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professional *solutions*

LIR18650-26-CI • High discharge battery

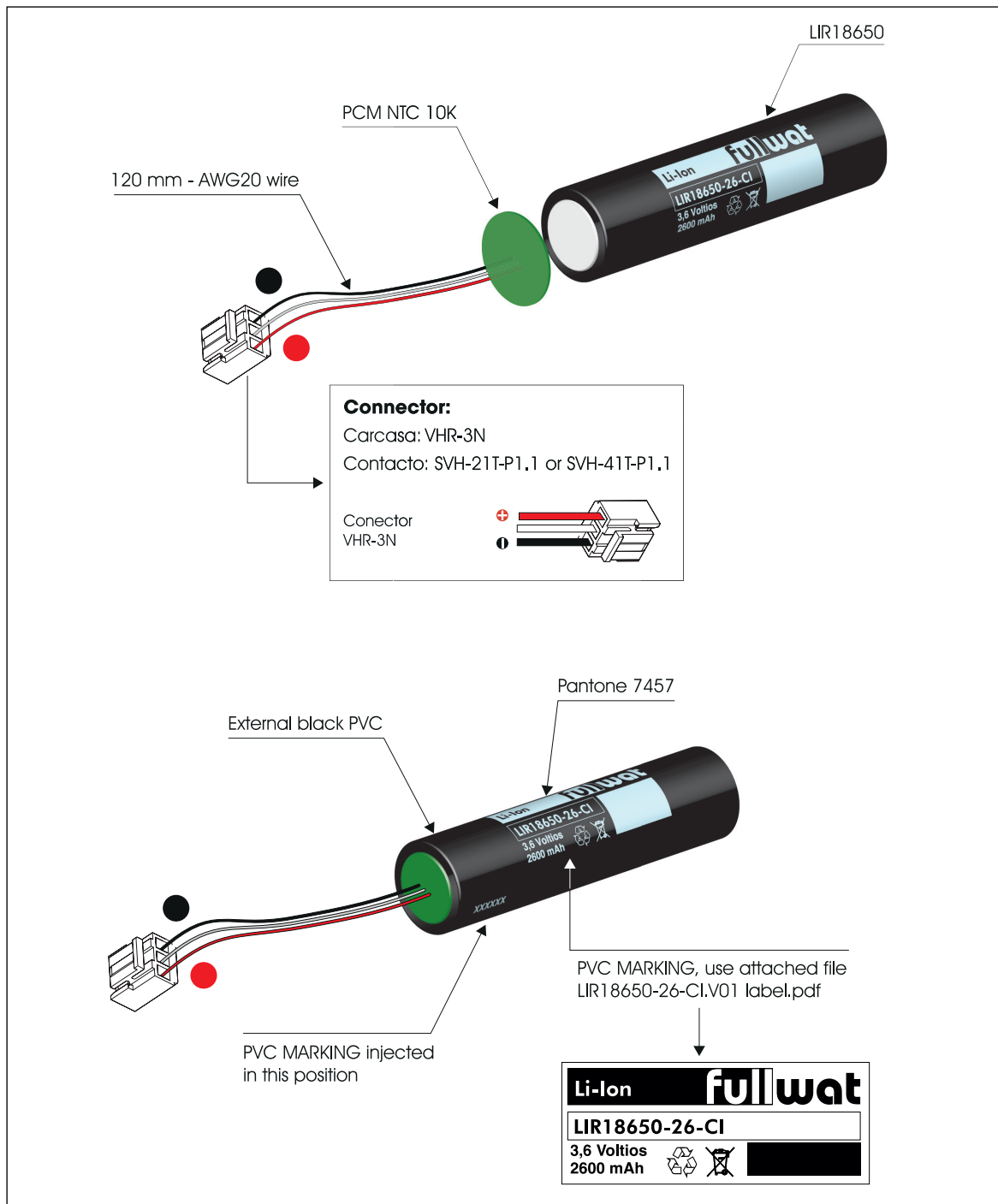


LIR18650-26-CI • High discharge battery

1. Scope

This specification describes the type, dimension, performance, technical characteristics, warnings and cautions of the lithium ion rechargeable cell. The specification only applies to LIR18650-26-CI cell supplied by FULLWAT[®].

2. Initial dimension



3. Definition

3.1 Standard charge method

At $25 \pm 2^\circ\text{C}$, the cell is charged to 4.2V at constant current of 0.5C (1250mA), then charged at constant voltage of 4.2V until the current tapers to 0.01C (25mA) followed by resting for 5min.

