

# Signal Hound®

UNRIVALED VALUE IN RF TEST AND MEASUREMENT

## SM200B Spectrum Analyzer

Real-Time Spectrum Analyzer  
and Monitoring Receiver

100 kHz to 20 GHz

AVAILABLE FOR  
**\$12,990**  
US RETAIL



signalhound.com

# SM200B Spectrum Analyzer

## Real-Time Spectrum Analyzer and Monitoring Receiver 100 kHz to 20 GHz

### Features and Performance You Need Now

Implementing wireless technologies is becoming part of many of our jobs. Having a spectrum analyzer available to test and implement RF designs into your projects is key. The Signal Hound SM200B spectrum analyzer offers an unrivaled value, providing the performance you need at the best price available on the market.

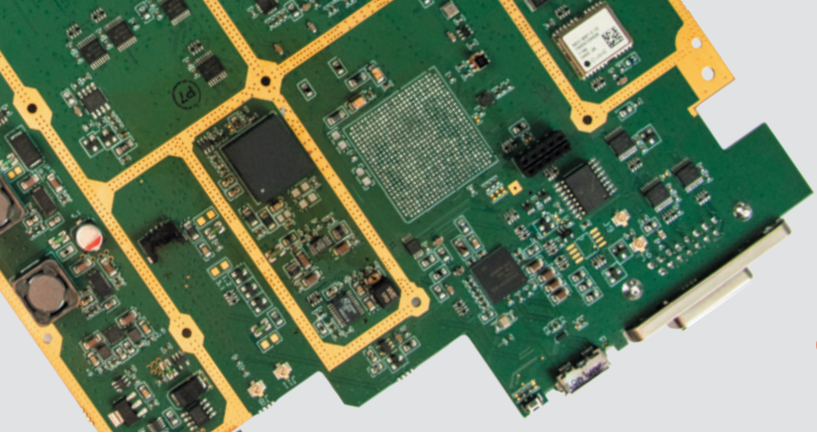
The SM200B is a high-performance spectrum analyzer and monitoring receiver. Tuning from 100 kHz to 20 GHz, the analyzer has 160 MHz of instantaneous bandwidth (IBW), 110 dB of dynamic range, 1THz/sec sweep speed at 30 kHz RBW, and phase noise performance that is low enough to contribute less than 0.1% error to EVM measurements. This rivals even the most expensive spectrum analyzers on the market.

Managing and maintaining efficient communication networks requires the best tools you can get. The need for an affordable spectrum analyzer with the performance to monitor, manage, troubleshoot, and protect RF spectrum in the field has become a critical factor for success. The SM200B is meeting the need for many of these applications.

Whether you are in the lab or in production, the SM200B is the spectrum analyzer you need to keep your product supported. Don't wait for your turn to share scarce equipment — now you can have what you need in your own desk drawer!

- 100 kHz to 20 GHz frequency range
- +20 dBm to -160 dBm measurement range
- 110 dB dynamic range
- 1 THz sustained sweep speed
- 160 MHz of instantaneous bandwidth
- Sub-octave preselector, 20 MHz to 20 GHz
- -160 dBm displayed average noise level (Frequency at 1 GHz)
- System noise figure 11 dB typical (0.7 to 2.7 GHz)
- Phase noise of 132 dBc/Hz, 10 kHz offset, and 1 GHz carrier
- ± 2.0 dB absolute amplitude accuracy
- 0.1 Hz to 3 MHz resolution bandwidth
- Calibrated streaming I/Q 5 kHz to 40 MHz of selectable I/Q bandwidth
- 2-second capture buffer for 160 MHz (IBW) I/Q, block transfers to PC
- Real-time spectrum analysis capabilities up to 160 MHz with a 100 percent probability of intercepting signals as fast as 3.1 μsec.





# SM200B Spectrum Analyzer

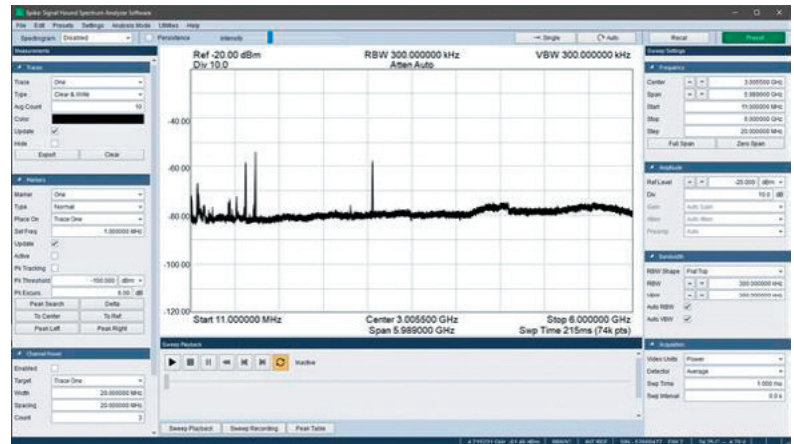
## Measurements, Capabilities and Features

### Spectrum Analyzer Measurements

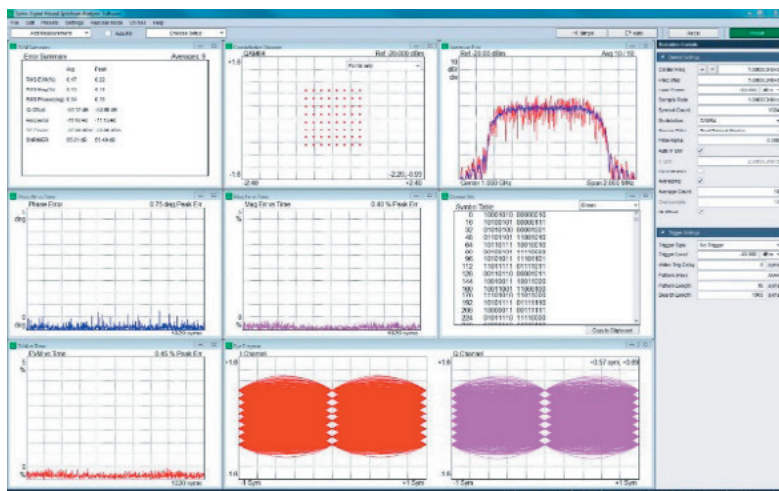
#### Evaluate your signal performance in detail

The SM200B provides a wide range of measurements that let you evaluate your signal performance in detail.

