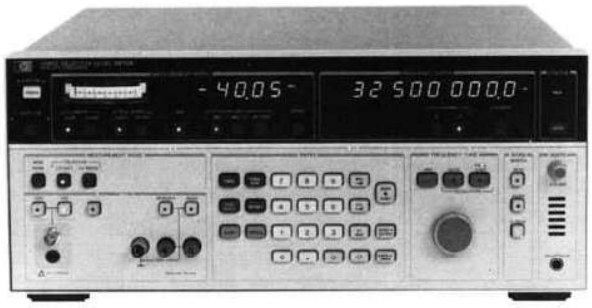
SIGNAL ANALYZERS

50 Hz to 32.5 MHz Selective Level Meter

Model 3586C



HP 3586C

DESIGNED FOR HP-IB SYSTEMS

Description

The HP 3586C selective Level Meter is designed for general pupose wave analysis applications in the design, manufacture, and maintenance of electronic systems.

Microprocessor control and HP-developed fractional-N synthesis provides precise frequency setting and time saving ease-of-use features, and the HP 3586C is fully HP-IB programmable.

The HP 3586C Selective Level Meter covers the frequency range from 50 Hz to 32.5 MHz, allowing measurement of audio, sonar, and other low frequency systems as well as high frequency communications and subsystems. Input impedances of 50, 75, or 600 Ω with 10 kΩ bridging adds measurement flexibility for a wide variety of applications.

Wideband power measurements can be made up to 32.5 MHz and down to −45 dBm. Measure selectively in LO distortion or LO noise modes or use USB or LSB for single sideband demodulation of a carrier.

Measurement Precision

Signal levels are measured with up to ±0.2 dB accuracy down to −80 dBm with .01 dB resolution and bandwidth choices of 20, 400, or 3100 Hz. Automatic level calibration eliminates the need for manual calibration operations prior to critical level measurements. Frequency can be set precisely with 0.1 Hz resolution and $\pm 1 \times 10^{-5}$ stability ($\pm 2 \times 10^{-7}$ optional). The built-in frequency counter allows you to measure the frequency of a signal greater than −100 dBm within the filter bandwidth chosen and then tune the center of the filter passband precisely to that signal with one keystroke.

Selective Measurements

Make measurements on signals as close as 80 Hz spacing with 50 dB rejection using the 20 Hz filter. Use the extremely selective 3100 Hz filter for telecommunications channel level or noise measurements with 60 dB carrier rejection and 75 dB adjacent channel rejection, or demodulate the upper or lower sideband signal for further processing and listen to it with the speaker output.

Digital or Analog Frequency Control

Frequencies may be entered directly on the keyboard with 0.1 Hz resolution and then changed by entering any step size and stepping up or down in frequency, or use the analog frequency tune control. The analog frequency tune control will change frequency in automatically chosen steps proportional to the bandwidth chosen, or in the step size entered.

Tracking Synthesizer

The HP 3586C will operate in the frequency tracking mode with either the HP 3336C Synthesizer (see page 417) for measurements up to 20.9 MHz, or the HP 3335A Synthesizer (see page 416) for full frequency coverage up to 32.5 MHz. The tracking synthesizer will automatically tune to the frequency programmed on the HP 3586C in the tracking mode when their HP-IB interfaces are connected together with a bus cable.

Use the tracking mode to save time in amplitude-only network analysis or for loop-around measurements in telecommunications systems.

Frequency Response Measurements

The HP 3586C includes a rear panel tracking output of approximately 0 dBm amplitude and ±.5 dB flatness at the same frequency as the passband center frequency. The tracking output has the same accuracy, stability and resolution as the HP 3586C center frequency specifications. This means the tracking output can be used for frequency response testing of high-Q filters and other selective networks. External attenuators can be used to adjust the input and output levels of the device under test to acceptable ranges.

