Teraflex summary datasheet

April 2025

General description

Teraflex is a complete solution for generation, test and measurement of terahertz and optics frequencies. It is an RF source based on optical photo mixing approach capable of generating any frequency between 0 to 2THz (5 THz is coming). The teraflex can also generate an ultra-narrow linewidth optical signal.

The patented optical feedback technology has solved two of the main problems associated with current optical source solutions, namely the frequency stability and the phase noise. This source can be coupled to a RF module for wireless communications, integrated into radars or THz active cameras via other modules.

The Teraflex can also incorporate an I/Q modulator, so if it is combined with an I/Q baseband generator, the instrument can be used to generate signals for all radio standards in both optics and RF frequency bands.

Applications

- High speed wireless communications (5G+, 6G …)
- High speed optical communication (fiber and free space)
- Radar
- Military and space communication
- Imaging
- Spectroscopy

Product highlights

- Fine tuning of the output frequency from 0 to 2 THz.
- Constant phase noise over the entire frequency range
- Only one device to meet all radio frequency bands.
- High-speed optical data encoding with standard modulation (QPSK, QAM, OFDM…)
- Well suitable to terahertz radar due to the source high stability and tunability. Terahertz radar is more effective than LiDAR in degraded visual environments (dust, sand, snow…).
- Excellent size, weight, power and cost factor (SWaP-C).
- Multiple output formats (fiber/RF connector) are available.

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Specifications

Unless stated the test conditions are at 25°C, 50% RH and 1 atmosphere.

Optical

Parameter	Condition	Min	Typ	Max	Unit
Laser center wavelength			1550		nm
Laser frequency step			1.47		GHz
Laser linear drift rate			0.1	10	Hz/s
Laser signal to noise ratio		80			dB
Laser unbalanced				1	dB
Output power • combined outputs • Isolated outputs	 Any output		 15 12		dBm

Frequency

Parameter	Condition	Min	Typ	Max	Unit
Coarse frequency step			1.47		GHz
Fine frequency step (1)			1		Hz
Difference frequency range		0		2	THz
Phase noise at 1Hz offset (2)	Fout = 66.15GHz			-90	dBc/Hz
Phase noise at 10KHz offset (2)	Fout = 66.15GHz			-110	dBc/Hz
Phase noise at 1MHz offset (2)	Fout = 66.15GHz			-120	dBc/Hz
Output power • RF high frequency (3) • RF high power (3)	 At 66.15Ghz At 10GHz		 7 22		dBm

Electrical

Parameter	Condition	Min	Typ	Max	Unit
Supply voltage		100		240	V
Supply voltage frequency		50		60	Hz
Average power consumption			20		W
Peak power consumption				30	W

Modulation (4)

Parameter	Condition	Min	Typ	Max	Unit
Modulation bandwidth	wavelength = 1550nm			20	GHz
Modulation data rate	wavelength = 1550nm			56	Gbaud
Frequency carrier offset	wavelength = 1550nm			20	GHz

