G22 FREQUENCY RESPONSE TEST INTERFACE

G22 Frequency Response Test Interface is an extension for Alpha-A modular measurement system featuring frequency response or gain phase measurements and cannot be used for dielectric, conductivity or impedance measurements.

G22 measures the amplitudes and phase shift $V1_{high}$-$V1_{low}$ and $V2_{high}$-$V2_{low}$ of two voltage channels. It has similar functionality to a dual input channel lock-in amplifier with improved accuracy and extended frequency range.

GAIN PHASE or FREQUENCY RESPONSE MEASUREMENTS

In impedance mode used for dielectric, conductivity and electrochemical impedance spectroscopy the analyzer measures the response voltage and current of a material sample to an applied sine wave signal.

In gain phase mode, a second voltage is measured instead of the current. This allows measurement of two response voltages to an applied sine wave driver signal at two arbitrary points of a system under test. The two voltages are measured with the analyzer frequency response analyzer channels CH1 and CH2. The applied sine wave is created by the analyzer sine wave generator.

Gain phase measurements are supported by the Alpha-A, Alpha and Beta series analyzers.

A typical application as an example would be to measure the transfer function of an amplifier or transformer. In this case, the analyzer generator output and input CH1 have to be connected to the amplifier input and CH2 to the amplifier output. The amplifier complex transfer function defined by Vout*/Vin* is determined by measuring the voltages at CH2 and CH1.

It should be noted, that in gain phase mode the analyzer can be operated like a digital lock-in amplifier with two input channels. The main function of a lock-in amplifier is to apply a signal with a defined frequency to a system under test and to measure a response signal. As a lock-in amplifier feature, only the frequency component of the applied generator signal is detected in the response signal. Typically, most of the response signals noise and DC errors are at other frequencies, those will therefore be suppressed. The Alpha-A, Alpha and Beta analyzers employ the same principle, but have an additional second voltage channel, wider bandwidth and better accuracy as lock-in amplifiers.

Gain phase measurements are therefore not specially related to dielectric, conductivity and impedance spectroscopy but may be of general interest if;

- a very small or noisy signal need to be measured with high precision and, or
- the response of any kind of system to an applied signal in the frequency domain need to be measured

SPECIFICATION

FREQUENCY RANGE:	3uHz to 20MHz (12.5 decades) [1]
AC SIGNAL OUT:	100uV to 3Vrms
DC BIAS OUT:	40VDC, 70mA [2]
OUTPUT IMPEDANCE:	50Ω (Signal Generator)
VOLTAGE IN:	< ± 4.3Vp DC or AC coupled

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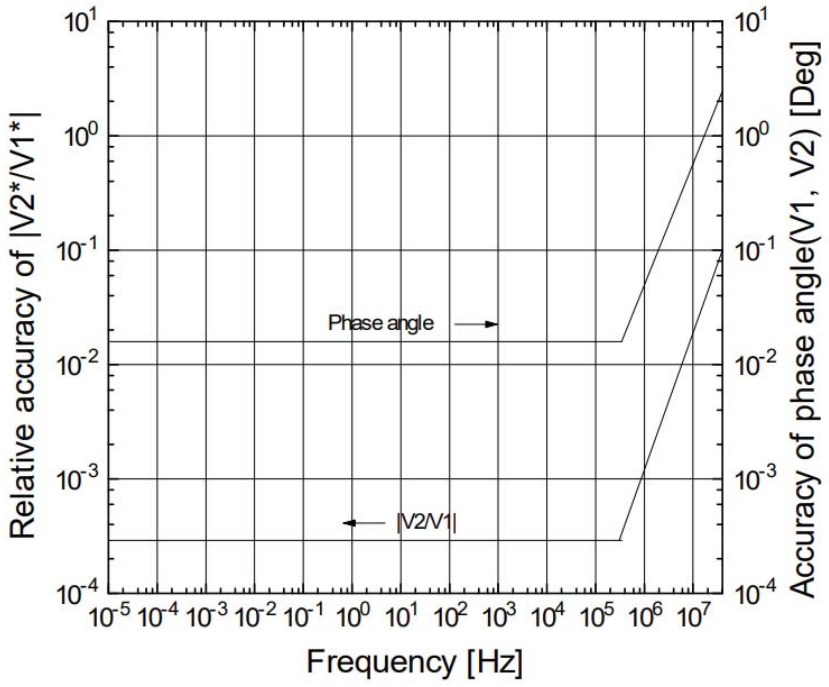
DIFFERENITAL VOLTAGE INPUT WITH DRIVEN SHIELD

INPUT IMPEDANCE:	10GΩ||10pF
CMRR:	< 10^{-4} dB below 100kHz, < 10^{-3} dB below 1MHz
INPUT BIAS CURRENT:	< 2pA
VOLTAGE RATION V2/V1 ACCURACY:	< 3E10^{-5} [3]
VOLTAGE RATION V2/V1 RESOLUTION:	< 10^{-5} [3]
PHASE ANGLE ACCURACY:	< 2m° [3]
PHASE ANGLE RESOLUTION:	< 0.06m° [3]

[1] in combination with the Alpha-A mainframe types AN, AT

[2] requires DC Bias option B of the Alpha-A mainframe

[3] for details refer to specification charts



Alpha analyzer accuracy for gain-phase measurements