



Hewlett-Packard offers a complete line of signal analyzers to provide frequency, time, and modulation domain measurement capability. This section is devoted primarily to the frequency domain. It includes spectrum analyzers, distortion analyzers, audio analyzers, modulation analyzers, and measuring receivers. Each type of instrument has distinctive capabilities that make it the preferred instrument for a particular measurement application.

The spectrum analyzer is a swept-tuned, superheterodyne receiver that provides a CRT display of amplitude versus frequency. It is essentially a frequency-selective, peak-responding voltmeter calibrated to display the rms value of a sine wave. The spectrum analyzer can show the individual frequency components that make up a complex signal. (It does not provide phase information about a signal, however.) The swept receiver technique used in Hewlett-Packard spectrum analyzers enables frequency domain measurements to be made over a large dynamic range and a wide frequency range (5 Hz to 325 GHz).

The Fourier analyzer uses digital sampling and mathematical transformation techniques to form a Fourier spectrum of a signal. This method is useful for measuring signals from a few μHz to 100 kHz, and provides frequency, amplitude, and phase information. As with the spectrum analyzer, all information is presented on a CRT display. With its real-time signal analysis capability, the Fourier analyzer is able to capture periodic as well as random and transient events.

Distortion analyzers and audio analyzers employ broadband detectors and notch filters to measure signal properties such as total harmonic distortion. These tunable filters enable the analyzer to selectively display the level and frequency of harmonic and distortion products. Measurement results are shown on a meter or digital display. Audio analyzers include a signal source, making possible measurements such as SINAD, which include signal and distortion levels. The frequency range covered by HP distortion and audio analyzers extends from 5 Hz to 600 kHz.

Modulation analyzers and measuring receivers are designed to capture and analyze a fundamental signal and its entire modulation envelope. These analyzers use independent AM and FM detection circuits for simultaneous analysis of complex modulated signals. When these analyzers are combined with a downconverter and local oscillator, accurate measurements of frequency, power, and modulation characteristics can be made on signals from 150 kHz to 26.5 GHz. All measurement results are presented on a digital display.

Spectrum Analyzers

Spectrum analyzers take advantage of the frequency-conversion properties of the swept-tuned heterodyne receiver to make significant contributions to frequency-domain signal analysis. The following are some of the measurements that can be made with spectrum analyzers:

- Absolute and relative frequency
- Absolute and relative amplitude
- Scalar
- Noise
- Distortion products
- AM, FM, pulsed RF modulation
- Stimulus response
- Electromagnetic compatibility (EMC)

These measurements are possible because spectrum analyzers have the following characteristics:

- Broad frequency coverage from 2 Hz to 325 GHz
- Wide amplitude range from -148 dBm to $+30$ dBm
- Tracking generators for scalar measurements
- Excellent sensitivity for low signal detection
- Excellent frequency stability
- High resolution of frequency and amplitude

These capabilities allow spectrum analyzers to provide frequency-domain signal analysis for numerous applications, including the manufacture and maintenance of microwave communications links, radar, telecommunications equipment, CATV systems, and broadcast equipment; mobile communication systems; EMI diagnostic testing; component testing; lightwave measurements; and signal surveillance.