ModBox

ModBox-PS-CBand-200ps

C-Band, from 200 ps Pulse Shaper

The ModBox-PS-CBand-200ps is a high extinction ratio optical Pulse Shaper operating in the C-Band. It allows to generate 200 ps to 1 µs, 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.



Exail has accumulated a strong experience in such systems and successfully installed them in many laboratories over the world.

The ModBox-Pulse provides R&D and production engineers with state of the art performance and the peace of mind of a turn-key instrument. It can be used as a reference transmitter in laboratories and production for a broad variety of applications : components and material characterization, seeder for high energy lasers, lidars...

FEATURES

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

OPTIONS

- Extinction ratio choice
- Pulse Energy

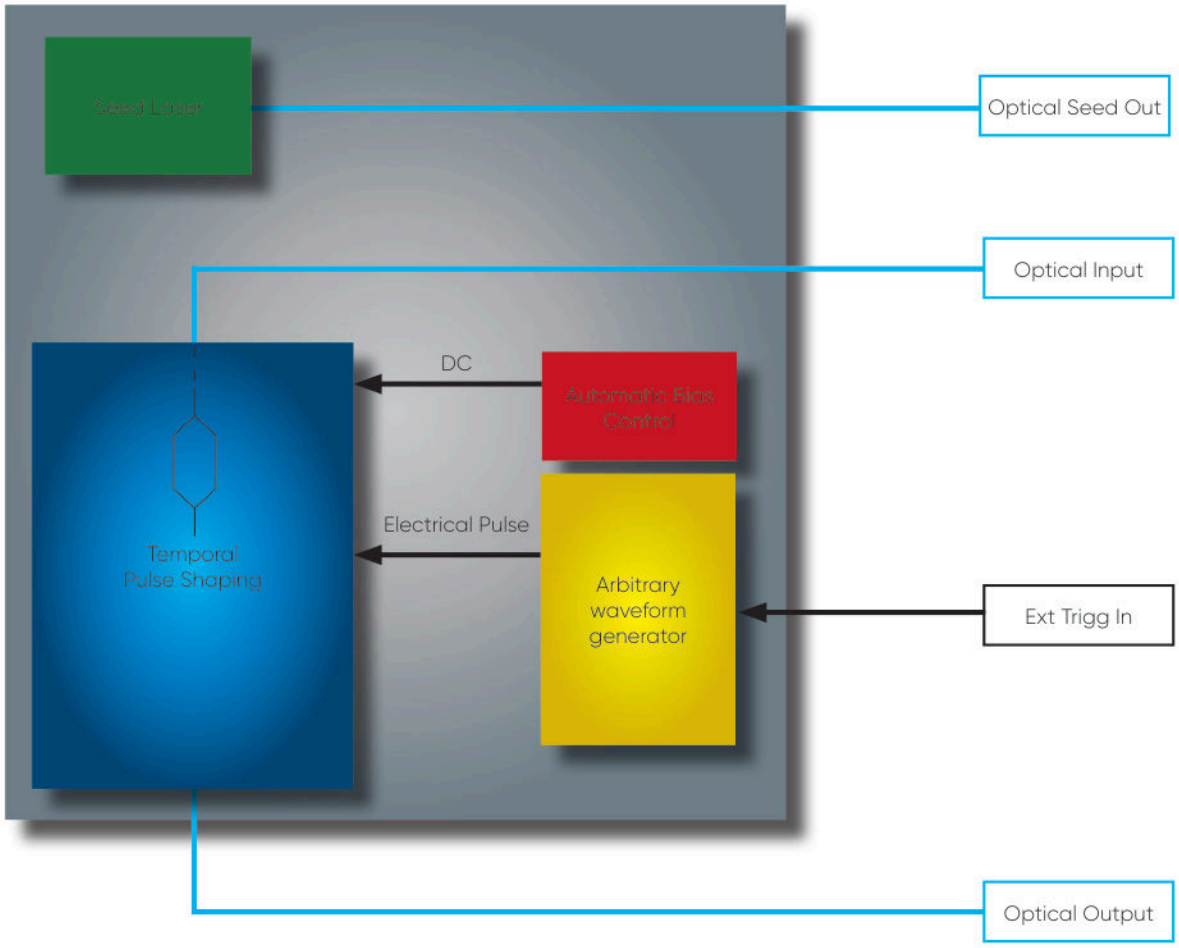
RELATED EQUIPMENTS

- ModBox-SB

PERFORMANCE HIGHLIGHTS

Operating wavelength	C-Band
Pulse contrast @ 1550 nm	> 40
Pulse waveform	Arbitrary
Pulse width	200 ps - 1 µs
Frequency Repetition Rate	< 5 MHz
Rise / Fall times	60 ps

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 and flexible pulse shaping,
- an automatic Modulator Bias Control circuitry (MBC) to garantee high extinction ratio stability over time,
- an arbitrary waveform capability,
- a master oscillator.

