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Agilent Technologies 3588A

Data Sheet

Product Specifications

Amplitude Specifications

All receiver specifications apply from 10 Hz to 150 MHz and include 30 minute warmup from ambient conditions unless otherwise noted. Typical performance is applicable over ±5°C from the most recent autocalibration and is not warranted. Supplemental characteristics are non-warranted functional and feature information.

Amplitude measurement range

Maximum Safe Input Level: 50/75 Ohm 1M Ohm
Average Continuous Power: 26 dBm - (10 Hz to 150 MHz)
Combined AC/DC ±4 Vpk ±25 Vpk
Maximum Measured Input 20 dBm

Input range settings (characteristic only)

50 Ohm input (in 10 dB steps) +20 dBm to -20 dBm
75 Ohm input (in 10 dB steps) +22 dBm to -18 dBm w/included adapter
1M Ohm input 0 dBm (for reference impedance of 50 Ohm)

A/D overload level:2 dB (relative to selected range)

Dynamic range

Note: Dynamic range specifications apply with the source turned off.

Noise Level, 50 Ohm input (dBm/Hz using the marker noise function, -20 dBm range)

The 50 ohm input noise level (dBm/Hz using the marker noise function, -20 dBm range) will be typically -135dBc/Hz @ 1KHz and - 140 dBc/Hz

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above 30 KHz to 100 MHz.

Specified for swept spectrum mode, with 50 Ohm input and low-distortion mode off. Degrade 10 dB if in low-distortion mode and 2 dB if using 75 Ohm input.

For 1M Ohm input, noise is <-110 dBm/Hz below 40 MHz, with 1/f corner at 100 kHz.

Input noise is degraded 4 dB in narrowband zoom mode for spans >10 kHz, and 3 dB for start frequency <30 kHz.

Note: Equivalent noise bandwidth is narrower than 1 Hz for spans below 150 Hz in the narrowband zoom mode, providing additional reduction in phase noise from that shown above. This maintains good dynamic range, even for extremely small offset frequencies in narrow spans. Noise is reduced by 10 × log [1/noise bandwidth] dBc relative to the above graph.

Spurious Responses

General Spurious

Unless specifically mentioned in other spurious specifications, spurious responses are <-70 dBc for signal levels = range. (<-80 dBc typical)

Harmonic distortion

Low-distortion mode, 50 and 75 Ohm inputs: Harmonic distortion products are <-80 dBc (<-90 dBc typical) for spectrally pure input signals with total input power level = range. Degrade specification by 10 dB when low-distortion mode is off.

1M Ohm input:<-65 dBc (<-75 dBc typical)

Degrade harmonic distortion specifications by 10 dB (5 dB for 1M Ohm input) when input frequency is less than 30 kHz.

Intermodulation distortion

Low-distortion mode, 50 and 75 Ohm inputs: Intermodulation distortion products are <-80 dBc (<-90 dBc typical) with respect to 2 tones 6 dB below range. Degrade specification by 10 dB when low-distortion mode is off.

1M Ohm input: <-65 dBc (<-75 dBc typical)

Degrade intermodulation distortion specifications by 10 dB (5 dB for 1 MOhm input) when input frequency is less than 30 kHz.

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Residual responses

Residual responses are less than -110 dBm on the -20 dBm range.
Degrade specification by 10 dB when low-distortion mode is on.
Degrade 10 dB for 40 kHz spans in narrowband zoom mode.

Image, multiple and out-of-band responses

<-70 dBc (<-80 dBc typical) where applied signal level = range.

Local oscillator feedthrough

Local oscillator feedthrough (appears as signal at dc) is >20 dB below range. Degrade specification by 10 dB when low-distortion mode is on.

Full Scale Absolute Accuracy
(applies over entire 0 to 55°C temp range)

	10 Hz- 100 Hz	100 Hz 30 kHz	30 kHz- 300 kHz	300 kHz 40 MHz	40 MHz- 150 MHz
50 Ohm input	±2.5 dB (1 dB typ)	±1.0 dB (0.5 dB typ)	±0.5 dB (0.2 dB typ)	±0.4 dB (0.2 dB typ)	0.5 dB (0.2 dB typ)
75 Ohm Input	±2.5 dB	±1.0 dB	±0.8 dB	±0.8 dB	±0.8 dB
1M Ohm Input	±2.5 dB	±1.0 dB	±0.6 dB	±0.6 dB	

The calibration procedures produce the greatest accuracy at 300 kHz. Full-scale absolute accuracy at 300 kHz is ±0.3 dB (0.1 dB typical) when input level = range.

Accuracy is specified for manual frequency or for sweeps where sweep time is increased by a factor of 4. Add ±0.1 dB for autocoupled sweep times.

Narrowband zoom: Measurement data is "windowed" in the FFT operation of the narrowband zoom mode to optimize amplitude accuracy or frequency resolution. This adds the following frequency response errors to the full-scale absolute accuracy specifications.

High accuracy mode (Flat-Top window): ±0.005 dB
High resolution mode (Hanning window): +0, -1.5 dB

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Scale fidelity (linearity)

Level Specified Typical

0 to -30 dB <0.05 dB 0.02 dB

-30 to -40 dB <0.1 dB 0.03 dB

-40 to -50 dB <0.3 dB 0.05 dB

-50 to -60 dB <0.5 dB 0.10 dB

-60 to -70 dB <0.7 dB 0.10 dB

-70 to -80 dB - 0.25 dB

-80 to -90 dB - 0.25 dB

-90 to -100dB - 0.40 dB

-100 to -110 dB - 0.70 dB

-110 to -120 dB - 4.0 dB

Level is relative to the input range
Specifications are valid for frequencies >100 kHz.

