

Frequency and Time Characteristic

| Frequency span | | |
|----------------------|---|----------------|
| | SSA5083A | SSA5085A |
| Frequency range | 9 kHz~13.6 GHz | 9 kHz~26.5 GHz |
| Frequency resolution | 1 Hz | |
| Range | 0 Hz (Zero Span), 100 Hz to Max Frequency | |
| Accuracy | $\pm \text{Span} / (\text{number of sweep points} - 1)$ | |

| Internal Reference Source | |
|------------------------------|---|
| Reference frequency | 10.000000 MHz |
| Reference frequency accuracy | $\pm [(\text{time since last adjustment} \times \text{frequency aging rate}) + \text{temperature stability} + \text{initial calibration accuracy}]$ |

| Standard Reference Source | |
|------------------------------|--|
| Initial calibration accuracy | < 1 ppm, 20 °C~30 °C |
| Temperature stability | < 1 ppm, 0 °C~50 °C |
| Frequency aging rate | < 0.5 ppm/first year, 3.0 ppm/20 years |

| OCXO Precise Reference Source (Opt. 10M_OCXO_L) | |
|---|------------------------|
| Initial calibration accuracy | < 0.1 ppm, 20 °C~30 °C |
| Temperature stability | < 1 ppb, 0 °C~50 °C |
| Frequency aging rate | < 50 ppb/year |

| Marker | |
|------------------------------|---|
| Marker resolution | $\text{Span} / (\text{number of sweep points} - 1)$ |
| Marker uncertainty | $\pm [\text{frequency indication} \times \text{reference frequency uncertainty} + 10\% \times \text{resolution bandwidth} + \frac{1}{2} * \text{marker resolution} + 1 \text{ Hz}]$ |
| Marker type | Normal, Delta, Fixed, Reference to, Table |
| Marker Functions | Noise marker, N dB BW, Frequency counter |
| Frequency Counter resolution | 0.1 Hz |

| Bandwidths | |
|--------------------------------|---|
| Resolution bandwidth (-3dB) | 1 Hz ~ 10 MHz, in 1-3-10 sequence |
| Resolution filter shape factor | < 5:1 (60 dB:3 dB) (nom.) |
| RBW uncertainty | < 5% (nom.) |
| Video bandwidth (-3dB) | 1 Hz ~ 10 MHz, in 1-3-10 sequence |
| VBW uncertainty | < 5% (nom.) |
| EMI bandwidth (-6dB) | 200 Hz, 9 kHz, 120 kHz, 1 MHz (CISPR16 compliant) |
| Analysis bandwidth | 25 MHz, 40 MHz (opt. SSA5000-B40) |

| Sweep and Trigger | |
|--------------------------|---|
| Sweep time | 1 μ s to 6000 s, Span=0 Hz |
| | 1 ms to 4000 s, Span \geq 100 Hz |
| Sweep mode | RBW=3k Hz~10 MHz, Swept |
| | RBW=1 Hz~10 kHz, FFT |
| Sweep (trace) points | 201~10001 |
| Sweep rule | Single, Continuous |
| Trigger source | Free, Video, External, Period |
| Trigger delay | -200 ms ~ +500 ms, Span=0 Hz |
| | 1 ms ~ +500 ms, Span \geq 100 Hz, swept and FFT |
| External trigger | 5V TTL level, Rising edge/Falling edge |

