	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		

Battery Pack Specification for Approved

客戶名稱：

Customer：

品名規格：NCR18650PF-4S2P Battery Pack (14.4V / 5800mAh / 83.52Wh)
Description.

客戶料號：

Cus. P/N.

昌勃料號：

日期: Apr.17.2020

DPC P/N : NCR18650PF-42

Date: Apr.17.2020

業務專員：

版次: 1.0

客戶簽署 Customer Signature.

結果 Conclusion

OK Limited

Rejected

Approved	Checker	Engineer
Simon	Denny	Tony
Mar.05.2020	Mar.05.2020	Mar.05.2020

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		

Revision of Specification

Rev.	Date	Description	Prepared	Approved
1.0	Apr.17.2020	First Issue	Simon	Simon

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		

CONTENT

1. Scope.
2. Composition.
3. Product Specification.
4. Protection Circuit Module Specification.
5. Battery Specification.
6. Product Label.
7. Safety Device.
8. Product Picture.
9. Outer Dimension.

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		

1. Scope

This specification shall be applied to Sonata Lithium Ion battery pack (4 series 2 parallel)

* Recharge battery after long time storage before use.

2. Composition

The Single cell consists of 2900 mAh capacity also Battery Pack 5800 mAh combines with protection circuit and thermal protection.

3. Product specification

No	Item	Rating performance	Remark
1	Typical Capacity	5800 mAh	0.2C discharging to 3.0V
2	Nominal voltage	14.4 v	
3	Maximum charge voltage	17.1 v	
4	The end of discharging voltage	11.12 v	
5	Suggestive charging current(standard)	1160mA	0°Cto 40°C
6	Suggestive charging current(Max)	2900mA	0°C to 40°C
7	Suggestive continuous discharging current	1160mA	-20°C to 60°C
8	Suggestive continuous discharging current (Max)	5000mA	0°C to 60°C
9	Internal resistance	< 200 mΩ	Measured by the alternate current method (1Khz)
10	Outer Dimension(mm) (L*W*T)	76*39*72mm(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% ※	

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		

4. Protection Circuit Module



Protection Circuit Module

SPECIFICATION

Model No. : CT-PCBL4S2P-NBF3-LF (Lead Free)

Document No. : DM-PCBL4S2P-NBF3-LF (Rev. B)

Customer. :

Record of Revisions

Revision	Model. No.	From	Description	Date
A	CT-PCBL4S2P-NBF3-LF	R&D Dept.	New issued from R&D NO: PPCBL4S2P-NBF3-LF	Sept.,22, 2009
B	CT-PCBL4S2P-NBF3-LF	Customer.	Operating Temperature: Minimum - 40 °C	May 28, 2010

