

H500 SA2500 Spectrum Analyzer Datasheet

Spectrum Analyzer Datasheet

OVERVIEW SPECIFICATIONS ORDERING INFORMATION

Specifications

All specifications apply to all models unless noted otherwise.

MODEL OVERVIEW

Model	Real-time bandwidth	Frequency range	Minimum event duration for 100% POI	SFDR (typical)
SA2500	20 MHz	10 kHz - 6.2 GHz	125 μ s ¹ - 500 μ s	<70 dB
H500	20 MHz	10 kHz - 6.2 GHz	125 μ s	<70 dB

¹ With option EP1 installed

GENERAL PERFORMANCE CHARACTERISTICS

RF input

Operating frequency range

10 kHz - 6.2 GHz

Maximum operating input level

+20 dBm peak envelope power

This is the maximum input level at which the instrument will meet its performance specifications. For a signal without any amplitude variation, peak envelope power = rms.

Maximum Input Power without Damage

50 W_{rms} below 3.2 GHz

15 W_{rms} between 3.2 GHz and 6.2 GHz

IF output

Output impedance

50 Ω

IF center frequency

140 MHz

IF 3 dB bandwidth

24 MHz

IF Output Level (nominal performance at 0 dBm input)

Input frequency	IF output level
1 GHz	-12 dBm
1.6 GHz	-12 dBm
3.6 GHz	-10 dBm
4.35 GHz	-11 dBm
5 GHz	-16 dBm
5.75 GHz	-22 dBm

Internal timebase

Frequency error (factory calibration corrected)

± 0.5 PPM from 0 $^{\circ}$ C to 50 $^{\circ}$ C



STARTING PRICES:
H500/SA2500 Handheld
Spectrum Analyzer : \$24,600

CONFIGURE & QUOTE

MORE INFORMATION:
[H500/SA2500 Handheld Spectrum Analyzer Overview](#)
[Product Support](#)

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(1.59 MB)

±1.0 PPM aging/year

Twenty-minute warm-up period required to meet accuracy specification

Frequency error (GPS corrected)

±0.01 ppm (typical)

Frequency error (after GPS lock loss)

±0.03 ppm, 10 minute interval after lock loss (unit operated for >20 minutes before lock loss and < 5 °C temperature change over interval) (typical)

External reference input

impedance

1500 Ω

Frequency range

1 MHz up to 20 MHz ± 1 PPM, in 1 MHz steps

Input level range

-15 dBm to +15 dBm, 1 MHz to 15 MHz
-10 dBm to +15 dBm, 16 MHz to 20 MHz

dBm levels assume 50 ohm source

Integrated GPS receiver

Position Accuracy (typical)

Horizontal: R < 9 meters (P = 90%)
Altitude: H < 18 meters (P = 90%)

Position Update Rate (nominal)

1 update/sec (Latitude/Longitude/Altitude)

SPECTRUM ANALYZER CHARACTERISTICS

Frequency

Span

10 kHz to 6.2 GHz (preamp off)
10 MHz to 6.2 GHz (preamp on)

Center frequency setting resolution

1 Hz

Swept spans (wide scanning)

Span Range

20 MHz to 6.2 GHz

Spectrums per second

61 (typical)

Scan Speed

1240 MHz per second (typical)

Resolution Bandwidth (RBW)

RBW Range

10 Hz to 3 MHz (Manual)
10 Hz to 1 MHz (Auto)

RBW setting resolution

1 Hz

Spectral purity

Displayed average noise level, preamp On

-153 dBm, 10 MHz to 2 GHz, 10 Hz RBW
-152 dBm, 2 GHz to 4 GHz, 10 Hz RBW

-151 dBm, 4 to 5 GHz, 10 Hz RBW
-145 dBm, 5 to 6.2 GHz, 10 Hz RBW

Phase noise (entire operating frequency range)

