

## ModBox-AN-Cband-40GHz

C-Band, 40GHz Analog Modulation Unit

ModBox



The ModBox-AN-Cband-40GHz is an optical transmitter dedicated to analog transmission up to 40 GHz.

The ModBox-AN-Cband-40GHz features an optional internal laser source. The unit is optimized to generate a high performance and high stability optical analog signal from its internal laser source and a user supplied RF modulation signal.

### FEATURES

- Analog modulation up to 40 GHz
- dither-free bias controller
- Low RIN
- High harmonics suppression

### APPLICATIONS

- Transmission system test
- Components characterization
- Radio Over Fiber
- R&D laboratories

### OPTIONS

- Receiver
- C, L, O bands operation
- Multi-Channel
- DFB and tunable lasers

### Performance Highlights

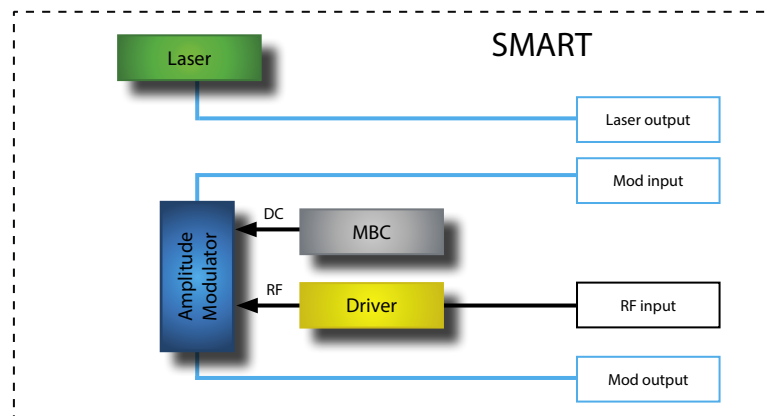
Parameter	Min	Typ	Max
Operating wavelength	C band		
Modulation format	Amplitude Analog Modulation		
Frequency	100 M	-	40 G
Insertion loss (Analog modulation)	-	4 dB	5 dB

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### Functional Block Diagram



### The ModBox-AN-Cband-40GHz features:

- a C-band, 100 mW optical source including a low RIN DFB laser, its low noise current driver and temperature controller. A laser output port is available on the front panel of the unit. An optical PM patchcord is supplied.
- a modulation stage optimized for analog modulation. This stage is built around a high bandwidth, chirp-free, analog intensity modulator and a high bandwidth linear RF amplifier. The modulator is characterized by its high harmonic suppression and flat bandwidth curve, the amplifier by flat group delay and gain curves with reduced ripple all over the bandwidth. A dither-free automatic bias controller allows to lock the modulator operating point in quadrature so as to operate it in the linear part of its transfer function and to guarantee highly stable performance.

The ModBox-AN-Cband-40GHz 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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The ModBox integrates a laser. The ModBox Smart Interface allows the user to control laser power and wavelength.

### C-Band DFB Laser Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Wavelength	$\lambda$	By default	1550.12 nm - ITU CH 34 *			
Laser type	-	-	DFB			
Optical output power	-	CW	-	-	100	mW
Spectrum linewidth	$\Delta\lambda$	FWHM	-	-	1	MHz
Optical return loss	ORL	-	30	35	-	dB
Side mode suppression ratio	SMSR	-	30	-	-	dB
Optical output power adjustment	PCW	Smart	0	-	100	mW
Wavelength laser tuning range	-	Smart	-	0.8	1	nm

\* Other ITU-Channel on request.

