RSA6100B Series
Real-Time Signal Analyzer
Specifications and Performance Verification

Technical Reference

077-0647-02

Tektronix

RSA6100B Series
Real-Time Signal Analyzer
Specifications and Performance Verification

Technical Reference

This document applies to instruments running software version 3.2.x or later.

Warning

The servicing instructions are for use by qualified personnel only. To avoid personal injury, do not perform any servicing unless you are qualified to do so. Refer to all safety summaries prior to performing service.

www.tektronix.com

077-0647-02

Contacting Tektronix

Tektronix, Inc.
14150 SW Karl Braun Drive
P.O. Box 500
Beaverton, OR 97077
USA

For product information, sales, service, and technical support:

- In North America, call 1-800-833-9200.
- Worldwide, visit www.tektronix.com to find contacts in your area.

Warranty

Tektronix warrants that this product will be free from defects in materials and workmanship for a period of one (1) year from the date of shipment. If any such product proves defective during this warranty period, Tektronix, at its option, either will repair the defective product without charge for parts and labor, or will provide a replacement in exchange for the defective product. Parts, modules and replacement products used by Tektronix for warranty work may be new or reconditioned to like new performance. All replaced parts, modules and products become the property of Tektronix.

In order to obtain service under this warranty, Customer must notify Tektronix of the defect before the expiration of the warranty period and make suitable arrangements for the performance of service. Customer shall be responsible for packaging and shipping the defective product to the service center designated by Tektronix, with shipping charges prepaid. Tektronix shall pay for the return of the product to Customer if the shipment is to a location within the country in which the Tektronix service center is located. Customer shall be responsible for paying all shipping charges, duties, taxes, and any other charges for products returned to any other locations.

This warranty shall not apply to any defect, failure or damage caused by improper use or improper or inadequate maintenance and care. Tektronix shall not be obligated to furnish service under this warranty a) to repair damage resulting from attempts by personnel other than Tektronix representatives to install, repair or service the product; b) to repair damage resulting from improper use or connection to incompatible equipment; c) to repair any damage or malfunction caused by the use of non-Tektronix supplies; or d) to service a product that has been modified or integrated with other products when the effect of such modification or integration increases the time or difficulty of servicing the product.

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[W2 – 15AUG04]

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General safety summary

Review the following safety precautions to avoid injury and prevent damage to this product or any products connected to it.

To avoid potential hazards, use this product only as specified.

Only qualified personnel should perform service procedures.

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.

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.

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.

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.

The inputs are not rated for connection to mains or Category II, III, or IV circuits.

Power disconnect. The power cord disconnects the product from the power source. Do not block the power cord; it must remain accessible to the user at all times.

Do not operate without covers. Do not operate this product with covers or panels removed.

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

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

Replace batteries properly. Replace batteries only with the specified type and rating.

Use proper fuse. Use only the fuse type and rating specified for this product.

Wear eye protection. Wear eye protection if exposure to high-intensity rays or laser radiation exists.

Do not operate in wet/damp conditions.

Do not operate in an explosive atmosphere.

Keep product surfaces clean and dry.

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

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.*

Symbols and terms 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.

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

Preface

This document contains the Specifications and the Performance Verification for the RSA6100B Series Real Time Signal Analyzers. It contains procedures suitable for determining that the analyzer functions, is adjusted properly, and meets the performance characteristics as warranted.

Related Manuals

The following documents relate to the operation or service of the analyzer:

- The *RSA6100B Series Quick Start User Manual* describes how to use your analyzer.
- The *RSA6100B Series Real-Time Signal Analyzers Application Examples Manual*, provides tutorial examples of how to take measurements in different application areas.
- The *RSA6100B Series Programmers Manual* describes how to use a computer to control the analyzer through the GPIB interface.
- The *RSA6100B Series Service Manual* provides information for maintaining and servicing your analyzer to the module level.

Specifications

This section contains specifications for the RSA6100B Series Real Time Signal Analyzers. All specifications are warranted unless noted as a typical specification.

Table 1: Specification categories

Catagory	Description
Specified Characteristics	These are the warranted characteristics of the device, and are tested either on each unit in manufacturing or by type-testing. Specified characteristics include measurement tolerance and temperature limits.
Typical	This is performance that will be met by 80% of instruments with 80% confidence, for ambient temperatures in the range of 18 °C to 28 °C, immediately after performing an alignment. Values include the effects of the uncertainties of external calibration references and aging over the course of the published calibration interval. These values are determined from qualification testing and are not warranted or tested in the performance verification.
Typical-95	This is performance that will be met by 95% of instruments with 95% confidence, for ambient temperatures in the range of 18 to 28°C, immediately after performing an alignment. Values include the effects of the uncertainties of external calibration references and aging over the course of the recommended calibration interval. These values are determined from qualification testing and are not warranted or tested in the performance verification.
Typical-mean	This represents the mean of performance measured on a sample of units. Sample data is collected at laboratory temperature, immediately after performing an alignment. Values do not include the effects of uncertainties of external calibration references and aging over the course of the recommended calibration interval. These values are determined from qualification testing and are not warranted or tested in the performance verification.

Specifications that are marked with the ✓ symbol are checked in the Performance Verification section.

Performance Conditions

The performance limits in these specifications are valid with these conditions:

- The Signal Analyzer must have been calibrated and adjusted at an ambient temperature between +20 °C and +30 °C.
- The Signal Analyzer must be in an environment with temperature, altitude, humidity, and vibration within the operating limits described in these specifications.
- The Signal Analyzer must have had a warm-up period of at least 20 minutes after starting the RSA6100B application.

Electrical Specifications

Table 2: Frequency

Characteristic			Description
Measurement frequency			
	Frequency range, nominal	RSA6106B	9 kHz to 6.2 GHz
		RSA6114B	9 kHz to 14 GHz
		RSA6120B	9 kHz to 20 GHz
	Frequency Marker	Readout Accuracy	±(RE × MF + 0.001 × Span + 2) Hz RE: Reference Frequency Error MF: Marker Frequency [Hz]
		Readout Resolution	As small as 0.0001 Hz
	Residual FM, typical		<2 Hz_{p-p} in 1 second at 200 MHz CF, 100 Hz span, Freq vs Time mode, Autoscale (95% confidence)
	Span Accuracy		±0.3% of span (Auto mode)

Table 2: Frequency (cont.)

Characteristic			Description
Reference Frequency			
	Stability, nominal		2×10^{-8}
	Adjustment Range		$\pm 5.5 \times 10^{-7}$
	✓ Initial Accuracy at Cal		Within 1×10^{-7} (after a 10 min warmup)
	Aging	Per day	1×10^{-9} (after 30 days of operation)
		First Year	5×10^{-8} (1 year)
		Long term	3×10^{-7} (10 years)
		Cumulative Error, typical (Temperature + Aging)	4×10^{-7} (10 years)
	Temperature drift		$\pm 2 \times 10^{-8}$ (0 °C to 50 °C)
	Reference output Level	✓ Internal Reference selected	>0 dBm
		External Reference selected, nominal	Approximately 0 dB gain from Reference input (+15 dBm Max output)
	External Reference Input, nominal		BNC Connector, 50 Ω
	External Reference Input Frequency, nominal		Every 1 MHz from 1 MHz to 25 MHz plus 1.2288 MHz, 4.8 MHz, 19.6608 MHz, and 31.07 MHz. Spurious level on input signal must be <–80 dBc within 100 kHz offset to avoid on-screen spurious
	External Reference Input Range		$\pm 3 \times 10^{-7}$
	✓ External Reference Input Level		–10 dBm to +6 dBm

Table 3: Phase noise

Characteristic		Description	
✓ Specified		Noise sideband	Offset
	Frequency = 1000 MHz	–80 dBc/Hz	100 Hz
		–100 dBc/Hz	1 kHz
		–106 dBc/Hz	10 kHz
		–107 dBc/Hz	100 kHz
		–128 dBc/Hz	1 MHz
		–134 dBc/Hz	6 MHz
		–134 dBc/Hz	10 MHz

Table 3: Phase noise (cont.)

Characteristic		Description	
Typical			
	Frequency = 1000 MHz	–86 dBc/Hz	100 Hz
		–106 dBc/Hz	1 kHz
		–110 dBc/Hz	10 kHz
		–113 dBc/Hz	100 kHz
		–134 dBc/Hz	1 MHz
		–142 dBc/Hz	6 MHz
		–142 dBc/Hz	10 MHz
	Frequency = 2000 MHz	–80 dBc/Hz	100 Hz
		–106 dBc/Hz	1 kHz
		–110 dBc/Hz	10 kHz
		–111 dBc/Hz	100 kHz
		–133 dBc/Hz	1 MHz
		–142 dBc/Hz	6 MHz
		–142 dBc/Hz	10 MHz
	Frequency = 6000 MHz	–70 dBc/Hz	100 Hz
		–96 dBc/Hz	1 kHz
		–107 dBc/Hz	10 kHz
		–107 dBc/Hz	100 kHz
		–132 dBc/Hz	1 MHz
		–142 dBc/Hz	6 MHz
		–142 dBc/Hz	10 MHz
	Frequency = 10000 MHz (RSA6114B only)	–64 dBc/Hz	100 Hz
		–91 dBc/Hz	1 kHz
		–106 dBc/Hz	10 kHz
		–106 dBc/Hz	100 kHz
		–132 dBc/Hz	1 MHz
		–142 dBc/Hz	6 MHz
		–142 dBc/Hz	10 MHz

Table 3: Phase noise (cont.)

Characteristic		Description	
	Frequency = 10000 MHz (RSA6120B only)	–77 dBc/Hz	100 Hz
		–95 dBc/Hz	1 kHz
		–111 dBc/Hz	10 kHz
		–112 dBc/Hz	100 kHz
		–130 dBc/Hz	1 MHz
		–142 dBc/Hz	6 MHz
		–142 dBc/Hz	10 MHz
	Frequency = 18000 MHz (RSA6120B only)	–70 dBc/Hz	100 Hz
		–93 dBc/Hz	1 kHz
		–108 dBc/Hz	10 kHz
		–111 dBc/Hz	100 kHz
		–130 dBc/Hz	1 MHz
		–142 dBc/Hz	6 MHz
		–142 dBc/Hz	10 MHz

Table 4: Integrated jitter

Characteristic	Description
Integrated Phase Jitter	2.51^{e-3} radians at 100 MHz
(100 Hz to 100 MHz), typical	3.14^{e-3} radians at 1 GHz
	3.77^{e-3} radians at 2 GHz
	6.28^{e-3} radians at 5 GHz

Table 5: RF input

Characteristic	Description
RF Input Connector, nominal	Planar Crown
RF Input Impedance, nominal	50 Ω
RF VSWR, typical Center Frequency set to < 200 MHz at time of test.	<1.6 (9 kHz to 10 MHz, RF ATT = 10 dB, Preamp OFF)
	<1.2 (1 MHz to 10 MHz, RF ATT = 10 dB, Preamp OFF)
	<1.2 (100 kHz to 10 MHz, RF ATT = 10 dB, Option 51 Preamp ON)
	<1.2 (1 MHz to 10 MHz, RF ATT = 10 dB, Option 50 Preamp ON)
✓ RF VSWR	Center Frequency must be set within 200 MHz of any VSWR test frequency at time of test.

Table 5: RF input (cont.)

Characteristic			Description
	Preamp OFF, RF ATT = 10 dB	10 MHz to 4 GHz	<1.5
		>4 GHz to 6.2 GHz	<1.6
		>6.2 GHz to 20 GHz	<1.9
	RSA6106B Opt. 50 Preamp ON, RF ATT = 10 dB	10 MHz to 6.2 GHz	<1.6
	RSA6114B Preamp ON, RF ATT = 10 dB	10 MHz to 4 GHz	<1.5
		>4 GHz to 6.2 GHz	<1.6
		>6.2 GHz to 14 GHz	<1.9
	RSA6120B Preamp ON, RF ATT = 10 dB	10 MHz to 4 GHz	<1.5
		>4 GHz to 6.2 GHz	<1.6
		>6.2 GHz to 20 GHz	<1.9

Table 6: Maximum input level

Characteristic	Description
Maximum DC voltage	±40 V (RF Input)
Maximum safe input power	+30 dBm (RF Input, RF ATT ≥10 dB)
	+20 dBm (RF Input, RF ATT ≥10 dB, Opt. 50, Preamp ON)
	+30 dBm (RF Input, RF ATT ≥10 dB, Opt. 51, Preamp ON)
	+75 Watts peak (RF Input, RF ATT ≥30 dB (<5 µs Pulse Width, 0.5% Duty Cycle repetitive pulses)
Maximum Measureable input power	+ 30 dBm (RF Input, RF ATT Auto)
	+ 75 Watts peak (RF Input, RF ATT Auto), (<5 µs Pulse Width, 0.5% Duty Cycle repetitive pulses)
ESD Protection Level (Option 50 Preamp)	1 kV (Human Body Model)
ESD Protection Level (Option 51 Preamp)	500 V (Human Body Model)

Table 7: Input attenuator

Characteristic	Description
RF Attenuator (9 kHz to 20 GHz)	0 dB to 75 dB (5 dB step), nominal

Table 8: Analog sweep

Characteristic	Description
Sweep time, typical	1200 MHz/sec tuning rate (standard unit)
	4000 MHz/sec tuning rate (Option 110)
	3200 MHz/sec tuning rate (Opt WinXP with Option 110)

Table 9: Amplitude and RF flatness (excluding mismatch error) [1]

Characteristic			Description
Reference level setting range, nominal			–170 dBm to +50 dBm, 0.1 dB step, (Standard RF input) Minimum ref level –50 dBm at CF < 70 MHz
Frequency response (18 °C to 28 °C)			
	✓ 10 dB RF attenuator setting	10 MHz to 3 GHz Preamp OFF	±0.5 dB
		3 GHz to 6.2 GHz, Preamp OFF	±0.8 dB
		6.2 GHz to 20 GHz, Preamp OFF	±1.0 dB
		10 MHz to 6.2 GHz, Preamp ON (Option 50)	±0.8 dB
		10 MHz to 6.2 GHz, Preamp ON (Option 51)	±0.8 dB
		6.2 GHz MHz to 14 GHz, Preamp ON (Option 51)	±1.0 dB
		14 GHz to 20 GHz, Preamp ON (Option 51, RSA6120B)	±1.2 dB
	All RF attenuator settings, typical	9 kHz to 10 MHz, Preamp OFF	±0.7 dB
	All Preamp options, Atten. = 10 dB, typical	1 MHz to 10 MHz, Preamp ON (Option 50)	±0.8 dB
		100 kHz to 10 MHz, Preamp ON (Option 51)	±0.8 dB
Frequency response (5 °C to 50 °C), typical			
	Preamp OFF, All RF attenuator settings	9 kHz to 10 MHz	±1.0 dB
		10 MHz to 3 GHz	±0.7 dB
		3 GHz to 6.2 GHz	±0.8 dB
		6.2 GHz to 20 GHz	±2.0 dB
	Preamp ON, Atten. = 10 dB	1 MHz to 6.2 GHz, (Opt. 50)	±2.0 dB
		100 kHz to 8 GHz, (Opt. 51)	±1.5 dB
		8 GHz to 14 GHz, (Opt. 51)	±3.0 dB
		14 GHz to 20 GHz, (Opt. 51, RSA6120B)	±3.0 dB
Input attenuator switching uncertainty			±0.2 dB

Table 9: Amplitude and RF flatness (excluding mismatch error) [1] (cont.)

Characteristic		Description
✓ Absolute amplitude accuracy at calibration point (RF)		
	Test Information: Measure at each of three spans: 300 kHz, 1 MHz, and 41 MHz (Option 110 only). Use Auto RBW mode. Always run an **Align** prior to the verification of this specification. (at 100 MHz, -20 dBm signal, 10 dB ATT, 18° C to 28° C)	
	Preamp OFF	±0.31 dB
	Preamp ON	±0.40 dB
Absolute amplitude accuracy at all center frequencies (18 °C to 28 °C) [2], 95% confidence		
	Reference Information: This is a statistical combination of the Accuracy at the Calibration Point, the flatness, and other measurement uncertainties.	
	Preamp OFF	
	10 MHz to 3 GHz	±0.5 dB
	3 GHz to 6.2 GHz	±0.8 dB
	6.2 GHz to 20 GHz (RSA6114B and RSA6120B only)	±1.5 dB
	Preamp ON	
	10 MHz to 3 GHz	±0.5 dB
	3 GHz to 6.2 GHz	±0.8 dB
	6.2 GHz to 14 GHz (RSA6114B only)	±1.5 dB
	6.2 GHz to 20 GHz (RSA6120B only)	±1.5 dB
Level Linearity		±0.1 dB (0 dB to –70 dB Below Reference Level)

1 All amplitude and frequency response measurements made with Preamp OFF, except where noted, and Flattop window filter used to maximize CW amplitude measurement accuracy.

2 Reference Level ≤ –15 dBm, –15 dBm to –50 dBm. 10 Hz ≤ RBW ≤ 1 MHz, after alignment performed.

Table 10: Noise and distortion

Characteristic		Description
1 dB Compression Input, Preamp OFF	100 MHz to 3 GHz	>+9 dBm
	3 GHz to 6.2 GHz	>+12 dBm
	6.2 GHz to 14 GHz (RSA6114B only)	>+12 dBm
	6.2 GHz to 20 GHz (RSA6120B only)	>+12 dBm
	Reference Information: The 1 dB compression point for the RF conversion system cannot be measured from outside the instrument, nor can signals get near to it in operation. This is because the A/D converter will clip before the 1 dB compression is reached.	

Table 10: Noise and distortion (cont.)

Characteristic			Description	
3rd Order IM Intercept – RSA6106B and RSA6114B, Preamp OFF				
	Typical	9 kHz to 100 MHz	+13.5 dBm	Set Setup > Amplitude > Internal Settings > RF & IF Optimization to Maximize Dynamic Range.
		100 MHz to 3 GHz	+15 dBm	
		3 GHz to 6.2 GHz	+17 dBm	
		6.2 GHz to 14 GHz (RSA6114B only)	+17 dBm	
3rd Order IM Intercept – RSA6120B, Preamp OFF				
	Typical	9 kHz to 100 MHz	+14.5 dBm	Set Setup > Amplitude > Internal Settings > RF & IF Optimization to Maximize Dynamic Range.
		100 MHz to 3 GHz	+20 dBm	
		3 GHz to 6.2 GHz	+19 dBm	
		6.2 GHz to 20 GHz	+19 dBm	
3rd Order Intermodulation Distortion, Preamp OFF				
	✓ Specified	2.130 GHz	–80 dBc	
		Each signal level -25 dBm at the RF input. 1 MHz tone separation. Attenuator = 0, Ref Level = –20 dBm.		
	Typical (RSA6106B, RSA6114B)	9 kHz to 100 MHz	<-77 dBc	
		100 MHz to 3 GHz	<-80 dBc	
		3 GHz to 6.2 GHz	<-84 dBc	
		6.2 GHz to 14 GHz (RSA6114B only)	<-84 dBc	
	Typical (RSA6120B)	9 kHz to 100 MHz	<-79 dBc	
		100 MHz to 3 GHz	<-90 dBc	
		3 GHz to 6.2 GHz	<-88 dBc	
		6.2 GHz to 20 GHz	<-88 dBc	
	Each signal level –25 dBm at the RF input. 1 MHz tone separation. Attenuator = 0, Ref Level = –20 dBm.			
2nd Harmonic Distortion, typical. Preamp OFF				
	10 MHz to 3.1 GHz (–40 dBm at RF Input, Atten = 0)		<–80 dBc	
	3.1 GHz to 7 GHz (RSA6114B Only) (–25 dBm at RF Input, Atten = 0)		<–80 dBc	
	3.1 GHz to 10 GHz (RSA6120B Only) (–25 dBm at RF Input, Atten = 0, Preamp OFF,) RF & IF Optimization set to “Maximize Dynamic Range”.		<–80 dBc	

Table 10: Noise and distortion (cont.)

Characteristic		Description	
Displayed Average Noise Level (DANL) Normalized to 1 Hz RBW, with Average of Logs detector			
Preamp OFF (minimize noise mode, RSA6106B and RSA6114B only)		✓ *Specification*	*Typical*
	9 kHz to 10 MHz	–99 dBm/Hz	–102 dBm/Hz
	10 MHz to 100 MHz	–149 dBm/Hz	–151 dBm/Hz
	100 MHz to 2.3 GHz	–151 dBm/Hz	–153 dBm/Hz
	2.3 GHz to 4 GHz	–149 dBm /Hz	–151 dBm /Hz
	4 GHz to 6.2 GHz	–145 dBm /Hz	–147 dBm /Hz
	6.2 GHz to 7 GHz (RSA6114B only)	–145 dBm /Hz	–147 dBm /Hz
	7 GHz to 10 GHz (RSA6114B only)	–137 dBm /Hz	— —
	10 GHz to 14 GHz (RSA6114B only)	–135 dBm /Hz	— —
	7 GHz to 14 GHz (RSA6114B only)	— —	–139 dBm /Hz
Preamp OFF (Auto RF/IF Optimization or Minimize Noise Mode, RSA6120B only)		✓ *Specification*	*Typical*
	9 kHz to 10 MHz	–99 dBm/Hz	–102 dBm/Hz
	10 MHz to 100 MHz	–149 dBm/Hz	–151 dBm/Hz
	100 MHz to 2.3 GHz	–151 dBm/Hz	–153 dBm/Hz
	2.3 GHz to 4 GHz	–149 dBm/Hz	–151 dBm/Hz
	4 GHz to 6.2 GHz	–145 dBm/Hz	–147 dBm/Hz
	6.2 GHz to 8.2 GHz	–145 dBm/Hz	–147 dBm/Hz
	8.2 GHz to 12.4 GHz	–149 dBm/Hz	–152 dBm/Hz
	12.4 GHz to 17.5 GHz	–145 dBm/Hz	–147 dBm/Hz
	17.5 GHz to 20 GHz	–143 dBm/Hz	–145 dBm/Hz

Table 10: Noise and distortion (cont.)

Characteristic			Description	
	Preamp OFF (Maximize Dynamic Range Mode, RSA6120B only)		— —	*Typical*
		9 kHz to 10 MHz	— —	–102 dBm/Hz
		10 MHz to 2.3GHz	— —	–149 dBm/Hz
		2.3 GHz to 4 GHz	— —	–147 dBm/Hz
		4 GHz to 8 GHz	— —	–145 dBm/Hz
		8 GHz to 17.5 GHz	— —	–139 dBm/Hz
		17.5 GHz to 20 GHz	— —	–136 dBm/Hz
	Preamp ON (option 50 only, Best Noise Mode, RSA6106B only)		✓ *Specification*	*Typical*
		1 MHz to 10 MHz	–159 dBm/Hz	–162 dBm/Hz
		10 MHz to 1 GHz	–165 dBm/Hz	–168 dBm/Hz
		1 GHz to 4 GHz	–164 dBm/Hz	–167 dBm/Hz
		4 GHz to 6.2 GHz	–163 dBm/Hz	–166 dBm/Hz
	Preamp ON (option 51 only, Best Noise Mode, RSA6114B/RSA6120B only)		✓ *Specification*	*Typical*
		100 kHz to 2 MHz	–122 dBm/Hz	–133 dBm/Hz
		2 MHz to 5 MHz	–140 dBm/Hz	–151 dBm/Hz
		5 MHz to 15 MHz	–145 dBm/Hz	–155 dBm/Hz
		15 MHz to 50 MHz	–152 dBm/Hz	–160 dBm/Hz
		50 MHz to 150 MHz	–160 dBm/Hz	–166 dBm/Hz
		150 MHz to 4 GHz	–164 dBm/Hz	–168 dBm/Hz
		4 GHz to 14 GHz	–162 dBm/Hz	–166 dBm/Hz
		14 GHz to 17.5 GHz	–160 dBm/Hz	–165 dBm/Hz
		14 GHz to 20 GHz	–159 dBm/Hz	–163 dBm/Hz

Table 11: Channel response [1]

Characteristic		Description
✓ Amplitude Flatness	BW ≤ 300 kHz [2]	±0.1 dB
	300 kHz < BW ≤ 10 MHz [2]	±0.2 dB
	10 MHz < BW ≤ 20 MHz [2]	±0.3 dB
	20 MHz < BW ≤ 40 MHz [2]	±0.3 dB
	40 MHz < BW ≤ 110 MHz [2]	±0.4 dB

Table 11: Channel response [1] (cont.)

