

Agilent N8211A Performance Analog Upconverter Synthetic Instrument Module 250 kHz to 20/40 GHz

Data Sheet



The Agilent Technologies N8211A performance analog upconverter is a fully synthesized 20 or 40 GHz synthetic instrument module that converts a baseband signal to a microwave signal. The N8211A is an analog microwave source that generates a stimulus signal by upconverting a baseband signal with superior AM, FM, phase, and pulse modulation capabilities (external or internal modulation). The N8211A is based upon the PSG analog signal generator's high output power, low phase noise, and excellent level accuracy.

Agilent's synthetic instrument family offers the highest-performing RF/MW LAN-based modular instrumentation and the smallest footprint for automated test systems (ATSS); providing the maximum flexibility and minimizing the cost of an ATS over its lifetime.


- Fully LXI Class-A compliant 
- Similar performance to the Agilent E8257D PSG analog signal generator, 20/40 GHz
- Coherent LO input/output ports allowing use of a common LO signal with multiple upconverters to provide coherent upconversion capability
- CW, digital step, or analog ramp sweeps
- Optional step attenuator, narrow pulse capability, enhanced phase noise performance

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Definitions and Conditions

All specifications and characteristics apply over a 0 to 55 °C range (unless otherwise stated) and apply after a 45 minute warm-up time. Supplemental characteristics, denoted as typical, nominal, or measured, provide additional (non-warranted) information, which may be useful in the application of the product.

Specifications (spec): Specifications describe the performance of parameters covered by the product warranty and apply over 0 to 55 °C temperature range unless otherwise noted.

Typical (typ): Represents characteristic performance which is non-warranted. Describes performance that will be met by a minimum of 80% of all products.

Nominal (nom): Nominal values indicate expected performance, or describe product performance that is useful in the application of the product, but is not covered by the product warranty. Nominal values represent the value of a parameter that is most likely to occur; they represent the expected mean or average.

Measured (meas.): Measured values represent the value of a parameter measured on an instrument during the design stage. Measured values are non-warranted.

The N8211A performance analog upconverter will meet its specifications when:

- Stored a minimum of two hours within the operating temperature range and turned on for at least 45 minutes.
- The instrument is within its two-year calibration cycle.

Specifications

Frequency

| | | | |
|--|---|--|------|
| Range ¹ | | | |
| Option 520 | 250 kHz to 20 GHz | | |
| Option 540 | 250 kHz to 40 GHz | | |
| Resolution | | | |
| CW | 0.001 Hz | | |
| All sweep modes | 0.01 Hz ² | | |
| Accuracy | Aging rate ± temperature effects ± line voltage effects | | |
| Switching speed ^{3, 4} | < 11 ms (typ) | | |
| Phase offset | Adjustable in nominal 0.1° increments | | |
| Frequency bands | Band | Frequency range | N # |
| | 1 | 250 kHz to 250 MHz | 1/8 |
| | 2 | > 250 to 500 MHz | 1/16 |
| | 3 | > 500 MHz to 1 GHz | 1/8 |
| | 4 | > 1 to 2 GHz | 1/4 |
| | 5 | > 2 to 3.2 GHz | 1/2 |
| | 6 | > 3.2 to 10 GHz | 1 |
| | 7 | > 10 to 20 GHz | 2 |
| | 8 | > 20 to 40 GHz | 4 |
| Accuracy | Aging rate ± temperature effects ± line voltage effects | | |
| Internal timebase reference oscillator | Standard | Option UNX | |
| Aging rate | < ±1 × 10 ⁻⁷ /year or < ±4.5 × 10 ⁻⁹ /day after 45 days | < ±3 × 10 ⁻⁸ /year or < ±2.5 × 10 ⁻¹⁰ /day after 30 days | |
| Temperature effects | Standard | Option UNX | |
| | < ±5 × 10 ⁻⁸ 0 to 55 °C (typ) | < ±4.5 × 10 ⁻⁹ 0 to 55 °C (typ) | |
| Line voltage effects | Standard | Option UNX | |
| | < ±2 × 10 ⁻⁹ for +5% –10% change (typ) | < ±2 × 10 ⁻¹⁰ for ±10% change (typ) | |
| External reference frequency | 1, 2, 2.5, 5, 10 MHz | 10 MHz only | |
| Lock range | ±0.2 ppm | ±1.0 ppm | |
| Reference output | | | |
| Frequency | 10 MHz | | |
| Amplitude | > +4 dBm into 50 Ω load (typ) | | |
| External reference input | | | |
| Amplitude | > –3 dBm | | |
| Option UNX | 5 dBm ±5 dB ⁵ | | |
| Input impedance | 50 Ω (nom) | | |

1. Usable, but unspecified, down to 100 kHz.

2. In ramp sweep mode (Option 007), resolution is limited with narrow spans and slow sweep speeds. Refer to ramp sweep specifications for more information.

3. Time from IEEE 1588 trigger to within 0.1 ppm of final frequency above 250 MHz or within 100 Hz below 250 MHz.

4. Add 12 ms (typ) when switching from greater than 3.2 GHz to less than 3.2 GHz.

5. To optimize phase noise 5 dBm ± 2 dB.

Specifications (continued)

Step (digital) sweep

| | |
|----------------------------|---|
| Operating modes | Step sweep of frequency or amplitude or both (start to stop) List sweep of frequency or amplitude or both (arbitrary list) |
| Sweep range | |
| Frequency sweep | Within instrument frequency range |
| Amplitude sweep | Within attenuator hold range (see "Output" section) |
| Dwell time | 1 ms to 60 s |
| Number of points | 2 to 65535 (step sweep) 2 to 1601 per table (list sweep) |
| Triggering | Auto, external, single, or LAN IEEE 1588 |
| Settling time ⁶ | |
| Frequency | < 8 ms (typ) |
| Amplitude | < 5 ms (typ) |

Ramp (analog) sweep (Option 007)^{7, 8}

| | | | |
|----------------------|--|--------------------|---------------------------|
| Operating modes | Synthesized frequency sweep (start/stop), (center/span), (swept CW) Power (amplitude) sweep (start/stop) | | |
| Sweep span range | Settable from minimum ⁹ to full range | | |
| Maximum sweep rate | Start frequency | Maximum sweep rate | Max span for 100 ms sweep |
| | 250 kHz to < 0.5 GHz | 25 MHz/ms | 2.5 GHz |
| | 0.5 to < 1 GHz | 50 MHz/ms | 5 GHz |
| | 1 to < 2 GHz | 100 MHz/ms | 10 GHz |
| | 2 to < 3.2 GHz | 200 MHz/ms | 20 GHz |
| | ≥ 3.2 GHz | 400 MHz/ms | 40 GHz |
| Frequency accuracy | ±0.05% of span ± timebase (at 100 ms sweep time, for sweep spans less than maximum values given above) Accuracy improves proportionally as sweep time increases ¹⁰ | | |
| Sweep time | (Forward sweep, not including bandswitch and retrace intervals) | | |
| Resolution | 1 ms | | |
| Manual mode settable | 10 ms to 200 seconds | | |
| Auto mode | Set to minimum value determined by maximum sweep rate | | |
| Triggering | Auto, external, single, LAN IEEE 1588, or LXI trigger bus | | |
| Markers | 10 independent continuously variable frequency markers | | |
| Display | Z-axis intensity or RF amplitude pulse | | |
| Functions | M1 to center, M1/M2 to start/stop, marker delta | | |

6. 19 ms (typical) when stepping from greater than 3.2 GHz to less than 3.2 GHz.

