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Agilent
ESA-L Series Spectrum Analyzers

Data Sheet



Available frequency ranges

E4411B	9 kHz to 1.5 GHz
E4403B	9 kHz to 3.0 GHz
E4408B	9 kHz to 26.5 GHz

As the lowest cost ESA option, these basic analyzers are ideal for cost conscious bench-top or manufacturing environments.

If you are looking for a portable solution, consider the Agilent handheld spectrum analyzers (HSA).
www.agilent.com/find/HSA

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The ESA-L Series spectrum analyzers are tested to ensure they will meet their warranted performance. Unless otherwise stated, all specifications are valid over 0 to 55 °C. Supplemental characteristics, shown in italics, are intended to provide additional information that is useful in using the instrument. These typical (expected) or nominal performance parameters are not warranted but represent performance that 80 percent of the units tested exhibit with 95 percent confidence at room temperature (20 to 30 °C).

This data sheet is intended as a quick reference to ESA-L spectrum analyzer specifications, and is by no means complete. Please refer to the ESA-L specification guide for full information and specifications, publication number: E4403-90036.

Do you love your ESA-L, but need a more modern, faster analyzer?

The N9000A CXA is the ideal low-cost replacement for the ESA-L basic analyzer.

www.agilent.com/find/CXA

Table of Contents

Definition of Specifications 2
ESA-L Express Analyzer Option BAS or BTG 3
Frequency Specifications 4
Amplitude Specifications 7
Tracking Generator Specifications 13
General Specifications 14

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ESA-L Express Analyzer Option BAS or BTG

Receive faster delivery and a favorable price when you order the ESA-L express analyzer Option BAS or BTG. This express analyzer is configured based on the most frequently ordered ESA-L configuration and most popular options. The express analyzer options simplify the ordering process while maintaining the flexibility of the ESA platform.

Choose your frequency range:

- E4411B: 9 kHz to 1.5 GHz
- E4403B: 9 kHz to 3.0 GHz
- E4408B: 9 kHz to 26.5 GHz

Choose your express option:

- BAS : Includes IF/sweep port (A4J) and GPIB connection (A4H)
- BTG: Includes BAS, plus tracking generator functionality

And receive the following advantages:

- 1.1 dB overall amplitude accuracy
- +7.5 dBm TOI
- 1 kHz minimum RBW
- 100 Hz minimum RBW with Option 1DN

The BAS or BTG express option can be combined with Option 1DR, narrow resolution bandwidth.

Available through Agilent's distribution partners, the N9000AEP CXA signal analyzer express configuration provides excellent value and the fastest delivery of the most popular CXA configurations. For more information on the N9000AEP, go to: www.agilent.com/find/EXPRESS_CXA

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Frequency Specifications

Upgrading from the ESA-L to the X-Series lowest entry instrument, the N900A CXA signal analyzer, offers numerous benefits. A sampling of side by side specifications are shown here for easy comparison.

Frequency range	ESA-L			CXA
	E4411B	E4403B	E4408B	N9000A
BAS/BTG configuration	9 kHz to 1.5 GHz	9 kHz to 3.0 GHz	9 kHz to 26.5 GHz	9 kHz to 3.0/7.5 GHz
Custom configuration	(75 Ω input option 1DP) 1 MHz to 1.5 GHz	NA	NA	75 Ω input is a special option for CXA. Contact Agilent

ESA-L Frequency range	100 Hz to 3 GHz	2.85 to 6.7 GHz	6.2 to 13.2 GHz	12.8 to 19.2 GHz	18.7 to 26.5 GHz
Band	0	1	2	3	4
Harmonic (N [1]) mixing mode	1-	1-	2-	4-	4-

