center
type of battery	Li-ion 3.2V	**Edition**	A / 6
Test date	2019-04-11	**Production date**	2019-04-12

Test Conditions:

Test equipment: charge and discharge test cabinet, air switch, explosion-proof box

Test environment: (25 ± 5) ℃, humidity 60 ± 20 %, normal atmospheric pressure environment (86 ~ 106Kpa)

: Test step rt under , batteries $1I_1(A)$ discharging constant current to 2.5V, standing 30min, to $1I_1(A)$ constant current charging to 3.65V revolutions constant voltage charging to $0.05I_1(A)$ when Charging ends, and stand for 60 minutes after charging ;

① Record the voltage and internal resistance of the battery before the test

② Short circuit the positive and negative electrodes of the cell for 10 minutes, and the external line resistance should be less than 5mΩ;

③ Record the battery phenomenon and collect temperature changes during the test;

④ After the test, observe for 1h.

Technical requirements: The battery does not fire and does not explode.

Test Data:

Numbering	**Voltage (v)**	**Internal resistance (mΩ)**	**The highest temperature (℃)**	**phenomenon**	**Note**
25 #	3.367	0.51	85.6	No fire, no explosion	qualified
26 #	3.356	0.58	83.9	No fire, no explosion	qualified

Test Results:

Serial number	Check item	situation	Note
1	Safety performance	√	Battery not fire, not an explosion , for determining eligibility!

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Fall down

Model / Specification	GSP27135250 / 100Ah	**Testing department**	test Center
type of battery	Li-ion 3.2V	**Edition**	A / 6
Test date	2019-04-11	**Production date**	2019-04-12

Test Conditions:

Test equipment: charge and discharge test cabinet, drop equipment

Test environment: (25 ± 5) ℃, humidity 60 ± 20 %, normal atmospheric pressure environment (86 ~ 106Kpa)

: Test step rt under , batteries $1I_1(A)$ discharging constant current to 2.5V, standing 30min, to $1I_1(A)$ constant current charging to 3.65V revolutions constant voltage charging to $0.05I_1(A)$ when Charging ends, and stand for 60 minutes after charging ;

① Record the voltage and internal resistance of the battery before the test

② Freely drop the positive and negative terminals of the battery from a height of 1.5m to the horizontal concrete floor ;

③ After the test, observe for 1h.

Technical requirements: The battery does not fire and does not explode.

Test Data:

Numbering	**Voltage (v)**	**Internal resistance (mΩ)**	**phenomenon**	**Note**
27 #	3.354	0.62	No fire, no explosion	qualified
28 #	3.336	0.61	No fire, no explosion	qualified

Test Results:

Serial number	Check item	situation	Note
1	Safety performance	√	Battery not fire, not an explosion , for determining eligibility!

Heat up

Model / Specification	GSP27135250 / 100Ah	**Testing department**	test Center
type of battery	Li-ion 3.2V	**Edition**	A / 6
Test date	2019-04-11	**Production date**	2019-04-12

Test Conditions:

Test equipment: charge and discharge test cabinet , high temperature box

Test environment: (25 ± 5) ℃, humidity 60 ± 20 %, normal atmospheric pressure environment (86 ~ 106Kpa)

: Test step rt under , batteries $1I_1(A)$ discharging constant current to 2.5 V, left to stand 30min, to $1I_1(A)$ constant current charging to 3.65V revolutions constant voltage charging to $0.05I_1(A)$ when charging ends, and stand for 60 minutes after charging ;

① Record the voltage and internal resistance of the battery before the test .

② the battery into an oven, at a rate of 5 ℃ ± 2 ℃ / min in an oven heated to 130℃, and maintaining this temperature for 30min until the end of the test,

③ After the test, observe for 1h.

Technical requirements: The battery does not explode and does not catch fire.

Test process data record:

Numbering	**Voltage(V)**	**Internal resistance(mΩ)**	**Experimental phenomena**	**Note**
29 #	3.368	0.58	No explosion, no fire	qualified
30 #	3.361	0.58	No explosion, no fire	qualified

Test Results:

Serial number	Check item	situation	Note
1	Safety performance	√	Battery no explosion, no fire, determining eligibility!

