



The Modbox-PG-CBand-50ps is a high extinction ratio optical Pulse Generator operating in the C and L Bands. It allows an extremely high dynamic extinction ratio with high stability over time, with user adjustable optical pulse train repetition rate of 50 ps pulse duration.

The ModBox-PG 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

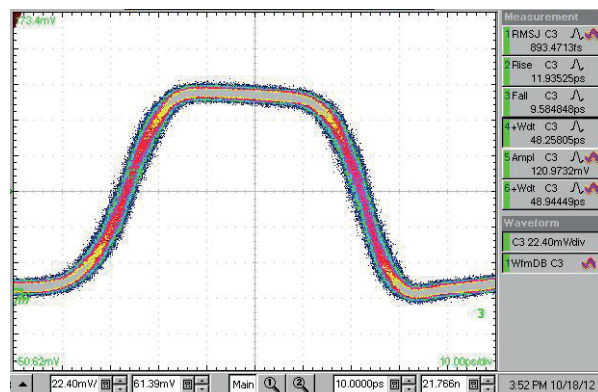
- Very high Extinction Ratio
- Fast rise & fall times
- Super-Gaussian optical pulses shape
- Proven solution

### OPTIONS

- Higher extinction ratio
- Electrical Pulse Penerator (EPG)
- Narrow line-width laser
- C-Band, L-Band tunable laser
- Higher Polarisation Extinction ratio

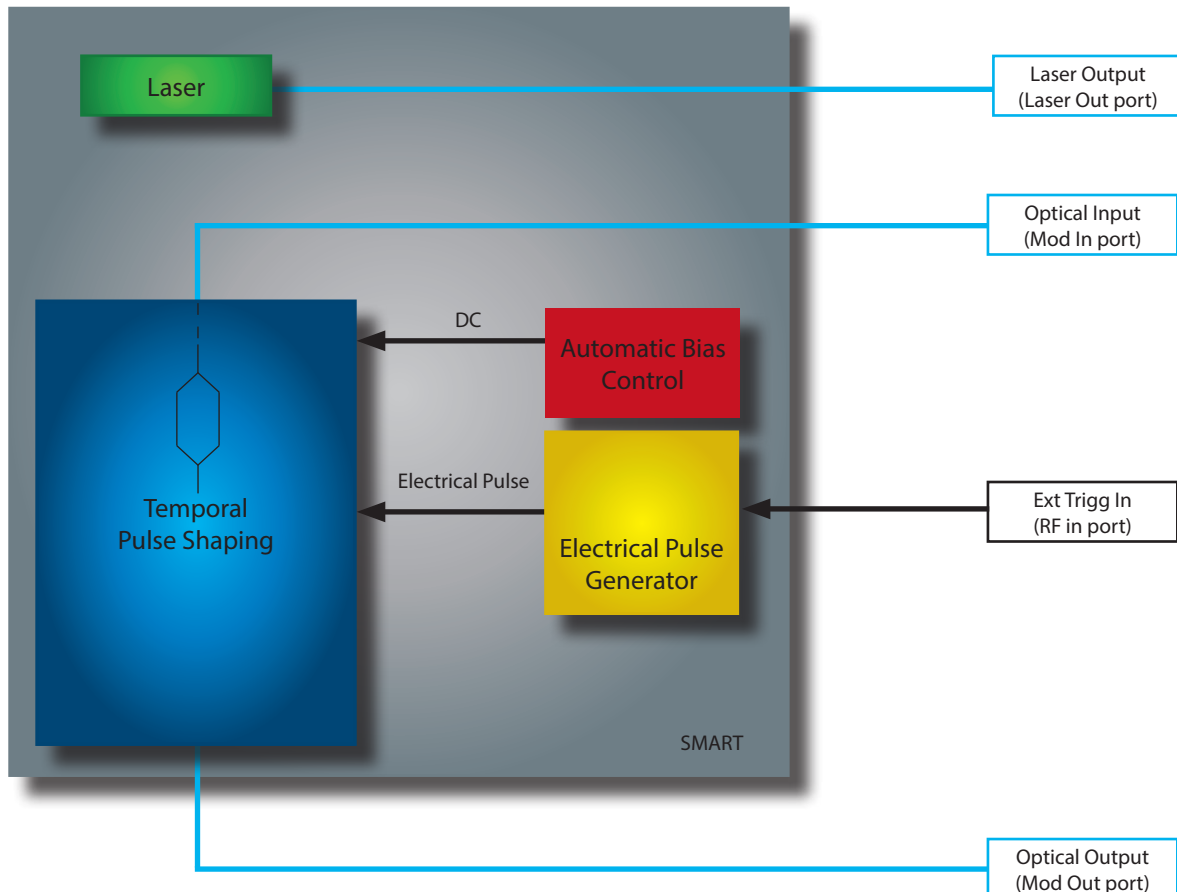
### Performance Highlights

Parameter	Min	Typ	Max
Operating wavelength	C & L Bands		
Pulse contrast @1550nm	> 40 dB, > 60 dB		
Pulse waveform	Super-Gaussian optical pulses		
Pulse width	50 ps		
Rise / Fall times	15 ps		



