



Li-ion Battery Specification

Pack Type: Cell +PCM

Cell Model: 18650-2600mAh

Product Capacity: 2600mAh/3.7V

Part Code: LS20091007

Customer Code: C207

Customer material number:

Total Page: 14

The company acknowledges (Stamp)	Registered	Checked by	Approved

Approved by customer (Stamp)	Tested by	Checked by	Approved

Remark: CEL Battery may, at any time, at its sole discretion, make changes to the technical and functional !
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1.Scope

The specification shall be applied to Rechargeable Lithium-ion battery which is manufactured by Dongguan Golden CEL Battery Co.LTD., which is the basis for product design, production and inspection, and its purpose is to let the customer know the quality standard and the instruction.

Reference standard

GB/T 18287-2013

GB31241-2014

IEC/EN61960 UL1642

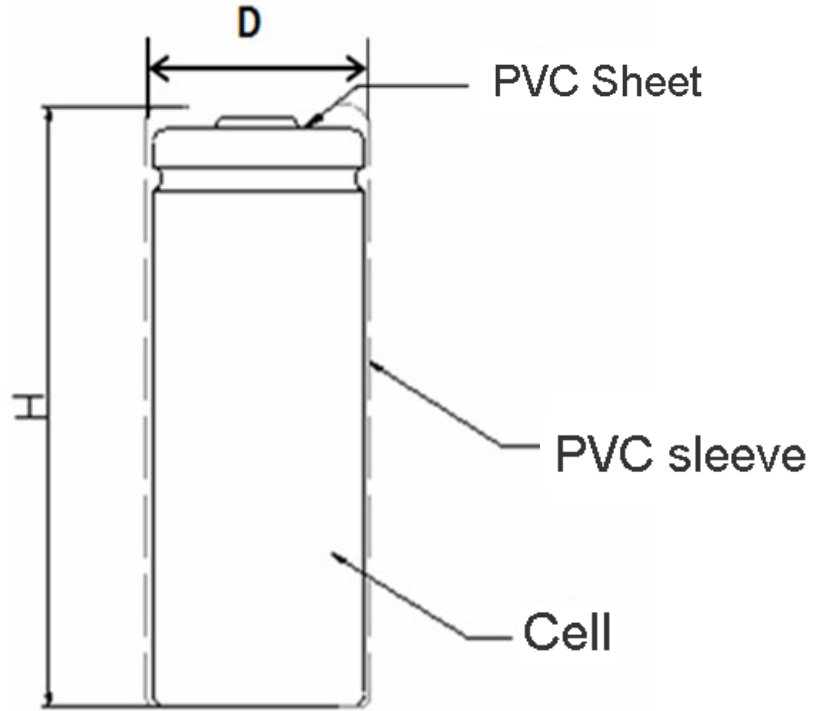
2.Product basic information

No.	Items		Parameter	
2.1	Battery model		18650	
2.2	Shipment voltage		3.8V-4.0V	
2.3	Inner Impedance (AC 1kHz)		Cell≤60mΩ	Battery≤200mΩ
2.4	pack weight		About: 47g	
2.5	Typical capacity		2600mAh	0.2C Discharge
	Nominal capacity		2600mAh	
	Minimal capacity		2550mAh	
2.6	Nominal voltage		3.7V	
2.7	Fully charge voltage(FC)		4.2V	Defined in this DOC: FC = 4.2V
2.8	Fully discharge voltage(FD)		2.75V	Defined in this DOC: FD =2.75V
2.9	Max continuous charge current		0°C~15°C	0.2C
			15°C~35°C	1C
			35°C~45°C	1C max to 4.1V, then CV to 0.05Cmin
2.10	Max continuous discharge current		-10°C~60°C	0.5C
2.11	Cycle life		After 300cycles charge/discharge, battery can recover 80% of its capacity (Detail in 6.4)	
2.12	Storage temperature	-20°C~50°C	≤7 day	The recovery capacity shall not be less than80% of the capacity,Recommended storage temperature is 25±2°C of half charge state (3.7~3.95v), humidity 45 to 85%。
		-20°C~40°C	≤1 month	
		-20°C~30°C	≤1 year	

Remarks :2.2,2.5 test results are subject to test within 7 days of receipt of goods ;2.6,2.7,2.8 items are recommended use parameters, different from actual protection parameters.

