ModBox-CBand-12.5Gb/s-NRZ-RZ50-DPSK

C-Band, NRZ, RZ50 & DPSK 12.5 Gb/s Optical Reference Transmitter
QU_2110_40408 - Northrop Grumman Corporation

ModBox

The ModBox-CBand-12.5Gb/s-NRZ-RZ50-DPSK is an Optical Reference Transmitter that generates excellent quality optical data streams up to 12.5 Gb/s in the C & L Bands. The equipment incorporates two $LiNbO_3$ modulators (a pulse carver combined with a data modulator) coupled with a CW laser, two high performance RF drivers, and a set of automatic modulator bias controllers circuitry (MBC).

The ModBox-CBand-12.5Gb/s-NRZ-RZ50 generates up to 12.5 Gb/s NRZ, RZ50 and NRZ-DPSK, RZ50-DPSK optical data streams from a 1.5 GHz to 12.5 GHz customer supplied clock signal and up to 12.5 Gb/s NRZ data stream properly pre-encoded. For NRZ duo binary generation, the carver modulator is just bypassed and only the RF NRZ pre-encoded signal is necessary.

The ModBox-CBand-12.5Gb/s-NRZ-RZ50-DPSK transmitter is a stand-alone and fully optimized instrument. For each modulation format the RF driver gain and the $LiNbO_3$ bias point are factory pre-set and recorded in the internal memory of the instrument. For optimal performance, a premium CW laser is embedded to ensure a high quality optical modulated signal (high and stable optical power, with low jitter, high SNR, fast rise and fall times, eye diagram).

The Optical Reference Transmitter ModBox addresses the Telecommunication and network equipment markets. It is the ideal optical transmitter for high-speed test solutions that are robust, reliable and compliant with IEEE standard.

The Optical Reference Transmitter ModBox is a very helpful tool for the development and characterization of the next-generation telecommunication components for Datacom, Long-Haul and other optical interfaces. Indeed, the ModBox can be used as a golden Optical Transmitter or as a tool to simulate network impairments in applications such a TIA and receiver testing in R&D or automated testing environments, network components and devices characterization.

FEATURES

- C & L golden optical transmitter
- Up to 12.5 Gb/s
- Modulation schemes preset
- Reliable & reproducible measurements
- High eye diagram stability

APPLICATIONS

- Transmission system test
- Components characterization
- Production test
- R&D laboratories

