Real-Time Spectrum Analyzer

**RSA3408B DC to 8 GHz Real-Time Spectrum Analyzer with DPX™**

The RSA3408B makes it easy for you to discover design issues that other signal analyzers miss. The revolutionary DPX™ spectrum display offers an intuitive live color view of signal transients changing over time in the frequency domain, giving you immediate confidence in the stability of your design or instantly displaying a fault when it occurs. This live display of transients is impossible with other signal analyzers. Once a problem is discovered with DPX, the RSA3408B Real-Time Spectrum Analyzer (RTSA) can be set to trigger on the event in the frequency domain, capture a continuous time record of changing RF events and perform time-correlated analysis in all domains. You get the functionality of a high-performance vector signal analyzer, a spectrum analyzer and the unique discover-trigger-capture-analyze capability of a Real-Time Spectrum Analyzer – all in a single package.

**Features & Benefits**

**Discover**
- DPX™ Spectrum Processing
  Provides an Intuitive Understanding of Time-varying RF Signals with Color Graded Displays Based on Frequency of Occurrence
- Revolutionary DPX Displays
  Transients with >48,000 Spectrum Measurements per Second

**Trigger**
- Tektronix Exclusive Frequency Mask Trigger (FMT) Offers Easy Event-based Capture of Transient RF Signals by Triggering on Any Change in the Frequency Domain

**Capture**
- DC to 8 GHz Frequency Range
  All Signals in Spans Up to 36 MHz are Captured into Memory
- Up to 1.28 s Acquisition Length at 36 MHz Bandwidth Provides Complete Analysis Over Time Without Making Multiple Acquisitions
- Fully Preselected and Image-free at all Times For Full Dynamic Range at any Capture Bandwidth
- Interfaces with TekConnect® Probes for RF Probing
- Differential IQ Input Available

**Analyze**
- Extensive Time-correlated Multidomain Displays Connect Problems in Time, Frequency, Phase and Amplitude for Quicker Understanding of Cause and Effect when Troubleshooting
- Power Measurements and Signal Statistics Help You Characterize Components and Systems: ACLR, Power vs. Time, CCDF, PDF
- Pulse Measurements Including Pulse Width, Duty Cycle and Pulse-to-Pulse Phase
- Offline analysis available with RSAVu Software

**Applications**
- RF Debug of Components, Modules or Systems
- Find Interference and Unknown Signals in Spectrum Monitoring and Management
- Analyze Time-variant Behavior of Standards-based and Other Radio Systems
- Characterize Radar and Pulsed RF Signals
- Powerful Vector Signal Analyzer Functionality, Signal Source Analysis and RFID-standards Support
- Broad Range of Standard-specific Options for Analysis of 3GPP, 3GPP2, WiMax and WLAN Systems

![Image of RSA3408B Real-Time Spectrum Analyzer with DPX™](image-url)
Real-Time Spectrum Analyzer
> **RSA3408B**

**Characteristics**

**Discover**
The DPX spectrum processing engine brings live analysis of transient events to spectrum analyzers. Performing more than 48,000 frequency transforms per second, transients as brief as 31 µs are displayed in the frequency domain. This is orders of magnitude faster than conventional analysis techniques. Events are color-coded by rate of occurrence onto a bitmapped display, providing unparalleled insight into transient signal behavior.

**Trigger**
The Tektronix Frequency Mask Trigger (FMT, Opt. 02) makes it easy to trigger on signals in the frequency domain and capture transient signals in bandwidths up to a 36 MHz. An FMT is simply configured to monitor all changes in frequency occupancy within the capture bandwidth. The Power Trigger, working in any capture bandwidth, fires at the instant in time when the RF input signal crosses a user-set power threshold. An external trigger is available for synchronization to test system events.

**Capture**
Unlike many SA/VSA combination instruments, the RSA3408B is fully preselected at all times for spurious and image rejection in any combination of capture bandwidth and frequency. Capture of small signals in the presence of large signals is enabled with 73 dB Spurious-Free Dynamic Range (SFDR) and class-leading image rejection in all capture bandwidths. Capture once – make multiple measurements without recapturing. Record lengths vary depending upon the selected capture bandwidth—up to 1.28 seconds at 36 MHz, 51.2 seconds at 1 MHz or 1.42 hours at 10 kHz bandwidth with FMT/Deep Memory Option 02.

**Analyze**
The RSA3408B offers analysis capabilities that advance productivity for engineers working on components or in RF system design, integration and performance verification, or operations engineers working in network or spectrum management.

- Spectrograms display both frequency and amplitude changes over time. Measurements are time-correlated across the frequency, phase, amplitude and modulation domains.
- Analog modulation analysis and pulse analysis are standard.

A wealth of modulation analysis options are available, including the UMTS W-CDMA Family (3GPP HSUPA and HSDPA), WiMax (Fixed and Mobile) and WLAN (802.11a/b/g/n). General purpose modulation analysis includes support for M-QAMs, OPSKs and the latest RFID standards including ISO 18000-7 and 15963, plus signal source analysis including phase noise, jitter, and frequency-settling time. See specifications for details on measurement options.

**Accessories**
A wide range of Tektronix active and passive probes are supported with the RTPA2A probe adapter for your RSA3408B in circuit-troubleshooting applications. Probe calibration factors are transferred via USB for calibrated measurements.

