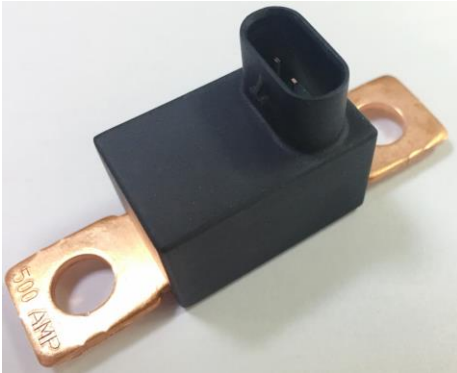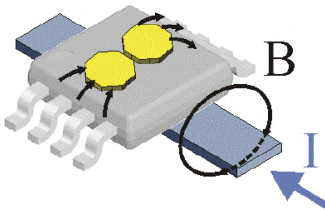# Current sensor

Automotive Business Unit

General Description

- Littelfuse Current Sensor use a single Hall IC which provides an output signal proportional to the flux density applied horizontally, therefore it is suitable for current measurement.

Features

- Electrically isolated measurement
- Busbar design using the Hall effect
- +5V DC power supply
- Analog ratiometric output
- Output voltage: 0.5V~4.5V
- Operating temperature: -40 degree<T<+125 degree
- Programmable linear transfer characteristic

Benefits

- High current measurement: +/-750A peak current
- High accuracy:2% max
- High linearity: 1% max
- Quick response time: 3 us
- Wideband: 250KHz
- Cost saving solution
- Easy assemble with Wires/Busbar at customer side
- Can replace the busbar at customer side
- Ability to customize design and programming output.

Applications

- Inverter
- Converter
- Battery
- Battery Charger
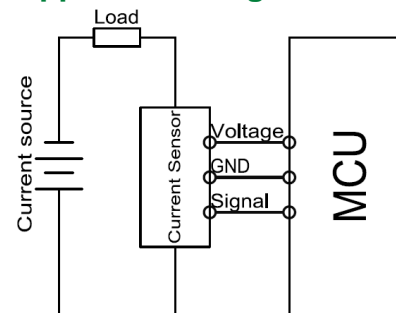- Power Distributor Unit
- Smart Fuse
- Power Relay

Dimensions (in mm)

84

30

Ø10

64

Ø10

16,5
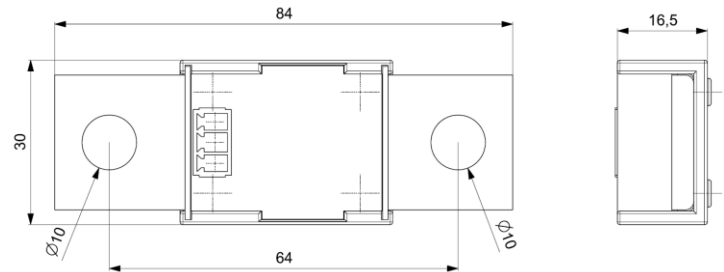
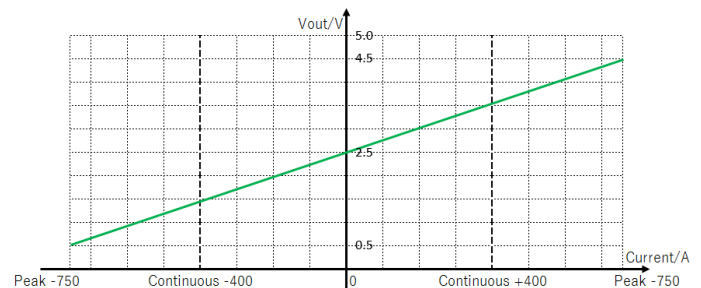## Mechanical characteristics

- Plastic Housing: PA66+30GF
- Busbar: Copper
- Mass: 80g
- M10 bolt fixation
- Customization connector design
- Pin definitions: Vsupply, GND, Vout

Typical application diagram

Load

Current source

Current Sensor

Voltage
GND
Signal

MCU

Output curve

Vout/V

5.0

4.5

2.5

0.5

Current/A

Peak -750   Continuous -400   0   Continuous +400   Peak -750

Absolute maximum ratings

Parameter	Symbol	Comments	Min	Typ.	Max	Units
Positive Supply Voltage(Overvoltage)					10	V
Positive Output Voltage					10	V
Positive Output Current			-70		70	mA
Reverse Supply Voltage protection					-0.3	V
Reverse Output Voltage					-0.3	V
Reverse Output Current					-50	mA
Storage Temperature			-55		165	Degree

Functional Characteristics

Parameter	Symbol	Comments	Min	Typ.	Max	Units
Supply Voltage	Vdd		4.5	5	5.5	V
Supply Current	Idd		7	12	14	mA
Output current	Imax		-2		2	mA
Output Voltage Swing	Vout		0.5		4.5	V
Peak Current	Ip		-750		750	A
Continuous current	Ic	Full temperature range		400		A
Operating Temperature	Ta		-40		125	Degree
Bandwidth	BW				250	kHz
Accuracy	Ea	Full temperature range	-2		2	%
Linearity	El	Full temperature range	-1		1	%
Repeatability	Er	Full temperature range	-0.5		0.5	%
Hysteresis	Eh	Full temperature range	-0.5		0.5	%
Sensitivity	G	@500A		0.4		mV/A
Resolution	R	@5V power supply		1.22		mV
Offset voltage error	Voe		-10		10	mV
Response time	t				3	us

