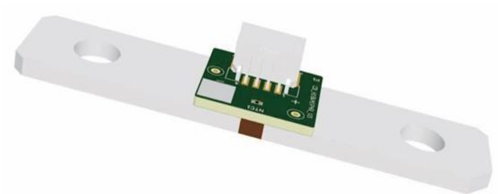
PCB+SHUNT Resistors

PCBS is an automotive current sensing module used to assist in measuring bidirectional DC current. It has high accuracy, low TCR, low inductance, low thermal EMF, and excellent long-term stability and anti-interference ability.



This module is designed based on a low-TCR shunt, which is welded with PCBA and can be installed on the circuit through bolts. It is used to collect bus current and shunt temperature, and send the measured signal to the signal processing side of the user defined module. It can be customized according to the specific technical requirements.

Applications : BMS Current Measurement, BDU/PDU Current Measurement

GENERAL SPECIFICATIONS

Model		Resistance (Capacitance)	Tolerance	TCR	Continuous Operating Current (Rated Voltage)	Operating Temperature Range
PCBS6918B100 P2AC00	Shunt	100μΩ	±5%	±100ppm/℃	±350A	-55℃~+175℃
	NTC	10kΩ	±1%	3434K		-40℃~+150℃
	Capacitor	0.1μF	±10%		50V	-55℃~+125℃
PCBS8436P025 T2AC00	Shunt	25μΩ	±5%	±100ppm/℃	±1000A	-55℃~+175℃
	NTC	10kΩ	±1%	3435K		-50℃~+150℃
	PCBS(Assembly)	Scan the QR code on the product to obtain the initial resistance R_0 ±0.2% R_0 is the initial resistance of shunt at lab environment, usually at +25℃±2℃				
PCBS8518A050 P1SC00	Shunt	50μΩ	±5%	±100ppm/℃	±350A	-55℃~+175℃
	NTC	10kΩ	±1%	3435K		-50℃~+150℃
PCBS8536P050 T1SN00	Shunt	50μΩ	±5%	±100ppm/℃	±600A	-55℃~+175℃
	NTC	10kΩ	±1%	3435K		-50℃~+150℃

* Shunt : TCR -40℃~+125℃
* NTC : TCR +25℃~+85℃

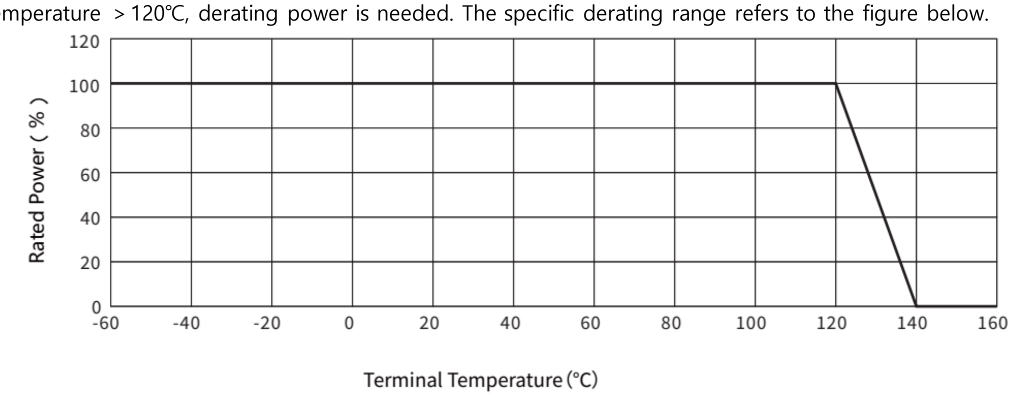
Homepage : www.rara.co.kr E-mail : sales1@rara.co.kr

LIMIT SPECIFICATIONS

Note : Product will affect its reliability and cause unexpected permanent damage if operating under limit parameters for long time.