In addition to its many specialized measurements, the SM200B offers all the traditional spectrum analyzer capabilities with features such as adding markers, traces, channel power, adjacent channel power, occupied bandwidth, spectrogram, phase noise, trace export, and sweep recording.



The SM200B offers all of the traditional spectrum analyzer measurement capabilities.



The SM200B includes a full suite of digital modulation analysis capabilities.

### Complex Signal Analysis

#### Don't pay extra to analyze your complex signals!

The SM200B includes a full suite of signal analysis capabilities. Our digital modulation analysis capability includes constellation diagrams and symbol tables for modulation formats such as QPSK, BPSK, 8PSK,  $\pi/4$ QPSK, DQPSK, and QAM16/32/64/256.

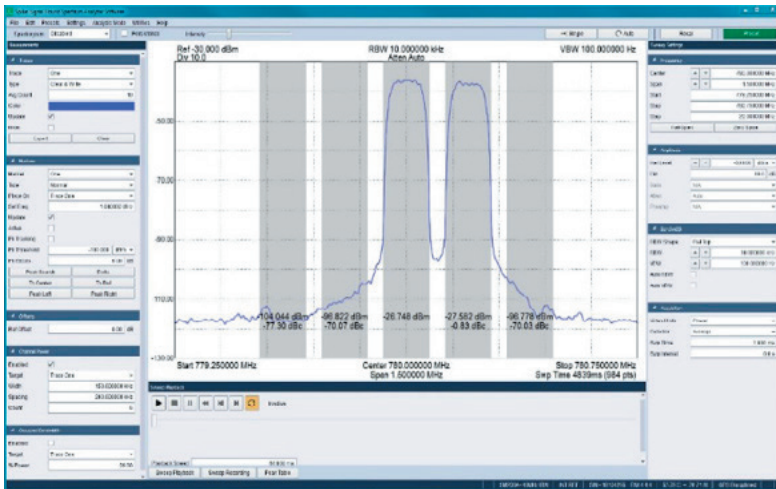
Use constellation plots to visualize RF metrics such as I/Q offset, skew, EVM, phase noise, sample timing jitter, and compression.

## ACPR, OBW, EVM Measurements and More

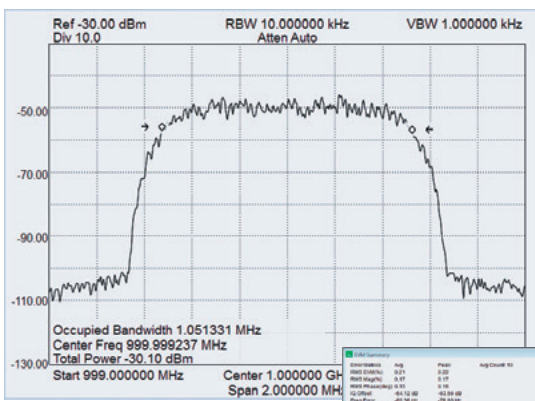
### 160 MHz of Instantaneous Bandwidth

Comprehensive signal analysis capabilities include adjacent channel power ratio (ACPR) or adjacent channel leakage ratio (ACLR), occupied bandwidth (OBW) and channel power measurements. The 160 MHz of instantaneous bandwidth provided by the SM200B enables real-time OBW and ACPR measurements of very wide-bandwidth signals, transient or continuous.

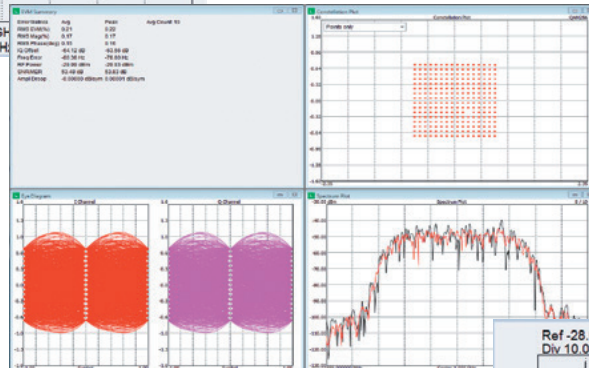
Measurements include: error vector magnitude (EVM), Signal-to-Noise Ratio (SNR), Modulation Error Ratio (MER), Modulation quality metrics, Linear compensations such as carrier offset, I/Q offset, amplitude droop (linear amplitude corrections), sync pattern triggering, eye diagrams, and equalization.



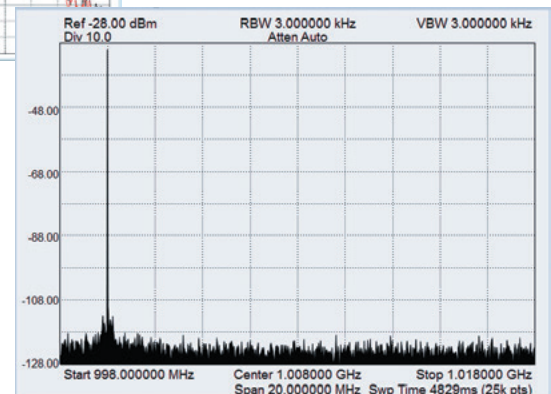
Adjacent Channel Power Ratio (ACPR) measurements.



