



電池組規格書/承認書

SPECIFICATION FOR APPROVAL

CUSTOMER : _____

DESCRIPTION : Lithium Battery Pack 7S1P

MODEL : NCR18650PF-71

CUSTOMER PART NO : _____

CUSTOMER PART NO: _____

APPROVED SIGNATURES

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Rev	Date	Description	Designed	Checked	Approved
1.0	May.12,2020	First issue		Leo	

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	Document Name		Rev.	1.0
	Model No.	NCR18650PF-71		

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1. Scope

This specification shall be applied to Sonata Lithium Ion battery pack (7 series 1 parallel)

★ Recharge battery after long time storage before use.

2. Composition

The Single cell consists of 2900 mAh capacity also Battery Pack 2900 mAh combines with protection circuit and thermal protection.

3. Product specification

No	Item	Rating performance	Remark
1	Typical Capacity	2900 mAh	0.2C discharging to 3.0V
2	Nominal voltage	25.2 v	
3	Maximum charge voltage	29.75 v	
4	The end of discharging voltage	17.5 v	
5	Suggestive charging current(standard)	1375mA@4hr	0°Cto 40°C
6	Suggestive charging current(Max)	2900mA	0°C to 40°C
7	Suggestive continuous discharging current	1450mA@0.5c	-20°C to 60°C
8	Suggestive continuous discharging current (Max)	9A	0°C to 60°C
9	Internal resistance	mΩ	Measured by the alternate current method (1Khz)
10	Outer Dimension(mm)(L*W*T)	130*70*25mm(Max)	
11	Weight		g
12	Storage temperature (At the shipment state)	Less than 1 months	-20°Cto +50°C
		Less than 3 months	-20°Cto +40°C ,
		Less than 1 years	-20°Cto +20°C ,
		Percentage of recoverable capacity 80% ※	

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4. Protection Circuit Module

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1. Introduction :

This specification provides engineering information and electrical specifications for the protection circuit module of Li-ion cells.

2. Description :

The RY-10S-67.8X52.8 PCM provides protection functions for seven-cell Li-ion battery. The semiconductor devices with ESD protections are utilized on RY-10S-67.8X52.8 PCM.

3. Major components :

ITEM	P/N	Package
Li-ion Protection IC	R5432V-404BA	SSOP-24
MOSFET	PDC6982X-5*4 / ME7692	DFN5*6
R-sense	50mR 1% 2W*2	SMD2512

4. Absolute maximum rating :

Parameter	Rating	Unit
Operating temperature range	-40 ~ +85	°C
Storage temperature range	-55 ~ +125	°C
Voltage between terminals of V+ and V-	30	V
Voltage Between terminals of B+ and B-	25	V

Remarks :

- (1) The negative voltage is not allowed to be applied between the charge / discharge terminals (+ and -) or between the cell connection terminals (B+ and B-)

5. Basic functions :

- (1) Over-charge protection

Over-charge occurs whenever the voltage applied to battery is over 4.25V.

Protection circuit on RY-10S-67.8X52.8 should stop charging the battery when over-charge condition occurs and any deformation in the outer appearance of the Lithium cell connected to RY-10S-67.8X52.8 should not occur.

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(2) Over-discharge protection

Over-discharge occurs whenever the battery is discharged with voltage below 2.5V. Protection Circuit on RY-10S-67.8X52.8 should stop discharging the cells when over-discharge condition occurs.

(3) Over-current protection

Over-current condition occurs when excessive discharge current occurs (The excessive current threshold is higher than 0.2V when R5432V is used.)

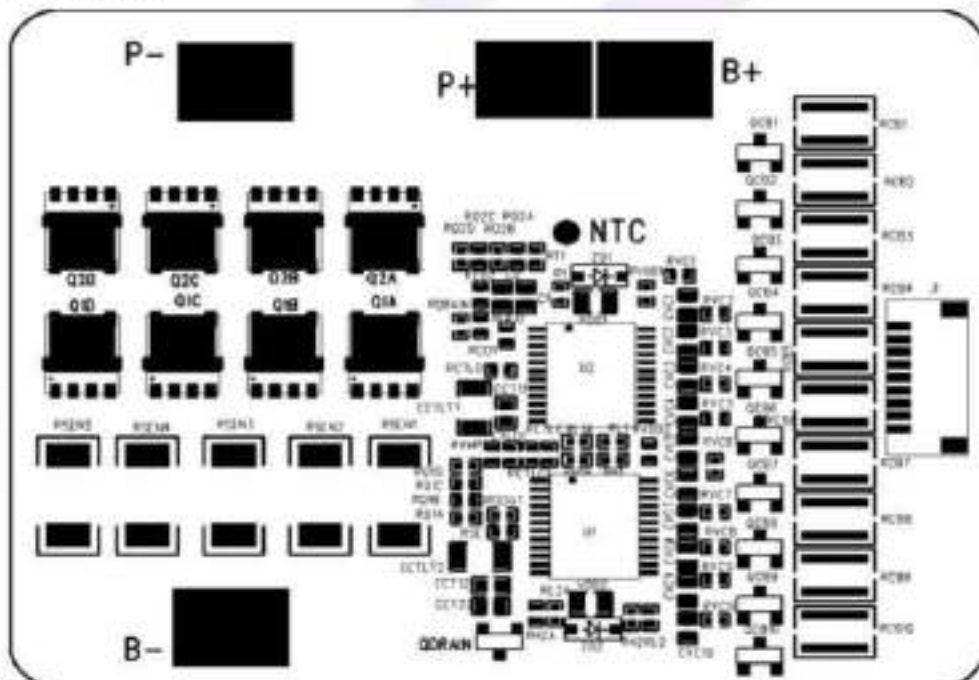
Protection circuit on RY-10S-67.8X52.8 should stop discharging the cell when over-current condition occurs.

