Signal Hound®

SM200C

Spectrum Analyzer

Real-Time Spectrum Analyzer
and Monitoring Receiver

100 kHz to 20 GHz

10 GbE SFP+ w/ 160 MHz IBW

Signal Hound® **SM200C**
Spectrum Analyzer / 100 kHz to 20 GHz

9-16 VDC   ⚠ +20 dBm MAX

GPS Antenna   Trigger
10 MHz out   10 MHz in   USB 2.0   10 GbE SFP+

CE   Made in USA   RF In - 50 Ω   Status   GPIO

Unrivaled Value
High Performance

ORDER ONLINE   SHIPS NEXT DAY
SATISFACTION   30   2-YEAR WARRANTY

signalhound.com

SM200C

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 SM200C spectrum analyzer offers an unrivaled value, providing the performance you need at the best price available on the market.

The SM200C 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, 1 THz/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 and rival 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 SM200C is meeting the need for many of these applications.

- 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 160 MHz of selectable I/Q bandwidth
- High speed data streaming and contol via fiber optic 10GbE SFP+
- No USB interface, perfect for secure environments
- Time stamp your measurements with integrated GPS timing and location
- Size 10.2" x 7.2" x 2.15" (259mm x 183mm x 55mm)
- Weight 7.77 lbs. (3.52 kg)
- Power 17 - 32 W (External power supply)

Monitor, Manage, Troubleshoot and Protect your RF Spectrum

Wireless technologies power the modern world. 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. Add to that illegal transmissions, unlicensed spectrum usage, leakage from all manner of devices, and the situation gets tricky.

Across a 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 has become a critical factor for success.

The Signal Hound SM200C spectrum analyzer has been designed to meet your key requirements of performance and affordability, plus it can easily be integrated into your monitoring system. Our open-systems approach provides a highly extensible platform for creating custom-tailored spectrum analysis applications.

Stream high speed data over distance with 10GbE SFP+

The SM200C uses a 10GbE SFP+ connector to enable wide bandwidth streaming directly to your server. This allows you to locate the signal analyzer close to your antenna and stream signals over a longer distance, without concern of RF signal loss. SFP+ is one of the most popular form factors for high-bandwidth data transfer over fiber, essentially eliminating any concern regarding the distance between the SM200C and the PC.
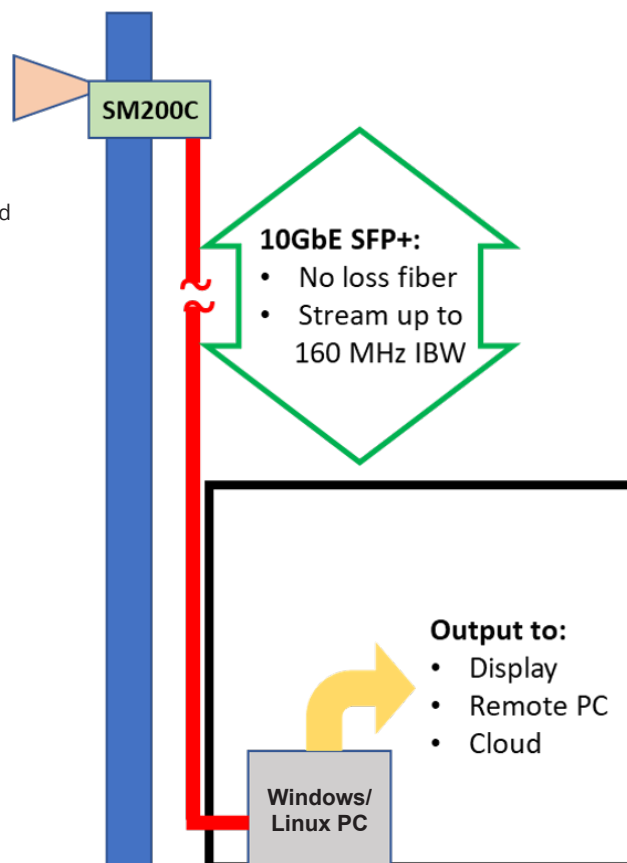
160 MHz of instantaneous bandwidth

Instantaneous or real-time bandwidth is especially important when looking for fast moving intermittent signals. The amount of instantaneous bandwidth you need will depend on the bandwidth of the signals you are trying to detect.

