Real-time Spectrum Analyzers

- RSA2200A Series • RSA3300A Series

Features & Benefits

Real-time Spectrum Analysis
Provides Seamless Capture of Time-varying, Transient or Periodic RF Signals not Possible with Swept Spectrum Analyzers

Up to 65,536 Ms (256 MB) of Internal Memory Provides for Complete Analysis of Signals Over Time Without Making Multiple Measurements

Time-correlated, Simultaneous Views of Time, Frequency, and Modulation Domains Provide Greater and Unique Understanding of Signal Behavior

Spectrogram Provides a Revealing Picture of RF Signal Frequency and Amplitude Behavior Over Time – Not Possible with a Swept Spectrum Analyzer

Frequency Mask Trigger in RSA3300A Series – Available only from Tektronix – Makes it Easy to Capture Fast, Transient, or Intermittent Signals that Swept Spectrum Analyzers Would Miss

Spectrum Analyzer Mode for Very Wide Span Analyses

Built-in Demodulators Enhance Analysis of AM, ASK, FM, FSK, and PM Signals

Digital Demodulator in RSA3300A Series Offers Affordable Vector Signal Analysis

Outstanding DC – 20 MHz Dynamic Range and Low Phase Noise Mean You Can Make High-Performance Weak Signal and Phase Noise Measurements

Applications

Analog and Digital Modulation Signal Quality Analysis

Understanding Frequency and Spectral Occupancy Behavior Over Time

Capture and Characterization of Undesired, Unknown, or Interfering Signals

Device/System Design or Operational Diagnostic Measurement

Getting Answers to Elusive EMI Problems

VCO/Synthesizer Design, RFID Device Characterization, General Purpose Digital Modulation Vector Signal Analysis, Spectrum Monitoring, Radar Measurements

Trigger, Capture, Analyze Your RF Signal

Quickly Solve Design, Production or Operational Problems With Comprehensive Characterization of Time-varying and Transient RF Signals

Define issues and solve problems faster by characterizing your device, system or signal more completely and rapidly than previously possible with swept spectrum analyzers. Tektronix RSA2200A and RSA3300A Series Real-time Spectrum Analyzers capture many signals not viewable on swept spectrum analyzers by seamlessly capturing and storing a span of RF frequencies all at one time. Once a signal is captured, it can be viewed simultaneously and analyzed in time-correlated frequency, time and modulation domains. RSA Series instruments include not only Real-time Spectrum Analyzer fast-signal capture, internal memory and modulation analysis but also functionality and operation of a swept spectrum analyzer for looking at very wide spans, all in an integrated, transportable package.

RSA Series Spectrogram uniquely shows time-varying signal behavior in frequency change/stability, spectrum occupancy, pulsed signal timing, power change and more! The sample above shows the frequency settling characteristic of a transmitting device.

Time-correlated multi-domain view provides a new level of insight about design or operational problems and possible solutions. This example includes frequency, time, and modulation domain views of an AM-modulated pulsed signal with pulse-to-pulse phase variation measured in the modulation domain.

*1 See Tektronix Real-time Spectrum Analysis Technical Brief (lit # 37W-17352-0) for an explanation of how RTSA works and its unique capabilities.
Real-time Spectrum Analyzers

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Trigger, Capture, Analyze

You can easily catch an elusive RF signal and analyze it at your convenience

Sensitive and fast, RSA Series Real-time Spectrum Analyzer triggering easily captures unknown, periodic or intermittent signals. Using the Tektronix exclusive

Frequency Mask Trigger, you can configure a custom frequency domain mask including signal guard bands and levels then trigger on events isolated to a specific frequency or frequency range. As signals are captured, they are automatically saved to RSA internal memory, making it easy to perform in-depth, time-correlated analysis across the frequency, time and modulation domains with no external computer required! Quick-to-set-up IF Level and Power (Span Bandwidth) triggers provide very convenient capture of signals in applications such as incident carrier-and-response interaction between two devices or burst signal carrier ramp up. Continuous Trigger Mode ensures a sequence of events are automatically captured into memory; you capture only the events and not time in between, maximizing memory efficiency and minimizing analysis time.

