APPROVAL SHEET

SEALED NICKEL CADMIUM
RECHARGABLE CELLS & BATTERIES

TO: _____

BST MODEL NO.: D-D4000BT

CUSTOMER APPROVED P/N: _____

DATE OF SUBMISSION: _____

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(with company chop)

Please sign and return one copy to us

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1. SCOPE 范围

This specification is suitable for the following sealed Nickel Cadmium cylindrical rechargeable single cell and batteries produced by the BST POWER (SHENZHEN) LIMITED.

此规格书仅适用于电科电源（深圳）有限公司所生产的镍镉可充电单体电池以及电池组

2. Model 型号

D-D4000BT

IEC Size 国际标准尺寸: KR33/62

3. RATINGS 标称定额

3.1 Nominal voltage 标称电压: 1.2V

3.2 Nominal capacity 标称容量: 4000mAh at 0.2CmA

3.3 Typical weight 典型重量: 127g

3.4 Standard charge 标准充电: 400mA×15hours

3.5 Standard discharge 标准放电: 800mA to 1.0V

3.6 Tickle charge 涓流充电: 120～250mA

3.7 Discharge cut-off voltage 放电终止电压: 1.0V

3.8 Temperature range for operation 工作温度: (Humidity 湿度: Max.最大 85%)

Standard charge 标准充电: 0～+70℃

Trickle charge 涓流充电: 0～+70℃

Discharge 放电: -20～+70℃

3.9 Temperature range for storage 储存温度: (Humidity 湿度: Max. 最大 85%)

Within 1 years 一年以内: -20～+25℃

Within 6 months 六个月以内: -20～+30℃

Within a months 一个月以内: -20～+40℃

Within a week 七天以内: -20～+50℃

4. APPEARANCE 外观

There shall be no such defect as discoloration or electrolyte leakage or zero voltage 没有诸如变色、漏液及零电压现象

5. PERFORMANCE 性能测试

5.1 TEST CONDITIONS 测试条件

The test is carried out with new batteries.(within a month after delivery, the batteries should be discharged to 1.0V at 0.2C before any testing) 电池测试必须使用交付后一个月内的新电池，在进行任何测试前，电池应用 0.2C 的电流放电到 1.0V

Ambient conditions:环境要求

Temperature 温度: +20±5℃

Humidity 相对湿度: 65±20%

5.2 TEST METHOD & PERFORMANCE 测试方法及性能要求

Test item 测试项目	Unit 单位	Spec 规格	Conditions 条件	Remarks 备注
Capacity 容量	mAh	≥4000	Standard charge/discharge 标准充电/标准放电	Up to 3 cycles are allowed 允许循环 3 次
Open Circuit Voltage (OCV) 开路电压	Volt	≥1.25	Rest for 1 hour after standard charge 标准充电后搁置 1 小时	1.25V/cell 1.25V/每只单体
Internal impedance(R) 内阻	mΩ	≤15	After fully charge (at 1000Hz) 充满电后用 1KHz 测试	Per Pack 每组电池
High rate discharge 大电流放电	minute	≥108	Standard charge and discharge at 0.5CmA 标准充电后用 0.5C 电流放电	End voltage is 1.0V/pks 终止电压 1.0/组
Overcharge 过充	mA	400(0.1C)	Continuous charge 28days at 0.1C and stored for 30minutes, discharge to 1.0V at 0.2C 用 0.1C 电流连续充电 28 天，搁置 30 分钟，电池以 0.2C 放电到 1.0V	No leakage nor deformation/discharge time ≥300min 电池无漏液变形，放电时间大于 300 分钟
Charge retention 荷电保持率	mAh	≥2600 (65%)	Standard charge;标准充电 Storage: 28days 储存 28 天 Standard discharge 标准放电	End voltage is 1.0V/pks 终止电压 1.0/组
Safety device operation 安全阀启动测试	N/A	No disrupt nor burst 不爆炸不爆裂	Forced discharge is conducted for 60minutes at 1C after pre-discharge at 0.2C to 0V 先将电池以 0.2C 放电到 0V 后再用 1C 电流强行放电 60 分钟	Leakage of electrolyte and deformation are acceptable 允许电池有漏液和变形
Short circuit 短路测试	N/A	No disrupt nor burst 不爆炸不爆裂	Fully charged and short circuit for 60minutes 充满电后短路 1 小时	Leakage and deformation are acceptable 允许电池有漏液变形

5.3 Permanent charge endurance 持久充电的耐受性

Prior to this test, the cell shall be discharged at 0.2C at 20±5℃ to a final voltage of 1.0V and stored, in an ambient temperature of 40±2℃, for not less than 16h and not more than 24h.在测试之前，电池必须在室温 20±5℃下用 0.2C 电流放电到 1.0V，然后在 40±2℃室温下储存 16-24 小时

