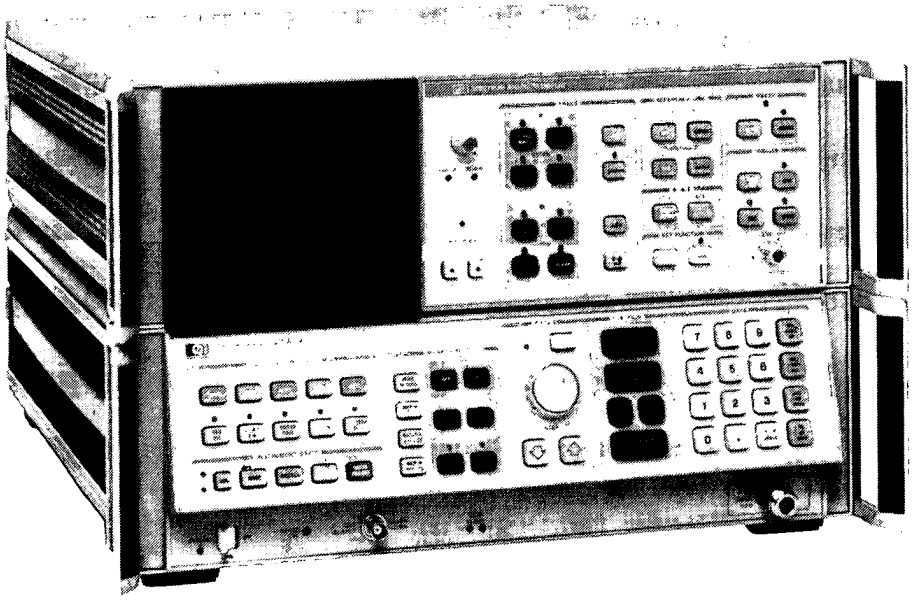


Figure 1-1. Model 8567A Spectrum Analyzer

Table 2-2. Model 8567A Specifications (1 of 5)

NOTE: Unless noted, all specifications are for AUTO COUPLED FUNCTION operation. Where specifications are subject to minimization with the error correction routine, corrected limits are given unless noted.

FREQUENCY

MEASUREMENT RANGE

10 kHz to 1500 MHz

DISPLAYED RANGE

Frequency Span

100 Hz to 1500 MHz over 10 divisions CRT horizontal axis.
Variable from data knob, or numeric/unit keyboard.
Step keys change span in a 1, 2, 5 sequence.
In zero span, the instrument is fixed tuned at the center frequency.

Full Span: (0-1500 MHz) is immediately executed with 0-1.5 GHz or INSTR PRESET keys.

Frequency Span Accuracy: For spans > 1 MHz, ±(2% of the actual frequency separation between two points + 0.5% of span setting); for spans ≤1 MHz, ±(5% of frequency separation +0.5% of span).

Center Frequency

0 Hz to 1500 MHz.
Variable from data knob or numeric/unit keyboard.
Center frequency step size may be set to any value through the numeric keyboard or using the MKR/Δ →STP SIZE key. Center frequency may also be set using MKR→CF or SIGNAL TRACK keys.

Readout Accuracy:
Span ≥100 Hz: ±(2% of frequency span + frequency reference error × tune frequency + 10 Hz) in AUTO resolution bandwidth at stabilized temperature, and using the error correction function, SHIFT W and SHIFT X. Add 30% of the resolution bandwidth setting if error correction is not used.

Zero Frequency Span

Resolution Bandwidth	Accuracy: Frequency Reference Error × Tune Frequency +	Readout Resolution
1 kHz - 3 kHz	100 Hz	10 Hz
10 kHz - 3 MHz	1 kHz	100 Hz

Start-Stop Frequency

Continuously variable from data knob, step keys, or numeric keyboard. Permissible values must be consistent with those for center frequency and frequency span. SHIFT O sets the analyzer start and stop frequencies equal to the frequencies of the two Δ markers.

Readout Accuracy: Center Frequency Readout Accuracy + ½ Frequency Span Accuracy. CRT display frequency readouts may be offset from their actual values by the amount entered through the numeric/unit keyboard after executing SHIFT V.

MARKER

Normal

Displays the frequency at the horizontal position of the tunable marker.