Price/Performance Choice: RSA2200A and RSA3300A Series Real-time Spectrum Analyzers

<table>
<thead>
<tr>
<th>Model</th>
<th>Frequency Range</th>
<th>Memory Depth</th>
<th>Modulation Analysis</th>
<th>Real-time Capture Bandwidth</th>
<th>Triggering Modes</th>
</tr>
</thead>
<tbody>
<tr>
<td>2203A</td>
<td>10 MHz – 3 GHz (DC to 3 GHz (Opt. 05))</td>
<td>512 ksamples</td>
<td>AM, FM (ASK, FSK), PM</td>
<td>10 MHz</td>
<td>IF Level</td>
</tr>
<tr>
<td>2208A</td>
<td>10 MHz – 8 GHz (DC to 8 GHz (Opt. 05))</td>
<td>512 ksamples</td>
<td>AM, FM (ASK, FSK), PM</td>
<td>10 MHz</td>
<td>IF Level</td>
</tr>
<tr>
<td>3303A</td>
<td>DC – 3 GHz</td>
<td>16.384 Msamples, 65.536 Msamples (Opt. 02)</td>
<td>AM, FM (ASK, FSK), PM, general purpose digital mod analysis (Opt. 21)</td>
<td>15 MHz</td>
<td>IF Level; Frequency Mask Trigger and Power (Span BW) (Opt. 02)</td>
</tr>
<tr>
<td>3308A</td>
<td>DC – 8 GHz</td>
<td>16.384 Msamples, 65.536 Msamples (Opt. 02)</td>
<td>AM, FM (ASK, FSK), PM, general purpose digital mod analysis (Opt. 21)</td>
<td>15 MHz</td>
<td>IF Level; Frequency Mask Trigger and Power (Span BW) (Opt. 02)</td>
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</tbody>
</table>

Characteristics

■ Frequency

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>RSA2203A</th>
<th>RSA2208A</th>
<th>RSA3303A</th>
<th>RSA3308A</th>
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</thead>
<tbody>
<tr>
<td>10 MHz – 3 GHz</td>
<td>10 MHz – 8 GHz</td>
<td>DC – 3 GHz</td>
<td>DC – 8 GHz</td>
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<tr>
<td>Opt. 05: DC – 3 GHz</td>
<td>Opt. 05: DC – 8 GHz</td>
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</table>

<table>
<thead>
<tr>
<th>Frequency Aging</th>
<th>RSA2203A</th>
<th>RSA2208A</th>
<th>RSA3303A</th>
<th>RSA3308A</th>
</tr>
</thead>
<tbody>
<tr>
<td>±2 x 10^-6/year</td>
<td>±2 x 10^-6/year</td>
<td>±1 x 10^-7/year</td>
<td>±1 x 10^-7/year</td>
<td></td>
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<tr>
<td>Opt. 10: ±1 x 10^-7/year</td>
<td>Opt. 10: ±1 x 10^-7/year</td>
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</table>

<table>
<thead>
<tr>
<th>Frequency Stability</th>
<th>RSA2203A</th>
<th>RSA2208A</th>
<th>RSA3303A</th>
<th>RSA3308A</th>
</tr>
</thead>
<tbody>
<tr>
<td>2 x 10^-4 (10 °C to 40 °C)</td>
<td>2 x 10^-4 (10 °C to 40 °C)</td>
<td>1 x 10^-7 (10 °C to 40 °C)</td>
<td>1 x 10^-7 (10 °C to 40 °C)</td>
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<tr>
<td>Opt. 10: 1 x 10^-7 (10 °C to 40 °C)</td>
<td>Opt. 10: 1 x 10^-7 (10 °C to 40 °C)</td>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Total Reference Frequency Error</th>
<th>RSA2203A</th>
<th>RSA2208A</th>
<th>RSA3303A</th>
<th>RSA3308A</th>
</tr>
</thead>
<tbody>
<tr>
<td>4 x 10^-6</td>
<td>4 x 10^-6</td>
<td>2 x 10^-7</td>
<td>2 x 10^-7</td>
<td></td>
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<tr>
<td>Opt. 10: 2 x 10^-7</td>
<td>Opt. 10: 2 x 10^-7</td>
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<td></td>
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</table>
Real-time Spectrum Analyzers

 RSA2200A Series • RSA3300A Series

Marker Frequency Readout Accuracy –
\[ \pm (RE \times MF + 0.001 \times Span + RFM) \text{ Hz} \]
RE = Reference Frequency Error.
MF = Marker Frequency [Hz].
RFM = Residual FM [Hz].

