Quality&**Precise**

MAXWELLON TW4207D

100KHz ~ 44GHz

Signal Analyzer

2026

MAXWELLON

The Maxwellon TW4207D is a high-performance benchtop signal analyzer designed to meet the rigorous demands of modern RF and microwave testing. Covering a continuous frequency range from **100 kHz to 44 GHz**, it delivers laboratory-grade precision in a compact, portable form factor weighing less than **10 kg**.

Equipped with advanced I/Q analysis capabilities and a Windows 10-based operating system, the TW4207D provides engineers with deep insights into complex signals, from radar pulses to high-frequency telecommunications. It is the ideal solution for R&D, manufacturing, and field-testing environments where high dynamic range and amplitude accuracy are critical.

Key Feature

- **Frequency Range:** 100 kHz to 44 GHz.
- **Sensitivity (DANL):** -160 dBm/Hz (Typical, Preamp On).
- **Phase Noise:** -106 dBc/Hz @ 10 kHz offset (1 GHz CF).
- **Analysis Bandwidth:** 25 MHz standard (upgradable to 40 MHz).
- **Amplitude Accuracy:** ±0.40 dB absolute accuracy.
- **Measurement Speed:** 167 updates/s remote data rate via LAN.
- **Data Acquisition:** 14-bit ADC / 90 MSa/s sampling rate.
- **Form Factor:** Lightweight < 10 kg portable benchtop design.

Specification

Frequency and Time Specifications

Frequency Range	
Frequency Range	100 kHz to 44 GHz
Frequency Reference	
Accuracy	±[(Time since last adjustment × Aging Rate) + Temperature Stability + Calibration Accuracy]
Aging Rate	$\pm 3 \times 10^{-7}$ / year (first year)
Temperature Stability	
20 °C to 30 °C	$\pm 3 \times 10^{-8}$
Full Temperature Range	$\pm 5 \times 10^{-8}$ (recommended)
Achievable Initial Calibration Accuracy	$\pm 8 \times 10^{-8}$
Sampling Frequency Reference Accuracy	$\pm(3 \times 10^{-7} + 3 \times 10^{-8} + 8 \times 10^{-8})$
After 1 year since last calibration	$\pm 4.1 \times 10^{-7}$
Residual FM	≤ 1 Hz × N (p-p), nominal value within 20 ms (Center Frequency = 1 GHz, 10 Hz RBW, 10 Hz VBW)
Frequency Readout Accuracy (Start, Stop, Center, Marker)	
±(Marker Frequency × Frequency Reference Accuracy + 0.25% × Span + 5% × RBW + 2 Hz + 0.5 × Horizontal Resolution)	
Marker Frequency Counter	
Accuracy	±(Marker Frequency × Frequency Reference Accuracy + 0.100 Hz)
Δ Counter Accuracy	±(Δ Frequency × Frequency Reference Accuracy + 0.141 Hz)
Counter Resolution	0.001 Hz

Frequency Range (FFT and Sweep Modes)		
Range	0 Hz (Zero Span), 100 kHz to Maximum Instrument Frequency	
Resolution	2 Hz	
Accuracy	Sweep: ±(0.25% × Span + Horizontal Resolution)	
	FFT: ±(0.10% × Span + Horizontal Resolution)	
Trigger	Free Run, Video, External, Periodic Timer	
Trigger Delay	Span = 0 Hz or FFT: –150 ms to +500 ms	
	Span ≥ 10 Hz, Sweep Mode: 1 µs to 500 ms	
	Resolution: 0.1 µs	
Time Gating		
Gating Methods	Gated Video; Gated FFT	
Gate Length Range (except FFT method)	100.0 ns to 5.0 s	
Gate Delay Range	0 to 100.0 s	
Gate Delay Jitter	33.3 ns p-p (nominal)	
Sweep (Trace) **Points Range**		
All Span Settings:	1 to 40,001 points	
Resolution Bandwidth (RBW)		
Range (–3.01 dB Bandwidth)	1 Hz to 3 MHz (10% steps), 4 MHz, 5 MHz, 6 MHz, 8 MHz	
Bandwidth Accuracy (Power)	Frequency Range	Accuracy
	1 Hz to 750 kHz	±1.0% (±0.044 dB), nominal
	820 kHz to 1.2 MHz	±2.0% (±0.088 dB), nominal
	1.3 MHz to 2.0 MHz	±0.13 dB, nominal
	2.2 MHz to 3 MHz	±0.3 dB, nominal
	4 MHz to 8 MHz	±0.55 dB, nominal
Bandwidth Accuracy (–3.01 dB)	1 Hz to 1.3 MHz: ±2% (nominal)	
RBW Range		
Selectivity (–60 dB / –3 dB)	4.1 : 1 (nominal)	
Analysis Bandwidth		
Maximum Bandwidth	25 MHz (40 MHz optional)	
Video Bandwidth (VBW)		
Range	1 Hz to 3 MHz (10% steps), 4 MHz, 5 MHz, 6 MHz, 8 MHz, and Wide Open (marked 50 MHz)	
Accuracy	±6% (nominal)	
Measurement Speed		
Local Measurement and Display Update Rate	11 ms (90/s), nominal	
LAN Remote Measurement Update Rate	6 ms (167/s), nominal	
Marker Peak Search	5 ms, nominal	
Center Frequency Tuning and Transfer	22 ms, nominal	
Measurement / Mode Switching Speed	75 ms, nominal	

