

PN9100A FREQUENCY SYNTHESIZER MODULE

**FEATURES VERY LOW PHASE NOISE
IN BOTH CW AND FM MODE**

FEATURES

The PN9100A is the ideal reference frequency source for making phase noise measurements in the RF and Microwave frequency ranges. It is designed to provide a very low residual phase noise both close and far from the carrier.

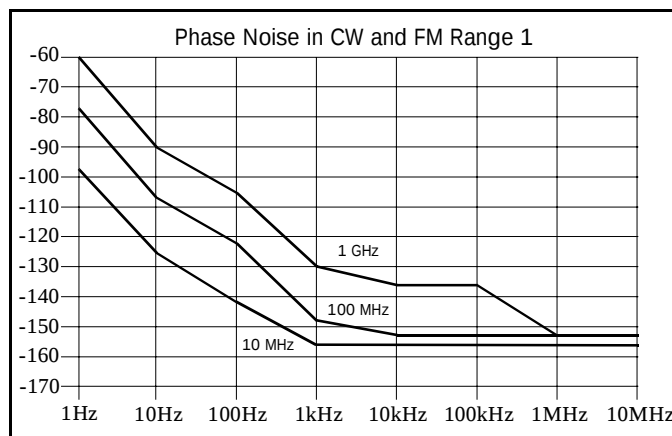


Figure 1: Phase Noise in CW and FM Range 1

Below 2 GHz, the output signal is derived from low noise dividers providing exceptionally low residual noise. This superior phase noise performance allows the PN9100A to support phase noise measurements of extremely low noise devices including crystal oscillators.

The PN9100A synthesizer is constructed as a module which can be plugged into a PN9000 mainframe. The PN9100A requires a very low noise reference signal generated by a PN9211 Time Base Module.

When a PN9200 Microwave Downconverter is installed in a PN9000 mainframe, its PN9210 Time Base can be used with the PN9100 Synthesizer instead of a PN9211 Time Base.

Frequency and FM ranges are controlled from the PN9000 computer through the internal bus.

SPECIFICATIONS

Frequency Range

2 MHz to 4.5 GHz

Output Level

+13 dBm / 50 Ohm: ± 2 dB

Frequency Resolution

2 MHz to 1024 MHz:	1 Hz
1024 MHz to 2048 MHz:	2 Hz
2048 MHz to 4500 MHz:	4 Hz

Spurious

Harmonics

2 MHz to 512 MHz:	-20 dBc
512 MHz to 4500 MHz:	-10 dBc

Sub-Harmonics

2 MHz to 1024 MHz:	-90 dBc
1024 MHz to 4500 MHz:	-30 dBc

Non-Harmonics

2 MHz to 1024 MHz:	-90 dBc
1024 MHz to 2048 MHz:	-84 dBc
2048 MHz to 4500 MHz:	-78 dBc

FM Mode

Frequency modulation is designed to contribute the lowest possible phase noise. The result is that for the FM Range 1, the residual phase noise is the same as it is in CW mode. For the other ranges it is reduced as much as possible.

FM Deviation

Four ranges of FM deviation are available (see tables on next page). Range 1 is used to make measurements of low noise sources. The other ranges provide 10, 100 and 1000 wider FM deviation and are used to measure noisier sources.

Full FM Deviation is obtained for ± 10 V peak.

FM Bandwidth

Ranges 1 and 2:	DC to 20 kHz at 3 dB
Ranges 3 and 4:	DC to 100 kHz

SPECIFICATIONS

Table 1: CW Mode and DC FM Range 1 (low noise)

Frequency Range		Step	Slope	Deviation	F ₀	SSB Noise (dBc/Hz)							
MIN	MAX	Hz	Hz/V	Hz	MHz	1 Hz	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	10 MHz
2048	4600	4	800	±8000	4000	-48	-78	-93	-118	-124	-124	-146	-152
1024	2048	2	400	±4000	2000	-54	-84	-99	-124	-130	-130	-152	-152
512	1024	1	200	±2000	1000	-60	-90	-105	-130	-136	-136	-152	-152
256	512	1	100	±1000	500	-66	-96	-111	-136	-142	-142	-152	-152
128	256	1	50	±500	250	-72	-102	-117	-142	-148	-148	-152	-152
64	128	1	25	±250	100	-78	-108	-123	-148	-152	-152	-152	-152
32	64	1	12.5	±125	60	-84	-114	-129	-152	-152	-152	-152	-152
16	32	1	6.25	±62.5	30	-90	-120	-135	-152	-152	-152	-152	-152
8	16	1	3.12	±31.2	10	-96	-126	-141	-155	-155	-155	-155	-155
4	8	1	1.56	±15.6	5	-102	-132	-147	-155	-155	-155	-155	-155
2	4	1	0.78	±7.8	4	-108	-138	-153	-155	-155	-155	-155	-155