OBW



EVM



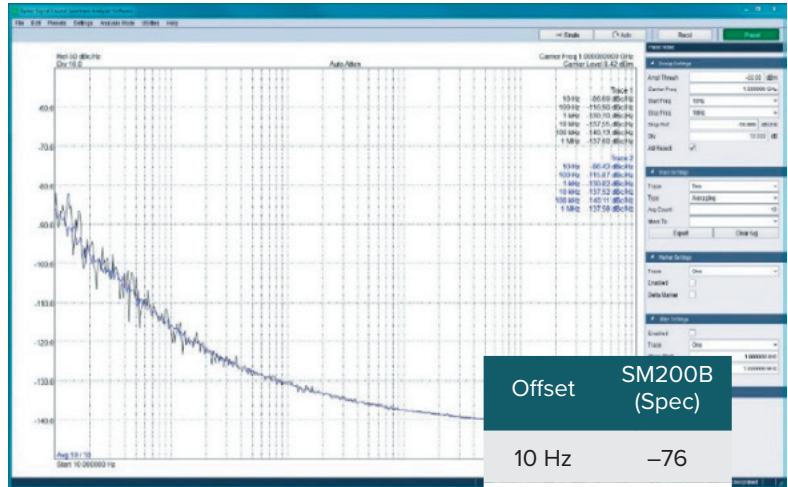
SNR



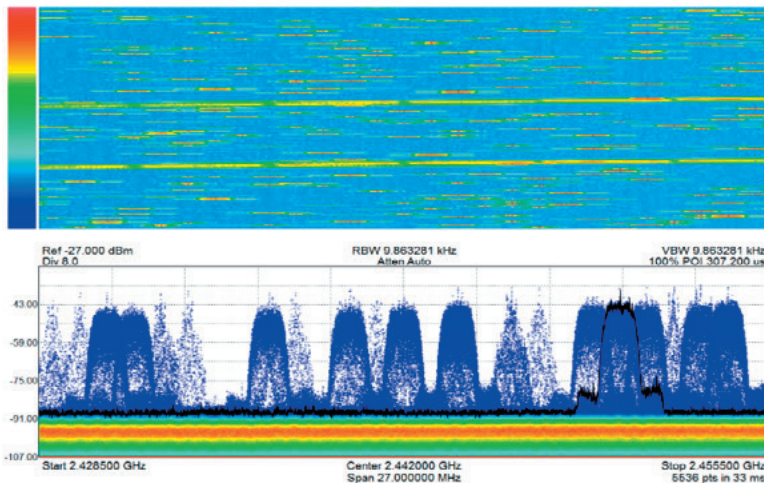
## Accurate Phase Noise Measurements

### Many devices, subsystems and systems require accurate phase noise measurements

Spectrum analyzers are commonly used for this measurement. However, the spectrum analyzer itself must have low phase noise so as not to contribute to the device measurement. The SM200B offers specified performance better than -130 dBc beyond 10 kHz. While many test equipment vendors charge for phase noise measurement personalities, Signal Hound's spectrum analysis software, **Spike™** includes phase noise measurement capability.



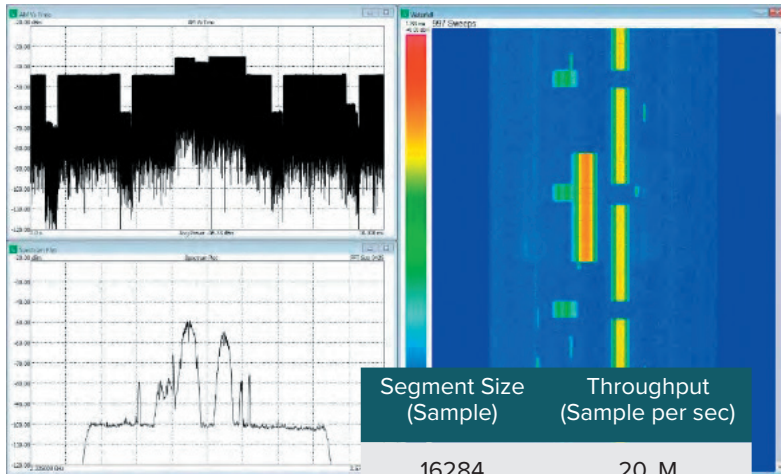
Accurate phase noise measurements made affordable!



The real-time persistence and waterfall analysis show the occupancy of the 2.4 GHz ISM band of a Bluetooth headset and a cell phone searching for a Wi-Fi network.

## Real-Time Spectrum Analyzer Capabilities

For many real-world signals — from complex modulated communications signals, to interference events, to pulsed tactical signals — the signal energy can be sporadic, non-recurring, or even random. With traditional spectrum analysis, these signals could be nearly impossible to “catch” in an analyzer window or to trigger on. Present and future communication modulations are increasing the challenge further with techniques, such as frequency hopping, spread spectrum, pulsed, and cognitive radio low probability of intercept techniques.



160 MHz looking at the entire 2.4 GHz ISM band

Segment Size (Sample)	Throughput (Sample per sec)
16284	20. M
32768	28.1 M
65536	35.3 M
131072	36.8 M
262144	39.1 M
1048576	40.6 M

Sample throughput

## 160 MHz Segmented I/Q Capture Capability

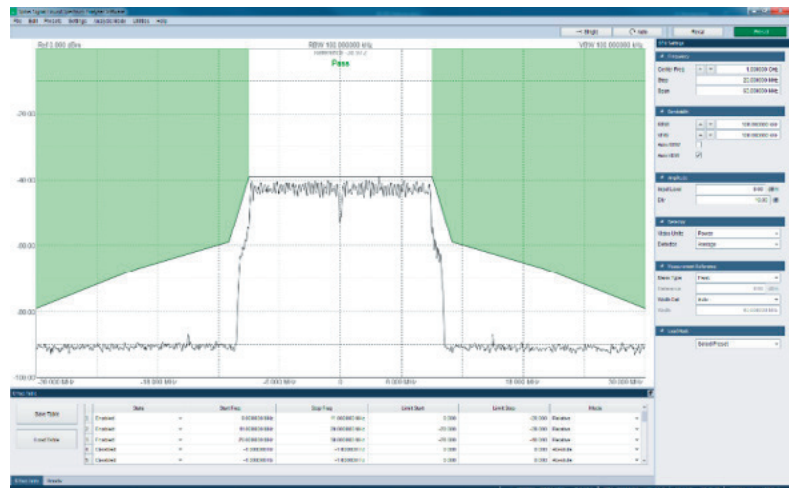
### Meeting Your 5G Needs

The SM200B has a 2-second RF capture buffer enabling 160 MHz instantaneous bandwidth (IBW) segmented I/Q capture, delivered via block transfer to the PC. With advanced triggering options such as frequency mask triggering (FMT), this satisfies the ever increasing analysis bandwidth demands of the wireless industry — including 5G. The SM200B also offers calibrated streaming of the I/Q data over a range of selectable bandwidths from 5 kHz up to 40 MHz.