Carrier Frequency Measurement Accuracy –
RSA2203A and RSA2208A
At spans ≤ 10 MHz, all frequency components of the signal must be contained in the analysis period and span.
Accuracy: \( RE \times CF + RFM \). Resolution Setting = 1 MHz to 1 MHz.
At 2 GHz ≤ ±0.01 kHz.
At 5 GHz ≤ ±0.01 kHz.
At 7 GHz ≤ ±0.01 kHz.
RSA2203A Opt. 10, RSA2208A Opt. 10, RSA3303A and RSA3308A – At spans ≤ 10 MHz for RSA2200A Opt. 10, and
spans ≤ 15 MHz for RSA3300A, all frequency components of the signal must be contained in the analysis period and span.
Accuracy: \( RE \times CF + RFM \). Resolution Setting = 1 MHz to 1 MHz.
At 2 GHz ≤ ±0.02 kHz.
At 5 GHz ≤ ±0.02 kHz.
At 7 GHz ≤ ±0.02 kHz.

Carrier Frequency Measurement Sensitivity –
Carrier Power, ≤ −40 dBfs (typical) (dBfs = dB below full scale reference).

Frequency Span Range –
RSA2203A and RSA2208A
Spectrum Analyzer Mode:
50 Hz to 3 GHz, (Start Frequency ≥ 20 MHz).
50 Hz to 20 MHz, (Stop Frequency < 20 MHz, Opt. 09).
Real-Time Spectrum Analyzer Mode:
100 Hz – 10 MHz, 1-2-5 sequence (RF);
20 MHz Baseband.

Time Domain and Demodulation Modes:
Span = 0 Hz (Simultaneous with 50 Hz to 10 MHz Span in second analysis window).
RSA3303A and RSA3308A
Spectrum Analyzer Mode:
50 Hz to 5 GHz, (Start Frequency ≥ 20 MHz).
50 Hz to 20 MHz, (Stop Frequency < 20 MHz).
Real-Time Spectrum Analyzer Mode:
100 Hz – 10 MHz, 15 MHz (RF);
20 MHz Baseband.

Resolution – ≤ 0.2% of Span (Span = 100 Hz to 10 MHz RSA2203A and RSA2208A; 100 Hz to 10 MHz; RSA3303A and RSA3308A).
Accuracy = ±0.1% of Span.

Resolution Bandwidth Range – 1 Hz to 10 MHz, automatically selected or user defined.
Accuracy – Within 6.0%. ±0.1%.
Shape Characteristic – Gaussian, ≤ 0.1 Shape Factor (≤ 0.00 dB); Rectangular, Nyquist, Root Nyquist shapes may also be selected.
Noise Bandwidth –
Range: 313.18 mHz to 400.87 kHz
Accuracy: ±0.1%
Real-time Spectrum Analyzers

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Time Domain
Trace Point Range –
Span > 50 Hz, 64 – 240001 (RBW mode), 18 – 240001 (FFT mode).
Span = 0 Hz (Time and Demodulation Modes).

RSA3300A and RSA3308A – 10 Data Pairs: 1024 to 16384000, 1 to 65536000 (Option 02) Power vs. Time: 1 to 512000.

Triggers –
RSA2203A and RSA2208A: Free run, single, external, IF level (10 MHz BW).
RSA3303A and RSA3308A: Free run, single, external, IF level (15 MHz BW).
Option 02: adds Power (Span BW, Span < 15 MHz) and Frequency Mask.

Frequency Mask Trigger (Real-Time SA Mode), RSA3303A and RSA3308A with Opt. 02 Bandwidth –
Up to 15 MHz: Start Frequency ≥ 20 MHz.
Up to 20 MHz: Start Frequency < 20 MHz, and on IQ inputs.

Event Detection Bandwidth –
≤ 5 MHz (100% probability of intercept), signal occupying at least one complete ≥ 160 µs frame).
10 MHz (50% probability of intercept, signal occupying at least one complete 80 µs frame (typical).
15/20 MHz (25% probability of intercept, signal occupying at least one complete 40 µs frame (typical).

Frequency Mask Range –
0 to – 6 divisions from Reference Level at 10 dB/div.

Frequency Response

Frequency Range Specification, dB

<table>
<thead>
<tr>
<th>Frequency Range</th>
<th>Spec., dB</th>
<th>Typical, dB</th>
</tr>
</thead>
<tbody>
<tr>
<td>100 Hz – 20 MHz*</td>
<td>±0.5</td>
<td>±0.3</td>
</tr>
<tr>
<td>15 MHz – 3 GHz</td>
<td>±1.2</td>
<td>±0.5</td>
</tr>
<tr>
<td>3 GHz – 3.5 GHz*</td>
<td>±1.7</td>
<td>±0.5</td>
</tr>
<tr>
<td>3.5 GHz – 6.5 GHz*</td>
<td>±1.7</td>
<td>±1.0</td>
</tr>
<tr>
<td>5 GHz – 8 GHz*</td>
<td>±1.7</td>
<td>±1.0</td>
</tr>
</tbody>
</table>

* RSA2203A or RSA2208A Opt. 05 only.  ** RSA2208A only.  *** RSA3303A only.