<table>
<thead>
<tr>
<th>TekConnect</th>
<th>Frequency Range</th>
<th>Type</th>
</tr>
</thead>
<tbody>
<tr>
<td>P7225</td>
<td>2.3 GHz</td>
<td>Active</td>
</tr>
<tr>
<td>P7240</td>
<td>4 GHz</td>
<td>Active</td>
</tr>
<tr>
<td>P7260</td>
<td>6 GHz</td>
<td>Active</td>
</tr>
<tr>
<td>P7330</td>
<td>3.5 GHz</td>
<td>Differential</td>
</tr>
<tr>
<td>P7355</td>
<td>5 GHz</td>
<td>Differential</td>
</tr>
<tr>
<td>P7355SMA</td>
<td>5 GHz</td>
<td>Differential SMA</td>
</tr>
<tr>
<td>P7380</td>
<td>8 GHz</td>
<td>Z-Active Differential</td>
</tr>
<tr>
<td>P7380SMA</td>
<td>8 GHz</td>
<td>Differential SMA</td>
</tr>
<tr>
<td>P7313</td>
<td>&gt;12.5 GHz</td>
<td>Z-Active Differential</td>
</tr>
</tbody>
</table>

The RSA3408B is your best tool for both troubleshooting and conformance testing. Here, a mobile WiMax analysis is performed using RSA-IQWiMAX software.

Powerful pulsed signal analysis for characterization of Radar and other pulsed systems. The RSA3408B automatically measures pulse width, rep rate, pulse power and 7 other pulse parameters.
Real-Time Spectrum Analyzer

RSA3408B: The mid-range member of the RTSA Family

Tektronix offers Real-Time Spectrum Analyzer models to meet a range of needs for frequency coverage, real-time bandwidth and dynamic range. The table below summarizes the differences between the models. Full details of the RSA3300B and RSA6100A models are available in separate data sheets.

<table>
<thead>
<tr>
<th>Specification or Feature</th>
<th>RSA3303/08B</th>
<th>RSA3408B</th>
<th>RSA6106/14A</th>
</tr>
</thead>
<tbody>
<tr>
<td>Freq Range</td>
<td>DC to 3.0/8.0 GHz</td>
<td>DC to 8.0 GHz</td>
<td>9 kHz to 6.2/14.0 GHz</td>
</tr>
<tr>
<td>Max. Capture BW</td>
<td>15 MHz</td>
<td>36 MHz</td>
<td>40 MHz standard 110 MHz Option</td>
</tr>
<tr>
<td>Triggers, Standard</td>
<td>Level, Free Run, External</td>
<td>Level, Free Run, External</td>
<td>Level, Free Run, External(2), Line</td>
</tr>
<tr>
<td>Triggers, Optional</td>
<td>Frequency Mask</td>
<td>Frequency Mask</td>
<td>Frequency Mask</td>
</tr>
<tr>
<td>Digital Phosphor (DPX) Spectrum Update Rate, Max Span and Min. Signal Duration</td>
<td>&gt;48,000 Spectrums/sec</td>
<td>&gt;48,000 Spectrums/sec</td>
<td>&gt;48,000 Spectrums/sec</td>
</tr>
<tr>
<td>Memory</td>
<td>64M/256MB</td>
<td>64M/256MB</td>
<td>256M/1 GB</td>
</tr>
<tr>
<td>Spurious-Free Dynamic Range at Max. Capture BW</td>
<td>-70 dBc/15 MHz</td>
<td>-73 dBc/36 MHz</td>
<td>-73 dBc/110 MHz</td>
</tr>
<tr>
<td>ACCL (GPP 1 DPCH)</td>
<td>66 dB</td>
<td>72 dB</td>
<td>79 dB</td>
</tr>
<tr>
<td>SSB Phase Noise at Specified Offsets at 1 GHz, dBc/Hz (Typical)</td>
<td>10 kHz -108</td>
<td>10 kHz -112</td>
<td>10 kHz -110</td>
</tr>
<tr>
<td>1 MHz -133</td>
<td>1 MHz -135</td>
<td>1 MHz -134</td>
<td>1 MHz -134</td>
</tr>
<tr>
<td>10 MHz -136</td>
<td>10 MHz -140</td>
<td>10 MHz -142</td>
<td></td>
</tr>
<tr>
<td>Screen Size, User Interface</td>
<td>8.4 Inch Screen, Keyboard, Mouse, Front Panel</td>
<td>8.4 Inch Screen, Keyboard, Mouse, Front Panel</td>
<td>10.4 Inch Touch-Screen, Keyboard, Mouse, Front Panel</td>
</tr>
<tr>
<td>Interface Ports</td>
<td>GPIB, LAN, USB(2)</td>
<td>GPIB, LAN, USB(2)</td>
<td>GPIB, LAN, USB(4)</td>
</tr>
<tr>
<td>Storage Media</td>
<td>Internal HDD, FDD</td>
<td>Internal HDD, FDD</td>
<td>Internal HDD, DVD-RW</td>
</tr>
<tr>
<td>Optional Removable HDD</td>
<td>Optional Removable HDD</td>
<td></td>
<td></td>
</tr>
<tr>
<td>IQ Inputs Option</td>
<td>20 MHz BW Differential Inputs</td>
<td>40 MHz BW Differential Inputs</td>
<td>Not Available</td>
</tr>
<tr>
<td>IF Outputs</td>
<td>Not Available</td>
<td>Standard, 421 MHz, 40 MHz BW</td>
<td>Option, 500 MHz, 120 MHz BW</td>
</tr>
<tr>
<td>Digital I and Q Output</td>
<td>Not Available</td>
<td>Up to 36 MHz BW</td>
<td>Up to 110 MHz BW, fully corrected amplitude and phase</td>
</tr>
<tr>
<td>Option Bandwidth</td>
<td>Not Available</td>
<td>Up to 36 MHz BW</td>
<td></td>
</tr>
<tr>
<td>Preamplifier</td>
<td>Option, External, 0.1 to 3 GHz 20 dB Gain nominal</td>
<td>Option, External, 0.1 to 3 GHz 20 dB Gain nominal</td>
<td>0.01 to 3 GHz 30 dB Gain nominal</td>
</tr>
<tr>
<td>Spurious-Free Dynamic Range at Max. Capture BW</td>
<td>-70 dBc/15 MHz</td>
<td>-73 dBc/36 MHz</td>
<td>-73 dBc/110 MHz</td>
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<td>1 MHz -134</td>
<td>1 MHz -134</td>
</tr>
<tr>
<td>10 MHz -136</td>
<td>10 MHz -140</td>
<td>10 MHz -142</td>
<td></td>
</tr>
</tbody>
</table>

