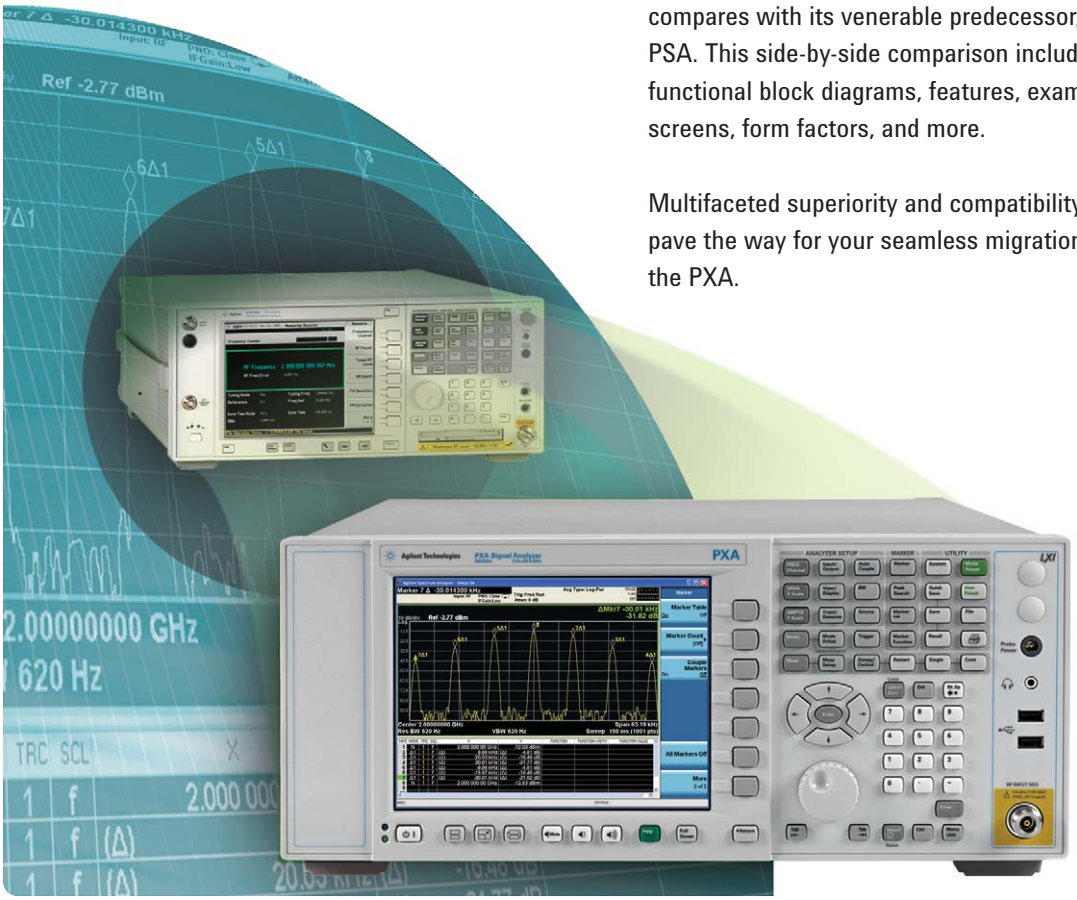
Diving Deeper: A Detailed Side-by-Side Comparison of the PSA and the PXA

Technical Overview



See how the N9030A PXA high-performance signal analyzer compares with its venerable predecessor, the E444xA PSA. This side-by-side comparison includes specifications, functional block diagrams, features, example measurement screens, form factors, and more.

Multifaceted superiority and compatibility offered by the PXA pave the way for your seamless migration from the PSA to the PXA.

Agilent Technologies

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Introduction

The Agilent RF/microwave PSA (E4440A/43A/45A) high-performance spectrum analyzers, introduced a decade ago, have been the standard, serving the aerospace/defense and communications industries in applications that demand the most stringent signal analysis capabilities.

Now, the N9030A PXA high-performance signal analyzer has been introduced to help you meet the challenges of an increasingly competitive market that demands yet greater capabilities and performance from your signal analysis solution. The PXA is ideally suited to meet today's and tomorrow's technological challenges, while maintaining the best form-fit-functional compatibility with the PSA. Migrating to the PXA helps to sustain your past achievements, enhance your current designs and accelerate your future innovations.

The technical overview titled "Why Migrate from the PSA to the PXA?" (Agilent literature number 5990-3990EN) summarizes the key advantages of the PXA over the PSA. Complementary to that document, this one provides a more comprehensive comparison of PXA and PSA specifications. It is intended to provide a "like-to-like" comparison. In cases where the structural differences between the PXA and the PSA make such a comparison impossible, the most appropriate comparison will be provided. Please refer to the PSA or PXA specification guide if you need more details.

Side-by-Side Comparison

Simplified functional block diagrams

The PXA architecture has been designed such that it is the ideal evolutionary replacement for the PSA.

