Long Sing Technology Group (Hong Kong) Limited

Product technical specifications

battery model: ER18505+HPC1550

Prepared by: _____ date: _____

Review by: _____ date: _____

Approved by: _____ date: _____

Long Sing Technology Group (Hong Kong) Limited
Tel: 0755-86309333 www.longsingtechnology.com
Address: Room 502BC, Block C, Yingdali Science&Technology Park, 8 Hongmian Road, Futian Free Trade zone, Shenzhen, China

1． Introduction to battery pack principle

ER and HPC are connected in parallel, and the voltages of the two are always the same. When power is supplied externally, HPC bears most of the current output; when the work turns to static, the open circuit voltage of ER has a rebound instinct, which will instantly form a voltage difference with the capacitor in order to form the battery charging. However, this is only a momentary balance. In this way, the voltage of the entire battery pack is repeatedly pulled up by the ER until the voltage reaches 3.66V and it is balanced. Before the next pulse arrives, ER rushes HPC to a suitable voltage, because the discharge capacity of HPC corresponds to the voltage. Such a reciprocating cycle will work until the ER battery capacity is exhausted which can ensure that the service life and discharge capacity of the battery pack are within the estimated range.

2． Characteristics

- ◆ High pulse current capability
- ◆ Fast voltage response (no voltage hysteresis)
- ◆ High reliability (laser welding, glass-to-metal seal, can adapt to humid environment, prevent leakage)
- ◆ Excellent storage function (10 years)
- ◆ The performance at the end of the battery pack life is guaranteed
- ◆ Safe, reliable and environmentally friendly (UL, UN, IEC, ROHS)

3． Performance

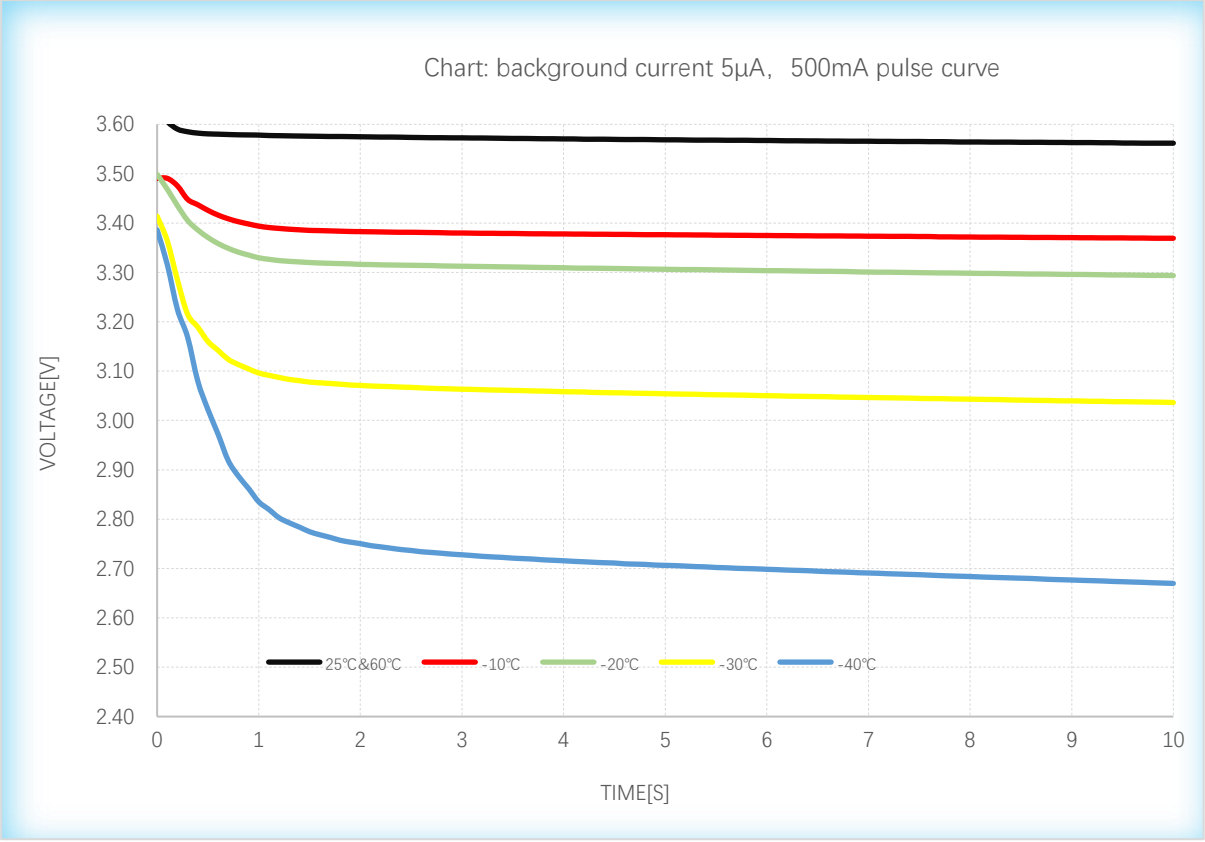
① Nominal effective capacity	4.0Ah
② Nominal voltage	3.66V
③ Load voltage (@5 ohm)	3.4V
④ Maximum pulse current (@1S, @3.0V)	3A
⑤ Annual average capacity reduction rate	≤2%
⑥ Operating temperature range	-40℃ ~ +85℃

