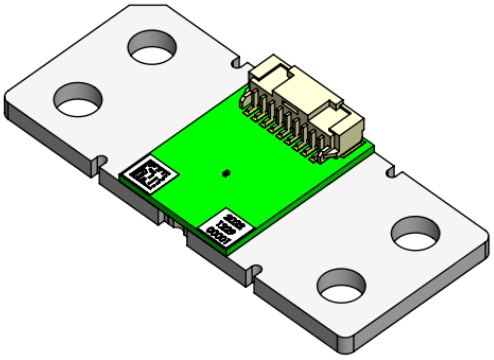
Reversion history:

Date	Revision	Changes	
2021.10.12	A0	Initial released for preliminary datasheet	Renee Chen
2021.11.29	A1	1. Modify the QR code drawing to data-matrix 2. Update the coefficients of A, B and C 3. Define the tolerance of Resistance on page1	Renee Chen
2021.12.15	A2	Let "Label Size : 5 x 5 x 0.1 mm(ref.), Data-matrix Size : 4mm x 4mm(ref.)" be changed to "Label Size : 7 x 7 x 0.1 mm(ref.), Data-matrix Size : 5mm x 5mm(ref.)"	Renee Chen
2022.01.19	A3	1. Change the description on first page 2. Dimension drawing revision 3. Change QR code printing method from "Label QR code" to "data-matrix PCB Laser marking" 4. Add "Type Designation" 5. Add "Packing"	Renee Chen
2022.04.14	A4	Add "Peak Current Measurement Range : ±2000A(5s)"	Renee Chen
2022.05.27	A5	1. Add Tray drawing 2. Modify the number of tray/box and Tray size	Renee Chen
2022.07.18	A6	1. Modify the format and add some text descriptions 2. Add "Care note" 3. Remove the words "Preliminary specification"	Cody Wang
2022.09.08	A7	1. Change "Rcomp" to "Rcomp_f" in the diagram on page5 2. Change all "Rcomp" to "Rcomp_f" on page5	Renee chen
2022.10.07	A8	Change the coefficients in Shunt temperature compensation function A, B, C to letter x	Cody Wang
2023.01.04	A9	1. Delete the description about "Storage temperature" 2. Revise schematic diagram on page1 3. Revise dimension drawing on page1 4. Add data code information and schematic diagram on page4	Renee chen
2023.02.17	B0	1. Revise the description of "*Connector Mates Part(s)" 2. Revise the description of "Connector pin definition"	RihYang Huang

Date	Revision	Changes	
2023.4.18	B1	1. Add the size of M8 locking screw & torque value recommendations 2. Revise the description of "Connector pin definition"	RihYang Huang
2023.06.07	B2	1. Add Note5, "font specification of date code" 2. Remove (Lead / Halogen Free)	Renee Chen
2023.07.13	B3	1. It is defined that the deviation of repeated testing of resistance value is within ±0.3% at room temperature	Renee Chen
2023.10.30	B4	1. Low inductance (< 3nH) 2. Low thermal EMF (< 0.6μV/℃)	Renee Chen

VGB00-1K0VN-070, Current 1000A

Features/Applications:



- Nominal current up to 1000 A
- Peak current measurement range: ±2000 A (5 s)
- 9-pin connector allows fast connection
- High precision current measurement with temperature compensation
- High pulse current rating
- Low inductance (< 3 nH)
- Low thermal EMF (< 0.6 μV/℃)
- Pb-free for RoHS compliant and reliability completed
- Ni & Sn plating assists with PCB mounting and corrosion protection
- Automotive applications and current sensing for BMS

General description:

The shunt current module is a PCBA, which includes one thermistor and a connector mounting on the shunt resistor. Users can easily mount the module on the current sense location and connect to the signal processing side via board-to-wire connection.

Electrical specifications:

Characteristics	Feature
Nominal current	1000 A
Resistance value	25 μΩ
Temperature coefficient of resistance (25 ℃/ 125 ℃)	± 200 ppm/℃
Operating temperature*Note1	-40~125 ℃
Resistance tolerance*Note2	± 5%
Resistance re-testing tolerance at room temperature	± 0.3%

