



Specifications

Specifications describe the instrument's warranted performance. Specifications designated as "typical" reflect supplemental, non-warranted characteristics.

Frequency and Time

Frequency Range:	31.25 mHz to 40 kHz with alias protection
Frequency Accuracy:	$\pm 0.02\%$ of reading
Frequency Controls:	<p>Zoom On – User selects a <i>center frequency and span</i>. The analyzer performs an FFT on the chosen portion of the data record. Zoom provides a way to concentrate the number of lines of resolution in the frequency band of interest.</p> <p>Zoom Off – In this mode the frequency measured is of the baseband span chosen. Frequency resolution is determined by dividing baseband span by resolution. Baseband spans start at 0 Hz.</p>
Minimum Baseband Resolution:	50 Hz/1600 lines = 0.03125 Hz
Real-time Bandwidth: baseband, rms averaging Dual-Channel:	> 2 kHz

Window Characteristics (400 lines)

–3 dB Bandwidth (% of span)	Uniform	0.25% of span
	Hann	0.37% of span
	Flat Top	0.9% of span
Shape Factor (–60 dB BW/–3 dB BW)	Uniform	716
	Hann	9.1
	Flat Top	2.6
Noise Equivalent Bandwidth	Uniform	0.25% of span
	Hann	0.375% of span
	Flat Top	0.955% of span
Window Flatness	Uniform	+0, –4.0 dB
	Hann	+0, –1.5 dB
	Flat Top	+0, –0.01 dB

Time Domain:

Anti-alias Filters:	Switchable in or out for all ranges (When the anti-alias filter is switched out, the signal is band-limited to 80 kHz before sampling.)
Sample Rate:	102.4 kHz/channel
Amplitude Resolution:	$\pm 0.05\%$ of input range

The instrument acts as a sampling digital-storage oscilloscope when operating in the time domain mode. TIME CH1/CH2, and CH1–CH2 are time domain operations. Data is measured according to record length. Use the anti-alias filter ON/OFF selection to take advantage of the full frequency range of the HP 3560A for time domain measurements.

Amplitude and Input

(Specifications stated are at the center of the frequency bins, in dc coupling)

Full Scale Range: $\pm 5\text{mV}$ to $\pm 5\text{V}$ peak
(autoranging or manually selectable for each channel in a 1,2,5 sequence)

Overload Detection: Both channels with on-screen message

Absolute Amplitude Accuracy (50 Hz to 40 kHz baseband spans first 80% of span)
Overall accuracy is the sum of absolute accuracy, window flatness and noise level data at a given frequency.
 $\pm 0.5\text{ dB} \pm 0.025\%$ of input range

Dynamic Range:

(16 rms averages, 50 Hz to 20 kHz baseband spans, internal sampling)

Alias Responses:
(single out-of-band tone, $\leq 0\text{ dBfs}$)
0 to 70% of span

$< -60\text{ dBfs}$

Spurious or Residual Responses:
(in-band, $\leq 0\text{ dBfs}$ input
 $R_{ds} = 50\Omega$, Backlight Off)

$< -70\text{ dBfs}$

Harmonic Distortion:
(single in-band tone $\leq 0\text{ dBfs}$)
50 Hz – 10 kHz span
20 kHz – 40 kHz span

$< -60\text{ dBfs}$

$< -50\text{ dBfs}$

Noise Level:
(PSD process, Flat Top window
5 mV range, $R_{ds} = 50\Omega$
at 1 Hz on the 200 Hz Span)

$< -100\text{ dBV}/\sqrt{\text{Hz}}$

Residual DC Response

$R_{ds} = 50\Omega$

5 mV to 20 mV Range

$< -20\text{ dBfs}$

50 mV to 5 V Range

$< -40\text{ dBfs}$

Channel-to-Channel Amplitude and Phase Match
(Frequency Response mode, 16 rms averages, Ch1 range = Ch2 range, 50 Hz to 20 kHz baseband spans)

0 to 50% of span $\pm 0.1\text{ dB}$, $\pm 1.0^\circ$ typical

0 to 80% of span $\pm 0.2\text{ dB}$, $\pm 5.0^\circ$

Channel-to-Channel Crosstalk
(Receive channel $R_{ds} = 50\Omega$)
 $< -85\text{ dB}$ (typical)

Input Characteristics

Number of data inputs 2 Channels

Input Impedance (high to low) 1 M Ω typical

Coupling ICP Power, dc, ac

AC Coupling Attenuation $< 3\text{ dB}$ @ 0.5 Hz typical

ICP Supply Current 4 mA/20 V typical

Scaling Engineering Units with these labels:
g, in/s, m/s, in, m, lbf, kgf, SPL, psi, EU

Math Functions Differentiation
Integration, single/double

Octave Analysis

The measurement is made in synthesized 1/3 or 1/1 octave bands. Filter bandwidth, center frequency, and bandshape meet ANSI Std. S1.11-1966 (R 1975) type E Class II specifications. Acoustic Weighting (A-weighting) filter is available. The filter shape complies with definitions given in ANSI S1.4-1983 and IEC 651-1979.