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Squeeze pressure

Model / Specification	GSP27135250 / 100Ah	**Testing department**	test Center
type of battery	Li-ion 3.2V	**Edition**	A / 6
Test date	2019-04-11	**Production date**	2019-04-12

Test Conditions:

Test equipment: squeeze tester, charge and discharge test cabinet

Test environment: (25 ± 5) ℃, humidity 60 ± 20 %, normal atmospheric pressure environment (86 ~ 106Kpa)

Test Procedure: rt under , batteries $1I_1(A)$ discharging constant current to 2.5 V, left to stand 30min, to $1I_1(A)$ constant current charging to 3.65V revolutions constant voltage charging to $0.05I_1(A)$

When the charging ends, leave it for 60 minutes after charging ;

① Record the voltage and internal resistance of the battery before the test

② Squeeze direction: apply pressure (plane) perpendicular to the battery plate

③Squeeze plate form: a semi-cylindrical body with a radius of 75mm , the length (L) of the semi-cylindrical body is greater than the size of the battery being squeezed;

④Squeeze speed: (5 ± 1) mm / s;

⑤ Squeeze degree: stop pressing after voltage reaches 0V or deformation reaches 30% or squeeze force reaches 200kN

⑥ After the test, observe for 1h.

Technical requirements: The battery does not explode and does not catch fire .

Test process data record:

Numbering	**Voltage(V)**	**Internal resistance(mΩ)**	**Experimental phenomena**	**Note**
31 #	3.366	0.61	No explosion, no fire	qualified
32 #	3.300	0.69	No explosion, no fire	qualified

Test Results:

Serial number	Check item	situation	Note
1	Safety performance	√	Battery no explosion, no fire , determining eligibility!

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Address: 1st floor of building 3 at sector B and 3rd floor of building 9, Henglong industrial park, Shuitian, Baoan District, Shenzhen, China

Needle prick

Model / Specification	GSP27135250 / 100Ah	**Testing department**	test Center
type of battery	Li-ion 3.2V	**Edition**	A / 6
Test date	2019-04-11	**Production date**	2019-04-12

Test Conditions:

Test equipment: Needle tester, charge and discharge test cabinet

Test environment: (25 ± 5) ℃, humidity 60 ± 20 %, normal atmospheric pressure environment (86 ~ 106Kpa)

: Test step rt under , batteries $1I_1(A)$ discharging constant current to 2.5 V, left to stand 30min, to $1I_1(A)$ constant current charging to 3.65V revolutions constant voltage charging to $0.05I_1(A)$ when Charging ends, and stand for 60 minutes after charging ;

① Record the voltage and internal resistance of the battery before the test

② Use high-temperature-resistant steel needles with a diameter of 5mm to 8mm (the angle of the needle tip is 45-60 °, and the surface of the needle is smooth, free of rust, oxidation, and oil).

(25 ± . 5 mm / S is velocity, from the vertical to the battery electrode plate through direction ;

③ After the test, observe for 1h.

Technical requirements: The battery does not explode and does not catch fire.

Test process data record:

Numbering	**Voltage(V)**	**Internal resistance (mΩ)**	**phenomenon**	**Note**
33 #	3.364	0.60	No explosion , no fire	qualified
34 #	3.366	0.62	No explosion , no fire	qualified

Test Results:

Serial number	Check item	situation	Note
1	Safety performance	√	The battery is not explosion , no fire , determining eligibility!

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Seawater immersion

Model / Specification	GSP27135250 / 100Ah	**Testing department**	test Center
type of battery	Li-ion 3.2V	**Edition**	A / 6
Test date	2019-04-11	**Production date**	2019-04-12

Test Conditions:

Test equipment: charge and discharge test cabinet, salt water

Test environment: (25 ± 5) ℃, humidity 60 ± 20 %, normal atmospheric pressure environment (86 ~ 106Kpa)

: Test step rt under , batteries $1I_1(A)$ discharging constant current to 2.5V, standing 30min, to $1I_1(A)$ constant current charging to constant voltage charging 3.65V transferred to $0.05I_1(A)$ when Charging ends, and stand for 60 minutes after charging ;

① Record the voltage and internal resistance of the battery before the test

② The battery dipped into 3.5% NaCI solution (mass fraction of simulated seawater composition at room temperature) of 2H , depth should not completely through the cell;

③ After the test, observe for 1h.

Technical requirements: The battery does not explode and does not catch fire.

Test process data record:

Numbering	**Voltage (V)**	**Internal resistance(mΩ)**	**phenomenon**	**Note**
35 #	3.351	0.60	No explosion , no fire	qualified
36 #	3.364	0.62	No explosion , no fire	qualified

Test Results:

Serial number	Check item	situation	Note
1	Safety performance	√	The battery is not explosion , no fire , determining eligibility!