



MAXWELLON TW4105D

100KHz ~ 44GHz
Signal Generator
2026

The Maxwellon TW4105D is a high-precision scalar signal generator covering a wide frequency range from 100 kHz to 44 GHz. Featuring a fine frequency resolution of 0.001 Hz and a compact, lightweight design of 6 kg, it is optimized for both laboratory and field testing. The instrument supports comprehensive analog modulation (AM, FM, ϕ M) and advanced pulse modulation, including a high-capacity pulse train generator supporting up to 2046 patterns.

■ Key Feature

- **Broad Frequency Range:** Continuous coverage from **100 kHz to 44 GHz**.
- **Exceptional Resolution:** Precise frequency control with **0.001 Hz steps**.
- **High Power Output:** Delivers up to **+26 dBm** (typical) for high-loss test environments.
- **Fast Switching:** Frequency switching speeds as fast as **< 5 ms** in list/step modes.
- **Advanced Modulation:** Includes internal/external **AM, FM, Phase (ϕ M)**, and Pulse modulation.
- **Pulse Train Generator:** Integrated capability for complex pulse sequences with **2,046 pulse modes**.
- **Portable Design:** Small form factor and lightweight for portability.

■ Specification

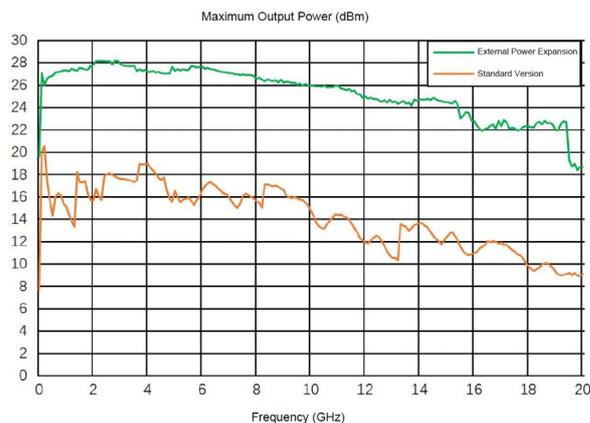
Frequency Performance

Frequency	
Frequency Range	100 kHz to 44 GHz
Resolution	0.001 Hz
Phase Offset	0.1° increments (Nominal)
Switching Speed (Continuous wave (CW) mode: Time from receiving the SCPI command to the amplitude stabilizing within ± 0.2 dB of the set value.)	
SCPI Mode	< 20 ms (Typical)
List/Step Mode	< 5 ms (Typical)
Ramp Sweep Mode	please refer to the Ramp Sweep Specifications section.
Internal Timebase Reference	
Accuracy	\pm [(Time since last adjustment * Aging rate) + Temperature effects + Line voltage effects + Calibration accuracy]
Aging Rate	< ± 0.3 ppm/year
Initial Calibration Accuracy	< ± 0.08 ppm
Temperature Effect	< ± 0.05 ppm
Line Voltage Effect	< $\pm 2 \times 10^{-4}$ ppm ($\pm 10\%$ variation)
Reference Output	
Frequency	10 MHz
Amplitude	≥ 0 dBm, 50 Ω
Ext. Reference Input	
Input Frequency	10 MHz
Amplitude	5 dBm ± 2 dBm, 50 Ω
Stability	Determined by the stability of the external reference input signal
Lock Range	± 5 ppm
Waveform	Sine wave

Step Sweep Mode		
Operating Modes	Step Sweep / List Sweep	
Sweep Range	100 kHz to 44 GHz	
Dwell Time	1 ms to 40 s	
Number of Points	2 to 10,001 (Step Sweep)	
	2 to 1,001 (per list in List Sweep mode)	
Step Type	Linear or Logarithmic	
Trigger Modes	Continuous (Free Run), External Trigger, Key Trigger, Timer, Bus (LAN, USB 3.0)	
Ramp Sweep Mode (Option)		
Start Frequency	Maximum Sweep Rate	Maximum Sweep Span (at 100 ms sweep time)
300 kHz to 250 MHz	125 MHz/ms	5 GHz
250 MHz to 500 MHz	31.25 MHz/ms	2.75 GHz
500 MHz to 1 GHz	62.5 MHz/ms	5.5 GHz
1 GHz to 2 GHz	125 MHz/ms	11 GHz
> 2 GHz	250 MHz/ms	22 GHz
Sweep Resolution	1 ms	
Trigger Modes	Continuous (Free Run), External Trigger, Key Trigger, Timer, Bus (LAN, USB 3.0)ms (Typical)	

