ModBox

ModBox-VNA-850nm-940nm-40GHz

850 nm & 940 nm, 40 GHz Modulation Unit

The ModBox-VNA-850nm-940nm-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-850nm-940nm-40GHz incorporates a 852 nm DBR & 940 nm FP-FBG laser and a modulation stage based on a large bandwidth $LiNbO_3$ analog modulator with an automatic bias control circuit.



FEATURES

- Analog modulation up to 40 GHz
- Embedded bias controller
- High harmonics suppression

APPLICATIONS

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

OPTIONS

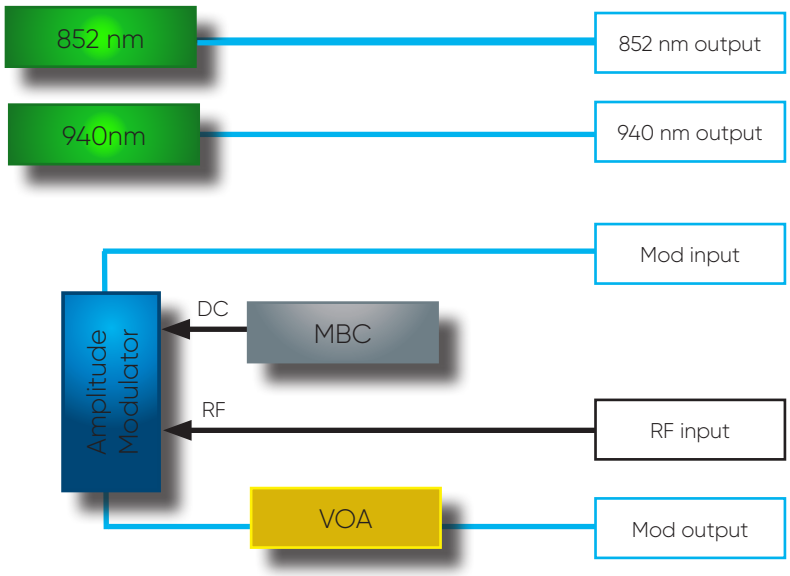
- C, L, O bands operation
- Multi-channels

PERFORMANCE HIGHLIGHTS

Parameter	
Operating wavelengh	Min 850 nm - Max 950 nm
Embedded laser	852 nm & 940 nm
Modulation format	Analog modulations
Frequency	Up to 40 GHz

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FUNCTIONAL BLOCK DIAGRAM



The ModBox-VNA-850nm-940nm-40GHz features:

• A chirp-free X-cut $LiNbO_3$ (Lithium Niobate) Mach-Zehnder modulator for very high linearity and very wide electro-optical bandwidth.

• 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 whatever the environmental conditions. The bias control circuit is based on dither tone. 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)

• Two lasers sources, a 852 nm DBR & 940 nm FP-FBG lasers. For ease of use, an external patch cord is delivered to connect the laser output to the modulator input optical port. 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.

INPUT ELECTRICAL SPECIFICATIONS

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input electrical termination	-	AC coupled		Single ended		
Signal type	-	-		Analog, sine		
Input voltage [1]	V_{IN}	Amplitude modulation	-	100	-	mVpp
Bandwidth	BW	-	-	40	-	GHz
Impedance matching	Z_{IN-RF}	-	-	50		Ω

(1): The ModBox-VNA-850m-940nm-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.

INPUT OPTICAL SPECIFICATIONS

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Operating wavelength	–	CW	850	-	950	nm
Polarization	Pol	-		Maintain and linear		
Optical power	-	CW	7	-	16	dBm