Characteristic		Description
Phase Linearity, typical	BW ≤300 kHz [2]	±0.1°
	300 kHz < BW ≤ 10 MHz [2]	±0.5°
	10 MHz < BW ≤ 20 MHz [2]	±0.75°
	20 MHz < BW ≤ 40 MHz [2]	±0.75°
	40 MHz < BW ≤ 110 MHz [2]	±2.0°

1 The BW value used in this table is the bandwidth of the channel. RF Attenuator = 10 dB. Use Flattop Window for maximum CW amplitude verification accuracy.
2 After calibration and normalization, CF=200 MHz.

Table 12: Channel response (center frequency ≤3.0 GHz) [1]

Characteristic		Description	
Amplitude Flatness		*Specification*	*Typical*
	BW ≤ 300 kHz, CF ≤ 0.01 GHz [2]	±0.1 dB [3]	0.05 dB_{RMS} [4]
	BW ≤ 40 MHz, CF ≤ 0.03 GHz	±0.3 dB [3]	0.18 dB_{RMS} [4]
	BW ≤ 80 MHz, CF ≤ 0.07 GHz	±0.5 dB [3]	0.3 dB_{RMS} [4]
	BW ≤ 110 MHz, CF ≤ 0.07 GHz	±0.5 dB [3]	0.3 dB_{RMS} [4]
Phase Linearity, typical			
	BW ≤300 kHz, CF ≤ 0.01 GHz [2]	±0.1° RMS [4]	
	BW ≤ 40 MHz, CF ≤ 0.03 GHz	0.5° RMS [4]	
	BW ≤ 80 MHz, CF ≤ 0.07 GHz	1.0° RMS [4]	
	BW ≤ 110 MHz, CF ≤ 0.07 GHz	1.0° RMS [4]	

1 The BW value used in this table is the bandwidth of the channel. Atten = 10 dB. Use Flattop Window for maximum CW amplitude verification accuracy.
2 High Dynamic Range mode.
3 After calibration and normalization.
4 After calibration and alignment.

Table 13: Channel response (3.0 GHz < center frequency ≤ 6.2 GHz) [1]

Characteristic		Description	
Amplitude Flatness		*Specification*	*Typical*
	BW ≤ 300 kHz [2]	±0.1 dB [3]	0.05 dB_{RMS} [4]
	BW ≤ 40 MHz	±0.3 dB [3]	0.2 dB_{RMS} [4]
	BW ≤ 80 MHz	±0.5 dB [3]	0.3 dB_{RMS} [4]
	BW ≤ 110 MHz	±0.5 dB [3]	0.4 dB_{RMS} [4]

Table 13: Channel response (3.0 GHz < center frequency ≤ 6.2 GHz) [1] (cont.)

Characteristic		Description
Phase Linearity, typical		
	BW ≤300 kHz [2]	0.1° RMS [4]
	BW ≤ 40 MHz	0.5° RMS [4]
	BW ≤ 80 MHz	1.0° RMS [4]
	BW ≤ 110 MHz	1.0° RMS [4]

1 The BW value used in this table is the bandwidth of the channel. Atten = 10 dB. Use Flattop Window for maximum CW amplitude verification accuracy.

2 High Dynamic Range mode.

3 After calibration and normalization.

4 After calibration and alignment

Table 14: Channel response (6.2 GHz < center frequency ≤ 20 GHz, RSA6114B and RSA6120B) [1]

Characteristic		Description	
Amplitude Flatness		*Specification*	*Typical*
	BW ≤ 300 kHz [2]	±0.1 dB [3]	0.05 dB_{RMS} [3]
	BW ≤ 40 MHz	±0.5 dB [3]	0.4 dB_{RMS} [3]
	40 MHz ≤ BW ≤ 80 MHz	±0.75 dB [3]	0.7 dB_{RMS} [3]
	40 MHz ≤ BW ≤ 110 MHz	±1.0 dB [3]	0.7 dB_{RMS} [3]
Phase Linearity, typical			
	BW ≤300 kHz [2]	0.1° RMS [3]	
	BW ≤ 40 MHz	1.0° RMS [3]	
	40 MHz ≤ BW ≤ 80 MHz	1.5° RMS [3]	
	40 MHz ≤ BW ≤ 110 MHz	1.5° RMS [3]	

1 The BW value used in this table is the bandwidth of the channel. Atten = 10 dB. Use Flattop Window for maximum CW amplitude verification accuracy.

2 High Dynamic Range mode.

3 After calibration and normalization.

Table 15: Pulse measurements, typical

Characteristic	Description	
	110 MHz BW	**40 MHz BW**
Minimum Pulse Width for detection, typical	50 ns	150 ns
Average ON Power (18 °C to 28 °C), typical	±0.3 dB + absolute Amplitude Accuracy	
	For pulse widths ≥100 ns, duty cycles of 0.5 to 0.001, and S/N ratio = 30 dB	For pulse widths ≥300 ns, and signal levels >70 dB below Ref Level
Duty Factor, typical	±3% of reading	
	For pulse widths ≥150 ns, duty cycles of 0.5 to 0.001, and S/N ratio = 30 dB	For pulse widths ≥450 ns, duty cycles of 0.5 to 0.001, and S/N ratio = 30 dB
Average Transmitted Power, typical	±0.4 dB + absolute Amplitude Accuracy	
	For pulse widths ≥100 ns, duty cycles of 0.5 to 0.001, and S/N ratio = 30 dB	For pulse widths ≥300 ns, duty cycles of 0.5 to 0.001, and S/N ratio = 30 dB
Peak Pulse Power, typical	±0.4 dB + absolute Amplitude Accuracy	
	For pulse widths ≥100 ns, duty cycles of 0.5 to 0.001, and S/N ratio = 30 dB	For pulse widths ≥300 ns, duty cycles of 0.5 to 0.001, and S/N ratio = 30 dB
Pulse Width, typical	±3% of reading	
	For pulse widths ≥150 ns, duty cycles of 0.5 to 0.001, and signal levels >50 dB below Ref Level	For pulse widths ≥450 ns, duty cycles of 0.5 to 0.001, and S/N ratio = 30 dB
System Rise time, typical	<10 ns	<25 ns

Table 15: Pulse measurements, typical (cont.)

Characteristic		Description	
Pulse-to-Pulse carrier phase (non-chirped pulse), typical [1 2] 95% confidence		**110 MHz BW**	**40 MHz BW**
	2 GHz	±0.6°	±0.35°
	10 GHz	±0.75°	±0.75°
	20 GHz	±1.5°	±1.3°
		60 MHz BW	**20 MHz BW**
	2 GHz	±0.5°	±0.3°
	10 GHz	±0.75°	±0.6°
	20 GHz	±1.5°	±1.3°
Pulse-to-Pulse carrier phase (linear-chirped pulse), typical [3], [4] 95% confidence		**110 MHz BW**	**40 MHz BW**
	2 GHz	±0.6°	±0.4°
	10 GHz	±1.0°	±1.0°
	20 GHz	±2.0°	±2.0°
		60 MHz BW	**20 MHz BW**
	2 GHz	±0.5°	±0.4°
	10 GHz	±1.0°	±0.9°
	20 GHz	±2.0°	±1.8°
Pulse-to-Pulse carrier Frequency (non-chirped pulse), typical [5 6] 95% confidence		**110 MHz BW**	**40 MHz BW**
	2 GHz	±170 kHz	±30 kHz
	10 GHz	±150 kHz	±50 kHz
	20 GHz	±300 kHz	±60 kHz
		60 MHz BW	**20 MHz BW**
	2 GHz	±70 kHz	±13 kHz
	10 GHz	±175 kHz	±40 kHz
	20 GHz	±275 kHz	±60 kHz

Table 15: Pulse measurements, typical (cont.)

Characteristic		Description	
Pulse-to-Pulse carrier Frequency (linear-chirped pulse), typical [7], [8] 95% confidence		**110 MHz BW**	**40 MHz BW**
	2 GHz	±275 kHz	±40 kHz
	10 GHz	±300 kHz	±50 kHz
	20 GHz	±500 kHz	±130 kHz
		60 MHz BW	**20 MHz BW**
	2 GHz	±130 kHz	±25 kHz
	10 GHz	±150 kHz	±30 kHz
	20 GHz	±200 kHz	±50 kHz
Pulse Frequency Linearity (absolute frequency error RMS), typical [9], [10] 95% confidence		**110 MHz BW**	**40 MHz BW**
	2 GHz	±50 kHz	±10 kHz
	10 GHz	±50 kHz	±10 kHz
	20 GHz	±100 kHz	±20 kHz
		60 MHz BW	**20 MHz BW**
	2 GHz	±30 kHz	±5 kHz
	10 GHz	±30 kHz	±5 kHz
	20 GHz	±50 kHz	±8 kHz
Chirp Frequency Linearity (absolute frequency error RMS), typical [11], [12] 95% confidence		**110 MHz BW**	**40 MHz BW**
	2 GHz	±75 kHz	±12 kHz
	10 GHz	±75 kHz	±15 kHz
	20 GHz	±125 kHz	±30 kHz
		60 MHz BW	**20 MHz BW**
	2 GHz	±60 kHz	±10 kHz
	10 GHz	±60 kHz	±15 kHz
	20 GHz	±75 kHz	±25 kHz

1 For 60 MHz / 110 MHz bandwidths, and conditions of:
Pulse ON power ≥ –20 dBm
Frequency Estimation = Manual
CW (non-chirped) pulses
Signal peak at Ref Lvl.
Atten = Auto
Pulse width ≥ 500 ns.
PRI ≤300 us.
Duty cycle ≥ 0.0007

t_{meas} — $t_{reference}$ ≤10 ms
Phase measurement includes 100 pulses minimum.
Measured pulses to be adjacent.
Measurement time position excludes the beginning and ending of the pulse extending for a time = (10/measurement Bandwidth) as measured from the 50% point of the Tr or Tf.

2 For 20 MHz / 40 MHz bandwidths, and conditions of:
Pulse ON power ≥ –20 dBm
Frequency Estimation = Manual
CW (non-chirped) pulses
Signal peak at Ref Lvl.
Atten = Auto
Pulse width ≥ 1.2 µs.
PRI ≤300 µs.
Duty cycle ≥ 0.001
t_{meas} — $t_{reference}$ ≤10 ms
Phase measurement includes 100 pulses minimum.
Measured pulses to be adjacent.
Measurement time position excludes the beginning and ending of the pulse extending for a time = (10/measurement Bandwidth) as measured from the 50% point of the Tr or Tf.

3 For 60 MHz / 110 MHz bandwidths, and conditions of:
Peak-to-peak Chirp Deviation: ≤0.8 * Measurement BW
Frequency Estimation = Manual
Pulse ON power ≥ –20 dBm
Signal peak at Ref Lvl.
Atten = Auto
Pulse width ≥ 500 ns.
PRI ≤300 µs.
Duty cycle ≥ 0.0003
t_{meas} — $t_{reference}$ ≤10 ms
Measured pulses to be adjacent.
Measurement time position excludes the beginning and ending of the pulse extending for a time = (10/measurement Bandwidth) as measured from the 50% point of the Tr or Tf.

4 For 20 MHz / 40 MHz bandwidths, and conditions of:
Peak-to-peak Chirp Deviation: ≤0.8 * Measurement BW
Frequency Estimation = Manual
Pulse ON power ≥ –20 dBm
Signal peak at Ref Lvl.
Atten = Auto
Pulse width ≥ 1.2 µs.
PRI ≤1000 µs.
Duty cycle ≥ 0.0003
t_{meas} — $t_{reference}$ ≤10 ms
Measured pulses to be adjacent.
Measurement time position excludes the beginning and ending of the pulse extending for a time = (10/measurement Bandwidth) as measured from the 50% point of the Tr or Tf.

5 For 60 MHz / 110 MHz bandwidths, and conditions of:
Frequency Estimation = Manual
Pulse ON power ≥ –20 dBm
Signal peak at Ref Lvl.
Atten = Auto
Pulse width ≥ 500 ns.
PRI ≤300 µs.
Duty cycle ≥ 0.0007
t_{meas} — $t_{reference}$ ≤10 ms

Measured pulses to be adjacent.

Measurement time position excludes the beginning and ending of the pulse extending for a time = (10/measurement Bandwidth) as measured from the 50% point of the Tr or Tf.

6 For 20 MHz / 40 MHz bandwidths, and conditions of:

Peak-to-peak Chirp Deviation: ≤0.8 * Measurement BW

Frequency Estimation = Manual

Pulse ON power ≥ –20 dBm

Signal peak at Ref Lvl.

Atten = Auto

Pulse width ≥ 1.2 μs.

PRI ≤300 μs.

Duty cycle ≥ 0.001

t_{meas} — $t_{reference}$ ≤10 ms

Measured pulses to be adjacent.

Measurement time position excludes the beginning and ending of the pulse extending for a time = (10/measurement Bandwidth) as measured from the 50% point of the Tr or Tf.

7 For 60 MHz / 110 MHz bandwidths, and conditions of:

Peak-to-peak Chirp Deviation: ≤0.8 * Measurement BW

Frequency Estimation = Manual

Pulse ON power ≥ –20 dBm

Signal peak at Ref Lvl.

Atten = Auto

Pulse width ≥ 500 ns.

PRI ≤300 μs.

Duty cycle ≥ 0.0003

t_{meas} — $t_{reference}$ ≤10 ms

Measured pulses to be adjacent.

Measurement time position excludes the beginning and ending of the pulse extending for a time = (10/measurement Bandwidth) as measured from the 50% point of the Tr or Tf.

8 For 20 MHz / 40 MHz bandwidths, and conditions of:

Frequency Estimation = Manual

Pulse ON power ≥ –20 dBm

Signal peak at Ref Lvl.

Atten = Auto

Pulse width ≥ 1.2 μs.

PRI ≤1000 μs.

Duty cycle ≥ 0.0003

t_{meas} — $t_{reference}$ ≤10 ms

Measured pulses to be adjacent.

Measurement time position excludes the beginning and ending of the pulse extending for a time = (10/measurement Bandwidth) as measured from the 50% point of the Tr or Tf.

9 For 60 MHz / 110 MHz bandwidths, and conditions of:

Pulse ON power ≥ –20 dBm

Frequency Estimation = Manual

CW (non-chirped) pulses

Signal peak at Ref Lvl.

Atten = Auto

Pulse width ≥ 200 ns.

PRI ≤300 μs.

Duty cycle ≥ 0.0007

t_{meas} — $t_{reference}$ ≤10 ms

Measured pulses to be adjacent.

Measurement time position excludes the beginning and ending of the pulse extending for a time = (10/measurement Bandwidth) as measured from the 50% point of the Tr or Tf.

10 For 20 MHz / 40 MHz bandwidths, and conditions of:

Pulse ON power ≥ –20 dBm

Frequency Estimation = Manual

CW (non-chirped) pulses

Signal peak at Ref Lvl.

Atten = Auto

Pulse width ≥ 300 ns.

PRI ≤300 µs.

Duty cycle ≥ 0.001

t_{meas} — $t_{reference}$ ≤10 ms

Measured pulses to be adjacent.

Measurement time position excludes the beginning and ending of the pulse extending for a time = (10/measurement Bandwidth) as measured from the 50% point of the Tr or Tf.

11 For 60 MHz / 110 MHz bandwidths, and conditions of:

Peak-to-peak Chirp Deviation: ≤0.8 * Measurement BW

Pulse ON power ≥ –20 dBm

Frequency Estimation = Manual

Signal peak at Ref Lvl.

Atten = Auto

Pulse width ≥ 100 ns.

PRI ≤300 µs.

Duty cycle ≥ 0.0003

t_{meas} — $t_{reference}$ ≤10 ms

Absolute Frequency Error determined over center 50% of pulse.

12 For 20 MHz / 40 MHz bandwidths, and conditions of:

Peak-to-peak Chirp Deviation: ≤0.8 * Measurement BW

Pulse ON power ≥ –20 dBm

Frequency Estimation = Manual

Signal peak at Ref Lvl.

Atten = Auto

Pulse width ≥ 300 ns.

PRI ≤1000 µs.

Duty cycle ≥ 0.0003

t_{meas} — $t_{reference}$ ≤10 ms

Absolute Frequency Error determined over center 50% of pulse.

Table 16: Impulse response

Characteristic	Description
Impulse Response Measurement Range (nominal)	15 to 40 dB
	Across the width of the chirp
Impulse Response Measurement Accuracy (typical)	±2 dB [1]
	For a signal 40 dB in amplitude and delayed 1% to 40% of the chirp width
Impulse Response Weighting	Taylor Window

1 Chirp width 100 MHz, pulse width 10 μs, minimum signal delay 1% of pulse width or 10/(chirp bandwidth), whichever is greater, and minimum 2000 sample points during pulse on-time.

Table 17: Spurious response

Characteristic			Description
✓ Residual Response (Atten = 0 dB)	All models	✓ 40 MHz to 200 MHz	<–90 dBm (Ref = –30 dBm, RBW =1 kHz, Span = 40 MHz) Test Reference Information: RBW can be increased for measurement speed as long as the peak noise is at least 6 dB below the spur spec limit value. Reference Information: These specifications are not related to input signals.
	RSA6120B only	✓ 200 MHz to 20 GHz	<–95 dBm (Ref = –30 dBm, RBW =1 kHz, Span = 40 MHz) Test Reference Information: RBW can be increased for measurement speed as long as the peak noise is at least 6 dB below the spur spec limit value. Reference Information: These specifications are not related to input signals.
	RSA6114B only	✓ 200 MHz to 6.2 GHz	<–95 dBm (Ref = –30 dBm, RBW =1 kHz, Span = 40 MHz) Test Reference Information: RBW can be increased for measurement speed as long as the peak noise is at least 6 dB below the spur spec limit value. Reference Information: These specifications are not related to input signals.
	All models	200 MHz to 6.2 GHz	<–110 dBm (Ref = –30 dBm, RBW =1 kHz, Span = 40 MHz), typical Test Reference Information: RBW can be increased for measurement speed as long as the peak noise is at least 6 dB below the spur spec limit value. Reference Information: These specifications are not related to input signals.

Table 17: Spurious response (cont.)

Characteristic			Description
	RSA6114B	6.2 GHz to 14 GHz	<–95 dBm (Ref = –30 dBm, RBW =1 kHz, Span = 40 MHz), typical Test Reference Information: RBW can be increased for measurement speed as long as the peak noise is at least 6 dB below the spur spec limit value. Reference Information: These specifications are not related to input signals.
	RSA6120B	6.2 GHz to 20 GHz	<–110 dBm (Ref = –30 dBm, RBW =1 kHz, Span = 40 MHz), typical Test Reference Information: RBW can be increased for measurement speed as long as the peak noise is at least 6 dB below the spur spec limit value. Reference Information: These specifications are not related to input signals.
✓ Spurious Response with Signal (Image Suppression)			<–80 dBc (9 kHz to 8 GHz, Ref= –30 dBm, Atten = 10 dB, RF Input Level = –30 dBm, RBW = 10 Hz) <–76 dBc (8 GHz to 20 GHz, Ref= –30 dBm, Atten = 10 dB, RF Input Level = –30 dBm, RBW = 10 Hz)
✓ Spurious Response with Signal	30 MHz to 20 GHz		(See Table 18.)
Spurious Response with signal within capture bandwidth, at other than CF, typical	30 MHz to 20 GHz		(See Table 19.)
✓ Spurious Response with Signal (4.75 GHz - Half-IF)			<–62 dBc (CF 40 MHz to 8 GHz, Ref = –30 dBm, Atten = 10 dB, RBW = 1 kHz, Span = 10 kHz) Signal frequency range = 4.7225 to 4.7775 GHz, RF input level = –30 dBm
Local Oscillator Feed-through to Input Connector (Spurious Leakage), typical			<–65 dBm (Attenuator = 10 dB)

Table 18: Spurious response with signal

	Span ≤ 40 MHz, Swept Spans > 40 MHz		For Option 110 [1] 40 MHz < Span ≤ 110 MHz	
Frequency	Specification	Typical	Specification	Typical
30 MHz - 6.2 GHz	–73 dBc	–78 dBc	–73 dBc	–75 dBc
≥6.2 GHz - 20 GHz (RSA6114B and RSA6120B only)	–70 dBc	–75 dBc	–70 dBc	–75 dBc

1 1 In 110 mode CF > 80 MHz, after alignment.

Table 19: Spurious response with signal within capture bandwidth

	Span ≤ 40 MHz, Swept Spans > 40 MHz	For Option 110 [1] 40 MHz < Span ≤ 110 MHz
Frequency	Typical	Typical
30 MHz - 6.2 GHz	–73 dBc	–73 dBc
≥6.2 GHz - 20 GHz (RSA6114B and RSA6120B only)	–70 dBc	–70 dBc

1 1 In 110 mode CF > 80 MHz, after alignment.

Table 20: Acquisition

Characteristic	Description
Real-time Capture Bandwidth, nominal	40 MHz (RF, 40 MHz Version) 110 MHz (RF, 110 MHz Version)
Demodulation Bandwidth	40 MHz (RF, 40 MHz Version) 110 MHz (RF, 110 MHz Version)
A/D Converter, nominal	14 bits, 100 Ms/s (40 MHz Version) 14 bits, 100 Ms/s, 300 Ms/s (Option 110)

Table 20: Acquisition (cont.)

Characteristic		Description			
Sampling Rate and Available Memory time in RTSA/Time/Demod Mode, nominal		**Acquisition BW**	**Sample Rate (for I and Q)**	**Record Length**	**Record Length (option 52)**
		110 MHz (Option 110)	150 MS/s	1.79 s	7.15 s
		60 MHz (Option 110)	75 MS/s	3.58 s	14.31 s
		40 MHz	50 MS/s	4.77 s	19.08 s
		20 MHz	25 MS/s	9.54 s	38.17 s
		10 MHz	12.5 MS/s	19.08 s	76.35 s
		5 MHz	6.25 MS/s	38.17 s	152.7 s
		2 MHz	3.125 MS/s	42.9s	171.8 s
		1 MHz	1.56 MS/s	85.8 s	343.5 s
		500 kHz	781 kS/s	171.7 s	687.1 s
		200 kHz	390 kS/s	343.5 s	1374 s
		100 kHz	195 kS/s	687.1 s	2748 s
		50 kHz	97.6 kS/s	1374 s	5497 s
		20 kHz	48.8 kS/s	2748 s	10955 s
		10 kHz	24.4 kS/s	5497 s	21990 s
		5 kHz	12.2 kS/s	10955 s	43980 s
		2 kHz	3.05 kS/s	43980 s	175921 s
		1 kHz	1.52 kS/s	87960 s	351843 s
		500 Hz	762 S/s	175921 s	703687 s
		200 Hz	381 S/s	351843 s	1407374 s
		100 Hz	190 S/s	703686 s	2814749 s
Minimum Acquisition Length in RTSA/Time/Demod Mode, nominal		64 samples			
Maximum Acquisition Length in RTSA/Time/Demod Mode (Acquisition BW Dependent), nominal		64M samples (Std.) 1G samples (Option 52)			
Acquisition Length Setting resolution in RTSA/Time/Demod Mode, nominal		1 sample			
Fast Frame Acquisition Mode		Up to 65,535 records can be stored in a single acquisition (for Pulse Measurements and Spectrogram Analysis)			
Acquisition Memory Size	Acq BW > 2.5 MHz (1 Gbyte) (Std)	256 MSamples			
	Acq BW ≤ 2.5 MHz (1 Gbyte) (Std)	128 MSamples			

Table 20: Acquisition (cont.)

Characteristic		Description
	Acq BW > 2.5 MHz (4 Gbyte) (Option 52)	1 GSamples
	Acq BW ≤ 2.5 MHz (4 Gbyte)(Option 52)	512 MSamples

Table 21: Amplitude vs. time

Characteristic	Description
Time Scale (Zero Span), nominal	400 ns min to 2000 s max (Option 110) 1 μs min to 2000 s max (Option 40)
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)

Table 22: Trigger

Characteristic	Description
Trigger Mode, Type, & Source, nominal	Modes: Free Run (Triggered by the end of the preceding acquisition) Triggered (Triggered by Event) Fast Frame (Triggered by Event, sequential storage of acquisitions) Types: Single (one acquisition from one trigger) Continuous (repeated acquisitions from repeating triggers) Sources: RF Input Trigger 1 (Front) Trigger 2/ Gate (Rear) Gated (Logical AND of the selected edge [rising or falling] of TRIG 1 and the selected level [LOW or HIGH] of TRIG 2) Line
Trigger Event Types	Power Level (IF Span BW after RBW and VBW filters) Frequency Mask (Option 52)
Trigger Event Delay Range, nominal	20 ns to 60 s
Trigger Event Delay Resolution, nominal	20 ns
Trigger Event Delay Uncertainty, nominal	±20 ns

Table 22: Trigger (cont.)