**Trigger-related**

**Trigger Modes** – Free run, Triggered (Single or Continuous).

**Trigger Event Source** – RF Input, External Trigger Input.

**Trigger Types** – Power Level, Frequency Mask (Opt. 02).

**Trigger Position** – settable from 0 to 100% of total acquisition length.

**Power Level Trigger**

- **Level Range** – 0 dBfs to –40 dBfs from reference level.
- **Bandwidth Range** – 100 Hz to 36 MHz.
- **Signals Drift** – 20 µs (at maximum acquisition bandwidth).

**Trigger Position Display Timing Uncertainty**

- **Power Level Trigger**
  - **Span Range**: 36 MHz
  - **Minimum Event Duration for 100% Probability of Trigger**: 20 µs

**External Trigger**

- **Level Range**: –1.5 V to +1.5 V.
- **Level Setting Resolution**: 0.1 V.
- **Preamplifier**: 0.1 to 3 GHz, 20 dB Gain nominal.

**Capture-related**

**Real-Time Acquisition Bandwidth**

- **Start Frequency**: 40 MHz RF – 36 MHz.
- **Start Frequency**: 0 MHz (Baseband) – 40 MHz.

**IQ Inputs (Opt. 03)** – 40 MHz.

**A/D Converter** – 40 MS/s, 14 bit.

**Acquisition Memory Size** – 64 MB (64 MSamples) Standard, 256 MB (65.6 MSamples), Opt. 02.

**Minimum Acquisition Length** – 1024 Samples.

**Acquisition Length Setting Resolution** – 1024 Samples.

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**Frequency Mask Trigger (Option 02)**

- **Mask Shape** – User-defined.
- **Mask Point Horizontal Resolution** – 1 bin.
- **Level Range**: 0 to –60 dBfs at 10 dB/div vertical scale.
- **Level Accuracy** – Equal to reference level accuracy + frequency accuracy over –60 dBfs range.
- **Span Range**: Start Frequency ≥ 40 MHz to 36 MHz, Minimum Event Duration for 100% Probability of Trigger (20 µs at maximum acquisition bandwidth).
- **Events Lasting Less Than Minimum Event Duration Specification** will result in degraded Frequency Mask Trigger level accuracy.
- **Trigger Position Uncertainty** – ± 2 Frames (For Span = 36 MHz, uncertainty = ±40 µs).
Real-Time Spectrum Analyzer

