

# Real-Time Spectrum Analyzer Software Options

► Measurement Software Options for RSA3408A • RSA3303A • RSA3308A



## Trigger, Capture, Analyze

See frequency, amplitude and modulation change over time. With only a single acquisition, Real-Time Spectrum Analyzers (RTSA) capture a continuous time record of changing RF events and enable time-correlated analysis in the Frequency, Time and Modulation domains. You get the functionality of a vector signal analyzer, a wide band

spectrum analyzer, plus the unique trigger-capture-analyze capability of RTSA – in one package. Optional application-focused software allows you to tailor the advanced characterization and troubleshooting tools of the RTSA to meet the needs of your specific application.

	RSA3303/8A	RSA3408A
General Purpose Modulation	Opt. 21	Opt. 21
W-CDMA Uplink		Opt. 23
GSM/EDGE		Opt. 24
CDMA 1X Forward/Reverse Link		Opt. 25
1X EVDO Forward/Reverse Link		Opt. 26
3GPP Release 5 Downlink (HSDPA)		Opt. 27
3GPP Release 6 (HSUPA) <sup>*2</sup>		Opt. 40
TD-SCDMA		Opt. 28
WLAN 802.11a/b/g/n		Opt. 29

<sup>\*2</sup> For 3GPP Release 6 (HSUPA) analysis, Opt. 23 and 27 are required in addition to Opt. 40.

## ► Features & Benefits

### Trigger

- Tektronix Exclusive Frequency Mask Trigger Makes Event-based Capture of Transient RF Signals Easy by Triggering on Any Change in the Frequency Domain

### Capture

- All Input Signals up to 36 MHz<sup>\*1</sup> Spans are Seamlessly Captured Into Memory
- Long Record Length Enables Complete Analysis Over Time Without Making Multiple Acquisitions
- Interfaces with TekConnect® Probes for RF and Baseband Probing

### Analyze

- Analyze Frequency, Amplitude and Modulation Over Time
- Multi-domain Analysis Enables Fast, Complete Signal Analysis in Frequency, Time, Code and Modulation Domains
- General Purpose Digital Modulation Analysis
- 802.11a/b/g/n Measurement Suite
- Codogram Provides a Simple, Graphical Means of Analyzing Individual Code Powers *versus* Time
- Key Signaling Analysis Over Air Interface Enables Checking Interaction between Base Station and UE
- Signal Source Analysis Simplifies Phase Noise, Jitter and Frequency Settling Measurements

## ► Applications

- W-CDMA
- HSUPA
- HSDPA
- GSM/EDGE
- cdma2000 1x
- cdma2000 1xEV-DO
- TD-SCDMA
- RFID
- Phase Noise
- Jitter
- IEEE 802.11 a/b/g/n WLAN
- IEEE 802.15.4 OQPSK (Zigbee)
- P25 (C4FM Signal Analysis)
- Digital Modulation Analysis

<sup>\*1</sup> RSA3408A: 36 MHz RF, 40 MHz Baseband;  
RSA3300A: 15 MHz RF, 20 MHz Baseband.

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## ► Characteristics

### Opt. 21 - Advanced Measurement Suite

#### Modulation Format –

BPSK, QPSK, OQPSK,  $\pi/4$  – DQPSK, 8PSK, 16QAM, 32QAM, 64QAM, 128QAM, 256QAM, GMSK, GFSK, ASK, FSK, DSB-ASK, OOK, PR-ASK, SSB-ASK, Subcarrier OOK, Subcarrier BPSK, C4FM (Fixed symbol rate).

Maximum Symbol Rate – RSA3408A: 51.2 MS/s.

#### Parameter Presets –

PDC, PHS, NADC, TETRA, GSM, CDPD, Bluetooth, IEEE 802.15.4 OQPSK (Zigbee), P25.

#### Vector Diagram Display Format –

Symbol Locus Display, Frequency Error and Origin Offset Measurement.

### Characteristics

QPSK EVM CF = 2 GHz (typical value)

### RSA3408A

0.5% (at 100 kS/s)  
0.5% (at 1 MS/s)  
0.6% (at 4 MS/s)  
0.9% (at 10 MS/s)

#### Constellation Diagram Display Format –

Symbol Display, Frequency Error and Origin Offset Measurement.

#### Eye Diagram Display Format –

I/Q/Trellis Display (1 to 16 symbols).