Characteristic		Description
Pre/Post Trigger Setting, nominal		Trigger Position is settable within 1% to 99% of Total Data Length
Power Trigger Level Range, nominal		0 dB to –100 dB from Reference Level
Power Trigger Level Resolution, nominal		0.1 dB
Power Trigger Level Accuracy		±0.5 dB (level ≥ –50 dB from Reference Level) for trigger levels >30 dB above the noise floor ±1.5 dB (from –50 dB to –70 dB from Reference Level) for trigger levels >30 dB above the noise floor This applies when the Trigger Level is between 10% and 90% of the signal amplitude
Power Trigger Position Timing Uncertainty, typical		±12 ns for 40 MHz Acq BW using no trigger RBW ±15 ns for 40 MHz Acq BW using 20 MHz trigger RBW ±4 ns for 110 MHz Acq BW using no trigger RBW ±5 ns for 110 MHz Acq BW using 60 MHz trigger RBW
Trigger Rearm Time, minimum (FastFrame ON)		
	10 MHz acquisition BW	≤25 µs
	40 MHz acquisition BW	≤10 µs
	110 MHz acquisition BW (Opt. 110)	≤5 µs
Power Trigger Bandwidth setting, nominal		Not an independent setting. This is set by the "Time Domain Bandwidth" control
Frequency Mask Trigger Mask Point Horizontal Resolution (Option 52), nominal		<0.2% of span
Frequency Mask Trigger Level Range (Option 52), nominal		0 to –80 dB from reference level for spans ≤40 MHz for spans ≤110 MHz (Option 110)
Frequency Mask Trigger Level Resolution (Option 52), nominal		0.1 dB
Frequency Mask Trigger Level Accuracy (Option 52) (with respect to Reference Level)		±(Channel Response Flatness + 1 dB) (for mask levels ≥ –50 dB) for masks >30 dB above the noise floor ±(Channel Response Flatness + 2.5 dB) (for mask levels of –50 dB to –70 dB) for masks >30 dB above the noise floor
Frequency Mask Trigger Max Real-time Event Detection Bandwidth (Option 52), nominal		40 MHz (1024 point FFT, 50% overlapping, Base Unit) 110 MHz (1024 point FFT, 50% overlapping, Option 110)
Frequency Mask Trigger Real-time Event Minimum Duration for 100% probability of trigger (Option 52), nominal		Standard: 35.8 µs at 40 MHz span for base unit (standard) 23.9 µs at 110 MHz span for Option 110 Option 09: 25.6 µs at 40 MHz span for base unit (standard) 10.3 µs at 110 MHz span for Option 110
		Instrument Center Frequency ≥ 50 MHz

Table 22: Trigger (cont.)

Characteristic		Description
Frequency Mask Trigger Timing Uncertainty		Standard: ±18 µs at 40 MHz span for base unit (standard), RBW=AUTO ±12 µs at 110 MHz span for Option 110, RBW=AUTO Option 09: ±12.8 µs at 40 MHz span for base unit (standard), RBW=AUTO ±5.2 µs at 110 MHz span for Option 110, RBW=AUTO
		Instrument Center Frequency ≥ 50 MHz
External Trigger 1 Threshold Voltage, nominal		Variable: –2.5 V to +2.5 V settable
External Trigger 2 Threshold Voltage, nominal		Fixed: TTL
External Trigger 1 Threshold Voltage Setting Resolution, nominal		0.01 V
External Trigger 1 Input Impedance, nominal		Selectable: 50 Ω or 5 kΩ
External Trigger 2 Input Impedance, nominal		Fixed: 5 kΩ
External Trigger 1 Minimum Pulse Width (applies to 50 Ω Impedance only), nominal		> 5 ns
External Trigger 2 to External Trigger 1 Minimum Delay, nominal		> 20 ns This is the time from the rising edge of the external gate signal to the rising edge of the external trigger signal needed to guarantee a trigger will be accepted. This specification also applies from the falling edge of the external trigger signal to the falling edge of the external gate signal.
External Trigger 1 Timing Uncertainty (50 Ω impedance only)		
	>75 MHz to 110 MHz acquisition BW	±12 ns
	>40 MHz to 75 MHz acquisition BW	±15 ns
	>20 MHz to 40 MHz acquisition BW	±20 ns
Trigger Output Voltage, nominal (Output Current < 1mA)		HIGH: > 2.0 V LOW: < 0.4 V
Trigger Output Impedance, nominal		50 Ω
Power Trigger Output Position Timing Uncertainty		±2 sample points (Decimated clock periods, refer to the following table) This trigger has no specified timing relation to the signal at the RF input. For a given instrument setup, the delay from the RF input to this trigger output will be the same within the uncertainty given in this specification. The time delay can be measured for a specific instrument setup and it will be stable as long as the setup is not changed. If the setup changes, the delay should be measured again.

Table 23: Trigger (with Option 200)

Characteristic	Description
Trigger Event Types	Power Level (IF Span BW after RBW and VBW filters) Frequency Mask (Option 52) Frequency Edge Trigger DPX Density Trigger Runt Trigger (applies to Power Level Trigger) Time-Qualified Trigger Holdoff Trigger
Power Trigger Minimum Event Duration Instrument Center Frequency ≥ 50 MHz	12 ns (ACQ BW = 110 MHz, no TDBW, Option 110)
	16.6 ns (ACQ BW = 110 MHz, TDBW = 60 MHz, Option 110)
	25 ns (ACQ BW = 40 MHz, no TDBW, standard)
	50 ns (ACQ BW = 40 MHz, TDBW = 20 MHz, standard)
Frequency Edge Trigger Range	± (½ * (ACQ BW or TDBW if TDBW is active))

Characteristic	Option 110, span = 110 MHz			Base Unit, span = 40 MHz		
Frequency Mask Trigger Real-time Event Minimum Duration for 100% probability of trigger (Option 52), nominal	FMT RBW	Minimum event duration (μs)		FMT RBW	Minimum event duration (μs)	
		Standard	Option 09		Standard	Option 09
	10 MHz	17.3	3.7	5 MHz	17.5	3.9
	1 MHz	19.5	5.8	1 MHz	19.5	5.8
	100 kHz	37.6	37.6	300 kHz	25.1	11.4
				100 kHz	37.7	30.9

Characteristic	Description
Frequency Edge Trigger Timing Uncertainty	± 12 ns for 40 MHz Acq BW using no trigger RBW
	± 15 ns for 40 MHz Acq BW using 20 MHz trigger RBW
	± 4 ns for 110 MHz Acq BW using no RBW
	± 5 ns for 110 MHz Acq BW using 60 MHz trigger RBW
Frequency Mask Trigger Timing Uncertainty	Standard: ±12.6 μs at 40 MHz span base unit (Standard), RBW=AUTO ±9.8 μs at 110 MHz span (Option 110) RBW=AUTO Option 09: ±5.8 μs at 40 MHz span base unit (Standard), RBW=AUTO ±3 μs at 110 MHz span (Option 110) RBW=AUTO
	Instrument Center Frequency ≥ 50 MHz
Runt Trigger Level Range, nominal	Same as Power Trigger Level Range
Runt Trigger Level Resolution, nominal	Same as Power Trigger Level Resolution
Runt Trigger Polarity, nominal	Positive Negative

Table 23: Trigger (with Option 200) (cont.)

Characteristic	Description
Runt Trigger Level Accuracy	Same as Power Trigger Level Accuracy This applies when the Runt Trigger Level is between 10% and 90% of the signal amplitude.
Runt Trigger Position Timing Uncertainty	Same as Power Trigger Position Timing Uncertainty
DPX Density Trigger Minimum Detectable Trigger Event Duration, typical	Same as DPX Min Signal Duration for 100% probability of intercept
DPX Density Trigger Threshold Setting Range, nominal	0% – 100%
DPX Density Trigger Area of Interest Range, nominal	2 to 801 pixels (horizontal) x 2 to 201 pixels (vertical)
DPX Density Trigger Area of Interest Resolution, nominal	2 pixels, horizontal or vertical
DPX Density Trigger Area of Interest Accuracy, nominal	Horizontal: ±0.25% of Span Vertical: ±(2 X DPX amplitude accuracy)
DPX Density Trigger Timing Uncertainty, nominal	For a pulse widths less than 40 ms, where DPX RBW = AUTO and Density = Higher: Uncertainty = –(Pulse Width + DPX Minimum Event Duration) to +(DPX Minimum Event Duration) For Span = 110 MHz: Uncertainty = –(Pulse Width + 10.3 μs) to +10.3 us For Span = 40 MHz: Uncertainty = –(Pulse Width + 23.9 μs) to +23.9 μs For pulse width 40 ms or longer, the timing uncertainty is not specified. For Density = Lower, the timing uncertainty is not specified.
Time Qualified Trigger Source	Power Trigger or Frequency Mask Trigger or DPX Density Trigger or Runt Trigger or External Trigger or Gated

Table 23: Trigger (with Option 200) (cont.)

Characteristic	Description
Time Qualified Trigger Type, nominal	Shorter or Longer or Inside or Outside Reference information: INSIDE means the measured time of the source event is greater than or equal to the minimum time AND less than or equal to the maximum time. OUTSIDE means the measured time of the source event is less than the minimum time OR greater than the maximum time
Time Qualified Trigger (minimum or maximum) Time Range, nominal	0 ns to 10 s
Time Qualified Trigger (Minimum or Maximum) Time Resolution	Trigger Source is not EXTERNAL: 6.7 ns Trigger Source is EXTERNAL: SPAN ≤40 MHz: 20 ns 40 MHz < SPAN ≤ 110 MHz: 6.7 ns
Time Qualified Trigger (minimum or maximum) Time Accuracy, nominal	For Power Trigger: ±[(2 X Power Trigger Position Timing Uncertainty) + 6.7 ns]; All conditions for Power Trigger Position timing uncertainty must be met For FMT: ±[(2 X Frequency Mask Timing Uncertainty) + 6.7 ns]; All conditions for Frequency Mask Trigger timing uncertainty must be met For DPX Density Trigger: ±42 ms; For External Trigger SPAN ≤ 40 MHz: ±[(2 X External Trigger Timing Uncertainty) + 20 ns]; All conditions for External Trigger Timing uncertainty must be met For External Trigger 40 MHz < SPAN ≤ 110 MHz: ±[(2 X External Trigger Timing Uncertainty) + 6.7 ns]; All conditions for External Trigger Timing uncertainty must be met
Holdoff Trigger	ON or OFF Reference Information: Holdoff Trigger means triggers will be held off until a period of time equal to or greater than the Holdoff Trigger Time occurs with no trigger events; once the Holdoff timer has expired, a trigger will be generated on the next trigger event
Holdoff Trigger Source	Applied to any allowed combination of trigger source and time qualification
Holdoff Trigger Time Range, nominal	20 ns to 10 s

Table 23: Trigger (with Option 200) (cont.)

Characteristic	Description
Holdoff Trigger Time Resolution, nominal	Trigger Source is not EXTERNAL: 6.7 ns Trigger Source is EXTERNAL: SPAN ≤40 MHz: 20 ns 40 MHz < SPAN ≤ 110 MHz: 6.7 ns
Holdoff Trigger Time Accuracy, nominal	For Power Trigger: ±(Power Trigger Position Timing Uncertainty + 6.7 ns); All conditions for Power Trigger Position Timing Uncertainty must be met For FMT: ±(Frequency Mask Trigger Timing Uncertainty + 6.7 ns); All conditions for Frequency Mask Trigger Timing Uncertainty must be met For DPX Density Trigger: ±42 ms; For External Trigger SPAN ≤ 40 MHz: ±(External Trigger Timing Uncertainty + 20 ns); All conditions for External Trigger Timing uncertainty must be met For External Trigger 40 MHz < SPAN ≤ 110 MHz: ±(External Trigger Timing Uncertainty + 6.7 ns); All conditions for External Trigger Timing Uncertainty must be met If Time Qualified Trigger is used, the Accuracy value increases to 2X the number given above for the specified trigger source.

Table 24: Decimated clock period

Power Trigger Time Domain Bandwidth	Decimated clock period	
	Standard (40 MHz span)	Option 110 (110 MHz span)
60 MHz (Option 110 only)	NA	6.67 ns
20 MHz	20 ns	6.67 ns
10 MHz	20 ns	6.67 ns
1 MHz	80 ns	53.4 ns
100 kHz	640 ns	854 ns
10 kHz	5.12 µs	N/A

1 The decimated clock period is used for determining the Power Trigger Output Position Timing Uncertainty. See Power Trigger Output Position Timing Uncertainty. (See Table 22.)

Table 25: Resolution bandwidth filter (SA mode)

Characteristic	Description
Filter Shape, nominal	Gaussian-like (Actual filter shape is Kaiser with β = 16.72)
Bandwidth Accuracy	1.0% (Auto-coupled)
Range, nominal	(See Table 26.)

Table 25: Resolution bandwidth filter (SA mode) (cont.)

Characteristic	Description
Resolution, nominal	1, 2, 3, 5 (for sequence selection) 1% (for user-entry mode)
Minimum Settable RBW, nominal	(See Table 26.)
Shape Factor, typical	4.1:1 (60 dB:3 dB) (±10%)

Table 26: Range and settable RBW (SA mode)

	Frequency Domain Resolution Bandwidth Range	
Acquisition BW	**Maximum RBW**	**Minimum RBW**
110 MHz (Option 110)	5 MHz	100 Hz
60 MHz (Option 110)	5 MHz	100 Hz
40 MHz	5 MHz	100 Hz
20 MHz	5 MHz	100 Hz
10 MHz	2 MHz	10 Hz
5 MHz	1 MHz	10 Hz
2.5 MHz	625 kHz	10 Hz
1.25 MHz	312 kHz	1 Hz
625 kHz	156 kHz	1 Hz
312.5 kHz	78 kHz	1 Hz
156.25 kHz	39 kHz	1 Hz
78.125 kHz	20 kHz	1 Hz
39.0625 kHz	10 kHz	1 Hz
19.53125 kHz	5 kHz	1 Hz
9.765625 kHz	2 kHz	1 Hz
4.8828125 kHz	1 kHz	1 Hz
2.44140625 kHz	610 Hz	1 Hz
1.220703125 kHz	305 Hz	1 Hz
610.3515625 Hz	152 Hz	1 Hz
305.17578125 Hz	76 Hz	1 Hz
152.587890625 Hz	38 Hz	1 Hz

Table 27: Resolution bandwidth filter (time-domain mode)

Characteristic	Description
Filter Shape, nominal	Gaussian-like (Actual filter shape is Kaiser with b = 16.72)
Shape Factor, typical	4.1:1 (60 dB:3 dB) (±10%) for filters up to 10 MHz < approximately 2.5:1 (60 dB:3 dB) for filters >10 MHz to 60 MHz
Range, nominal	(See Table 28.)

Table 27: Resolution bandwidth filter (time-domain mode) (cont.)

Characteristic	Description
Bandwidth Accuracy	1 Hz to 10 MHz = 1% (Auto-coupled) 20 MHz & 60 MHz = 10%
Resolution, nominal	1, 2, 3, 5 (plus 60 MHz for Option 110) (for sequence selection) 1% (for user-entry mode)
Minimum Settable RBW, nominal	(See Table 28.)

Table 28: Range and settable RBW (time-domain mode)

Acquisition BW	Time Domain Trigger And Maximum TDBW	Minimum TDBW
110 MHz (Opt 110)	60 MHz	11 kHz
60 MHz (Opt 110)	7.5 MHz	6 kHz
40 MHz	20 MHz	4 kHz
20 MHz	2.5 MHz	2 kHz
10 MHz	1.25 MHz	1 kHz
5 MHz	625 kHz	500 Hz
2.5 MHz	312.5 kHz	250 Hz
1.25 MHz	156.25 kHz	125 Hz
625 kHz	78.125 kHz	62.5 Hz
312.5 kHz	39.0625 kHz	31.25 Hz
156.25 kHz	19.53125 kHz	15.625 Hz
78.125 kHz	9.765625 kHz	7.8125 Hz
39.0625 kHz	4.8828125 kHz	3.90625 Hz
19.53125 kHz	2.44140625 kHz	1.953125 Hz
9.765625 kHz	1.220703125 Hz	1 Hz
4.8828125 kHz	610.3515625 Hz	1 Hz
2.44140625 kHz	305.17578125 Hz	1 Hz
1.220703125 kHz	152.587890625 Hz	1 Hz
610.3515625 Hz	76.2939453125 Hz	1 Hz
305.17578125 Hz	38.14697265625 Hz	1 Hz
152.587890625 Hz	19.073486328125 Hz	1 Hz

1 Time Domain Trigger bandwidth can always be set to "Wide Open", equal to the acquisition BW

Table 29: Video bandwidth filters

Characteristic	Description
Range, typical	1 Hz to 5 MHz, or no VBW filtering at all.
RBW/VBW Ratio, typical	10,000:1, maximum
Resolution, typical	5% of entered value
Accuracy, typical	±10%

Table 30: Preamp (Option 50)

Characteristic	Description
Noise Figure	<6 dB at 6.2 GHz
Bandwidth	1 MHz to 6.2 GHz
Gain (nominal)	20 dB at 2 GHz

Table 31: Preamp (Option 51)

Characteristic	Description
Noise Figure	<6 dB at 10 GHz
Bandwidth	100 kHz to 20 GHz
Gain (nominal)	30 dB at 10 GHz

Table 32: IF output (Option 05)

Characteristic	Description
Output Level, typical	–10 dBm to +3 dBm for peak level of –20 dBm at the RF Mixer
Output Frequency, typical	500 MHz. Varies ±1 MHz with changes in center frequency
IF Filter, typical	Selectable: 60 MHz Gaussian to –12 dB, or 150 MHz "wide-open"
Spurious	May contain spurious signals as high as –75 dBc

Table 33: Digital IQ output

Characteristic	Min	Max
Differential Output voltage magnitude (R_{LOAD} = 100 Ω)	247 mV	454 mV
Steady state common mode output voltage	1.125 V	1.375 V

1 LVDS signaling - ANSI EIA/TIA-644 standard

Table 34: 28 Volt noise source drive output

Characteristic	Description
Output Level, nominal	28 VDC @ 140 mA

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Table 35: Measurement function

Characteristic	Description
Power and Frequency Domain Measurement Functions, nominal	Channel Power, Adjacent Channel Power, Multi-carrier Adjacent Channel Power/Leakage Ratio, Occupied Bandwidth xdB Down dBm/Hz Marker dBc/Hz Marker
Time Domain and Statistical Measurement Functions, nominal	RF I/Q vs. Time, Power vs. Time, Frequency vs. Time, Phase vs. Time, CCDF, Peak-to-Average Ratio
Analog Modulation Analysis, nominal	% Amplitude Modulation (+, –, rms, modulation depth) Frequency Modulation (±peak, +peak to –peak, rms, peak-peak/2, frequency error) Phase Modulation (±peak, , rms, +peak to –peak)
Phase Noise and Jitter Measurements (Option 11)	Phase Noise vs. Frequency Offset Carrier Power Frequency Error RMS Phase Noise Integrated Jitter Residual FM
Frequency and Phase Settling Measurements (Option 12)	Frequency Settling Time Phase Settling Time

Table 35: Measurement function (cont.)

Characteristic	Description
Advanced Measurements Suite (Option 20), nominal	Average On Power Peak Power Average Transmitted Power Pulse Width, Rise Time, Fall Time, Repetition Interval (seconds) Repetition Interval (Hz) Duty Factor (%) Duty Factor (ratio) Ripple (dB) Ripple (%) Droop (dB) Droop (%) Overshoot (dB) Overshoot (%) Pulse-to-Pulse Frequency Difference, Pulse-to-Pulse Phase Difference RMS Frequency Error, Max Frequency Error RMS Phase Error Max Phase Error Frequency Deviation Phase Deviation Impulse Response (dB) Impulse Response (time) Time Stamp

General Purpose Digital Modulation Analysis (Option 21), nominal	Constellation
	Error Vector Magnitude (EVM) vs. Time (RMS Peak)
	Magnitude Error vs. Time (RMS/Peak)
	Phase Error vs. Time (RMS/Peak)
	Signal Quality (EVM RMS/Peak)
	    EVM (RMS/Peak), Location
	    Magnitude Error (RMS/Peak), Location
	    Phase Error (RMS/Peak), Location
	    Waveform Quality (RHO)
	    Modulation Error Rate (MER) RMS
	    Frequency Error
	    IQ Origin Offset
	    Gain Imbalance
	    Quadrature Error
	Symbol Table

Table 36: Views by domain

Characteristic	Description
Frequency, nominal	Spectrum (Amplitude vs. Frequency) DPX™ Spectrum Display (Live RF color-graded spectrum) DPX™ Frequency Spectrogram (Amplitude vs. Frequency over Time) Channel Power and ACPR MCPR Occupied Bandwidth Spurious
Time and Statistics, nominal	Frequency vs. Time Amplitude vs. Time Phase vs. Time RF I&Q vs. Time Time Overview CCDF Peak-Average-Ratio DPX™ Zero Span DPX™ Phase
Phase Noise and Jitter Measurements (Option 11)	Phase Noise
Frequency and Phase Settling Measurements (Option 12)	Frequency Settling Phase Settling
Advanced Measurements Suite (Option 20), nominal	Pulse Results Table Pulse Trace (Selectable by pulse number) Pulse Statistics (Trend of Pulse Results and FFT of Trend)
General Purpose Digital Modulation Analysis (Option 21), nominal	Constellation Diagram I/Q vs. Time EVM vs. Time Symbol Table (Binary or Hexadecimal) Demodulated IQ vs. Time Eye Diagram Trellis Diagram Frequency Deviation vs. Time

Table 37: Analog demodulation accuracy

Characteristic	Description
Amplitude vs. Time Accuracy, typical	±1% (–10 dBfs Input at center, 5% to 95% Modulation Depth)
Phase vs. Time Accuracy, typical	±0.1° for modulations <180° , and rates <500 kHz. (–10 dBfs Input at center)
Frequency vs. Time Accuracy, typical	±0.1% of Span for deviations < 2 MHz, and modulation frequencies < 500 kHz. (–10 dBfs Input at center)

Table 38: General Purpose Analog modulation accuracy

Characteristic	Description
AM Demodulation Accuracy, typical	±2% (0 dBm Input at center, Carrier Frequency 1 GHz, 10 to 60 % Modulation Depth) (1 kHz/ 5kHz Input/Modulated Frequency) (0 dBm Input Power Level, Reference Level 10 dBm, Atten=Auto)
PM Demodulation Accuracy, typical	±3° (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)

Table 39: Frequency and phase error referenced to non-chirped signal

	Center Frequency = 2 GHz			Center Frequency = 10 GHz			Center Frequency = 20 GHz		
Bandwidth	Abs. Freq.	Pulse-Pulse Frequency	Pulse-Pulse Phase	Abs. Freq.	Pulse-Pulse Frequency	Pulse-Pulse Phase	Abs. Freq.	Pulse-Pulse Frequency	Pulse-Pulse Phase
20 MHz	±5 kHz	±13 kHz	±0.3 °	±5 kHz	±40 kHz	±0.6 °	±8 kHz	±60 kHz	±1.3 °
40 MHz	±10 kHz	±30 kHz	±0.35 °	±10 kHz	±50 kHz	±0.75 °	±20 kHz	±60 kHz	±1.3 °
60 GHz (Opt. 110)	±30 kHz	±70 kHz	±0.5 °	±30 kHz	±150 kHz	±0.75 °	±50 kHz	±275 kHz	±1.5 °
110 MHz (Opt. 110)	±50 kHz	±170 kHz	±0.6 °	±50 kHz	±150 MHz	±0.75 °	±100 kHz	±300 kHz	±1.5 °

Table 40: Frequency and phase error referenced to a linear chirp [1]

	Center Frequency = 2 GHz			Center Frequency = 10 GHz			Center Frequency = 20 GHz		
Bandwidth	Abs. Freq.	Pulse-Pulse Frequency	Pulse-Pulse Phase	Abs. Freq.	Pulse-Pulse Frequency	Pulse-Pulse Phase	Abs. Freq.	Pulse-Pulse Frequency	Pulse-Pulse Phase
20 MHz	±10 kHz	±25 kHz	±0.4 °	±15 kHz	±30 kHz	±0.9 °	±25 kHz	±50 kHz	±1.8 °
40 MHz	±12 kHz	±40 kHz	±0.4 °	±15 kHz	±50 kHz	±1.0 °	±30 kHz	±130 kHz	±2.0 °
60 GHz (Opt. 110)	±60 kHz	±130 kHz	±0.5 °	±60 kHz	±150 kHz	±1..0 °	±75 kHz	±200 kHz	±2.0 °
110 MHz (Opt. 110)	±75 kHz	±275 kHz	±0.6 ° ±25 kHz	±75 kHz	±300 kHz	±1.0 °	±125 kHz	±500 kHz	±2.0 °

1 At the following frequencies and bandwidths, 95% confidence. For signal type: Linear chirped pulses, peak-to-peak Chirp Deviation ≤ 0.8 * Measurement BW. Pulse ON power ≥–20 dBm, signal peak at reference level, Attenuator = Auto, tmeas - treference ≤10 ms, Frequency Estimation: Manual.Pulse width ≥ 100 ns, PRI ≤ 300 μs. Duty cycle ≥ 0.0003. Pulse-to-Pulse measurement time position excludes the beginning and ending of the pulse extending for a time = (10/Measurement BW) as measured from 50% of the t(rise) or t(fall). Absolute Frequency Error determined over center 50% of pulse.