For applications requiring improved amplitude accuracy and flatness, full amplitude range control without external attenuators, or better signal purity, use the HP 3336C or HP 3335A tracking synthesizer in place of the HP 3586C tracking output. By automatically tracking the frequency of the HP 3586C, the tracking synthesizers improve the accuracy and flexibility of frequency response measurements without increasing the measurement time.

Distortion Measurements

The front panel convenience features of the HP 3586C allow fast, accurate measurement of individual harmonic levels. To measure harmonic levels relative to the fundamental, first measure the fundamental signal level, and enter that level as an offset. Then, enter a frequency step size equal to the fundamental frequency. Now you can quickly step to the harmonic frequencies and measure the harmonic distortion directly without time-consuming calculations. When the exact fundamental frequency is unknown, the built-in counter can be used to measure the fundamental frequency, thereby ensuring precise tuning and accurate measurement.

Intermodulation distortion can also be measured quickly by storing the intermod frequencies and front panel settings in the non-volatile storage registers of the HP 3586C.

Verifying the total harmonic distortion specifications of sources and amplifiers is a laborious measurement unless a special purpose distortion analyzer is used. With a simple routine in a controller such as the HP 85B Personal Computer, the HP 3586C can be used to quickly measure total harmonic distortion as well as individual harmonic levels.

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TOTAL HARMONIC DISTORTION TEST

FUNDAMENTAL FREQ      ABSOLUTE AMP

     10,805.1 Hz          1.18 dBm

HARMONIC FREQ         RELATIVE AMP

2    21,610.2 Hz        -50.65 dB
3    32,415.3 Hz        -50.36 dB
4    43,220.4 Hz        -72.35 dB
5    54,025.5 Hz        -50.55 dB
6    64,830.6 Hz        -67.73 dB

  THD = -46.89 dB  OR  0.45 %
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The HP 3586C and an HP computer were used to characterize a function generator for total harmonic distortion as well as harmonic level.

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Model 3586C (con't)

HP 3586C Specifications

Frequency
Frequency range: 50/75 Ω unbalanced input, 50 Hz to 32.5 MHz; 600 Ω Balanced Input, 50 Hz to 108 kHz
Frequency resolution: 0.1 Hz
Center frequency accuracy: ±1 x 10^{-5}/year, (±2 x 10^{-7}/year with option 004).
Counter accuracy: ±1.0 Hz in addition to center frequency accuracy for signals within the 60 dB bandwidth of the IF filter chosen or greater than −100 dBm (largest signal is measured).
Frequency display: 9 digit LED

Selectivity

3 dB bandwidth,* ±10%: 20 Hz, 400 Hz, 3100 Hz

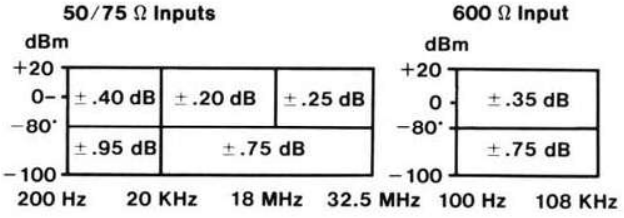
*Noise bandwidth is the same as the 3 dB bandwidth

60 dB bandwidth: 3100 Hz BW, ±1850 Hz; 400 Hz BW, ±1100 Hz; 20 Hz BW, ±90 Hz
Adjacent channel rejection: 75 dB minimum at ±2850 Hz, 3100 Hz BW
Passband flatness ±0.3 dB

Passband Flatness

Bandwidth	Flatness Range	Flatness
3100 Hz	±1000 Hz	
400 Hz	± 50 Hz	±0.3
20 Hz	± 3 Hz	dB

Amplitude
Measurement range: +20 to −120 dBm
Amplitude resolution: .01 dB
Level accuracy: 10 dB auto range, low distortion mode, after calibration, signal at ±1 Hz from center frequency.

