

# 圆柱型锂离子电池规格书

## Specification of Cylindrical Lithium-ion Rechargeable Cell

Model电芯型号: INR18650-20PA

应用领域: 高倍率电动工具

	Sign签名	Date日期
Customer		
Approval	Company Name: 公司名称:	
客户确认	Company Stamp: 公司印章:	

Document No 文件编号	Q/DMLDC技03.07-2018	Version No 版本号	B/3
Prepared By 制定	Standardized By 标准化	Checked By 审核	Approved By 批准

### 1.Scope 适用范围

This product specification has been prepared to specify the Cylindrical Lithium-ion Cell to be supplied to the customer by HENGDIAN GROUP DMEGC MAGNETICS Co.,Ltd.

本规格书适用于由横店集团东磁股份有限公司生产的圆柱型锂离子电芯。

### 2.Description and Model 型号及说明

2.1 Description 说明 Cell (Cylindrical Lithium-Ion Cell) 圆柱型锂离子电芯

2.2 Model 电芯型号 INR18650-20PA

### 3.Cell specification 电芯特性

NO. 序号	ITEM 项目	SPECIFICATION 特性规格
3.1	Normal capacity 标称容量	2000 mAh @0.2C
3.2	Minimum capacity 最小容量	1900 mAh @0.2C (Discharge the cell from 4.2V to 2.50V by 0.2C current) (电芯以 0.2C 从 4.2V 放电至 2.50V)
3.3	Internal resistance 内阻	≤18 mΩ (ACIR)
3.4	Normal voltage 标称电压	3.7V
3.5	Charging voltage 充电电压	4.2 ±0.05 V
3.6	Discharge ending voltage 放电终止电压	2.50±0.05 V
3.7	Standard charging current 标准充电电流	0.5C (1.0A)
3.8	Standard charge cut-off current 标准充电截止电流	0.05C(100 mA)
3.9	Max charge current (continuous) 最大持续充电电流	1C(45°C>T≥20°C) 0.5C(20°C>T≥10°C) 0.2C(10°C>T≥0°C)
3.10	Max discharge current (continuous) 最大持续放电电流	10C (20A) (60°C>T≥20°C) 7.5C (15A) (20°C>T≥0°C) 5C (10A) (0°C>T≥-10°C)
3.11	Cell dimension 电芯尺寸	Height (高度) : ≤65.5mm Diameter (直径) : ≤18.6mm Refertotheattacheddrawing1 参考附图 1

3.12	Weight 重量	< 45g
3.13	Max recommended charge and discharge cell body temperature 充放电过程中电芯表面的最大推荐温度	Charge: 0~ 45°C Discharge: -20~ 75°C 充电时: 0~45°C 放电时: -20~75°C
3.14	Max. period charge and discharge cell body temperature. Charging and discharging at these conditions will shorten cell cycle life. 周期充放电过程中电芯表面的最大推荐温度 (在这些情况下充放电将会导致电池循环寿命很快衰减)	Charge: 50°C Discharge: 80°C 充电时: 50°C 放电时: 80°C
3.15	Storage Temperature 存储温度	1 year: -20~ 25°C 3 month: -20~ 45°C 1 month: -20~ 60°C 1年: -20~ 25°C 3个月: -20~ 45°C 1个月: -20~ 60°C
3.16	Humidity range 湿度范围	0~90%RH(non-condensing 不冷凝)

#### 4. APPEARANCE 外观

There shall be such defect as deep scratch、pits、creck、rust、leakage, which may adversely affect commercial performance of the cell.

电芯外观不存在明显的刮痕、凹坑、裂痕、锈蚀、漏液等影响电池性能的外观不良。

#### 5. Technical characteristics 技术要求

##### 5.1 Cell usage conditions 电芯使用环境

Temperature of charge 充电温度: 0~45°C

Temperature of discharge 放电温度: -20~60°C

##### 5.2 Cell testing conditions 电芯试验环境

Unless otherwise specified, all tests stated according to following: Temperature: 25±2.5°C

除非有特殊说明, 所有测试的环境条件要求如下: 温度: 25±2.5°C

##### 5.3 Requirement of the testing equipment 测量仪表要求

Voltage meter: The voltage tester internal resistance is  $\geq 10 \text{ K}\Omega/\text{V}$

电压仪表要求: 测量电压的仪表内阻不小于 10KΩ/V

Temperature meter: The precision is  $\leq 0.5^\circ\text{C}$

温度仪表要求: 测量温度的仪表精度不低于 0.5°C

## 5.4 Electronic performance 电性能

### 5.4.1 Standard charge 标准充电

This "Standard charge" means charging the cell with constant current 0.5C and then with constant voltage 4.2V 100mA cut-off at 25±3°C.