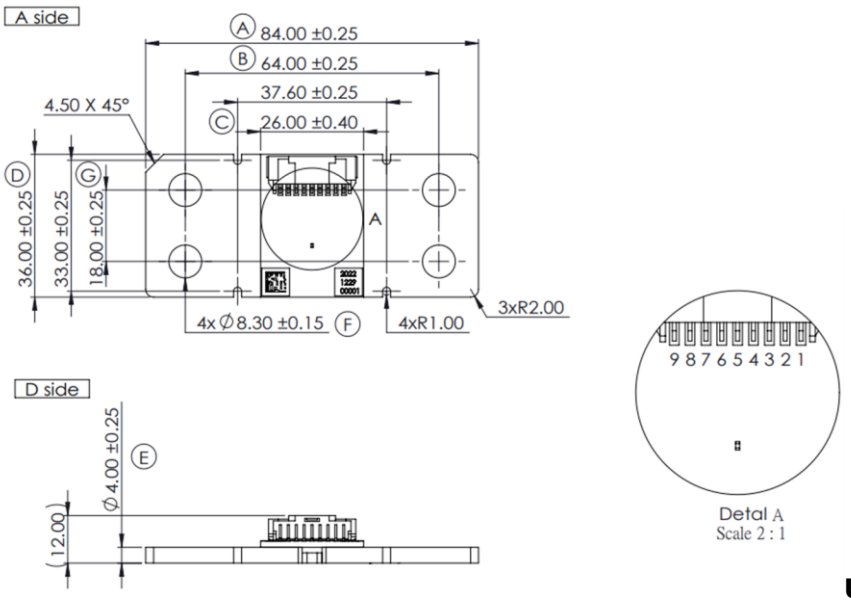
*Note1: Operating temperature means that NTC temperature need to be between -40 ℃ to 125 ℃.

*Note2: Definition of resistance tolerance is measuring between pin 5 and pin 6.

Pin 3 and pin 4, pin 1 and pin 2 of resistance tolerance are reference only.

Outline drawing:

Dimension



Unit: mm

Component	Manufacturer	Part No.	Pin definition
Connector	MOLEX	502352-0900	1: SHUNT_V_{SENSE}_3 2: SHUNT_V_{SENSE}_3 3: SHUNT_V_{SENSE}_1 4: SHUNT_V_{SENSE}_1 5: SHUNT_V_{SENSE}_2 6: SHUNT_V_{SENSE}_2 7: SHUNT_GND 8: NTC_T_{SENSE} 9: NTC_T_{SENSE}
Thermistor	Thinking	TSM0C103F34D1R	-

*Connector Mates Part(s): 560123-0900, 505151-0901

Type designation:

V G B 0 0	-	1 K 0	V N	-	0 7 0
(1)		(2)	(3)		(4)

Note:

(1) Series No.

(2) Nominal current

(3) Series No.

(4) Hardware format

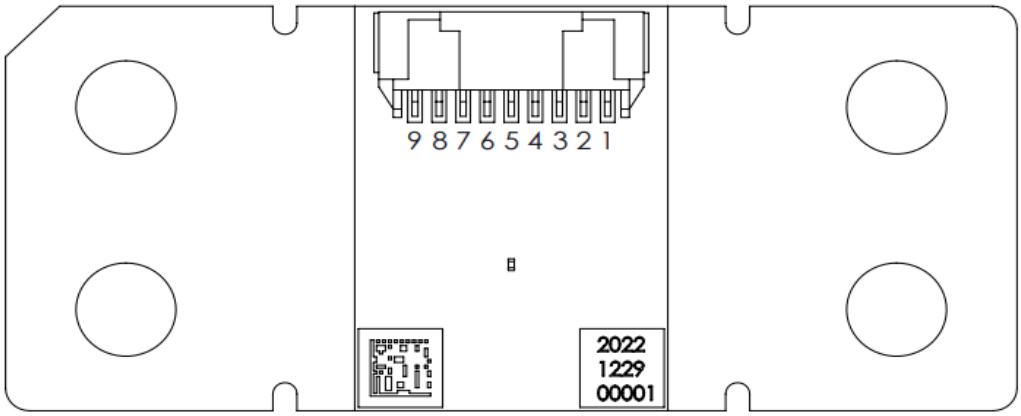
Bus-bar setup:

There are a few recommendations for a good connection between the shunt current module and the bus-bar.

1. Always use screws with an outer diameter of 6 mm (M6) or 8 mm (M8).
2. The recommended torque is 8~10 N-m for M6 screw or 15~17 N-m for M8 screw.
3. The shunt and the bus-bar must be clean.

