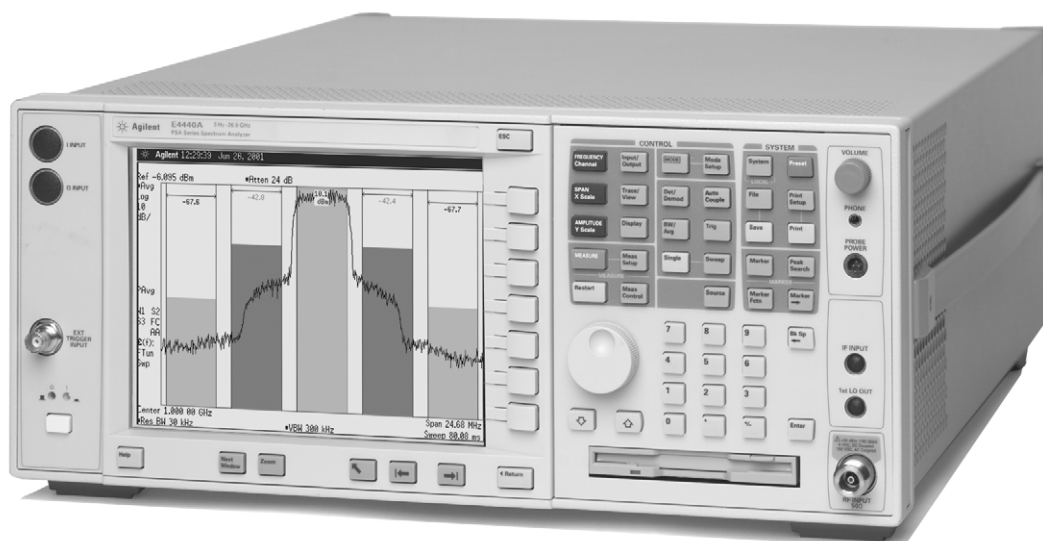


Agilent PSA Series Spectrum Analyzers Data Sheet

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



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, 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.



Agilent Technologies

Table of contents

Definitions and Conditions	3	Power Suite Measurement Specifications	12
Specifications for the PSA Series Spectrum Analyzers	4	Channel power	12
Frequency Specifications	4	Occupied bandwidth	12
Frequency range	4	Adjacent channel power	12
Frequency reference	4	Multi-carrier power and ACP	12
Frequency readout accuracy	4	Power statistics CCDF	12
Marker frequency counter	4	Harmonic distortion	12
Frequency span	4	Intermod (TOI)	12
Sweep time and triggering	4	Burst power	12
Sweep (trace) point range	4	Spurious emission	12
Gated FFT	4	Spectrum emission mask (SEM)	12
Resolution bandwidth (RBW)	4	General Specifications	12
Information bandwidths	4	Temperature range	12
Video bandwidth (VBW)	6	EMI compatibility	12
Stability	6	Audio noise	12
Amplitude Specifications	6	Military specification	12
Amplitude range	6	Power requirements	12
Maximum safe input level	6	Weight	13
1dB gain compression (two tone)	6	Dimensions	13
Typical gain compression (two tone)	6	Warranty	13
Displayed average noise level (DANL)	7	Calibration cycle	13
Display range	8	Input and Outputs	13
Frequency response	8	Front panel	13
Input attenuation switching uncertainty	8	Rear panel	13
Absolute amplitude accuracy	8	Ordering Information	14
Input voltage standing wave ratio (VSWR)	8	PSA Series spectrum analyzer	14
Resolution bandwidth switching uncertainty	8	Options	14
Reference level	8	Product Literature	15
Display scale switching uncertainty	8	Warranty and Contact Information	16
Display scale fidelity	8		
Spurious response	8		
Second harmonic distortion (SHI)	9		
Third-order intermodulation distortion (TOI)	10		
Residual responses	11		
Trace detectors	11		
Option E444xA-1DS, preamplifier	11		
Measurement speed	11		

