

CFP2 100G DCO C-band 50GHz SMF LC Digital Coherent Optical Transceiver Modules

FSTC2D-100G-XX-X

Features

- Operating optical data rate up to 128Gbps
- Transmission distance up to 2000km
- CD tolerance max. 40000ps/nm
- DGD tolerance 50ps
- Low latency HD-FEC/SD-FEC
- Full C-Band 50GHz ITU-T Grid
- Built in Client and line OTN Processing
- Hot pluggable electrical interface
- Typical power dissipation 17/22 W
- Operating case temperature 0°C to +70°C
- Single 3.3V power supply
- 2*LC Fiber connections
- CFP2 MSA compliant
- IEEE 802.3ba MAC compliant
- OTL4.4 and CAUI-4 compatible
- PRBS generation and detection for line and host interfaces
- RoHS compliant(Lead Free)
- ZR、MR、LH Application
- Single ITLA



Applications

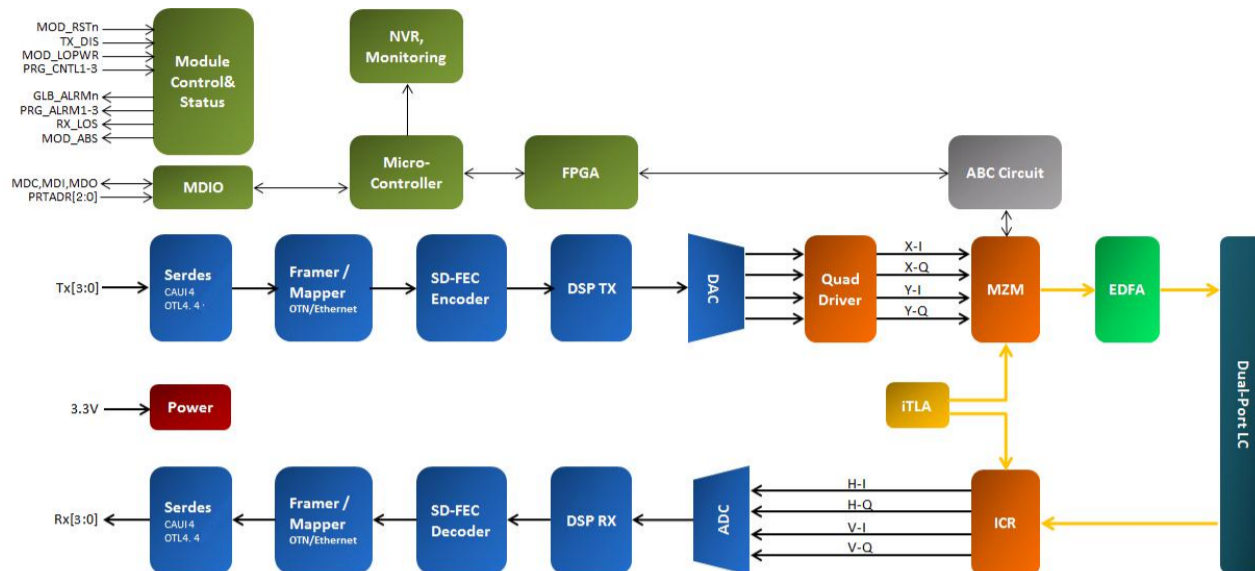
- 100GbE IEEE 802.3bj;
- ITU-T G.709/Y.1331 for Optical transport network
- Switch to switch interface or Switch to router interface
- Access, Metro, Long-haul Ethernet DWDM Networks

Description

The FiberStamp 100G CFP2 DCO module is the CFP2 optical transponder which is a hot pluggable form factor designed for high speed optical networking application. The module is designed for 100Gigabit Ethernet and OTU4 application, CAUI-4 and OTL4.4 electrical interface and MDIO module management interface. The module converts 4-lane OTU4/100G Electrical data streams to DP-D/QPSK optical output signal in Egress, and also converts DP-D/QPSK optical input signals to 4-lane electrical data streams in



Ingress. This 4-lane electrical signal is fully compliant with 802.3ba CAUI specification and OIF-CEI-03.1 specification, and allows M6 host PCB trace up to 25cm. The block diagram is illustrated below, DSP is used for electric data signals generation and recovery, ITLA is a full C_Band wavelength tunable assemble which is used for optical signal carrier in egress and for coherent receive in ingress, MZM is used for E-O convert in egress and ICR is used for O-E convert in ingress, the optical signals format is DP-D/QPSK, EDFA is used for optical signal amplify that we can get suitable output optical power.



