Tektronix®

RSA500A and RSA600A Series
Real-Time Spectrum Analyzers
Specifications and Performance Verification

Technical Reference

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Real-Time Spectrum Analyzers
Specifications and Performance Verification**

Technical Reference

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For product information, sales, service, and technical support:
- In North America, call 1-800-833-9200.
- Worldwide, visit www.tek.com to find contacts in your area.

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Important safety information

This manual contains information and warnings that must be followed by the user for safe operation and to keep the product in a safe condition.

To safely perform service on this product, additional information is provided at the end of this section. (See page v, *Service safety summary (all models)*.)

General safety summary (all models)

Use the product only as specified. Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it. Carefully read all instructions. Retain these instructions for future reference.

Comply with local and national safety codes.

For correct and safe operation of the product, it is essential that you follow generally accepted safety procedures in addition to the safety precautions specified in this manual.

The product is designed to be used by trained personnel only.

Only qualified personnel who are aware of the hazards involved should remove the cover for repair, maintenance, or adjustment.

This product is not intended for detection of hazardous voltages.

While using this product, you may need to access other parts of a larger system. Read the safety sections of the other component manuals for warnings and cautions related to operating the system.

When incorporating this equipment into a system, the safety of that system is the responsibility of the assembler of the system.

To avoid fire or personal injury

Use proper power cord.   Use only the power cord specified for this product and certified for the country of use. Do not use the provided power cord for other products.

Connect and disconnect properly.   Do not connect or disconnect probes or test leads while they are connected to a voltage source.

Observe all terminal ratings.   To avoid fire or shock hazard, observe all ratings and markings on the product. Consult the product manual for further ratings information before making connections to the product.

Do not apply a potential to any terminal, including the common terminal, that exceeds the maximum rating of that terminal.

The measuring terminals on this product are not rated for connection to mains or Category II, III, or IV circuits.

Do not operate without covers.   Do not operate this product with covers or panels removed, or with the case open.

Avoid exposed circuitry.   Do not touch exposed connections and components when power is present.

Do not operate with suspected failures.   If you suspect that there is damage to this product, have it inspected by qualified service personnel.

Disable the product if it is damaged. Do not use the product if it is damaged or operates incorrectly. If in doubt about safety of the product, turn it off and disconnect the power. Clearly mark the product to prevent its further operation.

Examine the exterior of the product before you use it. Look for cracks or missing pieces.

Use only specified replacement parts.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry.   Remove the input signals before you clean the product.

Provide proper ventilation.   Refer to the installation instructions in the manual for details on installing the product so it has proper ventilation.

Provide a safe working environment.   Avoid improper or prolonged use of keyboards, pointers, and button pads. Improper or prolonged keyboard or pointer use may result in serious injury.

Be sure your work area meets applicable ergonomic standards. Consult with an ergonomics professional to avoid stress injuries.

Use only the Tektronix rackmount hardware specified for this product.

General safety summary (RSA500A Series specific)

To avoid fire or personal injury

Use proper AC adapter.   Use only the AC adapter specified for this product.

Replace batteries properly.   Replace batteries only with the specified type and rating. Refer to the WFM200BA Battery Pack instructions (0751041xx) for details.

Recharge batteries properly.   Recharge batteries for the recommended charge cycle only. Refer to the WFM200BA Battery Pack instructions (0751041xx) for details.

General safety summary (RSA600A Series specific)

To avoid fire or personal injury

Ground the product.   This product is grounded through the grounding conductor of the power cord. To avoid electric shock, the grounding conductor must be connected to earth ground. Before making connections to the input or output terminals of the product, ensure that the product is properly grounded. Do not disable the power cord grounding connection.

Power disconnect.   The power cord disconnects the product from the power source. See instructions for the location. Do not position the equipment so that it is difficult to operate the power cord; it must remain accessible to the user at all times to allow for quick disconnection if needed.

Do not operate in wet/damp conditions.   Be aware that condensation may occur if a unit is moved from a cold to a warm environment.

Service safety summary (all models)

The *Service safety summary* section contains additional information required to safely perform service on the product. Only qualified personnel should perform service procedures. Read this *Service safety summary* and the *General safety summary* before performing any service procedures.

To avoid electric shock.   Do not touch exposed connections.

Do not service alone.   Do not perform internal service or adjustments of this product unless another person capable of rendering first aid and resuscitation is present.

Disconnect power.   To avoid electric shock, disconnect the USB 3.0 cable from the instrument before removing any covers or panels, or opening the case for servicing.

Use care when servicing with power on.   Disconnect power, remove battery (if applicable), and disconnect test leads before removing protective panels, soldering, or replacing components.

Terms in this manual

These terms may appear in this manual:

WARNING.   Warning statements identify conditions or practices that could result in injury or loss of life.

CAUTION.   Caution statements identify conditions or practices that could result in damage to this product or other property.

Terms and symbols on the product

These terms may appear on the product:

- DANGER indicates an injury hazard immediately accessible as you read the marking.

- WARNING indicates an injury hazard not immediately accessible as you read the marking.

- CAUTION indicates a hazard to property including the product.

When this symbol is marked on the product, be sure to consult the manual to find out the nature of the potential hazards and any actions which have to be taken to avoid them. (This symbol may also be used to refer the user to ratings in the manual.)

The following symbol(s) may appear on the product:

CAUTION
Refer to Manual

Preface

This manual contains performance verification procedures and lists the electrical, mechanical, and environmental specifications for the following Tektronix USB Real-Time Spectrum Analyzers.

- RSA503A

- RSA507A

- RSA513A

- RSA518A

- RSA603A

- RSA607A

Documentation

The following table lists the product specific documentation available for these models. Other information, such as demonstration guides and application notes for RF or signal analysis, can be found at www.tek.com.

Product documentation

Document	Purpose	Location
Installation and Safety Instructions	Provides software and hardware installation instructions and associated safety warnings	Printed manual and also available in electronic format on the product flash drive and at www.tek.com/manuals
Specifications and Performance Verification Technical Reference (this manual)	Specifications and performance verification procedures for checking instrument performance	Available at www.tek.com/manuals
SignalVu-PC application help	Using the application and interpreting the measurement results	Application help files located in the SignalVu-PC application (Press Help)
RSA API Programmer manual	Details on commands used to control the instrument through API	Available at www.tek.com/manuals
SignalVu-PC Programmer manual	Details on SCPI commands used with the SignalVu-PC application to remotely control the instrument	Available at www.tek.com/manuals
Declassification and Security	Details on how to declassify and sanitize the product(s)	Available at www.tek.com/manuals

Specifications

All specifications are guaranteed unless labeled typical.

NOTE. Warranted characteristics that are checked in the Performance Verification are marked with a ✓ symbol.

The performance limits in this specification are valid within the following conditions:

■   The SignalVu-PC software version is 3.16.x or greater.

■   Operate the instrument in an environment that meets the temperature, altitude, and humidity characteristics listed in these specifications.

■   The instrument must have been operating for a warm-up period of at least for 30 minutes (after being connected to the PC, starting the SignalVu-PC application, and SignalVu-PC is connected to the instrument and continuously acquiring data).

■   The instrument must have had an alignment last executed through SignalVu-PC or the API after at least a 30 minute warm–up period at an ambient temperature within ±2 °C of the current ambient temperature.

Frequency

Frequency range	9 kHz to 3 GHz (RSA503A, RSA603A)
	9 kHz to 7.5 GHz (RSA507A, RSA607A)
	9 kHz to 13.6 GHz (RSA513A)
	9 kHz to 18 GHz (RSA518A)
Frequency marker readout accuracy	±(RE × MF + 0.001 × Span) Hz RE: Reference Frequency Error MF: Marker Frequency [Hz]
Frequency reference accuracy	±1 x 10^{-6} (after 30 minute warm up)
	This is the guarantee that the frequency has been set. The first measured frequency depends on the elapsed time since the date/time of the calibration, the warm-up time, and environmental conditions at the time of measurement.
✓Initial accuracy at Cal (30 min warm-up)	±1 x 10^{-6}
First year aging, typical	±1 x 10^{-6} (1 year)
Cumulative error (Initial accuracy + temperature + aging), typical	3 x 10^{-6} (1 year)
Temperature drift	±0.9 x 10^{-6} (-10 to 60 °C)
Accuracy, when locked to GNSS [1]	±0.025 ppm
	(For use to a stability of ±0.025 ppm, the unit should be powered on continuously for 2 to 5 days after initial unpacking.)
	(For use to a stability of ±0.05 ppm, the unit is typically stable in 2 hours of continuous operation after initial unpacking.)
GNSS Trained Accuracy, when GNSS antenna is disconnected [1], [2]	±0.025 ppm [3] ±0.08 ppm [4]
External reference input	BNC connector, 50 Ω nominal

External reference input frequency	Every 1 MHz from 1 to 20 MHz plus the following:
	    1.2288 MHz
	    2.048 MHz
	    2.4576 MHz
	    4.8 MHz
	    4.9152 MHz
	    9.8304 MHz
	    13 MHz
	    19.6608 MHz.
	The spurious level on the input signal must be less than -80 dBc within 100 kHz offset to avoid on-screen spurious.

External reference input range	± 5 ppm
External reference input level	-10 to +10 dBm

RF input

RF Input Impedance	50 Ω
RF VSWR, typical (RF Attn = 20 dB)	< 1.2 (10 MHz to 3 GHz) < 1.5 (>3 GHz to 7.5 GHz) (RSA507A, RSA607A) < 1.9 (>7.5 GHz to 18 GHz) (RSA513A, RSA518A)
RF VSWR preamp ON, typical	< 1.5 (10 MHz to 6 GHz, RF ATT=10 dB, preamp on) < 1.7 (> 6 GHz to 7.5 GHz, RF ATT=10 dB, preamp on) < 1.9 (> 7.5 GHz to 18 GHz, RF ATT=10 dB, preamp on) (RSA513A, RSA518A)

Maximum RF input level

Maximum DC voltage	±40 V (RF Input)
Maximum safe input power	+33 dBm (RF Input, 10 MHz to 7.5 GHz, RF Attn ≥ 20 dB) +13 dBm (RF Input, 9 kHz to 10 MHz) +20 dBm (RF Input, RF Attn < 20 dB)
Maximum safe input power (Preamp On)	+33 dBm (RF Input, 10 MHz to 18 GHz, RF Attn ≥ 20dB) +13 dBm (RF Input, 9 kHz to 10 MHz, RF Attn ≥ 20dB) +20 dBm (RF Input, RF Attn < 20 dB)
Maximum measurable input power	+30 dBm (RF Input, ≥10 MHz to Fmax, RF ATT Auto) +20 dBm (RF Input, <10 MHz, RF ATT Auto)

RF Attenuator	0 dB to 51 dB (1 dB step)

Sweep speed

Full span sweep speed, typical mean [5]	70.0 GHz/sec (RBW = 1 MHz) 60.0 GHz/sec (RBW = 100 kHz) 15.7 GHz/sec (RBW = 10 kHz) 1.7 GHz/sec (RBW = 1 kHz)
Tuning step time via API	1 ms

[1] Tested using GPS system.

[2] For 24 hours continuous operation within temperature limits (see footnotes below) after GNSS training. Refer to cumulative error specification if operating in GNSS trained mode beyond 24 hours since last training.

[3] For less than 3° C ambient temperature change after training.

[4] For less than 10° C ambient temperature change after training.

[5] Measured using a Dell Latitude E5540, i7, Windows ®7 Pro. Spectrum display is only measurement on screen.

Amplitude and RF flatness

These specifications exclude mismatch errors.

Characteristic	Description
	NOTE. All amplitude and frequency response measurements made with Preamp OFF except where noted. Flattop window filter is used to maximize CW amplitude measurement accuracy.
Reference level setting range	–170 dBm to +40 dBm, 0.1 dB step, (Standard RF input)
For RSA503A, RSA507A, RSA603A, RSA607A:	
Frequency response at 18 ℃ to 28 ℃ [1]	

Characteristic	Description		
Amplitude accuracy at all center frequencies (Preamp OFF)	18 °C to 28 °C ✓	18 °C to 28 °C typical at 95% confidence	-10 °C to 55 °C typical
9 kHz ≤ 3.0 GHz	±0.8 dB	±0.2 dB	±1.0 dB
> 3-7.5 GHz	±1.5 dB	±0.6 dB	±2.0 dB

For RSA513A, RSA518A:

Frequency response at 18 ℃ to 28 ℃ [1]

Amplitude accuracy at all center frequencies (Preamp OFF)	18 °C to 28 °C ✓	-10 °C to 55 °C typical
9 kHz ≤ 50 kHz	-1.2, ±0.8 dB	—
50 kHz ≤ 3.0 GHz	±0.8 dB	±1.0 dB
> 3 GHz to 7.5 GHz	±1.5 dB	±2.0 dB
> 7.5 GHz to 13.6 GHz	±1.55 dB	±2.0 dB
> 13.6 GHz to 18 GHz	±1.55 dB	±2.0 dB

For RSA503A, RSA507A, RSA603A, RSA607A:

Frequency response at 18℃ to 28℃ with Preamp ON [2]

Amplitude accuracy at all center frequencies (Preamp ON)	18 °C to 28 °C ✓	18 °C to 28 °C typical at 95% confidence	-10 °C to 55 °C typical
> 200 kHz to ≤ 3.0 GHz	±1.0 dB	±0.5 dB	±1.0 dB
> 3 GHz to 7.5 GHz	±1.75 dB	±0.75 dB	±3.0 dB
Preamp Gain	27 dB at 2 GHz 21 dB at 6 GHz (RSA607A)		

For RSA513A, RSA518A:

Frequency response at 18℃ to 28℃ with Preamp ON [2]

Amplitude accuracy at all center frequencies (Preamp ON)	18 °C to 28 °C ✓	-10 °C to 55 °C typical
> 200 kHz to ≤ 3.0 GHz	±1.0 dB	±1.0 dB
> 3 GHz to 7.5 GHz	±1.75 dB	±3.0 dB
> 7.5 GHz to 13.6 GHz	±2.0 dB	±3.0 dB
> 13.6 GHz to 18 GHz	±2.0 dB	±3.0 dB

[1]   Alignment run prior to testing

Verified with input level of -20 to -15 dBm, Ref level = -15 dBm, preamp OFF, all settings auto-coupled

Applies to corrected IQ data, with signal to noise ratios > 40 dB

[2]   Alignment run prior to testing

Verified with input level of -20 to -15 dBm, Ref level = -15 dBm, preamp ON, all settings auto-coupled

Applies to corrected IQ data, with signal to noise ratios > 40 dB

Channel response (amplitude and phase deviation), typical

For these specifications, use a flat top window for maximum CW amplitude verification accuracy with the RF attenuator setting at 10 dB.

Characteristic		Description			
Measure-ment center frequency	Span [1]	Amplitude flatness, typical	Amplitude flatness, RMS, typical	Phase linearity, RMS, typical
>40 MHz to 4.0 GHz	≤20 MHz	±0.20 dB	0.12 dB	0.4°
>4.0 GHz to 7.5 GHz	≤20 MHz	±0.35 dB	0.20 dB	0.7°
>7.5 GHz to 13.6 GHz	≤20 MHz	±0.35 dB	0.20 dB	0.7°
>13.6 GHz to 18 GHz	≤20 MHz	±0.35 dB	0.20 dB	0.7°
>40 MHz to 4.0 GHz	≤40 MHz	±0.35 dB	0.14 dB	0.8°
>4.0 GHz to 7.5 GHz	≤40 MHz	±0.40 dB	0.20 dB	1.0°
>7.5 GHz to 13.6 GHz	≤40 MHz	±0.60 dB	0.40 dB	1.5°
>13.6 GHz to 18 GHz	≤40 MHz	±0.60 dB	0.40 dB	1.5°

1 Span extents cannot exceed lower frequency limits of the instrument.

Channel response (amplitude flatness)

For these specifications, use a flat top window for maximum CW amplitude verification accuracy with the RF attenuator setting at 10 dB. The specifications are valid for the test center frequencies listed at the end of the table.

Characteristic	Description
Amplitude flatness✓	
Span	
≤20 MHz	±0.5 dB
≤40 MHz	±0.5 dB
Test center frequencies (in MHz)	
All models:	21, 30, 500, 1000, 3000
All models EXCEPT RSA503A/603A:	4500, 5500, 6200, 7000
RSA513A/518A:	8000, 10000, 11500, 15000
RSA518A:	17000

Trigger

Trigger/Sync input, typical	Voltage Range: TTL, 0.0 V – 5.0 V
	Trigger Level (Schmitt trigger): Positive-going threshold voltage: 1.6 V min, 2.1 V max Negative-going threshold voltage: 1.0 V min., 1.35 V max
	Impedance: 10 kΩ with schottky clamps to 0 V, +3.4 V
External trigger timing uncertainty	>20 MHz to 40 MHz Acquisition Bandwidth: ±250 ns
	Uncertainty increases as acquisition bandwidth is decreased.
Power trigger	
Power trigger, typical	Range: 0 dB to -50 dB from reference level, for trigger levels > 30 dB above the noise floor.
	Type: Rising or falling edge
	Trigger re-arm time: ≤ 100 μsec
Power trigger position timing uncertainty	>20 MHz to 40 MHz acquisition bandwidth: ±250 ns
	Uncertainty increases as acquisition bandwidth is decreased.
Power trigger level accuracy	±1.5 dB for CW signal at tuned center frequency for trigger levels > 30 dB above the noise floor.

