



The ModBox-VNA-1310nm-1550nm is a 1310 nm and 1550 nm wide bandwidth Optical Transmitter designed to extend Vectorial Network Analyzers applications into the optical domain.

When associated with a Vectorial Network Analyzer, they make up a high performance and easy to use test equipment for the characterization of photoreceivers or any high speed optoelectronic device.

The ModBox-VNA-1310nm-1550nm incorporates a 1310 nm and 1550 nm low RIN DFB lasers source and a modulation stage based on a high bandwidth LiNbO₃ modulator with an automatic bias control circuit.

FEATURES

- Analog modulation up to 40 GHz
- Dual wavelength operation
- Dither-free bias controller
- Low RIN
- High harmonics suppression

APPLICATIONS

- Transmission system test
- Components characterization
- Receiver frequency test
- R&D laboratories

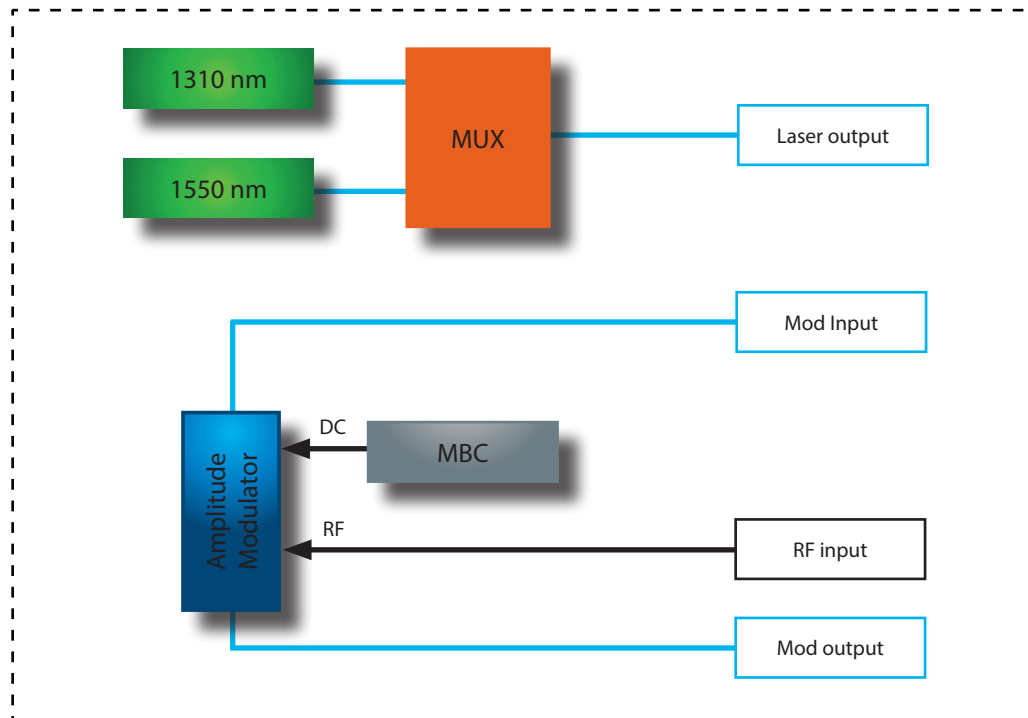
OPTIONS

- 850 nm, C, O bands operation
- Multi-Channel

Performance Highlights

Parameter	Min	Typ	Max
Operating wavelength	1310 nm & 1550 nm		
Modulation format	Analog Modulations		
Modulation bandwidth	-	-	40 GHz
Modulated output power	2 dBm	-	-

Functional Block Diagram



The ModBox-VNA-1310nm-1550nm features:

- A chirp-free X-cut LiNbO₃ (Lithium Niobate) Mach-Zehnder Intensity modulator. It is selected for its wide optical bandwidth, and its high electro-optic bandwidth and flat, low ripple, electro-optic response curve.
- A modulator bias controller. The internal LiNbO₃ modulator is a X-cut device with very low drift. However an automatic bias control circuit is provided to lock the operating point of the modulator at the quadrature point whatever the environmental conditions. The bias control circuit is dither free and therefore does not add any spurious content to the small signal modulation generated by the VNA. It is pre-set for operation in quadrature, in the linear portion of the modulator transfer curve. The system can operate over a large power dynamic range thanks to its software controllable gain parameters).
- Two 1310 nm and 1550 nm low RIN lasers are integrated by default (C-Band tunable laser in option). For convenience, the two lasers are multiplexed and an external patch cord is delivered to connect the laser output to the modulator input optical port. Wavelength selection (1310 nm or 1550 nm) and laser power are tunable through the front panel controls or the ModBox software interface.