Frequency range	ESA-L (BAS/BTG)	CXA
Frequency reference error	±[(aging rate x time since last adjustment) + settability + temperature stability]	±[(time since last adjustment × aging rate) + temperature stability + calibration accuracy [3]]
Frequency readout accuracy	(start, stop, center, marker) = ±(frequency indication x frequency reference error + SP [2] + 15% of RBW + 10 Hz + 1 Hz x N [1])	±(marker frequency × frequency reference accuracy + 0.25% × span + 5% × RBWa + 2 Hz +0.5 × horizontal resolution [4])
Aging rate	$\pm 2 \times 10^{-6}$/year	$\pm 1 \times 10^{-6}$/year [5]
Tempurature stability	$\pm 5 \times 10^{-6}$/year	$\pm 2 \times 10^{-6}$
Settability	$\pm 5 \times 10^{-6}$/year	$\pm 2 \times 10^{-8}$
Span coefficient (SP) [2]	0.75% x span	±(0.25% x span + horizontal resolution [4])
External reference	10 MHz	10 MHz
Marker frequency counter [6]		
Accuracy	±(marker frequency x frequency reference error + counter resolution)	±(marker frequency × frequency reference accuracy + 0.100 Hz)
Counter resolution	selectable from 1 Hz to 100 kHz	0.001 Hz
Frequency span		
Range	0 Hz (zero span), 100 Hz to maximum frequency range of the analyzer	0 Hz (zero span), 10 Hz to maximum frequency range of the analyzer

1. *N is the harmonic mixing mode. For negative mixing modes (as indicated by "-"), the desired first LO harmonic is higher than the tuned frequency by the first IF (3.9214 for the 9 kHz to 3 GHz band, and 321.4 MHz for all other bands).*
2. *+5% of span + $\frac{\text{span}}{\text{sweep pts.} - 1}$. Sweep points fixed at 401 for basic analyzer.*
3. *Calibration accuracy depends on how accurately the frequency standard was adjusted to 10 MHz. If the adjustment procedure is followed, the calibration accuracy is given by the "Achievable Initial Calibration Accuracy Specification."*
4. *Horizontal resolution is span/(sweep points -1).*
5. *For periods of one year or more.*
6. *Not available in RBW < 1 kHz (Option 1DR).*

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Frequency Specifications (continued)

Sweep time and trigger		ESA-L (BAS/BTG)	CXA
Range	Span = 0 Hz	4 ms to 4000 s	1 µs to 6000 s
	Span > 100 Hz	4 ms to 4000 s	1 ms to 4000 s
Accuracy (span = 0 Hz)		±1%	±1% (nominal)
Trigger type		Free run, single, line, video, offset, delayed, external	Free run, line, video, external 1, RF burst, periodic timer
Sweep (trace) points			
Range	Zero and non-zero span	401	1 to 40001
Resolution bandwidths			
Sequence		1/3/10	Bandwidths 1 Hz to 3 MHz are spaced at 10% spacing using the E24 series (24 per decade). Bandwidths above 3 MHz are 4, 5, 6, and 8 MHz.
Range	-3 dB	1 kHz to 5 MHz [1]	1 Hz to 8 MHz
	-6 dB	9 kHz, 120 kHz	
Range with option 1DR [2] (ESA-L only)	-3 dB	Add 100 Hz, 300 Hz	
	-6 dB	Add 200 Hz	
Accuracy			
1 to 300 Hz		±10%	±2% (nominal)
300 Hz to 1 kHz			±2% (nominal)
1 kHz to 1.3 MHz		±15%	±2% (nominal)
1.5 MHz to 3.0 MHz		±15%	±7% (nominal)
5 MHz		±30%	
4 to 8 MHz			±15% (nominal)
Selectivity (60 dB/3 dB)			
	100 to 300 Hz	< 5:1 digital, approximately Gaussian	4.1:1 (nominal)
	1 kHz to 5 MHz	< 15:1 synchronously tuned four poles, approximately Gaussian	4.1:1 (nominal)
Video bandwidth			
Sequence		1-3-10	Same as resolution bandwidth range plus wide-open VBW (labeled 50 MHz)
Range		30 Hz to 3 MHz	1 Hz to 8 MHz and wide open (labeled 50 MHz)
Range with 1DR (ESA-L only)		Adds 1, 3, 10 Hz for RBWs less than 1 kHz	

