ModBox

ModBox-SB-NIR

Near Infra Red Spectral Broadening Unit

The Spectral Broadening ModBox achieves the broadening of an optical signal by modulating its phase via the mean of a very efficient $LiNbO_3$ 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.

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 2220 nm
- Alternative synthetizer frequencies
- Rack-mount or module version

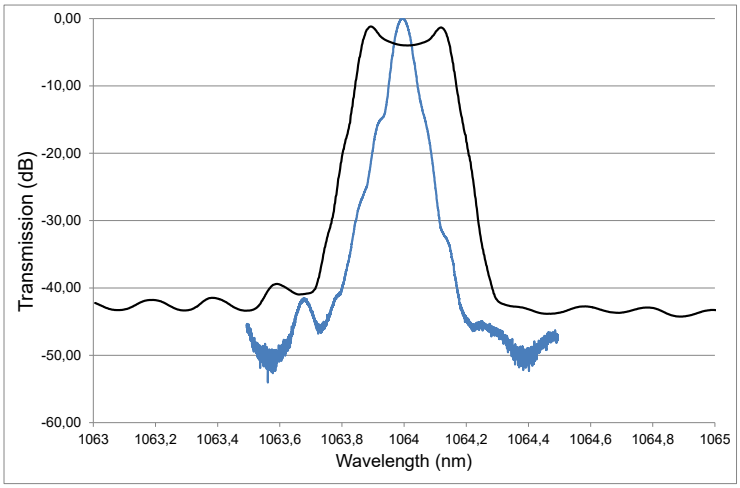
RELATED EQUIPMENTS

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

PERFORMANCE HIGHLIGHTS

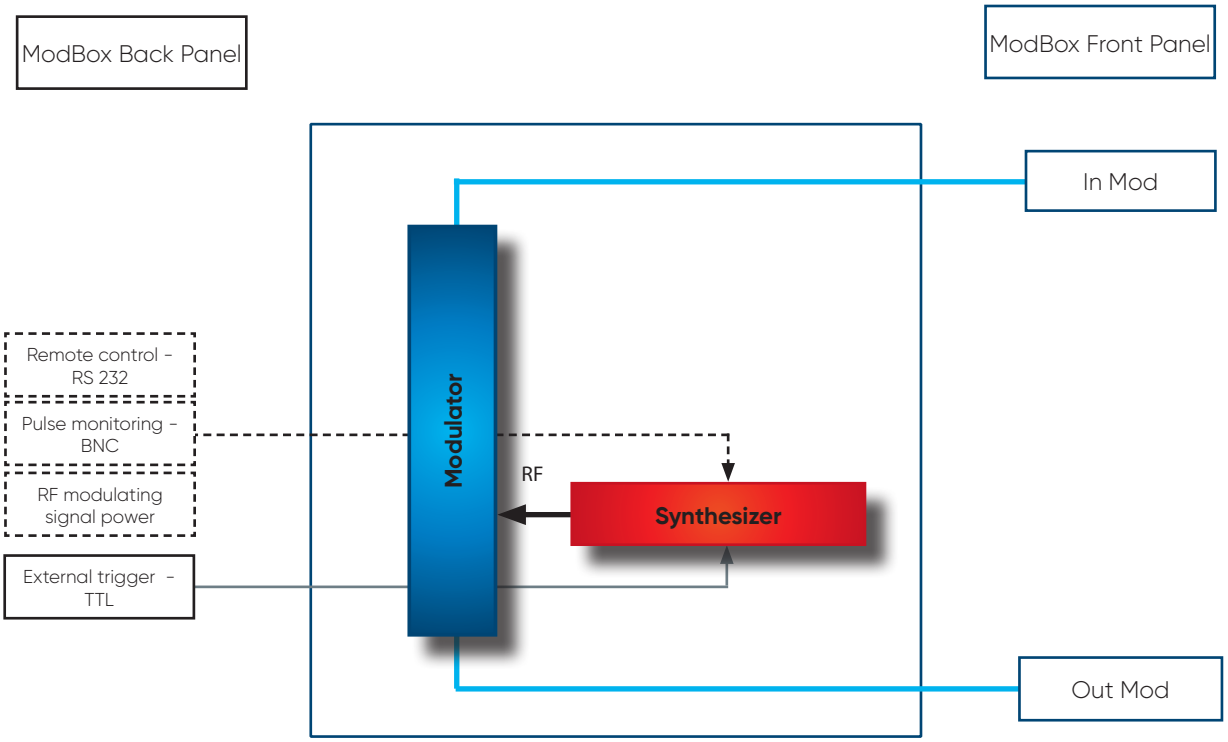
Operating wavelength	980 nm / 1053 nm / 1150 nm
Spectrum broadening	0.3 nm / 1.5 nm
RF Source frequency	2 GHz / 14.25 GHz
Insertion loss	3 dB