Table 41: General purpose digital modulation analysis (Option 21)

Characteristic	Description
Carrier Type, nominal	Continuous, Burst (5 μs minimum on-time)
Analysis Period, nominal	Up to 80,000 samples
Modulation Format Presets, nominal	BPSK, QPSK, DQPSK, OQPSK, pi/2DBPSK, pi/4DQPSK, D8PSK, 8PSK, 16QAM, 64QAM, 256QAM, GMSK, GFSK, MSK, 2FSK, 4FSK, 8FSK, 16FSK, CPM, SOQPSK, SBPSK, C4FM
Measurement Filter, nominal	Root Raised Cosine, Raised Cosine, Gaussian, Rectangular, IS-95, IS-95 Base EQ, C4FM-P25, half sine, None, User defined
Reference Filter, nominal	Gaussian, Raised Cosine, Rectangular, IS-95 baseband, SBPSK-MIL, SOQPSK-MIL, SOQPSK-ARTM, None, User defined
Filter Rolloff Factor, nominal	a:0.001 to 1, 0.001 step
Maximum Symbol Rate, nominal	100 Ms/s (Option 110)
Standard Setup Presets, nominal	None
Measurement Functions, nominal	Constellation, EVM, Symbol Table
Vector Diagram Display Format, nominal	Symbol/Locus Display, Frequency Error Measurement, Origin Offset Measurement
Constellation Diagram Display Format, nominal	Symbol Display, Frequency Error Measurement, Origin Offset Measurement
Eye Diagram Display Format, nominal	None
Error Vector Diagram Display Format, nominal	EVM, Magnitude Error, Phase Error, Waveform Quality (r) Measurement Frequency Error Measurement Origin Offset Measurement
Symbol Table Display Format, nominal	Binary, Hexadecimal

Table 42: Digital demodulation accuracy (Option 21)

Characteristic			Description
QPSK Residual EVM, typical	CF		2 GHz
	Symbol Rate	100 kHz	0.35%
		1 MHz	0.35%
		10 MHz	0.6%
		30 MHz	1.5%
		80 MHz	2.0%

Table 42: Digital demodulation accuracy (Option 21) (cont.)

Characteristic			Description
256 QAM Residual EVM, typical	CF		2 GHz
	Symbol Rate	10 MHz	0.4%
		30 MHz	0.8%
		80 MHz	0.8%
	400 symbols measurement length, 20 Averages, Normalization reference = Max Symbol Magnitude		
OQPSK Residual EVM, typical	CF		2 GHz
	Symbol Rate	100 kHz (200 kHz measurement bandwidth)	0.5%
		1 MHz (2 MHz measurement bandwidth)	0.5%
		10 MHz (20 MHz measurement bandwidth)	1.4%
	Reference Filter: Raised Cosine, Measurement Filter: Root Raised Cosine, Filter Parameter: Alpha = 0.3		
S-OQPSK (MIL) Residual EVM, typical	CF		250 MHz
	Symbol Rate	4 kHz (64 kHz measurement bandwidth)	0.5%
	Measurement bandwidth: 64 kHz, Reference Filter: MIL STD, Measurement Filter: None		
S-OQPSK (MIL) Residual EVM, typical	CF		2 GHz
	Symbol Rate	20 kHz (320 kHz measurement bandwidth)	0.5%
		100 kHz (1.6 MHz measurement bandwidth)	0.5%
		1 MHz (16 MHz measurement bandwidth)	0.5%
	Measurement bandwidth: 64 kHz, Reference Filter: MIL STD, Measurement Filter: None		
S-OQPSK (ARTM) Residual EVM, typical	CF		250 MHz
	Symbol Rate	4 kHz (64 kHz measurement bandwidth)	0.3%
	CF		2 GHz
	Symbol Rate	20 kHz (320 kHz measurement bandwidth)	0.5%
		100 kHz (1.6 MHz measurement bandwidth)	0.5%
		1 MHz (16 MHz measurement bandwidth)	0.5%
	Reference Filter: ARTM STD, Measurement Filter: None		

Table 42: Digital demodulation accuracy (Option 21) (cont.)

Characteristic			Description
S-OQPSK (ARTM) Residual EVM, typical	CF		2 GHz
	Symbol Rate	20 kHz (320 kHz measurement bandwidth)	0.5%
		100 kHz (1.6 MHz measurement bandwidth)	0.5%
		1 MHz (16 MHz measurement bandwidth)	0.5%
	Reference Filter: ARTM STD, Measurement Filter: None		
S-BPSK (MIL) Residual EVM, typical	CF		250 MHz
	Symbol Rate	4 kHz (64 kHz measurement bandwidth)	0.4%
	Reference Filter: MIL STD, Measurement Filter: None		
S-BPSK (MIL) Residual EVM, typical	CF		2 GHz
	Symbol Rate	20 kHz (320 kHz measurement bandwidth)	0.5%
		100 kHz (100 kHz measurement bandwidth)	0.5%
		1 MHz (1 MHz measurement bandwidth)	0.5%
	Reference Filter: MIL STD, Measurement Filter: None		
CPM (MIL) Residual EVM, typical	CF		250 MHz
	Symbol Rate	4 kHz (64 kHz measurement bandwidth)	0.3%
	Reference Filter: MIL STD, Measurement Filter: None		
CPM (MIL) Residual EVM, typical	CF		2 GHz
	Symbol Rate	20 kHz Measurement bandwidth: 320 kHz,	0.5%
		100 kHz Measurement bandwidth: 1.6 MHz,	0.5%
		1 MHz Measurement bandwidth: 16 MHz,	0.5%
	Reference Filter: MIL STD, Measurement Filter: None		
2/4/8/16 FSK Residual RMS FSK Error, typical	CF		2 GHz
	Symbol Rate	10 kHz (10 kHz frequency deviation)	0.6%
	Reference Filter: None, Measurement Filter: None		

Table 43: OFDM measurement (Option 22)

Characteristic	Description
OFDM Maximum Residual EVM (RMS) (802.11a/g/j OFDM and 802.16-2004), typical	–45 dB at 2.4 GHz –43 dB at 5.8 GHz

Table 44: ACLR measurement

Characteristic	Description
ACLR (3GPP Down Link, 1 DPCH) (2130 MHz), typical	–70 dBc (Adjacent Channel) –79 dBc w/Noise Correction ACPR (Adjacent Channel) –70 dBc (First Alternate Channel) –79 dBc w/Noise Correction (First Alternate Channel)
ACLR (3GPP TM1 64 channel) (2130 MHz), typical	–69 dBc (Adjacent Channel) –78 dBc w/Noise Correction ACPR (Adjacent Channel) –69 dBc (First Alternate Channel) –78 dBc w/Noise Correction (First Alternate Channel)

Table 45: Digital phosphor spectrum processing (DPX)

<table>
<tr><th>Characteristic</th><th colspan="6">Description</th></tr>
<tr><td>Spectrum Processing Rate, nominal</td><td colspan="6">48,833 per second
292,000 per second (Option 200)</td></tr>
<tr><td>Min Signal Duration for 100% Probability of Intercept, typical
Standard instrument</td><td colspan="6">31 µs (Base Unit)
24 µs (Option 110)</td></tr>
<tr><td rowspan="7">Min Signal Duration for 100% Probability of Intercept, typical
Option 200</td><td colspan="3">Option 110 span = 110 MHz</td><td colspan="3">Base unit span = 40 MHz</td></tr>
<tr><td>DPX RBW</td><td colspan="2">Minimum event duration (µs)</td><td>DPX RBW</td><td colspan="2">Minimum event duration (µs)</td></tr>
<tr><td></td><td>Standard</td><td>Option 09</td><td></td><td>Standard</td><td>Option 09</td></tr>
<tr><td>10 MHz</td><td>17.3</td><td>3.7</td><td>5 MHz</td><td>17.5</td><td>3.9</td></tr>
<tr><td>1 MHz</td><td>19.5</td><td>5.8</td><td>1 MHz</td><td>19.4</td><td>5.8</td></tr>
<tr><td>100 kHz</td><td>37.6</td><td>37.6</td><td>300 kHz</td><td>25</td><td>11.4</td></tr>
<tr><td></td><td></td><td></td><td>100 kHz</td><td>37.6</td><td>30.8</td></tr>
<tr><td>Span Range, nominal</td><td colspan="6">100 Hz to 40 MHz
100 Hz to 110 MHz (Option 110)</td></tr>
</table>

Table 45: Digital phosphor spectrum processing (DPX) (cont.)

Characteristic	Description			
RBW Settings, nominal	Acquisition Bandwidth	RBW (Min)	RBW (Min) Option 200	RBW (Max) Option 200
	110 MHz	640 kHz	20 kHz	10 MHz
	55 MHz	320 kHz	10 kHz	5 MHz
	40 MHz	214 kHz	10 kHz	3 MHz
	20 MHz	107 kHz	5 kHz	3 MHz
	10 MHz	53.3 kHz	2 kHz	1 MHz
	5 MHz	26.7 kHz	1 kHz	500 kHz
	2 MHz	13.4 kHz	500 Hz	300 kHz
	1 MHz	6.66 kHz	200 Hz	100 kHz
	500 kHz	3.33 kHz	100 Hz	50 kHz
	200 kHz	1.67 kHz	50 Hz	30 kHz
	100 kHz	833 kHz	20 Hz	10 kHz
	50 kHz	417 Hz	10 Hz	5 kHz
	20 kHz	209 Hz	5 Hz	3 kHz
	10 kHz	105 Hz	2 Hz	1 kHz
	5 kHz	52 Hz	0.1 Hz	500 Hz
	2 kHz	13.1 Hz	0.1 Hz	200 Hz
	1 kHz	6.51 Hz	0.1 Hz	100 Hz
	500 Hz	3.26 Hz	0.1 Hz	50 Hz
	200 Hz	1.63 Hz	0.1 Hz	20 Hz
	100 Hz	0.819 Hz	0.1 Hz	10 Hz
RBW Accuracy	+1% - –7%			
Span Accuracy (Option 200)	±1%			
Amplitude Accuracy (Option 200)	±0.5 dB Reference Information: This specification is in addition to the overall amplitude accuracy uncertainty for spectrum analysis mode, and includes any channel flatness degradation caused by the real-time flatness correction in DPX mode. Measured using the DPX average trace.			
Zerospan, Frequency, or Phase Measurement BW Range (nominal)	Decimation of 2^N from Sample Rate (after DIFP decimation) Minimum BW = 100 Hz $0 \le N \le 20$			

Table 45: Digital phosphor spectrum processing (DPX) (cont.)

Characteristic	Description
Zerospan, Frequency, or Phase Time Domain BW(TDBW) Range (nominal)	Maximum = Minimum ≤ 15 Hz for Sample Rate ≤ 150 Ms/s Minimum ≤ 5 Hz for Sample Rate ≤ 50 Ms/s Minimum = 1 Hz for Sample Rate ≤ 6.25 Ms/s Note: ***NOTE.*** *Actual time-domain bandwidth value is shown in the DPX Settings > Freq & BW tab*
Zerospan, Frequency, or Phase Time Domain Bandwidth (TDBW) Accuracy (nominal)	±1%
Zerospan, Frequency, or Phase Sweep Time Range (nominal)	100 ns (minimum) 1 s (maximum, measurement bandwidth > 60 MHz) 2000 s (maximum, measurement bandwidth ≤ 60 MHz)
Zerospan, Frequency, or Phase Sweep Time Accuracy (nominal)	± (0.5 % + Reference Frequency Accuracy)
Zerospan Amplitude Range (nominal)	+130 dBm to -270 dBm
Zerospan Trigger Timing Uncertainty (nominal)	± (Zerospan Sweep Time/800) (Only valid if using Power Trigger and only valid at trigger point.)
Zerospan, Frequency, or Phase Measurement BW Range (nominal)	± (½ * ACQ BW) Minimum measurement bandwidth = 100 Hz
DPX Frequency Display Range (nominal)	±100 MHz
DPX Frequency Timing Uncertainty (nominal)	± (Frequency Sweep Time/800) (only valid if using Frequency Edge Trigger, only valid at trigger point) *Reference Information:* ±100 ns/800 or ±125 ps for a 100 ns sweep time ±100 us/800 or ±125 ns for a 100 us sweep time
Phase Range (nominal)	± 200 degrees (wrapped) ± 500 Gigadegrees (unwrapped)

Table 46: DPX Processing – Minimum Signal Duration vs RBW and Acquisition Bandwidth (nominal)

Span (MHz)	RBW (kHz)	Sample rate (MHz)	Resample rate (MHz)	Window length	FFT length	Minimum Event duration (μs)
110	10000	150	140.7	34	1024	3.7
110	1000	150	140.7	338	1024	5.8
110	300	150	140.7	1126	2048	14.8
110	100	150	140.7	3378	4096	37.7
110	30	150	140.7	11261	16384	134.7
110	20	150	140.7	16891	32768	229.3
40	5000	50	51.1	25	1024	3.9
40	1000	50	51.1	123	1024	5.8
40	300	50	51.1	409	1024	11.4
40	100	50	51.1	1228	2048	30.9
40	30	50	51.1	4095	4096	93.8
40	20	50	51.1	6142	8192	147.5
40	10	50	51.1	12284	16384	295.0

Table 47: Frequency Settling Time Measurement (Option 12) [1]

Measurement frequency, averages	Frequency Uncertainty at stated measurement bandwidth			
1 GHz	**110 MHz BW**	**10 MHz BW**	**1 MHz BW**	**100 kHz BW**
Single measurement	2 kHz	100 Hz	10 Hz	1 Hz
100 Averages	200 Hz	10 Hz	1 Hz	0.1 Hz
1000 Averages	50 Hz	2 Hz	1 Hz	0.05 Hz
10 GHz				
Single measurement	5 kHz	100 Hz	10 Hz	5 Hz
100 Averages	300 Hz	10 Hz	1 Hz	0.5 Hz
1000 Averages	100 Hz	5 Hz	0.5 Hz	0.1 Hz
20 GHz				
Single measurement	2 kHz	100 Hz	10 Hz	5 Hz
100 Averages	200 Hz	10 Hz	1 Hz	0.5 Hz

Table 47: Frequency Settling Time Measurement (Option 12) [1] (cont.)

Measurement frequency, averages	Frequency Uncertainty at stated measurement bandwidth			
1 GHz	**110 MHz BW**	**10 MHz BW**	**1 MHz BW**	**100 kHz BW**
1000 Averages	100 Hz	5 Hz	0.5 Hz	0.2 Hz
Reference information: Measured input signal > –20 dBm, Attenuator: Auto				

1 Settled Frequency Uncertainty, 95% confidence.

Table 48: Phase Settling Time Measurement (Option 12) [1]

Measurement frequency, averages	Phase uncertainty (degrees) at stated measurement bandwidth		
1 GHz	**110 MHz BW**	**10 MHz BW**	**1 MHz BW**
Single measurement	1.00	0.50	0.50
100 Averages	0.10	0.05	0.05
1000 Averages	0.05	0.01	0.01
10 GHz			
Single measurement	1.50	1.00	0.50
100 Averages	0.20	0.10	0.05
1000 Averages	0.10	0.05	0.02
20 GHz			
Single measurement	1.00	0.50	0.50
100 Averages	0.10	0.05	0.05
1000 Averages	0.05	0.02	0.02
Reference information: Measured input signal > –20 dBm, Attenuator: Auto			

1 Settled Phase Uncertainty, 95% confidence.

Table 49: File saving speeds

Characteristic	Description
Save to Hard disk drive speed (standard), typical	
20 Msamples	5 s.
100 Msamples	25 s.
954 Msamples	330 s.
Save to Solid-state Drive (Option 56), typical	
20 Msamples	5 s.
100 Msamples	25 s.
954 Msamples	330 s.

Table 50: Data Transfer/Measurement Speeds

Characteristic	Description
Spectrum traces transfer speed via ethernet, typical	12 ms per trace
Marker readout transfer speed via ethernet, typical	4 ms
Center frequency tuning speed via ethernet, typical	
Tune 1 GHz to 1.01 GHz	50 ms
Tune 1 GHz to 10 GHz, RSA6114/20B only	100 ms

Physical Characteristics

Table 51: Physical characteristics

Characteristic		Description	
Dimensions		**mm**	**in.**
	Width (handles folded in)	473	18.6
	Height (with feet, without accessory pouch)	282	11.1
	Length	531	20.9
Weight (without accessories)		**kg**	**lb.**
	Net	26.3	58.0

Table 52: Display/computer

Characteristic	Description
LCD Panel Size	264 mm (10.4 in)
Display Resolution	1024 x 768 pixels
Colors	256 colors (Maximum)
CPU	Intel Core i7-620LE, 2.0 GHz, 4M Cache
DRAM	4 GB DIMM
OS	Windows 7 Ultimate 64–bit
System Bus	PCIe
Disk Drives	Standard (Opt 57/59): 3.5 in. SATA II, 7200 rpm, 160 GB (minimum size) Removable (Opt 56): Solid-State Hard-drive, 160 GB (minimum size) CD/DVD (Opt 57): SATA I, class 1 laser; Read formats: CD-R, CD-RW, CD-ROM, DVD-R, DVD-ROM, DVD-RW, DVD+R, DVD+RW, DVD-RAM. Recordable disc: CD-R, CD-RW
Printer Port	USB
GPIB	IEEE488.2
LAN	10/100/1000 Base-T
USB	USB 2.0 x 4 (2 front panel, 2 rear panel)
PS2	Keyboard only (rear panel)
VGA	D-SUB 15 pin, rear panel - up to 2048 x 1536
Audio	Realtek HD Audio (ALC888). Internal speaker, Rear panel Headphone out, Mic IN

Safety

For detailed information on Safety, see the *RSA6100B Series Real-Time Signal Analyzers Quick Start User Manual*, Tektronix part number 071-1909-06 or later.

Certifications and Compliances

For detailed information on Certifications and Compliances, see the *RSA6100B Series Real-Time Spectrum Analyzers Quick Start User Manual*, Tektronix part number 071-1909-06 or later.

Environmental Characteristics

Table 53: Environmental characteristics

Characteristic			Description
Temperature range [1]			
	Operating		+5 °C to +50 °C
		When accessing DVD	+5 °C to +40 °C
	Non-operating		–20 °C to +60 °C
Relative Humidity			90% RH at 30 °C (No condensation) (80% RH max when accessing CD) Maximum wet-bulb temperature 29 °C
Altitude			
	Operating		Up to 3000 m (approximately 10000 ft)
	Non-operating		Up to 12190 m (40000 ft)
Vibration			
	Operating		0.22 Grms. Profile = 0.00010 g^2/Hz at 5 Hz to 350 Hz, –3dB/Octave slope from 350 Hz to 500 Hz, 0.00007 g^2/Hz at 500 Hz, 3 Axes at 10 min/axis (Except when equipped with Option 06 Removable HDD, or when accessing DVD/CD), Class 8 When equipped with Option 08, Removable Solid State Hard Drive 0.24 Grms. Profile – 0.000125 g^2/Hz at 5 Hz to 350 Hz, –3dB/Octave slope from 350 Hz to 500 Hz, 0.0000876 g^2/Hz at 500 Hz, 3 Axes at 10 min/axis. Class 5
	Non-operating		2.28 Grms. Profile = 0.015 g^2/Hz at 5 Hz to 100 Hz, –3 dB/Octave slope from 100 Hz to 200 Hz, 0.075 g^2/Hz at 200 Hz to 350 Hz, –3dB/Octave slope from 350 Hz to 500 Hz, 0.00526 g^2/Hz at 500 Hz, 3 Axes at 10 min/axis. Class 5

Table 53: Environmental characteristics (cont.)

Characteristic		Description
Shock		
	Operating	(15 G), half-sine, 11 ms duration. Three shocks per axis in each direction (18 shocks total) (1 G max when accessing DVD) (DVD tray ejection may occur)
	Non-operating	296 m/s^2 (30 G), half-sine, 11 ms duration. Three shocks per axis in each direction (18 shocks total) (DVD tray ejection may occur)
Cooling Clearance		
	Bottom	20 mm (0.79 in)
	Both Sides	50 mm (1.97 in)
	Back	50 mm (1.97 in)

1 Measured one inch (2.5 cm) away from the ventilation air intake (located at the left side of the instrument when viewed from the front).

Table 54: Power requirements

Characteristic		Description
Voltage range	50 Hz/60 Hz	90 V - 264 V
	400 Hz	90 V - 132 V
Maximum Power dissipation (fully loaded)	Maximum power	450 W
	Maximum line current	5.5 Amps at 50 Hz, 90 V line
Surge Current		MAX 52 A peak (25 °C) for ≤5 line cycles, after product has been turned off for at least 30 s.

Digital IQ Output Connector Pin Assignment (Option 05 Only)

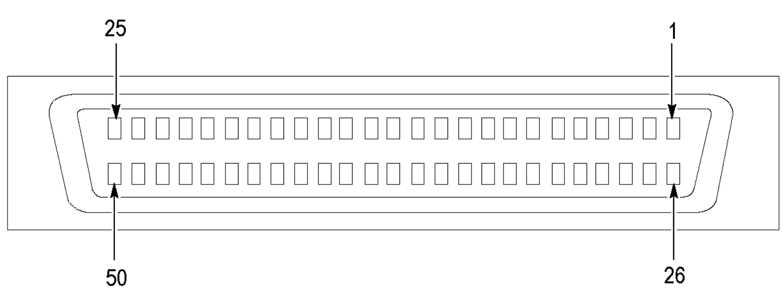

Figure 1: Digital IQ output connector pin assignment

Table 55: I OUTPUT connector pin assignment

Pin number	Signal name	Description
1	IQ_ENABLE*	IQ output enable signal input Open: IQ output disable GND: IQ output enable
26	GND	Ground
2	EXT_IQ_MSW–	Reserved for future use
27	EXT_IQ_MSW+	
3	EXT_I0–	I output data (bit 0), LVDS
28	EXT_I0+	
4	EXT_I1–	I output data (bit 1), LVDS
29	EXT_I1+	
5	EXT_I2–	I output data (bit 2), LVDS
30	EXT_I2+	
6	EXT_I3–	I output data (bit 3), LVDS
31	EXT_I3+	
7	GND	Ground
32	GND	
8	EXT_I4–	I output data (bit 4), LVDS
33	EXT_I4+	
9	EXT_I5–	I output data (bit 5), LVDS
34	EXT_I5+	
10	EXT_I6–	I output data (bit 6), LVDS
35	EXT_I6+	
11	EXT_I7–	I output data (bit 7), LVDS
36	EXT_I7+	
12	GND	Ground
37	GND	
13	EXT_I8–	I output data (bit 8), LVDS
38	EXT_I8+	
14	EXT_I9–	I output data (bit 9), LVDS
39	EXT_I9+	
15	EXT_I10–	I output data (bit 10), LVDS
40	EXT_I10+	
16	EXT_I11–	I output data (bit 11), LVDS
41	EXT_I11+	
17	GND	Ground
42	GND	

Table 55: I OUTPUT connector pin assignment (cont.)

