

SPECIFICATION FOR APPROVAL

Customer Name :
NETGEAR INC.

Model Name :
NW-1

Model P/N :
Customer P/N:
308-10106-01

Celxpert P/N :
924900140

[ACCEPTANCE]

Accepted by: _____
Date: _____

CELXPERT ENERGY CORPORATION

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技術文件制/修訂履歷表

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1. Scope

Specifications described in sections apply to the Li-Polymer Rechargeable batteries supplied by Celxpert Energy Corporation. The battery described in these specifications is the battery pack, which consists of unit cells manufactured by Highpower.

2. Battery Pack Specification

Applied Product Name	Rechargeable Li-Polymer Battery Pack
Cell Type	Highpower 545974
Cell Configuration	I series I parallel (I S I P)
BMU Solution	R5486K514CM

3. Rating

No	Item		Specification	Remarks
1	Normal Capacity		3950 mAh	0.7C(2.695A) charge CC-CV to 4.4V, 0.05C(192mA) cut off 0.2C(0.77A) discharge to 3.0V @25±2°C (*3)
2	Minimal Capacity		3850 mAh	
3	Nominal Voltage		3.85V	
4	Charge Voltage		4.40V	
5	Maximum Charge Current		3.0A	Temperature: 15°C~45°C
6	Maximum Discharge Current		3.0A	Temperature: 10°C~60°C
7	End of Discharging Voltage		3.0V	
8	Internal Impedance		≤ 105 mΩ	Measure internal impedance by 1KHz
9	Cell Surface Temperature For Charge and Discharge condition	Charge	0°C ~ 10°C	0.2C(0.77A) CC-CV to 4.4V, 0.05C(192mA) cut off
			10°C ~ 15°C	0.5C(1.925A) CC-CV to 4.4V, 0.05C(192mA) cut off
			15°C ~ 45°C	0.7C(2.695A) CC-CV to 4.4V, 0.05C(192mA) cut off 3A CC-CV to 4.2V, 0.7C(2.695A) CC to 4.4V, 0.05C(192mA) cut off
			45°C ~ 60°C	0.5C(1.925A) CC-CV to 4.1V, 0.05C(192mA) cut off
		Discharge	-20°C ~ 10°C	0.35C(1.347A) to 3.0V
			10°C ~ 60°C	Max 3.0A to 3.0V
10	Storage Ambient Temperature	≤1 month	-20°C ~ 60°C	The cell should cycle once every 3 months. Recommended storage temperature is 25±2°C of SOC 30%. Storage Humidity: ≤ 85% RH. (*1)
		≤3 months	-20°C ~ 45°C	
		≤1 year	-20°C ~ 30°C	
11	Shipping Voltage		3.73~3.80V	≤ 30% SOC. (*2)
12	Current Consumption		≤ 9uA	Normal Mode
			≤ 1uA	Standby Mode
13	Weight		59 ± 5g	
14	Rated Energy		14.82 Wh	

(*1) Capacity recovery rate : [Remaining capacity / 0.2C min] X 100%

Remaining capacity: cells shall be discharged with Std, discharge condition(4.1.5), and then cells shall be charged with std. charge condition(4.1.4), and then discharged with Std. condition(4.1.5).

This Charge/discharge cycle shall be repeated three times to measure the recovery capacity ≤ 50uA

(*2) The shipping voltage detection specification is only grant 4 weeks warranty after manufacture date.

(*3) Such standards only apply to fresh products that have not been used within 30 days after cell vendor manufacture.

Products used or stored for more than 30 days may show numerical parameters below such standards.

4. Performance and Characteristics

4.1 Temperature and Humidity

Unless otherwise specified, the measurement is executed at a temperature of $25 \pm 2^{\circ}\text{C}$ and at a relative humidity of $\leq 85\%\text{RH}$. Atmospheric Pressure: 86~106KPa.

4.1.2 Initial Test

Initial test is started within 7 days after delivery.