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)	10 MHz to 6.7 GHz
E4445A	(DC coupled)	3 Hz to 13.2 GHz
	(AC coupled)	10 MHz to 13.2 GHz
E4440A	(DC coupled)	3 Hz to 26.5 GHz
	(AC coupled)	10 MHz to 26.5 GHz
E4446A	(DC coupled)	3 Hz to 44 GHz
E4448A	(DC coupled)	3 Hz to 50 GHz

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

Example frequency reference accuracy 1 year after last adjustment:
 $= \pm(1 \times 1 \times 10^{-7} + 1 \times 10^{-8} + 7 \times 10^{-8})$
 $= \pm 1.8 \times 10^{-7}$

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

\pm (marker frequency x frequency reference accuracy + 0.25 percent
x span + 5 percent x RBW + 2 Hz + 0.5 x horizontal resolution*)

*Horizontal resolution is span/(sweep points – 1)

Marker frequency counter

Accuracy	\pm (marker frequency x frequency reference accuracy + 0.100 Hz)
Delta counter accuracy	\pm (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	\pm [0.2 percent x span + span / (sweep points – 1)]

Sweep time and triggering

Range:

Span = 0 Hz	1 μ s to 6000 s
Span \geq 10 Hz	1 ms to 2000 s

Accuracy

Span \geq 10 Hz, sweep	$\pm 0.01\%$ nominal
Span \geq 10 Hz, FFT	$\pm 40\%$ nominal
Span = 0 Hz	$\pm 0.01\%$ nominal

Trigger

Free run, line, video, RF burst,
external front, external rear

Trigger delay

Span = 0 Hz, or FFT	–150 ms to +500 ms
Span \geq 10 Hz, swept	1 μ s to 500 ms
Resolution	0.1 μ s

Sweep (trace) point range

Span = 0 Hz	2 to 8192
Span \geq 10 Hz	101 to 8192

Gated FFT

Maximum span	10 MHz
Delay range	–150 to +500 ms
Delay resolution	100 ns or 4 digits whichever is more
Gate duration	1.83/RBW $\pm 2\%$ 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	$\pm 0.5\%$ (± 0.022 dB)
56 kHz to 75 kHz	$\pm 1.0\%$ (± 0.044 dB)
82 kHz to 330 kHz	$\pm 0.5\%$ (± 0.022 dB)
360 kHz to 1.2 MHz (< 3 GHz CF)	$\pm 1.0\%$ (± 0.044 dB)
1.3 MHz to 2.0 MHz (< 3 GHz CF)	± 0.07 dB nominal
2.2 MHz to 6.0 MHz (< 3 GHz CF)	± 0.02 dB nominal

Bandwidth accuracy (–3.01 dB):

RBW range	
8 MHz (< 3 GHz CF)	$\pm 15\%$ nominal

Selectivity (–60 dB/–3 dB)

4.1:1 nominal

Information bandwidths

Maximum FFT width	10 MHz
I/Q waveform digital output bandwidth (Option E444xA-B7J)	10 MHz
321.4 MHz IF output:	
–1 dB bandwidth	20 to 30 MHz nominal
–3 dB bandwidth	30 to 60 MHz nominal
70 MHz IF output (Option E444xA-H70):	
–1 dB bandwidth	20 to 30 MHz nominal
–3 dB bandwidth	30 to 60 MHz nominal