Marker Readout Resolution, Log – 0.01 dB.
Linear Display Scale – 10 divisions.
Linear Display Units – dBm, dBµV, V, Watts + Hz for FM Demod, Degrees for PM Demod.

Amplitude Specifications

Measurement Range – Displayed average noise level to MAX safe input.
Input Attenuator Range –
RSA2203A, RSA2208A – 0 – 50 dB, 10 dB steps.
RSA3303A – 0 – 50 dB, 10 dB steps, DC to 3.0 GHz.
RSA3308A – 0 – 50 dB, 2 dB steps, DC to 3.5 GHz.

Maximum Safe Input Level –
Average Continuous – +30 dBm (RF ATT ≥ 10 dB),
Peak Pulse Power – +30 dBm (RF ATT ≥ 10 dB),
DC –
RSA2203A, RSA2208A: ±0.2 V (CF ≥ 20 MHz); ±5 V DC – 20 MHz (Opt. 05).
RSA3303A, RSA3308A: ±0.2 V (CF ≥ 20 MHz); ±5 V DC – 20 MHz.

Input Attenuator Switching Uncertainty –
(at 50 MHz) < 0.5 dB for all values of attenuation.

Absolute Amplitude Uncertainty –
At Reference Setting – ±0.5 dB (RF) at 50 MHz CF, –20 dBm signal, 0 dB ATT, 20 ºC to 30 ºC; ±0.3 dB (baseband) (Opt. 05) at 10 MHz CF, –20 dBm signal, 0 dB ATT, 20 ºC to 30 ºC.
Overall Amplitude Accuracy – ±0.7 dB (RF) + Frequency Response.

Displayed Average Noise Level (DANL)

Frequency

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Spec., dBm/Hz</th>
<th>Typical, dBm/Hz</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kHz – 10 kHz</td>
<td>–144*1</td>
<td>N/A</td>
</tr>
<tr>
<td>10 kHz – 10 MHz</td>
<td>–150*1</td>
<td>N/A</td>
</tr>
<tr>
<td>10 MHz – 100 MHz</td>
<td>–148</td>
<td>N/A</td>
</tr>
<tr>
<td>100 MHz – 1 GHz</td>
<td>–148</td>
<td>–164</td>
</tr>
<tr>
<td>1 GHz – 2 GHz</td>
<td>–148</td>
<td>–164</td>
</tr>
<tr>
<td>2 GHz – 3 GHz</td>
<td>–147</td>
<td>–153</td>
</tr>
<tr>
<td>3 GHz – 5 GHz</td>
<td>–142*3</td>
<td>N/A</td>
</tr>
<tr>
<td>5 GHz – 8 GHz</td>
<td>–142*3</td>
<td>N/A</td>
</tr>
</tbody>
</table>

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Log Display Range – 10 µdB/div to 10 dB/div.

Absolute Amplitude Uncertainty at Reference Setting – ±0.5 dB (RF) at 50 MHz CF, –20 dBm signal, 0 dB ATT, 20 ºC to 30 ºC; ±0.3 dB (baseband) (Opt. 05) at 10 MHz CF, –20 dBm signal, 0 dB ATT, 20 ºC to 30 ºC.

Marker Readout Resolution, Log – 0.01 dB.
Linear Display Scale – 10 divisions.
Linear Display Units – dBm, dBµV, V, Watts + Hz for FM Demod, Degrees for PM Demod.
Spurious Responses

Third-order Intermodulation Distortion – 100 MHz – 3 GHz:
- RSA2203A, RSA2208A: < –73 dBc (Ref Level = +5 dBm, RF Att. = 20 dB, total signal power = –7 dBm, signal separation 300 kHz).
- RSA3303A, RSA3308A: < –74 dBc (Ref Level = +5 dBm, RF Att. = 20 dB, total signal power = –7 dBm, signal separation 300 kHz).

3 GHz – 8 GHz:
- RSA2208A and RSA3308A: < –72 dBc (Ref Level = +5 dBm, RF Att. = 20 dB, total signal power = –7 dBm, signal separation 300 kHz).

