



The ModBox-VNA-CBand is a C-Band and 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-CBand incorporates a 1550 m low low RIN DFB laser source and a modulation stage based on a high bandwidth LiNbO<sub>3</sub> modulator with an automatic bias control circuit.

#### FEATURES

- Analog modulation up to 40GHz, 70GHz
- Dither-free bias controller
- Low RIN laser
- High harmonics suppression

#### APPLICATIONS

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

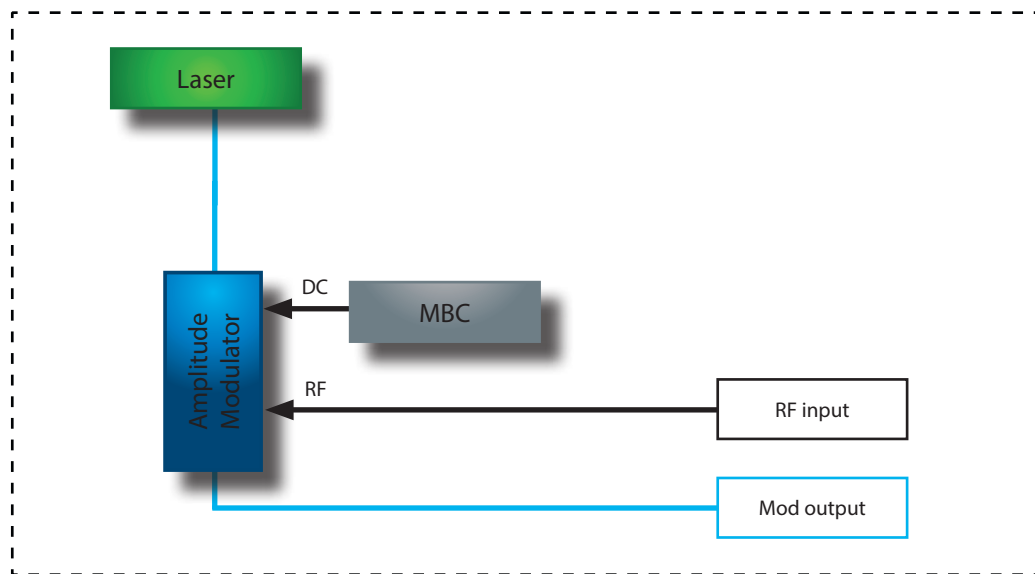
#### OPTIONS

- 850 nm, 1310 nm & 1550 nm, O-band
- Multi-Channel

#### Performance Highlights

Parameter	Min	Typ	Max
Operating wavelength	-	1550 nm	-
Modulation format	Analog Modulations		
Modulation bandwidth	-	-	40 GHz, 70 GHz
Modulated optical output power	6 dBm	-	-

## Functional Block Diagram



## The ModBox-VNA-CBand features:

- A chirp-free X-cut LiNbO<sub>3</sub> (Lithium Niobate) Mach-Zehnder Analog Intensity modulator. It is selected for its high electro-optic bandwidth and flat, low ripple, electrooptic response curve.
- A modulator bias controller. The internal LiNbO<sub>3</sub> 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.
- An 1550 nm low RIN laser directly spliced to the modulator. Wavelength and power of such embedded laser are tunable through the front panel controls or the ModBox software interface. For ease of use, an external patch cord is delivered to connect an external laser (user supplied) to the modulator input optical port.

The ModBox-VNA-CBand 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, sine			-
Input voltage <sup>(1)</sup>	$V_{IN}$	Amplitude Modulation	-	100	-	mVpp
Bandwidth	BW	-	-	-	70	GHz
Impedance matching	$Z_{IN-RF}$	-	-	50	-	$\Omega$

(1): The ModBox-VNA-CBand 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 Optical Specifications Specifications below are given with embedded 1550 nm laser.

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Modulation Frequency	-	ModBox-VNA-CBand-40GHz	38	-	40	GHz
		ModBox-VNA-CBand-70GHz	60	65	70	GHz
Wavelength	$\lambda$	Embedded by default	-	1550,12	-	nm
Wavelength laser tuning range	$\Delta\lambda$	Diode chip temperature control	-	$\pm 0.8$	$\pm 1$	nm
Modulated output power	$OP_{OUT}$	ModBox-VNA-CBand-40GHz	6.5	8	-	dBm
		ModBox-VNA-CBand-70GHz	6	7	-	dBm
Optical output power adjustment	$\Delta OP_{OUT}$	Diode Injection current control	0	-	100	%
Optical output power stability	$\delta OP_{OUT}$	Over 12 hours	-	-	1	%rms
Side Mode Supression Ratio	SMSR	-	40	45	-	dB
Spectrum linewidth	$\delta\lambda$	FWHM	-	3	15	MHz
Relative Intensity Noise	RIN	16 dBm	-	-	-163	dB/Hz
Polarization extinction ratio	PER	-	17	20	-	dB
Optical return loss	ORL	-	-40	-	-	dB
Electrical return loss	ERL	-	-	-12	-10	dB

### Absolute Maximum Ratings

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

Interfaces, Dimensions and Compliance

Interfaces		
Optical connectors and fibers	(FC-SC)/(APC-UPC) - Polarization maintaining fiber Corning PM13-U25D	
Electrical connector	ModBox-VNA-OBand-40GHz	K female (2.92 mm)
	ModBox-VNA-OBand-70GHz	V female (1.85 mm)
Control	Smart Interface (front panel), GUI (USB typeB)	
Power supply	100-120V/220-240 automatic switch 50-60Hz (Rear panel)	
EMC / Optical norms	EN61326-1 Ed. 2006 / EN 60625-1	



Ordering information

ModBox-VNA-CBand-XXGHz-YY

VNA = Optical Vectorial Network Analyser extension  
 CBand = Embeds laser, 1550 nm by default  
 XX = Analog Modulation bandwidth: 40GHz up to 40 GHz - 70 GHz up to 70 GHz  
 YY = Output connectors, FA : FC/APC - FC : FC/UPC - SC : SC/UPC - SA : SC/APC

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.

3, rue Sophie Germain  
 25 000 Besançon - FRANCE  
 Tel. : +33 (0) 381 853 180 - Fax : + 33 (0) 381 811 557

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