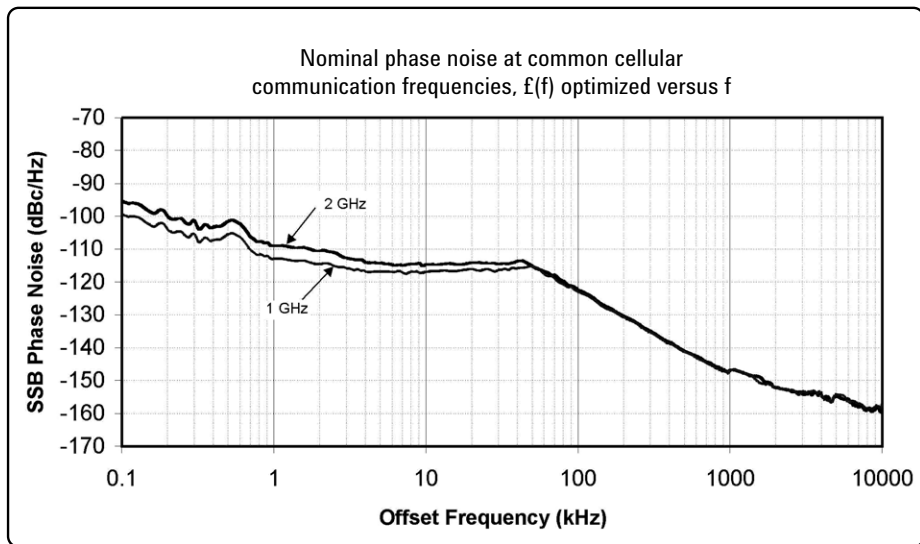


Figure 1. Nominal phase noise at common cellular frequencies

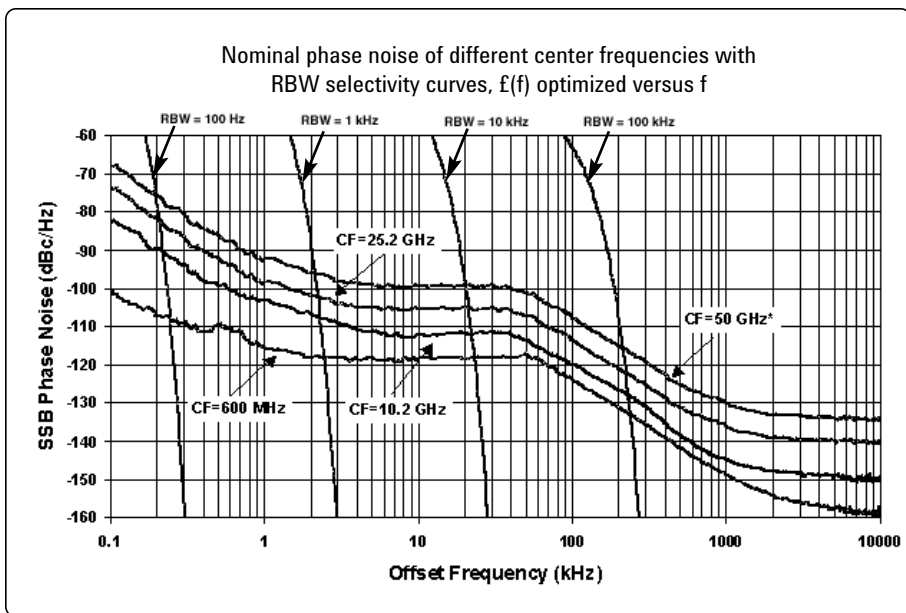


Figure 2. Nominal phase noise at various center frequencies

Video bandwidth (VBW)

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

Stability

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

Offset	Specification	Typical
100 Hz	−91 dBc/Hz	−97 dBc/Hz
1 kHz	−103 dBc/Hz	−107 dBc/Hz
10 kHz	−114 dBc/Hz	−117 dBc/Hz
30 kHz	−114 dBc/Hz	−117 dBc/Hz
100 kHz	−120 dBc/Hz	−123 dBc/Hz
1 MHz	−144 dBc/Hz	−146 dBc/Hz −148 dBc/Hz nominal
6 MHz	−151 dBc/Hz	−152 dBc/Hz −156 dBc/Hz nominal
10 MHz	−151 dBc/Hz	−152 dBc/Hz −157.5 dBc/Hz nominal

Residual FM: < (1 Hz X N) p-p in 1 s

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	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