Accuracy: Center frequency accuracy + frequency span accuracy between marker and center frequencies.
PEAK SEARCH positions the marker at the center of the largest signal response present on the display to within ±10% of resolution bandwidth.
MKR→CF sets the analyzer center frequency equal to the marker frequency; MKR/Δ →STP SIZE sets the center frequency step size equal to the marker frequency.

Frequency Count

Displays the frequency of the signal on whose response the marker is positioned. The marker must be positioned at least 20 dB above the noise or the intersection of the signal with an adjacent signal and more than four divisions up from the bottom of the CRT.
Counter resolution is normally a function of frequency span but may be specified directly using SHIFT =.

Accuracy:
Span ≤1 MHz: frequency reference error × displayed frequency ±10 Hz + 2 counts.
Span >1 MHz: ±10 kHz + 1 count.

Frequency Reference Error, after 1 hour warm-up (see also STABILITY Drift):

Aging Rate: $<5 \times 10^{-6}$/year

Temperature Stability: $<1 \times 10^{-5}$, 5° to 55°C

Signal Track

Re-tunes the analyzer to place a signal identified by the marker at the center of the CRT and maintain its position. Useful when reducing frequency span to zoom-in on a signal; also keeps a drifting input signal centered.

Δ — (Marker Delta)

Displays the frequency difference between the stationary and tunable markers. Reference frequency need not be displayed.

Accuracy: Same as frequency span accuracy; in the FREQ COUNT mode, twice the frequency count uncertainty plus drift during the period of the sweep. (See STABILITY Drift.)
MKR/Δ →STP SIZE sets the center frequency step size equal to the frequency difference between the markers. SHIFT O sets the analyzer start and stop frequencies equal to the frequencies of the two markers.

Zoom

Makes it possible to reduce the frequency span about the marker (or signal in the signal track and frequency count mode) using the step down key.

Table 2-2. Model 8567A Specifications (2 of 5)

RESOLUTION

Resolution Bandwidth
3 dB bandwidths of 1 kHz to 3 MHz in a 1, 3, 10 sequence. Bandwidth may be selected manually or coupled to frequency span.

Bandwidth Accuracy: Calibrated to:
±20%, 3 MHz to 1 kHz
30 kHz and 100 kHz bandwidth accuracy figures only applicable ≤90% R.H.

Bandwidth Selectivity
60 dB/3 dB bandwidth ratio:
<15:1, 3 MHz to 100 kHz
<13:1, 30 kHz to 1 kHz

STABILITY

Residual FM
<100 Hz peak-to-peak ≤10 sec; span <100 kHz, resolution bandwidth 1 kHz, video bandwidth ≤30 Hz.

Drift (After 1 hour warm-up at stabilized temperature):

Frequency Span	Drift (per minute) of SWEEPTIME
≤100 kHz	<100 Hz
>100 kHz but <1 MHz	<1 kHz
>1 MHz	<300 kHz

Because the analyzer is frequency corrected on retrace, drift occurs only during the period of one sweep. This drift is in addition to frequency reference error due to aging.

SPECTRAL PURITY

Noise Sidebands

SSB Phase Noise (1 kHz BW, offset 30 kHz from carrier): −75 dBc

NO LINE RELATED SPEC

AMPLITUDE

MEASUREMENT RANGE
−115 dBm to +30 dBm.

DISPLAYED RANGE

Scale
Over a 10 division CRT vertical axis with the Reference Level (0 dB) at the top graticule line.

Calibration
Log: 10 dB/div for 90 dB display from Reference Level
5 dB/div for 50 dB display
2 dB/div for 20 dB display
1 dB/div for 10 dB display
} expanded from Reference Level
Linear: 10% of Reference Level/div when calibrated in voltage.

Fidelity
Log
Incremental: ±0.1 dB/dB over 0 to 80 dB display
Cumulative:
3 MHz to 1 kHz Res BW
≤±1.0 dB max over 0 to 80 dB display, 20° to 30°C
≤±1.5 dB max over 0 to 90 dB display
Linear: ±3% of Reference Level for top 9½ divisions of display.

Reference Level
Range
Log: +30.0 to −99.9 dBm or equivalent in dBmV, dBμV, volts.
Expandable to +60.0 to −119.9 dBm using SHIFT 1.
Linear: 7.07 volts to 2.2 μvolts full scale.
Expandable to 223.6 volts to 2.2 μvolts using SHIFT 1.
(Maximum input must not exceed +30 dBm damage level.)

