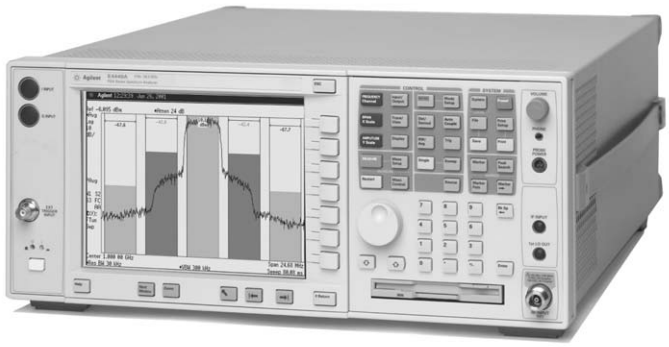
Agilent
PSA Series Spectrum Analyzers
Data Sheet

40/80 MHz Analysis Bandwidth

Models	
E4443A	3 Hz to 6.7 GHz
E4445A	3 Hz to 13.2 GHz
E4440A	3 Hz to 26.5 GHz *
E4447A	3 Hz to 42.98 GHz
E4446A	3 Hz to 44 GHz *
E4448A	3 Hz to 50 GHz *

*325 GHz With external mixing



The Agilent PSA Series offers high-performance spectrum analysis, up to 50 GHz, with powerful one-button measurements, a versatile feature set, and a leading-edge combination of flexibility, speed, accuracy, analysis bandwidth, and dynamic range. From millimeter wave and phase noise measurements to spur searches and modulation analysis, the PSA Series offers unique and comprehensive high-performance solutions to R&D and manufacturing engineers in cellular and emerging wireless communications, aerospace, and defense.

For more information regarding the PSA wide analysis bandwidth, see the 40/80 MHz BW digitizers, Option 140/122, technical overview at www.agilent.com/find/PSA

Agilent Technologies

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Definitions and Conditions

Specifications describe the performance of parameters covered by the product warranty and apply over 0 to 55 °C unless otherwise noted. Typical describes additional product performance information that is not covered by the product warranty. It is performance beyond specifications that 80 percent of the units exhibit with a 95 percent confidence level over the temperature range 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.

The analyzer will meet its specifications when:

- stored a minimum of two hours within the operating temperature range and turned on for at least 30 minutes with **Auto Align On** selected.
- the instrument is within its one year calibration cycle.
- **Align All Now** has been performed within the past 24 hours or when the temperature changes 3 °C.
- the instrument is under auto couple control, except that Auto Sweep Time = Accy.
- DC coupling applied if center frequency is < 20 MHz.

This PSA Series data sheet is a summary of the complete specifications and conditions, which are available in the *PSA Series Spectrum Analyzers Specification Guide.*

The *PSA Series Spectrum Analyzers Specification Guide* can be obtained on the web through:
www.agilent.com/find/psa

Then follow this selection process:

- Select “Manuals, Guides & Services Notes” from “In the Library”.
- Select “PSA Series Spectrum Analyzers Specifications Guide”.
- Download specifications guide.

Frequency Specifications

Frequency range

E4443A	(DC coupled)	3 Hz to 6.7 GHz
	(AC coupled)	20 MHz to 6.7 GHz
E4445A	(DC coupled)	3 Hz to 13.2 GHz
	(AC coupled)	20 MHz to 13.2 GHz
E4440A	(DC coupled)	3 Hz to 26.5 GHz [1]
	(AC coupled)	20 MHz to 26.5 GHz [1]
E4447A	(DC coupled)	3 Hz to 42.98 GHz
E4446A	(DC coupled)	3 Hz to 44 GHz [1]
E4448A	(DC coupled)	3 Hz to 50 GHz [1]

Band	**Harmonic mixing mode (N)**	
0	1–	3 Hz to 3 GHz
1	1–	2.85 GHz to 6.6 GHz
2	2–	6.2 GHz to 13.2 GHz
3	4–	12.8 GHz to 19.2 GHz
4	4–	18.7 GHz to 26.8 GHz
5	4+	26.4 GHz to 31.15 GHz
6	8–	31.0 GHz to 50.0 GHz

Frequency reference

Accuracy	± [(time since last adjustment x aging rate) + temperature stability + calibration accuracy]
Aging rate	± 1 x 10^{-7} / year
Temperature stability	
20 °C to 30 °C	± 1 x 10^{-8}
0 °C to 55 °C	± 5 x 10^{-8}
Achievable initial calibration accuracy	± 7 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}

Frequency readout accuracy *(start, stop, center, marker)*

± (marker frequency x frequency reference accuracy + 0.25% x span + 5% x RBW + 2 Hz + 0.5 x horizontal resolution*)
*Horizontal resolution is span/(sweep points – 1)

Marker frequency counter

Accuracy	± (marker frequency x frequency reference accuracy + 0.100 Hz)
Delta counter accuracy	± (delta frequency x frequency reference accuracy + 0.141 Hz)
Counter resolution	0.001 Hz

Frequency span *(FFT and swept mode)*

Range	0 Hz (zero span), 10 Hz to maximum frequency of model
Resolution	2 Hz
Accuracy	± [0.2% x span + span / (sweep points – 1)]

Sweep time and triggering

Range:	
Span = 0 Hz	1 µs to 6000 s
Span ≥ 10 Hz	1 ms to 2000 s
Accuracy	
Span ≥ 10 Hz, sweep	±0.01% nominal
Span ≥ 10 Hz, FFT	±40% nominal
Span = 0 Hz	±0.01% nominal
Trigger	Free run, line, video, RF burst, external front, external rear, frame (basic mode)
Trigger delay	
Span = 0 Hz, or FFT	–150 ms to +500 ms
Span ≥ 10 Hz, swept	1 µs to 500 ms
Resolution	0.1 µs

Sweep (trace) point range

Span = 0 Hz	2 to 8192
Span ≥ 10 Hz	101 to 8192

Gated sweep

Gate length	10 µs to 500 ms
Gate delay range	0 to 500 ms
Gate delay jitter	33.3 ns p-p nominal

Gated FFT

Delay range	–150 to +500 ms
Delay resolution	100 ns or 4 digits whichever is more
Gate duration	1.83/RBW ±2% nominal