≤ -95 dBc/Hz at 10 kHz offset
≤ -95 dBc/Hz at 20 kHz offset

≤ -95 dBc/Hz at 30 kHz offset
≤ -97 dBc/Hz at 100 kHz offset

	<p>≤ -110 dBc/Hz at 1 MHz offset</p>
	<p>Residual spurious, preamp Off</p> <p>≤ -90 dBm, 0 dBm attenuator setting</p> <p>Exception Frequencies:</p> <p>9 MHz to 19 MHz center frequency</p> <p>3464 MHz center frequency</p> <p>4592 MHz center frequency</p> <p>5374 MHz to 5378 MHz center frequency</p> <p>6160 MHz center frequency</p>
	<p>Residual spurious, preamp On</p> <p>≤ -105 dBm, 0 dBm attenuator setting</p> <p>Exception Frequencies:</p> <p>9 MHz to 19 MHz center frequency</p> <p>5374 MHz to 5378 MHz center frequency</p>
	<p>Third order IMD</p> <p>≤ -70 dBc for two tones at or below the reference level, preamp Off, all gain settings auto-coupled</p>
	<p>Second harmonic</p> <p>≤ -60 dBc for a single tone at or below the reference level, preamp Off, all gain settings auto-coupled</p>
	<p>Input-related spurious</p> <p>≤ -70 dBc except for $F_{in} = 2.282 \text{ GHz} \pm 20 \text{ MHz}$</p> <p>The dBc reference for this specification is the total power of all signals at the input of the instrument regardless of the current span</p>
	<p>Input-related spurious, exception frequencies, typical</p> <p>≤ -55 dBc at $F_{in} = 2.282 \text{ GHz} \pm 20 \text{ MHz}$</p> <p>The dBc reference for this specification is the total power of all signals at the input of the instrument regardless of the current span</p>
	<p>Third order intercept</p> <p>$\geq +7$ dBm, 0 dB input attenuation, preamp Off</p>
Spectral display amplitude	<p>Reference level range</p> <p>+20 dBm to -160 dBm</p>
	<p>Marker power accuracy</p> <p>± 1.75 dB, -50 dBm \leq input \leq +20 dBm, preamp off</p> <p>± 3.0 dB, -80 dBm \leq input $<$ -50 dBm, preamp on, above 10 MHz</p> <p>± 3.75 dB, -120 dBm \leq input $<$ -80 dBm, preamp on, above 10 MHz</p> <p>Use peak detector for CW-like signals; use average detector for wideband (signal \gg RBW)</p> <p>Accuracy guaranteed for CW signals and span set to 20 MHz or less</p>
Display modes	<p>Display modes</p> <p>Normal – Updates display with each new result</p> <p>Max Hold – Updates displayed point only if new point $>$ old</p> <p>Min Hold – Updates displayed point only if new point $<$ old</p> <p>Max/Min Hold – Displays a vertical bar between Max Hold and Min Hold</p> <p>Average – Displays average of N (specified by user) acquisitions</p> <p>Average is calculated as follows:</p> <p>Last N values are saved in memory; when a new result is available, the earliest result of the N stored values is discarded, the new result is added to the stored values, and a new average is calculated from the stored values. If the number of results is less than N, then all of the</p>

results are averaged together

Number of averages

$1 \leq N \leq 200$

GENERAL PURPOSE RF MEASUREMENT CHARACTERISTICS

RF channel power measurement

Bandwidth range

1 kHz - 20 MHz

Accuracy

≤ 1.2 dB; +20 dBm to -60 dBm; 1 MHz to 3.2 GHz, preamp off, Ref Level > -35 dBm

≤ 2.4 dB; -40 dBm to -75 dBm; 10 MHz to 3.2 GHz, preamp on, Ref Level \leq -35 dBm

≤ 1.8 dB; +20 dBm to -50 dBm; 3.2 GHz to 6.2 GHz, preamp off, Ref Level > -35 dBm

≤ 3 dB; -40 dBm to -75 dBm; Resolution BW < 100 kHz; -40 dBm to -55 dBm; Resolution BW \geq 100 kHz 3.2 GHz to 6.2 GHz, preamp on, Ref Level \leq -35 dBm

Specifications apply for default control settings (Auto RBW, Auto Level)

Occupied bandwidth measurement

Percent Power Inclusion Range

50-100%

RF field strength

Channel bandwidth range

Same as RF channel power

Accuracy

Same as RF channel power

SCAN, CLASSIFY, AND LOCATE CHARACTERISTICS

DPX™ Live RF spectrum display

Spectrum processing rate, nominal

10,000 spectrums per second, span independent (H500 standard and SA2500 with Option EP1)

2,500 spectrums per second (SA2500 standard)

Minimum signal duration for 100% probability of intercept (POI), typical

125 μ s (H500 standard and SA2500 with Option EP1)

500 μ s (SA2500 standard)

Span Range

5 kHz to 20 MHz

Spectrogram (rising raster)

Spectrum processing rate, nominal

20 spectrums per second

Minimum signal duration for time measurement

20 milliseconds (typical)

Span range

5 kHz to 20 MHz

Trigger

Modes

Single or continuous, free run or triggered

Event source

IF level, external input, or internal timebase

Types

Rising edge, falling edge, level above threshold, level below threshold

Delay

0 to 60 s with 1 μ s resolution

Position

Settable from 0-100%

IF level trigger

Threshold range

-160 dBm to +20 dBm

Bandwidth range

5 kHz to 20 MHz

External trigger

Maximum input level without damage

$\pm 5 V_{\text{peak}}$ continuous

Minimum high threshold

2.0 V

Maximum low threshold

0.8 V

Minimum High/Low time

10 ns

Impedance

10 k Ω

Coupling

DC

Internal timebase trigger

Mode

Single trigger on time, repeat trigger at interval, or both

Resolution

1 μ s

Measurement result time stamps

Resolution (nominal)

1 ms before GPS lock obtained; 1 ns after GPS lock obtained.

Accuracy - relative (typical)

± 500 ns time-stamp error between multiple measurement results.
Internal GPS reference lock required.