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 synchrone 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 RF generator can also be synchronized by a 10 MHz external reference clock. 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

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
Ref Clock Input	Frequency	Sine wave	-	10	-	MHz
	Amplitude	Sine wave	-	500	-	mVpp

OPTICAL OUTPUT SPECIFICATIONS

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Spectral broadening	SP	With 2 GHz synthetizer	0.2	0.3	-	nm
		With 14.25 GHz synthetizer	-	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

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PANELS

Parameter		Condition
	Front panel	
Optical ports	Input and output	FC/APC, SC/APC
Optical fiber	-	Polarization maintaining fiber, Corning PM98-U25A
	Rear panel	
External trigger input	-	BNC - TTL
Ref Clock In	-	BNC
Pulse monitoring output	-	BNC
RF source control & monitoring	-	RS 232 - SubD9 female

COMPLIANCE AND SAFETY

Parameter	Condition	Min	Typ	Max	Unit
Compliance	-	BS EN 60825	- CE certified		
Interlock response time	From laser system	-	-	10	ms
Remote interlock	Laser emission authorized only when 24 V TTL applied on ModBox Interlock input. Laser emission is produced only when specific instructions sent through Ethernet port of the ModBox. Laser status emission is available on a dry contact: open during laser emission, closed when there is no laser emission.				

DIMENSIONS

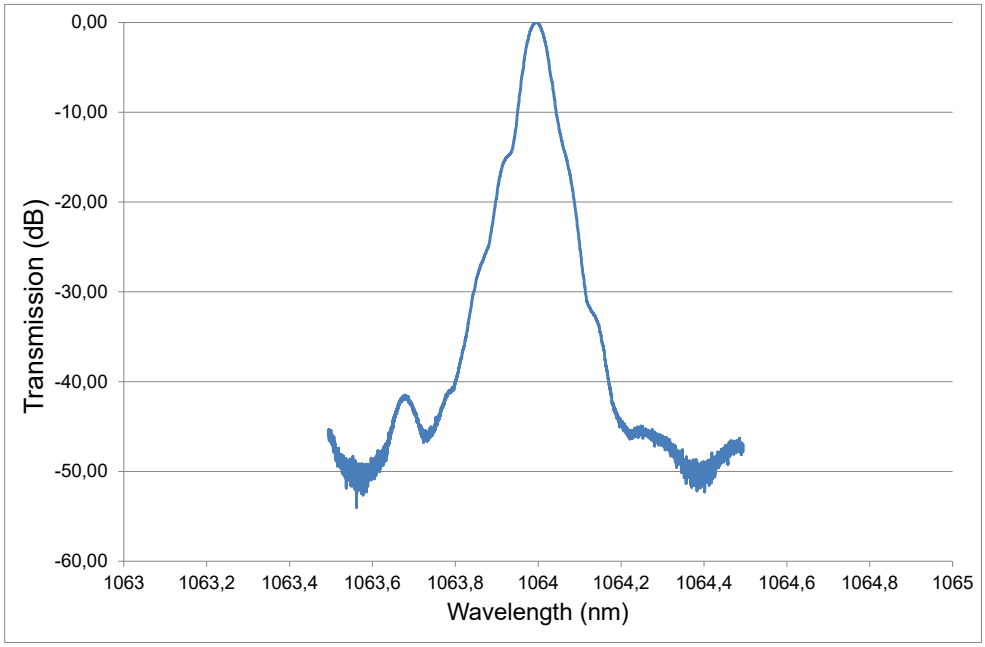
Parameter	
Size	19 inches 2U or 3U
Weight	3 kg
Power supply	100 - 120 V / 220 - 240 V automatic switch, 50 - 60 Hz

