



昌 勃 股 份 有 限 公 司
Dr . POWER CORPORATION

零 件 規 格 書 / 承 認 書
SPECIFICATION FOR APPROVAL

CUSTOMER : _____

DESCRIPTION : Battery Pack 4S6P (14.4V / 21Ah / 302.4Wh)

MODEL : Baby Car-21A Battery Pack

CUSTOMER PART NO : _____

APPROVED SIGNATURES

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Rev	Date	Description	Designed	Checked	Approved
1.0	Nov.24.2020	First issue	Po-Chen	Po-Chen	Nelson

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	Baby Car-21A		

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壹. Scope.

This specification shall be applied to Sonata Lithium Ion battery pack (4 series 6 parallel)

* Recharge battery after long time storage before use.

貳. Composition.

The Single cell consists of **3500** mAh capacity also Battery Pack **21.0** Ah combines with protection circuit and thermal protection.

叁. Product Specification.

No	Item		Rating performance	Remark
1	Typical Capacity		21.0 Ah	
2	Nominal voltage		14.4 V	
3	Maximum charge voltage		17.0 V	
4	The end of discharging voltage		10.0 V	
5	Suggestive charging current(standard)		4200mA @0.2c	0°Cto 40°C
6	Suggestive charging current(Max)		10500mA @0.5c	0°C to 40°C
7	Suggestive continuous discharging current		20A	-20°C to 60°C
8	Suggestive continuous discharging current (Max)		30A	0°C to 40°C within 2 sec
9	Internal resistance		mΩ	Measured by the alternate current method (1Khz)
10	Outer Dimension(mm) (T*W*L)		93.8*98.8*150.8	
11	Weight		1535	g
12	Storage temperature (At the shipment state)	Less than 1 months	-20°Cto +50°C	Percentage of recoverable capacity 80% ※
		Less than 3 months	-20°Cto +40°C ,	
		Less than 1 years	-20°Cto +20°C ,	

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肆. Protection Circuit Module Specification.

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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-34S-50X28 V2 PCM provides protection functions for four-cell Li-ion battery.
The semiconductor devices with ESD protections are utilized on RY-34S-50X28 V2 PCM.

3. Major components :

ITEM	P/N	Package
Li-ion Protection IC	NT1775-AAN	16-Pin TSSOP
MOSFET	MTB9D0P03H8*4/PDC3903X	TDFN5X6
R-SENSE	5m 1%*2	SMD2512

4. Absolute maximum rating :

Parameter	Rating	Unit
Operating temperature range	-40 ~ +85	°C
Operating humidity range	Less than 85% RH	%RH
Storage temperature range	-40 ~ +125	°C
Storage humidity range	Less than 85% RH	%RH
Voltage between terminals of V+ and V-	40	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-)

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5. Basic functions :

(1) Over-charge protection

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

Protection circuit on RY-34S-50X28 V2 should stop charging the battery when over-charge condition occurs and any deformation in the outer appearance of the Lithium cell connected to RY-34S-50X28 V2 should not occur.

(2) Over-discharge protection

Over-discharge occurs whenever the battery is discharged with voltage below 2.5V.

Protection Circuit on RY-34S-50X28 V2 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 0.1V when NT1775-AAN is used.)

Protection circuit on RY-34S-50X28 V2 should stop discharging the cell when over-current condition occurs.

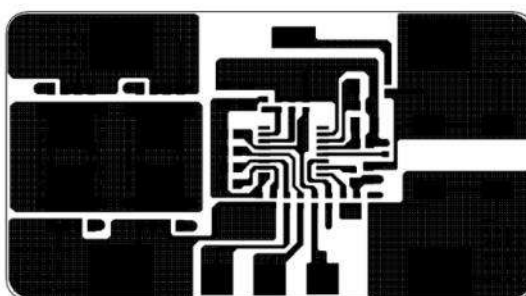
(4) Short-circuit protection

Short-circuit condition occurs when the terminals between + and - is shortened.

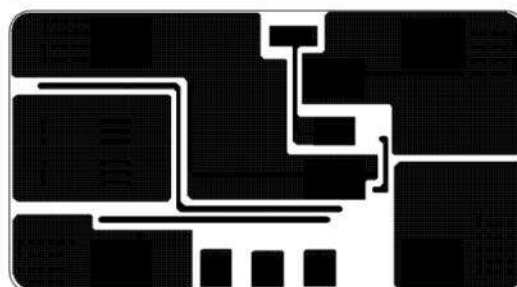
Protection circuit on RY-34S-50X28 V2 should stop discharging the cell when short-circuit condition occurs and temperature of MOSFET should not be overheated.