7. During ramp sweep operation, AM, FM, phase modulation, and pulse modulation are usable but performance is not guaranteed.

8. The N8211A does not support operation with swept scalar analyzers, such as the 8757 family.

9. Minimum settable sweep span is proportional to carrier frequency and sweep time. Actual sweep span may be slightly different than desired setting for spans less than $[0.00004\% \text{ of carrier frequency or } 140 \text{ Hz}] \times [\text{sweep time in seconds}]$. Actual span will always be displayed correctly.

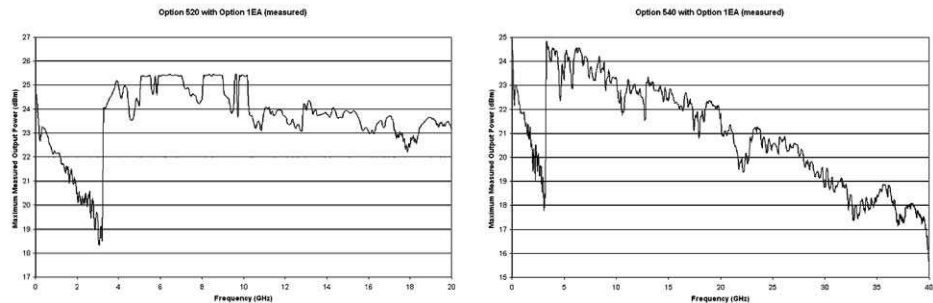
10. Typical accuracy for sweep times > 100 ms can be calculated from the equation: $[(0.005\% \text{ of span})/(\text{sweep time in seconds})] \pm \text{timebase}$. Accuracy is not specified for sweep times < 100 ms.

Specifications (continued)

Output

| Power ¹¹ (dBm) | Frequency range | Standard | Option 1EA spec. (typ.) |
|---|---|---------------------------|---------------------------------|
| Option 520 | 250 kHz to 3.2 GHz | -20 to +13 | -20 to +16 (+19) |
| | 250 kHz to 3.2 GHz with Option UNW | -20 to +11 | -20 to +11 (+14) |
| | 250 kHz to 3.2 GHz with Option 1EH | -20 to +13 ¹² | -20 to +13 (+16) ¹² |
| | 250 kHz to 3.2 GHz with Options UNW and 1EH | -20 to +10 ¹² | -20 to +10 (+13) ¹² |
| | > 3.2 to 5.2 GHz | -20 to +13 | -20 to +22 (+23) |
| | > 5.2 to 12 GHz | -20 to +13 | -20 to +23 (+24) |
| | > 12 to 20 GHz | -20 to +13 | -20 to +21 (+23) |
| Option 540 | 250 kHz to 3.2 GHz | -20 to +9 | -20 to +15 (+18) |
| | 250 kHz to 3.2 GHz with Option UNW | -20 to +9 | -20 to +10 (+13) |
| | 250 kHz to 3.2 GHz with Option 1EH | -20 to +9 | -20 to +12 (+15) ¹² |
| | 250 kHz to 3.2 GHz with Options UNW and 1EH | -20 to +9 ¹² | -20 to +9 (+12) ¹² |
| | > 3.2 to 17 GHz | -20 to +9 | -20 to +17 (+19) |
| | > 17 to 37 GHz | -20 to +9 | -20 to +14 (+17) |
| | > 37 to 40 GHz | -20 to +9 | -20 to +12 (+15) |
| Option 520 with step attenuator (Option 1E1) | 250 kHz to 3.2 GHz | -135 to +11 | -135 to +15 (+18) |
| | 250 kHz to 3.2 GHz with Option UNW | -135 to +10 | -135 to +10 (+13) |
| | 250 kHz to 3.2 GHz with Option 1EH | -135 to +10 ¹³ | -135 to +12 (+15) ¹² |
| | 250 kHz to 3.2 GHz with Options UNW and 1EH | -135 to +9 ¹² | -135 to +9 (+12) ¹² |
| | > 3.2 to 10 GHz | -135 to +11 | -135 to +21 (+22) |
| | > 10 to 20 GHz | -135 to +11 | -135 to +19 (+20) |
| Option 540 with step attenuator (Option 1E1) | 250 kHz to 3.2 GHz | -135 to +7 | -135 to +14 (+17) |
| | 250 kHz to 3.2 GHz with Option UNW | -135 to +7 | -135 to +9 (+12) |
| | 250 kHz to 3.2 GHz with Option 1EH | -135 to +7 | -135 to +11 (+14) ¹² |
| | 250 kHz to 3.2 GHz with Options UNW and 1EH | -135 to +7 ¹³ | -135 to +8 (+11) ¹² |
| | 3.2 to 17 GHz | -135 to +7 | -135 to +15 (+18) |
| | 17 to 37 GHz | -135 to +7 | -135 to +12 (+15) |
| | 37 to 40 GHz | -135 to +7 | -135 to +10 (+14) |
| Step attenuator ¹⁴ (Option 1E1) Options 520 and 540 | 0 dB and 5 to 115 dB in 10 dB steps | | |

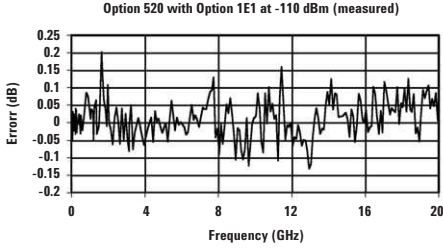
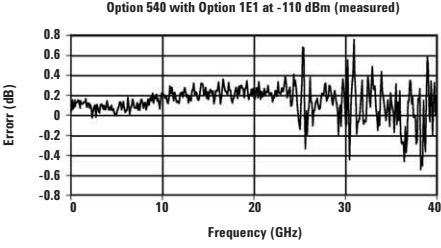
Maximum available power (measured)



- Maximum power specification is warranted from 15 to 35 °C, and is typical from 0 to 15 °C. Maximum power over the 35 to 55 °C range typically degrades less than 2 dB.
- With harmonic filters switched off. With filters on, maximum output power is reduced 3 dB for frequencies below 2 GHz.
- With harmonic filters switched off. With filters on, maximum output power is reduced 2 dB for frequencies below 2 GHz.
- The step attenuator provides coarse power attenuation to achieve low power levels. Fine power level adjustment is provided by the ALC (Automatic Level Control) within the attenuator hold range.