The ModBox-VNA-1310nm-1550nm is controlled from the front panel thanks to the Smart interface with a simple rotary knob and keypad. The Smart manual interface allows for bias control circuit, drivers gain and laser current settings. It comes also with a simple GUI solution, Windows based and implemented through the USB interface of the user PC.

Input Electrical Specifications User supplied, not a ModBox specification

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input electrical termination	-	AC coupled	Single ended			-
Signal type	-	-	Analog			-
Input voltage ⁽¹⁾	V_{IN}	Amplitude Modulation	0.4	0.6	1	Vpp
Impedance matching	Z_{IN-RF}	-	-	50	-	Ω

(1): The ModBox-VNA-1310nm-1550nm does NOT feature an internal RF amplifier. The VNA characterization is usually performed in a “small signal mode”, therefore a RF amplifier is not necessary. Omitting the amplifier allows to obtain a smoother and flatter transfer function.

1310 nm & 1550 nm DFB Lasers Specifications The laser 1310 nm & 1550 nm lasers are embedded by default.

Parameter	Symbol	Condition	Min	Typ	Max	Unit	
Lasers type	-	-	DFB			-	
Wavelength	λ	Embedded by default	1310 nm & 1550 nm			-	
Wavelength laser tuning range	-	Diode chip temperature control	-	0.8	1	nm	
Optical output power	-	CW	1310 nm	13	-	-	dBm
			1550 nm	16	-	-	dBm
Optical output power adjustment	-	Diode Injection current control	0	-	100	%	
Spectrum linewidth	$\Delta\lambda$	FWHM	1	2	-	MHz	
Side Mode Suppression Ratio	SMSR	-	35	-	-	dB	

Tunable C-Band Laser Specifications Option

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Wavelengths laser tuning range	λ	-	1527.60	-	1565.50	nm
Optical output power	-	CW	-	15	-	dBm
Optical output power adjustment	-	Diode Injection current control	0	-	100	%
Spectrum linewidth	$\Delta\lambda$	FWHM, instantaneous	-	100	-	kHz
Side Mode Suppression Ratio	SMSR	-	40	55	-	dB

Output Specifications

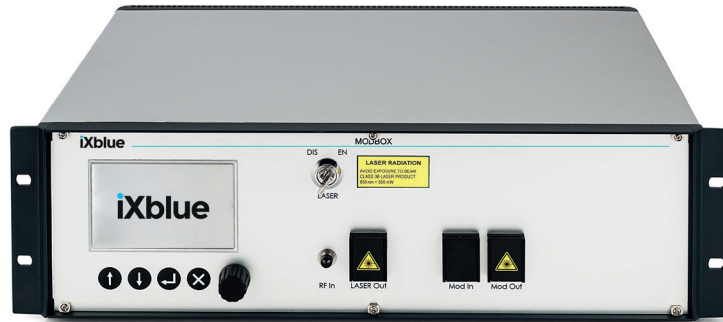
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Modulation bandwidth	-	-	-	35	40	GHz
Modulated output power	-	1310 nm & 1550 nm lasers	2	-	-	dBm
Optical return loss	ORL	-	-45	-50	-	dB
Electrical return loss	ERL	-	-	-12	-10	dB
Static extinction ratio	ER	-	20	25	-	dB
Bias Control	MBC	Quad mode	Dither-less - Automatic / Manual			

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
RF input power	EP _{in}	-	28	dBm
Optical input power	OP _{in}	-	20	dBm

Front Panel

Parameter	
Power	Powers the system and lits green when the switch is set on
LCD	Displays ModBox current status and allows the user to edit parameter in the ModBox menus
Keypad	Allows one to browse through the smart interface menus and edit the system's parameters
System rotary knob	Allows browsing and editing through the ModBox menus
Mod In / Mod Out	Amplitude modulation input and output optical ports
RF input	Single 1.85 mm RF connector
Laser Out	Laser output optical port



Ordering information

ModBox-VNA-1310nm-1550nm-40GHz-YY

VNA = Optical Vectorial Network Analyser extension
1310nm-1550nm = 1310 nm & 1550 nm operation, embedded lasers
40GHz = Analog Modulation bandwidth: 40GHz up to 40 GHz
YY = Output connectors, FA : FC/APC - FC : FC/UPC - SC : SC/UPC

Opt-CTun

C-Band Tunable Laser option:
YY = Input / Output connectors - FA : FC/APC - FC : FC/UPC - SC : SC/UPC

About us

iXBlue Photonics produces specialty optical fibers and Bragg gratings based fiber optics components and provides optical modulation solutions based on the company lithium niobate (LiNbO₃) modulators and RF electronic modules.

iXBlue Photonics serves a wide range of industries: sensing and instruments, defense, telecommunications, space and fiber lasers as well as research laboratories all over the world.