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	−135 dBm	−142 dBm	−135 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	−155 dBm	−156 dBm	−154 dBm
1.2 GHz to 2.5 GHz	−154 dBm	−155 dBm	−153 dBm
2.5 GHz to 3.0 GHz	−153 dBm	−154 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 E4443/5/0A-1DS)			
100 kHz to 200 kHz	−161 dBm	−164 dBm	−160 dBm
200 kHz to 500 kHz	−164 dBm	−167 dBm	−163 dBm
500 kHz to 10 MHz	−166 dBm	−168 dBm	−165 dBm
10 MHz to 1.1 GHz	−169 dBm	−170 dBm	−168 dBm
1.1 GHz to 2.5 GHz	−168 dBm	−169 dBm	−167 dBm
2.5 GHz to 3.0 GHz	−166 dBm	−167 dBm	−165 dBm
E4446A/E4448A			
3 Hz to 1 kHz	—	−110 dBm nominal	—
1 kHz to 10 kHz	—	−130 dBm nominal	—
10 kHz to 100 kHz	−140 dBm	−143 dBm	−140 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	−154 dBm	−155 dBm	−153 dBm
1.2 GHz to 2.2 GHz	−153 dBm	−154 dBm	−152 dBm
2.2 GHz to 3 GHz	−152 dBm	−153 dBm	−151 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	−145 dBm	−147 dBm	−144 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 36 GHz	−134 dBm	−136 dBm	−133 dBm
36 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 E4446/8A-1DS)			
100 kHz to 200 kHz	−160 dBm	−164 dBm	−159 dBm
200 kHz to 500 kHz	−163 dBm	−167 dBm	−162 dBm
500 kHz to 10 MHz	−164 dBm	−168 dBm	−163 dBm
1 MHz to 10 MHz	−167 dBm	−169 dBm	−166 dBm
10 MHz to 1.2 GHz	−167 dBm	−169 dBm	−167 dBm
1.2 GHz to 2.2 GHz	−166 dBm	−168 dBm	−166 dBm
2.2 GHz to 3.0 GHz	−164 dBm	−166 dBm	−164 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, dBuV, V, and W

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)

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
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

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	< 1.6:1 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:

f < 10 MHz from carrier	(–73 + 20 log N) dBc
f ≥ 10 MHz from carrier	(–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 400 MHz (-40 dBm mixer level)	-82	+42
400 MHz to 1.25 GHz (-40 dBm mixer level)	-92	+52
1.25 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

E4446A, E4448A	Distortion (dBc)	SHI (dBm)
10 MHz to 400 MHz (-40 dBm mixer level)	-82	+42
400 MHz to 1.25 GHz (-40 dBm mixer level)	-91	+51
1.25 GHz to 1.5 GHz (-40 dBm mixer level)	-81	+41
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