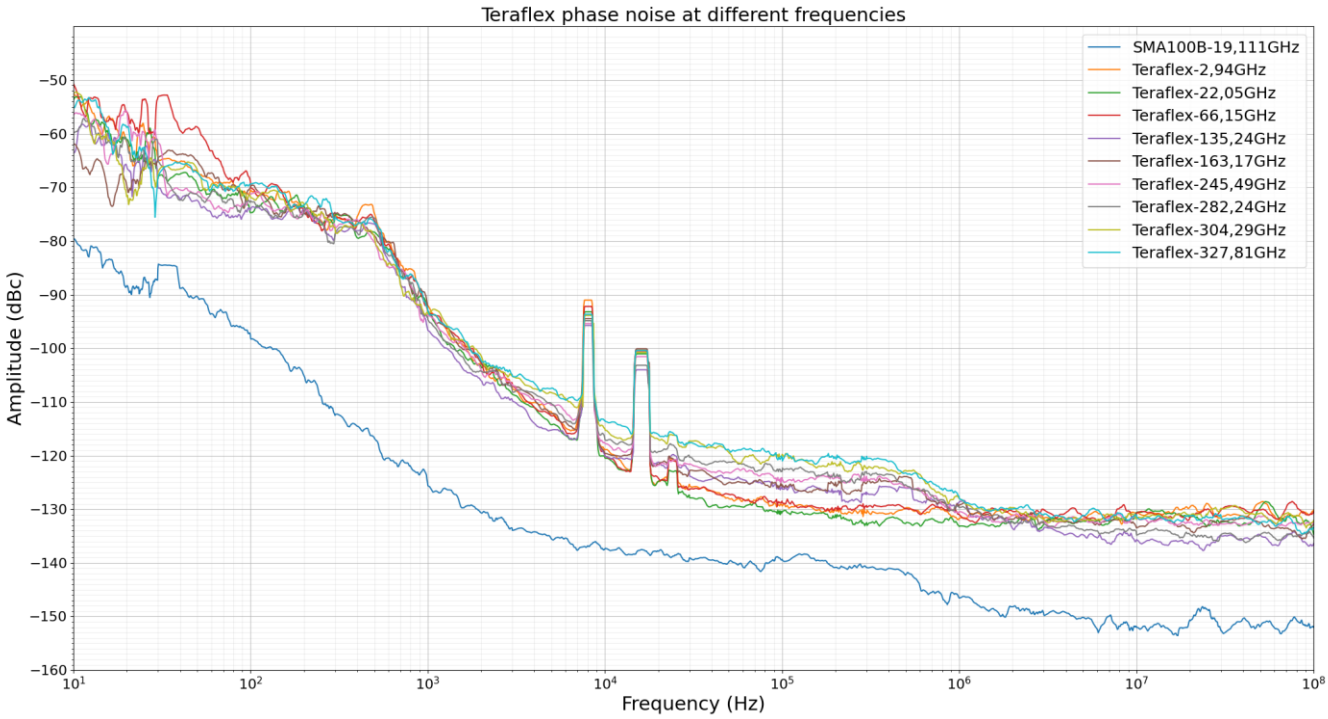
Environmental conditions

Description	Specifications
Operating environment: Temperature Humidity Altitude Vibration	 +10°C to +40°C RH 20% to 80% (non-condensing) 0 to 2000m 0.1Grms max, 1Hz to 100Hz

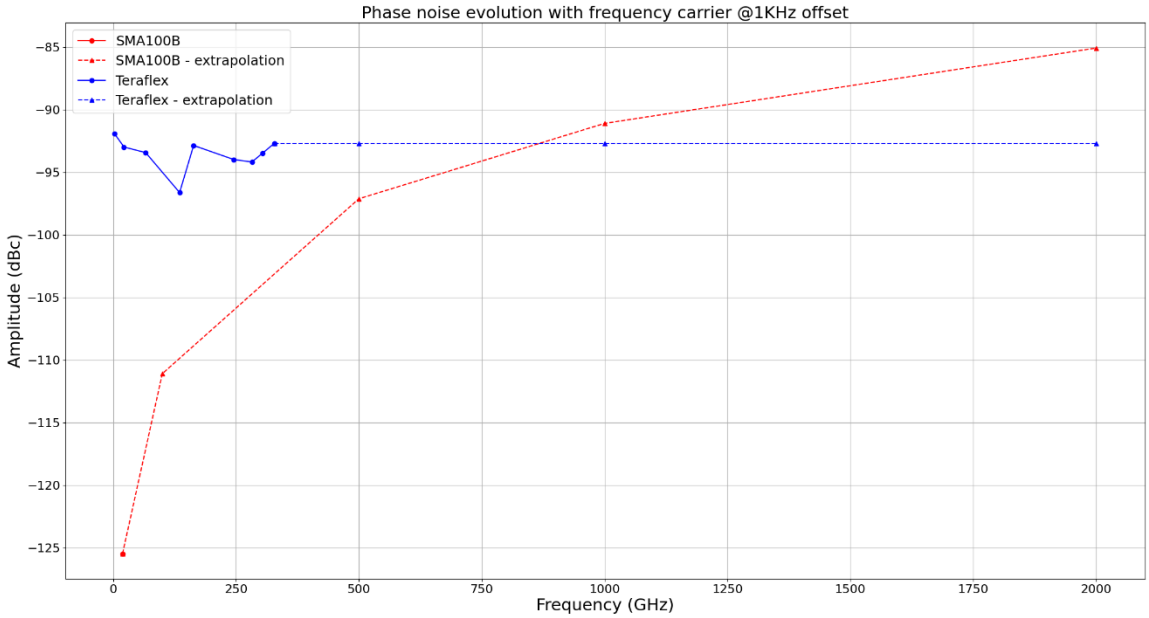
(1) Available with fine tuning option
(2) Measures made by an independent laboratory (IEMN, Lille, France)
(3) Maximum RF output frequency and power depending on output option
(4) Available with modulation option

