

# Model RTSA7550 Specification v1.1

## Real-Time Spectrum Analyzers - 9 kHz to 8/18/27 GHz



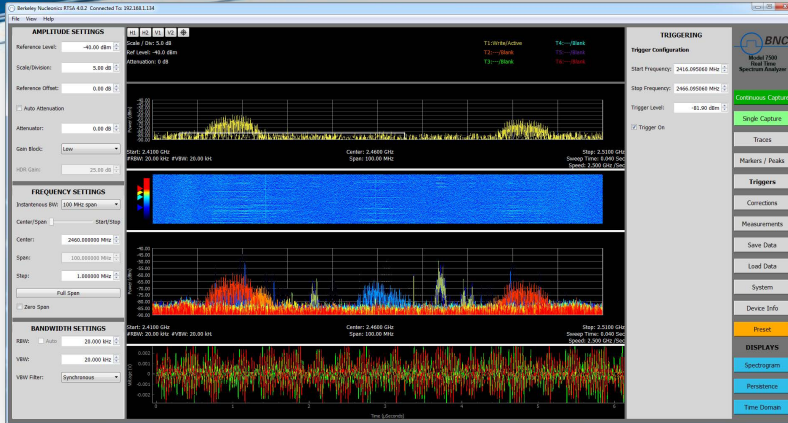
### Featuring

- Real-Time Bandwidth (RTBW) up to 160 MHz
- Spurious Free Dynamic Range (SFDR) up to 100 dBc
- Small form-factor, GigE Networked and remote deployable



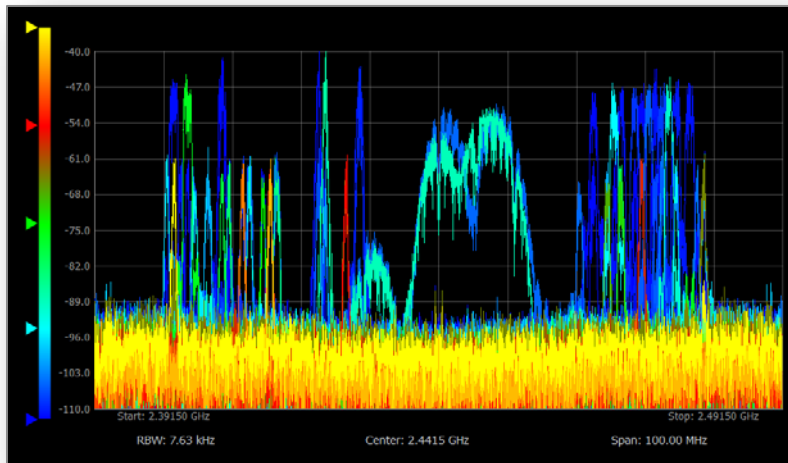
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# BNC Model RTSA7550 Series Introduction



## What is a Real-Time Spectrum Analyzer?

A Real-Time Spectrum Analyzer (RTSA) processes RF signals at a speed fast enough to avoid missing any signals for its given captured bandwidth, known as its Real-Time Bandwidth (RTBW) or Instantaneous Bandwidth (IBW). In addition, an RTSA needs to provide views of the spectrum in the frequency and time domains, as well as power spectral density to enable analysis of signals that may be too fast to detect with the human eye. And finally an RTSA must provide the capability to trigger on events and capture them, and record them for playback enabling deeper analysis.



## Who needs a Real-Time Spectrum Analyzer?

Anyone dealing with signals that may vary dynamically in amplitude or are agile in frequency. Examples include:

- Short duration intermittent signals such as pulsed radar systems, frequency-hopping spread spectrum radios, pulse modulated radios;
- Multi-signal environments such as ISM bands – 915 MHz, 2.4, 5.8, 24 GHz;
- Unwanted signals such as unintentional or self-interference, intentional interference (jammers), and listening devices (bugs).

