

ModBox 850nm 28Gb/s Stress Eye

850 nm 28 Gb/s NRZ Stress Eye Modulation Unit

PHOTLINE ModBox


The Photline ModBox-850nm-28Gb/s-NRZ-SE provides production and R&D engineers a solution for Stress Receiver Sensitivity test & measurements at 850nm.

This Reference Transmitter delivers high-quality NRZ clean eye diagram and offers the possibility to add variable Stress to the data.

This 850nm optical transmitter operates with data-rate from 155 Mb/s up to 28 Gb/s, and provides an independent solution for tunable stress magnitudes in both horizontal (time) and vertical (optical power) eye axis (Stressed Eye).

It is primarily intended for electrical to optical conversion in an Optical Stressed Eye test set up. This unit is also used to test communication links and other telecommunication stress simulation purposes.

FEATURES

- Reference transmitter
- Clean and Stress eye capabilities
- 852 nm laser embedded
- Sinusoidal interference input
- Extinction Ratio Variation (VER)

APPLICATIONS

- 100 GbE testing
- Fibre channel dispersion penalty testing
- Manufacturing and R&D receiver testing
- R&D Datacom/Telecom

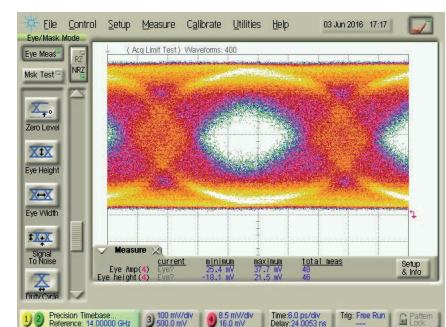
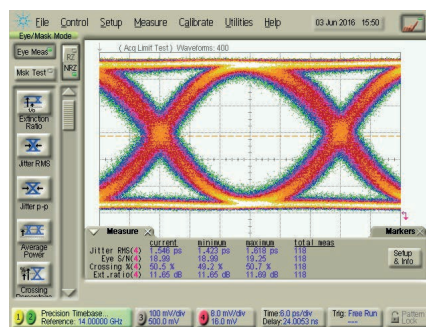
OPTIONS

- O-band & C-band versions

Performance Highlights

Parameter	Min	Typ	Max
Operating wavelength	-	852 nm	-
Modulation format	NRZ, clean and stressed eye diagrams		
Rise / fall times	-	12 ps	-
RMS jitter	-	1.4	-
Peak to peak jitter	-	-	2 UI
Vertical Eye Closure Penalty	1 dB	-	5 dB
Variable Extinction Ratio	3 dB	-	12 dB

28 Gb/s Clean and Stressed Eye diagrams



852 nm DFB Laser Specifications and Other Lasers Option The laser 852 nm laser is embedded by default.

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Laser type	-	-		DFB		-
Wavelength	λ	Embedded by default	-	852	-	nm
Wavelength laser tuning range	-	Diode chip temperature control	-	0.8	1	nm
Optical output power	-	CW	-	40	50	mW
Optical output power adjustment	-	Diode Injection current control	0	-	100	%
Spectrum linewidth	$\Delta\lambda$	FWHM	0.5	1	-	MHz
Side Mode Suppression Ratio	SMSR	-	30	-	-	dB
Optical Return Loss	ORL	-	45	-	-	dB

Input Electrical Specifications User supplied, not a ModBox specification

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Data Input Specifications						
Input electrical data	-	NRZ - Single ended / AC coupled	0.1	-	28	Gb/s
Rise / fall times	t_r / t_f	20 % - 80 %	-	12	16	ps
Input signal amplitude	V_{IN}	50 Ω – Single ended / AC coupled	-	450	-	mVpp
SI Input Specifications						
Frequency	F	Single ended / AC coupled	0.1	-	2	GHz
Signal type ⁽²⁾	-	Single ended / AC coupled	Sinusoidal			
Input signal amplitude	V_{IN}	50 Ω – Single ended / AC coupled	-	120	-	mVpp
Optical Input Specifications						
Operation	λ	CW	850	852	854	nm
Polarization	-	-	Linear and controlled			-
Power	P	-	-	-	40	mW
Side Mode Supression Ratio	SMSR	-	30	-	-	dB
Spectrum linewidth	$\Delta\lambda$	FWHM	-	1	-	MHz

Output Modulated Signal

The ModBox 28 Gb/s Stress Eye has several features that allow the user to build a stressed eye. The transmitter provides the user with the ability to insert a sinusoidal interference signal, add an internal 4th order low pass Bessel Thomson filter, or externally customer supplied filter, and also provide the flexibility of adjusting the extinction ratio for vertical eye closure.