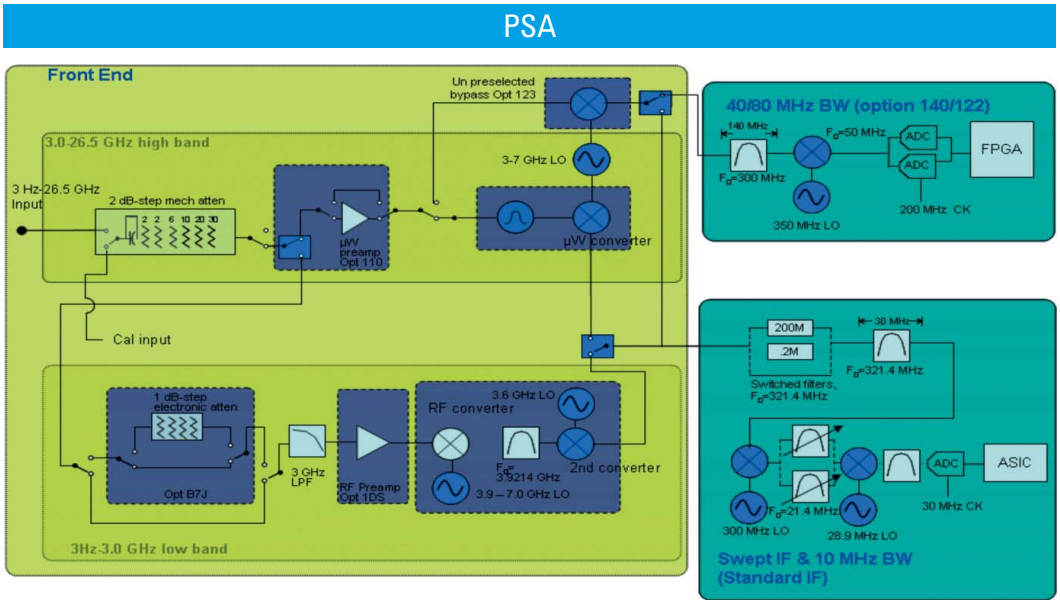


Figure 1. PSA simplified block diagram

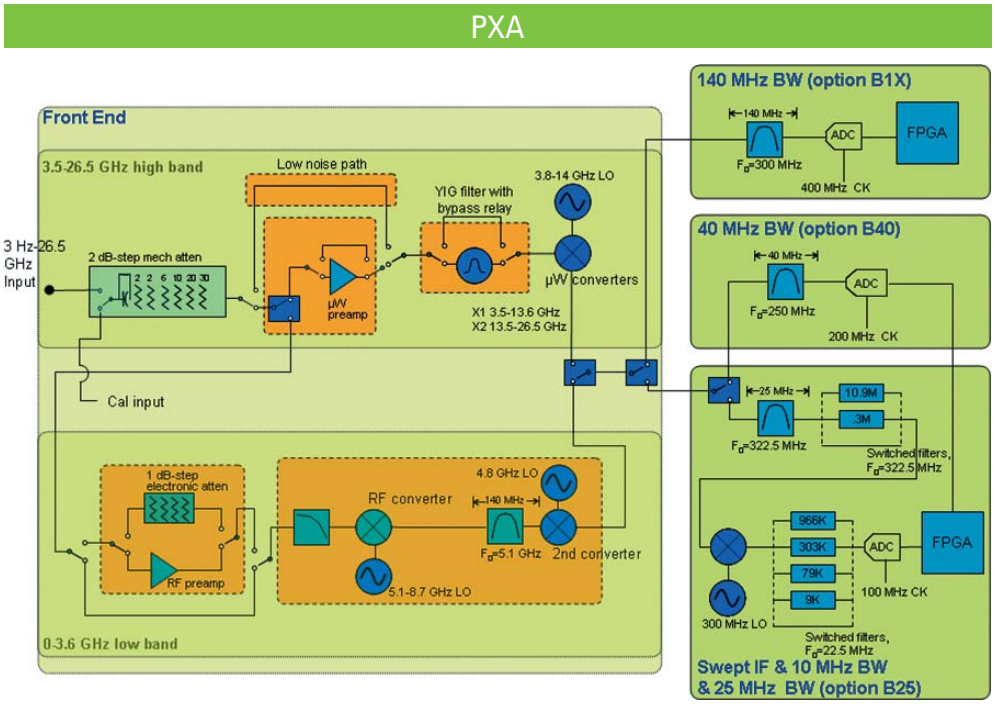


Figure 2. PXA simplified block diagram

Side-by-Side Comparison

Frequency specifications

PSA		
Frequency range		
E4443A	(DC Coupled) (AC Coupled)	3 Hz to 6.7 GHz 20 MHz to 6.7 GHz
E4445A	(DC Coupled) (AC Coupled)	3 Hz to 13.2 GHz 20 MHz to 13.2 GHz
E4440A	(DC Coupled) (AC Coupled)	3 Hz to 26.5 GHz 20 MHz to 26.5 GHz
Band	N[1]	
0	1	3 Hz to 3 GHz
1	1	2.85 to 6.6 GHz
2	2	6.2 to 13.2 GHz
3	4	12.8 to 19.2 GHz
4	4	18.7 to 26.8 GHz

PXA		
Frequency range		
N9030A Option 503	(DC Coupled) (AC Coupled)	3 Hz to 3.6 GHz 10 MHz to 3.6 GHz
N9030A Option 508	(DC Coupled) (AC Coupled)	3 Hz to 8.4 GHz 10 MHz to 8.4 GHz
N9030A Option 513	(DC Coupled) (AC Coupled)	3 Hz to 13.6 GHz 10 MHz to 13.6 GHz
N9030A Option 526	(DC Coupled) (AC Coupled)	3 Hz to 26.5 GHz 10 MHz to 26.5 GHz
Band	N[1]	
0	1	3 Hz to 3.6 GHz
1	1	3.5 to 8.4 GHz
2	2	8.3 to 13.6 GHz
3	2	13.5 to 17.1 GHz
4	4	17 to 26.5 GHz

1. *N is the "harmonic mixing mode" for PSA, whereas it is the "LO multiplication factor" for PXA. These two parameters are equivalent in the context presented here.*

Notes:

In this document, terms of specifications, 95th percentile values, typical, and nominal are used to describe the instrument's performance.

- Specifications describe the performance of parameters covered by the product warranty and apply to full temperature range unless otherwise noted.
- 95th percentile values indicate the breath of the population (approximately 2 σ) of performance tolerances expected to be met in 95% of cases with a 95% confidence, for any ambient temperature in the range of 20 to 30 °C. These values are not warranted.
- Typical describes additional product performance information that is not covered by the product warranty. It is performance beyond specifications that 80% of the units exhibit with a 95% confidence level over the temperature range of 20 to 30 °C. Typical performance does not include measurement uncertainty.
- Nominal values indicate expected performance, or describe product performance that is useful in the application of the product, but is not covered by the product warranty.

Please refer to the PXA data sheet (publication number 5990-3952EN) and the PSA data sheet (publication number 5980-1284E) for more details on the term definitions and measurement conditions.

Side-by-Side Comparison

Frequency specifications

	PSA	PXA
Frequency references		
Accuracy	±[(time since last adjustment x aging rate) + temperature stability + calibration accuracy]	
Aging rate	±1 x 10^{-7}/year	±1 x 10^{-7}/year
Temperature stability 20 °C to 30 °C 0 °C to 55 °C	 ±1 x 10^{-8} ±5 x 10^{-8}	 ±1.5 x 10^{-8} ±5 x 10^{-8}
Achievable initial calibration accuracy	±7 x 10^{-8}	±4 x 10^{-8}
Example frequency reference accuracy (1 year after last adjustment)	= ±(1 x 1 x 10^{-7} + 1 x 10^{-8} + 7 x 10^{-8}) = ±1.8 x 10^{-7}	= ±(1 x 1 x 10^{-7} + 1.5 x 10^{-8} + 4 x 10^{-8}) = ±1.65 x 10^{-7}
Sweep (trace) point range		
Factory preset	601	1001
Span = 0 Hz	2 to 8192	1 to 40,001
Span ≥ 10 Hz	101 to 8192	1 to 40,001
Gated sweep		
Gate length	10 µs to 500 ms	1 µs to 5.0 s
Gate delay range	0 to 500 ms	0 to 100.0 s
Gate delay jitter	33.3 ns p-p nominal	33.3 ns p-p nominal
Resolution bandwidth (RBW)		
Range (–3.01 dB bandwidth)	1 Hz to 3 MHz (in 10% steps) 4, 5, 6, 8 MHz	1 Hz to 3 MHz (in 10% steps) 4, 5, 6, 8 MHz
Power bandwidth accuracy	(all CFs) 1 Hz to 51 kHz ±0.5% (±0.022 dB)	(all CFs) 1 Hz to 51 kHz ±0.5% (±0.022 dB)
	(all CFs) 56 kHz to 100 kHz ±1.0% (±0.044 dB)	(all CFs) 56 kHz to 100 kHz ±0.5% (±0.022 dB)
	(all CFs) 110 kHz to 240 kHz ±0.5% (±0.022 dB)	(≤ 3.6 GHz CF) 110 kHz to 1.0 MHz ±1.0% (±0.044 dB)
	(< 3 GHz CF) 270 kHz to 1.1 MHz ±1.5% (±0.066 dB)	(≤ 3.6 GHz CF) 1.1 MHz to 2.0 MHz ±0.07 dB nominal
	(< 3 GHz CF) 1.2 MHz to 2.0 MHz ±0.07 dB nominal	(≤ 3.6 GHz CF) 2.2 MHz to 3 MHz ±0.10 dB nominal
	(< 3 GHz CF) 2.2 MHz to 6.0 MHz ±0.20 dB nominal	(≤ 3.6 GHz CF) 3 MHz to 8 MHz ±0.20 dB nominal
RBW bandwidth accuracy (–3.01 dB BW)	(all CFs) 1 Hz to 1.5 MHz ±2.0% nominal	(all CFs) 1 Hz to1.3 MHz ±2.0% nominal
	(≤ 3 GHz CF) 1.6 MHz to 3 MHz ±7.0% nominal (≤ 3 GHz CF) 4 MHz to 8 MHz ±15.0% nominal	(≤ 3.6 GHz CF) 1.5 MHz to 3 MHz ±7.0% nominal (≤ 3.6 GHz CF) 4 MHz to 8 MHz ±15.0% nominal
Selectivity (–60 dB/–3 dB)	4.1:1 nominal	4.1:1 nominal
EMI bandwidths	(CISPR compliant) 200 Hz, 9 kHz, 120 kHz, 1 MHz	(CISPR compliant)[1] 200 Hz, 9 kHz, 120 kHz, 1 MHz
EMI bandwidths	(MIL STD 461E) 10 Hz, 100 Hz, 1 kHz, 10 kHz, 1 MHz	(MIL STD 461E)[1] 10 Hz, 100 Hz, 1 kHz, 10 kHz, 1 MHz

