



Bi-Directional
 100/200G CFP2-DCO Transceiver

Revision History

Revision	Date	Editor	Reason for Change
1.0	11-12-2019		Initial Release

1 Applicable Industry Standards

- ❖ CFP MSA Hardware Specification, Revision 1.4, 7-Jun-2010
- ❖ CFP MSA CFP2 Hardware Specification Revision 1.0 31-July-2013
- ❖ CFP MSA Management Interface Specification Version 2.6 r06a 24-Mar-2017
- ❖ CFP MSA CFP2 Mechanical Baseline Drawing, Revision 1L
- ❖ Open ROADM / Open White Box: 20171121a-Open-ROADM-MSA-specification-ver-2-00.xlsx
- ❖ OIF IA OIF-CFP2-DCO-01.0 DRAFT
- ❖ CableLabs Point-to-Point Coherent Optical / P2P Coherent Optics PHY Specification / P2PCOSP-PHY-D01-180329 29-Mar-18
- ❖ IEEE 802.3 2015, "IEEE Standard for Ethernet"
- ❖ ITU-T G.959.1 02/2012, "Optical transport network physical layer Interfaces"
- ❖ IEEE 802.3 Clause 45 [spec for MDIO]
- ❖ OIF-CEI-04.0, December 29, 2017

1.2 Detailed Reason for Change

1.2.1 Release 1.0

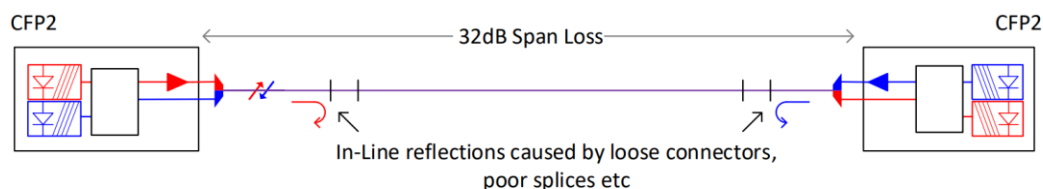
This is the initial release of the full datasheet

2 Introduction

BiDi CFP2-DCO is a digital coherent module designed for bi-directional single-fiber transmission. It is the first digital coherent module in the industry to successfully integrate rich DSP and FEC options, two independently tuned narrow-linewidth lasers, and an optical EDFA in a CFP2 form factor. In addition, BiDi CFP2-DCO is designed to operate under industrial temperature range making it ideal for outside plant applications.

2.1 Product Highlights

- ❖ Coherent 100 and 200 Gb/s bi-directional transmission over a single fiber.
- ❖ Integrated micro-amplifier for provides over 30dB of span budget without external amplification
- ❖ Bi-Directional operation on a single fiber tolerant to high inline reflections due to poor splicing and loose connectors.
- ❖ Designed to support outside plant deployment (- 20°C to 85°C case temperature)



Single Fiber Bi-Directional Coherent Transmission

CFP2-DCO supports the general features listed below:

- ❖ Integrated advanced Coherent DSP and FEC processing
- ❖ 100 Gbps per wavelength up to 4000 km and 200 Gbps per wavelength up to 600 km reach
- ❖ Under 24 W power consumption in 100 Gbps ZR mode

- ❖ 100 GE, OTU4, OTUC2 and mixed mode client interfaces
- ❖ Integrated G.709 OTN processing
- ❖ Support for 100Gbps using DP-QPSK and 200Gbps using DP-16QAM transmission modes
- ❖ Rich choice of inner and outer FEC codes including SD-FEC, SC-FEC (HGFECC), and RS-FEC
- ❖ 6.25 GHz Flex-grid support
- ❖ 100GE client support (4x25G) and OTU4 Client support (4x28)
- ❖ 2 x 100 GE and 2 x OTU4 client interfaces (synchronous and asynchronous)
- ❖ IEEE 802.3 Clause 45 MDIO management interface
- ❖ Control per CFP2 MSA management specification Version 2.6 r06a

CFP2-DCO is based on a state-of-the-art 16 nm process full featured DSP, a silicon photonic coherent integrated modulator receiver assembly, a narrow linewidth micro ITLA, and an integrated EDFA assembly as shown in Figure 1.