Parameter	Symbol	Condition	Min	Typ	Max	Unit
Output data-rate		Single ended / AC coupled	0.1 ⁽¹⁾	25	28	Gb/s
Wavelength	I_{laser}	-	-	852	-	nm
Spectrum linewidth	DI	-	-	1	-	MHz
Optical output power	P_{Out}	Average NRZ	-	5	-	dBm
Cross point	-	-	45	50	55	%
Chirp	a	-	-0.1	0	0.1	-
Optical Return Loss	ORL	-	-40	-45	-	dB

Reference mode (Unstressed Eye Diagram)

Rise / fall times	t_r / t_f	20 % - 80 %	-	10	14	ps
RMS jitter	J_{RMS}	-	1	1.4	-	ps
Peak to peak jitter	J_{pp}	-	-	-	0.2	UI
Variable Extinction Ratio ⁽²⁾	VER	Pres-set value 3dB, 6dB, 9dB, 12dB	3	-	12	dB
Pre-set VER values ⁽²⁾	VER	Available from the Smart and GUI	3 dB, 6 dB, 9 dB, 12 dB			-
Vertical Eye Closure Penalty	VECP	-	-	0.8	1	dB
Extinction ratio	ER	-	-	12	-	dB

Internal stress eye mode

Vertical Eye Closure Penalty	VECP	28Gb/s, by SI amplitude gain control	1	-	5	dB
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(1) Automatic Bias Control is warranted from 5 Gb/s up to 28 Gb/s.

(2) The VER can be adjusted independently of the Stress applied with SI.

Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the data sheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

Parameter	Symbol	Min	Max	Unit
Optical input power	OP_{in}	-	17	dBm
Data input power	EP_{in}	-	4	dBm
SI input power	OP_{in}	-	5	dBm

Front Panel

Parameter	
Power	General main switch
LCD	Displays ModBox current status and allows the user to edit parameter in the ModBox menus
Keypad	Allows browsing and editing through the ModBox menus
System rotary knob	Allows browsing and editing through the ModBox menus
DIS / EN	Switch the laser status between enable and disable positions
852 nm	Laser output optical port
Mod In / Out	Laser modulation input and output ports
Filter In / Filter Out	RF filter input and output ports - 2.92 mm connector, 50 Ω
SI In	Sinusoidal Interference (SI) input port - SMA connector, 50 Ω
RF In	RF data input port - 2.92 mm RF connector, 50 Ω



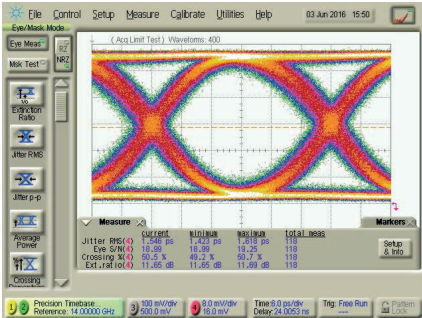
Rear Panel

Parameter	
USB	This USB port allows system remote control through software
Mains power supply socket	Fuse socket accepts 5*20mm size (2A, quick action)
Ground	This port connects to the internal ground

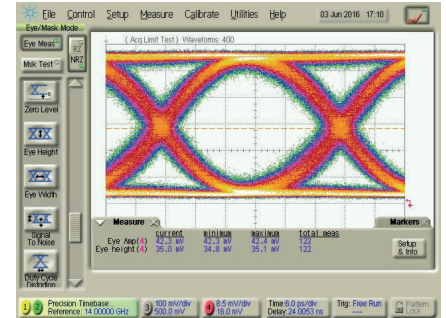
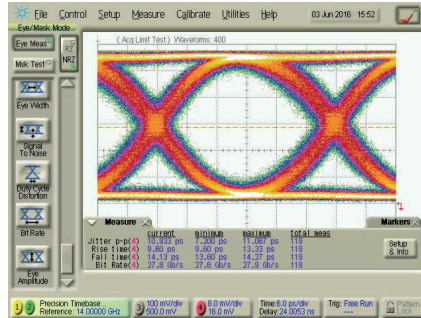
Dimensions

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

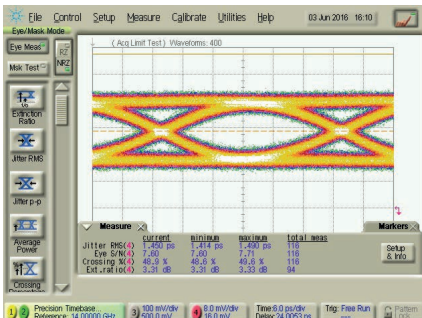
ModBox Output Signal - Unstressed Eye Diagram @ 28 Gb/s PRBS31