Other Input-related Spurious –
> 30 kHz offset – 70 dBc (Span = 2 MHz, Ref Level = 0 dBm, RBW = 50 kHz, Signal Level = –5 dBm, any center frequency).

Non-input-Related Spurious –
(Ref = –30 dBm, RBW = 100 kHz, Span 3 GHz)
RSA2203A:
- 1 MHz – 20 MHz (Opt. 05): –90 dBm
- 20 MHz – 3 GHz: –90 dBm.
RSA3303A:
- 1 MHz – 20 MHz: –93 dBm.
- 20 MHz – 3 GHz: –90 dBm.

RSA2208A:
- 1 MHz – 20 MHz (Opt. 05): –93 dBm.
- 20 MHz – 3.5 GHz: –90 dBm.
- 3.5 GHz – 8 GHz: –85 dBm.

RSA3308A:
- 1 MHz – 20 MHz: –93 dBm.
- 20 MHz – 3.5 GHz: –90 dBm.
- 3.5 GHz – 8 GHz: –85 dBm.
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Real-Time Capture Bandwidth
(seamless data capture) —
RSA2203A and RSA2208A: 10 MHz (rf); 20 MHz,
DC – 20 MHz (Baseband) (Opt.05).
RSA3303A and RSA3308A: 15 MHz (rf); 20 MHz,
DC – 20 MHz (Baseband); 20 MHz,
IQ Inputs (Opt.03).

Data Samples per Frame (Real-time S/A
Mode) — 1024.

Block Size (number of frames) —
RSA2203A and RSA2208A: 1 to 500.
RSA3303A and RSA3308A: 1 to 16000;
1 to 64000 (Opt. 02).

Maximum A/D Sampling Rate and Resolution –
51.2 Msamples/sec, 14 bits.

Measurement Speed
Screen Update Rate —
38/Sec, (SA Mode, 2 MHz span, 128 point FFT).
33/Sec, (SA Mode, 2 MHz span, 1024 point FFT).

Remote Measurement Rate and GPIB Transfer
rate — 7000 Samples/Sec at 2 MHz scan Auto RBW
Spectrum data.
Ethernet Transfer Rate — Mbyte/Sec
RF Center Frequency Switching Time — <10 ms
for 10 MHz frequency change; <500 ms for 3 GHz
frequency change.

Traces, Displays, Detectors
Traces — 2 traces, Spectrum Analyzer Mode.
Displays — Up to 3 time-correlated, user-selected
displays from the following: Spectrum, Spectrogram,
Amplitude vs. Time, Frequency vs. Time, Phase vs.
Time, IQ vs. time, RSA3303A Opt. 21 and
RSA3308A Opt. 21 add: Constellation, EVM vs. time,
Symbol Table, Eye Diagram.
Detector — RMS.
Trace Types — Normal (RMS), Average, Max Hold,
Min Hold.
Display Detection — Max, Min, Max/Min.

Inputs and Outputs
Front Panel
Input — 50 Ω, type N.
Preamp Power — Standard RSA3303A and
RSA3308A, Opt. 2A, RSA2203A and RSA2208A:
LEMO 6 pin connector – Pin 1, NC; Pin 2, ID1;
Pin 3, ID2; Pin 4, –12V; Pin 5, GND; Pin 6, +12V.

Rear Panel
10 MHz REF OUT — 50 Ω, BNC, >3 dBm.
10 MHz REF IN — 50 Ω, BNC, -10 dBm – +6 dBm.
–I, +I, –Q, +Q inputs — RSA3303A with Opt. 03,
and RSA3308A with Opt. 03.
EXT TRIG IN — Ext Trig. BNC, High: 1.6 to 5.0 V,
Low: 0 to 0.5 V.
GPIB Interface — IEEE 488.2
TRIGGER OUT — 50 Ω, BNC, High >2.0 V, Low: <
0.4 V (output current 1 mA).

Side Panel
LAN Interface (Ethernet) — 10/100 Base-T (std.).
Serial Interface — USB 1.1, 2 ports.
VGA Output — VGA compatible, 15 pin DSUB.

Automated Measurements
Automated Measurements —
Channel Power, ACPR, Carrier to Noise, Occupied
BW, Carrier Frequency, Emission BW, Spurious
Search, CCDF, dB/Hz Mkr, dBc/Hz Mkr.