1. Option EMC required.

Side-by-Side Comparison

Amplitude specifications

	PSA	PXA
Amplitude range		
Measurement range	Displayed average noise level to +30 dBm	Displayed average noise level to +30 dBm
Input attenuator range	(3 Hz to 26.5 GHz) 0 to 70 dB in 2 dB steps	(3 Hz to 26.5 GHz) 0 to 70 dB in 2 dB steps
Maximum safe input level		
Average total power	+30 dBm (1 W)	+30 dBm (1 W)
With preamplifier	Option 1DS +30 dBm Option 110 +23 dBm	Option P03 +30 dBm (1 W) Options P08, P13, P26 +30 dBm (1 W)
Peak pulse power < 10 µs pulse width, < 1% duty cycle and input attenuation ≥ 30 dB	+50 dBm (100 W)	+50 dBm (100 W)
DC volts	(DC coupled) < ±0.2 Vdc (AC coupled) ±100 Vdc	(DC coupled) < ±0.2 Vdc (AC coupled) ±70 Vdc
Frequency response (10 dB input attenuation, 20 to 30 °C, preselector centering applied above 3 GHz)		
	3 Hz to 10 MHz ±0.38 dB (±0.11 dB typical) 10 MHz to 3 GHz ±0.38 dB (±0.11 dB typical) 3 to 6.6 GHz ±1.50 dB (±0.60 dB typical) 6.6 to 13.5 GHz ±2.00 dB (±1.0 dB typical) 13.5 to 22 GHz ±2.00 dB (±1.0 dB typical) 22 to 26.5 GHz ±2.50 dB (±1.3 dB typical)	3 Hz to 10 MHz ±0.46 dB (±0.19 dB 95th %) 10 MHz to 3.6 GHz ±0.35 dB (±0.16 dB 95th %) 3.5 to 8.4 GHz ±1.5 dB (±0.39 dB 95th %) 8.3 to 13.6 GHz ±2.0 dB (±0.45 dB 95th %) 13.5 to 22 GHz ±2.0 dB (±0.62 dB 95th %) 22 to 26.5 GHz ±2.5 dB (±0.82 dB 95th %)
Total absolute amplitude accuracy[1] (10 dB input attenuation, 20 to 30 °C, 10 Hz ≤ RBW ≤ 1 MHz, input signal –10 dBm to –50 dBm, all settings auto-coupled except Auto Swp Time = Accy, any reference level, any scale)		
	At 50 MHz ±0.24 dB At all frequencies (±0.24 dB + frequency response) 3 Hz to 3 GHz ±0.19 dB (95th %)	At 50 MHz ±0.24 dB At all frequencies (±0.24 dB + frequency response) 0.01 to 3.6 GHz ±0.19 dB (95th %)
Input voltage standing wave ratio (≥ 8 dB input attenuation)		
	50 MHz to 3 GHz < 1.2:1 nominal 3 GHz to 18 GHz < 1.6:1 nominal 18 GHz to 26.5 GHz < 1.9:1 nominal	50 MHz to 3.6 GHz < 1.2:1 nominal 3 GHz to 18 GHz < 1.6:1 nominal 18 GHz to 26.5 GHz < 1.9:1 nominal

1. *This absolute amplitude accuracy specification includes the sum of the following contributing factors: Scale fidelity, reference level accuracy, displayed scale switching uncertainty, resolution bandwidth switching uncertainty, 50 MHz amplitude reference accuracy, and the accuracy with which the instrument aligns its internal gains to the 50 MHz amplitude reference.*

Side-by-Side Comparison

Dynamic range-related specifications

1 dB gain compression (two-tone)

PSA		PXA		
	Maximum mixer level		**Maximum mixer level**	**Maximum mixer level (20 - 30 °C)**
20 to 200 MHz	0 dBm	40 to 200 MHz	–1 dBm	+1 dBm
200 MHz to 6.6 GHz	+3 dBm	200 MHz to 3.6 GHz	+2 dBm	+3 dBm
6.6 GHz to 26.5 GHz	–2 dBm	3.6 to 16 GHz	0 dBm	+1 dBm
		16 to 26.5 GHz	–3 dBm	–1 dBm

Second harmonic distortion (SHI)

PSA				PXA			
Source frequency	**Mixer level (dBm)**	**SHI (dBm)**	**Distortion (dBc)**	**Source frequency**	**Mixer level (dBm)**	**SHI (dBm)**	**Distortion (dBc)**
10 MHz to 460 MHz	–40	+42	–82	10 to 100 MHz	–15	+42	–57
460 MHz to 1.18 GHz	–40	+52	–92	100 MHz to 1.8 GHz	–15	+45	–60
1.18 GHz to 1.5 GHz	–40	+42	–82	1.75 to 6.5 GHz	–15	+62	–77
1.5 GHz to 2.0 GHz	–10	+80	–90	6.5 to 10 GHz	–15	+55	–70
2.0 GHz to 13.25 GHz	–10	+90	–100	10 to 13.25 GHz	–15	+47	–62

Second harmonic distortion (SHI) with Option LNP enabled[1]

PSA	PXA			
N/A	**Source frequency**	**Mixer level (dBm)**	**SHI (dBm)**	**Distortion (dBc)**
	10 to 100 MHz	N/A	N/A	N/A
	100 MHz to 1.8 GHz	N/A	N/A	N/A
	1.75 to 2.5 GHz	–15	+80	–95
	2.5 to 4 GHz	–15	+86	–101
	4 to 13.25 GHz	–15	+90	–105

1. *Specifications given for the N9030A PXA low noise path require Option LNP and that the low noise path be enabled (ON). The low noise path operates from 3.6 to 26.5 GHz (equivalent to 1.75 to 13.25 GHz source frequency in the SHI measurements). The LNP significantly improves SHI performance at higher bands.*

Third-order intermodulation distortion (TOI) (Tone separation > 15 kHz, 20 to 30 °C)

PSA			PXA		
	TOI	**TOI typical**		**TOI**	**TOI typical**
10 to 100 MHz	+14 dBm	+17 dBm	10 to 150 MHz	+13 dBm	+16 dBm
100 to 400 MHz	+15 dBm	+18 dBm	150 to 600 MHz	+18 dBm	+21 dBm
400 MHz to 1.7 GHz	+16 dBm	+19 dBm	600 MHz to 1.1 GHz	+20 dBm	+22 dBm
1.7 to 2.7 GHz	+17 dBm	+19 dBm	1.1 to 3.6 GHz	+21 dBm	+23 dBm
2.7 to 3.0 GHz	+17 dBm	+20 dBm	3.5 to 8.4 GHz	+15 dBm	+22 dBm
3.0 to 6.0 GHz	+15 dBm	+18 dBm	8.3 to 13.6 GHz	+15 dBm	+23 dBm
6.0 to 16 GHz	+8 dBm	+11 dBm	13.5 to 17.1 GHz	+11 dBm	+17 dBm
16 to 26.5 GHz	+12 dBm	+14 dBm	17.0 to 26.5 GHz	+10 dBm	+17 dBm nominal