Typical characteristics

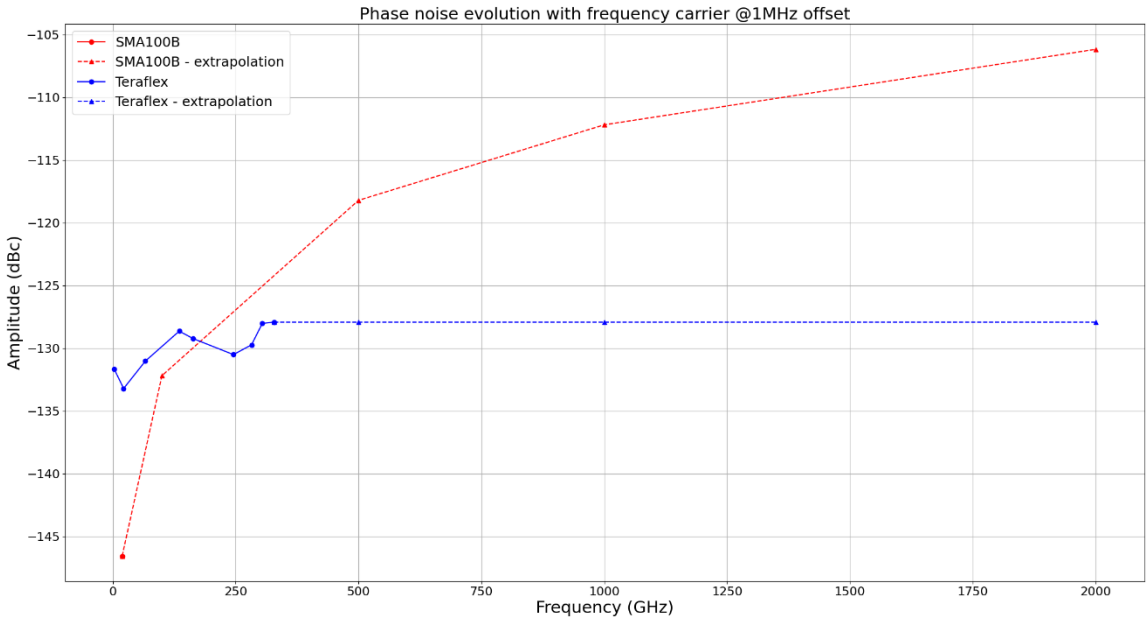
Teraflex phase noise for various frequency compared to generator SMB100B in "low noise" version.