Amplitude Accuracy and Range Specifications

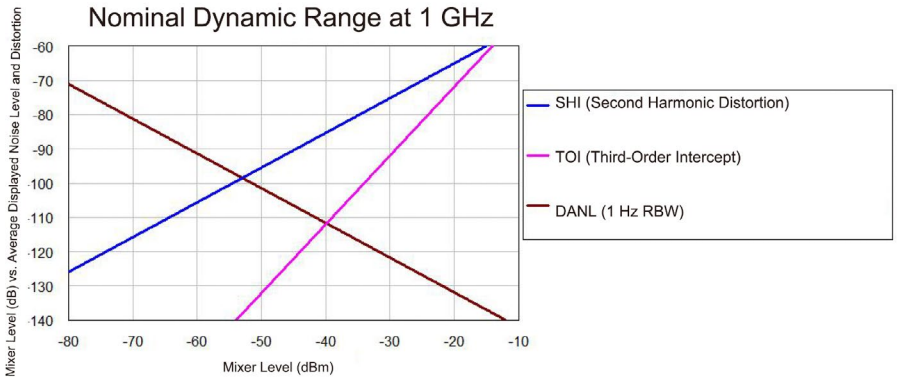
Amplitude Range			
Measurement Range	From displayed average noise level (DANL) to +27 dBm with preamplifier off		
Input Attenuator Range	0 to 50 dB, in 2 dB steps		
Maximum Safe Input Level			
Average Total Power	+27 dBm (0.5 W), Input Attenuation ≥ 10 dB, Preamplifier Off		
	+27 dBm (0.5 W), Input Attenuation ≥ 20 dB, Preamplifier On		
Peak Pulse Power	+47 dBm (50 W), <10 µs pulse width, <1% duty cycle, Input Attenuation ≥ 30 dB		
DC Voltage	±16 Vdc		
Display Range			
Log Scale	0.1 to 1 dB/div, in 0.1 dB steps		
	1 to 20 dB/div, in 1 dB steps (10 display divisions)		
Linear Scale	10 divisions		
Scale Units	dBm, dBmV, dBµV, dBmA, dBµA, V, W, A		
Frequency Response (Conditions: 10 dB Input Attenuation, 20°C to 30°C. σ = Nominal Standard Deviation)			
Preamplifier Off	Frequency Range	Specification	95% Confidence (≈2σ)
	100 kHz to 10 MHz	±0.50 dB	±0.4 dB
	10 MHz to 3 GHz	±0.75 dB	±0.65 dB
	3 GHz to 13.6 GHz	±1.30 dB	±0.8 dB
	13.6 GHz to 19.3 GHz	±1.50 dB	±1.0 dB
	19.3 GHz to 24.2 GHz	±2.20 dB	±1.3 dB
	24.2 GHz to 26.5 GHz	±2.50 dB	±1.3 dB
	26.5 GHz to 44 GHz	±3.00 dB	±1.8 dB
Preamplifier On	100 kHz to 10 MHz	±0.60 dB	±0.5 dB
	10 MHz to 3 GHz	±1.40 dB	±1.0 dB
	3 GHz to 7.5 GHz	±1.40 dB	±1.2 dB
	7.5 GHz to 13.6 GHz	±1.20 dB	±1.0 dB
	13.6 GHz to 21 GHz	±1.40 dB	±1.2 dB
	21 GHz to 24.2 GHz	±2.00 dB	±1.8 dB
	24.2 GHz to 26.5 GHz	±2.80 dB	±2.4 dB
	26.5 GHz to 44 GHz	±3.30 dB	±2.7 dB
Input Attenuator Switching Uncertainty			
50 MHz (Reference, Atten > 2 dB, Preamp Off)	± 0.3 dB (± 0.15 dB, Typical)		
Relative to 10 dB (Reference Setting)	Frequency Range	Accuracy (Nominal)	
	100 kHz to 3.0 GHz	±0.30 dB	
	3.0 GHz to 7.5 GHz	±0.50 dB	
	7.5 GHz to 26.5 GHz	±0.70 dB	
	26.5 GHz to 44 GHz	±0.80 dB	
Absolute Amplitude Accuracy (10 dB Attenuation, 20 to 30 °C, 1 Hz ≤ RBW ≤ 1 MHz, Input Signal –10 to –50 dBm; except Auto Sweep Time = Accuracy, all other settings auto-coupled, any reference level, any scale, σ = nominal standard deviation)			
At 50 MHz	±0.40 dB		
All Frequencies	±(0.40 dB + Frequency Response)		
Preamplifier On	±(0.36 dB + Frequency Response) (95%)		
Input Voltage Standing Wave Ratio (0 dB Attenuationn)			
10 MHz to 44 GHz	< 2.4 (nominal)		
RBW Switching Uncertainty (Based on 30 kHz RBW)			
1 Hz to 3 MHz	±0.15 dB		
4, 5, 6, 8 MHz	±1.0 dB		