Side-by-Side Comparison

PSA

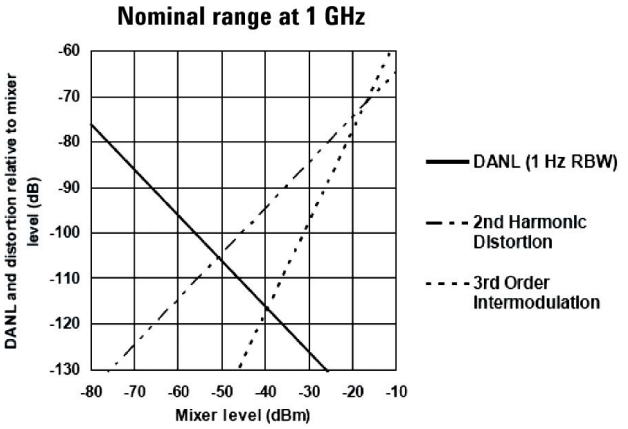


Figure 3. Nominal PSA DR plot at 1 GHz

PXA

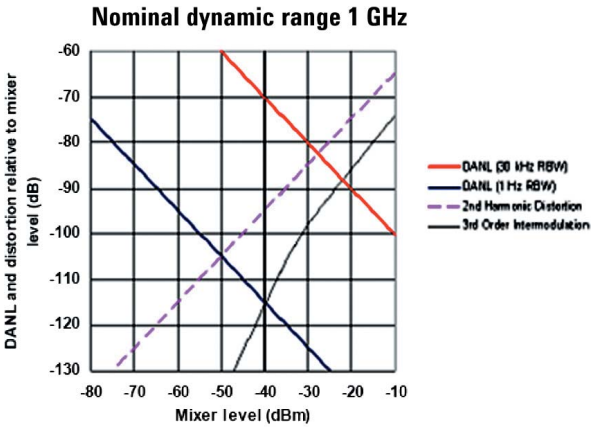


Figure 4. Nominal PXA DR plot at 1 GHz

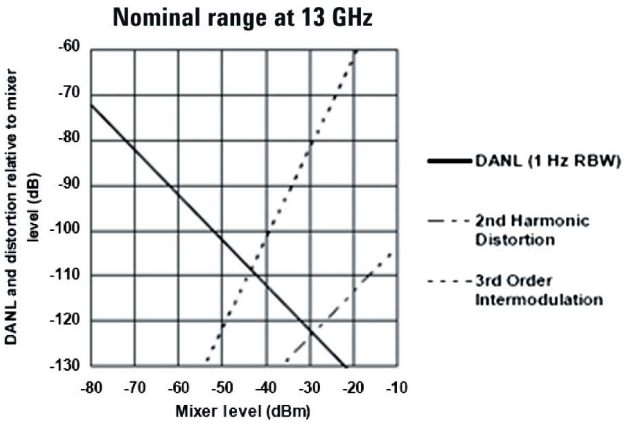


Figure 5. Nominal PSA DR plot at 13 GHz

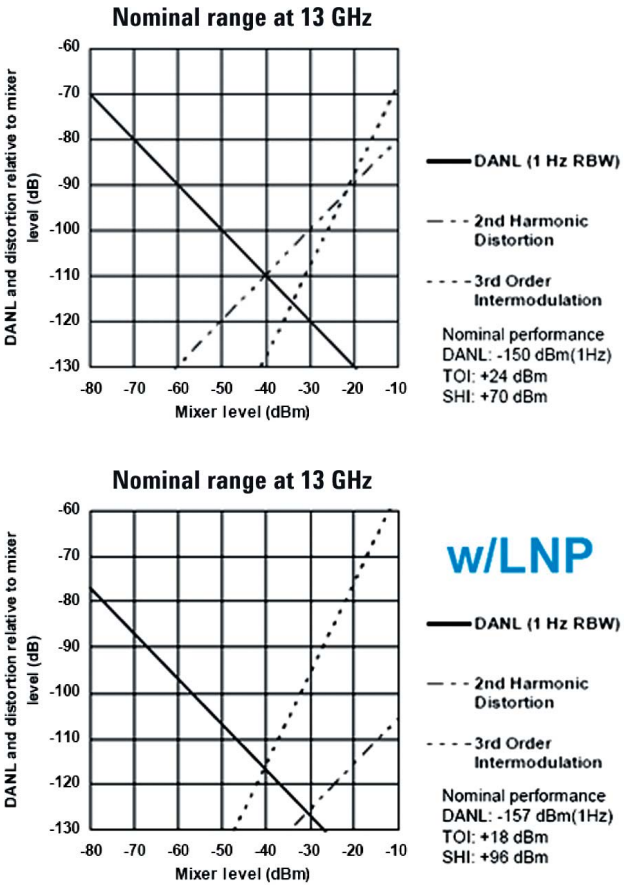


Figure 6.Nominal PXA DR plots at 13 GHz (with or without LNP)

Side-by-Side Comparison

PSA

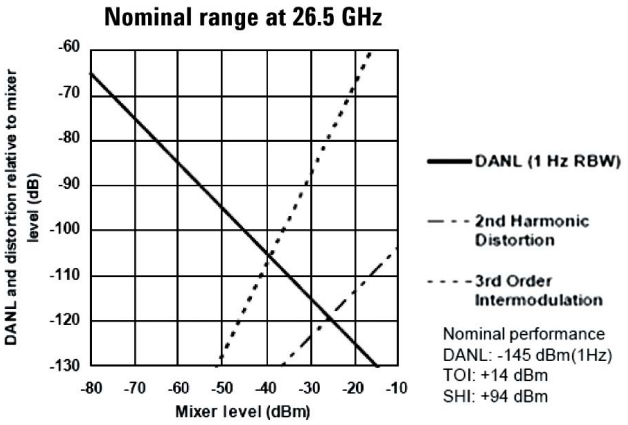
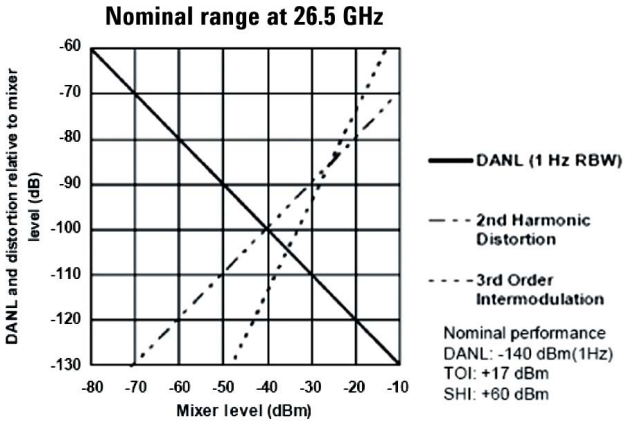


Figure 7. Nominal PSA DR plot at 26.5 GHz

PXA



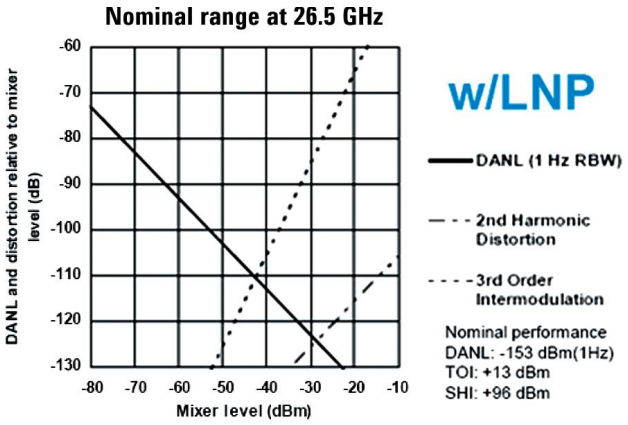


Figure 8. Nominal PXA DR plots at 26.5 GHz (with or without LNP)