IEC61951-1/7.4.2.3 （ex IEC60598-2-22 – 2002§22.6.8）

Cycle Number 循环次数	Ambient Temperature 环境温度	Charge 充电	Discharge A or B[a] 放电	Minimum discharge Duration 最小放电时间
1	40±2℃	0.05C for 48h	A: 0.2C to 1.0V or B: 1.0C to 1.0V	No requirement No requirement
2		0.05C for 24h	A: 0.2C to 1.0V or B: 1.0C to 1.0V	3h 45min 42min
3		0.05C for 24h	A: 0.2C to 1.0V or B: 1.0C to 1.0V	3h 45min 42min
4	70±2℃	0.05C for 60days	A: 0.2C to 1.0V or B: 1.0C to 1.0V	No requirement
5		0.05C for 60days	A: 0.2C to 1.0V or B: 1.0C to 1.0V	
6		0.05C for 60days	A: 0.2C to 1.0V or B: 1.0C to 1.0V	
7	40±2℃	0.05C for 48h	A: 0.2C to 1.0V or B: 1.0C to 1.0V	No requirement No requirement
8		0.05C for 24h	A: 0.2C to 1.0V or B: 1.0C to 1.0V	2h 30min 24min
9		0.05C for 24h	A: 0.2C to 1.0V or B: 1.0C to 1.0V	2h 30min 24min

[a] A: for LT, MT or HT cells B: for MT or HT cells only.

5.4 Special clause for Emergency Lighting luminaries 适用于应急灯的特殊条款

Item	Technical Data	International standards Clauses
cells intended for permanent charge at elevated temperature	Yes	IEC 61-951-1 (ex IEC61436) §7.2 IEC 61-951-1 (ex IEC61436) §7.4.2.3 and 7.9 (test simulating 4 years of permanent charge at +40℃)
Expected operation life under following conditions: ·Maximum continuous temperature ·Maximum occasional temperature ·Permanent charging current ·Charge – Maintenance charge at 40℃ ·Discharge frequency ·Minimum operating time	＞4years +55℃ +65℃(1 month) 200mA max 24h at 0.05C 1 disch/month 1 hour at 0.6C 3 hours at 0.25C	IEC 60598.2.22 – 2002 clause 22.6.8 IEC 60598.2.22 – 2002 Annex A

5.5 Charge acceptance at ＋55℃ 电池在＋55℃下充电效率

Prior to this test, the cell shall be discharged at 0.2C at 20±5℃ to a final voltage of 1.0V and stored, in an ambient temperature of 55±2℃, for not less than 16h and not more than 24h. 在测试之前，电池必须在室温 20±5℃下用 0.2C 电流放电到 1.0V，然后在 55±2℃室温下储存 16-24 小时

ICEL 1001

Cycle Number 循环次数	Ambient Temperature 环境温度	Charge 充电	Discharge [a] 放电	Minimum discharge Duration 最小放电时间
1	55±2℃	1/16C for 48h	0.25C to 1.0V	No requirement
2		1/16C for 24h	0.25C to 1.0V	180 min
3		1/16C for 24h	0.25C to 1.0V	180 min
4	70±2℃	Continuous charge 1/16C for 28 days		
5	70±2℃	discharge to 1.0V at 0.25C, no minimum duration required		
6	55±2℃	1/16C for 48h	0.25C to 1.0V	No requirement
7		1/16C for 24h	0.25C to 1.0V	180 min
8		1/16C for 24h	0.25C to 1.0V	180 min
Note: Battery should be no deformation, leakage and short circuit during all testing period 测试过程中，电池应无变形、漏液及短路				

5.6 Vibration 振动测试

Cells shall be mechanically and electrically normal after vibration which has an amplitude of 4mm (0.1575inches) a frequency of 1000 cycles per minute (16.7Hz), which should be continued in three directions (X, Y, Z) for 60 minutes.

电池在振幅 4mm，频率 16.7 Hz 的条件下，以 X, Y, Z 三个方向振动 60 分钟后，其机械性能和电性能保持不变

5.7 Incorrect polarity charging 反向充电

Cells shall not explode after 1 hours of incorrect polarity charging at 0.5CmA.