50 ps - 1550 nm - optical pulse

## Functional Block Diagram



The ModBox Pulse integrates the new Smart Interface which allows control for the full system:

- a temporal pulse block based on a modulators set to ensure a very high optical pulse extinction ratio (> 40 dB, or > 60 dB @1550nm) over a large optical bandwidth,
- an automatic modulator bias control circuitry to guarantee high extinction ratio stability over long periods of time,
- the Electrical Pulse Generator with a flexible Frequency Repetition rate tunability,
- the seed laser (C-Band tunable laser and narrow line-width laser choice).

**Optical Input Specifications** User supplied, not a ModBox specification

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Operating wavelength	$\lambda$	-	C&L Bands			
Line-width	$\Delta\lambda$	-	-	1	-	MHz
Optical input power	$OP_{in}$	-	10	-	60	mW

**Laser Option Specifications**

Parameter	Symbol	Condition	Min	Typ	Max	Unit
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## C-Band Tunable Laser Specifications

Optical output power	$P_{CW}$	CW - 1527.60 nm up to 1565.50 nm	5	-	35	mW
Wavelength accuracy	$\delta\lambda_{acc}$	-	-1.5	-	1.5	GHz
Spectrum linewidth	$\Delta\lambda$	FWHM @-3 dB, instantaneous	-	-	100	kHz

## Narrow Line-width Laser Specifications

Optical output power	$P_{CW}$	CW - 1550 nm (other $\lambda$ on request)	-	20	-	mW
Wavelength tunability	$\delta\lambda$	By temperature	-	30	-	pm
Spectrum linewidth	$\Delta\lambda$	FWHM @-3 dB, instantaneous	-	-	15	kHz

**Electrical Input Specifications - Clock Characteristics** User supplied, not a ModBox specification

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Signal type	-	-	Square clock for enhanced jitter performance			
Input level	-	50 $\Omega$	300	-	500	mVpp
Frequency range	-	-	10	-	500	MHz

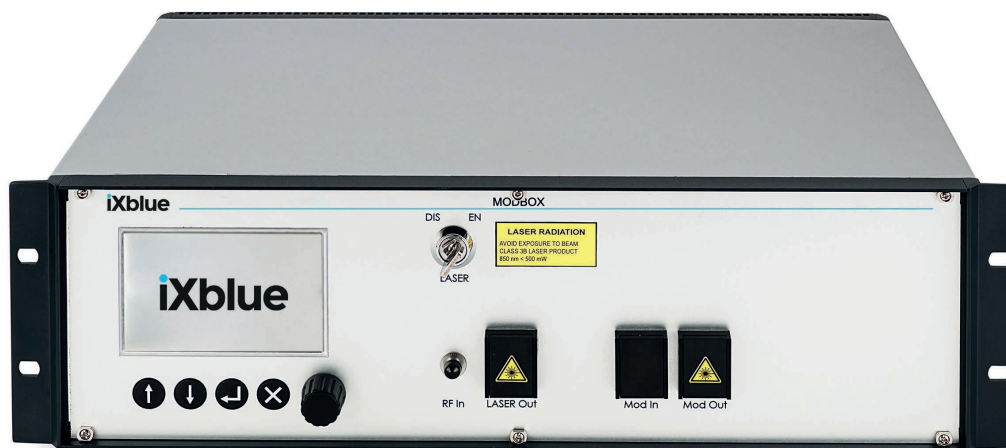
**Optical Output Specifications**

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Output pulse shapes	-	-	Super-Gaussian			
Pulse width	PW	Fixed	-	50	-	ps
Frequency repetition rate	FRR	Adjustable by the trigger frequency	10	-	500	MHz
Rise time / Fall time	$t_r/t_f$	20% - 80%	-	15	-	ps
Pulse extinction ratio	SER	@1550nm, ModBox ER > 40dB	40	43	-	dB
		@1550nm, ModBox ER > 60dB	60	70	-	dB
		@1550nm $\pm$ 20nm, ModBox > 40dB	-	30 <sup>(1)</sup>	-	dB
		@1550nm $\pm$ 20nm, ModBox > 60dB	-	40 <sup>(1)</sup>	-	dB
Extinction ratio stability	$\Delta SER$	Over 12 hours	-	-	1	%rms
Polarisation extinction ratio	PER	-	15	20	-	dB
Insertion loss	IL	@1550nm, ModBox ER > 40dB	-	5	6	dB
		@1550nm, ModBox ER > 60dB	-	10	12	dB
Jitter RMS	$J_{RMS}$	-	-	1	2	ps
Optical return loss	ORL	-	40	-	-	dB

(1) : The highest Extinction ratio is given at 1550nm, and can be degraded of other wavelengths from the C-Band

#### Panels

Parameter	Condition	Min	Typ	Max	Unit
Front panel					
Interface	Pulse generator, MBC				LCD interface with keypad
Optical ports	Laser Out & Modulators In & Out				FC/APC / Cable gland modulator output option
Optical fiber	-				Polarization maintaining fiber, Corning PM 98-U25A
Trigger input connector	-				BNC or SMA



Non contractual picture - ModBox front panel with laser embedded.