6. Pin Layout Diagram :

Component side :



Solder side



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PIN	Description
B+	Battery +
B-	Battery -
3-7V	Battery COM 1(B + & COM1 between the voltage)
7-2V	Battery COM 2(B + & COM2 between the voltage)
11-1V	Battery COM 2(B + & COM3 between the voltage)
P+	Load+ / Charger +
P-	Load - / Charger -
NTC	NC

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	4.1500±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	0.10±0.025	V
6	Over-charge detection delay time	500~1500	msec
7	Over-discharge detection delay time	50~150	msec
8	Over current detection delay time	5~15	msec
9	Supply current (Normal mode)	~30	μA
10	Supply current (Protection mode)	< 0.1	μA

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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	瞬間 30~50A
6	Over-current release	Reset by load release

8. Specification of PCB :

Material	FR-4
Dimension	50X28 (+/- 0.2)mm
Thickness	2.0(+/- 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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Baby Car-21A

伍. Battery cell NCR18650GA/ INR18650-35E.

陸. Safety Devices.



SEKI CONTROLS
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SINCE 1980 ISO 9001/14001

THERMAL PROTECTOR

ST-22

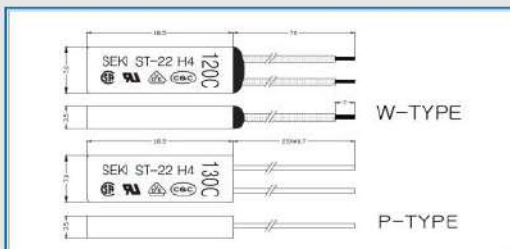












- **TEMPERATURE SETTING RANGE (at no load)**
50°C to 150°C in increments of 5°C
- **TOLERANCE**
Indicated temp. $\pm 5^{\circ}\text{C}$
- **ON-OFF DIFFERENTIAL TEMP. (general)**
 $30 \pm 15\text{K}$
- **HEAT ENDURANCE**
Open temp. $+50^{\circ}\text{C}$ /continuity, $200^{\circ}\text{C}/1\text{min}$
- **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

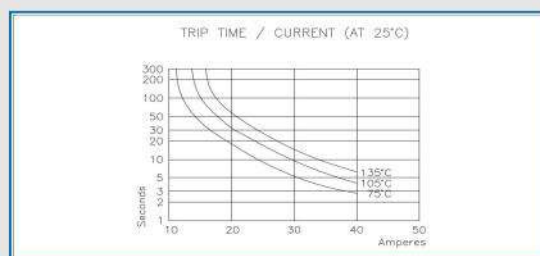
• **APPLICATION**

Overheat protection for Electric Motors, Battery Chargers, Transformers, Power Supplies, Heating Pads, Fluorescent Ballasts, OA-Machines, Solenoids, LED Lighting, etc.



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	E162232
		DC (Thermal Protective Device)	DC 48V/2.2A 10,000 cycles		
	UL 873	Resistive	DC 48V/3A 6,000 cycles		
		Incandescent Lamp	AC 125V/10A, 250V/7A 10,000 cycles	130°C	E162183
		Fluorescent Lamp/Ballast	AC 125V/4A, 250V/2A 10,000 cycles		
CSA	CSA C22.2 No.77	Motor Protectors	AC 250V, 1/2HP	150°C	203758
	CSA C22.2 No.24	Appliance Type	AC 250V, 1/2HP, 6,000 cycles		
VDE	EN-60730-2-2	Thermal Motor Protector	AC 250V	150°C	1916600-4510-0003
	EN-60730-2-9	Thermal Cut-Out	AC 250V/7A(4A) Resistive(Inductive) 10,000Cycles		
	EN-60730-2-3	Thermal Ballast Protector	AC 250V/1A	130°C	
CQC	GB14536.1-2008	Thermal Protector	Motor Protector AC 125V/250V, 1/2HP	150°C	CQC08002022430
	GB14536.3-2008		Resistive AC 125V/10A, 250V/7A 10,000 cycles		
	GB14536.10-2008		Inductive AC 125V/4A, 250V/2.5A 10,000 cycles		
KC	K60730-1	Thermal Protector	AC 250V/5A	150°C	ZH02003-10001B
	K60730-2-9				

• LEAD WIRE SPECIFICATION

- W-Type : UL3266 AWG22 Stranded, Standard Length: 70mm long with 7mm stripped
- P-Type : ϕ 0.7 Tinned Lead, Standard Length: 25mm

* The length can be adjustable on demand.

• 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.



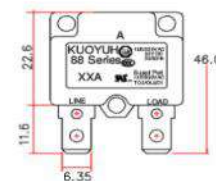
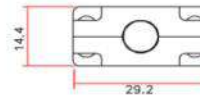
柒. Thermal Circuit Breaker.

