



Applications

- Wireless infrastructure design
- Up-converting and down-converting
- Educational / university lab use
- Production verification and test setups
- Automated Test Equipment (ATE)
- General RF lab use
- Flexible and portable LO sourcing
- Ka-band development
- 5G testing

Features

- 50 MHz to 40 GHz synthesizer
- USB Type-C interface
- Low phase noise
- GUI and API control

Electrical Specifications

Parameter	Min	Typical	Max
Frequency Range	50 MHz		40 GHz
Frequency Resolution		1 Hz	
Frequency Stability ¹		± 0.5 ppm	

¹ Measured after 10 minutes of operation.



USB RF Synthesizer

Technical drawing of a rectangular plate with dimensions in mm and inches. The drawing includes a top view, a side view, and a detail view of a corner. The top view shows a plate with a width of 100.00 mm (3.937 inches) and a length of 113.60 mm (4.472 inches). The side view shows a thickness of 18.54 mm (0.730 inches). The detail view shows a corner with a radius of 18.02 mm (0.709 inches) and a hole diameter of 30.72 mm (1.209 inches). The drawing also shows a series of holes along the edges, with dimensions for their positions: 65.00 mm (2.559 inches) from the top edge, 43.42 mm (1.709 inches) from the right edge, and 1.209 mm (0.050 inches) from the bottom edge. The drawing is labeled with dimensions in mm and inches, with the unit specified as mm[inch].

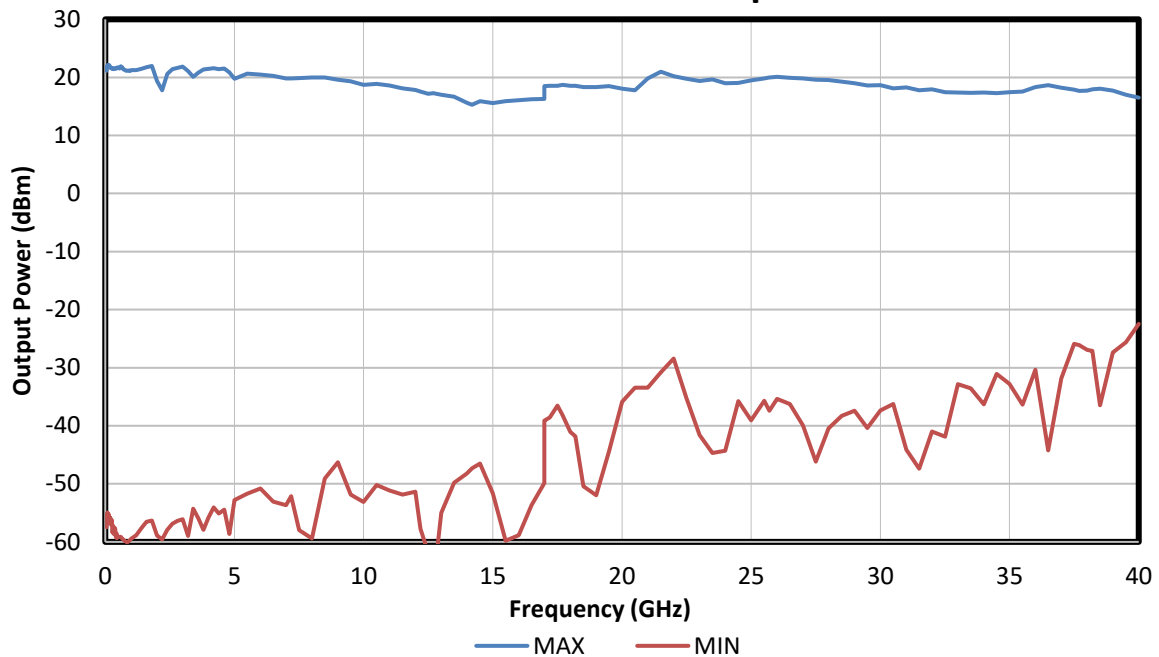
UNIT:mm[inch]

Parameter	Typical
RF Maximum Output Power	
50 MHz - 10 GHz	19 dBm
10 GHz - 17 GHz	15 dBm
17 GHz - 34 GHz	18 dBm
34 GHz - 36 GHz	17 dBm
36 GHz - 40 GHz	15 dBm
RF Minimum Output Power	
50 MHz -17 GHz	-40 dBm
17 GHz - 40 GHz	-25 dBm
RF Off Output Power	-80 dBm
RF Output Power Resolution	0.5 dB
RF Output Power Accuracy (Pout ≥ -15 dBm)	± 2 dBm