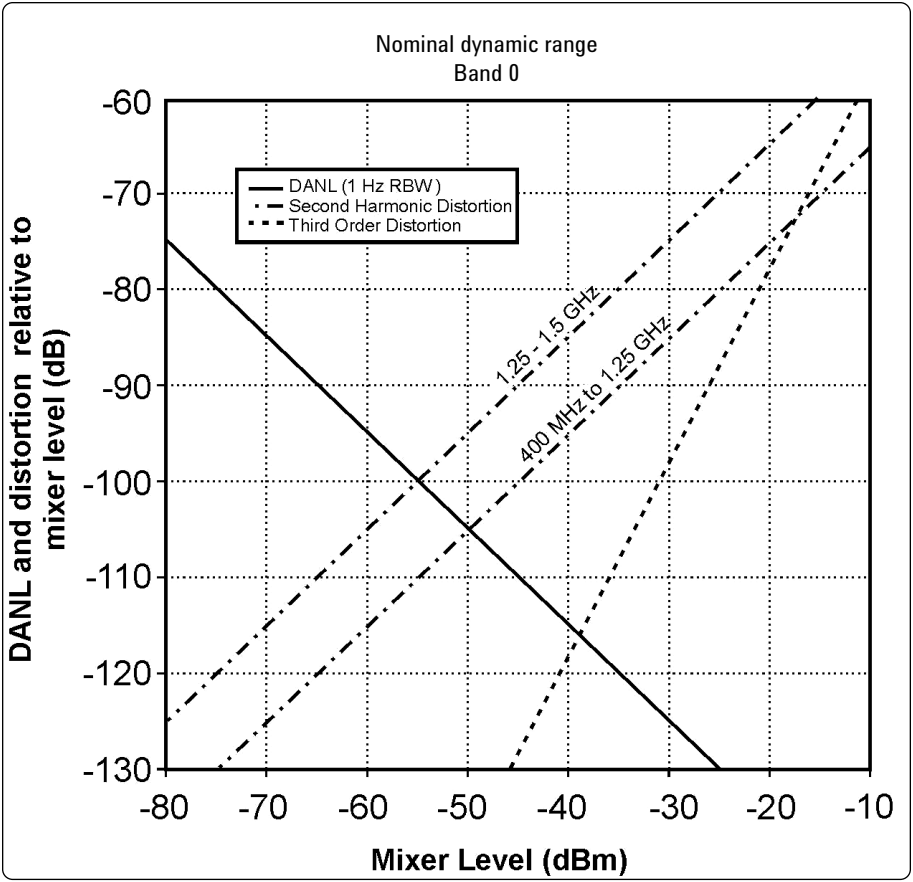


Figure 3. Nominal dynamic range - Band 0, for second and third order distortion, E4443A, E4445A, and E4440A - 3 Hz to 3 GHz

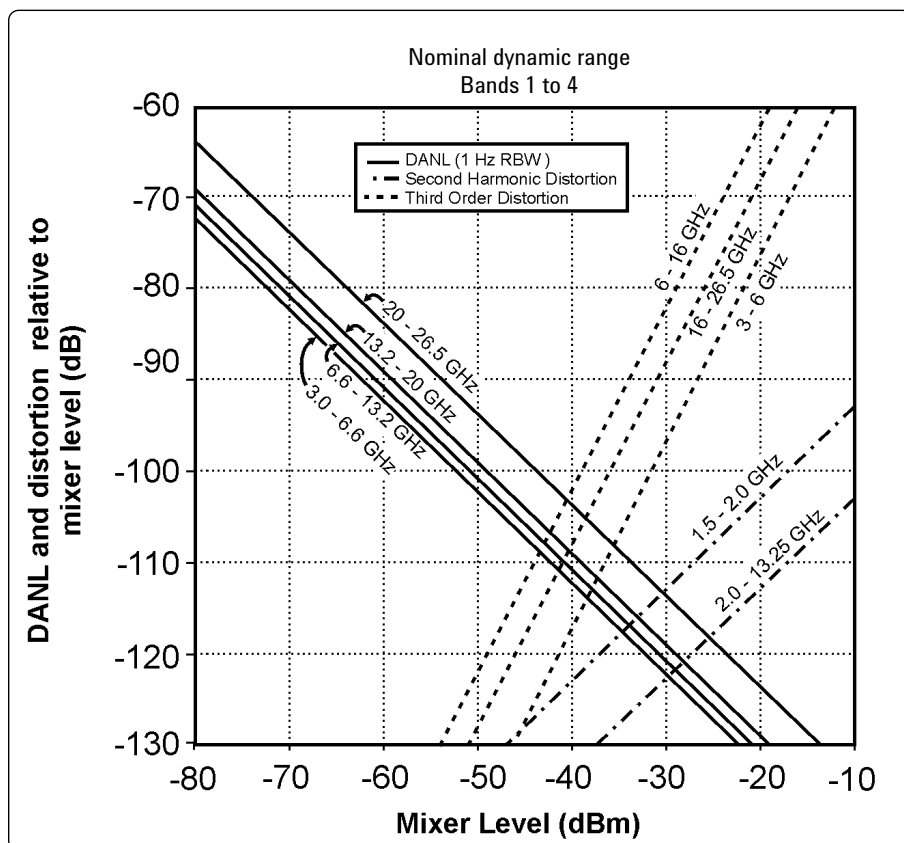


Figure 4. Nominal dynamic range – Bands 1 to 4, second and third order distortion, E4443A, E4445A, E4440A - 3 GHz to 26.5 GHz