The SM200C also offers calibrated streaming of the I/Q data over a range of selectable bandwidths from 5 kHz up to 160 MHz. The 10GbE SFP+ interface allows you to stream up to 160 MHz I/Q data over fiber optic cable directly to your server.

No USB - no problems

The SM200C is our first product that does not have a USB interface. We have heard from many customers that in certain environments, USB interfaces are not allowed. This makes it the analyzer of choice when USB is a known problem.

Note that the USB 2.0 port on the SM200C can only be used for firmware updates.

Expand Your Spectrum Monitoring Capability with Affordable Performance

The first requirement for any spectrum analyzer is its ability to deliver the performance needed for a variety spectrum monitoring applications. Fall short on these performance requirements and nothing else matters.

Sweep Speed

For spectrum monitoring, sweep speed is of critical importance. Certain situations require broad frequency sweeps in search of a variety of signal situations. Signal Hound's SM200C offers an industry leading 1 THz/sec sweep speed at any of its resolution bandwidth settings ≥30 kHz. Covering 1 GHz to 20 GHz in just 19 milliseconds allows for a constant sweep of the airwaves. This is due to a very agile local oscillator in the SM200C. With a sustained 1 THz/s sweep speed the SM200C can monitor a 2 GHz span with a 100% probability of intercept for signals lasting 2 milliseconds or longer. This means that any signal event lasting 2ms or longer will be captured in the spectrum.

SWaP+C: Look No Further

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.

Dynamic Range

Dynamic range is an important specification that determines what signals can be distinguished from the spectrum analyzer's noise floor. An important consideration is to determine how low a level is needed for your monitoring situation. If you are trying to make sure your spectrum is clear enough for a live performance, then maybe 60 dB meets your need. However, if you are doing Technical Surveillance Counter Measures (TSCM) testing, the lower your noise floor the better. The SM200C has a displayed average noise level (DANL) of -160 dBm at 1 GHz.

Phase Noise

Low phase noise compliments the dynamic range in that a spectrum analyzer can only distinguish signals that are above the unit's phase noise. The Signal Hound SM200C uses a low IF architecture, making it inherently less expensive to achieve exceptional phase noise performance. The low IF architecture of the SM200C enables exceptional phase noise performance with a lower cost design, but it does come with a tradeoff of higher image response spurs. In many cases the spurs can be identified as coming from the spectrum analyzer, allowing them to be ignored during the actual measurement. Customer feedback confirms that this is the preferred price vs. performance engineering balance for many field applications.

Spectrum Monitoring Applications

Across a wide range of industry and specialized applications, high-end spectrum analysis has become a "go anywhere" necessity for supporting field and remote deployments. Signal Hound is working closely with our customers in a wide variety of areas including the following spectrum monitoring applications.

Covert Spectrum Analysis

SIGINT operations are an important specialized area of the government's covert agencies. For these applications, spectrum analysis systems need the greatest degree of remote hardware flexibility and overall system extensibility. Depending on the deployment scenario, remote covert signal analysis systems may need to operate independently for long periods of time and respond to specific software-defined parameters that are unique to each situation.

Frequency Coordination

Today, many live events rely on wireless technologies to enhance their customer's experience. Sporting events are not only attended by tens of thousands of people but are watched on television by millions more. Ensuring that the quarterback hears the play, or the officials can communicate their rulings, is key to the event's success. The same is true for wireless guitars and microphones at concerts, as well as microphones etc. for live television events.

Government Regulation of Spectrum

In today's increasingly crowded and globalized wireless environment, effective governmental regulation and spectrum management is both critical for international success and very difficult to accomplish. Governments need to have the most advanced capabilities for field-based spectrum analysis and remote deployment in order to stay ahead of the curve, to catch violators, and to resolve disputes.

