ModBox

ModBox-CBC-1064nm

ModBox 1064 nm 8 channels with phase modulation control

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 8 parallel and independent channels.
Each channel allows an adjustment of the temporal phase for synchronization of all beams.
The design integrates Exail proprietary low frequency phase modulator combined with its matching RF electronic and wide delay range tunable optical delay line.
Specific effort is done for ModBox product: the Exail electro-optical modulators are screened from our regular production to ensure very low insertion loss,
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

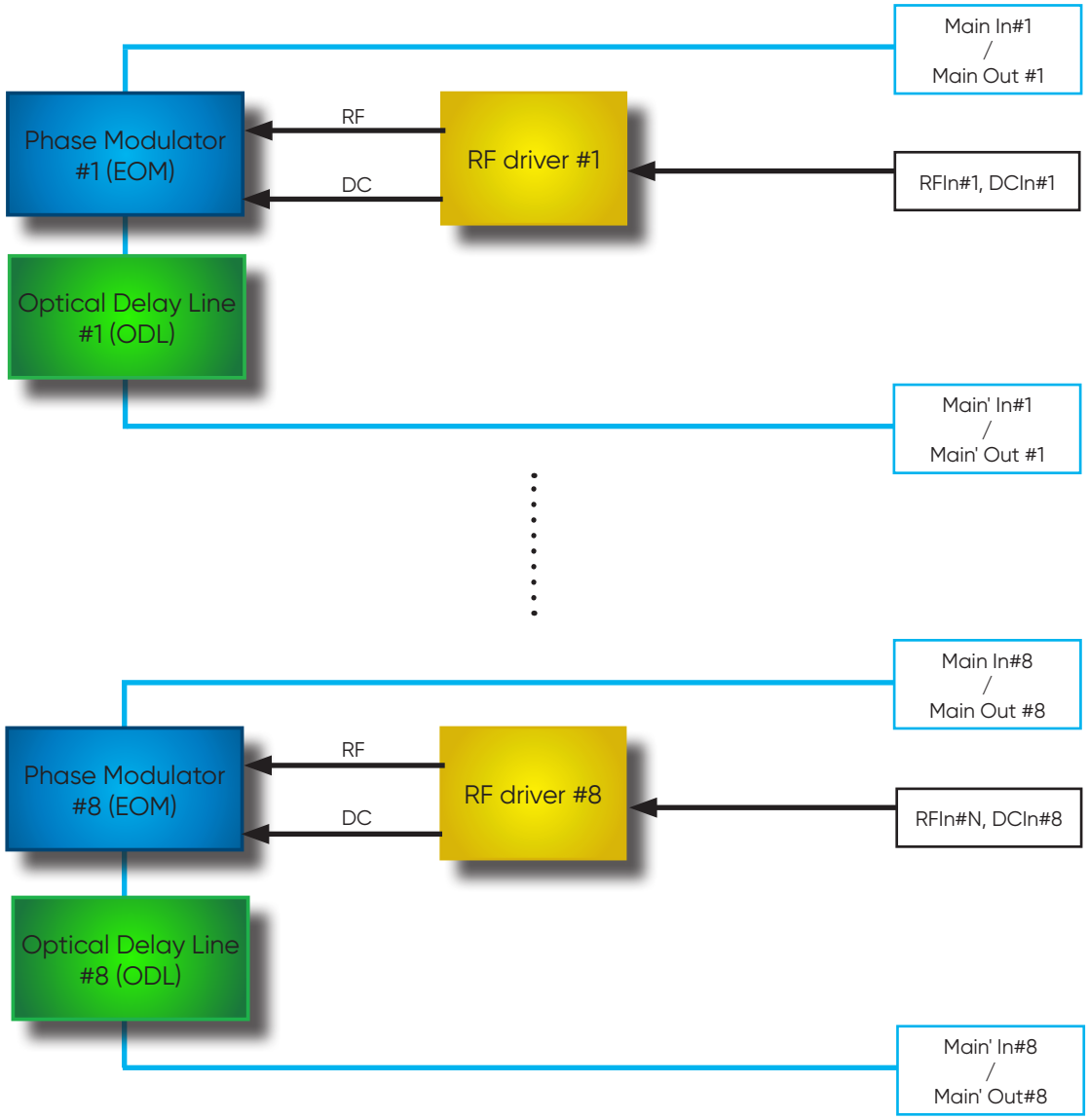
- Proven and reliable solution
- Adjustable delay range and temporal phase modulation per channel
- Scalable number of channels
- Adjustable Residual Amplitude Modulation
- Low insertion loss

PERFORMANCE HIGHLIGHTS

Operating wavelength	1064 nm
Insertion loss	< 5 dB
Polarisation extinction ratio	> 20 dB
Adjustable delay range	600 ps
RAM	Adustable
Number of channels	8

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FUNCTIONAL BLOCK DIAGRAM



The ModBox-CBC-1064nm is an independant 8 channels, each channel integrates:
- a high speed phase modulator
- a modulator matching RF amplifier
- a tunable and remotely 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.

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INPUT SPECIFICATIONS

Parameter	Symbol	Condition	Min	Typ	Max	Unit
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
Modulator V_{π}	V_{π}	50 Ω, 50 kHz	-	1.5	-	V

OUTPUT SPECIFICATIONS

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
Polarization extension ratio	PER	-	20	-	-	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	2	fs
Optical return loss	ORL	-	-40	-45	-	dB
RF driver gain	G	DC & RF	25 (1)	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

Parameter	Symbol	Condition	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

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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.



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PANELS

Parameter	Condition	
		Rear panel
Remote port	-	USB
		Front panel
Optical ports	«Main in #N» [1]	Narrow key FC/APC, free space divergence, cable gland, 2m fiber length
	«Main out #N» [1]	Narrow key FC/APC, free space divergence, cable gland, 2m 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 PM98-U25A
RF & DC input port	«RFin#N, DCInN»	BNC

[1] *With N = 1,...., 8*

ENVIRONMENT

Parameter	Condition	Min	Typ	Max	Unit
Operating / storage Temp	-	+20 / -10	-	+25 / +30	°C
Operating / storage humidity	-	30 to 60 / 30 to 80			%

COMPLIANCE AND SAFETY

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

DIMENSIONS

Parameter	
Size	19 inches 2U
Weight	12 kg
Power supply	100 V - 120 V / 220 V - 240 V automatic switch, 50 Hz - 60 Hz

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