

Confidential

Control Number

SP-BK-300SCEY1-01-05

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To: PAISEU

### Delivery Specification

**Products Name:** Sealed Nickel Metal Hydride Rechargeable Battery

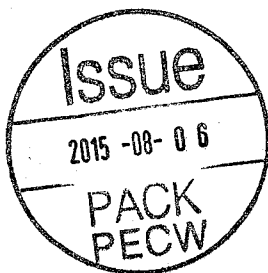
**Customer P/N:** —




**Panasonic P/N:** BK-300SCEY1

Received by Customer

Received on:

Panasonic Corporation  
Automotive & Industrial Systems Company  
Energy Device Business Division  
Panasonic Energy (Wuxi) Co.,Ltd.



Panasonic Energy (Wuxi) Co.,Ltd.		
Approved	Checked	Prepared
	 	



# SEALED NICKEL METAL HYDRIDE BATTERIES

## BK-300SCEY1 Specification

### 1. Application Range

This specification applies to the Sealed Nickel Metal Hydride Rechargeable Batteries for

PAISEU

### 2. Rating specification

o Model	<u>BK300SCE</u>
o IEC designation	<u>HR23/43</u> (Cell)
o Nominal Voltage	<u>1.2</u> V
o Rating (minimum)Capacity	<u>2800</u> m A h
o Average Capacity (for reference only)	<u>3050</u> m A h
o Standard Charge Rate	<u>280</u> m A × 1 6 hours
o Rapid Charge Rate	<u>3000</u> m A (with the following charge conditions)

#### (charge condition)

Value of $dT/dt$ (for reference only)	<u>1 ~ 2</u> °C/m i n
Value of $-\Delta V$ per cell	<u>5 ~ 10</u> m V (Cell)
Value of $T_{co}$	<u>60</u> °C
Trickle current with timer	<u>93 ~ 140</u> m A (with timer)

All rapid charge systems should be discussed with our engineer.

o Standard Discharging	<u>560</u> m A
o Discharge Cut-off Voltage	<u>1.0</u> V

(When you use single battery by series, refer to "Cautions of the design of battery-operated products 5-4".)

o Maximum Continuous Discharge Current	<u>30000</u> m A (20°C, single cell)
o Operating Temperature Range( $T_a$ )	(Humidity : +65 %±20 %)
Standard charge	$0^{\circ}\text{C} \leq T_a \leq +45^{\circ}\text{C}$ ( $32 \leq T_a \leq 113^{\circ}\text{F}$ )
Rapid charge	$0^{\circ}\text{C} \leq T_a \leq +40^{\circ}\text{C}$ ( $32 \leq T_a \leq 104^{\circ}\text{F}$ )
Discharge	$-10^{\circ}\text{C} \leq T_a \leq +65^{\circ}\text{C}$ ( $14 \leq T_a \leq 149^{\circ}\text{F}$ )
o Storage Temperature Range( $T_a$ )	(Humidity : +65 %±20 %)
within 1 year	$-20^{\circ}\text{C} \leq T_a < +35^{\circ}\text{C}$ ( $-4 \leq T_a < 95^{\circ}\text{F}$ )
within 6 months	$-20^{\circ}\text{C} \leq T_a < +45^{\circ}\text{C}$ ( $-4 \leq T_a < 113^{\circ}\text{F}$ )
within 1 month	$-20^{\circ}\text{C} \leq T_a < +55^{\circ}\text{C}$ ( $-4 \leq T_a < 131^{\circ}\text{F}$ )
within 1 week	$-20^{\circ}\text{C} \leq T_a \leq +65^{\circ}\text{C}$ ( $-4 \leq T_a \leq 149^{\circ}\text{F}$ )

Rated capacity figures are based on single cell performance.

We recommend cells or batteries are charged at least once every year (if possible every 6 months).

In use or storage, avoid condensation.

Discuss about a condition of above outside separately.

### 3. Assembly & Dimension

Drawing No. W21300382-1

Cell is composed with Positive electrode, Negative electrode, Separator, and Steel case. Positive and Negative electrode is separated by Separator, and received in case, closed up by Positive electrode collector.

Positive electrode collector is composed with Cap, Sealing plate and Insulation ring. Case is negative and is covered by tube or label.

### 4. Test

#### 4-1 Test Condition

- (1) All tests are carried out on new cells or batteries. (within one month after delivery)
- (2) Ambient conditions :
- |             |             |
|-------------|-------------|
| Temperature | +20 °C±5 °C |
| Humidity    | +65 %±20 %  |

#### 4-2 Test method and judgment criteria. Refer to appended table.

### 5. Others

#### 5-1 Packing state

- o The cell or battery shall be **charged state** at shipping.

#### 5-2 Cut-off voltage

- o We recommend a cut-off voltage of 1.0 to 1.1 V per cell.
- o If the cut-off voltage is above 1.1 V per cell, the battery may be underutilized resulting in insufficient use of the available capacity
- o If the cell voltage drops below 1.0 V per cell, the battery may become over discharged or reverse charged.  
In case of over 2It mA discharge a cut-off voltage should be 0.8 V per cell.