Specifications (continued)

Output (continued)

| | | | | | |
|--|---|--|------------------|--|--------------------|
| Attenuator hold range minimum | From -20 dBm to maximum specified output power with step attenuator in 0 dB position; can be offset using Option 1E1 attenuator | | | | |
| Amplitude switching speed ¹⁵ CW or analog modulation | < 3 ms (typ) with ALC on or off, without power search | | | | |
| Level accuracy ¹⁶ (dB) | Frequency | > +10 dBm | +10 to 0 dBm | 0 to -10 dBm | -10 to -20 dBm |
| | 250 kHz to 2 GHz | ± 0.6 | ± 0.6 | ± 0.6 | ± 1.4 |
| | 2 GHz to 20 GHz | ± 0.8 | ± 0.8 | ± 0.8 | ± 1.2 |
| | > 20 to 40 GHz | ± 1.0 | ± 0.9 | ± 0.9 | ± 1.3 |
| Level accuracy with step attenuator (Option 1E1) ¹⁷ (dB) Options 520 and 540 | Frequency | > +10 dBm | +10 to -10 dBm | -10 to -70 dBm | -70 to -90 dBm |
| | 250 kHz to 2 GHz | ± 0.6 | ± 0.6 | ± 0.7 | ± 0.8 |
| | > 2 to 20 GHz | ± 0.8 | ± 0.8 | ± 0.9 | ± 1.0 |
| | > 20 to 40 GHz | ± 1.0 | ± 0.9 | ± 1.0 | ± 2.0 |
| | |  | |  | |
| Resolution | 0.01 dB | | | | |
| Temperature stability | 0.01 dB/°C (typ) | | | | |
| User flatness correction | 2 to 1601 points/table | | | | |
| Number of points | Up to 10,000 memory limited | | | | |
| Number of tables | Arbitrary, within attenuator range | | | | |
| Path loss | Remote power meter ¹⁸ , remote bus, manual (user edit/view) | | | | |
| Entry modes | Remote power meter ¹⁸ , remote bus, manual (user edit/view) | | | | |

15. To within 0.1 dB of final amplitude within one attenuator range. Add 10 to 50 ms when using power search.

16. Specifications apply in CW and list/step sweep modes over the 15 to 35 °C temperature range. Degradation outside this range, for power levels > -10 dBm, is typically < 0.3 dB. In ramp sweep mode (with Option 007), specifications are typical. Specifications do not apply above the maximum specified power.

17. Specifications apply in CW and list/step sweep modes over the 15 to 35 °C temperature range, with attenuator hold off (normal operating mode). Degradation outside this range, for ALC power levels > -10 dBm, is typically < 0.3 dB. In ramp sweep mode (with Option 007), specifications are typical. Specifications do not apply above the maximum specified power.

18. Compatible with Agilent N1911A and N1912A power meters as well as EPM Series (E4418B and E4419B) power meters.

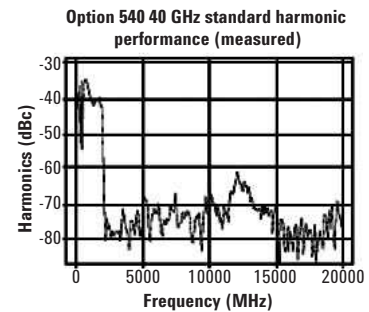
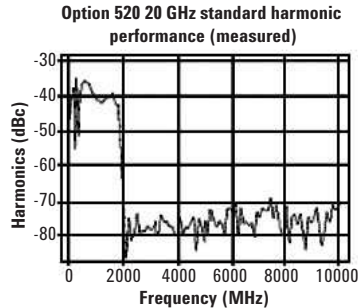
Specifications (continued)

Output (continued)

| | |
|--------------------------------|--|
| Output impedance | 50 Ω (nom) |
| SWR (internally leveled) (typ) | |
| 250 kHz to 2 GHz | < 1.4:1 |
| > 2 GHz to 20 GHz | < 1.6:1 |
| > 20 GHz to 40 GHz | < 1.8:1 |
| Leveling modes | Internal leveling, external detector leveling, millimeter source module, ALC off |
| External detector leveling | |
| Range | -0.2 mV to -0.5 V (nom) (-36 dBm to +4 dBm using Agilent 33330D/E detector) |
| Bandwidth | Selectable 0.1 to 100 kHz (nom) (Note: Not intended for pulsed operation) |
| Maximum reverse power | 1/2 Watt, 0 VDC |

Spectral purity

| | |
|---|--|
| Harmonics ¹⁹ | (at +10 dBm or maximum specified output power, whichever is lower) |
| < 10 MHz | -28 dBc (typical below 1 MHz) |
| 10 MHz to 2 GHz | -30 dBc ²⁰ |
| 10 MHz to 2 GHz (with Option 1EH filters on) | -55 dBc ²¹ |
| > 2 GHz to 20 GHz | -55 dBc |
| > 20 GHz to 40 GHz (Option 540) | -50 dBc (typ) |



| | |
|-----------------------------|--|
| Sub-harmonics ²² | (at +10 dBm or maximum specified output power, whichever is lower) |
| 250 kHz to 10 GHz | None |
| > 10 GHz to 20 GHz | < -60 dBc |
| > 20 GHz | < -50 dBc |

19. Specifications are typical for harmonics beyond specified frequency range.

20. Typical below 250 MHz if Option 1EH is installed and the filters are off.

21. In ramp sweep mode (Option 007), harmonics are -28 dBc below 250 MHz.

22. Sub-harmonics are defined as Carrier Freq / N. Specifications are typical for sub-harmonics beyond specified frequency range.

Specifications (continued)

Spectral purity (continued)

| | | | | |
|--|---|----------------------|--------------------------|------------------------|
| Non-harmonics ²³ | (at +10 dBm or maximum specified output power, whichever is lower, for offsets > 3 KHz [> 300 Hz with Option UNX]) | | | |
| | Frequency | Spec | Typical | |
| | 250 kHz to 250 MHz | -65 | -72 for > 10 kHz offsets | |
| | > 250 MHz to 1 GHz | -80 | -88 | |
| | > 1 to 2 GHz | -74 | -82 | |
| | > 2 to 3.2 GHz | -68 | -76 | |
| | > 3.2 to 10 GHz | -62 | -70 | |
| | > 10 to 20 GHz | -56 | -64 | |
| | > 20 to 40 GHz | -50 | -58 | |
| SSB phase noise (CW) ²⁴ | Offset from carrier (dBc/Hz) | | | |
| | Frequency | 20 kHz | 20 kHz (typical) | |
| | 250 kHz to 250 MHz ²⁵ | -130 | -134 | |
| | > 250 to 500 MHz ²⁵ | -134 | -138 | |
| | > 500 MHz to 1 GHz ²⁵ | -130 | -134 | |
| | > 1 to 2 GHz ²⁵ | -124 | -128 | |
| | > 2 to 3.2 GHz | -120 | -124 | |
| | > 3.2 to 10 GHz | -110 | -113 | |
| | > 10 to 20 GHz | -104 | -108 | |
| | > 20 to 40 GHz | -98 | -102 | |
| Option UNX: Absolute SSB phase noise (dBc/Hz) (CW) ²⁴ | Offset from carrier | | | |
| | Frequency | 1 Hz spec (typical) | 10 Hz spec (typical) | 100 Hz spec (typical) |
| | 250 kHz to 250 MHz ²⁵ | -58 (-66) | -87 (-94) | -104 (-120) |
| | > 250 to 500 MHz ²⁵ | -61 (-72) | -88 (-98) | -108 (-118) |
| | > 500 MHz to 1 GHz ²⁵ | -57 (-65) | -84 (-93) | -101 (-111) |
| | > 1 to 2 GHz ²⁵ | -51 (-58) | -79 (-86) | -96 (-106) |
| | > 2 to 3.2 GHz | -46 (-54) | -74 (-82) | -92 (-102) |
| | > 3.2 to 10 GHz | -37 (-44) | -65 (-72) | -81 (-92) |
| | > 10 to 20 GHz | -31 (-38) | -59 (-66) | -75 (-87) |
| | > 20 to 40 GHz | -25 (-32) | -53 (-60) | -69 (-79) |
| | Frequency | 1 kHz spec (typical) | 10 kHz spec (typical) | 100 kHz spec (typical) |
| | 250 kHz to 250 MHz ²⁵ | -121 (-128) | -128 (-132) | -130 (-133) |
| | > 250 to 500 MHz ²⁵ | -126 (-132) | -132 (-136) | -136 (-141) |
| | > 500 MHz to 1 GHz ²⁵ | -121 (-130) | -130 (-134) | -130 (-135) |
| | > 1 to 2 GHz ²⁵ | -115 (-124) | -124 (-129) | -124 (-129) |
| | > 2 to 3.2 GHz | -111 (-120) | -120 (-124) | -120 (-124) |
| | > 3.2 to 10 GHz | -101 (-109) | -110 (-114) | -110 (-115) |
| | > 10 to 20 GHz | -95 (-106) | -104 (-107) | -104 (-109) |
| | > 20 to 40 GHz | -89 (-99) | -98 (-101) | -98 (-103) |

23. Specifications apply for CW mode, without modulation. In ramp sweep mode (Option 007), performance is typical for offsets > 1 MHz.