Memory Depth (Time) - RSA3303A and RSA3308A

<table>
<thead>
<tr>
<th>Span</th>
<th>Sample Rate</th>
<th>Record Length</th>
<th>Record Length Opt. 02</th>
<th>Spectrum Frame Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>20 MHz (Baseband)</td>
<td>25.6 Msps</td>
<td>0.64 s</td>
<td>2.56 s</td>
<td>40 μs</td>
</tr>
<tr>
<td>15 MHz</td>
<td>25.6 Msps</td>
<td>0.64 s</td>
<td>2.56 s</td>
<td>40 μs</td>
</tr>
<tr>
<td>10 MHz</td>
<td>12.8 Msps</td>
<td>1.28 s</td>
<td>5.12 s</td>
<td>80 μs</td>
</tr>
<tr>
<td>5 MHz</td>
<td>6.4 Msps</td>
<td>2.56 s</td>
<td>10.24 s</td>
<td>160 μs</td>
</tr>
<tr>
<td>2 MHz</td>
<td>3.2 Msps</td>
<td>5.12 s</td>
<td>20.48 s</td>
<td>320 μs</td>
</tr>
<tr>
<td>1 MHz</td>
<td>1.6 Msps</td>
<td>10.24 s</td>
<td>40.96 s</td>
<td>640 μs</td>
</tr>
<tr>
<td>500 kHz</td>
<td>800 kbps</td>
<td>20.48 s</td>
<td>81.92 s</td>
<td>1.280 ms</td>
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<tr>
<td>200 kHz</td>
<td>320 kbps</td>
<td>51.20 s</td>
<td>200.48 s</td>
<td>3.2 ms</td>
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<tr>
<td>100 kHz</td>
<td>160 kbps</td>
<td>102.40 s</td>
<td>409.60 s</td>
<td>6.4 ms</td>
</tr>
<tr>
<td>50 kHz</td>
<td>80 kbps</td>
<td>204.80 s</td>
<td>819.20 s</td>
<td>12.8 ms</td>
</tr>
<tr>
<td>20 kHz</td>
<td>32 kbps</td>
<td>512 s</td>
<td>2048 s</td>
<td>32 ms</td>
</tr>
<tr>
<td>10 kHz</td>
<td>16 kbps</td>
<td>1024 s</td>
<td>4096 s</td>
<td>64 ms</td>
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<tr>
<td>5 kHz</td>
<td>8 kbps</td>
<td>2048 s</td>
<td>8192 s</td>
<td>128 ms</td>
</tr>
<tr>
<td>2 kHz</td>
<td>3.2 kbps</td>
<td>5120 s</td>
<td>20480 s</td>
<td>320 ms</td>
</tr>
<tr>
<td>1 kHz</td>
<td>1.6 kbps</td>
<td>10240 s</td>
<td>40960 s</td>
<td>640 ms</td>
</tr>
<tr>
<td>500 Hz</td>
<td>800 sps</td>
<td>20480 s</td>
<td>81920 s</td>
<td>1.28 s</td>
</tr>
<tr>
<td>200 Hz</td>
<td>320 sps</td>
<td>51200 s</td>
<td>204800 s</td>
<td>2.56 s</td>
</tr>
<tr>
<td>100 Hz</td>
<td>160 sps</td>
<td>102400 s</td>
<td>409600 s</td>
<td>5.12 s</td>
</tr>
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</table>

