

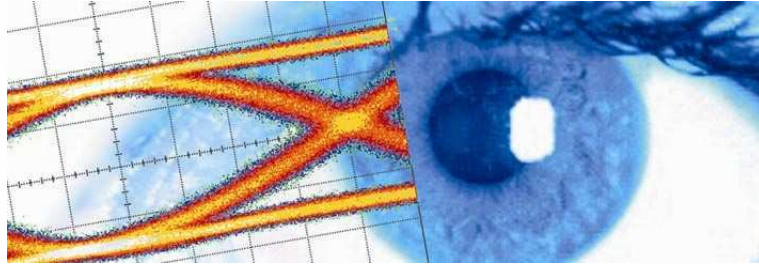


SHF Communication Technologies AG

Wilhelm-von-Siemens-Str. 23D • 12277 Berlin • Germany

Phone ++49 30 / 772 05 10 • Fax ++49 30 / 753 10 78

E-Mail: sales@shf.de • Web: <http://www.shf.de>



Datasheet

SHF 46215A

Optical DP-QPSK Transmitter



Description

The SHF 46215A is an optical transmitter unit featuring Quadrature Phase Shift Keying modulation format in two orthogonal Polarization planes, (DP-QPSK). It is a field replaceable plug-in module which needs to be installed in a mainframe type SHF 10001B or SHF 10000A. Together with other plug-in modules from this instruments series, a modular and scalable measurement system can be put together.

In a single polarization DQPSK (Differential Quadrature Phase Shift Keying) transmission system, the data is transmitted in the differential optical phase change between the symbols. The data is encoded in four different phase states. Since one transmitted symbol includes the information of two bits the symbol rate is reduced by the factor $\frac{1}{2}$. Therefore one advantage of a DQPSK transmission system is a high spectral efficiency. In a **DP-QPSK** transmission system the capacity is doubled by transmitting the data in two orthogonal polarization planes.

The SHF 46215A uses two modulators (one modulator per polarization plane) integrated in parallel, and converting four electrical data streams (I and Q in X- and Y-polarization) of up to 32 Gbps into 1 optical data stream of up to 32 GSymbols/s, and hence a total capacity of up to 128 Gbps. The output optical data in the two orthogonal polarization planes are bit-synchronized in time.

The 4 data channels can be switched On and Off independently, thus permitting to generate either DPSK or DQPSK signals in single- or dual polarisation mode. Therefore, the instrument has a dual-use feature for either DP-BPSK or DP-QPSK for a variety of coherent transmission system investigations.

The DC biases of the MZ modulators are controlled automatically as other SHF optical transmitter instruments, to ensure stability for long term measurements.

An optical pulse carver is available as an option.

To detect and to demodulate the phase information of either the I or the Q channel per polarisation into intensity/amplitude, the 32 Gbps DPSK optical receiver SHF 47215 in combination with a PM-splitter is the ideal instrument. It is possible to switch between the I and the Q channel for eye analysis or BER measurement of both channels separately.

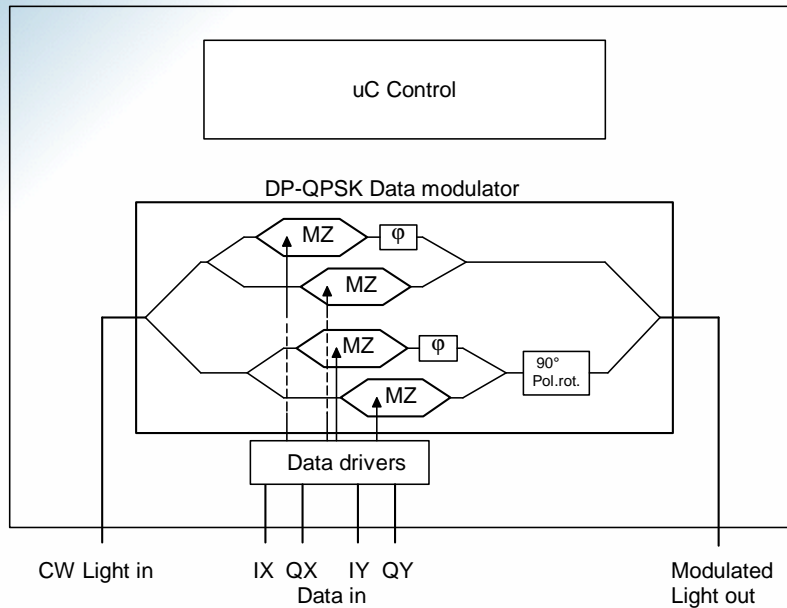
If BER measurements at 32 Gbps are desired, the SHF Bit Pattern Generators (SHF 12103) can provide the pre-coded I and Q data stream pairs.