Module Block Diagram

Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
Storage Temperature Range	Ts	°C	-40	+85
Relative Humidity	RH	%	5	85
Power Supply Voltage	Vcc	V	-0.5	+ 3.6
Operating Case Temperature Range	Tc	°C	-5	75
Receiver Optical Power	Pdag	dBm		+3

Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Typ	Max
Operating Case Temperature Range	Tc	°C	0		70
Power Supply Voltage	Vcc	V	3.2	3.3	3.4
Data rate		Gb/s		103.125	112

Products Characteristics

(Tested under recommended operating conditions)

Parameter	Symbol	Unit	Min	Typ	Max	Notes
Voltage Supply Electrical Characteristics						
Supply Current		a	-	-	7	
Power Supply Noise	Vrip				2%	DC-1MHz
					3%	1-10MHz
Dissipation Class3/4	Pw	W		21	24	LH
				18	19	MR
				17	18	ZR



Parameter	Symbol	Unit	Min	Typ	Max	Notes
Low Power Dissipation	P _{low}	W			2	
Inrush Current n 2	I _{inrush}	mA/usec			100	
Turn-off Current Class2	I _{turnoff}	mA/usec	-100			
Different Signal Electrical Characteristics						
Single Ended Data Input Swing		mV			525	
Single Ended Data Output Swing		mV	150		385	
Differential Signal Resistance	Output	Ω	80		120	
Differential Signal Resistance	Input	Ω	80		120	
3.3V LVCMOS Electrical Characteristics						
Input High Voltage	3.3VIH	V	2.0		V _{cc} +0.3	
Input Low Voltage	3.3VIL	V	-0.3		0.8	
Input Leakage Current	3.3IIN	uA	-10		+ 10	
Output High Voltage(I _{oh} =100uA)	3.3VOH	V	V _{cc} -0.2		-	
Output Low Voltage (I _{oi} = 100uA)	3.3VOL	V			0.2	
Minimum Pulse Width of Control Pin Signal	T _{CNTL}	us	100			
1.2V LVCMOS Electrical Characteristics						
Input High Voltage	1.2VIH	V	0.84		1.5	
Input Low Voltage	1.2VIL	V	-0.3		0.36	
Input Leakage Current	1.2IIN	uA	-100		+ 100	
Output High Voltage	1.2VOH	V	1.0		1.5	
Output Low Voltage	1.2VOL	V	-0.3		0.2	
Output High Current	1.2IOH	mA			-4	
Output Low Current	1.2IOL	mA	+4			
Input Capacitance	C _i	pF			10	
Optical Transmitter Characteristics						
Signaling Rate for Each Lane (100GE)		Gbps	-	25.78125+/-100 ppm		100GE
Signaling Rate for Each Lane (OTU4)			27.95249+/-20p pm		OTU4	
Wavelength Range	DWDM	nm	1529.16	-	1567.13	
Channel Spacing	F_SPACING	GHz	50			
Laser Tuning Range	F_TUNE	Full C-band 96				
Wavelength Accuracy	λ _{EOL}	GHz	-2	-	2	
Output Power	P_OUT	dBm	-15	0	+2	With EDFA adjustable
			-12	-8	-6	Without WDFFA fixed