(4) Short-circuit protection

Short-circuit condition occurs when the terminals between + and - is shortened. Protection circuit on RY-10S-67.8X52.8 should stop discharging the cell when short-circuit condition occurs and temperature of MOSFET should not be overheated.

6. Pin Layout Diagram :

Component side :



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7. Electrical characteristics :

7.1 Parameters of protection circuit (@25°C) :

No	Item	Specification	Unit
1	Over-charge detection voltage	4.2500±0.025	V
2	Over-charge release voltage	4.100±0.050	V
3	Over-discharge detection voltage	2.50±0.080	V
4	Over-discharge release voltage	3.00±0.100	V
5	Over-current detection voltage	0.20±0.025	V
6	Over-charge detection delay time	0.7~1.3	Sec
7	Over-discharge detection delay time	50~150	msec
8	Over current detection delay time	89~167	msec
9	Supply current (Normal mode)	~12	μA
10	Supply current (Protection mode)	< 0.1	μA

7.2 Requirement of protection functions (@25°C) :

No.	Item	Criteria
1	Over-charge inhibition	4.2500±0.025 (from cell terminal)
2	Over-charge protection recovery method	When the battery is connected to the cellular phone, the protective condition is released.
3	Over-discharge inhibition	2.50±0.080 (from cell terminal)
4	Over-discharge protection recovery method	When the battery is charged, the protective condition is released.
5	Over-current protection	7~9A
6	Over-current release	Reset by load release

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8.Specification of PCB :

Material	FR-4
Dimension	67.8X52.8 (+/- 0.1)mm
Thickness	1.6(+/- 0.15)mm (overall)
UL	94V-0

1. Material 1 oz copper double sided bonded to FR-4 base material.
2. 2 layers with through hole.
3. All through hole connections to have solder resist applied.
4. Printed Silk.
5. Contacts are Sn

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5. Battery Specification

Panasonic Lithium Ion NCR18650PF

Features & Benefits

- High energy and power density
- Long, stable, high power
- High safety performance
- Ideal for power assisted bicycles, 2-way radios, medical devices and robotics.

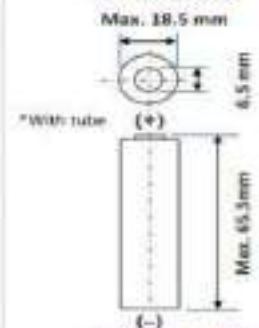
* At temperatures below 10°C, charge at a 0.25C rate.

Specifications

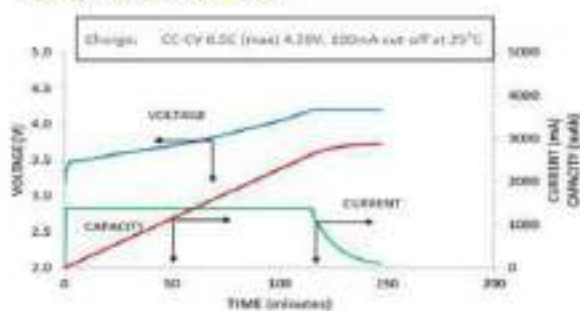
Rated capacity ⁽¹⁾	Min. 2700mAh
Capacity ⁽²⁾	Min. 2750mAh Typ. 2900mAh
Nominal voltage	3.6V
Charging	CC-CV, 5td, 1375mA, 4.20V, 4.0 hrs
Weight (max.)	48.0 g
Temperature:	Charge*: 0 to +45°C Discharge: -20 to +60°C Storage: -20 to +50°C
Energy density ⁽³⁾	Volumetric: 577 Wh/l Gravimetric: 207 Wh/kg

⁽¹⁾ At 20°C. ⁽²⁾ At 25°C. ⁽³⁾ Energy density based on bare cell dimensions

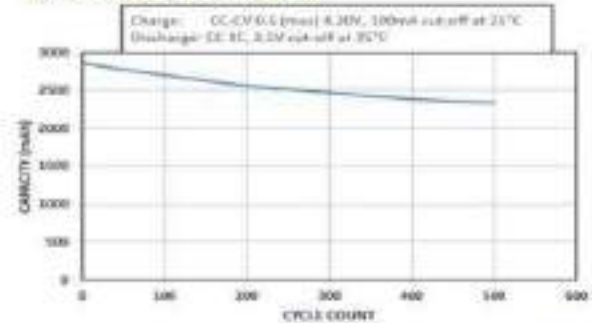
Dimensions



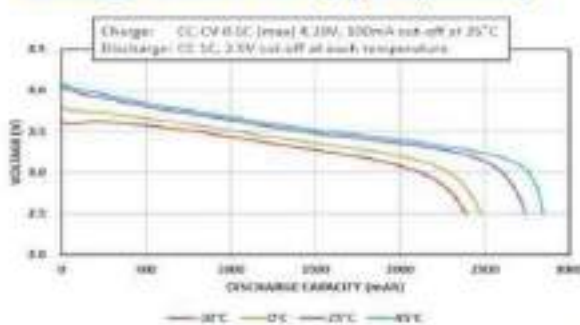
Charge Characteristics



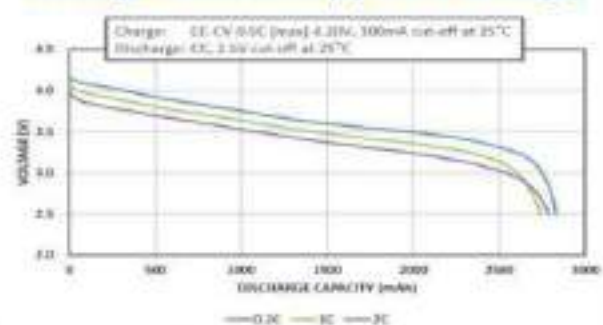
Cycle Life Characteristics



Discharge Characteristics (by temperature)