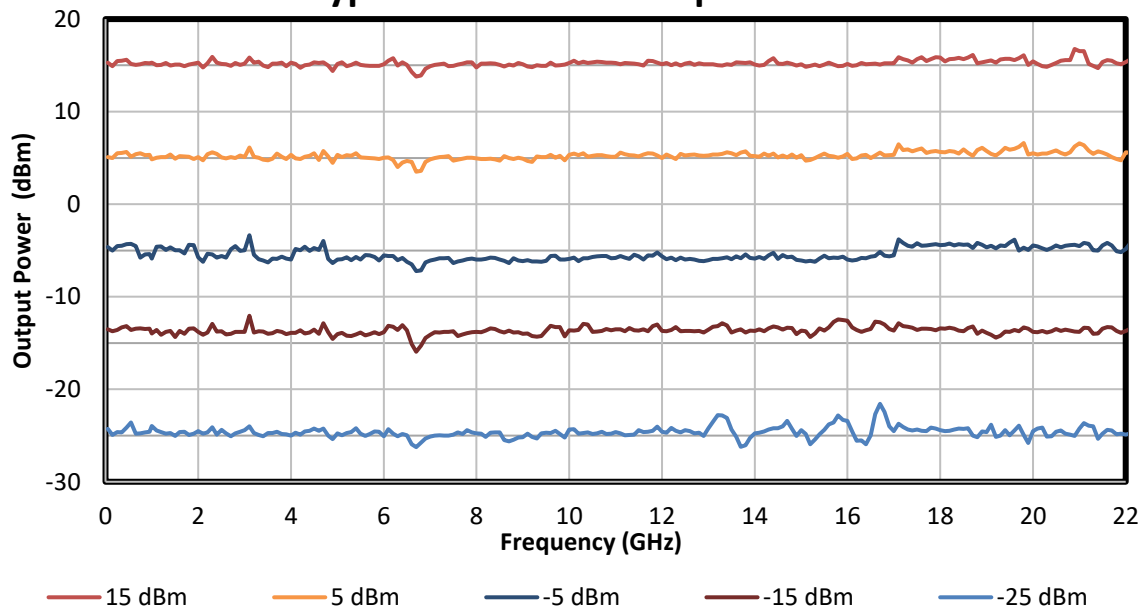
² Measured at room temperature and after 10 minutes of operation.



Maximum and Minimum Output Power



Typical Measured Output Power

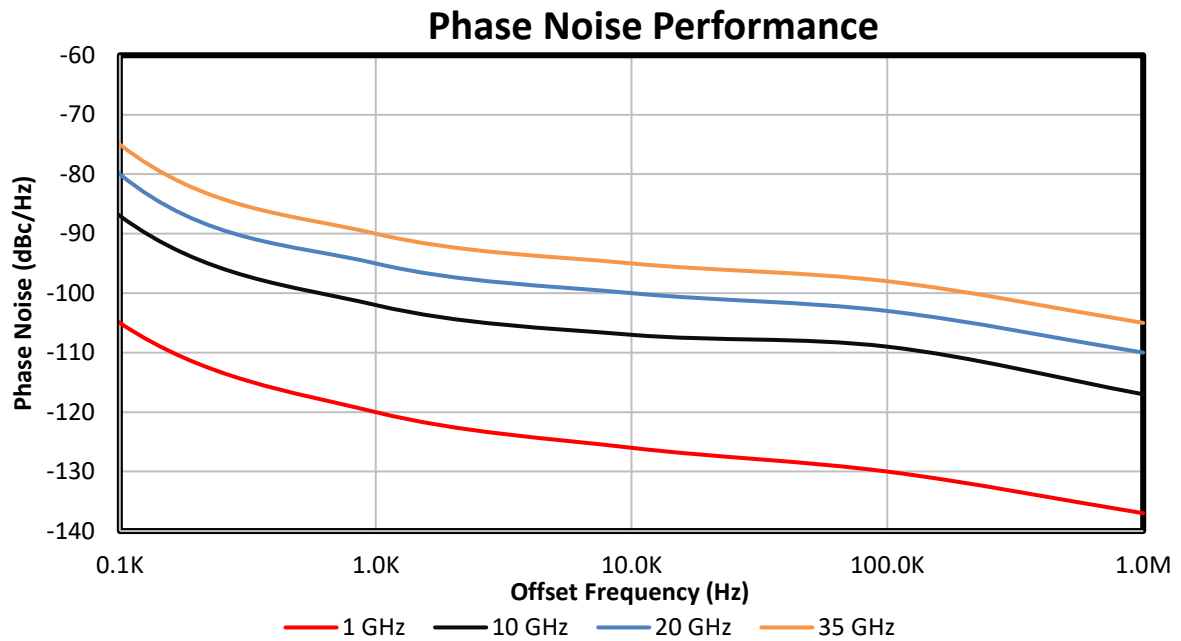


Phase Noise

Frequency	Typical
1 GHz Offset 10 Hz	-63 dBc/Hz



Offest 100 Hz Offest 1 kHz Offset 10 kHz Offset 100 kHz Offset 1 MHz	-105 dBc/Hz -120 dBc/Hz -126 dBc/Hz -130 dBc/Hz -137 dBc/Hz
10 GHz Offest 10 Hz Offest 100 Hz Offest 1 kHz Offset 10 kHz Offset 100 kHz Offset 1 MHz	-39 dBc/Hz -87 dBc/Hz -102 dBc/Hz -107 dBc/Hz -109 dBc/Hz -117 dBc/Hz
20 GHz Offest 10 Hz Offest 100 Hz Offest 1 kHz Offset 10 kHz Offset 100 kHz Offset 1 MHz	-25 dBc/Hz -80 dBc/Hz -95 dBc/Hz -100 dBc/Hz -103 dBc/Hz -110 dBc/Hz
35 GHz Offest 10 Hz Offest 100 Hz Offest 1 kHz Offset 10 kHz Offset 100 kHz Offset 1 MHz	-23 dBc/Hz -75 dBc/Hz -90 dBc/Hz -95 dBc/Hz -98 dBc/Hz -105 dBc/Hz