4.1.3 Measuring Instruments and Devices

- (1) Dimension measurement is carried out using a caliper whose measuring range is from 0 mm to 300 mm and the precision is 1/20 mm,
- (2) Voltage measurement is carried out using a DC voltmeter, which can measure from 0 V to 20 V.
- (3) The precision of the voltmeter is $\pm 1\text{mV}$ and input impedance is more than 10Mn
- (4) Discharge is carried out using electronic load equipment.

The precision of the current is $\pm 0.5\%$.

- (5) Impedance is carried out using an AC m Ω meter with 4 terminals at 1kHz.

4.1.4 Standard Charge

Standard charge means 0.7C (2.695A) CC charge to 4.4V, then CV charge till charge current deadline to 0.05C (192mA)

4.1.5 Standard Discharge

Standard discharge means 0.2C (0.77A) down to 3.0V.

4.2 Electric Characteristics

4.2.1 Initial Capacity

After standard charge, within 1 hour, the duration time of standard discharge is measured and the capacity more than 3850mAh.

4.2.2 Cycle Life

At item 4.1 condition, Charge current 0.5C(1.925A) CC-CV to 4.4V, 0.05C(192mA) cut off. Discharge current 0.5C(1.925A) to 3.0V cut off, Rest for 10 minutes between each charge and discharge step, 500 Cycles $\geq 65\%$ of the min capacity.

4.3 Safety Performance

4.3.1 Terminal short circuit

After fully charged connect positive and negative terminal with a copper wire of resistance less than 100m Ohm, No explode, No fire.

4.3.2 Overcharge

After fully charged, continuously charge by constant current 1.925A and constant voltage of 6V for 24hours. No explode, No fire

4.3.3 Reverse charge test

Apply 6V/1.925A current with reverse polarity for 2.5 hour at fully charged state. No explode, No fire.

4.3.4 ESD Test

Contact discharge $\pm 8\text{KV}$, Air discharge $\pm 15\text{KV}$. No damage to protection circuit after subjected to ESD test.

5. Protection Board

Built-in control circuit of BMU (Battery Management Unit) for safety (Ta= 25°C)

No	Function	Type	Action	Unit
1	Cell Over-voltage protection	Threshold	4450 ± 25	mV
		Delay Time	0.5 ~ 1.5	Sec
2	Cell Under voltage protection	Threshold	2600 ± 40	mV
		Delay Time	10 ~ 35	mSec
3	Over charge current protection	Threshold	3.36 ~ 5.9	A
		Delay Time	10 ~ 30	mSec
4	Over discharge current protection	Threshold	4.8 ~ 7.5	A
		Delay Time	5 ~ 20	mSec
5	Short protection	Current	13.5 ~ 34	A
		Delay Time	150 ~ 500	µSec

6. Terminal Specifications

Name	Function	Remark
P+	Battery Positive Power	
TH	Measure Battery Temperature	Thermistor (100KΩ ±1% at 25°C) B value 4250K (25/50)
ID	ID Resistor	Connect 36KΩ ±1% to GND
P-	Battery Negative power	

7. Handling Instructions

The following hazard alert signals and words must appear in manuals and / or instructions for users. Especially is at the point of use.

HANDLING INSTRUCTIONS

FOR

LITHIUM ION RECHARGEABLE BATTERY

Please read and follow the handling instructions for the battery before use.

Improper use of the battery may cause heat, fire explosion, damaged or capacity deterioration of the battery.