Prepared by : Gary Wang, Project engineer

Checked by : Jonathan Chiang, Project Manager

Approved by : Sam Tsao, R&D Manager

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		



Protection Circuit Module

Table of Contents

1.0 Introduction3

2.0 Description3

3.0 Circuit diagram3

4.0 Major components.....4

5.0 Bill of materials4

6.0 Absolute maximum rating5

7.0 Basic functions5

8.0 Component Layout Diagram6

9.0 Artwork drawing.....7

10.0 Electrical characteristics8

 10.1 Parameters of protection circuit8

 10.2 Requirement of protection functions.....8

11.0 Specification of PCB9

CONFIDENTIAL

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		



Protection Circuit Module

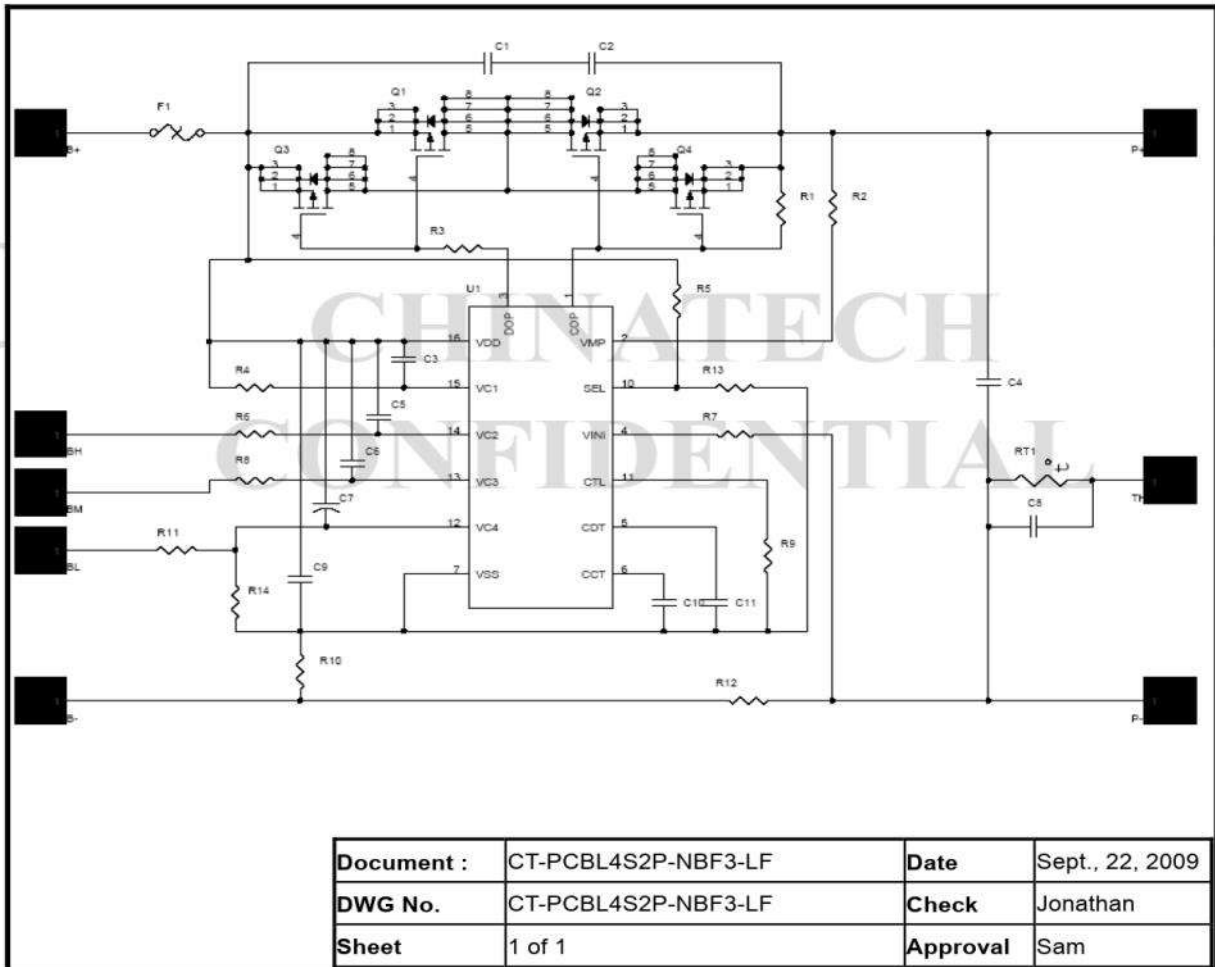
1. Introduction :

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

2. Description :

The CT-PCBL4S2P-NBF3-LF PCM provides protection functions for a three-cell Li-ion battery.

3. Circuit diagram :



	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		



Protection Circuit Module

4. Major components :

ITEM	P/N	Package
Li-ion Protection IC	Seiko S-8254AAVFT	TSSOP-16
MOSFET	VISHAY SI4835	SOP-8

4. Bill of materials :

Document :					Subject :		Revision : 1.0.2	
CT-PCBL4S2P-NBF3-LF-BOM					BOM for CT-PCBL4S2P-N BF3-LF		Date: May 28, 2010	
No.	Bill of materials for CT-PCBL4S2P-NBF3-LF				Q'ty	Maker	REMARK	
	Ref.	Part Name	DESCRIPTION	Package				
1	C1,C2,C3,C4 ,C5,C6,C7,C 8,C10,C11	Capacitor	0.1μF X7R	SMD0603	10			
2	C9	Capacitor	2.2μF X7R/25V	SMD1206	1			
3	F1	Thermal Fuse	T6D	DIP	1			
4	Q1,Q2	MOSFET	SI4835	SOP8	2	VISHAY		
5	Q3,Q4	MOSFET	SI4835	SOP8	2	VISHAY		
6	R1	Resistor	1M Ω ±5%	SMD0603	1			
7	R2,R3	Resistor	5.1K Ω ±5%	SMD0603	2			
8	R4,R5,R6,R7 ,R8,R9,R11	Resistor	1K Ω ±5%	SMD0603	7			
9	R10	Resistor	51 Ω ±5%	SMD0603	1			
10	R12	Resistor	20m Ω ±1% 1W	SMD2512	1	PDC		
11	R13,R14	NC			0			
12	RT1	Thermistor	10KΩ ±1% (TSM1A103F39H1R)	SMD0603	1	Thinking		
13	U1	Protection IC	S-8254AAVFT	TSSOP-16	1	Seiko		
14	-	PCB	PPCBL4S2P-NBF3 -LF		1	Sunjung		