Spectral Purity ³

Parameter	Fundamental Frequency	Typical
1/2 Harmonic	50 MHz - 11 GHz	-70 dBc
	11 GHz - 30 GHz	-40 dBc
	30 GHz - 34 GHz	-25 dBc
	34 GHz - 40 GHz	-30 dBc
3/4 Harmonic	25 GHz - 32 GHz	-40 dBc
	32 GHz - 34 GHz	-25 dBc
	34 GHz - 40 GHz	-20 dBc
2nd Harmonic	50 MHz - 4 GHz	-20 dBc
	4 GHz - 20 GHz	-16 dBc
3rd Harmonic	50 MHz - 1 GHz	-10 dBc
	1 GHz - 7 GHz	-13 dBc
	7 GHz - 9 GHz	-20 dBc
	9 - 14 GHz	-30 dBc
Non-Harmonic Spurious		
Close-in ⁴ at output step size 5 MHz ⁵	50 MHz - 40 GHz	-50 dBc
Close-in at output step size 1 MHz ⁶		-35 dBc
Close-in at output step size 100 kHz ⁷		-35 dBc
Far-out ⁸		-50 dBc

³ The harmonic values in the table were measured at the maximum output power

⁴ Close-in spurious is measured within ± 10 MHz of the output center frequency.

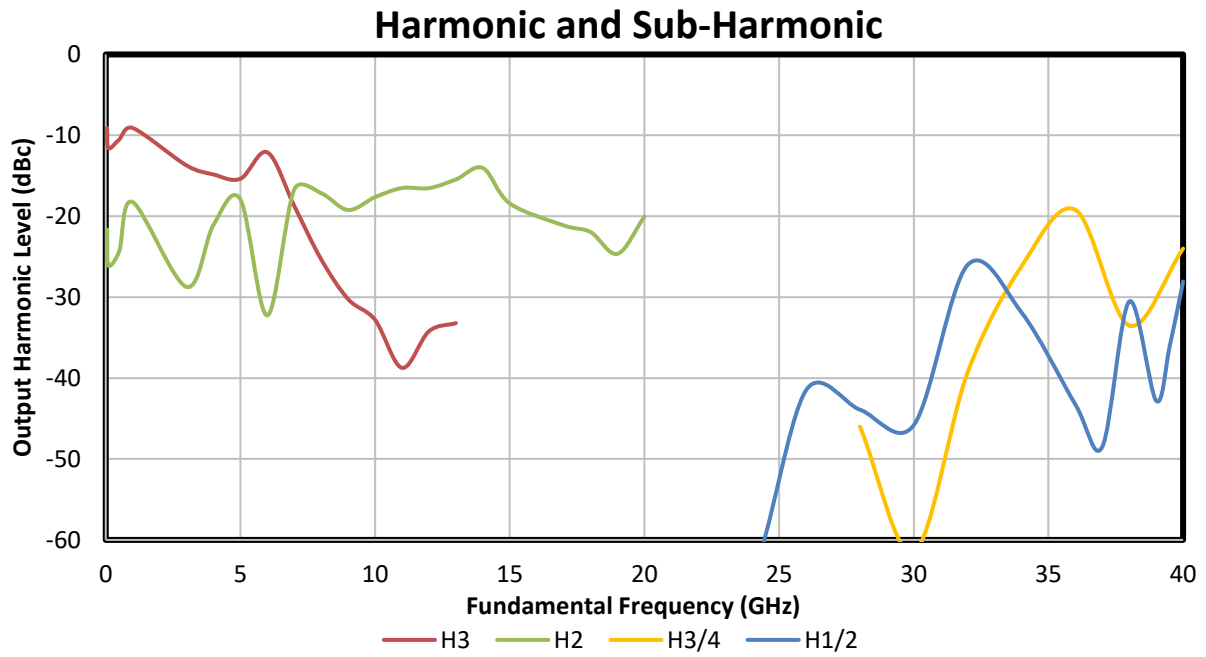
⁵⁻⁷ Spurious performance varies based on the frequency step size (5 MHz, 1 MHz, 100 kHz).