Long Sing Technology Group (Hong Kong) Limited
Tel: 0755-86309333 www.longsingtechnology.com
Address: Room 502BC, Block C, Yingdali Science&Technology Park, 8 Hongmian Road, Futian Free Trade zone, Shenzhen, China

4． Performance testing standards

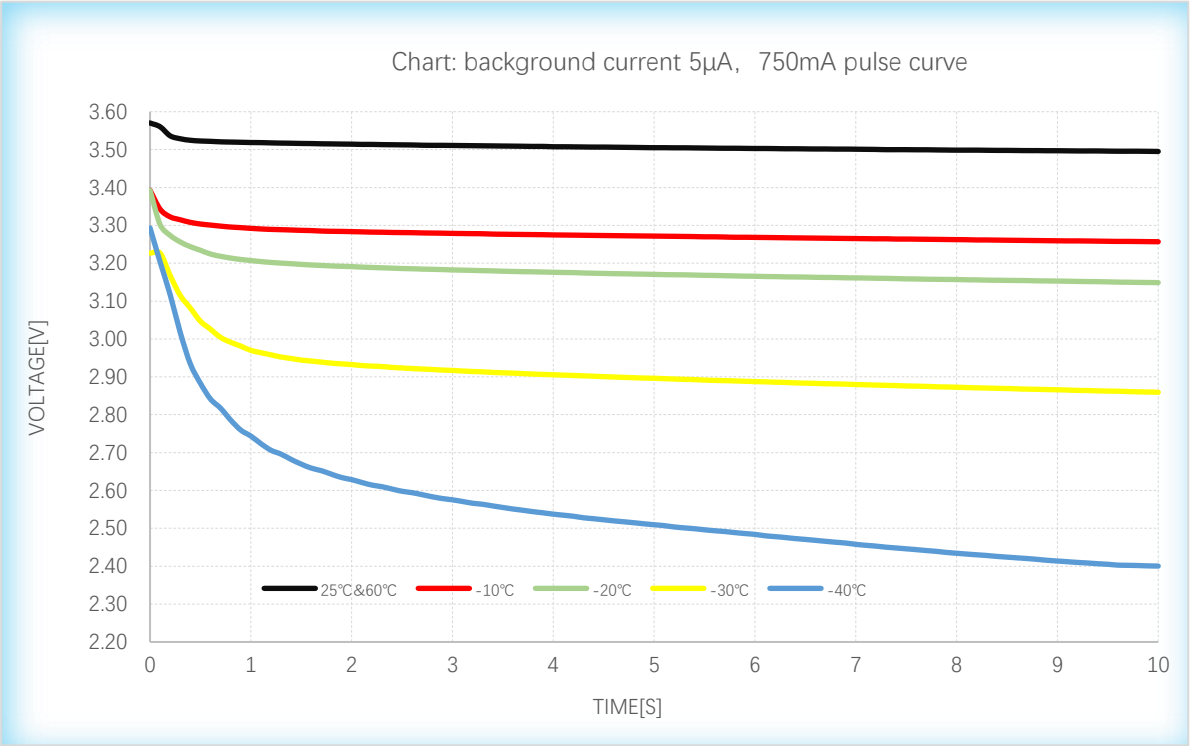
Testing project	Testing method	Testing standards
capacity	Discharge 80mA, 1mAh. 350mA, 0.1mAh. stand for 2 hour; after 500 cycles, leave it until the open circuit voltage returns to 3.65V or more, and then perform the above 500 cycles until the first load voltage is lower than 3.0V. Count its capacity.	≥4.0Ah
Open circuit voltage	Measure with a four and a half digital voltmeter	≥3.66V
Load voltage	Measured with four and a half digital voltmeter, resistance 5Ω, load voltage within 1S	≥3.40V