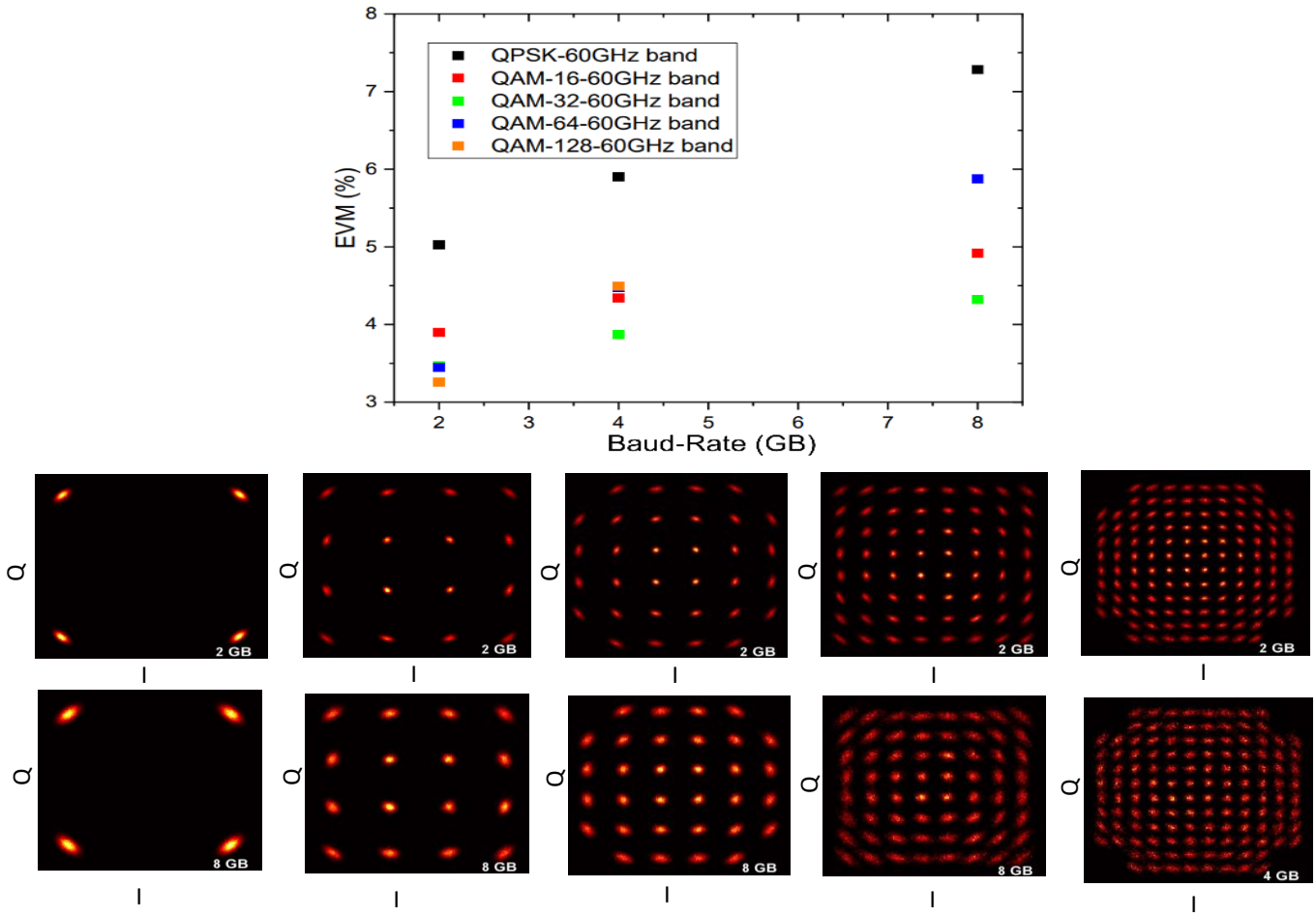
Teraflex phase noise evolution with frequency carrier at 1KHz offset.



Teraflex phase noise evolution with frequency carrier at 1MHz offset.



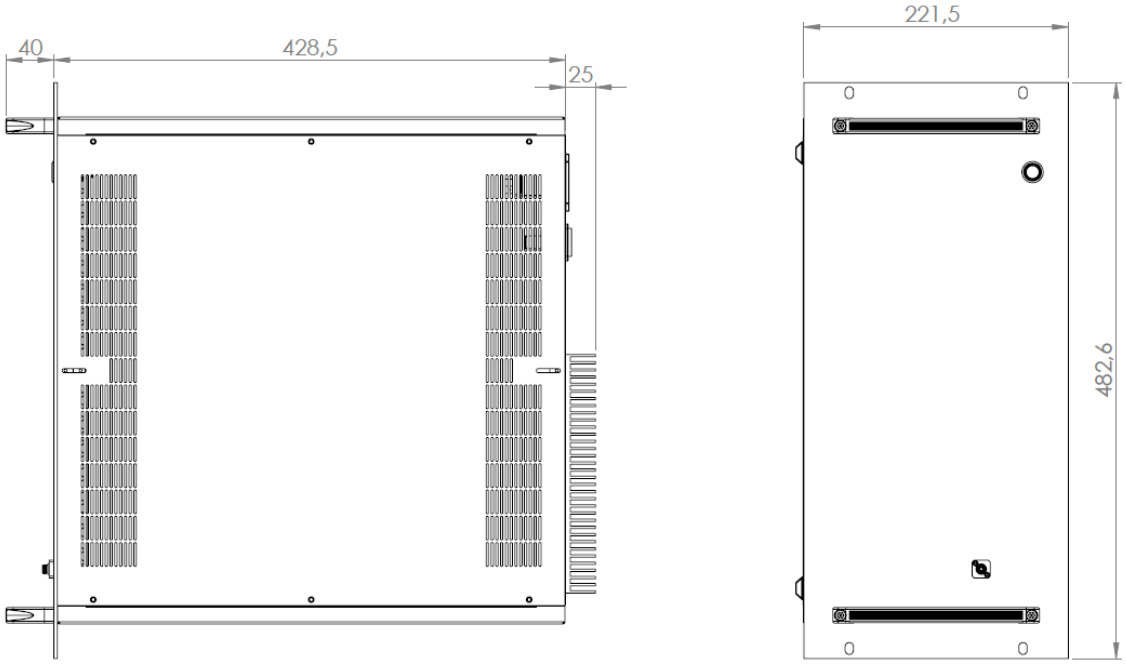
Teraflex output QAM-X modulation at 60GHz carrier frequency