Ex. 5 MHz step: 50, 55, 60 MHz ... 40 GHz;

1 MHz step: 50, 51, 52 MHz ... 40 GHz;

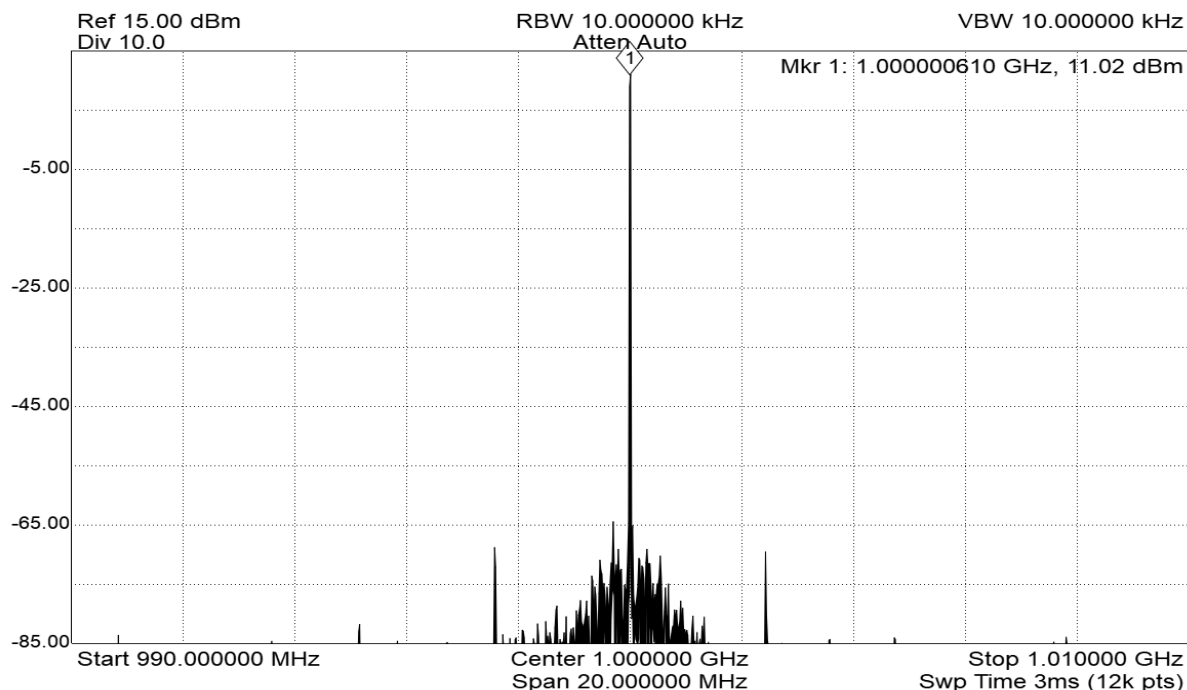
100 kHz step: 50, 50.1, 50.2 MHz ... 40 GHz.

⁸ Far-out spurious is measured from 50 MHz to 40 GHz, excluding close-in spurious.