3.2 Standard discharge method

Under $25 \pm 2^\circ\text{C}$, the cell is discharged to 2.75V at a constant current of 0.2C (500mA).

3.3 Nominal capacity

Nominal capacity, signed as capacity and using mAh as unit, is obtained by discharging a cell via standard discharge method after it is standard charged.

4. Cell model and dimensions

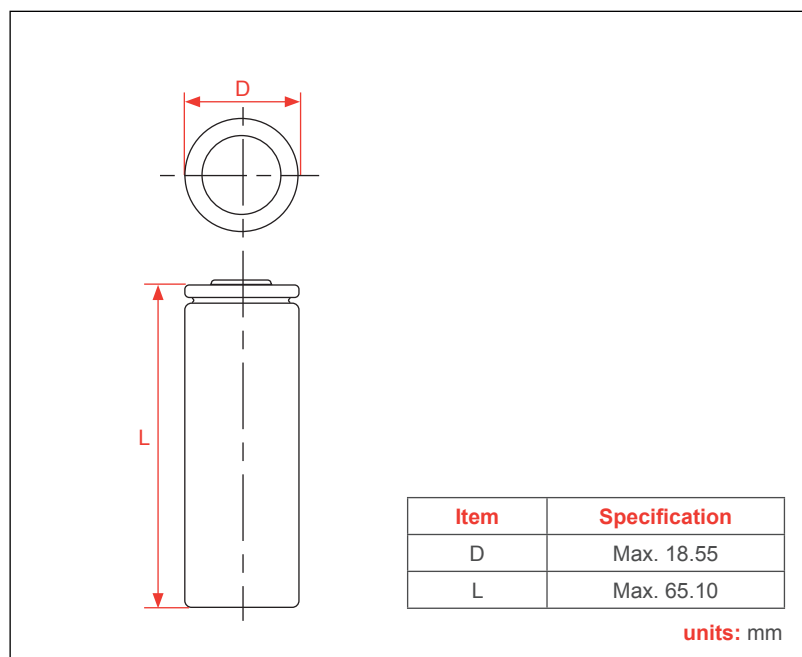
4.1 Description and model

Description: Cylindrical Li-ion rechargeable cell.

Model: LIR18650-26-CI.

4.2 Cell dimensions

Physical dimensions of the cell shown in the following figure (unit: mm), with tube.



5. Cell characteristics

Unless otherwise specified, the cell is fresh cell and tested by standard charge and standard discharge.

Item		Specifications
Capacity	Nominal capacity	2600mAh by standard charge and discharge
	Min. capacity	2500mAh by standard charge and discharge
Nominal Voltage		3.60V
Charge cut-off voltage		4.20V
Discharge cut-off voltage		2.75V
Max charge current		1C (25°C, not for cycle life)
Max discharge current		3C (25°C, not for cycle life)
Max. discharge current		8000mA pulse<5s at 25±3°C
Storage temperature		1 year: -20~25°C 3 months: -20~45°C 1 month: -20~60°C
Humidity range		0 ~ 60% RH (non-condensing)
Internal resistance		≤30 mΩ(AC Impedance, 1000Hz)
Weight		≤48g

6. Technical requirements

6.1 Cell operating conditions

Charge temperature: 0 ~ 45°C

Discharge temperature: -20 ~ 60°C

6.2 Cell testing conditions

Unless otherwise specified, all tests stated should be done at 25 ± 2°C

6.3 Requirement of the testing equipment

The voltage measurement device: not less than 0.5 grade.

The current measurement device: not less than 0.5 grade.

AC Impedance: 1000Hz

Temperature meter: precision ≤ 0.5°C

The size measurement device: ±0.1%

The quality measurement device: ± 0.1%

LIR18650-26-CI • High discharge battery

6.4 Electrochemical characteristics

Unless otherwise specified, the cell should be fresh cell and tested by standard charge and discharge.