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		



Protection Circuit Module

6. Absolute maximum rating :

Parameter	Rating	Unit
Operating temperature range	-40 ~ 75	°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 P+ and P-	24.0	V
Voltage Between terminals of B+ and B-	24	V

Remarks:

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

7. Basic functions :

(1) Over-charge protection

Over-charge occurs whenever the voltage applied to each battery is over $4.250V \pm 0.025V$.

Protection circuit on CT-PCBL4S2P-NBF3-LF should stop charging the battery when over-charge condition occurs and any deformation in the outer appearance of the Lithium cell connected to CT-PCBL4S2P-NBF3-LF should not occur.

(2) Over-discharge protection

Over-discharge occurs whenever the battery is discharged with voltage below $2.700V \pm 0.080V$

Protection Circuit on CT-PCBL4S2P-NBF3-LF 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 $0.200V \pm 0.025 V$ when S8254AAVFT is used)

Protection circuit on CT-PCBL4S2P-NBF3-LF should stop discharging the cell when over-current condition occurs.

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		



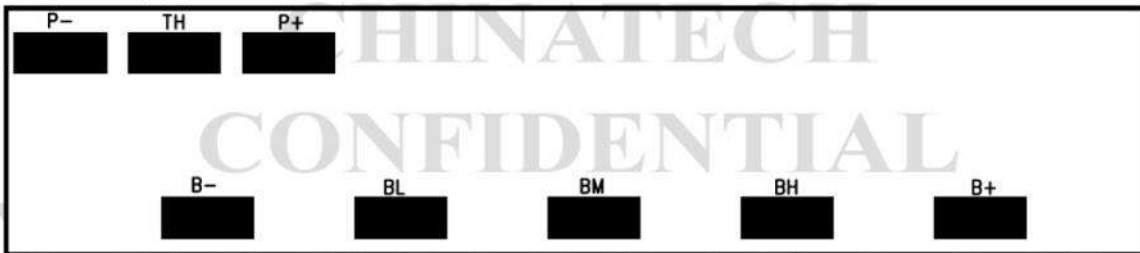
Protection Circuit Module

(4) Short-circuit protection

Short-circuit condition occurs when the terminals between P+ and P- is shortened. Protection circuit on CT-PCBL4S2P-NBF3-LF should stop discharging the cell when short-circuit condition occurs and temperature of MOSFET should not be overheated.

8.Component Layout Diagram :

PPCBL4S2/1P-NBF3-LF
 PPCBL3S2/1P-NBF3-LF



B + :	Battery 1 +
BH :	Battery 1 – & Battery 2 +
BM:	Battery 2 – & Battery 3 +
BL:	Battery 3 – & Battery 4 +
B – :	Battery 4 –
TH	10Kohm 1%
P +	Device +/Charger +
P –	Device -/Charger -

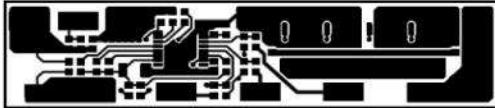
Document :	CT-PCBL4S2P-NBF3-LF-CL	Date	Sept., 22, 2009
DWG No.	CT-PCBL4S2P-NBF3-LF	Check by	Jonathan
Revision	A	Approval by	Sam

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		

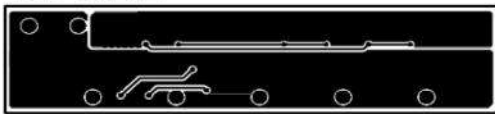


Protection Circuit Module

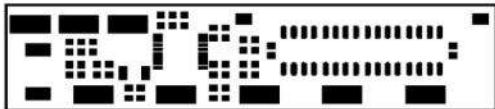
9. Artwork drawing :



