ModBox-FE-NIR

Near-Infra Red Front-End Laser Source

PHOTLINE MODBOX

The Photline ModBox-FE is a complete front end laser system designed to be used as a seed source in high energy density laser facilities. The system is available at 1030 nm, 1053 nm and 1064 nm , it allows to generate 125 ps to 10 ns, custom shapped optical pulses with high stability and high extinction ratio. The short pulse generation is based on the combination of a high performance continuous laser souce combined with a large bandwidth modulation stage based on a high extinction ratio external $LiNbO_3$ modulator.

An automatic bias control circuitry (MBC) guarantees the extinction ratio stability over time and the optical pulses are carved out thanks to a high resolution Arbitrary Waveform Generator. A multi year collaboration experience with famous intense laser facilities all over the world allows Photline to propose high performance, reliable and easy to use systems perfectly suited to the various applications related with high energy optical pulse generation.

The ModBox-FE can be associated with the Spectral Broadening unit ModBox-SB in order to counter the SBS effects caused by the amplification of a narrow linewidth laser source.

FEATURES

- Optical waveform flexibility
- Low jitter
- Low rise & fall times
- Very high extinction ratio and stability
- Proven solution

APPLICATIONS

- Inertial confinement fusion
- Interaction of intense light with matter
- Laser plasma interaction
- Laser implosion
- Interaction of ion beam with HP laser

OPTIONS

- Extinction ratio choice
- Pulse energy

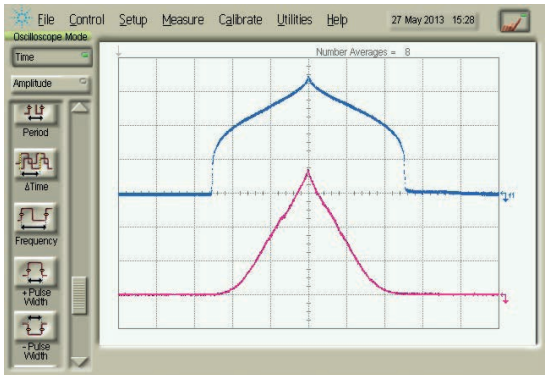
RELATED EQUIPMENTS

- ModBox-SB

Performance Highlights

	1030 nm	1053 nm	1064 nm
Pulse contrast	35 dB / 55 dB		
Pulse waveform	Arbitrary, user adjustable		
Pulse width	125 ps to 10 ns		
Energy per pulse: PW = 1 ns & ER = 35 dB	300 pJ	800 pJ	800 pJ
Energy per pulse: PW = 1 ns & ER = 55 dB	100 pJ	250 pJ	250 pJ
RMS jitter	7 ps		

Electrical & Optical Pulse Diagrams



Electrical pulse from AWG (blue curve) with corresponding Optical output (pink curve)

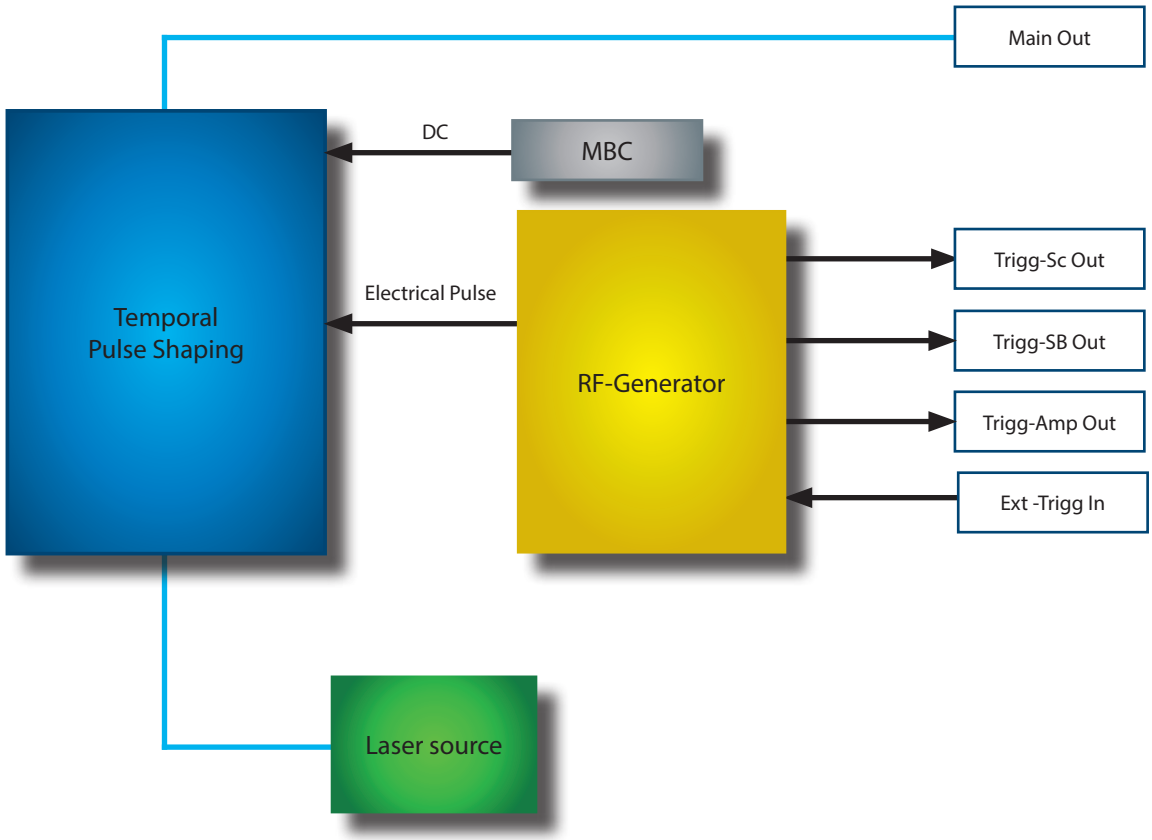
Ordering Information:

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 Pulse Shaper integrates:

- a temporal pulse shaping block based on a modulator set to ensure a very high optical pulse extinction ratio (30 dB) and flexible pulse shaping,
- an automatic Modulator Bias Control circuitry (MBC) to garantee high extinction ratio stability over time,
- a RF-Generator with an arbitrary waveform capability,
- a CW laser source.

The ModBox offers several electrical outputs and input:

- a "Trigg-Sc" : for scope synchronization,
- a "Trigg-SB" : for pulse synchronization with the ModBox-Spectrum-Broadening,
- a "Trigg-Amp" : for optical amplifier synchronization,
- an "Ext-Trigg In" : external clock input.

Input Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Electrical Input Specifications						
External Trigg input	-	+5 V on 50 Ω with positive slop	0	-	1	MHz

Electrical Output Specifications

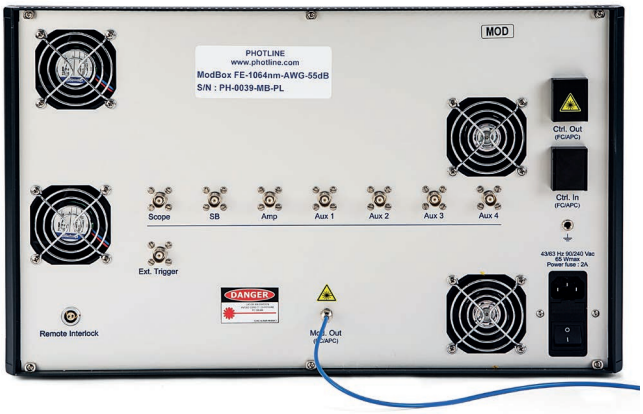
Parameter	Symbol	Condition	Min	Typ	Max	Unit
Trigg-Sc / Trigg-SB / Trigg-Amp outputs						
Delay range	-	-	0	-	10	s
Delay resolution	R	Trigg-Amp / Trigg-SB	-	1	-	ps
		Trigg-Sc	-	1.25	-	ns
Delay RMS jitter	J_{RMS}	Internal trigger w/o additional delay	-	10	-	ps
		External trigger w/o additional delay	-	-	25	ps
Delay accuracy	-	-	-	-	150	ps
Trigger delay	-	(Insertion delay)	-	-	100	ns