24. Phase noise specifications are warranted from 15 to 35 °C.

25. Measured at +10 dBm or maximum specified power, whichever is less.

Specifications (continued)

Spectral purity (continued)

| | | | | |
|--|--|----------------------|-----------------------|------------------------|
| Option UNX: Residual SSB phase noise (dBc/Hz) (CW) ²⁶ | Offset from carrier | | | |
| | Frequency | 1 Hz spec (typical) | 10 Hz spec (typical) | 100 Hz spec (typical) |
| | 250 kHz to 250 MHz ²⁷ | (-94) | -100 (-107) | -110 (-118) |
| | > 250 to 500 MHz ²⁷ | (-101) | -105 (-112) | -115 (-122) |
| | > 500 MHz to 1 GHz ²⁷ | (-94) | -100 (-107) | -110 (-118) |
| | > 1 to 2 GHz ²⁷ | (-89) | -96 (-101) | -104 (-112) |
| | > 2 to 3.2 GHz | (-85) | -92 (-97) | -100 (-108) |
| | > 3.2 to 10 GHz | (-74) | (-87) | (-98) |
| | Frequency | 1 kHz spec (typical) | 10 kHz spec (typical) | 100 kHz spec (typical) |
| | 250 kHz to 250 MHz ²⁷ | -120 (-126) | -128 (-132) | -130 (-133) |
| | > 250 to 500 MHz ²⁷ | -124 (-131) | -132 (-136) | -136 (-141) |
| | > 500 MHz to 1 GHz ²⁷ | -120 (-126) | -130 (-134) | -130 (-134) |
| | > 1 to 2 GHz ²⁷ | -114 (-120) | -124 (-129) | -124 (-129) |
| | > 2 to 3.2 GHz | -110 (-116) | -120 (-124) | -120 (-124) |
| | > 3.2 to 10 GHz | (-106) | (-114) | (-115) |
| Residual FM | (rms, 50 Hz to 15 kHz bandwidth) | | | |
| CW mode | < N x 6 Hz (typ) | | | |
| Option UNX | < N x 4 Hz (typ) | | | |
| Ramp sweep mode | < N x 1 kHz (typ) | | | |
| Broadband noise | (CW mode at +10 dBm or maximum specified output power, whichever is lower, for offsets > 10 MHz) | | | |
| > 2.4 to 20 GHz | < -148 dBc/Hz (typ) | | | |
| > 20 to 40 GHz | < -141 dBc/Hz (typ) | | | |

26. Phase noise specifications are warranted from 15 to 35 °C.

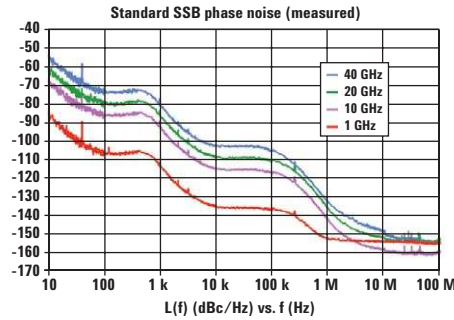
27. Measured at +10 dBm or maximum specified power, whichever is less.

Specifications (continued)

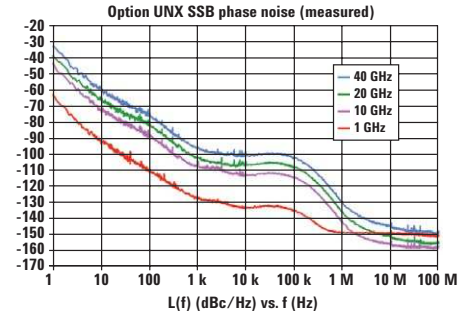
Spectral purity (continued)

Measured phase noise

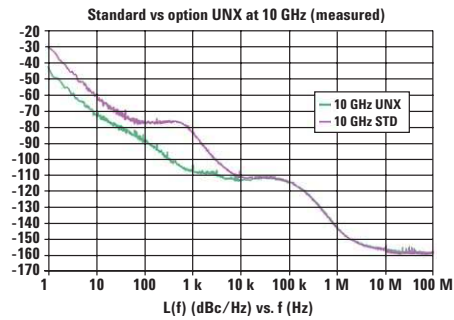
Standard phase noise



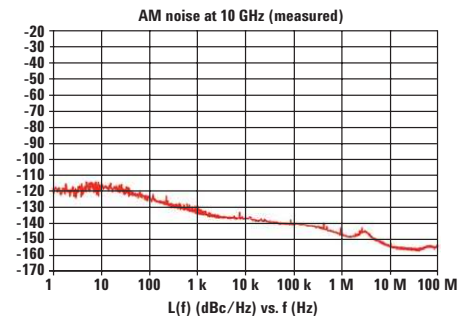
Option UNX phase noise



Standard vs Option UNX phase noise



AM noise at 10 GHz



Measured RMS jitter²⁸

Standard

| Carrier frequency | SONET/SDH data rates | RMS jitter bandwidth | Unit intervals (μ UI) | Time (fs) |
|---------------------------------|----------------------|----------------------|----------------------------|-----------|
| 155 MHz | 155 MB/s | 100 Hz to 1.5 MHz | 25 | 158 |
| 622 MHz | 622 MB/s | 1 kHz to 5 MHz | 21 | 34 |
| 2.488 GHz | 2488 MB/s | 5 kHz to 20 MHz | 57 | 23 |
| 9.953 GHz | 9953 MB/s | 10 kHz to 80 MHz | 152 | 15 |
| 39.812 GHz (with Option 540) | 39812 MB/s | 40 kHz to 320 MHz | 627 | 16 |

Option UNX

| Carrier frequency | SONET/SDH data rates | RMS jitter bandwidth | Unit intervals (μ UI) | Time (fs) |
|---------------------------------|----------------------|----------------------|----------------------------|-----------|
| 155 MHz | 155 MB/s | 100 Hz to 1.5 MHz | 23 | 151 |
| 622 MHz | 622 MB/s | 1 kHz to 5 MHz | 19 | 30 |
| 2.488 GHz | 2488 MB/s | 5 kHz to 20 MHz | 56 | 22 |
| 9.953 GHz | 9953 MB/s | 10 kHz to 80 MHz | 152 | 15 |
| 39.812 GHz (with Option 540) | 39812 MB/s | 40 kHz to 320 MHz | 626 | 16 |

28. Calculated from phase noise performance in CW mode only at +10 dBm.

Specifications (continued)

