

# 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 i7 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.
- **Resolution Bandwidths (RBW):** 0.1 Hz ( $\leq 200$ kHz 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 typical);
  - holdover of  $\pm 1 \times 10^{-8}$  for temperature over -40°C to 65°C typical

## 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<sub>2</sub>** +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<sub>3</sub>** +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 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

Intel i7, 3rd generation or later with a quad 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	-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 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.

## CONNECTIVITY

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

## GPIO PORT

- Used for antenna switching and in/out triggering.