## Spectrum Emission Mask Measurements

### Easily trigger on out-of-band and spurious signals

The SM200B software comes with a spectrum emission mask capability. This allows you to easily locate out-of-band or spurious signals. For several wireless standards, such as Wi-Fi, we offer single button presets for all the WLAN 802.11b/a/n/ac standards. This allows you to easily test out-of-channel spurious and adjacent channel power against the standard specified transmission mask.



Define your own spectrum emission mask



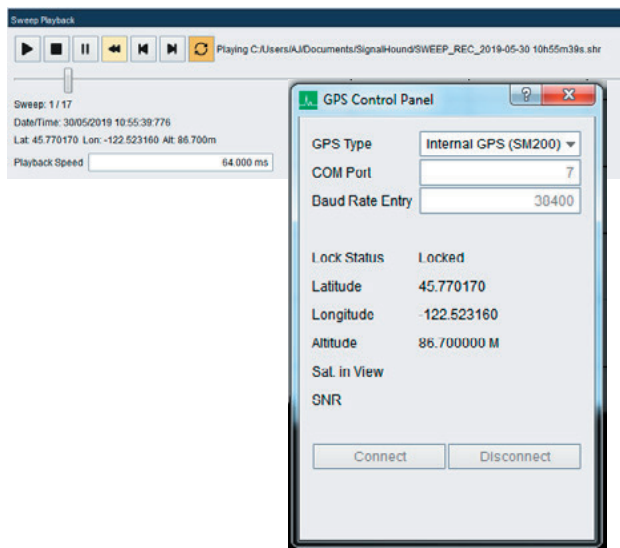
## SWaP+C: Look No Further

### Pushing the boundaries of performance

Next-generation defense systems are pushing the boundaries of performance even as they continue to reduce size, weight, power, and cost (SWaP+C). Even in the commercial world, providing test engineers with critical test equipment in their drawer or on-the-go provides a competitive advantage.

SM200B Real-time Spectrum Analyzer	
Size	10.2" x 7.2" x 2.15" (259 mm x 183 mm x 55 mm)
Weight	7.77 lbs. (3.52 kg)
Power	17 - 32 W (External power supply)

*The SM200B offers excellent SWaP+C parameters*



## Integrate GPS timing and location

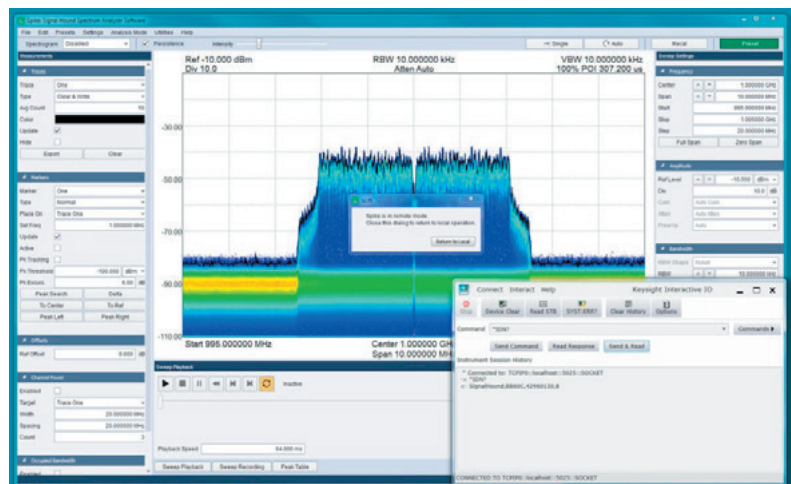
### Time stamp your measurements

The SM200B offers a GPS capability for system integrators via its API. This allows for the GPS coordinates to be associated with every sweep. When the device has a valid GPS lock with the supplied GPS antenna connected, I/Q data is time-stamped with +/- 40ns of accuracy. The GPS location and all NMEA data can be queried at any time. It is updated once a second internally in the API when making active measurements. Applications can pull data from the SM200B (whether sweeps or I/Q data) through the API. Applications may query the GPS information and tie it to the measurement (e.g. a given time and location). Sweeps do not have the high precision accuracy that I/Q data does, but do provide a coarse GPS time with each sweep if the GPS is locked.

## SCPI Automation

### Remote operation via a TCP/IP link

The SM200B offers remote interface and control capabilities using SCPI compatible commands. It can be remotely operated by sending SCPI commands through a TCP/IP link. You can connect and interface the SM200B software through any VISA implementation or any programming language that allows SOCKET programming.



## Expand Your Spectrum Monitoring Capability with Affordable Performance

### Monitor, manage, troubleshoot and protect your RF spectrum

Wireless technology powers the modern world. From Wi-Fi to Bluetooth, satellites to smart phones, and automobiles to homes, every year it becomes more vital and ubiquitous. When signals interfere with one another, data rates plummet, connections drop, errors multiply, range decreases, pathways become noisy, and information exchange slows. The consequences can range from annoying to catastrophic.

Across this wide range of spectrum monitoring applications, high-end spectrum analysis has become a necessity. The need for affordable spectrum analyzer performance to monitor, manage, troubleshoot, and protect RF spectrum in the field has become a critical factor for success.

### The SM200B meets your key requirements of performance and affordability

**Sweep Speed** — the SM200B offers an industry leading 1 THz/sec sweep speed at any of its resolution bandwidth settings  $\geq 30$  kHz. Covering 1 GHz to 20 GHz in just 19 milliseconds allows for a constant sweep of the airwaves.