#### 5-3 Change of specification

- o When change of specification contents is necessary, change is determined through mutual sincere consultation
- o
- o

#### 5-4 Note of export and import

- o When your company export and import to other country, it may not comply with the local laws and regulations. on tariff, environment, quality, etc. In this situation, your company needs to handle all these concerns.
- o Furthermore, all the documents that your company issued for the purpose of exporting the product should also comply with the above laws and regulations. Our company will not be responsible for your loss caused by legal problems.

#### 5-5 Country of origin

- o China

## **6. Prohibition items in handling battery packs for safety**

Panasonic corporation AIS company can not take responsibility for troubles occurred in handling as the followings

### **6 - 1 Disassembling of the battery pack and cell**

Do not disassemble the battery pack and cell.

Because an electrolyte is strong alkalinity, it can moun of over skin and a wearing apparel.

### **6 - 2 Externally short circuit of the battery pack**

Do not externally short-circuited the battery pack. If externally short-circuited , the battery pack may be heated, ignited or broken.

### **6 - 3 Throwing into fire of the battery pack**

If battery pack thrown into the fire, the battery pack may be ignited or broken. Olso if battery pack thrown into the water, the battery may be lost the function.

### **6 - 4 Soldering**

Do not solder to battery. There is a fear of destruction of safe mechanism by the damage of a relief valve in a battery cap.

### **6 - 5 Incorrect inserting**

Do not reverse of battery pack + - . There is a fear of ignition and explosion of a battery.

### **6 - 6 Over charge,inverse charge in high current**

- ① Do not charged,over-charge or inverse-charge in higher current than specified. Gas may be quickly generated in the cell inside, causing ignition or breakage
- ② Charging by not specified chargers or modified chargers being specified may cause heating,igniting and breaking. Please specify as a prohibition matter for safe security to handling instructions by all means.
- ③ If a deep discharge by a long-term strage of remains connected for an extended period and equipment battery and tern the camera off after the equipment switched.  
there is a risk that performance,life is extermely low or to leak.  
To prevent these overdischarge, please be sure to provide a deep discharge mechanism.  
At the same time, leakage current to the main unit from the battery, please enter a few  $\mu\text{A}$  or less.  
Also please aviod the shippment of and attached to the main body of the battery.

### **6 - 7 Mounting to units**

Do not mount in close structure. Combustibles released from cells in operating the safety mechanism may take fire by sparks generated by the motor,switches,etc. Take notice to immediately release combustible from the units.

### **6 - 8 Use for other usage**

Do not use battery pack to other units or for other usage. Specification difference may damage battery pack or break units.

## &lt; Appendix &gt; Standard test method &amp; criteria

(Notes) Although the basic unit cell specification, if the number N of cells in series configuration, the test method, the voltage and the resistance value(except in the case of an insulating) of the standard is N times.

Unless otherwise stated, discharge cut-off voltage is 1.0v / cell.

Item	Test Method	Judgment Criteria
<b>1. Appearance / Indication</b>	Visual inspection	There are not excessive dirt, deformation & flaws Indication is according to appended drawing
<b>2. Dimension</b>	Measure by calipers.	According to appended drawing
<b>3. Insulation resistance</b> (Cell)	Measure by insulation resistance meter between outer jacket and terminal.	more than 10 MΩ
<b>4. Weight</b> (Cell)	Measure by balance	Approx. weight <b>57 g</b>
<b>5. Charge voltage</b> (Cell)	Following the pre-discharging and the quick charging , and measure the voltage for less than 5 minutes before the charge end. Pre-discharging : Discharge until cut-off voltage at <b>2800 mA</b>	<b>1.8 v / cell</b> or less
<b>6. Open circuit voltage</b> (Cell)	Measure open circuit voltage within 1 hour after standard charging	<b>1.25 v / cell</b> or more
<b>7. Close circuit voltage</b> (Cell)	Measure close circuit voltage within 1 hour after standard charging Constant resistive load <b>0.40 Ω/cell</b>	The close circuit voltage for measurement start less than 1 second <b>1.2 v / cell</b> or more
<b>8. Internal resistance</b> (Cell)	Measure internal resistance within 1 hour after standard charging	<b>7 mΩ / cell</b> or less.
<b>9. Capacity</b> (Cell)	Measure capacity by discharging in standard charging current within 1 hour after standard charging (It Can repeat a test to amount to 3 cycle when does not satisfy the first time standard.)	Rating capacity or more.
<b>10. High rate discharging</b> (Cell)	Measure discharging time by holding for 1hour after standard charging and discharging at <b>2800 mA</b> to 0.9V(cell voltage)	<b>48 minutes</b> or more.
<b>11. Low temperature discharging</b> (Cell)	Measure discharging time by holding at 0°C±2°C for 24 hours after standard charging and standard discharging.	<b>3 hours 00 minutes</b> or more