Reference Level		
Range	Logarithmic Scale: –170 to +23 dBm, 0.1 dB steps< 2.0:1	
	Linear Scale: Same as logarithmic (707 pV to 3.16 V)	
Accuracy	0 dB	
Display Scale Switching Uncertainty		
Switching between Linear and Log Scale	0 dB	
Log Scale / Div Switch	0 dB	
Display Scale Fidelity		
Input Mixer Level	–80 dBm ≤ Level < –10 dBm, ±0.15 dB total	
Trace Detectors		
Normal, Peak, Sample, Negative Peak, Log Power Average, RMS Average, Voltage Average		
Preamplifier		
Frequency Range	Low Frequency: 100 kHz to 7.5 GHz	
	Full Frequency: 100 kHz to 44 GHz	
Gain	100 kHz to 44 GHz: +17 dB (nominal)	
Noise Figure	10 MHz to 44 GHz: DANL + 17.4 dB (nominal)	

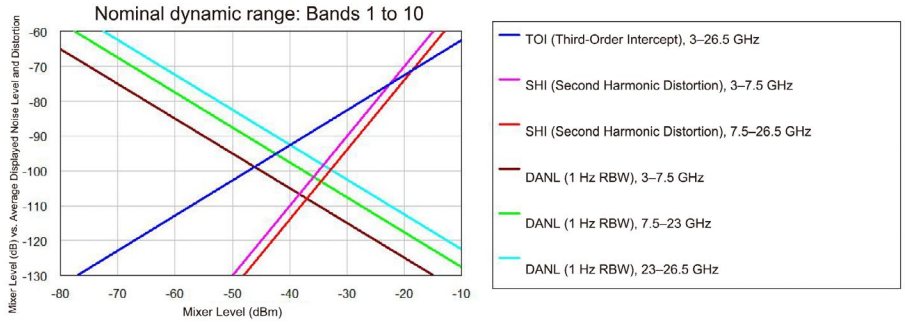
Dynamic Range Specifications

1 dB Gain Compression (Two-Tone)		
Total Power at Input Mixer (Preamplifier Off)	10 MHz – 7.5 GHz	+6 dBm
	7.5 – 13.5 GHz	+4 dBm
	13.5 – 26.5 GHz	+2 dBm
	26.5 – 44 GHz	+2 dBm
Total Power at Input Mixer (Preamplifier On)	10 MHz – 7.5 GHz	–15 dBm
	7.5 – 26.5 GHz	–19 dBm
	26.5 – 44 GHz	–19 dBm
Displayed Average Noise Level (Input connected, sample or average detector, Average Type = Log, 0 dB Input Attenuation, IF Gain = High, 20–30 °C, Parentheses indicate typical performance)		
100 kHz – 1 MHz	–125 dBm	—
1 – 20 MHz	–130 (–135) dBm	–154 (–158) dBm
20 MHz – 1.5 GHz	–145 (–150) dBm	–160 (–163) dBm
1.5 – 4.5 GHz	–144 (–149) dBm	–160 (–163) dBm
4.5 – 7.6 GHz	–139 (–145) dBm	–156 (–161) dBm
7.6 – 9.5 GHz	–141 (–147) dBm	–158 (–160) dBm
9.5 – 13 GHz	–136 (–140) dBm	–156 (–160) dBm
13 – 14.5 GHz	–139 (–145) dBm	–156 (–161) dBm
14.5 – 19.3 GHz	–132 (–138) dBm	–153 (–157) dBm
19.3 – 23 GHz	–133 (–139) dBm	–152 (–157) dBm
23 – 24 GHz	–132 (–137) dBm	–150 (–155) dBm
24 – 26.5 GHz	–126 (–128) dBm	–144 (–149) dBm
26.5 – 44 GHz	–120 (–122) dBm	–140 (–145) dBm
Spurious Response		
Residual Response (Input connected, 0 dB attenuation)	200 kHz – 26.5 GHz (Sweep)	–90 dBm
	Zero Span or FFT or other frequencies	–100 dBm (nominal)
Image Response (1st Mixer)	Tuned Frequency (f) / Mixer Input Level	Response
	10 MHz – 26.5 GHz / –10 dBm	–70 dBc (–80 dBc typical)