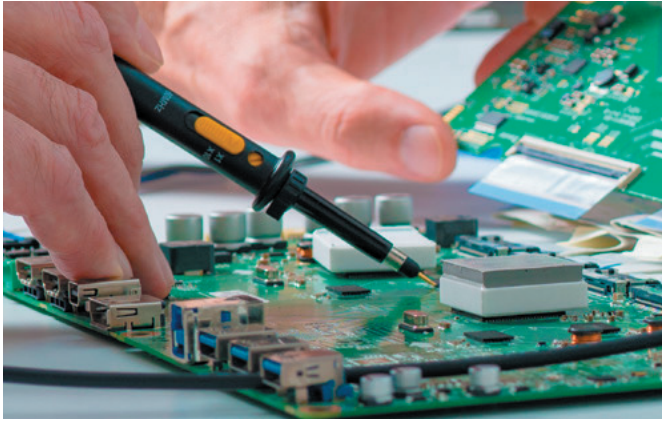
**Dynamic range** — over 110 dB of specified dynamic range ensures that your signals can be distinguished from the spectrum analyzer's noise floor.

**Low phase noise** — the SM200B's low IF architecture design enables exceptional phase noise performance.

**Real-time spectrum analysis capabilities** — up to 160 MHz of instantaneous bandwidth with a 100 percent probability of intercepting signals as fast as 3.1 microseconds.





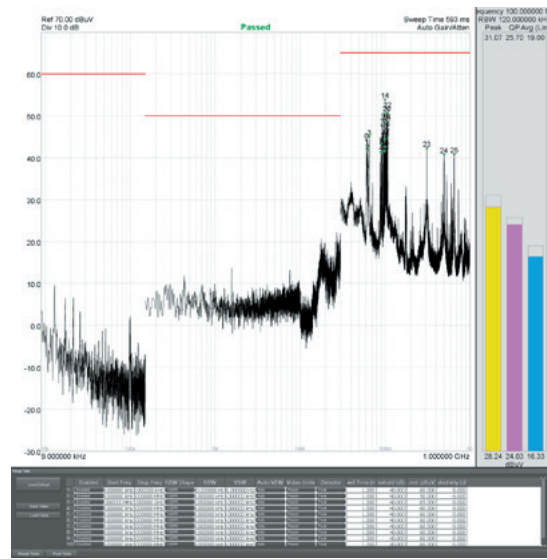


## Affordable EMC Precompliance Testing

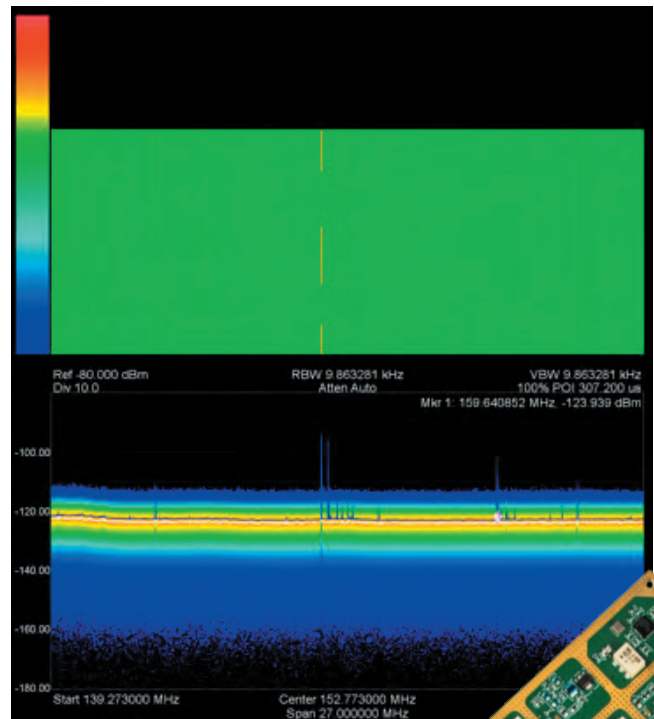
Radiated emissions standards exist for commercial, industrial, military, and aerospace products and systems, and involve formal testing of RF emissions during device operation. For those developing electronic hardware, low-cost alternatives are needed to help guide EMC decisions during the development phase.

The SM200B offers EMC Precompliance analysis for evaluating device behavior during prototyping and pre-production phases. EMC regulations have many frequency ranges and complex level requirements; we provide Limit Line Tables and Range Tables which can be used to generate and simplify the use of complex EMC Plots. The SM200B allows you to add in path loss and add Antenna Factor Correction Tables, which are used to calibrate or compensate for test setup frequency response imperfections.

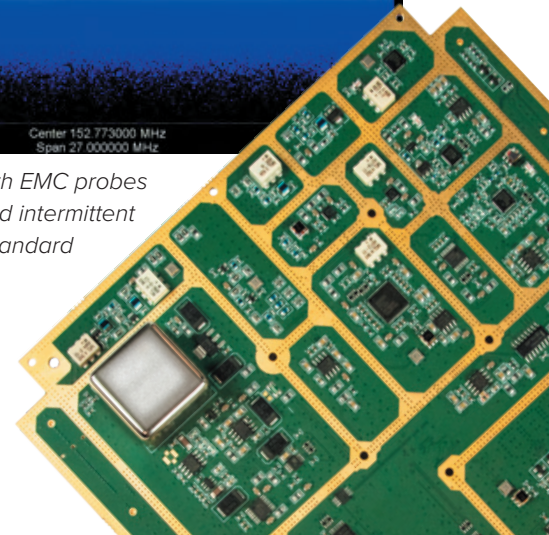
Using the real-time capabilities allows you to capture very short duration and intermittent signals that traditional spectrum analyzers or EMC receivers aren't capable of measuring reliably. The SM200B provides persistent displays, waterfall displays, max held trace, and frequency mask triggers. It can perform all of these measurements that reveal frequency and time-domain information simultaneously. These measurement methods are particularly useful for capturing and analyzing bursty, modulated, or intermittent signals.