OPTIONS

- Tunable L-Band
- Receiver

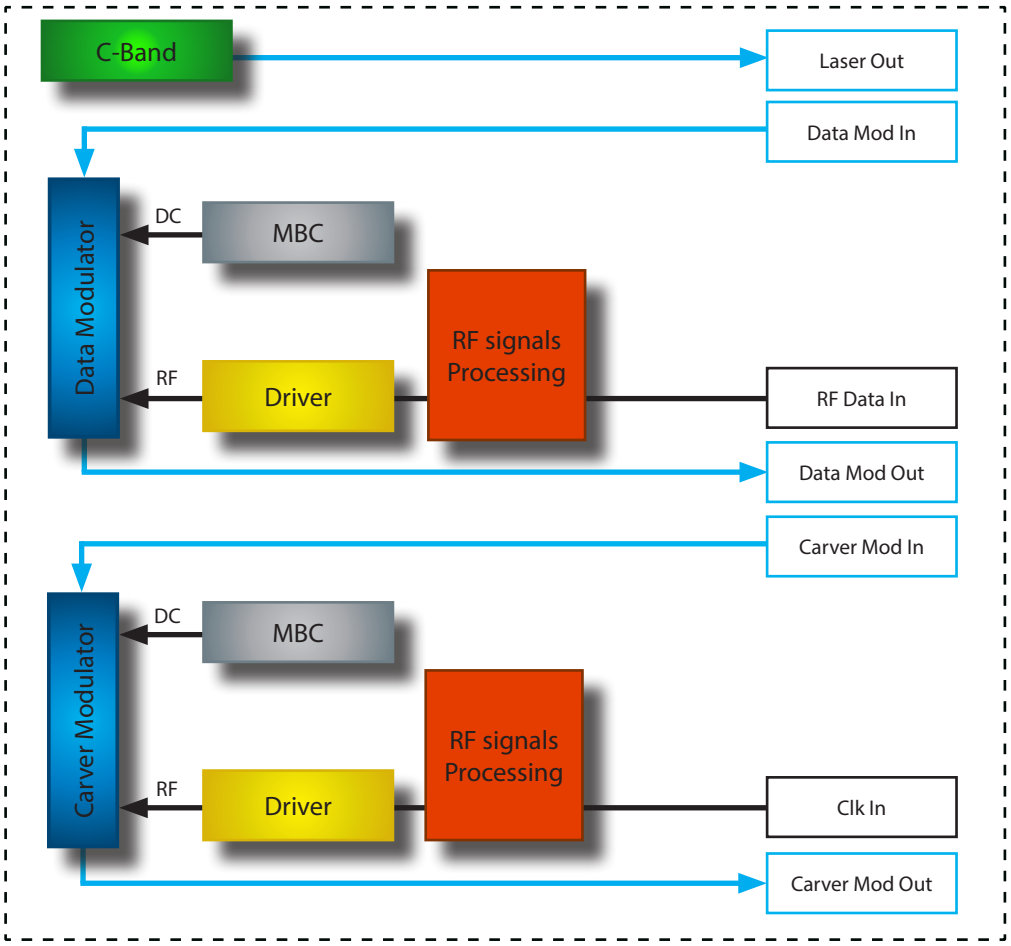
Performance Highlights

Parameter	Min	Typ	Max
Operating wavelength		C & L Bands	
Modulation format		NRZ, RZ50, NRZ-DPSK, RZ50-DPSK	
		Up to 12.5 Gb/s	

Ordering Information:

XSoptix
800 Village Walk #316
Guilford, CT 06437
Ph: 203-401-8093
Email orders to: sales@xsoptix.com
Fax orders to: 800-878-7282

Functional Block Diagram



The ModBox-CBand-12.5Gb/s-NRZ-RZ50-DPSK features:

- A narrow line-width tunable laser with low RIN is integrated by default and covers the full C-Band. For convenience, an external patch cord is delivered to connect the laser output to the optical input of the modulation stage. Wavelength and power are tunable through the front panel controls or the ModBox software interface.
- A Carver Modulation Stage optimized for analog modulation. This stage relies on a high bandwidth, chirp free, analog intensity modulator and a high bandwidth linear RF amplifier. The modulator is characterized by its high harmonic suppresssion and flat bandwidth curve. The RF amplifier features flat group delay and gain curves with reduced ripple all over the bandwith. An automatic bias controller allows to lock the modultor operating point in quadrature or the Null point of its transfer function and ensures highly stable performance.
- A Data Modulation Stage optimized for digital modulation. A chirp-free X-cut $LiNb0_3$ (Lithium Niobate) Mach-Zehnder Intensity Data Modulator is selected for its wide electro-optic bandwidth and flat, low ripple, electro-optic response curve. The EOM is connected to a high bandwidth limiting RF driver with gain and crossing levels adjustment for eye diagram optimization. A modulator bias controller is provided to lock the operating point and ensures a highly stable optical output signal to provide reliable and reproducible measurements.
- An encoder.

Input Specifications

User supplied, not a ModBox specification

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electrical Specifications - Data Modulation Stage						
Data-rate	PRBS	-	1.5	-	12.5	Gb/s
Signal type	PRBS	-	NRZ or pre-coded electrical data signal			-
Input voltage	V_{IN}	AC coupled - 50 Ω - Single ended	-	0.400	-	Vpp
Electrical Specifications - Carver Modulation Stage						
Frequency	F	-	1.5	-	12.5	GHz
Signal type	PRBS	-	Sinusoidal			-
Input voltage	V_{IN}	AC coupled - 50 Ω - Single ended	0.700	-	-	Vpp
Optical Specifications						
Laser mode	-	C & L Bands	CW			-
Polarization	Pol	-	Linear and controlled			-
Power	P_{IN}	-	13	-	20	dBm

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
Clock/RF electrical signal	-	-	5	dBm
Optical inputs power	OP_{in}	-	20	dBm