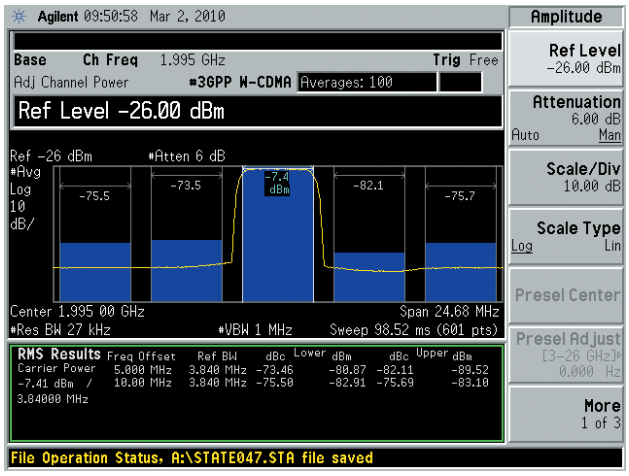


Figure 9. A PSA W-CDMA ACLR measurement showing –82 dBc dynamic range

Figure 10. A PXA W-CDMA ACLR measurement showing –89 dBc dynamic range

Side-by-Side Comparison

PSA			PXA			
Displayed average noise level (DANL) (Input terminated, sample or average detector, averaging type = Log, 20 to 30 °C)						
E4443A/E4445A/ E4440A (Preamp OFF)	Zero span and swept normalized to 1 Hz RBW and 0 dB attenuation	Zero span and swept normalized to 1 Hz RBW and 0 dB attenuation (typical)	**N9030A Option 503, 508, 513, 526 (Preamp OFF)**	Zero span and swept normalized to 1 Hz RBW and 0 dB attenuation (NFE ON)[1, 2]	Zero span and swept normalized to 1 Hz RBW and 0 dB attenuation (NFE OFF)	Zero span and swept normalized to 1 Hz RBW and 0 dB attenuation (NFE OFF Low Noise Path ≥ 3.6 GHz)[3, 4]
3 Hz to 1 kHz	N/A	–110 dBm nominal	3 Hz to 9 kHz	–100 dBm typical	–100 dBm typical	
1 kHz to 10 kHz	N/A	–130 dBm nominal				
10 kHz to 100 kHz	–137 dBm	–141 dBm nominal	9 to 100 kHz	–146 dBm	–146 dBm	
100 kHz to 1 MHz	–145 dBm	–149 dBm	100 kHz to 1 MHz	–150 dBm	–150 dBm	
1 to 10 MHz	–150 dBm	–153 dBm	1 to 20 MHz	–155 dBm	–155 dBm	
10 MHz to 1.2 GHz	–154 dBm	–155 dBm	20 MHz to 1.2 GHz	–165 dBm	–155 dBm	
1.2 to 2.1 GHz	–153 dBm	–154 dBm	1.2 to 2.1 GHz	–163 dBm	–153 dBm	
2.1 to 3.0 GHz	–152 dBm	–153 dBm	2.1 to 3.0 GHz	–162 dBm	–152 dBm	
3 to 6.6 GHz	–152 dBm	–153 dBm	3.0 to 3.6 GHz	–161 dBm	–151 dBm	
			3.5 to 4.2 GHz	–151 dBm	–147 dBm	–153 dBm
6.6 GHz to 13.2 GHz	–150 dBm	–152 dBm	4.2 to 8.4 GHz	–154 dBm	–150 dBm	–155 dBm
			8.3 to 13.6 GHz	–156 dBm	–149 dBm	–155 dBm
13.2 GHz to 20 GHz	–147 dBm	–149 dBm	13.5 to 16.9 GHz	–154 dBm	–145 dBm	–152 dBm
			16.9 to 20 GHz	–149 dBm	–143 dBm	–151 dBm
20 GHz to 26.5 GHz	–143 dBm	–145 dBm	20 to 26.5 GHz	–143 dBm	–137 dBm	–150 dBm
Preamp ON (Option 1DS)[5]			**Preamp ON (Option P03)**			
100 kHz to 200 kHz	–159 dBm	–162 dBm	100 to 200 kHz	–157 dBm	–157 dBm	N/A
200 kHz to 500 kHz	–159 dBm	–162 dBm	200 to 500 kHz	–160 dBm	–160 dBm	N/A
500 kHz to 1 MHz	–163 dBm	–165 dBm	500 kHz to 20 MHz	–164 dBm	–164 dBm	N/A
1 MHz to 10 MHz	–166 dBm	–168 dBm	20 MHz to 2.1 GHz	–172 dBm	–165 dBm	N/A
10 MHz to 500 MHz	–169 dBm	–170 dBm				
500 MHz to 1.1 GHz	–168 dBm	–169 dBm				
1.1 GHz to 2.1 GHz	–167 dBm	–168 dBm				
2.1 GHz to 3.0 GHz	–165 dBm	–166 dBm	2.1 to 3.6 GHz	–172 dBm	–163 dBm	N/A
Preamp ON (Option 110)[5]			**Preamp ON (Option P03/P08/P13/P26)**			
10 to 50 MHz	–148 dBm	–154 dBm	100 to 200 kHz	–157 dBm	–157 dBm	
50 to 500 MHz	–153 dBm	–164 dBm	200 to 500 kHz	–160 dBm	–160 dBm	
500 MHz to 2.1 GHz	–166 dBm	–168 dBm	500 kHz to 20 MHz	–164 dBm	–164 dBm	
2.1 to 3 GHz	–166 dBm	–168 dBm	20 MHz to 2.1 GHz	–172 dBm	–165 dBm	
3.0 to 6.6 GHz	–165 dBm	–166 dBm	2.1 to 3.6 GHz	–172 dBm	–163 dBm	
6.6 to 13.2 GHz	–163 dBm	–165 dBm	3.5 to 8.4 GHz	–172 dBm	–164 dBm	N/A
13.2 to 16 GHz	–162 dBm	–165 dBm	8.3 to 13.6 GHz	–170 dBm	–163 dBm	N/A
			13.5 to 16.9 GHz	–166 dBm	–161 dBm	N/A
16 to 19 GHz	–162 dBm	–164 dBm	16.9 to 20.0 GHz	–162 dBm	–159 dBm	N/A
19 to 26.5 GHz	–159 dBm	–161 dBm	20.0 to 26.5 GHz	–162 dBm	–155 dBm	N/A

1. *The DANL with the Noise Floor Extension (NFE) ON is calculated based on the normal DANL specs and NFE improvement (at 95th percentile). Refer to the PXA specificaiton guide for details.*
2. *NFE improvements are specified only above 20 MHz. Refer to the PXA specificaiton guide for details.*
3. *NFE is not very helpful in reducing the effective DANL in the low noise path.*
4. *The low noise path requires Option LNP to be installed and enabled (ON). The low noise path operates from 3.6 GHz to 26.5 GHz and cannot operate simultaneously with the preamplifier.*
5. *Options 1DS and 110 are mutually exclusive on PSA.*

Side-by-Side Comparison

PSA

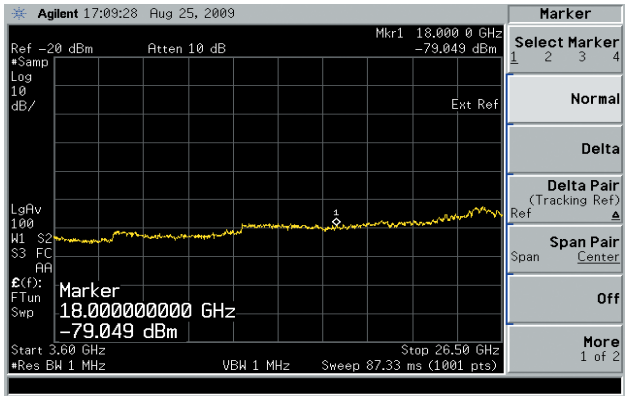


Figure 11. Nominal PSA noise floor in high band (1 MHz RBW)

PXA

Figure 12. Nominal PXA noise floor in high band (1 MHz RBW), showing approximately 11 dB improvement of Opt LNP at 18 GHz

	PSA			PXA		
Stability						
Phase noise (20 °C to 30 °C) (CF = 1 GHz)	**Offset**	**Specification**	**Typical**	**Offset**	**Specification**	**Typical**
	10 Hz			10 Hz		75 dBc/Hz (nominal)
	100 Hz	–91 dBc/Hz	–96 dBc/Hz	100 Hz	–94 dBc/Hz	–100 dBc/Hz
	1 kHz	–103 dBc/Hz	–108 dBc/Hz	1 kHz	–121 dBc/Hz	–125 dBc/Hz
	10 kHz	–116 dBc/Hz	–118 dBc/Hz	10 kHz	–129 dBc/Hz	–132 dBc/Hz
	30 kHz	–116 dBc/Hz	–118 dBc/Hz	30 kHz	–130 dBc/Hz	–132 dBc/Hz
	100 kHz	–122 dBc/Hz	–124 dBc/Hz	100 kHz	–129 dBc/Hz	–131 dBc/Hz
	1 MHz	–145 dBc/Hz	–147 dBc/Hz	1 MHz	–145 dBc/Hz	–146 dBc/Hz
	6 MHz	–153 dBc/Hz	–155.5 dBc/Hz			
	10 MHz	–155 dBc/Hz	–156 dBc/Hz	10 MHz	–155 dBc/Hz	–158 dBc/Hz
Residual FM	< (1 Hz x N[1]) p-p in 1 s, typical, see frequency range for N (harmonic number)			≤ (0.25 Hz x N[1]) p-p in 20 ms, nominal, see frequency range for N (harmonic number)		

1. *N value depends on the frequency band. See the frequency specifications table.*

For nominal phase noise performance at different carrier frequencies, refer to Figures 15 and 16.

