Signal Hound®

SM200C Real-Time Spectrum Analyzer & Monitoring Receiver

100 kHz to 20 GHz
with 160 MHz BW I/Q Streaming over 10 GbE

The SM200C is a high-performance spectrum analyzer and monitoring receiver with a 10 Gigabit Ethernet SFP+ port, which enables the SM200C to communicate with a PC over long distances using a fiber optic cable. Tuning from 100 kHz to 20GHz, the analyzer has 160 MHz of instantaneous streaming bandwidth (IBW), 110 dB of dynamic range, 1THz/sec sweep speed at 30kHz RBW (using Nuttall windowing), and phase noise performance that rivals even the most expensive spectrum analyzers on the market.

Signal processing is distributed between a powerful Intel FPGA and an external PC having an Intel Core i7 processor. The Signal Hound SM200C can be readily interfaced, using its local API, to an automated monitoring system or to automated test equipment. The SM200C API provides customers the access needed to insert their own DSP algorithms into a calibrated stream of I/Q data.

FREQUENCY
- **Range:** 100 kHz to 20.0 GHz
- **RF Input Impedance (type-N connector):** 50Ω
- **Calibrated Streaming I/Q:** 5 kHz to 160 MHz of selectable I/Q streaming bandwidth

- **Resolution Bandwidths (RBW):** 0.1Hz (≤200kHz span) to 3MHz (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;
- holdover of $\pm 5 \times 10^{-9}$ /day for aging ($\pm 2 \times 10^{-8}$ first day typ);
- holdover of $\pm 1 \times 10^{-8}$ for temperature over -40°C to 65°C (typ)

SYSTEM NOISE FIGURE (Typical)
11dB over 700 MHz to 2.7 GHz;
14dB from 2.7 GHz to 4.5 GHz;
18dB from 4.5 GHz to 15 GHz;

IP_2 +64dBm from 100 kHz to 2 GHz; +74dBm from 2 GHz to 11 GHz; +76 dBm from 11 GHz to 15 GHz; +60 dBm from 15 GHz to 20 GHz

IP_3 +28dBm from 100 kHz to 4 GHz; +23dBm from 4 GHz to 6 GHz +18dBm from 6 GHz to 14 GHz; +23dBm from 14 GHz to 20 GHz

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SWEEP SPEED

Speed	RBW
1THz/sec	1MHz
1THz/sec	100kHz
1THz/sec	30kHz
160GHz/sec	10kHz
18GHz/sec	1kHz

AMPLITUDE ACCURACY (+10 dBm TO DISPLAYED AVERAGE NOISE LEVEL (DANL))

100 kHz to 6 GHz	6 GHz to 20 GHz	RBW filter shape
±2.0 dB	±3.0 dB	Flat-Top windowing
+2.0 dB/-2.6 dB	+3.0/-3.6 dB	Nuttall windowing

DISPLAYED AVERAGE NOISE LEVEL (DANL)

Input Frequency Range	dBm/Hz (Typical)
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

RESIDUAL RESPONSES: REF LEVEL ≤ -20 dBm, 0 dB ATTENUATION, 50-ohm load on RF input

Input Frequency Range	Residual Level
100 kHz to 80 MHz	-110 dBm
80 MHz to 15 GHz	-100 dBm
15 GHz to 20 GHz	-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-OCTAVE PRESELECTOR FILTERS 20 MHz to 20 GHz

SPURIOUS MIXER 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	Image Reject Off	Image Reject On
100 kHz to 6 GHz	-58 dBc	-75 dBc **(typ)**
6 GHz to 10 GHz	-55 dBc	-75 dBc **(typ)**
10 GHz to 20 GHz	-44 dBc	-75 dBc **(typ)**

Note: Signal ID/image reject 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.

SYNCHRONIZATION

GPS data in each packet with ± 40ns timestamping

SSB PHASE NOISE AT 1 GHz CENTER FREQUENCY

Offset Frequency	dBc/Hz
10 Hz	-76
100 Hz	-108
1 kHz	-123
10 kHz	-132
100 kHz	-136
1 MHz	-133

FPGA

Intel 10AX027 has 1660 multipliers, provides selectable decimation, 160 MHz of instantaneous bandwidth from FFT processing W/ resources to spare for future growth

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)

SIZE AND WEIGHT

• 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
• 10.2" x 7.2" x 2.80" (259mm x 183mm x 71mm) 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

18W (when idling) or ≤30W typical at room temperature (when sweeping or streaming I/Q) sourced from the AC/DC wall adapter which is included, or from an external supply of 9VDC to 16VDC when using the Option-12 LEMO power cord pigtail. Maximum power consumption at +50°C is 36W.

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.

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.