WARNING

01. Keep the battery and equipment out of reach of infants/children or pets so that they are not able to swallow or mistreat the battery by mistake. In case of ingestion, seek medical advice immediately.
02. Do not let leaked electrolyte come into contact with eyes or skin
In such a case, immediately flush the contact area with plenty of water and seek help from a doctor.
03. Do not throw the battery into a fire. Do not use or leave it in a place near fire, heaters, or high temperature sources.
In such a case, the insulator in the battery may be melted, the safety vent and structure may be damaged, or the electrolyte may catch fire, all of which may cause heat generation, explosion, or fire.
04. Do not submerge the battery in water, or wet the battery.
If the protecting device assembled in the battery is damaged, the battery may be charged with an abnormal current and voltage and may cause an abnormal chemical reaction within the battery, which may result in the cause of heat generation, explosion, or fire of the battery.
05. Do not use any battery charger not specified by end product, also follow the charge conditions specified by end product.
If the battery is charged under other conditions (a high temperature, a high voltage/current, or an altered charger) not specified by the end product, the battery may become over-charged with an excessive current and cause heat, explosion, or fire with abnormal chemical reactions.
06. Do not use, charge, or leave the battery near fire or in a car under the blazing sun
Such a high temperature may cause damage of the protecting device in the battery, which may result in an abnormal reaction, and then heat generation, explosion, or fire.
07. Do not connect the battery reversed in positive (+) and negative (-) terminals in the charger or equipment
In case the battery is connected and charged reversely, it may cause heat generation, explosion, or fire due to an abnormal chemical reaction
08. Do not let the battery terminals (+ and -) contact a wire or any metal (like a metal necklace or a hairpin) with which it carried or stored together. In such a case, the battery will be shorted and cause an excessive Current, which may result in heat generation, explosion, or fire.
09. Do not connect the battery directly to an electric outlet or cigarette heater socket in car.
With a high voltage applied, the battery may overheat, explode, Or cause fire.
10. Strong impacts or shocks may damage the protecting deuce, which may cause an abnormal chemical reaction during charging and result in heat generation, explosion, or fire of the battery.
11. Do not drive a nail in or piece the battery with sharp objects.
In such a case, the battery may be deformed and shorted, witch which may cause heat generation, explosion, or fire of the battery

12. Do not solder the battery directly

Heat applied during soldering may damage the insulator of the safety vent and mechanism, which may result in heat generation, explosion, or fire of the battery.

13. Do not disassemble or alter the battery.

The battery employs a safety mechanism and a protecting device in order to avoid any danger.

If these are damaged, heat, explosion or fire may be caused.



CAUTION

01. Do not put the battery in a microwave, oven, or high pressure container.

Sudden heat may damage the seal of the battery and may cause heat generation, explosion, or fire of the battery.

02. Do not leave the battery in a charger or equipment if it generates an odor and/or heat, color and/or shape changed, electrolyte leaked, or any other abnormalities.

In such a case, immediately take the battery out of the charge or equipment and keep it away from fire, otherwise, the battery might overheat, explode, or cause fire.

In such a case, over-discharge during use, or over-charge during charge may occur abnormal chemical reactions and may cause heat generation, explosion, or fire of the battery.

03. Discontinue charging after specified charging time even if the charge is not complete, otherwise, the battery might cause heat generation, explosion, or fire.

04. Do not use the battery in the place where the static electricity (more than the limit of the manufacturer's guarantee) occurs. Otherwise, the protecting device in the battery might be damaged and cause heat generation, explosion, or fire.

05. Do not use and store the battery in other than the following conditions; otherwise, the battery might cause heat generation, damage, or deterioration of its performance.

Battery shall be charged and discharged at the temperature condition that defined in the section 3.9 and 3.10 of this specification.

06. Do not use the battery in other than the following conditions; otherwise, the battery might cause heat generation, damage, or deterioration of its performance.

Operating Temperature (Follow Item 3.9)

When the battery is charged : 0 ~ 60°C

When the battery is discharged : -20 ~ 60°C

When stored 1 month : -20 ~ 60°C (of SOC 30%), Storage Humidity: ≤85%RH.

When stored 3 months : -20 ~ 45°C (of SOC 30%), Storage Humidity: ≤85%RH.

When stored 12 month : -20 ~ 30°C (of SOC 30%), Storage Humidity: ≤85%RH.