Amplitude Specifications

Output Parameters	
Output Power Range	+26 to -110 dBm (typical)
Resolution	0.01 dB
Temperature Stability (25°C ±10°C)	0.02 dB/°C (typical)
Connector	3.5 mm female
Output Impedance	50 Ω
Maximum Output Power (CW mode with ALC enabled, measured at 15°C to 35°C. Outside this range, refer to a slope of 0.05 dB/°C. Typical values.)	
100 kHz to 300 kHz	+18 dBm
300 kHz to 10 MHz	+26 dBm
10 MHz to 100 MHz	+26 dBm
100 MHz to 250 MHz	+26 dBm
250 MHz to 1.3 GHz	+24 dBm
1.3 GHz to 10 GHz	+24 dBm
10 GHz to 12 GHz	+20 dBm
12 GHz to 17 GHz	+20 dBm
17 GHz to 20 GHz	+18 dBm
20 GHz to 44 GHz	+13 dBm



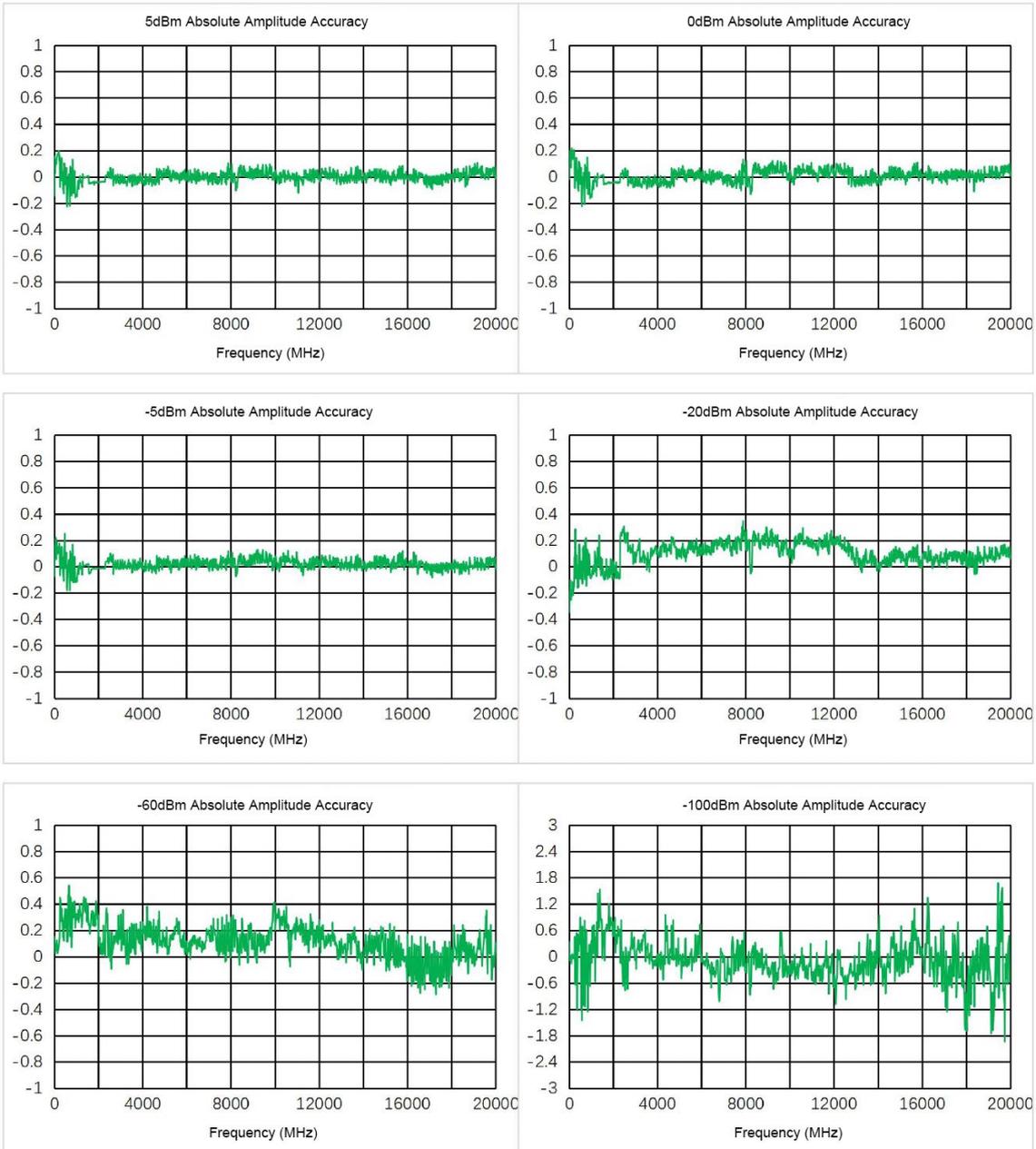
Amplitude Switching Speed (CW mode: Time from receiving the SCPI command to the amplitude stabilizing within ± 0.2 dB of the set value, typical)