1   This specification is in addition to the overall amplitude accuracy uncertainty for SA mode. On the low frequency path, the signal frequency should be higher than 0.75 x BW – CF, where BW is the acquisition bandwidth in Hz and CF is the center frequency in Hz.

2   This specification is in addition to the overall amplitude accuracy uncertainty for SA mode.

Noise and distortion

All noise and distortion measurements in the following table are made with the Preamp off, except where noted.

Characteristic	Description
3rd Order IM intercept (TOI)	+14 dBm at 2.130 GHz (RSA503A, RSA507A, RSA603A, RSA607A)
	+12 dBm at 2.130 GHz (RSA513A, RSA518A)
3rd Order IM intercept (TOI),	
Preamp off, typical	+10 dBm (9 kHz to 25 MHz, RSA503A, RSA507A, RSA603A, RSA607A) +17 dBm (9 kHz to 25 MHz, RSA513A, RSA518A) +15 dBm (25 MHz to 3 GHz) +15 dBm (3 GHz to 4 GHz, RSA507A, RSA607A) +10 dBm (4 GHz to 7.5 GHz, RSA507A, RSA607A) +15 dBm (7.5 GHz to max CF, RSA513A, RSA518A)
Preamp on, typical	–20 dBm (9 kHz to 25 MHz) –15 dBm (25 MHz to 3 GHz) –15 dBm (3 GHz to 4 GHz, RSA507A, RSA607A) –20 dBm (4 GHz to 7.5 GHz, RSA507A, RSA607A) –15 dBm (7.5 GHz to max CF, RSA513A, RSA518A)

Characteristic	Description		
3rd Order Inter-modulation distortion✓	**RSA503A/507A, RSA603A/607A:**		
	–74 dBc at 2.130 GHz		
	Each signal level –25 dBm at the RF input. 2 MHz tone separation. Attenuator = 0, Reference level = –20 dBm.		
	RSA513A/518A:		
	–78 dBc at 2.130 GHz		
	Each signal level –25 dBm at the RF input. 2 MHz tone separation. Attenuator = 0, Reference level = –20 dBm.		
3rd Order inter-modulation distortion			
Preamp off, typical	< –70 dBc (10 kHz to 25 MHz) < –80 dBc (25 kHz to 3 GHz) < –80 dBc (3 GHz to 4 GHz, RSA507A, RSA607A) < –70 dBc (4 GHz to 7.5 GHz, RSA507A, RSA607A) < –80 dBc (7.5 GHz to max CF, RSA513A, RSA518A)		
	Each signal level –25 dBm at the RF input. 2 MHz tone separation. Attenuator = 0, Reference level = –20 dBm.		
Preamp on, typical	< –70 dBc (9 kHz to 25 MHz) < –80 dBc (25 MHz to 3 GHz) < –80 dBc (3 GHz to 4 GHz, RSA507A, RSA607A) < –70 dBc (4 GHz to 7.5 GHz, RSA507A, RSA607A) < –80 dBc (7.5 GHz to max CF, RSA513A, RSA518A)		
	Each signal level –55 dBm at the RF input. 2 MHz tone separation. Attenuator = 0, Reference level = –50 dBm.		
2nd Harmonic distortion, typical	< –75 dBc (40 MHz to 1.5 GHz) < –75 dBc (1.5 GHz to 3.75 GHz, RSA507A, RSA607A) < –75 dBc (3.75 GHz to 6.8 GHz, RSA513A) < –75 dBc (6.8 GHz to 9 GHz, RSA518A)		
2nd Harmonic distortion, Preamp on, typical	< –60 dBc, 40 MHz to 15.9 GHz, input frequency		
2nd Harmonic distortion intercept (SHI), typical	+35 dBm, 40 MHz to 1.5 GHz, input frequency +35 dBm, 1.5 GHz to 3.75 GHz, input frequency (RSA507A, RSA607A) +35 dBm, 3.75 GHz to 6.8 GHz, input frequency (RSA513A) +35 dBm, 6.8 GHz to 9 GHz, input frequency (RSA518A)		
2nd Harmonic distortion intercept (SHI), Preamp on, typical	+5 dBm, 40 MHz to 15.9 GHz, input frequency		
Displayed average noise level (DANL) **RSA503A, RSA507A, RSA603A, RSA607A**	(Normalized to 1 Hz RBW, with log-average detector)		
Frequency Range	Preamp on✓ (18°C to 28°C)	Preamp on, typical (–10°C to 55°C)	Preamp off, typical (–10°C to 55°C)
500 kHz to 1 MHz	-138 dBm/Hz	-145 dBm/Hz	-130 dBm/Hz
>1 MHz to 25 MHz	-153 dBm/Hz	-158 dBm/Hz	-130 dBm/Hz
>25 MHz to 1 GHz	-161 dBm/Hz	-164 dBm/Hz	-141 dBm/Hz
>1 GHz to 2 GHz	-159 dBm/Hz	-162 dBm/Hz	-141 dBm/Hz

Characteristic	Description		
>2 GHz to 3 GHz	-156 dBm/Hz	-159 dBm/Hz	-138 dBm/Hz
>3 GHz to 4.2 GHz, RSA507A, RSA607A	-153 dBm/Hz	-156 dBm/Hz	-138 dBm/Hz
>4.2 GHz to 6 GHz, RSA507A, RSA607A	-159 dBm/Hz	-162 dBm/Hz	-147 dBm/Hz
>4 GHz to 7.5 GHz, RSA507A, RSA607A	-155 dBm/Hz	-158 dBm/Hz	-145 dBm/Hz
Displayed average noise level (DANL)	(Normalized to 1 Hz RBW, with log-average detector)		
RSA513A, RSA518A			
Frequency Range	Preamp on✓ (18°C to 28°C)	Preamp on, typical (–10°C to 55°C)	
500 kHz to 1 MHz	-138 dBm/Hz	-145 dBm/Hz	
>1 MHz to 25 MHz	-153 dBm/Hz	-158 dBm/Hz	
>25 MHz to 1 GHz	-158 dBm/Hz	-161 dBm/Hz	
>1 GHz to 2 GHz	-156 dBm/Hz	-159 dBm/Hz	
>2 GHz to 2.75 GHz	-153 dBm/Hz	-157 dBm/Hz	
>2.75 GHz to 4 GHz	-149 dBm/Hz	-152 dBm/Hz	
>4 GHz to 6 GHz	-155 dBm/Hz	-159 dBm/Hz	
>6 GHz to 7.5 GHz	-151 dBm/Hz	-155 dBm/Hz	
>7.5 GHz to 14 GHz	-161 dBm/Hz	-165 dBm/Hz	
>14 GHz to 14.8 GHz	-159 dBm/Hz	-165 dBm/Hz	
>14.8 GHz to 15.2 GHz	-157 dBm/Hz	-161 dBm/Hz	
>15.2 GHz to 17.65 GHz	-159 dBm/Hz	-165 dBm/Hz	
>17.65 GHz to 18.0 GHz	-157 dBm/Hz	-161 dBm/Hz	

Phase noise

Phase noise✓ Center frequency = 1000 MHz	-94 dBc/Hz at 10 kHz offset -94 dBc/Hz at 100 kHz offset -116 dBc/Hz at 1 MHz offset		
Phase noise, typical	Center frequency (CF)		
Offset	**10 kHz**	**100 kHz**	**1 MHz**
1 GHz CF	-94 dBc/Hz	-94 dBc/Hz	-116 dBc/Hz
10 MHz (typical)	-120 dBc/Hz	-124 dBc/Hz	-124 dBc/Hz
1 GHz CF (typical)	-97 dBc/Hz	-98 dBc/Hz	-121 dBc/Hz
2 GHz CF (typical)	-96 dBc/Hz	-97 dBc/Hz	-120 dBc/Hz
6 GHz CF [1][2][3] (typical)	-94 dBc/Hz	-96 dBc/Hz	-120 dBc/Hz
10 GHz CF [2][3] (typical)	-89 dBc/Hz	-90 dBc/Hz	-113 dBc/Hz
15 GHz CF [2][3] (typical)	-86 dBc/Hz	-87 dBc/Hz	-110 dBc/Hz
Integrated Phase (RMS), typical	7.35×10^{-3} radians @ 1 GHz 8.24×10^{-3} radians @ 1 GHz 9.34×10^{-3} radians @ 6 GHz [1][2][3] 18.4×10^{-3} radians @ 10 GHz [2][3] 26.1×10^{-3} radians @ 15 GHz [2][3] Integrated from 10 kHz to 1 MHz		

[1] RSA507A, RSA607A

[2] RSA513A

[3] RSA518A

Spurious response

Residual spurious response [1] (Reference = 30 dBm, RBW = 1 kHz), typical	<-75 dBm (500 kHz to 60 MHz) <-85 dBm (>60 MHz to 80 MHz) <-100 dBm (>80 MHz to max CF [4]) Exceptions: <-90 dBm (>13.78 GHz to 13.94 GHz)
Ref= -30 dBm, RBW=1 kHz:	<-70 dBm (40 MHz to 60 MHz)
	<-80 dBm (>60 MHz to 80 MHz)
	<-95 dBm (>80 MHz to max CF [4])
Spurious response with Signal (Image suppression) [2], [5], [6]✓	< -65 dBc (10 kHz to max CF [4], Ref= -20 dBm, Atten = 10 dB, RF input Level = -20 dBm, RBW = 10 Hz) < -65 dBc (3 GHz to 7.5 GHz, Ref= -30 dBm, Atten = 10 dB, RF input Level = -30 dBm, RBW = 10 Hz)
Spurious response with signal at input (CF)	
Spurious response with signal at CF (CF = 1 MHz to max CF [4], offset ≥ 1 MHz) [2] ✓	
Frequency	Span ≤ 40 MHz, swept span > 40 MHz
1 MHz – 100 MHz	-75 dBc (typical)
100 MHz – 3 GHz	-72 dBc -75 dBc (typical)

3 GHz – 7.5 GHz (RSA507A, RSA607A)	-72 dBc -75 dBc (typical)
7.5 GHz – 13.6 GHz (RSA513A)	-72 dBc -75 dBc (typical)
13.6 GHz – 18 GHz (RSA518A)	-72 dBc -75 dBc (typical)

Spurious response with signal at CF (CF = 1 MHz to max CF [4] , 150 kHz ≤ offset < 1 MHz) [2], typical

Frequency	Span = 2 MHz
1 MHz – 100 MHz	-70 dBc
100 MHz – 3 GHz	-70 dBc
3 GHz – 7.5 GHz (RSA507A, RSA607A)	-70 dBc
7.5 GHz – 13.6 GHz (RSA513A)	-64 dBc
13.6 GHz – 18 GHz (RSA518A)	-64 dBc

Spurious response with signal at input (IF feed-through)

Spurious response with signal at half-IF [3]	< -75 dBc, (CF 30 MHz to max CF [4] , Ref = -20 dBm, Atten = 10 dB, RBW = 10 Hz, Span = 10 kHz)
✓	Signal frequency (see following signal frequency table), RF input level = -20 dBm

Signal frequency	Center frequency	Source frequency
(Span = 10 kHz, Ref = –20 dBm, Atten = 10 dB, RBW = 10 Hz)	1000 MHz	2310 MHz
	2000 MHz	2310 MHz
	3000 MHz	2310 MHz
	4000 MHz	2310 MHz
	5000 MHz	630 MHz
	6000 MHz	630 MHz
	7000 MHz	630 MHz
	8000 MHz	2310 MHz
	10000 MHz	2310 MHz
	12000 MHz	2310 MHz
	14000 MHz	2310 MHz
	16000 MHz	2310 MHz
	7000 MHz	2310 MHz

Spurious response with signal at IF2 Image [3] ✓	< -75 dBc, (CF 30 MHz to max CF [4] , Ref = -20 dBm, Atten = 10 dB, RBW = 10 Hz, Span = 10 kHz)	
	Signal frequency (see following signal frequency table), RF input level = -20 dBm	
	Center frequency	Source frequency
	1000 MHz	1280 MHz
	2190 MHz	2470 MHz
	4020 MHz	4300 MHz
	4910 MHz	5190 MHz
	5810 MHz	6090 MHz
	6760 MHz	7040 MHz
	7510 MHz	7790 MHz
	9010 MHz	9290 MHz
	10710 MHz	10990 MHz
	13950 MHz	14230 MHz
	15210 MHz	15490 MHz

Spurious leakage

Local oscillator feed-through to input connector, typical	< -70 dBm, preamp off
	< -90 dBm, preamp on
	(Attenuator = 10 dB)

[1] These are not related to input signals. The performance with the Preamp On will be equal or better than measured with the Preamp Off.

[2] Equal or better performance is expected when the Preamp is On and the power level at the output of the RF attenuator is lower than or equal to -55 dBm. This is not guaranteed and is not part of the performance verification.

[3] This is an input signal at half of the IF frequency.

[4] CF as defined by instrument model.

[5] Measure with Atten = 10 dB, Span = 2 MHz, RBW=10 Hz, Preamp is turned off.

[6] Due to internal LO1 offsetting, the image spur may not be exactly at the center of the span. Confirm that the image is being measured by manually turning the signal generator off then back on and observe the spur disappearing and reappearing.

Amplitude vs. time

Time scale (Zero Span)	1 µs minimum to 2000 s maximum
Time accuracy	±0.5% of total time
Time resolution	0.1% of total time
Time linearity	±0.5% of total time (measured at 11 equally-spaced points across the display, including the ends)

Acquisition

Characteristic	Description
IF Bandwidth	40 MHz
A/D Converter	14 bits, 112 MSps
Real-Time IF Acquisition Data	112 Msps, 16-bit integer samples
	40 MHz BW, at Digital IF = 28±0.25 MHz, uncorrected
	Block streaming data at an average rate of 224 MBytes/sec
Real-Time Baseband Acquisition Data (Uncorrected)	14 Msps, 16-bit integer or 32-bit float complex sample
	10 MHz BW, 0 Hz Digital IF, uncorrected
	Block streaming data at an average rate of 56 or 112 MBytes/sec
Block Baseband Acquisition Data (Corrected)	Maximum acquisition time: 1 second
	Bandwidths: 40 /(2^N) MHz, 0 Hz Digital IF, N ≥ 0
	Sample Rates: 56 / (2^N) Msps, 32-bit float complex samples, N ≥ 0

GPS Location

Format	GPS/GLONASS/BeiDou
GPS Antenna power	3 V, 100 mA maximum
Time to first fix, maximum	2 seconds (hot) to 46 seconds (cold) [1]
Horizontal Position Accuracy	Test conditions: 24 hour static, -130 dBm, full power
	GPS: 2.6 m
	Glonass: 2.6 m
	BeiDou: 10.2 m
	GPS + Glonass: 2.6 m
	GPS + BeiDou: 2.6 m

[1]   At -130 dBm input signal power.

Tracking generator (Option 04)

Frequency range	10 MHz to 3 GHz (RSA503A, RSA603A)
	10 MHz to 7.5 GHz (RSA507A, RSA607A, RSA513A, RSA518A)
	(Range settable down to 9 kHz, usable down to 100 kHz.)
Sweep speed, typical mean	0.192 sec/sweep, 101 points, 50 kHz RBW, 980 to 1020 MHz sweep
	(1.9 msec per point) [1]
Frequency resolution	100 Hz
TG output connector	N type
VSWR	< 1.8:1, 10 MHz to 7.5 GHz, –20 dB output level
Maximum output power, typical	–3 dBm, 10 MHz to 7.5 GHz
Output power level setting range	40 dB, 10 MHz to 7.5 GHz
Output power level step size	1 dB, 10 MHz to 7.5 GHz

Output level accuracy ✓	±1.5 dB, 10 MHz to 7.5 GHz, –5 dBm output level
Harmonics	< –22 dBc , ≥ 20 MHz
Non-harmonic spurious	< –30 dBc; spurious < 2 GHz from TG output frequency
	< –25 dBc; spurious ≥ 2 GHz from TG output frequency
Reverse power without damage	40 V DC, +20 dBm RF

1 Measured using a Panasonic Toughpad FZ-G1, Intel® Core™ i5-5300U 2.3GHz Processor, 8GB RAM, 256GB SSD, Windows®7 Pro. Transmission Gain display is the only measurement on the screen. Power management set to High Performance.

