



# 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, 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
- **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 span, 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 ( $\leq 200$  kHz span) to 10 MHz (any span)

**Timebase Accuracy:** GPS disciplined OCXO remains within  $\pm 5 \times 10^{-10}$  when locked to GPS;

holdover of  $\pm 5 \times 10^{-9}$  per day for aging;

holdover of  $\pm 1 \times 10^{-8}$  for temperature over  $-40^{\circ}\text{C}$  to  $65^{\circ}\text{C}$

## SYSTEM NOISE FIGURE (Typical)

13dB over 700 MHz to 2.7 GHz;

16dB from 2.7 GHz to 4.5 GHz;

19dB from 4.5 GHz to 15.2 GHz;

**IP<sub>2</sub>** +42dBm from 700 MHz to 2.7 GHz

**IP<sub>3</sub>** +28dBm from 100 kHz to 600 MHz

+20dBm from 600 MHz to 4.2 GHz

- +15dBm from 4.2 GHz to 20 GHz





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## SWEEP SPEED

Speed	RBW
1THz/sec	1MHz
1THz/sec	100kHz
1THz/sec	30kHz
160GHz/sec	10kHz
20GHz/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	-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

Input Freq. Range	Residual Level
500 kHz to 20 GHz	-90 dBm

## LO LEAKAGE AT RF INPUT WITH PREAMP ON -60 dBm

## SPURIOUS MIXER RESPONSES (any reference level from +10 dBm TO -30 dBm, in 5 dB increments, input signal 10 dB below reference level):

-55 dBc without image reject algorithm and -75 dBc (typical) using the image reject algorithm

**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

## SYSTEM REQUIREMENTS

Intel i5, 4th generation or later with a dual core processor, one USB 3.0 port. **Note:** RF recording using streaming I/Q bandwidths > 8MHz requires the computer's mass storage drive to have at least 250MB/sec of sustained write speed such as an SSD, RAID-0, or RAID-5.

## SYNCHRONIZATION

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

## SSB PHASE NOISE AT 1 GHz CENTER FREQUENCY

Offset Frequency	dBc/Hz
10 Hz	-83
100 Hz	-112
1 kHz	-122
10 kHz	-130
100 kHz	-134
1 MHz	-131

## FPGA

Altera 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  
7.94 lbs. (3.60 kg) passive cooling
- 10.2" x 7.2" x 2.74" (259mm x 183mm x 70mm) active cooling  
8.98 lbs. (4.07 kg) active cooling

## 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 4th Gen i5 processor or equivalent).

## GPIO PORT

- Used for antenna switching and in/out triggering.