SCPI Mode < 20 ms

List / Step Sweep Mode < 5 ms

Absolute Level Accuracy (CW mode with ALC enabled, measured at 15°C to 35°C. Outside this range, refer to a slope of 0.03 dB/°C. Typical values)

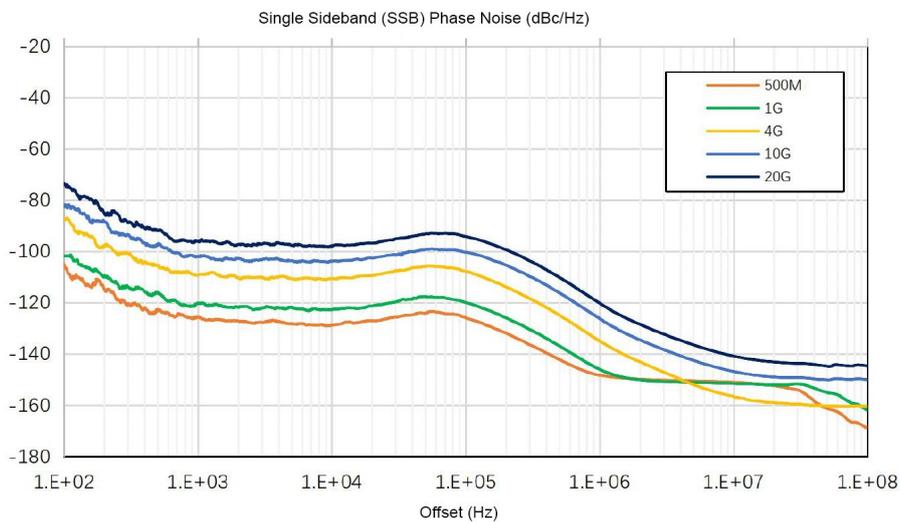
Frequency Range	Max Power to +10 dBm (ALC On)	< +10 dBm to +20 dBm (ALC On)	< -20 dBm to -60 dBm (ALC On)	< -60 dBm to -100 dBm (ALC Off)	< -100 dBm to -120 dBm (ALC Off)
100 kHz to 2.3 GHz	± 0.7 dB	± 0.7 dB	± 0.7 dB	± 2.5 dB	± 3.0 dB
2.3 GHz to 20 GHz	± 0.7 dB	± 0.7 dB	± 0.7 dB	± 2.5 dB	± 3.0 dB
20 GHz to 44 GHz	± 1.0 dB	± 1.0 dB	± 1.0 dB	± 2.5 dB	± 3.0 dB