3. Cell

3.1.Cell outline drawing (Not In Scale)

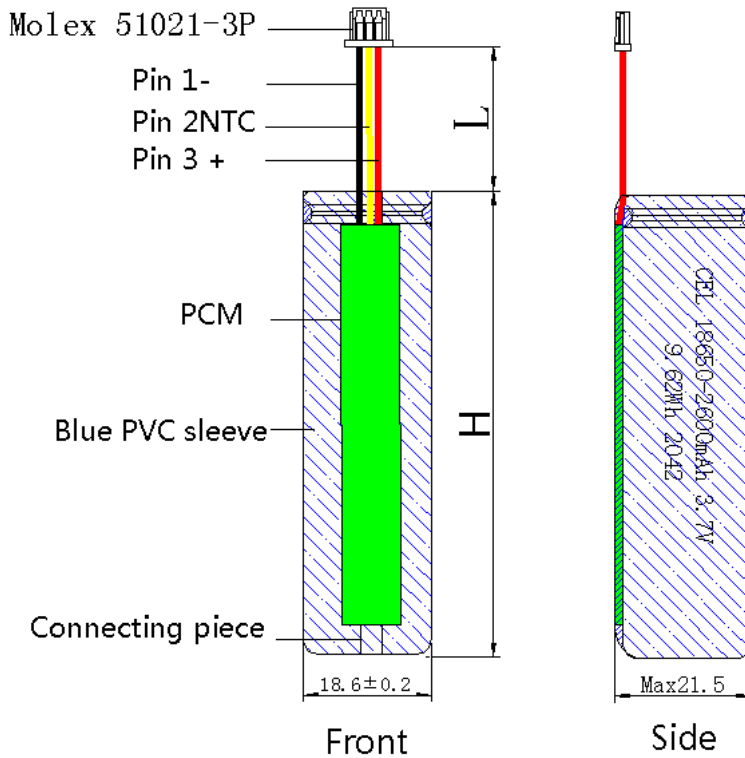


3.2.Cell Performance parameters

NO.	Item	Specification	Unit	Remarks	
1	Edgefold require	-	-	-	
2	Dimensions	D	Max 18.5	mm	Diameter
3		H	Max 65	mm	Cell length

4. Battery Outline Drawing

4.1. Battery Outline Drawing (Not In Scale)



4.2. Spray Content:

CEL 18650-2600mAh 3.7V
9.62Wh 2042

In the inkjet code, 2042 is the date, 20 represents 2020, 42 represents 42 weeks, and the year and week vary with the actual situation.

4.3. Battery Performance parameters

NO.	Item	Specification
1	Diameter Max D	21.50mm
2	width size Max W	-
3	Height size Max H	66.50mm (Not include the cable leading position on battery top)
4	The leakage line length L	50 ± 3mm
5	Direction of outgoing line	Up

4.4. BOM 1 (Bill of materials)

NO.	Material Name	Specification	Qty (PCS)
1	Cell	18650-2600mAh	1
2	Protection board	DPDW01+DP8205A+NTC (LP35055NTC)	1
3	Red wire	UL3302-26#	1
4	Black wire	UL3302-26#	1
5	Yellow wire	UL3302-26#	1
6	Connector / Polarity	Molex 51021-3P / Reverse	1
7	Barley paper	Insulation Barley paper	2



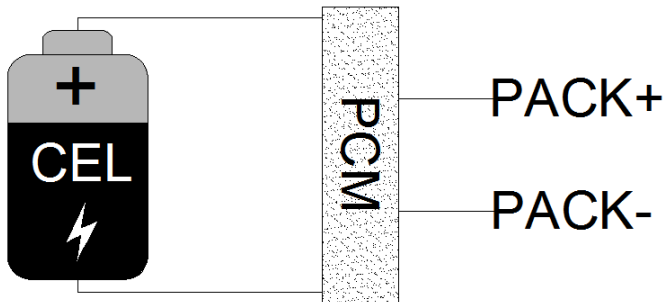
5. Battery protection characteristics (n=1)