Discharge Characteristics (by rate of discharge)



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Issue Date: 2013/5/15

LITHIUM ION BATTERY SPECIFICATION

BATTERY CLASSIFICATION LITHIUM ION BATTERY
MODEL NUMBER NCR18650P-H044A
PRODUCT CODE BJ-A300100AA

[The client's agreement]

Signature: _____
Name in block letters: _____
Date: _____

*If there is no reply within 30 days after the delivery, This document shall be presumed valid.

**Portable Rechargeable Battery Business Division,
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Title	Specifications of Lithium Ion battery (Cylindrical Type)			page	1/12
1. Publication Record					
No.	Date	Class	Items		
(0)	2013/4/12	-	Issue (Tentative)	Dft.	T.Higami
				Chk.	Y.Nishimura
				Chk.	M.Ito
				Chk.	T.Nishitani
				App.	H.Matsui
(a)	2013/5/15	-	Issue	Dft.	T.Higami <i>T. Higami</i>
				Chk.	Y.Nishimura <i>Y. Nishimura</i>
				Chk.	M.Ito <i>M. Ito</i>
				Chk.	T.Nishitani <i>T. Nishitani</i>
				App.	H.Matsui <i>H. Matsui</i>
				Dft.	
				Chk.	
				Chk.	
				Chk.	
				App.	
				Dft.	
				Chk.	
				Chk.	
				Chk.	
				App.	
*Key to Class abbreviations : A for Added, D for Deleted, R for Revised					
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Title	Specifications of Lithium Ion battery (Cylindrical Type)	page	2/12
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2. Safety Instructions

Prohibited Actions

The cell contains flammable objects such as organic solvents. If the battery is mishandled, it may cause fire, smoke or an explosion and the battery's functionality will be seriously damaged. Please read and check the following prohibited actions. Also, please equip a protection in the application so the application troubles don't affect the battery. Additionally, SANYO highly recommends embedding these instructions into the owner's manual.

! D a n g e r

- Immersion

"Do not immerse the battery with liquid such as water, sea water or soda."

The battery or the battery pack (including protection circuit) may catch on fire, smoke, explode, or cause heat generation by unexpected electrical load.

- High Temperature

"Do not use or place the battery near fire, a heater or a high temperatures (more than 80 °C)."

The battery's polyolefin separator may get damaged from the heat and could cause an internal short circuit. This may cause the battery to catch on fire, smoke, explode, or cause heat generation.

- Charger and Charge Condition

"Do not use unauthorized chargers."

If the battery is charged under unacceptable conditions (For example: usage in restricted temperature ranges, over voltage, or over current with unauthorized chargers) the battery may catch on fire, smoke, explode, or cause heat generation.

- Reverse Polarity

"Do not force a reverse-charge or a reverse-connection."

The battery has correct polarity. If the battery doesn't fit, please check the battery's orientation and do not force into the battery mount. If the battery is forced to set with a different polarity, the battery may catch on fire, smoke, explode, or cause heat generation.

- Direct Connection

"Do not connect the battery with AC plug (outlet) or car plugs."

The battery requires a specific charger. If the battery connects with the outlet directly, the battery may catch on fire, smoke, explode, or cause heat generation.

- Inappropriate Use with Other Equipment

"Do not adapt the battery to unspecified applications."

If the battery is used for unspecified applications or systems, the battery may get damaged or catch on fire, smoke, explode, or cause heat generation.