Optical Output Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Operating wavelength	λ	-	1030 nm, 1053 nm, 1064 nm			
Wavelength tunability	dλ	By temperature	-	-	0.7	nm
Line-width	Δλ	-	70 kHz or 1 MHz			-
Output pulse shapes	-	-	Arbitrary, user adjustable			
Sample rate	-	-	8	-	-	Gsample/s
Number of samples	-	Per pulse	-	800	-	-
Pulse width	PW	Remotly adjustable	125 p	-	100 n	s
		Optimized value	-	10	-	ns
Frequency repetition rate	FRR	Adjustable by the trigger frequency	1	-	100 k	Hz
		Optimized value	-	10	-	Hz
Rise time / Fall time	t_r/t_f	20 % - 80 %	-	35	50	ps
Pulse extinction ratio	SER	-	> 30 dB or > 55 dB			-
Extinction ratio stability	ΔSER	Over 12 hours	-	-	1	%rms
Polarisation extinction ratio	PER	-	25	29	-	dB
RMS jitter	J_{RMS}	-	-	7	10	ps
Optical return loss	ORL	-	40	-	-	dB
Pulse energy	E	Rectangular pulse shape of 1 ns	100pJ, 250pJ, 300pJ, 800pJ			-
Pulse energy stability	ΔE	Based on rectangular pulse shape	-	-	1	%rms

Panels

Parameter	Condition	Min	Typ	Max	Unit
Front Panel					
Interface	AWG, MBC	Smart interface with keypad			
Remote control connector	AWG & MBC	USB			
	Delay Generator	Ethernet			



Parameter	Condition	Min	Typ	Max	Unit
Rear panel					
Optical ports	"Main Out"	FC/APC, 2 meters fiber long			
Optical fiber	-	Polarization maintaining fiber, Corning PM 98-U25A			
Trigg output connectors	"Trigg SB" "Trigg Amp" "Trigg Scope"	BNC			
Trigger input connector	"Ext Trigg In"	BNC			

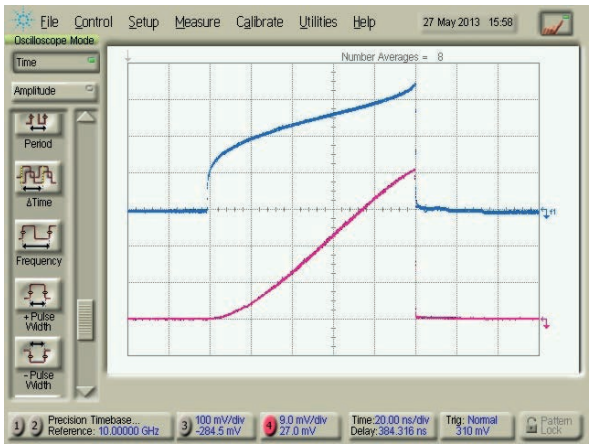
Dimensions

Parameter	
Size	19 inches 5U (6U max)
Weight	8 kg
Power supply	100 - 120 V / 220 - 240 V automatic switch, 50 - 60 Hz

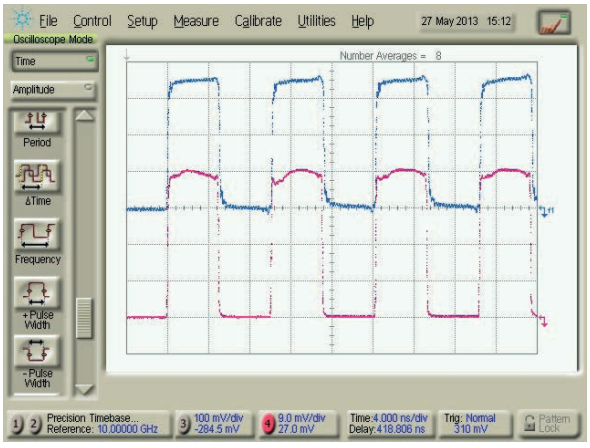
ModBox Electrical and Optical Outputs

The following equipment was used to obtain below results:

- ModBox-Pulse-Shaper with built-in AWG
- Oscilloscope Agilent 86100B
- Tektronix CSA 8000 oscilloscope



Electrical pulse from AWG (blue curve) with corresponding Optical output (pink curve)