1. *For resolution bandwidths < 1 kHz or > 3 MHz, not compatible with the rms detector.*
2. *Only available for spans < 5 MHz.*

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Frequency Specifications (continued)

	ESA-L spectrum analyzers		CXA signal analyzers	
	E4411B	E4403B/08B	All CXA configurations	
Noise sidebands (Phase noise)	Noise sidebands offset from CW signal with 1 kHz RBW, 30 Hz VBW and sample detector. Specification and typical dBc/Hz applies to all frequencies < 6.7 GHz. [1, 2]		CF = 1 GHz	
Offset from CW signal	Italics indicate typical performance			
1 kHz			-93 dBc/Hz	-98 dBc/Hz (nominal)
≥ 10 kHz	-93, *-95* dBc/Hz	-90, *-94* dBc/Hz	-98 dBc/Hz	-102 dBc/Hz (typical)
≥ 20 kHz	-100, *-102* dBc/Hz	-100, *-105* dBc/Hz		
≥ 30 kHz	-104, *-106* dBc/Hz	-106, *-112* dBc/Hz		
≥ 100 kHz	-113, *-116* dBc/Hz	-118, *-122* dBc/Hz	-101 dBc/Hz	-104 dBc/Hz (typical)
1 MHz			-119 dBc/Hz	-121 dBc/Hz (typical)
10 MHz				-143 dBc/Hz (nominal)

	ESA-L spectrum analyzers	CXA signal analyzers
	1 kHz RBW and 1 kHz VBW (measurement time)	Center frequency = 1 GHz, 10 Hz RBW, 10 Hz VBW (measurement time)
Residual FM (peak-to-peak)	≤ 150 Hz x N [3] (100 ms)	≤ 10 Hz peak to peak (20 ms) nominal
	≤ 30 Hz x N [3] (20 ms), Option 1DR	

1. *Enhanced wide offset phase noise and ACPR dynamic range.*
2. *Option 1DR is required for phase noise measurements at frequency offsets of 10 kHz and less. Performance at 10 kHz offset without Option 1DR is -90 dBc/Hz.*
3. *N = LO Harmonic mixing number.*

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Amplitude Specifications

		ESA-L spectrum analyzer		CXA signal analzyer	
		E4411B	E4403/08B	All frequency ranges	
Amplitude range					
Measurement range		Displayed average noise level (DANL) to +30 dBm		Displayed anverage noise level (DANL) to +23 dBm	
Mechanical input attenuator range		0 to 60 dB	0 to 65 dB	Standard	0 to 50 dB in 10 dB steps
				Option FSA	0 to 50 dB in 2 dB steps
Maximum safe input level					
Average continuous power		+30 dBm (1 W)	+30 dBm (1 W)	+30 dBm (1 W)	
Peak pulse power [1]		+30 dBm (1 W)	+50 dBm (100 W)	+50 dBm (100 W), input attenuation ≥ 30 dB	
DC voltage	AC coupled	100 Vdc	100 Vdc	±50 Vdc	
		+75 dBmV (0.4 W) Option 1DP			
1 dB gain compression total power at input mixer [2]		Two tone			
50 MHz to 6.7 GHz		0 dBm to 1.5 GHz	0 dBm	+2 dBm nominal, 50 MHz to 7.5 GHz, preamp off	
				-19 dBm nominal, 50 MHz to 7.5 GHz, preamp on	
6.7 GHz to 13.2 GHz			-3 dBm		
13.2 GHz to 26.5 GHz			-5 dBm		

1. *< 10 µs pulse width, < 1% duty cycle.*
2. *Mixer power level (dBm) = Input power (dBm) minus input attenuation (dB).*

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Amplitude Specifications (continued)

