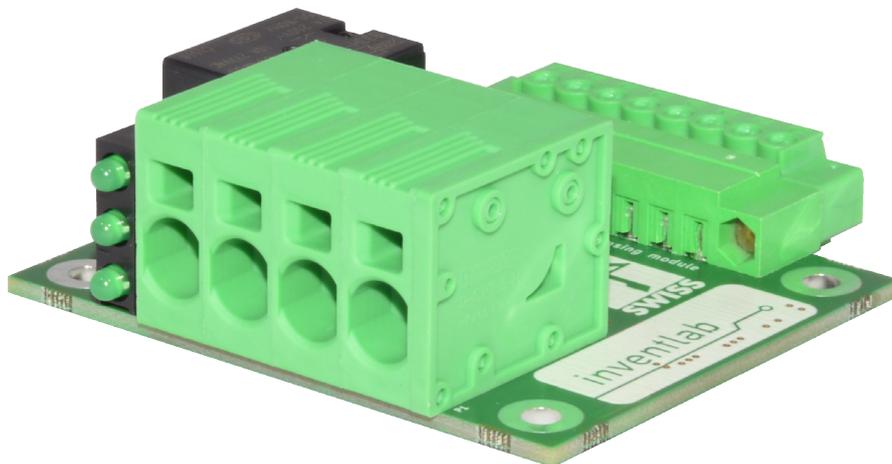# inventlab®

ics - inventlab current sensing module

Datasheet

Observe safety instructions on page 2

V3.1

Features of ics

► **Current sensing module for currents up to 80A**
► **Overcurrent/current detect output**
► **Wide operating voltage range: 2.7V to 40V DC**
► **Relais output (min input voltage 7V DC)**
► **Proper state down to 0V**
► Sense output voltage, directly proportional to measured current
► Adjustable current sense gain
► Adjustable overcurrent/current detect level
► -40°C to 85°C operating temperature

Applications

► Industrial
► Security
► Defense
► Marine
► Vehicle
► Railway
► ...

Safety instructions

The manufacturer declines any liability for damage to humans and machines. In particular, damage arising from the non-observance of the following safety regulations!
All work on the device must be carried out only by qualified and trained personnel!
Keep conductive parts away from the connectors, risk of short circuit!
If the device has visible defects or it indicates defects, disconnect it and return it to manufacturer for repair.
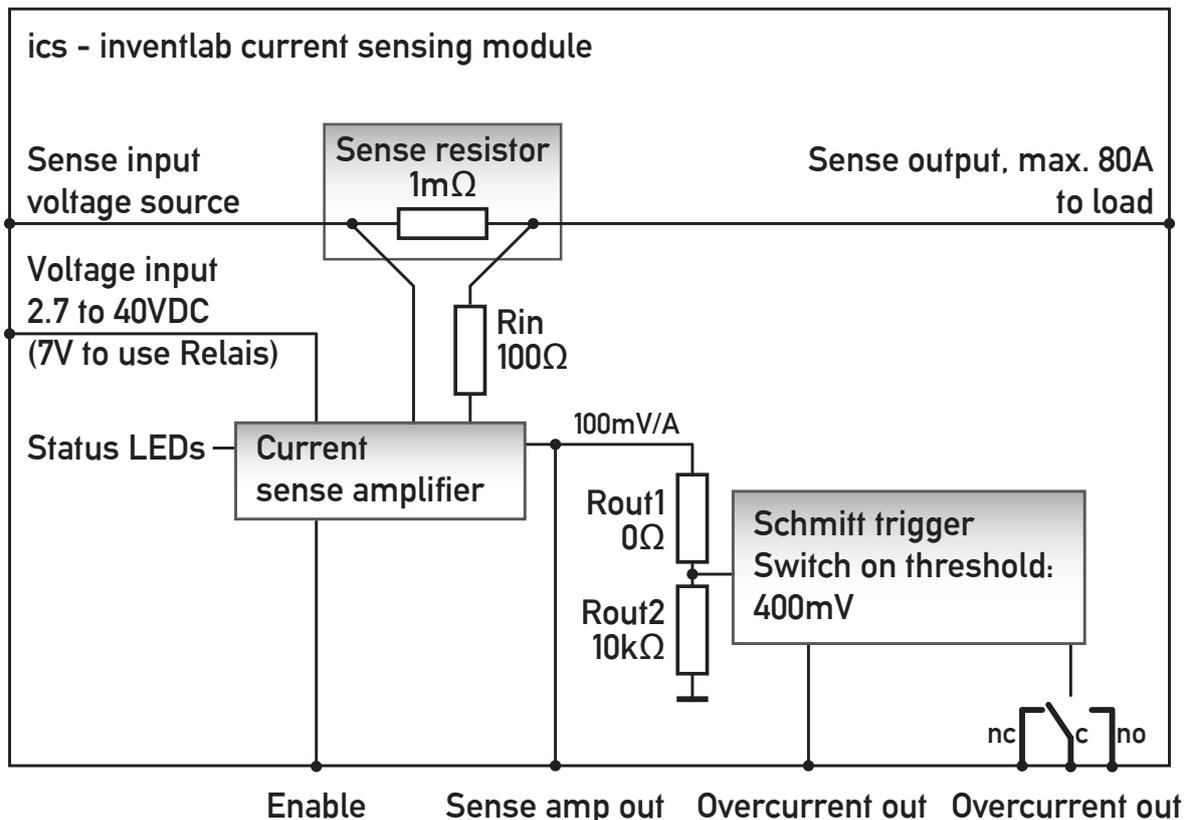
Description