Return loss, Distance-to-fault, and Cable loss measurements

Measurements	Return Loss, Distance-to-Fault (DTF), Cable Loss
Frequency range	10 MHz to 3 GHz (RSA503A, RSA603A)
	10 MHz to 7.5 GHz (RSA507A, RSA607A, RSA513A, RSA518A)
Sweep speed, typical mean [1], [2], [3]	5 ms/point (Return Loss measurement)
	5 ms/point (DTF measurement)
	5 ms/point (Cable Loss measurement)
Frequency resolution	500 Hz
Return loss measurement error, typical	Return Loss of 0 to 15 dB: ±0.5 dB
	Return Loss of 15 to 25 dB: ±1.5 dB
	Return Loss of 25 to 35 dB: ±4.0 dB
Return loss measurement error at 14 dB Return Loss ✓	±1.5 dB; 10 MHz to 6.8 GHz
	±3.0 dB; 6.8 GHz to 7.5 GHz
Return loss measurement range	50 dB
Interference immunity, typical	Return Loss measurement error within specifications for the following conditions:
	+5 dBm interferer power within 800 kHz of measurement point
	+5 dBm interferer power more than 800 kHz away from measurement point
	(High power test level. Interferer not included in accuracy assessment.)

Distance-to-fault range, typical	1500 m or 15 dB one-way cable loss capable, user definable
	The maximum range is a function of the cable velocity factor and the frequency step size as follows:
	$$Range = \left(\frac{V_p * c}{2} \right) * \left(\frac{N-1}{Fstop - Fstart} \right)$$ Where:
	V_p = Cable velocity factor relative to the speed of light.
	c = Speed of light (m/s)
	F_{start} = Sweep start frequency (Hz)
	F_{stop} = Sweep stop frequency (Hz)
	N = Number of sweep points
Distance to fault resolution	RSA503A, RSA603A: 0.03 m (RG-58 (Vp=0.66)), user definable
	RSA507A, RSA607A: 0.01 m (RG-58 (Vp=0.66)), user definable
	The minimum resolution is a function of the cable velocity factor and the frequency step size as follows:
	$$Resolution = \left(\frac{V_p * c}{2} \right) * \left(\frac{1}{Fstop - Fstart} \right)$$ Or $$Resolution = \left(\frac{Range}{N-1} \right)$$ Where:
	V_p = Cable velocity factor relative to the speed of light.
	c = Speed of light (m/s)
	F_{start} = Sweep start frequency (Hz)
	F_{stop} = Sweep stop frequency (Hz)
	N = Number of sweep points

[1] 201 point sweep.

[2] Measured using a Panasonic Toughpad FZ-G1, Intel® Core™ i5-5300U 2.3GHz Processor, 8GB RAM, 256GB SSD, Windows®7 Pro.

[3] Return Loss, Cable Loss, or Distance-to-Fault display is the only measurement on screen.

28 Volt noise source drive output (RSA600A Series only)

Output level	28 V DC at 140 mA
Output voltage turn ON/OFF, typical	Turn ON: 100 μs
	Turn OFF: 500 μs

Measurements

Measurement functions [1]

Frequency domain measurement functions	Channel power, Multi-carrier adjacent channel power / leakage ratio, Adjacent channel power, dBm/Hz marker, dBc/Hz marker
Time domain and statistical measurement functions	RF I/Q vs. Time, Power vs. Time, Frequency vs. Time, Phase vs. Time, CCDF, Peak-to-average ratio

Views by domain

Frequency	Spectrum (Amplitude vs. Frequency), DPX™ Spectrum display (Color-graded frequency-of-occurrence), Spectrogram (Spectrums over Time vs. Frequency)
Time and statistics	Frequency vs. Time, Amplitude vs. Time, Phase vs. Time, RF I & Q vs. Time, Time overview, CCDF, Peak-average-ratio

[1] Application licenses are available that add many other measurement functions.

Analog demodulation accuracy

Amplitude vs. time, typical	±1% (-10 dBfs input at center, 5 to 95% modulation depth)
Phase vs. Time, typical	±0.1 degree for modulations less than 180 degrees and rates less than 500 kHz (-10 dBfs input at center)
Frequency vs. time, typical	±0.1% of span for deviations less than 2 MHz, and modulation frequencies less than 500 kHz (-10 dBfs input at center)

General purpose analog modulation analysis accuracy

AM demodulation accuracy, typical	±2%
	(0 dBm input at center, Carrier frequency 1 GHz, 10 to 60% modulation depth) (1 kHz/5 kHz input/modulated frequency) (0 dBm input power level, reference level 10 dBm, Atten = Auto)
PM demodulation accuracy, typical	±3 degrees
	(0 dBm input at center) (Carrier frequency 1 GHz, 400 Hz/1 kHz input/modulated frequency) (0 dBm input power level, reference level 10 dBm, Atten = Auto)
FM demodulation accuracy, typical	±1% of span
	(0 dBm input at center) (Carrier frequency 1 GHz, 1 kHz/5 kHz input/modulated frequency) (0 dBm input power level, reference level 10 dBm, Atten = Auto)

General purpose digital modulation analysis (Option SVMNL-SVPC, SVMFL-SVPC)

Carrier type	Continuous, Burst (5 µs minimum on-time)
Analysis period	Up to 81,000 samples
Modulation format presets	π/2 DBPSK, BPSK, SBPSK, QPSK, DQPSK,π/4 DQPSK, D8PSK, 8PSK, OQPSK, SOQPSK, CPM, 16QAM, 32QAM, 64QAM, 256QAM, MSK, GFSK, 2-FSK, 4-FSK, 8-FSK, 16-FSK, C4FM
Measurement filter	Root Raised Cosine, Raised Cosine, Gaussian, Rectangular, IS-95 Base EQ, None
Reference filter	Gaussian, Raised Cosine, Rectangular, IS-95 baseband, None
Filter roll-off factor	α : 0.001 to 1, 0.001 step
Maximum symbol rate	40 MSps (Option SVM)
Standard setup presets	None
Measurement functions	Constellation, EVM, Symbol table
Vector diagram display format	Symbol/Locus display, Frequency error measurement, Origin offset measurement
Constellation diagram display format	Symbol display, Frequency error measurement, Origin offset measurement
Eye diagram display format	None
Error vector diagram display format	EVM, Magnitude error, Phase error, Waveform quality (ρ) measurement, Frequency error measurement, Origin offset measurement
Symbol table display format	Binary, hexadecimal

Digital demodulation accuracy (Option SVMNL-SVPC, SVMFL-SVPC)

QPSK residual EVM, typical Symbol rate = 100 kHz / 1 MHz / 10 MHz / 30 MHz	CF = 2 GHz 0.6% (100 kHz symbol rate) 0.8% (1 MHz symbol rate) 0.8% (10 MHz symbol rate) 0.8% (30 MHz symbol rate)
256 QAM residual EVM, typical CF = 2 GHz Symbol rate = 10 MHz / 30 MHz	CF = 2 GHz 0.6% (10 MHz symbol rate) 076% (30 MHz symbol rate)
OQPSK residual EVM, typical Symbol rate = 100 kHz / 1 MHz / 10 MHz	CF = 2 GHz 0.6 % (100 kHz symbol rate, 200 kHz measurement bandwidth), 0.9 % (1 MHz symbol rate, 2 MHz measurement bandwidth), 1.2 % (10 MHz symbol rate, 20 MHz measurement bandwidth) Reference Filter: Raised Cosine Measurement Filter: Root Raised Cosine Filter Parameter: Alpha = 0.3
S-OQPSK(MIL) residual EVM, typical Symbol rate = 4 kHz	CF = 250 MHz 0.4 % (4 kHz symbol rate, 64 kHz measurement bandwidth), Reference Filter: MIL STD Measurement Filter: None
S-OQPSK(MIL) residual EVM, typical Symbol rate = 20 kHz / 100 kHz / 1 MHz	CF = 2 GHz 0.9 % (20 kHz symbol rate, 320 kHz measurement bandwidth) 1.0 % (100 kHz symbol rate, 1.6 MHz measurement bandwidth) 1.0 % (1 MHz symbol rate, 16 MHz measurement bandwidth) Reference Filter: MIL STD Measurement Filter: None
S-OQPSK(ARTM) residual EVM, typical Symbol rate = 4 kHz	CF = 250 MHz 0.4 % (4 kHz symbol rate, 64 kHz measurement bandwidth) Reference Filter: ARTM STD Measurement Filter: None
S-OQPSK(ARTM) residual EVM, typical Symbol rate = 20 kHz / 100 kHz / 1 MHz	CF = 2 GHz 0.8 % (20 kHz symbol rate, 320 kHz measurement bandwidth) 1.0 % (100 kHz symbol rate, 1.6 MHz measurement bandwidth) 1.0 % (1 MHz symbol rate, 16 MHz measurement bandwidth) Reference Filter: ARTM STD Measurement Filter: None
S-BPSK(MIL) residual EVM, typical Symbol rate = 4 kHz	CF = 250 MHz 0.4 % (4 kHz symbol rate, 64 kHz measurement bandwidth) Reference Filter: MIL STD Measurement Filter: None

S-BPSK(MIL) residual EVM, typical Symbol rate = 20 kHz / 100 kHz / 1 MHz	CF = 2 GHz 0.9 % (20 kHz symbol rate, 320 kHz measurement bandwidth) 1.0 % (100 kHz symbol rate, 1.6 MHz measurement bandwidth) 1.0 % (1 MHz symbol rate, 16 MHz measurement bandwidth) Reference Filter: MIL STD Measurement Filter: None
CPM(MIL) residual EVM, typical Symbol rate = 4 kHz	CF = 250 MHz 0.5 % (4 kHz symbol rate, 64 kHz measurement bandwidth) Reference Filter: MIL STD Measurement Filter: None
CPM(MIL) residual EVM, typical Symbol rate = 20 kHz / 100 kHz / 1 MHz	CF = 2 GHz 0.9 % (20 kHz symbol rate, 320 kHz measurement bandwidth) 1.0 % (100 kHz symbol rate, 1.6 MHz measurement bandwidth) 1.0 % (1 MHz symbol rate, 16 MHz measurement bandwidth) Reference Filter: MIL STD Measurement Filter: None
2/4/8/16FSK residual RMS FSK error, typical Symbol rate = 10 kHz	CF = 2 GHz 1.0 % (2/4FSK, 10 kHz symbol rate, 10 kHz frequency deviation) 1.0 % (8/16FSK, 10 kHz symbol rate, 10 kHz frequency deviation) Reference Filter: None Measurement Filter: None

Adaptive equalizer

Characteristic	Description
Adaptive equalizer type	Linear, Decision-Directed, Feed-Forward (FIR) equalizer with coefficient adaptation and adjustable convergence rate
Modulation types supported by adaptive equalizer	BPSK, QPSK, OQPSK, π/2-DBPSK, π/4-DQPSK, 8-PSK, 8-DSPK, 16-DPSK, 16/32/64/128/256-QAM
Reference filters	Raised Cosine, Rectangular, None Except for OQPSK modulation
Reference filters - OQPSK	Raised Cosine, Half Sine
Adaptive filter length	1 to 128 taps
Adaptive filter taps/symbol	1, 2, 4, or 8 Raised Cosine, Half Sine, or No Filter
Adaptive filter taps/symbol – rectangular Filter	1
Equalizer controls	Off, Train, Hold, or Reset

OFDM measurement (Option SVONL-SVPC, SVOFL-SVPC)

OFDM Maximum residual EVM (RMS), typical (802.11a/g/j OFDM and 802.16-2004)	–38 dB at 2.4 GHz –37 dB at 5.8 GHz

WLAN 802.11a/b/g/j/p Tx measurement (Option SV23NL-SVPC, SV23FL-SVPC)

OFDM maximum residual EVM (RMS), typical (802.11a/g/j/p OFDM)	–39 dB at 2.4 GHz –38 dB at 5.8 GHz
OFDM maximum residual EVM (RMS), typical-mean (802.11a/g/j/p OFDM)	–40 dB at 2.4 GHz –39 dB at 5.8 GHz
ODFM maximum residual EVM (RMS), typical (802.11b OFDM)	1.3%
ODFM maximum residual EVM (RMS), typical-mean (802.11b OFDM)	1.2%

WLAN 802.11n Tx measurement (Option SV24NL-SVPC, SV24FL-SVPC)

OFDM Maximum residual EVM (RMS), typical (802.11n OFDM) 40 MHz BW	-38 dB at 2.4 GHz -38 dB at 5.8 GHz
OFDM Maximum residual EVM (RMS), typical-mean (802.11n OFDM) 40 MHz BW	-39 dB at 2.4 GHz -39 dB at 5.8 GHz

WLAN 802.11ac Tx measurement (Option SV25NL-SVPC, SV25FL-SVPC)

OFDM maximum residual EVM (RMS), typical (802.11ac OFDM)	-38 dB
OFDM maximum residual EVM (RMS), typical-mean (802.11ac OFDM)	-39 dB

P25 measurement (Option SV26NL-SVPC, SV26FL-SVPC)

P25 Modulation fidelity, typical CF = 460 MHz, 815 MHz	≤ 1.0%; C4FM modulation ≤ 0.5%; HCPM modulation ≤ 0.25%; HDQPSK modulation
ACLR P25 C4FM modulation (not noise corrected), typical	–60 dBc, CF= 460 MHz, 815 MHz Measured at 25 kHz offset, 6 kHz measurement BW
ACLR P25 HCPM modulation (not noise corrected), typical	–60 dBc, CF= 460 MHz, 815 MHz Measured at 25 kHz offset, 6 kHz measurement BW
ACLR P25 HCPM modulation (not noise corrected), typical	–60 dBc, CF= 460 MHz, 815 MHz Measured at 25 kHz offset, 6 kHz measurement BW

Bluetooth® measurements (Option SV27NL-SVPC, SV27FL-SVPC)

Output power (BR and LE), typical	(Average and peak power in line with Bluetooth RF test specifications DF TS 4.1.1 and BT LE RF PHY 4.1.1.)
Supported measurements	Average power, peak power
Level uncertainty	Refer to the Amplitude and RF Flatness specification
Measurement range	Signal level > –70 dBm
Basic rate modulation characteristics, typical	(CF = 2400 MHz to 2500 MHz) (Measurements in line with Bluetooth RF test specification 4.1.1)
Supported measurements	ΔF_1avg, ΔF_2avg, ΔF_2avg/ ΔF_1avg, ΔF_2max% ≥ 115 kHz
Deviation range	±280 kHz
Deviation uncertainty	< 2 kHz [1] + RSA frequency uncertainty
Measurement resolution	10 Hz
Measurement range	Nominal channel frequency ±100 kHz
RF signal power range	≥70 dBm
Low energy modulation characteristics, typical	(CF = 2400 MHz to 2500 MHz) (Measurements in line with Bluetooth low energy RF PHY specification 4.1.1)
Supported measurements	ΔF_1avg, ΔF_2avg, ΔF_2avg/ ΔF_1avg, ΔF_2max% ≥ 185kHz
Deviation range	±280 kHz
Deviation uncertainty	< 3 kHz [1] + RSA frequency uncertainty
Measurement resolution	10 Hz
Measurement range	Nominal channel frequency ±100 kHz
RF signal power range	≥70 dBm
Initial carrier frequency tolerance (ICFT) (BR and LE), typical	Measurements in line with Bluetooth RF test specifications RF TS 4.1.1, and BT LE RF PHY 4.1.1.
Measurement uncertainty	< 1 kHz [1] + RSA frequency uncertainty
Measurement resolution	10 Hz
Measurement range	Nominal channel frequency ±100 kHz
RF signal power range	≥70 dBm

Carrier frequency drift (BR and LE), typical	Measurements in line with Bluetooth RF test specifications RF TS 4.1.1, and BT LE RF PHY 4.1.1.
Supported measurements	Maximum frequency. offset, drift f_1- f_0, maximum drift f_n-f_0, maximum drift f_n-f_{n-5} (BR and LE 50 us)
Measurement uncertainty	< 1 kHz [1] + RSA frequency uncertainty
Measurement resolution	10 Hz
Measurement range	Nominal channel frequency ±100 kHz
RF signal power range	≥70 dBm
In-band emissions (ACPR) (BR and LE)	Measurements in line with Bluetooth RF test specifications RF TS 4.1.1, and BT LE RF PHY 4.1.1.
Level uncertainty	Refer to the Amplitude and Flatness specification

[1]   At nominal power level of 0 dBm

LTE measurements (Option SV28NL-SVPC, SV28FL-SVPC)

Characteristic	Description
Channel power measurement accuracy, typical	For 40 MHz bandwidth
Level uncertainty	Refer to Amplitude and RF Flatness specification