Resolution bandwidth (RBW)

Range (–3.01 dB bandwidth)	1 Hz to 3 MHz (10% steps), 4, 5, 6, 8 MHz
Bandwidth accuracy (power):	
RBW range	
1 Hz to 51 kHz	±0.5% (±0.022 dB)
56 kHz to 75 kHz	±1.0% (±0.044 dB)
82 kHz to 330 kHz	±0.5% (±0.022 dB)
360 kHz to 1.1 MHz (< 3 GHz CF)	±1.0% (±0.044 dB)
1.2 MHz to 2.0 MHz (< 3 GHz CF)	±0.07 dB nominal
2.2 MHz to 6.0 MHz (< 3 GHz CF)	±0.2 dB nominal
Bandwidth accuracy (–3.01 dB):	
RBW range	
1 Hz to 1.5 MHz	±2% nominal
Selectivity (–60 dB/–3 dB)	4.1:1 nominal
EMI bandwidths (CISPR compliant)	200 Hz, 9 kHz 120 kHz, 1 MHz
EMI bandwidths (MIL STD 461E compliant)	10 Hz, 100 Hz, 1 kHz, 10 kHz 100 kHz, 1 MHz

1. 325 GHz with external mixers

Analysis bandwidth[1]

Maximum bandwidth	10 MHz
with Option 140	40 MHz
with Option 122	80 MHz
I/Q waveform digital output bandwidth (Option E444xA-B7J)	10 MHz
321.4 MHz IF output [2]:	
–1 dB bandwidth	20 to 30 MHz nominal
Option 123 (> 2.85 GHz)	200 MHz nominal
–3 dB bandwidth	30 to 60 MHz nominal
70 MHz IF output [2] (Option E444xA-H70):	
–1 dB bandwidth	20 to 30 MHz nominal
–3 dB bandwidth	30 to 60 MHz nominal

Video bandwidth (VBW)

Range	1 Hz to 3 MHz (10% steps), 4, 5, 6, 8 MHz and wide open
Accuracy	± 6% nominal

Stability[3]

Noise sidebands (20 °C to 30 °C, CF = 1 GHz)

Offset	Specification	Typical
100 Hz	–91 dBc/Hz	–96 dBc/Hz
1 kHz	–103 dBc/Hz	–108 dBc/Hz
10 kHz	–116 dBc/Hz	–118 dBc/Hz
30 kHz	–116 dBc/Hz	–118 dBc/Hz
100 kHz	–122 dBc/Hz	–124 dBc/Hz
1 MHz	–145 dBc/Hz	–147 dBc/Hz
		–148 dBc/Hz nominal
6 MHz	–154 dBc/Hz	–156 dBc/Hz
		–156.5 dBc/Hz nominal
10 MHz	–156 dBc/Hz	–157.5 dBc/Hz
		–158 dBc/Hz nominal

Residual FM: < (1 Hz X N) p-p in 1 s, typical
See frequency range for N (harmonic number)

Amplitude Specifications

Amplitude range

Measurement range	Displayed average noise level (DANL) to maximum safe input level
Input attenuator range (3 Hz to 50 GHz)	0 to 70 dB in 2 dB steps

Maximum safe input level

Average total power	+30 dBm (1 W)
Preamp (Option E444xA-1DS)	+25 dBm
Peak pulse power	
< 10 µs pulse width, < 1% duty cycle and input attenuation ≥ 30 dB	+50 dBm (100 W)
DC volts:	
DC coupled	< ±0.2 Vdc
AC coupled (E4443A, E4445A, E4440A only)	±100 Vdc

1 dB gain compression (two-tone)

	Total power at input mixer	
20 MHz to 200 MHz	0 dBm	+3 dBm nominal
200 MHz to 3 GHz	+3 dBm	+7 dBm nominal
3 GHz to 6.6 GHz	+3 dBm	+4 dBm nominal
6.6 GHz to 26.5 GHz	–2 dBm	0 dBm nominal
26.5 GHz to 50 GHz		0 dBm nominal
Preamp on (Option E444xA-1DS)		
10 MHz to 200 MHz		–30 dBm nominal
200 MHz to 3 GHz		–25 dBm nominal

Typical gain compression (two-tone)

	Mixer level	Compression
20 MHz to 200 MHz	0 dBm	< 0.5 dB
200 MHz to 6.6 GHz	+3 dBm	< 0.5 dB
6.6 GHz to 26.5 GHz	–2 dBm	< 0.4 dB

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.

