ModBox-CBC-1064 nm-CH

Modbox 1064 nm 4 or 8 Channels with phase modulation control

MODBOX

The ModBox-CBC-1064nm is a proven and robust multi-channels phase modulation solution for multibeam coherent combination.
The ModBox operates at 1064 nm and is composed of 4 or 8 parallel and independent channels for adjusting the phase of each to match the others. Each channel allows an adjustment of the temporal phase for synchronization of all beams. The design integrates iXblue proprietary low frequency phase modulator combined with its matching RF electronic and associated with a selected for high accuracy and for wide delay range tunable optical delay line.
Specific effort is done for ModBox product: the iXblue electro-optical modulators are screened from our regular production to ensure very low insertion loss, high polarization extinction ratio, low Residual Amplitude Modulation, and high phase modulation stability. Additionally, iXblue phase modulator is well known to be the best planar phase modulator in the NIR featuring the highest optical input power handling capability.
The component selection makes the ModBox-CBC-1064nm an accurate, adjustable, and reliable phase-lock modulation solution for Coherent Beam Combining technique.

The ModBox-CBC-1064nm can be associated with the Spectral Broadening unit ModBox-SB-1064nm based on high frequency phase modulation in order to counter the SBS effects caused by the amplification of a narrow linewidth laser source.