Data-matrix and date-code information for reference:

1. PCB top overlay (for laser marking) dimension: 7 mm x 7 mm (ref.)
2. Data-matrix dimension: 5 mm x 5 mm (ref.)



3. Data-matrix information for reference for left side :

	Year	Month	Day	Module ID	Resistance R_{25}*	Quadratic coefficient	First-order coefficient	Constant term
Form	YYYY	MM	DD	XXXXX	Rxxxxxn	±x.xxxxxxxxx	±x.xxxxxxxxx	±x.xxxxxxxxx
Example	2020	11	25	00001	R25123n	-0.000000431	+0.000117042	+0.997245080
	2020112500001R25123n-0.000000431+0.000117042+0.997245080*Note3							

* R_{25} is shunt resistance at 25 ℃, unit: nOhm

*Note3: Total characters are 56.

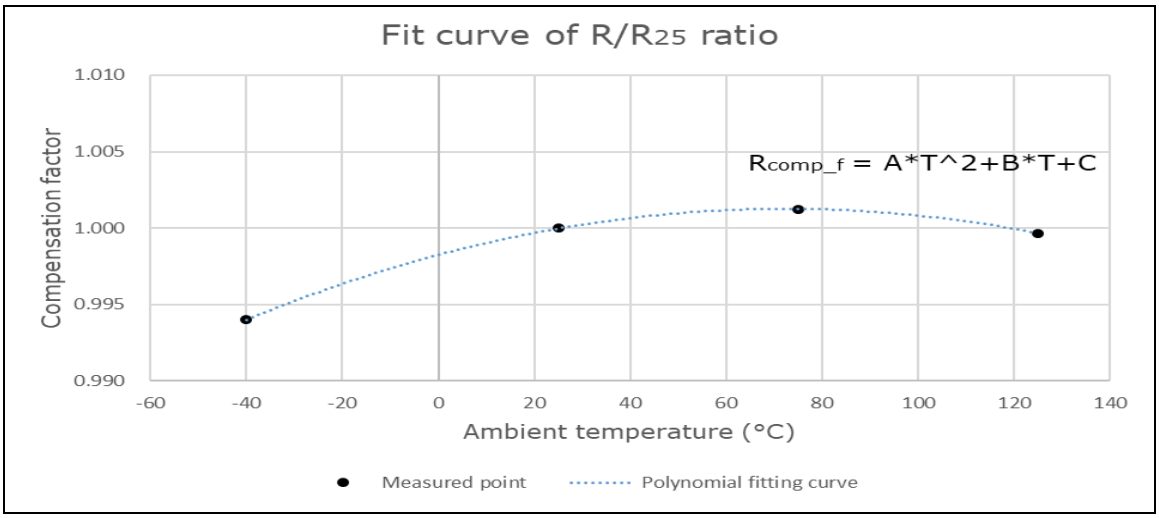
4. Date code information for reference for right side :

	Year	Month	Day	Module ID
Form	YYYY	MM	DD	XXXXX
Example	2020	11	25	00001
	2020112500001*Note4 and*Note5			

*Note4: Total characters are 13.

*Note5: The font is definition by software system. And the line width of the font is 0.230±0.1mm and wobble is setting by 80±10%. The size of font is height 1.6±0.2mm and width 74±2%

Shunt temperature compensation function:



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

R_{comp_f} = A*T^2 + B*T +C

Where:

R_{comp_f} is the compensation factor for shunt resistance drift over ambient temperature normalized to 1 at 25 ℃.

T is temperature reading from PCB temperature sensor NTC.

A is quadratic coefficient, the default value is -0.xxxxxxxxx*.

B is first-order coefficient, the default value is +0.xxxxxxxxx*.

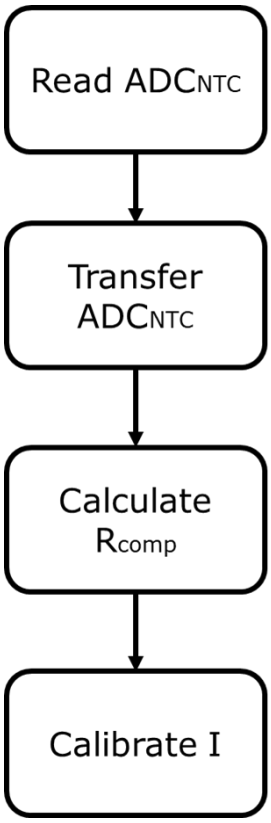
C: constant term coefficient, the default value is +0.xxxxxxxxx*.

The compensated shunt resistance value R_{comp} = R_{25} * R_{comp_f}.

R_{25} is resistance value of shunt at 25℃.

* A, B, and C values are for reference only, the actual values will be slightly different from each batch production, please refer to the data matrix on the PCB.