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 3.0 GHz	-94	+17 (+19 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)

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 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

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 $\geq 50/s$ nominal

Remote measurement and GPIB transfer rate

101 sweep points $\geq 45/s$ nominal

401 sweep points $\geq 30/s$ nominal

601 sweep points $\geq 25/s$ nominal

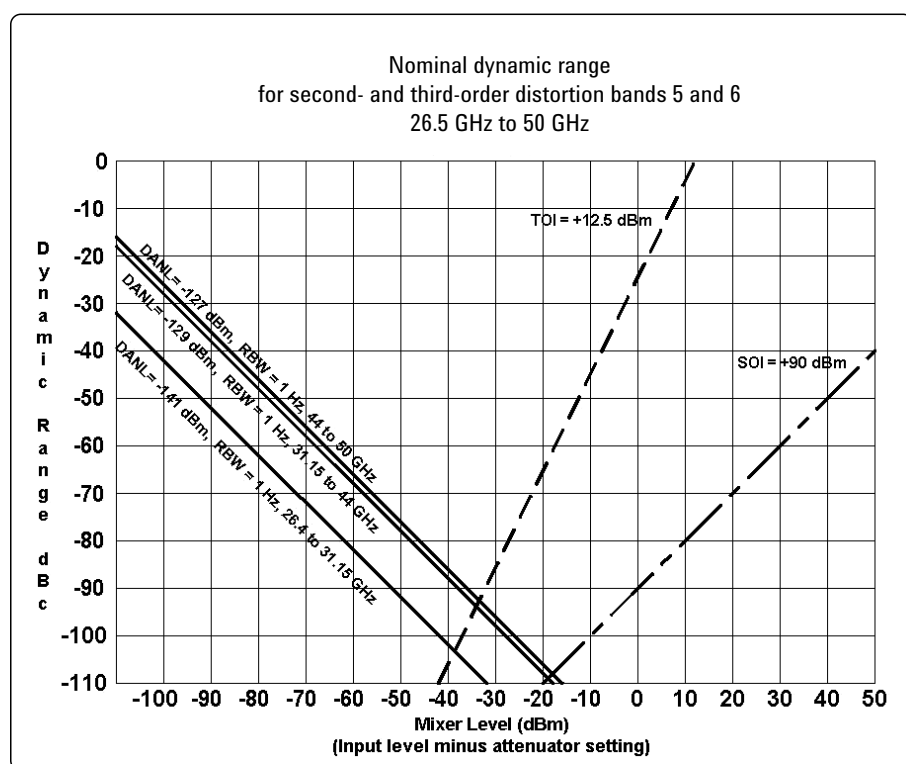


Figure 5. Nominal dynamic range – Bands 5 to 6, E4446A and E4448A - 26.4 GHz to 50 GHz

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 \pm [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):		
w/o noise correction	-74.5 dB	-82 dB
w/noise correction	-81 dB	-88 dB
Offset channel pairs measured	1 to 6	

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	-68 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	10 th
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

cdma2000 or 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 85.3 dB (88.3 dB typical)
(30 kHz RBW)

Absolute sensitivity -105.7 dBm (-107 dBm typical)

Relative accuracy ± 0.09 dB

3GPP W-CDMA (2.515 MHz offset):

Relative dynamic range 87.3 dB (89.5 dB typical)
(30 kHz RBW)

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 +75 °C

EMI compatibility

- Conducted interference is in compliance with
CISPR Pub 11/1990 Group 1 Class A
- Radiated emission is in compliance with
CISPR Pub 11/1990 Group 1 Class B