	ESA-L spectrum analyzer			CXA signal analzyer		
	E4411B	E4403B	E4408B	All frequency ranges		
Displayed average noise level (dBm) (input terminated, 0 dB attenuation, sample detector) specification Italics indicate typical performance				Displayed average noise level (dBm) (input terminated, 0 dB attenuation, sample or average detector) normalized to 1 Hz RBW specification *Italics indicate typical performance*		
Condition	100 Hz RBW; 1 Hz VBW (Option 1DR)				Preamplifier OFF	Preamplifier ON
Frequency				Frequency		
1 to 10 MHz	-123, *-129* dBm	-126 dBm	-129 dBm	1 to 10 MHz [1]	-130, *-137* dBm	-149, *-157* dBm
10 to 500 MHz	-127, *-131* dBm	-125, *-130* dBm	-124, *-129* dBm	10 MHz to 1.5 GHz	-148, *-150* dBm	-161, *-163* dBm
500 MHz to 1 GHz	-125, *-130* dBm			1.5 to 2.2 GHz	-144, *-147* dBm	-160, *-163* dBm
1 to 1.5 GHz	-121, *-128* dBm	-124, *-130* dBm	-123, *-130* dBm	2.2 to 3 GHz	-140, *-143* dBm	-158, *-161* dBm
1.5 to 2 GHz	N/A	-124, *-130* dBm	-123, *-130* dBm	3 to 4.5 GHz	-137, *-140* dBm	-155, *-159* dBm
2 to 3 GHz		-122, *-130* dBm	-120, *-128* dBm			
3 to 6 GHz		N/A	-120, *-128* dBm	4.5 to 6 GHz	-133, *-136* dBm	-152, *-156* dBm
6 to 12 GHz			-118, *-127* dBm	6 to 7.5 GHz	-128, *-131* dBm	-148, *-152* dBm
12 to 22 GHz			-115, *-124* dBm			
22 to 26.5 GHz			-109, *-122* dBm			

1. DANL below 10 MHz is dominated by phase noise around the LO feedthrough signal.

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Amplitude Specifications (continued)

	ESA-L spectrum analyzer, all frequency ranges	CXA signal analyzer, all frequency ranges	
Display			
Display range	0.1, 0.2, 0.5 dB/division and 1 to 20 dB/division in 1 dB steps (10 display divisions)		
Log scale			
RBW ≥ 1 kHz	Calibrated 0 to -85 dB from reference level	Ten divisions displayed	
RBW ≥ 300 Hz	Calibrated 0 to -120 dB [1] from reference level	0.1 to 1 dB/division in 0.1 dB steps	
		1 to 20 dB/division in 1 dB steps	
Linear scale	10 divisions		
Scale units	dBm, dBmV, dBµV, dBµA, A, V, and W	dBm, dBmV, dBµV, dBµA, dBmA, A, V, and W	
Trace detectors	Peak, negative peak, sample, rms [2], video averaging	Peak, negative peak, sample, normal, average [3]	
Marker readout resolution			
Log scale			
0 to -85 dB	0.04	0.01 dB (average off)	
0 to -120 dB (1DR)		0.001 dB (average on)	
Linear scale	0.01% of reference level	< 1% of signal level (nominal)	
Reference level			
Range	-149.9 dBm to maximum mixer level + attenuator setting	-170 to +30 dBm, 707 pV to 7.07 V	
Resolution			
Log scale	±0.1 dB	0.01 dB	
Linear scale	±0.12% of reference level	0.01 dB (0.11%)	
Accuracy [4]	For reference level (dBm) – input attenuator setting (dB) + preamp gain (dB)		
-10 to > -60 dBm	±0.3 dB	0 dB	
-60 to > -85 dBm	±0.5 dB		
-85 to > -90 dBm	±0.7 dB		
Display scale switching uncertainty (referenced to 1 kHz RBW at reference level)			
Linear to log switching	±0.15 dB at reference level	0 dB	
Resolution bandwidth switching uncertainty			
	Referenced to 1 kHz RBW	Referenced to 30 kHz RBW	
100 Hz, 300 Hz RBW	±0.3 dB (1DR)	1 Hz to 3 MHz	±0.15 dB
1 kHz to 3 MHz RBW	±0.3 dB	4, 5, 6, 8 MHz	±1.0 dB
5 MHz RBW	±0.6 dB		