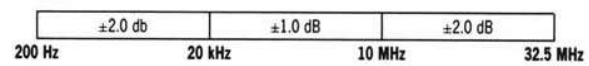


*20 Hz & 400 Hz BW below −90 dBm

Level accuracy: 100 dB range (after calibration), add correction to 10 dB auto-range accuracy for dB below full scale. (Not required when in 10 dB auto-range.)

dB Below Full Scale	Accuracy Correction
0 to −20 dB	±.25 dB
−20 to −40 dB	±.50 dB
−40 to −80 dB	±2.0 dB

Wideband power accuracy: after calibration, 100 dB range, average on, −45 to +20 dBm.



Dynamic Range
Spurious Responses
−110 dBm maximum or the following, whichever is greater:
Image rejection (100-132 MHz): −80 dBc
IF rejection: 15625 Hz, −80 dBc; 50 MHz, −60 dBc
Spurious signals: >1600 Hz offset, >−80 dBc; 300 Hz to 1600 Hz, >−75 dBc
Residual spurious: −110 dBm maximum; <350 Hz, −95 dBm

Distortion
Harmonic distortion: −75 dB below full scale, low distortion mode, above 4 kHz.
Intermodulation distortion: two-tone second and third order, separation 10 kHz to 1 MHz, −78 dB below full scale. Either tone ≥10 MHz, −70 dB.

Noise Floor (full scale setting −35 to −120 dBm)

Frequency	Bandwidth	Noise Level
100 kHz to 32.5 MHz	3100	−114 dBm
	20 Hz, 400 Hz	−120 dBm
2 kHz to 100 kHz	All	−105 dBm

The noise floor for full scale settings of −30 to +25 dBm will be 75 dB below full scale for >100 kHz, or 55 dB below full scale for <100 kHz.

Signal Inputs

Impedance	Frequency	Mating Connector
50/75 ohms unbalanced	50 Hz to 32.5 MHz	BNC
600 ohms balanced	50 Hz to 108 kHz	Dual Banana Plug 0.75 inch Spacing

Return loss: 50/75 Ω, 30 dB; 600 Ω, 25 dB
Balance: 600 Ω; 40 dB
Demodulated Audio Output
Output level: 0 dBm into a 600 Ω load
Output connector: 1/4″ jack, mates with WECO 347.

Auxiliary Signal Inputs/Outputs
Tracking output: 0 dBm rear panel tracking output
Ext. reference input: 1 MHz to 10 MHz or sub-harmonic input.
Reference output: 10 MHz at 8 dBm output (also 10 MHz oven oscillator on instruments with option 004).
Probe power: front panel dc output for HP active high impedance accessory probes, (+15, −12 Vdc)
HP-IB Interface Functions: SH1, AH1, T6, L4, SR1, RL1, PP1, DC1, DT1, C1, C3, C28
Additional outputs: audio, phase jitter and meter output.

Options
Option 004: High stability frequency reference: 10 MHz oven stabilized reference oscillator improves frequency stability to ±2 x 10^{-7}/year.

General

Operating Environment
Temperature: 0° to 55°C
Relative humidity: 95%, 0° to 40°C
Altitude: ≤15,000 ft., ≤4600 metres
Storage environment temperature: −40°C to 75°C
Storage altitude: ≤50,000 ft., ≤15,240 metres
Power: 100/120/220/240 V, +5%, −10%, 48 to 66 Hz, 150 VA
Weight: 23 kg. (50 lb) net; 30 kg. (65 lb) shipping
Size: 177 mm H x 425.5 mm W x 475.5 mm D (7″ x 16.75″ x 16.75″)

HP 3586C Selective Level Meter*	**$10,200**
Opt 004: High Stability Frequency Reference	add $750
Opt 907: Front Panel Handles	add $65
Opt 908: Rack Flange Kit	add $35
Opt 909: Rack Flange & Handle Combination Kit	add $90

Accessories
HP 1124A: High Impedance Probe $325

*HP-IB cables not supplied, see page 133