## What is the BNC solution?

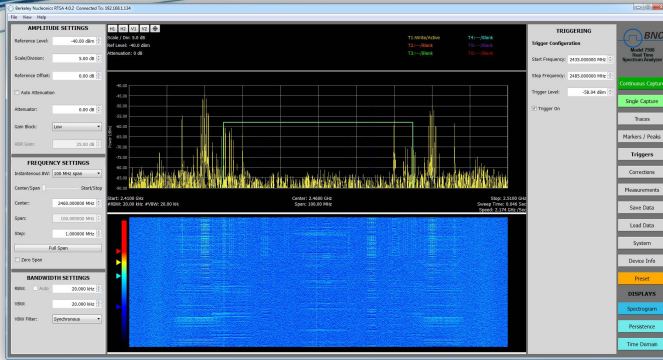
The BNC RTSA7550 is a PC-controlled Real-Time Spectrum Analyzer (RTSA) which includes:

- 9 kHz to 8, 18 or 27 GHz frequency range
- Real-time spectrum graph
- Real-time spectrogram view
- Real-time power spectral density display (persistence)
- Real-Time Triggering
- Real-time Time Domain
- Real-Time Recording and Playback

The RTSA7550 can be utilized anywhere in the wireless ecosystem, R&D, Education, Manufacturing, Deployment, and Monitoring.

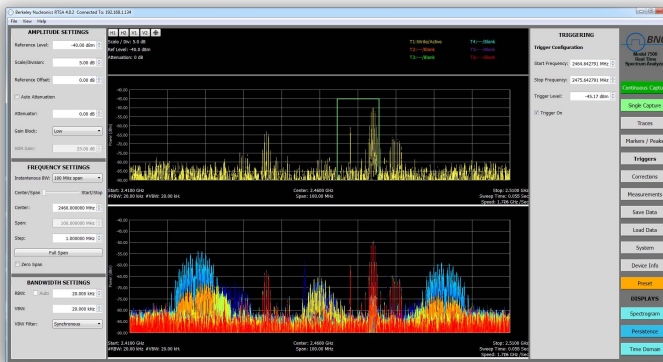


# BNC Model RTSA7550 Series RTSA7550 Displays



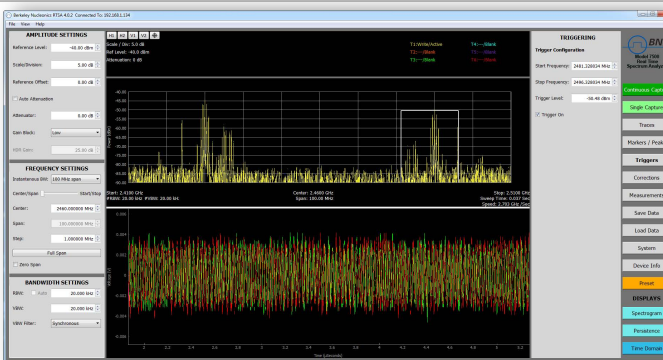
## Spectrogram View

Along with the standard spectrum graph which plots Power versus Frequency the user can select the Spectrogram View. The Spectrogram View provides a 3-dimensional view of the spectrum adding the dimension of Time. Time zero is at the top of the Spectrogram view and measurements in the past scroll down. The color indicates the relative magnitude of the Power. In this case, red is the highest power. Several palettes are available to optimize viewing depending on the signals to be evaluated. By looking at the time, you can see the periodicity of any given signal.