Pulse measurements (Option SVPNL-SPVC, SVPFL-SVPC)

Maximum pulse width for detection, typical	150 ns
Average ON power at 18 to 28 °C, typical	±0.3 dB + absolute amplitude accuracy
	For pulses of 300 ns width or greater and signal levels above 70 dB below reference level
Duty factor, typical	±0.2% of reading
	For pulses of 450 ns width or greater, duty cycles of 0.5 to 0.001, and S/N ratio ≥ 30 dB
Average transmitted power, typical	±0.5 dB + absolute amplitude accuracy
	For pulses of 300 ns width or greater, duty cycles of 0.5 to 0.001, and S/N ratio ≥ 30 dB
Peak pulse power, typical	±1.2 dB + absolute amplitude accuracy
	For pulses of 300 ns width or greater, duty cycles of 0.5 to 0.001, and S/N ratio ≥ 30 dB
Pulse width, typical	±0.25 % of reading
	For pulses of 450 ns width or greater, duty cycles of 0.5 to 0.001, and S/N ratio ≥ 30 dB
Pulse-to-pulse carrier phase (non-chirped pulse), typical	(BW = 40 MHz)
	±2 degrees at 2 GHz
	±2 degrees at 6 GHz
Pulse-to-pulse carrier phase (linear-chirped pulse), typical	(BW = 40 MHz)
	±2 degrees at 2 GHz
	±2 degrees at 6 GHz
Pulse-to-pulse carrier frequency (non-chirped pulse), typical	(BW = 40 MHz)
	±20 kHz at 2 GHz
	±30 kHz at 6 GHz
Pulse-to-pulse carrier frequency (linear-chirped pulse), typical	(BW = 40 MHz)
	±25 kHz at 2 GHz
	±40 kHz at 6 GHz
Pulse-to-pulse delta frequency (non-chirped pulse), typical	(BW = 40 MHz)
	±3 kHz at 2 GHz
	±3 kHz at 6 GHz
Pulse frequency linearity (absolute frequency error RMS), typical	(BW = 40 MHz)
	±4 kHz at 2 GHz
	±7 kHz at 6 GHz
Chirp frequency linearity (absolute frequency error RMS), typical	(BW = 40 MHz)
	±6 kHz at 2 GHz
	±8 kHz at 6 GHz

ACLR measurement

ACLR (3GPP down link, 1 DPCH) (2130 MHz), typical	-57 dB (Adjacent channel)
	-57 dB (First alternate channel)
ACLR LTE, typical	-57 dB (Adjacent channel)
	-60 dB with noise correction (Adjacent channel)
	-59 dB (First alternate channel)
	-62 dB with noise correction (First alternate channel)
ACLR LTE, typical-mean	-58 dB (Adjacent channel)
	-61 dB with noise correction (Adjacent channel)
	-61 dB (First alternate channel)
	-63 dB with noise correction (First alternate channel)

Digital phosphor spectrum processing (DPX)

DPX bitmap image resolution	201 pixels vertical x 801 pixels horizontal	
Minimum signal duration for 100% probability of intercept, typical [2], [3]	**Minimum signal duration for 100% POI**	**Test controller**
	27 μs	Dell Desktop (Windows® 10 Enterprise, Intel® Core™ i7-4790 CPU, 3.6GHz, 8GB RAM, 256GB SSD)
	34 μs	Dell Desktop (Windows® 7 Enterprise, Intel® Core™ i7-2600 CPU, 3.4GHz, 8GB RAM, 256GB SSD)
	36 μs	Dell Laptop Latitude E6430 (Windows® 10 Enterprise, Intel® Core™ i7-3520M CPU, 2.9GHz, 8GB RAM, 250 GB SSD)
	35 μs	Dell Laptop Precision M4700 (Windows® 8 Enterprise, Intel® Core™ i7-3520M CPU, 2.9GHz, 8GB RAM, 750GB HD)
	37 μs	Panasonic ToughPad (Windows® 7 Pro, Intel® Core™ i5-5300U CPU, 2.3GHz, 8GB RAM, 256GB SSD)
Swept span range	Up to instrument frequency range	
Dwell time per step (Swept spans)	50 ms to 100 s	
DPX Spectrogram minimum time resolution per line	1 ms [1] [3]	

[1] ≤ 10,000 per second (span independent)

[2] DPX setings: Span = 40 MHz, RBW = 300 kHz (Auto)

[3] Due to the non-deterministic execution time of programs running under the Microsoft Windows operating system, this specification might not be met when the host PC is heavily loaded with other processing tasks.

OBW measurement

OBW Accuracy, typical	±0.35%
(2 GHz OFDM carrier, 10 MHz 99% OBW) (measured in a 20 MHz measurement BW, S/N >30 dB)	

xdB bandwidth measurement

xdB bandwidth, typical	±0.35%, 0 to -18 dB below carrier

Frequency and phase settling time measurement (Option SVT)

Settled frequency uncertainty, 95% confidence, typical	Measurement frequency, averages [1]	Frequency uncertainty at stated measurement bandwidth			
	1 GHz	*40 MHz*	*10 MHz*	*1 MHz*	*100 kHz*
	Single measurement	150 Hz	35 Hz	5 Hz	0.4 Hz
	100 averages	35 Hz	10 Hz	1 Hz	0.1 Hz
	1000 averages	20 Hz	4 Hz	0.5 Hz	0.05 Hz
	6 GHz				
	Single measurement	250 Hz	55 Hz	7 Hz	0.75 Hz
	100 averages	40 Hz	12 Hz	1.5 Hz	0.15 Hz
	1000 averages	20 Hz	5 Hz	0.75 Hz	0.1 Hz
Settled phase uncertainty, 95% confidence, typical	Measurement frequency, averages [1]	Phase uncertainty (degrees) at stated measurement bandwidth			
	1 GHz	*40 MHz*	*10 MHz*	*1 MHz*	
	Single measurement	0.20	0.20	0.20	
	100 averages	0.04	0.03	0.03	
	1000 averages	0.02	0.02	0.02	
	6 GHz, RSA503A and RSA507A (10 GHz, RSA603A and RSA607A)				
	Single measurement	0.25	0.25	0.20	
	100 averages	0.05	0.05	0.05	
	1000 averages	0.02	0.02	0.02	

[1]   Measured input signal > –20 dBm, Attenuator: Auto

AM/FM/PM measurements (Option SVA)

Analog demodulation	
Carrier frequency range, typical	9 kHz or one half of the audio analysis bandwidth to the maximum input frequency
	Distortion and noise performance reduced below 30 MHz CF

Maximum audio frequency span, typical	10 MHz
Global conditions for audio measurements	Input frequency: < 2 GHz RBW: Auto Averaging: Off Filters: Off FM Performance: Modulation index > 0.1

Audio filters

Low-pass audio filters, typical	300 Hz, 3 kHz, 15 kHz, 30 kHz, 80 kHz, 300 kHz and user-entered up to 0.9 × (audio bandwidth)
High-pass audio filters, typical	20 Hz, 50 Hz, 300 Hz, 400 Hz, and user-entered up to 0.9 × (audio bandwidth)
Standards-based audio filters	CCITT, C-Message
De-emphasis	25 μs, 50 μs, 75 μs, 750 μs, and user-entered
User-defined audio file format	.txt or .csv file of amplitude/frequency pairs. Maximum 1000 pairs

FM modulation analysis

FM measurements	Carrier power, Frequency error, Audio frequency, Deviation (+peak, -peak, pk-pk/2, RMS), SINAD, Modulation distortion, S/N, Total harmonic distortion, Total non-harmonic distortion, Hum, and Noise
FM carrier power accuracy, typical	±0.85 dB Carrier frequency: 10 MHz to 2 GHz Input power: -20 to 0 dBm
FM carrier frequency accuracy, typical	±0.5 Hz + (transmitter frequency × reference frequency error) Deviation: 1 to 10 kHz
FM deviation accuracy, typical	±(1% of (rate + deviation) + 50 Hz) Rate: 1 kHz to 1 MHz
FM rate accuracy, typical	±0.2 Hz Deviation: 1 to 100 kHz
FM residual THD, typical	0.10% Rate: 1 to 10 kHz Deviation: 5 kHz
FM residual distortion, typical	0.7% Rate: 1 to 10 kHz Deviation: 5 kHz
FM residual SINAD, typical	43 dB Rate: 1 to 10 kHz Deviation: 5 kHz

AM modulation analysis

AM measurements	Carrier power, Audio frequency, Modulation depth (+peak, -peak, pk-pk/2, RMS), SINAD, Modulation distortion, S/N, Total harmonic distortion, Total non-harmonic distortion, Hum, and Noise
AM carrier power accuracy, typical	±85 dB Carrier frequency: 10 MHz to 2 GHz Input power: -20 to 0 dBm

AM depth accuracy, typical	±0.2% + (0.01 × measured value)
	Rate: 1 kHz to 100 kHz Depth: 10% to 90%
AM rate accuracy, typical	±0.2 Hz
	Rate: 1 kHz to 1 MHz Depth: 50%
AM residual THD, typical	0.16%
	Rate: 1 kHz to 10 kHz Depth: 50%
AM residual distortion, typical	0.13%
	Rate: 1 kHz to 10 kHz Depth: 50%
AM residual SINAD, typical	58 dB
	Rate: 1 kHz to 10 kHz Depth: 50%
PM modulation analysis	
PM Measurements	Carrier power, Carrier frequency error, Audio frequency, Deviation (+peak, -peak, pk-pk/2, RMS), SINAD, Modulation distortion, S/N, Total harmonic distortion, Total non-harmonic distortion, Hum, and Noise
PM carrier power accuracy, typical	±0.85 dB
	Carrier frequency: 10 MHz to 2 GHz Input power: -20 to 0 dBm
PM carrier frequency accuracy, typical	±0.2 Hz + (transmitter frequency × reference frequency error)
	Deviation: 0.628 radians
PM deviation accuracy, typical	±100% × (0.01 + (measured rate ÷ 1 MHz))
	Rate: 10 kHz to 20 kHz Deviation: 0.628 radians
PM rate accuracy, typical	±0.2 Hz
	Rate: 1 kHz to 10 kHz Deviation: 0.628 radians
PM residual THD, typical	0.1%
	Rate: 1 kHz to 10 kHz Deviation: 0.628 radians
PM residual distortion, typical	1%
	Rate: 1 kHz to 10 kHz Deviation: 0.628 radians
PM residual SINAD, typical	40 dB
	Rate: 1 kHz to 10 kHz Deviation: 0.628 radians

Installation requirements

Maximum power dissipation (fully loaded)	RSA500A:
	15 W maximum. Maximum line current is 0.2 A at 90 V line
	60 W maximum when charging the battery
	RSA600A: 45 W maximum
Surge current	2 A peak maximum, at 25 °C (77 °F) for ≤ 5 line cycles, after the product has been turned off for at least 30 s
Cooling clearance [3]	Bottom, top RSA500A: 25.4 mm (1.0 in.) RSA600A: 6.3 mm (0.25 in.)
	Sides RSA500A: 25.4 mm (1.0 in.) RSA600A: 0 mm (0 in.)
	Rear RSA500A: 25.4 mm (1.0 in.) RSA600A: 38.1 mm (1.5 in.)
Primary line voltage, (RSA600A)	
Voltage	100 to 240 V at 50/60 Hz
Voltage range limits	90 to 264 V at 47 to 63 Hz
External DC input (RSA500A)	
Voltage	19 V nominal
Voltage range limits	Operation: +12.0 V to +19.95 V
	Battery Charging: +17.5 V to +19.95 V
Connector type	2.5 mm male Center conductor: positive Outer conductor: negative
External supplies (RSA500A) AC adapter output	19 V ±5%, 5 A (90 W maximum) Center conductor: positive Outer conductor: negative
Battery (RSA500A)	
Nominal voltage	14.4 V
Nominal capacity	6140 mAh
Battery technology	Li-Ion, Smart Battery compatible with SMBus Interface
Battery operational life	Four hours of continuous operation per battery

Battery operating temperature [5]	Operating (discharge) [1]: -10 °C to +45 °C [2] Charging: 0 °C to 45 °C [3], [4]
Battery storage life	Two years at +20 °C (68 °F) nominal
	Maximum storage duration between recharge: 10 months at +20 °C (68 °F)
	Storage temperature specified for maximum battery life. During extended storage, charge should be monitored and replenished at regular intervals. Recommended monitoring interval vs. storage temperature: Six months at 20 °C (68 °F) One month at 35 °C (95 °F) One week at 50 °C (122 °F)

[1] Operation at -10 °C may require turning on the unit at room temperature first.

[2] Varies per discharge current and heat dissipation characteristics; actual limit may be lower.

[3] Clearances for the RSA500A series apply to unsupported faces (i.e., if placed on a table or other flat surface, no additional clearance is needed).

[4] The battery will charge at a faster rate when the instrument is turned off. Charging the battery while the instrument is running will require a longer time for the battery to reach a full charge.

[5] The internal charging circuit monitors the internal battery temperature. Normal charging is allowed when the battery temperature is between 0° C and 46° C. If the battery temperature falls outside of this range, charging will be suspended. Battery charging may resume once the battery temperature falls within this range.

Physical

Dimensions	
RSA500A	Height: 67.3 mm (2.65 in)
	Length: 271.3 mm (10.68 in)
	Width: 299.1 mm (11.78 in)
RSA600A	Height: 75 mm (2.95 in)
	Length: 358.6 mm (14.12 in)
	Width: 222.3 mm (8.75 in)

Weight (Net)	
RSA503A, RSA507A	2.54 kg (5.6 pounds) without battery
	2.99 kg (6.6 pounds) with battery
RSA513A, RSA518A	3.40 kg (7.5 pounds) without battery
	3.85 kg (8.5 pounds) with battery
RSA600A	2.79 kg (6.15 pounds)

Computer

I/O	USB: USB 3.0

Interfaces, input, output ports

RF input (RSA500A)	RSA503A/507A: N type, female
	RSA513A/518A: N type, female (ships standard with this connector)
	RSA513A/518A: Planar Crown, 50 Ω. (optional connector type)
RF input (RSA600A)	N type, female
External frequency reference input	BNC, female
Trigger/Sync input	BNC, female
Tracking generator source output	N type, female
GPS antenna	SMA, female
USB device port	USB 3.0, type A
Status indicators	
USB status LED	LED, dual color red/green

	LED states:
	    Steady red: USB power applied, or resetting
	    Steady green: Initialized, ready for use
	    Blinking green: Transferring acquired data to host PC

Battery status LED, (RSA500A)	LED, green

	LED states:
	    Blinking green: external power connected, charging battery
	    Off: No external power connected or battery fully charged

Environmental

Temperature

Operating	
RSA600A, RSA500A (without battery)	–10 °C to +55 °C (+14 °F to +131 °F)
RSA500A (with battery)	–10 °C to +45 °C (+14 °F to +113 °F), Charging: 0 °C to +45 °C (+32 °F to +113 °F)
Nonoperating	
RSA500A (without battery)	–51 °C to +71 °C (–60 °F to +160 °F)
RSA600A	–40 °C to +71 °C (+32 °F to +160 °F)

Humidity

	Operating	MIL-PRF-28800F Class 2
	RSA600A, RSA500A (without battery)	5% to 95 ±5% RH (relative humidity) in the temperature range of +10 °C to 30 °C (+50 °F to 86 °F)
		5% to 75% ±5% RH from +30 °C to +40 °C (+86 °F to 104 °F)
		5% to 45% ±5% RH above +40 °C to +55 °C (+86 °F to +131 °F)
		<10 °C humidity is uncontrolled; non-condensing
	Operating RSA500A (with battery)	5% to 95 RH (relative humidity) in the temperature range of +10 °C to 30 °C (+50 °F to 86 °F)
		5% to 45% RH above +30 °C to +50 °C (+86 °F to +122 °F)
		<10 °C humidity is uncontrolled; non-condensing
		Operation at -10 °C (14 °F) with battery requires disconnection of external power to prevent charging.
Altitude		
	Operating	Up to 3000 m (9,842 ft.) RSA600A
		Up to 5000 m (16404 ft.) RSA500A
	Nonoperating	Up to 12,000 meters (39,370 feet) RSA600A
		Up to 15,240 meters (50,000 feet) RSA500A
Exposure, RSA500A		
	Splash-Proof test: operating and non-operating	No potential of shock hazard after exposure to non-operating Splash Proof Test per IEC529, level IP52
	Dust resistance test: operating and non-operating	The equipment is designed to be adequately resistant to the effects of dust, so as to allow proper performance without hazard to the user under conditions of moderately dusty environments.
	Salt exposure test:structural parts	This corrosion test is used to help determine finish quality of disassembled metal parts.
Dynamics		
	Vibration	
	RSA500A, Operating	Tektronix Class 2 Random Vibration Test at 2.66 GRMS: 5-500 Hz, 3 Axes at 10 min/axis
	Nonoperating	MIL-PRF-28800F Class 2 0.030 g²/Hz., 10–500 Hz, 30 minutes per axis, 3 axes (90 minutes total).
	RSA600A. Operating	Tektronix Class 3 Random Vibration Test at 0.31 GRMS: 5-500 Hz, 3 Axes at 10 min/axis
	Nonoperating	MIL-PRF-28800F Class 3 2.06 GRMS, 5 500 Hz, 10 minutes per axis, 3 axes (30 minutes total).
Mechanical shock		
	Operating	296 m/s² (30 G), half-sine, 11 ms duration. Three shocks per axis in each direction (18 shocks total)
	Non-operating	490 m/s² (50 G), half-sine, 11 ms duration. Three shocks per axis in each direction (18 shocks total)

Bench handling, operating	
RSA500A	MIL-PRF-28800F Class 2 Operating: Rotational-edge-drops of appropriate edges on appropriate sides of the equipment
RSA600A	MIL-PRF-28800F Class 3 Rotational-edge-drops of appropriate edges on appropriate sides of the equipment
Transit drop, nonoperating (RSA500A)	MIL-PRF-28800F Class 2 Transit drops onto six faces and four corners of the equipment, from a height of 30 cm (11.8 in.) for a total of 10 impacts
Free-fall drop, nonoperating (RSA500A)	Free-fall drops of the equipment, onto a hard, non-resilient surface, impacting the 6 faces, 8 corners, and 8 edges. The drop height will be 81.3 cm (32 in)

Performance verification

These procedures are to verify that your instrument meets key specifications. These are not calibration procedures. For your instrument to be calibrated, it must be returned to a Tektronix service facility.