2. Not available for E4447A.

3. For nominal values, refer to Figures 1 and 2 on page 6.

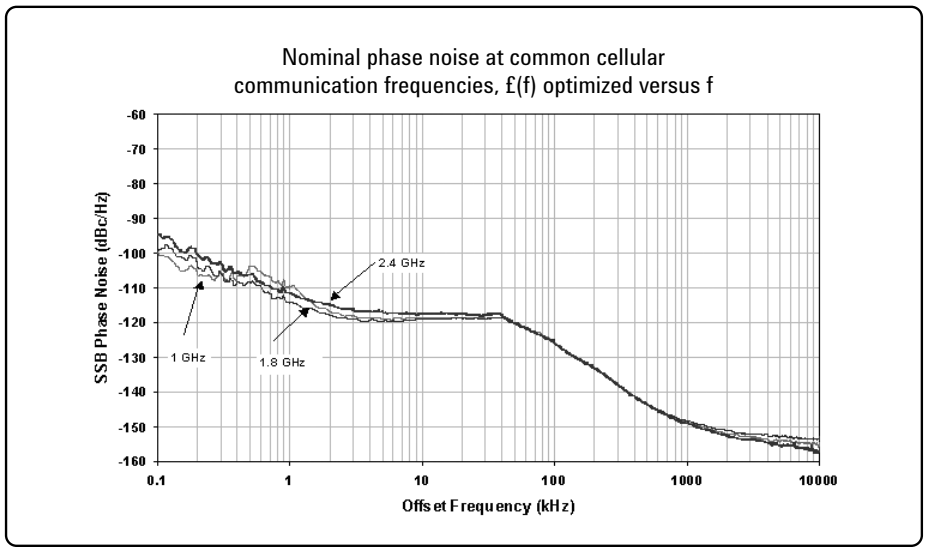

Figure 1. Nominal phase noise at common cellular frequencies

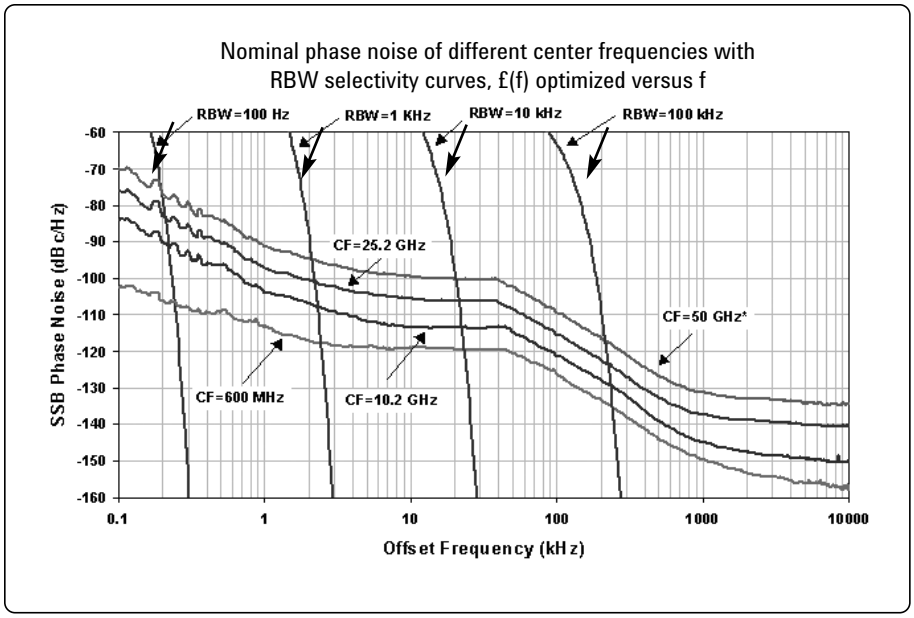

Figure 2. Nominal phase noise at various center frequencies

Displayed Average Noise Level (DANL)

(Input terminated, sample or average detector, averaging type = Log, 20 to 30 °C)

	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)	FFT only actual 1 Hz RBW 0 dB attenuation
E4443A/E4445A/E4440A			
3 Hz to 1 kHz	—	–110 dBm nominal	—
1 kHz to 10 kHz	—	–130 dBm nominal	—
10 kHz to 100 kHz	–137 dBm	–141 dBm	–137 dBm
100 kHz to 1 MHz	–145 dBm	–149 dBm	–145 dBm
1 MHz to 10 MHz	–150 dBm	–153 dBm	–150 dBm
10 MHz to 1.2 GHz	–154 dBm	–155 dBm	–154 dBm
1.2 GHz to 2.1 GHz	–153 dBm	–154 dBm	–153 dBm
2.1 GHz to 3.0 GHz	–152 dBm	–153 dBm	–152 dBm
3 GHz to 6.6 GHz	–152 dBm	–153 dBm	–151 dBm
6.6 GHz to 13.2 GHz	–150 dBm	–152 dBm	–149 dBm
13.2 GHz to 20 GHz	–147 dBm	–149 dBm	–146 dBm
20 GHz to 26.5 GHz	–143 dBm	–145 dBm	–143 dBm
Preamp ON (Option 1DS)			
100 kHz to 200 kHz	–159 dBm	–162 dBm	–158 dBm
200 kHz to 500 kHz	–159 dBm	–162 dBm	–158 dBm
500 kHz to 1 MHz	–163 dBm	–165 dBm	–162 dBm
1 MHz to 10 MHz	–166 dBm	–168 dBm	–165 dBm
10 MHz to 500 MHz	–169 dBm	–170 dBm	–168 dBm
500 MHz to 1.1 GHz	–168 dBm	–169 dBm	–167 dBm
1.1 GHz to 2.1 GHz	–167 dBm	–168 dBm	–166 dBm
2.1 GHz to 3.0 GHz	–165 dBm	–166 dBm	–165 dBm
E4447A/E4446A/E4448A			
3 Hz to 1 kHz	—	–110 dBm nominal	—
1 kHz to 10 kHz	—	–130 dBm nominal	—
10 kHz to 100 kHz	–137 dBm	–141 dBm	–137 dBm
100 kHz to 1 MHz	–145 dBm	–150 dBm	–145 dBm
1 MHz to 10 MHz	–150 dBm	–155 dBm	–150 dBm
10 MHz to 1.2 GHz	–153 dBm	–154 dBm	–152 dBm
1.2 GHz to 2.1 GHz	–152 dBm	–153 dBm	–151 dBm
2.1 GHz to 3 GHz	–151 dBm	–152 dBm	–150 dBm
3 GHz to 6.6 GHz	–151 dBm	–152 dBm	–150 dBm
6.6 GHz to 13.2 GHz	–146 dBm	–149 dBm	–146 dBm
13.2 GHz to 20 GHz	–144 dBm	–146 dBm	–143 dBm
20 GHz to 22.5 GHz	–143 dBm	–146 dBm	–143 dBm
22.5 GHz to 26.8 GHz	–140 dBm	–144 dBm	–140 dBm
26.8 GHz to 31.15 GHz	–142 dBm	–145 dBm	–141 dBm
31.15 GHz to 35 GHz	–134 dBm	–136 dBm	–133 dBm
35 GHz to 38 GHz	–129 dBm	–132 dBm	–129 dBm
38 GHz to 44 GHz	–131 dBm	–134 dBm	–131 dBm
44 GHz to 49 GHz	–128 dBm	–131 dBm	–127 dBm
49 GHz to 50 GHz	–127 dBm	–130 dBm	–126 dBm
Preamp ON (Option 1DS)			
100 kHz to 200 kHz	–158 dBm	–162 dBm	–157 dBm
200 kHz to 500 kHz	–158 dBm	–162 dBm	–157 dBm
500 kHz to 1 MHz	–161 dBm	–165 dBm	–160 dBm
1 MHz to 10 MHz	–167 dBm	–169 dBm	–166 dBm
10 MHz to 500 MHz	–167 dBm	–169 dBm	–167 dBm
500 MHz to 1.2 GHz	–166 dBm	–168 dBm	–166 dBm
1.2 GHz to 2.1 GHz	–165 dBm	–167 dBm	–165 dBm
2.1 GHz to 3.0 GHz	–163 dBm	–165 dBm	–163 dBm

