

### REVERSION HISTORY:

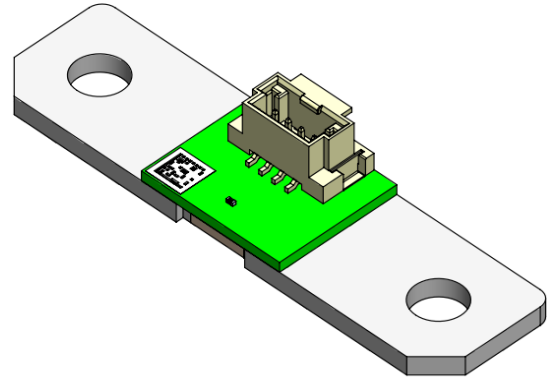
Date	Revision	Changes	
2021.12.10	A0	Transferred from "CYNP-18Z-022 (A6)"	RENEE.CHEN
2022.01.10	A1	<ol style="list-style-type: none"><li>1. Change the description on the first page</li><li>2. Change QR code printing method from "Label QR code" to "data-matrix PCB Laser marking"</li><li>3. Add "Type Designation"</li><li>4. Add "Packing"</li></ol>	
2022.01.14	A2	<ol style="list-style-type: none"><li>1. Change all diagrams and dimension drawing</li></ol>	
2022.09.12	A3	<ol style="list-style-type: none"><li>1. Change "Rcomp" to "Rcomp_f" in the diagram on page5</li><li>2. Change the R25 icon in flow chart on page6</li><li>3. Change the package explanation from "180 Pcs /Carton" to "90 Pcs / Box"</li></ol>	Renee.chen
	A3	Update picture of "Packing"	Vivian
2023.10.31	A4	Change the feature description <ol style="list-style-type: none"><li>1. Low inductance &lt; 3nH</li><li>2. Low thermal EMF ( &lt; 0.6μV/°C)</li></ol>	Renee.Chen

## 400A, Shunt current module

VGE00-400VN-000

### FEATURES:

- Nominal Current Up to 400A
- High pulse current rating
- Low inductance (< 3nH)
- Low thermal EMF (< 0.6μV/°C)
- Welding construction; Excellent long-term stability
- Pb-free for RoHS compliant
- Ni & Sn plating assists with PCB mounting and corrosion protection



### APPLICATIONS:

- EV/HEV BMS
- Battery and storage based application

### GENERAL DESCRIPTION:

The shunt module is a PCBA which include a thermistor and a connector mount on the shunt resistor. User can easy mount the module on current sense location and connect to signal processing side via board to wire connection.

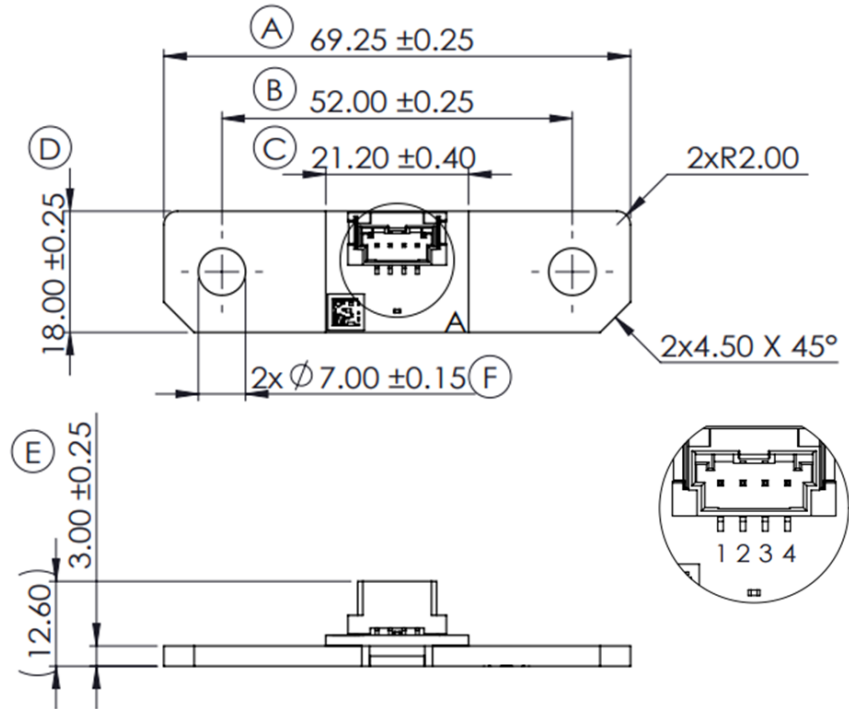
### ELECTRICAL SPECIFICATIONS:

Characteristics	Feature
Nominal current	400A
Resistance value	150μΩ
Temperature coefficient of resistance(25°C/125°C)	± 100 ppm/°C
Operating Temperature* <sub>NOTE1</sub>	-40~105°C
Storage Temperature	-40~125°C
Resistance tolerance	± 5%

\*Note1: Operating temperature means that NTC temperature need to be between -40°C to 105°C.