PSA

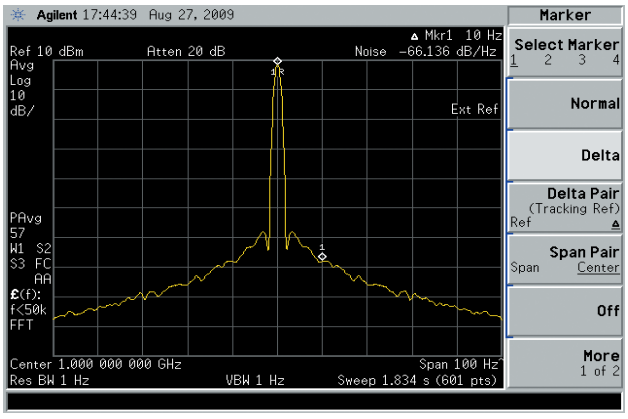


Figure 13. PSA screen shot demonstrating the phase noise performance of –66 dBc/Hz at 10 Hz offset for a 1 GHz carrier.

PXA

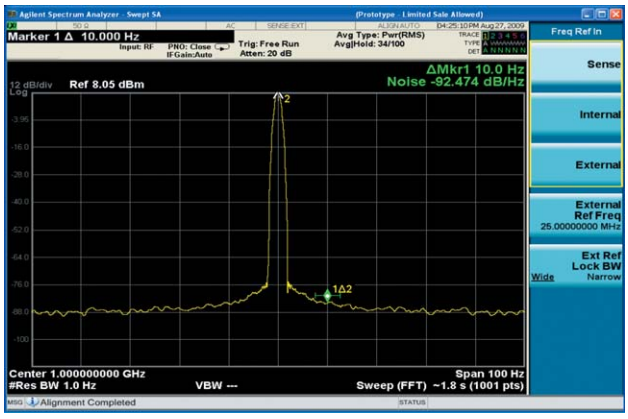


Figure 14. PXA screen shot demonstrating the phase noise performance of –92 dBc/Hz at 10 Hz offset for a 1 GHz carrier.

Side-by-Side Comparison

PSA

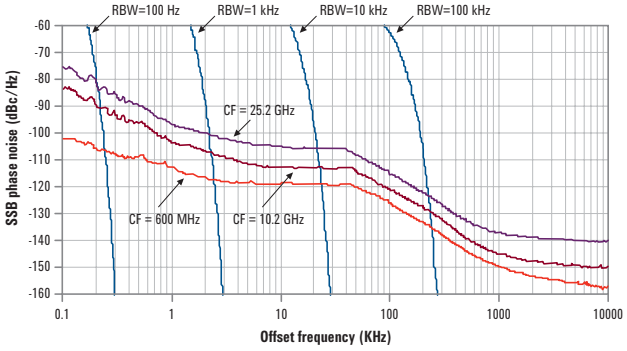


Figure 15. PSA nominal phase noise plot at different carrier frequencies and offsets.

PXA

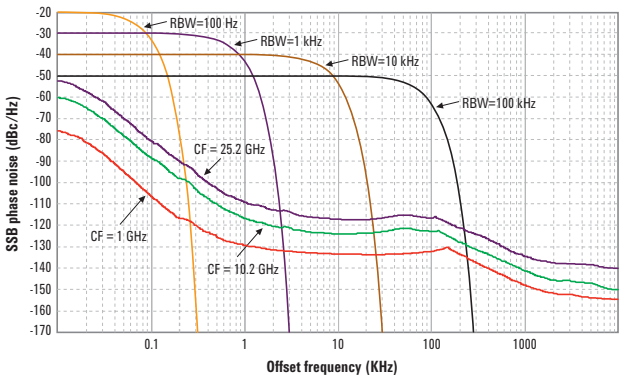


Figure 16. PXA nominal phase noise plot at different carrier frequencies and offsets.

	PSA		PXA	
Spurious response (mixer level = –40 dBm)				
General spurious	100 Hz ≤ f < 10 MHz from carrier	(–73 + 20 log N[1]) dBc	100 Hz ≤ f < 10 MHz from carrier (LO-related)	(–73 + 20 log N[1]) dBc
	f ≥ 10 MHz from carrier	(–80 + 20 log N[1]) dBc	f ≥ 10 MHz from carrier	(–80 + 20 log N[1]) dBc
Residual responses Input terminated and 0 dB attenuation				
	200 kHz to 6.6 GHz 6.6 GHz to 26. 5 GHz	–100 dBm –100 dBm nominal	200 kHz to 8.4 GHz Other frequencies	–100 dBm –100 dBm nominal

1. *N value depends on the frequency band. See the frequency specifications table.*

Side-by-Side Comparison

Simplified block diagrams showing wideband IF digital processing

While the PXA shares the same "All-digital-IF" concept with the PSA, it offers wider analysis bandwidth (up to 140 MHz) with superior IF frequency response and phase linearity, which minimize the instrument's inherent distortion resulting in the highest modulation analysis accuracy. A more advanced A/D converter and FPGA and larger data memory are employed in the PXA with higher clock frequency.