Display range

Log scale	0.1 to 1 dB/division in 0.1 dB steps 1 to 20 dB/division in 1 dB steps (10 display divisions)
Linear scale	10 divisions
Scale units	dBm, dBmV, dBµV, dBmA, dBµA, V, W, A, dBµV/m, dBµA/m, dBpT, dBG

Frequency response

(10 dB input attenuation, 20 to 30 °C, preselector centering applied)

E4443A/E4445A/E4440A

3 Hz to 3 GHz	±0.38 dB	(±0.11 dB typical)
3 GHz to 6.6 GHz	±1.50 dB	(±0.6 dB typical)
6.6 GHz to 22 GHz	±2.00 dB	(±1.0 dB typical)
22 GHz to 26.5 GHz	±2.50 dB	(±1.3 dB typical)

E4447A/E4446A/E4448A

3 Hz to 3 GHz	±0.38 dB	(±0.15 dB typical)
3 GHz to 6.6 GHz	±1.50 dB	(±0.6 dB typical)
6.6 GHz to 22 GHz	±2.00 dB	(±1.2 dB typical)
22 GHz to 26.8 GHz	±2.50 dB	(±1.3 dB typical)
26.4 GHz to 31.15 GHz	±1.75 dB	(±0.6 dB typical)
31.15 GHz to 50 GHz	±2.50 dB	(±1.0 dB typical)

Frequency response at attenuation ≠ 10 dB

(Atten = 20, 30, or 40 dB)

10 MHz to 2.2 GHz	±0.53 dB
2.2 GHz to 3 GHz	±0.69 dB

Preamp on (Option E444xA-1DS), (for all models)

100 kHz to 3 GHz	±0.70 dB	< (±0.30 dB typical)

Input attenuation switching uncertainty

(Attenuator setting ≥ 2 dB)

At 50 MHz	±0.18 dB	±0.053 dB typical
3 Hz to 3 GHz		±0.3 dB nominal
3 GHz to 13.2 GHz		±0.5 dB nominal
13.2 GHz to 26.5 GHz		±0.7 dB nominal
26.5 GHz to 50 GHz		±1.0 dB nominal

Total absolute amplitude accuracy

(10 dB attenuation, 20 to 30 °C, 10 Hz ≤ RBW ≤ 1 MHz, input signal –10 to –50 dBm, all settings auto-coupled except Auto Swp Time = Accy, any reference level, any scale)

At 50 MHz	±0.24 dB (±0.06 dB typical)
At all frequencies	± (0.24 dB + frequency response) ± (0.06 dB+ frequency response) typical
3 Hz to 3 GHz (95% confidence)	±0.24 dB
Preamp on (Option E444xA-1DS)	± (0.36 dB + frequency response) ± (0.09 dB+ frequency response) typical

Input voltage standing wave ratio (VSWR)

(≥ 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
26.5 GHz to 50 GHz	< 1.57:1 nominal
Preamp on (50 MHz to 3 GHz) (≥ 10 dB attenuation)	< 1.2:1 nominal

Resolution bandwidth switching uncertainty

(referenced to 30 kHz RBW)

1 Hz to 1 MHz RBW	±0.03 dB
1.1 MHz to 3 MHz RBW	±0.05 dB
4, 5, 6, 8 MHz RBW	±1.0 dB

Reference level

Range:	
Log scale	–170 dBm to +30 dBm in 0.01 dB steps
Linear scale	707 pV to 7.07 V in 0.1% steps
Accuracy	0 dB

Display scale switching uncertainty

Switching between linear and log	0 dB
Log scale/div switching	0 dB

Display scale fidelity

≤ –20 dBm input mixer level	±0.07 dB total
–20 dBm < mixer level ≤ –10 dBm	±0.13 dB total

Spurious response *(mixer level = –40 dBm)*

General spurious:

100 Hz ≤ f < 10 MHz from carrier	(–73 + 20 log N) dBc
f ≥ 10 MHz from carier	(–80 + 20 log N) dBc (–90 + 20 log N) dBc typical

See frequency range for N

Second harmonic distortion (SHI)

E4443A/E4445A/E4440A	Distortion (dBc)	SHI (dBm)
10 MHz to 460 MHz (–40 dBm mixer level)	–82	+42
460 MHz to 1.18 GHz (–40 dBm mixer level)	–92	+52
1.18 GHz to 1.5 GHz (–40 dBm mixer level)	–82	+42
1.5 GHz to 2.0 GHz (–10 dBm mixer level)	–90	+80
2.0 GHz to 13.25 GHz (–10 dBm mixer level)	–100	+90

E4447A/E4446A/E4448A	Distortion (dBc)	SHI (dBm)
10 MHz to 460 MHz (–40 dBm mixer level)	–82	+42
460 MHz to 1.18 GHz (–40 dBm mixer level)	–92	+52
1.18 GHz to 1.5 GHz (–40 dBm mixer level)	–82	+42
1.5 GHz to 2.0 GHz (–10 dBm mixer level)	–90	+80
2.0 GHz to 3.25 GHz (–10 dBm mixer level)	–94	+84
3.25 GHz to 13.25 GHz (–10 dBm mixer level)	–96	+86
13.25 GHz to 25 GHz (–10 dBm mixer level)	–100 nominal	+90 nominal
Preamp on (Option E444xA-1DS), (for all models) (input preamp level = –45 dBm)		
10 MHz to 1.5 GHz	–60 nominal	+15 nominal