5． Periodic pulse performance

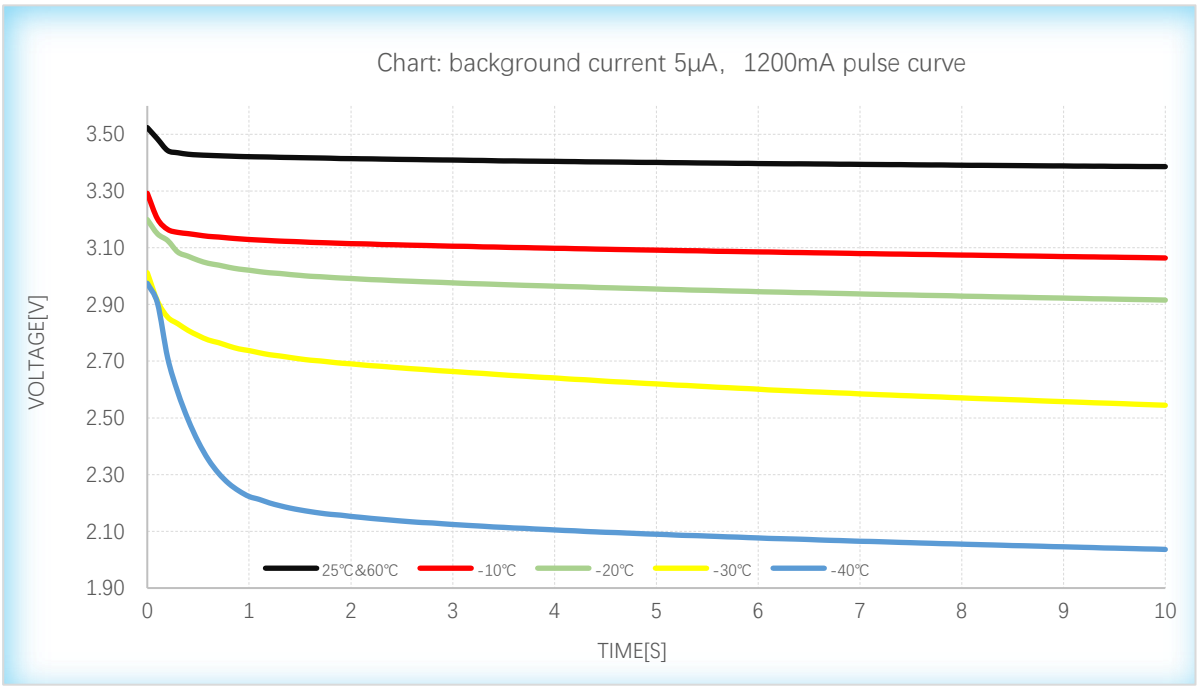


In a single pulse duty cycle, the peak current is 500mA and below, and the pulse capacity is 5AS/1.39mAh and below. You can refer to this graph for voltage design.

Long Sing Technology Group (Hong Kong) Limited
Tel: 0755-86309333 www.longsingtechnology.com
Address: Room 502BC, Block C, Yingdali Science&Technology Park, 8 Hongmian Road, Futian Free Trade zone, Shenzhen, China