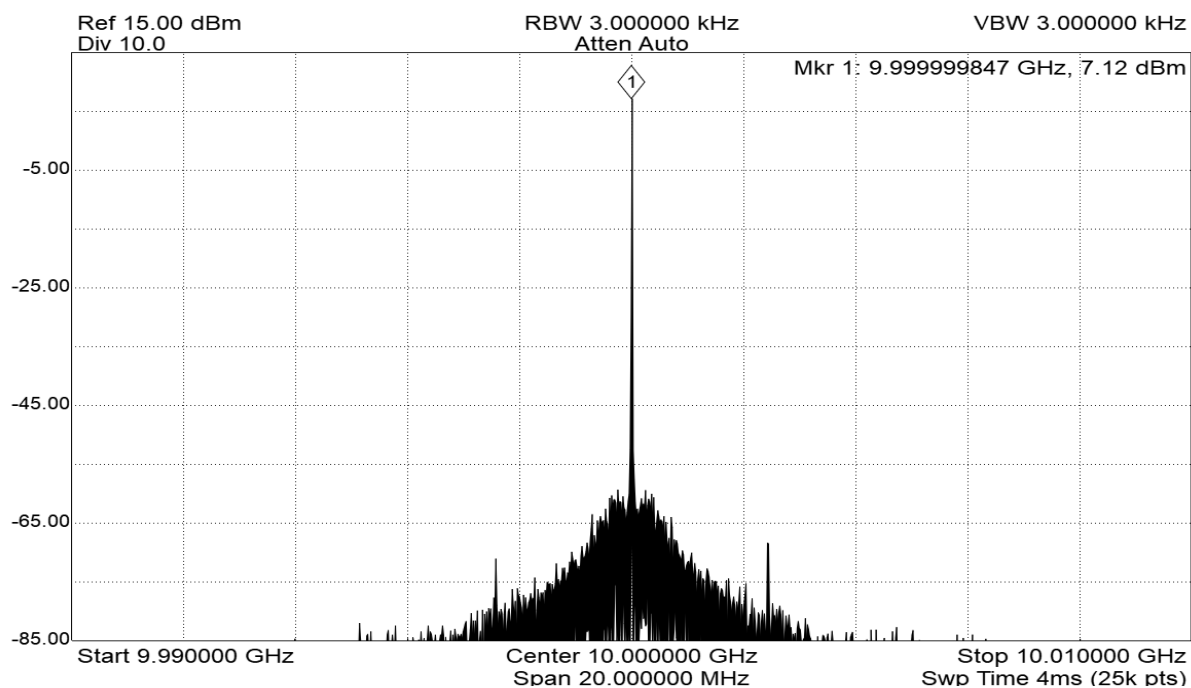




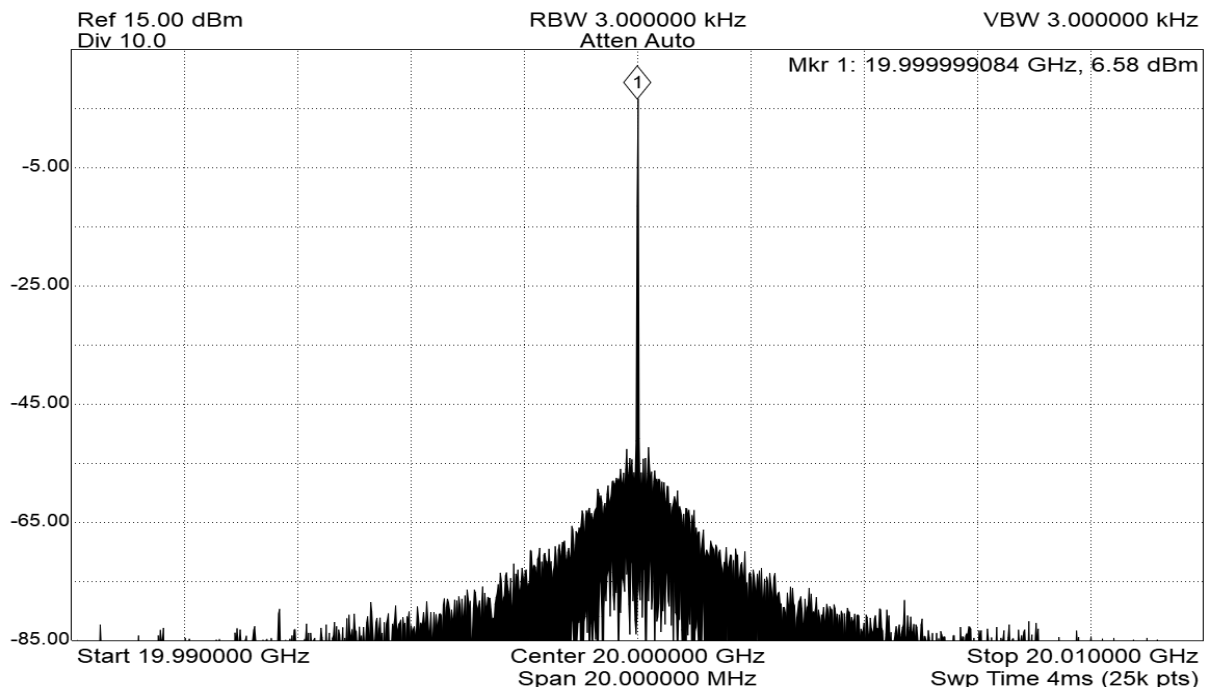
Frequency Spectrum



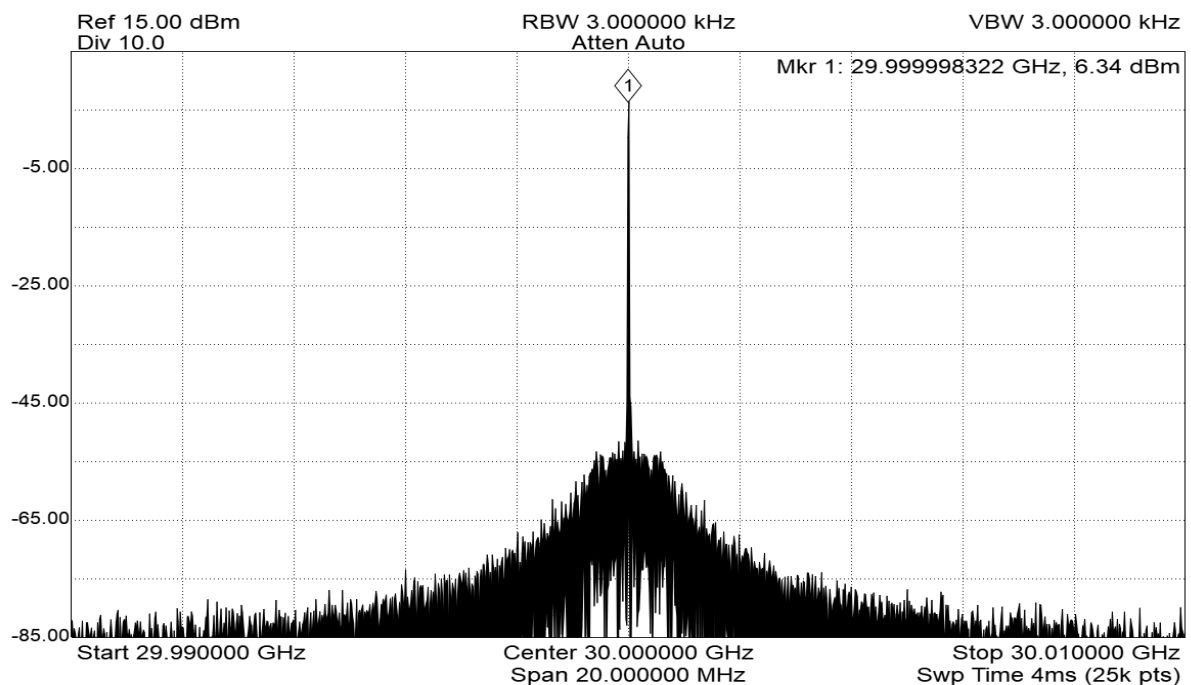
Measurement results of spurious, output frequency is 1 GHz, span is 20 MHz.