PSA

PSA 80 MHz Digital IF

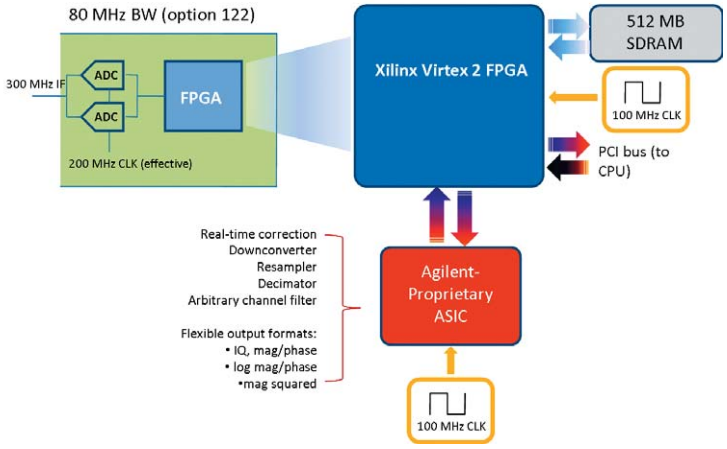


Figure 17. Simplified block diagram for PSA digital IF

PXA

PXA 140 MHz Digital IF

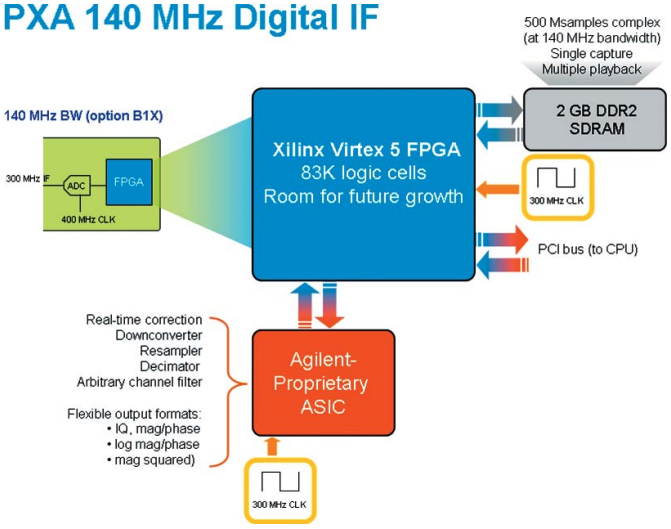


Figure 18. Simplified block diagram for PXA digital IF

Side-by-Side Comparison

Analysis banwidth specifications

	PSA	PXA
Analysis bandwidths[1]		
	Option B7J 10 MHz Option 140 40 MHz Option 122 80 MHz	(standard) 10 MHz Option B25 25 MHz Option B40 40 MHz Option B1X 140 MHz
Wideband (40 MHz) IF frequency response[2]		
	Option 140 Center frequency (GHz) ≤ 3.0 ±0.65 dB > 3.0, ≤ 6.6 ±0.43 dB > 6.6, ≤ 26.5 ±0.96 dB	Option B40 Center frequency (GHz) ≥ 0.03, < 3.6 ±0.4 dB ≥ 3.6, < 8.4 ±0.4 dB > 8.4, ≤ 26.5 ±0.6 dB
Wideband (40 MHz) IF phase linearity[2]		
	Option 140 Center frequency (GHz) RMS (nominal) > 0.3, ≤ 3.0 0.6° > 3.0, ≤ 26.5 0.3°	Option B40 Center frequency (GHz) RMS (nominal) ≥ 0.02, < 3.6 0.012° ≥ 3.6, ≤ 26.5 0.08°
Wideband (80 MHz) IF frequency response[3]		
	Option 122 Center frequency (GHz) ≥ 0.10, < 3.05 ±0.73 dB ±0.30 dB (typical) ≥ 3.05, ≤ 6.6 ±0.63 dB ±0.19 dB (typical) ≥ 6.6, ≤ 26.5 ±1.13 dB ±0.40 dB (typical)	Option B1X Center frequency (GHz) ≥ 0.1, < 3.6 ±0.73 dB ±0.15 dB (typical) ≥ 3.6, ≤ 8.4 ±0.73 dB ±0.2 dB (typical) ≥ 8.4, ≤ 26.5 ±0.9 dB ±0.4 dB (typical)
Wideband (80 MHz) IF phase linearity[3]		
	Option 122 Center frequency (GHz) RMS (nominal) > 0.3, ≤ 3.0 0.9° > 3.0, ≤ 26.5 0.4°	Option B1X Center frequency (GHz) RMS (nominal) ≥ 0.03, < 3.6 0.004° ≥ 3.6, ≤ 26.5 0.2°
Wideband (140 MHz) IF frequency response[4]		
	Option 122 Not applicable	Option B1X Center frequency (GHz) ≥ 0.1, < 3.6 ±0.25 dB (typical) ≥ 3.6, ≤ 8.4 ±0.30 dB (typical) ≥ 8.4, ≤ 26.5 ±0.75 dB (typical)
Wideband (140 MHz) IF phase linearity[4]		
	Option 122 Not applicable	Option B1X Center frequency (GHz) RMS (nominal) ≥ 0.03, < 3.6 0.004° ≥ 3.6, ≤ 26.5 0.2°

1. *Analysis bandwidth is the instantaneous bandwidth available around a center frequency over which the input signal can be digitized for further analysis or processing in the time, frequency, or modulation domain. Preselector bypassed for frequency above band 0. Span ≤ 140 MHz.*
2. *Preselector bypassed for frequency above band 0. Span ≤ 40 MHz.*
3. *Preselector bypassed for frequency above band 0. Span ≤ 80 MHz.*
4. *Preselector bypassed for frequency above band 0. Span ≤ 140 MHz.*

Side-by-Side Comparison

PSA

Capture length versus span (nominal)

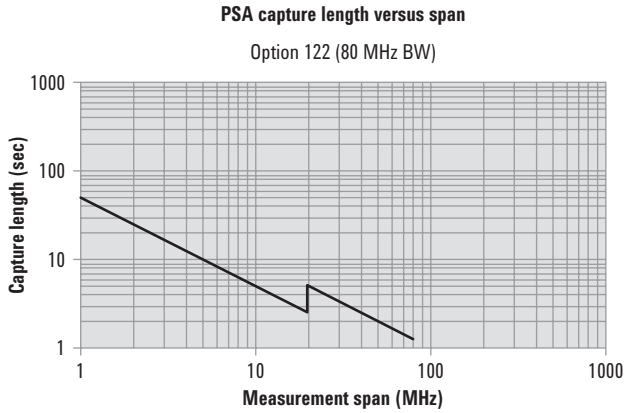


Figure 19. PSA WBIF capture versus span

Note: PSA requires the use of Agilent 89600 VSA software for maximum capture length shown above.

PXA

Capture length versus span (nominal)

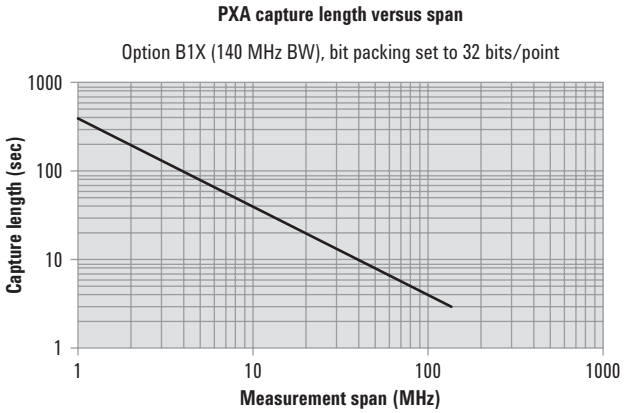


Figure 20. PXA WIBIF capture versus span

Note: PXA requires the use of Agilent 89600 VSA software for maximum capture length shown above.

General specifications

	PSA	PXA
Temperature range		
Operating	0 °C to +55 °C	5 °C to +50 °C 0 °C to +55 °C[1]
Storage	–40 °C to +65 °C	–40 °C to +65 °C

	PSA	PXA
EMI, radiated immunity and environmental conditions		
Radiated and conducted emission is in compliance with CISPR Pub 11/1996 Class B.	Yes	Yes
Complies with the radiated electromagnetic field immunity requirements in IEC/EM 61326-1.	Yes	Yes
Samples of this product have been type tested in accordance with the Agilent Environmental Test manual and verified to be robust against the environmental stresses of storage, transportation and end-use. These stresses include but are not limited to temperature, humidity, shock, vibration, altitude and power line conditions.	Yes	Yes
Test methods are aligned with IEC 60068-2 and levels are similar to MIL-PRF-28800F Class 3.	Yes	Yes

1. *Option SSD, solid state hard drive, required for temperature operating range from 0 to 55 °C.*

Side-by-Side Comparison

	PSA	PXA
Dimensions		
Dimensions (W x H x D)	426 x 177 x 483 mm 16.8 x 7.0 x 19 inch	426 x 177 x 556 mm 16.8 x 7.0 x 21.9 inch
Rack height	4-U in 19 inch chassis	4-U in 19 inch chassis
Weight		
Net	24 kg (50 lbs) nominal	23 kg (48 lbs) nominal
Shipping	33 kg (73 lbs) nominal	34 kg (75 lbs) nominal
Power requirements		
Voltage and frequency	100/120 V, 50/60/400 Hz; 220/240 V, 50/60 Hz	100 to 120 V, 50/60/400 Hz; 220 to 240 V, 50/60 Hz
Power consumption	On < 260 W, no options < 450 W, all options Standby < 20 W	On < 450 W, fully loaded with options Standby 40 W
Data storage		
Internal	512 MB (nominal)	160 GB (Removable hard disk drive, standard; or removable solid-state drive, optional)
Floppy drive	10 to 40 °C 3.5" 1.44 MB	Option EFM USB storage device