Parameter	Model	Condition	Min.	Typical	Max.	Unit
Current Measurement Range	PCBS6918B100P2AC00	±1000A			5	s
	PCBS8436P025T2AC00	±3000A			5	
	PCBS8518A050P1SC00	±1000A			5	
	PCBS8536P050T1SN00	±3000A			10	
Operating Temperature	PCBS6918B100P2AC00 PCBS8436P025T2AC00 PCBS8518A050P1SC00 PCBS8536P050T1SN00		-40		125	℃
Storage Temperature			-40		125	℃
Humidity					95	%RH

When operating temperature ＞120℃, derating power is needed. The specific derating range refers to the figure below.



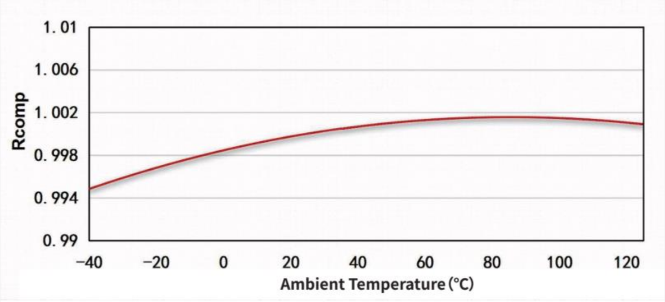
TEST STANDARDS

Test No.	Test Standards	Test Items
1	VW 80000-2021 5.4.20	E-18 Insulation resistance
2	VW 80000-2021.5.4.22	E-20 Dielectric strength
3	GB/T 6148-2005	Drift of temperature
4	GB/T 2423.2-2008	High temperature aging
5	GB/T 2423.1-2008	Low temperature operation
6	VW 80000:2021 5.6.5	K-05 Thermal shock (component)
7	GB/T2423.50-2012 MIL-STD-202 Method 103	Damp heat, constant
8	VW 80000:2021 5.8.3	L-03 Service life test – Temperature cycle durability testing
9	GB/T 10125-2021	Salt spray
10	VW 80000-2021 5.5.1	M-01 Free fall
11	VW 80000-2021 5.5.4	M-04 Vibration test
12	VW 80000-2021 5.5.5	M-05 Mechanical shock
13	RoHS	Pb, Cd, Hg, Cr(V), PBBs, PBDEs
14	REACH	CMR, PBT, vPvB…

TEMPERATURE COMPENSATION

PCBS6918B100P2AC00	PCBS8436P025T2AC00

These apply temperature compensation to weaken the impact of ambient temperature changes on the shunt resistance. A fitting algorithm is used to compute a curve of the shunt resistance change with temperature, as shown in graph.



As shown graph, the compensation factor R_{COMP} temperature characteristic curve is : $R_{COMP} = A\times T^2+B\times T+C$

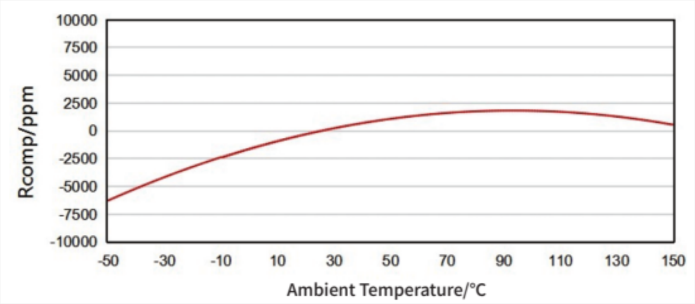
Demonstration :
R_{COMP} : The drift of the shunt resistance relative to the change from initial temperature to present temperature, in ppm.
T : Present Temperature of Shunt
A : Coefficient of Quadratic Term T^2
B : Coefficient of Primary Term T
C : Constant Term

Shunt resistance R_t at present temperature t, through temperature compensation : $R_t = R_0 \times R_{COMP}$[1]

[1] R_0 is the initial resistance of shunt at lab environment, usually at +25℃±2℃
[2] Graph is only for illustration of this product. It is not the temperature characteristic curve for all products.

PCBS8518A050P1SC00	PCBS8536P050T1SN00

These apply temperature compensation to weaken the impact of ambient temperature changes on the shunt resistance. A fitting algorithm is used to compute a curve of the shunt resistance change with temperature, as shown in graph.