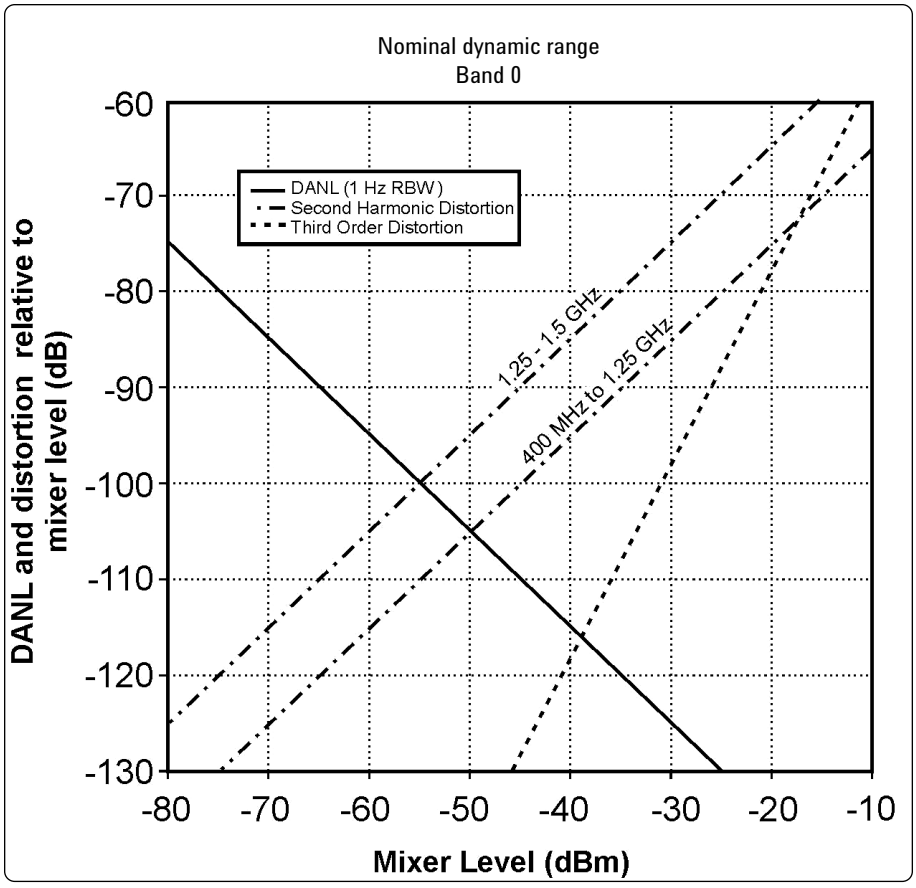

Figure 3. Nominal dynamic range - Band 0, for second and third order distortion, E4443A, E4445A, and E4440A - 3 Hz to 3 GHz

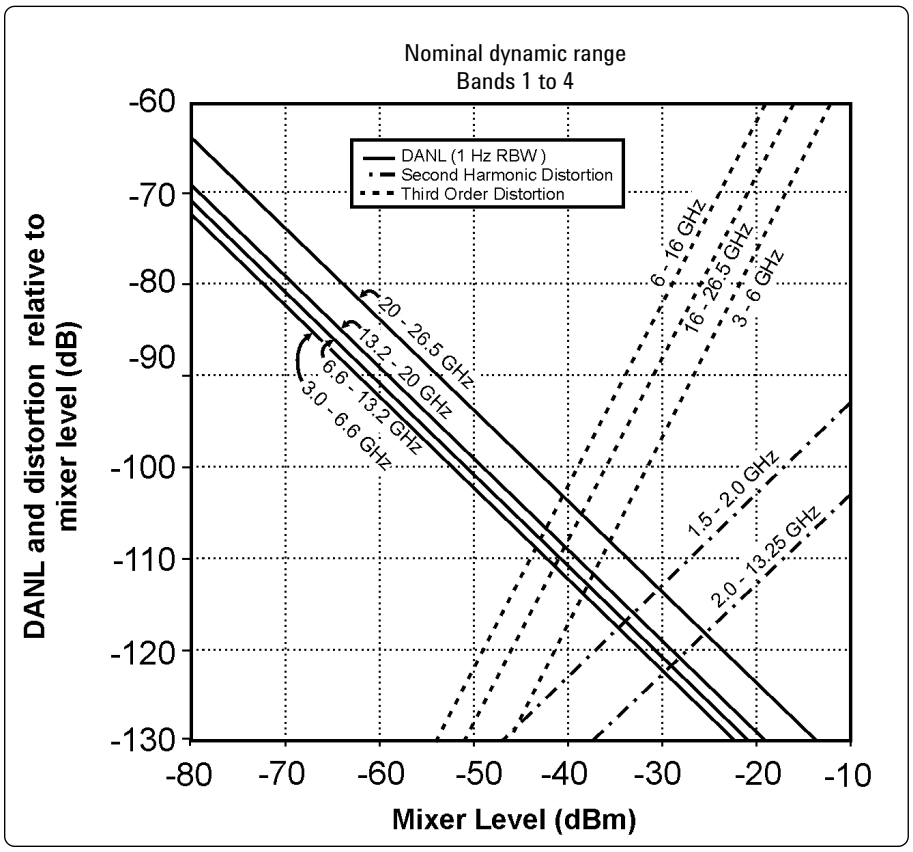

Figure 4. Nominal dynamic range – Bands 1 to 4, second and third order distortion, E4443A, E4445A, E4440A - 3 GHz to 26.5 GHz

Third-order intermodulation distortion (TOI)

(two –30 dBm tones at input mixer with tone separation > 15 kHz, 20 to 30 °C)

E4443A/E4445A/E4440A

	Distortion (dBc)	TOI (dBm)
10 MHz to 100 MHz	–88	+14 (+17 typical)
100 MHz to 400 MHz	–90	+15 (+18 typical)
400 MHz to 1.7 GHz	–92	+16 (+19 typical)
1.7 GHz to 2.7 GHz	–94	+17 (+19 typical)
2.7 GHz to 3.0 GHz	–94	+17 (+20 typical)
3.0 GHz to 6.0 GHz	–90	+15 (+18 typical)
6.0 GHz to 16 GHz	–76	+8 (+11 typical)
16 GHz to 26.5 GHz	–84	+12 (+14 typical)