Example: To compute the typical accuracy for a signal of -45 dBm at 100 MHz with 50 Ohm full-scale range of -20 dBm and manual sweep, sum the typical full-scale absolute accuracy and scale fidelity.
i.e. (0.2 dB + 0.02 dB) = 0.22 dB

Input Port Return Loss: >20 dB

Frequency Specifications

Frequency range

Specifications apply over the range of 10 Hz to 150 MHz
(10 Hz to 40 MHz for 1M Ohm input).

Frequency accuracy

Frequency accuracy is the sumofinitial accuracy, aging and frequency counter resolution. Accuracy is measured with frequency counter function.

Initial Accuracy Without opt. 001 With opt. 001

20 to 30°C ±0.5 ppm ±0.01 ppm

0 to 55°C ±3.0 ppm ±0.07 ppm

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Aging ±0.25 ppm/mo. ±0.125 ppm/mo

*Add ±0.1 ppm if instrument is on < 48 hours

Frequency Counter Resolution: 0.1 Hz

Drift/residual FM

Frequency drift and residual FM are negligible, as the Agilent 3588A is fully synthesized (phase-locked to frequency reference) during sweeps. For frequency accuracy during sweeps, see the accuracy specifications above.

Frequency span range (characteristic only)

Swept spans:

Range: 10 Hz to 150 MHz, and zero span

Resolution: 0.1 Hz

Accuracy: Greater of 0.1 Hz or .125% of span

Start/stop freq: 0 Hz to 150 MHz

Narrowband zoom spans:

Range: 1.23 Hz to 40 kHzin ×2 steps

Accuracy: ±0.001% of span

Resolution bandwidth

Swept spectrum: 1.1 Hz to 17 kHz ±10%

Narrowband zoom:

High-accuracy mode: 0.90% of span (11 mHz-360 Hz)

High-resolution mode: 0.37% of span (4.5 mHz-148 Hz)

Bandwidth selectivity

(shape factor or ratio of -60 dB to -3 dB bandwidths)

Swept spectrum mode (see also filter comparison graph)

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Manual sweep: <4.0:1

Auto-coupled sweep: 4.3:1 (typical)

Auto-coupled oversweep: 5.1:1 (typical)

Narrowband zoom mode

High-accuracy mode: 2.6:1

High-resolution mode: 9.1:1

Narrowband zoom (FFT) equivalent noise bandwidth

High-accuracy mode: 0.955% of span

High-resolution mode: 0.375% of span

Measurement speed (maximum, characteristic only)

Sweep rate, oversweep off: RBW ÷ 2 Hz/s

Sweep rate, oversweep on: 4 × (RBW ÷ 2) Hz/s

Narrowband zoom mode: >7 measurements/s (for spans >=10 kHz)

Narrowband zoom (FFT): 400 ÷ span (Hz) seconds time record length

Note: Traditional analog RBW filters are usually swept at RBW ÷ 2 Hz/s (or slower), to limit amplitude errors due to sweeping to <0.1 dB. The oversweep mode of the Agilent 3588A provides up to 4 times faster sweep times without increased error.

HP-IB binary trace output: approx. 120 ms/trace

Video Bandwidth

Coupled to RBW from (1.54 × RBW) to (0.012 × RBW) in 7 steps, and OFF

Source Specifications

Frequency range(characteristic only):10 Hz to 150 MHz

Amplitude range: +10 to -59.9 dBm and OFF

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Amplitude resolution: 0.1 dBm

Absolute amplitude accuracy: ±1 dB
(300 kHz, +10 dBm output)

Dynamic accuracy

(add to absolute accuracy): Add 0.02 dB/dB below +10 dBm

Frequency response ±1 dB

(Variation relative to

level at 300 kHz):

Spurious products

Harmonic products: <-30 dB

Non-harmonic products: <-40 dB

Noise: <-80dB

Relative to the carrier in a 1 Hz bandwidth for offsets greater than 500 Hz from the carrier)

Output Port Return Loss: >20 dB

General Specifications

Environmental

Temperature, standard instrument

Operating: 5 to 50°C

Storage (no disk in drive): -20 to 60°C

Temperature, delete disk option

Operating: 0 to 55°

Storage: -40 to 70°C

Humidity, non-condensing,

standard instrument

Operating: 8% to 80% at 30°C

Storage (no disk in drive): 5% to 95%

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Humidity, non-condensing,

delete disk opt.

Operating: 5% to 95% at 40°C

Storage: 5% to 95% at 40°C

Altitude, standard instrument

Operating: 2150m (7000 ft)

Storage: 4570m (15,000 ft)

Altitude, delete disk option

Operating: 4570m (15,000 ft)

Storage: 4570m (15,000 ft)

Calibration

Calibration Interval: 1 year

Warmup time: 30 minutes

Physical

Power requirements

115 VAC operation 19-132 Vrms, 47-440 Hz

230 VAC operation 198-264 Vrms, 47-66 Hz

Max power dissipation 450 VA

Weight

Net: 28 kg (61 lbs)

Shipping: 38 kg (81 lbs)

Dimensions

Height: 222 mm (8.75 in)

Width: 425.5 mm (16.75 in)

Depth: 630 mm (24.8 in)



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