

Stretching the limits of gain/phase testing

1250 series Frequency Response Analyzers



The 1250 series of Frequency Response Analyzers (FRA) provide a range of accurate solutions for the measurement of gain and phase.

The device under test is stimulated by a sinewave and the response analyzed at one, two or more points in the system. These responses are then correlated with the stimulus to determine the amplitude and phase relative to the generator. The ratio of the two measured signals can then be used to provide the system transfer function.

This process rejects all harmonics and, by increasing the integration time, even signals which are buried in noise can be measured accurately.

The 300V range on the 1250 series is particularly useful for making measurements on fuel cell stacks and high voltage batteries, used in hybrid vehicles and residential power supplies.

The 1250 series FRAs key features include:-

- ac amplitude range - 10mV to 10V, for power supply testing
- Analyzer range - 300V, ie for ATS (Automated Test Systems), power station vibration testing
- Noise rejection capability
- Synchronizer option enabling generator and carrier signals to be locked in terms of frequency / phase
- Ability to analyze non-linear systems
- Multiple channel analysis - 1254 FRA has four channels in parallel
- Front panel or software (Visual Basic) control
- Modulator / demodulator card for interfacing to ac carrier systems

Control Systems

A standard use for a FRA is to generate a signal which is connected to a signal converter (this may take many forms; e.g. hydraulic, pneumatic or electrical), which forces controlled movement to take place (e.g. displacement transducers used in aerodynamic tests). These are placed on the system under test and the output signal fed back to the FRA via a sensor, enabling the system to be characterized. Typical uses include:-

- Automated test systems
- Power supply testing
- Aircraft instrumentation/system controls
- Aerodynamic tests - study of applied forces to wing structures
- Car shock absorbers
- Weapons guidance systems
- Rocket propulsion and vectoring technology

Electrochemistry

Measurement of impedance has become an important tool in the study of electrochemical/biological phenomena and material properties.

The 1250 series together with a potentiostat such as 1287, can be used in a wide range of applications, including:-

- Corrosion and inhibitor studies
- Analysis of organic and inorganic coatings and films
- Research into solid electrolytes for oxygen sensors/fuel cells
- Development of novel anode/cathode materials and electrolytes
- Bioanalytical research into plant/soil properties

Materials Testing

When combined with a 1296 Dielectric Interface and temperature test equipment the 1250 series can be used to test a wide range of materials, such as:-

- Supercapacitor/battery/fuel cell materials
- Charge transport in semiconductors, organic crystals, ceramics etc.
- Analysis of chemical reactions, polymerization and curing processes
- Novel gas and liquid sensors
- Characterization of ferro/piezoelectric and semiconductor materials



1250 series Frequency Response Analyzer Specification

Generator

Waveform	sine, square, triangle
Frequency	range: 10 μ Hz to 65kHz max resolution: 10 μ Hz: \pm 100ppm stability (24hrs, \pm 1°C): 10ppm
Amplitude	10mV to 10.23V
Resolution	1 in 1023
Error	<1% \pm 1 digit
Distortion	<2%

dc Bias

Range	-10.23V to +10.23V
Resolution	1 in 1023
Error	<1% \pm 1 digit
Maximum Voltage (lo to ground)	150V
Impedance	100K Ω / 100pF
Connection	front, floating, 4mm: rear floating, BNC

Output is short circuit proof

Analyzers

1250: Two independent analyzers operating in parallel.
1254: Four independent analyzers operating in parallel.

Range	Sensitivity (dynamic range)	Full scale peak input	Com. Mode rejected
30mV	1 μ V (90dB)	45mV	30V
300mV	10 μ V (90dB)	500mV	30V
3V	100 μ V (90dB)	5V	30V
30V	1mV (90dB)	50V	500V
300V	10mV	500V	500V

Maximum input (hi or lo to ground)	500V peak, 300V rms
Coupling	dc or ac (<1dB at 2.5Hz)
Impedance (hi or lo to ground)	1M Ω
Common mode rejection (dc coupling up to 100Hz)	>65dB up to 50V peak
Cross-channel isolation (1k Ω across inputs)	>100dB up to 10kHz
Measurement delay	0 to 10 ⁵ s
Power supply	90 to 127V, 188 to 265V, ac, 45 to 440Hz
Consumption	130VA to 210VA
Dimensions (w x h x d)	432mm x 176mm x 573mm (17in x 6.93in x 22.56in)
Weight	18kg (40lbs)
Operating temp. range	0 to 50°C (32 to 122°F)

The 1250/1254 can be controlled directly at the front panel, or by software (GPIB interface).
Operation for the 1250B (no front panel) is remote - software control only.
For more information on the specification of the synchroniser and mod / demod cards please visit our website.

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Solartron Analytical's Quality System is approved to BS EN ISO 9001: 1994.

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Synchroniser

The synchroniser option enables the generator to be locked to a rotating / reciprocating component, and measurements can then be made relative to this. Applications include turbine analysis - using harmonics to enable crack detection.

Modulator / Demodulator

This optional card allows the user to superimpose an external modulator signal onto the 1250 generator signal which acts as a carrier. This modulation signal can then be demodulated through the analyzer inputs. Applications include telecommunications and automated test systems.

Solartron Analytical is a world leader in instrumentation and software for the characterization of materials and electrochemical systems using precision electrical measurement techniques.

These techniques find particular use in the fields of corrosion, battery and fuel cell research, dielectric analysis and electrochemistry. The product portfolio includes industry standard frequency response analyzers, potentiostats, electrochemical software (Zplot and CorrWare) and battery test equipment.

Arun Technology, an operating unit of Solartron Analytical, provides a range of metal analyzers using optical emission techniques for determining elemental content. The units in static laboratory or mobile format are used in foundries, steelworks, or scrapyards for metals analysis or material identification.



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