Prerequisites

The tests in this section confirm performance and functionality when the following requirements are met:

- The SignalVu-PC application is version 3.16.0014 or greater.

- You are operating the instrument in an environment that meets the temperature, altitude, and humidity characteristics listed in the specifications.

- The instrument is completely assembled and the covers are installed per factory specification.

- The instrument is plugged into DC power or has a charged battery installed (RSA500A) or is plugged into AC power (RSA600A).

- The instrument has been operating for a warm-up period of at least for 30 minutes (after being connected to the PC, starting the SignalVu-PC application, and SignalVu-PC is connected to the RSA and continuously acquiring data).

NOTE. The RSA does not fully power on until SignalVu-PC has established communication with it and is acquiring data.

- The instrument has had its last alignment routine done after at least a 30 minute warm-up period at an ambient temperature not more than ±2 °C different than the current ambient temperature.

Required equipment

These procedures use external, traceable signal sources to directly check warranted characteristics. The following tables list the equipment required for these procedures. The second table is specifically for the RSA518.

Table 1: Required test equipment (all models)

Item	Description	Qty	Model Number	Purpose
Desktop or Laptop PC	PC with Windows 7, Windows 8/8.1, or Windows 10, 64-bit operating system. A USB 3.0 connection is required for operation of the RSA. 8 GB RAM and 20 GB free drive space is required for installation of SignalVu-PC. For full performance of the real time features of the RSA, an Intel Core i7 4th generation processor is required. Processors of lower performance can be used, with reduced real-time performance. Storage of streaming data requires that the PC be equipped with a drive capable of streaming storage rates of 300 MB/sec	1	Panasonic FZ-G1 Toughpad Dell Optiplex 9020 MT, or equivalent Dell Desktop (Windows® 10 Enterprise, Intel® Core™ i7-4790 CPU, 3.6GHz, 8GB RAM, 256GB SSD)	Run SignalVu-PC
USB 3.0 cable	2 meter length, A to A	1	Tektronix 174-6810-00	Required for the RSA communication
Signal generator	DC – 8 GHz	1	Stanford Research Systems SG386 option 02	Test full frequency range
Signal generator	DC – 6 GHz	1	Tektronix TSG4106A	Second signal generator require to perform third-order distortion test
Signal generator	Frequency: 8 MHz to 20 GHz	1	Anritsu MG3692C with Options 2X, 5, and 15X	Required for the Input-related spurious response: first converter images test
Power meter	9 kHz – 18 GHz (power head dependent)	1	Keysight E4418B	Verifies RSA input signal amplitude
Power sensor	9 kHz – 18 GHz	1	Keysight power head E9304A H18	Measures RSA input signal amplitude
Power splitter	DC – 18 GHz, N	1	Keysight 11667A	Amplitude adjustments and input amplitude setting in spurious tests

Table 1: Required test equipment (all models) (cont.)

Item	Description	Qty	Model Number	Purpose
Power combiner	2 –18 GHz, SMA	1	M/A-COM 2089-6208-00	Third-order distortion measurement
Attenuator	3 dB, SMA, >8 GHz bandwidth	2	Mini-Circuits Labs FW-3+	For third-order distortion measurement
Termination	DC -18 GHz, N-m	1	Maury Microwave 2510B6	For DANL tests
Adapter N(male) to N(male)	DC -18 GHz coaxial adapter	1	Pasternack PE91034 or Maury Microwave 8828B	Amplitude adjustments
Adapter N(male) to SMA(female)	DC -18 GHz adapter	2-6 (as needed)	Needed for SG386 generator	May be needed for signal generator and filter RF connections
Band pass filter	2150 MHz, SMA	2	Mini-Circuits Labs ZX75BP-2150+	For third-order distortion measurement
Low pass filter	3300 MHz cutoff, L250 filter	1	K&L 5L3-3300/E 10000 – O/OP	Spurious test
Tunable filter	375 MHz to 750 MHz, N connectors	1	K&L 5BT-375/750-5-N/N	Spurious test
Tunable filter	750 MHz to 1500 MHz, N connectors	1	K&L 5BT-750/1500-5-N/N	Spurious test
Tunable filter	1500 MHz to 3000 MHz, N connectors	1	K&L 5BT-1500/3000-5-N/N	Spurious test
Cable, SMA-to-N	SMAm/Nm/36in	1	Huber	Generator output to RF input
Cable, SMA	ST18/SMAm/SMAm/36in	2	Huber-Suhner 84002061	TOI and tests requiring low-pass filters
Cable, SMA	ST18/SMAm/SMAm/8	2	Huber-Suhner 84028563	TOI tests
Cable, BNC-to-SMA	BNC(m) to SMA(m) cable - 1 meter	1	Pasternack PE3615-36	Generator timebase output to Ref IN. (External-timebase to generator-timebase input may need a similar cable)
Torque wrench	12 in-lb - Type N	1	Maury Microwave 2698C2	N- connector attachments
Torque wrench	8 in-lb Torque wrench - 3.5 mm	1	Huber-Suhner 74Z-0-0-21	SMA-connector attachments
Fixed coaxial termination *(For RSA500/600 only)*	N-M 1.50 MISMATCH	1	Maury Microwave 2562E	Fixed coaxial termination

NOTE. *Make sure that any adaptor and cable you use is specified to operate at the frequency range of the test you are performing. Connector frequency ranges:*

BNC*: DC to 1 GHz typical, up to 3 GHz for certain BNC cable/connectors.*

N*: DC to 18 GHz typical*

SMA*: DC to 18 GHz typical, up to 26.5 GHz for certain SMA cable/connectors.*

Table 2: Required test equipment (RSA518)

Item number and	Minimum requirements		Example	Purpose
1. Frequency Counter	Frequency Range: 10 MHz; Accuracy: 1 x 10^{-9}		Agilent 53132A Option 10	Checking reference output frequency accuracy
2. RF Power Meter			Agilent E4418B	Adjusting signal generator output level, checking reference output power level
3. RF Power Sensor 1	9 kHz to 18 GHz RF Flatness: <3% Calibration factor data uncertainty: <2% (RSS)		Agilent E9304A Option H18	
4. RF Power Sensor 2	10 MHz to 26.5 GHz RF Flatness		Agilent E4413A, Option H10	
5. RF Signal Generator	Output Frequency 10 MHz to 26.5 GHz		Anritsu MG3694B Options 2A, 3A, 4, 15A, 16, 22, SM5821	Checking phase noise and third order intermodulation distortion
	Phase Noise at Center Frequency = 1 GHz			
	Offset	**SSB Phase Noise (F) dBc/Hz**		
	10 Hz	–71		
	100 Hz	–93		
	1 kHz	–118		
	10 kHz	–121		
	100 kHz	–119		
	1 MHz	–138		
6. Signal Generator	DC – 6 GHz		Tektronix TSG4106A	Checking RF flatness, intermodulation distortion, image suppression, and external reference lock check.
7. Precision Attenuator	30 dB			
8. Power Splitter			Agilent 11667B	Adjusting signal generator output level
9. Power Combiner			Anritsu 2089-6208-00	Checking intermodulation distortion

Table 2: Required test equipment (RSA518) (cont.)

Item number and	Minimum requirements	Example	Purpose
10. Low Pass Filters (2)	<3 dB loss DC –3 GHz >50 dB rejection 4 GHz to 14 GHz		Checking third order intermodulation distortion
11. BNC Cable	50 Ω, 36 in. male to male BNC connectors		Signal interconnection
12. 3.5 mm -3.5 mm Cable	50 Ω, 36 in. male to male 3.5 mm connectors		Signal interconnection
13. N-SMA Cable	50 Ω, 36 in. male N to male SMA connectors		Signal interconnection
14. Termination, Precision 50 Ω	Impedance: 50 Ω 3.5 mm male		Signal interconnection
15. 3.5 mm (F) to 3.5 mm (F) coaxial adapter		Tektronix part number 131-8508-00	
16. 3.5 mm attenuator	3 dB (two required)	Midwest Microwave ATT-0550-03-35M-02	Checking third order intermodulation distortion
17. Planar Crown RF Input Connector - 3.5 mm (RSA5115B,(RSA5126B only)		Tektronix part number 131-9062-00	

Preliminary checks

Do these steps before starting the performance verification procedures.

Warm up the instrument

1. Connect the RSA USB cable to the host PC. The LED on the RSA should initially glow red then turn green after a few moments.

2. Make sure the SignalVu-PC application is connected to the RSA over USB.

3. View hardware status in the SignalVu-PC display (located on the left side of the status bar). Verify that there are no errors or messages indicating loss of or invalid calibration data. At startup, the application may show the message, "Unaligned data": this is OK.

4. Start the application acquiring data and allow the instrument to warm up for at least 30 minutes.

Run the alignment process

Align the instrument after the 30 minute warm-up period and before proceeding with the Warranted Characteristics tests:

1. Select **Alignments** in the Tools menu to open the Alignments dialog box.

2. Select **Align Now**. The alignment process takes a few seconds.

3. Verify that no alignment failures are reported in the status bar.

Performance verification procedures

Internal reference frequency accuracy
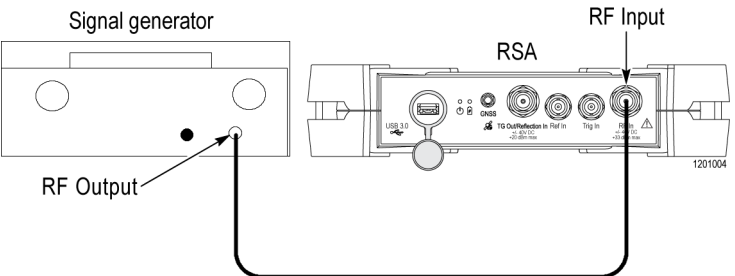
1. Connect a signal generator to the N-connector RF input of the RSA.

NOTE. The signal generator accuracy must be better than ±0.05 ppm. If the signal generator accuracy does not meet this requirement, it must have its frequency reference phase locked to a precision frequency reference.

NOTE. The Stanford Research Systems SG386 signal generator has adequate frequency stability without use of an external timebase, but only if it has been calibrated/verified within 1 year. If this is not the case, the signal generator must have an accurate external timebase connected to its timebase input (rear panel, BNC, 10 MHz).

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2. Set the signal generator to output a 0 dBm, 1 GHz CW frequency.

3. Reset the RSA to factory defaults: (**Presets > Main**) (The center frequency will be set to 1 GHz by the Main Preset.)

4. Set the frequency span to **10 kHz**.

5. Connect the signal generator output to the RF Input, N-connector input of the RSA.

6. Select **Markers > Peak**.

7. Enter the measured marker frequency in the calculations table. (See Table 3.)

8. Compare the measured value with the specification for Internal Frequency accuracy. Enter the results in the test record.

Table 3: Internal reference frequency instability calculations

Marker frequency	Value
Total specified instability	±3 ppm
(Initial accuracy, temperature (18 °C to 28 °C), and aging)	(± 3000 Hz, or 999.9997 MHz to 1.000003 GHz)

External reference input, functional test

This check is a functional check. It is an important check for customer use, but does not check warranted specification limits.
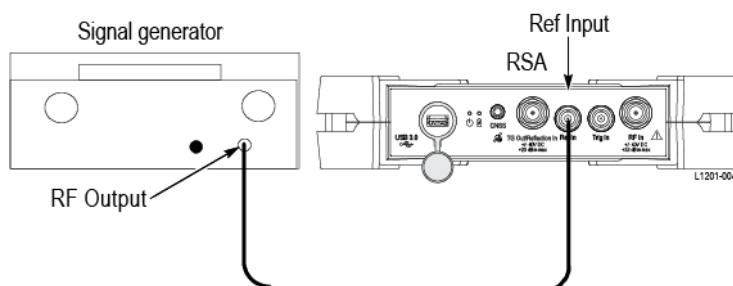
1. Connect a signal generator RF output to the BNC Ref input of the RSA, as shown. The signal generator accuracy must be better than ±0.05 ppm. If it does not, it must have its frequency reference phase locked to a precision frequency reference.

NOTE. The Stanford Research Systems SG386 signal generator has adequate frequency stability without use of an external timebase, but only if it has been calibrated/verified within 1 year. If this is not the case, the signal generator must have an accurate external timebase connected to its timebase input (10 MHz).

2. Set the signal generator controls:

    a. Frequency = **10 MHz**

    b. Amplitude =**0 dBm**

3. Set the RSA to use the external reference (**Setup > Acquire > Frequency Reference**).

4. Under the source field, select the **External (10 MHz)** radio button.

5. Check that the Status Bar shows **Ref: Ext**. This generally occurs within 5 seconds.

6. Enter the pass/fail result in the test record.

Amplitude accuracy at all center frequencies — Preamp OFF
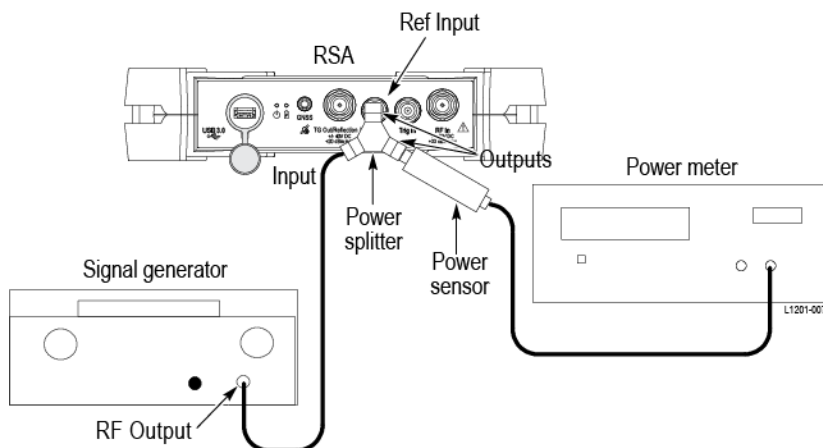
1. Connect the signal generator, power splitter, power sensor, power meter, and RSA, as shown. Connect the power sensor and RF signal generator directly to the power splitter, which is connected directly to the RSA.

2. Reset the RSA to factory defaults (**Presets > Main**).

3. Run the RSA alignment procedure (**Tools > Alignments > Align Now**).

4. Set the RSA as follows:

   a. Reference Level = **–15 dBm**

   b. Detection = **+PEAK** (Setup > Settings > Traces > Detection > +PEAK)

   c. Filter shape = **Flat-Top** (Setup > Settings > BW > Filter Shape > Flat-top)

   d. Preamp = **OFF** (Setup > Amplitude > Internal Preamp)

   e. Span and RBW:

      – For CF ≤ 1 MHz, Span = 100 kHz, RBW = 1 kHz

      – For 1 MHz ≤ CF < 30 MHz, Span = 1 MHz, RBW = 10 kHz

      – For CF ≥ 30 MHz, Span = 10 MHz, RBW = 100 kHz

5. Set the signal generator output amplitude to **–14 dBm**. The RF amplitude at the power sensor and RSA input = –20 dBm (nominal).

6. Set the signal generator center frequency to the first frequency specified in the Amplitude accuracy measurements table. (See Table 4.)

