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1 Using the current monitoring probes with an oscilloscope

QUESTION

I want to connect the current monitoring probe to an oscilloscope. How can I convert the voltage measured with the scope into the corresponding current?

ANSWER:

You need to consider 2 points.

- 1) The probes are calibrated within a 50 Ohm system. Consequently you need to switch the oscilloscope input to 50 Ohm input impedance. If your oscilloscope does not offer this feature, you have to connect a 50 Ohm feed-through termination to the oscilloscope input.
- 2) The transfer impedance of the current probe is given in dBΩ. You need to convert it into Ω and then apply Ohms law, in order to calculate the current corresponding with the voltage measured with the oscilloscope.

Example:

The signal amplitude measured with the scope is 500 mV. The current probe is a Tekbox TBCP1-250. The signal is sinusoidal and has a frequency of 1 MHz.

Look up the transfer impedance table delivered with your probe. The transfer impedance of the TBCP1-250 is approximately 18dBΩ over a wide frequency range, so let's use this value for the following calculation.

$$Z[\Omega] = 10^{\left(\frac{dB\Omega}{20}\right)} \quad Z[\Omega] = 10^{\left(\frac{18}{20}\right)} = 7.94 \Omega$$

$$I = \frac{U}{R} = \frac{500mV}{7.94 \Omega} = 62.9 mA$$

2 Spectrum Analyzer ADC overload / IF overload

Question 1:

When I make measurements, the spectrum analyzer beeps and displays the warning "ADC overload" or "IF overload". What is the reason?

Answer 1:

ADC overload or IF overload warnings report that the input of the spectrum analyzer is overdriven. Overdriven does not necessarily mean that the maximum permitted RF input power is exceeded.

If the internal attenuator setting is 0 and/or the pre-amplifier is on, strong input signals can drive the IF or ADC section into saturation. Increase the internal attenuation and / or turn off the pre-amplifier in the EMCview segment file.

Question 2:

When making conducted noise measurements with a Tekbox RF-current probe I get ADC / IF overload warnings? However I do not see any noise with excessive amplitude.

Answer 2:

The useful frequency range of Tekbox RF-current probes starts in the very low kHz range. You may measure an automotive switched mode regulator, starting conductive noise testing at 150 kHz according to CISPR 25. Have a look at the frequency range below 150 kHz. Your switched mode regulator may produce sub – harmonics, which you are not aware of. Sub-harmonics typically have high amplitude. The RF current probe picks it up and the amplitudes are high enough to saturate the spectrum analyzer. Use a 150 kHz high pass filter to suppress the sub harmonics, without losing dynamic range in the main frequency range of your measurement.

3 History

Version	Date	Author	Changes
V 1.0	25.02.2020	Mayerhofer	Creation of the document

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