NO.	Item	Test method and conditions	Criterion	
6.4.1	Rate discharge capability	(1) Charge: 0.5C constant current charge to 4.2 V followed by 4.2V constant voltage charge to cut-off current 0.01C; (2) Discharge: 0.2C, 0.5C, 1C, 2C, 3C constant current discharge to cut-off voltage 2.75 V.	Current	Relative capacity
			0.2C	100%
			0.5C	≥92%
			1C	≥92%
			2C	≥92%
			3C	≥92%
6.4.2	RT cycle life	(1) Charge: 0.5C constant current charge to 4.2 V followed by 4.2V constant voltage charge to cut-off current 0.01C; (2) Discharge: 1C constant current discharge to cut-off voltage 2.75V.	$\frac{\text{Discharge capacity of 801th cycle}}{\text{Original discharge capacity}} \geq 80\%$	
		(1) Charge: 0.5C constant current charge to 4.15V followed by 4.15V constant voltage charge to cut-off current 0.05C; (2) Discharge: 1C constant current discharge to cut-off voltage 3.0V.	$\frac{\text{Discharge capacity of 1001th cycle}}{\text{Original discharge capacity}} \geq 80\%$	
6.4.3	High-low temperature discharge performance	(1) Charge: 0.5C constant current charge to 4.2V followed by 4.2V constant voltage charge to cut-off current 0.01C at 25±2°C; (2) Discharge: 0.2C constant current discharge to cut-off voltage 2.75V at 25°C, 60°C, 45°C, 10°C, 0°C, -10°C, -20°C.	Temperature	Relative capacity
			25°C	100%
			60°C	≥100%
			45°C	≥100%
			10°C	≥90%
			0°C	≥80%
			-10°C	≥75%
			-20°C	≥65%

LIR18650-26-CI • High discharge battery

NO.	Item	Test method and conditions	Criterion	
6.4.4	Storage performance at 25°C (100% SOC)	<p>(1) Charge: 0.5C constant current charge to 4.2V followed by 4.2V constant voltage charge to cut-off current 0.01C; Discharge: 0.2C constant current discharge to cut-off voltage 2.75V, to obtain the initial capacity;</p> <p>(2) Charge: 0.5C constant current charge to 4.2V followed by 4.2V constant voltage charge to cut-off current 0.01C;</p> <p>(3) Stored at 25±21C for 28 days;</p> <p>(4) Discharge: 0.2C constant current discharge to cut-off voltage 2.75V, to obtain the residual capacity;</p> <p>(5) Charge: 0.5C constant current charge to 4.2V followed by 4.2V constant voltage charge to cut-off current 0.01C; Discharge: 0.2C constant current discharge to cut-off voltage 2.75V, to obtain the recovery capacity.</p>		
			Capacity	Relative capacity
			Residual capacity	≥95%
			Recovery capacity	≥97%
			Initial capacity	100%
6.4.5	Storage performance at 60°C (100% SOC)	<p>(1) Charge: 0.5C constant current charge to 4.2V followed by 4.2V constant voltage charge to cut-off current 0.01C at 25±2°C; Discharge: 0.2C constant current discharge to cut-off voltage 2.75V at 25±2°C, to obtain the initial capacity;</p> <p>(2) Charge: 0.5C constant current charge to 4.2V followed by 4.2V constant voltage charge to cut-off current 0.01C at 25±2°C;</p> <p>(3) Stored at 60 ± 2°C for 7 days;</p> <p>(4) Kept at 25 ± 2°C for 5 hours;</p> <p>(5) Discharge: 0.2C constant current discharge to cut-off voltage 2.75V at 25±2°C, to obtain the residual capacity;</p> <p>(6) Charge: 0.5C constant current charge to 4.2 V followed by 4.2V constant voltage charge to cut-off current 0.01C at 25±2°C; Discharge: 0.2C constant current discharge to cut-off voltage 2.75V at 25±2°C, to obtain the recovery capacity.</p>		
			Capacity	Relative capacity
			Residual capacity	≥90%
			Recovery capacity	≥95%
			Initial capacity	100%

