

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 160MHz of instantaneous bandwidth, 110dB 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 or 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
- **Calibrated Streaming I/Q:** 5 kHz to 40 MHz of selectable I/Q bandwidth.
- **Sparse Spectrum I/Q Streaming:** Streaming 160 MHz of Calibrated I/Q from sparsely occupied spectrum, using a low loss compression algorithm, is scheduled for release as a free firmware/software upgrade within 6 months of initial SM200A release.
- **Resolution Bandwidths (RBW):** 0.1 Hz (≤ 200 kHz span) to 10MHz (any span)

- **Timebase Accuracy:** GPS disciplined OCXO with a holdover of $\pm 1.5 \times 10^{-7}$ per day from -40°C to 65°C

SYSTEM NOISE FIGURE

12dB over 400MHz to 2.2GHz and 14dB from 2.2GHz to 6GHz

IP_2 +42dBm from 400MHz to 2.2GHz

IP_3 +22dBm from 400MHz to 2.2GHz



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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
100 kHz to 500 kHz	-140
500 kHz to 10 MHz	-154
10 MHz to 20 GHz	-157 + 0.5 dB/GHz

RESIDUAL RESPONSES: REF LEVEL ≤ -20dBm, 0dB

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 REF LEVEL FROM +10 dBm TO -30 dBm, IN 5 dB INCREMENTS, INPUT SIGNAL 10dB BELOW REF LEVEL, AND ≤30 kHz RBW):

-55dBc 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 i7, 3rd generation or later with a quad core processor, one USB 3.0 port, and one adjacent USB 2.0 or 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 ± 50ns time-stamping

SSB PHASE NOISE AT 1 GHz CENTER FREQUENCY

Offset Frequency	dBc/Hz
10 Hz	-90
100 Hz	-113
1 kHz	-123
10 kHz	-130
100 kHz	-134
1 MHz	-131

FPGA

Altera Arria-10, p/n 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 32°F to 149°F (0°C to +65°C); Option-1 -40°F to 149°F (-40°C to +65°C)

SIZE AND WEIGHT

- 7.53 lbs. (3.42 kg) including heat sink
- 5.80 lbs. (2.63 kg) without heat sink
- 10.2" x 7.2" x 2.05" (259mm x 183mm x 52mm) w/ heat sink
- 10.2" x 7.2" x 1.46" (259mm x 183mm x 37mm) w/o heat sink

POWER CONSUMPTION

• 4 watts (2% duty cycle) to 29 watts (100% duty cycle) from an external supply of 9V to 16V for the SM200A or the included AC wall adapter can be used.

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.