Front panel

PSA

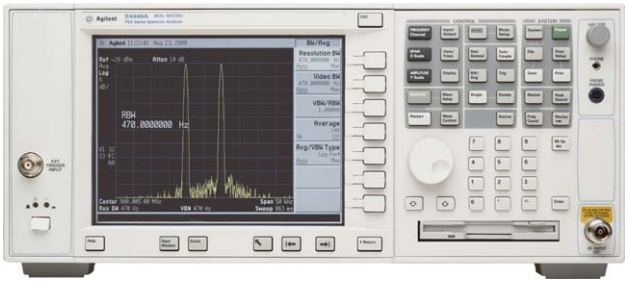


Figure 21. PSA front panel

PXA

Figure 22. PXA front panel

Rear panel

PSA

Figure 23. PSA rear panel

PXA

Figure 24. PXA rear panel

Side-by-Side Comparison

IF output characteristics

	PSA			PXA		
IF output characteristics[1]						
Center frequency	Standard mode Option 140 Option 122	321.4 MHz N/A N/A	 (40 MHz analysis BW) (80 MHz analysis BW)	Standard/ Option B25 Option B40 Option B1X	 322.5 MHz 250 MHz 300 MHz	 (≤ 25 MHz analysis BW) (40 MHz analysis BW) (140 MHz analysis BW)
Connector	SMA female	50 Ω nominal		SMA female	50 Ω nominal	
Conversion gain	Low band High band Preselector bypassed	+2 to +4 dB nominal –6 to –8 dB nominal High band	3 Hz to 3.05 GHz 2.85 GHz to upper limit –9 to –17 dB nominal (Option 123 required)	All bands	–1 to +4 dB nominal plus RF frequency response	
Bandwidth	Low band High band Preselector bypassed	40 MHz or 60 MHz[2] 35 to 70 MHz High band 240 MHz	Nominal Nominal Nominal	Low band High band High band	Up to 140 MHz[3] 58 to 74 MHz[4] Up to 700 MHz	Nominal Nominal Nominal

1. *While PSA has the IF output as standard, PXA requires Option CR3, second IF output, for this functionality.*
2. *40 MHz standard, 60 MHz with Option 122 or 140 installed in instrument. When Option 122 or 140 is installed, the bandwidth of the output is approximately 95 MHz.*
3. *Bandwidths being symmetric around the IF output center frequencies are: 95 MHz standard or with Option B25, 40 MHz with Option B40, or 140 MHz with option B1X.*
4. *Due to the preselector passbands depending on frequencies.*

	PSA			PXA		
Other IF output characteristics[1]						
Center frequency	Option H70	70 MHz	Special option	Option CRP	10 to 75 MHz	User programmable @ 0.5 MHz steps
Connector	SMA female	50 Ω nominal		SMA female	50 Ω nominal	
Conversion gain	All bands	–8 to –4 dB nominal	Nominal	All bands	–1 to +4 dB nominal plus RF frequency response	
Bandwidth	Low band High band Preselector bypassed	40 MHz 30 to 60 MHz	Nominal Nominal	Low band High band High band	100 MHz nominal Depend on RF center frequency 100 MHz nominal	Output centered @ 70 MHz Output centered @ 70 MHz
Center frequency	Option HYX	21.4 MHz	Special option	Option CRP	10 to 75 MHz	User programmable @ 0.5 MHz steps
Connector	BNC	50 Ω nominal		SMA female	50 Ω nominal	
Conversion gain	Low band 3.05 to 6.6 GHz 6.6 to 13.2 GHz 13.2 to 19.2 GHz 19.2 to 26.5 GHz	+6 to +9 dB nominal +4 to +7 dB nominal +5 to +8 dB nominal +7 to 10 dB nominal +8 to +11 dB nominal		All bands	–1 to +4 dB nominal plus RF frequency response	
Bandwidth	All bands	10 MHz nominal		Low band High band High band	100 MHz nominal Depend on RF center frequency 100 MHz nominal	Output centered @ 70 MHz Output centered @ 70 MHz

1. *PXA Option CRP provides user programmable IF output frequency ranging from 10 to 75 MHz for replacement of a variety of PSA special options for IF out such as H70, HYX, H20, and etc.*

Side-by-Side Comparison

Measurement personalities/application software

	PSA	PXA
Phase noise	E444xA Option 226	N9068A
Noise figure	E444xA Option 219	N9069A
Digital modulation analysis	E444xA Option 241	89601A
WLAN	E444xA Option 217 (Option 122 or 140 required)	89601A/89601X-B7R (Option B25 required)
W-CDMA	E444xA Option BAF	N9073A-1FP
HSDPA/HSUPA	E444xA Option 210 (Option BAF required)	N9073A-2FP (N9073A-1FP required)
GSM w/EDGE	E444xA Option 202	N9071A (future)
cdma2000	E444xA Option B78	(Contact Agilent)
1xEV-DV	E444xA Option 214	(Contact Agilent)
1xEV-DO	E444xA Option 204	(Contact Agilent)
cdmaOne	E444xA Option BAC	(Contact Agilent)
TD-SCDMA power	E444xA Option 211	(Future)
TD-SCDMA modulation	E444xA Option 212	(Future)
HSPA for TD-SCDMA	E444xA Option 213 (Option 212 required)	(Future)

Note: The Agilent 89601A VSA software can be installed in the PXA and used for in-depth signal analysis in various formats of cellular communications.

Side-by-Side Comparison

PSA to PXA models/options cross reference

PSA models/options		PXA options	
		N9030A-503	3 Hz to 3.6 GHz
E4443A	3 Hz to 6.7 GHz	N9030A-508	3 Hz to 8.4 GHz
E4445A	3 Hz to 13.2 GHz	N9030A-513	3 Hz to 13.6 GHz
E4440A	3 Hz to 26.5 GHz	N9030A-526	3 Hz to 26.5 GHz
E4446A	3 Hz to 44 GHz	Future	Contact Agilent
E4447A	3 Hz to 42.98 GHz	Future	Contact Agilent
E4448A	3 Hz to 50 GHz	Future	Contact Agilent
Option 122	80 MHz bandwidth digitizer	Option B1X	Analysis bandwidth, 140 MHz
Option 140	40 MHz bandwidth digitizer	Option B40	Analysis bandwidth, 40 MHz
Option 123	Switchable MW preselector bypass	Option MPB	Microwave preselector bypass
Option 235	Wide bandwidth digitizer external calibration wizard for Option 122/140	N/A. The calibration process for wide bandwidth IF is included.	
Option 1DS	RF internal preamplifier 100 kHz to 3 GHz	Option P03	Preamplifier, 3.6 GHz
Option 110	RF/uW internal preamplifier 10 MHz to the maximum frequency of the PSA	Option P08	Preamplifier, 8.4 GHz
		Option P13	Preamplifier, 13.6 GHz
		Option P26	Preamplifier, 26.5 GHz
Option 111	USB device-side I/O interface	Standard. PXA ships standard with 1 type-B slave port, and 6 type-A master ports.	
Option 117	Secure memory erase	PXA ships standard with a removable hard drive for instrument sanitization	
Option 124	Y-axis video output	Option YAV	Y-axis video output
Option B7J	Digital demod hardware	Option EA3	Electronic attenuator
Option BAB	Replace type-N input connector with APC 3.5 mm connector	Future	Contact Agilent
Option AYZ	External mixing	Future	Contact Agilent
Option UK6	Commercial calibration certificate with test data	Option UK6	Commercial calibration certificate with test data
Option A6J	ANSI Z540-compliant calibration from factory	Option A6J	ANSI Z540-compliant calibration from factory
Option 1A7	ISO17025A-compliant calibration from factory	Option 1A7	ISO17025A-compliant calibration from factory
Option 230	BenchLink web remote control software	N/A. PXA's Windows®-based OS offers the Web server enabling remote control to the PXA through the web.	
Option HYX	21.4 MHz narrow bandwidth IF output	Option CRP	Connector rear, Arbitrary IF output
Option H70	70 MHz IF output	Option CRP	Connector rear, Arbitrary IF output
Option HY7	Improved gain 70 MHz IF output	Option CRP	Connector rear, Arbitrary IF output
Option H7L	Auxiliary log video out	Option ALV	Log video out
Option 266	Programming code compatibility suite	N9061A	Remote language compatibility

Related Agilent Literature

Publication title	Pub number
Agilent PXA Signal Analyzer Brochure	5990-3951EN
Agilent N9030A PXA Signal Analyzer Configuration Guide	5990-3953EN
Agilent PXA Signal Analyzer N9030A Data Sheet	5990-3952EN
Agilent PSA Series High-Performance Spectrum Analyzers Brochure	5980-1283E
Agilent PSA Series Spectrum Analyzers Data Sheet	5980-1284E
PSA Series High-Performance Spectrum Analyzers Configuration Guide and PXA Cross Reference	5989-2773EN
Why Migrate from the PSA to the PXA? Technical Overview	5990-3990EN

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