标准充电定义为 25±3°C下，0.5C 恒流充电至截止电压 4.2V，恒压截止电流至 100mA。

### 5.4.2 Standard discharge capacity 标准放电容量

The standard discharge capacity is the initial discharge capacity of the cell, which is measured with discharge current of 0.2C with 2.50V cut-off at 25±3°C after the standard charge.

标准放电容量是指 25±3°C时标准充满电后，0.2C 恒流放电至截止电压 2.50V 所得到的容量。

### 5.4.3 Standard rated discharge capacity 标准倍率放电容量

The standard discharge capacity is the initial discharge capacity of the cell, which is measured with discharge current of 10C with 2.50V cut-off at 25±3°C after the standard charge.

Standard discharge capacity ≥ 1800mAh

标准倍率放电容量是指电池的初始放电容量，按如下形式，在 25±3°C下，按照标准充满电后，10C 恒流放电至截止电压 2.50V 所得到的容量，数据如下：

标准倍率放电容量 ≥ 1800mAh

### 5.4.4 Temperature dependence of discharge capacity 温度与放电容量的关系

Capacity comparison at each temperature, measured with discharge constant current 10A and 2.5V cut-off after the standard charge is as follows.

不同温度下容量的对比，按如下形式测试，标准充电后按 10A 恒流放电至截止电压 2.5V 所得到的容量，数据如下：

Discharge temperature 放电温度			
-10°C	0°C	25°C	60°C
60%	80%	100%	95%

Note: If charge temperature and discharge temperature is not the same, the interval for temperature change is three (3) hours. Percentage as an index of the capacity at 25°C(=1900mAh) is 100%.

备注：如果充放电温度不一致，充电后在测试的温度环境中搁置 3 小时；表中的百分比值，按 25°C (=1900mAh)的容量作为参照比。

#### 5.4.5 Discharge rate capabilities 倍率放电性能

Discharge capacity is measured with the various currents in under table and 2.50V cut-off after the standard charge.  
 放电容量按如下测试，标准充电后，按照不同的电流恒流放电至截止电压 2.50V 所得到的容量。

Discharge Condition 放电条件				
Current 电流	0.2C	1.0C	5.0C	10.0C
Relative Capacity 容量比率	100%	95%	90%	85%

Note: If charge temperature and discharge temperature is not the same, the interval for temperature change is three (3) hours. Percentage as an index of the capacity at 25°C(=1900mAh) is 100%.

备注：如果充放电温度不一致，充电后在测试的温度环境中搁置 3 小时；表中的百分比值，按 25°C (=1900mAh)的容量作为参照比。

#### 5.4.6 Cycle life 循环测试

Each cycle is an interval between the standard charge at 25±3°C, rest 10minutes, and the discharge (discharge current 10C) with 2.50V cut-off, then rest 45 minutes. After 300 cycles, Capacity ≥ 1500mAh (75% of the standard discharge capacity at 25°C).

在 25±3°C下标准充电后，休息 10 分钟，10C 恒流放电至截止电压 2.50V，休息 45 分钟，为一个循环。循环 300 次后，容量≥ 1500mAh (25°C标准放电容量的 75%)。

#### 5.4.7 Storage characteristics 储存特性

Storage for 30 days at 25±3°C from the standard charge, measured with discharge constant current 400mA with 2.50V cut-off at 25°C.

Capacity retention(after the storage) ≥1800mAh (90% of the standard discharge capacity at 25°C).

标准充电后，在环境温度 25±3°C的条件下存储 30 天，25°C下以 400mA 恒流放电至截止电压 2.50V 所得的容量。

剩余容量（储存后）≥ 1800mAh（25°C下标准放电容量的 90%）。

### 5.5 Environmental characteristics 环境适应性能

NO. 序号	ITEM 测试项目	CRITERION 性能标准	TESTING METHOD 测试条件与方法
5.5.1	Vibration 振动性能	There shall be no electrolyte leakage 电解液无泄漏	<p>After standard fully charge, cell shall be attached to a vibration table directly and subjected to vibration that consists of 10 Hz to 55 Hz to 10 Hz 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.</p> <p>将满电电芯放在振动实验台上，在 90~100mins 由 10 Hz 到 55 Hz 再到 10Hz 以 1Hz/min 的速率变化，振幅为 0.8mm(0.060 英寸)进行振动实验。电芯在电芯的轴向和与电芯轴向垂直的两个方向上振动。</p>

