

ModBox-VNA-CBand series
CBand, 40 GHz, 65 GHz Modulation Unit

MODBox



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 LiNbO₃ modulator with an automatic bias control circuit.

FEATURES

- Analog modulation up to 40GHz, 65 GHz
- Dither-free bias controller
- Low RIN
- High harmonics suppression

APPLICATIONS

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

OPTIONS

- 850 nm, L, O bands operation
- Multi-Channel

Performance Highlights

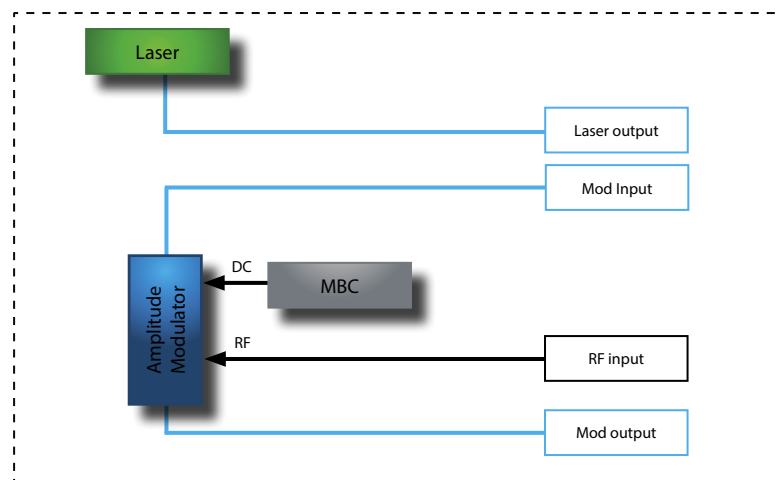
| Parameter | Min | Typ | Max |
|------------------------|--------------------|---------|----------------|
| Operating wavelength | 1530 nm | 1550 nm | 1560 nm |
| Modulation format | Analog Modulations | | |
| Modulation bandwidth | - | - | 40 GHz, 65 GHz |
| Modulated output power | 5 mW | 8 mW | - |

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Functional Block Diagram



The ModBox-VNA-CBand features:

- A chirp-free X-cut LiNbO₃ (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 LiNbO₃ 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. 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.

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.

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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 ⁽¹⁾ | V _{IN} | Amplitude Modulation | 0.4 | 0.6 | 1 | V _{pp} |
| Impedance matching | Z _{IN-RF} | - | - | 50 | - | Ω |

(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.

DFB Laser Specifications

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|-------------------------------|--------|------------------------------|-----------------------|-----|------|-------|
| Wavelength | λ | Other ITU-Channel on request | 1550.12 nm- ITU CH 34 | | | |
| Laser type | - | - | DFB | | | - |
| Spectrum linewidth | Δλ | FWHM | - | 1 | - | MHz |
| Side mode suppression ratio | SMSR | - | 40 | 55 | - | dB |
| Wavelength laser tuning range | - | GUI | - | 0.8 | 1 | nm |
| RIN | RIN | - | - | - | -145 | dB/Hz |

Output Specifications

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|-------------------------|--------|-------------------------|-----|-----|-----|------|
| Modulation bandwidth | - | ModBox-VNA-CBand-40GHz | - | 35 | 40 | GHz |
| | - | ModBox-VNA-CBand-65GHz | - | 60 | 65 | GHz |
| Modulated output power | - | With internal DFB laser | 5 | 8 | - | mW |
| Optical return loss | ORL | - | -45 | -50 | - | dB |
| Electrical return loss | ERL | - | - | -12 | -10 | dB |
| Static extinction ratio | ER | - | 20 | 25 | - | dB |

Optional C-Band Tunable Laser Specifications

| Parameter | Symbol | Condition | Min | Typ | Max | Unit |
|-----------------------------|-----------------|---------------------------------|---------|-----|-------------|-------|
| Optical wavelength range | λ_C-band | Smart & GUI | 1527.60 | - | 1565.50 | nm |
| Spectrum linewidth | Δλ | FWHM @-3 dB, instantaneous | - | - | 100 | kHz |
| Optical output power | P _{cw} | Smart & GUI | 5 | - | 35 | mW |
| Side Mode Suppression Ratio | SMSR | - | 40 | 55 | - | dB |
| RIN | RIN | For 7 dBm (13 dBm) output power | - | - | -140 (-145) | dB/Hz |

Absolute Maximum Ratings

| Parameter | Symbol | Min | Max | Unit |
|---------------------|------------------|-----|-----|------|
| RF input power | EP _{in} | - | 28 | dBm |
| Optical input power | OP _{in} | - | 20 | dBm |

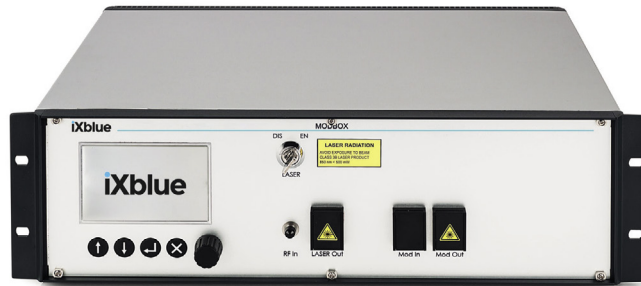
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Front Panel

| Parameter | |
|--------------------|--|
| Power | Powers the system and lits green when the switch is set on |
| LCD | Displays ModBox current status and allows the user to edit parameter in the ModBox menus |
| Keypad | Allows one to browse through the smart interface menus and edit the system's parameters |
| System rotary knob | Allows browsing and editing through the ModBox menus |
| Mod In / Mod Out | Amplitude modulation input and output optical ports |
| RF input | Single 1.85 mm RF connector |
| Laser Out | Laser output optical port |



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 65 GHz up to 65 GHz
 YY = Output connectors, FA : FC/APC - FC : FC/UPC - SC : SC/UPC

Opt-TunC-YY

Tunable laser option:
 YY = Input / Output connectors - FA : FC/APC - FC : FC/UPC - SC : SC/UPC

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.

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