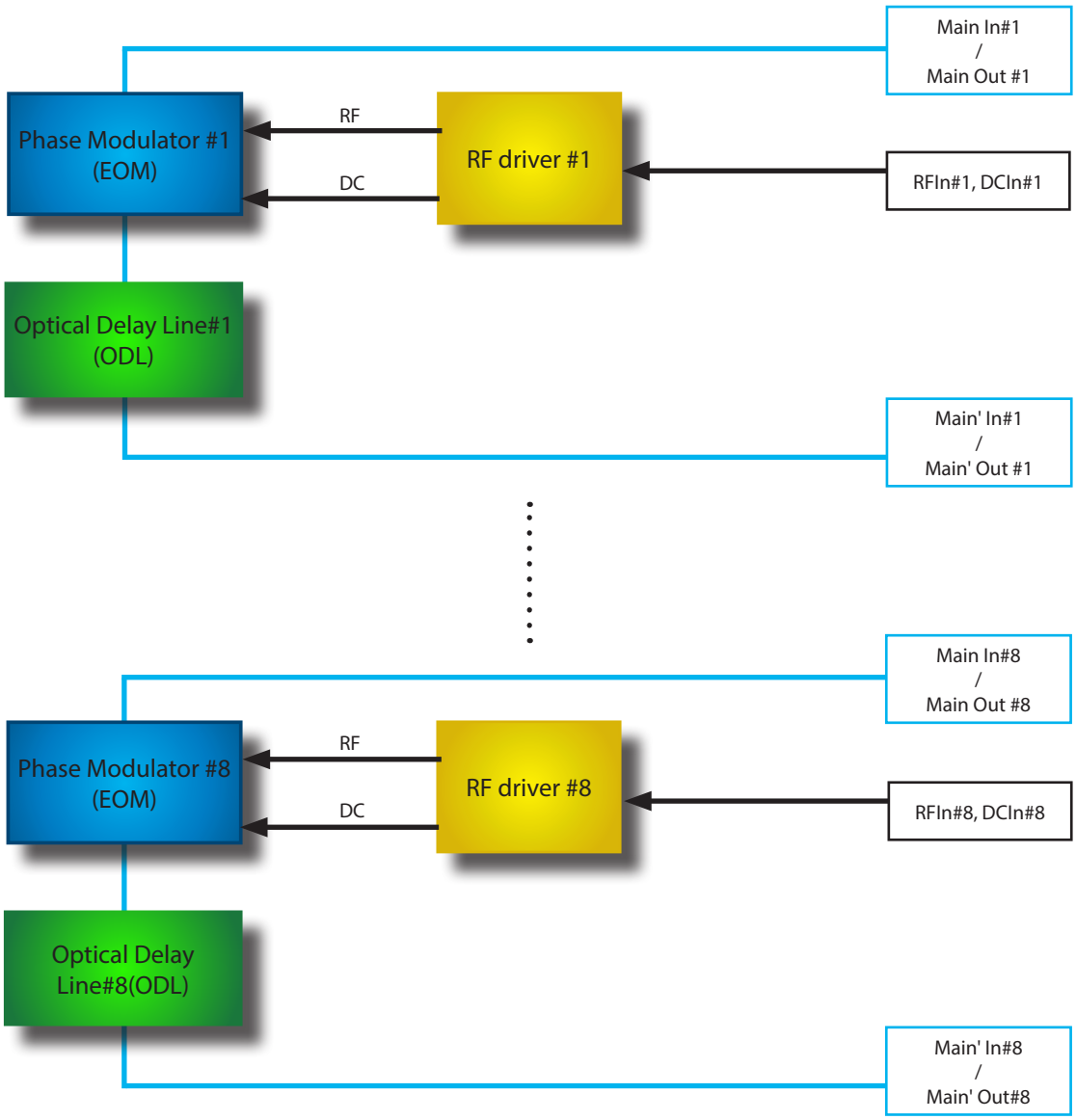
FEATURES

- Proven and reliable solution
- Adjustable delay range and temporal phase modulation per channel
- Scalable number of channels
- Adjustable Residual Amplitude Modulation
- Lower Insertion Loss
- Higher PER

Performance Highlights

Parameter	Typical
Operating wavelength	1064 nm
Insertion loss	< 5 dB
Polarisation extinction ratio	> 25 dB
Adjustable delay range	600 ps
RAM	Adjustable

Functional Block Diagram



The ModBox-CBC-1064nm-xCH is an independant 4 or 8 channels, each integrates:

- an high speed temporal phase modulator,
- a modulator matching RF amplifier,
- a tunable and remotly controllable optical delay line.

The ModBox is a reciprocal modulation unit: each main input (respectively output) can be seen as an output (respectively input) without any alterations to the specification.

Input Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electrical Input Specifications						
Input RF voltage	V_{RF_IN}	50 Ω	-	110	-	mVpp
Input RF frequency	F_{RF_IN}	50 Ω	-	-	200	MHz
Input DC voltage	V_{DC_IN}	50 Ω	-	±250	-	mV

Output Specifications (1)

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Operating wavelength	λ	-	950	1064	1150	nm
Maximum insertion loss	IL	Including ΔIL_{ODL} / Per channel	-	4	5	dB
Insertion loss uniformity	ΔIL_{ODL}	Loss variation over delay range	-	0.6	-	dB
Insertion loss inter-channels	ΔIL	-	-	0.8	1	dB
Polarisation extinction ratio	PER	Optimized for 1064 nm	25	30	-	dB
Temporal modulation	BW	From EOM	-	-	200	MHz
Adjustable delay range	DR	ODL, remotely controllable	-	600	-	ps
Inter-channel delay range	ΔDR	-	0	-	150	ps
Delay resolution	DRes	-	-	1	-	fs
Optical return loss	ORL	-	-40	-45	-	dB
RF driver gain	G	DC & RF	25 (2)	26 (2)	-	dB
Modulation rise & fall times	Rt / Ft	20 % - 80 %	8	-	-	ns

(1): The proposed system/components will properly work either with a kHz linewidth laser as well as with a 27 GHz one.
(2): The driver's gain will be not affected by the temperature when it ranges 25 °C ± 10 °C.