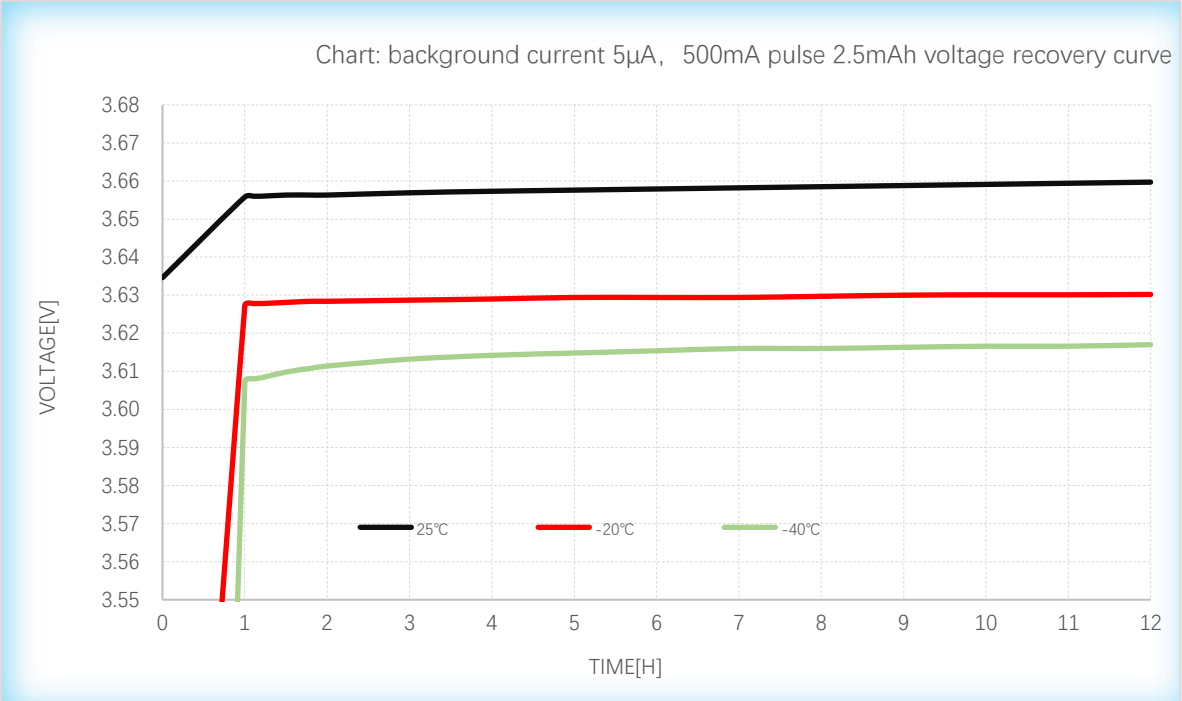
In a single pulse duty cycle, the peak current is 750mA and below, and the pulse capacity is 7.5AS/2.08mAh and below. You can refer to this graph for voltage design.



In a single pulse duty cycle, the peak current is 1200mA and below, and the pulse capacity is 12AS/3.331.66mAh and below. You can refer to this graph for voltage

Long Sing Technology Group (Hong Kong) Limited
Tel: 0755-86309333 www.longsingtechnology.com
Address: Room 502BC, Block C, Yingdali Science&Technology Park, 8 Hongmian Road, Futian Free Trade zone, Shenzhen, China

design.



After a single pulse, before the next pulse arrives, when it is converted to a static background current of 5μA, the voltage recovery of the battery pack within 12 hours. The pulse current is 500mA and below, the capacity is 2.5mAh and below, please refer to the voltage design of this graph.

6 . Safety and environmental adaptability

The battery pack can pass the following safety and environmental adaptability tests

① High and low temperature cycle

According to UL's test requirements: put the sample battery in a constant temperature box, and keep it from 20±3℃ to 70±3℃ within 30min for 4h, then use 30min to cool down to 20±3℃ for 2h, and then take 30min to cool to. Keep it at -40±3℃ for 4h, and finally use 30min to heat up to 20±3℃. Do this 10 times.

Judgment criteria: no explosion, no fire, no leakage.

② Height simulation

According to UL's test requirements: the sample battery is stored for 6 hours at an

Long Sing Technology Group (Hong Kong) Limited
Tel: 0755-86309333 www.longsingtechnology.com
Address: Room 502BC, Block C, Yingdali Science&Technology Park, 8 Hongmian Road, Futian Free Trade zone, Shenzhen, China

absolute pressure of 11.6 kPa and a temperature of 20±3°C.

Judgment criteria: no explosion, no fire, no leakage.

③ Free fall

According to IEC test requirements: Drop the battery test sample from a height of 1 meter on the concrete surface. Each battery should be dropped 6 times, and 2 times in each axis.

Judgment criteria: no explosion, no fire, no leakage.

④ Vibration

According to UL test requirements: clamp the sample battery on the vibrating platform, apply amplitude 0.8mm (double amplitude 1.6mm), frequency change rate 1Hz/min, frequency range 10Hz ~ 55Hz, and reciprocating vibration 95±5min. The sample batteries vibrate in three mutually perpendicular directions. For batteries with only two symmetry axes, vibration tests are performed in two mutually perpendicular directions.