电池以 0.5C 电流反向充电 1 小时后无爆炸

6. PRECAUTION 注意事项

6.1 We recommend you to set the cut-off voltage at 1.0V/cell.
建议设定 1.0V 为电池的放电终止电压

6.2 Do not subject batteries to adverse condition such as extreme temperature, deep cycling and excessive over charge/over discharged.
不要使电池处于极端高温，深度循环以及过充过放的不利环境

6.3 Do not detect – Δ V for first 5 minutes of charging.
在充电的前 5 分钟不要检测– Δ V

6.4 The cells shall be delivered in charged condition, before testing or using, the cells shall be correctly charged or discharge in accordance with this specification.
电池在交付时可能带电，在测试或使用前，请按此规格书要求的充放电方式进行作业

6.5 Avoid direct soldering onto cells.
避免直接在电池外壳上焊锡

6.6 Observe correct polarity when connecting.
在连接时需确认电池的极性

6.7 Do not charge with more than our specified current.
不能用超过我们规定的电流进行充电

6.8 Use only within the specified working temperature range.
确保电池在规定的工作温度下使用

6.9 Never put a battery into water or seawater
不要将电池投入水或海水中

6.10 Avoid throwing cells into a fire or attempting to disassemble them. As the electrolyte inside is strong alkaline and can damage skin and clothes.
不要将电池投入火中或试图解剖，因为电池内部有强碱，会伤害皮肤和衣服

6.11 Avoid short-circuiting. It may be leakage.
避免将电池短路，会产生漏液

6.12 Keep away from children, if swallowed, contact a physician at once.
避免儿童接触电池，如不慎吞咽，请立即看医生

6.13 Do not mix BST batteries with other battery brands or batteries of a different chemistry such as alkaline and zinc carbon.
不要将 BST 品牌电池与其它品牌电池或不同化学结构诸如碱性锌电池混用

6.14 During long term storage, battery should be charge and discharge once ever half a year
长期贮存期间，电池每半年必须进行充放电一个循环

7. DATA SHEET 数据表

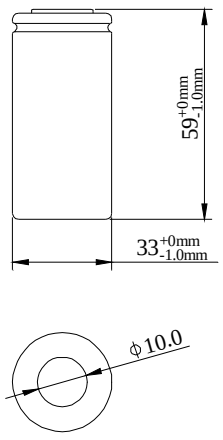
BST BATTERY

DATA SHEET
Model No.:D-D4000BT

Specification

Nominal Voltage		1.2V	
Capacity (mAh)	Rate	0.2C	0.5C
	Nominal	4000	3600
	Typical	4050	4000
Approx Weight		127g	
Internal Resistence(at 1KHz)		⩽15mΩ	
Charge	Standard	0.1C ×15hrs	
	Trickle	0.03C－0.0625C	
Discharge cut-off voltage		1.0V	
Operation temp.	Standard charge	0℃－70℃	
	Trickle charge	0℃－70℃	
	Discharge	-20℃－70℃	
Storage temp.	Within 6 month	-20℃－30℃	
	Within a month	-20℃－40℃	
	Within a week	-20℃－50℃	
Relative humidity		65±20%	

Dimension



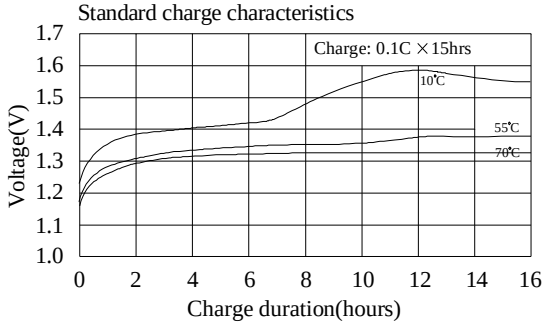
(with tube)

NOTE:

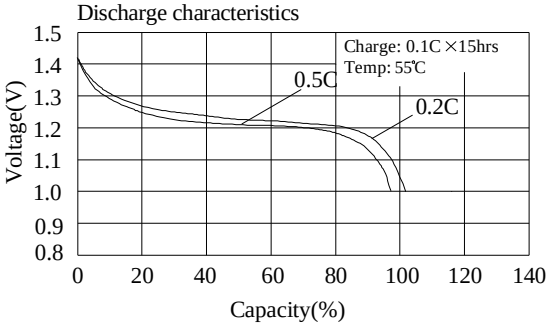
1. Nominal capacity rated at 0.2C
2. Other capacity are for reference
3. Weight and internal resistance are for reference

Typical characteristics

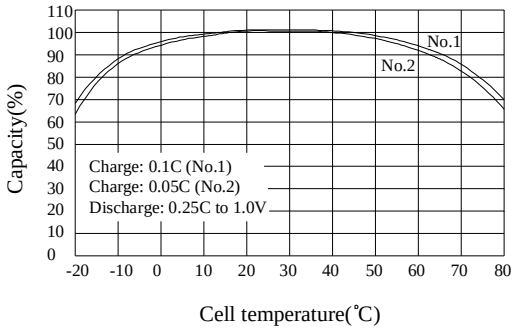
Standard charge characteristics



Discharge characteristics



Charge efficiency after differe nt charge rate



Capacity change in permanent cha rge