Frequency modulation (Option UNT)

| | | | |
|---|--|------------------------------|--------------------------|
| Maximum deviation ²⁹ | Frequency | Maximum deviation | |
| | 250 kHz to 250 MHz | 2 MHz | |
| | > 250 to 500 MHz | 1 MHz | |
| | > 500 MHz to 1 GHz | 2 MHz | |
| | > 1 GHz to 2 GHz | 4 MHz | |
| | > 2 GHz to 3.2 GHz | 8 MHz | |
| | > 3.2 GHz to 10 GHz | 16 MHz | |
| | > 10 GHz to 20 GHz | 32 MHz | |
| > 20 GHz to 40 GHz | 64 MHz | | |
| Resolution | 0.1% of deviation or 1 Hz, whichever is greater | | |
| Deviation accuracy | < ± 3.5% of FM deviation + 20 Hz (1 kHz rate, deviations < N x 800 kHz) | | |
| Modulation frequency response ³⁰ | Path [coupling] | Rates (at 100 kHz deviation) | |
| | | 1 dB bandwidth | 3 dB bandwidth (typical) |
| | FM path 1 [DC] | DC to 100 kHz | DC to 10 MHz |
| | FM path 2 [DC] | DC to 100 kHz | DC to 1 MHz |
| | FM path 1 [AC] | 20 Hz to 100 kHz | 5 Hz to 10 MHz |
| FM path 2 [AC] | 20 Hz to 100 kHz | 5 Hz to 1 MHz | |
| DC FM ³¹ carrier offset | ±0.1% of set deviation + (N x 8 Hz) | | |
| Distortion | < 1% (1 kHz rate, deviations < N x 800 kHz) | | |
| Sensitivity | ±1 V _{peak} for indicated deviation | | |
| Paths | FM1 and FM2 are summed internally for composite modulation. Either path may be switched to any one of the modulation sources: Ext1, Ext2, Internal1, Internal2. The FM2 path is limited to a maximum rate of 1 MHz. The FM2 path must be set to a deviation less than FM1. | | |

29. Through any combination of path1, path2, or path1 + path2.

30. Specifications apply in CW and list/step sweep modes. During ramp sweep operation (Option 007), 3 dB bandwidth is typically 50 kHz to 10 MHz (FM1 path), and 50 kHz to 1 MHz (FM2 path).

31. At the calibrated deviation and carrier frequency, within 5 °C of ambient temperature at time of user calibration.

Specifications (continued)

Phase modulation (Option UNT)

| | | | |
|---|--|----------------|------------------------------------|
| Maximum deviation ³² | Frequency | Normal BW mode | High BW mode |
| | 250 kHz to 250 MHz | 20 rad | 2 rad |
| | > 250 to 500 MHz | 10 rad | 1 rad |
| | > 500 MHz to 1 GHz | 20 rad | 2 rad |
| | > 1 GHz to 2 GHz | 40 rad | 4 rad |
| | > 2 GHz to 3.2 GHz | 80 rad | 8 rad |
| | > 3.2 GHz to 10 GHz | 160 rad | 16 rad |
| | > 10 GHz to 20 GHz | 320 rad | 32 rad |
| > 20 GHz to 40 GHz | 640 rad | 64 rad | |
| Resolution | 0.1% of set deviation | | |
| Deviation accuracy | < ±5% of deviation + 0.01 radians (1 kHz rate, normal BW mode) | | |
| Modulation frequency response ³³ | Normal BW mode | High BW mode | |
| | Rates (3 dB BW) | DC to 100 kHz | DC to 1MHz (typical) ³⁴ |
| Distortion | < 1 % (1 kHz rate, Total Harmonic Distortion (THD), dev < N x 80 rad, normal BW mode) | | |
| Sensitivity | ±1 V _{peak} for indicated deviation | | |
| Paths | ΦM1 and ΦM2 are summed internally for composite modulation. Either path may be switched to any one of the modulation sources: Ext1, Ext2, Internal1, Internal2. The ΦM2 path must be set to a deviation less than ΦM1. | | |

32. Through any combination of path1, path2, or path1 + path2.

33. Specifications apply in CW and list/step sweep modes. During ramp sweep operation (Option 007), 3 dB bandwidth is typically 50 kHz to 1 MHz (high BW mode).

34. Path 1 is usable to 4 MHz for external inputs less than 0.3 V peak.

Specifications (continued)

Amplitude modulation³⁵ (Option UNT) (typical)

| Depth | Linear mode | Exponential (log) mode (downward modulation only) |
|---|---|---|
| Maximum | | |
| ALC on | > 90% | > 20 dB |
| ALC off or deep AM on ³⁶ | > 95% | > 40 dB ³⁷ |
| Settable | 0 to 100 % (0 to 100%/volt sensitivity) | 0 to 40 dB (0 to 40 dB/volt sensitivity) |
| Resolution | 0.1% | 0.01 dB |
| Accuracy (1 kHz rate) | < ±(6 % of setting + 1 %) | < ±(2% of setting + 0.2 dB) |
| Ext sensitivity | Linear mode ±1 V _{peak} for indicated depth | Exponential (log) mode (downward modulation only) –1 V for indicated depth |
| Rates (3 dB bandwidth, 30% depth) | | |
| DC coupled | 0 to 100 kHz | |
| AC coupled | 10 Hz to 100 kHz (usable to 1 MHz) | |
| Distortion (1 kHz rate, linear mode, total harmonic distortion) | | |
| 30% AM | < 1.5% | |
| 60% AM | < 2% | |
| Paths | AM1 and AM2 are summed internally for composite modulation. Either path may be switched to any one of the modulation sources: Ext1, Ext2, Internal1, Internal2. | |

External modulation inputs (Ext1 & Ext2) (Option UNT)

| | |
|--|---|
| Modulation types | AM, FM, and Φ M |
| Input impedance | 50 or 600 Ω (nom) switched |
| High/low indicator (100 Hz to 10 MHz BW, ac coupled inputs only) | Activated when input level error exceeds 3% (nom) |

35. AM specifications are typical. For carrier frequencies below 2 MHz AM is usable but not warranted. Unless otherwise stated, specifications apply with ALC on, deep AM off, and envelope peaks within ALC operating range (–20 dBm to maximum specified power, excluding step-attenuator setting).

36. For reduced distortion at high modulation depths, either level hold mode (ALC-off with power search) or deep AM mode should be used. With ALC-On in deep AM mode, waveform peaks are controlled by ALC system, and the lower portion of the waveform (below –10 dBm nominal ALC level) is subject to sample-and-hold drift of approximately 0.25 dB/second.

37. To achieve > 40 dB depth, less than –1 V external input may be required.

Specifications (continued)

Simultaneous modulation (Option UNT)

All modulation types may be simultaneously enabled except: FM with Φ M, and linear AM with exponential AM. AM, FM, and Φ M can sum simultaneous inputs from any two sources (Ext1, Ext2, Internal1, or Internal2). Any given source (Ext1, Ext2, Internal1, or Internal2) may be routed to only one activated modulation type.

