SM200A Real-Time Spectrum Analyzer & Monitoring Receiver

100 kHz to 20 GHz

The SM200A is a high-performance spectrum analyzer and monitoring receiver. Tuning from 100 kHz to 20GHz, the analyzer has 160 MHz of instantaneous bandwidth (IBW), 110 dB of dynamic range, 1THz/sec sweep speed at 30kHz RBW (using Nuttall windowing), 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.

Signal processing is distributed between a very powerful Altera FPGA and an external PC having an Intel Core i5 processor. The Signal Hound SM200A can be readily interfaced, using its local API, to an automated monitoring system or to automated test equipment. The SM200A 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 40 MHz of selectable I/Q bandwidth.
- **Sparse Spectrum I/Q Streaming:** Users may load a mask, baseline, or threshold to reject signals below User-Defined Amplitude Levels (UDAL) and stream signals that are above the UDAL. The aggregate total of active streaming bandwidth is maintained at 20 MHz of the 160 MHz stare, or IBW (Instantaneous Bandwidth). The quantity of active segments selected are regulated with a dynamic UDAL offset to ensure aggregate system bandwidth does not exceed the 20 MHz limit.
- **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 ±5 x 10^{-10} when locked to GPS;
  holdover of ±5 x 10^{-9} per day for aging;
  holdover of ±1 x 10^{-8} for temperature over -40°C to 60°C

SYSTEM NOISE FIGURE (typical)

13 dB from 700 MHz to 2.7 GHz;
16 dB from 2.7 GHz to 4.5 GHz;
19 dB from 4.5 GHz to 15.2 GHz

IP_2 +68dBm from 100 kHz to 2 GHz;
+78dBm from 2 GHz to 10 GHz;
+75 dBm from 10 GHz to 15 GHz;
+60 dBm from 15 GHz to 20 GHz

IP_3 +28dBm from 100 kHz to 3 GHz;
+24dBm from 3 GHz to 6 GHz;
+20dBm from 6 GHz to 20 GHz

SWEEP SPEED

Speed	RBW
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

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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	–161 dBm
2.7 GHz to 4.5 GHz	–158 dBm
4.5 GHz to 8.2 GHz	–155 dBm
8.2 GHz to 15.2 GHz	–156 dBm
15.2 GHz to 20 GHz	–149 dBm

RESIDUAL RESPONSES (ref level ≤ -20 dBm, 0 dB attenuation, 50-ohm load on RF input)

Input Freq. Range	Residual Level
100 kHz to 80 MHz	-110 dBm
80 MHz to 6 GHz	-115 dBm
6 GHz to 15 GHz	-100 dBm
15 GHz to 20 GHz	-90 dBm

LO LEAKAGE AT RF INPUT WITH PREAMP ON –80 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

SPURIOUS MIXER RESPONSES (any reference level from +10 dBm TO -20 dBm, in 5 dB increments, input 10 dB less than reference level, RBW ≤30kHz):

Input Freq. Range	Image Reject Off	Image Reject On (typ)
100 kHz to 6 GHz	-60 dBc	-75 dBc
6 GHz to 10 GHz	-55 dBc	-75 dBc
10 GHz to 20 GHz	-44 dBc	-75 dBc

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.*

SUB-OCTAVE FILTERED PRESELECTOR 20 MHz to 20 GHz

FPGA

Altera 10AX027 has 1660 multipliers, provides selectable decimation, 160 MHz of instantaneous bandwidth from FFT processing with resources to spare for future growth.

SYNCHRONIZATION

GPS data in each packet with ± 40ns time-stamping

SSB PHASE NOISE AT 1 GHz CENTER FREQUENCY

Offset Frequency	dBc/Hz
10 Hz	–76
100 Hz	–110
1 kHz	–122
10 kHz	–130
100 kHz	–134
1 MHz	–131

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

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 9V to 16V when using the Option-12 LEMO Pigtail.

CONNECTIVITY

Local external computer with Microsoft Windows and a USB 3.0 port is required to operate the SM200A (minimum of Intel 3rd Gen i7 processor or equivalent equipped with SSD for rapid mass data storage during IQ recording).

UI LANGUAGES

English, Simplified Chinese, Dutch, French, German, Italian, Japanese, Russian, and Spanish.

GPIO PORT

Used for antenna switching and in/out triggering.