5.1.Performance Parameter						
Protection scheme		DPDW01+DP8205A+NTC	Parameter Values			
			Normal temperature 25 °C			
No.	Item		Min	Type	Max	Unit
1	Overcharge	Detection voltage	4.23	4.28	4.33	V
2		Release voltage	4.03	4.08	4.13	V
3		Detection delay time	-	0.12	0.16	s
4	Over discharge	Detection voltage	2.3	2.4	2.5	V
5		Release voltage	2.9	3.0	3.1	V
6		Detection delay time	-	60	80	ms
7	Discharge overcurrent current	Detection overcurrent	2	-	6	A
8		Detection delay time	5	7	10	ms
9	Charge overcurrent	Detection overcurrent	-	-	-	A
10		Detection delay time	-	-	-	ms
11	Short protection	Short detection delay time	-	400	600	us
12		Release Conditions	Cut off load			
13	Consume electricity while working		-	-	8	uA
14	IR of PCM/PCM		-	-	65	mΩ
15	input Voltage(B+ to B-)/		-0.3	-	+12	V
16	Max continuous charge current				2.6	A
17	Max continuous discharge current		-	-	1.3	A
18	suggest working temperature		-40		+85	°C
19	0V Charging function/OV		Available			
20	NTC Resistor(25°C)/NTC		9	10	11	KΩ

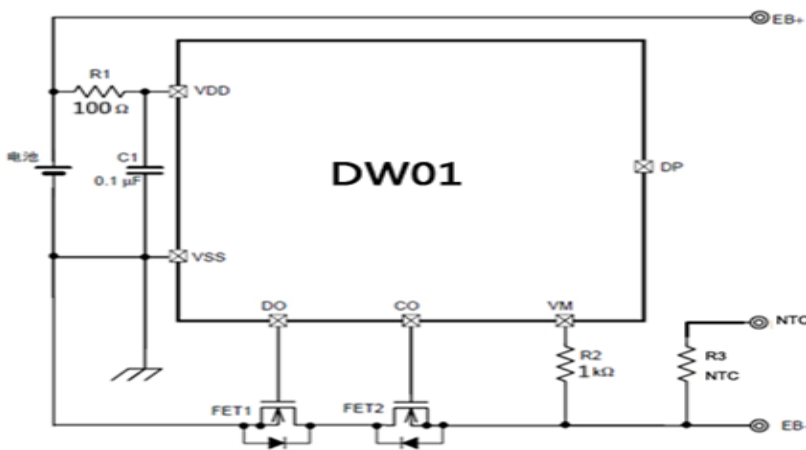
5.2.PCB Bom PCB

NO.	Name of material	Symb ol	Spec./Model	Size	Q'ty	Unit	Vendor	Rem arks
1	Protection IC	U1	DPDW01 Mark:	SOT-23-6	1	PCS	DP	
2	MOS Tube	Q1	DP8205 Mark:	TSSOP8	1	PCS	DP	
3	PCB	PCB	35*5.5*0.6mm	-	1	PCS	-	
4	SMD Resistance	R1	100Ω±5%	0603	1	PCS	YAGEO	
5	SMD Resistance	R2	1K±5%	0603	1	PCS	YAGEO	
6	SMD Capacitance	C1	0.1uF-20+80% 16- 25V	0603	1	PCS	YAGEO	
7	SMD Resistance	NTC	10KΩ±1%,B=3950	0603	1	PCS		

5.3.Battery structure diagram (Sketch map)



5.4.Schematic circuit diagram



5.5.PCB Layout PCB



6.General Performance

No.	Item	Test Methods and Condition	Criteria
6.1	standard charge	0.2C CC (constant current) charge to FC, then CV(constant voltage FC)charge till charge current decline to $\leq 0.01C$	About 300min
6.2	0.2C Capacity	At standard testing condition, after standard charging, rest battery for 10min, then discharging at 0.2C to voltage FD, recording the discharging time.	≥ 300 min
6.3	1C Capacity	At standard testing condition, after standard charging, rest battery for 10min, then discharging at 1C to voltage FD, recording the discharging Capacity	≥ 56 min
6.4	Cycle Life	At standard testing condition, constant current 0.2C charge to FC, then constant voltage charge to current declines to 0.01C, rest 10min. constant current 0.2C discharge to FD, rest 10min. Repeat above steps till continuously discharging capacity Higher than 80% of the Initial Capacities of the Cells	≥ 300 times
6.5	Capability of keeping electricity	At standard testing condition, After standard charging, no outer loading circuit, rest the pack 28days, discharging at 0.2C to voltage FD, recording the discharging time.	≥ 270 min