Accuracy - GPS reference (typical)

± 1 μ s, all measurements except DPX spectrum; ± 1 ms DPX spectrum.
Time-stamp error relative to GPS system absolute time reference.
Internal GPS reference lock required, identical acquisition bandwidth setting required.

IQ acquisition time

(available in amplitude vs. time measurement)

Span	Sample rate	Maximum acquisition length
20 MHz	28 msp/s	36 ms
10 MHz	14 msp/s	73 ms
5 MHz	7 msp/s	146 ms
2 MHz	2.8 msp/s	365 ms
1 MHz	1.4 msp/s	731 ms
500 kHz	700 ksps	1.4 sec
200 kHz	280 ksps	3.6 sec
100 kHz	140 ksps	7.3 sec
50 kHz	72.9 ksps	14 sec
20 kHz	27.3 ksps	37 sec
10 kHz	13.7 ksps	74 sec
5 kHz	6.8 ksps	149 sec

AM demodulation

Measurement frequency

As selected

Minimum input signal level, typical

-100 dBm

Audio measurement bandwidth

	8 kHz
FM demodulation	Measurement frequency
	As selected
	Minimum input signal level, typical
	-100 dBm
	Maximum signal deviation
	Up to 100 kHz
	Audio measurement bandwidth
	8 kHz, 15 kHz, 75 kHz, or 200 kHz
	Maximum audio output bandwidth
	15 kHz
Signal strength indicator	Input signal level
	-120 dBm, minimum
	Measurement frequency
	As selected
	Measurement bandwidth
	Up to 20 MHz, dependant upon span and RBW setting
	Tone type
	Variable beep rate or variable frequency
	Update rate, typical
	10 per second
Mapping	Native map type
	Graticule (.gsf)
	Map types directly supported
	Pitney Bowes MapInfo (*.mif), Bitmap (*.bmp), MPS (collection of GSF maps derived from Open Street Map mapping tiles) ¹
	Other map types accepted using PC application iMap converter
	Google™ earth Microsoft® MapPoint® USGS DLG (*.opt) ESRI ArcInfo Shape (*.shp) Other raster formats (*.gif, *.jpg, *.png, *.tif)

¹ Maps derived from Open Street Map tiles are © OpenStreetMap contributors. For more information see <http://www.openstreetmap.org/copyright>.

POWER

Battery life	5 hours of continuous Spectrum mode (with optional second battery). Actual life can be higher depending on usage.
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PHYSICAL CHARACTERISTICS

Temperature	Operating
	0 °C to +50 °C specified performance, -10 °C to +50 °C, typical
	Nonoperating
	-40 °C to +60 °C
	With batteries installed
	While charging: 0 °C to +45 °C Storage (nonoperating): -20 °C to +60 °C
Humidity	Operating and nonoperating
	5% to 95% relative humidity (RH) at up to +30 °C, noncondensing 5% to 45% RH above +30 °C up to +50 °C, noncondensing

Altitude	Operating
	Up to 4,600 meters (15,092 feet)
	Nonoperating
	Up to 12,192 meters (40,000 feet)
Dimensions	Height
	25.5 cm. (10.0 in.)
	Width
	33 cm. (13 in.)
	Depth
	12.5 cm.
	Weight
	5.56 kg (12.27 lb.)
Color display	Size
	10.4 in. (diagonal), transreflective LCD, color
	Resolution
	640×480 (VGA)

EMC ENVIRONMENT AND SAFETY

Electromagnetic compatibility (EMC) compliance	EN61326-1:2006 and EN61326-2:2006 Product Family Standard for Electrical Equipment for Measurement, Control, and Laboratory Use – EMC Requirements.
European Union	Emissions
	CISPR11, group 1, class a
	EN 61000-3-2
	EN 61000-3-3
	Immunity
	IEC 61000-4-2
	IEC 61000-4-3
	IEC 61000-4-4
	IEC 61000-4-5
	IEC 61000-4-6
	IEC 61000-4-11
Australia/New Zealand	EMC compliance in accordance with the ACMA
USA	FCC, CFR Title 47, Part 15, Subpart B, Class A.
Safety compliance	ANSI/UL610101:2004
	Electrical Equipment for Measurement, Control, and Laboratory Use
	CSA C22.2 No. 61010.1:2004
	Electrical Equipment for Measurement, Control, and Laboratory Use
	EN 610101:2001
	Safety Compliance Electrical Equipment for Measurement, Control, and Laboratory Use
	IEC610101:2001
	Electrical Equipment for Measurement, Control, and Laboratory Use
	ISA 82.02.01
	Electrical Equipment for Measurement, Control, and Laboratory Use

WARRANTY AND CALIBRATION

Warranty	1 year on parts and labor
Recommended instrument calibration	2 years



Tektronix is registered to ISO 9001 and ISO 14001 by SRI Quality System Registrar.



Product(s) complies with IEEE Standard 488.1-1987, RS-232-C, and with Tektronix Standard Codes and Formats.

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