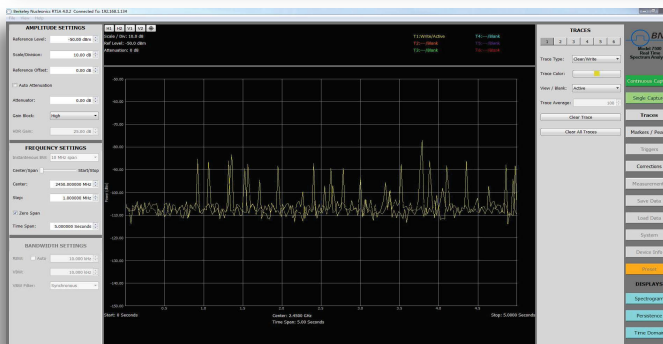
## Power Spectral Density Display

The Power Spectral Density Display is commonly called the Persistence Display. Both names give a partial description of what the display does. The color is an indication of how dense or how often the signal is present at the respective power level. In this case yellow represents the level the signal is at most of the time. And signals persist on the screen for a few seconds before fading out allowing you to see signals that come too fast to view in the spectrum graph. You can see the Wi-Fi signal, the Bluetooth Signals, and the Microwave Oven Signals that were present just a few seconds earlier.



## Time Domain View

The Time Domain view shows voltage on the vertical axis and time on the horizontal axis, allowing the user to view the shape of the signal as well as variations in the signal over time. The Time Domain view also displays the duration and amplitude of the signal.



## Zero-Span Mode (NEW)

The RTSA7550 now features a Zero-Span Mode, where power is displayed as a function of time. Zero-Span Mode is useful for taking pulsed power measurements at a specified frequency. By adjusting the resolution bandwidth (RBW), it is possible to get a range of measurements including power, power-in-band, and rise and fall times

# BNC Model RTSA7550 Series

## RTSA7550 Interfaces



### Extensibility of the RTSA7550 for additional functionality and OEMs

- 10 MHz In for external references and a 10 MHz Out reference for multi-unit synchronization
- Analog I/Q Out enables OEM high speed digitizers and post-processing software tools
- GPIO for external triggers and exterior modules such as antenna switches, downconverters, and GPS
- 10/100/1000 Ethernet port for control and networking the RTSA7550
- +12 V DC power input allowing drive testing with automobile 12 V DC sources and personal mobility with an external 12 Volt battery
- External support for 80 MHz and 160 MHz RTBW (optional)
- External Local Oscillator inputs for phase-coherent radio front-ends (not shown and optional)
- HIF out for immediate functionality as a block down converter



### Industry-leading APIs for customization

BNC utilizes industry-leading APIs/standards and open-source code for easy customization and remote control. University students can take advantage of it as well for their research and develop new applications.