Item	Test Method	Judgment Criteria																												
12. Capacity storage (Cell)	A standard charged the battery which was over of capacity test of 9, and a standard discharged after leave for 28 days, and measure discharging time.	3 hours 00 minutes or more																												
13. storage (Cell)	Battery of discharged condition hold open circuit state for 12 months. Measure discharging time after capacity test of 9.	4 hours 00 minutes or more																												
14. Over charge (Cell)	After standard discharging and following a 48hours continuous overcharge period at 280 mA the cell shall be stored for a period of 1 hour. Measure standard discharging time.	No deformation and leakage. 5 hours 00 minutes or more																												
15. Life time JIS C8708(2007) (Cell)	<p>Repeat cycle examinations from 1 to 50 as a 1 unit and measure discharge time. (Ambient temperature is 20°C)</p> <table border="1" data-bbox="359 772 1082 1104"> <tr> <td data-bbox="359 772 502 810">1 : charge</td> <td data-bbox="502 772 662 810">280</td> <td data-bbox="662 772 917 810">mA 1 6 hours</td> <td data-bbox="917 772 1082 810" rowspan="2">Do not hold by a charge state</td> </tr> <tr> <td data-bbox="359 810 502 851">: discharge</td> <td data-bbox="502 810 662 851">700</td> <td data-bbox="662 810 917 851">mA 2 hours 2 0 minutes</td> </tr> <tr> <td data-bbox="359 851 502 891">2~48 : charge</td> <td data-bbox="502 851 662 891">700</td> <td data-bbox="662 851 917 891">mA 3 hours 1 0 minutes</td> <td data-bbox="917 851 1082 891" rowspan="2"></td> </tr> <tr> <td data-bbox="359 891 502 931">: discharge</td> <td data-bbox="502 891 662 931">700</td> <td data-bbox="662 891 917 931">mA 2 hours 2 0 minutes</td> </tr> <tr> <td data-bbox="359 931 502 972">49 : charge</td> <td data-bbox="502 931 662 972">700</td> <td data-bbox="662 931 917 972">mA 3 hours 1 0 minutes</td> <td data-bbox="917 931 1082 972" rowspan="2"></td> </tr> <tr> <td data-bbox="359 972 502 1012">: discharge</td> <td data-bbox="502 972 662 1012">700</td> <td data-bbox="662 972 917 1012">mA Until the battery voltage 1.0v</td> </tr> <tr> <td data-bbox="359 1012 502 1052">50 : charge</td> <td data-bbox="502 1012 662 1052">280</td> <td data-bbox="662 1012 917 1052">mA 1 6 hours</td> <td data-bbox="917 1012 1082 1052" rowspan="2">Hold for 1~4hours by a charge state</td> </tr> <tr> <td data-bbox="359 1052 502 1093">: discharge</td> <td data-bbox="502 1052 662 1093">560</td> <td data-bbox="662 1052 917 1093">mA Until the battery voltage 1.0v</td> </tr> </table>	1 : charge	280	mA 1 6 hours	Do not hold by a charge state	: discharge	700	mA 2 hours 2 0 minutes	2~48 : charge	700	mA 3 hours 1 0 minutes		: discharge	700	mA 2 hours 2 0 minutes	49 : charge	700	mA 3 hours 1 0 minutes		: discharge	700	mA Until the battery voltage 1.0v	50 : charge	280	mA 1 6 hours	Hold for 1~4hours by a charge state	: discharge	560	mA Until the battery voltage 1.0v	Discharge time after 500 cycles 3 hours 00 minutes or more
1 : charge	280	mA 1 6 hours	Do not hold by a charge state																											
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: discharge	560	mA Until the battery voltage 1.0v																												
16. Life time (Cell)	<p>Charge and discharge cycles is repeated in the below condition. And measure discharge time at 2800 mA</p> <ul style="list-style-type: none"> <li>•Discharge: 2800 mA up to cut-off voltage</li> <li>•Charge: Depend on quick charging specification shown by 2:Rating specification.</li> </ul>	Discharge time after 300 cycles 36 minutes or more.																												
17. Leakage (Cell)	Leave in the atmosphere at temperature 40±2°C, humidity 93 ± 3% for 21days after standard charging and pre-discharge.	Leakage is not detected in visual inspection																												
18. Vibration (Cell)	<p>After standard charging, do the test under below conditions</p> <ul style="list-style-type: none"> <li>•Cycle 10 H z — 500 H z</li> <li>•Amplitude 0.35 mm or max.50m/s<sup>2</sup></li> <li>•Sweep speed 1 octave/min.</li> <li>•Sweep cycle 5 cycles</li> <li>•Axes Three axes to be perpendicular to each other (XYZ)</li> </ul>	<p>After standard discharging to 1.0v/cell, 4days later check the capacity(Item.9)</p> <p>5 hours 00 minutes or more</p> <p>No leakage of electrolyte in liquid form and no venting shall be observed.</p>																												
19. Drop (Cell)	<p>Store for 1~4 hours after standard charging, After that, do the test under below conditions</p> <ul style="list-style-type: none"> <li>•Hight 1000 mm</li> <li>•Surface Hardwood</li> <li>•Cycle Each twice for three axes to be perpendicular to each other (XYZ)</li> </ul>	<p>After standard discharging to 1.0v/cell, 4days later check the capacity(Item.9)</p> <p>5 hours 00 minutes or more</p> <p>No leakage of electrolyte in liquid form and no venting shall be observed.</p>																												

Item	Test Method	Judgment Criteria	
<b>20. Short circuit</b> (Cell)	After standard charging, short circuit for an hour through a lead with the shortest length between + and -	The battery must not explode, Leakage, deformation and rupturing of the exterior tubing are acceptable	
<b>21. Reverse charging</b> (Cell)	Reversecharge the battery at <b>2800</b> mA for 1 hour.		
<b>22. Over charging</b> (Cell)	Overcharge the battery at <b>2800</b> mA for 5 hours.		