Memory Depth (Time) - RSA3303A and RSA3308A

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<th>Span</th>
<th>Sample Rate</th>
<th>Record Length</th>
<th>Record Length Opt. 02</th>
<th>Spectrum Frame Time</th>
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<td>20 MHz (Baseband)</td>
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<td>0.64 s</td>
<td>2.56 s</td>
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<td>15 MHz</td>
<td>25.6 Msps</td>
<td>0.64 s</td>
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<td>10 MHz</td>
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<td>1.28 s</td>
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<td>5 MHz</td>
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<td>2.56 s</td>
<td>10.24 s</td>
<td>160 μs</td>
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<tr>
<td>2 MHz</td>
<td>3.2 Msps</td>
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<td>20.48 s</td>
<td>320 μs</td>
</tr>
<tr>
<td>1 MHz</td>
<td>1.6 Msps</td>
<td>10.24 s</td>
<td>40.96 s</td>
<td>640 μs</td>
</tr>
<tr>
<td>500 kHz</td>
<td>800 kbps</td>
<td>20.48 s</td>
<td>81.92 s</td>
<td>1.280 ms</td>
</tr>
<tr>
<td>200 kHz</td>
<td>320 kbps</td>
<td>51.20 s</td>
<td>200.48 s</td>
<td>3.2 ms</td>
</tr>
<tr>
<td>100 kHz</td>
<td>160 kbps</td>
<td>102.40 s</td>
<td>409.60 s</td>
<td>6.4 ms</td>
</tr>
<tr>
<td>50 kHz</td>
<td>80 kbps</td>
<td>204.80 s</td>
<td>819.20 s</td>
<td>12.8 ms</td>
</tr>
<tr>
<td>20 kHz</td>
<td>32 kbps</td>
<td>512 s</td>
<td>2048 s</td>
<td>32 ms</td>
</tr>
<tr>
<td>10 kHz</td>
<td>16 kbps</td>
<td>1024 s</td>
<td>4096 s</td>
<td>64 ms</td>
</tr>
<tr>
<td>5 kHz</td>
<td>8 kbps</td>
<td>2048 s</td>
<td>8192 s</td>
<td>128 ms</td>
</tr>
<tr>
<td>2 kHz</td>
<td>3.2 kbps</td>
<td>5120 s</td>
<td>20480 s</td>
<td>320 ms</td>
</tr>
<tr>
<td>1 kHz</td>
<td>1.6 kbps</td>
<td>10240 s</td>
<td>40960 s</td>
<td>640 ms</td>
</tr>
<tr>
<td>500 Hz</td>
<td>800 sps</td>
<td>20480 s</td>
<td>81920 s</td>
<td>1.28 s</td>
</tr>
<tr>
<td>200 Hz</td>
<td>320 sps</td>
<td>51200 s</td>
<td>204800 s</td>
<td>2.56 s</td>
</tr>
<tr>
<td>100 Hz</td>
<td>160 sps</td>
<td>102400 s</td>
<td>409600 s</td>
<td>5.12 s</td>
</tr>
</tbody>
</table>
Preamplifier (RSA2200A Series Opt. 2A, RSA3300A Series Opt. 1A, external)
Frequency Range – 100 MHz - 3 GHz.
Gain – 20 dB.
Noise Figure – 6.5 dB at 2 GHz.

Modulation Analysis
FM (may be used to evaluate FSK signals)
Minimum Input Level – –40 dBfs*2, typical.
Range – 0.8 Hz to 12.8 MHz.
Accuracy – ±2 % (Signal at center screen, input level –10 dBfs*2).

AM (may be used to evaluate ASK signals)
Minimum Input Level – –40 dBfs*2, typical.
Accuracy – ±3% (Signal at center screen, input level –10 dBfs*2).
PM
Minimum Input Level – –40 dBfs*2, typical.
Accuracy – ±3º (Signal at center screen, input level –10 dBfs*2).
PM Scale, Max, Min – ± 180º.

Digital Modulation (RSA3303A with Opt. 21, RSA3308A with Opt. 21)
Modulation Format – BPSK, QPSK, a/4 DQPSK, 8PSK, 16QAM, 32QAM, 64QAM, 256QAM, GMSK, GFSK.
Analysis Period – Up to 7680 sample points.
Filter Types – Measurement Filters: Square Root Raised Cosine, Gaussian, none.
Reference Filters: Raised Cosine, Gaussian, none.
Alpha / B*T range – 0.0001 to 1, 0.0001 step.
Maximum Symbol Rate – 12.8 Mymbols/sec.
Minimum Symbol Rate – 100 Symbols/sec (Typical).

Digital Demodulation Accuracy – The following tables are examples of typical digital demodulation accuracy:

### QPSK EVM (%), typical
<table>
<thead>
<tr>
<th>Symbol Rate, per second</th>
<th>100k</th>
<th>1M</th>
<th>4M</th>
<th>10M</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF = 1 GHz</td>
<td>0.5</td>
<td>0.5</td>
<td>1.2</td>
<td>2.7</td>
</tr>
<tr>
<td>CF = 2 GHz</td>
<td>0.5</td>
<td>0.5</td>
<td>1.2</td>
<td>2.7</td>
</tr>
<tr>
<td>CF = 3 GHz</td>
<td>0.7</td>
<td>0.7</td>
<td>1.5</td>
<td>2.9</td>
</tr>
<tr>
<td>CF = 5 GHz*3</td>
<td>0.7</td>
<td>0.7</td>
<td>1.5</td>
<td>3.0</td>
</tr>
</tbody>
</table>