C-Band Tunable Laser Specifications

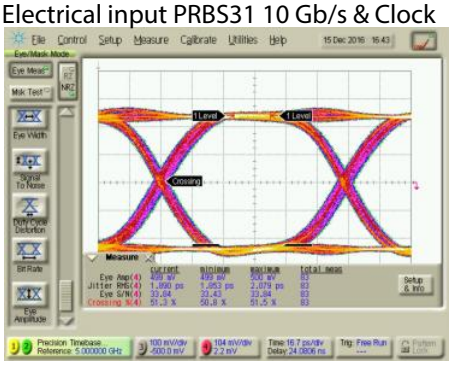
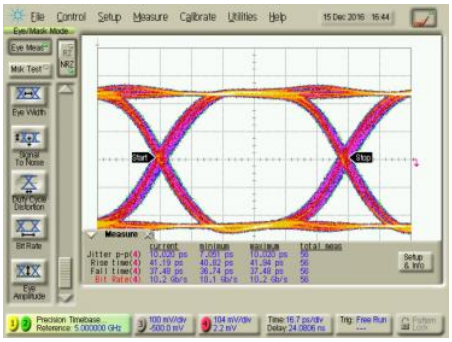
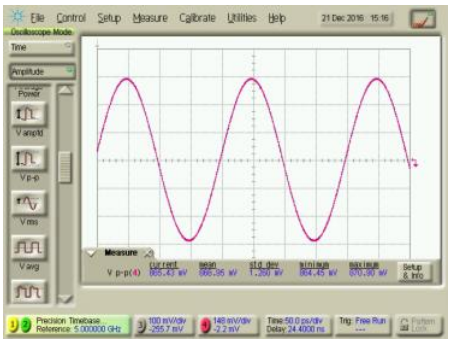
The laser is embedded by default.

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Laser type	-	-	Tunable			-
Wavelength	λ	Embedded by default	1527.60	-	1565.50	nm
Wavelength accuracy	$\Delta\lambda_{acc}$	-	-1.5	-	1.5	GHz
Spectrum linewidth	Δλ	FWHM @-3 dB, instantaneous	-	-	100	kHz
Optical output power	-	CW	7	-	15	dBm
Optical output power adjustment	-	-	0	-	100	%
Optical Return Loss	ORL	-	30	-	-	dB
Side Mode Suppression Ratio	SMSR	-	40	-	-	dB

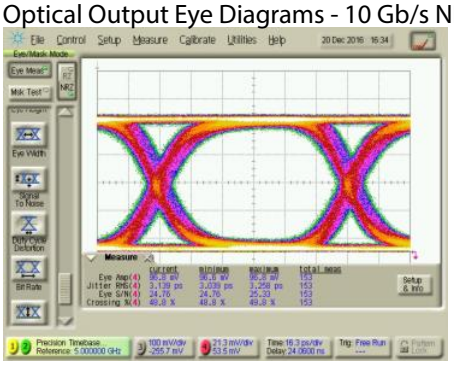
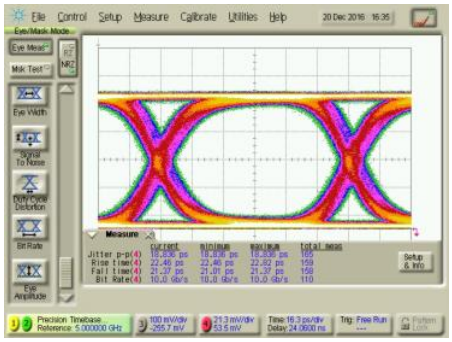
Output Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Output data-rate	-	NRZ, RZ50, NRZ-DPSK, RZ50-DPSK	1.5	-	12.5	Gb/s
		Optimised value	-	2.66	-	Gb/s
Average optical output power (With embedded tunable laser)	P_{OUT}	NRZ, RZ50	-	3	-	dBm
		NRZ-DPSK, RZ50-DPSK	-	7	-	dBm
Optical insertion loss	IL	NRZ, RZ50	-	5	-	dB
		NRZ-DPSK, RZ50-DPSK	-	10	-	dB
Static Extinction Ratio	SER	-	20	-	-	dB
Dynamic Extinction Ratio	ER	NRZ	-	12	-	dB
		RZ50	-	TBD	-	dB
Dynamic Signal to Noise Ratio	SNR	NRZ	-	20	-	dB
		RZ50	-	TBD	-	dB
Added RMS Jitter	J_{RMS}	NRZ	-	1.2	-	ps
		RZ50	-	1.2	-	ps
Optical Return Loss	ORL	-	30	-	-	dB
Electrical Return Loss	ERL	-	-	-10	-	dB