Memory Depth (time) and Maximum Time Resolution

<table>
<thead>
<tr>
<th>Span</th>
<th>Sample Rate</th>
<th>Record Length</th>
<th>Record Length</th>
<th>Spectrum Frame</th>
<th>Time Resolution</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>(For I and Q)</td>
<td>(Option 02)</td>
<td>(Time)</td>
<td>(I and Q)</td>
</tr>
<tr>
<td>40 MHz baseband</td>
<td>51.2 MS/s</td>
<td>0.32 s</td>
<td>1.28 s</td>
<td>20 s</td>
<td>20 ns</td>
</tr>
<tr>
<td>36 MHz</td>
<td>51.2 MS/s</td>
<td>0.32 s</td>
<td>1.28 s</td>
<td>20 s</td>
<td>20 ns</td>
</tr>
<tr>
<td>20 MHz</td>
<td>25.6 MS/s</td>
<td>0.64 s</td>
<td>2.56 s</td>
<td>40 s</td>
<td>40 ns</td>
</tr>
<tr>
<td>10 MHz</td>
<td>12.8 MS/s</td>
<td>1.28 s</td>
<td>5.12 s</td>
<td>80 s</td>
<td>80 ns</td>
</tr>
<tr>
<td>5 MHz</td>
<td>6.4 MS/s</td>
<td>2.56 s</td>
<td>10.24 s</td>
<td>160 s</td>
<td>160 ns</td>
</tr>
<tr>
<td>2 MHz</td>
<td>2.56 MS/s</td>
<td>6.4 s</td>
<td>25.6 s</td>
<td>400 s</td>
<td>400 ns</td>
</tr>
<tr>
<td>1 MHz</td>
<td>1.28 MS/s</td>
<td>1.28 s</td>
<td>5.12 s</td>
<td>800 s</td>
<td>800 ns</td>
</tr>
<tr>
<td>500 kHz</td>
<td>640 k/s</td>
<td>25.6 s</td>
<td>102.4 s</td>
<td>160 s</td>
<td>160 ns</td>
</tr>
<tr>
<td>200 kHz</td>
<td>256 k/s</td>
<td>64 s</td>
<td>256 s</td>
<td>400 ms</td>
<td>400 µs</td>
</tr>
<tr>
<td>100 kHz</td>
<td>128 k/s</td>
<td>128 s</td>
<td>512 s</td>
<td>800 ms</td>
<td>800 µs</td>
</tr>
<tr>
<td>50 kHz</td>
<td>64 k/s</td>
<td>256 s</td>
<td>1024 s</td>
<td>160 s</td>
<td>160 µs</td>
</tr>
<tr>
<td>20 kHz</td>
<td>25.6 k/s</td>
<td>2560 s</td>
<td>10240 s</td>
<td>400 s</td>
<td>400 µs</td>
</tr>
<tr>
<td>10 kHz</td>
<td>12.8 k/s</td>
<td>1280 s</td>
<td>5120 s</td>
<td>800 s</td>
<td>800 µs</td>
</tr>
<tr>
<td>5 kHz</td>
<td>6.4 k/s</td>
<td>2560 s</td>
<td>10240 s</td>
<td>160 s</td>
<td>160 µs</td>
</tr>
<tr>
<td>2 kHz</td>
<td>2.56 k/s</td>
<td>6400 s</td>
<td>25600 s</td>
<td>400 s</td>
<td>400 µs</td>
</tr>
<tr>
<td>1 kHz</td>
<td>1.28 k/s</td>
<td>12800 s</td>
<td>51200 s</td>
<td>800 s</td>
<td>800 µs</td>
</tr>
<tr>
<td>500 Hz</td>
<td>640 S/s</td>
<td>2560 s</td>
<td>10240 s</td>
<td>1.6 ms</td>
<td>1.6 µs</td>
</tr>
<tr>
<td>200 Hz</td>
<td>256 S/s</td>
<td>64000 s</td>
<td>256000 s</td>
<td>4.0 s</td>
<td>4 ms</td>
</tr>
<tr>
<td>100 Hz</td>
<td>128 S/s</td>
<td>128000 s</td>
<td>512000 s</td>
<td>8.0 s</td>
<td>8 ms</td>
</tr>
</tbody>
</table>

Analysis-related

Standard Measurement Functions by Mode

Spectrum Analyzer Mode – Channel Power, Adjacent Channel Power, Occupied Bandwidth, Emission Bandwidth, Carrier-to-Noise Ratio, Carrier Frequency, Spurious Search, dBm/Hz Marker, dBc/Hz Marker, RTSMA Mode – Channel Power, Adjacent Channel Power, Occupied Bandwidth, Emission Bandwidth, Carrier-to-Noise Ratio, Carrier Frequency, Spurious Search, dBm/Hz Marker, dBc/Hz Marker, RTSC Mode – Channel Power, Adjacent Channel Power, Occupied Bandwidth, Emission Bandwidth, Carrier-to-Noise Ratio, Carrier Frequency, Spurious Search, dBm/Hz Marker, dBc/Hz Marker, RTSA with Zoom – dBm/Hz Marker, dBc/Hz Marker, DPX– dBm/Hz Marker, dBc/Hz Marker, Analog Mod. Analysis – Q vs. Time, AM Depth, FM Deviation, PM, Pulse Spectrum, Time – IQ vs. Time, Power vs. Time, Frequency vs. Time, CCDF, Crest Factor, Pulse – Pulse Width, Peak Power, Ripple, Pulse Repetition Interval, Duty Cycle, Pulse-to-Pulse Phase, Frequency Deviation, Channel Power, OBW, EBW.

Optional Measurement Functions, Standards-based and Offline Analysis

General Purpose Digital Modulation Analysis (Option 21) Mod. Formats: BPSK, QPSK, x/4 DQPSK, 16/32/64/128/256-QAM, GMSK, GFSK, CAFM, ZASK, 2FASK. Standard support: Bluetooth, TETRA, P25, 802.15.4 – EVM (EVM, Peak, EVM vs. Time), Magnitude Error (EVM, Peak, Mag Error vs. Time), Phase Error (EVM, RMS, Peak, Phase Error vs. Time), Origin Offset, Frequency Error, Gain Imbalance, Quadrature Error, Rho (ρ), Constellation, Symbol Table, PDF: Probability of Occurrence vs. Power Level - AM-AM, AM-PM, 1 dB Compression, Crest Factor.


All measurements that can be performed on a stored waveform can be performed with RSAVu offline analysis software (except TD-SCDMA, Option 28).

Spectrum Mode Display Traces, Detectors and Functions

Traces – Two traces.
Detector – Max, Min, Max-Min.
Trace Functions – Normal, Average, Max Hold, Min Hold.
Spectrum Trace Length – 801 points (Auto mode).