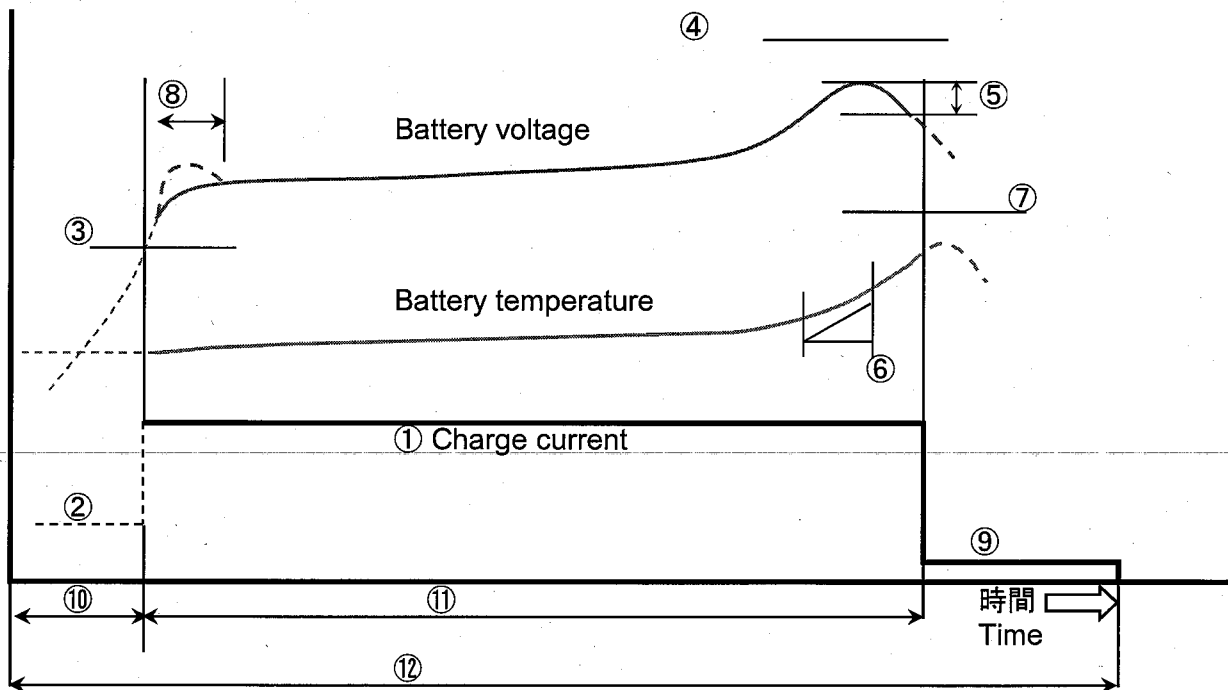


## Ni-MH Battery ; Example on rapid charge system

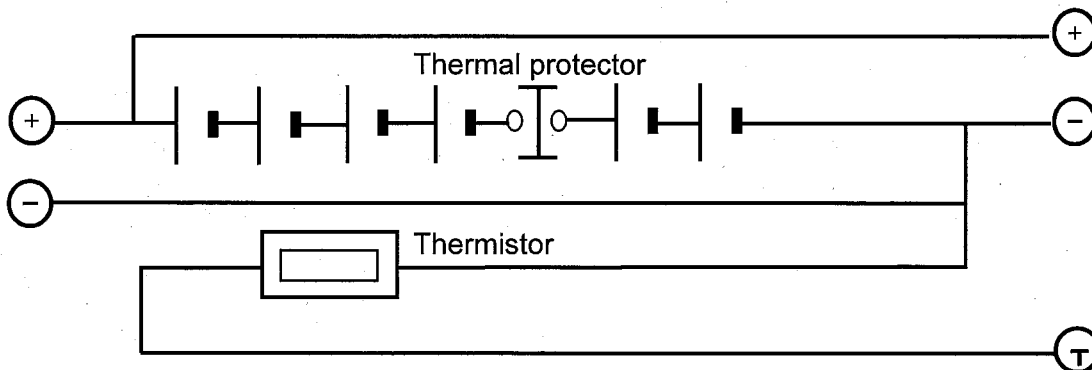
### 1. Basic charge system

①	Rapid charge current	0.5It to 1.0It mA
②	Charge current to voltage for rapid charge	0.2It to 0.3It mA
③	Start voltage of rapid charge	above 0.8 V per cell
④	Upper limit voltage (to trickle charge)	1.8 V per cell
⑤	Value of minus delta V (-ΔV)	5 to 10 mV per cell
⑥	Temperature increase rate (dT/dt)	1 to 2 °C/min
⑦	Upper limit temperature (Tco)	60 °C
⑧	Initial non-detection timer of minus delta V(-ΔV)	5 to 10 min
⑨	Trickle charge current	1/30It to 1/20It mA
⑩	Transfer timer to rapid charge	60 min
⑪	Total rapid charge timer	1.5 h
⑫	Total charge timer	10 to 20 h
⑬	Ambient temperature for rapid charge	0 to 40 °C

※ Matching test is necessary because it depends on the fast-charge current, cell number, pack shape etc.