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<ul style="list-style-type: none"> ● Incineration and Heat <i>"Please keep the battery away from heat and fire"</i> The battery materials will get damaged and may catch on fire, smoke, explode, or cause heat generation. ● Short-Circuit <i>"Do not make a short-circuit. "</i> Do not connect the + and - terminals with conductive material. Do not carry or store the battery with metal objects (such as wire, necklace or hairpins). If the battery is in a short-circuit, excessive large current will flow and may catch on fire, smoke, explode, or cause heat generation. ● Impact <i>"Avoid unnecessary impact to the battery"</i> Unnecessary impact may cause the battery to leak, heat generation, smoke, fire or explode. Also, the protection circuit may break and that will lose the function of the battery's protection system. ● Penetration <i>"Do not penetrate with a nail or strike with a hammer"</i> The battery cell may get destroyed or damaged. And the battery's protection circuit may get damaged and case an internal short-circuit. Additionally, the battery may catch on fire, smoke, explode, or cause heat generation. ● Soldering <i>"Do not directly solder the battery"</i> The insulator could melt or the gas release vent might get damaged from the heat. Additionally, the battery may catch on fire, smoke, explode, or cause heat generation. ● Disassemble and Reconstruction <i>"Do not disassemble the battery"</i> If the protection circuit gets damaged, the battery will not be protected. Then, the battery may catch on fire, smoke, explode, or cause heat generation. ● Charge near High Temperatures <i>"Do not charge the battery near high temperatures"</i> If the battery is charged near high temperatures, the battery may not be able to charge due to the activation of the protection circuit. In these conditions, the protection circuit may break and the battery may catch on fire, smoke, explode, or cause heat generation. ● Deformation <i>"Do not use the battery with conspicuous damage or deformation"</i> It causes the generating heat, smoke, rupture or flame. ● Reverse Charge and Overdischarge <i>"Do not reverse polarity (and terminals) "</i> On charging, the battery is reverse-charged and abnormal chemical reaction occurs. And also, there may be case that unexpected large current flows on discharging. These cause the generating heat, smoke, rupture or flame. 			
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! W a r n i n g			
<ul style="list-style-type: none"> ● Ingestion <i>"Keep away from infants"</i> The battery should be kept away from infants. In case of swallowing the battery, see a doctor immediately. ● Storing <i>"Do not put the battery in the microwave or other cooking appliances"</i> The battery may on fire, smoke, explode, or cause heat generation due to heat or the electrical impact from the microwave. ● Mixed Use <i>"Do not mix the battery with other batteries."</i> The battery should not be used with other batteries with different capacity, chemistry or manufacturer. Do not connect with other batteries or mix with other batteries. The battery may catch on fire, smoke, explode, or cause heat generation. ● Rust, Changing Color and Deformities <i>"Do not use abnormal batteries."</i> Please stop using the battery if there are noticeable abnormalities such as abnormal smell, heat, deformities, or discoloration. The battery may have a defect and may catch fire, smoke, heat generation or explode if used continuously. ● Charging Time <i>" Stop charging if the charging process cannot be finished."</i> If the battery can not finish the charging process within the specified time, please stop the charging process. The battery may catch on fire, smoke, explode, or cause heat generation. ● Leakage① <i>"Do not use a leaking battery near flames"</i> If the battery or liquid leaking from the battery has a pungent odor, the battery should keep away from flames. The battery may ignite and explode. ● Leakage② <i>"Do not touch a leaking battery"</i> If the liquid leaking from the battery gets into eyes, it will cause significant damage. If the leaking liquid gets into your eyes, please flush eyes immediately with pure water. Please consult a physician immediately. If the liquid remains in the eyes it will cause significant damage. ● Transport <i>" Pack the battery tightly during transport"</i> To prevent short-circuit or damages, please tightly pack the battery into a case or a carton box. 			
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! C a u t i o n

- **Use under Direct Sunlight**
Do not use or leave the battery in excessive heat such as in a car in direct sunlight. The battery may catch on fire, smoke, explode, or cause heat generation. Also, it might cause a deterioration of battery's characteristics and battery life.
- **Static Electricity**
The battery pack has a protection circuit. Do not use the battery where it generates static electricity (more than 100V) that might damage the protection circuit. If the protection circuit is broken, the battery may catch on fire, smoke, explode, or cause heat generation.
- **Charging Temperature Range**
Charging temperature range is regulated between 10°C and 45°C. Do not charge the battery out of the specified temperature range. Otherwise, it may cause heat generation, leakage or a serious damage. Also, it might cause deterioration of the battery's characteristics and battery life.
- **Manual**
Please read the manual before usage. Please save the manual for future reference.
- **Charging Method**
Please read the charger's manual for the charging method.
- **First Time Use**
Please contact the supplier if the battery has unusual odor, heat generation or rusts during the first usage.
- **Use by Children**
Parents must explain how to use the system and the battery. Please check back periodically to ensure children are using the system and the battery correctly.
- **Inflammable Materials**
Please keep away from flammable materials during the charge and the discharge. It may catch on fire, smoke, explode, or cause heat generation.
- **Leakage**
If electrolyte leak from the battery and adhere to the skin or clothes, immediately flush it with water. Otherwise, it may cause skin irritation.
- **Insulation**
If lead wires or metal objects come out from the battery, please seal and insulate them completely. Otherwise, the battery may cause a short circuit and catch on fire, smoke, explode, or cause heat generation.
- **Recycle**
Please recycle the battery according to local rules or regulations after use.

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3. Extent of the Application

This specification is applied to Lithium Ion Battery of NCR18650P-H044A for Pedelec.

For special applications in which quality and reliability are required, or if the failure or malfunction of the products may directly jeopardize life or cause threat of personal injury such as for weapon, aircraft and aerospace equipment, aircraft electronics equipment, medical equipment (a part of class 2 equipment, class 3 or more equipment), or cause large-scale system troubles, explosion-proof equipment, electric vehicle, hybrid electric vehicle, and electric motor cycle (except electric power-assisted bicycle), this specification shall not be applied.

4. Battery Classification and Model No.

4.1 Battery Classification	Lithium Ion Battery
4.2 Model No.	NCR18650P-H044A
4.3 Cell Type	NCR18650PF

5. Nominal Specifications

Items		Specifications	Notes
5.1	Rated Capacity	2700mAh	0.54A discharge at 20°C
5.2	Capacity	Minimum ^{※1}	2750mAh
		Typical	2900mAh
			Reference only 0.54A discharge at 25°C
5.3	Nominal Voltage	3.60V	0.54A discharge at 25°C
5.4	Discharging End Voltage	2.5V	
5.5	Charging Current (Std.)	1.35A	
5.6	Charging Voltage	4.20 ± 0.03V	
5.7	Charging Time (Std.)	4.0 hours	
5.8	Continuous Discharging Current (Max.) ^{※2,3}	10A	0 ~ +40°C
5.9	Internal Resistance	less than 35mΩ	AC Impedance 1 kHz
5.10	Weight	less than 47.0g	
5.11	Operating Temperature	Charge	10 ~ +45°C
		Discharge	-20 ~ +60°C
5.12	Storing Conditions	less than 1 month	-20 ~ +50°C
		less than 3 months	-20 ~ +40°C
		less than 1 year	-20 ~ +20°C
			Percentage of recoverable capacity 80% ^{※4}

※1 Minimum capacity is measured by the discharge at 0.54A until end voltage of 2.5V after fully charged at 25°C as described in the specification.