#### Error Vector Diagram Display Format –

EVM, Magnitude Error, Phase Error, Waveform Quality ( $\rho$ ), Frequency Error and Origin Offset Measurement.

#### Coding Format –

NRZ-L (8 periods), NRZ-L (4 periods), NRZ-L (2 periods), PWM, Bit Cell, Miller, Modified Miller, Miller (M\_2), Miller (M\_4), Miller (M\_8), Manchester, NRZ.

#### Symbol Table Display Format –

Binary, Octal, Hexadecimal.

#### Signal Source Analysis –

Phase Noise, Jitter and Automated Frequency Settling Measurement.

#### RFID Standards –

ISO/IEC 18000 Part 4 Mode 1.  
ISO/IEC 18000 Part 6 Type A, B, C.  
ISO/IEC 18092.  
ISO/IEC 14443 Part 2 Type A, B.  
EPC Global Generation 1 Class 0, Class 1.

#### Digital Demodulation

##### GMSK (1 MHz Span) –

EVM  $\leq 1.8\%$ , Magnitude Error  $\leq 1.2\%$ , Phase Error  $\leq 1.0^\circ$

##### 64QAM, 5.3 MS/s 1 GHz Carrier (15 MHz Span) –

EVM  $\leq 2.5\%$  (typical).

##### QPSK, 3.84 MS/s 2 GHz Carrier (15 MHz Span) –

EVM  $\leq 2.5\%$  (typical).

## Signal Source Analysis

Stability  
RSA3408A

## ► Noise Sidebands, dBc/Hz

Offset	At 1 GHz CF		At 2 GHz CF		At 6 GHz CF	
	Spec	Typical	Spec	Typical	Spec	Typical
1 kHz	-105	-107	-103	-105	-97	-99
10 kHz	-110	-112	-109	-111	-106	-108
20 kHz	-110	-112	-109	-111	-106	-108
30 kHz	-110	-112	-109	-111	-106	-108
100 kHz	-112	-115	-112	-115	-111	-113
1 MHz	-132	-135	-132	-135	-132	-134
5 MHz	-138	-140	-138	-140	-137	-139
7 MHz	-138	-140	-138	-140	-137	-139
10 MHz	-138	-140	-138	-140	-137	-139

STABILITY  
RSA3308A/3303A

► Noise Sidebands, dBc/Hz

Offset	At 1 GHz CF		At 2 GHz CF		At 6 GHz CF	
	Spec	Typical	Spec	Typical	Spec	Typical
1 kHz	-100	-107	-96	-99	-87	-90
10 kHz	-105	-112	-104	-107	-104	-107
20 kHz	-105	-112	-105	-108	-105	-108
30 kHz	-105	-112	-105	-108	-105	-108
100 kHz	-112	-115	-112	-115	-112	-115
1 MHz	-132	-135	-132	-135	-128	-131
5 MHz	-135	-140	-135	-138	-130	-133
7 MHz	-135	-140	-135	-138	-130	-133

**Frequency Settling Time**

RSA3408A (typical).

Input Power – -5 dBm.

RF Attenuator – 0 dB.

Smoothing Factor – 1.

Span – ≥10 MHz.

Input Frequency – 100 MHz to 101 MHz.

Frequency Settling Threshold – 100 kHz.

Span – 100 kHz.

Input Frequency – 10 MHz to 10.01 MHz.

RSA3300A Series (typical)

Input Power – -5 dBm.

RF Attenuator – 0 dB.

Smoothing Factor – 1.

Span – ≥10 MHz.

Input Frequency – 100 MHz to 101 MHz.

Frequency Settling Threshold – 100 kHz.

Span – 100 kHz.

Input Frequency – 10 MHz to 10.01 MHz.

**Opt. 23 - W-CDMA**

**Uplink Analysis**

Perform key measurements for 3GPP

TS34.121 including PRACH analysis capability.

**Supports the Following Measurements –**

Constellation, EVM, Eye Diagram, Symbol Table, CDP

Spectrogram, CDP vs. Short Code, CDP vs. Symbol,

CDP vs. Time Slot, Symbol Constellation, Symbol

EVM, Symbol Eye Diagram.

**Supports W-CDMA Uplink Signals –**

DPDCH 9 Dedicated Physical Data Channel/DPCCCH

(Dedicated Physical Control Channel), PRACH

(Physical Random Access Data Channel), PCPCH

(Physical Common Packet Channel).