Trigger

Trigger Sources: Internal or External

Trigger Modes: Freerun – processes data as quickly as possible using the internal clock
Input channel – measurements triggered by the selected channel
External Trigger – initiates measurement by a TTL pulse on the external trigger connector

Trigger Controls: Single – Arms the instrument to capture and display only one data record upon trigger.
Re-trigger – Gathers and displays a data record each time a valid trigger is received.
Slope – Positive/negative
Trigger Level – Variable, steps of 1% of range
Pre-trigger delay – 0 to 4096 points
Post-trigger delay – 0 to 4096 points

Sample Clock

Source: Internal or External

External Sample: The external clock connector allows synchronization of the sample clock to an external source (up to 100 kHz) with TTL levels such as the output of a shaft encoder.
 Minimum logic low time: 250 ns
 Minimum logic high time: 9.75 μ s

Formats: Single, front/back, upper/lower, map with hidden line removal and baseline suppression of up to 99 traces.

Y-Coordinates: Linear Mag, dB Mag, Log Mag (logarithmic data with linear readouts), Phase, Real, Imaginary

Units: Volts, dBV, and EU (Engineering Units) with selectable labels; g, in/s, m/s, in, m, lbf, kgf, SPL, psi, EU

Scaling: X-Axis – linear or log
 Y-Axis – auto or manual

Display Type: LCD with fill, contrast, backlight and auto-shutdown
 320 \times 240 Pixels

Marker Functions: Marker trace A, B, or both, marker to peak, harmonic markers (20 max), scroll display left or right, expanded x-axis display

Measurement Averaging

RMS: For each calculated frequency point, the displayed amplitude is averaged in a root-mean-square fashion. After a user-defined number of averages, the average process is completed and a final result is displayed.

RMS Exponential: This type of averaging yields a weighted average with each record being weighted according to the time at which it was acquired. Exponential averaging continues indefinitely.

Peak Hold: Holds the highest amplitude value of each frequency component of a spectrum compared to the previous spectrum.

Time Averaging: Data is averaged as it is acquired by the instrument before processing. This type of averaging improves the signal-to-noise ratio for triggered measurements. Time averaging is used to uncover deterministic signals from the noisy background data.

Number of Averages: 1 to 4096

Average Controls: Start, Pause/Continue, Fast Average, Time Record Preview

Data Storage, Data Recall, Interface to PCs, Prints/Plots

Data is stored with a time-data stamp, data record number, and the type of data that was taken. The HP 3560A comes with 768 kBytes non-volatile RAM, enough storage for 500 state/trace combinations with 200 line spectra.

Traces may be selectively viewed on the analyzer or transferred via the RS-232 Interface to attached printers or to a personal computer.

Data Output Commands:

Transfer All sends all records over RS-232

Transfer One sends the selected record over RS-232

Print prints/plots output over RS-232 to supported printers and plotters

Data Transfer

Every HP 3560A comes with a PC program to make your data transfer simple. The program formats the data into a PC file format called standard data format (sdf), which is supported by many HP products. Once data is in the sdf format, it may be converted for use in the HP 3566A, HP 3567A PC Spectrum/Network Analyzers, HP 35665A, or in other third-party software packages such as PC Matlab from The Mathworks and MATRIXx from Integrated Systems.

Data Formats, Displays and Markers

Data: Time, CH1 – CH2 (time), Differentiated Time, Orbits (x vs. y), Spectrum, Frequency Response, Coherence, Cross-Correlation, Octave, 1/3 Octave, PSD

Interface type:	9-pin RS-232 conforming to EIA/TIA-562 and EIA/TIA-574
Baud Rates:	38400 / 19200 / 9200 / 4800 / 2400 / 1200
Parity (odd/even)	Data bits (7 / 8)
Supported Printers:	HP DeskJet, HP LaserJet, HP QuietJet, HP ThinkJet, Epson(R) Graphic with RS-232 interface
Supported Plotters:	HP-GL Plotters (such as HP 7550A) with RS-232 interface

General

Temperature	
Operating	+0° to 40°C
Battery Charging	+20° to 40°C
Storage	-20° to 50°C
Humidity (non-condensing)	5 to 95%
Altitude	
Operating	4600 m (15,000 ft)
Storage	<15000 m (50,000 ft)

Power

Type:	NiCd rechargeable battery (internal, removable), Battery Recharger/AC adapter included
Running time on full charge (Backlight off, typical use with auto shut-down capability on)	6 hours (typical)
Battery recharge	14 hours (typical)
Memory Backup	Lithium battery - 5 year backup (Option to delete lithium battery and use internal rechargeable NiCd for backup is available)

Physical

Size	11.75" × 8.25" × 3.75" 300 × 210 × 95mm
Weight (analyzer only)	3.2 kHz (7 lbs.)
Shipping Wt.	6.4 kg (14 lbs.)

Abbreviations:

dBV = dB relative to 1 volt rms.

dBfs = dB relative to full scale.

Rds = Source resistance or termination connected to the HP 3560A input

typical = typical, non-warranted performance specification included to provide general product information.