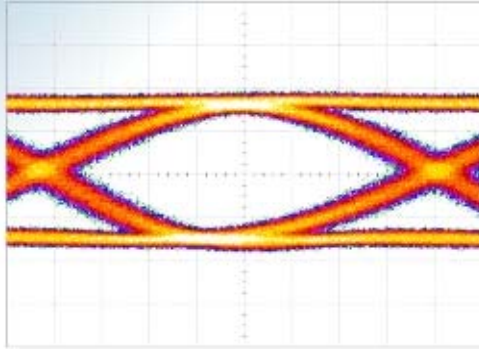




SHF Communication Technologies AG,

Amalienstrasse 14 • 12247 Berlin – Lankwitz, Phone ++49 30 / 772 05 10, Fax ++49 30 / 753 10 78,

E-Mail: mail@shf.biz, Web: <http://www.shf.biz>



Datasheet

SHF 5003 RZ

Optical Transmitter





Description

The SHF 5003 RZ Optical Transmitter converts electrical signals into RZ optical signals at a data rate of up to 50 Gbps.

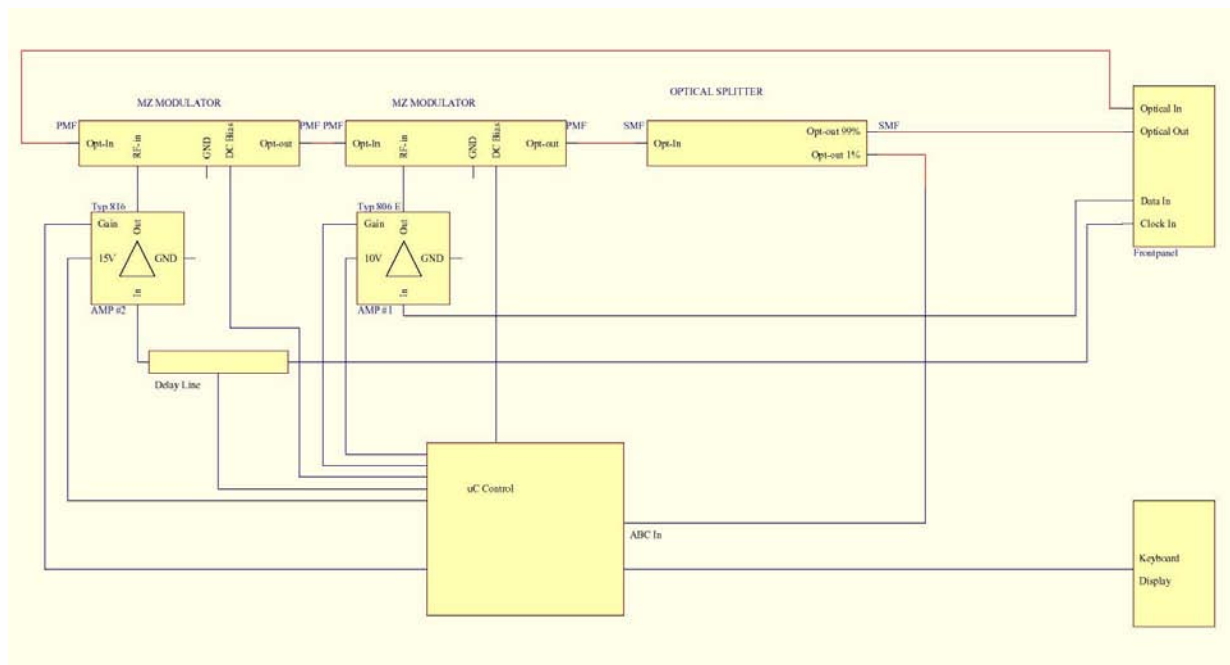
The main elements of the SHF 5003 RZ are two thermally stable Corning OTI X-cut Lithium Niobate Mach-Zehnder modulators which are each driven by an individually optimized amplifier. One amplifier amplifies a clock signal which is used to drive the first modulator. The output from this modulator is a train of pulses of constant width. These pulses are fed into the second modulator. The pulsed light is then modulated by the data signal. In this way, RZ signals are produced from an incoming NRZ signal.

The temperature stable modulators and an automatic bias circuit ensure high stability of the output signal. All features on the instrument can be controlled remotely via a GPIB connection.

Features

- 50 GBit/s TDM RZ optical data streams
- < 9 ps rise and fall time digital optical signals at 44 GBit/s
- 50 kHz to >40 GHz E/O conversion bandwidth (typical)
- Quick optimization of optical eye diagram performance by user adjustable gain and modulator bias control
- Short optical pulses for soliton applications
- GPIB connector for remote control
- All features computer controlled
- Both modulators' bias conditions controlled automatically
- Selectable automatic and manual bias control (ABC circuit)

Functional block diagram





Specifications

Parameter	Unit	Min.	Typ.	Max.	Conditions
Optical parameters					
Wavelength range		C- and L-band			
Insertion loss	dB		10	11	connector to connector, maximum transmission without modulation
Extinction ratio	dB	11	13		
Return loss	dB		50		without optical connector
Chirp (Alpha parameter)					small signal measurement method ¹
Positive slope			0.03	0.1	
Negative slope			-0.01	-0.1	
Electrical and electro-optical parameters					
Electro-optical bandwidth of NRZ data modulator	GHz		40		-3dB electrical
Bit rate	Gbps				
RZ		36		44	
NRZ		2		50	
Drive amplifier electrical return loss	dB				
NRZ data				-10	
RZ clock input				-10	
Drive amplifier input level	Vpp (dBm)				
NRZ data input		0.35 (-5)	0.4 (-4)	0.45 (-3)	
RZ clock input		0.5 (-2)	0.6 (0)	1.2 (6)	
Dynamic extinction ratio	dB				measured between data '1' and long sequence of '0'
NRZ		11	13		
RZ		12	14		
CS-RZ		12	14		
Dynamic signal to noise ratio					
NRZ			14		
RZ			17		
CS-RZ			17		
Output rise and fall times	ps				20%...80% as displayed on oscilloscope
NRZ			9	10	
Pulse width (FWHM)	ps				
RZ			12		
CS-RZ			15		
Output timing jitter <RMS>	ps				total RMS jitter measured with Agilent Mainframe 86100A + 70 GHz plug in 86118A + precision timebase 86107A
NRZ			1.0		
RZ			0.4		
CS-RZ			0.4		
Position of crossing point	%	45	50	55	
Auto-bias control					
Dither signal frequency	kHz		10		
Dither signal amplitude (% of 40Gb/s drive data signal)	%		1		