Parameter	Condition	Min	Typ	Max	Unit
Rear Panel					
Remote control connector	Smart (Automatic bias controller)				USB

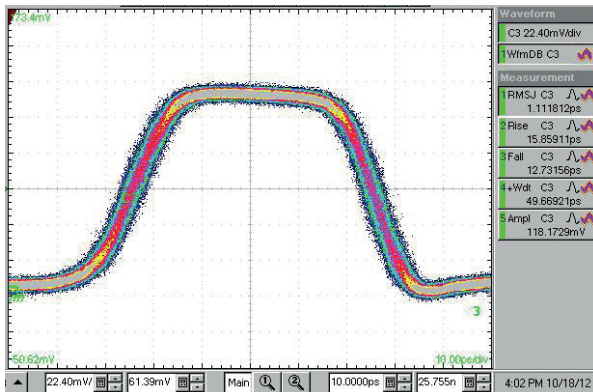
#### Dimensions - Compliance

Parameter	Condition	Min	Typ	Max	Unit
Size					19 inches 3U
Weight					5 kg
Power supply					100 - 120 V / 220 - 240 V automatic switch, 50 - 60 Hz

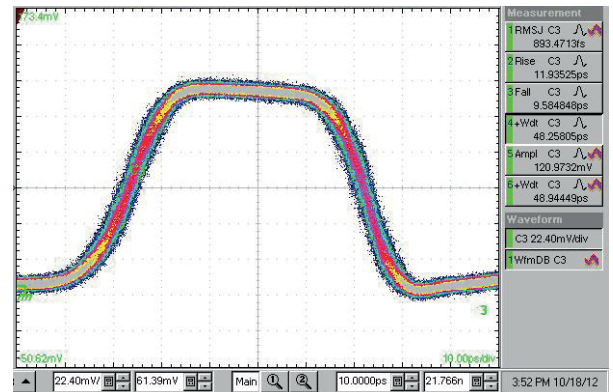
### ModBox Electrical and Optical Outputs

The following equipment was used to obtain below results :

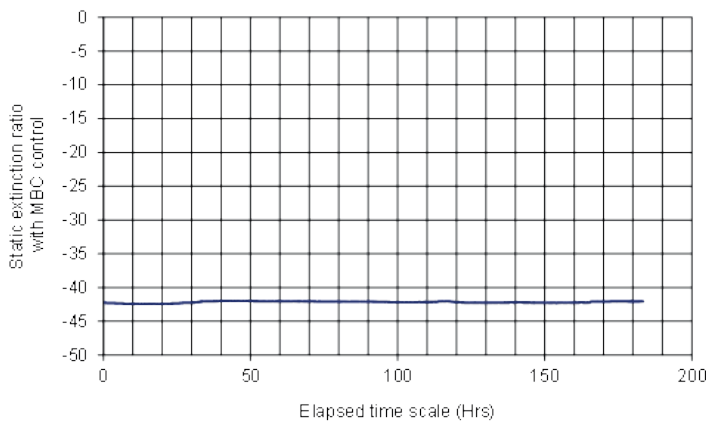
- ModBox-Pulse with built-in Pulse generator
- Oscilloscope Agilent 86100B
- Tektronix CSA 8000 oscilloscope



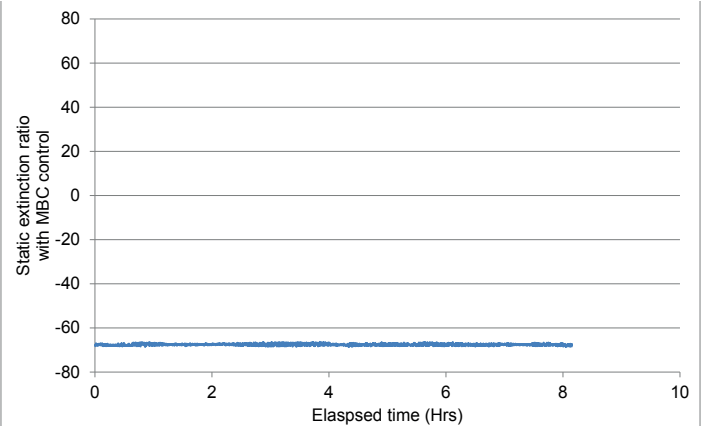
50 ps @ 100 MHz optical pulse



50 ps @ 500 MHz optical pulse



SER stability @ 1550 nm from ModBox-PG-CBand-50ps-40dB



SER stability @ 1550 nm from ModBox-PG-CBand-50ps-60dB