1. Description
The sensormodul IMS-B-R0001 has been designed for all applications in which high currents, voltages and temperatures have to be measured. It contains a 100 µOhm precision resistor, the ISA-ASIC and all analog circuitry for a complete 4-channel 16bit data acquisition system. It has been developed as a highly versatile subunit for a simple integration into an external μC system.

2. Electrical characteristics

<table>
<thead>
<tr>
<th>Power supply</th>
<th>Min.</th>
<th>Max.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supply voltage</td>
<td>4.7 V</td>
<td>5.3 V</td>
</tr>
<tr>
<td>Supply current</td>
<td>4 mA</td>
<td>6 mA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Current measurement</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Resistance value of the Shunt</td>
<td>100 µΩ</td>
</tr>
<tr>
<td>Range</td>
<td>±1200 / 300 / 150 / 75 A</td>
</tr>
<tr>
<td>Resolution</td>
<td>40 / 10 / 5 / 2.5 mA</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Voltage measurement</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>±30 / 15 / 7.5 / 3.75 V</td>
</tr>
<tr>
<td>Resolution</td>
<td>1 / 0.5 / 0.25 / 0.125 mV</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Differential voltage</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>±120 / 30 / 15 / 7.5 mV</td>
</tr>
<tr>
<td>Resolution</td>
<td>4 / 1 / 0.5 / 0.25 µV</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Internal temperature</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>Range</td>
<td>-40...+125°C</td>
</tr>
<tr>
<td>Resolution</td>
<td>0.1°C</td>
</tr>
</tbody>
</table>

3. Electrical circuit
See page 3

4. Pin configuration (left to right)
SIL-type connector
12 PIns, spacing 1.27 mm
solder pads with through connections

<table>
<thead>
<tr>
<th>number</th>
<th>Function</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>EZPRG</td>
</tr>
<tr>
<td>2</td>
<td>CLK</td>
</tr>
<tr>
<td>3</td>
<td>SCLK</td>
</tr>
<tr>
<td>4</td>
<td>SDAT</td>
</tr>
<tr>
<td>5</td>
<td>INTN</td>
</tr>
<tr>
<td>6</td>
<td>VDDD</td>
</tr>
<tr>
<td>7</td>
<td>GND</td>
</tr>
<tr>
<td>8</td>
<td>ETS</td>
</tr>
<tr>
<td>9</td>
<td>VBAT</td>
</tr>
<tr>
<td>10</td>
<td>Vx</td>
</tr>
<tr>
<td>11</td>
<td>Vx, DC</td>
</tr>
<tr>
<td>12</td>
<td>Vx, AC</td>
</tr>
</tbody>
</table>

5. Photo
Photo of the sensor module IMS-B-R0001

6. Calibration
The ISA-ASIC on the modul is precalibrated and the calibration constants are written into the ZZR-register which is a OTP-memory. These data are automatically loaded into the RAM register TRR during the power up routine (POR).

The following properties are calibrated:
- offset of the amplifier (TRIMA)
- internal current source (TRIMC)
- absolute value of the reference voltage (TRIMBV)
- TC value of the reference voltage (TRIMBTC)

In addition the ISA-ASIC provides the possibility to calibrate the absolute values of all input channels. The calibration coefficients can also be stored in the ZZR-register (for more details see data sheet of the IHM-A-1500).

The absolute accuracy depends mainly on the uncertainty of the shunt. For reach the highest accuracy the complete module has to be calibrated on the customer side. For getting a complete calibrated module please have a look on our IMC-A-R0001 data sheet.

7. Shunt drawing
See page 4
8. Reset possibility
To ensure a correct operation over long time it is necessary to supply a possibility to reset the sensormodule from the external µC. To start the ASIC-internal reset procedure the supply voltage has to fall below +3.0 VDC for at least 1 µsec. The electrical circuit shown below can be used to realize this reset. A rising edge at the input will drive VDDD down to nearly 1 VDC for 2 µsec as shown in the screenshot below. After approx. 1 msec the ASIC internal reset procedure is finished and the µC can reprogram the internal registers for the application configuration.

If further components are supplied by the same +5V as for the ISA-ASIC, it should be ensured that the power supply will be stable during the reset impulse, otherwise the buffer capacitor C3 should be added.

The electrical circuit can also be realised by using a NPN transistor instead of the MOSFET.

9. General
For a fast and easy start with this module the source code for the serial communication between the ISA-ASIC and the external µC can be provided in C-code. The driving power of the digital output lines of the ASIC is limited, therefore the length of the connector lines to the external µC should be as short as possible. It should never exceed a length of 100 mm to avoid errors due to dropout and interferences.
Electrical circuit
drawing-no. Z-DV-329a