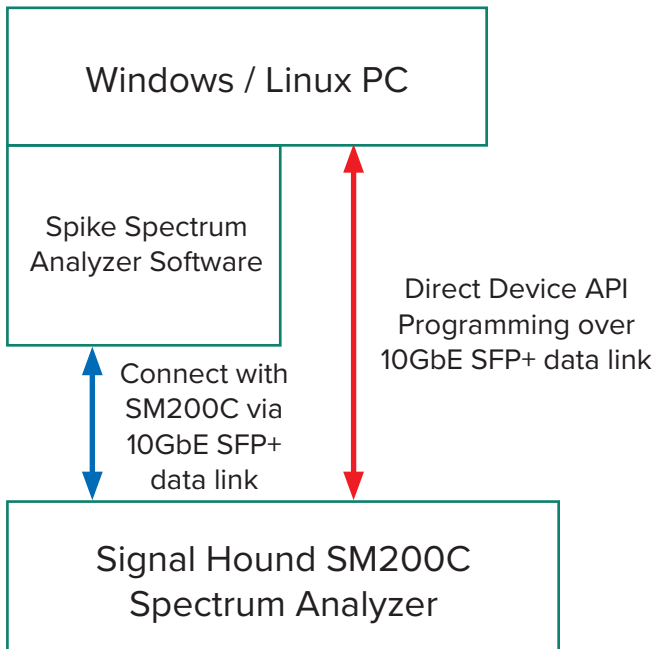## Technical Surveillance Counter Measures (TSCM)

Along similar lines, there are a growing number of independent groups that provide technical surveillance counter measure (TSCM) capabilities – they look for bugs or hidden listening devices. Affordable portable spectrum analyzers with high dynamic range and low phase noise are key to ensure corporate boardrooms or other sensitive business locations are free from outside listeners.

Easy Integration into Test Environments

Most SM200C applications will bypass the SM200C's SPIKE software application. Signal Hound's open-systems approach provides a highly extensible platform for creating custom-tailored applications.

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. This allows for direct device API programming for even faster measurements. The SM200C can be programmed in C++, LabVIEW, MATLAB, Python, C# or any language that has C bindings.

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 SM200C sends digitized data of the received RF spectrum to the system controller over it 10GbE SFP+ fiber optic interface, where most of the signal processing occurs. This architecture has distinct advantages over sensors that perform all of their signal processing in an FPGA.

Lower Cost per Station

The growing use of wireless technologies is increasing the need for spectrum monitoring applications. Along with the increased interest is a need to drive down the cost per monitoring station. Signal Hound's architectural approach is providing a level of overall system price versus performance value that breaks through the cost barriers posed by conventional one-box systems. This is creating new opportunities for wider field usage and enabling more cost-efficient remote deployments.

Windows / Linux PC

Spike Spectrum Analyzer Software

Connect with SM200C via 10GbE SFP+ data link

Direct Device API Programming over 10GbE SFP+ data link

Signal Hound SM200C Spectrum Analyzer

Standard Spike Software Capabilities and Features

All of the SM200C spectrum analyzers include our Spike software. In fact all of your Signal Hound SA, TG, BB, or SM-series devices can be controlled with this one application. While many of the SM200C applications will be controlled directly via the API, there are many standard features which may be useful when a general spectrum analyzer may be needed.

Spectrum Analyzer Measurement

In addition to its many specialized measurements, the SM200C 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.

Complex Signal Analysis

The SM200C 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, π/4DQPSK, DQPSK, and QAM16/32/64/256.

ACPR, OBW, EVM Measurements and More

Comprehensive signal analysis capabilities including 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 SM200C enables real-time OBW and ACPR measurements of very wide-bandwidth signals, transient or continuous.

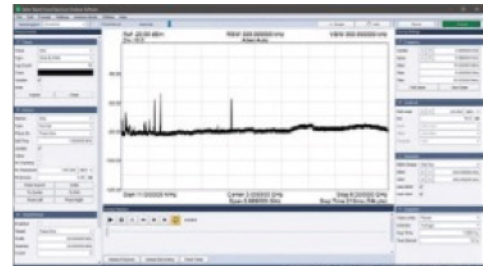## Real-Time Spectrum Analyzer Capabilities

Real-time no longer means real expensive. The SM200C offers real-time spectrum analysis capabilities up to 160 MHz with a 100 percent probability of intercepting signals as fast as 10-microseconds.
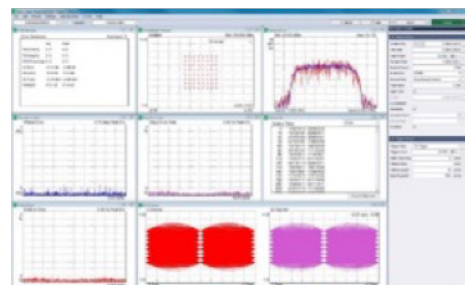
Spectrum Emission Mask Measurements