¹ (F. Devaux, Y. Sorel and J.F. Kerdiles, "Simple Measurement of Fiber Dispersion and of Chirp Parameter of Intensity Modulated Light Emitter", J. Lightwave Technol., vol. 11, no. 12, December 1993)

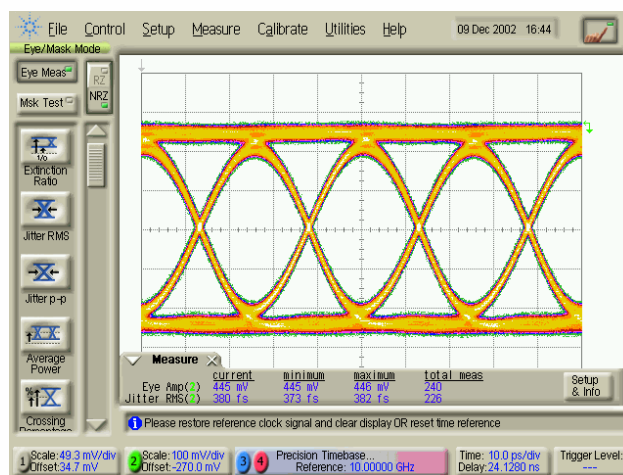


Parameter	Unit	Min.	Typ.	Max.	Conditions
Absolute maximum ratings					
Optical input power	dBm	8		20	CW
NRZ data amplifier input power	dBm			4 10	in operation without power supply
RZ clock driver input power	dBm			10	
General					
Weight	kg		9		
Dimensions	mm				472x365x110
Power supply	V	90 180	110 230	135 270	47...63 Hz
Power consumption	W		60		
Operating temperature	°C	15		35	
Storage temperature	°C	-20		85	
Electrical data input connector					V (1.85 mm) male
Clock input connector					K (2.9 mm) male
Optical connectors (input and output)					FC/PC (others available on request)

Test Measurements

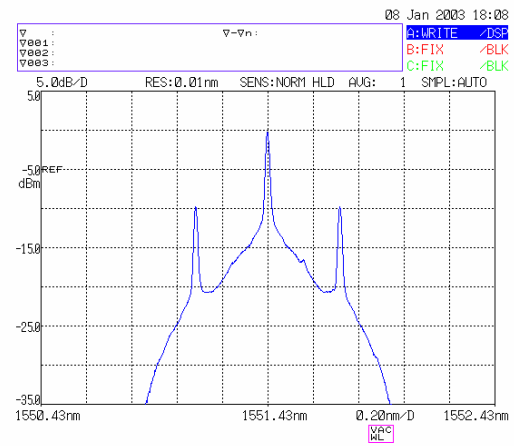
The signal source used in all measurements was an SHF BPG 44 E LJ operating at 40 Gbps. Optical output signals from the SHF 5003 RZ were detected with a high speed photodetector and displayed on an Agilent 86100A oscilloscope with an 86118A 70 GHz plug-in and precision time base. The optical spectra were measured with an ANDO AQ 6317B optical spectrum analyzer.

Input electrical waveform

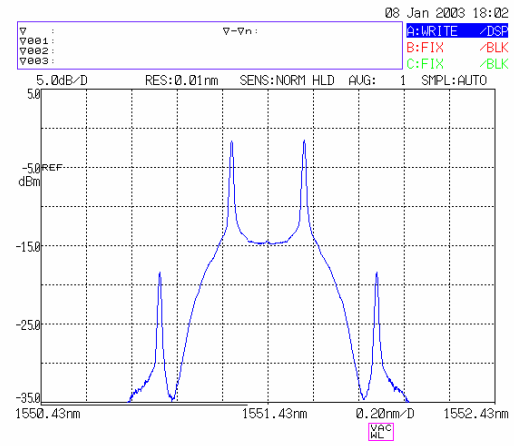
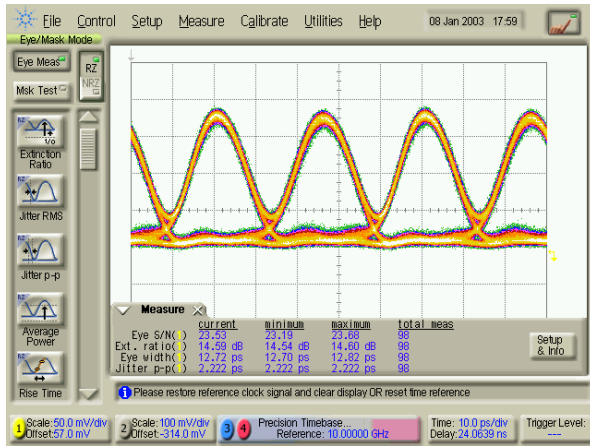




40 Gbps C-RZ optical output waveform



40 Gbps CS-RZ optical output waveform



40 Gbps NRZ optical output waveform