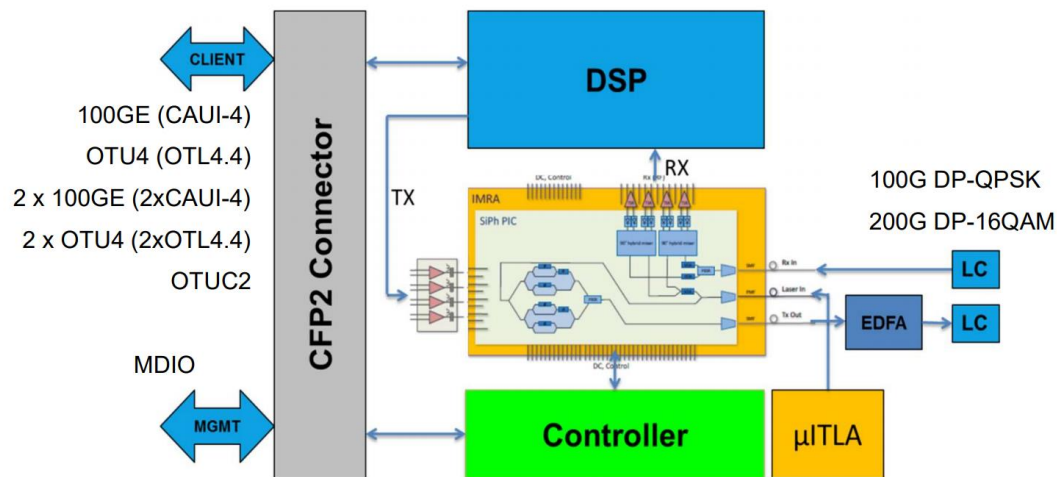


Figure 1. CFP2-DCO Transceiver Module block diagram

2.2 Client Interface

The client interface supports the following client types:

- ❖ 100GE (CAUI-4)
- ❖ OTU4 (OTL4.4)
- ❖ 2 x 100GE (2x CAUI4) for 200G asynchronous
- ❖ 2 x OTU4 (2x OTL4.4) for 200G, synchronous and asynchronous
- ❖ OTUC2 client for 200G

2.3 Client Performance Monitoring

- ❖ Client performance monitoring includes:
 - ❖ PCS/MAC monitor for 100GE
 - ❖ OTN-OH Monitor and insertion for OTU4
 - ❖ LLDP snooping for 100G 100GE (Monitor only in future release)

2.4 Forward Error Correction

The HDFEC block can be configured to support following Line FEC modes:

- ❖ Transparent
- ❖ GFEC
- ❖ SC-FEC (HGFEF or EFEC)

In addition, the SDFEC block can be enabled for the following SDFEC modes

- ❖ Differential Encoding SD-FEC in 100G
- ❖ Non-Differential Encoding SD-FEC 100G and 200G

2.5 Line Interface

Feature	Description
Line Interface	66 Gsample/sec 4 channel DAC
	50 Gsample/sec 4 channel ADC
Line Modulation Format	100G DP-QPSK; Baud Rate < 33 Gbaud
	200G DP-16QAM; Baud Rate < 33 Gbaud
Line Tx Function	Nyquist Filter
Line Coding Options	Differential and Non-Differential coding
Line FEC	7% HD-FEC: GFEC or SC-FEC (staircase FEC)
	20% SD-FEC (LDPC) for HD-FEC+SD-FEC concatenation
Line Signal Bit Rate 100G DP-QPSK	OTU4: 111.8099736 Gbps
	OTU4V1: 127.1564405 Gbps
	OTU4V2: 131.1026749 Gbps
OTU4V2: 131.1026749 Gbps	OTU4 mode: 111.8099736 Gbps x2
	OTU4 mode: 111.8099736 Gbps x2
	OTU4 mode: 111.8099736 Gbps x2

2.6 Typical Applications

The CFP2-DCO is a pluggable transceiver for switches and transport equipment to support DWDM transmission for point to point. The CFP2-DCO supports a wide range of applications from access, 100 km ZR, Long Haul and Ultra Long Haul.

- ❖ CFP2DCO-ZR1-BD supports 100 Gbps, ZR 160 km application for DCI and access
- ❖ CFP2DCO-LH1-BD supports 100 Gbps, Long Haul, 3000 km
- ❖ CFP2DCO-ZR2-BD supports 200 Gbps, ZR 160 km application for DCI and access
- ❖ CFP2DCO-LH2-BD supports 100 Gbps, Long Haul, 3000 km

The part number is selected based on the desired application as shown in the table below.