1. *0 to -70 dB range when span = 0 Hz, or when IF gain fixed.*
2. *Not available for RBW < 1 kHz or > 3 MHz.*
3. *Average detector works on RMS, voltage and logarithmic scales.*
4. *50 Ω, accuracy (at a fixed frequency, a fixed attenuator, and referenced to -35 dBm.*

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Amplitude Specifications (continued)

	ESA-L spectrum analyzer	CXA signal analyzer	
	Input attenuator switching uncertainty (at 50 MHz)	Input attenuation switching uncertainty relative to 10 dB reference setting	
Attenuator setting 0 to 5 dB	±0.3 dB		
10 dB	Reference	50 MHz	±0.15 dB typical
		Attenuation > 2 dB, preamp off	
		100 kHz to 3.0 GHz	±0.30 dB nominal
15 to 60 dB	±(0.1 dB + 0.01 x attenuator setting)	3.0 to 7.5 GHz	±0.50 dB nominal
Frequency response (10 dB input attenuation)			
Absolute [1] 9 kHz to 3 GHz	±0.5 dB	9 kHz to 10 MHz	±0.6 dB, ±0.45 dB (95th percentile)
3 to 6.7 GHz	±1.5 dB	10 MHz to 3 GHz	±0.75 dB, ±0.55 dB (95th percentile)
6.7 to 13.2 GHz	±2 dB	3 to 5.25 GHz	±1.45 dB, ±1.00 dB (95th percentile)
13.2 to 26.5 GHz		5.25 to 7.5 GHz	±1.65 dB, ±1.20 dB (95th percentile)
Absolute amplitude accuracy			
At reference settings [2]	±0.4 dB		
Overall amplitude accuracy [3]	±(0.6 dB + absolute frequency response)		
Preamplifier off		At reference setting, 50 MHz	±0.40 dB
		At all frequencies	±(0.40 dB + frequency response)
		100 kHz to 10 MHz	±0.40 dB (95th percentile)
		10 MHz to 2.0 GHz	±0.50 dB (95th percentile)
		2.0 to 3.0 GHz	±0.60 dB (95th percentile)
Preamplifier on		100 kHz to 7.5 GHz	±(0.39 dB + frequency response), nominal

1. *Frequency response values are referenced to the amplitude at 50 MHz (20 to 30 °C).*
2. *Settings are: reference level -25 dBm; (75 Ω reference level +28.75 dBmV); input attenuation 10 dB; center frequency 50 MHz; RBW 1 kHz; VBW 1 kHz; amplitude scale linear or log; span 2 kHz; frequency scale linear; sweep time coupled, sample detector, signal at reference level.*
3. *For reference level 0 to -50 dBm; input attenuation 10 dB; RBW 1 kHz; VBW 1 kHz; amplitude scale log, log range 0 to -50 dB from reference level; frequency scale linear; sweep time coupled; signal input 0 to -50 dBm; span ≤ 20 kHz (20 to 30 °C).*

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Amplitude Specifications (continued)

	ESA-L spectrum analyzer	CXA signal analyzer	
Display scale fidelity [2]		Log-linear fidelity (relative to the reference condition of -25 dBm input through the 10 dB attenuation, or -35 dBm at the input mixer)	
Log max cumulative dB below reference level RBW ≥ 1 kHz 0 dB reference	±(0.3 dB + 0.01 x dB from reference level)	Input mixer level [2]	
> 0 to 70 dB		-80 dBm ≤ ML < -15 dBm	±0.15 dB
RBW ≤ 300 Hz (Option 1DR) span > 0 Hz, auto range on 0 to 98 dB [1]	±(0.3 dB + 0.01 x dB from reference level)	-15 dBm ≤ ML < -10 dBm	±0.3 dB, ±0.15 typical
> 98 to 120 dB	±2.0 dB from reference level, characteristic		
Log incremental accuracy dB below reference level 0 to 80 dB [1]	±0.4 dB/4 dB		
Linear accuracy	±2% of reference level		

1. *0 to 30 dB for RBW = 200 Hz.*
2. *Mixer level = input level - input attenuator.*