Continuously variable from data knob or numeric keyboard with 0.1 dB resolution; step keys change level in 10% of full scale increments. Reference level may also be set using the MKR→REF LVL key.

Accuracy
The sum of the following factors determines the accuracy of the reference level readout. Depending upon the measurement technique followed after calibration, various of these sources of uncertainty may not be applicable.

An internal error correction function calibrates and reduces the uncertainty introduced by analyzer control changes from a state defined during the calibration of the instrument when SHIFT W is executed just prior to the signal measurement (i.e., at the same temperature) within the 20° to 30°C range.

Calibrator Uncertainty: ±0.2 dB

Frequency Response (Flatness) Uncertainty: ≥10 dB

RF Attenuation: ±1 dB, 10 kHz to 1500 MHz

Amplitude Temperature Drift:
At −10 dBm reference level with 10 dB input attenuation and 1 MHz resolution bandwidth, ±0.05 dB/°C (eliminated by recalibration).

Input Attenuation Switching Uncertainty:
±1.0 dB over 10 dB to 70 dB range.

Resolution Bandwidth Switching Uncertainty:
(Referenced to 1 MHz bandwidth; for Resolution Bandwidths of 1 kHz to 3 MHz.)

Corrected: ±0.2 dB (at 20° to 30°C after 1 hour warm-up)

Uncorrected: ±1.0 dB (at 20° to 30 °C after 1 hour warm-up)
±2.0 dB (at 5° to 55°C)

30 kHz and 100 kHz bandwidth switching uncertainty figures only applicable ≤90% R.H.

Log Scale Switching Uncertainty:

Corrected: ±0.1 dB (at 20° to 30°C)

Uncorrected: ±0.5 dB (at 20° to 30 °C)
±1.0 dB (at 5° to 55°C)

Table 2-2. Model 8567A Specifications (3 of 5)

IF Gain Uncertainty

Assuming the internal calibration signal is used to calibrate the reference level at −10 dBm and the input attenuator is fixed at 10 dB, any changes in reference level in the following ranges will contribute to IF gain uncertainty:

Corrected:

Reference Level = 0 to −55.9 dBm,
±0.1 dB (at 20° to 30°C)
Reference Level = −56.0 to −119.9 dBm,
±1.0 dB (at 20° to 30°C)

Uncorrected:

Reference Level = 0 to −55.9 dBm,
±0.7 dB (at 20° to 30°C)
±1.1 dB (at 5° to 55°C)
Reference Level = −56.0 to −119.9 dBm,
±1.1 dB (at 20° to 30°C)
±1.6 dB (at 5° to 55°C)

Correction Accuracy only applied over 0 dBm to −55.9 dBm range.

Each 10 dB decrease (or increase) in the amount of input attenuation at the time of calibration and measurement will cause a corresponding 10 dB decrease (or increase) in the absolute reference level settings described above.

RF Gain Uncertainty (due to 2nd LO shift): ✱
±0.1 dB corrected (±1.2 dB uncorrected)

Error Correction Accuracy (Applicable when SHIFT W and SHIFT X are used): ±0.4 dB

MARKER

Normal

Displays the amplitude at the vertical position of the tunable marker.

Accuracy: Equals the sum of calibrator uncertainty, reference level uncertainty, and scale fidelity between the reference level and marker position.

PEAK SEARCH positions the marker at the peak of the largest signal present on the display. MKR→REF LVL sets the analyzer reference level equal to the marker amplitude.

RMS noise density in a 1 Hz bandwidth is read out using SHIFT M, by sampling the displayed trace and arithmetically correcting for the analyzer envelope detector response, log shaping, and measurement bandwidth.

Δ — (Marker Delta)

Displays the amplitude difference between the stationary and tunable markers. Reference frequency need not be displayed.

Accuracy: Equals the sum of scale fidelity and frequency response uncertainty between the two markers.

REFERENCE LINES

Display Line

Movable horizontal line with amplitude readout.

Threshold

Movable horizontal trace threshold with amplitude readout.

Accuracy

Equals the sum of calibrator uncertainty, reference level uncertainty, and scale fidelity between the reference level and reference line.

DYNAMIC RANGE

Spurious Responses

For total signal power of < −40 dBm at the input mixer of the analyzer, all image and out-of-band mixing responses, harmonic and intermodulation distortion products are >70 dB below the total signal power.