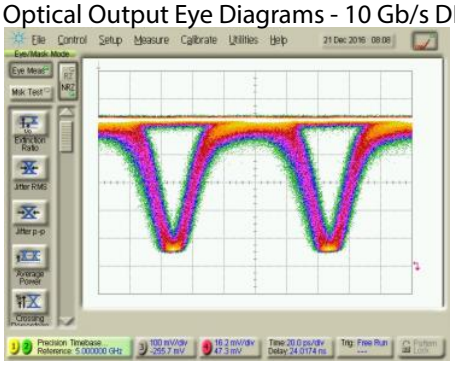
Electrical input PRBS31 10 Gb/s & Clock

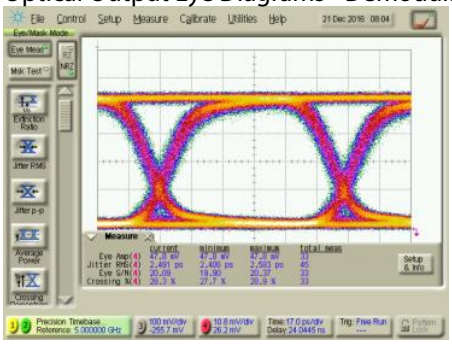
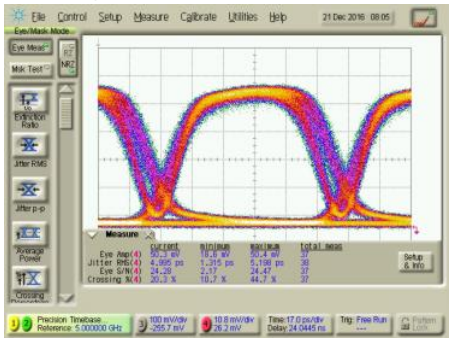
Optical Output Eye Diagrams - 10 Gb/s NRZ

Optical Output Eye Diagrams - 10 Gb/s DPSK

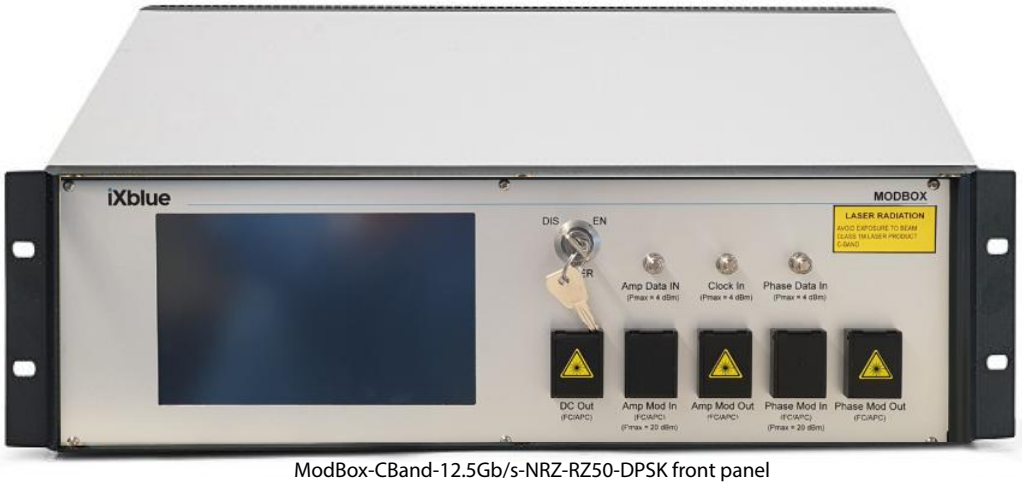


Optical Output Eye Diagrams - Demodulated 10 Gb/s DPSK

Interfaces, Dimensions and Compliance

Interfaces	
Optical Laser Out, Modulator Input & Output	Polarization maintaining fiber PM1550 - FC/APC
Data, Clock input & Output	AC coupled - 50 Ω - Single ended SMA female RF connector
Control	Touch screen interface, GUI (Ethernet)
Power supply	100-120V/220-240 automatic switch 50-60Hz (Rear panel)
EMC and optical norms	EN61326-1 Ed. 2006 / NF EN 60825-1 & EN 60825-2 Ed.2014
Dimensions / Weight	Rack 19" x 3U, Depth=375mm / 3 kg



ModBox-CBand-12.5Gb/s-NRZ-RZ50-DPSK front panel

ModBox-CBand-12.5Gb/s-NRZ-RZ50-DPSK - QU_2110_40408 - Northrop

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 ($LiNbO_3$) 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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