

Specifications

• MS8609A

Frequency range	9 kHz to 13.2 GHz	
Max. input level	+20 dBm (100 mW), continuous average power, DC input: 0 Vdc	
Input impedance	Power meter 50 Ω, VSWR: ≤1.3 (30 MHz to 3 GHz) Except power meter 50 Ω, VSWR: ≤1.5 (input attenuator: ≥4 dB, ≤3 GHz)/≤2.3 (input attenuator: ≥10 dB, >3 GHz)	
Input connector	N-type	
Reference oscillator	Frequency: 10 MHz Starting characteristics: ≤5 x 10 ⁻⁸ (after 10 minute warm-up, compared to frequency after 24 hour warm-up) Aging rate: ≤2 x 10 ⁻⁸ /day, ≤1 x 10 ⁻⁷ /year (compared to frequency after 24 hour warm-up) Temperature characteristics: ±5 x 10 ⁻⁸ (0° to 50°C, compared to frequency at 25°C)	
Power meter	Frequency range: 30 MHz to 3 GHz, Level range: -20 to +20 dBm, Measurement accuracy (after zero calibration): ±10%	
Spectrum analyzer	Frequency	<p>Frequency setting Setting range: 9 kHz to 13.2 GHz, Pre-selector range: 3.15 to 13.2 GHz (Band 1 and 2)</p> <p>Frequency accuracy Accuracy: ± (display frequency x reference frequency accuracy + span x span accuracy + resolution bandwidth × 0.15 + 10 × N Hz) *N: Mixer harmonic order Normal marker: Same as display frequency accuracy Delta marker: Same as span accuracy</p> <p>Frequency span setting range: 0 Hz, 5 kHz to 13.2 GHz Span accuracy: ±1.0% (at single band sweep, number of data points: 1001) RBW (resolution bandwidth) Setting range: 300 Hz to 3 MHz (1-3 sequence), 5 MHz, 10 MHz, 20 MHz (Band 0) Accuracy: ±20% (300 Hz to 10 MHz), ±40% (20 MHz) Selectivity (60 dB: 3 dB): ≤15:1 VBW (video bandwidth): 1 Hz to 3 MHz (1-3 sequence), off Sideband noise: ≤-108 dBc/Hz (1 GHz, 10 kHz offset), ≤-120 dBc/Hz (1 GHz, 100 kHz offset)</p>
	Amplitude	<p>Maximum input level Continuous average power: +20 dBm, DC voltage: 0 V</p> <p>Average noise level (RBW: 300 Hz, VBW: 1 Hz): [Without Option 08] ≤-124 dBm + 1.5 x f [GHz] dB (1 MHz to 2.5 GHz, Band 0) ≤-120 dBm + 1.5 x f [GHz] dB (2.5 to 3.2 GHz, Band 0) ≤-116 dBm (3.15 to 7.8 GHz, Band 1) ≤-107 dBm (7.7 to 13.2 GHz, Band 2) [With Option 08] ≤-122 dBm + 1.8 x f [GHz] dB (1 MHz to 2.5 GHz, Band 0) ≤-120 dBm + 1.8 x f [GHz] dB (2.5 to 3.2 GHz, Band 0) ≤-116 dBm (3.15 to 7.8 GHz, Band 1) ≤-107 dBm (7.7 to 13.2 GHz, Band 2)</p> <p>Residual response: ≤-100 dBm (1 MHz to 3.2 GHz, Band 0), ≤-90 dBm (3.15 to 7.8 GHz, Band 1)</p> <p>Reference level Setting range: -100 to +30 dBm</p> <p>Accuracy: ±0.75 dB (+0.1 to 20 dBm), ±0.5 dB (-49.9 to 0 dBm), ±0.75 dB (-69.9 to -50 dBm), ±1.5 dB (-80 to -70 dBm) *After calibration, frequency: 50 MHz, span: 1 MHz (Input attenuator, RBW, VBW and sweep time are set to AUTO.)</p> <p>RBW Switching uncertainty: ±0.3 dB (300 Hz to 5 MHz), ±0.5 dB (10, 20 MHz) *After calibration, with RBW 3 kHz referenced</p> <p>Input attenuator: 0 to 62 dB (2 dB steps) Switching uncertainty: ±0.3 dB (10 to 50 dB), ±0.5 dB (52 to 62 dB) *After calibration, with 50 MHz, RF ATT 10 dB referenced</p> <p>Frequency response: ±0.6 dB (9 kHz to 3.2 GHz, Band 0), ±1.5 dB (3.15 to 7.8 GHz, Band 1*¹), ±2.0 dB (7.7 to 13.2 GHz, Band 2*¹)</p> <p>Log linearity: ±0.4 dB (0 to -20 dB, RBW: ≤1 kHz), ±1.0 dB (0 to -90 dB, RBW: ≤1 kHz)</p> <p>2nd harmonic distortion: ≤-60 dBc (10 to 200 MHz), ≤-75 dBc (200 to 850 MHz, Band 0), ≤-70 dBc (0.85 to 1.6 GHz, Band 0), ≤-90 dBc (1.6 to 6.6 GHz, Band 1 and 2)</p> <p>Two-tone 3rd order distortion: ≤-70 dBc (10 to 100 MHz), ≤-85 dBc (0.1 to 3.2 GHz), ≤-80 dBc (3.15 to 7.8 GHz), ≤-75 dBc (7.7 to 13.2 GHz) *Frequency difference of two signals: ≥50 kHz, mixer input: -30 dBm</p> <p>1 dB gain compression: ≥0 dBm (≥100 MHz), ≥+3 dBm (≥500 MHz, Band 0), ≥-3 dBm (≥3150 MHz, Band 1 and 2)</p>