Second Harmonic Distortion: For a signal −30 dBm at the mixer and ≥10 MHz, second harmonic distortion >70 dB down; 60 dB down for signals <10 MHz.

Third-Order Intermodulation Distortion: For two signals each −30 dBm at the mixer, third-order intermodulation products:

Signal Separation: >100 kHz
Center Frequency: >10 MHz
Distortion Products: >80 dBc
T.O.I.: +10 dBm

Residual Responses (no signal at input) ✱
< −100 dBm for frequencies >1 MHz, < −90 dBm for frequencies ≤1 MHz but >50 kHz, with 0 dB input attenuation.

Average Noise Level ✱
Displayed < −115 dBm for frequencies >1 MHz, < −92 dBm for frequencies ≤1 MHz but >50 kHz with 1 kHz bandwidth, 0 dB input attenuation, 1 Hz video filter.

Video Bandwidth: Post detection low pass filter used to average displayed noise; bandwidth variable from 1 Hz to 3 MHz in a 1, 3, 10 sequence. All bandwidths are nominal except 3 MHz, which is a minimum.

Video bandwidth may be selected manually or coupled to resolution bandwidth.

Digital Video Averaging: Displays the sweep-to-sweep average of the trace over a specifiable number of sweeps with SHIFT G; video averaging is turned off with SHIFT H.

Gain Compression ✱
<1.0 dB for total signal power ≤ −10 dBm at the input mixer.

SWEEP

TRIGGER

Free Run

Sweep triggered by internal source.

Line

Sweep triggered by power line frequency.

Video

Sweep triggered by detected waveform of input signal at an adjustable level; signal must be ≥0.5 div peak-to-peak.

For sweeps of 10 msec and less (zero span) the signal must have >40 Hz rate.

SHIFT y allows any envelope rate, but display will blank between triggers when sweep is <20 msec.

External

Sweep triggered by rising edge of signal input to rear panel BNC connector; trigger source must be >2.4 volts (5 volts max).

For sweeps of 10 msec and less (zero span) trigger source must have >40 Hz rate.

SHIFT x allows any trigger source rate but display will blank between low rep trigger when sweep is <20 msec.

CONTINUOUS

Sequential sweeps initiated by the trigger; 20 msec full span to 1500 sec full span in 1, 1.5, 2, 3, 5, 7.5, 10 sequence.

Table 2-2. Model 8567A Specifications (4 of 5)

Accuracy
Sweep time ≤100 sec, ±10%; >100 sec, ±20%.

Zero Frequency Span
1 μsec full sweep (10 divisions) to 10 msec full sweep in 1, 2, 5, sequence; 20 msec full sweep to 1500 sec full sweep in 1, 1.5, 2, 3, 5, 7.5, 10 sequence.

Accuracy: same as continuous.

Marker (sweeps ≥20 msec only)

Normal: Displays time from beginning of sweep to marker position.

Accuracy: Sweep time settings ≥20 msec but ≤100 sec, ±10% × (indicated time/sweep time setting); settings >100 sec, ±20% × (indicated time/sweep time setting).

Δ **— (Marker Delta):** Displays time difference between stationary and tunable marker.

Accuracy: Same as normal.

SINGLE
Single sweep armed on activation and initiated by trigger (sweep ≥20 msec only.)

DISPLAY

CATHODE RAY TUBE

Type
Post deflection accelerator, aluminized P31 phosphor, electrostatic focus and deflection.

Viewing Area
Approximately 9.6 cm vertically × 11.9 cm horizontally (3.8 in. × 4.7 in.).

The CRT is completely turned off with SHIFT g (and on with SHIFT h) to avoid unnecessary aging of the CRT during long term unattended operation of the analyzer.

INPUTS

INPUT

10 kHz to 1500 MHz, 50Ω, Type N connector; dc coupled

Reflection Coefficient (typical values): <0.20 (1.5 SWR); ≥10 dB input attenuation.

MAXIMUM INPUT LEVEL

AC
Continuous power, +30 dBm (1 watt); 100 watts, 10μsec pulse into ≥50 dB attenuation.

DC
0 volts.

INPUT ATTENUATOR

70 dB range in 10 dB steps. Zero dB attenuation accessible only through numeric/unit keyboard.

Attenuation may be selected manually or coupled to reference level.

Accuracy
±1.0 dB over 10–70 dB range.

EXTERNAL SWEEP TRIGGER INPUT (rear panel)

Must be >2.4 volts (5 volt max.). 1kΩ nominal input impedance.