► Frequency Settling Threshold – 1 kHz

Span (Hz)	Error Frequency Settling Time	Error Frequency Settling Time From Trigger
36 MHz	60 ns	100 ns
10 MHz	240 ns	240 ns
100 KHz	19 µs	19 µs

► Frequency Settling Threshold – 1 kHz

Span (Hz)	Error Frequency Settling Time (S)	Error Frequency Settling Time From Trigger (S)
15 MHz	160 ns	40 ns
10 MHz	240 ns	80 ns
100 kHz	19 µs	13 µs

# Real-Time Spectrum Analyzer Software Options

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## Opt. 24 – GSM/EDGE Analysis Software

Perform key measurements for ETSI TS 100 910 and 3GPP TS45.005.

### ► Burst Type: Normal

Characteristics	Description
<b>Modulation Accuracy Measurement</b>	
Carrier Power Range	–30 to +30 dBm
Phase Error Measurement Accuracy for GMSK Modulation (typical)	≤0.8° (RMS) ≤1.8° (Peak)
Phase Error Resolution	0.01°
EVM Measurement Accuracy for 8-PSK Modulation (typical)	≤0.9% (RMS)
EVM Resolution	0.01%
Time Resolution	0.15625 μs at 5 MHz span
Burst Count	1000 maximum
<b>Mean Power Measurement</b>	
RF Input Range	–50 dBm to +30 dBm
Absolute Power Measurement Accuracy for GSM900 at 20 °C to 30 °C, Excluding Mismatch Error (typical)	±0.5 dB Signal frequency: 880 MHz to 960 MHz, Signal power: +10 dBm to –30 dBm, RF attenuator: 0 dB –20 dB, after auto level is performed at 5 MHz span
Absolute Power Measurement Accuracy for DCS1800/PCS1900 at 20 °C to 30 °C, Excluding Mismatch Error (typical)	±0.6 dB Signal frequency: 1710 MHz to 1990 MHz, Signal power: +10 dBm to –30 dBm, RF attenuator: 0 dB to 20 dB, after auto level is performed at 5 MHz span
Resolution	0.01 dB
Burst Count	1000 maximum
<b>Power Versus Time Measurement</b>	
RF Input Range	–50 dBm to +30 dBm
Power Ramp Relative Accuracy (typical)	±0.2 dB at 0 dBfs to –40 dBfs
Time Resolution (typical)	0.15625 μs at 5 MHz span
Marker Amplitude Resolution	0.001 dB
Burst Count	1000 maximum

► **Burst Type: Normal** (continued)

Characteristics	Description
<b>Modulation Spectrum Measurement</b>	
Carrier Power Range	-5 dBm to +30 dBm
Dynamic Range for GMSK Modulation (typical)	82 dB at 600 kHz offset (30 kHz RBW) 86 dB at 1.2 MHz offset (30 kHz RBW) 83 dB at 1.8 MHz offset (100 kHz RBW) 85 dB at 6 MHz offset (100 kHz RBW)
Dynamic Range for 8-PSK Modulation (typical)	82 dB at 600 kHz offset (30 kHz RBW) 85 dB at 1.2 MHz offset (30 kHz RBW) 83 dB at 1.8 MHz offset (100 kHz RBW) 83 dB at 6 MHz offset (100 kHz RBW)
Burst Count	1000 maximum
<b>Switching Spectrum Measurement</b>	
Carrier Power Range	-5 dBm to +30 dBm
Dynamic Range for GMSK Modulation (typical)	75 dB at 400 kHz offset (30 kHz RBW) 80 dB at 600 kHz offset (30 kHz RBW) 84 dB at 1.2 MHz offset (30 kHz RBW) 88 dB at 1.8 MHz offset (30 kHz RBW)
Dynamic Range for 8-PSK Modulation (typical)	75 dB at 400 kHz offset (30 kHz RBW) 80 dB at 600 kHz offset (30 kHz RBW) 84 dB at 1.2 MHz offset (30 kHz RBW) 88 dB at 1.8 MHz offset (30 kHz RBW)
Burst Count	1000 maximum

# Real-Time Spectrum Analyzer Software Options

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## Opt. 25 - cdma2000 1x Signal Analysis Software

Perform key measurements for cdma2000 forward link (3GPP2 C.S0010) and reverse link (3GPP2 C.S0011).