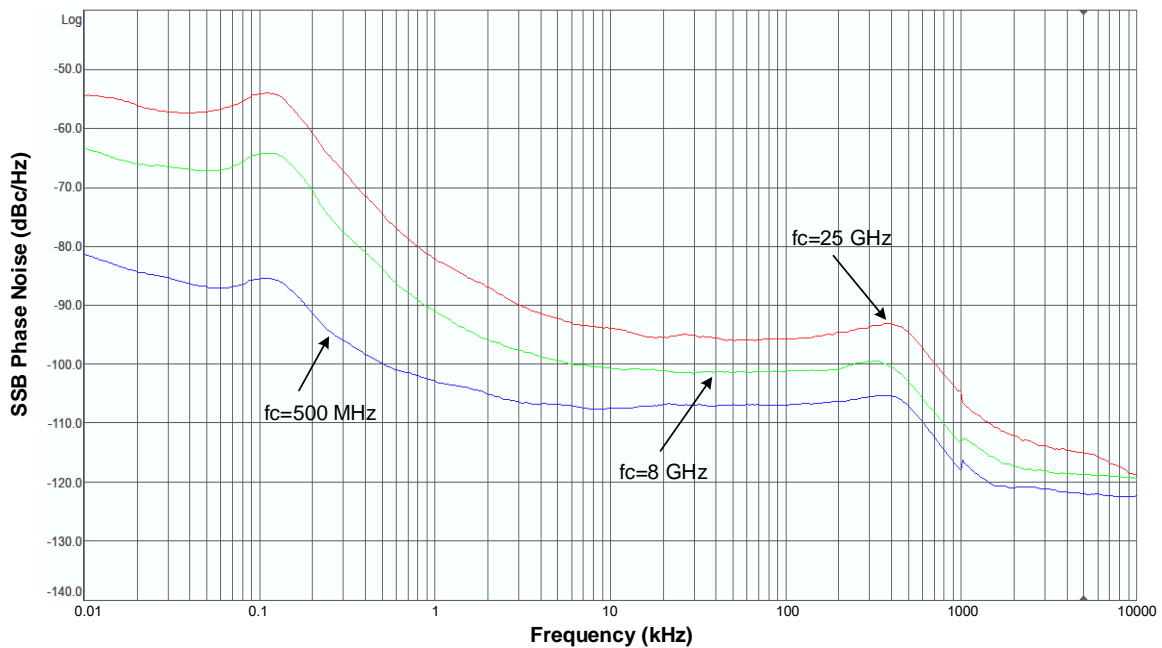
| Time gating | |
|--------------------|----------------------------------|
| Gate methods | Gated LO, Gated Video, Gated FFT |
| Gate length | 501 μ s~5 s |
| Gate delay | 2 μ s~25 s |

Amplitude Accuracy and Range Specifications

| Amplitude and Level | |
|--------------------------|---|
| Measurement range | DANL to +10 dBm, 100 kHz ~ 1 MHz, Preamp off DANL to +23 dBm, 1 MHz ~ 26.5 GHz, Preamp off |
| Reference level | -170 dBm to +23 dBm, 1 dB steps |
| Preamplifier | 20 dB (nom.), 100 kHz~26.5 GHz |
| Input attenuation | 0 ~ 50 dB, 2 dB steps |
| Maximum input DC voltage | +/- 50 V _{DC} |
| Maximum average power | 27 dBm, 3 minutes, $f_c \geq 10$ MHz, att > 20 dBm, preamp off 27+10*log($f_c/1$ MHz) dBm, $f_c < 1$ MHz, att ≥ 20 dBm |

| Level Display | |
|------------------------|--|
| Logarithmic level axis | 1 dB to 200 dB |
| Linear level axis | 0 to reference level, 0% to 100% |
| Units of level axis | dBm, dBmV, dB μ V, dB μ A, Volt, Watt |
| Number of traces | 6 |
| Trace detectors | Positive-peak, Negative-peak, Sample, Normal, Average(Voltage/RMS/Video) |
| Trace functions | Clear Write, Max Hold, Min Hold, View, Blank, Average, Math |

| SSB Phase Noise | |
|-----------------|---|
| Offset | 20 °C to 30 °C, $f_c = 1$ GHz, Normalized to 1 Hz |
| 10 kHz | -103 dBc/Hz, -105 dBc/Hz (typ.) |
| 100 kHz | -103 dBc/Hz, -105 dBc/Hz (typ.) |
| 1 MHz | -116 dBc/Hz, -119 dBc/Hz (typ.) |



Displayed Average Noise Level (DANL)