EXTERNAL FREQUENCY REFERENCE INPUT (rear panel)

Must equal 10 MHz ± 100 Hz, 0 dBm to +10 dBm, 50Ω nominal input impedance.

Quasi-Peak (rear panel; nominal values)
VIDEO INP: 0–2 V. 139Ω input impedance.
IF INP: 21.4 MHz. Input is nominally −11 dBm with 10 dB input attenuation. 50Ω input impedance.

OUTPUTS

CALIBRATOR

20 MHz ±(frequency reference error × days since calibration), −10 dBm ±0.2 dB; 50Ω.

AUXILIARY (rear panel; nominal values)

DISPLAY
X, Y and Z outputs for auxiliary CRT displays exhibiting <75 nsec rise times for X and Y; <30 nsec rise time for Z (compatible with HP 1300 series displays).

X, Y: 1 volt full deflection
Z: 0 to 1 volt intensity modulation, −1 volt blank, BLANK output (TTL level >2.4 volts for blanking), compatible with most oscilloscopes.

Recorder
Outputs to drive all current HP X-Y recorders (using positive pencoils or TTL penlift input).

Horizontal Sweep Output (X-axis): A voltage proportional to the horizontal sweep of the frequency sweep generator that ranges from 0V for the left edge to +10 V for the right edge. 1.7 kΩ output impedance.

Video Output (Y-axis): Detected video output (before A-D conversion) proportional to vertical deflection of the CRT trace. Output increases 100 mV/div from 0 to 1 V. Output impedance ≤475Ω.

Penlift Output (Z-axis): A blanking output, 15V from 10 kΩ, occurs during frequency sweep generator retrace; during sweep, output is low at 0V with 10Ω output impedance for a normal or unblanked trace (pen down).

LOWER LEFT and UPPER RIGHT pushbuttons calibrate the recorder sweep and video outputs with 0,0 and 10,1 volts respectively, for adjusting X-Y recorders.

21.4 MHz IF
A 50Ω, 21.4 MHz output related to the RF input to the analyzer. In log scales, the IF output is logarithmically related to the RF input signal; in linear, the output is linearly related. The output is nominally −20 dBm for a signal at the reference level. Bandwidth is controlled by the analyzer's resolution bandwidth setting; amplitude is controlled by the input attenuator and IF step gain positions.

1st LO
2–3.7 GHz, >+4 dBm; 50Ω output impedance.

Frequency Reference
10.000 MHz, 0 dBm nominal; 50Ω output impedance.

Quasi-Peak (rear panel; nominal values)
VIDEO OUT: 0–2 V. 130Ω input impedance.
IF OUT: 21.4 MHz. Output is nominally −11 dBm with 10 dB input attenuation. 50Ω output impedance.

Table 2-2. Model 8567A Specifications (5 of 5)

INSTRUMENT STATE STORAGE

Instrument state information is retained in memory for approximately 30 days in STANDBY mode or after line power is removed.

REMOTE OPERATION

The standard HP 8567A operates on the Hewlett-Packard Interface Bus (HP-IB). All analyzer control settings (with the exception of VIDEO TRIGGER LEVEL, FOCUS, ALIGN, INTENSITY, AMPTD CAL and LINE) are remotely programmable. Function values, marker frequency/amplitude, and traces may be output; CRT labels and graphics may be input.

LCL

Returns analyzer to local control, if not locked out by controller.

OPTIONS

All specifications are identical to the standard HP 8567A except as noted.

75Ω INPUT IMPEDANCE (Option 001)

RF Input
10 kHz to 1500 MHz, 75Ω, BNC connector; dc coupled.

Frequency Response (Flatness) Uncertainty
≥10 dB RF attenuation,
±1.5 dB, 10 kHz to 1500 MHz

Residual Responses (no signal at input)
< −94 dBm for frequencies > 1 MHz,
< −84 dBm for frequencies ≤ 1 MHz but > 50 kHz with 0 dB input attenuation.

Average Noise Level
Noise level displayed on RF input < −109 dBm with 1 kHz resolution bandwidth, frequencies > 1 MHz;
< −86 dBm for frequencies ≤ 1 MHz but > 50 kHz.
(0 dBm input attenuation, 1 Hz video filter.)