Pin number	Signal name	Description
18	EXT_I12–	I output data (bit 12), LVDS
43	EXT_I12+	
19	EXT_I13–	I output data (bit 13), LVDS
44	EXT_I13+	
20	EXT_I14–	I output data (bit 14), LVDS
45	EXT_I14+	
21	EXT_I15–	I output data (bit 15), LVDS
46	EXT_I15+	
22	GND	Ground
47	GND	
23	GND	
48	GND	
24	EXT_IQ_DAV–	IQ Data Valid indicator, LVDS
49	EXT_IQ_DAV+	
25	EXT_IQ_CLK–	IQ output clock, LVDS
50	EXT_IQ_CLK+	

Table 56: Q OUTPUT connector pin assignment

Pin number	Signal name	Description
1	IQ_ENABLE*	IQ output enable signal input Open: IQ output disable GND: IQ output enable
26	GND	Ground
2	GND	
27	GND	
3	EXT_Q0–	Q output data (bit 0), LVDS
28	EXT_Q0+	
4	EXT_Q1–	Q output data (bit 1), LVDS
29	EXT_Q1+	
5	EXT_Q2–	Q output data (bit 2), LVDS
30	EXT_Q2+	
6	EXT_Q3–	Q output data (bit 3), LVDS
31	EXT_Q3+	
7	GND	Ground
32	GND	
8	EXT_Q4–	Q output data (bit 4), LVDS
33	EXT_Q4+	

Table 56: Q OUTPUT connector pin assignment (cont.)

Pin number	Signal name	Description
9	EXT_Q5–	Q output data (bit 5), LVDS
34	EXT_Q5+	
10	EXT_Q6–	Q output data (bit 6), LVDS
35	EXT_Q6+	
11	EXT_Q7–	Q output data (bit 7), LVDS
36	EXT_Q7+	
12	GND	Ground
37	GND	
13	EXT_Q8–	Q output data (bit 8), LVDS
38	EXT_Q8+	
14	EXT_Q9–	Q output data (bit 9), LVDS
39	EXT_Q9+	
15	EXT_Q10–	Q output data (bit 10), LVDS
40	EXT_Q10+	
16	EXT_Q11–	Q output data (bit 11), LVDS
41	EXT_Q11+	
17	GND	Ground
42	GND	
18	EXT_Q12–	Q output data (bit 12), LVDS
43	EXT_Q12+	
19	EXT_Q13–	Q output data (bit 13), LVDS
44	EXT_Q13+	
20	EXT_Q14–	Q output data (bit 14), LVDS
45	EXT_Q14+	
21	EXT_Q15–	Q output data (bit 15), LVDS
46	EXT_Q15+	
22	GND	Ground
47	GND	
23	GND	
48	GND	
24	GND	
49	GND	
25	GND	
50	GND	

Table 57: Mating connections

Recommendation	Description
Mating cable	Tektronix part number 174-5194-00
Mating connector	3M N10250-52E2PC

Digital IQ Output Timing

All I/Q output signals are synchronous to clock EXT_IQ_CLK. The clock operates at either 50 MHz or 150 MHz, depending on the selected real-time span of the RSA6100B. (See Table 59.)

Data is valid when the EXT_IQ_DAV signal is asserted high; data is invalid when EXT_IQ_DAV is low. The EXT_IQ_DAV duty cycle varies with the real-time SPAN, as shown in the following table. At spans where the duty cycle is less than 100%, the EXT_IQ_DAV signal is high for one clock cycle, then low for one or more clock cycles.

Table 58: EXT_IQ_DAV Duty cycle versus Span

Span	EXT_IQ_CLK frequency (MHz)	EXT_IQ_DAV duty cycle (%)
110 MHz	150	100.0
60 MHz	150	50.0
40 MHz	50	100.0
20 MHz	50	50.0
10 MHz	50	25.0
5 MHz	50	12.5
2 MHz	50	6.250
1 MHz	50	3.125
500 kHz	50	1.5625
200 kHz	50	0.78125
100 kHz	50	0.39063
50 kHz	50	0.19531
20 kHz	50	0.097656
10 kHz	50	0.048828
5 kHz	50	0.024414
2 kHz	50	0.006104
1 kHz	50	0.003052
500 kHz	50	0.001526
200 kHz	50	0.000763
100 kHz	50	0.000381

The rising edge of EXT_IQ_CLK is aligned to be in the center of the settled EXT_I[15:0], EXT_Q[15:0], and EXT_IQ_DAV signals.

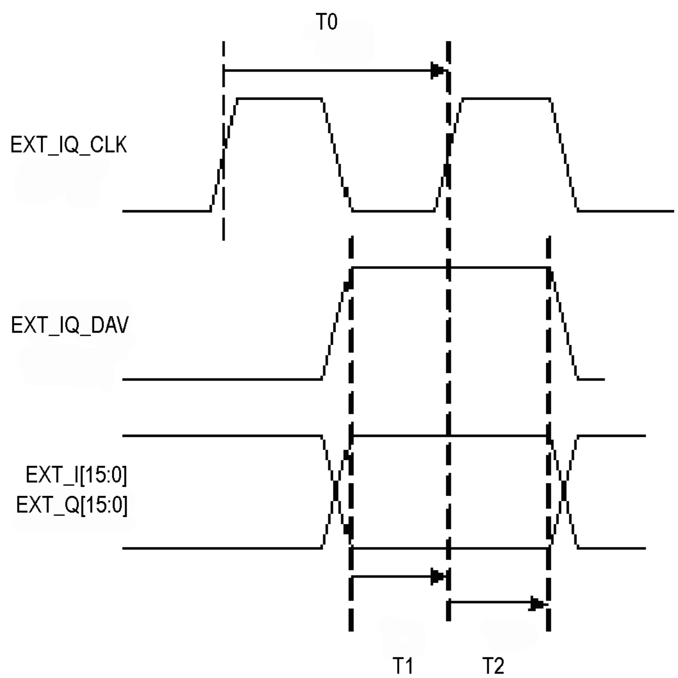

Figure 2: IQ Timing

Table 59: IQ Timing

Real Time Span	T0	T1	T2
>40 MHz	6.6 ns	1.54 ns	1.58 ns
≤40 MHz	20 ns	8.2 ns	8.4 ns

Possible Interruption of Data from Digital I/Q Outputs

There are three conditions during which the RSA6100B will interrupt the flow of data to the digital I/Q outputs. Those conditions are:

- Alignments
- Control Changes
- Stitched Spectrum Mode

When any of these conditions are active, the EXT_IQ_DAV signal will be held in its inactive state. The EXT_IQ_CLK signal will remain active and operate at the frequency consistent with the SPAN value selected for the RSA6100B.

The EXT_IQ_DAV signal will remain inactive for the duration of any alignment or control change. Once the alignment or control change has been completed, the EXT_IQ_DAV signal becomes active again. While the EXT_IQ_DAV signal is inactive, the data from the digital I/Q outputs are not valid and should be ignored.

The duty cycle of the EXT_IQ_DAV signal varies from 100% at the widest SPAN values to a very small percentage at the narrowest SPAN values. (See Table 58.) At a SPAN of 100 Hz, the duty cycle will be 0.00038%; here, the EXT_IQ_DAV signal is active (high) for 20 ns, and then inactive (low) for ≈5.28 ms.

The length of time that the EXT_IQ_DAV signal is inactive can be used to determine if the RSA6100B is performing an alignment or a control change. If the EXT_IQ_DAV signal is inactive for longer than 10 ms, then the RSA6100B digital I/Q output data stream has been interrupted.

External equipment used to detect the occurrence of a data interruption can monitor the state of the EXT_IQ_DAV signal. If the EXT_IQ_DAV signal is inactive for 10 ms or more, an alignment or control change has occurred. The duration of the data interruption can be determined by measuring the time between successive EXT_IQ_DAV pulses.

Digital IQ Output Scaling

Output power in dBm for a sinusoidal input

Where:

$$P\,(dBm) = \ 20log\left(\frac{\sqrt{I^2\ +\ Q^2}}{2^{14}\sqrt{2}}\right) + Ref$$

Where:

- I and Q are the digital values at the Digital IQ output port
- Ref = Reference Level

Valid for center frequencies that exceed:

- Center frequency ≥ 80 MHz for Spans > 40 MHz
- Center frequency ≥ 30 MHz for Spans > 312.5 kHz and ≤ 40 MHz
- Center frequency ≥ 2 MHz for Spans < 312.3 kHz

Performance Verification

NOTE. *The performance verification procedure is not a calibration procedure. The performance verification procedure only verifies that your instrument meets key specifications. For your instrument to be calibrated, it must be returned to a Tektronix service facility.*

Prerequisites

The tests in this section make up an extensive, valid confirmation of performance and functionality when the following requirements are met:

- The cabinet must be installed on the instrument.
- The instrument must have passed the Power On Self Tests (POST).
- The instrument must have been last adjusted at an ambient temperature between +18 °C (+64 °F) and +28 °C (+82 °F), must have been operating for a warm-up period of at least 20 minutes after starting the RSA6100B application, and must be operating at an ambient temperature. (See Table 53.)

Required Equipment

The procedures, use external, traceable signal sources to directly check warranted characteristics. (See page 61, *Warranted Characteristics Tests*.) The following table lists the equipment required for this procedure.

Table 60: Equipment required for Performance Verification

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	RSA6106B/RSA6114B: 9 kHz to 18 GHz RF Flatness: <3% Calibration factor data uncertainty: <2% (RSS). Minimum power dynamic range: –60 dBm to +20 dBm	Agilent E9304A Option H18	
	RSA6120B: 10 MHz -26.5 GHz RF Flatness: <3% Calibration factor data uncertainty: <2% (RSS). Minimum power dynamic range: –60 dBm to +20 dBm.	Agilent E4413A Option H10	

Table 60: Equipment required for Performance Verification (cont.)

Item number and	Minimum requirements		Example	Purpose
4. Signal Generator	Frequency Accuracy: ±3 x 10^{-7} Output Frequency: 0 to 20 GHz		Anritsu MG3692B Options 2A, 3A, 4, 15A, 16, 22, SM5821	Checking RF flatness, intermodulation distortion, image suppression, and external reference lock check.
5. RF Signal Generator	Output Frequency 0 to 18 GHz		Anritsu MG3692B 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. Network Analyzer	10 MHz to 20 GHz		Agilent N5320A, with Option 220	Checking VSWR
7. Power Splitter			Agilent 11667A (RSA6106B/RSA6114B) Agilent 11667B (RSA6120B)	Adjusting signal generator output level
8. Power Combiner	Range: 1 to 18 GHz Insertion loss: 3 dB at 2.13 GHz		MACOM 2089-6208-00	Checking intermodulation distortion
9. Low Pass Filters (2)	< 3 dB loss DC –3 GHz >50 dB rejection 4 GHz to 14 GHz			Checking third order intermodulation distortion
10. Voltmeter	Capable of measuring 30 VDC		Standard Equipment	Checking Noise Source
11. BNC Cable	50 Ω, 36 in. male to male BNC connectors		Tektronix part number 012-0482-00	Signal interconnection
12. N-N Cable	50 Ω, 36 in. male to male N 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 Type N male		Maury 2510B6 (RSA6106B/RSA6114B) Maury 8031B4, 3.5mm male (RSA6120B)	Signal interconnection
15. N-Female to BNC male Adapter			Tektronix part number 103-0058-00	N cable to RSA6100B connections
16. N-3.5mm cable	50 Ω, 36 in. male N to male SMA connectors			
17. N-Male to 3.5 mm male adapter				

Table 60: Equipment required for Performance Verification (cont.)

Item number and	Minimum requirements	Example	Purpose
18. 3.5 mm attenuator	3 dB (two required)	Midwest Microwave ATT-0550-03-35M-02	Checking third order intermodulation distortion
19. Planar Crown Type N connector		Tektronix part number 131-4329-00	
20. Planar Crown 3.5 mm connector		Tektronix part number 131-9062-00	

Preliminary Checks

These steps should be performed before proceeding to the Warranted Characteristics tests.

Fan Check

Plug in the RSA6100B, power it on, and check that the fans located on the left side of the RSA6100B are operating.

CAUTION. *Turn the RSA6100B off immediately if the fans are not operating. Operating the Signal Analyzer without fans will damage the instrument.*

Warm-up

Make sure the RSA6100B application is running, and allow the instrument to warm up for at least 20 minutes.

NOTE. *The fans will slow down and be quieter when the application is started; this is normal. Fan speed may vary while the application is running, depending on the internal temperature detected by the instrument.*

CD Drive Check

Press the button on the DVD-R/W drive (Option 57 only) and verify that the tray door opens. Press the button again to close it.

Touch Screen Check

Check that the touch screen detects touches:

1. Verify that the touch screen is enabled (**Touch Screen Off** button is not lighted).
2. Use your finger or a stylus to touch several of the on-screen touchable readouts, such as RBW or Span, and verify they become active when touched.

Diagnostics

Run a complete Diagnostics test session:

1. Select **Tools > Diagnostics** from the menubar.
2. Select the **All Modules, All Tests** checkbox at the top of the list.
3. Touch the **RUN** button. The diagnostics tests will take some time to complete, and some of them are interactive:
   a. Noise Source Drive 28VDC Out diagnostic will ask you to test the noise source output on the RSA6100B rear-panel.
      - Check with a voltmeter that the voltage is 28 V ±2 V.

   b. The LED Check diagnostic will ask you to verify that all the highlighted LEDs are turned on:
      - Compare the LEDs highlighted in the diagnostic display with the buttons on the front panel.
      - Press each of the keys and rotate the knob on the front panel. You should see the corresponding key in the diagnostic display turn green. Verify that each key is recognized.
      - Click the PASS or FAIL button when done.

   c. The Display Pixel Test will ask you to look for video problems on the test patterns:
      - Check the Green screen for any stuck or missing pixels. Any keypress, click, or touch will move to the next screen.
      - Repeat with the Red screen, the Blue Screen, and the Gray scale screen. Select Yes or No when the LCD Test dialog asks "Did you see any video problems".
4. When all diagnostics tests have completed, check that there is a check mark beside each diagnostic name. An X instead of a check mark indicates that the diagnostic had a failure.
5. Click the **Diagnostics Failure** Info tab and verify there is no failure information listed.
6. Click the **Exit Diagnostics** button to exit diagnostics.

Alignment

You should align the instrument before proceeding with the Warranted Characteristics tests.

1. Select **Alignments** in the **Tools** menu. The Alignments dialog box will open.
2. Select **Align Now**. The alignment process will take a few minutes.
3. Verify that no alignment failures are reported in the status bar.

Warranted Characteristics Tests

The following procedures verify the RSA6100B Series Signal Analyzer performance is within the warranted specifications.

Frequency Accuracy

Check Reference Output Frequency Accuracy

1. Connect **Ref Out** on the RSA6100B rear-panel through a 50 Ω precision coaxial cable to the frequency counter input. See the following figure.
2. Connect a precision frequency reference to the frequency counter.

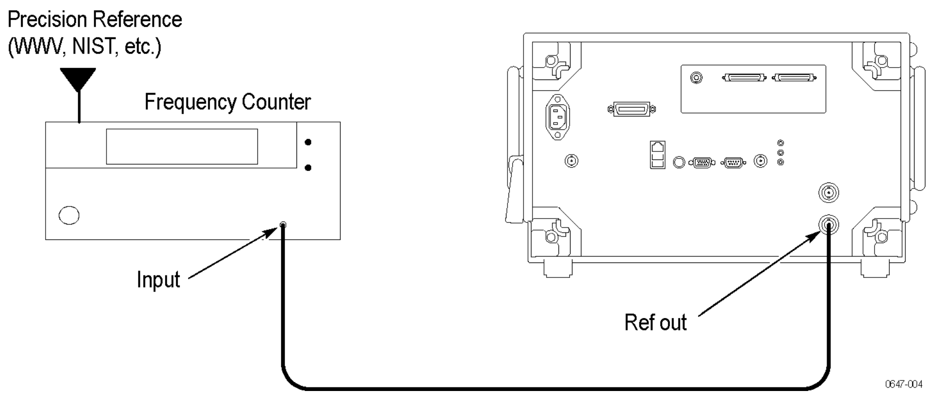

Figure 3: Connections for Reference Frequency Output Accuracy check

3. Set the Frequency counter:

Function	Frequency
Gate time	2 s

4. Check that the frequency counter reads 10 MHz ±3 Hz. Enter the frequency in the test record.

Check Reference Output Power Level

1. Set up the power meter and sensor.

***NOTE.** Store the power sensor correction factors in the power meter, if you have not yet done so.*

   a. Connect the power sensor to the Sensor input on the power meter, as shown in the following figure.

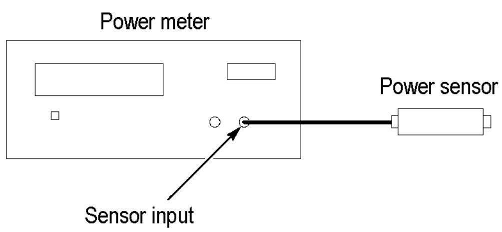

Figure 4: Power meter setup

   b. Press **Zero/Cal**, then press **ZERO** on the power meter.

   c. Connect the RF input of the power sensor to the power meter power reference output, as shown in the following figure.

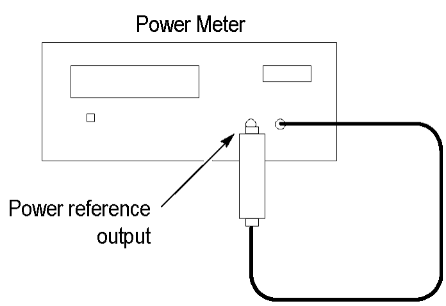

Figure 5: Power meter calibration

   d. Press **CAL** to execute the calibration.

   e. Disconnect the RF input of the power sensor from the power meter reference output.

2. Connect the power sensor RF input to the Ref Out connector on the RSA6100B rear-panel, using the N-female to BNC male adapter (see the following figure).
3. Press **Frequency/Cal Factor**, then set **Freq** to 10 MHz.
4. Check that the Ref Out signal is >0 dBm. Enter this level in the test record.

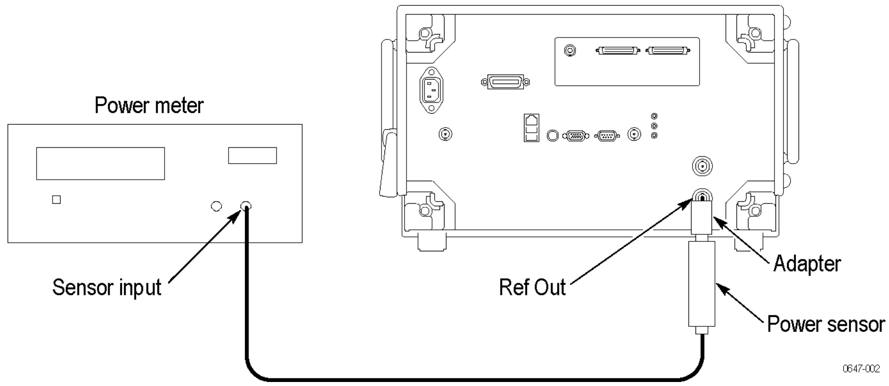

Figure 6: Equipment connections for Ref Out power level check

External Reference Input Level

1. Connect the signal generator output to the **Ref In** connector on the RSA6100B rear panel, using a 50 Ω N-N coaxial cable and N-female to BNC male adapter (see the following figure).

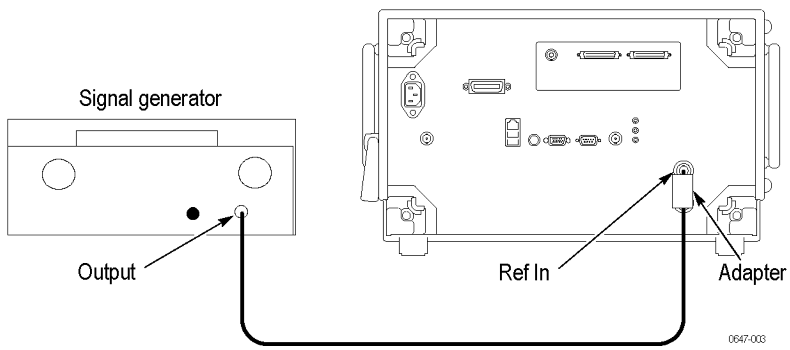

Figure 7: Equipment connections for Ref In power level check

2. Set the Signal generator controls:

Frequency	10 MHz
Level	0 dBm
RF	On

3. Set the RSA6100B to use the external reference:
   a. Select **Setup > Configure In/Out > Frequency Reference**.
   b. Select the **External** radio button.
4. Check the Input Reference limits:
   a. Check that the Status Bar shows **Ref: Ext**.
   b. Set the **Source** to **Internal (10 MHz)**.
   c. Set the signal generator output level to –10 dBm.

d. Set the **Source** to **External**.

e. Check that the Status Bar shows **Ref: Ext**.

f. Set the **Source** to **Internal (10 MHz)**.

g. Set the signal generator output level to +6 dBm.

h. Set the **Source** to **External**.

i. Check that the Status Bar shows **Ref: Ext**.

j. Disconnect the signal generator from the **Ref In** connector. An error message should pop up to indicate loss of lock (see the following figure).

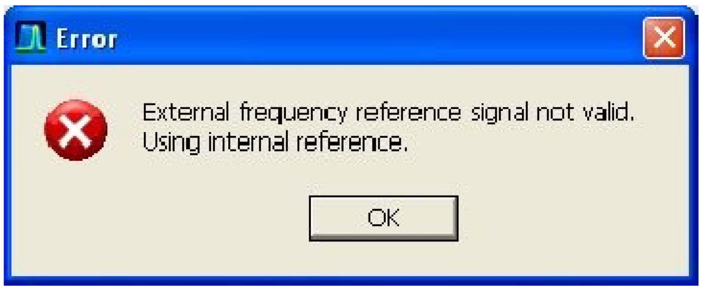

Figure 8: Error message showing loss of lock to External Reference signal

k. Click OK on the error message, and check that the Status Bar shows **Ref: Int**.

l. Enter Pass or Fail in the test record.

Phase Noise (Instruments with Option 11)

If Option 11 is installed in your instrument, use the following procedure to check the phase noise. If Option 11 is not installed in your instrument, use the procedure (See page 66, *Phase Noise (Instruments without Option 11)*.) that follows.

NOTE. *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. (See Table 17.). Also, refer to the Spurious Response section of this procedure to determine whether or not a residual spur is within the specification. (See page 102, Spurious Response.)*

1. Connect the generator output to the RTSA RF Input, using a 50 Ω N-N coaxial cable (see the following figure).

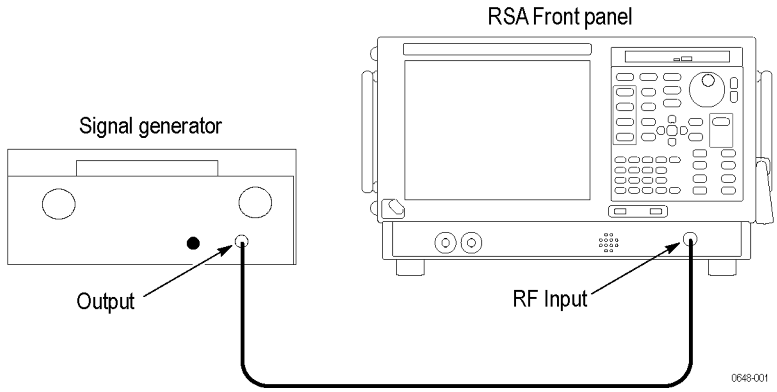

Figure 9: Equipment connections for phase noise checks

2. Reset the RSA6100B to factory defaults: select **Setup > Preset (Main)** from the **Setup** menu.
3. Select **Tools** > **Alignments** and then select **Align Now**.
4. Modify the default settings:

Center Frequency Setup > Settings > Freq & Span > Center	1.00 GHz
Span Setup > Settings > Freq & Span > Span	1 MHz
Ref Level Setup > Amplitude > Internal Settings > Ref Level	+5 dBm
RF & IF Optimization Setup > Amplitude > Internal Settings > RF & IF Optimization	Maximize Dynamic Range

5. Set the generator as follows:

Center Frequency	1.00 GHz
Output level	+5 dBm
RF	On

6. Select Run > Run Single to stop acquisitions.
7. Display the Phase Noise measurement:
   - Select **Setup** > **Displays**.
   - Select the **RF Measurements** folder.
   - Select the **Phase Noise** display and select **Add**.

- Select the **Spectrum** display and select **Remove**.
- Select **OK**.

8. Select **Setup** > **Settings** to display the Phase Noise settings control panel.
9. On the Frequency tab, set the Start Offset to 100 Hz for both the Measurement BW and the Integration BW.
10. Set the Stop Offset to 10 MHz for both the Measurement BW and the Integration BW.
11. Select the Parameters tab.
12. Set the Average value to 20 and click the check box to enable averaging.
13. Select the Traces tab.
14. Select **Trace 2** in the Trace drop-down list. Deselect the **Show** checkbox so that Trace 2 is not be displayed.
15. Select Trace 1 from the trace drop-down list above the graph display. Select the Marker readout on the left side of the graph. Set the Marker value to 6 MHz.
16. Press the Single key and wait for 20 averages to complete.
17. Read the value for the 6 MHz offset from the Offset readout.
18. Document the test results in the test record at each frequency.