### ► cdma2000 1x Forward Link

Characteristics	Description
<b>Channel Power</b>	
Minimum Power at RF Input	-50 dBm
Absolute Power Measurement Accuracy (at 20 °C to 30 °C, excluding mismatch error), Typical	±0.6 dB at conditions below: Signal frequency: 824 to 960 MHz or 1750 to 2170 MHz, Signal power: 0 dBm to -50 dBm after auto level is performed at 10 MHz span
Relative Power Measurement Accuracy (at 20 °C to 30 °C, excluding mismatch error), Typical	±0.2 dB at conditions below: Signal frequency: 824 to 960 MHz or 1750 to 2170 MHz, Signal power: 0 dBm to -30 dBm after auto level is performed at 10 MHz span, 0 dBm input
Resolution	0.01 dB
<b>ACPR</b>	
Minimum Carrier Power at RF Input	-40 dBm
Dynamic Range	At -5 dBm signal input
765 kHz Offset	76 dB (30 kHz BW)
1.995 MHz Offset	81 dB (30 kHz BW)
3.125 MHz Offset	81 dB (30 kHz BW)
4 MHz Offset	82 dB (30 kHz BW)
<b>CCDF</b>	
Histogram Resolution	0.01 dB
<b>Intermodulation Distortion</b>	
Measurement Filter	Rectangular, Root Nyquist, Nyquist and Gaussian
<b>Occupied Bandwidth</b>	
Minimum Carrier Power at RF Input	-50 dBm
Measurement Accuracy	0.2%
<b>Spectrum Emission Mask</b>	
Minimum Carrier Power at RF Input	-5 dBm
Dynamic Range	82 dB (30 kHz BW)
1.995 MHz Offset	
<b>Code Domain Power</b>	
Relative Code Domain Power Accuracy	±0.15 dB/±0.075 dB (typical)
<b>QPSK EVM</b>	
Minimum Carrier Power at RF Input	-40 dBm
EVM Floor, Typical	2.0%
<b>Modulation Accuracy (composite)</b>	
Minimum Carrier Power at RF Input	-40 dBm
Composite EVM Floor, Typical	2.0%
Rho ( $\rho$ )	0.999
Frequency Error Accuracy	±10 Hz + center frequency accuracy
Timing Accuracy ( $\tau$ )	±250 ns

► cdma2000 1x Reverse Link

Characteristics	Description
<b>Channel Power</b>	
Minimum Power at RF Input	-50 dBm
Absolute Power Measurement Accuracy (at 20 °C to 30 °C, excluding mismatch error), Typical	±0.6 dB at conditions below: Signal frequency: 824 to 960 MHz or 1750 to 2170 MHz, Signal power: 0 dBm to -50 dBm after auto level is performed at 10 MHz span
Relative Power Measurement Accuracy (at 20 °C to 30 °C, excluding mismatch error), Typical	±0.2 dB at conditions below: Signal frequency: 824 to 960 MHz or 1750 to 2170 MHz, Signal power: 0 dBm to -30 dBm after auto level is performed at 10 MHz span, 0 dBm input
Resolution	0.01 dB
<b>ACPR</b>	
Minimum Carrier Power at RF Input	-40 dBm
Dynamic Range	At -5 dBm signal input
900 kHz Offset	76 dB (30 kHz BW)
1.995 MHz Offset	81 dB (30 kHz BW)
3.125 MHz Offset	81 dB (30 kHz BW)
4 MHz Offset	82 dB (30 kHz BW)
<b>CCDF</b>	
Histogram Resolution	0.01 dB
<b>Intermodulation Distortion</b>	
Measurement Filter	Rectangular, Root Nyquist, Nyquist and Gaussian
<b>Occupied Bandwidth</b>	
Minimum Carrier Power at RF Input	-50 dBm
Measurement Accuracy	0.2%
<b>Spectrum Emission Mask</b>	
Minimum Carrier Power at RF Input	-5 dBm
Dynamic Range	82 dB (30 kHz BW)
1.995 MHz Offset	
<b>Code Domain Power</b>	
Relative Code Domain Power Accuracy	±0.15 dB/±0.075 dB (typical)
<b>QPSK EVM</b>	
Minimum Carrier Power at RF Input	-40 dBm
EVM Floor, Typical	2.0%
<b>Modulation Accuracy (composite)</b>	
Minimum Carrier Power at RF Input	-40 dBm
Composite EVM Floor, Typical	2.0%
Rho ( $\rho$ )	0.999
Frequency Error Accuracy	±10 Hz + center frequency accuracy

## Real-Time Spectrum Analyzer Software Options

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### Opt. 26 – 1xEV-DO Signal Analysis Software

Perform key measurements for 1xEV-DO forward link (3GPP2 C.S0032) and reverse link (3GPP2 C.S0033).