OUTPUT OPTICAL SPECIFICATIONS

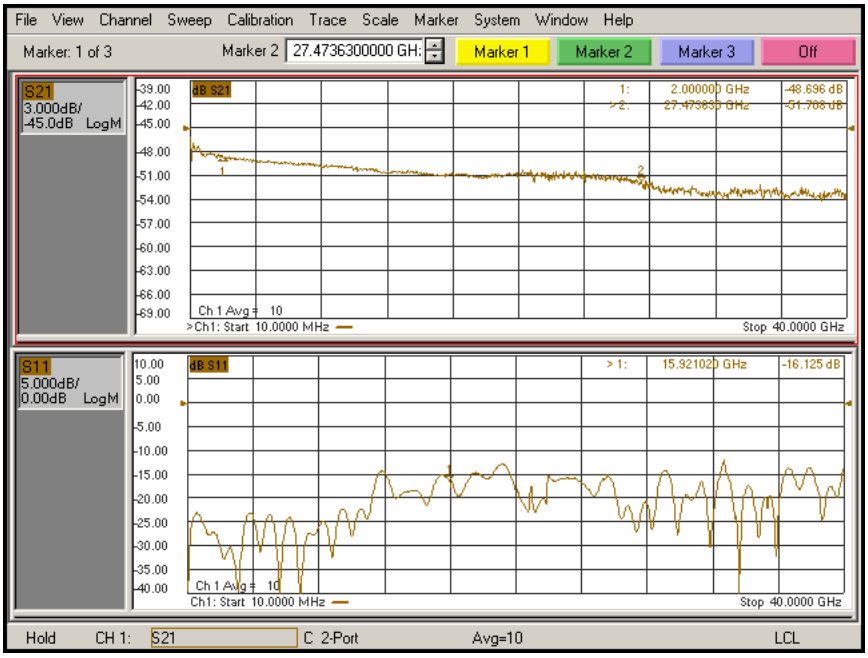
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Modulation frequency	-	-	-	40	-	GHz
Wavelength	λ	Embedded by default	852 nm & 940 nm			
Wavelength laser tuning range - 850 nm	Δλ	Diode chip temperature control	-	0.8	-	nm
Wavelength laser tuning range - 940 nm	Δλ	Diode chip temperature control	-	0	-	nm
Modulated output power	OP_{OUT}	-	5	6	-	dBm
Optical output power adjustment	ΔOP_{OUT}	By the use of VOA	-40	-	6	dBm
Optical output power stability	δOP_{OUT}	Over 8 hours	-	-	1	%rms
Side mode suppression ratio	SMSR	-	40	45	-	dB
Spectrum linewidth - 850 nm	δλ	FWHM	-	3	15	MHz
Spectrum linewidth - 940 nm	δλ	FWHM	-	30000	35000	MHz
Relative intensity noise - 850 nm	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

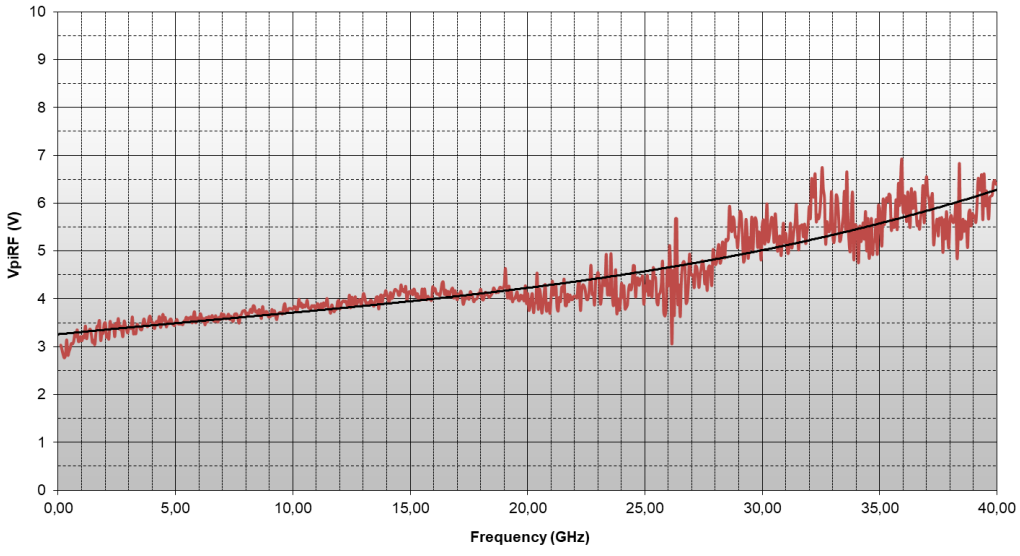
Parameter	Symbol	Min	Max	Unit
RF input power	EP_{in}	-	28	dBm

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Modulator [S] parameters



Modulator Vp versus frequency @850 nm



INTERFACES, DIMENSIONS AND COMPLIANCE

Interfaces

Optical connectors and fibers	FC/APC - Polarization maintaining fiber, Corning PM 85-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 laser product 



ORDERING INFORMATION

Modbox-VNA-850nm-940nm-40GHz

VNA = Optical Vectorial Network Analyser extension

850 nm, 940nm = embeds laser 852 nm & 944 nm

40 GHz = Analog Modulation up to 40 GHz and beyond

FA = Optical connectors, FA: FC/APC

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