### Input Optical Specifications User supplied, not a ModBox specification

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Modulators (Amplitude, Phase) Data Input Specifications						
Source type	-	CW	DFB, tunable laser			
Wavelength	$\lambda$	C, L bands	1527	1550	1608	nm
Input power	$P_{CW}$	CW	1	-	100	mW
Polarization	P	-	Linear and controlled			

### Input Electrical Specifications User supplied, not a ModBox specification

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Input electrical termination	-	AC coupled	Single ended			
Frequency and signal type	F	Amplitude Modulation - Analog	100 M	-	40 G	Hz
Input signal amplitude	$V_{IN}$	Amplitude Modulation	-	200	250	mVpp
Impedance matching	$Z_{IN-RF}$	-	-	50	-	$\Omega$

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#### Output Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Analog Modulation						
Modulation bandwidth	-	-	100 M	-	40 G	Hz
Insertion loss	IL	At maximum transmission	-	4	5	dB
Chirp	$\alpha$	-	-0.1	0	0.1	-
Optical return loss	ORL	-	-45	-50	-	dB
Electrical return loss	ERL	-	-	-12	-10	dB
Static extinction ratio	ER	@1550nm	20	25	-	dB
Input third order intercept	IIP3	Electrical	-	-1	-	dBm
2 <sup>nd</sup> harmonic suppression ratio	$H_1-H_2$	By design	-	-60	-	dB
RF gain adjustment	DG	Smart	-	3	-	dB
Bias Control	MBC	Smart	Dither-less - Automatic / Manual			

#### Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Symbol	Min	Max	Unit
RF input power	$EP_{in}$	-	4	dBm
Optical input power	$OP_{in}$	-	20	dBm

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### Optional C-Band DFB Laser Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Wavelength	$\lambda$	Other wavelength on request	1550.12 nm - ITU CH 34 *			-
Laser type	-	-	DFB			-
Optical output power	-	CW	-	40*	-	mW
Spectrum linewidth	$\Delta\lambda$	FWHM	-	-	1	MHz
Optical return loss	ORL	-	30	35	-	dB
Side mode suppression ratio	SMSR	-	30	-	-	dB
Optical output power adjustment	PCW	Front & back panels with GUI	20	-	40	mW
Wavelength laser tuning range	-	Back panel with GUI	-	0.8	1	nm

\* Other ITU-Channel and power laser up to 100 mW on request.

### Optional C-Band & L-Band Tunable Laser Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Optical wavelength range	L_C-band	C-band version	1527.60	-	1565.50	nm
Optical wavelength range	L_L-band	L-band version	1570.01	-	1608.76	nm
Optical output power	PCW	CW	5	-	35	mW
Frequency fine tune resolution	FTF	-	-	1	-	MHz
Optical output power accuracy	PCW-acc	-	-1	-	1	dB
Wavelength accuracy	DLacc	-	-1.5	-	1.5	GHz
Spectrum linewidth	DI	FWHM @-3 dB, instantaneous	-	-	100	kHz
Side Mode Suppression Ratio	SMSR	-	40	55	-	dB
RIN	RIN7	For 7 dBm output power	-	-	-140	dB/Hz
	RIN13	For 13 dBm output power	-	-	-145	
Optical output power adjustment	DPCW	Back panel with GUI	5	-	35	mW

### Optional Photodetector Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Photodetector type	-	-	APD			-
Operating wavelength range	$\lambda$	-	1480	-	1620	nm
Operating optical input range	Popt	-	-20	-	13	dBm
3dB cut-off frequency	$F_{3dB}$	-	33	40	-	GHz
Optical return loss	ORL	-	27	-	-	dB
Photodiode DC responsivity	R	Optimum polarisation	0.5	0.65	-	A/W
Maximum optical input power	Popt	Average	-	-	16	dBm
Maximum output peak voltage	VPeak	-	-	-	1.5	V

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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
Analog Modulation - Mod In / Mod Out	Amplitude modulation input and output optical ports - FC/APC fiber connector
Analog Modulation - RF input	Single 1.85 mm RF connector
Laser Out	Laser output optical port - FC/APC fiber connector

There are monitoring LEDs on the front panel upper right corner: Analog modulation drivers, MBC, Laser green LEDs monitor operation.



Analog ModBox with optional receiver - Front panel.

### Ordering information

#### ModBox-AN-Cband-40GHz

AN = ANalog modulation unit type up to 40 GHz  
 Cband = Full C-Band operation and CH34 laser embedded  
 Opt PD = Optional receiver  
 FA = FC/APC (slow axis parallel to the key)

### 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.

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