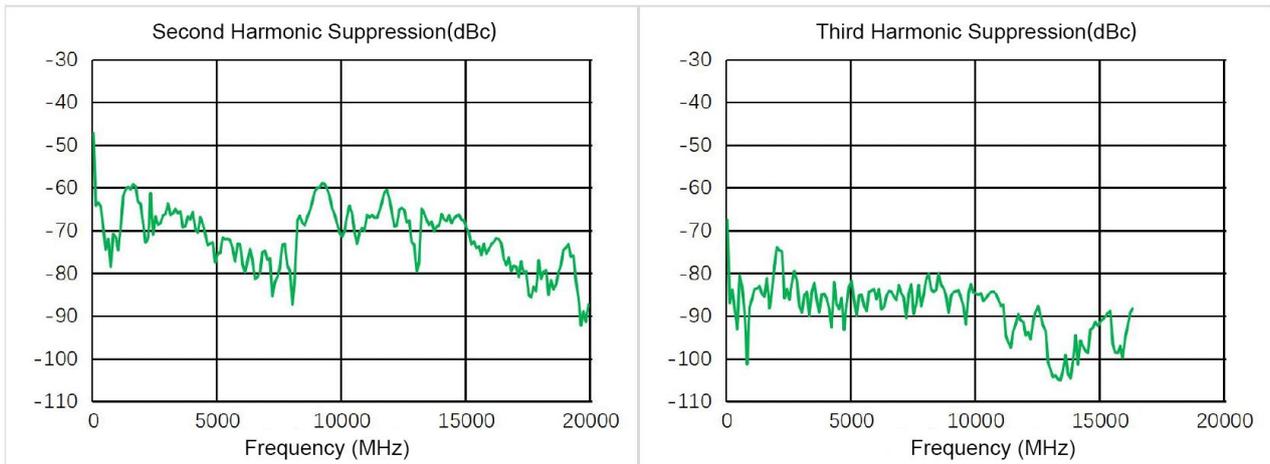
VSWR		
Frequency Range	Standard Version	External Power Expansion
100 kHz to 1.3 GHz	< 1.4:1	< 2.0:1
1.3 GHz to 3.6 GHz	< 1.6:1	< 2.0:1
3.6 GHz to 8.2 GHz	< 1.8:1	< 2.0:1
8.2 GHz to 13.2 GHz	< 2.0:1	< 2.0:1
13.2 GHz to 20 GHz	< 2.2:1	< 2.0:1
20 GHz to 44 GHz	< 2.2:1	< 2.0:1
Maximum Reverse Power (Nominal)		
≤ 10 MHz	0 dBm	
10 MHz to 44 GHz	25 dBm	
Maximum DC Voltage	10 VDC	

Spectral Purity Specifications

Single Sideband (SSB) Phase Noise (CW mode, output level +3 dBm, measured at 10 kHz offset)		
Carrier Frequency	Nominal Value	Typical Value
5 MHz to 250 MHz	-109 dBc/Hz	-112 dBc/Hz
500 MHz	-125 dBc/Hz	-128 dBc/Hz
1 GHz	-120 dBc/Hz	-123 dBc/Hz
4 GHz	-107 dBc/Hz	-110 dBc/Hz
10 GHz	-101 dBc/Hz	-104 dBc/Hz
20 GHz	-94 dBc/Hz	-97 dBc/Hz
40 GHz	-87 dBc/Hz	-90 dBc/Hz



Broadband Noise (CW mode, output level +3 dBm, measured at offset > 10 MHz, typical)	
10 MHz to 20 GHz	-142 dBc/Hz
20 GHz to 40 GHz	-141 dBc/Hz
> 40 GHz	-135 dBc/Hz
Residual FM (CW mode, 0.3 to 300 kHz bandwidth, rms, typical)	
100 kHz to 22 GHz	< N × 1 Hz
Residual AM (CW mode, output level +3 dBm, 0.3 to 300 kHz bandwidth, rms)	
< 2 GHz	< 0.01 %
Non-Harmonic Spurious (CW mode, output level +3 dBm, Frequency offset > 10 kHz, typical)	
8 GHz to 16.4 GHz	70 dBc (typical)
Harmonic Suppression (Measured at CW mode with output level +3 dBm, nominal value)	
< 10 MHz	-20 dBc
10 MHz to 200 MHz	-30 dBc
200 MHz to 1.2 GHz	-60 dBc
1.2 GHz to 2.4 GHz	-55 dBc
2.4 GHz to 9 GHz	-60 dBc
9 GHz to 12 GHz	-55 dBc
12 GHz to 20 GHz	-60 dBc
20 GHz to 32 GHz	-60 dBc
32 GHz to 44 GHz	/



Subharmonic Suppression (Measured at CW mode with output level +3 dBm, nominal value)	
300 kHz to 4 GHz	/
4 GHz to 44 GHz	-80 dBc