### 2. Basic pack circuit



# <<Sealed Type Nickel-Metal Hydride Rechargeable Battery>>

## Cautions concerning the use of the batteries and the design of battery-operated products

When using these batteries and when designing battery-operated products, please pay particular attention to the following points in order to take full advantage of the batteries' characteristics, and to prevent problems due to improper use.

**Panasonic assumes no responsibility for quality problems or troubles resulting from use that does not conform to the "Cautions concerning the use of the batteries and the design of battery-operated products" shown below.**

When this mention contents and individual specifications are not equal, individual specifications contents are given priority to.

- |   |  |   |
|---|--|---|
| 1 | Charging   | <ul style="list-style-type: none"> <li>1 - 1 Charging temperature</li> <li>1 - 2 Parallel charging of batteries</li> <li>1 - 3 <b>Reverse charging</b></li> <li>1 - 4 <b>Overcharging</b></li> <li>1 - 5 <b>Rapid charging</b></li> <li>1 - 6 Trickle charging (continuous charging)</li> </ul>   |
| 2 | Discharging  | <ul style="list-style-type: none"> <li>2 - 1 Discharging temperature</li> <li>2 - 2 Overdischarging (deep discharge)</li> <li>2 - 3 High-current discharging</li> </ul>   |
| 3 | Storage  | <ul style="list-style-type: none"> <li>3 - 1 Storage temperature and humidity</li> <li>3 - 2 Long-term storage</li> </ul>   |
| 4 | Service life of batteries  | <ul style="list-style-type: none"> <li>4 - 1 Cycle life</li> <li>4 - 2 Service life with long-term use</li> </ul>   |
| 5 | Design of products which use batteries                                   | <ul style="list-style-type: none"> <li>5 - 1 Connecting batteries and produc</li> <li>5 - 2 <u>Material for terminals in products using the batteries</u></li> <li>5 - 3 Position and temperature of batteries in products</li> <li>5 - 4 Discharge end voltage</li> <li>5 - 5 Overdischarge (deep discharge) prevention</li> </ul>   |
| 6 | <b>Restrictions regarding battery handling in order to ensure safety</b> | <ul style="list-style-type: none"> <li>6 - 1 <b>Disassembly</b></li> <li>6 - 2 <b>Short-circuiting</b></li> <li>6 - 3 <b>Throwing batteries into a fire or water</b></li> <li>6 - 4 <b>Soldering</b></li> <li>6 - 5 <b>Inserting the batteries with their polarities reversed</b></li> <li>6 - 6 <b>Overcharging at high currents and reverse charging</b></li> <li>6 - 7 <b>Installation in equipment (with a sealed construction)</b></li> <li>6 - 8 <b>Use of batteries for other purposes</b></li> <li>6 - 9 <b>Short-circuiting of battery packs</b></li> <li>6 - 1 <b>Using old and new batteries together</b></li> </ul> |
| 7 | Other precautions  | <ul style="list-style-type: none"> <li>7 - 1 Charging before use</li> </ul>   |
| 8 | Requests   | Please pay particular attention to underlined text.   |

## 1 Charging

### 1 – 1 Charging temperature

- ① Charge batteries within an ambient temperature range of 0°C to +40°C.
- ② The ambient temperature during charging affects the charging efficiency. Since the charging efficiency is best within a temperature range of +10°C to +30°C, whenever possible place the charger (battery pack) in a location within this temperature range
- ③ At temperatures below 0°C, the gas absorption reaction is not adequate, causing the gas pressure inside the battery to rise, which can activate the safety vent and lead to leakage of alkaline gas and deterioration of the battery performance.
- ④ The charging efficiency drops at temperatures above +40°C.  
This can impact the full charging and lead to deterioration in performance and battery leakage.

### 1 – 2 Parallel charging of batteries

- When charging batteries connected in parallel, sufficient attention should be paid to the design of the charger, including temperature variations depending on the number of batteries charged.  
Consult Panasonic when parallel charging is required.

### 1 – 3 Reverse charging

- Never carry out reverse charging.  
**Charging with reversed polarities can cause a reversal in a battery's polarity, causing the gas pressure inside the battery to rise, which can activate the safety vent and cause a rapid deterioration in battery performance, even battery swelling and battery rupture.**

### 1 – 4 Overcharging

- Avoid overcharging.  
**Repeated overcharging can lead to deterioration in battery performance.**  
**(Overcharging means charging a battery when it is already fully charged.)**

### 1 – 5 Rapid charging

- **To charge batteries rapidly, use the specified charger (or charging method recommended by Panasonic) and follow the correct procedures.**

### 1 – 6 Trickle charging (continuous charging)

- ① When adopting trickle charging as the standard charging method, use the H or O type batteries.  
Charge the batteries at a current from 1/30 ItmA to 1/20 ItmA.
- ② When adopting trickle charging as a supplementary charging method after rapid charging, carry out trickle charging at a current from 1/30 ItmA to 1/20 ItmA.  
To avoid the deterioration of a battery's performance due to overcharging, use a timer that measures the total charging time including trickle charging.

\* Note: "It mA" During charging and discharging, ItmA is a value indicating current and expressed as a multiple of nominal capacity. Substitute "It" with the battery's nominal capacity when calculating.  
For example,  
for a 1500mAh battery of 1/30 ItmA, this value is equal to  $1/30 \times 1500$ , or roughly 50mA.