As shown graph, the compensation factor R_{COMP} temperature characteristic curve is : $R_{COMP} = A\times T^2+B\times T+C$

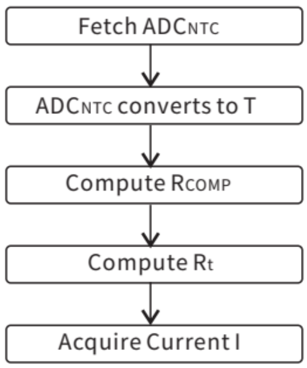
Demonstration :
R_{COMP} : The drift of the shunt resistance relative to the change from initial temperature to present temperature, in ppm.
T : Present Temperature of Shunt
A : Coefficient of Quadratic Term T^2
B : Coefficient of Primary Term T
C : Constant Term

Shunt resistance R_t at present temperature t, through temperature compensation : $R_t = R_0 \times (R_{COMP/}\ 10^6\ )$[1]

[1] R_0 is the initial resistance of shunt at lab environment, usually at +25℃±2℃
[2] Graph is only for illustration of this product. It is not the temperature characteristic curve for all products.

CURRENT DATA ACQUISITION

PCBS6918B100P2AC00 / PCBS8436P025T2AC00



ADC_{NTC} : ADC of NTC

T: NTC Temperature (°C)

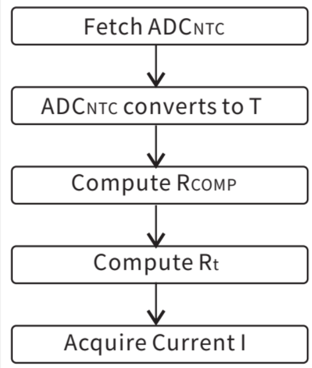
R_{COMP} : $R_{COMP}=A*T^2+B*T+C$

$R_t=R_0*R_{COMP}$

$I=V_{SHUNT}/R_t$

V_{SHUNT} : Voltage of Shunt

PCBS8518A050P1SC00 / PCBS8536P050T1SN00



ADC_{NTC} : ADC of NTC

T: NTC Temperature (°C)