ENVIRONMENT

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

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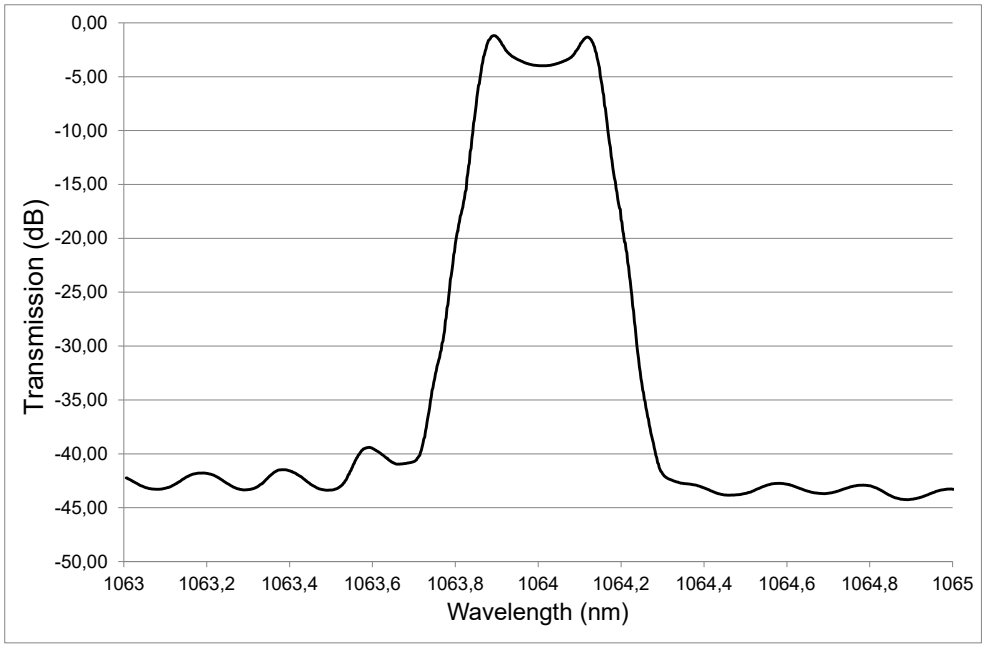
OPTICAL SIGNAL WITH INTERNAL 2 GHZ RF SOURCE



The curve shows the spectrum 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 Anritsu MS9710C resolution (0,05 nm = 13 GHz)



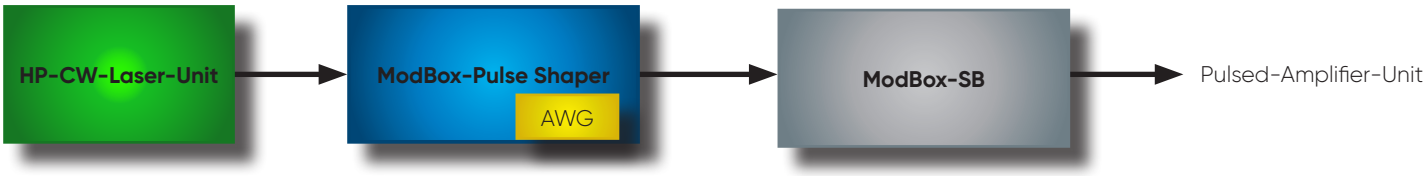
The curve shows the spectrum of the output optical signal, spectrally broadened optical signal.

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 Anritsu MS9710C resolution (0,05 nm = 13 GHz)

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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 Exail 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-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

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