Offline Analysis

RSAVu – All measurements that can be performed on a stored waveform can be performed with RSAVu offline analysis software (except TD-SCDMA, Option 28).

Jitter, Settling Time, Spurious, Real-Time Phase


RF Performance

Frequency
Frequency Range – DC to 8 GHz.
Initial Center Frequency Setting Accuracy – within \(10^{-3}\) after 10 minute warm-up.
Center Frequency Setting Resolution – 0.1 Hz.
Frequency Marker Readout Accuracy – <40 MHz \pm (RE x MF + 0.001 x Span + 2) Hz.

Center Frequency Setting Resolution – 0.1 Hz.
Frequency Marker Readout Accuracy – <40 MHz \pm (RE x MF + 0.001 x Span + 2) Hz.

Note: RE: Reference Frequency Error, MF: Marker Frequency (Hz)
Span Accuracy – \(\pm 0.3\%\) (Auto mode).
Reference Frequency –
Aging per Day – 1 \(\times 10^{-9}\) (after 30 days of operation).
Aging per Year – 1 \(\times 10^{-7}\) (after 30 days of operation).
Temperature Drift – 1 \(\times 10^{-7}\) (10 to 40 ºC).

Total Frequency Error – 2 \(\times 10^{-7}\) (within one year after calibration).
Reference Output Level – > 0 dBm.
External Reference Input Frequency – 10 MHz.
External Reference Input Level Range – \(-10\) dBm to + 6 dBm, Spurious level must be < \(-80\) dBc within 100 kHz offset.

Resolution Bandwidth (Spectrum Analysis Mode)
Resolution Bandwidth Range – 1 Hz to 10 MHz (auto-coupled or user-selected (arbitrary)),
Resolution Bandwidth Shape – 1 Hz to 10 MHz.
Approximately Gaussian, shape factor <3.1 \((60.3\) dB) typical. Rectangular, Nyquist and Root Nyquist shapes may also be selected.
Resolution Bandwidth Accuracy – Within 6\% (referenced to 3-dB BW) \(\pm 0.1\%\) (referenced to Noise BW).

Minimum Settable Spectrum Analysis RBW vs. Span Extended Resolution ON

<table>
<thead>
<tr>
<th>Frequency Span</th>
<th>RBW</th>
</tr>
</thead>
<tbody>
<tr>
<td>&gt; 2 GHz</td>
<td>100 kHz</td>
</tr>
<tr>
<td>&gt; 1 GHz to 2 GHz</td>
<td>50 kHz</td>
</tr>
<tr>
<td>&gt; 500 MHz to 1 MHz</td>
<td>20 kHz</td>
</tr>
<tr>
<td>&gt; 2 MHz to 500 MHz</td>
<td>10 kHz</td>
</tr>
<tr>
<td>&gt; 500 kHz to 2 MHz</td>
<td>1 kHz</td>
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<tr>
<td>&gt; 200 kHz to 500 kHz</td>
<td>500 Hz</td>
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<tr>
<td>&gt; 100 kHz to 200 kHz</td>
<td>200 Hz</td>
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<td>&gt; 50 kHz to 100 kHz</td>
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<td>&gt; 20 kHz to 50 kHz</td>
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<td>&gt; 10 kHz to 20 kHz</td>
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<tr>
<td>&gt; 2 kHz to 5 kHz</td>
<td>5 Hz</td>
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<tr>
<td>&gt; 1 kHz to 2 kHz</td>
<td>2 Hz</td>
</tr>
<tr>
<td>&gt; 1 kHz to 1 kHz</td>
<td>1 Hz</td>
</tr>
</tbody>
</table>

Frequency Resolution (RTSA Mode and FFT Analysis in Spectrum Mode)
Noise Bandwidth Range, RTSA Mode – 0.250545 Hz to 100.218 kHz.
FFT Performance, Spectrum Mode – Number of samples per frame : 64 to 8192 (65,536 samples per frame, extended resolution).

DPX Digital Phosphor Spectrum Processing
Spectrum Processing Rate – 48,000/s, span-independent.
Number of Traces – 2.
Trace Types – Color-graded bit map, +Peak, Max Hold, –Peak, Min-Hold, Average.
Minimum Signal Duration for 100% Probability of Intercept – 31 µs.
Span Range – 100 Hz to 36 MHz.
Resolution BW Accuracy – 7%.

Resolution BW Range vs. Span (DPX)

<table>
<thead>
<tr>
<th>Acquisition Bandwidth</th>
<th>RBW (Min)</th>
</tr>
</thead>
<tbody>
<tr>
<td>36 MHz</td>
<td>300 kHz</td>
</tr>
<tr>
<td>20 MHz</td>
<td>200 kHz</td>
</tr>
<tr>
<td>10 MHz</td>
<td>100 kHz</td>
</tr>
<tr>
<td>5 MHz</td>
<td>30 kHz</td>
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<tr>
<td>2 MHz</td>
<td>20 kHz</td>
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<tr>
<td>1 MHz</td>
<td>10 kHz</td>
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<td>500 kHz</td>
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<tr>
<td>500 Hz</td>
<td>3 Hz</td>
</tr>
<tr>
<td>200 Hz</td>
<td>2 Hz</td>
</tr>
<tr>
<td>100 Hz</td>
<td>1 Hz</td>
</tr>
</tbody>
</table>