| | SSA5083A | SSA5085A | |
|---|-------------------|--------------------------|--------------------------|
| 20 °C to 30 °C, att = 0 dB, RBW = 1 Hz, sample detector, trace average > 50 | | | |
| Preamp off | 100 kHz~1 MHz | -130 dBm, -143 dBm(typ.) | -130 dBm, -143 dBm(typ.) |
| | 1 MHz~10 MHz | -143 dBm, -148 dBm(typ.) | -143 dBm, -148 dBm(typ.) |
| | 10 MHz~1.22 GHz | -144 dBm, -148 dBm(typ.) | -144 dBm, -148 dBm(typ.) |
| | 1.22 GHz~3.15 GHz | -140 dBm, -144 dBm(typ.) | -140 dBm, -144 dBm(typ.) |
| | 3.15 GHz~7.22 GHz | -137 dBm, -141 dBm(typ.) | -137 dBm, -141 dBm(typ.) |
| | 7.22 GHz~13.6 GHz | -136 dBm, -140 dBm(typ.) | -136 dBm, -140 dBm(typ.) |
| | 13.6 GHz~18.9 GHz | | -134 dBm, -140 dBm(typ.) |
| | 18.9 GHz~24.2 GHz | | -132 dBm, -137 dBm(typ.) |
| | 24.2 GHz~26.5 GHz | -124 dBm, -134 dBm(typ.) | |
| Preamp on | 100 kHz~1 MHz | -135 dBm, -148 dBm(typ.) | -135 dBm, -148 dBm(typ.) |
| | 1 MHz~10 MHz | -153 dBm, -165 dBm(typ.) | -153 dBm, -165 dBm(typ.) |
| | 10 MHz~1.22 GHz | -159 dBm, -163 dBm(typ.) | -159 dBm, -163 dBm(typ.) |
| | 1.22 GHz~3.15 GHz | -158 dBm, -162 dBm(typ.) | -158 dBm, -162 dBm(typ.) |
| | 3.15 GHz~7.22 GHz | -154 dBm, -158 dBm(typ.) | -154 dBm, -158 dBm(typ.) |
| | 7.22 GHz~13.6 GHz | -154 dBm, -158 dBm(typ.) | -154 dBm, -158 dBm(typ.) |
| | 13.6 GHz~18.9 GHz | | -151 dBm, -155 dBm(typ.) |
| | 18.9 GHz~24.2 GHz | | -148 dBm, -152 dBm(typ.) |
| | 24.2 GHz~26.5 GHz | -142 dBm, -149 dBm(typ.) | |

| Error and Accuracy | |
|--|---|
| Resolution bandwidth switching uncertainty | Logarithmic resolution, relative to RBW = 10 kHz ± 0.2 dB (nom.) |
| Input attenuation switching uncertainty | 20 °C to 30 °C, preamp off, relative to att=20 dB 1 MHz~7.22 GHz 0.5 dB 7.22 GHz~26.5 GHz 0.7 dB |
| Frequency Response relative to 50 MHz | 20 °C to 30 °C, 30% to 70% relative humidity, att=20 dB, preamp off 10 MHz ~ 7.5 GHz ± 1.5 dB 7.5 GHz ~ 13.6 GHz ± 2.0 dB 13.6 GHz ~ 26.5 GHz ± 2.5 dB |
| Absolute amplitude accuracy | 20 °C to 30 °C, input signal level=-50~-10 dBm, RBW=VBW=30 kHz, att=20 dB, peak detector, 95% reliability ±0.4 dB, fc=50 MHz ± 0.4 dB + Frequency Response, Preamp off ± 0.5 dB + Frequency Response, Preamp on |
| RF input VSWR | Att = 10 dB, fc≥10 MHz 10 MHz~13.6 GHz 1.6 (nom.) 13.6 GHz~24.2 GHz 1.9 (nom.) 24.2 GHz~26.5 GHz 2.1 (nom.) |
| Distortion and Spurious Responses | |
| Second harmonic distortion (SHI) | 20 °C to 30 °C, fc≥50 MHz, input signal level=-20 dBm, att=0 dB, preamp off 10 MHz~7.22 GHz 42 dBm (nom.) 7.22 GHz~13.25 GHz 54 dBm (nom.) |
| Third-order intercept (TOI) | 20 °C to 30 °C, fc≥50 MHz, input signal two -20 dBm tones spaced by 100 kHz, att=0 dB, preamp off 50 MHz~7.22 GHz 11 dBm, 15 dBm (nom.) 7.22 GHz~26.5 GHz 10 dBm, 14 dBm (nom.) |
| 1dB gain compression | 20 °C to 30 °C, fc≥50 MHz, input signal two tones spaced larger than 20 MHz, att=0 dB, preamp off >5 dBm (nom.) |
| Residual response | 20 °C to 30 °C, input terminated 50 Ω, att=0 dB < -90 dBm |
| Input related spurious | 20 °C to 30 °C, mixer level -30 dBm <-65 dBc |

Advanced Measurement Kit (SSA5000-AMK)

| Power Measurement | |
|------------------------------------|--|
| CHP, Channel Power | Channel Power, Power Spectral Density |
| ACPR, Adjacent Channel Power Ratio | Main CH Power, Left channel power, Right channel power |
| OBW, Occupied Bandwidth | Occupied Bandwidth, Transmit Frequency Error |
| T-Power, Time Domain Power | Zero Span Integrated Power |
| CNR, Carrier Noise Ratio | C/N, Noise Power |
| Non-Linear Measurement | |
| Harmonic measurement | Max Harmonic number 10 |
| TOI, Third-Order Intercept | Measure the third-order products from two tones |
| Spectrum Monitor Measurement | |
| Spectrogram | |

