

SFP203MOD

Precision Current Measurement Module

The SFP203MOD is a shunt-based, automotive grade precision module capable of measuring currents from mA to 500 A continuous. The module incorporates SFP200 IC and an 18 $\mu\Omega$ shunt and achieves an accuracy of better than $\pm 1.0\%$ (typically $\pm 0.5\%$) over the entire operating temperature range of $-40\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$.

The module simultaneously measures bi-directional DC current through the shunt temperature, as well as provides separate charge, discharge and total Coulomb output.

The module provides automatic compensation for resistance dependence of the shunt on temperature. Communications are achieved via an isolated CAN 2.0B interface (500 kbit/s).

Highlights

Superior Accuracy

- Patented dynamic self-calibration algorithm delivers $\pm 0.5\%$ accuracy, ensuring accurate SOC and EV range calculation
- Helps eliminate errors over time

Reduced Power Losses and Lower Self-Heating

- Ultra-low resistance for low system losses & simplified thermal management
- 18 $\mu\Omega$ shunt resistor thermal losses are 28% lower compared to a 25 $\mu\Omega$ shunt; 64% lower compared to a 50 $\mu\Omega$ shunt

Simple, Cost-effective Integration

- Ready-to-use; calibrated and compensated
- No production calibration necessary

Flexible Configuration

- Feature set can be customized

Applications

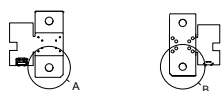
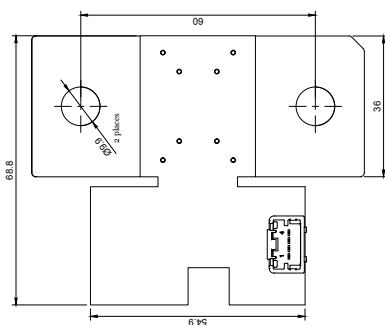
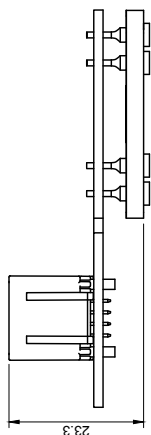
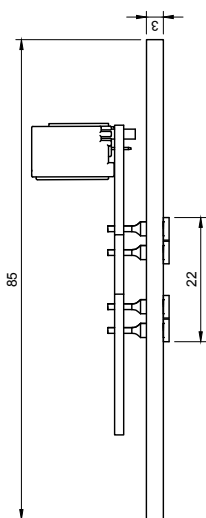


Features

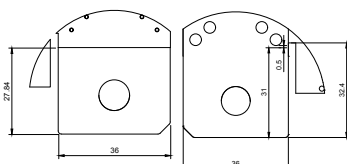
- The SFP203MOD precisely measures currents from mA to kA. Designed specifically for the needs of electric vehicles (EVs) and Energy Storage Systems (ESS), this cost-effective member of Sensata | Sendyne's SFP family communicates via an isolated CAN 2.0B interface (500 kbit/s). The module achieves a total accuracy of $\pm 1.0\%$ for current and voltage measurement over the whole operating temperature range of $-40\text{ }^\circ\text{C}$ to $+125\text{ }^\circ\text{C}$.

SFP203MOD Technical Specifications

Dimensions in mm



A (2:1) B (2:1)



Operating Specifications

Parameters	Value
Shunt value	18 μOhm
Power supply	+4.5 ~ +5.5 V
Interface	CAN 2.0B isolated, 120 Ω terminated
Current measurement range	± 500 A continuous / ± 1000 A (5 s), $< \pm 1.0\%$ error
Rating	Automotive
Power consumption	< 350 mW

Electrical Specifications

Parameter	Min	Typical	Max	Units	Conditions / Comments
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Power and General

Shunt & electronics operating temperature range	-40		+125	$^{\circ}\text{C}$	
Operating temperature range for connectors	-40		+105	$^{\circ}\text{C}$	
Supply Current			50	mA	
Start-up time		0.5	0.75	s	After initial application of power and power supply stabilization

Current Measurement

Total Shunt Resistance	16	18	20	$\mu\Omega$	
Nominal Full-scale current		± 500		A	Continuous rating in still air at room temperature of 23 $^{\circ}\text{C}$ with module connected to 18" (457 mm) 1/0 AWG cable on each side
Peak Full-scale current		± 1250		A	Maximum current value that is measured without clipping; less than 5 s duration, the same conditions as above
Current offset error*	-50	$< \pm 20$	+50	mA	Uncalibrated performance, applies over the full operating temperature range
Current noise error*		< 25	50	mA_{RMS}	Reported isolation resistance value will be exactly 0 Ω/V
Current value error*	-0.25		+0.25	%	Room temperature, test current ± 20 A or higher
		-0.5	+0.5	%	0 $^{\circ}\text{C}$ to +50 $^{\circ}\text{C}$, test current as above
		-1	+1	%	-40 $^{\circ}\text{C}$ to +125 $^{\circ}\text{C}$, test current as above
			± 1	%	End of life, test current as above
Current measurement resolution		< 100		μA	Minimum discernible current change; corresponds to one count of Analog to Digital Converter (ADC), 1 Hz current report rate

* The combined Total Current Error is the \pm sum of Current offset error, Current noise error, and $[\text{Current value error}] \times [\text{measured value}]$. For currents over 100 A the Current offset error and the Current noise error could be omitted from the calculation since they will typically contribute less than 0.05 % to the error.