*The SM200B offers easily accessible Frequency Scan Displays for common standards, Bar Meter Plots with quasi-peak detector features, and a spur table display, all in one interface.*



*A persistent display with EMC probes can reveal spurious and intermittent spurious activity of a standard USB 2.0 port.*

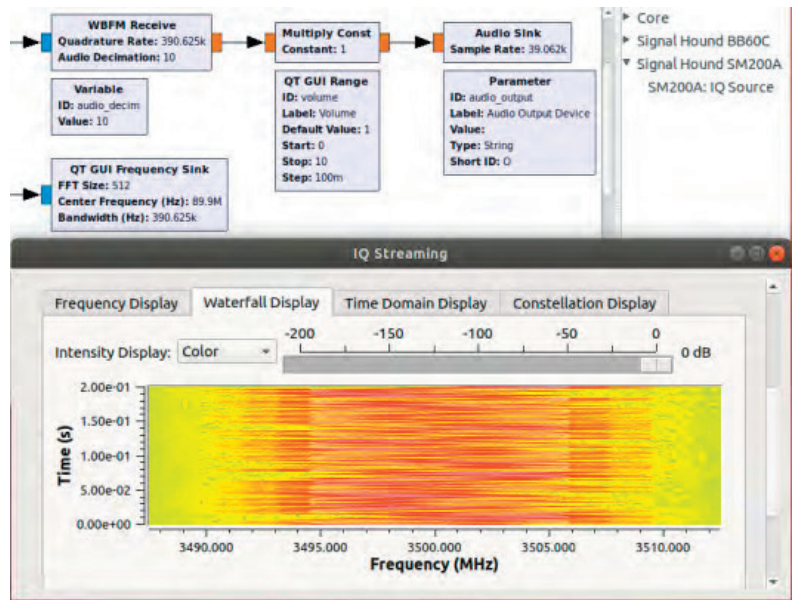




## Modules Accelerate SDR Development

### Integrate the SM200B into your SDR

Software-defined radio (SDR) is a radio communication system where components that have been traditionally implemented in hardware (e.g. mixers, filters, amplifiers, modulators/demodulators, detectors, etc.) are instead implemented by means of software on a personal computer or embedded system. While the concept of SDR is not new, the rapidly evolving capabilities of digital electronics make practical many processes which were once only



The GNU Radio application running the SM200B analyzer as a flowgraph block.

theoretically possible. Signal Hound offers GNU Radio modules for the SM200B. This allows them to be used as I/Q sources from within GNU Radio, as blocks in a flowgraph, components of a hierarchical block, or called from a script.



Accurately evaluate your Wi-Fi signal performance and analyze modulation quality down to the bit level.

## 802.11a/b/g/n/ac WLAN Modulation Analysis

### Now you can afford to evaluate transmitted WLAN signals at your desk

The SM200B enables you to accurately evaluate your signal performance and quality for the 802.11a/b/g/n/ac WLAN standards. You can demodulate WLAN signals with bandwidths up to 40 MHz and all QAM formats. Capture signal details with up to 15 different measurement windows so you can analyze modulation quality down to the bit level. The SM200B lets you capture and analyze transient rogue signals, plus troubleshoot spurious and out-of-band emissions.



## Easy Integration into Test Environments

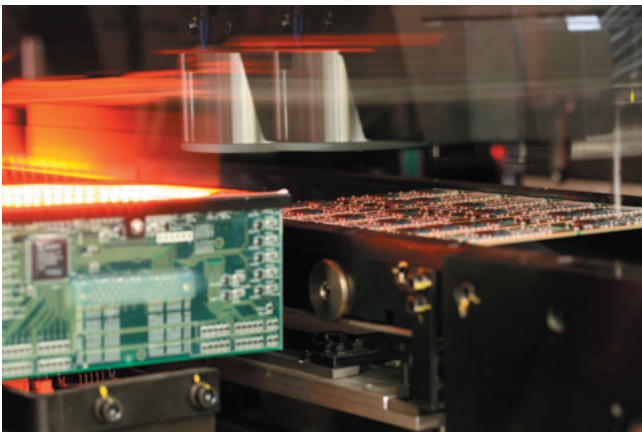
Signal Hound's open-systems approach provides a highly extensible platform for creating custom-tailored applications. Companies with automated test equipment (ATE) applications can easily extend the basic analysis software that comes with the product to address their unique requirements. Since the APIs are fully documented and programmable in C/C++, virtually any set of custom functions can be created, deployed, and maintained by programmers who are familiar with these industry-standard software methods.

### Expanding capabilities beyond the box

Extensibility is very important in today's rapidly changing wireless communications environment where you need to remotely deploy solutions or updates that can then be adapted to address new requirements simply by remote updates of the software — without the need for physical interaction.

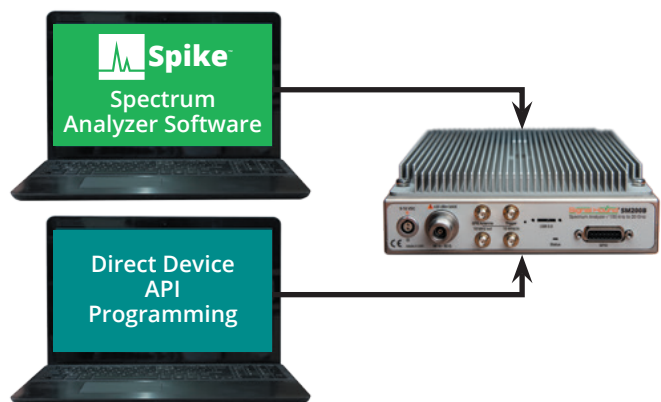
Software customization is also a critical factor for creating specialized spectrum analysis functions. Often, spectrum analysis applications need to incorporate complex algorithms to detect, analyze, and "chase" signals of interest.

The SM200B sends digitized data of the received RF spectrum to the PC where most of the signal processing occurs. This architecture has distinct advantages over sensors that perform all of their signal processing in an FPGA.