Primary current definition (Ip)

① Continuous current (Ic)
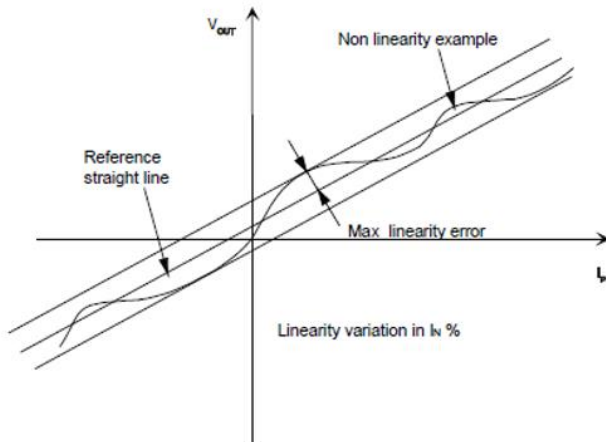② Peak current (Ip)
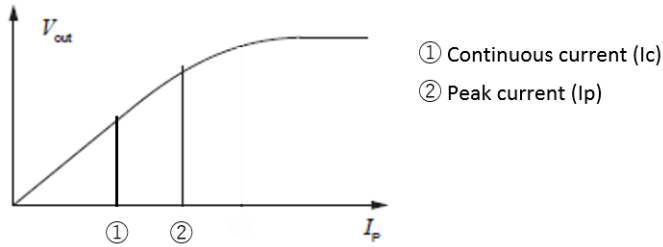
Accuracy (Ea)

Accuracy is the comprehensive error. Using below formula to calculate accuracy.
Note: The calculation results of using 3 sigma method, can also meet the parameters that mentioned in this datasheet.
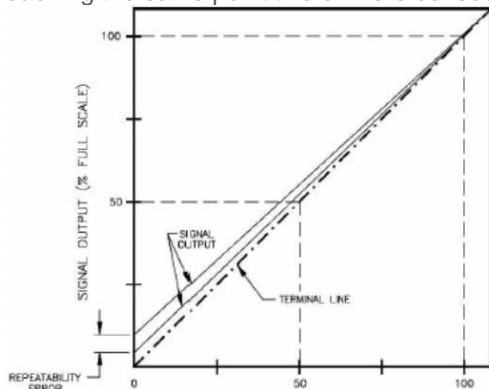
$$Ea = \sqrt{El^2 + Er^2 + Eh^2}$$

Linearity (El)

The maximum positive or negative discrepancy with a reference straight line Vout=f(Ip).
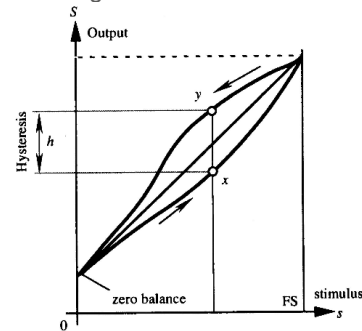

Repeatability (Er)

Repeatability error is the maximum difference in output when approaching the same point two or more consecutive.

Hysteresis (Eh)

The hysteresis error is the maximum difference in output at any measurement value within the sensor's specified range when approaching the point first with increasing and then with decreasing current value.

Offset with temperature (Et)

The Accuracy error of the offset in the operating temperature is the variation of the offset in the temperature considered with the initial offset at 25℃.

Sensitivity (G)

The sensor's sensitivity is the slope of the straight line Vout=f(Ip)

Resolution (R)

Hall IC use 12 bits ADC, the typical step size would be 5V/4096 = 1.22 mV, but the actual size can differ from the nominal value because of internal gain tolerance. A maximum step size of 1.5 mV is guaranteed.

Offset voltage error @ Ip=0A (Voe)

Is the output voltage when the primary current is null. The ideal value is 2.5V. So, the difference of the measured value and ideal value is called the total offset voltage error. This offset error can be attributed to the electrical offset, the magnetic offset, the thermal drift and the thermal hysteresis.

Response time (t)

The time between the primary current signal and the output signal reach at 90% of its final value.
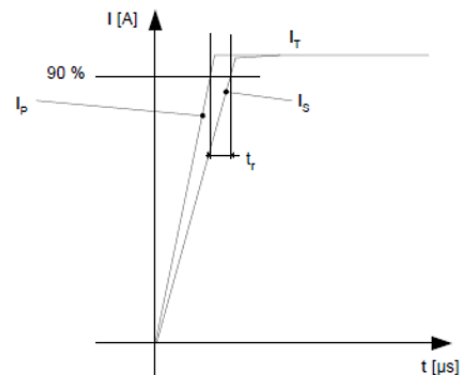
Automotive Business Unit

Custom electrical and environmental specifications can be designed to meet any need, please contact Littelfuse Engineering for details.

Littelfuse

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