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Amplitude Specifications (continued)

	Basic analyzer E4411B/03B/08B	CXA signal analyzers	
Spurious responses			
Third order intermodulation distortion (TOI) [3]	For two -30 dBm signals at input mixer [1] and > 50 kHz separation	For two -20 dBm signals at input mixer with tone separation 100 kHz, 0 dB RF attenuation	
100 MHz to 26.5 GHz	< -75 dBc, +7.5 dBm TOI	Distortion [4], TOI [5], TOI typical	
10 to 400 MHz		-60 dBc, +10 dBm, +14 dBm	
400 MHz to 3 GHz		-66 dBc, +13 dBm, +17 dBm	
3 GHz to 7.5 GHz		-66 dBc, +13 dBm, +15 dBm	
Preamplifier on			
10 MHz to 7.5 GHz		-8 dBm nominal (Two -45 dBm tones at the preamp input, spaced by 100 kHz)	
Second harmonic distortion			
2 to 750 MHz	< -75 dBc, +35 dBm SHI (E4411B)	10 MHz to 3.75 GHz Input level -20 dBm, Input attenuation 10 dB, Preamp off	+35 dBm, +42 dBm nominal
-40 dBm tone at input mixer [1]			
10 to 500 MHz	< -60 dBc, +30 dBm SHI		
-30 dBm tone at input mixer [1]			
500 MHz to 1.5 GHz	< -70 dBc, +40 dBm SHI	10 MHz to 3.75 GHz Input level -40 dB, Input attenuation 10 dB, Preamp on	+10 dBm nominal
-30 dBm tone at input mixer [1]			
1.5 to 2.0 GHz	< -80 dBc, +70 dBm SHI		
-10 dBm tone at input mixer [1]			
> 2 GHz	≤ -95 dBc, +85 dBm SHI		
-10 dBm tone at input mixer [1]			
Other input related spurious			
Inband > 30 kHz offset	< -65 dBc for -20 dBm tone at input mixer [1]		
Out of band responses	< -80 dBc for -10 dBm tone at input mixer [1]		
10 MHz to 7.5 GHz		-60 dBc for -30 dBm mixer level (typical)	
Residual responses (Input terminated and 0 dB attenuation)			
50 Ω RF input impedance			
150 kHz to 1.5 GHz/6.7 GHz [2]	< -90 dBm		
75 Ω RF input impedance (Option 1DP only available on ESA-L custom configuration for the E4411B)			
1 MHz to 1.5 GHz	< -36 dBmV		
200 kHz to 7.5 GHz (swept)		-90 dBm	
Zero span or FFT or other frequencies		-100 dBm (nominal)	

1. *Mixer power level (dBm) = input power (dBm) - input attenuation (dB).*
2. *Up to 1.5 GHz for models E4411B/03B. Up to 6.7 GHz for model E4408B.*
3. *The nominal performance of the phase noise at tfrequencies above the frequency at which the specifications apply (1 GHz) depends on the band and the offset.*
4. *Distortion for two tones that are each at -20 dBm is computed from TOI.*
5. *TOI = third order intercept. The TOI is given by the mixer tone level (in dBm) minus (distortion/2) where distortion is the relative level of the distortion tones in dBc.*

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Tracking Generator Specifications