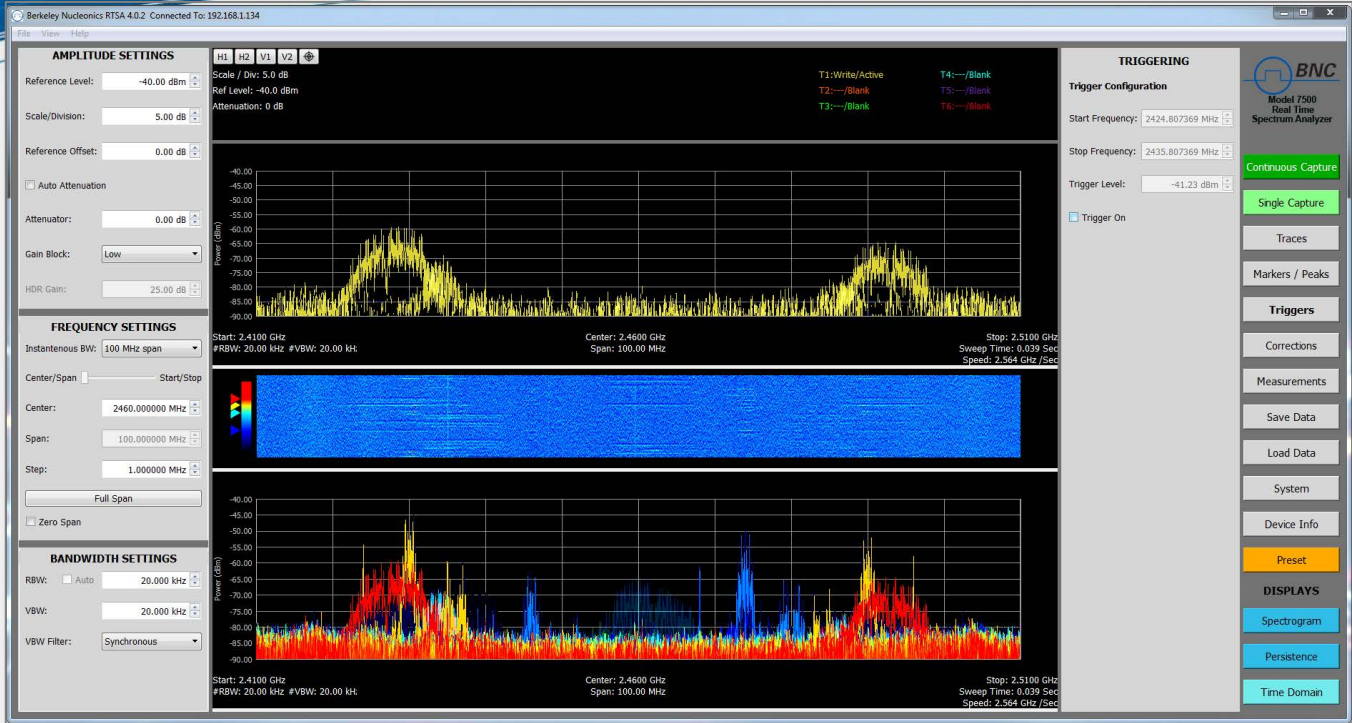
- Python
- LabVIEW Base Development System for Windows
- MATLAB® R2014b
- C / C++ programming
- SCPI Commands

Standard saved file formats for deeper analysis:

- Comma Separated Values (CSV)

# BNC Model RTSA7550 Series

## RTSA7550 Measurements



### Make measurements locally or remotely

Measurement can be made remotely via the Internet around the globe. Ideal for remote monitoring applications.

- Up to six traces are available as Trace Normal, Trace Average, Max Hold, and Min Hold.
- Twelve Markers are available as Normal (tracking), Delta, and Fixed with Peak Search functions that can be assigned to any trace.
- The Real-Time Level Trigger only captures signals over a certain level and is useful for viewing signals over the Internet.
- For remote applications, Record data on the local PC and then use Playback to view the data without any Internet latency.
- The widescreen view of a laptop or PC monitor enables enhanced viewing not available on instruments with built-in screens.
- The intuitive GUI display makes it easy to operate for anyone familiar with a benchtop spectrum analyzer.

### RTSA7550 Key Features

- **9 kHz to 8, 18, or 27 GHz Frequency Range**
- **Real-Time Bandwidth (RTBW) up to 160 MHz**
- **100% Probability of Intercept (POI) as short as 25.5  $\mu$ s**
- **Spurious Free Dynamic Range (SFDR) up to 100 dBc**
- **Fraction of the cost of benchtop/PXIe systems**

### BNC, the source for real-time analysis

BNC combines patented technology, low-cost digital software-defined radio technology, open source software, standard APIs, and a PC-controlled architecture to provide unparalleled performance for the price. If you are dealing with dynamic and agile signals and could be more productive with an RTSA but thought it was out of your budget, think BNC. Only BNC can deliver these Real-Time Spectrum Analysis features with this performance at a price that is affordable. For the best features, real-time analysis, and affordability we invite you to visit BNC in Real-Time!