R_{COMP} : $R_{COMP}=A*T^2+B*T+C$

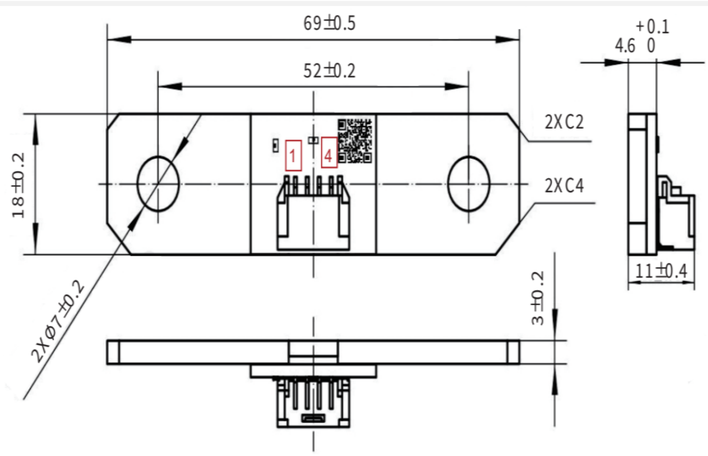
$R_t=R_0*(1+R_{COMP}/10^6)$

$I=V_{SHUNT}/R_t$

V_{SHUNT} : Voltage of Shunt

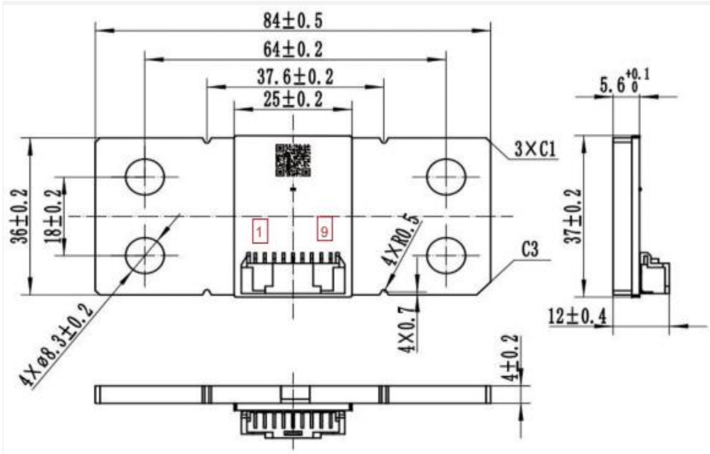
DIMENSIONS

PCBS6918B100P2AC00



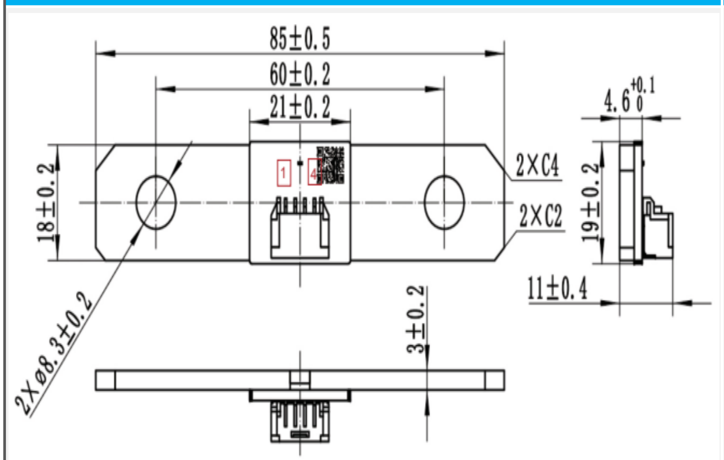
PCB Cover Size : L6×W6 (mm)
Data Matrix Size : L5×W5 (mm)

PCBS8436P025T2AC00



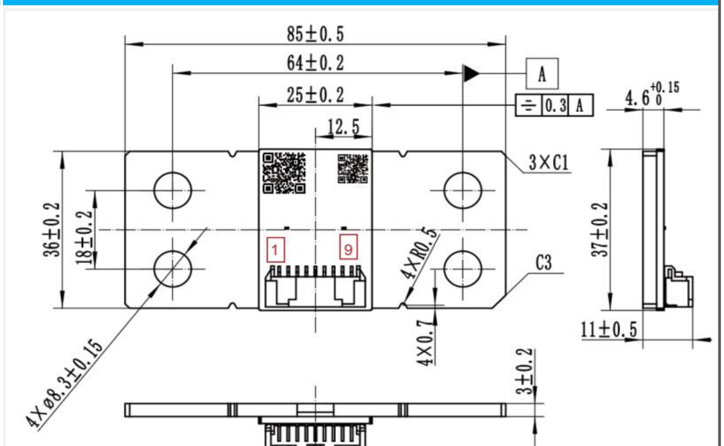
PCB Cover Size : L7×W7 (mm)
Data Matrix Size : L5×W5 (mm)

PCBS8518A050P1SC00



PCB Cover Size : L6×W6 (mm)
Data Matrix Size : L5×W5 (mm)

PCBS8536P050T1SN00



PCB Cover Size : L10×W10 and L7×W7 (mm)
Data Matrix Size : L9×W9 and L5×W5 (mm)

DATA MATRIX

※ PCBS6918B100P2AC00, PCBS8436P025T2AC00

The content of the QR code includes date, serial number, and the actual resistance value
(Take 100μΩ for example, measurement is to three decimal places : 100.000μΩ, output as R100000n, if it is 99.000μΩ is R99000n)

Content	Year	Month	Day	Module ID	R_0 [1]	Coefficient A	Coefficient B	Constant Term C
Format	YYYY	MM	DD	XXXXX	Rxxxxxxn or Rxxxxxn [2]	±X.XXXXXXXXX	±X.XXXXXXXXX	±X.XXXXXXXXX
Example	2020	11	25	00001	R100123n R99123n	-0.000000576	+0.000086780	+0.998188760
	If R≥100nΩ 2020112500001R100123n-0.000000576+0.000086780+0.998188760 If R＜100nΩ 2020112500001R99123n-0.000000576+0.000086780+0.998188760 [3]							

[1] R_0, the initial resistance of shunt at lab environment, usually at 25℃±2℃, in nΩ.