Measurement results of spurious, output frequency is 10 GHz, span is 20 MHz.



Measurement results of spurious, output frequency is 20 GHz, span is 20 MHz.



Measurement results of spurious, output frequency is 30 GHz, span is 20 MHz.

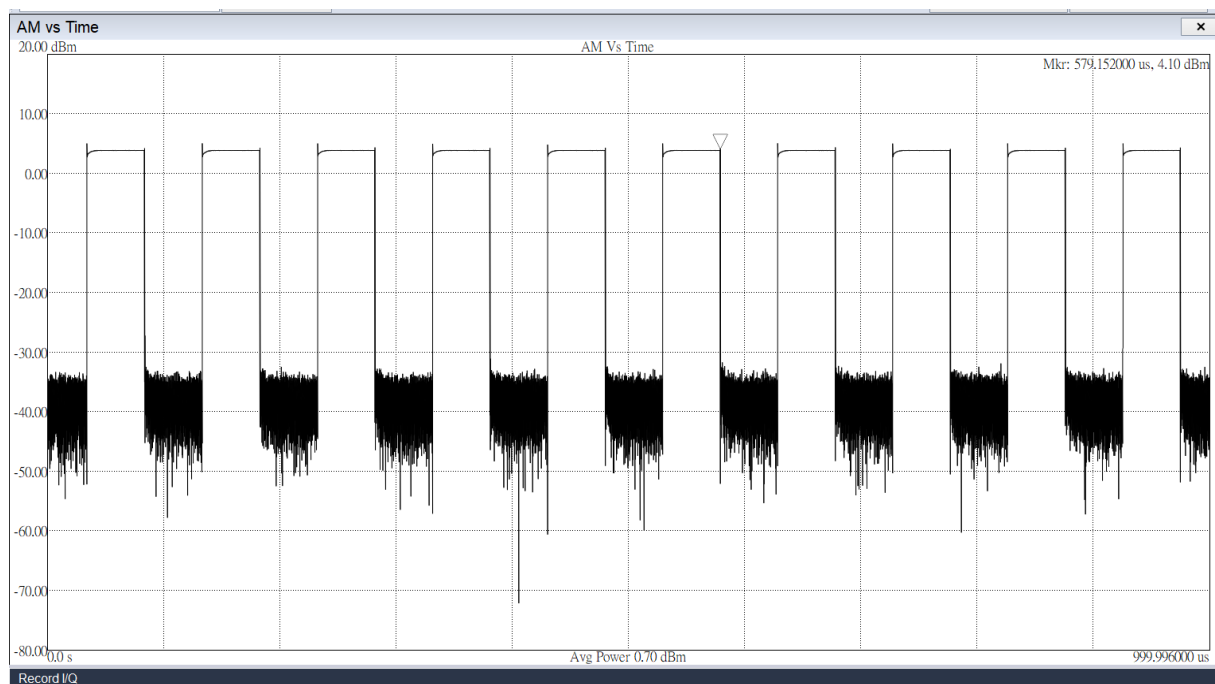
Pulse Modulation

Parameter	Min	Typical	Max
Pulse Modulation Source		Internal/External	
On/Off Ratio		35 dB	
Rise/fall time		30 ns	
Pulse Width (High & Low) ⁹	100 ns		30 s
Duty Cycle ¹⁰ (Internal source)	0.1%		99.9%
Trigger Voltage (External source)		High-Enable	
High-Level	1.7 V		3.3 V
Low-Level	0 V		0.7 V

⁹ Both high and low pulse widths must be within the range of 100 ns to 30 s.

¹⁰ The duty cycle is limited to 1% to 99% when either high or low pulse widths are between 0.5 μ s and 5 μ s.

Pulse Modulation



Pulse width 50 μ s and Duty Cycle 50 % when Output Frequency is 17 GHz.



List Mode (Frequency/Power List)

Parameter	Min	Typical	Max
Frequency List Switching Time ¹¹		2 ms	
Power List Switching Time ¹¹		0.5 ms	
Dwell Time	1 ms		

¹¹ The switching time is defined as the time interval from the previous output signal falling to 90% to the next output signal rising to 90%. The RF output remains inhibited during the switching duration.

CW/List Trigger Mode ¹²

Parameter	Min	Typical	Max
Trigger Pulse Width	60 ns		
Trigger ON Latency ¹³		300 μ s	
Trigger OFF Latency ¹⁴		1 μ s	
Trigger Level	2.7 V	3.3 V	3.6 V

¹² In CW trigger mode, the RF output is inhibited until a trigger pulse is applied to the Trigger ON port; the output is subsequently disabled upon detecting a trigger pulse at the Trigger OFF port. In List trigger mode, the output dwells at the current state and will not advance to the next frequency/power point until a trigger pulse is applied to the Trigger ON port. Applying a pulse to the Trigger OFF port will disable the List trigger mode output.

¹³ Trigger ON latency is defined as the time interval from trigger detection at the Trigger ON port to RF output turn-on in CW trigger mode or to the next frequency/power advancement step in List trigger mode.

