



FEATURES

- Suppress Stimulated Brillouin Scattering
- Externally triggered
- Low insertion loss

APPLICATIONS

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

OPTIONS

- Wavelength from 780 nm up to 2 220 nm
- Alternative synthesizer frequencies
- Rack-mount or module version

RELATED EQUIPMENTS

- ModBox Pulse-Shaper
- CW high power laser
- Pulsed amplifiers
- Complete Front-End System

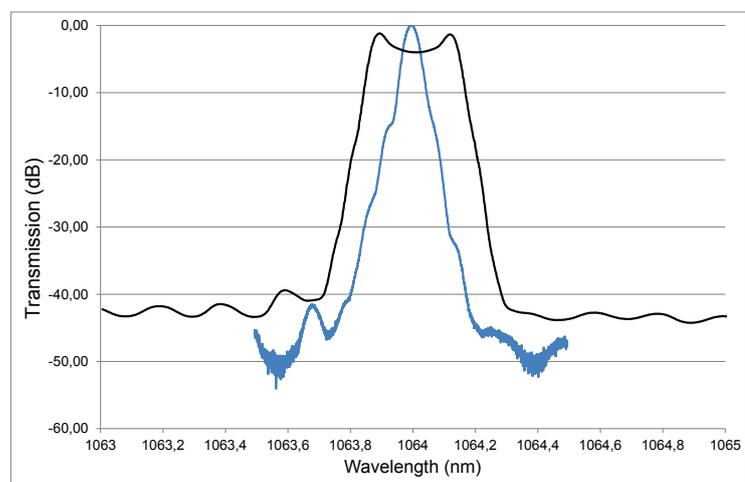
The Spectral Broadening ModBox achieves the broadening of an optical signal by modulating its phase via the mean of a very efficient LiNbO₃ phase modulator. A number of side bands are created over a spectral width that can reach several hundreds GHz.

The 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.

Performance Highlights

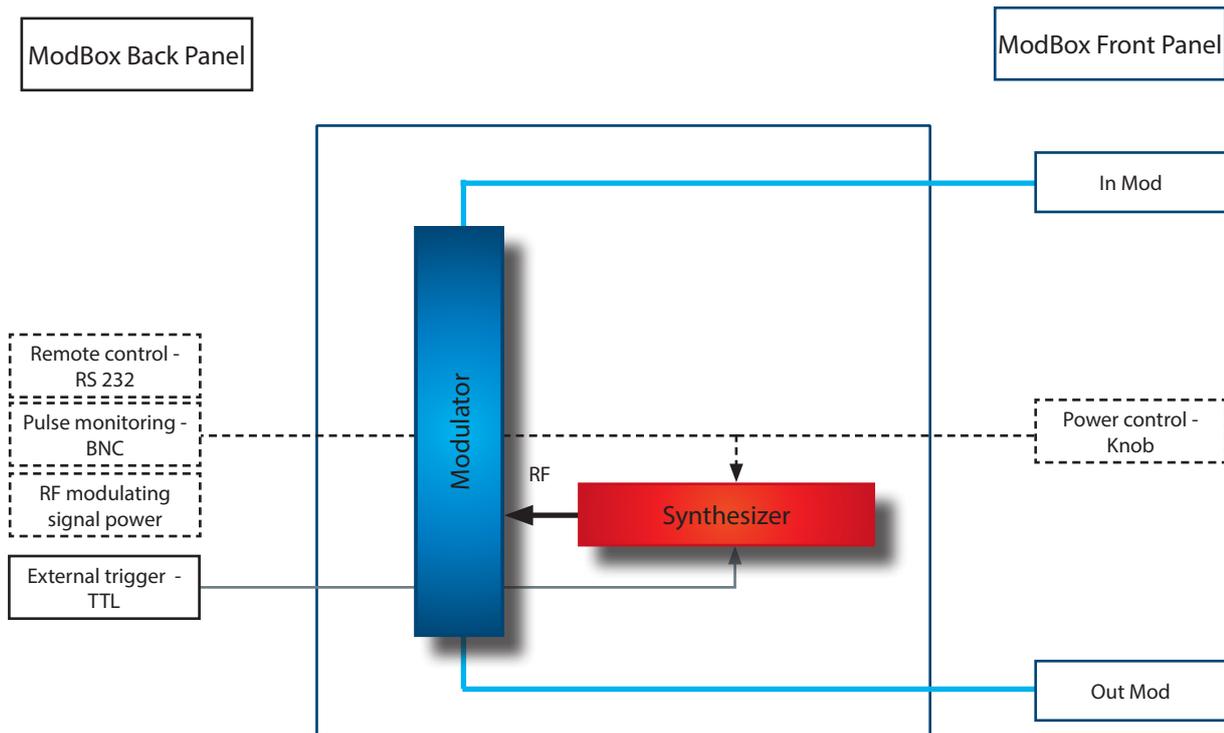
Parameter	Min	Typ	Max
Operating wavelength	980 nm	1053 nm	1150 nm
Spectral broadening	-	0.3 nm / 1.5 nm	-
RF source frequency	-	2 GHz / 14.25 GHz	-
Insertion loss	-	3 dB	-

