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SPECIFICATION SHEET FOR IFR18650PC-1100

1 Scope

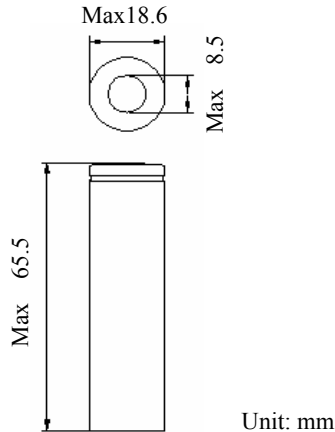
This technical data stipulates technical specification and requirements of cylindrical high power Li-ion cell IFR18650PC-1100 used in electric power tools manufactured by TYSONIC Battery Inc.

2 Main Technical Specification

See Table 1.

Table 1 Main Technical Specification

Item	Parameter
Dimension (with PVC/Paper Tube)	$\Phi=18.3\text{mm}\pm 0.3\text{mm}$ $H=65.0\text{mm}\pm 0.5\text{mm}$
Nominal Voltage	3.2V
Capacity	Nominal Capacity: 1100mAh Min Capacity: $\geq 1080\text{mAh}$ (constant discharge at 220mA to 2.0V in an ambient temperature of $23^{\circ}\text{C} \pm 3^{\circ}\text{C}$)
Standard Charge	Constant charge at 550mA to 3.65V, then constant charge the battery until the current is lower than 22mA.
Endurance	300 cycles (charge at 1100mA/discharge at 11A; remanent capacity $\geq 80\%$ of nominal capacity)
Weight	Approx 40g
Internal Resistance	$8\text{m}\Omega$ - $12\text{m}\Omega$
Max Charge Voltage	3.65V
Max Safe Charge Voltage	4.2V
Temperature Range	Charge: 0°C - 45°C Discharge: -10°C - 60°C Store: -5°C - 35°C



3 Performance

See Table 2.

Table 2 Performance Test

No.	Items	Test Method	Requirements
1	Appearance	Naked eyes.	Surface clean,no Deformation,no obvious scratch,No mechanical damage, no rust,no leakage.
2	Standard Test Condition	Tests shall be carried out at an ambient temperature of 23°C ±3°C and humidity of 65%±20%RH unless special specified.	
3	Standard Charge	Constant charge at 550mA to 3.65V, then constant charge at 3.65V till the charge current is less than 22mA.	
4	Rapid Charge	Charge at a constant current of 2200mA to 3.65V, then charge at a constant voltage of 3.65V till the charge current is less than 55mA.	
5	Shipment Voltage	Inspect before delivery.	≥3.20V
6	Nominal Capacity	1.Discharge at a constant current of 550mA to the final voltage of 2.0V; 2.Store battery for 10min after standard charge; 3. Discharge at a constant current of 220mA to cut-off voltage of 2.0V.	1100mAh
7	High Rate Discharge Performance	1.Discharge at a constant current of 550mA to the final voltage of 2.0V; 2.Charge at a constant current of 1100mA to 3.65V,then charge at a constant voltage of 3.65V until the charge current is less than 22mA,store it for 10min; 3. Discharge at a constant current of 11A to 2.0V.	Final Capacity is equal or more than 95% Nominal Capacity

8	Endurance in cycles	Store 10min after standard charge, then discharge at a constant current of 1100mA to 2.0V, then store for 20min.Repeat the cycle till the discharge current is less than 70% of nominal capacity.	≥1000 cycles
9	Maximum Discharge Endurance	Charge at a constant current of 1100mA to 3.65V, then charge at a constant voltage of 3.65V until the charge current is less than 22mA,store it for 10min; Then discharge at a constant current of 11A to 2.0V and store 45min.Repeat the cycle until the discharge capacity is less than 80% of its nominal capacity.	≥300 cycles
10	Maximum Discharge Current	Store the battery for 10min after standard charging, then continuous discharge at a constant current of 40A	Can be continuous discharge to 2.0V
11	Low Temperature Performance	Store the batteries in the low temperature cabinet at -10°C ±2°C for 24h after standard charging. Discharge at a constant current of 220mA to 2.0V inside the cabinet. Then take out the batteries, store for 2h, inspect the appearance.	Discharge time shall be not less than 3.5h. Battery shall be no deformation, no breakage.
12	Capacity Retention	Store the battery for 28 days at ambient temperature of 20°C ±5°C after standard charging, and then discharge at a constant current of 1100mA to 2.0V.	Discharge time shall be not less than 51min
13	Internal Resistance	Test the internal resistance with A/C internal resistance tester of 1KHz within 1h after standard charging	8mΩ-12mΩ