¹⁴ Trigger OFF latency is defined as the time interval from trigger detection at the Trigger OFF port to RF output turn-off.

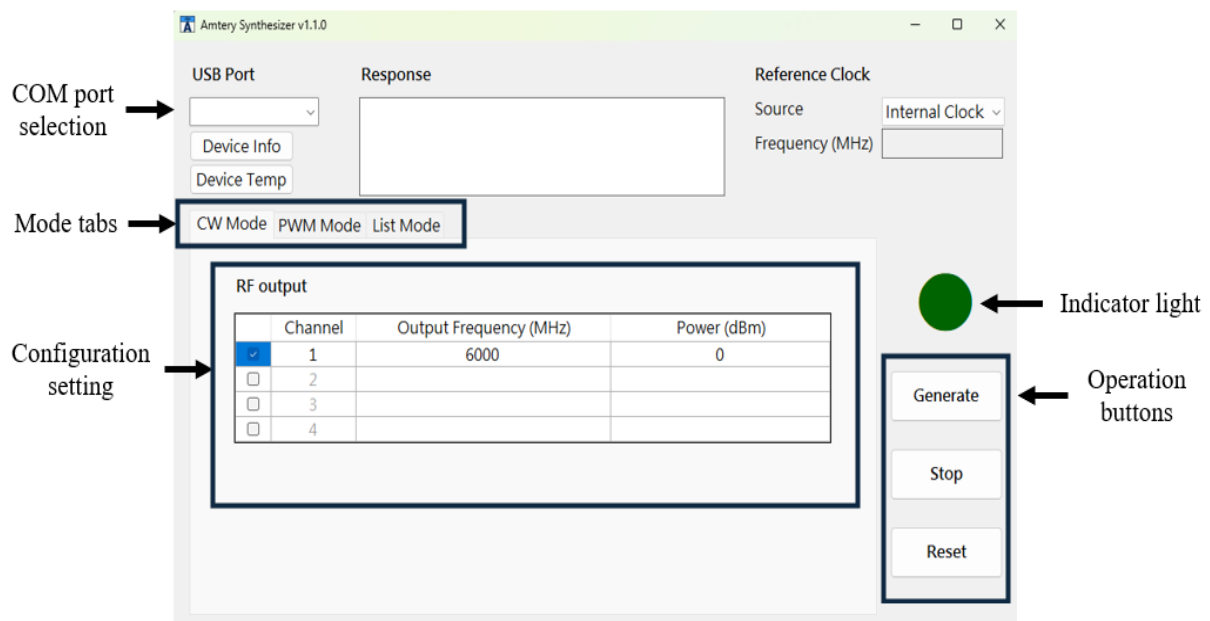
External Input Reference Clock

Parameter	Min	Typical	Max
Frequency	10 MHz	100 MHz	110 MHz
Single-ended Input Power	0 dBm	10 dBm	15 dBm
Single-ended Input Voltage	0.6 Vpp	2 Vpp	3.6 Vpp