Broadened Spectrum



Typical ModBox responses: the blue curve is the optical analyzer impulse response, the black curve is the broadened spectrum.

Functional Block Diagram



The ModBox Spectrum Broadening integrates :

- a high RF power handling LiNbO_3 Mach-Zehnder phase modulator,
- a synchronic and pulsed sine wave 2 GHz / 14.25 GHz oscillator with power control.

The RF generator delivers a pulsed sine wave signal to the internal phase modulator. This signal is gated by the ModBox-Pulse-Shaper (external trigger) and is applied to the phase modulator only in presence of an optical pulse. A number of side bands with a frequency spacing equal to the RF frequency appears and the optical spectrum is strongly widened.

Optical Input Specifications User supplied, not a ModBox specification

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Operating wavelength	λ	-	980	1053	1150	nm
Optical input power	OP _{in}	Average, CW	-	-	100	mW
Polarization extinction ratio	PER	Polarization is linear and controlled	25	-	-	dB

Electrical Specifications

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Frequency	F	Sine wave pulsed	-	2 / 14.25	-	GHz
External trigger input signal	-	From ModBox-Pulse-Shaper	-	TTL	-	-
External trigger repetition rate	-	From ModBox-Pulse-Shaper	1	-	200 k	Hz

Output Modulated Signal with Internal synthesizer

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Spectral broadening	SP	With 2 GHz synthesizer	0.2	0.3	-	nm
		With 14.25 GHz synthesizer	-	1.5	-	nm
Polarization extinction ratio	PER	-	25	29	-	dB
Insertion loss	IL	-	-	2.5	3.3	dB
Optical return loss	S ₁₁	-	-	-40	-	dB

Panels

Parameter	Condition	Min	Typ	Max	Unit
Front panel					
RF modulating signal power	-	Rotary knob			
Optical ports	Input and output	FC/APC, SC/APC			
Optical fiber	-	Polarization maintaining fiber, Corning PM 98-U25A			

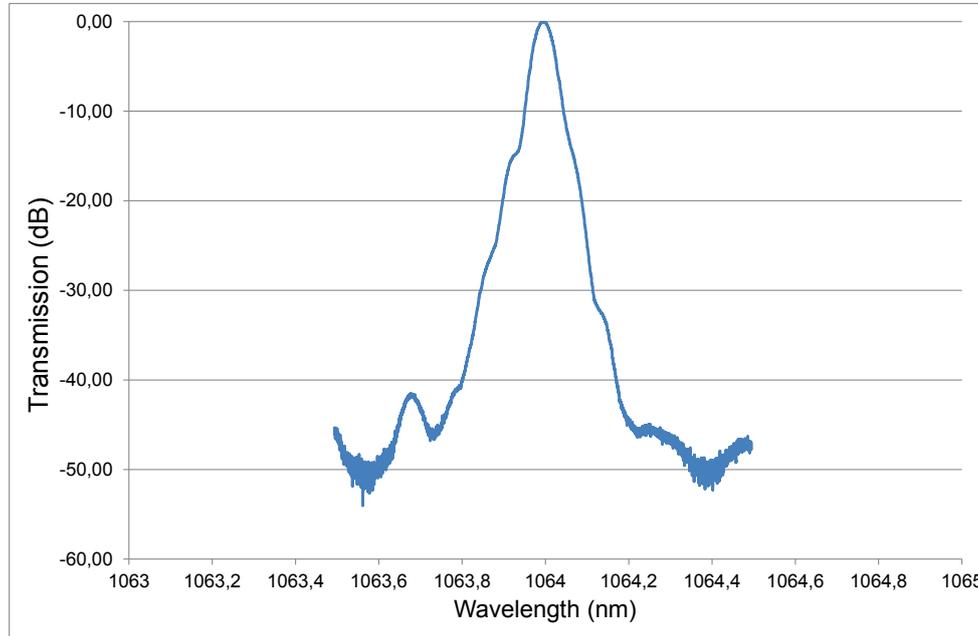


Parameter	Condition	Min	Typ	Max	Unit
Rear Panel					
External trigger input	-	TTL			
Pulse monitoring output	-	BNC			
RF source monitoring	-	RS 232 - SubD9 female			