Audio noise

ISO 7779 LNPE < 5.0 BELS at 25 °C

Military specification

Type tested to environmental specifications MIL-PRF-28800F Class 4

Power requirements

Voltage and frequency:

100 to 132 Vrms, 47 to 66 Hz/360 to 440 Hz
195 to 250 Vrms, 47 to 66 Hz

Power consumption:

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

Weight *(without options)*

E4443A, E4445A, E4440A

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

E4446A, E4448A

Net	24 kg (53 lbs) nominal
Shipping	34 kg (76 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 and E4448A are supplied with a three-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
E4446A/E4448A	2.4 mm male, 50 Ω

Probe power

Voltage/current (nominal)	+15 Vdc, $\pm 7\%$ at 150 mA max –12.6 Vdc, $\pm 10\%$ at 150 mA max GND
---------------------------	--

Headphone

Reserved for future applications

Ext trigger input

Connector	BNC female
Impedance	10 k Ω nominal
Trigger level	5 V TTL nominal

Rear panel

10 MHz OUT (switched)

Connector	BNC female, 50 Ω
Output amplitude	≥ 0 dBm nominal
Frequency accuracy	10 MHz \pm (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	$\pm 5 \times 10^{-6}$ of specified external reference input frequency

Trigger in

Connector	BNC female
External trigger input:	
Impedance	> 10 k Ω nominal
Trigger level	5 V TTL nominal

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	Reserved for future applications

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

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

Remote programming

GPIO interface:	
Connector	IEEE-488 bus connector
GPIO 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

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

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
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 or 8)
Example options	E4440A-B7J E4448A-1DS

Digital demodulation hardware

E444xA-B7J	Digital demodulation hardware (required for digital demodulation measurement personalities)
------------	---

Digital demodulation measurements

E444xA-BAF	W-CDMA measurement personality
E444xA-202	GSM w/ EDGE measurement personality
E444xA-B78	cdma2000 measurement personality
E444xA-204	1xEV-DO measurement personality
E444xA-BAC	cdmaOne measurement personality
E444xA-BAE	NADC, PCD measurement personality

General purpose measurements

E444xA-226	Phase noise measurement personality
E444xA-219	Noise figure measurement personality

Amplifiers

E444xA-1DS	100 kHz to 3 GHz built-in preamplifier
------------	--

Inputs and outputs

E4440A-BAB	Replaces type "N" input connector with APC 3.5 connector
------------	--

Connectivity software

E444xA-230	BenchLink Web Remote Control Software
------------	---------------------------------------

Code compatibility

E444xA-266	HP 8566B/8568B code compatibility measurement personality
------------	---

Accessories

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

Warranty and service

For warranty and service of 5 years, please order 60 months of R-51B (quantity = 60). Standard warranty is 36 months.

R-51B	Return-to-Agilent warranty and service plan
-------	---

Calibration¹

For 3 years, order 36 months of the appropriate calibration plan shown below. For 5 years, specify 60 months.

R-50C-001	Standard calibration
R-50C-002	Standards compliant calibration
E444xA-OBW	Service manual and calibration software
E444xA-UK6	Commercial calibration certificate with test data

¹ Options not available in all countries.

Product Literature

PSA Series, brochure, literature number 5980-1283E
PSA Series, data sheet, literature number 5980-1284E
Self-Guided Demonstration for Spectrum Analysis,
product note, literature number 5988-0735EN

Phase Noise Measurement Personality, technical overview,
literature number 5988-3698EN
Noise Figure Measurement Personality, technical overview,
literature number 5988-7884EN
W-CDMA Measurement Personality, technical overview,
literature number 5988-2388EN
GSM with EDGE Measurement Personality,
technical overview, literature number 5988-2389EN
cdma2000 Measurement Personality,
technical overview, literature number 5988-3694EN
1xEV-DO Measurement Personality,
technical overview, literature number 5988-4828EN
cdmaOne Measurement Personality,
technical overview, literature number 5988-3695EN
NADC/PDC Measurement Personality,
technical overview, literature number 5988-3697EN