Judgment criteria: no explosion, no fire, no leakage.

⑤ Heating

According to UL's test requirements: the sample battery is heated in a natural convection or forced convection oven, the oven is heated to 130°C at a rate of 5±2°C/min, and kept at constant temperature for 10 minutes before stopping.

Judgment criteria: no explosion, no fire.

⑥ Heavy impact

According to UL's test requirements: the longitudinal axis of the sample battery is placed parallel to the horizontal plane, and a steel bar with a diameter of 15.8mm is placed in the center position in a cross, and then a 9.1kg weight is dropped from a height of 61cm onto the sample battery.

Judgment criteria: no explosion, no fire.。

⑦ Squeeze

According to UL's test requirements: lay the battery flat between the two flat steel plates of the press at +20°C, and apply a pressure of 13kN±0.78kN on the battery. Once this

Long Sing Technology Group (Hong Kong) Limited
Tel: 0755-86309333 www.longsingtechnology.com
Address: Room 502BC, Block C, Yingdali Science&Technology Park, 8 Hongmian Road, Futian Free Trade zone, Shenzhen, China

pressure is reached, the pressure can be released.

Judgment criteria: no explosion, no fire.

⑧ External short circuit

According to UL's test requirements: short-circuit the positive and negative electrodes of the sample battery with a copper wire with a resistance value of <0.1Ω at room temperature until the sample battery catches fire or explodes, or until the sample battery is completely discharged to 0.2V and the case temperature drops again To ambient temperature ±10°C.

Judgment criteria: no explosion, no fire.

⑨ Forced charging

According to UL's test requirements: charge the sample battery with a DC power supply, and the charging current is 3 times the maximum charging current Ic specified by the manufacturer. The minimum charging time Tc is calculated according to formula (1), and a suitable resistor should be connected in series with the charging circuit. $Tc=2.5*C/(3*Ic)$ „„„„„„„„„„„„„„„„„„„„ (1) Where: Tc——Charging time (H). $Tc\geq7H$; C-Battery rating Capacity (Ah); Ic-Maximum charging current (A). The maximum charging current of the battery pack is 0.035A.

Judgment criteria: no explosion, no fire

⑩ Forced discharge performance

According to UL test requirements: short-circuit the sample battery to be tested (discharged battery) in series with a fully charged battery of the same model. The total number of batteries in series is the same as the number of batteries in series in actual applications, and the wire resistance in the loop is less than 0.1 Ω. Battery short-circuit end conditions: the battery catches fire, explodes, leaks or the battery is fully discharged to 0.2V, and the temperature of the battery casing drops to the ambient temperature ±10°C.

Judgment criteria: no explosion, no fire.

Long Sing Technology Group (Hong Kong) Limited
Tel: 0755-86309333 www.longsingtechnology.com
Address: Room 502BC, Block C, Yingdali Science&Technology Park, 8 Hongmian Road, Futian Free Trade zone, Shenzhen, China

The tests in items ⑤-⑩ are all carried out under extreme conditions. It is only used to illustrate a specific situation, and it must not be understood that these methods can be applied in practice. If some requirements exceed the standard during the application process or the following types of tests must be approved by the factory.

7． Product identification

The outer trademark of the battery pack will display the following content: battery pack model; nominal voltage; the outlet method is generally positive outlet, if the negative outlet is used, the positive and negative ends will be marked; date code; safety warning mark.

The date of coding is marked by year, month, and day, which represents the final inspection time before shipment.

8． Incoming inspection

The battery pack inside the factory will be fully inspected for open circuit voltage (OCV) and load voltage, and appearance before shipment. The external dimensions are subject to random inspection according to the GB2828.1-2003 standard.

It is recommended to use GB2828.1-2003 and GB2829-2002 standards to perform random inspection within one month of receiving the goods. Can be executed as listed in Table 1 and 2.