EMI Measurement (Option SSA5000-EMI)

| Measurement | |
|-------------------------|---|
| Measurement View | Frequency scan, Meter, Signal list |
| Pre-compliance Sequence | Scan, Search, Meas |
| EMI filter RBW (-6dB) | 200 Hz, 9 kHz, 120 kHz, 1MHz(following CISPR 16-1-1) |
| RBW uncertainty | < 5% (nom.) |
| Detector | Peak, Voltage Average, Quasi-Peak(following CISPR 16-1-1) |
| Dwell time | 0 us ~ 10 s |
| RBW/Steps | 0.1, 0.3, 0.5, 1, 2, 3 |
| Corrections | 4 |
| Limit and Trace | 3 |
| Limit Standards | EN550xx, GB9254, FCC Part15, User defined |
| Attenuator | 0-50 dB |
| Report | Signal List |
| Frequency scale | Linear, Logarithmic |

Analog Modulation Analysis (Option SSA5000-AMA)

| Common Parameter | | |
|-------------------------|-------------------------------|-------------------------|
| | SSA5083A | SSA5085A |
| Carrier Frequency Range | 2 MHz~13.6 GHz | 2 MHz~26.5 GHz |
| Carrier Power Accuracy | ±2 dB (nom.) | |
| Carrier Power Range | -30 dBm to +20 dBm (nom.) | |
| AM | | |
| Modulation rate range | 20 Hz to 100 kHz | |
| Accuracy | 1 Hz (nom.) | Modulation rate < 1 kHz |
| | < 0.1% modulation rate (nom.) | Modulation rate ≥ 1 kHz |
| Modulation depth range | 5% to 95% | |
| Accuracy | ±4% (nom.) | |
| FM | | |
| Modulation rate range | 20 Hz to 200 kHz | |
| Accuracy | 1 Hz (nom.) | Modulation rate < 1 kHz |
| | < 0.1% modulation rate (nom.) | Modulation rate ≥ 1 kHz |
| Frequency deviation | 1 kHz to 400 kHz | |
| Accuracy | ±4% (nom.) | |
| PM | | |
| Modulation rate range | 50 Hz~50 kHz | |
| Accuracy | 1 Hz(nom.) | Modulation rate < 1 kHz |
| | < 0.1% modulation rate (nom.) | Modulation rate ≥ 1 kHz |
| Frequency deviation | 0.2~100 rad | |
| Accuracy | ±4%(nom.) | |

Digital Modulation Analysis (Option SSA5000-DMA)

| Common Parameter | | |
|------------------------|---|----------------|
| | SSA5083A | SSA5085A |
| Frequency Range | 2 MHz~13.6 GHz | 2 MHz~26.5 GHz |
| Carrier Power Accuracy | ± 2 dB (nom.) | |
| Carrier Power Range | -30 dBm to +20 dBm (nom.) | |
| Measurement | | |
| Modulation Type | ASK: 2ASK; FSK: 2FSK, 4FSK, 8FSK, 16FSK; MSK: GMSK; PSK: BPSK, QPSK, OQPSK, 8PSK; DPSK: DBPSK, DQPSK, D8PSK, $\pi/4$ -DQPSK, $\pi/8$ -D8PSK; QAM: 16, 32, 64, 128, 256 | |
| Meas Length | 16 to 4096 | |
| Points/Symbol | 4, 6, 8, 10, 12, 14, 16 | |
| Symbol Rate | 1 ksp/s to 32 Msp/s, Symbol Rate* Points/Symbol ≤150 Msp/s | |
| Trigger Holdoff | 500 ms | |
| Burst | Burst power sync, BERT | |
| Filter | | |
| Meas/Ref Filter | Nyquist, Sqrt Nyquist, Gauss, Half Sine, Rectangular | |
| Length | 2 to 128 | |
| Alpha/BT | Alpha 0.01~1, BT 0.01~10 | |
| Trace | | |
| Trace Data | IQ Meas Time, IQ Meas Spectrum, IQ Ref Time, IQ Ref Spectrum, Time, Spectrum, IQ Mag Err, IQ Phase Err Symbol Error Chart, Err Vector Time, Err Vector Spectrum, | |
| Trace Formats | Log mag, Lin mag, Real, Imag, I-Q, Constellation, I-eye, Q-eye, Wrap Phase, Unwrap Phase, Trellis eye | |
| Symbol Error Chart | | |
| PSK/DPSK/MSK/QAM | EVM (rms EVM, peak EVM), Magnitude error, Phase error, IQ offset, Carrier offset, SNR Quadrature error, Gain imbalance(not support for MSK) | |
| ASK | ASK Error, ASK depth, carrier offset | |
| FSK | FSK Error, Magnitude error, FSK deviation, carrier offset | |