5.6 Safety characteristics 安全性能

NO. 序号	ITEM 测试项目	CRITERION 性能标准	TESTING METHOD 测试条件与方法
5.6.1	Overcharge Testing 过充测试	No leakage、 No flame 、 No fire、 No explosion 不漏液、不冒烟、不起火、不爆炸	The cell is discharged according to the standard discharge method. Apply a 1C Constant current 12V constant voltage charge for 1.5h. 电芯按照标准放电方式放完后，采用 1C 和 12V 的恒流恒压充电 1.5 小时。
5.6.2	130°C Hot oven Testing 130°C热箱测试	No fire 、 No explosion 不起火、不爆炸	After fully charging the cell following the standard charge method and put in the oven. And then the oven temperature will be ramped at 5°C per minute to 130°C, When the temperature of the oven reach 130°C, the cell is maintained in the 130°C oven for 60 minutes or until fire or explosion is obtained and Record the time that the cell temperature reaches 130°C and the time when a fire or explosion occurs. 电芯按照标准充电方式充满电后，将电芯放进烘箱里，然后将烘箱按 5°C/min 升温到 130°C，当烘箱的温度也达到 130°C时，电芯在烘箱 130°C环境下保持 60 分钟或者电芯起火爆炸为止。记录电芯温度升至 130°C起直到电芯起火或爆炸的时间。
5.6.3	Crush Testing 挤压测试	No fire 、 No explosion 不起火、不爆炸	After fully charging the cell following the standard charge method and Put it between two flat surfaces for a Crush Test. The direction of the crushing force shall be vertical to axis of the cylinder. Using a pressure device which has a 32mm diameter Hydraulic piston with 13 KN Crushing force ,Release the pressure immediately until the maximum is reached. 电芯按照标准充电方式充满电后，放在两个平整的表面进行挤压测试，压力器必须施加一个与圆柱电芯轴向垂直的力，平压于电芯。采用 32 mm 直径的液压活塞，所用压力为 13 KN，一旦达到最大压力值，即释放压力。
5.6.4	Short circuit Testing 短路测试	No fire 、 No explosion 不起火、不爆炸	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 50mΩ. 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 then peak temperature. 电芯按照标准充电方式充满电后，在室温条件下进行短路实验，将接有热电偶的电芯置于通风橱中，用铜线短路其正负极(线路总电阻不大于 50 毫欧)，实验过程中监视电芯温度变化，当电芯温度下降到比峰值低 10°C时，结束实验。

5.6.5	Impact Testing 重物冲击测试	No flame、No fire、No explosion 不冒烟、不起火、不爆炸	<p>After fully charging the cell following the standard charge method, then the cell was placed on a flat surface so that the longitudinal axis of the cell shall be parallel with it. A 15.8mm diameter bar is to be placed across the center of the sample. A 9.1kg weight is to be dropped from a height of 61cm on the sample.</p> <p>电芯按照标准充电方式充满电后，水平放置于一个与电芯纵轴平行的平板。将一直径Φ15.8mm的棒放在样品中心，让重量9.1kg的重物从610mm的高度落到实验电芯上</p>
Note 备注	<p>All above safety tests will be conducted at 25±3°C except where specified differently. Use proper ventilation with protective equipment.</p> <p>除特殊说明，以上所有安全测试均应在25±3°C通风橱中，且附带有保护装置的条件下进行。</p>		

## 6. Warning and cautions in handling the lithium-ion cell

### 电芯使用时警告事项及注意事项

To prevent the possibility of the cell from leakage, heating, explosion, please observe the following precautions:  
为防止电芯可能发生泄露，发热，爆炸，请注意以下预防措施：

Don't immerse the cell in water. Cell should be placed in a cool and dry environment

严禁将电芯浸入水中，保存不用时，应放置在阴凉干燥的环境中。

Don't use and leave the cell near a heat source such as fire or heater.

禁止将电芯在热高温源旁，如火，加热器等旁边使用和留置。

When charging, use a cell charger specifically for that purpose.

充电时请选用锂离子电芯专用充电器。

Don't reverse the positive and negative terminals.

严禁颠倒正负极后使用电芯。

Don't connect the cell to an electrical outlet directly.

严禁将电芯直接插入电源插座。

Don't discard the cell in fire or heater.

禁止将电芯丢入火或加热器中。

Don't connect the positive and negative terminals directly with metal objects.

禁止用金属直接连接电芯正负极，造成短路。

Don't transport and store the cell together with metal objects such as necklaces, hairpins.

禁止将电芯与金属，如发卡、项链等一起运输或存储。

Don't strike, throw or trample the cell.

禁止敲击，抛掷或踩踏电芯等。

Don't directly solder the cell.

禁止直接焊接电芯。

Don't pierce the cell with a nail or other sharp object.

禁止用钉子或其它利器刺穿电芯。

Don't use or leave the cell at very high temperature conditions (for example, strong direct sunlight or a vehicle in extremely hot conditions).



禁止在高温下（直热的阳光下或很热的汽车中）使用或放置电芯，否则可能会引起电芯过热，起火或功能失效，寿命减短。

If the cell leaks and the electrolyte get into your eyes, don't wipe eyes, instead thoroughly rinse the eyes with clean running water, and immediately seek medical attention if necessary. Otherwise, eyes injury can result.

