

1. General description

The fully calibrated advanced sensor module IVT-A has been designed for all applications in which high currents, voltages and temperatures have to be measured. It contains a precision resistor with 100 $\mu\Omega$, the ISA-ASIC and all analogue circuits for a complete 4-channel 16bit data acquisition system. The internal μC is supplying the clock and controls the measurements and communication with the ISA-ASIC. The module contains a SPI interface which allows a simple integration into an external system.

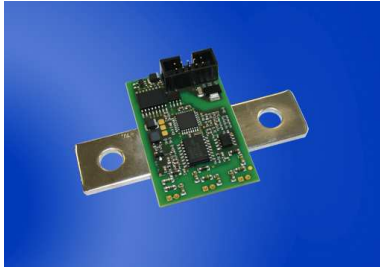


Figure 1: Picture of IVT-A

2. Measurement functions

Current – by using the voltage drop over the shunt
Voltage – by using an internal voltage divider
Temperature – by using internal temperature of ISA-ASIC

3. Electrical characteristics

Power supply	Min	Typ	Max	Unit
Supply voltage	6	12	16	V
Supply current	90	100	110	mA

Current measurement	Value	Unit
resistance value of the shunt	100	$\mu\Omega$
nominal current range	± 300	A
max. pulse current (1 sec) ¹	1500	A
internal sampling rate	1750	s/sec
accuracy ²	$\pm(0.2\% + 30 \text{ mA})$	-
resolution ³	1 to 10	mA
noise _{p-p} ³	15 to 100	mA

Voltage measurement	Value	Unit
independent channels	3	-
nominal voltage range	± 600	V
internal sampling rate	1750	s/sec
accuracy ²	$\pm(0.2\% + 100 \text{ mV})$	-
resolution ³	1 to 20	mV
noise _{p-p} ³	30 to 200	mV

SPI interface	Value	Unit
clock frequency	1 to 2	MHz
EOC frequency	7 to 1750	Hz

¹ for max. load capacity of shunt

² over temperature range 0 °C to +60 °C

³ depends on EOC frequency

4. Start-up and operation of the module

After power up, the module automatically starts to measure current and voltage alternately. Every time both measurements are done, EOC goes low for 10 μs indicating that measurement values are ready to be read. The EOC frequency can be changed by setting the average counter. However values can be read every time.

Changing the measurement mode (e.g. temperature) requires an external set command.

The IVT-A device is SPI slave. The communication is done by the 4 isolated SPI signals lines.

5. Over Current Detection (OCD)

The IVT contains an independent hardware over current detection for the positive and negative current. As soon as the over current is detected the alarm line OCS is activated which signals the external circuit an error condition. The limit is given by design to 300A.

6. Pin configuration

Solder pads with through hole connections for a standard 10 pin connector 2x5 (2.54 mm).

PIN	Name	Function
1	GND	module ground
2	VCC	supply voltage
3	OCS	Over Current Signal
4	SCK	SPI signal
5	MOSI	SPI signal
6	MISO	SPI signal
7	SS	SPI signal
8	EOC	End Of Conversion
9	Not connected	
10	Not connected	

7. Additional information and options

The IVT-A contains an isolation of power supply and communication signals by using iCoupler.

To customize the IVT-A for special applications, the additional options shown in the table on next page are available. Further customizing is available upon request.

IVT-A	ISABELLENHÜTTE Heusler GmbH & Co. KG	Dillenburg, 24.10.2009 HE/RS/BS
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8. Additional options

Option	Details	Assembly option	Redesign required
Voltage measurement range	30 V to 900 V	X	X
Voltage measurement channels	1 to 3	X	
Over current detection limit	50 A to 500 A	X	
Current measurement range	300 A to 600 A	X	
Disengageable voltage channels	Photo MOS / transistor		X
Customized shunt	resistance and mechanics	X	
Anti aliasing filter for measurement channels			X
Temperature measurement with external sensor			X
Power supply without voltage regulator	range 4.5 V to 5.5 V	X	
Extended operating temperature range	-40 °C to +80 °C	X	
Soldered cables instead of standard 10 pin connector		X	

9. Drawings

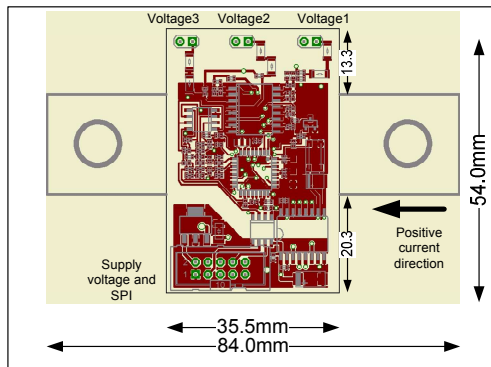


Figure 2: Dimensions of IVT-A

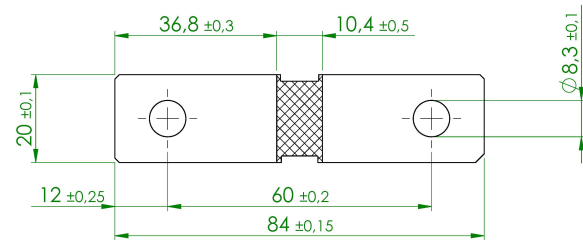


Figure 3: Drawing of BAS-Shunt

10. Typical measurement error at room temperature