	ESA-L			CXA*
	E4411B-1DN (50 Ω)	E4411B-1DQ (75 Ω)	E4403B/08B-1DN	N9000A-T03
Frequency range	9 kHz to 1.5 GHz	1 MHz to 1.5 GHz	9 kHz to 3 GHz	9 kHz to 3 GHz
RBW range	1 kHz to 5 MHz	1 kHz to 5 MHz	1 kHz to 5 MHz	1 Hz to 8 MHz
Output power level range	0 to -70 dBm	+42.75 to -27.25 dBmV	-2 to -66 dBm	0 to -50 dBm
Output vernier range	10 dB	10 dB	8 dB	0.1 dB
Output flatness	±2.0 dB (9 kHz to 10 MHz)	±2.5 dB (1 to 10 MHz)	±3.0 dB (9 kHz to 10 MHz)	±1.5 dB (9 kHz to 100 kHz)
	±1.5 dB (10 MHz to 1.5 GHz)	±2.0 dB (10 MHz to 1.5 GHz)	±2.0 dB (10 MHz to 3 GHz)	±1.2 dB (100 kHz to 3 GHz)
Effective source match (nominal)	< 2.5:1	< 2.0:1	< 2.0:1	< 1.5:1
Spurious output				
Harmonic spurs	< -20 dBc (9 kHz to 20 MHz)	< -20 dBc (9 kHz to 20 MHz)	≤ -15 dBc (9 to 20 kHz)	< -35 dBc (100 kHz to 3 GHz)
	< -25 dBc (20 MHz to 1.5 GHz)	< -25 dBc (20 MHz to 1.5 GHz)	≤ -25 dBc (20 kHz to 3 GHz)	
Non-Harmonic spurs	< -35 dBc	< -35 dBc	≤ -27 dBc (9 kHz to 2 GHz)	< -35 dBc nominal (9 kHz to 10 MHz)
			≤ -23 dBc (2 to 3 GHz)	< -35 dBc (10 MHz to 3 GHz)
Dynamic range	Max output power level -DANL			
Output power sweep range	(-15 to 0 dBm) - (source attenuator setting)	(+27.75 to +42.75 dBmV) - (source attenuator setting)	(-10 to -2 dBm) - (source attenuator setting)	-50 to 0 dBm

** CXA signal analyzer also offers Option T06 for the tracking generator up to 6 GHz.*

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General Specifications

	Basic analyzer			CXA signal analyzer
	E4411B	E4403B	E4408B	N9000A-503/507
Temperature range				
Operating	0 to +55 °C			5 to 50 °C
Storage	-40 to +75 °C			-40 to +70 °C
Disk drive	10 to +40 °C			NA
EMI compatibility				
	Conducted and radiated interference is in compliance with CISPR Pub. 11/1990 Group 1 Class A			Complies with European EMC Directive 2004/108/EC
	Conducted and radiated interference is in compliance with CISPR Pub. 11/1990 Group 1 Class B [1] (Option 060)			
Audible noise sound pressure at 25 °C				
	< 40 dBa pressure and < 4.6 bels power (ISODP7779)			
Military specifications power requirements	Type tested to the environmental specifications of MIL-PRF-28800F Class 3			Test methods are aligned with IEC 60068-2 and levels are similar to MIL-PRF-28800F Class 3.
AC operation on (line |)	90 to 132 V rms, 47 to 440 Hz			100 to 120 V, 50/60/400 Hz
	195 to 250 V rms, 47 to 66 Hz			220 to 240 V, 50/60 Hz
	Power consumption < 300 W			Power consumption < 270 W
Standby (line ⏻)	Power consumption < 5 W			Power consumption < 20 W
DC operation	12 to 20 Vdc, < 200 W power consumption			NA
Data storage (nominal)				
Internal [2]	200 traces or states/8.0 MB			40 GB (nominal)
External	3.5 in, 1.44 MB, MS-DOS			Supports USB 2.0 compatible memory devices
Memory usage (nominal)				
State	16 kB [3]			
State plus 401- point trace	20 kB [3]			
Measurement speed				
Local measurement rate	≥ 35/s	≥ 30/s	≥ 28/s	11 ms nominal
Remote measurement and GPIB transfer	≥ 30/s	≥ 30/s	≥ 30/s	6 ms nominal
RF center freq tuning time	≤ 90 ms	≤ 90 ms	≤ 90 ms	22 ms nominal
Display				
Display resolution [4]	640 x 480			1024x768 XGA

1. *Meeting class A performance during DC operation.*
2. *For serial numbers < US414400 or MY41440000, 1 MB without Option B72, 8 Mb with Option B72.*
3. *401 sweep points. The size of a state will increase depending on the installed application(s). General Specifications.*
4. *The LCD display is manufactured using high precision technology. However, there may be up to six bright points (white, blue, red, or green in color) that constantly appear on the LCD screen. These points are normal in the manufacturing process and do not affect the measurement integrity of the product in any way.*

