

### 1. General description

The innovative shunt based current sensing modules are designed for high dynamic and accurate motor phase currents measurements in high power inverters.

It was the purpose to design a compact, versatile modul for phase current sensing in the range of 50 to 1000 A which can easily be implemented into existing applications.

The modules can measure both positive and negative currents with only one supply voltage. Sampling rates range from 75 kHz up to 300 kHz. The 12 to 16 bit results are transmitted via SPI-bus to the external motor controller. The measurements can be triggered to the switching edge of the IGBT with a programmable delay time. Within 3µsec a fast over current signal is generated whenever a programmed threshold level is exceeded.

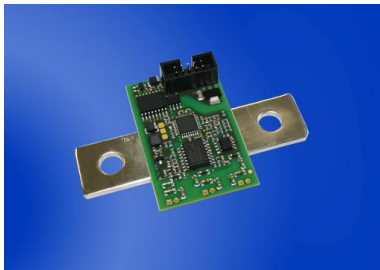


Figure 1: Picture of IPC-A

### 2. Measurement functions

Current – by using the voltage drop over the shunt

### 3. Electrical characteristics

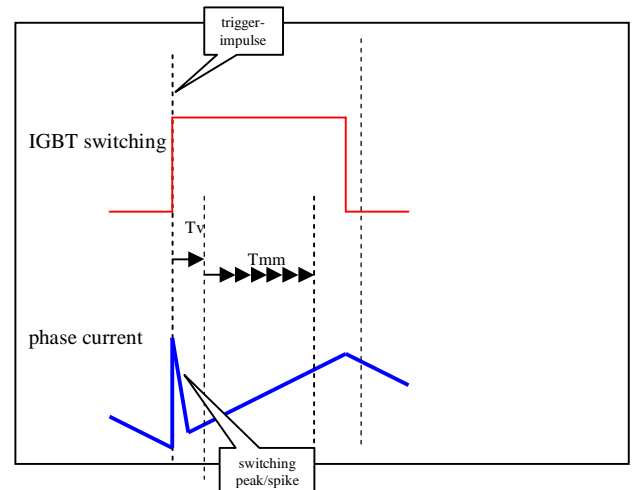
Power supply	Min	Typ	Max	Unit
Supply voltage	4,5	5	5,5	V
Supply current		100		mA

Current measurement	Value	Unit
resistance value of the shunt	40, 100, 400, 1000	µΩ
nominal current range	±500, ±200, ±50, ±20	A
max. pulse current (1 sec) <sup>1</sup>	Depenting on shunt	
internal sampling rate	75, 150, 300	kS/sec
resolution	16, 14, 12	bit
accuracy	±(0.2 rdg + 0.02 fs)	%
Linearity error	0,02 rdg +0,005 fs	%
offset	0,01 fs	%
dU/dt	> 15	kV/µsec
resolution	1 to 10	mA
noise <small>Fehler! Textmarke nicht definiert. FS<sub>C</sub>(75db)</small>	<0,02	%
dielectric withstanding	5	kV
Integration delay	0 to 100 <small>(programmable)</small>	µsec
Fast over current detection	Nominal to 5XFSC, after max 3µsec	-

<sup>1</sup> for max. load capacity of shunt

### 4. Start-up and operation of the module

- an external trigger starts the programmed measurement cycle
- after the delay time of  $T_v$  (to suppress the transient switching spike) the actual integration time starts
- $T_m$  is the programmed integration time. (i.e. number of single samplings)
- within this time all results will be stored in the internal memory
- after completion of the measurement the data are transmitted as single values or average



### 5. Over Current Detection (OCD)

The IPC contains a fast over current detection for the positive and negative current.

### 6. Additional information and options

The IPC-A contains an isolation of power supply and communication signals.

To customize the IPC-A for special applications, additional options are available upon request.

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7. experimental results