Internal modulation source (Option UNT)

Dual function generators provide two independent signals (Internal1 and Internal2) for use with AM, FM, Φ M, or LF Out

| | |
|-----------|--|
| Waveforms | Sine, square, positive ramp, negative ramp, triangle, Gaussian noise, uniform noise, swept sine, dual sine ³⁸ |
|-----------|--|

| | |
|------------------------|-------------------|
| Rate range | |
| Sine | 0.5 Hz to 1 MHz |
| Square, ramp, triangle | 0.5 Hz to 100 kHz |
| Resolution | 0.5 Hz |
| Accuracy | Same as timebase |

| | |
|------------------|--|
| LF Out | |
| Output | Internal1 or Internal2; also provides monitoring of Internal1 or Internal2 when used for AM, FM, or Φ M |
| Amplitude | 0 to 3 V _{peak} (nom) into 50 Ω |
| Output impedance | 50 Ω (nom) |

| | |
|---|---|
| Swept sine mode (frequency, phase continuous) | |
| Operating modes | Triggered or continuous sweeps |
| Frequency range | 1 Hz to 1 MHz |
| Sweep rate | 0.5 Hz to 100 kHz sweeps/s, equivalent to sweep times 10 μ s to 2 s |
| Resolution | 0.5 Hz (0.5 sweep/s) |

38. Internal2 is not available when using swept sine or dual sine modes.

Specifications (continued)

| Pulse modulation^{39, 40} (Option UNU) | 500 MHz to 3.2 GHz | Above 3.2 GHz |
|---|------------------------------|------------------------------|
| On/Off ratio | 80 dB (typ) | 80 dB |
| Rise/Fall times (Tr, Tf) | 100 ns (typ) | 6 ns (typ) |
| Minimum pulse width | | |
| Internally leveled | 2 μ s | 1 μ s |
| Level hold (ALC off with power search) | 0.5 μ s | 0.15 μ s |
| Repetition frequency | | |
| Internally leveled | 10 Hz to 250 kHz | 10 Hz to 500 kHz |
| Level hold (ALC off with power search) | DC to 1 MHz | DC to 3 MHz |
| Level accuracy (relative to CW) | | |
| Internally leveled | ± 0.5 dB | ± 0.5 dB |
| Level hold (ALC off with power search) | ± 0.5 dB (typ) | ± 0.5 dB (typ) |
| Width compression (RF width relative to video out) | ± 50 ns (typ) | ± 5 ns (typ) |
| Video feed-through ⁴¹ | < 200 mv (typ) | < 2 mv (typ) |
| Video delay (ext input to video) | 40 ns (nom) | 40 ns (nom) |
| RF delay (video to RF output) | 280 ns (nom) | 35 ns (nom) |
| Pulse overshoot | < 10% (typ) | < 10% (typ) |
| Input level | +1 V _{peak} = RF On | +1 V _{peak} = RF On |
| Input impedance | 50 Ω (nom) | 50 Ω (nom) |

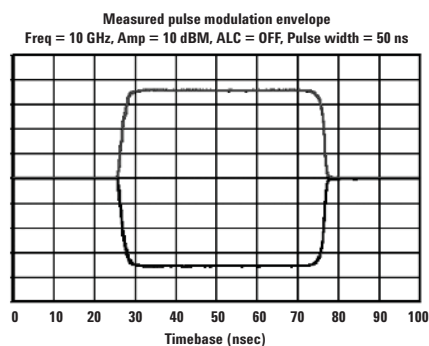
39. With ALC off, specs apply after the execution of power search. Specifications apply with Atten Hold Off (default mode for instruments with attenuator), or ALC level between -5 and 10 dBm or maximum specific power, whichever is lower.

40. Power search is a calibration routine that improves level accuracy with ALC off. The instrument microprocessor momentarily closes the ALC loop to find the modulator drive setting necessary to make the quiescent RF level equal to an entered value, then opens the ALC loop while maintaining that modulator drive setting. When executing power search, RF power will be present for typically 10 to 50 ms; the step attenuator (Option 1E1) can be set to automatically switch to maximum attenuation to protect sensitive devices. Power search can be configured to operate either automatically or manually at the carrier frequency, or over a user-definable frequency range.

41. With attenuator in 0 dB position. Video feed-through decreases with attenuator setting.

Specifications (continued)

| Narrow pulse modulation^{42, 43} (Option UNW) | 10 MHz to 3.2 GHz | Above 3.2 GHz |
|--|------------------------------|-----------------------------------|
| On/Off ratio | 80 dB | 80 dB |
| Rise/Fall times (Tr, Tf) | 10 ns (8 ns typ) | 10 ns (6 ns typ) |
| Minimum pulse width | | |
| Internally leveled: | 1 μ s | 1 μ s |
| Level hold (ALC off with power search) | 20 ns | 20 ns |
| Repetition frequency | | |
| Internally leveled | 10 Hz to 500 kHz | 10 Hz to 500 kHz |
| Level hold (ALC off with power search) | DC to 5 MHz | DC to 10 MHz |
| Level accuracy (relative to CW) | | |
| Internally leveled | ± 0.5 dB | ± 0.5 dB (0.15 dB typ) |
| Level hold (ALC off with power search) | ± 1.3 dB (typ) | ≤ 20 GHz: ± 0.5 dB (typ) |
| Width compression (RF width relative to video out) | ± 5 ns (typ) | ± 5 ns (typ) |
| Video feed-through ⁴⁴ | < 125 mv (typ) | < 2 mv (typ) |
| Video delay (ext input to video) | 50 ns (nom) | 50 ns (nom) |
| RF delay (video to RF output) | 45 ns (nom) | 35 ns (nom) |
| Pulse overshoot | < 15% (typ) | < 10% (typ) |
| Input level | +1 V _{peak} = RF On | +1 V _{peak} = RF On |
| Input impedance | 50 Ω (nom) | 50 Ω (nom) |



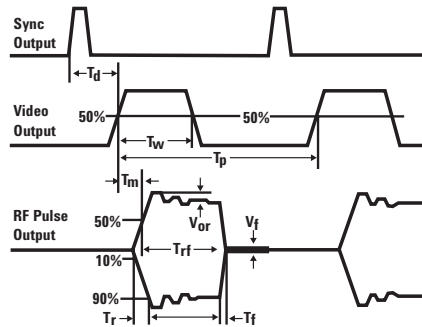
42. With ALC off, specs apply after the execution of power search. Specifications apply with Atten Hold Off (default mode for instruments with attenuator), or ALC level between -5 and 10 dBm or maximum specific power, whichever is lower.
43. Power search is a calibration routine that improves level accuracy with ALC off. The instrument microprocessor momentarily closes the ALC loop to find the modulator drive setting necessary to make the quiescent RF level equal to an entered value, then opens the ALC loop while maintaining that modulator drive setting. When executing power search, RF power will be present for typically 10 to 50 ms; the step attenuator (Option 1E1) can be set to automatically switch to maximum attenuation to protect sensitive devices. Power search can be configured to operate either automatically or manually at the carrier frequency, or over a user-definable frequency range.
44. With attenuator in 0 dB position. Video feed-through decreases with attenuator setting.

Specifications (continued)

Internal pulse generator (Option UNU or UNW)

| | |
|--|--|
| Modes | Free-run, triggered, triggered with delay, doublet, and gated. Triggered with delay, doublet, and gated require external trigger source. |
| Period (PRI) (T_p) | 70 ns to 42 s (Repetition frequency: 0.024 Hz to 14.28 MHz) |
| Pulse width (T_w) | 10 ns to 42 s |
| Delay (T_d) | |
| Free-run mode | 0 to ± 42 s |
| Triggered with delay and doublet modes | 75 ns to 42 s with ± 10 ns jitter |
| Resolution | 10 ns (width, delay, and PRI) |

T_d Video delay (variable)
 T_w Video pulse width (variable)
 T_p Pulse period (variable)
 T_m RF delay
 T_{rf} RF pulse width
 T_f RF pulse fall time
 T_r RF pulse rise time
 V_{or} Pulse overshoot
 V_f Video feedthrough



Simultaneous modulation

All modulation types (FM, AM, Φ M, and pulse modulations) may be simultaneously enabled except: FM with Φ M, and linear AM with exponential AM. AM, FM, and Φ M can sum simultaneous inputs from any two sources (Ext1, Ext2, Internal1, or Internal2). Any given source (Ext1, Ext2, Internal1, or Internal2) may be routed to only one activated modulation type.