### Remote control of monitoring nodes

With the reduced expense of setting up a spectrum monitoring node, it follows that it must be able to be reset or rebooted without the need for field personnel visiting each node. The monitoring system is connected to the network and backend resources through the PC's Ethernet interface. The Ethernet interface supports the full range of communications, data uploads, software updates, and other system management tasks. By pairing the SM200B with any Intel vPro-enabled PC, from a high-performance desktop to an ultra-compact NUC, the entire system can be managed remotely, including the ability to cycle the power and initiate operations.



### Increase measurement speed with direct device API programming

The SM200B architecture allows for an additional technique to further increase speed performance. In many cases, the instrument software can consume computer processor overhead. The added use of the program may have a small impact on overall test times. In cases where fractions of a second are critical, Signal Hound allows its users to bypass the SM200B software application. This allows for direct device API programming for even faster measurements. The SM200B can be programmed in C++, LabVIEW, MATLAB, Python, C#, or any language that has C bindings.

# SM200B Spectrum Analyzer

## Technical Specifications

<b>Frequency Range</b>	100 kHz to 20.0 GHz		
<b>RF Input Impedance</b>	50 Ω: type-N connector		
<b>Calibrated Streaming</b>	I/Q: 5 kHz to 40 MHz of selectable I/Q bandwidth		
<b>Resolution Bandwidths (RBW)</b>	0.1 Hz ( $\leq 200$ kHz span) to 3 MHz (any span) using 40 MHz IBW 30 kHz to 10 MHz using 160 MHz IBW		
<b>Timebase Accuracy</b>	GPS disciplined OCXO remains within $\pm 5 \times 10^{-10}$ when locked to GPS <ul style="list-style-type: none"> <li>• Standard: holdover of <math>\pm 5 \times 10^{-9}</math> /day for aging (<math>\pm 2 \times 10^{-8}</math> first day typical)</li> <li>• Option 1: holdover of <math>\pm 1 \times 10^{-8}</math> for temperature over -40°C to 65°C typical</li> </ul>		
<b>System Noise Figure (Typical)</b>	11 dB over 700 MHz to 2.7 GHz 14 dB from 2.7 GHz to 4.5 GHz 18 dB from 4.5 GHz to 15 GHz		
<b>IP2</b>	+64 dBm from 100 kHz to 2 GHz +74 dBm from 2 GHz to 11 GHz +76 dBm from 11 GHz to 15 GHz +60 dBm from 15 GHz to 20 GHz		
<b>IP3</b>	+28 dBm from 100 kHz to 4 GHz +23 dBm from 4 GHz to 6 GHz +18 dBm from 6 GHz to 14 GHz +23 dBm from 14 GHz to 20 GHz		
<b>SSB Phase Noise at 1 GHz Center Frequency</b>	<b>Offset Frequency</b>	<b>dBc/Hz</b>	
	10 Hz	-76	
	100 Hz	-108	
	1 kHz	-123	
	10 kHz	-132	
	100 kHz	-136	
	1 MHz	-133	
<b>Sweep Speed</b>	<b>Speed</b>	<b>RBW</b>	
	1 THz/sec	1 MHz	
	1 THz/sec	100 kHz	
	1 THz/sec	30 kHz	
	160 GHz/sec	10 kHz	
	18 GHz/sec	1 kHz	
<b>Amplitude Accuracy (+10 dBm to Display Average Noise Level (DANL))</b>	<b>100 kHz to 6 GHz</b>	<b>6 GHz to 20 GHz</b>	<b>RBW filter shape</b>
	$\pm 2$ dB	$\pm 3$ dB	Flat-Top windowing
	+2 dB/-2.6 dB	+3/-3.6 dB	Nuttall windowing



<b>Display Average Noise Level (DANL)</b>	<b>Input Frequency</b>	<b>Range dBm/Hz (Typical)</b>	
	100 kHz to 700 MHz	-156 dBm	
	700 MHz to 2.7 GHz	-160 dBm	
	2.7 GHz to 4.5 GHz	-158 dBm	
	4.5 GHz to 8.5 GHz	-153 dBm	
	8.5 GHz to 15 GHz	-154 dBm	
15 GHz to 20 GHz	-149 dBm		
<b>Residual Responses</b> <b>REF Level ≤ -20 dBm, 0 dB Attenuation, 50 Ω load on RF input</b>	<b>Input Frequency</b>	<b>Range Residual Level</b>	
	100 kHz to 80 MHz	-110 dBm	
	80 MHz to 15 GHz	-100 dBm	
<b>LO Leakage @ RF Input:</b>	-82 dBm from 100 kHz to 5 GHz;		
	-55 dBm from 5 GHz to 10 GHz;		
	-50 dBm from 10 GHz to 18 GHz;		
	-47 dBm from 18 GHz to 20 GHz		
<b>Sub-octive Preselector Filters</b>	20 MHz to 20 GHz		
<b>Spurious Mizer Responses (any ref level (RL) from +10 dBm to -20 dBm, in 5 dB increments, input 10 dB less than RL, RBW ≤30kHz, IBW ≤40MHz)</b>	<b>Input Freq. Range</b>	<b>Image Reject Off</b>	<b>Image Reject On</b>
	100 kHz to 6 GHz	-58 dBc	-75 dBc (typical)
	6 GHz to 10 GHz	-55 dBc	-75 dBc (typical)
	10 GHz to 20 GHz	-44 dBc	-75 dBc (typical)
Note: Signal ID can be activated and deactivated, by toggling the F3 key on keyboard, to allow low level mixer spurs to be differentiated from RF Input signals.			
<b>System Requirements</b>	Intel i7, 3rd generation or later with a quad core processor, one USB 3.0 port.		
	Note: RF recording using streaming I/Q bandwidths > 8 MHz requires the computer's mass storage drive to have at least 250 MB/sec of sustained write speed such as an SSD, RAID-0, or RAID-5.		
<b>Connectivity</b>	Local external computer with Microsoft Windows and a USB 3.0 port is required to operate the SM200B (minimum of Intel 3rd Gen i7 processor or equivalent equipped with SSD for rapid mass data storage during IQ recording).		
<b>GPIO Port</b>	Used for antenna switching and in/out triggering.		
<b>Synchronization</b>	GPS data in each packet with ± 40ns time-stamping.		
<b>Operating Temperature (Ambient)</b>	• <b>Standard:</b> (passive cooling) 32°F to 122°F (0°C to +50°C)		
	• <b>Option-1:</b> (active cooling & extended temperature) -40°F to 149°F (-40°C to +65°C)		
<b>FPGA</b>	Intel 10AX027 has 1660 multipliers, provides selectable decimation, 160 MHz of instantaneous bandwidth from FFT processing W/ resources to spare for future growth.		
<b>Size and Weight</b>	• <b>Standard:</b> 10.2" x 7.2" x 2.15" (259mm x 183mm x 55mm) passive cooling 7.77 lbs. (3.52 kg) passive cooling plus 0.90 lbs. (0.41 kg) for AC power module and AC power cord.		
	• <b>Option-1:</b> 10.2" x 7.2" x 2.80" (259 mm x 183 mm x 71 mm) active cooling 9.13 lbs. (4.14 kg) active cooling plus 1.43 lbs. (0.65 kg) for AC power module and AC power cord.		
<b>Power Consumption</b>	17 watts (when idling) or ≤32 watts (when sweeping or streaming I/Q) sourced from the AC wall adapter which is included or from an external supply of 9VDC to 16VDC when using the Option-12 LEMO Pigtail.		