6.5 Environmental and safety characteristics

NO.	Item	Criterion	Testing method	Standard
6.5.1	Vibration	No fire, No explosion, No leakage, The maximum mass loss ≤0.1%	After standard fully charge, cell shall be attached to a vibration table directly and subjected to vibration that consists of 10Hz to 55Hz to 10Hz at the speed of 1Hz/min in 90~100mins. The total excursion of the vibration is 0.8mm (0.060 inches). The cell shall be vibrated in each direction along axis of the cylinder and the vertical directions of axis of the cylinder.	UL1642
6.5.2	Drop test	No fire, No explode	The cell is charged following the standard charge method; The cells is dropped three times from a height of 1.0 m onto a concrete floor, to obtain impacts in random orientations, at 25°C±2°C; Observation of 1 h.	IEC62133
6.5.3	Overcharge test	No fire, No explode	The cell is discharged following the standard discharge method. Apply a 8.4V power supply and a 2C charge current for 24hrs.	UN38.3
6.5.4	Forced discharge test	No fire, No explode	Cell shall first be discharged according to standard discharge method, then the cell is subjected to a reverse charge at 1C for 90 min at 25±2°C	IEC62133
6.5.5	130°C hot oven test	No fire, No explode	The cell is charged following the standard charge method. After charging the cell is put in the oven. And then the oven temperature will be ramped at 5°C per minute to 130°C and held at 130°C. When the temperature of the cell reach 130°C, the cell is maintained in the 130°C oven for a maximum of 30 minute or until a fire or explosion is obtained, whichever comes first.	GB31241
6.5.6	Crush test	No fire, No explode	After charging a cell following the standard charge method, the cell shall be crushed between two flat surfaces. The direction of the crushing force shall be vertical to axis of the cylinder. The crushing force is to be applied by a hydraulic ram with a 32mm diameter piston. Crushing force is approximately 13KN. Once the maximum pressure has been obtained it is to be released.	UL1642
6.5.7	Short circuit test at room temperature	No fire, No explode	Cell shall first be charged according to standard charge method, and then cell is to be short-circuited by connecting the positive and negative terminals of the cell with copper wire having a maximum resistance load of 80±20mΩ. This test is done at room temperature. Monitor the cell temperature while testing. The cell is continuously discharged until the cell case temperature has returned to be 10°C less than peak temperature.	UL1642

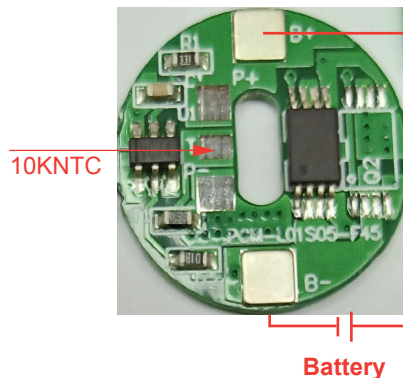
LIR18650-26-CI • High discharge battery

NO.	Item	Criterion	Testing method	Standard
6.5.8	Short circuit test at 55°C	No fire, No explode	Cell shall first be charged according to standard charge method, and then cell is to be short-circuited by connecting the positive and negative terminals of the cell with copper wire having a maximum resistance load of 80±20mΩ. This test is done at 55±5°C. Monitor the cell temperature while testing. The cell is continuously discharged until the cell case temperature has returned to be 10°C less than peak temperature.	UL1642
6.5.9	Thermal cycling	No fire, No explode No leakage	After fully charged according to the standard charge method, the cell is put in an oven. Then: 1. Raising the chamber temperature from Room temperature to 70°C within 30 min and keep the cell under 70°C for 4hrs. 2. Reducing the chamber temperature from 70°C to 20°C within 30 min and maintaining this temperature for 2hrs. 3. Reducing the chamber temperature from 20°C to -40°C within 30 min and keep the cell under -40°C for 4hrs. 4. Raising the chamber temperature from -40°C to 20°C within 30min. 5. Repeat the sequence for a further 9 cycles. Afterwards, the cell is observed for a minimum of 24hrs.	UL1642
6.5.10	Low pressure test	No fire, No explosion, No leakage, The maximum mass loss ≤0.1%	Cell shall first be charged according to standard charge method, and then cell is to be stored at an absolute pressure of 11.6kPa for six hours at ambient temperature.	UL1642

Note: All above safety tests will be conducted at 25°C±2°C except where specified differently. Use proper ventilation with protective equipment.

7. PCM specification - Ref. model: PCM-L01S05-F45 (1S)

NO.	Item	Condition	Specification
1	Voltage	Charging voltage (CC/CV)-	DC4.2V CC/CV
		Cell-balance voltage	---
2	Current	Cell-balance current	---
		Current consumption on operation for single cell	≤10μA
		Maximal continuous charging current	3A
		Maximal continuous discharging current	3A
3	Overcharge (single cell)	Overcharge detection voltage	4.25±0.05V
		Overcharge delay time	0.5—2S
		Overcharge release voltage	4.15±0.05V
4	Overdischarge (single cell)	Over discharge detection voltage	2.50±0.1V
		Over discharge delay time	10—200mS
		Over discharge release voltage	2.50±0.1V
5	Discharge overcurrent	Discharge overcurrent protection	5.5±1A
		Discharge overcurrent delay time	5ms—60ms
		Release condition	Cut-off-load,reset automatically
6	Short-circuiting protection	Detection condition	Exterior short circuit
		Load short-circuiting detection delay time	200-800us
		Release condition	Cut-off-load, reset automatically
7	Internal resistance	Proection circuit (MOSFET)	≤50mΩ
8	Temperature	Wide range of operation temperature	-40~+85°C
		Storage Temperature Range	-40~+125°C



