iXblue PHOTONICS

ModBox-VNA-1310nm-1550nm

1310nm & 1550 nm 40 GHz, 70 GHz Modulation Unit

MODBOX

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 lasers source and a modulation stage based on a wide bandwidth $LiNbO_3$ modulator with an automatic bias control circuit.

FEATURES

- Analog modulation to 40 GHz, 70 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

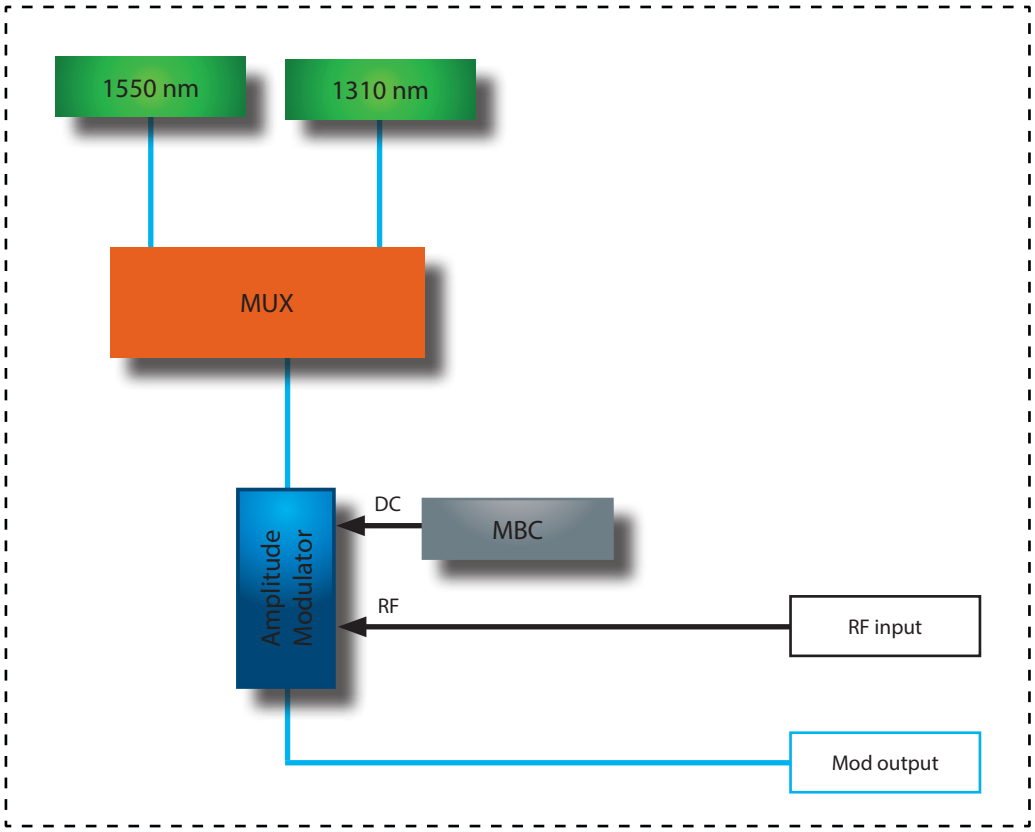
OPTIONS

- 850 nm, full 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, 70 GHz
Modulated output power (option HP)	5 dBm	-	-

Functional Block Diagram



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

- A chirp-free $LiNbO_3$ (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 $LiNbO_3$ modulator is a low drift device. 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.
- 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. 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 touch screen. The Smart manual interface allows for bias control circuit and laser current settings. It comes also with a simple GUI solution, Windows based and implemented through the Ethernet interface.

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
Bandwidth	BW	ModBox-VNA-1310nm-1550nm-40GHz	-	-	40	GHz
		ModBox-VNA-1310nm-1550nm-70GHz	-	-	70	GHz
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.

Output Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Modulation bandwith	-	ModBox-1310nm-1550nm-40GHz	-	-	40	GHz
		ModBox-1310nm-1550nm-70GHz	-	-	70	GHz
Wavelength	λ	From embedded laser diodes		1310 nm & 1550 nm		-
Wavelength laser tuning range	-	From embedded laser diodes	-	0.8	1	nm
Modulated output power	OP_{OUT}	1310 nm & 1550 nm	2	-	-	dBm
Modulated output power	HOP	ModBox-1310nm-1550nm-40GHz	5	6	-	dBm
Optical output power adjustment	ΔOP_{OUT}	Diode Injection current control	0	-	100	%
Optical output power stability	δOP_{OUT}	Over 12 hours	-	-	1	%rms
Spectrum linewidth	Δλ	1310 nm	-	3	15	MHz
		1550 nm	-	-	1	MHz
Relative Intensity Noise	RIN	1310 nm	-	-	-160	dB/Hz
		1550 nm	-	-	-155	dB/Hz
Optical return loss	ORL	-	-45	-50	-	dB
Electrical return loss	ERL	-	-	-12	-10	dB

Tunable C-Band Laser Specifications Option

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Wavelengths laser tuning range	λ	-	1527.60	-	1565.50	nm
Modulated output power	OP	-	1	-	-	dBm
Optical output power adjustment	-	Diode Injection current control	25	-	100	%
Spectrum linewidth	Δλ	FWHM, instantaneaous	-	100	-	kHz
Relative Intensity Noise	RIN	-	-	-	-145	dB/Hz

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
RF input power	EP_{in}	-	28	dBm

Interfaces, Dimensions and Compliance

Interfaces		
Optical output port	(FC-SC)/(APC-UPC) - Polarization maintaining fiber PM1550	
Electrical connector	ModBox-VNA-1310nm-1550nm-40GHz	V female (1.85 mm)
	ModBox-VNA-1310nm-1550nm-70GHz	V female (1.85 mm)
Control	Embedded Interface (front panel touchscreen) + Remote control (Ethernet)	
Color LCD	Displays ModBox current status and allows the user to edit parameter in the ModBox menus	
Power supply	100-120V/220-240 automatic switch 50-60Hz (Rear panel)	
EMC / Optical norms	EN61326-1 Ed. 2006 / EN 60625-1	
Dimensions / Weight	Rack 19" x 2U, Depth=495mm / 5 kg	

Ordering information

ModBox-VNA-1310nm-1550nm-XXGHz-YY

VNA = Optical Vectorial Network Analyser extension
1310nm-1550nm = 1310 nm & 1550 nm operation, embedded lasers
XX = Analog Modulation bandwith: 40GHz up to 40 GHz - 70GHz up to 70 GHz
YY = Output connectors, FA : FC/APC - FC : FC/UPC - SC : SC/UPC

Opt-CTun

C-Band Tunable Laser option

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 ($LiNbO_3$) 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.

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