Features

- 4 x 32 Gbps optical data streams
- All modulators' bias conditions controlled automatically
- Selectable automatic and manual bias control (ABC circuit)
- Operation under DP-BPSK or DP-QPSK mode possible
- All features are computer controlled via BCC software
- Optional pulse carver for RZ operation



Functional block diagram



Specifications – SHF 46215A

Parameter	Unit	Min.	Typ.	Max.	Comment
Optical parameters					
Wavelength range		C- and L-band			
Insertion loss (for each polarization)	dB		14	16	connector to connector, maximum transmission without modulation, option No RZ
DC Extinction ratio	dB	20			
Return loss	dB	30			without optical connector
Electrical and electro-optical parameters					
Electro-optical bandwidth of Data modulator	GHz	23			-3dB electrical
Symbol rate DP-QPSK	Gsym/s	5		33	
Drive amplifier electrical return loss Data	dB			-10	
Drive amplifier input level Data input	Vpp	0.5		0.9	
Dynamic signal to noise ratio DPSK-mode, either Data IX, QX, IY or QY		9	11		measured with SHF 47215 DPSK-receiver. @ 28 Gbps



Absolute maximum ratings

Parameter	Unit	Min.	Typ.	Max.	Conditions
Optical input power	dBm			18	
NRZ data amplifier input power	dBm			4	NRZ data

General specifications

Parameter	Unit	Min.	Typ.	Max.	Conditions
Weight	kg		3.3		
Dimensions	mm		59x213x450		w/o Front panel - Connectors
Power consumption	W		20.5		
Operating temperature	°C	10		35	
Electrical data input connectors					male K (2.92mm)
Optical connectors					FC/PC ¹

¹ Other connectors available on request.



Direct Detection Performance Results

The following equipment was used in obtaining these results:

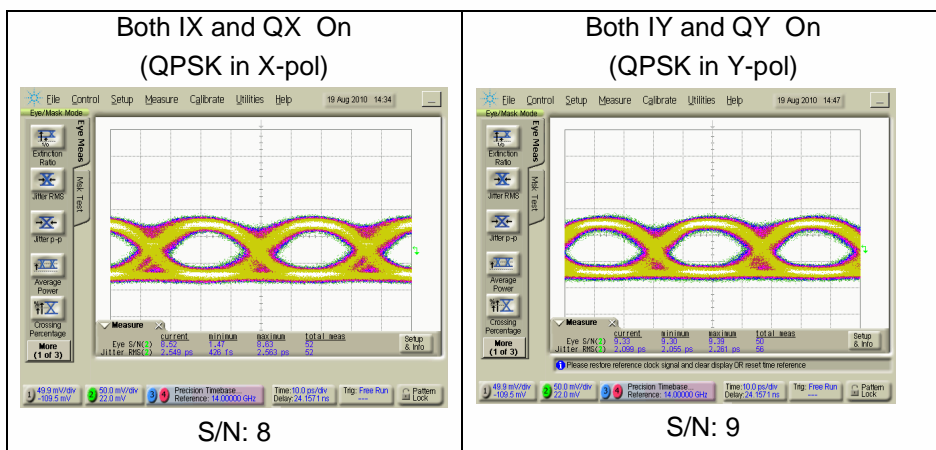
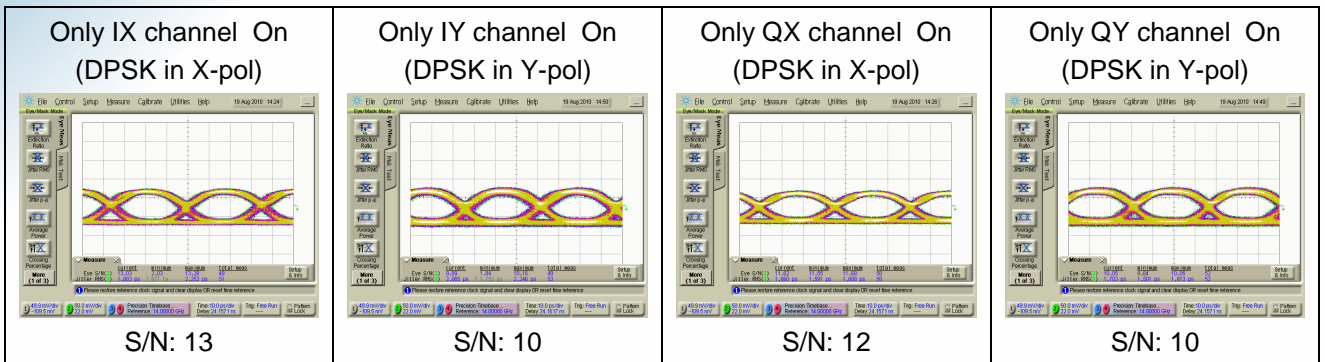
SHF12103 A Pattern Generator at 28 Gbps, PRBS 2³¹-1

SHF 1550DFB Laser source set to 15mW output power @ 1550 nm.

