



Agilent 71209A Microwave Spectrum Analyzer, 100 Hz to 26.5 GHz

Product Specifications

Frequency Range: 100 Hz to 26.5 GHz
Tunable in 1 Hz increments

Frequency Readout Accuracy

Span ≤ 10 MHz x N1: $\pm[(\text{freq readout} \times \text{freq ref accuracy}) + 1.0\% \text{ of span} + 10 \text{ Hz}]$
Span > 10 MHz x N1
Sweep ≥ 20 ms: $\pm[(\text{freq readout} \times \text{freq ref accuracy}) + 1.5\% \text{ of span} + 10 \text{ Hz}]$
10 ms \leq sweep < 20 ms $\pm[(\text{freq readout} \times \text{freq ref accuracy}) + 2.5\% \text{ of span} + 10 \text{ Hz}]$

Frequency Span

Range: 0 to 26.5 GHz in 0.5% increments
Accuracy
Span ≤ 10 MHz x N1: $\pm[1\% \text{ of span} + (\text{span} \times \text{freq ref accuracy})]$
Span > 10 MHz x N1
Sweep ≥ 50 ms: $\pm[1.5\% \text{ of span} + (\text{span} \times \text{freq ref acc})]$
Sweep ≥ 20 ms: $\pm[2.5\% \text{ of span} + (\text{span} \times \text{freq ref acc})]$
Sweep ≥ 10 ms: $\pm[4.0\% \text{ of span} + (\text{span} \times \text{freq ref acc})]$

Frequency Reference Accuracy

w/ Agilent 70310A w/o Agilent 70310A
Aging: $< 1 \times 10^{-7}$ /year, $< 3 \times 10^{-6}$ /year
 $< 5 \times 10^{-10}$ /day (7-day avg.)
Temperature Drift: $< 7 \times 10^{-9}$ $< 1 \times 10^{-5}$

Sweep Time

Range (continuous): 10 ms to 1000 s
with Agilent 70700A: Swept freq spans: 15 ms to 355 s
Fixed freq (zero span): 80 μ s to 355 s
with 800 point trace

Resolution Bandwidth (3 dB, synchronously tuned)

Range: 10 Hz to 300 kHz (HP 70902A)
100 kHz to 3 MHz (HP 70903A)
(1, 3, 10 sequence and 10% increments
except 3 kHz to 10 kHz)
Accuracy: $\pm 20\%$

Video Bandwidth

Range: 3 Hz to 300 kHz (HP 70902A)
(1, 3, 10 sequence) 300 Hz to 3 MHz (HP 70903A)
Accuracy: $\pm 20\%$ (characteristic)
Amplitude Specifications

Frequency Response

(10 dB attn, preselector peaked)
0 to 55 °C 20 to 30 °C 0 to 55 °C
Frequency Peak Ref. to Ref. to
Range Variation Calibrator Calibrator
100 Hz to 2.9 GHz: ± 1.5 dB ± 2.0 dB ± 2.0 dB
2.7 to 6.2 GHz: ± 2.0 dB ± 2.0 dB ± 3.0 dB
6.0 to 12.8 GHz: ± 2.0 dB ± 2.0 dB ± 3.0 dB
12.6 to 22.0 GHz: ± 2.0 dB ± 2.0 dB ± 3.5 dB
22.0 to 26.5 GHz: ± 2.5 dB ± 2.5 dB ± 4.0 dB
Ref. to
(10 dB attn, Calibrator
20-30 °C, preset: 2.7 to 22.0 GHz + 2.0, to 3.0 dB
preselector DAC): 22.0 to 26.5 GHz + 2.5, to 3.5 dB
(for spans ≤ 100 MHz)

Calibrator Uncertainty: ± 0.3 dB (-10 dBm, 300 MHz)

Input Attenuator

Range: 0 to 65 dB range in 5 dB steps
Switching
Repeatability: ± 0.2 dB
Accuracy Center Frequency Referenced to
the 10 dB setting
0.0 to 2.9 GHz ± 1.2 dB
2.9 to 12.7 GHz ± 2.3 dB
12.7 to 19.9 GHz ± 2.8 dB
19.9 to 26.5 GHz ± 4.8 dB