※2 Discharge at high rate or high temperature environment will accelerate the degradation of the battery capacity.

※3 The maximum discharge current for a single cell use. However after the battery pack assembly, there will be a limitation of maximum discharge current due to a protection circuit or a protection device.

※4 Percentage of recoverable capacity

= (Discharging time after storage / initial discharging time) × 100

The discharging time is measured by the discharge current of 0.54A until 2.5V of end voltage after the battery is fully charged at 25°C.

※5 Maximum cell surface temperature :The cell temperature must not exceed 70°C

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6. Electrical Characteristics			
Items	Conditions	Criteria	
6.1 Full Charge	The battery is charged with 1.35A constant current until the voltage reaches 4.20V. Then, the current is reduced in order to keep the constant voltage of 4.20V. The total charging time is 4.0 hours at 25 °C.		
6.2 Capacity	① Within 1 hour, after fully charged at 25°C, the battery is discharged with 0.54A continuously until 2.5V of end voltage at 25°C.	More than 300min.	
	② Within 1 hour, after fully charged at 25°C, the battery is discharged with 2.75A continuously until 2.5V of end voltage at 25°C.	More than 54min.	
6.3 Cycle Life	The battery is repeated 300 times of Charge and Discharge cycles, (Charged by CC-CV of 1.35A-4.20V for 4.0 hours, Discharged by CC of 2.75A to 2.5V (E.V.)) at 25°C. After the 300 cycles, the discharge time is measured by the Item 6.2.②.	More than 38min.	
6.4 Temperature Characteristics	① Within 1 hour, after fully charged at 25°C, the battery is stored at 0 °C for 3 hours. After that, the discharge time is measured Item 6.2.② at 0 °C.	More than 30min.	
	② Within 1 hour, after fully charged at 25°C, the battery is stored at 60 °C for 3 hours. After that, the discharge time is measured Item 6.2.② at 60 °C.	More than 50min.	
6.5 Storage at Fully Charged State	After fully charged at 25°C, the battery is stored for 20 days at 60 °C. After the storage, the battery is set in 25°C for 3 hours. Then, the discharge time is measured Item 6.2.②.	More than 30min.	
	Then, the same battery is fully charged again and checked the second discharge time by the Item 6.2 ② at 25 °C.	More than 40min.	
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6.6 Storage at Full Discharged State	After fully charged at 25°C, the battery is discharged by the Item 6.2.②. Then, the battery is stored for 20 days at 60 °C. After the storage, the battery is set in 25°C for 3 hours. Then, the discharge time is measured by Item 6.2.② at 25°C.	More than 50min.	
6.7 Drop	After fully charged at 25°C, the cell is dropped 3 times in random direction from a height of 1 m onto a flat surface of concrete.	No rupture, no fire	
<p>STANDARD TEST CONDITIONS:</p> <p>The testes shall be implemented with new batteries that were delivered within the last 7 days. The tests shall be performed at 25±2 °C (The standard temperature of second grade is specified by <i>JIS Z 8703</i> (Standard Test Conditions)), 65±20 % (The standard humidity of twentieth grade is specified by <i>JIS Z 8703</i> (Standard Test Conditions)). The grade of voltmeter and ammeter in the tests shall be higher than Class 0.5 which is specified by <i>JIS C 1102</i> (Electric Indicator).</p> <p>7. Design and Dimensions The battery design is shown in the following documents or drawings. (Drawing No. NCR18650PF)</p> <p>8. Appearance The battery should not have the following appearance issues at delivery:</p> <ul style="list-style-type: none"> ·Scratch ·Rust ·Discoloration ·Dirt ·Deformation ·Leakage <p>The battery should be in good condition.</p> <p>9. Shipping Charge The battery is shipped out with the approximately 48%* charged state. *The 48% capacity is the condition in which SANYO ships the battery but it's not the condition when customer receives the battery.</p>			
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<p>10. Precautions for Designing of Pedelecs, the Chargers and the Battery Packs</p> <p>10-1. Precautions for Designing of Pedelec and the Charger.</p> <p>(1) Charge</p> <ul style="list-style-type: none"> · The battery is charged by a method of constant current-constant voltage. · Regarding NCR18650P-H044A, the charging current should not exceed 1.35A /cell. · The charging voltage should not exceed 4.20V /cell. <p>The charging voltage is required to be set to less than 4.23V/cell with considering the accuracy of charger. Even if the charger is failed, the total safety shall be secured.</p> <ul style="list-style-type: none"> · The charger shall be equipped with a pre-charge system. <p>If battery voltage goes down to less than 2.5V/cell, the battery should be charged by pre-charge current of maximum 0.27A. Once, the battery reached more than 2.5V/cell by the pre-charging, the charger can resume the standard charging method. However, if the battery voltage never recovers more than 2.5V/cell, the charger must be stopped and turned off.</p> <ul style="list-style-type: none"> · The charger shall be equipped a full charge detection. <p>The charger shall detect the full-charged state by a timer, current detection or open circuit voltage detection. When the charger detects the full-charge, the charger shall stop charging. Do not apply the continuous charging (trickle charging) method.</p> <ul style="list-style-type: none"> · The charging temperature range should be set between 10 °C to +45 °C. <p>(2) Discharge</p> <ul style="list-style-type: none"> · The discharge current should not exceed 10A/cell. · The discharge temperature should be between -20°C to +60 °C. · The discharge end voltage should be more than 2.5V/cell. <p>(3) Over discharge</p> <ul style="list-style-type: none"> · Do not discharge the battery less than 2.0V/cell. <p>(4) Design of Pedelecs and chargers.</p> <ul style="list-style-type: none"> · The cells should be kept away from heat generating electronic parts in order to avoid deterioration of battery performance. <p>10-2. Precautions for Battery Pack Design.</p> <p>(1) Shape, mechanism and material of battery packs</p> <ul style="list-style-type: none"> · The battery pack should be designed so it does not connect with to unauthorized chargers. · The battery pack should be designed so it cannot connect with unauthorized equipment and/or devices. · The terminal shape should be designed to avoid short circuit issues. In addition, the battery pack should be equipped with an over current protection function in order to prevent from external short circuit issues. · The terminal shape and structure should be designed so it does not connect in backwards. · The battery pack should be designed to prevent static electricity, electrolyte or water ingress issues. 			
