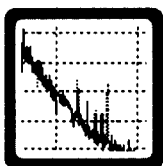

Fast, Accurate, and Flexible; The HP 3048A Solution

Fast Measurements



The HP 3048A is a flexible system designed to provide a simple solution to your absolute and residual noise measurement needs. It provides phase, frequency, and amplitude noise characterization for both signal sources (such as oscillators and signal generators) and two-port devices (such as dividers, mixers, and amplifiers).

The HP 3048A features rapid measurement speed. As you follow the measurement procedures presented in this manual, you will find that you are able to set up and complete your noise measurements in a fraction of the time it takes to make comprehensive noise measurement using other techniques.

The following table shows approximate system run times for measuring various frequency offsets.

Measurement Range	Approximate Measurement Period (Minutes)
0.01 to 1 Hz	17
1 to 10 Hz	2
10 Hz to 100 kHz	3
10 Hz to 2 MHz	4.5
10 Hz to 40 MHz	6

Specifications

Reliable Accuracy

The HP 3048A minimizes measurement uncertainty by assuring you of accurate and repeatable measurement results.

Frequency Offset Range	Accuracy
0.01 MHz to 1 MHz	± 2 dB
1 MHz to 40 MHz	± 4 dB

Measurement Qualifications

In order for the HP 3048A to meet its accuracy specifications, the following qualifications must be met by the signal sources you are using.

Source Return Loss: > 9.5 dB ($< 2:1$ SWR)

Source Harmonic Distortion < -20 dB (or a square wave)

If either of these conditions are not met, system measurement accuracy will be reduced.

Tuning

The tuning range of the voltage-controlled-oscillator (VCO) source must be commensurate with the frequency stability of the sources being used. If the tuning range is too narrow, the system will not properly phase lock, resulting in an aborted measurement. If the tuning range of the VCO source is too large, noise on the control line may increase the effective noise of the VCO source.

Specifications

System Phase Noise and Spurious Responses

The internal noise of the HP 3048A was designed for the measurement of even very low-noise reference sources. The following graph shows the phase noise and spurious response levels specified for the system.

The specified response does not include the phase noise or spurious signal contributions of a reference source.

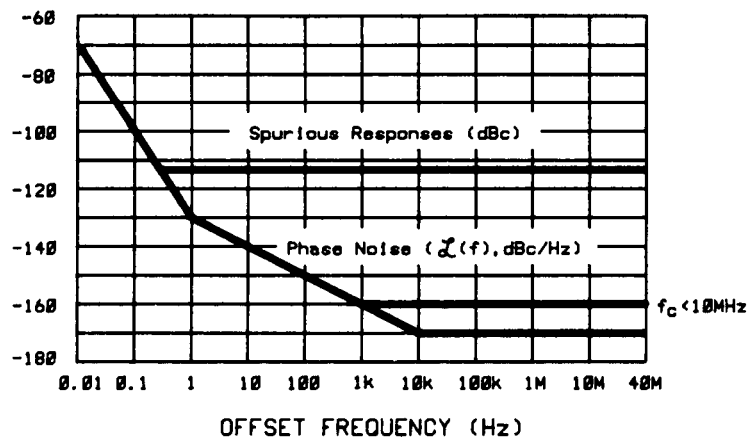


Figure 1-5. Graph of System Phase Noise and Spurious Responses

Specifications

Figure 1-6 shows the increase in system noise and spurious response levels as the signal level at the R input port of the HP 11848A Phase Detector is decreased below +15 dBm.

To determine the system noise and spurious response level for a given R input port level, determine the resulting dB degradation using Figure 1-6 and then adjust the phase noise and spurious response levels shown in Figure 1-5 by the degradation value.

For example, if the R input signal level is +5 dBm, the resulting degradation is +10 dB. Applying the +10 dB degradation to Figure 1-5 increases the system's maximum noise level at > 10 kHz offset frequencies from -170 to -160 dBc/Hz. The specified maximum spurious signal level also increases from -112 to -102 dBc at all offset frequencies.

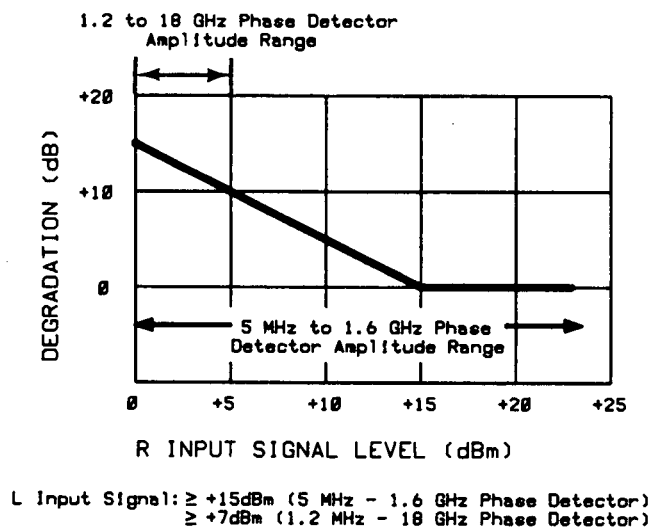


Figure 1-6. Increase in System Noise and Spurious Response Due to Decreased Input Level

Specifications

Phase Detector Input Ports

The wide frequency and amplitude ranges provided by the HP 3048A will enable you to make noise measurements for a wide variety of application requirements. The following tables indicate the frequency and amplitude ranges for the Phase Detector input ports on the HP 11848A.

Frequency Ranges

Carrier Frequency	Frequency Offset
5 MHz to 1.6 GHz ¹	0.01 Hz to 100 kHz ²
¹ Option 201 extends the carrier frequency range to 18 GHz ² When using a supported RF Analyzer).	

Amplitude Ranges

Phase Detector			
5 MHz to 1.6 GHz		1.2 GHz to 18 GHz ¹	
L Port	R Port	L Port	R Port
+15 dBm to +23 dBm	0 dBm to +23 dBm	+7 dBm to +10 dBm	0 dBm to +10 dBm
¹ Option 201 adds 1.2 to 18 GHz High Frequency Phase Detector.			

Specifications

Source Output Ports

Four signal sources are built into the HP 11848A that can be used as low-noise reference sources for your measurements. The typical amplitude level and tuning range for each of the HP 11848A's internal sources are shown below.

Typical Amplitude and Tuning Ranges

Source Outputs	Amplitude	Tuning
10 MHz A	+15 dBm	± 100 Hz
10 MHz B	+6 dBm	± 1 kHz
350–500 MHz	+17 dBm	± 20 MHz
400 MHz	–5 dBm	Fixed Frequency