7. Set the RSA center frequency to the first frequency specified in the table. (See Table 4.)

8. On the RSA, peak the marker on the signal at the center frequency; measure and record the amplitude.

9. Measure and record the power meter amplitude.

10. Repeat steps 6 through 8 for all of the –15 dBm reference level frequencies in the table, measuring power meter amplitude and RSA amplitude.

11. Calculate the amplitude errors for each frequency of each reference level in the reference level accuracy table. Error = RSA measurement – power meter measurement. Readings are in dBm and error is in dB.

12. Note the largest positive and negative errors in the Error column in all the reference level measurement tables.

13. Enter these values in the Amplitude accuracy results table. (See Table 6.)

14. Compare the +peak and –peak errors against the specifications.

15. Enter pass or fail in the test record.

Table 4: Amplitude accuracy measurements — Preamp OFF

Center/signal frequency	RSA reading, dBm	Power meter value, dBm	Error (RSA – Pwr meter), dB
9 kHz			
100 kHz			
1 MHz			
10 MHz			
100 MHz			
500 MHz			
1 GHz			
1.5 GHz			
2 GHz			
2.5 GHz			
3 GHz			
3.5 GHz			
3.99 GHz			
4.01 GHz			
4.5 GHz			
5 GHz			
5.5 GHz			
6 GHz			
6.5 GHz			
7 GHz			
7.5 GHz			
The following frequencies apply to RSA513 and RSA518 only.			
8 GHz			
8.5 GHz			
9 GHz			
9.5 GHz			
10 GHz			
10.5 GHz			

Table 4: Amplitude accuracy measurements — Preamp OFF (cont.)

Center/signal frequency	RSA reading, dBm	Power meter value, dBm	Error (RSA – Pwr meter), dB
11 GHz			
11.5 GHz			
12 GHz			
12.5 GHz			
13 GHz			
13.5 GHz			
The following frequencies apply to RSA518 only.			
14 GHz			
14.5 GHz			
15 GHz			
15.5 GHz			
16 GHz			
16.5 GHz			
17 GHz			
17.5 GHz			
18 GHz			

Table 5: RSA503/507 Amplitude accuracy results — Preamp OFF

Frequency range	Maximum +error	Maximum –error	Specification
9 kHz to 3.0 GHz			±0.8 dB
3 GHz to 7.5 GHz			±1.5 dB

Table 6: RSA513/518 Amplitude accuracy results — Preamp OFF

Frequency range	Maximum +error	Maximum –error	Specification
9 kHz to ≤ 50 kHz			±0.8 dB
50 kHz to ≤ 3.0 GHz			±0.8 dB
>3 GHz to 7.5 GHz			±1.5 dB

Table 6: RSA513/518 Amplitude accuracy results — Preamp OFF (cont.)

Frequency range	Maximum +error	Maximum –error	Specification
>7.5 GHz to 13.6 GHz			±1.55 dB
>13.6 GHz to 18 GHz			±1.55 dB

Amplitude accuracy at all center frequencies — Preamp ON
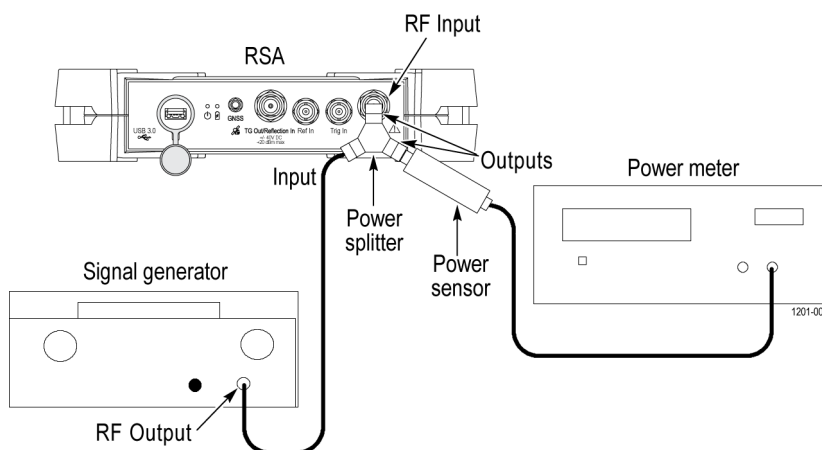
1. Connect the signal generator, power splitter, power sensor, power meter, and RSA, as shown. Connect the power sensor and RF signal generator directly to the power splitter, which is connected directly to the RSA.

2. Reset the RSA to factory defaults (**Presets > Main**).

3. Run the RSA alignment procedure (**Tools > Alignments > Align Now**).

4. Set the RSA as follows:

   a. Reference Level = **–15 dBm**

   b. Detection = **+PEAK** (Setup > Settings > Traces > Detection > +PEAK)

   c. Filter shape = **Flat-Top** (Setup > Settings > BW > Filter Shape > Flat-top)

   d. Preamp = **ON** (Setup > Amplitude > Internal Preamp)

   e. Span and RBW:

   - For CF < 1 MHz, Span = 100 kHz, RBW = 1 kHz

   - For 1 MHz ≤ CF ≤ 30 MHz, Span = 1 MHz, RBW = 10 kHz

   - For CF ≥ 30 MHz, Span = 10 MHz, RBW = 100 kHz

5. Set the signal generator output amplitude to **–14 dBm**. The RF amplitude at the power sensor and RSA input = –20 dBm (nominal).

6. Set the signal generator center frequency to the first frequency specified in the Amplitude accuracy measurements table. (See Table 8.)

7. Set the RSA center frequency to the first frequency specified in the amplitude accuracy table. (See Table 8.)

8. On the RSA, peak the marker on the signal at the center frequency; measure and record the amplitude.

9. Measure and record the power meter amplitude.

10. Repeat steps 6 through 8 for all of the −15 dBm reference level frequencies in the table, measuring power meter amplitude and RSA amplitude.

11. Calculate the amplitude errors for each frequency of each reference level in the reference level accuracy table. Error = RSA measurement – power meter measurement. Readings are in dBm and error is in dB.

12. Note the largest positive and negative errors in the Error column in all the reference level measurement tables.

13. Enter these values in the Amplitude accuracy results table. (See Table 9.)

14. Compare the +peak and –peak errors against the specifications.

15. Enter pass or fail in the test record.

Table 7: Amplitude accuracy measurements — Preamp ON (all models)

Center/signal frequency	RSA reading, dBm	Power meter value, dBm	Error (RSA – Pwr meter), dB
100 kHz			
1 MHz			
10 MHz			
20 MHz			
100 MHz			
500 MHz			
1 GHz			
1.5 GHz			
2 GHz			
2.5 GHz			
3 GHz			
3.5 GHz			
3.99 GHz			
4.01 GHz			
4.5 GHz			
5 GHz			
5.5 GHz			
6 GHz			
6.5 GHz			

Table 7: Amplitude accuracy measurements — Preamp ON (all models) (cont.)

Center/signal frequency	RSA reading, dBm	Power meter value, dBm	Error (RSA – Pwr meter), dB
7 GHz			
7.499 GHz			

Table 8: Amplitude accuracy measurements — Preamp ON (RSA513/518)

Center/signal frequency	RSA reading, dBm	Power meter value, dBm	Error (RSA – Pwr meter), dB
7.5 GHz			
8 GHz			
8.5 GHz			
9 GHz			
9.5 GHz			
10 GHz			
10.5 GHz			
11 GHz			
11.5 GHz			
12 GHz			
12.5 GHz			
13 GHz			
13.5 GHz			
14 GHz			
14.5 GHz			
15 GHz			
15.5 GHz			
16 GHz			
16.5 GHz			
17 GHz			
17.5 GHz			
18 GHz			

Table 9: Amplitude accuracy results — Preamp ON (RSA503/507)

Frequency range	Maximum +error	Maximum –error	Specification
>200 kHz to 3.0 GHz			±1.0 dB
>3 GHz to 7.5 GHz			±1.75 dB

Table 10: Amplitude accuracy results — Preamp ON (RSA513/518)

Frequency range	Maximum +error	Maximum –error	Specification
>200 kHz to 3.0 GHz			±1.0 dB
>3 GHz to 7.5 GHz			±1.75 dB
>7.5 GHz to 13.6 GHz			±2.0 dB
>13.6 GHz to 18 GHz			±2.0 dB

Channel amplitude flatness

The amplitude flatness test verifies amplitude at the commonly used frequency range bands. However, the flatness test may be performed across any selected 40 MHz span. In this procedure, the channel flatness is measured for 1 MHz – 41 MHz, 980 MHz – 1020 MHz, and 5730 MHz – 5770 MHz.

1. Connect the signal generator, power splitter, power sensor, power meter, and RSA as shown in the above figure. Connect the power splitter outputs directly to the RSA RF Input and to the power sensor.

2. Reset the RSA to factory defaults (**Presets > Main**).

3. Run the RSA alignment procedure (**Tools > Alignments > Align Now**).

4. Set the RSA as follows:

   a. Reference Level = **–15 dBm**.

   b. RF Attenuation = **10 dB**

   c. Detection = **+PEAK** (Setup > Settings > Traces > Detection > +PEAK).

   d. Function = **Normal** (Setup > Settings > Traces > Function > Normal)

   e. Filter shape = **Flat-Top** (Setup > Settings > BW > Filter Shape > Flat-top).

   f. Center Frequency = **21 MHz**

   g. Span = **40 MHz**

   h. RBW = **Auto (300 kHz)**

5. Set the signal generator frequency to the first frequency in the 1 MHz – 41 MHz channel flatness table. (See Table 11.)

6. Set the signal generator amplitude for **–20 dBm** at the power meter and RSA.

7. Record the power meter reading in the 1 MHz – 41 MHz channel flatness table. (See Table 11.)

8. On the RSA, position the marker on the peak amplitude of the signal; record the amplitude in the channel flatness table.

9. Repeat steps 5 through 8 to measure and record for all the frequencies in the channel flatness table, 1 MHz through 41 MHz. Do not change the RSA center frequency setting.

10. Set the RSA center frequency to **1000 MHz.**. Keep other settings the same.

11. Set the signal generator frequency to **980 MHz**.

12. Set the signal generator amplitude for **–20 dBm** at the power meter and RSA.

13. Repeat steps 5 through 8, but set the frequency to the next frequency in the table and record the power meter reading in the corresponding channel flatness table. Measure and record for all the frequencies in the channel flatness table, 980 MHz through 1020 MHz. (See Table 12.)

Do not change the RSA center frequency setting.

14. Change the RSA center frequency to **5750 MHz**. Keep other settings the same.

15. Set the signal generator frequency to **5730 MHz.**

16. Set the signal generator amplitude for **–20 dBm** at the power meter and RSA.

17. Repeat steps 5 through 8, but set the frequency to the next frequency in the table and record the power meter reading in the corresponding channel flatness table. Measure and record for all the frequencies in the channel flatness table, 5730 MHz through 5770 MHz. (See Table 13.)

Do not change the RSA center frequency setting. An alternate IF setting is used in this range. This verifies the alternate setting.

18. Repeat steps 14 through 17 for the remaining center frequencies in the list.

19. Use the recorded values to calculate the amplitude differences for each measured frequency in the three channel flatness tables.

Difference amplitude = (power meter amplitude – RSA marker amplitude)

The measured amplitudes are dBm. The difference amplitude is dB.

20. Calculate the channel flatness error relative the center screen amplitude. Center screen value:

21 MHz for the 1– 41 MHz channel

1000 MHz for the 980 – 102 MHz channel

5750 MHz for the 5730 – 5770 MHz channel

The flatness error at each frequency is:

Error = (difference amplitude, each frequency – difference amplitude, center screen frequency)

NOTE. All amplitudes are in dB. At center screen, Error = 0 dB.

Example calculation for 1 MHz frequency, 21 MHz center screen:

21 MHz Center screen difference amplitude = +0.13 dB

1 MHz Frequency difference amplitude = –0.32 dB

Error = (–0.32 dB – (0.13 dB)) = **–0.45 dB**

21. Enter Pass/Fail in the test record.

Table 11: 21 MHz channel flatness, 1 MHz – 41 MHz

Signal generator frequency	Power meter amplitude, dB	RSA marker amplitude, dB	Difference amplitude, dBm	Channel flatness error, dB
1 MHz				
3 MHz				
5 MHz				
7 MHz				
9 MHz				
11 MHz				
13 MHz				
15 MHz				
17 MHz				
19 MHz				
21 MHz				
23 MHz				
25 MHz				
27 MHz				
29 MHz				
31 MHz				
33 MHz				
35 MHz				
37 MHz				
39 MHz				
41 MHz				
Maximum difference amplitude				< +0.5 dB
Minimum difference amplitude				> –0.5 dB

Table 12: 1000 MHz channel flatness, 980 MHz – 1020 MHz

| Signal generator frequency	Power meter amplitude, dB	RSA marker amplitude, dB	Difference amplitude, dBm	Channel flatness error, dB
980 MHz				
982 MHz				
984 MHz				
986 MHz				
988 MHz				
990 MHz				
992 MHz				
994 MHz				
996 MHz				
998 MHz				
1000 MHz				
1002 MHz				
1004 MHz				
1006 MHz				
1008 MHz				
1010 MHz				
1012 MHz				
1014 MHz				
1016 MHz				
1018 MHz				
1020 MHz				
Maximum difference amplitude				< +0.5 dB
Minimum difference amplitude				> –0.5 dB

Table 13: 5750 MHz Channel flatness, 5730 MHz – 5770 MHz

Signal generator frequency	Power meter amplitude, dB	RSA marker amplitude, dB	Difference amplitude, dBm	Channel flatness error, dB
5730 MHz				
5732 MHz				
5734 MHz				
5736 MHz				
5738 MHz				
5740 MHz				
5742 MHz				
5744 MHz				
5746 MHz				
5748 MHz				
5750 MHz				
5752 MHz				
5754 MHz				
5756 MHz				
5758 MHz				
5760 MHz				
5762 MHz				
5764 MHz				
5766 MHz				
5768 MHz				
5770 MHz				
Maximum difference amplitude				< +0.5 dB
Minimum difference amplitude				> –0.5 dB

DANL (Displayed Average Noise Level)

The intent of the DANL test is to measure the average internal noise level of the instrument. The DANL specification does not cover residual spurs. If the specific measurement frequency results in measuring a residual spur that is visible above the noise level, the DANL specification applies not to the spur but to the noise level on either side of the spur. Please refer to the Spurious Response specifications.

RSA

1201-001

50 Ω N−type termination
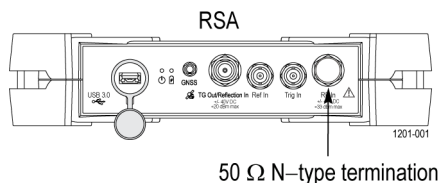
1. Connect a 50 Ω N termination to the RSA RF Input.

2. Reset the RSA to factory defaults (**Presets > Main**).

3. Run the RSA alignment procedure (**Tools > Alignments > Align Now**).

4. Set the RSA as follows:

   a. Reference Level = **–50 dBm**.

      The reference level can be set lower than -50 dBm to display the noise on screen. This helps avoid measuring on spurious signals since it is easier to determine the presence of spurious.

   b. Set Detection = **Avg (Vrms)** (Setup > Settings > Traces > Detection > Avg).

   c. Set Function = **Avg (of logs)** (Setup > Settings > Traces > Function)

   d. Averaging = **100** (Setup > Settings > Traces > Function: select 100 in field)

   e. Filter shape = **Flat-Top** (Setup > Settings > BW > Filter Shape > Flat-top).

   f. RF Attenuation = **0 dB** (Settings > Amplitude > Internal Settings > Auto (uncheck) > 0)

   g. Preamp = **ON** (Setup > Amplitude > Internal Preamp)

   h. Center Frequency = **500 kHz**

   i. Span = **100 kHz**

   j. RBW = **100 Hz**

5. Set the marker for POWER measurement:

   a. Turn on marker (Markers > Define Markers > Add).

   b. Marker function = **Power (dBm/Hz)** (Markers > Define Markers > Readouts (near bottom of screen) > Power).

   c. Turn on marker (Markers > Define Markers > Add).

6. Set the RSA to each of the center frequencies listed in the DANL frequencies of interest table. (See Table 14.) After averaging is completed, move the marker near the center screen to the baseline noise on either side of the center screen spurious. Make sure the marker is not on a coherent spurious signal. Enter the marker noise level amplitude in the DANL frequencies of interest table and the test record and compare with the specification.