400 Hz POWER LINE FREQUENCY OPERATION (Option 400)

Power Requirements
400 Hz ± 10% line frequency: 100 or 120 volts (+5%, −10%) line voltage; 50-60 Hz power line frequency for service only, not for extended periods.

Residual Responses (no signal at input)
< −90 dBm for frequencies > 1 MHz,
< −85 dBm for frequencies ≤ 1 MHz but > 50 kHz with 0 dB input attenuation.

Temperature Range (Operating)
50-60 Hz, 5° to 35°C;
400 Hz, 5° to 55°C.

GENERAL

ENVIRONMENTAL

Temperature
Operating: 5° to 55°C;
Storage: −40°C to +75°C.

EMI

Conducted and radiated interference is within the requirements of Class A1c, REO2 of MIL STD 461B, and within the requirements of VDE 0871 and CISPR publication 11.

WARM-UP TIME

Frequency Reference
Frequency reference aging rate attained after 1 hour from cold start at 25°C. Frequency is within 5×10^{-5} of final stabilized frequency within 30 minutes.

Operation
Requires 30 minute warm-up from cold start, 5° to 55°C.

Internal Temperature Equilibrium
Reached after 2 hour warm-up at stabilized outside temperature.

POWER REQUIREMENTS

50–60 Hz; 100, 120, 220, or 240 volts (+5%, −10%); approximately 450 VA (40 VA in standby).
400 Hz operation is available as Option 400.

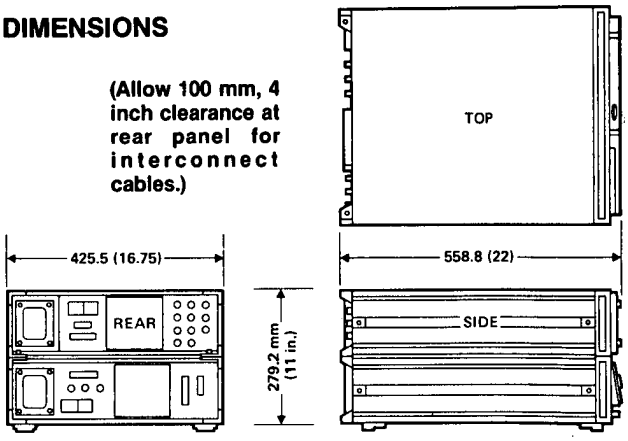
WEIGHT

Net:
Total, 45 kg (100 lbs.)
IF-Display Section, 21 kg (47 lbs.)
RF Section, 24 kg (53 lbs.)

Shipping:
IF-Display Section, 27 kg (60 lbs.)
RF Section, 32 kg (70 lbs.)

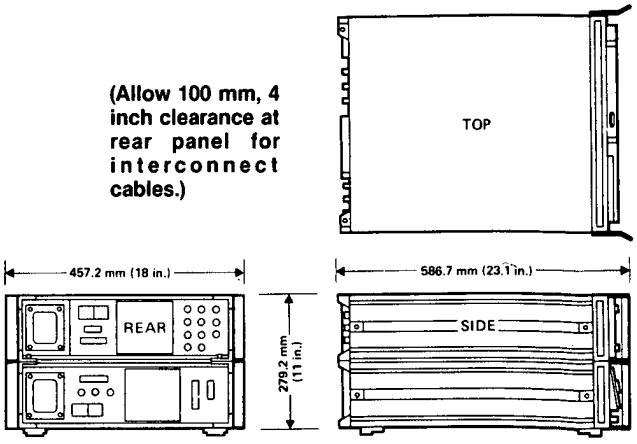
DIMENSIONS

(Allow 100 mm, 4 inch clearance at rear panel for interconnect cables.)



INSTRUMENT DIMENSIONS WITHOUT HANDLES

(Allow 100 mm, 4 inch clearance at rear panel for interconnect cables.)