AMPAQ EDFA + band pass filter.

Agilent 86100A DCA with 70GHz plug-in and precision time base module.

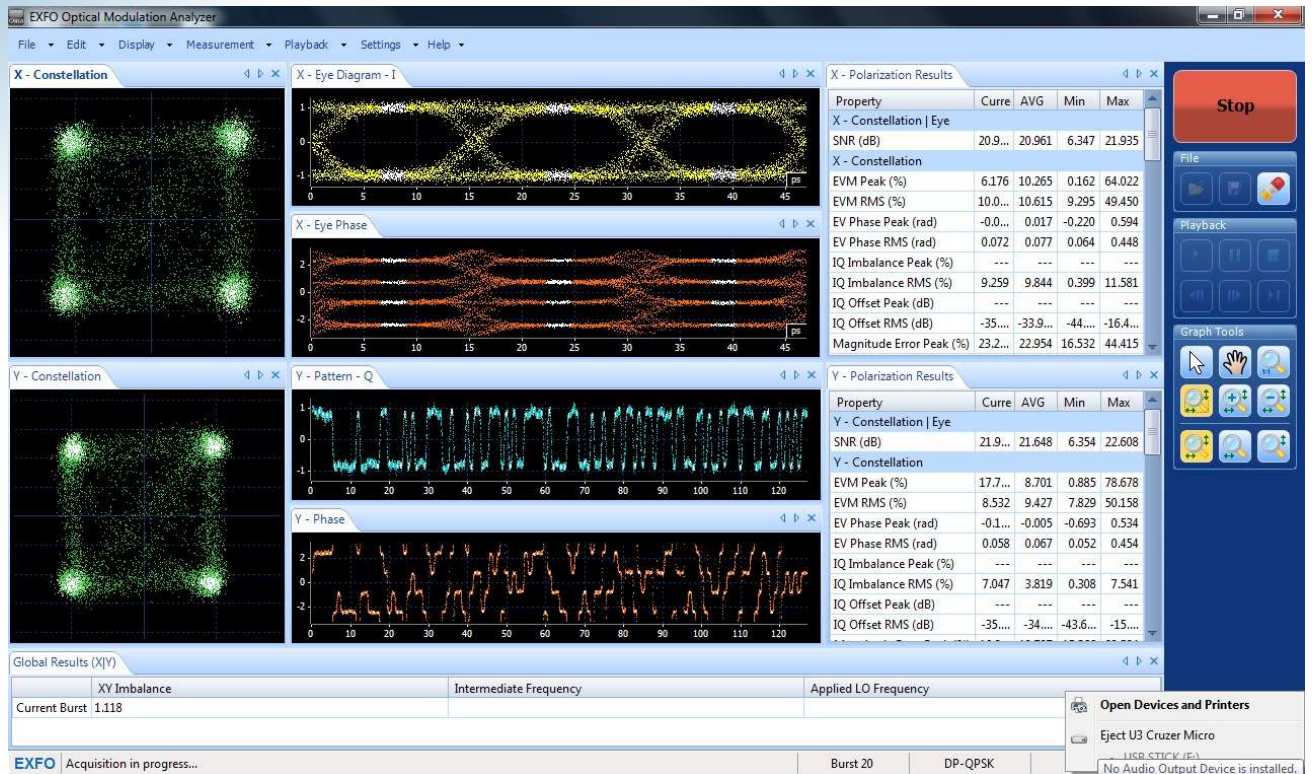
D(Q)PSK signals detected with SHF 47215 28 GBit/s DPSK receiver.





Coherent Detection Characteristics

Figure below shows the dual polarization feature of the transmitter output signal captured by using a commercial high speed coherent constellation analyzer, the EXFO PSO-200, and the corresponding time domain characteristics of the signal. A narrow line width laser source was used at the input. The four 32 Gbps input data channels were provided by using the SHF 12103A Quad-32 bit pattern generator.



Courtesy EXFO.com