



# Agilent 71200C Microwave Spectrum Analyzer, 50 kHz to 22 GHz

## Product Specifications

### Frequency Range

50 kHz to 22 GHz

Tunable in 1 Hz increments

N 1st IF Frequency

H=high IF (3.6214 GHz)

L=low IF (321.4 MHz) 1 H- 50 kHz to 2.9 GHz

N=harmonic number 1 L- 2.7 GHz to 6.2 GHz

2 L- 6.0 GHz to 12.7 GHz

3 L+ 12.0 GHz to 19.9 GHz

4 L+ 19.7 GHz to 22 GHz

### Frequency Readout Accuracy

Span  $\leq 10$  MHz  $\times N^1$ :  $\pm[(\text{freq readout} \times \text{freq ref accuracy})$

$\pm 1.0\%$  of Span + 10 Hz]

Span  $> 10$  MHz  $\times N^1$

Sweep  $\geq 20$  ms  $\pm[(\text{freq readout} \times \text{freq ref accuracy})$

+ 1.5% of span + 10 Hz]

Sweep  $\geq 10$  ms  $\pm[(\text{freq readout} \times \text{freq ref accuracy})$

+ 2.5% of span + 10 Hz]

### Frequency Span

Range: 0 to 22 GHz in 0.5% increments

Accuracy

Span  $\leq 10$  MHz:  $\pm[1\%$  of span + (span  $\times$  freq ref accuracy)]

Span  $> 10$  MHz

Sweep  $\geq 50$ ms:  $\pm[1.5\%$  of span + (span  $\times$  freq ref accuracy)]

Sweep  $\geq 20$ ms:  $\pm[2.5\%$  of span + (span  $\times$  freq ref accuracy)]

Sweep  $\geq 10$ ms:  $\pm[4.0\%$  of span + (span  $\times$  freq ref accuracy)]

### Frequency Reference Accuracy

with (Agilent 70310A) (without Agilent 70310A)

Aging:  $> 1 \times 10^{-7}$ /year  $> 3 \times 10^{-6}$ /year

7-Day Average:  $> 5 \times 10^{-10}$ /day

Temperature Drift:  $> 7 \times 10^{-9}$   $> 1 \times 10^{-5}$



### **Spectral Purity<sup>2</sup>**

Frequency Range Noise Sideband Offset  
50 kHz to 2.9 GHz <-108 dBc/Hz 10 kHz  
2.7 to 6.2 GHz <-108 dBc/Hz 30 kHz  
6.0 to 12.7 GHz <-102 dBc/Hz 30 kHz  
12.5 to 19.9 GHz <-98 dBc/Hz 30 kHz  
19.7 to 22/26.5 GHz <-96 dBc/Hz 30 kHz  
Line and System Related Sidebands:  
<-65 dBc + 20 log N<sup>1</sup>

### **Residual FM**

Span >10 MHz x N<sup>1</sup>: <25 kHz p-p in 0.1 s  
(measurement BW=100 kHz)  
Span <=10 MHz x N<sup>1</sup>: Determined from phase-noise sidebands

### **Frequency Drift**

For spans >10 MHz x N<sup>1</sup>: freq drift is ±1 kHz/s and +150 kHz/°C  
(Errors due to drift are not cumulative sweep to sweep.)

### **Sweep Time**

Range (Continuous): 10 ms to 1000 s  
Accuracy: ±2%  
With **Agilent 70700A**:  
Swept freq span: 15 ms to 355 s  
Fixed freq (zero span): 801 μs to 355 s with 800 point trace  
**Trigger**: free run, line, video, external  
**Resolution Bandwidth** (3 dB, synchronously tuned):  
Range (1, 3, 10, and 10% increments, except 3 kHz to 10 kHz)  
**Agilent 70902A**: 10 Hz to 300 kHz  
**Agilent 70903A**: 100 kHz to 3 MHz  
Accuracy: ±20%  
Selectivity Bandwidth (-60 dB/-3 dB):  
10 Hz to 3 kHz: <12:1  
10 kHz to 3 MHz: <16:1

### **Video Bandwidth**

Range (1, 3, 10 sequence)  
**Agilent 70902A**: 3 Hz to 300 kHz  
**Agilent 70903A**: 300 Hz to 3 MHz  
(When set to maximum (300 kHz or 3 MHz), effective bandwidth is greater than specified.)  
Accuracy: ±20% (characteristic)  
<sup>1</sup>N=Harmonic mixing band constant.  
<sup>2</sup>Refer to Figure 1 in the Spectrum Analyzer Overview for typical phase noise.  
Amplitude Specifications

### **Maximum Safe Input Power**

AC Average Continuous  
0 dB Attenuation: +15 dBm  
10 dB Attenuation: +25 dBm  
>10 dB Attenuation: +30 dBm  
Pulse Power: 100 watts, 10 ms pulse (>=40 dB attenuation)  
dc: 0 volts

**Display Range** (10 divisions)

Calibration Log: 0.01 to 20 dB/div in 0.5% increments

Linear: 0 to 10% of reference level per division

Reference Level Range

Log: +30 to -1400 dBm

Linear: 7.07 V to 22 nV

**Calibrator Uncertainty:**  $\pm 0.3$  dB (-10 dBm, 300 MHz)**Input Attenuator Switching Repeatability:** $\pm 0.2$  dB**IF Gain Accuracy**