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ELECTRICAL INPUT SPECIFICATIONS

Parameter	Symbol	Condition	Min	Typ	Max	Unit
External trigg input	-	50 Ω with positive slop	+1.5	-	+3.3	V
		Frequency Repetition Rate	-	-	5	MHz

OPTICAL INPUT SPECIFICATIONS

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Operating wavelength	λ	-			C-Band	
Line-width	Δλ	-	-	1	-	MHz
Optical input power	OP_{in}	-	10	-	60	mW

C-BAND TUNABLE LASER SPECIFICATIONS

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Operating wavelength range	λ_C-band	C-band version	1527.60	-	1565-50	nm
Optical output power	P_{CW}	CW	5	-	35	mW
Wavelength accuracy	$\Delta\lambda_{acc}$	-	1.5	-	1.5	GHz
Spectrum linewidth	Δλ	FWHM @ -3dB, instantaneous	-	-	100	kHz
Side mode suppression ratio	SMSR	-	40	55	-	dB
RIN	RIN_7	For 7 dBm output power	-	-	-140	dB/Hz

OPTICAL OUTPUT SPECIFICATIONS

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Operating wavelength	λ	-			C-Band	
Output pulse shapes	-	-		Arbitrary, user adjustable		
Sample rate	-	GUI	-	5	-	Gsam-ple/s
Pulse width	PW	Remotely adjustable	200 p	-	1 µ	s
Frequency repetition rate	FRR	Fixed by external trigger	Single shot	-	5	MHz
Added optical jitter	J	Within PW and FRR	-	60	-	ps
Rise time / Fall time	t_r/t_f	20 % - 80 %	-	60	-	ps
Pulse Extinction ratio	SER	@ 1550 nm [1]	40	45	-	dB
		@ 1550 nm +/- 20 nm [1]	30	35	-	dB
Extinction ratio stability	ΔSER	Over 12 hours	-	-	1	%rms
Polarization extension ratio	PER	-	15	20	-	dB
Optical return loss	ORL	-	40	-	-	dB
Insertion loss	IL	-	-	5	7	dB

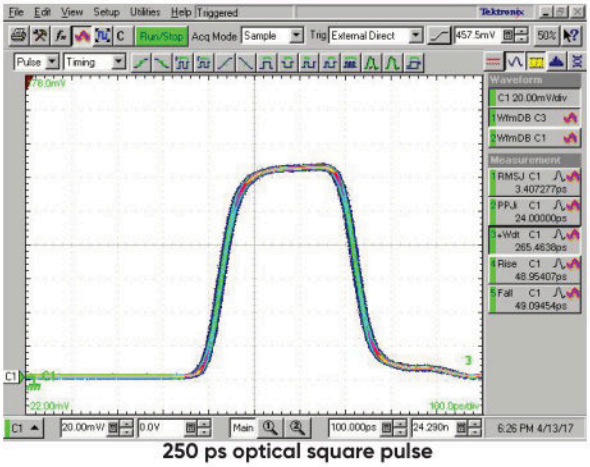
(1) The highest Extinction ratio is given at 1550 nm, and can be degraded of other wavelengths from the C-Band. The high SER is given for a Duty-Cycle < 1 %.

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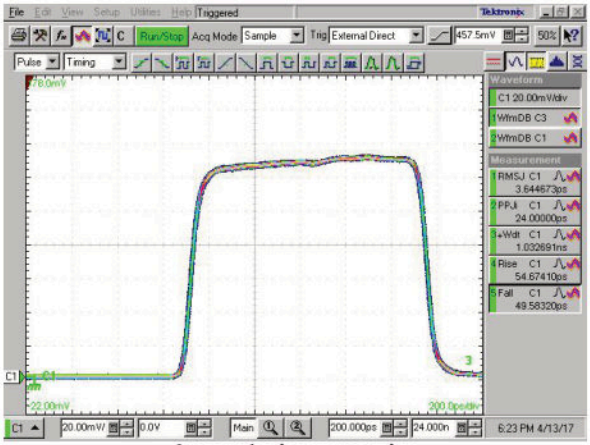
MODBOX ELECTRICAL AND OPTICAL OUTPUTS

The following equipment was used o obtain below results:

