Gain and Phase Meter

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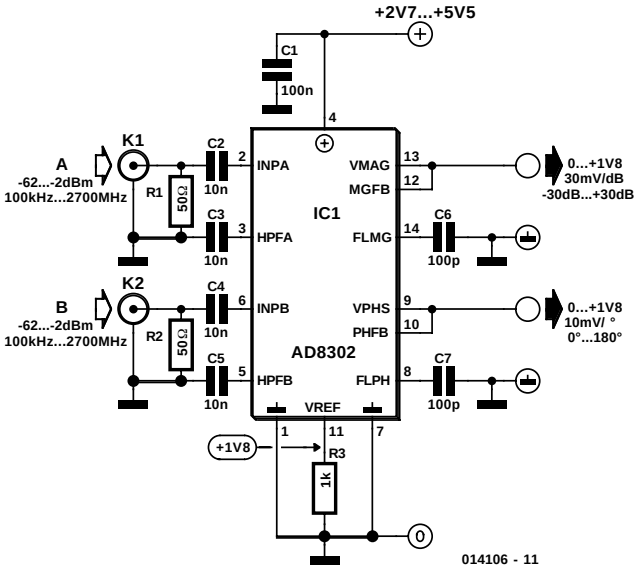
A simple way of measuring the amplitude and phase difference between two high-frequency signals is provided by the AD8302 from Analog Devices (www.analog.com).

The two input signals A and B are terminated with 50 Ω and fed to the internal logarithmic demodulators. Taking the difference of the outputs leads to a voltage which represents the amplitude difference in decibels (dB); by multiplying the internal signals an output voltage proportional to the phase difference between A and B is produced.

The circuit produces a voltage at output VMAG ('magnitude') between 0 V and +1.8 V. 0 V represents –30 dB while +1.8 V represents +30 dB, each 30 mV step thus representing one decibel. The amplitude of input B is taken as the reference. The phase output also varies between 0 V and +1.8 V, each 10 mV step representing one degree of phase difference. The outputs can drive up to 15 mA, and so the load impedance must be at least 120 Ω.

The AD8302 can be used, for example, as a level meter by applying a signal with a known amplitude to input B. The input level range runs from –62 dBm to –2 dBm. Error in the device is typically less than 0.5 dB in amplitude and 1 degree in phase. The device operates from a supply voltage between 2.7 V and 5.5 V. If modulation is present on the input signals, the modulation envelope will appear on the outputs.



The IC has a bandwidth of 30 MHz, which can be reduced by fitting a capacitor between pins 8 and 14. Pin 11 is a +1.8 V reference voltage output which can be used when further processing the outputs of the device.

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