

1. Description

The fully calibrated advanced sensor module IMC-B-R0001 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.

2. Measurement functions

Current – by using the voltage drop over the shunt
Voltage – by using an internal voltage divider

3. Electrical characteristics

Power supply	Min.	Max.
Supply voltage	3.2V	5.2V
Supply current	15mA	25mA
Current measurement		
resistance value of the shunt	100 $\mu\Omega$	
nominal current range ¹⁾	± 300 A	
sampling rate (dual mode)	900 S/sec	1800 S/sec
error ²⁾	$\pm(0.05\% + 20 \text{ mA})$	
resolution ³⁾	10 mA	
temperature coefficient ⁴⁾	75 ppm/K	
max. current ⁵⁾	1500 A for 1 sec.	
Voltage measurement		
voltage range	± 30 V	
error ¹⁾	$\pm(0.05\% + 15 \text{ mV})$	
resolution ³⁾	1 mV	
max. input-voltage	80 V	
temperature coefficient ⁴⁾	50 ppm/K	
Interface: SPI		
clock rate:	2MHz	

Notes:

- ¹⁾ absolute maximum current range ± 390 A
- ²⁾ at room temperature and external averaging over 100 values, at 900 S/sec the noise contribution is 100 mA resp 75 mV
- ³⁾ measuring resolution
- ⁴⁾ without TC calibration
- ⁵⁾ for max. load capacity of shunt

4. Start-up and operation of the module

After the connection of the module acc. to the following table 5 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. However values can be read every time.

The IMC-B device is SPI slave. The master has to initiate communication by setting SS low. SS has to be held low until communication has finished. The Master has to transmit one of the two available commands twice. After the two command bytes the master has to send four dummy bytes to read the desired measurement value.

Command 0x01 reads current value as long word, LSB first.
Command 0x02 reads voltage value.

Data bits are sampled at the rising edge of SCK and setup at the falling edge.

5. Pin configuration (left to right)

SIL-type connector
14 PINs, spacing 1.27 mm
solder pads with through connections

PIN number	function
1	unused
2	unused
3	V_x ¹⁾
4	GND
5	VCC ²⁾
6	unused
7	unused
8	NC
9	EOC ³⁾
10	SS ⁴⁾
11	MOSI ⁴⁾
12	MISO ⁴⁾
13	SCK ⁴⁾
14	reset

Notes:

- ¹⁾ input for the unknown voltage V_x with reference to GND
- ²⁾ supply voltage input +3.3 V or +5 VDC
- ³⁾ End Of Conversion
- ⁴⁾ SPI signals

All pins which are unused should be connected to GND.

6. Additional information

For special applications other resistance value resp. other current and voltage ranges as well as temperature and differential voltage measurement in the mV-range can be offered. For these applications special firmware versions are available to allow very flexible parameter settings for sampling rate, gain and the selection of the measurement functions.

IMC-A-R0001	ISABELLENHÜTTE Heusler GmbH & Co. KG	Dillenburg, 15.12.2008, jh/he/bs
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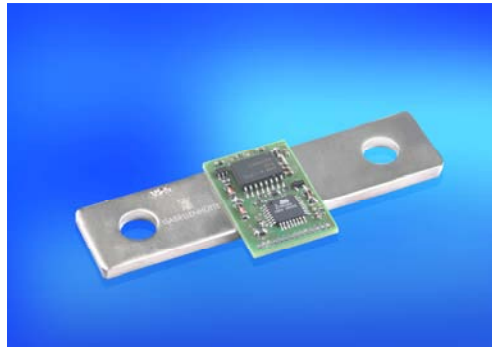
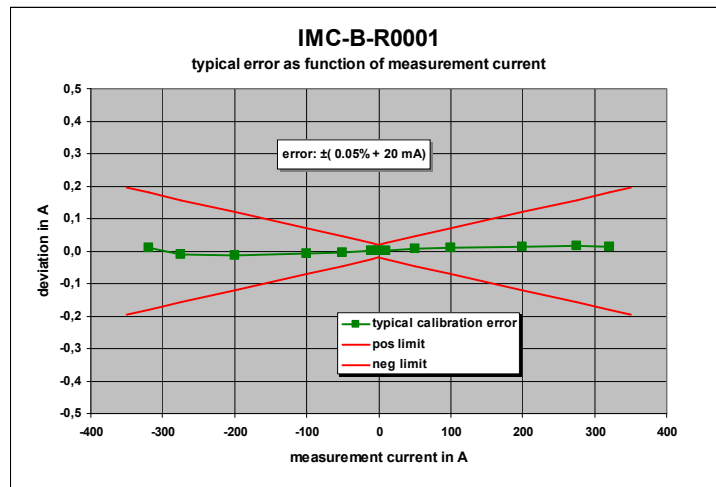
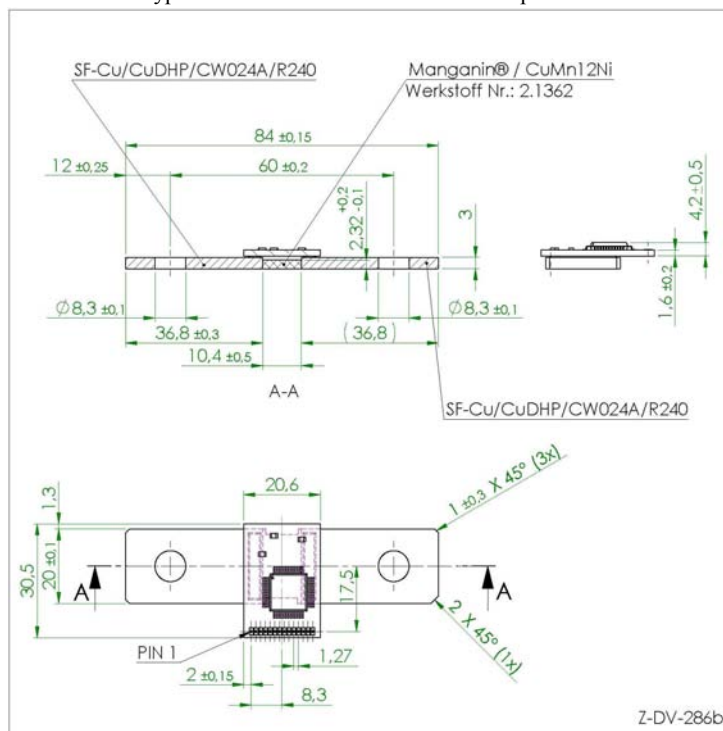


photo of the IMC-B-R0001



typical measurement error at room temperature



shunt drawing