#### ► 1xEV-DO Forward Link

Characteristics	Description
<b>Channel Power</b>	
Minimum Power at RF input	–50 dBm
Absolute Power Measurement Accuracy (at 20 °C to 30 °C, excluding mismatch error), Typical	±0.6 dB at conditions below: Signal frequency: 824 to 960 MHz or 1750 to 2170 MHz Signal power: 0 dBm to –50 dBm after auto level is performed at 10 MHz span
Relative Power Measurement Accuracy (at 20 °C to 30 °C, excluding mismatch error), Typical	±0.2 dB at conditions below: Signal frequency: 824 to 960 MHz or 1750 to 2170 MHz, Signal power: 0 dBm to –30 dBm after auto level is performed at 10 MHz span, 0 dBm input
Resolution	0.01 dB
<b>CCDF</b>	
Histogram Resolution	0.01 dB
<b>Intermodulation Distortion</b>	
Measurement Filter	Rectangular, Root Nyquist, Nyquist and Gaussian
<b>Occupied Bandwidth</b>	
Minimum Carrier Power at RF Input	–50 dBm
Measurement Accuracy	0.2%
<b>ACPR</b>	
Minimum Carrier Power at RF Input	–40 dBm
Dynamic Range	At –5 dBm signal input
765 kHz Offset	76 dB (30 kHz BW)
1.995 MHz Offset	81 dB (30 kHz BW)
3.125 MHz Offset	81 dB (30 kHz BW)
4 MHz Offset	82 dB (30 kHz BW)
<b>Spectrum Emission Mask</b>	
Minimum Carrier Power at RF Input	–5 dBm
Dynamic Range	
1.995 MHz Offset	82 dB (30 kHz BW)
<b>Code Domain Power</b>	
Relative Code Domain Power Accuracy	±0.15 dB/±0.075 dB (typical)
<b>QPSK EVM</b>	
Minimum Carrier Power at RF Input	–40 dBm
EVM Floor, Typical	2.0%
<b>Modulation Accuracy (composite)</b>	
Minimum Carrier Power at RF Input	–40 dBm
Composite EVM Floor, Typical	2.0%
Rho ( $\rho$ )	0.999
Frequency Error Accuracy	±10 Hz + center frequency accuracy
Timing Accuracy ( $\tau$ )	±250 ns



► 1xEV-DO Reverse Link

Characteristics	Description
<b>Channel Power</b>	
Minimum Power at RF Input	-50 dBm
Absolute Power Measurement Accuracy (at 20 to 30 °C, excluding mismatch error), Typical	±0.6 dB at conditions below: Signal frequency: 824 - 960 MHz or 1750 - 2170 MHz Signal power: 0 dBm to -50 dBm after auto level is performed at 10 MHz span
Relative Power Measurement Accuracy (at 20 to 30 °C, excluding mismatch error), Typical	±0.2 dB at conditions below: Signal frequency: 824 - 960 MHz or 1750 - 2170 MHz, Signal power: 0 dBm to -30 dBm after auto level is performed at 10 MHz span, 0 dBm input.
Resolution	0.01 dB
<b>CCDF</b>	
Histogram Resolution	0.01 dB
<b>Intermodulation Distortion</b>	
Measurement Filter	Rectangular, Root Nyquist, Nyquist and Gaussian
<b>Occupied Bandwidth</b>	
Minimum Carrier Power at RF Input	-50 dBm
Measurement Accuracy	0.2%
<b>ACPR</b>	
Minimum Carrier Power at RF Input	-40 dBm
Dynamic Range	At -5 dBm signal input
765 kHz Offset	74 dB (30 kHz BW)
1.995 MHz Offset	83 dB (30 kHz BW)
3.125 MHz Offset	83 dB (30 kHz BW)
4 MHz Offset	84 dB (30 kHz BW)
<b>Spectrum Emission Mask</b>	
Minimum Carrier Power at RF Input	-5 dBm
Dynamic Range	82 dB (30 kHz BW)
1.995 MHz Offset	
<b>Code Domain Power</b>	
Relative Code Domain Power Accuracy	±0.15 dB/±0.075 dB (typical)
<b>QPSK EVM</b>	
Minimum Carrier Power at RF Input	-40 dBm
EVM Floor, Typical	2.0%
<b>Modulation Accuracy (composite)</b>	
Minimum Carrier Power at RF Input	-40 dB
Composite EVM Floor, Typical	2.0%
Rho (ρ)	0.999
Frequency Error Accuracy	±10 Hz + center frequency accuracy