Stability
Residual FM – < 2 Hz p-p, typical
Phase Noise Sidebands, dBc/Hz at Specified Center Frequency (CF)

<table>
<thead>
<tr>
<th>Offset</th>
<th>CF = 1 GHz</th>
<th>CF = 2 GHz</th>
<th>CF = 6 GHz</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Spec</td>
<td>Typical</td>
<td>Spec</td>
</tr>
<tr>
<td>1 kHz</td>
<td>-105</td>
<td>-107</td>
<td>-103</td>
</tr>
<tr>
<td>10 kHz</td>
<td>-110</td>
<td>-112</td>
<td>-109</td>
</tr>
<tr>
<td>100 kHz</td>
<td>-112</td>
<td>-115</td>
<td>-112</td>
</tr>
<tr>
<td>1 MHz</td>
<td>-132</td>
<td>-135</td>
<td>-132</td>
</tr>
<tr>
<td>5 MHz</td>
<td>-138</td>
<td>-140</td>
<td>-138</td>
</tr>
<tr>
<td>10 MHz</td>
<td>-138</td>
<td>-140</td>
<td>-138</td>
</tr>
</tbody>
</table>
Real-Time Spectrum Analyzer

Real-Time Spectrum Analyzer

Amplitude
(Specifications excluding mismatch error)
Measurement Range – Displayed Average Noise Level to Maximum Safe Input.
Input Attenuator Range
RF/Baseband input – 0 dB to 55 dB, 5 dB step.
IQ Input (Opt 03) – 0 dB to 35 dB, 5 dB step.
Maximum Safe Input Level –
Average Continuous (RF Band, RF ATT ≥ 10 dB) – +30 dBm.
MAX DC Voltage – RF Band, ±0.2 V, Baseband, ±5 V IQ input, Opt. 03, ±5 V.
Maximum Measurable Input Level – Average Continuous (RF ATT: Auto) +30 dBm.
Log Display Scale – 10 µdB/div to 10 dB/div.
Display Divisions – 10 divisions.
Display Units – dBm, dBµV, Volts, Watts, Hz for Frequency Measurements, and Degrees for Phase Measurements.
Marker Readout Resolution, dB units – 0.01 dB.
Marker Readout Resolution, Volts units – 0.001 µV.
Reference Level Setting Range
RF – –50 dBm to +30 dBm, 1 dB step.
Baseband – –30 dBm to +20 dBm, 5 dB step.
IQ Inputs (Option 03) – –10 dBm to +20 dBm, 5 dB step.
Level Linearity over Display Range – ±0.2 dB, spec; ±0.12 dB, typical.
Frequency Response (20 ºC to 30 ºC, Att. ≥ 10 dB)

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Spec</th>
<th>Typical</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 kHz to 10 kHz</td>
<td>-144 dBm/Hz</td>
<td></td>
</tr>
<tr>
<td>&gt; 10 kHz to 100 kHz</td>
<td>-151 dBm/Hz</td>
<td></td>
</tr>
<tr>
<td>&gt; 100 kHz to 3 GHz</td>
<td>-150 dBm/Hz</td>
<td></td>
</tr>
<tr>
<td>&gt; 3 GHz to 8 GHz</td>
<td>-142 dBm/Hz</td>
<td></td>
</tr>
</tbody>
</table>
| Preamplifier (Opt. 01A) Performance (Typical)
| Frequency Range | 100 MHz to 3 GHz | 20 dB gain, 6.35 dB Noise Figure at 2 GHz |

Residual Response
(Input Terminated, Ref. Level= –30 dBm, RBW = 100 kHz)

<table>
<thead>
<tr>
<th>Frequency and Span</th>
<th>Specification</th>
</tr>
</thead>
<tbody>
<tr>
<td>1 MHz to 40 MHz, Span 20 MHz</td>
<td>-93 dBm</td>
</tr>
<tr>
<td>0.5 GHz to 3.5 GHz, Span 3 GHz</td>
<td>-90 dBm</td>
</tr>
<tr>
<td>3.5 GHz to 8 GHz, Span 3 GHz</td>
<td>-85 dBm</td>
</tr>
</tbody>
</table>

Spurious Response with Signal
(Signal at Center Frequency, Span=10 MHz, Ref Level=0 dBm, RBW=50 kHz, Signal Level= –5 dBm).

<table>
<thead>
<tr>
<th>Signal Frequency</th>
<th>Spurious Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>25 MHz</td>
<td>-73 dBc</td>
</tr>
<tr>
<td>2 GHz</td>
<td>-73 dBc</td>
</tr>
<tr>
<td>5 GHz</td>
<td>-70 dBc</td>
</tr>
<tr>
<td>5 GHz</td>
<td>-70 dBc</td>
</tr>
</tbody>
</table>

Distortion
3rd Order Inter-modulation Distortion – (Total Signal Power = -7 dBm, Ref Level +5 dBm, Attenuator adjusted for optimum performance).
Frequency – 3rd order IM,
2.0 GHz – < –78 dBc.
2nd Harmonic Distortion
(-30 dBm tone at input mixer)
Frequency – 2nd Harmonic Distortion, Typical,
10 MHz to 1.4 GHz – -65 dBc,
1.4 GHz to 1.75 GHz – < –70 dBc.