Remote programming

| | |
|-------------------|---|
| Interfaces | LXI Class-A compliant instrument LXI over 100BaseT LAN interface |
| Triggering | LXI LAN based triggering IEEE 1588 time-based triggering LXI hardware trigger bus |
| Control languages | IVI-COM - Interchangeable Virtual Instrument Common Object Model IVI-C - Interchangeable Virtual Instrument C (using C programming language) |

Specifications (continued)

General specifications

| | |
|--------------------|---|
| Power requirements | 100 to 240 V, 50/60 Hz (automatically selected) |
| Power consumption | 250 watts (typical), < 300 watts (maximum) Standby: < 20 watts (typical) |

Environmental

Samples of this product have been type tested in accordance with the Agilent Environmental Test Manual and verified to be robust against the environmental stresses of storage, transportation and end-use; those stresses include, but are not limited to temperature, humidity, shock, vibration, altitude, and power line conditions. Test methods are aligned with IEC 60068-2 and levels are similar to MIL-PRF-28800F Class 3.

| | |
|---|--|
| Operating temperature range | 0 to 55 °C |
| Storage temperature range⁴⁵ | –40 to +70 °C |
| Relative humidity | Type tested: 0 to 95% at 40 °C, (non-condensing) |
| Altitude | Type tested: 0 m to 4600 m above mean sea level |
| Audio noise | $L_{NPE} < 70$ dB(A), tested according to ISO 7779 |

Shock and vibration

| | |
|--------------------------------------|--|
| Operating random vibration | Type tested: 5 to 500 Hz, 0.21 g_{rms} |
| Survival random vibration | Type tested: 5 to 500 Hz, 2.09 g_{rms} |
| Survival swept sine vibration | Type tested: 5 to 500 Hz, 0.5 g_{peak} |
| End use handling shock | Type tested: Half sine, 60 in/sec ΔV , 2-3 ms duration |
| Transportation shock | Type tested: Trapezoidal, 50 g, 337 in/s ΔV |
| Functional shock | Type tested: Half-sine, 30 g, 11 ms |
| Bench drop test | Type tested: Per MIL-PRF28800F |

Electromagnetic compatibility (EMC)

| | |
|---|---|
| Complies with European EMC Directive 89/336/EEC, amended by 93/68/EEC | IEC/EN 61326 CISPR Pub 11 Group 1, Class A AS/NZS CISPR 11:2002 ICES/NMB-001 |
|---|---|

Safety

| | |
|--|---|
| Complies with European Low Voltage Directive 73/23/EEC, amended by 93/68/EEC | IEC/EN 61010 Canada: CSA C22.2 No. 61010 USA: UL 61010B |
|--|---|

45. Storage below –20 °C, instrument states may be lost.

Specifications (continued)

Weight

| | |
|------------|------------------------------|
| Net weight | 18.4 kg (40.5 lbs) (nominal) |
|------------|------------------------------|

Dimensions

4U, 1/2 rack width LXI module

| | |
|--------|--------------------|
| Height | 17.8 cm (7.0 in) |
| Width | 21.3 cm (8.375 in) |
| Length | 64.0 cm (25.2 in) |

Recommended calibration cycle

The recommended calibration cycle is 24 months. Calibration services are available through Agilent service centers.

ISO compliance

This product is manufactured in an ISO-9001 registered facility in concurrence with Agilent Technologies, Inc. commitment to quality.

Warranty

This Agilent Technologies product is warranted against defects in materials and workmanship for a period of one year from date of shipment. During the warranty period, Agilent Technologies will, at its option, either repair or replace products that are defective.

Input/Output Descriptions

Front panel connectors (all connectors are SMB male unless otherwise noted)

| | |
|--|---|
| RF output Option 520 Options 540 | RF/microwave output signal from the N8211A; nominal output impedance 50 Ω Precision APC-3.5 male connector Precision APC-2.4 male connector |
| References 10 MHz Out | Outputs internal or external reference signal. Nominal output impedance 50 Ω . Nominal output power +8 dBm. |
| 10 MHz In | Accepts an external reference (timebase) input (at 1, 2, 2.5, 5, 10 MHz for standard and 10 MHz only for Option UNX). Nominal input impedance 50 Ω . |
| 10 MHz EFC | (Option UNX only.) Accepts an external DC voltage, ranging from -5 V to $+5$ V, for electronic frequency control (EFC) of the internal 10 MHz reference oscillator. This voltage inversely tunes the oscillator about its center frequency approximately -0.07 ppm/V. The nominal input impedance is greater than 1 M Ω . Note: A short or 50 Ω termination should be attached to this input connector whenever the EFC port is not used. |
| Step Sweep Settled | Provides an output trigger that indicates when the upconverter has settled to a new frequency or power level. High indicates source not settled; low indicates source settled. |
| Trig out | Outputs a TTL signal. High at start of dwell, or when waiting for point trigger; low when dwell is over or point trigger is received. In ramp sweep mode, provides 1601 equally-spaced 1 μ s pulses (nom) across a ramp sweep. When using LF Out, provides 2 μ s pulse at start of LF sweep. |
| Trig in | Accepts TTL signal for triggering point-to-point in manual sweep mode, or to trigger start of LF sweep. Damage levels $\geq +10$ V or ≤ -4 V. |
| Analog Sweep Z/Mkrs | During ramp sweep, supplies +5 V (nom) level during retrace and band-switch intervals. Supplies -5 V (nom) level when the RF frequency is at a marker frequency. |
| Stop Swp | Open collector, TTL-compatible input/output. In ramp sweep operation, provides low level (nominally 0 V) during sweep retrace and bandcross intervals, and high level during the forward portion of the sweep. Sweep will stop when grounded externally, sweep will resume when allowed to go high. |
| Sweep Out | Supplies a voltage proportional to the RF power or frequency sweep ranging from 0 V at the start of sweep to +10 V (nominal) at the end of sweep, regardless of sweep width. During CW operation, supplies a voltage proportional to the output frequency, +10 V (nom) corresponding to the maximum specified frequency. Output impedance: < 1 Ω (nominal), can drive 2000 Ω . |
| LF Output | LF output (Option UNT) is an internal modulation drive and function generator for AM, FM, PM and pulse modulation. Nominal output impedance 50 Ω . |
| Pulse Modulation Pulse In | Accepts input signal for external fast pulse modulation. Also accepts external trigger pulse input for internal pulse modulation. Nominal impedance 50 Ω . Damage levels are 5 V _{rms} and 10 V _{peak} . |
| Sync Out | Outputs a synchronizing pulse, nominally 50 ns width, during internal and triggered pulse modulation. TTL-level compatible, nominal source impedance 50 Ω . |
| Video Out | Outputs a signal that follows the RF output in all pulse modes. TTL-level compatible, nominal source impedance 50 Ω . |

Input/Output Descriptions (continued)