[2] If R≥100μΩ, R_0 is expressed as Rxxxxxxn.
If R＜100μΩ, R_0 is expressed as Rxxxxxn.

[3] If R≥100μΩ, the total number of characters is 57
If R＜100μΩ, the total number of characters is 56

※ PCBS8518A050P1SC00, PCBS8536P050T1SN00 (Code 1)

Content	Year	Month	Day	Module ID	R_0 [1]	Coefficient A [2]	Coefficient B [3]	Constant Term C [4]
Format	YYYY	MM	DD	XXXXX	RXXX.XXXX	±X.XXXXXXXX	±XXX.XXXXX	±XXXX.XXX
Example	2023	02	13	00001	R051.4912	-0.45837105	+130.48848	-2975.730
	2023021300001R051.4912-0.45837105+130.48848-2975.730 [5]							

[1] R_0, the initial resistance of shunt at lab enviroment, usually at 25℃±2℃, rounded to 4 decimal places, in μΩ.

[2] Coefficient A of Quadratic Term T^2, rounded to 8 decimal places.

[3] Coefficient B of Primary Term T, rounded to 5 decimal places.

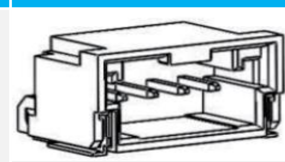
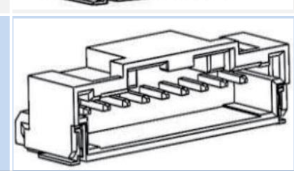
[4] Constant Term C, rounded to 3 decimal places.

[5] The total number of characters is 52.

※ PCBS8536P050T1SN00 (Code 2)

Content	Part Number PIN	Hardware Version	Date	Serial Number
Example	PCBS8536P050T1SN00	V2.0	B62	00001
	PCBS8536P050T1SN00V2.0B620001			

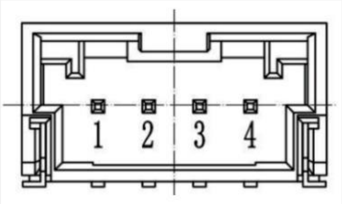
CONNECTOR

Model	Manufacturer	Pin Count	Part #	Structural Diagram
PCBS6918B100P2AC00 PCBS8518A050P1SC00	Molex	4	5023520400	
PCBS8436P025T2AC00 PCBS8536P050T1SN00	Molex	9	5023520900	

CONNECTOR DEFINITION

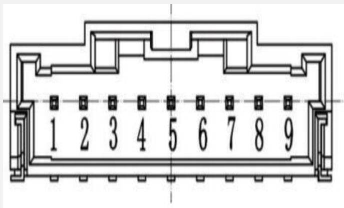
※ PCBS6918B100P2AC00, PCBS8518A050P1SC00

Pin No.	Code	Description	Structural Diagram
1	T1	Temperature Sensor Pin1	
2	S+	Current Signal Positive	
3	S-	Current Signal Negative	
4	T2	Temperature Sensor Pin2	



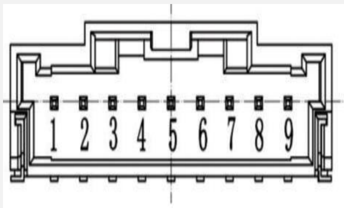
※ PCBS8436P025T2AC00

Pin No.	Code	Description	Structural Diagram
1	A+	Current Signal Group A Positive	
2	A-	Current Signal Group A Negative	
3	B+	Current Signal Group B Positive	
4	B-	Current Signal Group B Negative	
5	C+	Current Signal Group C Positive	
6	C-	Current Signal Group C Negative	
7	GND	Shunt Common Mode End	
8	T1	Temperature Sensor Pin1	
9	T2	Temperature Sensor Pin2	