## 2 – 1 Discharging temperature

- ① Discharge batteries within an ambient temperature range of  $-10^{\circ}\text{C}$  to  $+65^{\circ}\text{C}$ .
- ② The level of the discharge current (i. e., the current at which a battery is discharged) affects the discharging efficiency. The discharging efficiency is satisfactory within a current range of  $1/10 I_{\text{mA}}$  to  $1/2 I_{\text{mA}}$ .
- ③ Discharging batteries at temperatures below  $-10^{\circ}\text{C}$  or above  $+65^{\circ}\text{C}$  can lead to the deterioration in the battery's performance.
- ④ Even at the maximum discharge current or lower, discharging may be impossible at a low temperature.

2 – 2 **Overdischarging (deep discharge)**

**Because overdischarging (deep discharging) damages the battery and causes electrolyte leakage, do not forget to turn off the switch when discharging, and do not leave the battery connected to the equipment for long periods of time. Also, avoid shipping the battery installed in the equipment**

## 2 – 3 High-current discharging

- ① When discharging at a high current, use the P or X type batteries.
- ② Because high-current discharging can lead to heat generation and decreased discharging efficiency, consult Panasonic before attempting continuous discharging or pulse discharging at currents greater than  $2 I_{\text{mA}}$ .

## 3 Storage

## 3 – 1 Storage temperature and humidity (short-term)

- ① Store batteries in a dry location with low humidity, no corrosive gases, and a temperature range of  $-20^{\circ}\text{C}$  to  $+45^{\circ}\text{C}$ .
- ② Storing batteries in a location where humidity is extremely high or temperatures fall below  $-20^{\circ}\text{C}$  or rise above  $+45^{\circ}\text{C}$  leads to the rusting of metallic parts and battery leakage due to expansion or contraction in parts composed of organic materials.

3 – 2 Long-term storage (1 year,  $-20^{\circ}\text{C}$  to  $+35^{\circ}\text{C}$ )

- ① Long-term storage may cause the deterioration of various characteristic. Therefore, it is desirable to store the batteries at as a low temperature as much as possible.
- ② When charging for the first time after long-term storage, deactivation of reactants may have led to increased battery voltage and decreased battery capacity. Restore such batteries to their original performance through repeated several cycles of charging and discharging.
- ③ When storing batteries for more than 1 year, charge once every six months or at least once a year to prevent leakage and deterioration in performance due to self-discharging.

## 4 - 1 Cycle life

The life of a battery is 500 cycles or more of operation under the durability test conditions specified by JIS. A significantly reduced service time in spite of proper charging means that the life of the battery has been exceeded.

**Also, at the end of service life, an unusual increase in internal resistance, or an internal short-circuit may occur. Chargers and charging circuits should therefore be designed to ensure safety in the event of failure heat generated upon battery failure at the end of service life. (if any points are unclear, contact Panasonic.)**

## 4 - 2 Service life with long-term use

As batteries are chemical products involving internal chemical reactions, performance deteriorates not only with use, but also during prolonged storage.

Normally, a battery will last 2 to 3 years (or 500 cycles) if used under proper conditions and not overcharged or overdischarged. Note that failure to satisfy the proper conditions concerning charging, discharging, temperature, and other factors during actual use can cause electrolyte leakage, leading to the deterioration of a battery's performance or damage to products, and shorten the battery's service life (or cycle life).

### 5 – 1 Connecting batteries and products

- ① Never solder a lead wire or other connecting materials directly to the battery, because doing so will damage the battery's internal safety vent, separator, and other parts made of organic materials. To connect a battery to a product through soldering, solder the lead wire to a contact piece (tab) made of nickel or nickel-plated steel, and then spot-weld the tab to the battery.
- ② To connect the terminal of a product to the terminal of a battery pack by contact rather than using a connector, the terminal shapes and the contact pressure should be carefully designed to prevent contact failures.

### 5 – 2 Material for terminals in products using the batteries

- As small amounts of alkaline electrolyte can leak out from the battery seal during extended use or when the safety vent is activated during improper use, use a highly alkaline-resistant material for the product's contact terminals in order to avoid problems due to corrosion.

### 5 – 3 Position and temperature of batteries in products

- As excessively high temperatures (i. e., higher than 65°C) can cause alkaline electrolyte to leak out from the battery, thus damaging the product and shorten battery life by causing deterioration in the separator or other battery parts, install the batteries far from the heat-generating parts of products. The best battery position is a battery compartment made of an alkaline-resistant material and that isolates the batteries from the product's circuitry. This prevents damage caused by slight leakages of alkaline electrolyte from the battery.

### 5 – 4 Discharge end voltage

The basic discharge end voltage is determined by the formula given below.

Number of batteries arranged serially

1 to 6: (Number of batteries × 1.0) V

7 to 10 : [( Number of batteries – 1) × 1.2 ] V

The discharge end voltage should be set in accordance with the number of cells in a battery pack and the discharge current. When you require a battery pack whose discharge current is 2 ItmA or more or includes more than 11 cells, please consult Panasonic.