Parameter	Symbol	Unit	Min	Typ	Max	Notes
Output Power Accuracy	P-a	dB	-1		1	BOL
			-2		2	EOL
Output Power Stability	Short time	dB	-0.3		0.3	
Shutdown Optical Power	POFF	dBm			-40	
Spectral Width @-20dB		GHz		50	53	
Transmitter Warm-Start Ready Time		ms		100		
Transmitter Cold-start Ready Time		s		120		
Transmitter OSNR		dB/0.1nm	35			
Transmitter Polarization Imbalance		dB	-1		1	
Optical Receiver Characteristics						
Receive Rate for Each Lane(100GE)		Gbps		25.78125+/-100 ppm		100GE
Receive Rate for Each Lane(OTU4)					27.95249+/-20 ppm	
Wavelength Range	DWDM	nm	1529.16	-	1567.13	
Receiver Operating Range	Pw	dBm	-18	-	0	
Receiver B2B Optical power Sensitivity2	O_sense	dBm	-21			
LOS assert	LOS_a	dBm			-21	
LOS De-assert	LOS_d	dBm	-18			
LOS hysteresis	LOS_h	dB		0.5		
ZR OSNR (@BER=4E-3)	OSNRMIN	dB/0.1nm		17		HD-FEC
MR OSNR (@BER=3E-3)	OSNRMIN	dB/0.1nm		15.5		HD-FEC
LH OSNR (@BER=2e-2)	OSNRMIN	dB/0.1nm		13		SD-FEC
Chromatic Dispersion Compensation3	CD	ps/nm			2000	ZR
		ps/nm			12000	MR
		ps/nm			25000/ 400003	LH
Filter Tolerance	OTF	GHz	30	45		
PMD Capability (DGD)	DGD	ps			50	
PDL Tolerance	PDL	dB			3	
Polarization SOP Tracking	SOP	kHz			20	
Receiver Warm-Start Turn-Up Time		s			30	



Parameter	Symbol	Unit	Min	Typ	Max	Notes
ReceiverCold-Start Turn-Up Time		s		60		



Note:

1. The supply current includes CFP2 module's supply current in pending status.
2. The module will be switched into Hold-state when input power lower than -21 dBm;
3. Please specify the CD requirement by ordering.

Hardware Control Pins

The CFP2 Module support real-time control functions via hardware pins, listed in the following table: Hardware Control Pins

Pin#	Symbol	Description	I/O	Logic	H	L	Pull-up/down
17	PRG_CNTL1	Programmable Control 1 MSADefault: TRXIC_RST n , TX&RX ICs reset, "0 " :reset; "1"	I	3.3V LVCMOS	Per CFP2 MSA Management Interface Specification		Pull-Up1
18	PRG_CNTL2	Programmable Control 2 MSADefault : Hardware Interlock LSB	I	3.3V LVCMOS			Pull-Up1
19	PRG_CNTL3	Programmable Control 3 MSA Default:Hardware Interlock MSB	I	3.3V LVCMOS			Pull-Up1
24	TX_DIS	Transmitter Disable	I	3.3V LVCMOS	Disable	Enable	Pull-Up1
26	MOD_LOPW R	Module Low Power Mode	I	3.3V LVCMOS	Low Power	Enable	Pull-Up1
28	MOD_RSTn	Module Reset(Invert)	I	3.3V LVCMOS	Enable	Reset	Pull-Down2

Note:

1. Pull-Up resistor (4.7KOhm to 10Kohm) is located within the CFP2 module
2. Pull-Down resistor (4.7KOhm to10Kohm) is located within the CFP2 module

Hardware Alarm Pins

The CFP2 Module supports alarm hardware pins listed in the following table: Hardware Alarm Pins

Pin#	Symbol	Description	I/O	Logic	H	L	Pull-up/down
20	PRG ALRM 1	Programmable Alarm 1 MSADefault:HIPWR_ON	O	3.3V LVCMOS	Active High per MDIO document		
21	PRG ALRM 2	Programmable Alarm 2MSA Default:MOD_READY , Ready State has been reached	O	3.3V LVCMOS			
22	PRG ALRM3	Programmable Alarm 3 MSA Default: MOD FAULT	O	3.3V LVCMOS			
27	MOD_ABS	Module Absent	O	3.3V LVCMOS	Absent	Present	Pull-Down1
25	RX_LOS	Receiver Loss of Signal	O	3.3V LVCMOS	Loss of Signal	OK	