Displayed Average Noise Level
(Input terminated)

<table>
<thead>
<tr>
<th>Frequency</th>
<th>Specification</th>
</tr>
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<tbody>
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</tr>
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<td>&gt; 3 GHz to 8 GHz</td>
<td>-142 dBm/Hz</td>
</tr>
</tbody>
</table>

Adjacent Channel Leakage Ratio Dynamic Range
(Typical, CF = 2.1425 GHz, with test signal amplitude adjusted for optimum performance).

<table>
<thead>
<tr>
<th>Signal Type</th>
<th>ACLR</th>
</tr>
</thead>
<tbody>
<tr>
<td>3GPP Downlink, 1 DPCH</td>
<td>Adjacent Alternate</td>
</tr>
</tbody>
</table>

Real-time (Spec.) – –66 dB – 68 dB
Step (Typical) – –70 dB – 72 dB
IF Frequency Response and IF Phase Linearity –
(MHz Center Frequency, 36.6 MHz BW, Typical). Amplitude – ±0.3 dB.
Phase – ±2.5º.

Analog Modulation Analysis

Displays
Amplitude vs. Time, Frequency vs. Time, Phase vs. Time

Pulse Measurements
Displays – Pulse Measurement Table, Pulse Trace.
Measurements – Pulse Width, Pulse Peak Power, On/Off Ratio, Pulse Ripple, Pulse Repetition Interval, Duty Cycle, Pulse-Pulse Phase, Channel Power, OBW, EBW, Frequency Deviation.
Minimum Pulse Width for Detection – 20 samples (400 ns@maximum sample rate).
Maximum Pulse Length – 260,000 samples.
Inputs and Outputs

Front Panel
RF and Baseband Input Connector – N type, 50 Ω.
I and Q Inputs (Option 03) – BNC Type.
Preamp Power Connector – Lemo, 6 poles:
  pin 1 = NC.
  pin 2 = ID1.
  pin 3 = ID2.
  pin 4 = –12 V.
  pin 5 = GND.
  pin 6 = +12 V.

Rear Panel
Analog IF Output – BNC Type, Frequency – 421 MHz.
10 MHz REF OUT – 50 Ω, BNC, > –3 dBm.
10 MHz REF IN – 50 Ω, BNC, –10 dBm to +6 dBm.
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).

Digital IQ Output (Option 05)
Connector Type – MDR (3M) 50 pin x 2.

Data Output
I data – 16 bit LVDS.
Q data – 16 bit LVDS.
Control Output – Clock: LVDS, MAX 51.2 MHz.
Control Input – IQ data output enabled, connecting
GND enables output of IQ data.
Clock Rising Edge to Data Transition Time
  (hold time) – > 5 ns.
Data Transition to Clock Rising Edge (setup time)
  – > 5 ns.

Note: Data from Option 05 requires application of
correction factors to IQ data to achieve similar RF
performance to RSA3408A.

Side Panel
LAN Interface Ethernet – 10/100Base-T.
Serial Interface – USB 1.1, two ports.
VGA Output – VGA compatible, 15 DSUB.
Floppy Disk Drive – 3.5 inch, 1.44 MB.

General Characteristics

Temperature Range
Operating – +10º C to +40º C.
Storage – –20º C to +60º C.
Warm-up Time – 20 minutes.

Operating Altitude
Operating – up to 3000 m (Approximately 10,000 ft.).
Non-operating – up to 12,190 m (40,000 ft.).

Safety and Electromagnetic Compatibility
UL 61010-1; CSA C22.2 No. 61010-1-04.
IEC61010, second edition (Self Declaration).
Low Voltage Directive 2006/95/EC; EN61010-1:
2001 Safety requirements for electrical equipment
for Measurement control and laboratory use.
EC Council EMC Directive 2004/108/EEC; EN61326:
1997 Product Family Standard for Electrical
Equipment for Measurement, Control, and
Laboratory Use-EMC Requirements.
Radiocommunications Act:1992, EMC Regulatory
Arrangements, AS/NZS CISPR 11 (Industrial,
Scientific and Medical Equipment).
Power Requirements – 90 VAC to 264 VAC, 47 Hz
to 63 Hz.
Power Consumption – 400 VA maximum.
Data Storage – Internal HDD, USB ports, FDD,
Removable HDD (Opt. 06).
Weight, with all options – 20 kg (44 lbs.).

Dimensions (mm, in)
Without bumpers and feet – 215 mm (H) x
425 mm (D) x 238 mm (W).
With bumpers and feet – 238 mm (H) x 470
mm (D) x 445 mm (W).

Calibration Interval – One year.
Warranty – One year.
GPIB – SCPI-compatible, IEEE488.2 compliant.

Ordering Information

RSA3408B
Real-Time Spectrum Analyzer, DC – 8 GHz.
CD), Power Cord, BNC-N Adapter, USB Keyboard,
USB Mouse, Front Cover.