SFP203MOD Technical Specifications

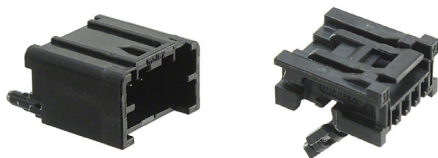
Parameter	Min	Typical	Max	Units	Conditions / Comments
Charge measurement resolution		<1		μC	Minimum discernible amount of charge change, 100 Hz report rate
Temperature Measurement (For shunt temperature measurement)					
Absolute temperature measurement error	-5	±0.5	+5	°C	Built-in temperature sensor for shunt temperature measurements
Temperature measurement resolution			10	m°C	Practical temperature measurement granularity
Isolation					
Test voltage		3		kV _{DC}	Built-in temperature sensor

Communication

Interface	Spec	Speed	Termination	Number of units in the same CAN branch
CAN	2.0B	500 kb/s	120 Ω	1

Connectors

Interface	Manufacturer	Position	Part Number	Description
CAN & power on board	Molex	4	347920040	4 pos. header, Shrouded connector (2.00 mm), Through hole tin
Can & power mating con.	Molex	4	347910040	Use appropriate crimp contacts (available for AWG 22, 24 and 26)



CAN and Power header & mating connectors

CAN Connector Pinout Description

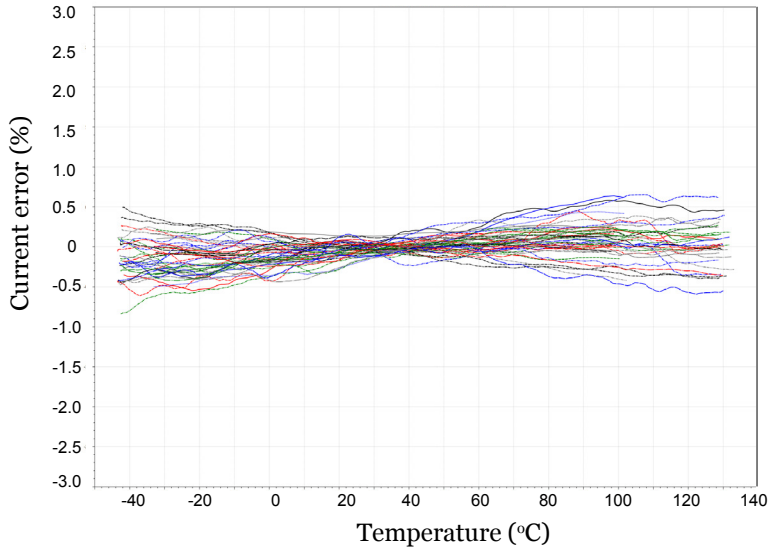
Pin Number	Description
Pin 1	GND
Pin 2	CAN HIGH
Pin 3	CAN LOW
Pin 4	VCC

The SFP203MOD uses Molex connectors, part number 347920040. For more details please see the [Molex datasheets](#).

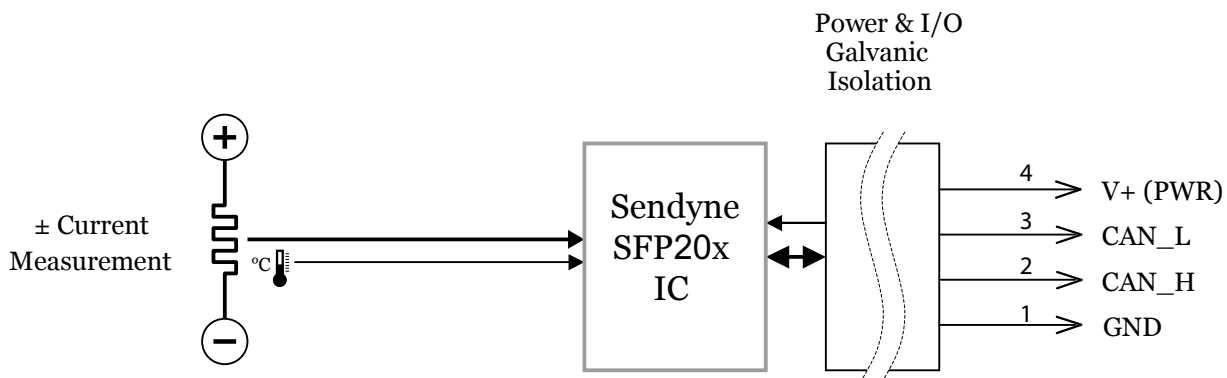
SFP203MOD Technical Specifications

Measured performance data

Current error over temperature range of -40 °C to +125 °C



SFP203MOD block diagram



Ordering Information

Part Number	Description
SFP203CA-MOD	SFP203MOD Module
SFP203KIT	SFP203MOD module, CAN to USB protocol converter for PC communication, Windows software and cable

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