Dimensions

Parameter	
Size	19 inches 2U or 3U
Weight	3 kg
Power supply	100 - 120 V / 220 - 240 V automatic switch, 50 - 60 Hz

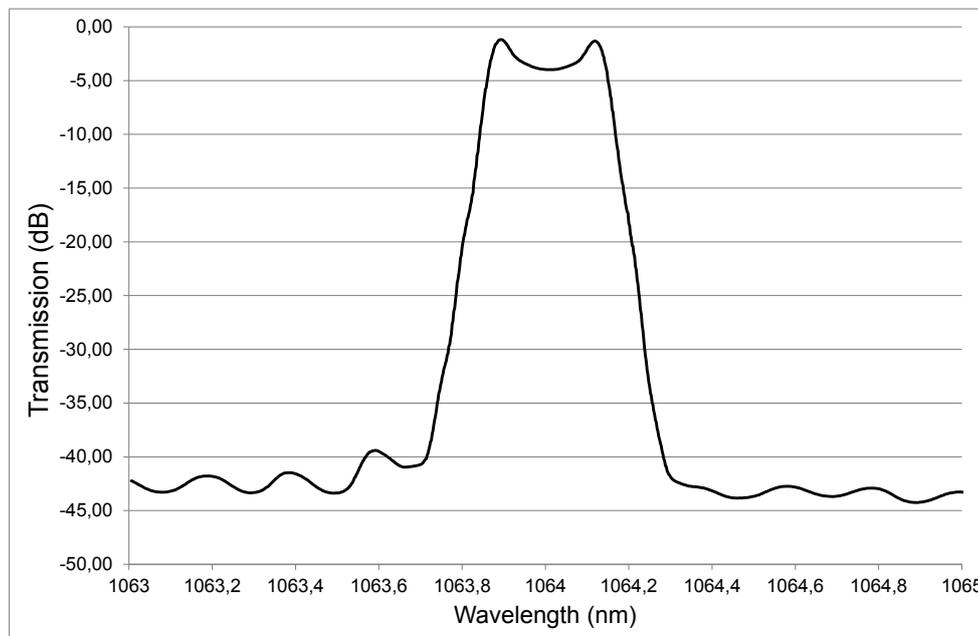
Optical Signal With Internal 2 GHz RF source



The curve shows the spectra of the input optical signal.

In regards of OSA resolution, bandwidth and sampling characteristics, the repetition rate was increased up to 100 kHz to obtain a better rendering.

NB : input laser spectrum is limited by the OSA Agilent 86142B resolution (0,06 nm = 16 GHz)

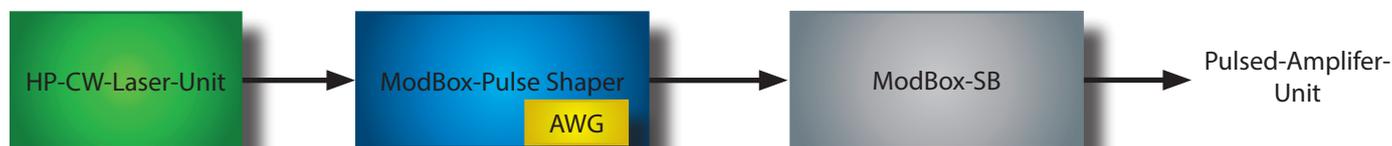


The curve shows the spectra of the output optical signal, spectrally broadened optical signal.

In regards of OSA resolution, bandwidth and sampling characteristics, the repetition rate was increased up to 100 kHz to obtain a better rendering.

NB: input laser spectrum is limited by the OSA Agilent 86142B resolution (0,06 nm = 16 GHz)

Related equipments



The HP-CW-Laser-Unit is a fiber laser featuring a single narrow line-width seed laser combined with an high output power amplifier. The high power laser delivers up to 5 W at 1053 nm, 1064 nm, and up to 2 W at 1030 nm.



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 distortion that occurs in the amplifiers chains that operate in (a highly) saturated regime.

Ordering information

ModBox-SB-WL-SP

SB = Optical Spectrum Broadening Unit
 WL = Wavelength: 1030nm, 1053nm, 1064nm
 SP = Spectral broadening: 0.3nm, 1.5nm

Opt-YY

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

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 (LiNbO₃) 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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