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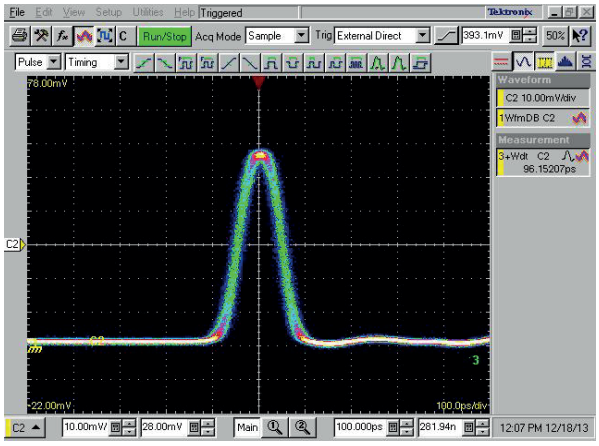
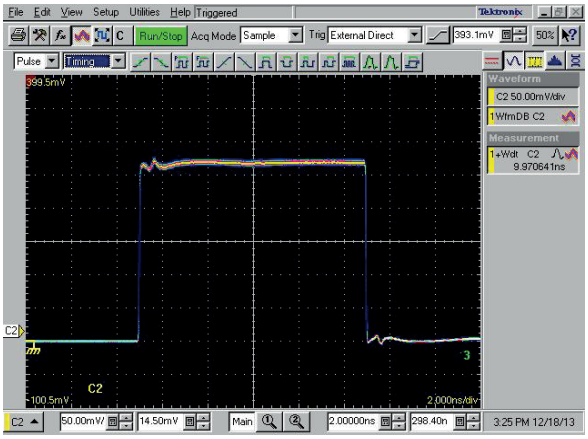
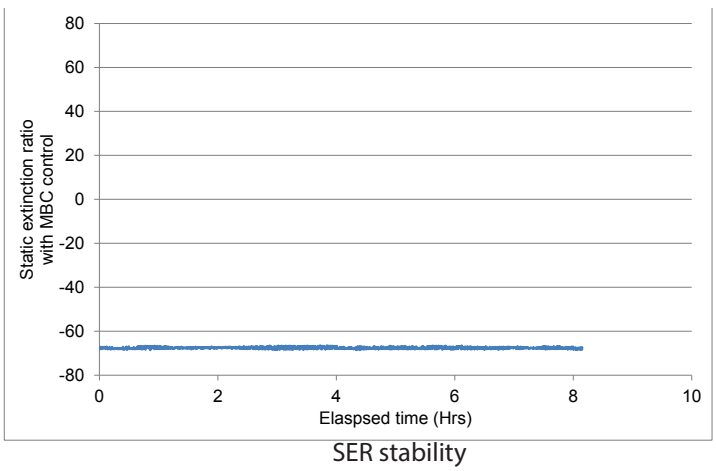


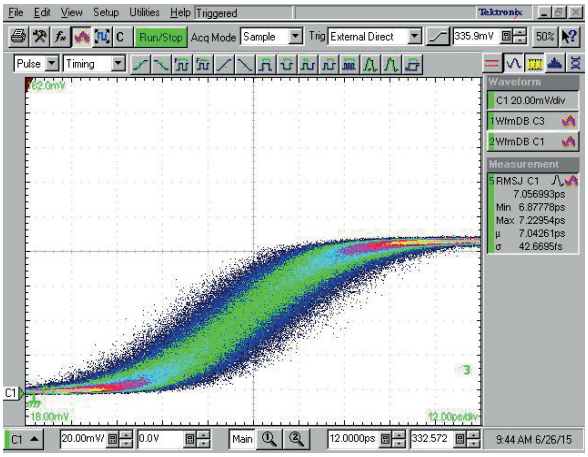
100 ps optical pulse



10 ns optical square pulse



SER stability



7 ps Jitter and rise time measurements

Related equipments

The Photline spectral broadening of optical signals is a solution to suppress the Stimulated Brillouin Scattering (SBS) caused in optical fibers by high fluxes of highly coherent light. The SBS degrades the signal integrity and prevents the proper transmission through the fiber. Under certain conditions, when amplification occurs for instance, the SBS can lead to the destruction of the fiber and the optical components along or forward the fiber. When the temporal coherence of the signal is destroyed, the SBS power threshold is significantly increased and thus its effects can be eliminated.

The Photline Modbox-Pulse-Shaper is an Optical Modulation Unit to generate short bespoke shaped pulses with high extinction ratio at 1030 nm, 1053 nm or 1064 nm. It allows dynamic extinction ratio from 35 dB to above 55 dB with user adjustable pulse duration, repetition rate and temporal pulse shape. One benefit of the Photline Modbox-Pulse-Shaper is to pre-compensate the pulse distorsion that occurs in the amplifiers chains that operate in (a highly) saturated regime.

Ordering information

ModBox-FE-WL-125ps-ER-EN

FE = Front-End Arbitrary Optical Pulse Genrator
WL = Wavelength: 1030nm, 1053nm, 1064nm
125ps = from 125 ps pulse width
ER = Extinction Ratio: 30dB, 60dB
EN = Energy per 1 ns pulse: 100pJ, 250pJ, 300pJ, 800pJ

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.

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