Compensated flow:



ADC_{NTC}: ADC value of NTC

Transfer ADC_{NTC} to T
T: Temperature of NTC (℃)

$R_{comp} = R_{25}*(A*T^2+B*T+C)$
R_{25}: Resistance of the shunt at 25 ℃
A,B,C: Compensation factor

$I = V_{shunt} / R_{comp}$
V_{shunt}: Voltage drop of shunt

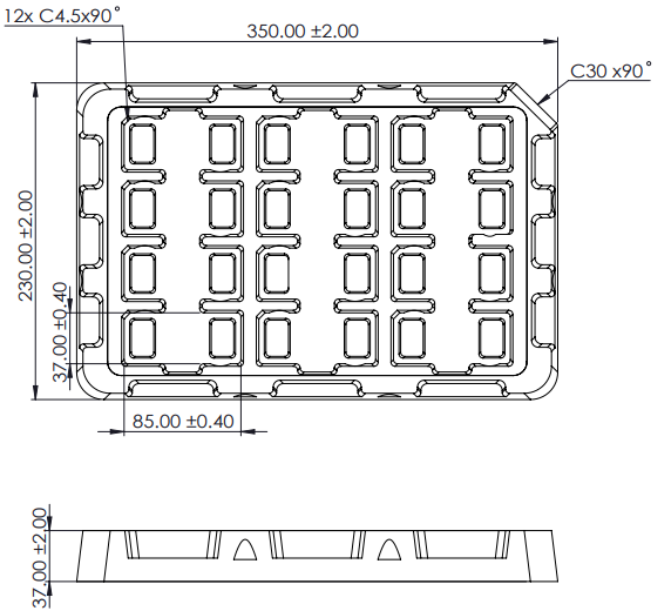
Reliability test:

Test item	Test condition	Spec
Low temperature storage	ISO 16750-4 IEC 60068-2-1 Ad Temperature: -40 ℃, Time: 500 hrs.	△R: ± 1%
High temperature storage	ISO 16750-4 IEC 60068-2-2 Temperature: 125 ℃,Time: 2000 hrs.	△R: ± 1%
Temperature cycling storage	IEC 60068-2-14,Nb -40 ℃to 125 ℃, Dwell time ≥ 15 min, 1000 cycles	△R: ± 1%
Thermal shock storage	IEC 60068-2-14,Na -40 ℃ to 125 ℃, Dwell times ≥ 15 min Transfer time: ≤30 s, 1000 cycles	△R: ± 1%
Cycling moisture resistance storage	MIL-STD-883. METHOD 1004.7 -10 ℃ to 70 ℃ ; 90% ~ 100 %RH @ 70 ℃, 20 cycles	△R: ± 1%
Damp heat storage	JESD22-A 101 Temperature: 85 ℃; Humidity: 85 %RH; Time: 1000 hrs.	△R: ± 1%
Vibration	ISO 16750-3 IEC 60068-2, 64 Random 10~1000 Hz, profile: 8hrs/axis The r.m.s. acceleration value shall be 27.1 m/s^2.	△R: ± 0.5%
Mechanical shock	ISO 16750-3 6 axis, 50G, 6 ms, half-sine, 10 times/axis	△R: ± 0.5%
Free fall	ISO 16750-3 3 axis, 2 falls per DUT by axis, 1 m, concrete ground or steel plate	△R: ± 0.5%

Note: Measurement at 24±4 hours after test conclusion for all reliability tests-parts.

Packing:

Tray packaging dimensions: 350 mm*230 mm*37 mm



Label marking:

The following items shall be marked on tray

(1) Description

(2) Quantity

(3) Part No.

(4) Tapping No.

Quantity: 12 Pcs / Tray

36 Pcs / Box

Care note:

Care note for storage

1. The shunt current module shall be stored in an environment where temperature and humidity must be controlled (temperature 5 ℃ to 35 ℃, humidity < 60% RH) . However, the humidity should be maintained as low as possible.
2. The shunt current module shall not be stored under direct sunlight.
3. The shunt current module shall be stored in condition without moisture, dust, any material defect solderability, or hazardous gas (i.e. hydrogen chloride, sulfurous acid gas, and hydrogen sulfide)
4. The shunt current module can be stored for at least two years under the condition mentioned above.

Care note for operating and handling

1. When applying a high current exceeding suggested specification (pulse current, shock current) to the sensor, it is necessary to re-evaluate the operating condition before using it in the system.
2. The shunt current module should operate within the condition of specification.
3. Avoid exceeding the recommended torque used on the bus-bar setup and avoid repeating tightening and loosening the bolts these will peel the plating off.