Real-Time Spectrum Analysis (Option SSA5000A-RTA1)

| Frequency and Time | | | |
|----------------------------------|---|--------------------|------------|
| Real-Time | 25 MHz (Default) | | |
| Bandwidth | 40 MHz (Option SSA5000A-B40) | | |
| 100% POI Minimum Signal Duration | Full Span, Kaiser Window, Frequency Mask Triggering at full amplitude accuracy 7.20 μ s | | |
| Measurement view | Density | 30 ms ~ 50 s | |
| | 3D+Spectrogram | 30 ms ~ 50 s | |
| | Spectrogram | 100 μ s ~ 50 s | |
| | PvT+Spectrum | 100 μ s ~ 50 s | |
| MAX Sample rate | 51.2 MHz | | |
| FFT per second | 150 000(40 MHz analysis BW) | | |
| Marker | 8 | | |
| Span min | 5 kHz | | |
| Window | Kaiser(Default), Hanning, Flattop, Gaussian, Blackman-Harris, Rectangular Any SPAN, six RBW for every window (only one for Rectangular), default min RBW. Typical RBW for Kaiser: | | |
| RBW | Span | RBW min | RBW MAX |
| | 40 MHz | 100.43 kHz | 3.3142 MHz |
| | 20 MHz | 50.21 kHz | 1.657 MHz |
| | 10 MHz | 25.11 kHz | 828.55 kHz |
| | 1 MHz | 2.51 kHz | 82.85 kHz |
| | 100 kHz | 251 Hz | 8.285 kHz |
| Spectrogram / PvT Maximum stored | 50 000 (Loop store) | | |

| Different RBW and span, 100% POI (μ s) | | | | | | |
|---|--------|--------|--------|--------|-------|-------|
| Analysis BW | RBW1 | RBW2 | RBW3 | RBW4 | RBW5 | RBW6 |
| 40 MHz | 26.56 | 16.56 | 11.56 | 9.06 | 7.81 | 7.20 |
| 20 MHz | 46.56 | 26.56 | 16.56 | 11.56 | 9.06 | 7.81 |
| 10 MHz | 86.56 | 46.56 | 26.56 | 16.56 | 11.56 | 9.06 |
| 1 MHz | 806.56 | 406.56 | 206.56 | 106.56 | 56.56 | 31.56 |

| Different window length for RBW | | | | | | |
|---------------------------------|----------|----------|----------|----------|---------|---------|
| Length\Type | 1024 | 512 | 256 | 128 | 64 | 32 |
| Kaiser(Beta=12) | 398.2849 | 198.9478 | 99.2793 | 49.4450 | 24.5279 | 12.0693 |
| Hanning | 533.4785 | 266.4785 | 132.9785 | 66.2285 | 32.8535 | 16.1660 |
| Flattop | 212.2447 | 106.0182 | 52.9050 | 26.3483 | 13.0700 | 6.4309 |
| Gaussian(alpha=3.5) | 404.8707 | 202.2399 | 100.9244 | 50.2666 | 24.9376 | 12.2729 |
| Blackman-Harris | 399.2401 | 199.4250 | 99.5174 | 49.5636 | 24.5868 | 12.0983 |
| Rectangular | 801 | 400.5000 | 200.2500 | 100.1250 | 50.0625 | 25.0313 |

| Amplitude Accuracy and Range | | |
|-------------------------------|-------------------------------|--|
| Detector | +Peak, -Peak, Sample, Average | |
| Trace | 3 | |
| Spectrum Density Display | 0~100% (resolution 0.1%) | |
| Dynamic range for Spectrogram | 200 dB | |
| Amplitude | Flatness | < 0.4 dB |
| | Resolution | 0.01 dB |
| | Dynamic range | < 60 dB |
| Trigger | Free Run, PvT, External | |
| Frequency Mask Trigger (FMT) | Source | Traces |
| | Type | Greater Than, Less Than, Outside Mask, Inside Mask |
| | Actions | Stop, Beep |
| Colour Mode | Warm(Default), Cool, Gray | |