# Real-Time Spectrum Analyzer Software Options

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## Opt. 27 - 3GPP Release 5 Downlink (HSDPA) Analysis Software

Perform key measurements for 3GPP TS25.141 v5.7.0

### ► 3GPP-R5 Downlink

Characteristics	Description
Modulation Format	QPSK, 16QAM auto detection
<b>Channel Power Measurement</b>	
Minimum Power at RF Input	-50 dBm
Absolute Power Measurement Accuracy (typical)	±0.6 dB at 20 °C to 30 °C, excluding mismatch error Signal frequency: 1900 to 2200 MHz Signal power: +10 dBm to -30 dBm after auto level is performed at 10 MHz span
Relative Power Measurement Accuracy (typical)	±0.2 dB at 20 °C to 30 °C, excluding mismatch error Signal frequency: 1900 to 2200 MHz Signal power: 0 dBm to -30 dBm after auto level is performed at 10 MHz span
Resolution	0.01 dB
<b>ACLR Measurement</b>	
Minimum Carrier Power at RF Input	-40 dBm
Dynamic Range	Test model 1, 16 ch, input power >-5 dBm 60 dB, typically 66 dB (5 MHz offset) 63 dB, typically 70 dB (10 MHz offset)
<b>CCDF Measurement</b>	
Histogram Resolution	0.01 dB
<b>OBW (Occupied Bandwidth) Measurement</b>	
Minimum Carrier Power at RF Input	-50 dBm
Measurement Accuracy	0.2% (5 MHz Span, 1000 times averaging)
<b>Spectrum Emission Mask</b>	
Dynamic Range	82 dB (30 kHz BW, Input Power >-5 dBm, 5 MHz offset)

► 3GPP-R5 Downlink (continued)

Characteristics	Description
<b>Code Domain Power</b>	
Relative Accuracy of Code Domain Power Accuracy	±0.15 dB, typically ±0.075 dB Using Test Model 5, Total Power = 0 dBm, Code Level >−15 dB
<b>QPSK EVM (Pilot Channel only)</b>	
Minimum Carrier Power at RF Input	−60 dBm (EVM <9%)
EVM Floor (typical)	2.0% (Input Power >−40 dBm, 10 times averaged)
<b>Modulation Accuracy (Composite, Test Model 5)</b>	
Minimum Carrier Power at RF Input	−60 dBm (EVM < 9%)
Composite EVM Floor (typical)	2.5% (Input Power > −40 dBm, 10 times averaged)
Frequency Error Accuracy	±10 Hz + (center frequency accuracy)
<b>Modulation Accuracy (Composite, Alternate Scrambling Code)</b>	
Minimum Carrier Power at RF Input	−60 dBm (EVM <9%)
Composite EVM Floor (typical)	2.5% (Input Power >−40 dBm, 10 times averaged)
Frequency Error Accuracy	±10 Hz + (center frequency accuracy)

► 3GPP-R5 Uplink

Characteristics	Description
<b>ACK/NACK Analysis</b>	
ACK/NACK Analysis Function	ACK/NACK/DTX detection, CQI decode
<b>Code Domain Power</b>	
Relative Accuracy of Code Domain Power Accuracy	±0.15 dB, typically ±0.075 dB (Total Power = 0 dBm, Code Level >−15 dB )

## Real-Time Spectrum Analyzer Software Options

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### Opt. 28 - 3GPP Release 4 Downlink and Uplink (TD-SCDMA)

► Perform key measurements for TS25.102 (UL), 3GPP TS25.142 (DL)