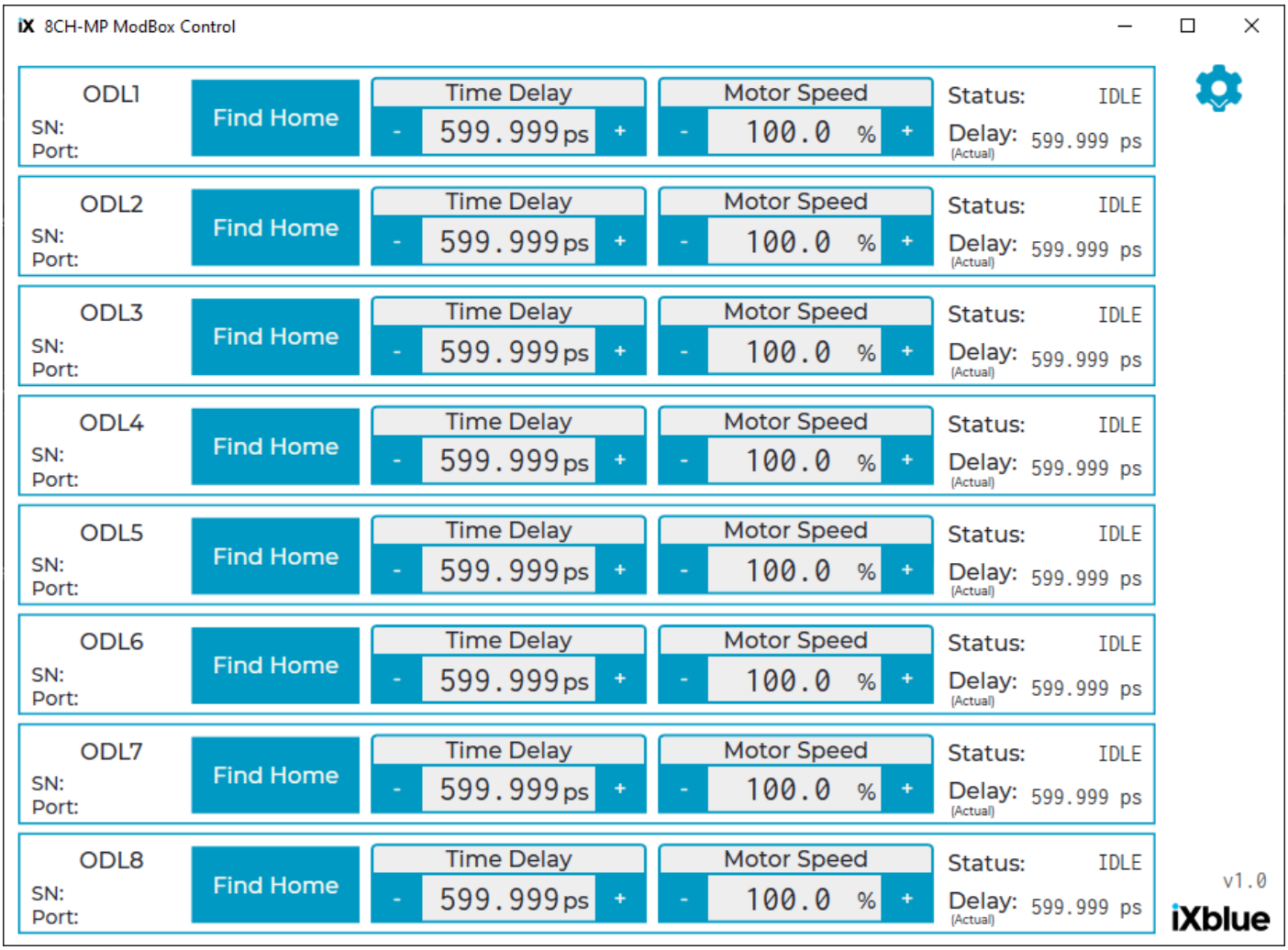
Absolute Maximum Ratings

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 voltage	EV_{in}	-	-	10	Vpp
DC input voltage	DCV_{IN}	-	-	±1	V
Optical input power	OP_{in}	To the EOM input port (Main In)	-	25	dBm
		To the ODL input port (Main' In)	-	27	dBm
Operating temperature	OT		0	+55	°C

Software interface

The ModBox-CBC is coming with a Graphical User Interface (GUI) allowing the controls of the Optical Delay Lines delays. Each channel can be adjusted individually.



Panels

Parameter	Condition	Min	Typ	Max	Unit
Rear Panel					
Remote port	-		USB		
Front panel					
Optical ports	"Main in #N" (1)		Narrow key FC/APC, free space divergence		
	"Main Out #N" (1)		Narrow key FC/APC, free space divergence, cable gand, 2 meters fiber length		
MFD (Mode Field Diameter)	"Main in #N" / "Main Out #N" (1)		6.5 ±0.5 µm		
Fiber core-diameter	"Main in #N" / "Main Out #N" (1)		5,6 µm		
Numerical aperture	"Main in #N" / "Main Out #N" (1)		0.12 @1060 nm		
Optical fiber	"Main in #N" / "Main Out #N" (1)		Polarization maintaining fiber, Corning PM 98-U25A		
RF & DC input port	"RFin#N, DCInN" (1)		BNC		

With N = 1, ..., 8

Compliance and safety

Parameter	Condition	Min	Typ	Max	Unit
Compliance	-		BS EN 60825 - CE certified		

Dimensions

Parameter		
Size	19 inches 2U	
Weight	ModBox-CBC-1064 nm-4CH: 8 kG	ModBox-CBC-1064 nm-8CH: 8 kG
Power supply	100 - 120 V / 220 - 240 V automatic switch, 50 - 60 Hz	

Ordering information

ModBox-CBC-1064nm-xCH

xCH = Number of parallel channels: 4CH 4 channels or 8CH: 8 channels

About us

iXblue Photonics includes iXblue iXFiber brand that produces specialty optical fibers and Bragg gratings based fiber optics components and iXblue Photline brand that 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.

3, rue Sophie Germain
25 000 Besançon - FRANCE
Tel. : +33 (0)1 30 08 87 43

ModBox-CBC-1064 nm 04-2021_ED0