如果电芯发生泄露，电解液进入眼睛，请不要搓揉，应用清水冲洗眼睛，必要时请立即前往医院接受治疗，否则会伤害眼睛。

If the cell gives off an odor, generates heat, becomes discolored or deformed, or in any way appear abnormal during usage, recharging or storage, immediately remove it from the device or cell charger and stop using it.

如果电芯发出异味，发热，变色，变形或使用、存储、充电过程中出现任何异常现象，立即将电芯从装置或充电器中移开并停用。

In case the cell terminals get dirty, clean the terminals with a dry cloth before use.

如果电芯弄脏，使用前应用干布抹净。

## 7.The restriction of the use of hazardous substances 有害物质控制要求

This model of lithium-ion cell is in accordance with our company's request of "environmental substances control standard".

本型号锂离子电芯符合本公司“环境物质控制标准”要求！

## 8. Guarantee 保证

Cells are guaranteed to be free from defects in workmanship and materials for a period of half a year provided that the manufacturer can confirm such defects are resulted from manufacturing abnormality, not from abusive usage, or else manufacturer will solve the quality problem. DMEGC won't replace a new cell for free if the defects are not due to the failure of manufacturing process or is due to customer's abuse or misuse.

电芯正常使用半年内，经确认出现任何制程而非滥用原因造成的质量问题，均由生产厂方予以解决。此期限外，非制程原因而是客户误用造成的电芯质量问题，东磁不承诺免费更换。

8.1.DMEGC will not be responsible for trouble occurred by against the precautions in instructions.

东磁公司对违反安全守则操作所产生的问题不承担任何责任。

8.2.DMEGC will not be responsible for trouble occurred by matching problems with electric circuit, cell pack and charger.

东磁公司对于电路，电池组以及充电器搭配使用所产生的问题不承担任何责任。

8.3.DMEGC will be exempt from warrantee any defect cells during assembling after acceptance.

东磁公司对于出货后客户在电芯组装过程中产生的不良电芯不予以质量保证。

## 9. Activation 激活

Please activate the battery once every three months according to the following method:Charge at a constant current and constant voltage of 0.2C to 4.2V, and cut-off 0.01C, rest ten minutes, then discharge at a constant current of 0.2C to 2.75V, and rest ten minutes, then charge at a constant current of 0.2C for three hours.

If the battery has been assembled or used, use the suitable matched charger and machines to activate.

电池每隔 3 个月激活电池一次，标准的激活方式为：0.2C 恒流恒压充电至 4.2V，0.01C 截止，休息 10 分钟，然后用 0.2C 恒流放电至截止电压 2.75V，休息 10 分钟，再 0.2C 恒流充电 3 小时。

如电池已被装配或已使用，须用配套的充电器和机器做激活。





#### 10. Package 包装

100 cells per box, 2 boxes into a case, totally 200 cells. Sketch map refers to attached drawing 2  
电芯包装每盒装 100 只电芯，每箱装 2 盒，共 200 只电芯。包装示意图见附图 2。

#### 11. OTHERS 其它

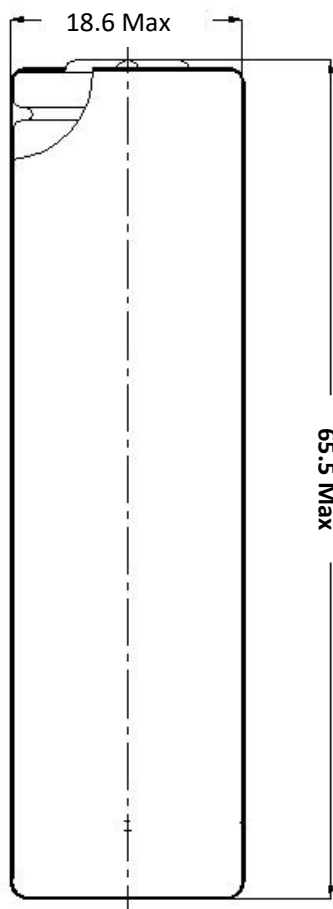
Any matter not included in this specification shall be conferred between the both parties.  
不包含在此产品规格书之内的任何问题，由双方协商解决。

#### 12. Shipping 运输

The capacity of delivery cell is approximately at 20-30% of charging. It is not guaranteed that 20-30% capacity remain when reach customer, because of self-discharge. During transportation, prevent the cell from acutely vibration, impacting, solarization, drenching.

出货电芯处于 20-30% 充电状态，由于电芯存在自耗，运送到客户端的电芯无法完全保证 20-30% 荷电量。运输过程应防止剧烈振动、冲击、日晒、雨淋。

Attached drawing1 附图 1单位: mm



Attached drawing2 附图2