Characteristics	Description
<b>General</b>	
Frequency Range	1850 to 2050 MHz
Minimum Power at RF Input	-60 dBm
<b>Channel Power Measurement</b>	
Absolute Power Measurement Accuracy (typical, after auto-level performed, excluding mismatch error, 5 MHz span)	±0.6 dB (Signal power +10 dBm to -30 dBm, 20 to 30 °C)
Relative Power Measurement Accuracy (typical, after auto-level performed, excluding mismatch error, 5 MHz span)	±0.2 dB (Signal power +0 dBm to -30 dBm, 20 to 30 °C)
Resolution	0.01 dB
<b>ACLR Measurement</b>	
Dynamic Range	(8 active DPCH, Timeslots 4, 5, 6), input power >-20 dBm 60 dB, 1.6 MHz offset 61 dB, 3.2 MHz offset
<b>CCDF Measurement</b>	
Histogram Resolution	0.01 dB
<b>Code Domain Analysis</b>	
Relative Code Domain Power Accuracy	Input power >-40 dBm ±0.15 dB (±0.075 typical) at code power >-10 dBc ±0.30 dB (±0.15 typical) at code power >-25 dBc
Code Domain Residual Error	<-40 dB (Input power >-40 dBm)
<b>Modulation and Frequency Related</b>	
Modulation Format	QPSK
Residual EVM Floor	≤1.5%, input level >-40 dBm (1 DPCH in timeslots 4, 5 and 6)
Residual Origin Offset	≤-40 dB, input level >-40 dBm (1 DPCH in timeslots 4, 5 and 6)
Frequency Error Accuracy	±10 Hz + (center frequency accuracy)
Frequency Lock Range	±4 kHz from defined carrier frequency (input level >-40 dBm)
Other Measurements	Occupied BW (OBW) Spectrum Emissions Mask (offset from carrier and inband, ungated)

**Opt. 29 - WLAN 802.11 a/b/g/n Analysis**

Characteristics	Description
Residual EVM for IEEE 802.11a/g/n 54 Mb/s OFDM (typical)	≤-44 dB at 2.447 MHz center frequency, ≤ -42 dB at 5.5 GHz center frequency
Residual EVM for IEEE 802.11b 11 Mbps CCK with Raised Cosine Filter (typical)	≤0.7% at 2.447 MHz center frequency
Residual EVM Against Frequency Offset (±10 MHz), OFDM Signal Conforming to IEEE 802.11g, 16.6 MHz BW, 52 Sub Carriers, 64 QAM, 54 Mb/s, with Long Training Symbol Correction (typical)	≤-41 dB, Center Frequency of the Analyzer is 5.0 to 6.0 GHz, Carrier Center is ±10 MHz apart from the Center Frequency setting

► IEEE 802.11 Measurements

Measurements	Measurement Contents	802.11a	802.11b	802.11g	802.11n
<b>Modulation Analysis</b>					
EVM vs. Time	EVM	X	X	X	X
	Magnitude Error	X	X	X	X
	Phase Error	X	X	X	X
Power vs. Time	—	X	X	X	X
Constellation	—	X	X	X	X
EVM vs. SC	EVM	X	X	X	X
	Magnitude Error	X	X	X	X
	Phase Error	X	X	X	X
Power vs. SC	—	X	X	X	X
SC Constellation	—	X	X	X	X
Frequency Error	—	X	X	X	X
OFDM Flatness	—	X	—	X	X (SISO only)
OFDM Linearity	—	X	—	X	X (SISO only)
Symbol Table	—	X	X	X	X
2 x 2 MIMO Signal Analysis	—	—	—	—	X
<b>Power Analysis</b>					
Spectrum Mask	—	X	—	X	X
Transmit Power	—	—	X	X	—
<b>Transmission Analysis</b>					
Transfer Function vs. Time	—	—	—	—	X
Delay Profile vs. Time	—	—	—	—	X

# Real-Time Spectrum Analyzer Software Options

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## Opt. 40 - 3GPP Release 6 (HSUPA) Analysis Software

Perform key measurements for 3GPP TS25.211 v6.7.0, TS25.212 v6.8.0, TS25.213 v6.5.0