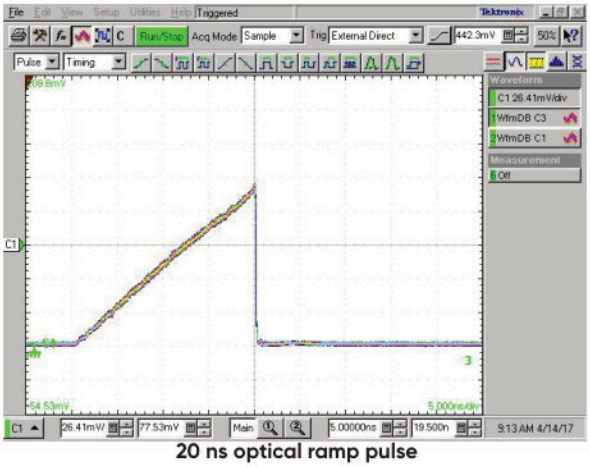
- Modbox-Pulse-Shaper with built-in AWG
- Oscilloscope Agilent 86100B
- Tektronix CSA 8000 oscilloscope



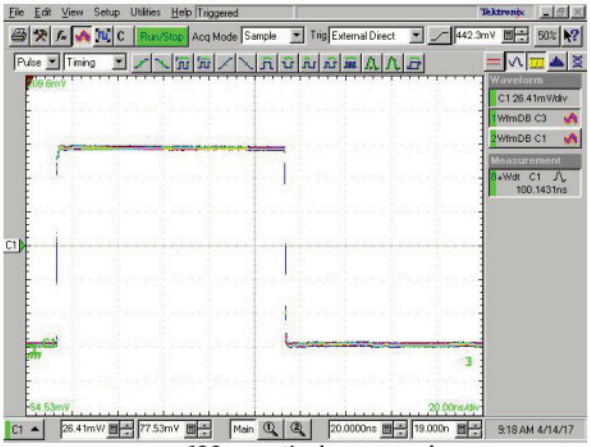
250 ps optical square pulse



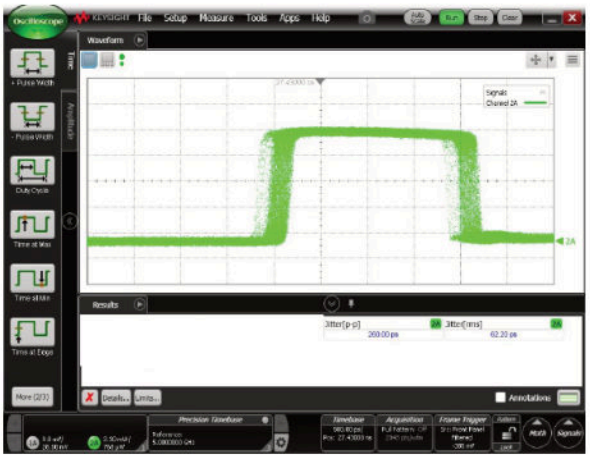
1 ns optical square pulse



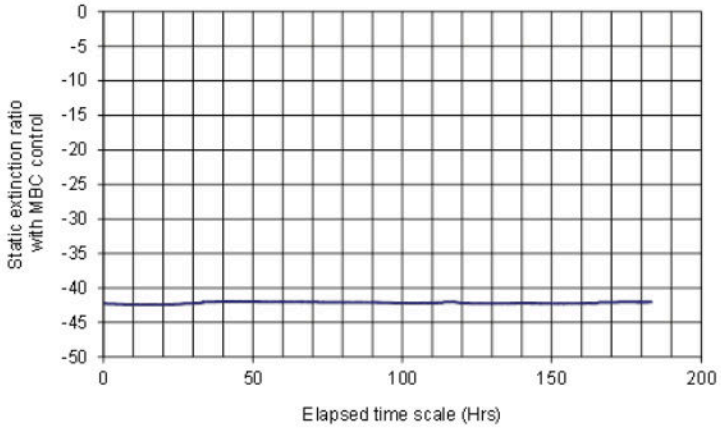
20 ns optical ramp pulse



100 ns optical square pulse



Jitter and rise time measurements, obtained with a trigger jitter < 1 ps



SER stability from ModBox-Pulse-CBand

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INTERFACES, DIMENSIONS AND COMPLIANCE

Interfaces	
Optical	Polarization maintaining fiber PM1550 - FC/APC (by default, other connectors type in option
RF input	Single SMA female RF connector - 50 Ω
Control	Touch screen interface / Ethernet remote control
Power supply	100 V - 120 V / 220 V - 240 V automatic switch 50-60 Hz (Rear panel)
EMC and optional norms	EN61326-1 Ed. 2006 / NF EN 60825-1 & EN 60825-2 Ed.2014
Dimensions / Weight	Rack 19'' x 3U, Depth = 495 mm / 8 kg



ModBox-PS-CBand-200ps

PS = Optical Pulse Shaper, CW laser and Arbitrary Waveform Generator are embedded.

CBand = Full band of operation, embeds a C-Band laser by default.

200ps = from 200 ps optical pulse width generation.

Opt-YY

YY = Output connectors, FA : FC/APC - FC : FC/UPC - SA : SC/APC- SC : SC/UPC

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