KUOYUH®

88AR Thermal Circuit Breaker Single Pole Auto- Reset



- **Technical data**
 - Current rating range 3~30A
 - Input voltage rating 125/250VAC; 32/50VDC
 - Contact Endurance 125Vac X150% of rated current >500 cycles
125Vac X200% of rated current >200 cycles
 - Insulation Resistance >100MOHM (DC 500V)
 - Dielectric Strength > 1,500VAC/min.
 - Degree of protection Terminal area IP00, operating area IP40
- **Mechanical/Environmental Data**
 - Operating Ambient Temperature: -10°C to +60°C
 - Termination: 110" (2.8mm) quick connects or solder terminals
 - Mounting: Various options. See Ordering Information and drawings
- **Compliance with Rohs**
The product accords with the requirement of ROHS(2011/65/EU)
Contacts use Exempted item of RoHS Directive 2010/571/EU 8(a)
- **Compliance with REACH, PAHS, PH1, PH2, PH3**
- **Typical applications**
Transformers, Motors, Battery chargers, Power supplies.



* Dimension in mm:

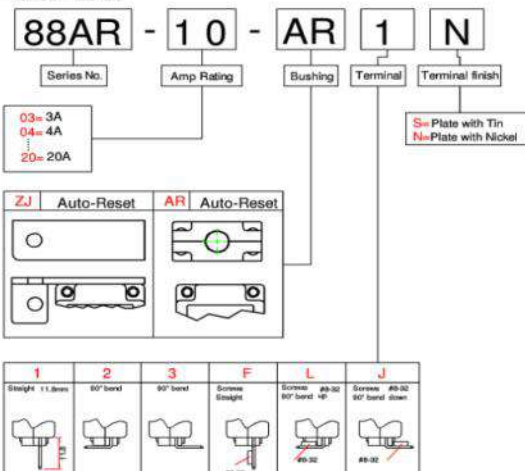
• Calibration(at25°C)

- 100% of Rated Current: Hold, No Trip
- 150% of Rated Current: Trip Within 1 Hour.
- 200% of Rated Current: 5-30 sec Trip
- 300% of Rated Current: 1.5-5.0 sec Trip

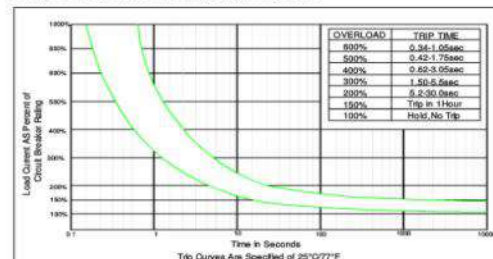
• Approval

Approval & File No.	Rated current	Rated voltage
CUL UL E155159	3-20A	24VDC
TUV SUD B15 09 58611 007	3-20A	125/250VAC; 32VDC

• Order Guide



• 88AR Series 3A-20A Trip Time Curves



• Ambient Temperature Correction Factor

Ambient temperature	-10°C	0°C	10°C	25°C	35°C	40°C	50°C	60°C
Multiplication factor	*1.30	*1.20	*1.10	1.00	*0.94	*0.85	*0.73	*0.68

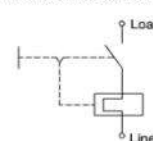
The time/current characteristic curve depends on the ambient temperature prevailing. In order to eliminate nuisance tripping, please multiply the circuit breaker current ratings by the derating factor shown below.

Example : Normal Continuous Current = 10A
Ambient Temperature = 45°C
Multiplication Factor = 0.85
Recommended Rating= 10A/0.85=11.8A
Select the Nearest Rating = 12A

• Max. Internal Resistance

Amp rating	Max resistance
3.0 - 5.0Amp	<0.225 Ohms
6.0 - 8.0Amp	<0.175 Ohm
9.0 - 12.0Amp	<0.125 Ohm
13.0 - 16.0Amp	<0.050 Ohm
17.0 - 20.0Amp	<0.040 Ohm

• Internal connection diagram



* The specification subject to change without notice. The drawing is for reference only.

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捌. Hook-up Wires.

瑞興電線有限公司

UL 1015 EQUIPMENT WIRE 105°C 600V PVC 電子線

UL Subject 758

UL FILE NO: E108485

CSA Standard

CSA FILE NO: LL84687

▲說明：

- 導體使用絞線 24-10AWG 鍍錫銅
- PVC 絕緣
- 額定溫度：105°C，額定電壓：600Volts
- 使用標準厚度，易剝，截斷容易
- 可通過 UL VW-1 及 CSA FT-1 垂直型耐燃測試

▲Product Description：

- Tinned copper conductor 24-10AWG
- Color-coded PVC insulation
- Rated temperature：105°C, Rated voltage：600Volts
- Uniform thickness of wire to ensure easy stripping and cutting
- Passes UL VW-1 & CSA FT-1 vertical flame test

▲應用：

- 用於一般電器產品內部配線

▲Applications

- For internal wiring of appliances.