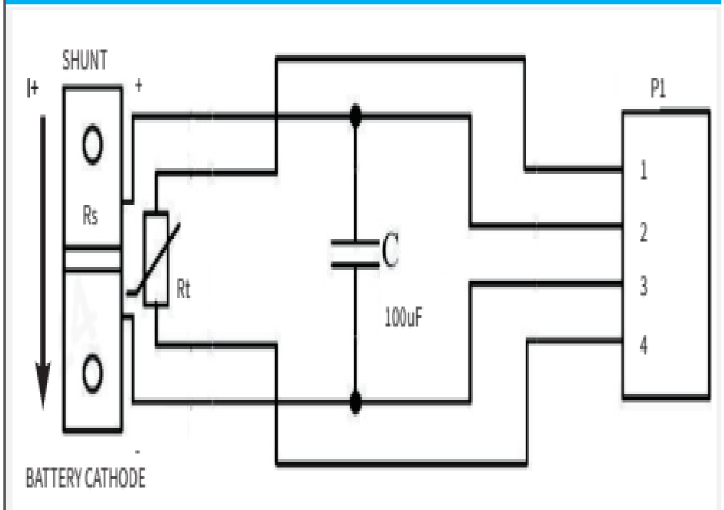
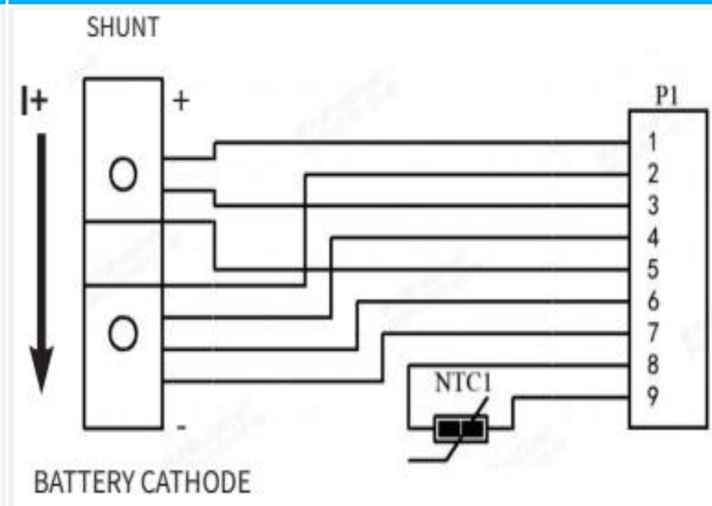
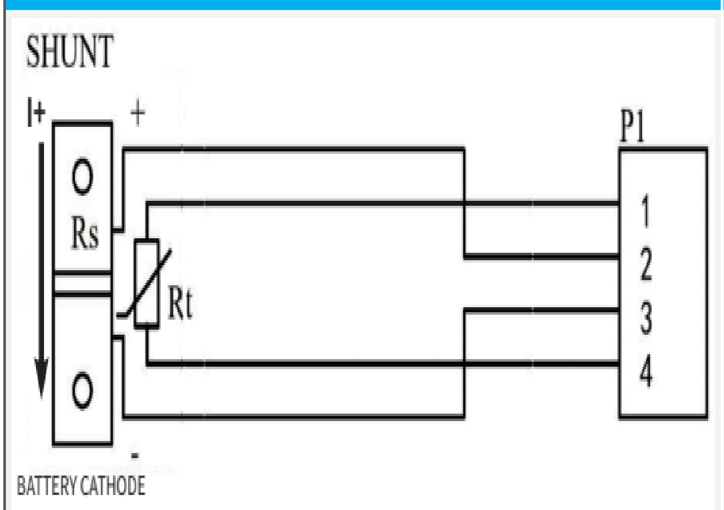
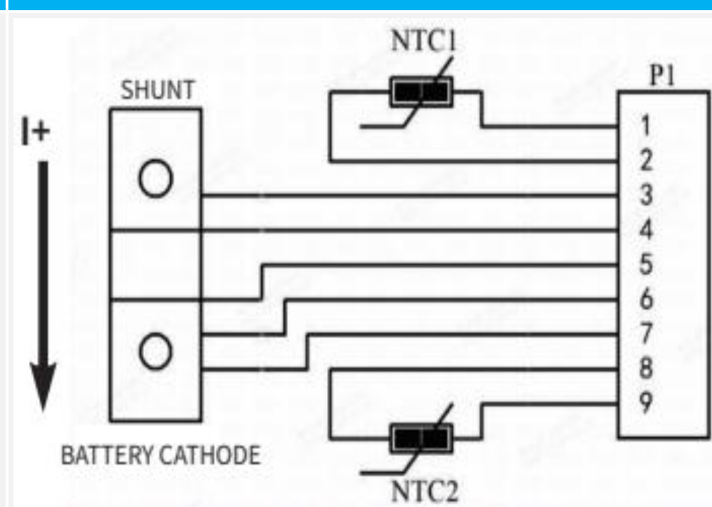