Gain 20 to 30 °C 0 to 50 °C

10 dB  $\pm 0.2$  dB  $\pm 0.2$  dB20 dB  $\pm 0.2$  dB  $\pm 0.2$  dB30 dB  $\pm 0.2$  dB  $\pm 0.3$  dB40 dB  $\pm 0.2$  dB  $\pm 0.5$  dB50 dB  $\pm 0.2$  dB  $\pm 0.6$  dB**Scale Fidelity**

Bandwidth Fidelity

Log, Corrected (1-3-10)

**Agilent 70902A:**(0 to 90 dB) 10 Hz  $\pm 0.7$  dB30 Hz to 100 kHz  $\pm 0.5$  dB300 kHz  $\pm 0.7$  dBLog, Uncorrected: All  $\pm 3.0$  dBIncremental, Corrected: All  $\pm 0.1$  dB/1 dBLinear  $\pm 7.5\%$  of reference level**Amplitude Temperature Drift** (nominal)10 dB Input Attenuation  $\pm 0.05$  dB/°C

100 Hz Res BW (HP 70902A IF)

300 kHz Res BW (HP 70903A IF)

(Accumulated error is eliminated by running internal correction routine.)

**Resolution Bandwidth Switching Repeatability**In 1, 3, 10 Sequence:  $\pm 0.1$  dBAll Bandwidths:  $\pm 3$  dB (uncorrected)**Marker Resolution:**  $\pm 0.03$  dB

Input/Output Characteristics

Front panel only for standard configuration and Option 002.

See individual module characteristics for complete information.

**Agilent 70900B LO Section**

300 MHz Calibrator

Output: BNC (f), 50 ohms (nominal)

Output Power: -10 dBm  $\pm 0.3$  dB

Frequency Accuracy: 300 MHz x freq reference accuracy

**Agilent 70905A:** Type N (f); 50 ohms (nominal)  
LO Emissions: <-10 dBm with 10 dB attenuation (nominal)  
VSWR (>=10 dB Attenuation)  
Frequency VSWR (nominal)  
0 to 12.7 GHz <1.7:1  
12.5 to 18.0 GHz <2.0:1  
18.0 to 22 GHz <2.5:1

#### **Agilent 70902A IF Section**

Auxiliary Video Output: BNC (f), 0 to 1 V, 1k ohms (nominal),  
3 MHz IF Output (linear): BNC (f), 50 ohms, 1.5:1 VSWR (nominal)  
Output Power: -15 dBm (nominal) with -10 dBm RF input,  
0 dB attenuation and -10 dBm reference level

**HP-IB Codes:** SHI, AH1, T6, L4, SR1, RL1, DC1, PP0,  
DT1, E2, C1

#### **General Specifications**

##### **Agilent 71200C System Components**

**Agilent 70001A**  
**Agilent 70004A**  
**Agilent 70900B**  
**Agilent 70310A**  
**Agilent 70902A**  
Standard: **Agilent 7095A**  
Opt 002: **Agilent 70905B, Agilent 70600A**

##### **Environmental**

Temperature  
Operational: 0 to +55 °C  
Storage: -40 to +75 °C  
Humidity  
Operational: 0 to 95% relative humidity at 45 °C  
EMC: Conducted and radiated interference is in compliance with CISPR pub 11, FTZ 526/1979, and MIL-STD 461B, RE02/part 7.  
Vibration and Shock: in compliance with MIL-T-28800E  
Type III Class 3  
Power Requirements: see requirements for Agilent 70001A and Agilent 70004A  
all power requirements supplied by the mainframe (HP 70001A or 70004A)  
Weight (nominal)

**Agilent 71200C Standard:** 47.7 kg (105.6 lb)

Dimensions

##### **Agilent 70001A Mainframe:**

177.0 mm H x 425.4 mm W x 526.0 mm L  
(6.97 in x 16.75 in x 20.7 in)

**Agilent 70004A Display:** 222.0 mm H x 425.4 mm W x 526.0 mm L  
(8.74 in x 16.75 in x 20.7 in)

##### **Warranty and Calibration**

Warranty: 1 year (extendible with options)  
Calibration Cycle: 3 years recommended

## Features and Compatibility

**Agilent 70004A** Display Features: memory card, direct-to-disk, keyboard (for title mode and writing small DLPs), direct plot (buffered), direct print, full color display

### Mass Storage

Memory card: 32 KB or 128 KB RAM per card

External: SS80-compatible hard or flexible disk User Memory: 128 KB minimum, 32 k bytes minimum with firmware before 901008, about 2.5 KB to store an 800 point trace with its state. System memory is reduced when slave modules are added. Optional 1 MB memory.

### Compatible Accessory Modules (slave modules to the **Agilent 70900B** master module)

**Agilent 70903A** IF Section

**Agilent 70621A** and **Agilent 70620B** Preamplifiers

**Agilent 70810B** Lightwave Section

**Agilent 70907B** External Mixer Interface Module

**Agilent 70700A** Digitizer

**Agilent 70205A** Monochrome Display

### Software Available

**Agilent 11990A** Performance Verification Software