Note:

1. Pull-Down resistor (less than 100 ohm) is located within the CFP2 module



The CFP2 Module supports alarm, control and monitor functions via an MDIO bus. The CFP2 MDIO pins are listed in the following table: Management Interface Pins

Pin#	Symbol	Description	I/O	Logic	H	L	Pull-up/down
29	GLB_ALRMn	Global Alarm	O	3.3V LVC MOS	Ok	Alarm	
32	MDIO	Management Data Input Output Bi-Directional Data	I/O	1.2V LVC MOS			
31	MDC	MDIO Clock	I	1.2V LVC MOS			
33	PRTADR0	MDIO Physical Port address bit0	I	1.2V LVC MOS	per MDIO document		
34	PRTADR1	MDIO Physical Port address bit1	I	1.2V LVC MOS			
35	PRTADR2	MDIO Physical Port address bit2	I	1.2V LVC MOS			

Management Interface Pins(MDIO)

Hardware Signaling Pin Timing Requirements

Timing Parameters for CFP2 hardware Signal Pins are listed in the following table.

Parameter	Symbol	Min	Max	Unit	Notes&Conditions
Hardware MOD_LOPWR assert	t_MOD_LOPWR_assert		10	ms	Application Specific May depend on current state Condition when signal is applied
TX Disable Assert Time	T_off		10	ms	

High Speed Clock Characteristics

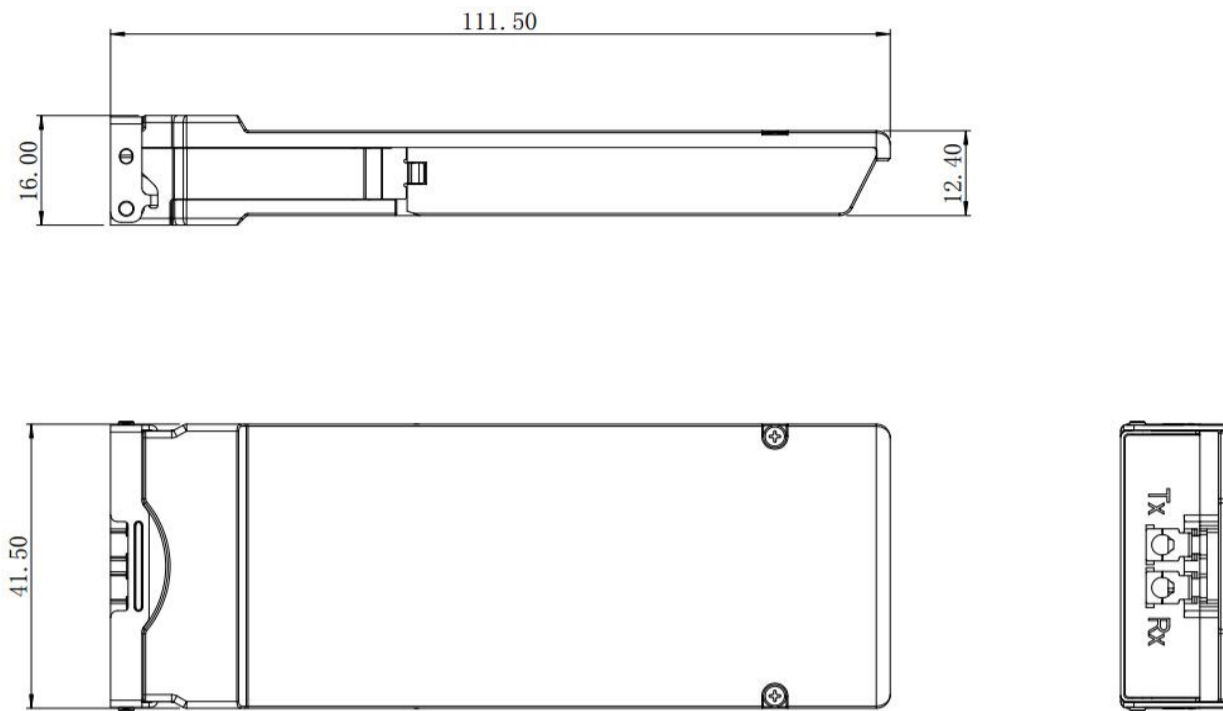
100G CFP2 DCO use inner REFCLK, Customer do not need to provide this clock. The output TXMONCLK is not support and the RX MONCLK characteristics is shown below