※ PCBS8436P025T2AC00

Pin No.	Code	Description	Structural Diagram
1	TL1	Temperature Sensor Pin1	
2	TL2	Temperature Sensor Pin2	
3	SB+	Current Signal Group B Positive	
4	SA+	Current Signal Group A Positive	
5	SA-	Current Signal Group A Negative	
6	SB-	Current Signal Group B Negative	
7	GND	Shunt Common Mode End	
8	TR1	Temperature Sensor Pin1	
9	TR2	Temperature Sensor Pin2	



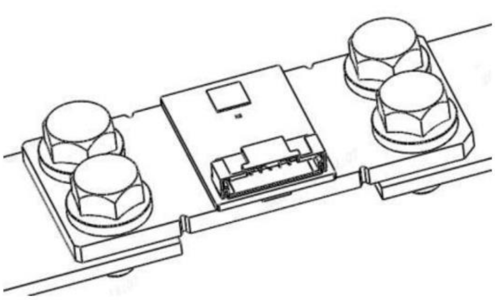
PCB STRUCTURAL DIAGRAM

PCBS6918B100P2AC00	PCBS8436P025T2AC00
	
PCBS8518A050P1SC00	**PCBS8536P050T1SN00**
	

[1] The direction of current is related to the installation position the PCBS product in the BDU, and is not related to the PCBS itself.
[2] The positive and negative electrode of the PIN is determined by the direction of the current in the diagram.
[3] Generally, battery discharge is considered positive and charging is considered negative.

COPPER BAR CONNECTION

- Recommended Bolts
  - PCBS6918B100P2AC00 : M6
  - Other models : M8
- Recommended Torque
  - PCBS6918B100P2AC00 : 8-10Nm
  - Other models : 15-20Nm
- Recommended Width × Thickness of copper Bar
  - PCBS6918B100P2AC00, PCBS8518A050P1SC00 : 24mm×3mm
  - PCBS8436P025T2AC00, PCBS8536P050T1SN00 : 40mm×4mm
- Recommended Length of Overlap between Shunt and Copper Bar : 20mm
- Do not use a flat washer between the copper bar and the shunt
- Keep the surface of shunt and copper bar clean and free of scratches



Example image

STORAGE & PACKAGING

- Recommended storage at room temperature.
- The storage environment shall be clean, tiny, dry and free of harmful gases.
  The packaging case shall be protected from direct sunlight.
- Anti-static bracelet or gloves shall be worn during installation, storage and handling.

※ General Information

Packaging Element	Specifications	
SNP[1]	150	
Container	Carton	
Container Size	509×342×240	mm

[1] SNP, Standard Number of package

※ Auxiliary Materials Information

No.	Materials	Size L×W×H (mm)	Quantity	Recycle
1	50-Grid EPE Tray	496×328×61	3	No
2	EPE Tray Cover	495×325×5	4	No
3	Anti-static PE Bag	900×510	1	No