7. Condition adapting characteristics (n=1)

No.	Item	Test Methods and Condition	Criteria
7.1	High/low Temperature	After the battery full charging at 23°C±2°C, measure the discharging capacity with discharging current 0.2C till 3.0 (V) cut off voltage at different temperature. (as compared with initial capacity)	At -10°C is ≥70% At 55°C is ≥95%
7.2	Low pressure	Each fully charged cell is placed in a vacuum chamber, in an ambient temperature of 20~25°C. Once the chamber has been sealed, its internal pressure is gradually reduced to a pressure equal to or less than 11.6 kPa (this simulates an altitude of 15240 m) held at that value for 6 h.	No leakage, No fire, No explosion
7.3	Vibration	The full charging battery vibrate from 90 to 100 minutes at three mutually perpendicular planes with excursion of 0.8mm, and change the frequency from 10 to 55 HZ with 1Hz/min speed.	The battery has no distortion, no visible evidence of leakage fume fire or explosion the battery voltage ≥n×90% initial voltage.
7.4	Free fall	The battery fall from a height of 1m free fall into the cement floor, from X、Y、Z positive and negative direction of each direction free fall time, and with discharging current 1.0C till 3.0*n(V) cut off voltage.	No leakage, smoke, fire or explosion voltage ≥ n × 90% initial voltage (V) 无漏液、冒烟、起火或爆炸电压 ≥n×90% 初始电压 (V)

8. Safety performance (n=1)

No.	Item	Test Methods and Condition	Criteria
8.1	Forced Discharge test	A discharged cell is subjected to a reverse charge at 1C for 90 min.	No fire, No explosion

8.2	Overcharge Test	After discharged at a constant current of 0.2C5A to the cut-off voltage, the battery shall be charged at 1.0C/4.6V for 7.0hrs.	No explosion, No fire
8.3	Short test	The fully charged battery is to be short-circuited by connecting the positive and negative terminals of the battery with resistance load $80\pm 20\text{ m}\Omega$ Tests are to be conducted at room temperature $20\sim 25^{\circ}\text{C}$.	No fire, no explosion Cell surface temperature does not exceed 150°C
8.4	Projectile Test	In the ambient temperature, the battery is placed on the wire net of the alcohol lamp burning, until the battery is completely destroyed or the fire explodes	Any part of the octagon eight aluminum mesh is not damaged, not out of the battery eight aluminum mesh.
8.5	Soak Test	Put the fully charged batteries into clean water, be soaked for 24 hours.	No break, No fire
8.6	Crush test	Fully charged the battery in accordance with standard charge condition, the battery is to be crushed between two flat plates. Continuous to applied force on battery of 13kN(17.2Mpa), stopped until a pressure reading of 17.2Mpa is reached on the hydraulic ram	No fire, No explosion

※ Above testing of safe characteristic must be with protective equipment.

9. Testing requirements

NO.	Battery Standard testing condition (Unless otherwise specified, the test environment should comply with this requirement)	
9.1	Temperature	$23^{\circ}\text{C}\pm 2^{\circ}\text{C}$
9.2	Relative humidity	45~85% RH
9.3	Atmospheric pressure	86~106 kPa
9.4	Measuring instrumentation requirements	
9.4.1	Voltage instrumentation requirements:	Measuring the current meter accuracy no less than 0.5Magnitude
9.4.2	Current instrumentation requirements:	Measuring the current meter accuracy no less than 0.5magnitude
9.4.3	Time instrumentation requirements:	The instrument accuracy for measuring time shall not be less than 0.1%



9.4.4	Temperature instrumentation requirements:	Measuring the temperature meter accuracy no less than 0.5 °C
9.4.5	Impedance instrumentation requirements:	Measuring impedance should be by sinusoidal alternating (1KHZ) test

10. Warnings

To prevent the possibility of the pack from leaking, heating, fire, please observe the following precautions:

- ☆ The soft aluminum packing foil is very easily damaged by sharp edge parts such as Ni-tabs, pins and needles. Do not strike at pack with any sharp edge parts.
- ☆ Do not immerse the battery in liquid such as water, beverages, or other fluids.
- ☆ Do not use and leave the pack near a heat source as fire or heater.
- ☆ When recharging, use the battery charger specifically for that purpose.
- ☆ Do not reverse the positive and negative terminals.
- ☆ Do not connect the pack to an electrical outlet.
- ☆ Do not discard the pack in fire or heat it.
- ☆ Do not short-circuit the pack by directly connecting the positive and negative terminal with metal object such as wire.
- ☆ Do not transport and store the battery together with metal objects such as necklaces, hairpins etc.
- ☆ Do not strike or throw the pack.
- ☆ Do not directly solder the pack or battery and pierce the battery with a nail or other sharp object.