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General Specifications (continued)

Inputs/Outputs	ESA-L spectrum analyzer	CXA signal analyzer
Front panel		
Input RF out	50 Ω type N (f); 75 Ω BNC (f) (Option 1DP); 50 Ω APC 3.5 (m) (Option BAB)	50 Ω type N (f)
Probe power	+15 Vdc, -12.6 Vdc at 150 mA max (characteristic)	+15 Vdc, ±7 % at 150 mA max (nominal)
		-12.6 Vdc, ±10 % at 150 mA max (nominal) GND
External keyboard	6-pin mini-DIN, PC keyboards (for entering screen titles and fi le names)	Compatible with USB 2.0
Headphone Power output	Front panel knob controls volume 0.2 W into 4 Ω (characteristic)	3.5 mm (1/8 inch) miniature stereo audio jack 90 mW per channel into 16 Ω (nominal)
AMPT REF out	50 Ω BNC (f) (nominal)	
IF INPUT (Option AYZ)	50 Ω SMA (f) (nominal)	
LO OUTPUT (Option AYZ)	50 Ω SMA (f) (nominal)	
Rear panel		
10 MHz REF OUT	50 Ω BNC (f), > 0 dBm (characteristic)	50 Ω BNC (f), nominal
10 MHz REF IN	50 Ω BNC (f), -15 to +10 dBm (characteristic)	50 Ω BNC (f), nominal
GATE TRIG/EXT TRIG IN	BNC (f), 5 V TTL	BNC (f), 5 V TTL
GATE /HI SWP OUT	BNC (f), 5 V TTL	NA
VGA OUTPUT	VGA compatible monitor, 15-pin mini D-SUB, (31.5 kHz horizontal, 60 Hz vertical sync rates, non-interlaced analog RGB 640 x 480)	VGA compatible monitor, 15-pin mini D-SUB
IF, sweep and video ports (Option A4J or AYX)		
AUX IF OUT	BNC (f), 21.4 MHz, nominal -10 to -70 dBm (uncorrected)	NA
AUX VIDEO OUT	BNC (f), 0 to 1 V, characteristic (uncorrected)	
HI SWP IN	BNC (f), low stops sweep, (5 V TTL)	
HI SWP OUT	BNC (f), (5 V TTL)	
	BNC (f), 0 to +10 V ramp	
	IEEE-488 bus connector	
	RS-232, 9-pin D-SUB (m)	
GPIB interface (Option A4H)		
	IEEE-488 bus connector	Standard
Serial interface (Option 1AX)		
	RS-232, 9-pin D-SUB (m)	NA
Parallel interface		
(Option A4H or 1AX)	25-pin D-SUB (f) printer port only	NA
I/O connectivity software	IO libraries suite (www.agilent.com/find/iosuite/data-sheet)	

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General Specifications (continued)

Dimensions and weight	ESA-L spectrum analyzer	CXA signal analyzer	
Width to outside of instrument handle	416 mm (16.4 in)	426 mm (16.8 in)	
Width to outside of the shipping cover	373 mm (14.7 in)		
Overall height	222 mm (8.75 in)	177 mm (7.0 in)	
Depth from front frame to rear frame	409 mm (16.1 in)	368 mm (14.5 in)	
Depth with instrument handle rotated horizontal	516 mm (20.3 in)		
	E4411B	For all CXA signal analyzer frequencies	
Instrument weight	13.2 kg (29.1 lbs)	Instrument weight; Shipping weight	14 kg (30.8 lbs) nominal; 26 kg (57.2 lbs) nominal
Shipping weight	25.1 kg (55.4 lbs)		
	E4403B		
Instrument weight	15.5 kg (34.2 lbs)		
Shipping weight	27.4 kg (60.4 lbs)		
	E4408B		
Instrument weight	17.1 kg (37.7 lbs)		
Shipping weight	31.9 kg (70.3 lbs)		

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