### ► 3GPP-R6 Uplink

Characteristics	Description
Modulation Format	Channel detection, IQ split analysis
<b>Channel Power Measurement</b>	
Minimum Power at RF Input	-50 dBm
Relative Power Measurement Accuracy (typical)	±0.2 dB at 20 °C to 30 °C, excluding mismatch error Signal Frequency: 1900 to 2200 MHz Signal power: 0 dBm to -30 dBm after auto level is performed at 10 MHz span
Resolution	0.01 dB
<b>Code Domain Power</b>	
Relative Accuracy of Code Domain Power Accuracy	±0.15 dB, typically ±0.075 dB Using Configuration 2, Total Power = 0 dBm, Code Level >-15 dB
<b>QPSK EVM (Pilot Channel only)</b>	
Minimum Carrier Power at RF Input	-60 dBm (EVM <9%)
EVM Floor (typical)	2.0% (Input Power >-40 dBm, 10 times averaged)
<b>Modulation Accuracy (Configuration 2)</b>	
Minimum Carrier Power at RF Input	-60 dBm (EVM <9%)
Composite EVM Floor (typical)	2.5 % (Input Power >-40 dBm, 10 times averaged)
Frequency Error Accuracy	±10 Hz + (center frequency accuracy)

### 3GPP-R6 Uplink and Downlink Analysis

Characteristics	Description
<b>Uplink</b>	
Phase Discontinuity	Result of Phase Discontinuity in accordance with 3GPP standard TS25.101(V6.9.0) 6.8.4
Gain Ratio over Time	Power ratio % over time
Modulation Accuracy over Time	EVM, Mag error, Phase error, PCDE, Frequency error, Origin offset, Phase discontinuity over time
<b>Uplink Signaling Analysis</b>	
HS-DPCCH Analysis	ACK/NACK/PRE/POST/DTX detection, CQI decode
E-DPCCH Analysis	RSN/E-TFCI/HAPPY decode
DPCCH	TPC, TFCI decode
<b>Downlink</b>	
Modulation Accuracy over Time	EVM, Mag error, Phase error, PCDE, Frequency error, Origin offset over time
<b>Downlink Signaling Analysis</b>	
E-RGCH (E - Relative Grant Channel) Analysis	UP/HOLD/DOWN detection
E-HICH (E-Hybrid ARQ Indicator Channel) Analysis	ACK/NACK decode
E-AGCH Analysis	AGV/AGS decode

## ► Ordering Information

### **RSA3408A**

#### **Product Options**

**Opt. 21** – Advanced Measurement Suite Software.

**Opt. 23** – W-CDMA Uplink Analysis Software.

**Opt. 24** – GSM/EDGE Analysis Software.

**Opt. 25** – cdma2000 1x Analysis Software.

**Opt. 26** – 1xEV-DO Analysis Software.

**Opt. 27** – 3GPP Release 5 Downlink (HSDPA) Analysis Software.

**Opt. 28** – TD-SCDMA Analysis Software.

**Opt. 29** – WLAN 802.11 a/b/g/n Analysis Software.

**Opt. 40** – 3GPP Release 6 (HSUPA) Analysis Software.<sup>3</sup>

<sup>3</sup> Options 23 and 27 are required for 3GPP Release 6 analysis in addition to Option 40.

#### **Upgrade Options**

**RSA34UP21** – Advanced Measurement Suite Upgrade (customer-installable).

**RSA34UP23** – W-CDMA Uplink Analysis Upgrade (customer-installable).

**RSA34UP24** – GSM/EDGE Analysis Upgrade (customer-installable).

**RSA34UP25** – cdma2000 1x Analysis Upgrade (customer-installable).

**RSA34UP26** – 1xEV-DO Analysis Upgrade (customer-installable).

**RSA34UP27** – 3GPP Release 5 Downlink (HSDPA) Analysis Upgrade (customer-installable).

**RSA34UP28** – TD-SCDMA Analysis Upgrade (customer-installable).

**RSA34UP29** – WLAN 802.11 a/b/g/n Analysis Upgrade (customer-installable).

**RSA34UP40** – 3GPP Release 6 (HSUPA) Analysis Software Upgrade (customer-installable).<sup>4</sup>

<sup>4</sup> Options 23 and 27 are required for 3GPP Release 6 analysis in addition to Option 40

### **RSA3303A, RSA3308A**

#### **Product Options**

**Opt. 21** – Advanced Measurement Suite Software.

#### **Upgrade Options**

**RSA3UP21** – Advanced Measurement Suite Upgrade (customer-installable).

# Real-Time Spectrum Analyzer Software Options

► Measurement Software Options for RSA3408A • RSA3303A • RSA3308A

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Updated 15 September 2006

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