Phase Noise (Instruments without Option 11)

Check Phase Noise

If Option 11 is not installed in your instrument, use the following procedure to check the phase noise. If Option 11 is installed in your instrument, use the preceding (See page 64, *Phase Noise (Instruments with Option 11)*.) procedure.

NOTE. *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. (See Table 17.). Also, refer to the Spurious Response section of this procedure to determine whether or not a residual spur is within the specification.* *(See page 102, Spurious Response.)*

---

1. Connect the generator output to the RTSA RF Input, using a 50 Ω N-N coaxial cable (see the following figure).

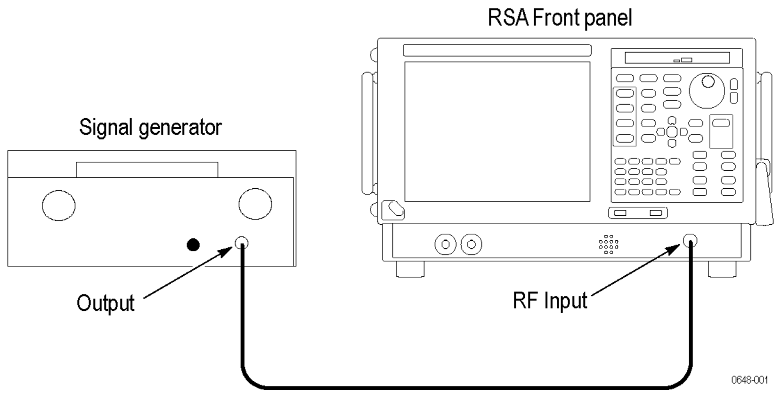

Figure 10: Equipment connections for phase noise checks

2. Reset the RSA6100B to factory defaults: Select **Setup** > **Preset (Main)** from the **Setup** menu.

3. Press Tools > Alignments and then select Align Now.

4. Modify the settings:

Center Frequency Setup > Settings > Freq & Span > Center	1.00 GHz
Span Setup > Settings > Freq & Span > Span	1 MHz
VBW Setup > Settings > BW > VBW	10 Hz (box checked)
Detection Setup > Settings > Traces > Detection	Avg (VRMS)
Function Setup > Settings > Traces > Function	Avg (VRMS)
Count Setup > Settings > Traces > Count	100 (box checked)
Trace Points Setup > Settings > Prefs > Trace Points	2401
Marker Noise Mode Setup > Settings > Prefs > Marker Noise Mode	Check Marker Noise mode box
RF & IF Optimization Setup > Amplitude > Internal Settings > RF & IF Optimization	Maximize Dynamic Range
Reference level Setup > Amplitude > Internal Settings > Ref Level	+5 dBm

5. Set the generator as follows:

Frequency	1.00 GHz
Output level	+5 dBm
RF	On

6. Turn on the Reference Marker (MR) and Marker 1 (M1), and set them for Delta operation and Noise Mode.

   a. Select **Markers** > **Define Markers**.

   b. Select the **Add** soft key to add the MR marker.

   c. Select the **Add** soft key again to add the M1 marker.

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

7. For each span shown in the following table, perform steps through :

Table 61: Phase noise offsets (Low range; without Option 11)

Span	M1 Offset
400 Hz	CF + 100 Hz
4 kHz	CF + 1 kHz
40 kHz	CF + 10 kHz
300 kHz	CF + 100 kHz

   a. Press the **Span** key and enter a Span value from the table.

   b. Select **Run > Run Single**.

   c. Select the Reference Marker with the Marker Select key and press the Peak key.

   d. Select Marker 1 (M1) with the marker select key.

   e. Set the Marker 1 (M1) frequency by entering the offset value from the table above in the Frequency box at the bottom center of the display.

   f. Read the marker noise level in dBc/Hz, in the Delta Marker readout (upper right corner of the screen), and enter the value in the test record. (Limits are shown in the test record.)

8. Record the generator signal amplitude in the Test Record:

   a. Select Marker (MR) with the Marker Select key.

   b. Select the Markers Peak key to center the MR marker on the peak of the 1000 MHz signal.

   c. Record the MR Marker amplitude (upper-left corner of the screen.) This value is called **Carrier Power** and is used below.

9. Obtain the phase noise at 1 MHz offset. Start by setting the RSA6100B to the settings listed below:

a. Center Frequency (Freq key): 1001 MHz

b. Span (Span key): 10 kHz

c. Reference Level Offset: -30 dBm (This is the amplitude control in the upper left of the display.)

d. Set input attenuation for manual control.

- Select **Setup** > **Amplitude** > **Internal Settings** .
- Deselect the Internal Attenuator **Auto** check box.
- Set **Internal Attenuator** to 0 dB.

a. Select **Run** > **Run Single**.

b. Center the M1 marker in the middle of the screen:

- Select **Markers > Define Markers**
- Select **Readouts** > **Absolute**.
- Press the **Select** key to select the **M1** marker.
- Select **Marker Frequency**. Set to 1001 MHz.

The marker is now located at the center frequency position.

a. Read the noise amplitude on Marker **M1**, in dBm/Hz.

b. Subtract the value of **MR** obtained in step 8 to obtain the phase noise amplitude at 1 MHz.

For example, if MR = 4.7 dBm and M1 = -129.6 dBm/Hz, then M1-MR = -134.3 dBc/Hz.

c. Enter the value obtained at 1 MHz in the test record for phase noise at 1 MHz.

10. Obtain the phase noise at 6 MHz offset. Start by setting the RSA6100B to the settings listed below:

a. Center Frequency (Freq key): 1006 MHz.

b. Span (Span key): 10 kHz.

c. Select **Run** > **Run Single**.

d. Set the Marker M1 Frequency to 1006 MHz..

e. Read the noise level on Marker **M1** in dBm/Hz.

f. Subtract the value of Carrier Power obtained in step 8 in order to obtain the phase noise amplitude at +6 MHz.

For example, if Carrier Power = 4.7 dBm and M1 = -145.1 dBm/Hz, then M1-Carrier Power = – 149.8 dBc/Hz.

g. Enter the value obtained at 6 MHz in the test record for phase noise at 6 MHz.

11. Obtain the phase noise at 10 MHz offset. Start by setting the RSA6100B to the settings below:

a. Center Frequency (**Freq** key): 1010 MHz.

b. Span (Span key): 10 kHz.

c. Select **Run** > **Run Single**.

d. Set the Marker Frequency to 1010 MHz.

NOTE. *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. (See Table 17.). Also, refer to the Spurious Response section of this procedure to determine whether or not a residual spur is within the specification. (See page 102, Spurious Response.)*

---

e. Read the noise amplitude on marker **M1** in dBm/Hz.

f. Subtract the value of the Carrier Power marker obtained in step 8 to obtain the phase noise amplitude at +10 MHz.

For example, if Carrier Power = 4.7 dBm and M1 = –146.1 dBm/Hz,

Then M1-Carrier Power = –150.8 dBc/Hz.

g. Enter the value obtained at 10 MHz in the test record for phase noise at 10 MHz.

RF Input

Input VSWR (Preamp OFF)

1. Connect the RSA6100B and the Network Analyzer as shown in the following figure.

NOTE. Verify that the network analyzer is properly calibrated, as specified by the manufacturer, before taking measurements on the RSA6100B.

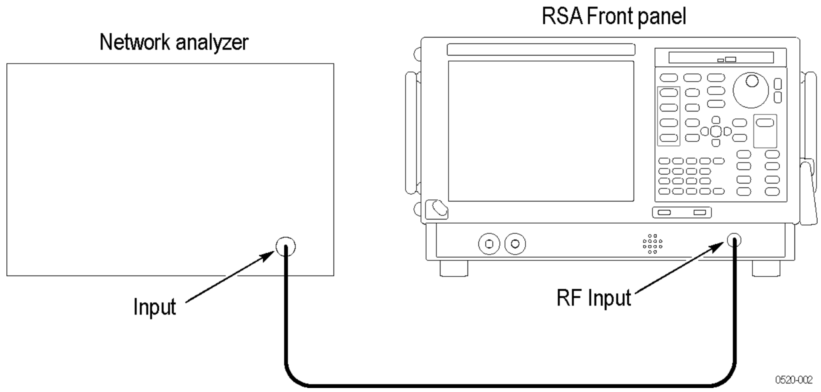

Figure 11: Equipment connections for VSWR check

2. Reset the RSA6100B to factory defaults: select **Setup** > **Preset (Main)**.
3. Select **Setup** > **Amplitude** > **Internal Settings**. Deselect the **Auto** check box and set the **Internal Attenuator** value to 10 dB.
4. Set up the Network Analyzer as follows:
   a. Preset.
   b. Calibration > Cal Set > [select appropriate Cal Set] > OK.
   c. Trace > Format > SWR > OK
   d. Scale > Scale > Per Division > 100 mUnits > OK.
   e. Set Span (F4) to 100 MHz.
5. Set the Center frequency of the RSA6100B to each frequency in the RSA6106B VSWR test frequencies table. Set the Network Analyzer center frequency [Start/Center > Center (F3)] to the same frequency. Press Marker Search > MAX (F1) and record the value in the table.

Table 62: RSA6106B VSWR Test Frequencies (MHz)

60	1060	2060	3060	4060	5060	6060
160	1160	2160	3160	4160	5160	6100
260	1260	2260	3260	4260	5260	
360	1360	2360	3360	4360	5360	

Table 62: RSA6106B VSWR Test Frequencies (MHz) (cont.)

460	1460	2460	3460	4460	5460
560	1560	2560	3560	4560	5560
660	1660	2660	3660	4660	5660
760	1760	2760	3760	4760	5760
860	1860	2860	3860	4860	5860
960	1960	2960	3960	4960	5960

6. Enter the highest VSWR in the table in the test record.
7. **RSA6114B/RSA6120B only**: Set the Center frequency of the RSA6114B to each frequency in the RSA6114B VSWR test frequencies table. Set the Network Analyzer center frequency [Start/Center > Center (F3)] to the same frequency. Press Marker Search > MAX (F1) and record the value in the table.

Table 63: RSA6114B VSWR Test Frequencies (GHz)

6.25	7.25	8.25	9.25	10.25	11.25	12.25	13.25
6.35	7.35	8.35	9.35	10.35	11.35	12.35	13.35
6.45	7.45	8.45	9.45	10.45	11.45	12.45	13.45
6.55	7.55	8.55	9.55	10.55	11.55	12.55	13.55
6.65	7.65	8.65	9.65	10.65	11.65	12.65	13.65
6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75
6.85	7.85	8.85	9.85	10.85	11.85	12.85	13.85
6.95	7.95	8.95	9.95	10.95	11.95	12.95	13.95
7.05	8.05	9.05	10.05	11.05	12.05	13.05	
7.15	8.15	9.15	10.15	11.15	12.15	13.15	

8. **RSA6114B/RSA6120B** only: Enter the highest VSWR in the table in the test record.
9. **RSA6120B only**: Set the Center frequency of the RSA6120B to each frequency in the RSA6120B VSWR test frequencies table. Set the Network Analyzer center frequency [Start/Center > Center (F3)] to the same frequency. Press Marker Search > MAX (F1) and record the value in the table.
10. **RSA6120B only**: Enter the highest VSWR in the table in the test record.

Table 64: RSA6120B VSWR Test Frequencies (GHz)

14.05	15.05	16.05	17.05	18.05	19.05
14.15	15.15	16.15	17.15	18.15	19.15
14.25	15.25	16.25	17.25	18.25	19.25
14.35	15.35	16.35	17.35	18.35	19.35
14.45	15.45	16.45	17.45	18.45	19.45

Table 64: RSA6120B VSWR Test Frequencies (GHz) (cont.)

14.55	15.55	16.55	17.55	18.55	19.55
14.65	15.65	16.65	17.65	18.65	19.65
14.75	15.75	16.75	17.75	18.75	19.75
14.85	15.85	16.85	17.85	18.85	19.85
14.95	15.95	16.95	17.95	18.95	19.95

Input VSWR (Preamp ON - Option 50/51 Only)

1. Reset the RSA6100B to factory defaults: select **Setup** > **Preset (Main)**.
2. Select **Setup** > **Amplitude** > **Internal Settings**. Deselect the **Auto** check box and set the Internal Attenuator to 10 dB.
3. Select **Setup** > **Amplitude** > **Internal Settings**. Select the **Internal Preamp** check box.
4. Let the instrument run for at least 7 minutes (after turning on the preamp) to allow the preamp to warm up to operating temperature.
5. Set up the Network Analyzer as follows:
   - Preset.
   - Calibration > Cal Set > [select appropriate Cal set] > OK.
   - Trace > Format > SWR > OK.
   - Scale > Scale > Per Division > 100 mUnits > OK.
   - Set Span (F4) to 100 MHz.
6. Set the Center frequency of the RSA6100B to each frequency in the RSA6106B VSWR Preamp On Test Frequencies table. Set the Network Analyzer center frequency (Start /Center > Center (F3)) to the same frequency. Press Marker Search > MAX (F1) and record the value in the table.

Table 65: RSA6106B VSWR Preamp On Test Frequencies (MHz)

60	1060	2060	3060	4060	5060	6060
160	1160	2160	3160	4160	5160	6100
260	1260	2260	3260	4260	5260	
360	1360	2360	3360	4360	5360	
460	1460	2460	3460	4460	5460	
560	1560	2560	3560	4560	5560	
660	1660	2660	3660	4660	5660	
760	1760	2760	3760	4760	5760	
860	1860	2860	3860	4860	5860	
960	1960	2960	3960	4960	5960	

7. Enter the highest VSWR in the table in the test record.

8. **RSA6114B/RSA6120B only:** Set the Center frequency of the RSA6114B to each frequency in the RSA6114B VSWR Preamp On Test Frequencies table. Set the Network Analyzer center frequency (Start /Center > Center (F3)) to the same frequency. Press Marker Search > MAX (F1) and record the value in the table.

Table 66: RSA6114B VSWR Preamp On Test Frequencies (GHz)

6.25	7.25	8.25	9.25	10.25	11.25	12.25	13.25
6.35	7.35	8.35	9.35	10.35	11.35	12.35	13.35
6.45	7.45	8.45	9.45	10.45	11.45	12.45	13.45
6.55	7.55	8.55	9.55	10.55	11.55	12.55	13.55
6.65	7.65	8.65	9.65	10.65	11.65	12.65	13.65
6.75	7.75	8.75	9.75	10.75	11.75	12.75	13.75
6.85	7.85	8.85	9.85	10.85	11.85	12.85	13.85
6.95	7.95	8.95	9.95	10.95	11.95	12.95	13.95
7.05	8.05	9.05	10.05	11.05	12.05	13.05	
7.15	8.15	9.15	10.15	11.15	12.15	13.15	

9. **RSA6114B/RSA6120B only**: Enter the highest VSWR in the table in the test record.

10. **RSA6120B only:** Set the Center frequency of the RSA6120B to each frequency in the RSA6120B VSWR Preamp On Test Frequencies table. Set the Network Analyzer center frequency (Start /Center > Center (F3)) to the same frequency. Press Marker Search > MAX (F1) and record the value in the table.

Table 67: RSA6120B VSWR Preamp On Test Frequencies (GHz)

14.05	15.05	16.05	17.05	18.05	19.05
14.15	15.15	16.15	17.15	18.15	19.15
14.25	15.25	16.25	17.25	18.25	19.25
14.35	15.35	16.35	17.35	18.35	19.35
14.45	15.45	16.45	17.45	18.45	19.45
14.55	15.55	16.55	17.55	18.55	19.55
14.65	15.65	16.65	17.65	18.65	19.65
14.75	15.75	16.75	17.75	18.75	19.75
14.85	15.85	16.85	17.85	18.85	19.85
14.95	15.95	16.95	17.95	18.95	19.95

11. **RSA6120B**: Enter the highest VSWR in the table in the test record.

Amplitude

RF Flatness (Frequency Response) 10 MHz to 20 GHz

1. Connect the RF generator, power splitter, power meter, and RSA6100B, as shown in the following figure.

   The power splitter outputs should connect directly to the RSA6100B RF Input and to the Power Sensor, without using cables.

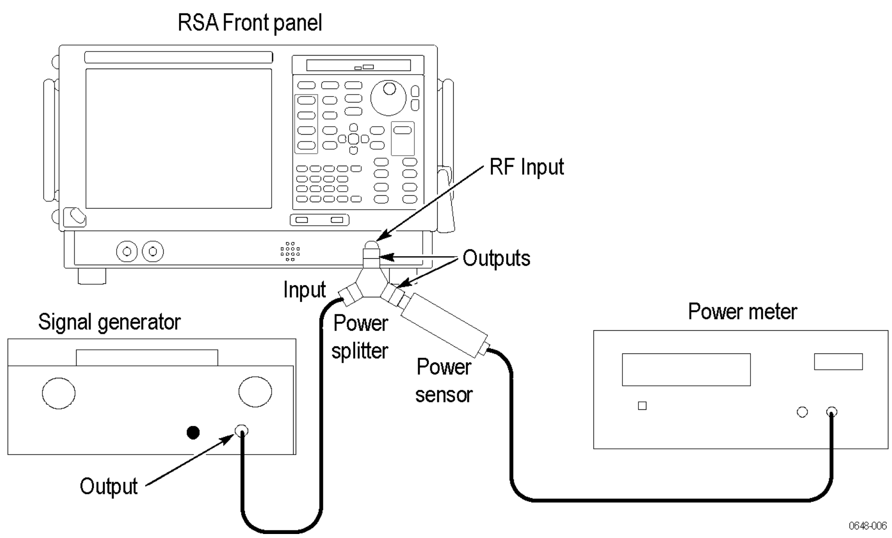

Figure 12: Equipment connections for RF Flatness check

2. To record the test readings, you can make a printout of the following table. (See Table 68.)
3. Reset the RSA6100B to factory defaults: Setup > Preset (Main).
4. Select **Tools** > **Alignments** and then select **Align Now**.
5. Set the RSA6100B as follows:

Ref Level	–15 dBm
Setup > Amplitude >Internal Settings > Ref Level	
Internal Attenuator	10 dB (Auto unchecked)
Setup > Amplitude > Internal Settings > Internal Attenuator	
Span	1 MHz
Setup > Settings > Freq & Span> Span	

6. Set the RF signal generator for a -14 dBm output amplitude and turn RF On..
7. Set both the RF signal generator output frequency and the RSA6100B Center Frequency to the first frequency in the RF Flatness table that follows. This is the reference frequency. (See Table 68.)

8. Select the Markers Peak key to set the Reference Marker (MR) to the carrier peak.
9. Adjust the RF signal generator output level for a marker reading of -20 ± 0.5 dBm.
10. Record the Power Meter reading and the RSA6100B marker reading in the following table.
11. Set both the RF Generator output frequency and the RSA6100B center frequency to the next frequency in the table.
12. Press the **Markers Peak** key to set the Reference Marker (MR) to the carrier peak.
13. Calculate the ΔPower Meter number: subtract the Power meter reading at 100 MHz from the Power Meter reading at this frequency.
14. Calculate the ΔRTSA number: subtract the RTSA reading at 100 MHz from the RTSA reading at this frequency.
15. Calculate the RF Flatness Error:

    RF Flatness Error = ΔRTSA at this freq – ΔPower Meter at this freq

    Readings are in dBm, error is in dB.
16. Repeat items 11 through 15 for each of the center frequencies shown in the RF Flatness table. (See Table 68.)

Table 68: RF Flatness (Preamp OFF)

Attenuator = 10 dB

Frequency	Power meter reading	Δ Power meter (vs. 100 MHz)	RTSA reading	Δ RTSA reading (vs. 100 MHz)	RF flatness error [1]
100 MHz		0		0	0
10 MHz					
20 MHz					
30 MHz					
40 MHz					
50 MHz					
60 MHz					
70 MHz					
80 MHz					
90 MHz					
200 MHz					
300 MHz					
400 MHz					
500 MHz					

Table 68: RF Flatness (Preamp OFF) (cont.)

Attenuator = 10 dB

Frequency	Power meter reading	∆ Power meter (vs. 100 MHz)	RTSA reading	∆ RTSA reading (vs. 100 MHz)	RF flatness error [1]
600 MHz					
700 MHz					
800 MHz					
900 MHz					
1.0 GHz					
1.1 GHz					
1.2 GHz					
1.3 GHz					
1.4 GHz					
1.5 GHz					
1.6 GHz					
1.7 GHz					
1.8 GHz					
1.9 GHz					
2.0 GHz					
2.1 GHz					
2.2 GHz					
2.3 GHz					
2.4 GHz					
2.5 GHz					
2.6 GHz					
2.7 GHz					
2.8 GHz					
2.9 GHz					
3.0 GHz					
3.1 GHz					
3.2 GHz					
3.3 GHz					
3.4 GHz					
3.5 GHz					
3.6 GHz					
3.7 GHz					
3.8 GHz					
3.9 GHz					
4.0 GHz					

Table 68: RF Flatness (Preamp OFF) (cont.)

Frequency	Power meter reading	∆ Power meter (vs. 100 MHz)	RTSA reading	∆ RTSA reading (vs. 100 MHz)	RF flatness error [1]
Attenuator = 10 dB					
4.1 GHz					
4.2 GHz					
4.3 GHz					
4.4 GHz					
4.5 GHz					
4.6 GHz					
4.7 GHz					
4.8 GHz					
4.9 GHz					
5.0 GHz					
5.1 GHz					
5.2 GHz					
5.3 GHz					
5.4 GHz					
5.5 GHz					
5.6 GHz					
5.7 GHz					
5.8 GHz					
5.9 GHz					
6.0 GHz					
6.1 GHz					
6.2 GHz					
RSA6114B only					
6.3 GHz					
6.4 GHz					
6.5 GHz					
6.6 GHz					
6.7 GHz					
6.8 GHz					
6.9 GHz					
7.0 GHz					
7.1 GHz					
7.2 GHz					
7.3 GHz					
7.4 GHz					

Table 68: RF Flatness (Preamp OFF) (cont.)

Attenuator = 10 dB					
Frequency	Power meter reading	Δ Power meter (vs. 100 MHz)	RTSA reading	Δ RTSA reading (vs. 100 MHz)	RF flatness error [1]
7.5 GHz					
7.6 GHz					
7.7 GHz					
7.8 GHz					
7.9 GHz					
8.0 GHz					
8.1 GHz					
8.2 GHz					
8.3 GHz					
8.4 GHz					
8.5 GHz					
8.6 GHz					
8.7 GHz					
8.8 GHz					
8.9 GHz					
9.0 GHz					
9.1 GHz					
9.2 GHz					
9.3 GHz					
9.4 GHz					
9.5 GHz					
9.6 GHz					
9.7 GHz					
9.8 GHz					
9.9 GHz					
10.0 GHz					
10.1 GHz					
10.2 GHz					
10.3 GHz					
10.4 GHz					
10.5 GHz					
10.6 GHz					
10.7 GHz					
10.8 GHz					
10.9 GHz					

Table 68: RF Flatness (Preamp OFF) (cont.)

Attenuator = 10 dB					
Frequency	**Power meter reading**	**∆ Power meter (vs. 100 MHz)**	**RTSA reading**	**∆ RTSA reading (vs. 100 MHz)**	**RF flatness error** [1]
11.0 GHz					
11.1 GHz					
11.2 GHz					
11.3 GHz					
11.4 GHz					
11.5 GHz					
11.6 GHz					
11.7 GHz					
11.8 GHz					
11.9 GHz					
12.0 GHz					
12.1 GHz					
12.2 GHz					
12.3 GHz					
12.4 GHz					
12.5 GHz					
12.6 GHz					
12.7 GHz					
12.8 GHz					
12.9 GHz					
13.0 GHz					
13.1 GHz					
13.2 GHz					
13.3 GHz					
13.4 GHz					
13.5 GHz					
13.6 GHz					
13.7 GHz					
13.8 GHz					
13.9 GHz					
14.0 GHz					
RSA6120B only					
14.1 GHz					
14.2 GHz					
14.3 GHz					

Table 68: RF Flatness (Preamp OFF) (cont.)