## How We Compare

	Signal Hound SM200B	Keysight MXA N9020B Opt 526, B1X	Keysight CXA N9000B Opt 526, B25	Tektronix RSA518A
Frequency	100 kHz to 20 GHz	10 Hz to 26.5 GHz	9 kHz to 26.5 GHz	9 kHz to 18 GHz
Maximum Analysis Bandwidth	160 MHz	160 MHz	25 MHz	40 MHz
DANL @ 1 GHz	-160 dBm	-172 dBm	-163 dBm	-158 dBm
Phase Noise @ 1 GHz (10 kHz Offset)	-132 dBc/Hz	-114 dBc/Hz	-110 dBc/Hz	-94 dBc/Hz
Phase Noise @ 1 GHz (1 MHz Offset)	-133 dBc/Hz	-136 dBc/Hz	-130 dBc/Hz	-116 dBc/Hz
TOI @ 1 GHz (3rd Order Intercept)	+28 dBm	+20 dBm	n/a	+15 dBm
Dimensions	10.2" x 7.2" x 2.15"	14.5" x 16.8" x 7"	14.5" x 16.8" x 7"	10.68" x 11.78" x 2.65"
Weight	7.77 lbs	40 lbs	34 lbs	7.5 lbs
Power	17-32 W	465 W max	270 W max	15 W

### SM200B Spectrum Analyzer Unrivalled Value and High Performance

### Real-Time Spectrum Analyzer and Monitoring Receiver



**Standard:** Passive cooling,  
32°F to 122°F (0°C to +50°C)  
**\$12,990**

**Option 1:** Active cooling &  
extended temperature  
-40°F to 149°F (-40°C to +65°C)  
**\$14,568**

## Ordering Information



- Order online: [www.signalhound.com](http://www.signalhound.com)
- Most orders ship next day
- Rental options available
- 30 day money back satisfaction guarantee

Prices include all software and options – no add-ons needed!



### VSG25A

## 2.5 GHz Vector Signal Generator **\$525**

- -40 dBm to +10 dBm output power
- Easily generate analog, digital, and arbitrary waveforms
- 1000+ simultaneous tones, 6 nanosecond pulses
- Built-in support for a number of modulation types

<https://signalhound.com/products/vsg25a-vector-signal-generator>



### VSG60A

## 6 GHz Vector Signal Generator **\$2,480**

- Arbitrary I/Q sample rates: 12.5 kSPS to 51.2 MSPS
- Stream waveforms of virtually any size
- +10 dBm to -55 dBm output power
- Agile, low phase noise LO with 200  $\mu$ s frequency hops

<https://signalhound.com/products/vsg60a-6-ghz-vector-signal-generator>



### SA44B

## 4.4 GHz Spectrum Analyzer **\$1,020**

- RF Frequency Range: 1 Hz to 4.4 GHz
- Wide dynamic range: -151 dBm to +10 dBm
- Resolution bandwidths (RBW) of 0.1 Hz to 250 KHz

<https://signalhound.com/products/usb-sa44b>



### BB60C

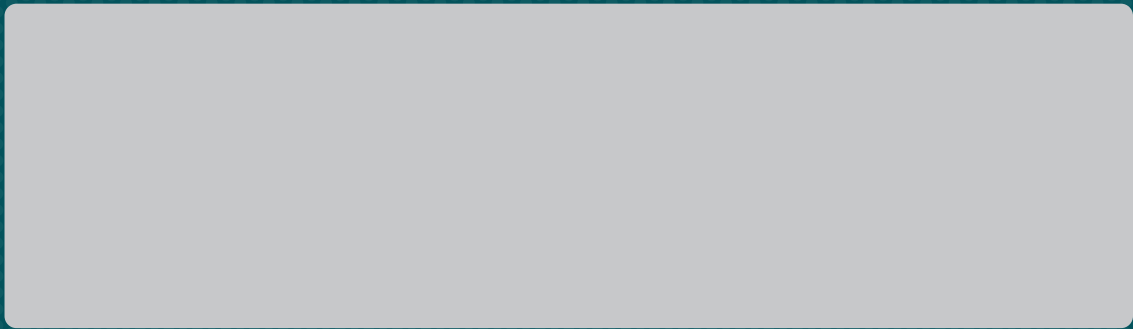
## 6 GHz Real-time Spectrum Analyzer **\$3,040**

- Frequency Range: 9 kHz to 6 GHz
- Dynamic range: -158 dBm to +10 dBm
- Instantaneous bandwidth of 27 MHz
- Up to 24 GHz/sec sweep speed ( $\geq$ 10 kHz RBW)

<http://signalhound.com/products/bb60c>

For additional models, frequency, options, etc.  
Visit: [www.signalhound.com](http://www.signalhound.com)

Online Ordering • All prices retail USD



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