E4447A/E4446A/E4448A

	Distortion (dBc)	TOI (dBm)
10 MHz to 100 MHz	–90	+15 (+20 typical)
100 MHz to 400 MHz	–92	+16 (+21 typical)
400 MHz to 1.7 GHz	–94	+17 (+20 typical)
1.7 GHz to 2.7 GHz	–96	+18 (+21 typical)
2.7 GHz to 3.0 GHz	–96	+18 (+21 typical)
3.0 GHz to 6.0 GHz	–92	+16 (+21 typical)
6.0 GHz to 16 GHz	–84	+12 (+15 typical)
16.0 GHz to 26.5 GHz	–84	+12 (+16 typical)
26.5 GHz to 50 GHz	–85 nominal	+12.5 nominal

Preamp on (Option E444xA-1DS), *(for all models, two –45 dBm tones at preamp input)*

10 MHz to 500 MHz	–15 nominal
500 MHz to 3 GHz	–13 nominal

Residual responses

Input terminated and 0 dB attenuation

200 kHz to 6.6 GHz	–100 dBm
6.6 GHz to 26.8 GHz	–100 dBm nominal
26.8 GHz to 50 GHz	–90 dBm nominal

Trace detectors

Normal, peak, sample, negative peak, log power average, RMS average, and voltage average

EMI detectors

CISPR:	Peak, quasi-peak and average
MIL-STD:	Peak

Option E444xA-1DS, preamplifier

Frequency range	100 kHz to 3 GHz
Gain	28 dB nominal
Noise figure	7 dB nominal

Measurement speed

Local measurement and display update rate	≥ 50/s nominal
Remote measurement and GPIB transfer rate	
101 sweep points	≥ 45/s nominal
401 sweep points	≥ 30/s nominal
601 sweep points	≥ 25/s nominal

Option AYZ, external mixing

Frequency range	18 to 325 GHz (to 110 GHz with the Agilent unpreselected mixer)	
LO output		
Frequency range	3.05 GHz to 6.89 GHz	
Power output (20 to 30 °C)		
E4440A	14.5 dBm min	18.5 dBm max
E4446A and E4448A		
3.05 to 3.2 GHz	14.5 dBm min	20 dBm max
3.2 to 6.7 GHz	14.5 dBm min	18.8 dBm max
6.7 to 6.89 GHz	14.5 dBm min	18.5 dBm max typical
VSWR	2.0:1 nominal	
IF input		
Frequency	321.4 MHz, ±30 MHz	
Maximum safe input range	10 dBm	
Absolute amplitude accuracy	± 1.2 dB (20 to 30 °C)	
VSWR	1.5:1 nominal	
Mixer bias current		
Range	± 10 mA	
Resolution	0.01 mA	
Accuracy	± 0.02 mA nominal	
Output impedance	477 Ω nominal	
Mixer bias voltage		
Range	± 3.7 V (open circuit)	
Preselector tune voltage	1.5 V/GHz of LO nominal	

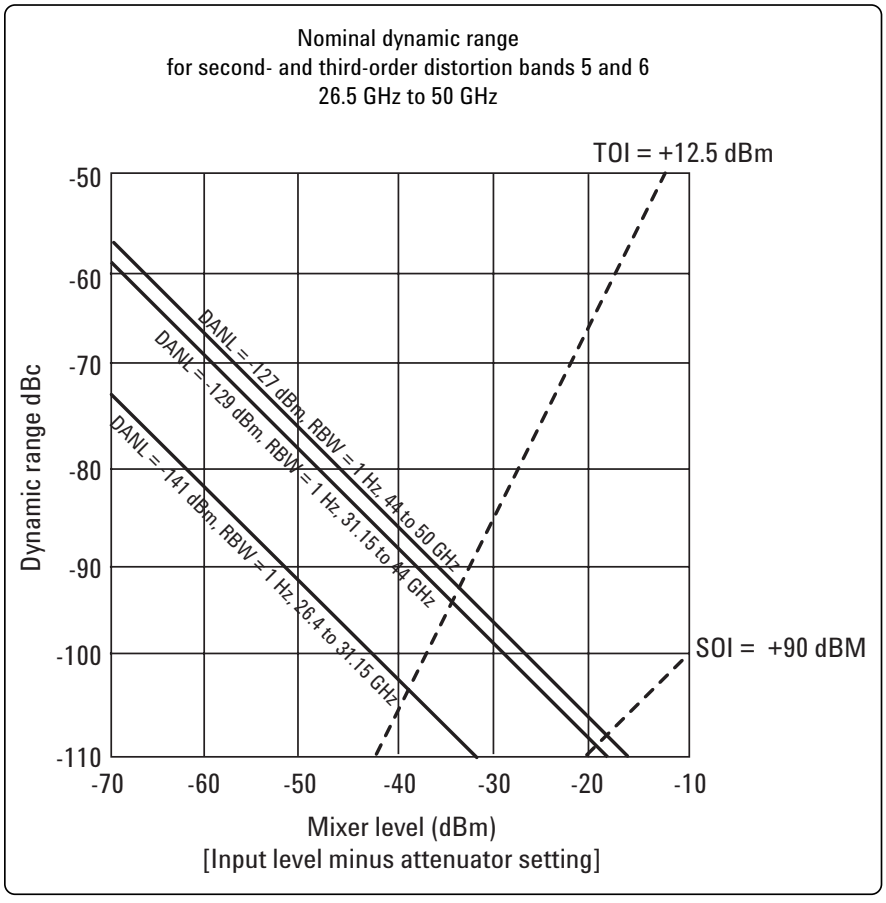

Figure 5. Nominal dynamic range – Bands 5 to 6, E4447A, E4446A, and E4448A 26.4 GHz to 50 GHz

Power Suite Measurement Specifications

Channel power

Amplitude accuracy, W-CDMA or IS95
(20 to 30 °C, mixer level < –20 dBm) ±0.68 dB (±0.18 dB typical)

Occupied bandwidth

Frequency accuracy ± [span/600] nominal

Adjacent channel power

Accuracy, W-CDMA (ACLR) (at specific mixer levels and ACLR ranges):

	Adjacent	**Alternate**
MS	±0.12 dB	±0.17 dB
BTS	±0.22 dB	±0.22 dB
Dynamic range (typical):		
Without noise correction	–74.5 dB	–82 dB
With noise correction	–81 dB	–88 dB
Offset channel pairs measured	1 to 6	
ACP speed (fast method)		
Data measurement and transfer time	30 ms nominal (0.2 dB standard deviation)	