Analog Modulation Specifications

Frequency Modulation (FM)			
Maximum Deviation	N × 10 MHz		
Deviation Accuracy	< ±2% + 20 Hz (at 1 kHz modulation rate)		
Carrier Frequency Accuracy	< ±0.2% of set value + (N × 1 Hz)		
Phase Modulation (PM)			
Maximum Phase Deviation	N × 5 rad		
Frequency Response	DC to 1 MHz		
Deviation Accuracy	< 0.5% + 0.01 rad (at 1 kHz modulation rate)		
Amplitude Modulation (AM)			
Modulation Depth	Linear Mode: 0 to 100% (0.1% steps)		
	Log Mode: 0 to 50 dB (0.01 dB steps)		
Modulation Frequency	1 kHz to 5 MHz		
AM Depth Accuracy (10 kHz modulation frequency, <80% depth, ALC on, typical)	Frequency	Log Mode	Accuracy
	< 5 MHz	±(1.5% of set value + 1%)	±2 dB @ 40 dB depth
	5 MHz to 3.2 GHz	±(4% of set value + 1%)	±2 dB @ 40 dB depth
	3.2 GHz to 20 GHz	±(3% of set value + 1%)	±4 dB @ 40 dB depth
Modulation Source	Internal / External		
External Modulation Input Sensitivity	±1 V (±5 V may cause damage), 50 Ω		
Modulation Waveforms	Sine, Dual Sine, Triangle, Positive Ramp, Negative Ramp, Square		
Total Harmonic Distortion (THD) (Conditions: 10 kHz Modulation Rate, Carrier Frequency as specified.)	Frequency	ALC On	ALC Off
	10 MHz to 8 GHz (10 kHz FM rate, 60% AM depth)	< 3%	< 3%
	8 GHz to 15 GHz (10 kHz FM rate, 60% AM depth)	< 5%	< 3%
	3.2 GHz to 20 GHz (10 kHz FM rate, 40% AM depth)	< 5%	< 3%
Pulse Modulation			
On/Off Ratio	80 dB (typical)		
Rise/Fall Time (T _r , T _f)	20 ns (typical)		
Minimum Pulse Width	ALC On: 200 μs		
	ALC Off: 30 ns		
Repetition Frequency	DC to 10 MHz		
Level Accuracy (relative to CW)	ALC On: ±0.5 dB (0.15 dB typical)		
	ALC Off: ±0.5 dB (typical)		
Width Compression (Relative to RF width at video output)	< 10 ns		
Video Delay (External Input to Video)	500 ns		
RF Delay (Video to RF Output)	50 ns		
Pulse Overshoot	< 10%		
Input Level	1 V peak = RF ON, 50 Ω (nominal)		
Input Impedance	50 Ω		
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 _r — RF Pulse Rise Time T _f — RF Pulse Fall Time T _{or} — Pulse Overshoot T _i — Video Feedthrough	<p>The diagram illustrates the timing relationships between three signals: Sync Output, Video Output, and RF Pulse Output. The Sync Output shows a series of pulses with a period T_p and a delay T_d from the start of the video pulse. The Video Output shows a pulse with a width T_w and a 50% duty cycle. The RF Pulse Output shows a pulse with a width T_{rf}, a rise time T_r, a fall time T_f, and a pulse overshoot V_{or}. The video feedthrough T_i is also indicated.</p>		