ics is an integration module to build to measure high currents. It allows to disconnect loads when an overcurrent is detected. The sense output voltage is proportional to the sensed current, by default 100mV/A. The internal schmitt trigger detects an overcurrent at 400mV current sensing.
The current sense gain is adjustable by replacing a resistor. The overcurrent point is adjustable too. By default it is 4A.
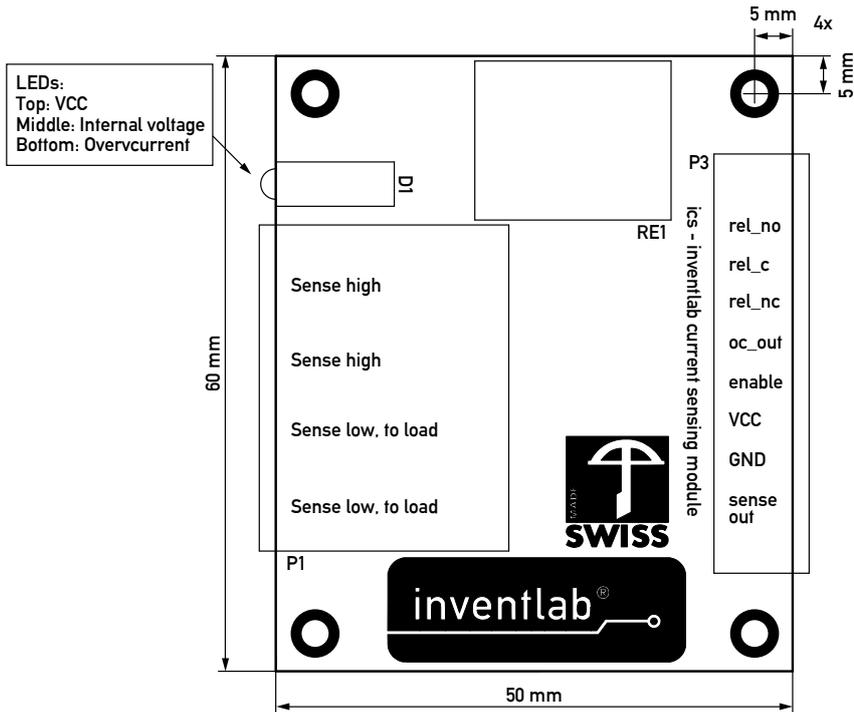
Application informations

► Contact inventlab LLC to get design support
► Ask inventlab LLC for customized current gain or overcurrent detect level

Block diagram

ics - inventlab current sensing module

Sense input voltage source

Sense resistor 1mΩ

Sense output, max. 80A to load

Voltage input 2.7 to 40VDC (7V to use Relais)

Rin 100Ω

Status LEDs — Current sense amplifier

100mV/A

Rout1 0Ω

Schmitt trigger Switch on threshold: 400mV

Rout2 10kΩ

nc   c   no

Enable   Sense amp out   Overcurrent out   Overcurrent out

Connectors, LEDs and dimensions

LEDs:
Top: VCC
Middle: Internal voltage
Bottom: Overcurrent

60 mm
50 mm
5 mm 4x
5 mm

D1
RE1
P3
P1

ics - inventlab current sensing module

Sense high
Sense high
Sense low, to load
Sense low, to load

rel_no
rel_c
rel_nc
oc_out
enable
VCC
GND
sense out

SWISS

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Pin	Description	Pin	Description
Sense high	Connect to power of the load (high side)	oc_out	Overcurrent out signal, do not connect this signal to any load.
Sense low	Connect to load	enable	Enable input: Connect to GND to disable the sense amplifier
rel_no	Overcurrent detect: Relais no output	VCC	Voltage input 2.7V to 40V DC When relais output is needed: min. 7V DC
rel_c	Overcurrent detect: Relais c output	GND	GND
rel_nc	Overcurrent detect: Relais nc output	sense out	Sense output voltage. Default: 100mV/A

