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Battery Type ULR18650

Specification 3.7V/2200mAh

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## 1. Preface

The purpose of this product specification is to provide technical information for the rechargeable Lithium-ion cylindrical battery ULR18650, manufactured and supplied by Unique Energy.

## 2. Description and Model

2.1 Description	Rechargeable Lithium-ion cylindrical battery
2.2 Model	ULR18650

## 3. Specification

3.1 Capacity	2200mAh
3.2 Charging Voltage	4.20V
3.3 Nominal Voltage	3.7V at 0.2C mA
3.4 Standard Charging Method	Constant current:0.5C <sub>5</sub> mA Constant voltage 4.20V
3.5 Cut-off Discharge Voltage	3.00V
3.6 Max. Discharge Current	1.5C <sub>5</sub> mA
3.7 Max. Charge Current	1C <sub>5</sub> mA
3.8 Cycle Life	>500 cycles
3.9 Ambient Temperature	
for Standard Charge	0°C ~ 45°C
for Discharge	-20°C ~ 60°C
3.10 Storage	
for within the temperature	-20°C ~ 60°C
for within the humidity	≪ 75%
3.11 Energy Density	
Wh/L	~490
Wh/Kg	~180
3.12 Weight of Bare Cell	~45.5g
3.13 Charge State Internal Impedance	<80mΩ

## 4. Appearance

Appearance shall be free from any remarkable scratch, flaws, rust, discoloration or electrolyte leakage (visible or by smell)

## 5. Standard Test condition

### 5.1 Environment Conditions

Unless otherwise specified, all test stated in this Product Specification are conducted within the temperature 15~25! and the humidity 45~85%RH.

## 5.2 Test Equipment

### (1) Impedance meter

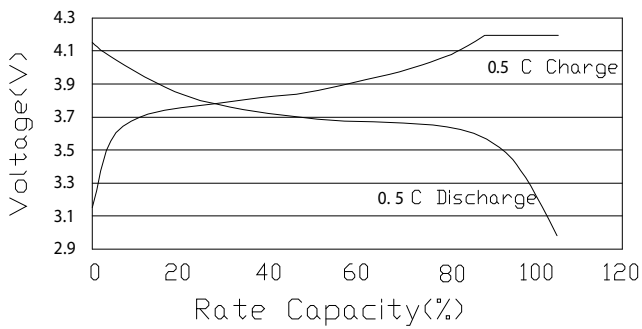
The impedance meter with AC 1kHz should be used

## 6. Test Procedure and Its Standard

Item	Measuring Procedure	Standard
6.1 Appearance	Visual	No Defect and Leak
6.2 Dimension	Caliper	As item 8
6.3 Weight	Scale	As item 3.12
6.4 Maximum Charge Current	CCC V (Constant Current Constant Voltage)	$1C_5mA$
6.5 Full charge	CCCV	CC- $0.5C_5mA$ CV- 4.2V End-Current $0.01C_5mA$
6.6 Open Circuit Voltage	Within 1hr after full charge, measure Open circuit voltage	>4.10V
6.7 Internal Impedance	Measure the battery with 1kHz AC	<80m $\Omega$
6.8 Discharge Capacity	Within 1hr after full charge, discharge until final discharge, at $0.2C_5mA$ and measure the capacity	>2200mAh
6.9 Maximum Discharge Current	Until final discharge voltage	$1.5C_5mA$
6.10 Charge/Discharge Cycle Life	Charge: CCC V, CC - $0.5C_5mA$ , CV- 4.2V End-Current $0.01C_5mA$ Discharge: $0.5C_5mA$ to 3.00V, This charge/discharge shall be repeated 500 times	Discharge capacity should be >70% of item 6.8
6.11 Leakage Proof	After full charging, the battery shall be stored at $40\pm 2^\circ C$ and humidity 80% $\pm$ 5% for 21 days	No leakage should be observed by visual inspection
6.12 Temperature Characteristics	1) After full charge at $20\pm 5^\circ C$ , stand at $-20\pm 2^\circ C$ for 18h, then discharge at $0.2C_5mA$ and measure the capacity 2) After full charge at $20\pm 5^\circ C$ , stand at $55\pm 2^\circ C$ for 2hrs, then discharge at $1C_5mA$ and measure the capacity	Discharge capacity should be >60% of item 6.8 and no abnormality on its appearance and structure
6.13 Charge Retention	After full charging, stand at $20\pm 5^\circ C$ for 28 days, measure the discharge capacity according to item 6.8	Discharge capacity should be >85% of item 6.8

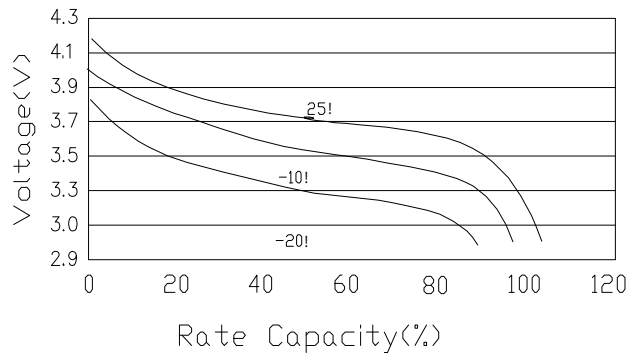
### 7.1 Charge/Discharge Characteristics

Charge: CC / CV 4.2V, 0.5C<sub>5</sub>mA,  
 End-current 0.01C<sub>5</sub>mA  
 Discharge: 0.5C<sub>5</sub>mA Cut-off at 3.00V  
 Temperature: 25!



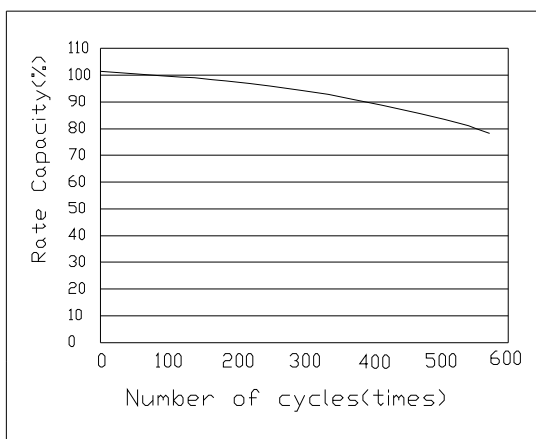
### 7.3 Temperature Characteristics

Charge: CC / CV 4.2V 0.5C<sub>5</sub>mA,  
 End-Current 0.01C<sub>5</sub>mA  
 Discharge: As item 6.10



### 7.2 Charge/Discharge Cycle Life

Charge: CC / CV 4.2V 0.5C<sub>5</sub>mA,  
 End-Current 0.01C<sub>5</sub>mA  
 Discharge: 0.5C<sub>5</sub>mA, Cut-off at 3.00V  
 Temperature: 25!



### 8. Dimension (Bare cell) mm