Table 2: DC FM Mode Range 2

Frequency Range		Step	Slope	Deviation	F ₀	SSB Noise (dBc/Hz)							
MIN	MAX	Hz	Hz/V	Hz	MHz	1 Hz	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	10 MHz
2048	4600	4	8000	±80000	4000	-24	-54	-84	-112	-124	-124	-146	-152
1024	2048	2	4000	±40000	2000	-30	-60	-90	-118	-130	-130	-152	-152
512	1024	1	2000	±20000	1000	-36	-66	-96	-124	-136	-136	-152	-152
256	512	1	1000	±10000	500	-42	-72	-102	-130	-142	-142	-152	-152
128	256	1	500	±5000	250	-48	-78	-108	-136	-148	-148	-152	-152
64	128	1	250	±2500	100	-54	-84	-114	-142	-152	-152	-152	-152
32	64	1	125	±1250	60	-60	-90	-120	-148	-152	-152	-152	-152
16	32	1	62.5	±625	30	-66	-96	-126	-152	-152	-152	-152	-152
8	16	1	31.5	±315	10	-72	-102	-132	-155	-155	-155	-155	-155
4	8	1	15.6	±156	5	-78	-108	-138	-155	-155	-155	-155	-155
2	4	1	7.8	±78	4	-84	-114	-144	-155	-155	-155	-155	-155

Table 3: DC FM Mode Range 3

Frequency Range		Step	Slope	Deviation	F ₀	SSB Noise (dBc/Hz)							
MIN	MAX	Hz	Hz/V	kHz	MHz	1 Hz	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	10 MHz
2048	4600	4	80000	±800	4000	-18	-48	-78	-103	-120	-124	-146	-152
1024	2048	2	40000	±400	2000	-24	-54	-84	-109	-126	-130	-152	-152
512	1024	1	20000	±200	1000	-30	-60	-90	-115	-132	-136	-152	-152
256	512	1	10000	±100	500	-36	-66	-96	-121	-138	-142	-152	-152
128	256	1	5000	±50	250	-42	-72	-102	-127	-144	-148	-152	-152
64	128	1	2500	±25	100	-48	-78	-108	-133	-152	-152	-152	-152
32	64	1	1250	±12.5	60	-54	-84	-114	-140	-152	-152	-152	-152
16	32	1	625	±6.25	30	-60	-90	-120	-146	-152	-152	-152	-152
8	16	1	312	±3.12	10	-66	-96	-126	-152	-155	-155	-155	-155
4	8	1	156	±1.56	5	-72	-102	-132	-155	-155	-155	-155	-155
2	4	1	78	±0.78	4	-78	-108	-138	-155	-155	-155	-155	-155

Table 4: DC FM Mode Range 4

Frequency Range		Step	Slope	Deviation	F ₀	SSB Noise (dBc/Hz)							
MIN	MAX	Hz	kHz/V	kHz	MHz	1 Hz	10 Hz	100 Hz	1 kHz	10 kHz	100 kHz	1 MHz	10 MHz
2048	4600	4	800	±8000	4000	-8	-38	-68	-93	-113	-124	-146	-152
1024	2048	2	400	±4000	2000	-14	-44	-74	-99	-119	-130	-152	-152
512	1024	1	200	±2000	1000	-20	-50	-80	-105	-125	-136	-152	-152
256	512	1	100	±1000	500	-26	-56	-86	-111	-131	-142	-152	-152
128	256	1	50	±500	250	-32	-62	-92	-117	-137	-148	-152	-152
64	128	1	25	±250	100	-38	-68	-98	-123	-143	-152	-152	-152
32	64	1	12.5	±125	60	-44	-74	-104	-129	-149	-152	-152	-152
16	32	1	6.25	±62.5	30	-50	-80	-110	-135	-152	-152	-152	-152
8	16	1	3.12	±31.2	10	-56	-86	-116	-141	-155	-152	-155	-155
4	8	1	1.56	±15.6	5	-62	-92	-122	-147	-155	-152	-155	-155
2	4	1	0.78	±7.8	4	-68	-98	-128	-153	-155	-152	-155	-155

All specifications subject to change without further notice.



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