Multi-carrier power and ACP

ACPR dynamic range, W-CDMA (5 MHz offset, RRC weighted, 3.84 MHz noise bandwidth):

Two carriers	–70 dB nominal
Four carriers	–66 dB nominal
With noise correction	–76 dB nominal
ACPR accuracy (two carriers, 5 MHz offset, –48 dBc ACPR)	±0.38 dB nominal
Multiple number of carriers measured	Up to 12

Power statistics CCDF

Histogram resolution 0.1 dB

Harmonic distortion

Maximum harmonic number	10th
Results	Fundamental power (dBm), relative harmonics power (dBc), total harmonic distortion in percent

Intermod (TOI)

Measure the third-order products and intercepts from two tones

Burst power

Methods	Power above threshold, power within burst width
Results	Single burst output power, average output power, maximum power, minimum power within burst, burst width

Spurious emission

W-CDMA *(1980 MHz region, 1.2 MHz RBW)*
Table driven spurious signals; search across regions.

Relative dynamic range	80.6 dB (82.4 dB typical)
Absolute sensitivity	–89.7 dBm (–91.7 dBm typical)

Spectrum emission mask (SEM)

cdma2000 (750 kHz offset):

Relative dynamic range (30 kHz RBW)	85.3 dB (88.3 dB typical)
Absolute sensitivity	–105.7 dBm (–107 dBm typical)
Relative accuracy	±0.09 dB

3GPP W-CDMA (2.515 MHz offset):

Relative dynamic range (30 kHz RBW)	87.3 dB (89.5 dB typical)
Absolute sensitivity	–105.7 dBm (–107.7 dBm typical)
Relative accuracy	±0.10 dB

General Specifications

Temperature range

Operating	0 °C to +55 °C
Storage	–40 °C to +70 °C

EMI compatibility

Conducted interference is in compliance with CISPR Pub 11/1990 Group 1 Class A

Radiated and conducted emission is in compliance with CISPR Pub 11/1996 Class B

Radiated immunity

Complies with the radiated electromagnetic field immunity requirements in IEC/EM 61326 using performance criteria B.

Audio noise

ISO 7779 sound pressure	Lp < 55 dBA

Military specification

Type tested to environmental specifications MIL-PRF-28800F Class 3

Power requirements

Voltage and frequency (nominal):

100 to 120 V, 47 to 66 Hz/360 to 440 Hz
220 to 240 V, 47 to 66 Hz

Power consumption:

On	< 260 watts, no options (< 450 watts, all options)
Standby	< 20 watts

Data storage

Internal	64 MB (nominal)
Floppy drive (10 to 40°C)	3.5" 1.44 MB (nominal)

Weight *(without options)*

E4443A/E4445A/E4440A

Net	23 kg (50 lbs) nominal
Shipping	33 kg (73 lbs) nominal

E4447A/E4446A/E4448A

Net	24 kg (53 lbs) nominal
Shipping	33 kg (73 lbs) nominal

Dimensions

Height	177 mm (7.0 in)
Width	426 mm (16.8 in)
Length	483 mm (19 in)

Warranty

The E4440A, E4443A, E4445A, E4446A, E4447A, and E4448A are supplied with a one-year warranty.

Calibration cycle

The recommended calibration cycle is one year. Calibration services are available through Agilent service centers.

Input and Outputs

Front panel

RF input

Connector:

E4443A/E4445A	Type-N female, 50 Ω
E4440A	Type-N female, 50 Ω
Option E4440A-BAB	APC 3.5 male
E4447A/E4446A/E4448A	2.4 mm male, 50 Ω

Probe power

Voltage/current (nominal)	+15 Vdc, ±7% at 150 mA max –12.6 Vdc, ±10% at 150 mA max

Ext trigger input

Connector	BNC female
Impedance	10 kΩ nominal
Trigger level range	–5 to +5 V

1st LO output (Option AYZ)

Connector	SMA female
Frequency range	3 to 7 GHz

IF input (Option AYZ)

Connector	SMA female
Frequency	321.4 MHz

Rear panel

10 MHz OUT (switched)

Connector	BNC female, 50 Ω
Output amplitude	≥ 0 dBm nominal
Frequency accuracy	10 MHz ± (10 MHz x frequency reference accuracy)

Ext Ref In

Connector	BNC female, 50 Ω
Input amplitude range	–5 to +10 dBm nominal
Input frequency	1 to 30 MHz nominal
Frequency lock range	± 5 x 10^{-6} of specified external reference input frequency

Trigger in

Connector	BNC female
External trigger input:	
Impedance	> 10 kΩ nominal
Trigger level range	–5 to +5 V

Trigger 1 and Trigger 2 outputs

Connector	BNC female
Trigger 1 output:	HSWP (high = sweeping)
Impedance	50 Ω nominal
Level	5 V TTL
Trigger 2 output	Gate

Monitor output

Connector	VGA compatible, 15-pin mini D-SUB
Format	VGA (31.5 kHz horizontal, 60 Hz vertical sync rates, non-interlaced) Analog RGB
Resolution	640 X 480

Noise source drive output (used by Option 219)

Connector	BNC female
Output voltage	
On	28.0 ± 0.1 V (60 mA maximum)
Off	< 1 V

Remote programming

GPIB interface:	
Connector	IEEE-488 bus connector
GPIB codes	SH1, AH1, T6, SR1, RL1, PP0, DC1, C1, C2, C3, and C28, DT1, L4, C0
Serial interface connector	9-pin D-SUB male (factory use only)
LAN TCP/IP interface	RJ45 Ethertwist

Parallel printer interface connector

25-pin D-SUB female

321.4 MHz IF output[1]

Connector	SMA female, 50 Ω nominal
Frequency	321.4 MHz nominal
Conversion gain	+2 to +4 dB nominal

Pre-sel tune output

Connector	BNC female

1. Not available for the E4447A.

PSA Series Ordering Information

PSA Series spectrum analyzer

E4443A 3 Hz to 6.7 GHz
E4445A 3 Hz to 13.2 GHz
E4440A 3 Hz to 26.5 GHz
E4447A 3 Hz to 42.98 GHz
E4446A 3 Hz to 44 GHz
E4448A 3 Hz to 50 GHz

Options

To add options to a product,
use the following ordering scheme:
Model E444xA (x = 0, 3, 5, 6, 7 or 8)
Example options E4440A-B7J, E4448A-1DS

Warranty & Service

Standard warranty is one year.