Table 14: DANL frequencies of interest (all models)

RSA center frequency	Marker noise level	Specification
500 kHz		< −138 dBm/Hz
1 MHz		< −138 dBm/Hz
10 MHz		< −153 dBm/Hz
20 MHz		< −153 dBm/Hz
30 MHz		< −161 dBm/Hz
		< −158 dBm/Hz (RSA513A, RSA518A)
100 MHz		< −161 dBm/Hz
		< −158 dBm/Hz (RSA513A, RSA518A)
500 MHz		< −161 dBm/Hz
		< −158 dBm/Hz (RSA513A, RSA518A)
1 GHz		< −161 dBm/Hz
		< −158 dBm/Hz (RSA513A, RSA518A)
1.5 GHz		< −159 dBm/Hz
		< −156 dBm/Hz (RSA513A, RSA518A)
2.0 GHz		< −159 dBm/Hz
		< −156 dBm/Hz (RSA513A, RSA518A)
2.5 GHz		< −156 dBm/Hz
		< −153 dBm/Hz (RSA513A, RSA518A)
3.0 GHz		< −156 dBm/Hz
		< −149 dBm/Hz (RSA513A, RSA518A)
3.5 GHz		< −153 dBm/Hz
		< −149 dBm/Hz (RSA513A, RSA518A)

Table 14: DANL frequencies of interest (all models) (cont.)

RSA center frequency	Marker noise level	Specification
4.0 GHz		< −153 dBm/Hz
		< −155 dBm/Hz (RSA513A, RSA518A)
4.5 GHz		< −159 dBm/Hz
		< −155 dBm/Hz (RSA513A, RSA518A)
5.0 GHz		< −159 dBm/Hz
		< −155 dBm/Hz (RSA513A, RSA518A)
5.5 GHz		< −159 dBm/Hz
		< −155 dBm/Hz (RSA513A, RSA518A)
6.0 GHz		< −159 dBm/Hz
		< −155 dBm/Hz (RSA513A, RSA518A)
6.5 GHz		< −155 dBm/Hz
		< −151 dBm/Hz (RSA513A, RSA518A)
7.0 GHz		< −155 dBm/Hz
		< −151 dBm/Hz (RSA513A, RSA518A)
7.5 GHz		< −155 dBm/Hz
		< −151 dBm/Hz (RSA513A, RSA518A)

Table 15: DANL frequencies of interest > 7.5 GHz (RSA513A, RSA518A ONLY)

RSA center frequency	Marker noise level	Specification
8 GHz		< −161 dBm/Hz
9 GHz		< −161 dBm/Hz
10 GHz		< −161 dBm/Hz

Table 15: DANL frequencies of interest > 7.5 GHz (RSA513A, RSA518A ONLY) (cont.)

RSA center frequency	Marker noise level	Specification
11 GHz		< −161 dBm/Hz
12 GHz		< −161 dBm/Hz
13 GHz		< −161 dBm/Hz

**Table 16: DANL frequencies of interest > 13 GHz (RSA518A ONLY)**

RSA center frequency	Marker noise level	Specification
14 GHz		< −161 dBm/Hz
15 GHz		< −157 dBm/Hz
16 GHz		< −159 dBm/Hz
17 GHz		< −159 dBm/Hz
18 GHz		< −157 dBm/Hz

Phase noise

The intent of the Phase Noise test is to measure the phase noise level of the instrument. The phase noise specification does not cover residual spurs. If the specific measurement frequency results in measuring a residual spur that is visible above the noise level, the phase noise specification applies not to the spur but to the noise level on either side of the spur. Please refer to the Spurious Response specifications. Also, refer to the Spurious Response section of this procedure to determine whether or not a residual spur is within the specification.

Connect the signal generator and RSA as shown in the following figure.
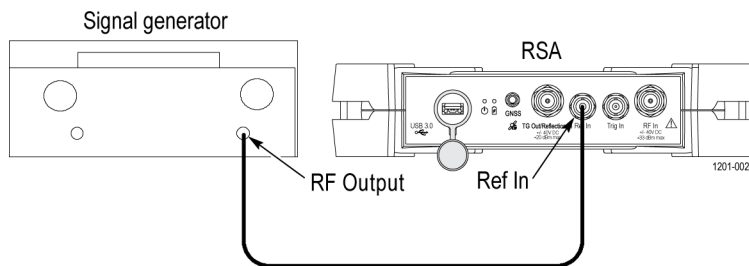
1. Reset the RSA to factory defaults (**Presets > Main**).

2. Select **Setup > Settings > Prefs** and set **Show** to **Center, Span**.

3. Run the RSA alignment procedure (**Tools > Alignments > Align Now**). The Center frequency should be 1 GHz.

4. Set the signal generator CW frequency = **1 GHz**.

5. Set the signal generator CW amplitude = **0 dBm** at the RSA input.

6. Select **External Reference** (Setup > Acquire > Frequency Reference > External)

7. Set trace detection = **+PEAK** (Setup > Settings > Traces > Detection)

8. Measure the CW amplitude for the following settings:

    a. Span = **10 kHz**

    b. RBW = **100 Hz**

    c. Turn on marker (Markers > Define Markers > Add)

    d. Move MR marker to highest amplitude signal after 10 averages and write marker value as the CW amplitude in the measurement table. (See Table 17.)

9. Set Trace detection = **Avg (Vrms)**.

10. Set Marker function = **Power (dBm/Hz)** (Markers > Define Markers > Readouts (near bottom of window) > Power).

11. **Measure noise for 1 MHz offset:**

   a. CF = **1000.95 MHz**

   b. Span = **1 MHz**

   c. RBW = **1 kHz**

   d. Avg count = **100**

   e. Marker frequency = **1.0009975 GHz** (note, this avoids the 1 MHz offset spur)

   f. After averaging is completed, enter the raw noise amplitude in dBm/Hz in the measurement table (See Table 17.) and test record.

   g. Calculate Phase noise, the difference of CW amplitude in 1 kHz filter and noise measured with the POWER marker. Enter the calculations in the measurement table (See Table 17.) and in the test record.

12. **Measure noise for 100 kHz offset:**

   a. CF = **1000.095 MHz**

   b. Span = **100 kHz**

   c. RBW = **1 kHz**

   d. Avg count= **100**

   e. Marker frequency = **1000.100 MHz**

   f. After averaging is completed, enter the raw noise amplitude in dBm/Hz in the measurement table (See Table 17.) and in the test record.

   g. Calculate Phase noise, the difference of CW amplitude in 1 kHz filter and noise measured with the POWER marker. Enter the calculations in the measurement table (See Table 17.) and test record.

13. **Measure noise for 10 kHz offset:**

   a. CF = **1000.0095 MHz**

   b. Span = **10 kHz**

   c. RBW = **100 Hz**

   d. Avg count =**100**

   e. Marker frequency = **1000.010 MHz**

   f. After averaging is completed, enter the raw noise amplitude in dBm/Hz in the measurement table (See Table 17.) and test record.

   g. Calculate Phase noise, the difference of CW amplitude in 100 Hz filter and noise measured with the POWER marker. Enter the calculations in the measurement table (See Table 17.) and test record.
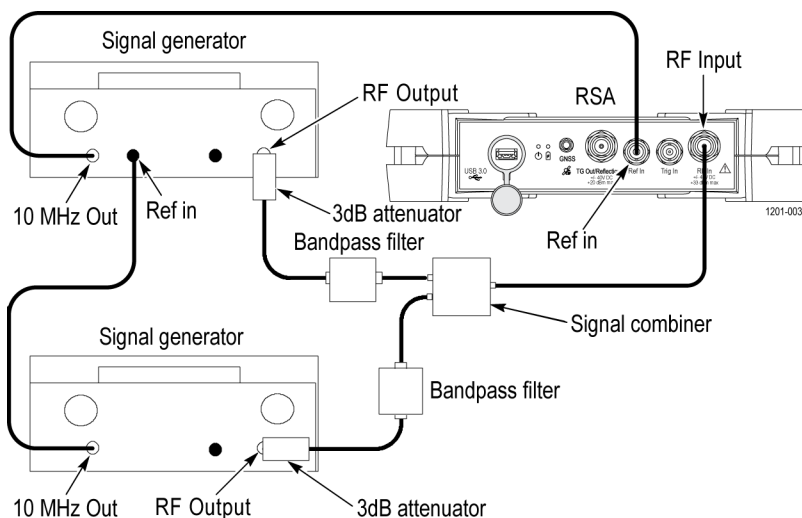
Table 17: Phase noise at 1 GHz center frequency

Phase noise offset frequency	RBW	CW amplitude, dBm	Raw noise, dBm/Hz	Phase noise (raw noise – CW amplitude), dBc/Hz	Specification
10 kHz	100 Hz				< –94 dBc/Hz
100 kHz	1 kHz				< –94 dBc/Hz
1 MHz	1 kHz				< –116 dBc/Hz

Third-order intermodulation distortion

Set up the RF signal generators, band-pass filters, signal combiner, and RSA as shown.

1. Reset the RSA to factory defaults (**Presets > Main**).

2. Run the RSA alignment procedure (**Tools > Alignments > Align Now**).

3. Set the RSA as follows:

   a. Reference Level = **–20 dBm**

   b. Span = **100 kHz**

   c. RBW = **1 kHz**

   d. Detection mode = **+PEAK** (Setup > Settings > Traces > Detection > +PEAK)

   e. Function = **Avg (Vrms)** (Setup > Settings > Traces > Function)

   f. Averaging = **10** (Setup > Settings > Traces > Function: set count = 10)

   g. Select **External Reference** (Setup > Acquire > Frequency Reference > External)

   h. Set the attenuator to 0 dB.

4. Set one RF signal generator frequency to **2.1290 GHz**. Set the second RF signal generator frequency to **2.131 GHz**.

5. Turn on marker (Markers > Define Markers > Add).

6. Set each of the RF signal generators to provide a power level of **-25 dBm** each to the RSA. The initial generator amplitude setting is should be -20 dBm, and the amplitude is fine-tuned as follows:

   a. Set the RSA center frequency to **2.129 GHz**. Move the marker to the largest amplitude. Adjust the first generator output level for a marker reading of **–25.0 dBm** (±0.1 dB) (after averaging).

   b. Set the RSA center frequency to **2.131 GHz**. Move the marker to the largest amplitude. Adjust the second generator output level for a marker reading of **–25.0 dBm** (± 0.1 dB) (after averaging).

7. Set span to 10 MHz and RBW to 1 kHz.

8. After averaging has completed, move the marker to the intermod product at **2.127 GHz** and read the marker amplitude. Record this value as the IMD #1 amplitude. (See Table 18.)

9. Move the marker to the intermod product at **2.133 GHz** and read the marker amplitude. Record this value as the IMD #2 amplitude. (See Table 18.)

10. Calculate IMD (dBc):

   (maximum of IMD #1 or IMD #2) + 25 dBm = IMD (dBc)

11. Enter the result in the test record.

Table 18: Third order intermodulation distortion measurements

Item	Measurement	Specification
Carrier #1 amplitude		–25 dBm
Carrier #2 amplitude		–25 dBm
IMD #1 amplitude		< –99 dBm typ.
IMD #2 amplitude		< –99 dBm typ.
IMD (Max IMD – (–25 dBm))		< –74 dBc

Input-related spurious response: first converter images

NOTE. You do not need to do the first three steps (setup, reset, and alignment) when you perform the input-related spurious response tests in sequence.
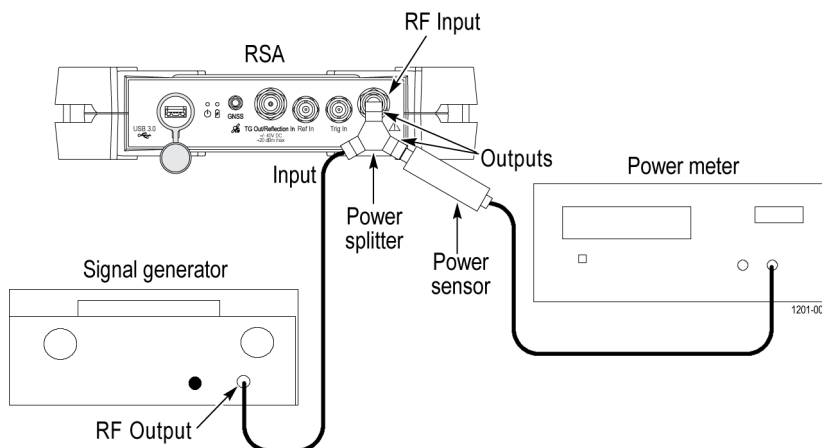
1. Connect the Anritsu 8 MHz - 20 MHz signal generator, power splitter, power sensor, power meter, and RSA as shown. Connect the power sensor and RF signal generator directly to the power splitter, which is connected directly to the RSA.

2. Reset the RSA to factory defaults (**Presets > Main**).

3. Run the RSA alignment procedure (**Tools > Alignments > Align Now**).

4. Set the RSA as follows:

   a. Reference Level = **–30 dBm**

   b. RF Atten = **10 dB**

   c. Span = **1 MHz**

   d. RBW = **100 Hz**

   e. Detection mode = **+PEAK** (Setup > Settings > Traces > Detection > +PEAK)

   f. Function = **Avg (Vrms)** (Setup > Settings > Traces > Function)

   g. Averaging = **10** (Setup > Settings > Traces > Function; count = 10)

   h. Select **External Reference** (Setup > Acquire > Frequency Reference > External)

   i. Preamp = **OFF** (Setup > Amplitude > Internal Preamp)

5. Set the signal generator output for **-30 dBm** as measured by the power meter (and RSA input).

6. Set the RSA to the Center frequency shown in the first column of the first converter images table. (See Table 21.)

7. Set the signal generator frequency to the associated image frequency value in the second column of the table.

NOTE. Monitor and set the signal generator amplitude to -30 dBm whenever you change frequency settings during this test.

8. Measure the Image Amplitude at the RSA center frequency.

9. Calculate and record the image spur amplitude in dBc (Image amplitude (dBm) + 30).

10. Repeat steps 6 through 9 10 for each center frequency listed in the table. (See Table 21.)

11. Record the results in the test record.

NOTE. The intent of the image spurious test is to measure spurious responses caused by the injection of an external signal that would induce an image product on the display. These images can be the same frequencies as residual spurs. In case of question, slightly change the frequency of the input signal to induce a corresponding change in the displayed frequency of the image spur.

Change the input frequency in steps that allow the product to stay within the on-screen frequency span. If the on-screen spur does not move in response to the input signal change, it is not an image and is not covered in the image spurious specification. Some care must be taken in noting the frequency change.

The images specified in the specification are 1:1 images and they will move either –1:1 or +1:1 with changes in input signal frequency.

The RSA500A and RSA600A series analyzers employ a method of 1st LO internal offsetting that could cause a displayed 1:1 image to be offset from the center by up to 10 kHz. This will not be the case at all test frequencies. You can confirm that you are measuring the image spur by adjusting the signal generator frequency by a small amount and noting the corresponding displayed spur frequency change.

Never discount the possibility that a spur in question could be coming from the test signal generator. Such spurious responses can also move with changes in signal generator frequency. In case of question, validate the performance of the generator with a different Signal Analyzer and/or filter the signal from the test generator to remove unwanted products.

If the spur seen on screen is a residual, it will still be present with the input to the signal analyzer terminated in 50 Ω. Residual spurs are subject to separate specification limits.

Table 19: First converter images: RSA and signal generator settings

Center frequency (RSA	Image frequency (signal generator)	Image Amplitude at CF, dBm	Image Spur Amplitude, dBc [1]	Specification, dBc (relative to –30 dBm input)
20 MHz	92 MHz			< –65 dBc
50 MHz	9.29 GHz			< –65 dBc
2000 MHz	11.24 GHz			< –65 dBc
3990 MHz	13.23 GHz			< –65 dBc
4020 MHz	6.54 GHz			< –65 dBc
4890 MHz	7.41 GHz			< –65 dBc
4910 MHz	7.43 GHz			< –65 dBc
5790 MHz	8.31 GHz			< –65 dBc
5810 MHz	8.33 GHz			< –65 dBc
6690 MHz	9.21 GHz			< –65 dBc
6710 MHz	10.01 GHz			< –65 dBc

1   Image amplitude + 30.

Spurious response with signal

Set up the RSA, signal generator, and power meter as shown in the following image.
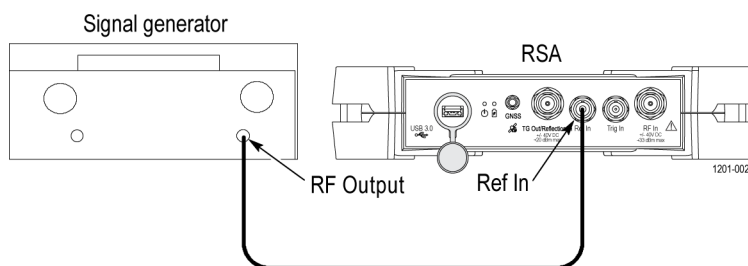
1. Connect the RF signal generator to the RSA RF Input.