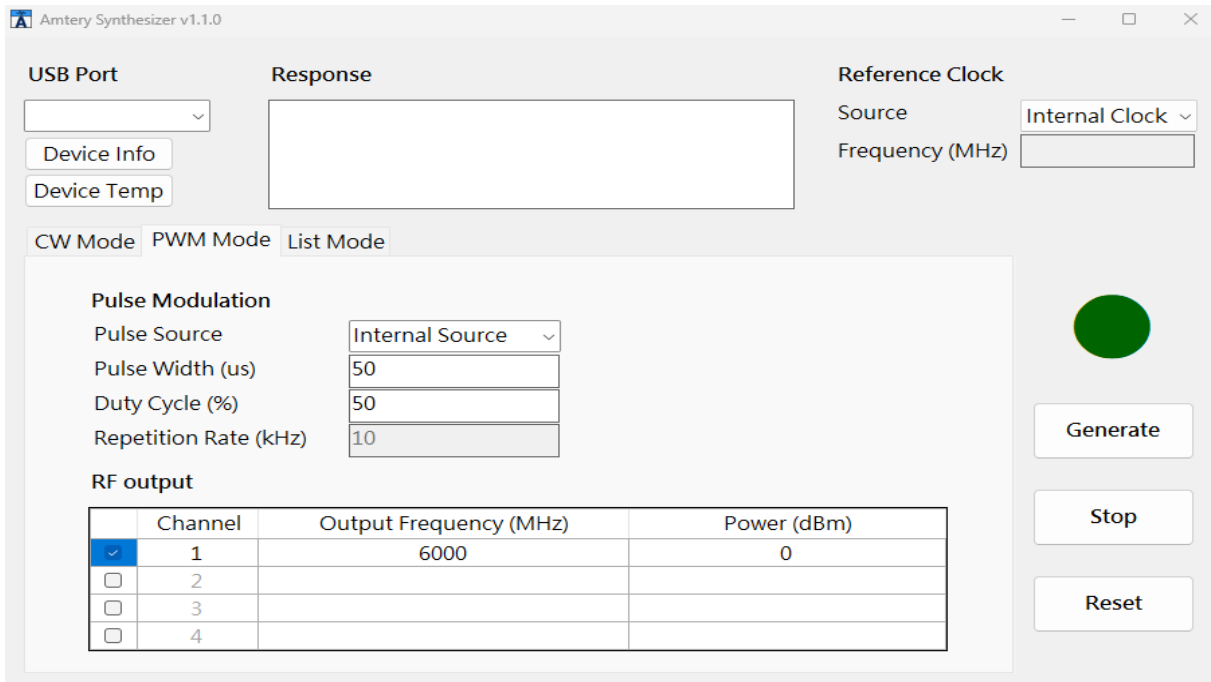
Connector

Parameter	Description
RF Output	2.92 mm female
External Pulse In	SMA female
Reference Clock In	SMA female
Control & Power Interface	USB 3.2 Gen1, Type-C connector. (Recommendation: Connect to the host via Type-C port.)

Graphical User Interface (GUI)



GUI - Continuous Wave (CW) Mode



Amtery Synthesizer v1.1.0

USB Port:
 Device Info
 Device Temp

Response:

Reference Clock
 Source: Internal Clock
 Frequency (MHz):

CW Mode PWM Mode List Mode

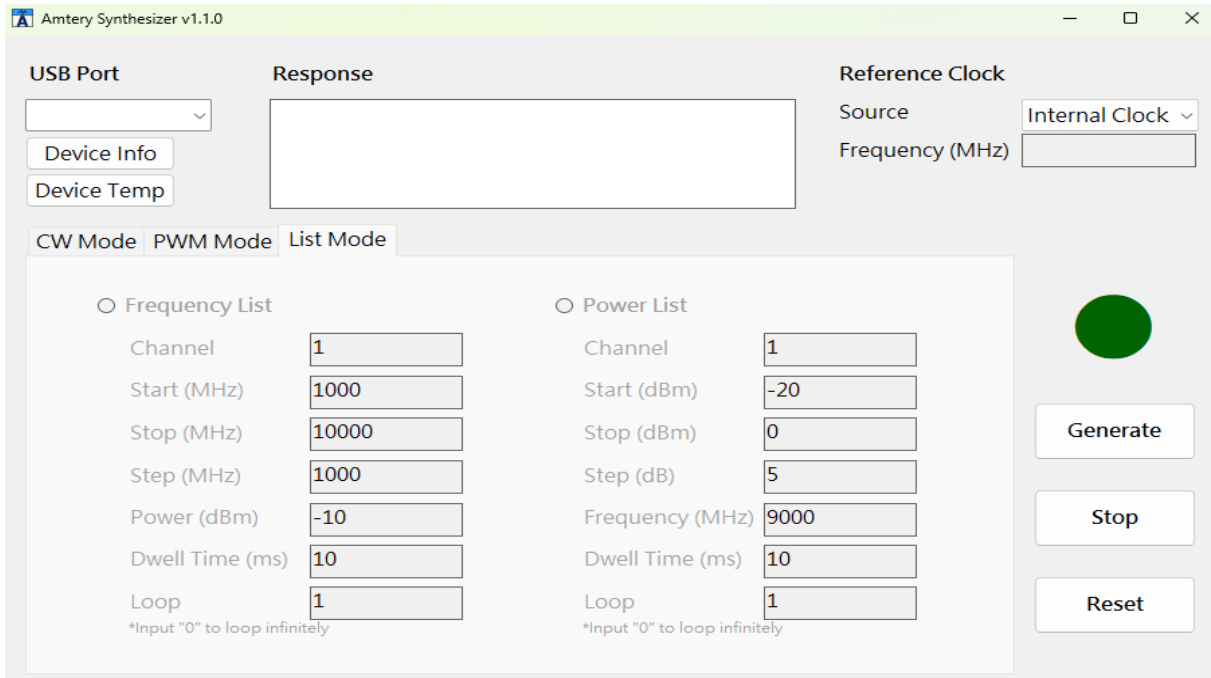
Pulse Modulation
 Pulse Source: Internal Source
 Pulse Width (us): 50
 Duty Cycle (%): 50
 Repetition Rate (kHz): 10

RF output

	Channel	Output Frequency (MHz)	Power (dBm)
☒	1	6000	0
☐	2		
☐	3		
☐	4		

Generate Stop Reset

GUI - Pulse Width Modulation (PWM) Mode



Amtery Synthesizer v1.1.0

USB Port:
 Device Info
 Device Temp

Response:

Reference Clock
 Source: Internal Clock
 Frequency (MHz):

CW Mode PWM Mode List Mode

☐ Frequency List ☐ Power List

Frequency List
 Channel: 1
 Start (MHz): 1000
 Stop (MHz): 10000
 Step (MHz): 1000
 Power (dBm): -10
 Dwell Time (ms): 10
 Loop: 1
*Input "0" to loop infinitely

Power List
 Channel: 1
 Start (dBm): -20
 Stop (dBm): 0
 Step (dB): 5
 Frequency (MHz): 9000
 Dwell Time (ms): 10
 Loop: 1
*Input "0" to loop infinitely

Generate Stop Reset

GUI - Frequency/Power List Mode

Note: Specifications are subject to change without notice.