Part No.	Encoding	Client	FEC	CD(ps/nm)	Data Rate
CFP2DCO-ZR1-BD	Differential	100GE,OTU4	GFEC,EFEC	2,000	100 Gbps
CFP2DCO-LH1-BD	Differential	100GE,OTU4	GFEC,EFEC,SDFEC	55,000,12,000,2,000	100 Gbps
CFP2DCO-ZR2-BD	Differential	100GE,OTU4,OTUC2	EFEC	2,000	100 Gbps ,200 Gbps
CFP2DCO-LH2-BD	Diff and Non-Diff	100GE,OTU4,OTUC2	GFEC,EFEC,SDFEC	55,000,12,000,2,000	100 Gbps ,200 Gbps

Table 1. Module Part Numbers



The default configuration for each part number is as shown in Table 2. The configuration is appended to the part number as shown to convey default settings. The user can specify the default configuration per the ordering information in the product datasheet. In addition, the user has the ability to change the configuration as defined in Table 3 supported modes using the procedure described in this document.

Default Parameter	CFP2DCO-ZR1DGE-BD	CFP2DCO-LH1DGE-BD	CFP2DCO-ZR2DGE-BD	CFP2DCO-LH2DOE-BD
Encoding	Differential	Differential	Differential	Differential
Client	100GE	100GE	2x100GE	2xOTU4
FEC	EFEC(SC-FEC)	EFEC(SC-FEC)	EFEC(SC-FEC)	EFEC(SC-FEC)
Client Interface	Asynchronous	Asynchronous	Asynchronous	Asynchronous
Data Rate	100 Gbps	100 Gbps	200 Gbps	200 Gbps
Nyquist Filter	off	off	off	off
Nyquist Filter α when on	0.15	0.15	0.15	0.15
CD	2,000 ps/nm	55,000 ps/nm	2,000 ps/nm	55,000 ps/nm
MLD(# logical lanes)	20	20	4	4

Table 2. Module Default Configuration

Notes: 1,The default chromatic dispersion compensation (CDC) is configured as defined in Table 2. This is the maximum CDC for the associated license. The user has the ability to reduce the CDC for shorter links with option shown in Table 1.

2,CFP2DCO-ZR2/UL2 can be configured for 100G operation. The CFP2DCO-UL2 when configured for 100G can support up to 80000 ps/nm chromatic dispersion compensation. The CFP2DCO-ZR2 can only support 2000 ps

4 Absolute Maximum Rating

Parameter	Symbol	Min	Max	Units	Notes
Case Operating Temp.	TOP	0	70	°C	C-Band Tunable
Storage Temp.	TSTO	-40	85	°C	
Relative Humidity	RH	5	85	%	Non-condensing
Input Rx Power			10	dBm	
3.3 VDC Supply Current			9.37	A	

5 Electrical Specifications

Parameter	Symbol	Min	Typ.	Max	Units	
Absolute Maximum Power Supply Voltage	Vcc			3.6	V	
Operating Power Supply	Voltage	Vcc	3.2	3.3	3.4	V
	Current	Icc	-	-	9.37	A
Low Power Mode Dissipation	Plow			2	W	
Inrush Current	Iinrush			100	mA/usec	
Turn-off Current	Iturnoff	-100			mA/usec	
Power Supply Noise	Vrip			2%	DC-1MHz	
				3%	1-10MHz	