2. Reset the RSA to factory defaults (**Presets > Main**).

3. Run the RSA alignment procedure (**Tools > Alignments > Align Now**).

4. Set the RSA as follows:

   a. Center frequency = **1 GHz**

   b. Reference Level = **–25 dBm**

   c. RF Atten = **0 dB**

   d. Span = **40 MHz**

   e. RBW = **100 Hz**

   f. Detection mode = **+PEAK** (Setup > Settings > Traces > Detection > +PEAK)

   g. Function = **Avg (Vrms)** (Setup > Settings > Traces > Function)

   h. Averaging = **25** (Setup > Settings > Traces > Function; count = 25)

   i. Select **External Reference** (Setup > Acquire > Frequency Reference > External)

   j. Preamp = **OFF** (Setup > Amplitude > Internal Preamp)

5. Set the signal generator as follows:

   a. Frequency to **1 GHz**.

   b. Output at **-30 dBm** at the RSA input.

6. Turn on the Marker Reference (MR) and Marker 1 (M1) and set them to Delta operation.

   a. Select Markers > Define markers.

   b. Click **Add** to add the MR marker.

   c. Click **Add** again to add the M1 marker.

   d. Select **Delta** from the Readouts dropdown menu.

7. After averaging has completed, select Markers > Select and select the MR marker.

8. Select the M1 marker (Markers > Select).

9. Set the M1 marker frequency to –20 MHz.

10. Drag the markers and verify that all marker amplitudes as shown by the Delta M1 marker readout are less than –73 dBc from –20 MHz to –1 MHz and 1 MHz to 20 MHz.

11. Record the results in the test record.

Residual response

1. Terminate the RSA RF Input.
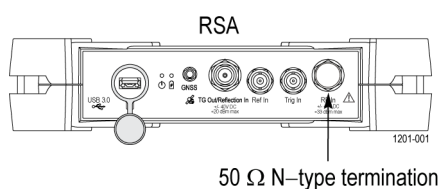
50 Ω N−type termination

2. Reset the RSA to factory defaults (**Presets > Main**).

3. Run the RSA alignment procedure (**Tools > Alignments > Align Now**).

4. Set the RSA as follows:

   a. Reference Level = **–30 dBm**

   b. RF Atten = **0 dB**

   c. RBW = **1 kHz**

   d. Detection mode = **+PEAK** (Setup > Settings > Traces > Detection > +PEAK)

   e. Function = **Avg (Vrms)** (Setup > Settings > Traces > Function)

   f. Averaging = **25** (Setup > Settings > Traces > Function; count = 25)

   g. Select **External Reference** (Setup > Acquire > Frequency Reference > External)

   h. Preamp = **OFF** (Setup > Amplitude > Internal Preamp)

5. Set the frequency to each center frequency in the Residual Response center frequencies table and set the span for each center frequency as shown in the table. (See Table 21.)

6. Wait for the averaging to complete and then select Markers > Peak and record the marker amplitude in the table.

7. Record the highest of these signal levels in the test record.

Table 20: Residual response center frequencies

Center frequency	Span	Range	Peak Marker amplitude	Specification
50 MHz	20 MHz	40 MHz to 60 MHz		< –70 dBm
70 MHz	20 MHz	> 60 MHz to 80 MHz		< –80 dBm
540 MHz	920 MHz	> 80 MHz to 1.0 GHz		< –95 dBm
1.5 GHz	1000 MHz	> 1.0 GHz to 2.0 GHz		< –95 dBm
2.5 GHz	1000 MHz	> 2.0 GHz to 3.0 GHz		< –95 dBm
3.5 GHz	1000 MHz	> 3.0 GHz to 4.0 GHz		< –95 dBm
4.5 GHz	1000 MHz	> 4.0 GHz to 5.0 GHz		< –95 dBm
5.5 GHz	1000 MHz	> 5.0 GHz to 6.0 GHz		< –95 dBm

Table 20: Residual response center frequencies (cont.)

Center frequency	Span	Range	Peak Marker amplitude	Specification
6.5 GHz	1000 MHz	> 6.0 GHz to 7.0 GHz		< –95 dBm
7.25 GHz	500 MHz	> 7.0 GHz to 7.5 GHz		< –95 dBm

Tracking generator output power level
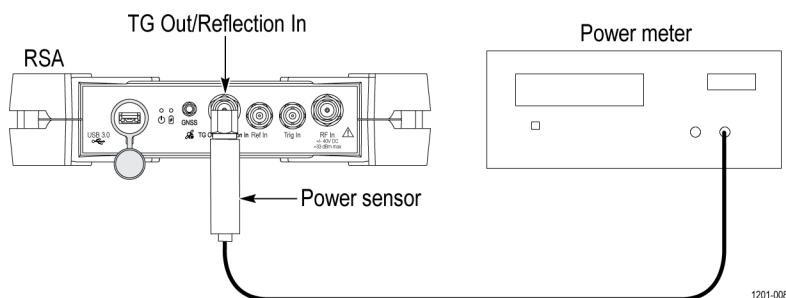
1. Zero and calibrate the power sensor.

2. Connect the power meter to the power sensor, and the power sensor to the RSA TG OUT / Reflection In connector, as shown.

3. Reset the RSA to factory defaults (**Presets > Main**).

4. Run the RSA alignment procedure (**Tools > Alignments > Align Now**).

5. Select the **Transmission Gain** display (Setup > Displays > Tracking Generator).

6. Set the RSA tracking generator output frequency and power as follows:

    a. Open the Transmission Gain Settings control panel (Setup > Settings).

    b. Select the **Freq Setup** tab and set the Center Freq to **10 MHz**.

7. Set the Span to **1 MHz**.

8. Set the Output Power Level to **–5 dBm** on the **Track Gen** tab.

9. Measure and record the power on the power sensor.

10. Repeat steps 6 and 9 for the other frequencies in the table. (See Table 21.)

11. Record the power in the test record.

Table 21: Tracking Generator Output Power frequencies for testing

Center frequency	Power sensor reading, dBm	Specification
10 MHz		– 5 dBm ± 1.5 dB
100 MHz		– 5 dBm ± 1.5 dB
500 MHz		– 5 dBm ± 1.5 dB

Table 21: Tracking Generator Output Power frequencies for testing (cont.)

Center frequency	Power sensor reading, dBm	Specification
1 GHz		– 5 dBm ± 1.5 dB
1.5 GHz		– 5 dBm ± 1.5 dB
2 GHz		– 5 dBm ± 1.5 dB
2.5 GHz		– 5 dBm ± 1.5 dB
3 GHz		– 5 dBm ± 1.5 dB
3.5 GHz		– 5 dBm ± 1.5 dB
4 GHz		– 5 dBm ± 1.5 dB
4.5 GHz		– 5 dBm ± 1.5 dB
5 GHz		– 5 dBm ± 1.5 dB
5.5 GHz		– 5 dBm ± 1.5 dB
6 GHz		– 5 dBm ± 1.5 dB
6.5 GHz		– 5 dBm ± 1.5 dB
7 GHz		– 5 dBm ± 1.5 dB
7.499 GHz		– 5 dBm ± 1.5 dB

Test record

Print out the following test record pages and use them to record the performance test results for the spectrum analyzer.

Table 22: Test record

Instrument Serial Number: Certificate Number:

Temperature: RH %:

Date of Calibration: Technician:

Frequency accuracy				
Measured Frequency (1 GHz CF)	**Instability measured, ppm [(Marker Frequency – 1E9)/1000]**	**Total specified Instability (aging plus other drift)**	**Pass/Fail**	

External reference	
Phaselock to 10 MHz, 0 dBm	**Pass/Fail**

Amplitude accuracy — Preamp OFF		
Center/signal frequency	**Specification**	**Pass/Fail**
9 kHz to 3.0 GHz	±0.8 dB	
3 GHz – 7.5 GHz	±1.5 dB	
Amplitude accuracy — Preamp ON		
Center/signal frequency	**Specification**	**Pass/Fail**
100 kHz to 3.0 GHz	±1.0 dB	
3 GHz to 7.5 GHz	±1.75 dB	
21 MHz channel amplitude flatness, 1 MHz - 41 MHz		
Center frequency	**Specification, dB**	**Pass/Fail**
1 MHz	±0.5 dB	
3 MHz	±0.5 dB	
5 MHz	±0.5 dB	
7 MHz	±0.5 dB	
9 MHz	±0.5 dB	
11 MHz	±0.5 dB	
13 MHz	±0.5 dB	
15 MHz	±0.5 dB	
17 MHz	±0.5 dB	

19 MHz	±0.5 dB	
21 MHz	±0.5 dB	
23 MHz	±0.5 dB	
25 MHz	±0.5 dB	
27 MHz	±0.5 dB	
29 MHz	±0.5 dB	
31 MHz	±0.5 dB	
33 MHz	±0.5 dB	
35 MHz	±0.5 dB	
37 MHz	±0.5 dB	
39 MHz	±0.5 dB	
41 MHz	±0.5 dB	
1000 MHz channel amplitude flatness, 980 MHz - 1020 MHz		
Center frequency	**Specification, dB**	**Pass/Fail**
980 MHz	±0.5 dB	
982 MHz	±0.5 dB	
984 MHz	±0.5 dB	
986 MHz	±0.5 dB	
988 MHz	±0.5 dB	
990 MHz	±0.5 dB	
992 MHz	±0.5 dB	
994 MHz	±0.5 dB	
996 MHz	±0.5 dB	
998 MHz	±0.5 dB	
1000 MHz	±0.5 dB	
1002 MHz	±0.5 dB	
1004 MHz	±0.5 dB	
1006 MHz	±0.5 dB	
1008 MHz	±0.5 dB	
1010 MHz	±0.5 dB	
1012 MHz	±0.5 dB	
1014 MHz	±0.5 dB	
1016 MHz	±0.5 dB	
1018 MHz	±0.5 dB	
1020 MHz	±0.5 dB	

5750 MHz channel amplitude flatness, 5730 MHz - 5770 MHz		
Center frequency	Specification, dB	Pass/Fail
5730 MHz	±0.5 dB	
5732 MHz	±0.5 dB	
5734 MHz	±0.5 dB	
5736 MHz	±0.5 dB	
5738 MHz	±0.5 dB	
5740 MHz	±0.5 dB	
5742 MHz	±0.5 dB	
5744 MHz	±0.5 dB	
5746 MHz	±0.5 dB	
5748 MHz	±0.5 dB	
5750 MHz	±0.5 dB	
5752 MHz	±0.5 dB	
5754 MHz	±0.5 dB	
5756 MHz	±0.5 dB	
5758 MHz	±0.5 dB	
5760 MHz	±0.5 dB	
5762 MHz	±0.5 dB	
5764 MHz	±0.5 dB	
5766 MHz	±0.5 dB	
5768 MHz	±0.5 dB	
5770 MHz	±0.5 dB	

DANL <7.5 GHz (RSA503A, RSA507A, RSA603A, RSA607A)			
Center frequency	Marker noise level	Specification	Pass/Fail
500 kHz		< –138 dBm/Hz	
1 MHz		< –138 dBm/Hz	
10 MHz		< –153 dBm/Hz	
20 MHz		< –153 dBm/Hz	
30 MHz		< –161 dBm/Hz	
100 MHz		< –161 dBm/Hz	
500 MHz		< –161 dBm/Hz	
1 GHz		< –161 dBm/Hz	
1.5 GHz		< –159 dBm/Hz	
2.0 GHz		< –159 dBm/Hz	
2.5 GHz		< –156 dBm/Hz	
3.0 GHz		< –156 dBm/Hz	
3.5 GHz		< –153 dBm/Hz	
4.0 GHz		< –153 dBm/Hz	
4.5 GHz		< –159 dBm/Hz	
5.0 GHz		< –159 dBm/Hz	
5.5 GHz		< –159 dBm/Hz	
6.0 GHz		< –159 dBm/Hz	
6.5 GHz		< –155 dBm/Hz	
7.0 GHz		< –155 dBm/Hz	
7.5 GHz		< –155 dBm/Hz	

DANL <7.5 GHz (RSA513A, RSA518 only)			
Center frequency	**Marker noise level**	**Specification**	**Pass/Fail**
500 kHz		< −138 dBm/Hz	
1 MHz		< −138 dBm/Hz	
10 MHz		< −153 dBm/Hz	
20 MHz		< −153 dBm/Hz	
30 MHz		< −158 dBm/Hz	
100 MHz		< −158 dBm/Hz	
500 MHz		< −158 dBm/Hz	
1 GHz		< −158 dBm/Hz	
1.5 GHz		< −156 dBm/Hz	
2.0 GHz		< −156 dBm/Hz	
2.5 GHz		< −153 dBm/Hz	
3.0 GHz		< −149 dBm/Hz	
3.5 GHz		< −149 dBm/Hz	
4.0 GHz		< −149 dBm/Hz	
4.5 GHz		< −155 dBm/Hz	
5.0 GHz		< −155 dBm/Hz	
5.5 GHz		< −155 dBm/Hz	
6.0 GHz		< −151 dBm/Hz	
6.5 GHz		< −151 dBm/Hz	
7.0 GHz		< −151 dBm/Hz	
7.5 GHz		< −151 dBm/Hz	
DANL >7.5 GHz to 13 GHz (RSA513A, RSA518 only)			
Center frequency	**Marker noise level**	**Specification**	**Pass/Fail**
8 GHz		< −161 dBm/Hz	
9 GHz		< −161 dBm/Hz	
10 GHz		< −161 dBm/Hz	
11 GHz		< −161 dBm/Hz	
12 GHz		< −161 dBm/Hz	
13 GHz		< −161 dBm/Hz	

DANL >13 GHz (RSA518 only)

Center frequency	Marker noise level	Specification	Pass/Fail
14 GHz		< –159 dBm/Hz	
15 GHz		< –157 dBm/Hz	
16 GHz		< –159 dBm/Hz	
17 GHz		< –159 dBm/Hz	
18 GHz		< –157 dBm/Hz	

Phase noise at 1 GHz center frequency

Phase noise offset frequency	Raw noise, dBc/Hz	Phase noise (raw noise – CW amplitude), dBc/Hz	Specification	Pass/Fail
10 kHz			< –94 dBc/Hz	
100 kHz			< –94 dBc/Hz	
1 MHz			< –116 dBc/Hz	

Third Order intermodulation distortion at 2130 MHz center frequency

Test	Measurement	Specification	Pass/Fail
IMD		< –74 dBc	

Spurious response: First converter images

Center frequency	Image amplitude at CF, dBm	Image spur amplitude, dBc	Specification (relative to –30 dBm input)	Pass/Fail
20 MHz			< –65 dBc	
50 MHz			< –65 dBc	
2000 MHz			< –65 dBc	
3990 MHz			< –65 dBc	
4020 MHz			< –65 dBc	
4890 MHz			< –65 dBc	
4910 MHz			< –65 dBc	
5790 MHz			< –65 dBc	
5810 MHz			< –65 dBc	
6690 MHz			< –65 dBc	
6710 MHz			< –65 dBc	

Spurious response: With signal

Offset frequency	Marker amplitude, dBc	Specification, dBc	Pass/Fail
–20 MHz to –1 MHz		< –73 dBc	
1 MHz to 20 MHz		< –73 dBc	

Residual response				
Center frequency	Span	Peak marker amplitude	Specification	Pass/Fail
50 MHz	20 MHz		< –70 dBm	
70 MHz	20 MHz		< –80 dBm	
540 MHz	920 MHz		< –95 dBm	
1.5 GHz	1000 MHz		< –95 dBm	
2.5 GHz	1000 MHz		< –95 dBm	
3.5 GHz	1000 MHz		< –95 dBm	
4.5 GHz	1000 MHz		< –95 dBm	
5.5 GHz	1000 MHz		< –95 dBm	
6.5 GHz	1000 MHz		< –95 dBm	
7.25 GHz	500 MHz		< –95 dBm	
Tracking generator output level				
Center frequency	Power sensor reading, dBm	Specification		
10 MHz		–5 dBm ± 1.5 dB		
100 MHz		–5 dBm ± 1.5 dB		
500 MHz		–5 dBm ± 1.5 dB		
1 GHz		–5 dBm ± 1.5 dB		
1.5 GHz		–5 dBm ± 1.5 dB		
2 GHz		–5 dBm ± 1.5 dB		
2.5 GHz		–5 dBm ± 1.5 dB		
3 GHz		–5 dBm ± 1.5 dB		
3.5 GHz		–5 dBm ± 1.5 dB		
4 GHz		–5 dBm ± 1.5 dB		
4.5 GHz		–5 dBm ± 1.5 dB		
5 GHz		–5 dBm ± 1.5 dB		
5.5 GHz		–5 dBm ± 1.5 dB		
6 GHz		–5 dBm ± 1.5 dB		
6.5 GHz		–5 dBm ± 1.5 dB		
7 GHz		–5 dBm ± 1.5 dB		
7.499 GHz		–5 dBm ± 1.5 dB		