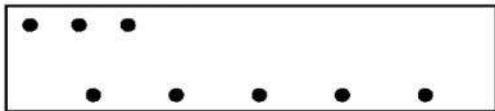
TOP SIDE



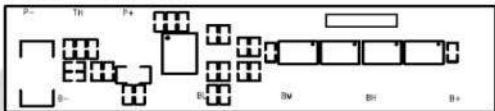
BOT SIDE



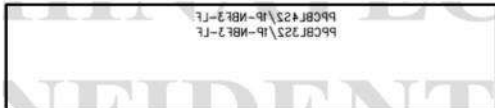
TOP MASK



BOT MASK



TOP SILK



BOT SILK



DRILL

Document:	CT-PCBL4S2P-NBF3-LF-AD	Date	Sept., 22, 2009
DWG No.	CT-PCBL4S2P-NBF3-LF	Check by	Jonathan
Revision	A	Approval by	Sam

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		



Protection Circuit Module

10. Electrical characteristics :

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

No	Item	Specification	Unit
1	Over-charge detection voltage	4.250±0.025	V
2	Over-charge release voltage	4.150±0.050	V
3	Over-discharge detection voltage	2.700±0.080	V
4	Over-discharge release voltage	3.000±0.100	V
5	Over-current detection voltage	0.200±0.025	V
6	Over-current	8.75~11.25	A
7	Charge/Discharge continue current	5	A
8	Over-charge detection delay time	500~1500	msec
9	Over-discharge detection delay time	50~150	msec
10	Over current detection delay time	5~15	msec
11	Short circuit detection delay time	100 ~ 600	usec
12	Supply current (Normal mode)	50 (max)	µA

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

No.	Item	Criteria
1	Over-charge inhibition	4.250±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	2.700±0.080 (from cell terminal)
4	Over-discharge protection recovery method	When the battery is charged, the protective condition is released.

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		



Protection Circuit Module

11.Specification of PCB :

Material	FR-4
Dimension	L: 62.00 +0.20/-0.20mm W: 15.00 +0.20/-0.20mm
Thickness	0.8 +0.10/-0.10 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) Gold Finger Plating 3u".

CHINATECH
CONFIDENTIAL

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		

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.

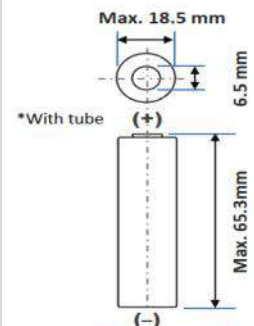
* At temperatures below 10°C, charge at a 0.25C rate.

Specifications

Rated capacity ⁽¹⁾	Min. 2700mAh
Capacity ⁽²⁾	Min. 2750mAh Typ. 2900mAh
Nominal voltage	3.6V
Charging	CC-CV, Std. 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

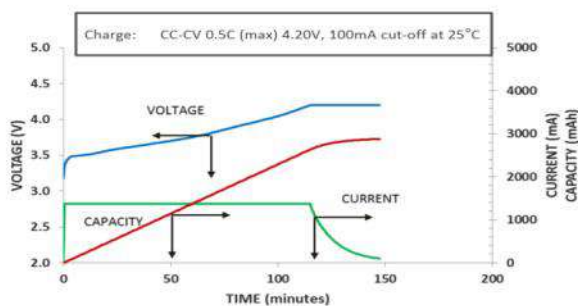
⁽¹⁾ At 20°C ⁽²⁾ At 25°C ⁽³⁾ Energy density based on bare cell dimensions