Attenuator = 10 dB

Frequency	Power meter reading	∆ Power meter (vs. 100 MHz)	RTSA reading	∆ RTSA reading (vs. 100 MHz)	RF flatness error [1]
14.4 GHz					
14.5 GHz					
14.6 GHz					
14.7 GHz					
14.8 GHz					
14.9 GHz					
15.0 GHz					
15.1 GHz					
15.2 GHz					
15.3 GHz					
15.4 GHz					
15.5 GHz					
15.6 GHz					
15.7 GHz					
15.8 GHz					
15.9 GHz					
16.0 GHz					
16.1 GHz					
16.2 GHz					
16.3 GHz					
16.4 GHz					
16.5 GHz					
16.6 GHz					
16.7 GHz					
16.8 GHz					
16.9 GHz					
17.0 GHz					
17.1 GHz					
17.2 GHz					
17.3 GHz					
17.4 GHz					
17.5 GHz					
17.6 GHz					
17.7 GHz					
17.8 GHz					

Table 68: RF Flatness (Preamp OFF) (cont.)

Attenuator = 10 dB

Frequency	Power meter reading	Δ Power meter (vs. 100 MHz)	RTSA reading	Δ RTSA reading (vs. 100 MHz)	RF flatness error [1]
17.9 GHz					
18.0 GHz					
18.1 GHz					
18.2 GHz					
18.3 GHz					
18.4 GHz					
18.5 GHz					
18.6 GHz					
18.7 GHz					
18.8 GHz					
18.9 GHz					
19.0 GHz					
19.1 GHz					
19.2 GHz					
19.3 GHz					
19.4 GHz					
19.5 GHz					
19.6 GHz					
19.7 GHz					
19.8 GHz					
19.9 GHz					
20.0 GHz					

1 Use the formula in Step 15

17. Enter the largest variation in each of the following frequency ranges into the test record:

10.0 MHz - 3.0 GHz (Preamp OFF)

3.0 GHz - 6.2 GHz (Preamp OFF)

6.2 GHz - 14.0 GHz (Preamp OFF, RSA6114B only)

6.2 GHz - 20.0 GHz (Preamp OFF, RSA6120B only)

RF Flatness (Frequency Response) 10 MHz to 20.0 GHz, Preamp On (Option 50/51 Installed)

1. Connect the RF generator, power splitter, power meter, and RSA6100B, as shown in the following figure.

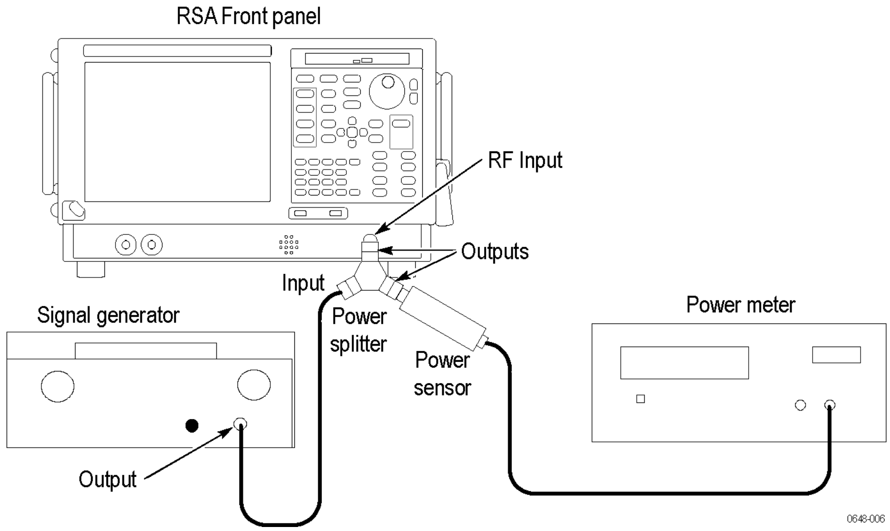

Figure 13: Equipment connections for RF Flatness (Frequency Response) 10 MHz to 20 GHz check

2. Reset the RSA6100B to factory defaults: select **Setup** > **Preset (Main)**.

3. Set the RSA6100B as follows:

Ref Level	–45 dBm
Setup > Amplitude > Internal Settings > Ref Level	
Internal Attenuator	10 dB (Auto unchecked)
Setup > Amplitude > Internal Attenuator	
Internal Preamp	Internal Preamp box checked
Setup > Amplitude > Internal Settings	
Span	1 MHz
Setup > Settings > Freq & Span > Span	

4. Let the instrument run for at least 8 minutes (after turning on the preamp) to allow the preamp to warm to operating temperature.

5. Select **Tools** > **Alignments** and then select **Align Now**.

6. Set the RF generator for a -44 dBm output amplitude and turn RF On.

7. Set both the RF signal generator output frequency and the RSA6100B Center Frequency to the first frequency shown in the table *RF Flatness (Option 50/51 Preamp ON)* (See Table 69.). This is the reference frequency.

8. Select the **Markers Peak** key to set the Reference Marker (MR) to the carrier peak.

9. Record the Power Meter reading and the RSA6100B marker reading in the following table.

10. Set both the RF generator output frequency and the RSA6100B Center Frequency to the next frequency in the table.

11. Select the **Markers Peak** key to set the Reference Marker (MR) to the carrier peak.

12. Calculate the ΔPower Meter number: subtract the Power Meter reading at 100 MHz from the Power Meter reading at this frequency.

13. Calculate the ΔRTSA number: subtract the RTSA reading at 100 MHz from the RTSA reading at this frequency.

14. Calculate the RF Flatness Error:

    RF Flatness Error = ΔRTSA at this freq - ΔPower Meter at this freq

    Readings are in dBm and error is in dB.

15. Repeat steps 10 through 14 for each of the center frequencies shown in the following table.

Table 69: RF Flatness (Option 50/51 Preamp ON)

Attenuator = 10 dB

Frequency	Power meter reading	Δ Power meter (vs. 100 MHz)	RTSA reading	Δ RTSA reading (vs. 100 MHz)	RF flatness error [1]
100 MHz		0		0	0
10 MHz					
20 MHz					
30 MHz					
40 MHz					
50 MHz					
60 MHz					
70 MHz					
80 MHz					
90 MHz					
200 MHz					
300 MHz					
400 MHz					
500 MHz					
600 MHz					
700 MHz					
800 MHz					
900 MHz					

Table 69: RF Flatness (Option 50/51 Preamp ON) (cont.)

Attenuator = 10 dB					
Frequency	Power meter reading	Δ Power meter (vs. 100 MHz)	RTSA reading	Δ RTSA reading (vs. 100 MHz)	RF flatness error [1]
1.0 GHz					
1.1 GHz					
1.2 GHz					
1.3 GHz					
1.4 GHz					
1.5 GHz					
1.6 GHz					
1.7 GHz					
1.8 GHz					
1.9 GHz					
2.0 GHz					
2.1 GHz					
2.2 GHz					
2.3 GHz					
2.4 GHz					
2.5 GHz					
2.6 GHz					
2.7 GHz					
2.8 GHz					
2.9 GHz					
3.0 GHz					
3.1 GHz					
3.2 GHz					
3.3 GHz					
3.4 GHz					
3.5 GHz					
3.6 GHz					
3.7 GHz					
3.8 GHz					
3.9 GHz					
4.0 GHz					
4.1 GHz					
4.2 GHz					
4.3 GHz					
4.4 GHz					

Table 69: RF Flatness (Option 50/51 Preamp ON) (cont.)

Attenuator = 10 dB

Frequency	Power meter reading	∆ Power meter (vs. 100 MHz)	RTSA reading	∆ RTSA reading (vs. 100 MHz)	RF flatness error [1]
4.5 GHz					
4.6 GHz					
4.7 GHz					
4.8 GHz					
4.9 GHz					
5.0 GHz					
5.1 GHz					
5.2 GHz					
5.3 GHz					
5.4 GHz					
5.5 GHz					
5.6 GHz					
5.7 GHz					
5.8 GHz					
5.9 GHz					
6.0 GHz					
6.1 GHz					
6.2 GHz					
RSA6114B only					
6.3 GHz					
6.4 GHz					
6.5 GHz					
6.6 GHz					
6.7 GHz					
6.8 GHz					
6.9 GHz					
7.0 GHz					
7.1 GHz					
7.2 GHz					
7.3 GHz					
7.4 GHz					
7.5 GHz					
7.6 GHz					
7.7 GHz					
7.8 GHz					

Table 69: RF Flatness (Option 50/51 Preamp ON) (cont.)

Attenuator = 10 dB

Frequency	Power meter reading	∆ Power meter (vs. 100 MHz)	RTSA reading	∆ RTSA reading (vs. 100 MHz)	RF flatness error [1]
7.9 GHz					
8.0 GHz					
8.1 GHz					
8.2 GHz					
8.3 GHz					
8.4 GHz					
8.5 GHz					
8.6 GHz					
8.7 GHz					
8.8 GHz					
8.9 GHz					
9.0 GHz					
9.1 GHz					
9.2 GHz					
9.3 GHz					
9.4 GHz					
9.5 GHz					
9.6 GHz					
9.7 GHz					
9.8 GHz					
9.9 GHz					
10.0 GHz					
10.1 GHz					
10.2 GHz					
10.3 GHz					
10.4 GHz					
10.5 GHz					
10.6 GHz					
10.7 GHz					
10.8 GHz					
10.9 GHz					
11.0 GHz					
11.1 GHz					
11.2 GHz					
11.3 GHz					

Table 69: RF Flatness (Option 50/51 Preamp ON) (cont.)

Attenuator = 10 dB

Frequency	Power meter reading	∆ Power meter (vs. 100 MHz)	RTSA reading	∆ RTSA reading (vs. 100 MHz)	RF flatness error [1]
11.4 GHz					
11.5 GHz					
11.6 GHz					
11.7 GHz					
11.8 GHz					
11.9 GHz					
12.0 GHz					
12.1 GHz					
12.2 GHz					
12.3 GHz					
12.4 GHz					
12.5 GHz					
12.6 GHz					
12.7 GHz					
12.8 GHz					
12.9 GHz					
13.0 GHz					
13.1 GHz					
13.2 GHz					
13.3 GHz					
13.4 GHz					
13.5 GHz					
13.6 GHz					
13.7 GHz					
13.8 GHz					
13.9 GHz					
14.0 GHz					
RSA6120B only					
14.1 GHz					
14.2 GHz					
14.3 GHz					
14.4 GHz					
14.5 GHz					
14.6 GHz					
14.7 GHz					

Table 69: RF Flatness (Option 50/51 Preamp ON) (cont.)

Attenuator = 10 dB

Frequency	Power meter reading	Δ Power meter (vs. 100 MHz)	RTSA reading	Δ RTSA reading (vs. 100 MHz)	RF flatness error [1]
14.8 GHz					
14.9 GHz					
15.0 GHz					
15.1 GHz					
15.2 GHz					
15.3 GHz					
15.4 GHz					
15.5 GHz					
15.6 GHz					
15.7 GHz					
15.8 GHz					
15.9 GHz					
16.0 GHz					
16.1 GHz					
16.2 GHz					
16.3 GHz					
16.4 GHz					
16.5 GHz					
16.6 GHz					
16.7 GHz					
16.8 GHz					
16.9 GHz					
17.0 GHz					
17.1 GHz					
17.2 GHz					
17.3 GHz					
17.4 GHz					
17.5 GHz					
17.6 GHz					
17.7 GHz					
17.8 GHz					
17.9 GHz					
18.0 GHz					
18.1 GHz					
18.2 GHz					

Table 69: RF Flatness (Option 50/51 Preamp ON) (cont.)

Attenuator = 10 dB

Frequency	Power meter reading	Δ Power meter (vs. 100 MHz)	RTSA reading	Δ RTSA reading (vs. 100 MHz)	RF flatness error [1]
18.3 GHz					
18.4 GHz					
18.5 GHz					
18.6 GHz					
18.7 GHz					
18.8 GHz					
18.9 GHz					
19.0 GHz					
19.1 GHz					
19.2 GHz					
19.3 GHz					
19.4 GHz					
19.5 GHz					
19.6 GHz					
19.7 GHz					
19.8 GHz					
19.9 GHz					
20.0 GHz					

1 Use the formula in Step 15

16. Enter the largest variation in each of the following frequency range into the test record:

    10 MHz - 6.2 GHz (Preamp ON, RSA6106B Option 50)

    10 MHz - 14.0 GHz (Preamp ON, RSA6114B Option 51)

    10 MHz - 20.0 GHz (Preamp ON, RSA6120B Option 51)

Absolute Accuracy at Calibration Point

1. Connect the RF generator, power splitter, power meter, and RSA6100B. (See Figure 12.)
2. Reset the RSA6100B to factory defaults: select **Setup > Preset (Main)**.
3. Select **Tools** > **Alignments** and select **Align Now**.
4. Set the RSA6100B:

Reference Level	–20 dBm
Setup > Amplitude > Internal Settings > Ref Level	
Center Frequency	100 MHz
Setup > Settings > Center	

5. Set the RF Generator:

Output Frequency	100 MHz
Output Level	–14 dBm
RF	On

6. Set the frequency span (Span key) to 300 kHz.
7. Press the **Markers > Peak** key to set the Reference Marker (MR) to the carrier peak.
8. Record the reading on the Power Meter and on the RSA6100B marker amplitude.
9. Calculate the Absolute Amplitude Accuracy:

   Delta = RSA6100B reading - Power Meter reading

   Readings are in dBm, error is in dB.
10. Record the Absolute Amplitude Error in the test record. (Limits are shown in the test record.)
11. Repeat steps 6 through 10 for frequency spans of 1 MHz and 41 MHz (Option 110).

Absolute Accuracy at Calibration Point, Preamp On (Option 50/51 Installed)

1. Connect the RF generator, power splitter, power meter, and RSA6100B. (See Figure 12.)
2. Reset the RSA6100B to factory defaults: select **Setup > Preset (Main)**.
3. Set the RSA6100B:

Reference Level	–45 dBm
Setup > Amplitude > Internal Settings > Ref Level	
Center Frequency	100 MHz
Setup > Settings > Center	
Internal Preamp	ON (Internal Preamp box checked)

4. Let the instrument run for at least 8 minutes (after turning on the preamp) to allow the preamp to warm to operating temperature.
5. Select **Tools** > **Alignments** and select **Align Now**.
6. Set the RF Generator:

Output Frequency	100 MHz
Output Level	–44 dBm
RF	On

7. Set the frequency span (Span key) to 300 kHz.
8. Press the **Markers > Peak** key to set the Reference Marker (MR) to the carrier peak.
9. Record the reading on the Power Meter and on the RSA6100B marker amplitude.
10. Calculate the Absolute Amplitude Accuracy:

    Delta = RSA6100B reading - Power Meter reading

    Readings are in dBm, error is in dB.
11. Record the Absolute Amplitude Error in the test record. (Limits are shown in the test record.)
12. Repeat steps 7 through 11 for frequency spans of 1 MHz and 41 MHz (Option 110).

Noise and Distortion

Third Order Intermodulation Distortion

1. Set up the RF sine wave generators, Low-pass filters, Signal Combiner, and RSA6100B as shown in the following figure.

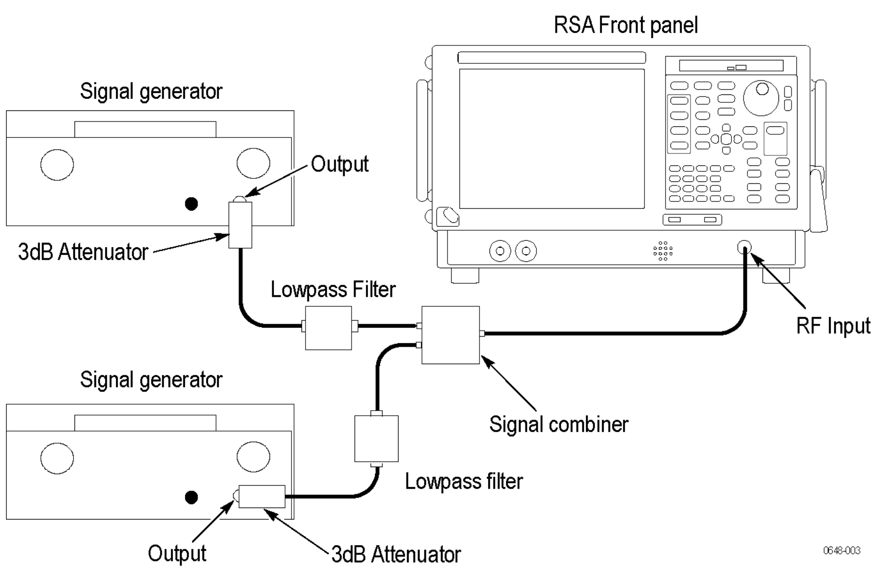

Figure 14: Equipment connections for Third Order Intermodulation Distortion check

2. Reset the RSA6100B to factory defaults: select **Setup > Preset (Main)**.

3. Select **Tools** > **Alignments** and select **Align Now**.

4. Set the RSA6100B:

Ref Level	–20 dBm
Setup > Amplitude > Internal Settings > Ref Level	
Internal Attenuator	0 dB (Auto unchecked)
Setup > Amplitude > Internal Settings > Internal Attenuator	
RF & IF Optimization	Maximize Dynamic Range
Setup > Amplitude > Internal Settings > RF & IF Optimization	
Span	10 kHz
Setup > Settings > Freq & Span > Span	
RBW	Auto checked
Setup > Settings > BW > RBW	
Function	Avg (VRMS)
Setup > Settings > Traces > Function	
Averaging	25 (Count checked)
(Settings >Traces > Avg (VRMS)	

5. Set each of the rf signal generators to provide a power level of -22 dBm and turn RF On.

   a. Set the first generator output frequency to 2.1295 GHz, and the second generator output frequency to 2.1305 GHz.

   b. Set the RSA6100B Function to Normal (Setup > Settings > Traces > Function > Normal).

   c. Set the RSA6100B Center frequency to 2.1295 GHz. Press the **Markers Peak** key. Adjust the first generator output level for a marker reading of –25.0dBm. Record this as carrier #1.

   d. Set the RSA6100B Center frequency to 2.1305 GHz Press the **Markers Peak** key. Adjust the second generator output level for a marker reading of -25.0. This is carrier amplitude #2.

6. Set the RSA6100B Function to Averaging (Setup > Settings > Traces > Function > Avg (VRMS)).

7. Set the RTSA center frequency to 2.1285 GHz. After averaging has completed, press the **Markers Peak** key and read the amplitude level of the signal displayed at the center of the screen. Record this as TOI #1.

8. Set the RTSA center frequency to 2.1315 GHz. After averaging has completed, press the Markers > Peak key and read the amplitude level of the signal displayed at the center of the screen. Record this as TOI #2.

9. Calculate the Third Order Intermodulation Distortion (TOI) using the following procedure. Record the results in the test record.

   a. Record the maximum reading from step 7 or step 8.

   b. Record the minimum reading from step 5 c or step 5 d.

   c. Calculate the TOI using this equation:

      TOI = step a – step b

DANL – Preamp OFF

1. Reset the RSA6100B to factory defaults: select **Setup** > **Preset (Main)**.

2. Select **Tools** > **Alignments** and select **Align Now**.

3. Set the RSA6100B:

Reference Level Setup > Amplitude > Internal Settings > Ref Level	–50 dBm
Internal Attenuator Setup > Amplitude > Internal Settings > Internal Attenuator	0 dB (Auto unchecked)
RF & IF Optimization Setup > Amplitude > RF & IF Optimization	Minimize Noise
Center Frequency Setup > Settings > Freq & Span > Center	10 MHz
Span Setup > Settings > Freq & Span > span	100 kHz
RBW Setup > Settings > BW > RBW	Auto (box checked)
Detection Setup > Settings > Traces > Detection	Avg (of logs)
Function Setup > Settings > Traces > Function	Avg (of logs)
Count Setup > Settings > Traces > Function	1000 (Count box checked)

4. Terminate the RSA6100B RF Input.

5. Set the markers for Noise Mode operation:

   a. Select **Markers** > **Define Markers**.

   b. Select the **Add** soft key to add the Reference marker (MR).

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

d. Select **Absolute** from the **Readouts** drop-down list.

e. Select **Setup** >**Settings**, click the **Prefs** tab, and then select the **Marker Noise Mode** checkbox so it is checked.

6. Set the RSA6100B to each of the Center Frequencies listed in the following tables by pressing the **Freq** key and entering the value listed. After averaging is completed, press the **Markers** > **Peak** key, for each Center Frequency setting. As noted below, if the peak is on a spur, not the noise floor, place the marker on the highest point of the noise floor.

Table 70: RSA6106B Frequencies of interest for DANL

Center frequency	Marker noise level	Frequency range
9.1 kHz [1]		9 kHz — 10 MHz
9.9 MHz		
10 MHz		10 MHz - 100 MHz
99.99 MHz		
100 MHz		100 MHz - 2.3 GHz
2.29 GHz		
2.31 GHz		2.3 GHz - 4.0 GHz
3.99 GHz		
4.01 GHz		4.0 GHz - 6.2 GHz
6.19 GHz		

1 For the 9.1 kHz center frequency, the span must be set to 10 kHz

Table 71: RSA6114B Frequencies of interest for DANL

Center frequency	Marker noise level	Frequency range
9.1 kHz		9 kHz — 10 MHz
9.9 MHz		
10 MHz		10 MHz - 100 MHz
99.99 MHz		
100 MHz		100 MHz - 2.3 GHz
2.29 GHz		
2.31 GHz		2.3 GHz - 4.0 GHz
3.99 GHz		
4.01 GHz		4.0 GHz - 6.2 GHz
6.19 GHz		
6.21 GHz		6.2 GHz - 7.0 GHz
6.99 GHz		

Table 71: RSA6114B Frequencies of interest for DANL (cont.)

Center frequency	Marker noise level	Frequency range
8.21 GHz		7 GHz - 14 GHz
13.9 GHz		

Table 72: RSA6120B Frequencies of interest for DANL

Center frequency	Marker noise level	Frequency range
9.1 kHz		9 kHz — 10 MHz
9.9 MHz		
10 MHz		10 MHz - 100 MHz
99.99 MHz		
100 MHz		100 MHz - 2.3 GHz
2.29 GHz		
2.31 GHz		2.3 GHz - 4.0 GHz
3.99 GHz		
4.01 GHz		4.0 GHz - 6.2 GHz
6.19 GHz		
7.01 GHz		6.2 GHz - 8.2 GHz
8.19 GHz		
14.9 GHz		8.2 GHz - 15 GHz
15.1 GHz		15 GHz - 17.5 GHz
17.49 GHz		
17.51 GHz		15 GHz - 17.5 GHz
19.99 GHz		17.5 GHz - 20 GHz

7. Enter the highest noise level for each of the frequency ranges shown into the test record. (Limits are shown in the test record.)

DANL – Preamp ON (Option 50/51 Only)

1. Reset the RSA6100B to factory defaults: select **Setup** > **Preset (Main)**.
2. Set the RSA6100B:

Reference Level	–50 dBm
Setup > Amplitude > Internal Settings > Ref Level	
Internal Attenuator	0 dB (Auto unchecked)
Setup > Amplitude > Internal Settings > Internal Attenuator	
RF & IF Optimization	Minimize Noise
Setup > Amplitude > RF & IF Optimization	

Internal Preamp Setup > Amplitude > Internal Settings > Internal Preamp	ON (Internal Preamp box checked)
Center Frequency Setup > Settings > Freq & Span > Center	1.1 MHz
Span Setup > Settings > Freq & Span > span	100 kHz
RBW Setup > Settings > BW > RBW	Auto (box checked)
Detection Setup > Settings > Traces > Detection	Avg (of logs)
Function Setup > Settings > Traces > Function	Avg (of logs)
Count Setup > Settings > Traces > Function	100 (Count box checked)

3. Terminate the RSA6100B RF Input.
4. Let the instrument run for at least 8 minutes (after turning on the Preamp) to allow the preamp to warm to operating temperature.
5. Select **Tools** > **Alignments** and select **Align Now**.
6. Set the markers for Noise Mode operation:
   a. Select **Markers** > **Define Markers**.
   b. Select the **Add** button to add the Reference marker (MR).
   c. Select **Add** again to add the M1 marker.
   d. Select **Absolute** from the **Readouts** drop-down list.
   e. Select **Setup** > **Settings** and select the **Prefs** tab. Select the **Marker Noise Mode** checkbox so it is checked.
7. Set the RSA6100B to each of the Center Frequencies listed in the following table by pressing the Freq key and entering the value listed. After averaging is completed, press the Markers > Peak key. As noted below, if the peak is

on a spur, not the noise floor, place the marker on the highest point of the noise floor.