# BNC Model RTSA7550 Series

## Specifications

Real-time spectrum analyzer mode		
Display Modes	Real-Time Spectrum Real-Time Spectrogram Real-Time Persistence Spectrum Time Domain Zero Span	
Real-time bandwidth (RTBW)	0.1 / 10 / 40 /100 MHz	
Spurious Free Dynamic Range (SFDR)	≥ 60 dBc (nominal) ≥ 70 dBc (nominal) ≥ 100 dBc (nominal)	100 MHz RTBW 10 / 40 MHz RTBW 0.1 MHz RTBW
Data Acquisition		
A/D Converter Sampling Rate and Resolution	125 MS/s, 12 bit 300 kS/s, 24 bit	10 / 40 / 100 MHz RTBW 0.1 MHz RTBW
FFT lengths	128 to 524288 in powers of 2	
Resolution Bandwidth (RBW)		
Range	0.24 kHz to 488.00 kHz 0.62 Hz to 2543.12 Hz	10 / 40 /100 MHz RTBW 0.1 MHz RTBW
Traces	6	Clear/Write, Trace Average, Max Hold, Min Hold
Markers	12	
Modes	Normal (tracking), Delta, Fixed	Peak, Next Peak (Right/Left), Center
Marker Frequency Resolution	0.01 Hz	
Triggers	1	Real-Time Level Trigger
APIs	Python™ LabVIEW MATLAB® C/C++ SCPI	Python GUI LabVIEW Base Development System for Windows MATLAB® Release 2014b ISO/IEC 14882:2011 IEEE 488.2 - Standard Commands for Programmable Instruments
Record/Playback Preferences	CSV Save/Load Settings	Comma Separated Values Save settings for easy recall
Export Data	CSV	Comma Separated Values

Frequency		
Frequency Ranges		
Swept Mode / RTSA Mode (100/40/10/0.1 MHz)	50 MHz to 8 GHz, 18 GHz or 27 GHz	
Baseband Mode	9 kHz to 62.5 MHz	Non-tunable
Frequency Reference	± 1.0 x 10 <sup>-6</sup> per year ± 1.0 x 10 <sup>-6</sup> per year	Aging Accuracy + aging

Amplitude		
Amplitude Accuracy		
25 °C ± 5 °C, typical	± 2.00 dB typical	9 kHz to 27 GHz
Amplitude Ranges		
Measurement Range	DANL to maximum safe input level	
Attenuator Range	0 or 30 dB in 10 dB steps 0 to 25 dB, 1 dB steps	8 GHz only IF Attenuator for 18 and 27 GHz only
Maximum Safe RF Input Level	+10 dBm, 0 V DC	



# BNC Model RTSA7550 Series

## Specifications

### Noise Measurements

SSB Phase Noise 25 °C ± 5 °C, typical	at 1 GHz	Carrier Offset
	-90 dBc/Hz typical	100 Hz
	-92 dBc/Hz typical	1 kHz
	-100 dBc/Hz typical	10 kHz
	-101 dBc/Hz typical	100 kHz
	-121 dBc/Hz typical	1 MHz

### Displayed Average Noise Level (DANL)

25 °C ± 5 °C, typical

	8 GHz (typical)	18 GHz (typical)	27 GHz (typical)	Frequency
	-151 dBm	-164 dBm	-162 dBm	100 MHz
	-151 dBm	-163 dBm	-162 dBm	500 MHz
	-150 dBm	-161 dBm	-160 dBm	1 GHz
	-149 dBm	-152 dBm	-144 dBm	2 GHz
	-145 dBm	-157 dBm	-157 dBm	3 GHz
	-140 dBm	-155 dBm	-154 dBm	4 GHz
	-142 dBm	-149 dBm	-145 dBm	5 GHz
	-134 dBm	-143 dBm	-143 dBm	6 GHz
	-134 dBm	-149 dBm	-143 dBm	7 GHz
	-131 dBm	-163 dBm	-158 dBm	8 GHz
		-162 dBm	-158 dBm	9 GHz
		-162 dBm	-157 dBm	10 GHz
		-160 dBm	-160 dBm	11 GHz
		-158 dBm	-154 dBm	12 GHz
		-156 dBm	-146 dBm	13 GHz
		-155 dBm	-150 dBm	14 GHz
		-159 dBm	-147 dBm	15 GHz
		-155 dBm	-150 dBm	16 GHz
		-152 dBm	-145 dBm	17 GHz
		-149 dBm	-147 dBm	18 GHz
			-147 dBm	19 GHz
			-151 dBm	20 GHz
			-146 dBm	21 GHz
			-145 dBm	22 GHz
			-149 dBm	23 GHz
			-151 dBm	24 GHz
			-148 dBm	25 GHz
			-143 dBm	26 GHz
			-133 dBm	27 GHz