Items	Symbol	Min	Typ	Max	Units	Notes
Host Side RX_MONCLK (Optional)						
Impedance	Zd	80	100	120	Ω	Differential
RXMONCLK Frequency	Freq		1.164		GHz	OTU4
			1.074			100GE
Output Differential Voltage	V-out Differential	800		1200	mV-pp	OTU4
		800		1200		100GE
Return Loss	SDD22			-12	dB	



Mechanical Dimensions

Unit(MM),General Tolerance:±0.1mm



Regulatory Compliance

FiberStamp 100G CFP2 DCO transponders are Class 1 Laser Products. They are certified per the following standards:

Feature	Standard
Laser Safety	IEC 60825-1:2014 (3rd Edition) IEC 60825-2:2004/AMD2:2010 EN 60825-1-2014 EN 60825-2:2004+A1+A2
Electrical Safety	EN 62368-1: 2014 IEC 62368-1:2014 UL 62368-1:2014
Environmental protection	Directive 2011/65/EU with amendment(EU)2015/863
CE EMC	EN55032 2015 EN55035 2017 EN61000-3-2:2014 EN61000-3-3:2013
FCC	FCC Part 15, Subpart B ANSI C63.4-2014

Ordering information

Part Number	Product Description
FSTC2D-100G-ZR-1	CFP2, 100GE/OTU4,ZR,Tunable,C_band, with EDFA
FSTC2D-100G-ZR-0	CFP2, 100GE/OTU4,ZR,Tunable,C_band, without EDFA
FSTC2D-100G-MR-1	CFP2, 100GE/OTU4,MR,Tunable,C_band, with EDFA
FSTC2D-100G-MR-0	CFP2, 100GE/OTU4,MR,Tunable,C_band, without EDFA
FSTC2D-100G-LH-1	CFP2, 100GE/OTU4,LH,Tunable,C_band, with EDFA
FSTC2D-100G-LH-0	CFP2, 100GE/OTU4,LH,Tunable,C_band, without EDFA

References:

- IEEE 802.3ba;
- ITU-T G.709/Y.1331



RoHS 2.0 compliant (2011/65/EU, lead free)
CFP2-MSA-HW-Spec-rev1.0
CFP_MSA_MIS_V2p6r06a
CFP2_MSA_Module-Dimensions_APRIL07-10
CFP2_MSA_Host-Mechanical-drawings
OIF-MSA-100GLH-EM-02.1
Regulation (EC) No.1907/2006(REACH)
Tested in accordance with Telcordia GR-468
IEC 60825-1:2014
EN 60825-1:2014
EN 60825-2:2004+A1+A2
FDA CDRH 21 CFR 1040
EN 60950-1:2006+A11+A1+A12+A2
EN 62368-1: 2014+A11:2017
UL 60950-1 & CAN/CSA C22.2 No. 60950-1
UL 62368-1:2014
IEC 60950-1:2005+AMD1:2009+AMD2:2013
IEC 62368-1:2014
GB 4943.1-2011
47 CFR FCC Part 15 Subpart B
EN 55032:2015
EN 55024:2010+A1:201

 **CAUTION:**

Use of controls or adjustment or performance of procedures other than those specified herein may result in hazardous radiation exposure.

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