Table 1： Acceptable level of quality

Serial number	project	skills requirement	Detection level	AQL
1	Size	2-6	S-2	0.65
2	appearance	2-8	II	1.0
3	Open circuit, load voltage	3-1	II	0.4

Table 2： Sample size

Batch quantity	Sample size
≤3200	32
3200~10000	50
> 10000	80

The customer should check the open circuit voltage before installing the equipment on the

Long Sing Technology Group (Hong Kong) Limited
Tel: 0755-86309333 www.longsingtechnology.com
Address： Room 502BC, Block C, Yingdali Science&Technology Park, 8 Hongmian Road, Futian Free Trade zone, Shenzhen, China

battery pack, and the load voltage can be checked according to the conditions.

9 . Storage

The battery pack should be stored in a cool, clean, and dry environment. The recommended temperature is ≤+30℃, and the relative humidity is ≤60%. Avoid contact with corrosive substances and keep away from fire and heat sources.

10 . Safety

It is recommended that during the use of the battery pack, the following regulations need to be observed:：

- Do not remove the battery pack from the original packaging before use.
- Do not place battery packs scattered together to avoid accidental short circuits.
- Do not heat the battery pack above 85°C or incinerate it.
- Do not charge the battery pack.
- For battery packs with leads, welding on the surface of the battery is not allowed.
- Do not mix new and used batteries or batteries from different origins.
- It is strictly prohibited to disassemble and dissect the battery pack.
- Short circuit or reverse connection between the positive and negative terminals of the battery pack is strictly prohibited.

11 . Transportation

The lithium content in the battery pack is greater than 1g, so it belongs to the 9th category of restricted transportation goods.

During transportation, the battery pack should be protected from sunlight, fire, rain, water and corrosive substances. The shock and vibration during transportation and loading and unloading should be limited to a minimum.

The stacking height of paper packaging boxes shall not exceed 1.5 meters.

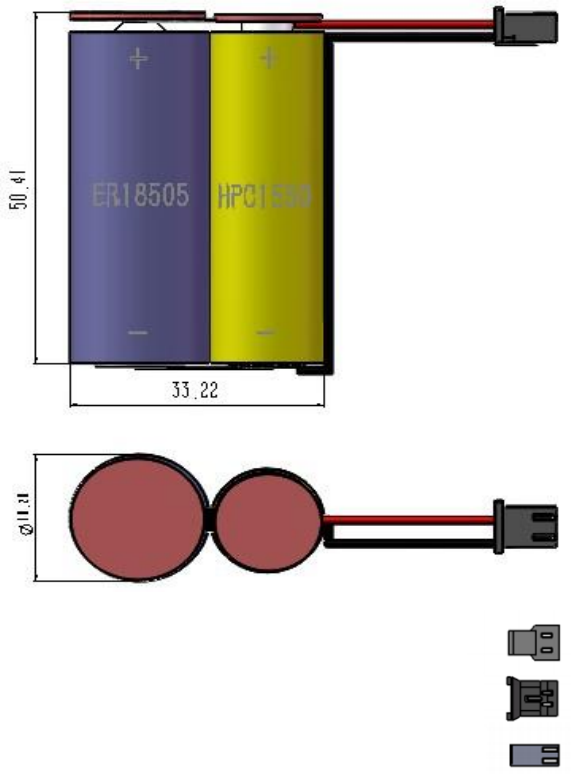
When the battery pack is transported over long distances, such as shipping by ship, avoid stacking it in an environment that can easily cause high temperatures.

12 . Product Liability

Long Sing Technology Group (Hong Kong) Limited
Tel: 0755-86309333 www.longsingtechnology.com
Address: Room 502BC, Block C, Yingdali Science&Technology Park, 8 Hongmian Road, Futian Free Trade zone, Shenzhen, China

Before using the battery, you must strictly follow this product specification. Use at higher than ambient temperature may cause a reduction in service life and low voltage readings at the initial stage of the pulse. Please fully evaluate before use. Misuse will cause the battery to heat up, explode, and cause personal injury or property damage. The factory will not bear any responsibility for any accidents caused by not operating in accordance with the product specifications.

13 . Product processing method



Battery pack composition

Materials	Number	Note
ER18505	1	
HPC1550	1	
Connection line	1	UL1007, AWG, 24# line
plug	1	Can choose XH-2P, 51005, PH-2P……
Thermistor (PTC)-3.5A	1	Optional (generally not needed)

Long Sing Technology Group (Hong Kong) Limited
Tel: 0755-86309333 www.longsingtechnology.com
Address: Room 502BC, Block C, Yingdali Science&Technology Park, 8 Hongmian Road, Futian Free Trade zone, Shenzhen, China