Easily trigger on out-of-band and spurious signals with the SM200C's spectrum emission mask capability. It allows you to easily locate out-of-band or spurious signals and easily test out of channel spurious and adjacent channel power against the standard specified transmission mask.
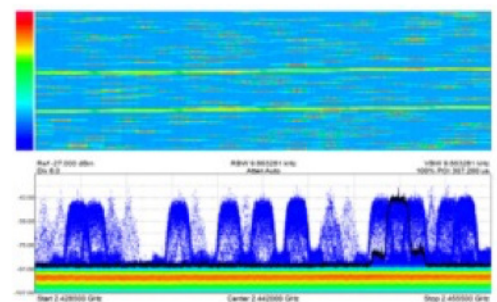
SCPI Automation

The SM200C 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 SM200C software through any VISA implementation or any programming language that allows SOCKET programming.
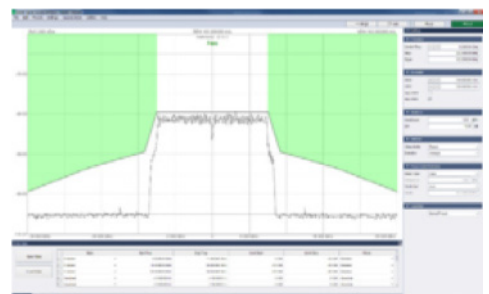

Spectrum Analyzer Measurements

Complex Signal Analysis

Real-Time Spectrum Analyzer Capabilities

Spectrum Emission Mask Measurements

Technical Specifications

Frequency Range	100 kHz to 20.0 GHz		
RF Input Impedance	50 Ω: type-N connector		
Calibrated Streaming	I/Q: 5 kHz to 160 MHz of selectable I/Q bandwidth		
Resolution Bandwidths (RBW)	0.1 Hz (≤200kHz span) to 3 MHz (any span) using 40 MHz IBW 30 kHz to 10 MHz using 160 MHz IBW		
Timebase Accuracy	GPS disciplined OCXO remains within $\pm 5 \times 10^{-10}$ when locked to GPS • Standard: holdover of $\pm 5 \times 10^{-9}$ /day for aging ($\pm 2 \times 10^{-8}$ first day typical) • Option-1: holdover of $\pm 1 \times 10^{-8}$ for temperature over -40°C to 65°C typical		
System Noise Figure (Typical)	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		
IP2	+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		
IP3	+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		
SSB Phase Noise at 1 GHz Center Frequency	**Offset Frequency** 10 Hz 100 Hz 1 kHz 10 kHz 100 kHz 1 MHz	**dBc/Hz** -76 -108 -123 -132 -136 -133	
Sweep Speed	**Speed** 1 THz/sec 1 THz/sec 1 THz/sec 160 GHz/sec 18 GHz/sec	**RBW** 1 MHz 100 kHz 30 kHz 10 kHz 1 kHz	
Amplitude Accuracy (+10 dBm to Display Average Noise Level (DANL))	**100 kHz to 6 GHz** ±2.0 dB +2.0 dB/–2.6 dB	**6 GHz to 20 GHz** ±3.0 dB +3.0/–3.6 dB	**RBW filter shape** Flat-Top windowing Nuttall windowing
Display Average Noise Level (DANL)	**Input Frequency** 100 kHz to 700 MHz 700 MHz to 2.7 GHz 2.7 GHz to 4.5 GHz 4.5 GHz to 8.5 GHz 8.5 GHz to 15 GHz 15 GHz to 20 GHz	**Range dBm/Hz (Typical)** –156 dBm –160 dBm –158 dBm –153 dBm –154 dBm –149 dBm	