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<ul style="list-style-type: none"> - The battery pack should be designed so the protection circuit functions can be inspected during the assembly process. - The battery pack should be designed so electrolyte cannot reach to the protection circuit board even if electrolyte leak out of the cells. - The cells should be fixed by a tape or a glue in the case. If the battery pack is dropped, the cells should be protected against dents, deformations and other mechanical stresses. - Plastic cases should be closed with glue. If an ultra sonic welding method is applied to the case sealing, SANYO will not take any responsibilities for any defects. - The pack shall be designed so end users cannot remove or disassemble the cells. <p>(2) Protection Circuit</p> <p>The following protection circuit should be equipped in the battery pack:</p> <ul style="list-style-type: none"> - Overcharge protection For safety reason and in order not to shorten the cycle life, max overcharge protection voltage of each block should be under 4.25V/cell including tolerance. - Over discharge protection If cell voltage reaches approximately 2.2V/cell, we recommend the over discharge protection will shut down the discharge current and the circuit consumption current will be set to less than 1μA. - Over current protection If discharge current exceeds approximately 10A/cell, the over current protection will shut down the current. <p>(3) Electric circuit</p> <ul style="list-style-type: none"> - To avoid over discharge mode during long storage times, the consumption current of the battery pack's protection circuit should be set as low as possible. <p>(4) Cell connection</p> <ul style="list-style-type: none"> - The cells should not be connected using a soldering process. In order to avoid any damages, cells should be connected to lead plates by a spot welding method. <p>(5) Precautions on label</p> <ul style="list-style-type: none"> - The rating label should indicate required information and precautions. The precautions should be based on the information in section 2. <p>11. Storing Condition</p> <p>11-1 Storage Temperature and Humidity (Within 3 months)</p> <ul style="list-style-type: none"> - Cells should be stored between -20°C to +40°C in a low humidity condition (less than 70 %RH) without any corrosive gases. - No condensation on the cell <p>11-2 Long Duration Storage</p> <ul style="list-style-type: none"> - Cells should be stored between -20°C to +20°C in a low humidity condition (less than 70%RH) without any corrosive gases. We recommend the discharged state or partially charged state SANYO shipped out for the long duration storage. - No condensation on cells. 			
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<p>12. Handling Precautions for Lithium Ion Cells</p> <ul style="list-style-type: none"> • This section describes handling precautions for lithium ion cells which will be assembled as Pedelec's battery packs with customer. This battery pack consists of NCR18650PF. <p>12-1 Series Connections Precautions</p> <ul style="list-style-type: none"> • When the cells are connected in series, use the same rank cells. This information is described in the label on the carton. In addition, the cell voltage should be checked and the voltage should be within 20mV. * Lot number on carton label. <p>12-2 Inspection of the Battery Pack before Shipping</p> <p>All battery packs shall be inspected for:</p> <ul style="list-style-type: none"> • Voltage • Internal impedance • Function of protection circuit • Thermistor resistance • Thermal fuse <p>12-3 Abnormal Cells</p> <ul style="list-style-type: none"> • Do not use damaged cells by dropping, and/or short circuit and cells with electrolyte smell and any other damaged cells. <p>13. Warranty Exemptions</p> <ul style="list-style-type: none"> • SANYO will not be liable for any damages that are caused by violations of the precautions in this specification. • SANYO will not be liable for any problems caused by design defects of the battery packs, Pedelec and/or chargers. • SANYO will not accept any abnormal cells that were caused due to any incorrect assembly process. <p>14. Other Remarks</p> <ul style="list-style-type: none"> • If there are problems in this specification, SANYO will take them into consideration. • SANYO can discuss specs or precautions that are not described in this specification. • Do not use the provided cells for other applications. 			
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<p>15. Standard Charging Method</p> <p>(1) The standard charge condition is 1.35A/cell - 4.20V/cell (Constant current-constant voltage).The charging process should be discontinued when either time, the, OCV or current, reach certain values.</p> <p>(2) In case of the over discharge state (For example: Battery voltage is less than 2.0V/cell), the battery should be charged by a pre-charge system in order to prevent FET's heat generation in a circuit.</p> <p>(3) The pre-charging current should be approximately 0.27A. Once, the battery voltage reaches more than 2.5V/cell, the charger can resume the standard charging method. The pre-charging should have a cut-off timer and if the voltage doesn't recover over 2.5V/cell in the set time, the charging should be stopped.</p> <p>(4) The current interrupt device (CID) may work if the battery is charged continuously after fully-charged and/or is charged at high temperature. Please consult SANYO for charging method instructions.</p>			
<p>16. Battery Warranty Period</p> <p>The warranty period is limited to one year from date of shipment. SANYO will replace batteries if it is clear that there was a defect in SANYO's manufacturing process and that the battery was not misused.</p>			
<p>17. Battery Safety Requirements</p> <p>In order to ensure the safety of the battery, please contact SANYO to discuss the application design from a mechanical or a electrical viewpoint. Also, if there are special conditions (For example: lager current load, a quick charge method or an unique usage pattern), please contact SANYO to check the conditions before the product specification is fixed.</p>			
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子番	部番コード	部品名	数量	材質・規格・寸法	備考
①		CELL	1	NCR18650PF	
②		INSULATOR	1	PAPER	
③		OUTER JACKET	1	SHRINK TUBE	