NOTE. *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. (See Table 1-18.). Also, refer to the Spurious Response section of this procedure to determine whether or not a residual spur is within the specification. (See page 102, Spurious Response.)*

Table 73: Frequencies of interest for DANL check (Option 50/51)

Center frequency	Marker Noise level	Frequency range
1.1 MHz		
9.9 MHz		
10.1 MHz		
19.99 MHz		
20.1 MHz		
49.9 MHz		
50.1 MHz		
99.9 MHz		
100.1 MHz		
999 MHz		
1.01GHz		
4.49 GHz		
4.51 GHz		
6.2 GHz		RSA6114B
14.0 GHz		RSA6114B
15.0 GHz		RSA6120B
20.0 GHz		RSA6120B

9. Enter the highest noise level for each of the frequency ranges shown into the test record. (Limits are shown in the test record.)

IF Flatness (Channel Response)

1. Connect the RF generator, power splitter, power meter, and RSA6100B as shown in the following figure.

   The power splitter outputs should connect directly to the RSA6100B RF Input and to the Power Sensor.

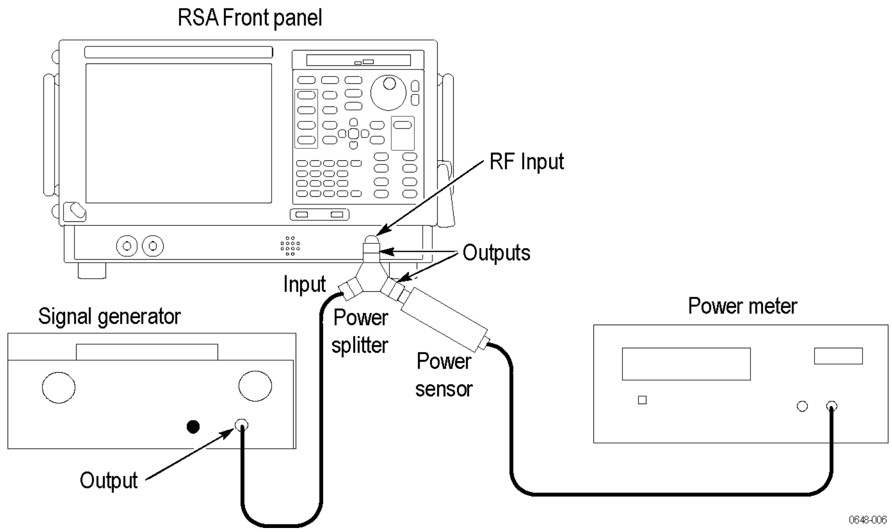

Figure 15: Equipment connections for IF Flatness check

2. Reset the RSA6100B to factory defaults: select **Setup** > **Preset (Main)**.
3. Select **Tools** > **Alignments** and select **Align Now**.
4. Set the RSA6100B:

Center Setup > Settings > Freq & Span > Span	200 MHz
Span Setup > Settings > Freq & Span > Span	300 kHz

5. Set the RF generator output frequency to 200 MHz. This is the reference frequency.
6. Select the **Markers** > **Peak** key to set the Reference marker to the carrier peak.
7. Adjust the signal generator output level to -4 dBm and turn RF On.
8. Record the Power Meter reading and the RSA6100B marker reading in the IF Flatness table. (See Table 74.).
9. Set the RF generator output frequency to the next frequency in the IF Flatness table that follows.
10. Leave the RSA6100B center frequency at 200 MHz and press the **Markers Peak** key.

11. Record the Power Meter reading and the RSA6100B marker reading in the IF Flatness table.
12. Calculate the Δ Power Meter number: subtract the Power Meter reading at 200 MHz from the Power Meter reading at this frequency.
13. Calculate the Δ RTSA number: subtract the RSA6100B marker reading at 200 MHz from the RSA6100B marker reading at this frequency.
14. Calculate the IF Flatness Error using the formula:

    RF Flatness Error = | (Δ RTSA at this freq - Δ Power Meter at this freq) |

    Readings are in dBm, error is in dB.
15. Repeat parts 9 through 14 for each of the remaining generator frequencies shown in the Span = 300 kHz portion of the following table.
16. Record the highest Calculated IF Flatness Error for the Span setting into the test record. (Limits are shown in the test record.)
17. Repeat steps 4 through 16 for Span settings of 10 MHz, 20 MHz and 40 MHz, using the appropriate span segment of the following table.
18. (Option 110 only.) Repeat steps 4 through 16 for a 110 MHz Span setting.

Table 74: IF Flatness - 300 kHz span

Generator Frequency	RTSA reading	Δ RTSA reading (vs. 200 MHz)	Power meter reading	Δ power meter reading (vs. 200 MHz)	Calculated IF Flatness Error
Span = 300 kHz					
200 MHz		0		0	0
199.85 MHz					
199.88 MHz					
199.91 MHz					
199.94 MHz					
199.97 MHz					
200.03 MHz					
200.06 MHz					
200.09 MHz					
200.12 MHz					
200.15 MHz					

Table 75: IF Flatness – 10 MHz span

Generator Frequency	RTSA reading	Δ RTSA reading (vs. 200 MHz)	Power meter reading	Δ power meter reading (vs. 200 MHz)	Calculated IF Flatness Error
200 MHz		0		0	0
195 MHz					
196 MHz					
197 MHz					
198 MHz					
199 MHz					
201 MHz					
202 MHz					
203 MHz					
204 MHz					
205 MHz					

Table 76: IF Flatness – 20 MHz span

Generator Frequency	RTSA reading	Δ RTSA reading (vs. 200 MHz)	Power meter reading	Δ power meter reading (vs. 200 MHz)	Calculated IF Flatness Error
200 MHz		0		0	0
190 MHz					
192 MHz					
194 MHz					
196 MHz					
198 MHz					
202 MHz					
204 MHz					
206 MHz					
208 MHz					
210 MHz					

Table 77: IF Flatness – 40 MHz span

Generator Frequency	RTSA reading	Δ RTSA reading (vs. 200 MHz)	Power meter reading	Δ power meter reading (vs. 200 MHz)	Calculated IF Flatness Error
200 MHz		0		0	0
180 MHz					
184 MHz					
188 MHz					

Table 77: IF Flatness – 40 MHz span (cont.)

Generator Frequency	RTSA reading	Δ RTSA reading (vs. 200 MHz)	Power meter reading	Δ power meter reading (vs. 200 MHz)	Calculated IF Flatness Error
192 MHz					
196 MHz					
204 MHz					
208 MHz					
212 MHz					
216 MHz					
220 MHz					

Table 78: IF Flatness – 110 MHz span (Option 110 only)

Generator Frequency	RTSA reading	Δ RTSA reading (vs. 200 MHz)	Power meter reading	Δ power meter reading (vs. 200 MHz)	Calculated IF Flatness Error
200 MHz		0		0	0
145 MHz					
156 MHz					
167 MHz					
178 MHz					
189 MHz					
211 MHz					
222 MHz					
233 MHz					
244 MHz					
255 MHz					

Spurious Response

Residual Response

1. Terminate the RSA6100B RF Input.
2. Reset the RSA6100B to factory defaults: select **Setup** > **Preset (Main)**.
3. Select **Tools** > **Alignments** and select **Align Now**.
4. Set the RSA6100B:

Ref Level Setup > Amplitude >	–50 dBm
Internal Attenuator Setup > amplitude > Internal Settings > Internal Attenuator	0 dB (Auto unchecked)
Span Setup > Settings > Freq & Span > span	40 MHz
RBW Setup > Settings > BW > RBW	1 kHz
Function Setup > Settings > Traces > Function	Avg (VRMS)
Count Setup > Settings > Traces	20 (Count checked)

5. Set the Frequency (Freq key) to each frequency in the Residual Response Center Frequencies table. (See Table 79.) Wait for the 20 averages to complete, then press the **Markers** > **Peak** key and record the marker amplitude in the following table, from 100 MHz to 6.2 GHz (RSA6106B), 13500 MHz (RSA6114B) or 18000 MHz (RSA6120B).
6. Enter the highest of these signal levels into the test record.

Table 79: Residual Response Center Frequencies

MHz	MHz
100	4500
150	9000
400	10500
575	13500
1285	18000
4125	– – –

Image Suppression

1. Connect the RF generator capable of at least 20 GHz to the RSA6100B RF Input, as shown in the following figure.

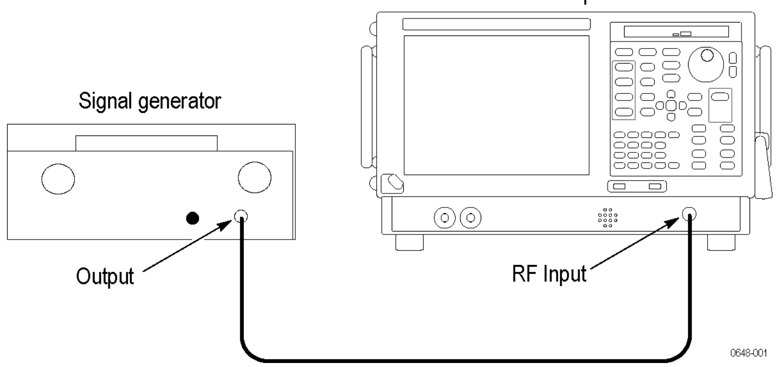

Figure 16: Equipment connections for Image Suppression check

2. Reset the RSA6100B to factory defaults: select **Setup** > **Preset (Main)**.
3. Select **Tools** > **Alignments** and select **Align Now**.
4. Set the RSA6100B:

Ref Level	–30 dBm
Setup > Amplitude > Internal Settings > Ref Level	
Internal Attenuator	10 dB (Auto unchecked)
Setup > Amplitude > Internal Settings > Internal Attenuator	
Span	10 kHz
Setup > Settings > Freq & Span > Span	
RBW	10 Hz (Auto unchecked)
Setup > Settings > BW > RBW	
Function	Avg (VRMS)
Setup > Settings > Traces > Function	
Averages	10 (Count checked)
Setup > Settings > Traces > Function	

5. Set the RF generator: Output Level to -30 dBm at the end of the cable and turn RF On. Verify the output level with the power meter, if necessary.
6. For each row of the table below (as appropriate to your instrument model):
   a. Set the RSA6100B to the Center Frequency shown in the first column.
   b. Set the RF signal generator frequency to that shown in the first column.
   c. Set **Function** to **Normal** (Setup > Settings > Traces > Function > Normal).
   d. Press the **Markers** > **Peak** key.

e. Adjust the RF signal generator amplitude to produce a signal level within 1 dB of the Reference Level. Record this value as the carrier level.

f. Set the RF generator output frequency to the Image Frequency shown in the second column.

g. Set **Function** to **Avg(VRMS)** (Setup>Settings>Traces>Function).

h. After the averaging has completed, press the **Markers** > **Peak** key to move the MR marker to the peak signal value.

i. Read the marker amplitude, in dBm, at the upper-left on the screen. Subtract the carrier level (step e) from the signal image amplitude (step h), to convert it to dBc.

j. Enter this value in the test record.

7. Repeat steps 4 through 6 for each frequency in the following table.

Table 80: Image Suppression Settings – RSA6106B and RSA6114B

RSA6100B Center Frequency	RF Generator Output Frequency (Image)
RSA6106B and RSA6114B	
1 GHz	20 GHz
3.868 GHz	11.434 GHz
RSA6114B only	
8.2 GHz	16.2 GHz
9.1 GHz	17.1 GHz
10 GHz	18 GHz
11 GHz	19 GHz
12 GHz	20 GHz

Table 81: Image Suppression Settings – RSA6120B

RSA6120B Center Frequency	RF Generator Output Frequency (Image)
1 GHz	20 GHz
3.868 GHz	11.434 GHz
8.75 GHz	18.75 GHz
9.6 GHz	19.6 GHz
10.5 GHz	18.5 GHz
11.45 GHz	19.45 GHz
13 GHz	5 GHz
13.5 GHz	5.5 GHz
14.25 GHz	6.25 GHz
15 GHz	7 GHz
16.5 GHz	8.5 GHz

Table 81: Image Suppression Settings – RSA6120B (cont.)

RSA6120B Center Frequency	RF Generator Output Frequency (Image)
17.5 GHz	9.5 GHz
18 GHz	8 GHz
19.5 GHz	9.5 GHz

NOTE. *The intent of the image spurious test is to measure spurious responses caused by the injection 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 -1:1 with changes in input signal frequency. 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 ohms. Residual spurs are subject to separate specification limits.

Spurious Response with Signal

1. Connect the RF generator to the RSA6100B RF Input, as shown in the following figure.

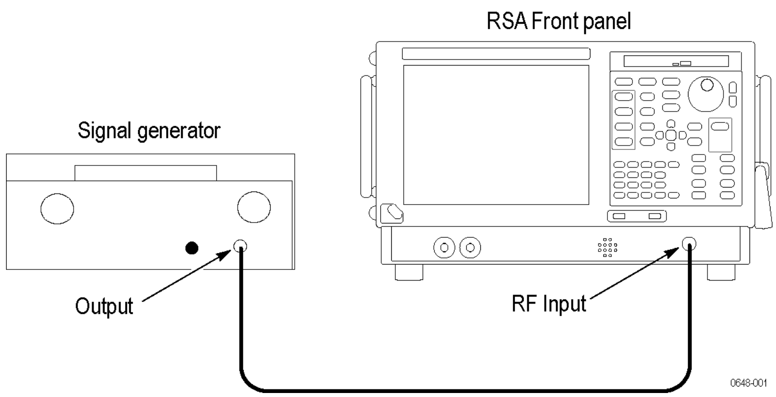

Figure 17: Equipment connections for Signal Spurious check

2. Reset the RSA6100B to factory defaults: select **Setup** > **Preset (Main)**.
3. Select **Tools** > **Alignments** and select **Align Now**.

4. Set the RSA6100B:

Center Frequency Setup > Settings > Freq & Span > Center	1 GHz
Span Setup > Settings > Freq & Span > Span	40 MHz
RBW Setup > Settings > BW > RBW	1 kHz
Function Setup > Settings > Traces > Function	Avg (RMS)
Averages Setup > Settings > Traces > Function	25 (count box is checked)
Ref Level Setup > Amplitude > Ref Level	-15 dBm
Internal Attenuator Setup > Amplitude > Internal Attenuator	10 dB (Auto unchecked)

5. Set the RF generator:

Output Level	–15 dBm
Output Frequency	1 GHz
RF	On

6. Turn on the Marker Reference (MR) and Marker 1 (M1) and set them for Delta Operation.
   - Select **Markers** > **Define** markers.
   - Select the **Add** key to add the MR marker.
   - Select the **Add** key again to add the M1 marker.
   - Select **Delta** from the **Readouts** dropdown menu.
7. After averaging has completed, press the **Markers** > **Select** key and select the **MR** marker.
8. Press the **Markers Peak** key.
9. Press the **Markers Select** key and select the M1 marker.
10. Set the M1 marker frequency to -20 MHz (Option 110: -55 MHz).
11. Rotate the control knob and verify that all marker amplitudes as shown by the Delta M1 marker readout are less than -73 dBc from -20 MHz (Option 110: -55 MHz) to -400 kHz and 400 kHz to 20 MHz (Option 110: 55 MHz).

12. (Option 110 only) Set the RSA6100B Span (Setup > Settings > Freq & Span > Span) to110 MHz. Repeat steps 7 to 11.
13. Enter Pass or Fail into the test record.

Spurious Response with Signal (Half-IF)

1. Connect the RF generator to the RSA6100B RF Input. (See Figure 17.)

NOTE. *Use a low-pass filter if the RF generator has a 2nd harmonic product greater than -70 dBc.*

2. Reset the RSA6100B to factory defaults: select **Setup** > **Preset (Main)**.
3. Select **Tools** > **Alignments** and select **Align Now**.
4. Set the RSA6100B:

Internal Attenuator Setup > Amplitude > Internal Settings > Ref Level	10 dB (Auto unchecked)
Ref Level Setup > Amplitude > Internal Settings > Ref Level	–30 dBm
Span Setup > Settings > Freq & Span > Span	10 kHz
Function Setup > Settings > Traces > Function	Avg (VRMS)
Averages Setup > Settings > Traces > Function	100 (count checked)

5. Set the RF generator:

Output Level	–30 dBm (at the end of the cable/filter)
RF	On

6. Measure the Half IF signal level as follows:
   a. Set the RF signal generator to the frequency in the *Center Frequencies for Half-IF* table. (See Table 82.)
   b. Set the RSA6100B Center Frequency to the frequency in the *Center Frequencies for Half-IF* table. (See Table 82.)
   c. Set **Function** to **Normal** (Setup > Settings > Traces > Function > Normal).
   d. Press the **Markers** > **Peak** key
   e. Adjust the RF signal generator amplitude to produce a signal level within 1 dB of the Reference Level. Record this value as the carrier level.

f. Set the RF signal generator frequency to 4.75 GHz.

g. Set **Function** to **Avg (VRMS)** (Setup > Settings > Traces > Function > Avg (VRMS)).

h. After the averaging has completed, press the **Markers** > **Peak** key to move the MR marker to the peak signal value.

i. Read the marker amplitude (in dBm) at the upper-left on the display. Subtract the carrier level (step e) from the spurious signal amplitude (step h) to convert it to dBc.

j. Enter this value in the test record.

Table 82: Center Frequencies for Half-IF

40 MHz	5 GHz
1 GHz	6 GHz
2 GHz	7 GHz (RSA6114B and RSA6120B only)
3 GHz	8 GHz (RSA6114B and RSA6120B only)
4 GHz	

7. Repeat step 6 for each entry in the table.

Test Record

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

RSA6100B Series Test Record

Model:

Serial Number:

Certificate Number:

Calibration Date:

Technician:

Frequency Accuracy	Low limit	Test Result	High limit
Reference output frequency accuracy	9,999,997 Hz		10,000,003 Hz
Reference output power level	0 dBm		
External reference input level	Fail		Pass

Phase Noise (with Option 11)		Test Result	High limit
Offset			
	CF + 100 Hz		–80 dBc/Hz
	CF + 1 kHz		–100 dBc/Hz
	CF + 10 kHz		–106 dBc/Hz
	CF + 100 kHz		–107 dBc/Hz
	CF + 1 MHz		–128 dBc/Hz
	CF + 6 MHz		–134 dBc/Hz
	CF + 10 MHz		–134 dBc/Hz

Phase Noise (without Option 11)	Cursor	Carrier power	Phase noise [1]	High limit
Offset				
	CF + 100 Hz			–80 dBc/Hz
	CF + 1 kHz			–100 dBc/Hz
	CF + 10 kHz			–106 dBc/Hz
	CF + 100 kHz			–107 dBc/Hz
	CF + 1 MHz			–128 dBc/Hz
	CF + 6 MHz			–134 dBc/Hz
	CF + 10 MHz			–134 dBc/Hz

1 Phase noise = –(cursor measurement – carrier power)

Input VSWR		Test Result	High limit
Preamp OFF			
	10 MHz - 4 GHz		1.5
	>4 GHz - 6.2 GHz		1.6
	6.2 GHz - 20 GHz (RSA6114B and RSA6120B only)		1.9
Preamp ON (Option 50/51 only)			
	10 MHz - 6.2 GHz (RSA6106B only)		1.6
	10 MHz - 4 GHz (RSA6114B and RSA6120B only)		1.5
	4 GHz - 6.2 GHz (RSA6114B and RSA6120B only)		1.6
	6.2 GHz - 14 GHz (RSA6114B only)		1.9
	6.2 GHz - 20 GHz (RSA6120B only)		1.9

RF Input Flatness		Low limit	Test Result	High limit
Attenuator = 10 dB				
	10 MHz - 3 GHz (Preamp OFF)	–0.5 dB		+0.5 dB
	3 GHz - 6.2 GHz (Preamp OFF)	–0.8 dB		+0.8 dB
	6.2 GHz - 20 GHz (Preamp OFF)	–1.0 dB		+1.0 dB
	10 MHz - 6.2 GHz (Preamp ON, Option 50)	–0.8 dB		+0.8 dB
	10 MHz - 6.2 GHz (Preamp ON, Option 51)	–0.8 dB		+0.8 dB
	6.2 GHz -14 GHz (Preamp ON, Option 51)	–1.0 dB		+1.0 dB
	14 GHz -20 GHz (Preamp ON, Option 51)	–1.2 dB		+1.2 dB

Absolute accuracy at calibration point	Low limit	Test Result	High limit
No Preamp/Preamp OFF			
Absolute amplitude SP 300 kHz	–0.31 dB		+0.31 dB
Absolute amplitude SP 1 MHz	–0.31 dB		+0.31 dB
Absolute amplitude SP 41 MHz	–0.31 dB		+0.31 dB
Preamp ON (Option 50/51 Only)			
Absolute amplitude SP 300 kHz	-0.4 dB		+0.4 dB
Absolute amplitude SP 1 MHz	-0.4 dB		+0.4 dB
Absolute amplitude SP 41 MHz	-0.4 dB		+0.4 dB

Third Order Intermodulation Distortion	Test Result	High limit
2.130 GHz		–84 dBc

Displayed Average Noise Level (DANL)		Test Result	High limit
Preamp OFF			
	9 kHz – 10 MHz		–99 dBm/Hz
	10 MHz – 100 MHz		–149 dBm/Hz
	100 MHz – 2.3 GHz		–151 dBm/Hz
	2.3 GHz – 4 GHz		–149 dBm/Hz
	4 GHz – 6.2 GHz		–145 dBm/Hz
	6.2 GHz – 7 GHz (RSA6114B only)		–145 dBm/Hz
	6.2 GHz – 8.2 GHz (RSA6120B only)		–145 dBm/Hz
	7 GHz – 14 GHz (RSA6114B only)		–137 dBm/Hz
	8.2 GHz – 15 GHz (RSA6120B only)		–149 dBm/Hz
	15 GHz – 17.5 GHz (RSA6120B only)		–145 dBm/Hz
	17.5 GHz – 20 GHz (RSA6120B only)		–143 dBm/Hz
Preamp ON (Option 50/51 only)			
	1 MHz – 10 MHz (RSA6106B only)		–159 dBm/Hz
	10 MHz – 1 GHz (RSA6106B only)		–165 dBm/Hz
	1 GHz – 4 GHz (RSA6106B only)		–164 dBm/Hz
	4 GHz –6.2 GHz (RSA6106B only)		–163 dBm/Hz
	100 kHz – 1 MHz (RSA6114B/6120B only)		–122 dBm/Hz
	1 MHz – 10 MHz (RSA6114B/6120B only)		–135 dBm/Hz
	10 MHz – 100 MHz (RSA6114B/6120B only)		–152 dBm/Hz
	100 MHz – 4 GHz (RSA6114B/6120B only)		–164 dBm/Hz
	4 GHz – 14 GHz (RSA6114B/6120B only)		–162 dBm/Hz
	14 GHz – 20 GHz (RSA6120B only)		–160 dBm/Hz

IF Flatness (Channel Response)		Low limit	Test Result	High limit
Span Setting				
	300 kHz	–0.1 dB		+0.1 dB
	10 MHz	–0.2 dB		+0.2 dB
	20 MHz	–0.4 dB		+0.3 dB
	40 MHz	–0.4 dB		+0.4 dB
	110 MHz	–0.5 dB		+0.5 dB

Residual Response	Test Result	High limit
100 MHz		–90 dBm
150 MHz		–90 dBm
400 MHz		–95 dBm
575 MHz		–95 dBm
1.285 GHz		–95 dBm
4.125 GHz		–95 dBm
4.500 GHz		–95 dBm
9.000 GHz (RSA6120B only)		–95 dBm
10.500 GHz (RSA6120B only)		–95 dBm
13.500 GHz (RSA6120B only)		–95 dBm
18.000 GHz (RSA6120B only)		–95 dBm

Image Suppression		Test Result	High limit
All Models			
	1GHz		–80 dBc
	3.868 GHz		–80 dBc
RSA6114B only			
	8.2 GHz		–76 dBc
	9.1 GHz		–76 dBc
	10 GHz		–76 dBc
	11 GHz		–76 dBc
	12 GHz		–76 dBc
RSA6120B only			
	14 GHz		-76 dBc
	15 GHz		–76 dBc
	16 GHz		–76 dBc
	17 GHz		–76 dBc
	18 GHz		–76 dBc
	19 GHz		–76 dBc
	20 GHz		–76 dBc

Spurious Response with Signal	Low limit	Test Result	High limit
>400 kHz of Center Frequency	Fail		Pass
>400 kHz of Center Frequency (Option110 only)	Fail		Pass

Spurious Response with Signal (Half IF)	Test Result	High limit
40 MHz		–62 dBc
1 GHz		–62 dBc
2 GHz		–62 dBc
3 GHz		–62 dBc
4 GHz		–62 dBc
5 GHz		–62 dBc
6 GHz		–62 dBc
7 GHz (RSA6114B and RSA6120B only)		–62 dBc
8 GHz (RSA6114B and RSA6120B only)		–62 dBc