Image Response (2nd Mixer)	Tuned Frequency (f)	Excitation Frequency	Mixer Input Level	Response
	10 MHz – 20.5 GHz	f + 1470 MHz	–10 dBm	–70 dBc (–80 dBc typical)
	20.5 GHz – 26.5 GHz	f – 1470 MHz	–10 dBm	–70 dBc (–80 dBc typical)
LO-Related Spurious Signals	Frequency Range		Mixer Input Level	Response
	10 MHz – 26.5 GHz		–10 dBm	–64 dB (typical)
Other Spurious Responses	Type		Mixer Input Level	Response
	IF Feedthrough		–10 dBm	–75 dBc (–80 dBc typical)
	1st Order RF (f ≥ 10 MHz from carrier)		–10 dBm	–70 dBc (–80 dBc nominal)
	Higher Order RF (f ≥ 10 MHz from carrier)		–10 dBm	–70 dBc (–80 dBc nominal)
Second Harmonic Distortion (SHI)				
Signal Source Frequency	SHI (Nominal)			
10 MHz – 3.75 GHz	+50 dBm			
3.75 – 13.25 GHz	+62 dBm			
Third-Order Intercept (TOI) (Parentheses indicate typical performance)				
Preamplifier Off (Mixer Input –20 dBm, 100 kHz frequency spacing two-tone signal, 0 dB attenuation, 20–30 °C)	Frequency Range		TOI Nominal	TOI Typical
	10 MHz – 2 GHz		+12 dBm	+16 dBm
	2 – 3 GHz		+12 dBm	+17 dBm
	3 – 7.5 GHz		+12 dBm	+16 dBm
	7.5 – 13.6 GHz		+11 dBm	+15 dBm
	13.6 – 26.5 GHz		+8 dBm	+12 dBm
	26.5 – 44 GHz		+8 dBm	+12 dBm
Preamplifier On (Mixer Input –45 dBm, 100 kHz frequency spacing two-tone signal, 0 dB attenuation, 20–30 °C)	Frequency Range		TOI Nominal	
	10 MHz – 26.5 GHz		–8 dBm	
	26.5 GHz – 44 GHz		–8 dBm	

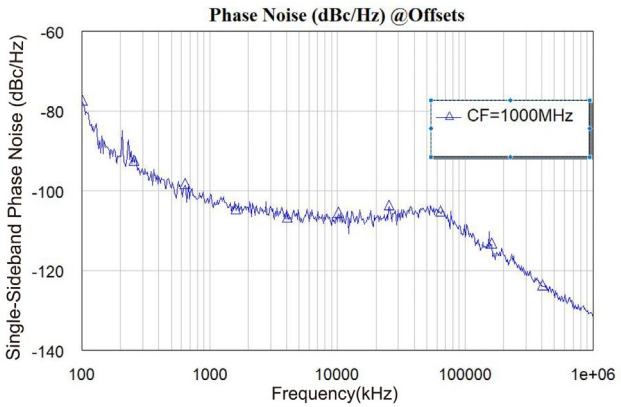


Nominal Dynamic Range (10 MHz to 3 GHz): 2nd and 3rd Order Distortion



Nominal Dynamic Range – 2nd and 3rd Order Distortion, 3 GHz to 26.5 GHz

Phase Noise		
Single-Sideband Phase Noise (20–30 °C, CF = 1 GHz)	Offset Frequency	Phase Noise
	100 Hz	–80 dBc/Hz (nominal)
	1 kHz	–100 dBc/Hz (nominal), –102 dBc/Hz (typical)
	10 kHz	–105 dBc/Hz (nominal), –106 dBc/Hz (typical)
	100 kHz	–108 dBc/Hz (nominal), –110 dBc/Hz (typical)
	1 MHz	–129 dBc/Hz (nominal), –132 dBc/Hz (typical)