4. Mechanical Characteristics

See Table 3

Table 3 Mechanical Characteristic Test Condition

No.	Items	Test Method	Requirements
1	Vibration Test	Full charged battery is to be subjected to simple harmonic with an amplitude of 0.76mm (1.52mm total maximum excursion)with frequency to be varied at the rate of 1Hertz per minute between 10 Hertz and 55Hertz,and return in 90min±5min.The battery is to be tested in three mutually perpendicur direction.	No obvious damage, leakage, smoking or explosion. Voltage shall be not less than 3.2V.
2	Drop Test	Full charged battery is to be dropped from a height of 1m to a board of 18mm-20mm.The battery shall be tested from three mutually perpendicular directions unless it has only two axes of symmetry in which case only two directions shall be tested.	The battery shall not catch fire or explode. No obvious deformation or smoking. Discharge the sample with a constant current of 1100mAh to 2.0V,discharge time shall be not less than 51min.

5. Safety Characteristics

See Table 4.

Table 4 Safety Characteristic Test Condition

No.	Items	Test Method	Requirements
1	Heating	After stabilized in room temperature, a full charged battery is to be heated in a gravity convection or circulating air oven with the rate of 5°C/min±2°C/min to 130°C±2°C and remain for 10 minutes.	The battery shall not explode or catch fire.
2	Short-Circuit	Full charged battery shall be shot-circuited by connecting the positive and negative terminals of the battery with a thermocouple in circulating air oven(Total resistance of whole circuit shall be less than 50 mΩ).Temperature of battery shall be examined. The test is to be continued until the temperature is 10°C lower than peak value.	The battery shall not explode or catch fire. The temperature of the exterior cell or battery casing shall not battery shall exceed 150°C.
3	Over Charge	1) Store the battery for 10min after standard discharging. 2) Store the battery for 10min after standard charging at temperature of 23°C±3°C, moisture of 65%±20%RH. 3) Charge the battery at a constant current of 3.3A to 10.0V and remain for 7h.The test is to be continued until the temperature drops to 20% of peak value.	The battery shall not explode or catch fire.
4	Impact	A hammer of 10Kg is to be dropped from a height of 1m to the top of the battery.	The battery shall not explode or catch fire.
5	Nail test	After full charge for battery as standard methods, penetrate a steel nail with diameter of 2.5mm into battery.	The battery shall not explode or catch fire.
6	Forced Discharge	Discharge the battery at a constant current of 220mA for 12.5h after standard charging. The test may discontinue when a protective device works.	The battery shall not explode or catch fire.

6. Warranty

The battery is warranted within one year. Discharge the battery of less than 3.0V at current of 220mA~1100mA to 3.6V every three months.

7. Delivery

The battery shall be delivered in cartons by car, train, ship or plane to avoid severe collision, impact, crush, sun-baked and wringing. The battery shall be half charged when delivered.

8. Operating instruction

- Do not heat or dispose into fire;
- Do not short-circuit the positive and negative terminals of the battery with metallic conductor;
- Do not disassemble;
- Do not weld the battery directly;
- The battery shall be charged, used and stored away from static places;
- Do not use the battery with primary batteries. Do not use with battery of different package, different model or different brands;
- If the electrolyte leaks on skin or clothes, wash immediately with clean water;
- If the electrolyte leaks into eyes, do not rub, wash with clean water immediately and contact physician;
- Keep the battery out of reach of children;
- Use the battery under the following temperature requirement: charge under 0°C~45°C, discharge under -10°C~60°C.

9. Others

- 9.1. The contents do not included in this technical data shall be negotiated by both party concerned.
- 9.2. It is our right to revise this technical data without notifying any customer.