ModBox

ModBox-VNA-OBand-40GHz

O-Band, 40 GHz Modulation Unit

The ModBox-VNA-OBand-40GHz is a 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 photoreceivers or any high speed optoelectronic device characterization.

The ModBox-VNA-OBand-40GHz incorporates a 1310 nm low noise laser source and a modulation stage based on a wide bandwidth $LiNbO_3$ analog modulator with an automatic bias control circuit. An optical input for external laser can be added to provide maximum flexibility for test & measurement.

FEATURES

- Analog modulation up to 40 GHz
- Low RIN
- High harmonics suppression

APPLICATIONS

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

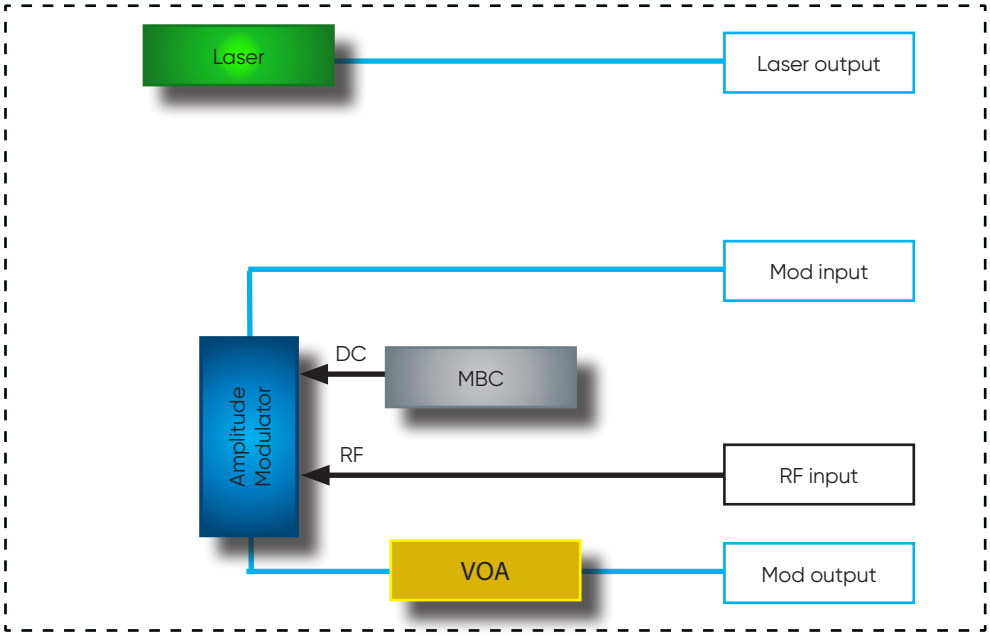
OPTIONS

- Optical input for external laser

PERFORMANCE HIGHLIGHTS

Parameter	
Operating wavelengh	O-Band
Embedded laser	1310 nm
Modulation formats	VNA, NRZ, PAM-4
Frequency	Up to 40 GHz
Modulated output power	Superior to 5 dBm

FUNCTIONAL BLOCK DIAGRAM



The ModBox-VNA-OBand-40GHz features:

• A chirp-free X-cut $LiNbO_3$ (Lithium Niobate) Mach-Zehnder modulator for very high linearity and very wide electro-optical bandwidth, it operates within the full O-Band.

• A modulator bias controller. The internal $LiNbO_3$ 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 in the linear portion of the modulator transfer curve. The MBC ensures a stable operation over time and shows a very low noise sensitivity yielding a significant reduction of the required dither voltage amplitude.

• A 1310 nm low RIN DFB laser. Wavelength and power are tunable through the front panel controls or the ModBox software interface.

• A Variable Optical Attenuator (VOA) to precisely control the modulated optical output signal.

The ModBox-VNA-OBand-40GHz is controlled from the front panel thanks to the Graphical Interface (Windos OS).
It comes also with a set of TCP commands for remote control through the Ethernet port.

Sales: contact@cybel-llc.com | Web: www.cybel-llc.com | 62 Highland Ave., Bethlehem, PA 18017, USA | Tel: +1 (610) 691-7012

INPUT ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input electrical termination	-	AC coupled		Single ended		
Signal type	-	-		Analog		
Input voltage [1]	V_{IN}	VNA mode	0.4	0.6	1	Vpp
Bandwidth	BW	-	-	-	40	GHz
Impedance matching	Z_{IN-RF}	-	-	50		Ω

(1): The ModBox-VNA-OBand-40GHz 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.
When a proper driver is plugged to the ModBox-VNA-OBand-40GHz an amplitude modulation is created, up to 56 Gb/s NRZ or up to 28 Gbauds PAM-4

INPUT OPTICAL SPECIFICATIONS (optional)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Operation	λ	CW	1260	-	1360	nm
Polarization	-	-		Linear and controlled		
Power	OP_{IN}	-	-	-	20	dBm

OUTPUT OPTICAL SPECIFICATIONS

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Modulation frequency	-	-	-	-	40	GHz
Wavelength	λ	With embedded laser @1310 nm	-	1310	-	nm
Wavelength laser tuning range	Δλ	Diode chip temperature control	-	0.8	1	nm
Modulated output power	OP_{OUT}	With embedded laser @1310 nm	5	6	-	dBm
Optical output power adjustment	ΔOP_{OUT}	By the use of VOA	-40	-	0	dB
Optical output power stability	δOP_{OUT}	Over 8 hours	-	-	0.25	dB
Spectrum linewidth	δλ	FWHM	-	3	15	MHz
Relative intensity noise	RIN	-	-	-	-160	dB/Hz
Optical return loss	ORL	-	-40	-45	-	dB
Electrical return loss	ERL	-	-	-12	-10	dB

ABSOLUTE MAXIMUM RATINGS

Parameter	Symbol	Min	Max	Unit
RF input power	EP_{in}	-	28	dBm
Optical input power	OP_{IN}	-	20	dBm

Sales: contact@cybel-llc.com | Web: www.cybel-llc.com | 62 Highland Ave., Bethlehem, PA 18017, USA | Tel: +1 (610) 691-7012

ModBox-VNA-OBand-40GHz

INTERFACES, DIMENSIONS AND COMPLIANCE

Interfaces

Optical connectors and fibers	FC/APC - Polarization maintaining fiber, Corning PM 13-U25D
Electrical connector	V female (1.85 mm)
Control	Embedded interface (front panel touchscreen) + remote control (Ethernet)
Power supply	100 V - 120 V / 220 V - 240 V automatic switch 50 Hz - 60 Hz (rear panel)
Dimensions / Weight	Rack 19'' x 2U, depth = 495 mm / 5 kg
EMC and optical norms	EN61326-1 Ed. 2006 / NF EN 60625-1
Laser safety	Class 3R



ORDERING INFORMATION

Modbox-VNA-OBand-40GHz

VNA = Optical Vectorial Network Analyser extension

OBand = operation in the O Band band with a 1310 nm embedded laser by default

40GHz = Analog Modulation up to 40 GHz

Sales: contact@cybel-llc.com | Web: www.cybel-llc.com | 62 Highland Ave., Bethlehem, PA 18017, USA | Tel: +1 (610) 691-7012