Nominal Phase Noise at 1 GHz Center Frequency

I/Q Analyzer Specifications

Frequency				
Frequency Sweep Range	Standard: 100 kHz – 25 MHz			
	Option B40: 100 kHz – 40 MHz			
Resolution Bandwidth (Spectrum Measurement)				
Sweep Width	RBW Range			
All	100 mHz – 3 MHz			
1 MHz	50 Hz – 1 MHz			
10 kHz	1 Hz – 10 kHz			
100 Hz	100 mHz – 100 Hz			
Window Functions				
Flat Top, Uniform Average, Hanning, Gaussian, Blackman, Blackman-Harris, Kaiser-Bessel (K-B 70 dB, K-B 90 dB, K-B 110 dB)				
Analysis Bandwidth (Standard)				
40 MHz				
IF Frequency Response (Standard 10 MHz IF Path)				
IF Frequency Response (Dependent on center frequency, demodulation & FFT response, 20–30 °C)	Center Frequency (GHz)	Sweep Width (MHz)	Maximum RMS Error (Nominal)	
	≤ 3.0	≤ 10	±0.50 dB, 0.03 dB	
	3.0 < f ≤ 26.5	≤ 10	0.10 dB	
IF Phase Linearity (Average Phase Linearity Deviation, Nominal)	Center Frequency (GHz)	Sweep Width (MHz)	Peak-to-Peak	RMS
	≤ 3.0	≤ 10	0.7°	0.4°
	3.0 < f ≤ 7.5	≤ 10	0.7°	0.5°
	7.5 < f ≤ 26.5	≤ 10	0.7°	0.5°
Data Acquisition				
Parameter	Value			
Time Record Length	4,000,000 IQ sample pairs			
Sampling Rate	90 MSa/s			
ADC Resolution	14-bit			

General Specifications

Dimensions (Excluding Connectors)	
Height	280 mm ±5 mm
Width	200 mm ±5 mm
Length	430 mm ±5 mm
Weight	
Weight	≤10 kg
Power Requirements	
Chassis Power Consumption	≤150 W
Temperature Range	
Operating	0 °C to 40 °C
Storage	–20 °C to 70 °C

Inputs and Outputs

RF Input	
Connector	2.4 mm-K, 50 Ω (nominal)
10 MHz Input	
Connector	SMA-K, 50 Ω (nominal)
Input Level	–5 dBm to +10 dBm, sine wave
Lock Range	$\pm 5 \times 10^{-6}$ relative to ideal external reference frequency
10 MHz Output	
Connector	SMA-K, 50 Ω (nominal)
Output Level	≥ 0 dBm (nominal)
Trigger Input	
Connector	SMA-K, 10 kΩ (nominal)
Trigger Output	
Connector	SMA-K, 50 Ω (nominal)

Specification Definitions

Temperature Ranges

- Operating Temperature: 0℃ to 40℃ ensures the instrument operates stably.
- Room Temperature: 20℃ to 30℃ provides the optimal environment for the highest measurement accuracy

Operational Requirements for Specifications

Specifications represent the guaranteed performance of a calibrated instrument under the following specific conditions:

- The analyzer must be within its valid calibration period.
- Auto-coupling controls must be active, except when Auto Sweep Time Rules is set to Accy.
- If the instrument was stored outside the operating temperature range, it must be allowed to acclimate within the 0℃ to 40℃ range for at least 2 hours before power-on.
- A minimum 30-minute warm-up is required if Auto Align is set to Normal.
- If Auto Align is Off or Partial, a recent alignment must have been performed to prevent warning messages and ensure the device meets specified performance levels

Performance Definitions

- Specifications: Describe the guaranteed performance of the analyzer, which includes measurement uncertainty.
- Measured (95%): Indicates that over (95%)of units are expected to meet the performance between 20℃ and 30℃. This value accounts for both statistical observations and external calibration reference uncertainties.
- Typical: Represents the performance achieved by 80% of instruments with a 95% confidence level within the 20℃ to 30℃ range. Typical values do not include measurement uncertainty.
- Nominal: Refers to the expected average performance or design-determined characteristics measured at 25℃. This data is not guaranteed and serves as the default for all data in this document unless otherwise specified.

Ordering Information

Model / Part Number	Description
TW4207D	Signal Analyzer, 100 kHz to 44 GHz
Standard Accessories	Power Cable, Calibration Certificate, User Manual.
Option B40	40 MHz Analysis Bandwidth: Extends the real-time analysis bandwidth from 25 MHz to 40 MHz

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