ModBox

ModBox-VNA-2000nm-20GHz

2000 nm band, 20 GHz Modulation Unit

The ModBox-VNA-2000nm-20GHz 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-2000nm-20GHz incorporates an 2000 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 20 GHz
- Low RIN
- High harmonics suppression

APPLICATIONS

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

OPTIONS

- Multi-channels
- External laser input

PERFORMANCE HIGHLIGHTS

Parameter	
Operating wavelengh	Min 1900 nm - Max 2200 nm
Embedded laser	Typical 2000 nm
Modulation formats	VNA, NRZ, PAM-4
Frequency	Up to 20 GHz
Modulated output power	Typical -5 dBm

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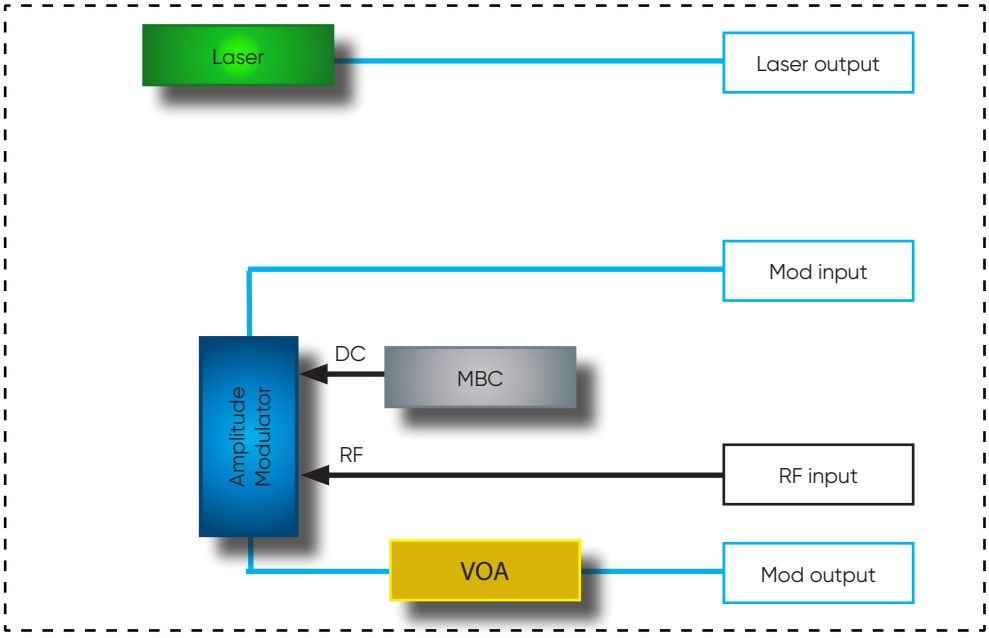
FUNCTIONAL BLOCK DIAGRAM



The ModBox-VNA-2000nm-20GHz 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 from 1900 nm up to 2200 nm.

• 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 2000 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-2000nm-20GHz is controlled from the front panel thanks to the Graphical User Interface (GUI)
It also comes with a set of TPC commands for remote control through the Eternet port.

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INPUT ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input electrical termination	-	AC coupled		Single ended		
Signal type	-	-		Analog / NRZ / PAM-4		
Input voltage [1]	V_{IN}	VNA mode	0.4	0.6	1	Vpp
		NRZ mode	-	9.5	-	Vpp
Impedance matching	Z_{IN-RF}	-	-	50		Ω

(1): The ModBox-VNA-2000nm-20GHz 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-2000nm-20GHz an amplitude modulation is created, up to 20 Gb/s NRZ or up to 20 Gbauds PAM-4

INPUT OPTICAL SPECIFICATIONS (optional)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Operation	λ	CW	1900	-	2200	nm
Polarization	-	-		Linear and controlled		
Power	OP_{IN}	-	-	-	17	dBm

OUTPUT OPTICAL SPECIFICATIONS

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Modulation frequency	-	-	15	20	-	GHz
Wavelength	λ	-	-	2000	-	nm
Wavelength laser tuning range	Δλ	Diode chip temperature control	-	0.8	1	nm
Modulated output power	OP_{OUT}	With embedded laser	-	-5	-	dBm
Optical output power adjustment	ΔOP_{OUT}	By the use of VOA	-30	-	0	dB
Optical output power stability	δOP_{OUT}	Over 8 hours	-	-	0.3	dB
Spectrum linewidth	δλ	FWHM	-	-	2	MHz
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
Optical input power	OP_{IN}	-	20	dBm

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INTERFACES, DIMENSIONS AND COMPLIANCE

Interfaces

Optical connectors and fibers	FC/APC - Polarization maintaining fiber, Corning PM 1950-U25D
Electrical connector	2.92mm female
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 1M 

ORDERING INFORMATION

Modbox-VNA-2000nm-20GHz

VNA = Optical Vectorial Network Analyser extension

2000nm = operation in the 2000nm band with a 2000 nm embedded laser by default

20GHz = Analog Modulation up to 20 GHz

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