▽

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②
φ6.5~6.6 (TOP CAP ①)

①

φ18.5^{+0.10}_{-0.1}

③
65.30⁰_{-0.1}

1.5±1

A

B

C

D

E

F

承認					
Tanaka					
検出					
Kazunaki					
検出					
Miyata					
設計					
Shibano					
製図					
Kohira					

製造	台	以上	以下	単位mm	R度1:1
NCR18650PF	台	±	±		
製図	台	±	±		
製図	台	±	±		
製図	台	±	±		

エナジー社 イオン電池ビジネスユニット

製図No. A4

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6. Product Label



Product Label Dimension: 45*25mm
 White

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K580001



Battery Pack Assembly Date Code / 3-Digits.



Product Series Number per Lot. / 4-Digits.



Battery Pack Assembly Date Code / 3-Digits.

年	2009	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019	2020	2021	2022	2023
簡碼	9	A	B	C	D	E	F	G	H	I	J	K	L	M	N
月	1	2	3	4	5	6	7	8	9	10	11	12			
簡碼	1	2	3	4	5	6	7	8	9	A	B	C			
日	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
簡碼	1	2	3	4	5	6	7	8	9	A	B	C	D	E	F
日	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30
簡碼	G	H	I	J	K	L	M	N	O	P	Q	R	S	T	U
日	31														
簡碼	V														

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7.Safety device



SEKI
CONTROLS

Preventing hazards due to overheating worldwide.
SEKI is always by your side.



SINCE 1980

THERMAL PROTECTOR

ST-22








W-TYPE

P-TYPE

- **TEMPERATURE SETTING RANGE (at no load)**
50°C to 150°C in increments of 5°C
- **TOLERANCE**
Indicated temp. ± 5°C
- **ON-OFF DIFFERENTIAL TEMP. (general)**
30 ± 15K
- **HEAT ENDURANCE**
Open temp. +50°C/continuity, 200°C/1min
- **CYCLE LIFE(Resistive Load)**
10A/125V AC 10,000 cycles, 7A/250V AC 10,000cycles
3A/48V DC 6,000 cycles, 2.2A/48V DC 10,000cycles
- **CONTACT CAPACITY**
Min. Current 50mA/ repeatedly,
Max. Current 30A/5 cycles
- **CONTACT SYSTEM**
Normally closed

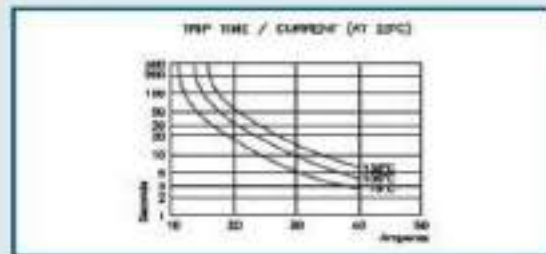
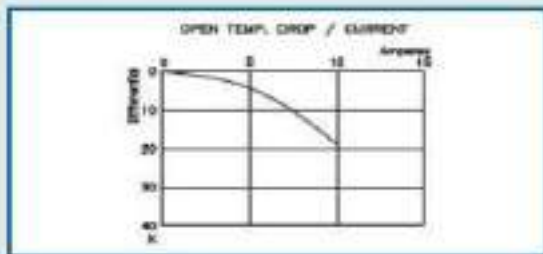
- **FEATURE**
 - Snap Action
 - Automatic Reset Bimetal
 - Moisture/ Dust-Proof
 - Superior Heat Response
 - PBT Resin Case with Epoxy Seal
 - Customization upon Request
- **APPLICATION**
Overheat protection for Electric Motors, Battery Chargers, Transformers, Power Supplies, Heating Pads, Fluorescent Ballasts, QA-Machines, Solenoids, LED Lighting, etc.

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Preventing hazards due to overheating worldwide.
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• APPROVAL/RATINGS

Agency	Standard	Category	Electrical Ratings	Max Temp.	File No.
UL	UL 2111	Thermal Protector	AC 125V/250V, 1/2 HP	150°C	E162132
		DC (Thermal Protective Device)	DC 48V/2.5A, 10,000 cycles		
		Resistive	AC 125V/10A, 250V/7A, 10,000 cycles		
CSA	154C217 No.77 154C217 No.34	Incandescent Lamp	AC 125V/4A, 250V/2A, 10,000 cycles	150°C	203258
		Fluorescent Lamp/Ballast	AC 250V/1A, 10,000 cycles		
		Motor Protectors	AC 250V, 1/2HP		
VDE	E6-60730-2-2 E6-60730-2-3 E6-60730-2-3	Appliance Type	AC 250V, 1/2HP, 6,000 cycles	130°C	1916400-4510-9003
		Thermal Motor Protector	AC 250V		
		Thermal Cut-Out	AC 250V/7A/4A Resistor/Inductive 10,000 cycles		
CCC	GB14536.1-2008 GB14536.1-2008 GB14536.10-2008	Thermal Ballast Protector	AC 250V/1A	150°C	CCC0000022430
		Motor Protector	AC 125V/250V, 1/2HP		
		Resistor	AC 125V/10A, 250V/1A, 10,000 cycles		
KC	K60730-1 K60730-2-3	Thermal Protector	Inductive AC 125V/4A, 250V/2.5A, 10,000 cycles	150°C	2802003-100019
		Thermal Protector	AC 250V/5A		