Residual Responses REF Level ≤ –20 dBm, 0 dB Attenuation, 50 Ω load on RF input	Input Frequency 100 kHz to 80 MHz 80 MHz to 15 GHz 15 GHz to 20 GHz	Range Residual Level –110 dBm –100 dBm –90 dBm	
LO Leakage @ RF Input:	–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		
Sub-octive Preselector Filters	20 MHz to 20 GHz		
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)	Input Freq. Range 100 kHz to 6 GHz 6 GHz to 10 GHz 10 GHz to 20 GHz	Image Reject Off –58 dBc –55 dBc –44 dBc	Image Reject On –75 dBc (typical) –75 dBc (typical) –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.		
System Requirements	External PC with Microsoft® Windows® 10, Ubuntu® 18.04, or CentOS® 7. A 10GbE SFP+ port (NIC or Thunderbolt 3 with recommended SFP+ to Thunderbolt 3 adapter) is also required to operate the SM200C. 200MS/s I/Q streaming requires an SSD for rapid mass data storage during IQ recording and a minimum of an Intel® 8th generation or newer i7 processor (for laptops), or 6th generation or newer i7 processor (for desktops). Refer to SM200C 10GbE Network Configuration Guide for further information.		
Connectivity	10GbE SFP+ port is used to send commands to and stream calibrated IQ data from the SM200C. The USB 2.0 port is used for firmware upgrades.		
GPIO Port	Used for antenna switching and in/out triggering.		
Synchronization	GPS data in each packet with ± 40ns time-stamping.		
Operating Temperature (Ambient)	• Standard: (passive cooling) 32°F to 122°F (0°C to +50°C) • Option-1: (active cooling & extended temperature) –40°F to 149°F (–40°C to +65°C)		
FPGA	Intel 10AX027 has 1660 multipliers, provides selectable decimation, 160 MHz of instantaneous bandwidth from FFT processing W/ resources to spare for future growth.		
Size and Weight	• Standard: 10.2" x 7.2" x 2.15" (259 mm x 183 mm x 55 mm) 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. • Option-1: 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.		
Power Consumption	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.		

SM200C

Spectrum Analyzer

Real-Time Spectrum Analyzer
and Monitoring Receiver w/ 10GbE
100 kHz to 20 GHz

Price $16,890 USD (Retail)

Extended warranty
options available.

Standard: Passive cooling,
32˚F to 122˚F (0˚C to +50˚C)

Price $18,531 USD (Retail)

Extended warranty
options available.

Option 1: Active cooling & extended
temperature, -40˚F to 149˚F
(-40˚C to +65˚C)

SM200B

Spectrum Analyzer

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

Price $13,510 USD (Retail)

Extended warranty
options available.

Standard: Passive cooling,
32˚F to 122˚F (0˚C to +50˚C)

Price $15,151 USD (Retail)

Extended warranty
options available.

Option 1: Active cooling & extended
temperature, -40˚F to 149˚F
(-40˚C to +65˚C)

Ordering Information

- **Order online: signalhound.com**

- **Most orders ship next day**

- **2-year warranty on all Signal Hound products**

- **30 day money back satisfaction guarantee**

Price includes all software and options — no add-ons needed!

VSG25A

2.5 GHz Vector Signal Generator **$545**

- **-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**

signalhound.com/products/vsg25a-vector-signal-generator/

VSG60A

6 GHz Vector Signal Generator....................**$2,580**

- **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 µs frequency hops**

signalhound.com/products/vsg60a-6-ghz-vector-signal-generator

SA44B

4.4 GHz Spectrum Analyzer **$1,060**

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

signalhound.com/products/usb-sa44b/

BB60C

6 GHz Real-time Spectrum Analyzer............**$3,160**

- **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 (≥10 kHz RBW)**

signalhound.com/products/bb60c/

For additional models, frequencies, options, etc.

Visit: signalhound.com

Online Ordering • All prices retail USD

About Signal Hound

Signal Hound designs and builds powerful, affordable spectrum analyzers and signal generators for engineers and RF professionals around the globe. Whether you're needing EMC precompliance capabilities in a small two-person shop or spectrum monitoring on a national scale, our test equipment is designed with you in mind. Accurate and powerful enough for mission-critical RF analysis, priced at a point accessible to most, and supported by a talented group of engineers committed to what they do – we truly believe that our devices offer unrivaled value in the test equipment industry.

In business since 1996 and selling our own line of Signal Hound test equipment since 2010, we've built the foundation of our company on years of test equipment repair, service, hardware and software development, and manufacturing experience. Signal Hound is a small company with big goals – and an even bigger commitment to providing our customers with an outstanding experience when purchasing and using our products.

Signal Hound®