Mechanical characteristics

Dimensions

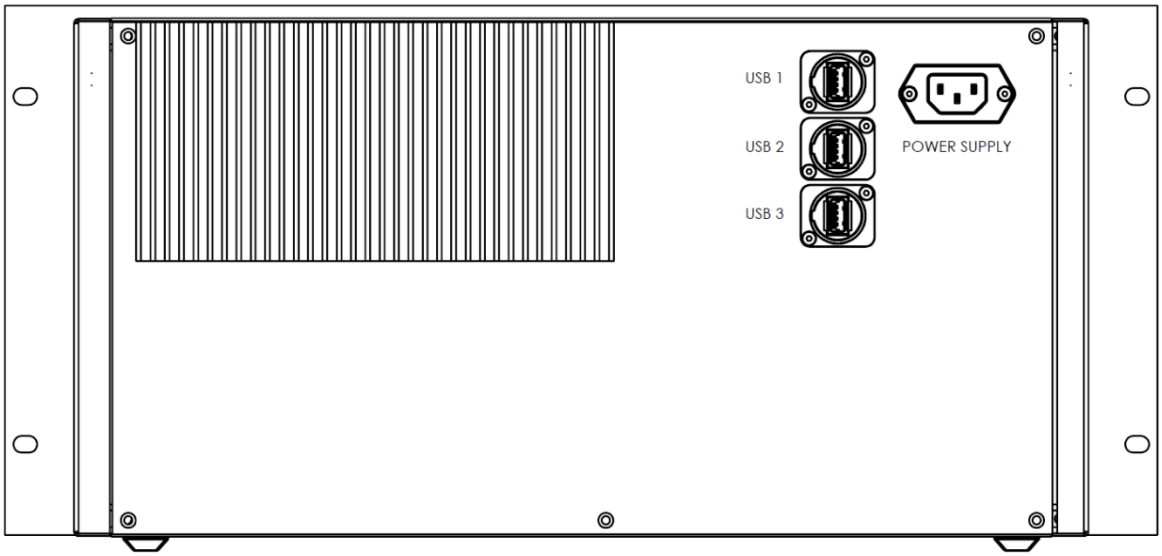
The Teraflex comes complete in a 5U high 19” rack mountable chassis.



Front panel

Description	Specification
Power switch	Illuminated push button
Input modulation Connector type	 SMA
Optical output Connector type	 FC/APC Fiber Connector
RF output Connector type	 Female V connector

Rear panel



Description	Specification
Power supply:	
Connector type	IEC 320-C13
Power input rating	100-240V_{AC} (50/60Hz)
Data I/O Interface:	
USB 1	USB-A (Virtual communication port)
USB 2	USB-A (Virtual communication port)
USB 3	USB-A (Virtual communication port)

Output configuration

Depending on the application and frequency range required, Teraflex output can be configured on request.

Output type	Connector
Combined laser (standard)	output A
Terahertz emission with photo-mixing	output A
Independent laser output	output A and B
RF up to 65GHz	RF output
RF high power up to 20GHz	RF output

Output power can be amplified or attenuated to suit the application.

Modulation input

The modulation inputs can be used either for fine tuning of the output difference laser frequency or for direct modulation of the optical signal.

Input type	Connector
Data I/Q modulation	
Modulation signal I	SMA 1
Modulation signal Q	SMA 2
Frequency fine tuning	
RF offset sinus signal	SMA 1
RF offset cosines signal	SMA 2

Configuration

The Teraflex can be easily configured with a serial interface via the USB connectors.