IF Gain Accuracy Gain 20 to 30 °C 0 to 50 °C

Agilent 70902A 10 dB ± 0.2 dB ± 0.2 dB
20 dB ± 0.2 dB ± 0.2 dB
30 dB ± 0.2 dB ± 0.3 dB
40 dB ± 0.2 dB ± 0.5 dB
50 dB ± 0.2 dB ± 0.6 dB
60 dB ± 0.4 dB ± 0.8 dB
Agilent 70903A 10 dB ± 0.1 dB
20 dB ± 0.3 dB

Scale Fidelity

Bandwidth Fidelity
Log Corrected
Agilent 70902A: 10 Hz ± 0.7 dB
(0 to 90 dB): 30 Hz to 100 kHz ± 0.5 dB
Agilent 70903A: 300 kHz to 1 MHz ± 0.5 dB
(0 to 75 dB): 3 MHz ± 0.7 dB

Resolution Bandwidth

Switching Repeatability: ± 0.2 dB in 1,3,10 sequence

Marker Resolution: ± 0.03 dB

Noise

Spectral Purity

Noise Sideband (dBc/Hz) (*characteristic*)

Offset N=1 N=2 N=4

100 Hz -92 -86 -80

300 Hz -100 -94 -88

1 kHz -108 -102 -96

3 kHz -108 -102 -96

10 kHz (spec) <-108 <-102 <-96

30 kHz -112 -106 -100

100 kHz -115 -109 -103

300 kHz -123 -117 -111

1 MHz -135 -129 -123

3 MHz -145 -139 -133

10 MHz -153 -147 -141

Line and System

Related Sidebands: <-65 dBc +20 Log N1

Displayed Average Noise Level

Frequency DANL

(*characteristic below 10 MHz*)

10 Hz Res BW, 0 dB: 100 Hz <-92 dBm (*char*)

attn. 3 Hz Video BW: 300 Hz <-95 dBm (*char*)

Ref Level <=-75 dBm: 1 kHz <-101 dBm (*char*)

3 kHz <-111 dBm (*char*)

10 kHz <-118 dBm (*char*)

30 kHz <-118 dBm (*char*)

100 kHz <-122 dBm (*char*)

300 kHz <-130 dBm (*char*)

1 MHz <-139 dBm (*char*)

3 MHz <-139 dBm (*char*)

10 MHz to 2.0 GHz -138 dBm

2.0 to 12.8 GHz -137 dBm

12.8 to 22.0 GHz -130 dBm

22.0 to 26.5 GHz -128 dBm

with Agilent 70620B: 1.0 to 12.8 GHz -155 dBm

12.6 to 22 GHz -150 dBm

22.0 to 26.5 GHz -148 dBm

False Signals

Spurious Responses Input Response

100 Hz to 10 MHz <-60 dBc

10 MHz to 22 GHz <-70 dBc

(Preselector ON for Agilent 70910A)

Second Harmonic Distortion

(Preselector ON

for Agilent 70910A) Frequency Response

100 Hz to 20 MHz <-60 dBc

20 MHz to 2.9 GHz <-75 dBc

2.9 GHz to 26.5 GHz <-100 dBc

Third-Order Intermodulation

(20 to 30 °C)

Agilent 70902A Center Intermod. Equiv.

Frequency Products TOI

100 Hz to 20 MHz <-64 dBc +2 dBm

22 MHz to 2.9 GHz <-78 dBc +9 dBm

2.7 to 6.2 GHz <-68 dBc +4 dBm

6.0 to 26.5 GHz <-64 dBc +2 dBm

Agilent 70903A Center Intermod. Equiv. TOI

100 Hz to 20 MHz <-54 dBc +2 dBm

22 MHz to 2.9 GHz <-68 dBc +9 dBm

2.7 to 6.2 GHz <-58 dBc +4 dBm

6.0 to 26.5 GHz <-54 dBc +2 dBm

Image Responses

For RF input Levels: <=0 dBm, 10 dB attn

6 MHz and 42.8 MHz: <-85 dBc

642.8 MHz Center Frequency Rejection

100 kHz to 2.9 GHz -85 dBc

2.7 to 6.2 GHz -70

6.0 to 12.8 GHz -70

12.7 to 18.0 GHz -70

18.0 to 26.5 GHz -60

Residual Responses

(0 dB attn, Range Responses

input terminated): 10 MHz to 26.5 GHz

<-100 dBm

Multiple and Out of Band Responses

For Inputs: <= 26.5 GHz, <-70 dBc

and RF levels: <=0 dBm, ³10 dB attn