**OUTLINE DRAWING:**

Unit: mm

**Dimension**


	Manufacture	Part No	Pin Definition
Connector	MOLEX	560020-0420	1, TEMP_P
			2, SHUNT_SENSE_P
			3, SHUNT_SENSE_N
			4, TEMP_N
Thermistor	Thinking	TSM0C103F34D1R	

\*Connector Mates Part(s): 560123-0400, 505151-0401

**Type Designation :**

VGE 00 - 400 VN - 000

(1) (2) (3) (4) (5)

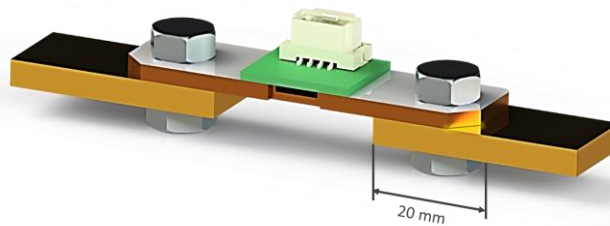
Note :

- (1) Series No.
- (2) Connector type
- (3) Nominal Current
- (4) Series No.
- (5) Hardware Format

**BUS BAR CONNECTION:**

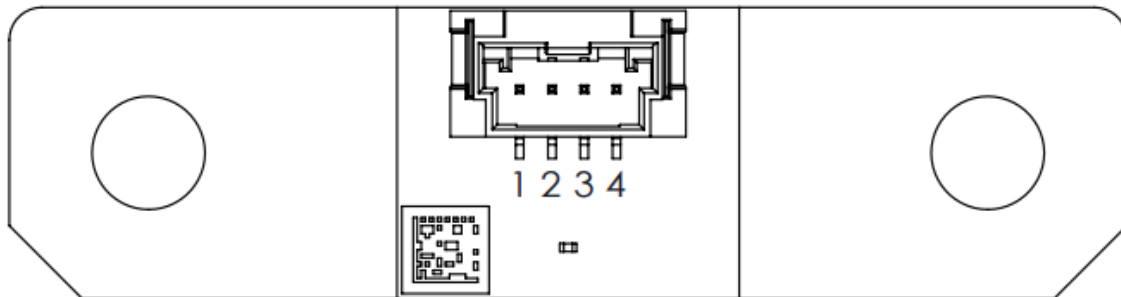
There are a few recommendations for a good connection.

- Always use screws with an outer diameter of 6 mm (M6)
- The recommended torque is 8~10Nm
- Shunt and bus bar must be clean.
- Correct mounting 20mm overlap ad shown in below figure.



**Data-matrix Information for reference:**

1. PCB Top overlay (for laser marking) dimension : 5mm x 5mm (ref.)
2. Data-matrix dimension : 4mm x 4mm (ref.)



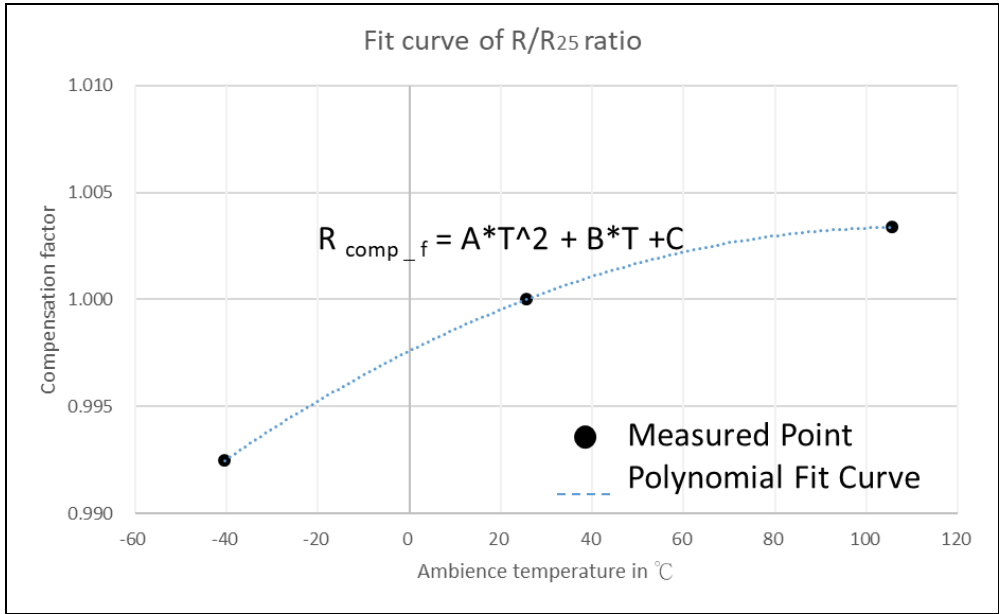
3. Data-matrix information for reference:

	Year	Month	Day	Module ID	Resistance R <sub>25</sub> *	Quadratic coefficient	First-order coefficient	Constant term
Form	YYYY	MM	DD	XXXXX	Rxxxxxn	±x.xxxxxxxxxx	±x.xxxxxxxxxx	±x.xxxxxxxxxx
Example	2020	11	25	00001	R150123n	-0.000000576	+0.000086780	+0.998188760
2020112500001R150123n-0.000000576+0.000086780+0.998188760								

\* R<sub>25</sub> is shunt resistance at 25°C, unit: nOhm

\*Note3 : Total Characters are 57.

**Shunt Temperature Compensation Function:**



Generic compensation factor the resistance of shunt need to be multiplied with:

$$R_{comp\_f} = A \cdot T^2 + B \cdot T + C$$

Where:

$R_{comp\_f}$  is the compensation factor for Shunt resistance drift over ambience temperature normalized

to 1 at 25°C.

T is temperature reading from PCB temperature sensor NTC.

A is quadratic coefficient, the default value is -0.000000576\*.

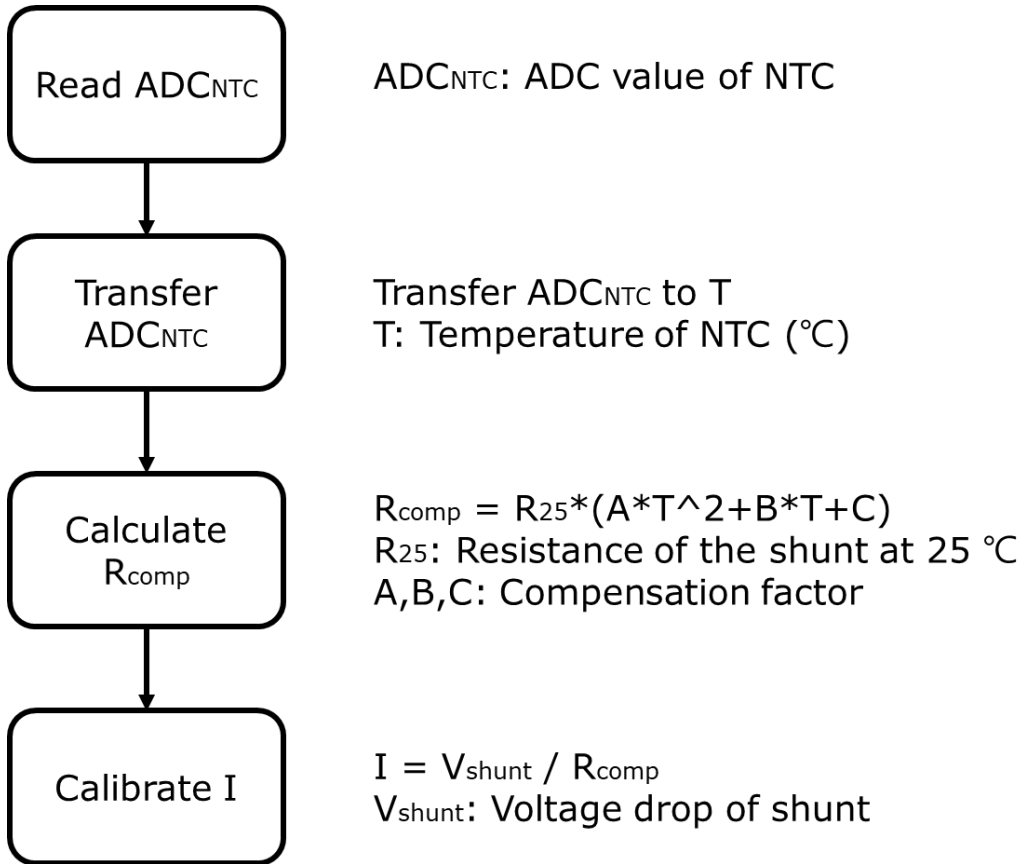
B is first-order coefficient, the default value is +0.000086780\*.