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, literature number 5980-3081EN
PSA Series Measurement Innovations and Benefits,
product note, literature number 5980-3082EN
8 Hints for Millimeter Wave Spectrum Measurements,
application note, literature number 5988-5680EN
PSA Series Spectrum Analyzers, Option H70,
70 MHz IF Output, product overview,
literature number 5988-5261EN
PSA Series Spectrum Analyzer Performance Guide
Using 89601A Vector Signal Analysis Software,
product note, literature number 5988-5015EN
89600 Series + PSA, 802.11A and HiperLAN2 OFDM
Measurements, product note,
literature number 5988-4094EN

Selecting the Right Signal Analyzer for Your Needs,
selection guide, literature number 5968-3413E
HP 8566B/68B Programming Code Compatibility for
PSA and ESA-E Series Spectrum Analyzers, product
overview, literature number 5988-5808EN
BenchLink Web Remote Control Software,
product overview, literature number 5988-2610EN
IntuiLink Software, Data Sheet,
Literature Number 5980-3115EN

For more information on the PSA Series, please visit:

www.agilent.com/find/psa

Agilent Technologies' Test and Measurement Support, Services, and Assistance

Agilent Technologies aims to maximize the value you receive, while minimizing your risk and problems. We strive to ensure that you get the test and measurement capabilities you paid for and obtain the support you need. Our extensive support resources and services can help you choose the right Agilent products for your applications and apply them successfully. Every instrument and system we sell has a global warranty. Support is available for at least five years beyond the production life of the product. Two concepts underlie Agilent's overall support policy: "Our Promise" and "Your Advantage."

Our Promise

Our Promise means your Agilent test and measurement equipment will meet its advertised performance and functionality. When you are choosing new equipment, we will help you with product information, including realistic performance specifications and practical recommendations from experienced test engineers. When you use Agilent equipment, we can verify that it works properly, help with product operation, and provide basic measurement assistance for the use of specified capabilities, at no extra cost upon request. Many self-help tools are available.

Your Advantage

Your Advantage means that Agilent offers a wide range of additional expert test and measurement services, which you can purchase according to your unique technical and business needs. Solve problems efficiently and gain a competitive edge by contracting with us for calibration, extra-cost upgrades, out-of-warranty repairs, and onsite education and training, as well as design, system integration, project management, and other professional engineering services. Experienced Agilent engineers and technicians worldwide can help you maximize your productivity, optimize the return on investment of your Agilent instruments and systems, and obtain dependable measurement accuracy for the life of those products.



Agilent Email Updates

www.agilent.com/find/emailupdates

Get the latest information on the products and applications you select.

Agilent T&M Software and Connectivity

Agilent's Test and Measurement software and connectivity products, solutions and developer network allows you to take time out of connecting your instruments to your computer with tools based on PC standards, so you can focus on your tasks, not on your connections. Visit **www.agilent.com/find/connectivity** for more information.

By internet, phone, or fax, get assistance with all your test & measurement needs

Phone or Fax

United States:

(tel) 800 452 4844

Canada:

(tel) 877 894 4414

(fax) 905 282 6495

China:

(tel) 800 810 0189

(fax) 800 820 2816

Europe:

(tel) (31 20) 547 2323

(fax) (31 20) 547 2390

Japan:

(tel) (81) 426 56 7832

(fax) (81) 426 56 7840

Korea:

(tel) (82 2) 2004 5004

(fax) (82 2) 2004 5115

Latin America:

(tel) (305) 269 7500

(fax) (305) 269 7599

Taiwan:

(tel) 0800 047 866

(fax) 0800 286 331

Other Asia Pacific Countries:

(tel) (65) 6375 8100

(fax) (65) 6836 0252

Email: tm_asia@agilent.com

Online Assistance:

www.agilent.com/find/assist

Product specifications and descriptions in this document subject to change without notice.

© Agilent Technologies, Inc. 2002
Printed in USA, December 17, 2002
5980-1284E



Agilent Technologies