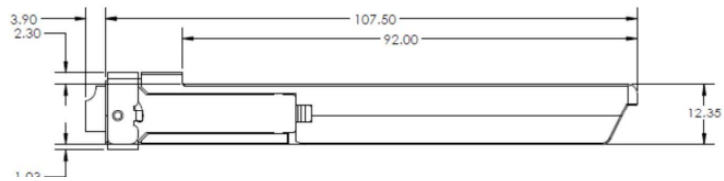
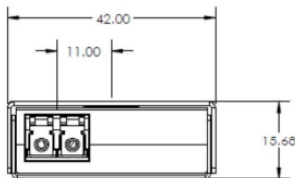
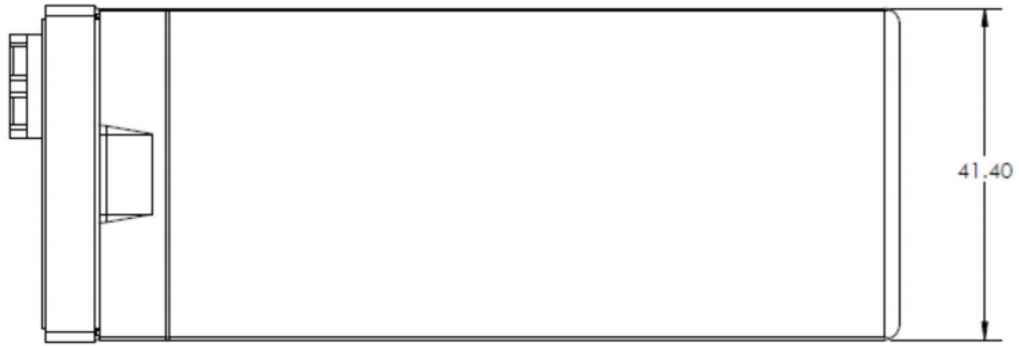
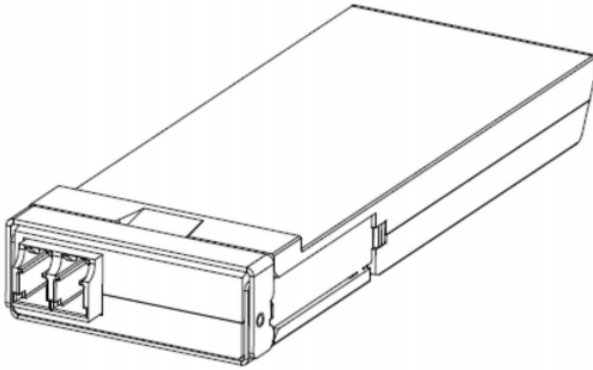
6 Transmitter Optical Specifications

Parameter	Symbol	Min	Typ.	Max	Units
Host Native Nominal Bit Rate (100G/200G) for 100GE, OTU4 and OTUC2 clients		4 x 25.781(CAUI-4)/ 8x25.781 (2 x CAUI-4) 4x27.952(OTL4.4)/ 8x27.952 (2 x OTL4.4)			Gbps
DWDM Line Interface Bit Rate		111.810 (GFEC or SC-FEC)/ x2 for 200G 127.156 (Diff SD-FEC)/ x2 for 200G 131.103 (Non-Diff SD-FEC)/ x2 for 200G 112.804 x 2 (OTUC2')			Gbps
Modulation		DP-QPSK for 100 Gbps DP-16QAM for 200 Gbps			
OTN Interface Bit Rate Deviation		±20			ppm
Client Symbol Rate Accuracy		±100			ppm
DWDM Frequency Range(2.5 THz)	fWDM	192.0	-	195.5	THz
Blue Band		192.0		193.3	THz
Red Band		194.3		195.5	THz
Frequency Accuracy	fEOL	-2.5	-	+2.5	GHz
Tx Output Power	POUT	-15		+7	dBm
Tx Output Power Step Size		0.25			dBm
Tx Output Power Stability		-0.5		0.5	dBm
Tx Power when Disabled				-40	dBm
Transmitter OSNR (in-band) 100G QPSK Transmitter OSNR (in-band) 200G-16QAM		35			dB/0.1 nm
Transmitter OSNR (out-of-band)		33			dB/0.1 nm
Tx Optical reflection tolerance				0	dB
Tx Optical Return Loss		27			dB
Tx Enable Time (cold start)				90	sec
Tx Enable Time (warm start)				1	sec
Tx Disable Time				10	ms

7 Receiver Optical Specifications

Parameter	Symbol	Min	Typ.	Max	Units
Rx Power Sensitivity at Tx OSNR: 100Gb/s, 200Gb/s		-27			dBm
Rx OSNR Sensitivity 100G QPSK diff HG FEC 200Gb/s 16 QAM		11 19			dB/0.1nm
CDC for 100G solutions				50.000	ps/nm
Rx Power Monitoring Accuracy		-2		2	dB
Rx Port Optical Return Loss		20			dB
Rx Cold Start Acquisition Time				60	sec
Rx Re-Acquisition Time				20	ms
LOS Threshold		-35		-30	dBm
LOS Hysteresis		1			dB

8 Mechanical Specifications



For more information pls contact : sales@fiberroad.com.cn <https://www.fiberroad.com.cn>

About the ordering information, please contact pre-sales for tailoring your needs.