11. Cautions

- ☆ Do not use or leave the pack at very high temperature (for example, at strong direct sunlight or a vehicle in extremely hot conditions). Otherwise, it can overheat or fire or its performance will be degenerate and its service life will be decreased.
- ☆ It is prohibited to use or place the battery combination at high temperature (beyond the range of 2.10, 2.11, 2.13), or it may cause the battery to overheat, catch fire or function failure, which may result in the short battery life.

- ☆ Do not use it in a location where static electricity is great, otherwise, the safety devices in the pack may be damaged, which will cause hidden trouble of safety.
- ☆ If the pack leaks and the electrolyte get into the eyes, do not rub eyes, instead, rinse the eyes, with clean running water, and immediately seek medical attention. Otherwise, eye injury can result.
- ☆ If the pack takes off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during use, recharging or storage, immediately remove it from the device or battery charge and stop using it.
- ☆ In case the pack terminals are dirt, clean the terminals with a dry cloth before use.
Otherwise power failure or charge failure may occur due to the poor connection with the instrument.
- ☆ Be aware discharged battery may cause fire or smoke, tape the terminals to insulate them.
- ☆ The pack should be stored at room temperature, charged to about 40% to 60% of capacity (about 3.8~3.9V) . In case of over-discharge, pack should be charged for one time every 6 months while storing and batteries should be discharge and charge after being stored more than a year in order to activate it and restore energy.
- ☆ The battery pack should be stored at room temperature and should be charged 40 to 60 percent (3.7 ~ 3.95V).In order to prevent battery overdischarge, it is recommended to charge the battery every 6 months. If the storage time is longer than one year, it is recommended to charge and discharge the battery once a year to activate the battery.

12. Handling of Cells

- ☆ Soft Aluminum foil Easily damaged by sharp edge parts such as pins and needles, Ni-tabs, comparing with metal-can-cased.
 - △ Don't strike battery with any sharp edge parts.
 - △ Trim your nail or wear glove before taking battery.
 - △ Clean worktable to make sure no any sharp particle.
- ☆ Sealed edge may be damaged by heat above 100°C, bend or fold sealed edge.
- ☆ Prohibition short circuit.
Never make short pack circuit. It generates very high current which causes heating of the cells and may cause electrolyte leakage, gassing or explosion that are very dangerous. The LIP tabs may be easily short-circuited by putting them on conductive surface. Such outershort circuit may lead to heat generation and damage of the cell.



☆.Using, keep away from heat, High pressure place, and do not beat, hit the battery.

Battery end of life should be immediately removed from the equipment, Please properly handle security of spent batteries, do not put into fire or water.

☆Mechanical shock

LIP cells have less mechanical endurance than metal-can-cased LIB.

Falling, hitting, bending, etc. may cause degradation of LIP characteristics.

13.Period of Warranty

Please be sure to comply with this specification and the following precautions for using the battery. Dongguan Golden CEL Battery Co.LTD., will not assume any responsibility for any accident caused by not operating in accordance with the specification.

The period of warranty is one year from the date of shipment.CEL Battery guarantees to give a replacement in case of battery with defects proven due to manufacturing process instead of the customer abuse and misuse.

14. Others

1. The customer is requested to contact CEL Battery in advance, if and when the customer needs other applications or operating conditions than those described in this document. Additional experimentation may be required to verify performance and safety under such conditions.
2. CEL Battery will take no responsibility for any accident when the battery is used under other conditions than those described in this Document.
3. CEL Battery will inform, in a written form, the customer of improvement(s) regarding proper use and handling of the battery, if it is deemed necessary.
4. Any matters that this specification does not cover should be conferred between the customer and CEL Battery.

The contents of this document are not allowed to be used in whole or in part without the written consent of Dongguan Golden CEL Battery Co.LTD., so please keep it strictly confidential.