Dimensions

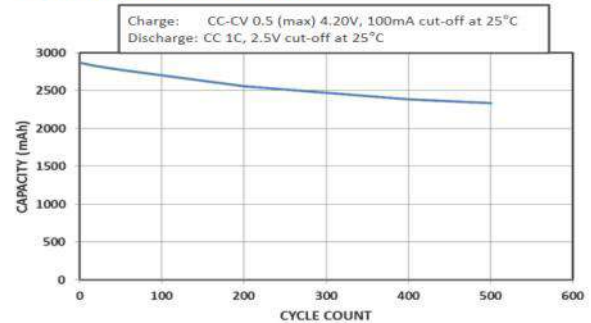


For Reference Only

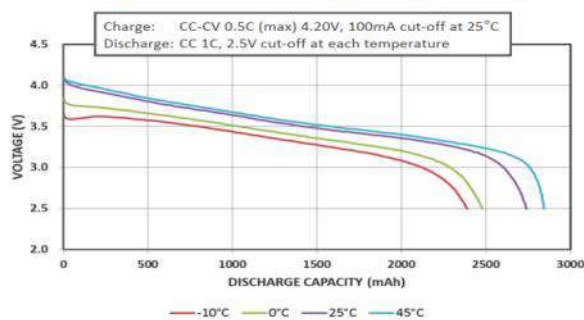
Charge Characteristics



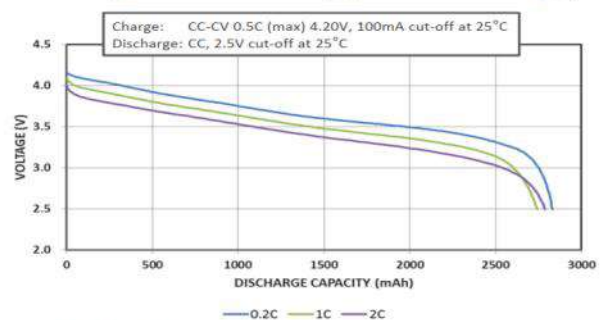
Cycle Life Characteristics



Discharge Characteristics (by temperature)



Discharge Characteristics (by rate of discharge)



The data in this document is for descriptive purposes only and is not intended to make or imply any guarantee or warranty.

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		

6. Product Label



Product Label Dimension: 45*25mm
 White

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		



K4D0001



 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														

Product by Simon in 21-July-2010

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		

7.Safety device



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



SINCE 1980 ISO 9001/T#001

THERMAL PROTECTOR



ST-22











- 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**

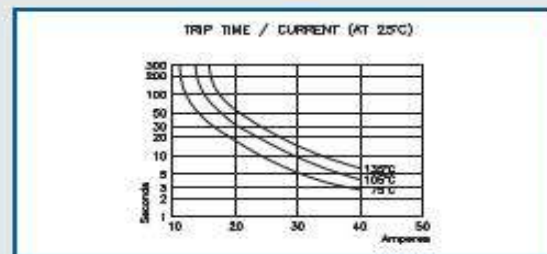
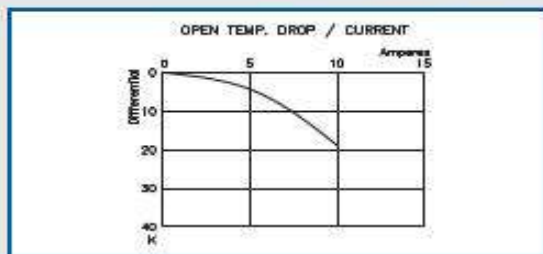
Overheat protection for Electric Motors, Battery Chargers, Transformers, Power Supplies, Heating Pads, Fluorescent Ballasts, OA-Machines, Solenoids, LED Lighting, etc.

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		



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

www.sekicon.com



• 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	AC 125V/10A, 250V/7A 10,000 cycles	130°C	E162183
		Incandescent Lamp	AC 125V/4A, 250V/2A 10,000 cycles		
CSA	CSA C22.2 No.77	Fluorescent Lamp/Ballast	AC 250V/1A 10,000 cycles	150°C	203758
	CSA C22.2 No.24	Motor Protectors	AC 250V, 1/2HP		
VDE	EN-60730-2-2	Appliance type	AC 250V, 1/2HP, 6,000 cycles	150°C	1916600-4510-0003
	EN-60730-2-9	Thermal Motor Protector	AC 250V		
	EN-60730-2-3	Thermal Cut-Out	AC 250V/7A(4A) Resistive(Inductive) 10,000Cycles		
CQC	GB14536.1-2008	Thermal Ballast Protector	AC 250V/1A	150°C	CQC08002022430
	GB14536.3-2008	Thermal Protector	Motor Protector AC 125V/250V, 1/2HP		
	GB14536.10-2008		Resistive AC 125V/10A, 250V/7A 10,000 cycles Inductive AC 125V/4A, 250V/2.5A 10,000 cycles		
KC	K60730-1	Thermal Protector	AC 250V/5A	150°C	ZH02003-100018
	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.

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		



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.

	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		

8. Product Picture



	Document Name		Rev.	1.0
	Model No.	NCR18650PF-42		

9. Outer Dimension