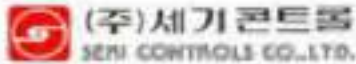
• LEAD WIRE SPECIFICATION

- W-Type : UL3266 AWG22 Stranded, Standard Length: 70mm long with 7mm stripped
- P-Type : #16-7 Tinned Lead, Standard Length: 25mm

• WARNING

You may happen to encounter counterfeits of SEKI products in the market, all of which cause a serious damage by their serious defectives in quality. Therefore it is strongly recommended that you purchase authentic SEKI products from our AUTHORIZED distributors.

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TECHNICAL SPECIFICATION OF THERMAL PROTECTOR, ST-22

1. APPLICATION SCOPE

ST-22 is an Automatic Reset Thermal Protector and is applied to OVERHEAT PROTECTION.

2. STRUCTURE

2-1. Type: Single-Pole Type using Bi-metal

2-2. Dimension: Please refer to the attachment.

3. SPECIFICATIONS

3-1. Electrical Ratings

Rated Voltage	AC 125 V	AC 250 V	DC 48 V
Rated Current	8 A	5 A	3 A
Rated Load	Resistive Load		

3-2. Pre-setting Temperature

Operating Temperature	Preset Temp. $\pm 5^{\circ}\text{C}$
Reset Temperature	Operating Temp. $- 30^{\circ}\text{C} \pm 15^{\circ}\text{C}$

During rising of temperature, when the contacts are open, it's called "Open Temperature". During dropping of temperature, when the contacts are closed, it's called "Reset Temperature".

Calibration Verification: The temperature in a convection oven (electrically heated, static air-oven) is to be increased or decreased at the rate of 1°C per minute. The current should be within 100mA.

3-3. Insulation Resistance

Insulation resistance between on-current-part and off-current-part (case & terminal) should be over $100\text{M}\Omega$ when measured with DC500V tester.

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8. Connector - - - TBD

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9. Hook-Up Wire



瑞興電線電纜有限公司
REI HSING ELECTRIC WIRE AND CABLE CO., LTD.

電子線系列

PVC電子線

UL 1007

UL Subject 758 UL FILE NO E169485
CSA Standard CSA FILE NO.LL84257

HOOK-UP WIRE 80°C 300V

說明

- 導體使用單絲或絞線 32-16AWG 裸銅或鍍錫銅
- PVC絕緣或依客户要求使用無毒PVC絕緣
- 額定溫度: 80°C, 額定電壓: 300Volts
- 可通過UL VW-1 及 CSA FT1, 垂直型耐燃測試

應用

- 一般電子, 電器設備內部配線。

Product Description

- Tinned, annealed, stranded or Solid copper conductor, 32-16AWG
- PVC insulation or non-toxic PVC insulation
- Rated temperature: 80°C, Rated voltage: 300 volts
- Passed UL VW-1 & CSA FT1 vertical flame test

Applications

- For general purpose internal wiring of electrical and electrical equipment

構造及電氣性能(Structure & electric properties)



UL 1007 CSA TR-84	額定 Range		導體 Conductor		絕緣體 Insulation		公差值 Tolerance mm	最大導體 阻抗 Maximum Conductor Resistance Ω/km	容許電流 Permissible Current A	最小絕緣 阻抗 Minimum Insulation Resistance MQ/km	絕緣耐電壓 (VAC/min) Insulation Potential Strength
	溫度 Temp °C	電壓 Voltage V	線號 AWG	構成 NO./mm	厚度 Thickness mm	外徑 O.D. mm					
絞線 (Stranded)	80 °C	300V	32	7/0.080	0.38	1.00	±0.10	703.0	1.60	15	2000
			30	7/0.100	0.38	1.10	±0.10	397.0	2.0		
			28	7/0.127	0.38	1.20	±0.10	248.0	2.5		
			26	7/0.160	0.38	1.30	±0.10	152.0	4.0		
	90 °C	300V	24	11/0.160	0.38	1.45	±0.10	88.6	5.0		
			22	17/0.160	0.38	1.60	±0.10	62.5	7.2		
			20	21/0.180	0.38	1.85	±0.10	39.5	10.0		
			18	34/0.180	0.38	2.10	±0.10	24.4	13.0		
Top-Coated (ATC)	80 °C	300V	30	7/0.100	0.38	1.10	±0.10	397.0	2.0		
			28	7/0.127	0.38	1.20	±0.10	248.0	2.5		
			26	7/0.160	0.38	1.30	±0.10	152.0	4.0		
			24	7/0.200	0.38	1.45	±0.10	88.6	5.3		
	90 °C	300V	22	7/0.254	0.38	1.60	±0.10	62.5	7.2		
			20	7/0.320	0.38	1.85	±0.10	39.5	10.0		
			18	1/0.320	0.38	1.15	±0.10	232.1	2.9		
			26	1/0.404	0.38	1.25	±0.10	155.0	3.8		
Solid(TA)	80 °C	300V	24	1/0.511	0.38	1.40	±0.10	92.4	5.3		
			22	1/0.643	0.38	1.55	±0.10	60.1	7.2		
			20	1/0.813	0.38	1.70	±0.10	37.0	9.1		
			18	1/1.020	0.38	1.90	±0.10	23.6	13.0		

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10. Outer Dimension