### 5 – 5 Overdischarge (deep discharge) prevention

**Overdischarging (deep discharging) or reverse charging deteriorates a battery's performance, leading to electrolyte leakage or deterioration of product performance. To avoid these problems, make sure to provide the product with a mechanism to prevent overdischarging (deep discharging). Further, minimize the leakage current from the battery to the product to several microamperes or less.**

6 – 1 Disassembly

- Never disassemble a battery, as the electrolyte inside is strong alkaline and can damage skin and clothes.

6 – 2 Short-circuiting

- Never attempt to short-circuit a battery. Doing so can damage the product and generate heat that can cause burns.

6 – 3 Throwing batteries into a fire or water

- Disposing of a battery in fire can cause the battery to rupture. Also avoid placing batteries in water, as this damages battery functions.

6 – 4 Soldering

- Never solder anything directly to a battery. This can destroy the safety features of the battery by damaging the safety vent inside the cap.

6 – 5 Inserting the batteries with their polarities reversed

- Never insert a battery with the positive and negative poles reversed, as this can cause the battery to swell or rupture.

6 – 6 Overcharging at high currents and reverse charging

- ① Never carry out reverse charging or overcharging with high currents ( i. e., higher than rated ). Doing so causes rapid gas generation and increased gas pressure, thus causing batteries to swell or rupture.
  - ② Charging with an unspecified charger or a specified charger that has been modified can cause batteries to swell or rupture.
- ☆ Be sure to indicate this safety warning clearly in all operating instructions as a handling restriction for ensuring safety

6 – 7 Installation in equipment (with a sealed construction)

- Always avoid incorporating batteries into a product with a sealed construction. In some cases, gases (oxygen, hydrogen) may be generated, and there is a danger of the batteries bursting or rupturing in the presence of a source of ignition (sparks generated by a motor, switch, etc.).

6 – 8 Use of batteries for other purposes

- Do not use a battery for an appliance or purpose for which it was not intended. Differences in specifications can lead to damage to the battery or appliance.

6 – 9 Short-circuiting of battery packs

- Take special care to prevent battery packs from short-circuiting. There is a possibility that cassette type battery packs may be inserted in a reverse direction depending on the shape of the product or battery. In addition, some shapes of product terminals are more likely to cause short-circuiting. Therefore, special care should be taken.

6 – 1 0 Using old and new batteries together

- Avoid using old and new batteries together. Also avoid using these batteries with ordinary dry-cell batteries, Ni-Cd batteries or with another manufacturer's batteries. Differences in the characteristics can damage the batteries or the product.

7 - 1 Charging before use

- Batteries should always be charged prior to use. Be sure to charge them correctly.

8 **Requests**

- ※ **Battery performance and service life vary largely with usage.**  
**When you design a battery-operated product, please consult Panasonic regarding the charging and discharging specifications and the product structure to ensure safety.**
- ※ About regulations outside specifications, it follows another individual specifications.

**Panasonic assumes no responsibility for quality problems or troubles resulting from use that does not conform to the "Cautions concerning use and the design of battery-operated products" shown above.**

**Quality Assurance Group  
Energy Device Business Division  
Automotive & Industrial Systems Company  
Panasonic Corporation**

**1-1, Matsushita-cho, Moriguchi City, Osaka Japan 570-8511  
Tel: +81 - (0) - 6 - 6994 - 4651**



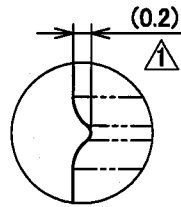
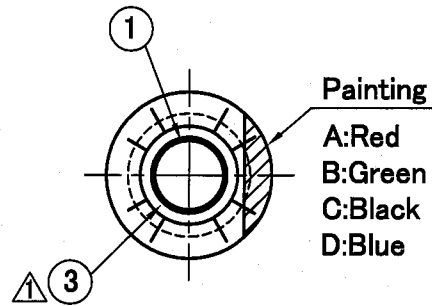
**FOR MESSRS : PAISEU**

## &lt; Warranty &gt;

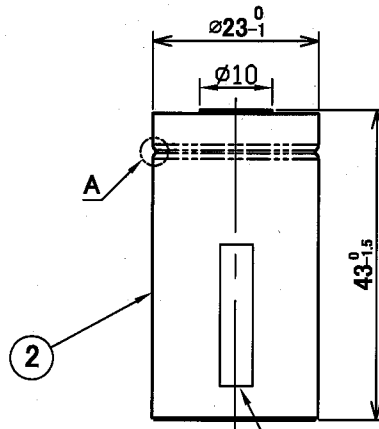
- 1) The Battery Packs are warranted to conform to the descriptions contained in this specifications for a period of twelve (12) months from the ex-factory date.  
In the event that a Battery Pack fails to comply with the Specifications and the cause of which was attributable to Panasonic Corporation's fault during the said warranty period, Panasonic Corporation will repair such non-conforming battery pack, or supply a replacement Battery Pack, either way agreed by both parties.
- 2) Please assure full responsibility for matching and reliability of Battery Packs on actual set or unit application.
- 3) Panasonic Corporation's warranty shall not be applicable in the case where customer fails to carry out proper handling, operating, installation, testing, service and checkout of the battery Packs and/or to follow the instructions, cautions, warnings, notes provided in this specifications, or other reasonable methods.