Options – Description
Opt 1A – Preamp, External, 0.1 to 1 GHz, 20 dB
Gain, 6.5 dB NF.
Opt 02 – 65.5 Msample Deep Memory, Frequency
Mask Trigger.
Opt 03 – IQ, Differential IQ inputs.
Opt 05 – Digital IQ Output.
Opt 06 – Removable HDD (40 GB).
Opt 21 – Advanced Measurements Suite (GP Mod.
Analysis, RFID, Sig. Source).
Opt 24 – GSM/EDGE Analysis.
Opt 25 – CDMA 1X Forward/Reverse Link Analysis.
Opt 26 – 1X EVDO Forward/Reverse Link Analysis.
Opt 28 – TD-SCDMA Analysis.
Opt 29 – WLAN 802.11a/b/g/n Analysis.
Opt 30 – 3GPP Release 99 (W-CDMA) and Release
5 UL/DL (HSDPA) Analysis.
Opt 40 – 3GPP Release 6 (HSUPA UL/DL) Analysis
(requires opt 30).
Real-Time Spectrum Analyzer

Real-Time Spectrum Analyzer

Model RS3408B

Specifications

- Frequency Range: 30 Hz to 3 GHz
- Dynamic Range: 80 dB
- Spectral Resolution: 1 Hz
- Measurement Accuracy: ±1 dB (3 dB for 100 kHz channel bandwidth)
- Display: 8.4” XGA TFT Display
- Operating Conditions: 5% to 95% non-condensing humidity, 0°C to 40°C

Features

- Built-in preamplifier
- Calibration data report
- Software upgrade capability
- User-friendly interface

Options and Accessories

- Option A1: Universal EURO
- Option A2: United Kingdom
- Option A3: Australia
- Option A4: 240V North America
- Option A5: Switzerland
- Option A6: Japan
- Option A10: China
- Option A11: India
- Option A99: No Power Cord or AC Adapter

- Option B: Single Calibration Event
- Option C: 3-Year Calibration Data Report
- Option D: 5-Year Calibration Data Report

Upgrades

- RSA343BUP
  - Option 01 - Preamplifier, 0.1 to 3 GHz, 20 dB Gain, 6.5 dB NF (customer-installable)
  - Option 02 - 65.5 MHz Sample Deep Memory, Frequency Mask Trigger (customer-installable)
  - Option 03 - IQ, Differential IQ inputs (customer-installable)
  - Option 05 - Digital IQ Output (customer-installable)
  - Option 06 - Removable HDD
  - Option 21 - Advanced Measurements Suite (customer-installable)
  - Option 24 - GSM/EDGE Analysis (customer-installable)
  - Option 25 - CDMA 1X Forward/Reverse Link Analysis (customer-installable)
  - Option 26 - 1X EVDO Forward/Reverse Link Analysis (customer-installable)
  - Option 28 - TD-SCDMA Analysis (customer-installable)
  - Option 29 - WLAN 802.11a/b/g/n Analysis (customer-installable)
  - Option 30 - 3GPP Release 99 (W-CDMA) and Release 5 (W-CDMA) Uplink/Downlink Analysis (customer-installable)
  - Option 40 - 3GPP Release 6 (HSUPA) Uplink/Downlink Analysis (requires option 30, customer-installable)
  - Option IF - Installation labor for RSA343BUP (no calibration required)

Languages

- Option L0 - English Users/Programmers Manual
- Option L5 - Japanese Users/Programmers Manual
- Option L10 - Russian Manual

Contact Tektronix:

AUS / Austrolasia (61) 6356 3900
Australia +61 52 675 3777

Belgium 07 81 60166

Brazil & South America (11) 40669400

Canada 1 (800) 661 5625

Central Europe & Greece +33 6 86 81 81

Central Europe, Ukraine and the Baltics +49 221 97 74 004

China (86) 10 6235 1230

China 86 (10) 6235 1230

CIS +7 (495) 748 4900

Czech Republic +420 2 6917 6900

Denmark +45 88 88 1401

Europe +33 (0) 1 69 86 81 81

France +44 (0) 1344 392400

Germany +49 (211) 94 77 400

Hong Kong 852 (2) 2585 6688

India (91) 80 2227 5577

Italy +39 02 25086 1

Japan 81 (3) 6714 3010

Korea 82 (2) 6917 5000

Mexico, Central America & Caribbean 52 (55) 542 4700

Middle East, Asia and North Africa +27 11 206 8360

Norway 800 16098

People’s Republic of China 010 6235 1230

Portugal +351 21 86 12370

Republic of Korea +82 (2) 6917 5000

Russia & CIS +7 (495) 748 4900

South Africa +27 11 206 8360

Spain +34 901 988 054

Sweden 020 08 80371

Switzerland +41 52 675 3777

Taiwan 886 (2) 2722 9622

United Kingdom & Eire +44 (0) 1344 392400

USA 1 (800) 426 2200

For other areas contact Tektronix, Inc. at: 1 (903) 267 7111

Updated 12 November 2007

Service Options

- Option C1 - Provides a single calibration event or coverage for the designated calibration interval, whichever comes first.
- Option C3 - Calibration Service 3 Years.
- Option C5 - Calibration Service 5 Years.
- Option D1 - Calibration Data Report.
- Option D3 - Calibration Data Report 3 Years (with Option C3).
- Option D5 - Calibration Data Report 5 Years (with Option C5).
- Option R3 - Repair Service 3 Years (including warranty).
- Option R5 - Repair Service 5 Years (including warranty).

For Further Information

Tektronix maintains a comprehensive, constantly expanding collection of application notes, technical briefs and other resources to help engineers working on the cutting edge of technology. Please visit www.tektronix.com

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