



The ModBox-VNA-OBand is a O-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-OBand incorporates a 1310 nm low low RIN laser source and a modulation stage based on a wide 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
- High harmonics suppression

#### APPLICATIONS

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

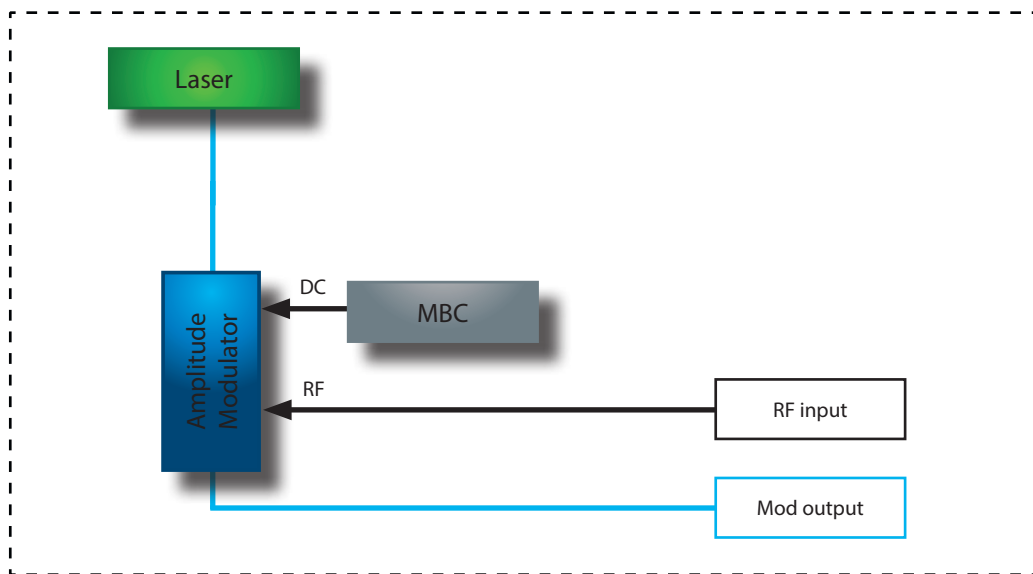
#### OPTIONS

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

#### Performance Highlights

Parameter	Min	Typ	Max
Operating wavelength	-	1310 nm	-
Modulation format	Analog Modulations		
Modulation bandwidth	-	-	40 GHz, 70 GHz
Modulated optical output power	5 dBm	-	-

## Functional Block Diagram



### The ModBox-VNA-OBand 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.
- An 1310 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.

The ModBox-VNA-OBand 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 <sup>(1)</sup>	$V_{IN}$	Amplitude Modulation	0.4	0.6	1	Vpp
Bandwidth	BW	ModBox-VNA-OBand-40GHz	-	-	40	GHz
		ModBox-VNA-OBand-70GHz	-	-	70	GHz
Impedance matching	$Z_{IN-RF}$	-	-	50	-	$\Omega$

(1): The ModBox-VNA-OBand 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 bandwidth	-	ModBox-VNA-OBand-40GHz	-	-	40	GHz
		ModBox-VNA-OBand-70GHz	-	-	70	GHz
Wavelength	$\lambda$	From embedded laser diode	1310 nm			-
Wavelength laser tuning range	-	From embedded laser diode	-	0.8	1	nm
Modulated output power	$OP_{OUT}$	1310 nm	2	-	-	dBm
Modulated output power	HOP	ModBox-VNA-OBand-40GHz	5	6	-	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
Spectrum linewidth	$\Delta\lambda$	1310 nm	-	3	15	MHz
Relative Intensity Noise	RIN	-	-	-	-160	dB/Hz
Optical return loss	ORL	-	-45	-50	-	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	V female (1.85 mm)
	ModBox-VNA-OBand-70GHz	V female (1.85 mm)
Control	Embedded Interface (front panel touchscreen) + Remote control (Ethernet)	
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-OBand-XXGHz-YY

VNA = Optical Vectorial Network Analyser extension

OBand = Embeds laser, 1310 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 (LiNbO<sub>3</sub>) 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.