### π/4 DQPSK EVM (%), typical
<table>
<thead>
<tr>
<th>Symbol Rate, per second</th>
<th>100k</th>
<th>1M</th>
<th>4M</th>
<th>10M</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF = 1 GHz</td>
<td>0.6</td>
<td>0.6</td>
<td>1.2</td>
<td>2.7</td>
</tr>
<tr>
<td>CF = 2 GHz</td>
<td>0.6</td>
<td>0.6</td>
<td>1.2</td>
<td>2.7</td>
</tr>
<tr>
<td>CF = 3 GHz</td>
<td>0.7</td>
<td>0.7</td>
<td>1.5</td>
<td>2.9</td>
</tr>
<tr>
<td>CF = 5 GHz*3</td>
<td>0.7</td>
<td>0.7</td>
<td>1.5</td>
<td>3.0</td>
</tr>
</tbody>
</table>

### 16 QAM EVM (%), typical
<table>
<thead>
<tr>
<th>Symbol Rate, per second</th>
<th>100k</th>
<th>1M</th>
<th>4M</th>
<th>10M</th>
</tr>
</thead>
<tbody>
<tr>
<td>CF = 1 GHz</td>
<td>0.9</td>
<td>0.5</td>
<td>1.2</td>
<td>2.2</td>
</tr>
<tr>
<td>CF = 2 GHz</td>
<td>0.9</td>
<td>0.5</td>
<td>1.2</td>
<td>2.2</td>
</tr>
<tr>
<td>CF = 3 GHz</td>
<td>0.9</td>
<td>0.5</td>
<td>1.2</td>
<td>2.5</td>
</tr>
<tr>
<td>CF = 5 GHz*3</td>
<td>0.9</td>
<td>0.5</td>
<td>1.2</td>
<td>2.5</td>
</tr>
</tbody>
</table>

**RSA3308A only.

### General Specifications
- **Temperature Range** – Operating: +10 ºC to +40 ºC.
  Storage: -20 ºC to +60 ºC.
- **Warm-up Time** – 20 min.
- **Safety and EMI Compatibility** – UL 61010-1; CSA C22.2 No.1010.1.
- **Power Requirements** – 100 VAC to 240 VAC, 47 Hz to 63 Hz.
- **Power Consumption** – 350 VA max.
- **Data Storage** – Internal HDD (20 GB) + USB port + Floppy Disk Drive.
- **Weight, without options** – 19 kg.
- **Dimensions** – 215 mm (H) x 425 mm (D) x 425 mm (W) without bumpers and feet.
  238 mm (H) x 470 mm (D) x 445 mm (W) with bumpers and feet.
- **Calibration Interval** – 1 year.
- **Warranty** – 1 year.

* dBfs = dB relative to full screen reference.
Real-time Spectrum Analyzers

• RSA2200A Series • RSA3300A Series

Ordering Information

RSA2203A
Real-time Spectrum Analyzer, 10 MHz – 3 GHz.

RSA2208A
Real-time Spectrum Analyzer, 10 MHz – 8 GHz.

Standard Accessories

Options
Opt. 1R – Rackmount.
Opt. 2A – Preamp, external, 20 dB gain to 3 GHz, + factory-installed Power Supply, internal.
Opt. 05 – DC – 20 MHz Baseband Frequency Extension.
Opt. 10 – OCXO Hi-stability Reference Oscillator, 1x10⁻⁷/day.
Opt. 12 – USB Keyboard and Mouse.

RSA3303A
Real-time Spectrum Analyzer, DC – 3 GHz.

RSA3308A
Real-time Spectrum Analyzer, DC – 8 GHz.

Standard Accessories

Options
Opt. 1R – Rackmount.
Opt. 2A – Preamp, external, 20 dB gain to 3 GHz.
Opt. 02 – 256 MB Data Memory with Frequency Mask Trigger and Power (Span BW) Trigger.
Opt. 03 – Differential IQ Inputs.
Opt. 21 – General Purpose Digital Modulation Analysis.

Upgrades
RSA3UP 21 – General Purpose Digital Modulation Analysis Upgrade (customer-installable).

RSA3UP IF – Installation for RSA3UP 21.

International Power Plugs
Opt. A0 – North America power.
Opt. A2 – United Kingdom power.
Opt. A3 – Australia power.
Opt. A5 – Switzerland power.
Opt. A10 – China power.
Opt. A99 – No power cord or AC adapter.

Language Option
Option L0 – English User/Programmers Manual.

Service Options
Opt. C5 – Calibration Service 5 Years.
Opt. D3 – Calibration Data Report 3 Years (with Option C3).
Opt. D5 – Calibration Data Report 5 Years (with Option C5).