構造及電器性能

structure & electric properties



UL 1015 CSA TEW	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	最小絕緣 阻抗 Minimum Insulation Resistance MΩ / Km	絕緣 耐電壓 (VAC/3min) Insulation Potential Strength
	溫度 Temp ℃	電壓 Voltage V	線號 AWG	構成 NO./mm	厚度 Thickness mm	外徑 O.D. mm				
多 芯 線 Standed	105℃	600V	24	11 / 0.160	0.76	2.20	± 0.10	88.6	15	2000
			22	17 / 0.160		2.40		62.5		
			20	21 / 0.180		2.60		39.5		
			18	34 / 0.180		2.80		24.4		
			16	26 / 0.254		3.10		15.6		
			14	41 / 0.254		3.50		9.9		
			12	65 / 0.254		4.10		6.24		
10			105 / 0.254	5.10		4.15				
(ATC) 先絞後鍍 Top-Coated			24	7 / 0.200		2.20		88.6		
			22	7 / 0.254		2.40		62.5		
			20	7 / 0.320		2.60		39.5		
			18	7 / 0.400		2.80		24.4		
			單 芯 線 Solid(TA)	24		1 / 0.511		2.15		
22				1 / 0.643		2.30		60.1		
20				1 / 0.813		2.45		37.0		
18				1 / 1.020		2.72		23.6		
14				1 / 1.630		3.30		22.6		

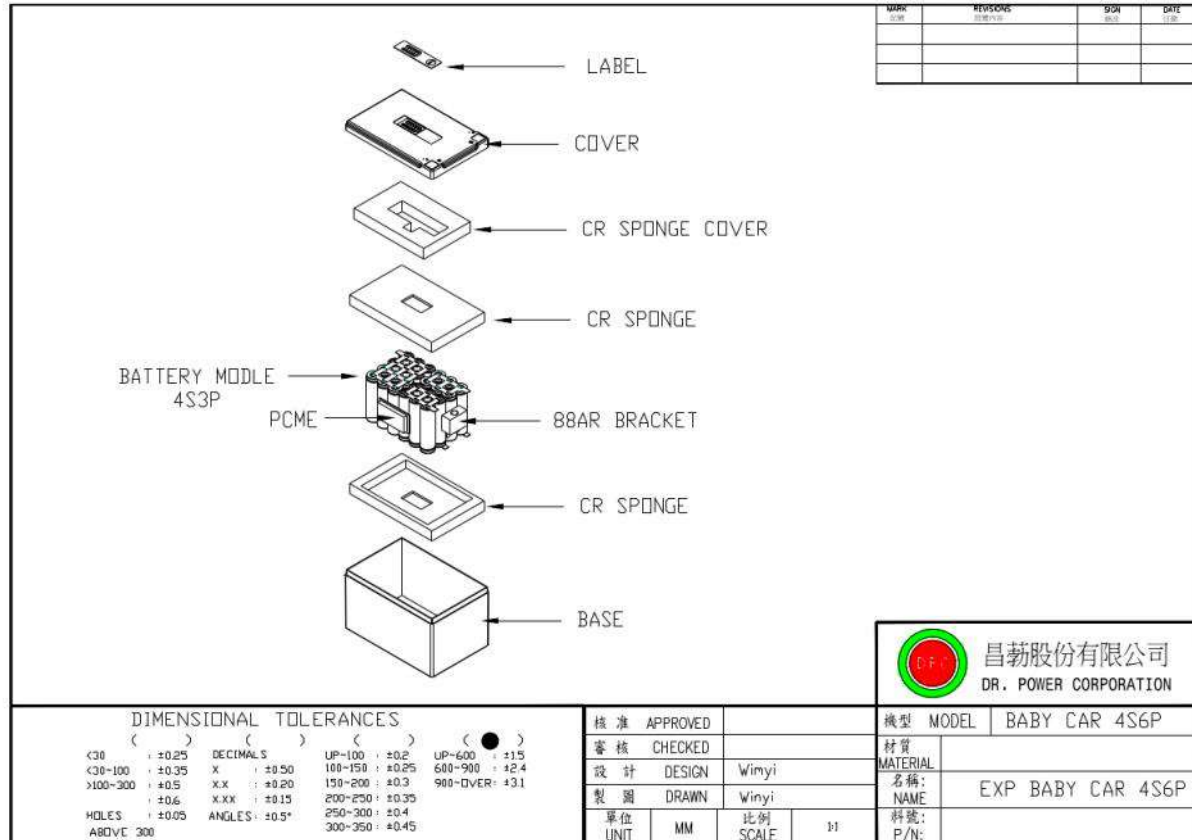


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玖. Finished Goods Package Drawing