Spectrum analyzer	Sweep	<p>Setting range: 10 ms to 1000 s (frequency axis sweep), 1 μs to 1000 s (time axis sweep)</p> <p>Trigger switch: Free-run, triggered</p> <p>Trigger source: Wide IF video, Line, External (TTL level), External (± 10 V)</p> <p>Trigger delay</p> <p>Pre-trigger range: –time span to 0 s</p> <p>Resolution: time span/500 or 100 ns, whichever larger</p> <p>Post trigger: 0 μs to 65.5 ms</p> <p>Resolution: 100 ns (sweep time: ≤ 4.9 ms), 1 μs (sweep time: ≥ 5 ms)</p> <p>Gate sweep mode</p> <p>Gate delay range: 0 to 65.5 ms (resolution: 1 μs), Gate length range: 2 μs to 65.5 ms (resolution: 1 μs)</p>
	Functions	<p>Number of data points: 501, 1001</p> <p>Detection modes: Normal, Positive peak, Negative peak, Sample, Average, RMS (Option 04)</p> <p>Display functions: Trace A, Trace B, Trace A/B, Trace A/BG, Trace A/Time</p> <p>Storage functions: Normal, View, Max hold, Min hold, Average, Linear average, Cumulative, Overwrite</p> <p>Markers</p> <p>Signal search: Auto tune, Peak \rightarrow CF, Peak \rightarrow Ref, Scroll</p> <p>Zone markers: Normal, Delta</p> <p>Marker function: Marker \rightarrow CF, Marker \rightarrow Ref, Marker \rightarrow CF step size, Δ marker \rightarrow Span, Zone \rightarrow Span</p> <p>Peak search: Peak, Next peak, Min dip, Next dip</p> <p>Multi-marker: 10 max.</p> <p>Measurements</p> <p>Noise power: dBm/Hz, dBm/ch, $\text{dB}\mu\sqrt{\text{Hz}}$</p> <p>C/N: dBc/Hz, dBc/ch</p> <p>Frequency counter</p> <p>Resolution: 1 Hz, 10 Hz, 100 Hz, 1 kHz</p> <p>Measurement accuracy: \pm (display frequency x reference frequency accuracy + 2 x N Hz + 1 LSB) \starAt S/N ≥ 20 dB and RBW ≤ 3 MHz, N: Mixer harmonic order</p> <p>Occupied bandwidth: Power N% method, X-dB down method</p> <p>Adjacent channel power</p> <p>Reference measurement: Total power, reference level, in-band method</p> <p>Display methods: Channel specified display (3 channels x 2), graphic display</p> <p>Average power of burst signal: Average power within specified time range of time domain waveform</p> <p>Template comparison measurement (time sweep): Upper limit x 2, lower limit x 2</p> <p>Mask measurement (frequency sweep): Upper limit x 2, lower limit x 2</p>
Others		<p>Display: Color TFT-LCD, VGA 6.5 inch</p> <p>Hard copy: Hard copy of screen via parallel interface (ESC/P compatible printer)</p> <p>Memory card interface: ATA flash card (3.3/5V)</p> <p>GPIOB:</p> <p>Can be controlled from external controller (except power switch) when specified as device</p> <p>Interface functions: SH1, AH1, T6, L4, SR1, RL1, PP0, DC1, DT1, C0, E2</p> <p>Parallel interface: Centronics printer I/F, D-sub 25-pin connector (female)</p> <p>Video output: Analog RGB output, D-sub 15-pin connector (female)</p>
Dimensions and mass		320 (W) x 177 (H) x 411 (D) mm (except handle, feet, front cover and fan cover), ≤ 16 kg (nominal)
Power		100 to 120/200 to 240 Vac ($-15/+10\%$, max. voltage: 250 V, automatic voltage selection), 47.5 to 63 Hz, ≤ 400 VA
Operating temperature and humidity		0° to +50°C, $\leq 85\%$ (no condensation)
EMC		EN61326: 1997/A2: 2001 (Class A), EN61000-3-2: 2000 (Class A), EN61326: 1997/A2: 2001 (Annex A)
LVD		EN61010-1: 2001 (Pollution Degree 2)

$\star 1$: Reference frequency: 50 MHz, input attenuator: 10 dB, +18° to +28°C