Front panel connectors (all connectors are SMB male unless otherwise noted) (continued)

| | |
|--|--|
| Analog Inputs | |
| Ext 1 | Drives either AM, FM, or Φ M. Nominal input impedance 50 or 600 Ω , damage levels are 5 V_{rms} and 10 V_{peak} . |
| Ext 2 | Drives either AM, FM, or Φ M. Nominal input impedance 50 or 600 Ω , damage levels are 5 V_{rms} and 10 V_{peak} . |
| Automatic Leveling Control (ALC) Input | |
| ALC Input | Used for negative external detector leveling. Nominal input impedance 120 k Ω , damage level -12 to +0.5 V. Connector type is BNC-female. |
| ALC Hold | Allows the user to enable or disable the Automatic Leveling Control (ALC) function of the upconverter. A TTL logic '1' signal enables the ALC function, and a TTL logic level '0' signal disables the ALC function of the upconverter. The ALC hold function is useful when pulse modulating the source, so that the ALC circuit does not try to react to the pulsed signal. Typically a marker signal from an external arbitrary waveform generator (AWG) is used to drive the ALC hold. |
| Coherent Carriers | |
| | The coherent carrier In/Out ports are used to allow multiple upconverters to be phase coherent. A common LO signal can be sent to two or more different upconverters, thus allowing their output signals to be phase coherent. In the upconverter, there is a low-band LO, and a high-band LO, thus requiring two different LOs to operate over the entire frequency range of the upconverter. To make the upconverter coherent over its entire frequency range requires having both a low-band and high-band coherent LO signal. When not using the coherent carriers ports for tying multiple upconverter LOs together to make them phase coherent, a jumper cable is required. A jumper cable from 0.25 to 3.2 GHz Out connector to 0.25 to 3.2 GHz In connector, and from 3.2 to 10 GHz Out connector to 3.2 to 10 GHz In connector is required for operation. |
| 0.25 to 3.2 GHz In | Input port for a reference LO signal for the low-band of operation. This port is used when it is desired to make the upconverter phase coherent over the low-band (0.25 to 3.2 GHz) of operation of the upconverter. Connector is SMA female. |
| 3.2 to 10 GHz In | Input port for a reference LO signal for the high-band of operation. This port is used when it is desired to make the upconverter phase coherent over the high-band (3.2 to 20/40 GHz) of operation of the upconverter. The LO signal needs to tune over the range of 3.2 to 10 GHz. There is a frequency doubler or quadrupler to get the upconverter's output signal to either 20 or 40 GHz. Connector is SMA female. |
| 0.25 to 3.2 GHz Out | Output port for the low-band reference LO. Normally this signal is routed back in to the 0.25 to 3.2 GHz In port on the upconverter. If multiple coherent upconverter operation is desired, this output signal can be split into multiple signals, and then routed to several different upconverters to provide a low-band (0.25 to 3.2 GHz) coherent LO signal. Connector is SMA female. |
| 3.2 to 10 GHz Out | Output port for the high-band reference LO. Normally this signal is routed back in to the 3.2 to 10 GHz In port on the upconverter. If multiple coherent upconverter operation is desired, this output signal can be split into multiple signals, and then routed to several different upconverters to provide a high-band (3.2 to 10 GHz) coherent LO signal. The high-band LO must tune over the range 3.2 to 10 GHz; there is a doubler or quadrupler to get the upconverter's output signal up to either 20 or 40 GHz. Connector is SMA female. |

Input/Output Descriptions (continued)

Front panel indicator lights

| | |
|---------|--|
| PWR | Indicates when the power switch on the unit is turned to the 'ON' position |
| LAN | Indicates LAN connection status |
| 1588 | Indicates the clock status of the IEEE 1588 time-based trigger |
| LAN RST | Front panel access hole to reset the LAN to a known default state |

Rear panel connectors

| | |
|---|--|
| Power requirements | 100-240 V, 50/60 Hz (automatically selected) |
| Power consumption | 250 watts (typical), < 300 watts (maximum) Standby: < 20 watts (typical) |
| LAN | Standard LAN connector for 10/100 BaseT LAN communication |
| LXI trigger bus in | Input for the LXI trigger-bus signals. 25-pin subminiature female connector. |
| LXI trigger bus out | Output for the LXI trigger-bus signals. 25-pin subminiature female connector. |
| Diagnostics port (25-pin parallel port) | For internal testing of the instrument in the factory. 25-pin D-subminiature female connector. |
| Diagnosis port (9-pin serial port) | For internal testing of the instrument in the factory. 9-pin D-subminiature male connector. |

Ordering Information and Options

| Model/Option | Description |
|--------------|---|
| N8211A | 20 or 40 GHz performance analog upconverter synthetic instrument module |
| N8211A-520 | Frequency range from 250 kHz to 20 GHz |
| N8211A-540 | Frequency range from 250 kHz to 40 GHz |
| N8211A-007 | Fully synthesized analog frequency and power ramp sweep |
| N8211A-UNT | AM/FM/ΦM modulation and LF output |
| N8211A-UNU | Standard pulse modulation |
| N8211A-UNW | Narrow pulse modulation |
| N8211A-UNX | Enhanced close-in phase noise performance (< 1 kHz) |
| N8211A-1EA | High output power |
| N8211A-1E1 | Step attenuator |
| N8211A-1EH | Improved harmonics below 2 GHz |

References

Glossary

| | |
|-------------|------------------------|
| AC | Alternating Current |
| DC | Direct Current |
| GS/s | Giga-sample per second |
| k | kilo, or 1000 |
| LAN | Local Area Network |
| MS/s | Mega-sample per second |
| ms | Milliseconds |
| NA | Not Applicable |
| ps | Pico-seconds |
| SMB | Sub-miniature bayonet |
| s | seconds |

Web resources

For additional information on synthetic instruments, visit:

www.agilent.com/find/synthetic

For additional information on instrument security issues, visit:

www.agilent.com/find/security

For information about renting, leasing, or financing Agilent's latest technology, visit:

www.agilent.com/find/buy/alternatives

For additional accessory information, visit:

www.agilent.com/find/accessories

For additional information about Agilent PSG microwave signal generators, visit:

www.agilent.com/find/psg

Related literature

Synthetic instruments

N8201A Performance Downconverter Synthetic Instrument Module, 3 Hz to 26.5 GHz, Data Sheet
Literature number 5989-5720EN

N8212A Performance Vector Upconverter Synthetic Instrument Module, 250 kHz to 20 GHz, Data Sheet
Literature number 5989-2593EN

N8221A IF Digitizer Synthetic Instrument Module, 30 MS/s, Data Sheet
Literature number 5989-2594EN

N8241A Arbitrary Waveform Generator Synthetic Instrument Module, 15-Bit, 1.25 GS/s or 625 MS/s, Technical Overview
Literature number 5989-2595EN

N8242A Arbitrary Waveform Generator Synthetic Instrument Module, 10-Bit, 1.25 GS/s or 625 MS/s, Technical Overview
Literature number 5989-5010EN

N8201A-H02 Compact Performance Spectrum Analyzer for ATE Applications,
Literature number 5989-5721EN

Signal generator literature

PSG Signal Generator, Brochure
Literature number 5989-1324EN

E8257D PSG Analog Signal Generator, Data Sheet
Literature number 5989-0698EN

E8267D PSG Vector Signal Generator, Data Sheet
Literature number 5989-0697EN

PSG Self Guided Demo
Literature number 5988-2414EN

E8257D PSG CW and Analog Signal Generators, Configuration Guide
Literature number 5989-1325EN

E8267D PSG Vector Signal Generator, Configuration Guide
Literature number 5989-1326EN



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