Third Order Intercept/(TOI)

+12 dBm, typical

at 1 GHz

### Regulatory Compliance

RoHS Compliance	RoHS/RoHS 2
Marks	CE
EMC Directive 2014/30/EU	EN 61326-1: 2013
Low Voltage Directive 2006/95/EC	EN 61010-1: 2010 Class 1



# BNC Model RTSA7550 Series Specifications

General Specifications		
<b>PC Required</b>		
Operating System	Windows 7 , 8, 10 (32 or 64 bit)	*For best performance, a dedicated PC is recommended.
Minimum RAM Size	4 GB	
Minimum Hard Disk space	2 GB	
Space Ethernet Port	1 GigE	
Display Resolution	1920 x 1080	
Status Indicators	PLL Lock / 10 MHz reference clock status Ethernet Link and Activity status CPU and Power status	
<b>Connectors</b>		
RF In	SMA female, 50 Ω	0 or 35 MHz
10 MHz Reference In and Out	SMA female, 50 Ω	
Analog I and Q Out	SMA female, 50 Ω	
HIF Out	SMA female, 50 Ω	
10/100/1000 Ethernet	RJ45	
USB Console	mini-USB	
GPIO	25-pin male D-Subminiature Type A: 5.5	
Coaxial Power	mm OD, 2.5 mm ID	
<b>Physical</b>		
Power Supply	+12 V DC	
Power Consumption	18 W	
Operating Temperature Range	0 °C to +50 °C	
Storage Temperature Range	-40 °C to +85 °C	
Size	269 x 173 x 61 mm (10.58 x 6.81 x 2.40 inches)	with mounting feet (shipped installed on unit)
	269 x 173 x 55 mm (10.58 x 6.81 x 2.15 inches)	without mounting feet
Weight	2.7 kg (6 lbs.)	
Warm Up Time	30 minutes	

Ordering Information		
8 GHz RTSA	RTSA7550-8B	9 kHz to 8 GHz, RTBW up to 10 MHz*
8 GHz RTSA	RTSA7550-8	9 kHz to 8 GHz, RTBW up to 100 MHz
18 GHz RTSA	RTSA7550-18	9 kHz to 18 GHz, RTBW up to 100 MHz
27 GHz RTSA	RTSA7550-27	9 kHz to 27 GHz, RTBW up to 100 MHz
80 MHz and 160 MHz RTBW Support	RTSA7550-xxx-WBIQ **	External support for 80 MHz Super-Heterodyne and 160 MHz Zero-IF RTBW. The RTBW of 160 MHz is intended for IQ out only. The internal digitizer remains at 125 MSa/s.
Software Included	RTSA	Real-Time Spectrum Analyzer software
Laptop Accessory	P/N7128	Laptop accessory - GUI installed for RTSA7550 - includes Toshiba L55-B5276 (or equivalent) loaded with MS Home and Business 2013, Adobe PDF Viewer & Windows 8 or 10 operating software
Rack Shelf	P/N7123	19" rack shelf supports two horizontally mounted
External Battery	P/N7127	20,000 mAh 12 V / 1.5 A battery, >3.5 hours typ.
* The 8B does not include 10 MHz Out or I/Q Out		
** xxx = 8, 18 or 27 for 8 GHz, 18 GHz, or 27 GHz models respectively		