Internal Pulse Generator					
Modes	Free Run, Square Wave, Trigger, Gate, Adjustable Pulse Pair, Triggered Pulse Pair, and External Pulse				
Square Wave Frequency	0.1 Hz to 10 MHz, 0.1 Hz resolution				
Pulse Period	50 ns to 40 s				
Pulse Width	30 ns to (Pulse Period – 20 ns)				
Resolution	20 ns				
Adjustable Trigger Delay	10 ns to (Pulse Width – 20 ns)				
Settable Trigger Delay	0 to 40 s				
Delay Resolution	10 ns				
Pulse Sequence Generator					
Number of Pulse Modes	2046				
ON/OFF Time Range	30 ns to 40 s				
Simultaneous Modulation and Composite Modulation					
Simultaneous Modulation	Except that Frequency Modulation (FM) and Phase Modulation (PM) cannot be combined and cannot use the same modulation source simultaneously, all other combinations of modulation types can be enabled at the same time. The available modulation types include: Amplitude Modulation (AM), Frequency Modulation (FM), Phase Modulation (PM), and Pulse Modulation.				
Composite Modulation	AM, FM, and PM each consist of two modulation paths, which are internally summed to achieve composite modulation. The modulation sources can be any combination of internal and external sources.				
Modulation Compatibility		AM	FM	PM	Pulse
	AM	/	Compatible	Compatible	Compatible
	FM	Compatible	/	/	Compatible
	PM	Compatible	/	/	Compatible
	Pulse	Compatible	Compatible	Compatible	/
External Modulation Input					
Modulation Inputs	Amplitude Modulation (AM), Frequency Modulation (FM), Phase Modulation (PM)				
Pulse Modulation	Pulse Sync Input/Output				
Input Impedance	50 Ω				
Internal Analog Modulation Source					
Waveforms	Sine, Square, Triangle, Pulse				
Frequency Range	0.1 Hz to 1 MHz				
Frequency Resolution	0.1 Hz				
Frequency Accuracy	Same as RF reference source (nominal)				
LF Output	0 to 5 Vpp, –5 V to +5 V offset (50 Ω , nominal)				
Function Generator					
Waveforms	Function Generator: Sine, Square, Triangle, Pulse, Positive and Negative Sawtooth				
	Sweep Function Generator: Sine, Square, Triangle, Positive and Negative Sawtooth				
	Noise Generator: Uniform, Gaussian				
	DC: Available only as LF output				
Frequency Parameters	Square, Triangle, Pulse, Sawtooth: 0.1 Hz to 10 MHz				
	Noise Bandwidth: 5 MHz				
	Resolution: 0.1 Hz				
	Frequency Accuracy: Same as RF reference source (nominal)				

General Specifications

Dimensions	Height: 213 mm ±5 mm, Width: 128 mm ±5 mm, Length: 300 mm ±5 mm (Excluding connectors)
Weight	6 kg
Power Supply and Consumption	220 VAC / 250 W
Remote Programming	Control Language: SCPI Commands, Interface: LAN
Operating Temperature Range	0 °C to 50 °C
Storage Temperature Range	-20 °C to 70 °C
Humidity	Relative Humidity Test: 95% at +40 °C (non-condensing)

Input and Output Connections

Front Panel Connectors	
RF Output	Output Impedance: 50 Ω
	Reverse Power: 0.5 W, 0 dBc
	Connector: 2.4 mm female
LF Output	Output Impedance: 50 Ω
	Outputs internally generated LF signals or internal modulation signals
	Maximum Output Level: 5 Vpp
	Connector: BNC female
USB Interface	Peripheral interface, not for instrument control
	USB 3.0
	Connector: Type-A receptacle
Digital Input/Output Interface	Data transfer and communication between external devices
	Nominal Level: +3.3 V
	Damage Level: +5 V
	Connector: Micro HDMI
Rear Panel Connectors	
Power Interface	R7B 4-pin locking connector, 12 V
USB Type-C	Type-C locking connector, USB 3.0
Power Button	On/Off button with LED indicator

Specification Definitions

- Specifications** refer to the performance that a calibrated instrument can guarantee under specified operating conditions. Specifications include measurement uncertainty.
- Typical values** describe additional product performance information that is not covered by the product warranty. When performance exceeds the specifications, 80% of the units will meet these values with a confidence level of 90% at room temperature (approximately 25°C). Typical performance does not include measurement uncertainty.
- Nominal values** indicate the expected average performance or design-determined characteristics. These data are not guaranteed and are measured at room temperature (approximately 25°C). Unless otherwise specified, the data in this document are nominal values.
- Measured values** represent performance characteristics measured during the design phase for comparison with expected performance. These data are not guaranteed and are measured at room temperature (approximately 25°C).

■ Ordering Information

Model / Part Number	Description
TW4105D	Scalar Signal Generator, 100 kHz to 44 GHz
Standard Accessories	Power Cable, Calibration Certificate, User Manual.
Option 001	Ramp Sweep Mode: Enables fast analog sweep functionality.



MAXWELLON

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