R-51B-001-3C	1-year return-to-Agilent warranty extended to 3-years

Calibration[1]

R-50C-011-3	Inclusive calibration plan, 3 year coverage
R-50C-013-3	Inclusive calibration plan and cal data, 3 year coverage

Measurement Personalities

E444xA-226	Phase noise	
E444xA-219	Noise figure	Requires 1DS
E444xA-241	Flexible digital modulation analysis	
E444xA-BAF	W-CDMA	Requires B7J
E444xA-210	HSDPA	Requires B7J and BAF
E444xA-202	GSM w/ EDGE	Requires B7J
E444xA-B78	cdma2000	Requires B7J
E444xA-214	1xEV-DV	Requires B7J and B78
E444xA-204	1xEV-DO	Requires B7J
E444xA-BAC	cdmaOne	Requires B7J
E444xA-BAE	NADC, PCD	Requires B7J
E444xA-217	WLAN	Requires 122 or 140
E444xA-211	TD-SCDMA	
E444xA-215	External source control	
E444xA-266	Programming code compatibility suite	

Hardware

E444xA-1DS	100 kHz to 3 GHz built-in preamplifier	
E444xA-B7J	Digital demodulation hardware	
E444xA-122	80 MHz bandwidth digitizer	E4440A/43A/45A only, excludes 140, H70
E444xA-140	40 MHz bandwidth digitizer	E4440A/43A/45A only, excludes 122, H70
E444xA-123	Switchable MW preselector bypass	E4440A/43A/45A only, excludes AYZ
E444xA-124	Y-axis video output	
E444xA-AYZ	External mixing	E4440A/47A/46A/48A only, excludes 123
E4440A-BAB	Replaces type-N input connector with APC 3.5 connector	E4440A only
E444xA-H70	70 MHz IF output	Excludes 122, 140. Not available for E4447A

PC Software

E444xA-230	BenchLink Web Remote Control Software	
E444xA-233	N5530S measuring receiver software & license	Requires B7J, E4443A/45A/40A only
E444xA-235	Wide BW digitizer external calibration wizard	Requires 122 E4443A/45A/40A only

Accessories

E444xA-1CM	Rack mount kit
E444xA-1CN	Front handle kit
E444xA-1CP	Rack mount with handles
E444xA-1CR	Rack slide kit
E444xA-015	6 GHz return loss measurement accessory kit
E444xA-045	Millimeter wave accessory kit
E444xA-0B1	Extra manual set including CD ROM

1. Options not available in all countries

Product Literature

PSA in general

- *Selecting the Right Signal Analyzer for Your Needs, Selection Guide,* literature number 5968-3413E
- *PSA Series, Brochure,* literature number 5980-1283E
- *PSA Series, Configuration Guide,* literature number 5989-2773EN
- Self-Guided Demonstration for *Spectrum Analysis, Product Note,* literature number 5988-0735EN

Wide bandwidth and vector signal analysis

- *40/80 MHz Bandwidth Digitizer, Technical Overview,* 5989-1115EN
- *Using Extended Calibration Software for Wide Bandwidth Measurements, PSA Option 122 & 89600 VSA, Application Note 1443,* 5988-7814EN
- *PSA Series Spectrum Analyzer Performance Guide Using 89601A Vector Signal Analysis Software, Product Note,* literature number 5988-5015EN
- *89650S Wideband VSA System with High Performance Spectrum Analysis, Technical Overview,* literature number 5989-0871EN

Measurement personalities and applications

- *Phase Noise Measurement Personality, Technical Overview,* 5988-3698EN
- *Noise Figure Measurement Personality, Technical Overview,* 5988-7884EN
- *External Source Measurement Personality, Technical Overview,* 5989-2240EN
- *Flexible Modulation Analysis Measurement Personality, Technical Overview,* literature number 5989-1119EN
- *W-CDMA and HSDPA Measurement Personalities, Technical Overview,* literature number 5988-2388EN
- *GSM with EDGE Measurement Personality, Technical Overview,* 5988-2389EN
- *cdma2000 and 1xEV-DV Measurement Personalities, Technical Overview,* literature number 5988-3694EN
- *1xEV-DO Measurement Personality, Technical Overview,* 5988-4828EN
- *cdmaOne Measurement Personality, Technical Overview,* 5988-3695EN
- *WLAN Measurement Personality, Technical Overview,* 5989-2781EN
- *NADC/PDC Measurement Personality, Technical Overview,* 5988-3697EN
- *TD-SDCMA Measurement Personality, Technical Overview,* 5989-0056EN
- *Agilent N5530S Measuring Receiver System, Technical Overview,* 5989-1113EN
- *BenchLink Web Remote Control Software, Product Overview,* 5988-2610EN
- *IntuiLink Software, Data Sheet,* 5980-3115EN
- *Programming Code Compatibility Suite, Technical Overview* 5989-1111EN

Hardware options

- *PSA Series Spectrum Analyzers Video Output (Option 124), Technical Overview,* literature number 5989-1118EN
- *PSA Series Spectrum Analyzers, Option H70,70 MHz IF Output, Product Overview,* literature number 5988-5261EN

Spectrum analyzer fundamentals

- *Optimizing Dynamic Range for Distortion Measurements, Product Note,* literature number 5980-3079EN
- *PSA Series Amplitude Accuracy, Product Note,* literature number 5980-3080EN
- *PSA Series Swept and FFT Analysis, Product Note,* 5980-3081EN
- *PSA Series Measurement Innovations and Benefits, Product Note,* 5980-3082EN
- *Spectrum Analysis Basics, Application Note 150,* literature number 5952-0292
- *Vector Signal Analysis Basics, Application Note 150-15,* 5989-1121EN
- *8 Hints for Millimeter Wave Spectrum Measurements, Application Note,* 5988-5680EN
- *Spectrum Analyzer Measurements to 325 GHz with the Use of External Mixers, Application Note 1453,* literature number 5988-9414EN
- *EMI, Application Note 150-10,* literature number 5968-3661E

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