P3 cable entry plug, cable cross sections

Solid wire: 26-16 AWG / 0.13-1.5mm²
Stranded wire: 26-16 AWG / 0.13-1.5mm²
Torque: 3.0Lb.In / 0.34Nm
Wire stripe length: 6-7mm

P1, cable cross sections

Conductor cross section solid min. 0.2 mm²
Conductor cross section solid max. 10 mm²
Conductor cross section flexible min. 0.2 mm²
Conductor cross section flexible max. 6 mm²
Conductor cross section flexible, with ferrule without plastic sleeve min. 0.25 mm²
Conductor cross section flexible, with ferrule without plastic sleeve max. 6 mm²
Conductor cross section flexible, with ferrule with plastic sleeve min. 0.25 mm²
Conductor cross section flexible, with ferrule with plastic sleeve max. 4 mm²
Conductor cross section AWG min. 24
Conductor cross section AWG max. 8
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, min. 0.25 mm²
2 conductors with same cross section, stranded, TWIN ferrules with plastic sleeve, max. 1.5 mm²
Wire Stripe length: 15mm

Electrical Specifications / Absolute Maximum Ratings

Symbol	Parameter	Condition	Min.	Typ.	Max.	Units
V_{VCC}	Input voltage	When relais output is not needed	0	2.7 - 40	42	V
V_{VCC}	Input voltage	When relais output is needed	6.6	7 - 40	42	V
I_{Relais}	Relais current				10	A
V_{RELAIS}	Relais voltage	Voltage respect to GND			48	V
V_{ENABLE}	Enable pin voltage		0	$0-V_{VCC}$	42	V
T_A	Temperature range	Storage	-40	20	85	°C
T_O	Temperature range	Operating	-40	20	85	°C

Current sensing, current derating

Current derating ($6mm^2$ wire)
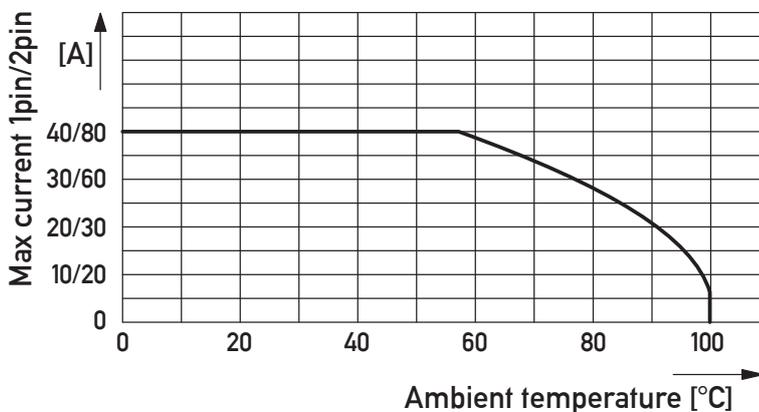
Adjusting the current sense gain and the overcurrent detection level

The levels are adjustable by Rin (R8), Rout1 (R11) and Rout2 (R12). (See block diagram).
The sense output voltage gain is defined as follows: (Rout1+Rout2)/Rin = mV/A
Rsense is 1mΩ. Default of Rin is 100Ω, Rout1 is 0Ω and Rout2 is 10kΩ.
The sense output voltage is by default: (0Ω + 10kΩ)/100Ω = 100mV/A

Resistor examples:

R8 (Rin) Ω	R11 (Rout1) Ω	R12 (Rout2) Ω	Sense amp output voltage	Overcurrent level
100	0	10k	100mV/A	4A
100	5k	5k	100mV/A	8A
100	10k	10k	200mV/A	2A
100	0	40k	200mV/A	1A
100	10k	1k	110mV/A	40A
100	20k	2k	220mV/A	20A
100	20k	1k	210mV/A	40A
100	10k	500	105mV/A	80A
100	9.5k	500	100mV/A	80A
100	0	4k	40mV/A	10A
100	6k	4k	100mV/A	10A
100	9k	1k	100mV/A	40A

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Product website / Where to buy

http://shop.inventlab.ch/en/12-integration-modules
or for German:

http://shop.inventlab.ch/de/12-integration-module

Your specific requirements

Please contact inventlab LLC if your project has special requirements. Our engineers look forward to hearing from you.