P+ = B+ = Charge+/Discharge+
P- = Charge-/Discharge-

Size: 117*17*2 mm (L*W*T)

8. Shipment

The cell shall be shipped in voltage range of 3.5~3.8V or in accordance with customers' requirement. The remaining capacity before charging shall be changed depending on the storage time and conditions.

9. Warranty

The warranty is specified in our warranties section of *Terms of Sales*. If the product is to be stored for more than three months it is necessary to perform the appropriate maintenance to ensure the good condition of the batteries. Consult our annex to the *Terms of Sales* on the recommended maintenance.

10. Storage and shipment requirement

Item	Conditions	Permissible time
Storage environment	-20°C~ 60°C, 60% RH Max	Less than 1 month
	-20°C~ 45°C, 60% RH Max	Less than 3 months
	-20°C~ 25°C, 60% RH Max	Less than 1 year

About long time storage:

If the cell needs to be stored for a long time, the cell's storage voltage should be 3.5 ~ 3.8 V. Also, it is recommended to charge the cell every six months.

11. Warning and cautions in handling the lithium-ion cell

Lithium-ion rechargeable cells subjected to abuse can cause damage to the cell and/or personal injury. Please read and observe the standard cell precautions below before utilization.

Note 1: The customer is required to contact FULLWAT[®] in advance, if and when the customer needs other applications or operating conditions not described in this document.

Note 2: FULLWAT[®] will take no responsibility for any accident when the cell is used under other conditions not described in this document.

Warnings!

To prevent the possibility of the cell from leaking, heating, explosion, please observe the following precautions: (It should be indicated especially in manual or instruction for users.)

- Do not use and leave the cell near a heat source such as fire or heater.
- Do not use or leave the cell under the blazing sun (or in heated car by sunshine).
- Do not use or leave the cell at very high temperature conditions (e.g., strong direct sunlight or a vehicle in extremely hot conditions). Otherwise, it can overheat or catch fire or its performance will be degenerate and its service life will be decreased.
- Do not short circuit, over-charge or over-discharge the cell.
- Don't immerse the cell in water and seawater. Please put it in cool and dry environment if no using.
- Don't reverse the positive and negative terminals
- Do not disassemble or modify the cell.
- Do not transport or store the cell together with metal objects such as necklaces, hairpins, coins, etc.
- Make sure the cell is not with conspicuous damage or deformation.
- Don't connect the cell to an electrical outlet directly.
- If the cell leaks and the electrolyte splashes into the eyes, rinse the eyes with clean running water immediately for at least 15 minutes, and go to hospital for treatment if necessary.
- Mixed use of cells of different types is not allowed.
- Keep the cell away from babies.
- Do not directly solder the cell and pierce the cell with a nail or other sharp object.
- Do not strike, throw or trample the cell.
- Use the cell charger specifically for that purpose when charging.
- Please separate cells of different electrochemical systems from one another when disposing of secondary cells.
- Clean the terminals with a dry cloth before use if the cell terminals are dirty. Otherwise power failure or charge failure may occur due to the poor connection with the instrument.
- Cells should be removed from the device or charger immediately and not used again if they are over heat, give off odor, discolor or deform, or appear abnormally in any way during use, charging and storage.
- The cell replacement shall be done only by either cell supplier or device supplier instead of the user.
- Please tape the terminals to insulate cells before discarding them in case of fire and explosion.
- Do not use cells in strong electrostatic and magnetic occasions, otherwise, it can cause safety problems easily.
- Use of damaged cells is not permitted.
- Make sure package designing will not cause cell damages.
- Cell packing should be conducted strictly according to level range, any misuse of different levels should not be permitted.
- Disassembling cells from pack or module is not permitted unless under the guidance of professional technicians.

12. Restriction of hazardous substances

This model of lithium-ion cell is in accordance with our company's request of "The hazardous substances and material management standard" or customer's requirements.