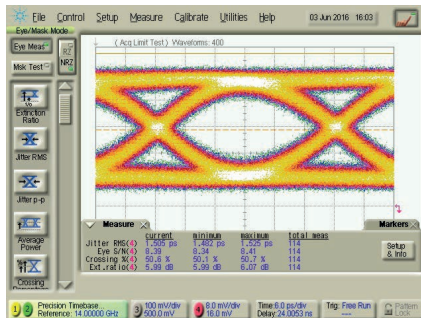
VER = 3 dB



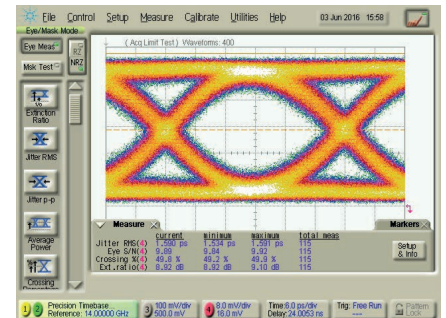
ModBox Output Signal - Unstressed Eye Diagram @ 28 Gb/s PRBS31 - VER



VER = 3 dB

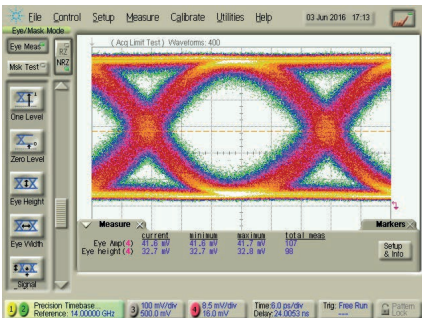


VER = 6 dB

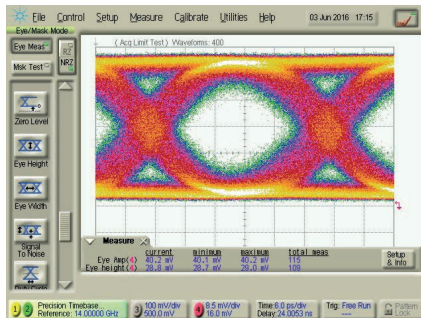


VER = 9 dB

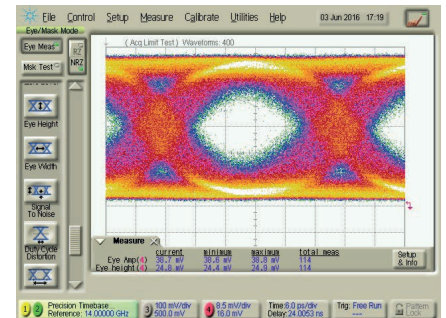
ModBox Output Signal - Unstressed Eye Diagram with SI @ 28 Gb/s PRBS31 - @ 28 Gb/s PRBS31



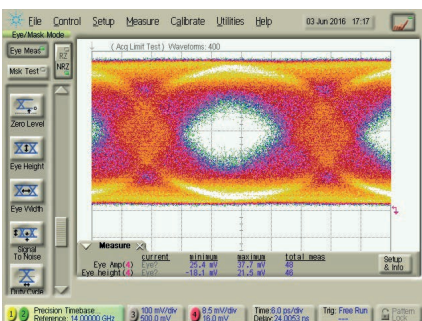
VECP = 1.05 dB



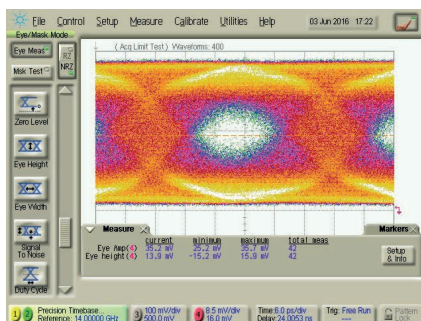
VECP = 1.42 dB



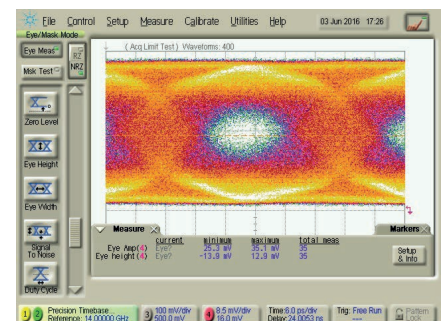
VECP = 1.93 dB



VECP = 2.42 dB



VECP = 3.5 dB



VECP = 4.35 dB

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Related equipments

This section gives a very brief equipment setup. In order to create an optical stressed eye, the following set of instrumentation is used. When combined together, these instruments fulfill specific functions in the construction of a stressed eye as required for receiver testing.

The ModBox adds impairments to the incoming data-stream coming from the Anritsu PRBS MP1800A generator for instance.

The impairments applied are:

- induced ISI (inter-symbol interference) by the external 4th order Bessel Thomson filter (@25.78125 Gb/s and provided with the ModBox),
- Sinusoidal amplitude interference (SI). The level of the SI is manually controlled. Sinusoidal signal (with fixed amplitude) is provided by the Anritsu MG3740A generator for instance.



Ordering information

ModBox-850nm-28Gbps-NRZ-SE

850 nm = Operating wavelength, embeds laser at 852 nm by default
28 Gb/s = Data-rate: 28Gb/s up to 28 Gb/s
NRZ-SE = NRZ and Stress-Eye

Opt-YY

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

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