C: constant term coefficient, the default value is +0.998188760\*.

The compensated shunt resistance value  $R_{comp} = R_{25} \cdot R_{comp\_f}$ .

$R_{25}$  is resistance value of shunt at 25°C.

\*Value is for reference only.

**Compensated Flow:**

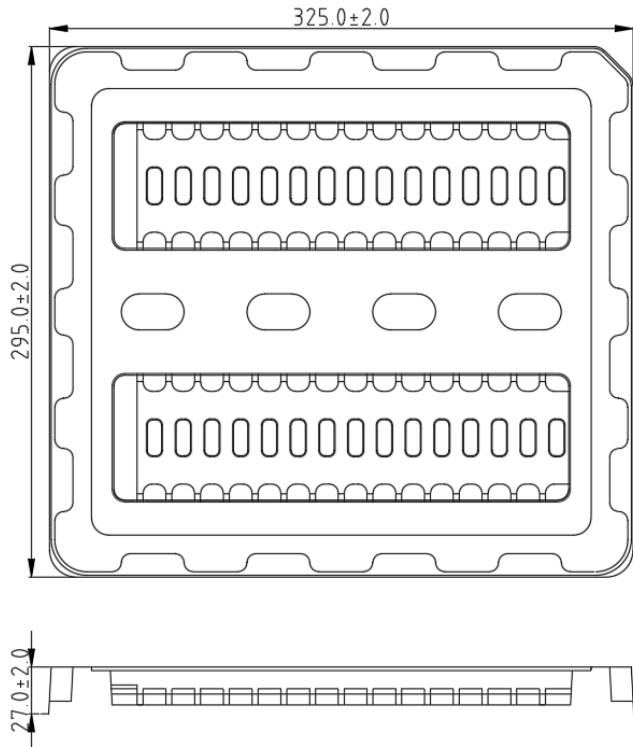
**RELIABILITY TEST:**

Test Item	Test Condition	Spec
Low temperature storage	ISO 16750-4 IEC 60068-2-1 Ad Temperature: -40°C, Time: 240hrs, 500hrs	$\Delta R: \pm 1\%$
High temperature storage	ISO 16750-4 IEC 60068-2-2 Temperature: 125°C, Time: 1000hrs, 2000hrs	$\Delta R: \pm 1\%$
Temperature cycling storage	IEC 60068-2-14, Nb -40°C to 125°C, Dwell time $\geq 15$ min, 1000 cycles	$\Delta R: \pm 1\%$
Thermal shock storage	IEC 60068-2-14, Na -40°C to 125°C, Dwell times $\geq 15$ min Transfer time: $\leq 30$ s, 500, 1000 cycles	$\Delta R: \pm 1\%$
Cycling moisture resistance storage	MIL-STD-883. METHOD 1004.7 -10°C to 70°C ; 90% ~ 100%RH @ 70°C, 20 cycles	$\Delta R: \pm 1\%$
Damp heat storage	JESD22-A 101 Temperature: 85 °C ; Humidity: 85%; Time : 1000hrs	$\Delta R: \pm 1\%$
Vibration	ISO 16750-3 IEC 60068-2, 64 Random 10~1000Hz, profile: 8hrs/axis The r.m.s. acceleration value shall be 27,1 m/s <sup>2</sup> .	$\Delta R: \pm 0.5\%$
Mechanical Shock	ISO 16750-3 6 axis, 50G, 6ms, half-sine, 10 times/axis	$\Delta R: \pm 0.5\%$
Free Fall	ISO 16750-3 3 axis, 2 falls per DUT by axis, 1m, concrete ground or steel plate	$\Delta R: \pm 0.5\%$



**Packing:**

Tray packaging dimensions :



Label Marking :

The following items shall be marked on tray

- (1) Description
- (2) Quantity
- (3) Part No.
- (4) Tapping No.

Quantity: 30 Pcs / Tray

90 Pcs / Box