INSTRUMENT DIMENSIONS WITH HANDLES

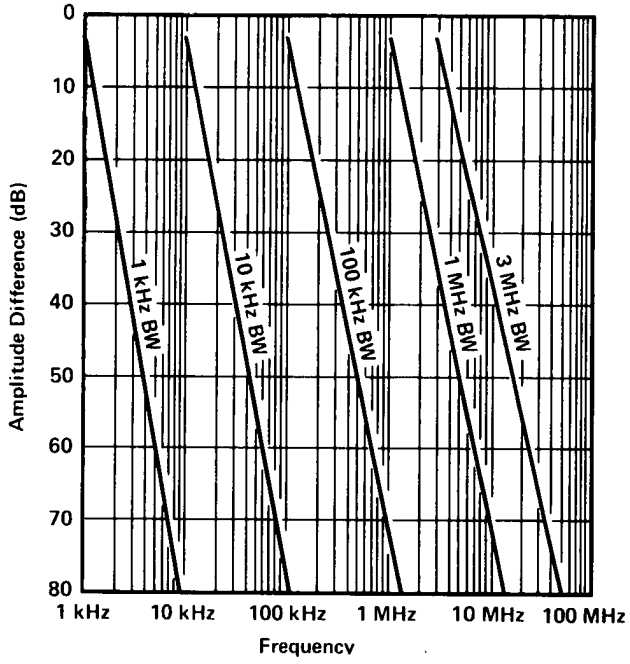
Table 2-3. Model 8567A Performance Characteristics

FREQUENCY

FREQUENCY SPAN
Variable from data knob or from numeric/unit keyboard, in approximately 1% increments.

CENTER FREQUENCY
Variable from data knob or from numeric/unit keyboard in approximately 1% increments. Center frequency step size is normally 10% of frequency span.

RESOLUTION



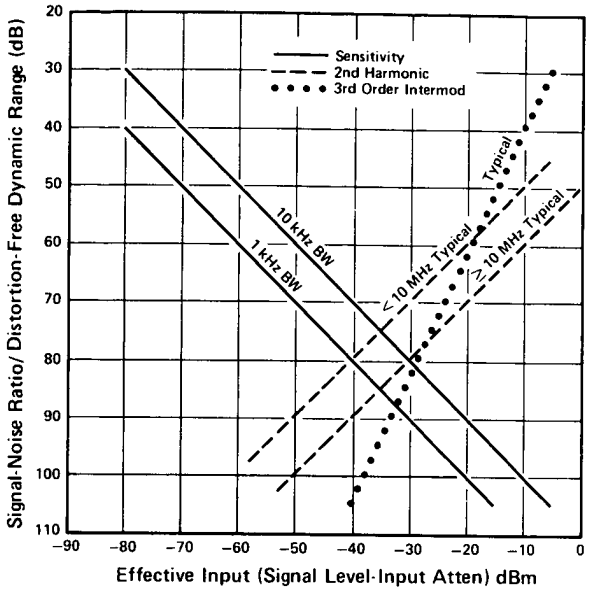
TYPICAL SPECTRUM ANALYZER RESOLUTION

AMPLITUDE

REFERENCE LEVEL
Signals at the reference level in log translate to approximately full scale signals in linear typically within ±1 dB at room temperature.

FREQUENCY RESPONSE (FLATNESS) UNCERTAINTY (≥10 dB RF Attenuation)
±0.7 dB, 10 kHz to 1500 MHz;
+1, −4 dB, 1500 MHz to 1650 MHz.

THIRD ORDER INTERMODULATION DISTORTION

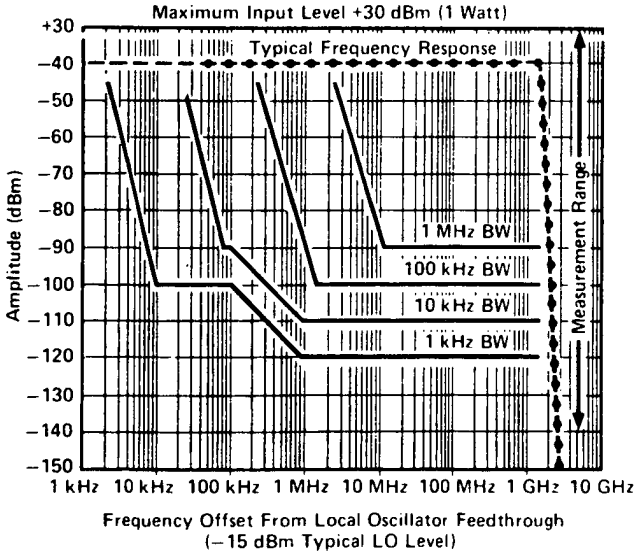


OPTIMUM DYNAMIC RANGE

INPUT

LO emission is typically < −75 dBm (0 dB RF attenuation)

AVERAGE NOISE LEVEL



TYPICAL SENSITIVITY VS. INPUT FREQUENCY