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Symbol	Date	Revision	Drawn	Checked	Approved
△×4	2015/08/05	Add insulation ring and the sleeve shape changed	XI	魏未	山森



SCALE A 5:1



Lot No. Stamp

(for length situation or side)

ex:13 08  
 year month

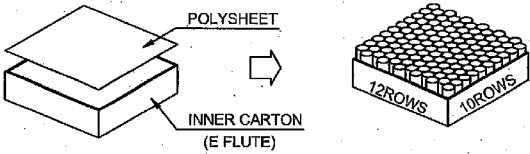
NOMINAL VOLTAGE : 1.2 V  
 RATED CAPACITY : 2800 mAh  
 AVERAGE CAPACITY : 3050 mAh  
 APPROX WEIGHT : 57 g

秘  
 Confidential

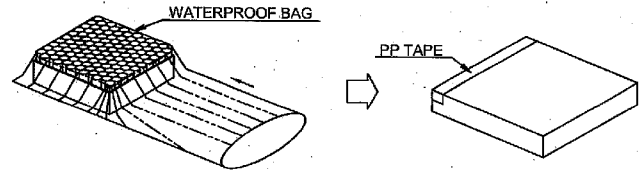
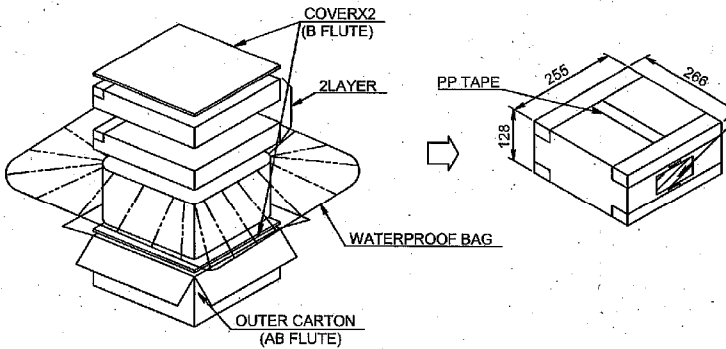
△3	Insulation ring	PET t=0.2mm	1		BLUE
2	Sleeve	Kraft Paper	1		
1	Cell	BK300SCE	1		
Symbol	Name	Material	qt.	Process	Remark
				Model No.	BK-300SCEY1
				Name	Dimension Sketch 制品图
				Parts No.	W21300382-1 △
Scale	Designed	Drawn	Checked	Checked	Approved
1:1	Shine	Shine	王珊	/	山森
	2013.08.21	2013.08.21			

Symbol	Date	Revision	Bigned	Checked	Checked
X					
X					
X					

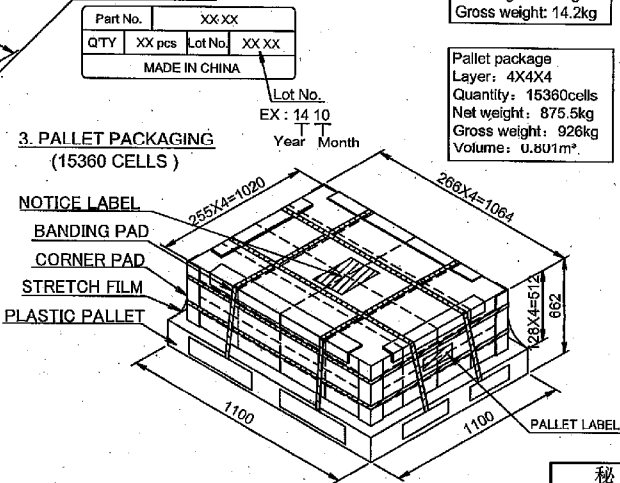
**1. INNER PACKAGING  
(120 CELLS)**



**2. OUTER PACKAGING  
(240 CELLS)**



**3. PALLET PACKAGING  
(15360 CELLS)**



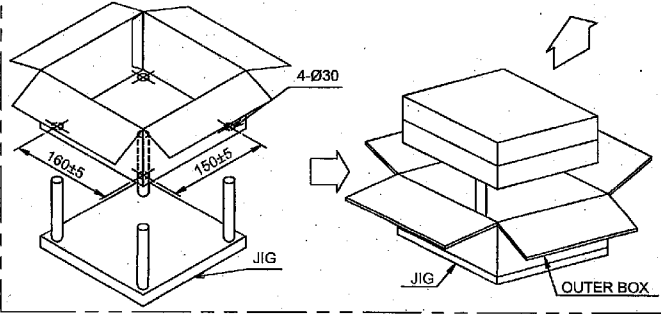
Carton box  
Quantity: 240 cells  
Net weight: 13.7kg  
Gross weight: 14.2kg

Pallet package  
Layer: 4X4X4  
Quantity: 15360cells  
Net weight: 875.5kg  
Gross weight: 926kg  
Volume: 0.801m³

**LABEL (PRINTING)**  
Part No. XX XX  
QTY XX pcs Lot No. XX XX  
MADE IN CHINA

Lot No.  
EX: 14 10  
Year Month

**EXAMPLE OF UNPACK**



秘  
Confidential

						Model No.	HHR-300SC SERIES BK-300SC SERIES
						Name	Packaging Specification (Paper pipe type)
						Parts No.	W91300783
Scale	Designed	Drawn	Checked	Checked	Approved		
Free	Victor	Victor	魏厚杰	林忠	林忠		
	2014.12.08	2014.12.08					