XDBxx1-xxLx

2-channel 1250Mbit/s Bi-Di CSFP with LC Receptacle Single 3.3V Power Supply

Features

o 2 channel transmission in current SFP outline.

o Single + 3.3 V power supply.

o Single fiber full duplex solution

o 1310 nm FP, 1490nm DFB or 1550nm DFB laser diode transmitter. (See ordering information)

o 1550nm, 1490 nm or 1310nm PIN photodiode detector with preamplifier.

o IEEE802.3A H 100BASE-BX, OC-3/STM-1SONET/SDH, 1000BASE-BX (See ordering information)

o Integrated WDM filter for 1310/1490 nm 1550/1310nm or 1490/1310nm transmitting/receiving light. (See ordering information)

o Compact small form factor pluggable MSA compliant.

o Standard LC receptacle optical interface.

o Hardware TX_fault, LOS and TX_disable function.

o RoHS 6 compliant

Applications

o SONET OC-24 system
o Gigabit Ethernet

o Fiber Channel

o Switch to Switch interface

o Point to Point FTTH Application

o Other optical transmission systems

Description

This Compact Small Form Factor Pluggable (CSFP) optical transceiver is a bidirectional single fiber optical module designed for point-to-point application. There are 2 single fiber duplex transmissions in current SFP form factor. There it could double the port density of current equipment or linecard.

I. Absolute Maxima Ratings

Parameter	Symbol	Min	Typ	Max	Unit
Storage temperature (operation and no operation)	T_S	-40		85	°C
Supply voltage	V_{CC}	0		3.8	V
Relative humidity (non-condensing)	RH			85	%
Static discharge voltage (human body mode)	ESD			500	V
Receiver damage threshold				+3	dBm

II. General Characteristics

Parameter	Symbol	Min	Typ	Max	Units
Data rate			1250[1]		Mbps
Operating case temperature (Commercial temperature option) (Industrial temperature option)	T_{CASE}	0 -40		70 85	°C
Supply current (TX+RX) for each channel	I_{CC}			300	mA
Total supply current (2 channels)	Icc			600	mA

[1]. Maximum operating data rate if M is indicated in mode number

III. Transmitter Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Electrical					
Supply voltage	V_{CC}	3.135	3.3	3.465	V
Supply current	Refer to General Characteristics				mA
Data differential input voltage swing[1]	$V_{in, pp}$	500		2400	mV
TX enable input voltage[2] [3]	V_{en}	0		0.8	V
TX disable input voltage[2] [3]	V_{dis}	2.0		3.465	V
Optical					
Output optical power	P_O	-9 -8 -6		-3[4] -3[5] 2[6]	dBm
Central wavelength	λ_{c} [7] [8]	1260 1480 1540	1310 1490 1550	1360 1500 1560	nm
Spectral width (RMS)	$\Delta\lambda$ [7] [8]	IEEE802.3AH 1000Base BX10-U, Table 59-4		1	nm
Output optical power TX disabled	$P_{O,OFF}$			-45	dBm
Extinction ratio [8]	ER	9			dB
Optical eye diagram[8] [9] Transmitter eye mask definition {X1, X2, Y1, Y2, Y3}	-	0.22, 0.375, 0.20, 0.20, 0.30			UI

[1]. Internally AC coupled
[2]. Compatible with LVTTL
[3]. levels For Tx_Disable pin
[4]. 10Km option
[5]. 20Km option
[6]. 40km option
[7]. For XDB341-xxLx
[8]. For XDB431-xxLx, for XDB531-xxLx
[9]. With pattern $PRBS2^{7}-1$, 4th Order Bessel-Thompson filter ON.
[10]. Refer to IEEE802.3AH-2004 Figure 58–5—Transmitter eye mask definition

IV. Receiver Characteristics

Parameter	Symbol	Min	Typ	Max	Unit
Electrical					
Supply voltage	Vcc	3.14	3.3	3.47	V
Supply current	Refer to General Characteristics				mA
Data differential output voltage swing		500		1600	mV
LOS output level high[1]		2		Vcc+0.165	V
LOS output level low[1]		0		0.8	V
Optical					
Input optical saturation power [2]	Psat1	-3			dBm
Input optical sensitivity [2]	Psen1			-20 [3] -22.5[4] -25 [5]	dBm
Input optical wavelength	[6] [7]	1480 1260		1500 1380	nm
LOS de-assert	Psda			-20 [3] -22.5 [4] -25 [5]	dBm
LOS assert	Psdd	-45			dBm
LOS hysteresis	H	0.5	2	6	dB

[1]. Compatible with LVTTL levels

[2]. Measured at back-to-back with PRBS2^7-1, Bit Error Rate 10^{-12} , ER=9, standard light source.

[3]. For XDBxx1-10Lx (10km option)

[4]. For XDBxx1-20Lx (20km option)

[5]. For   XDBxx1-40Lx (40km option)

[6]. For XDB341-xxLx

[7]. For XDB431-xxLx, XDB531-xxLx

# V. Recommended Circuit Diagram
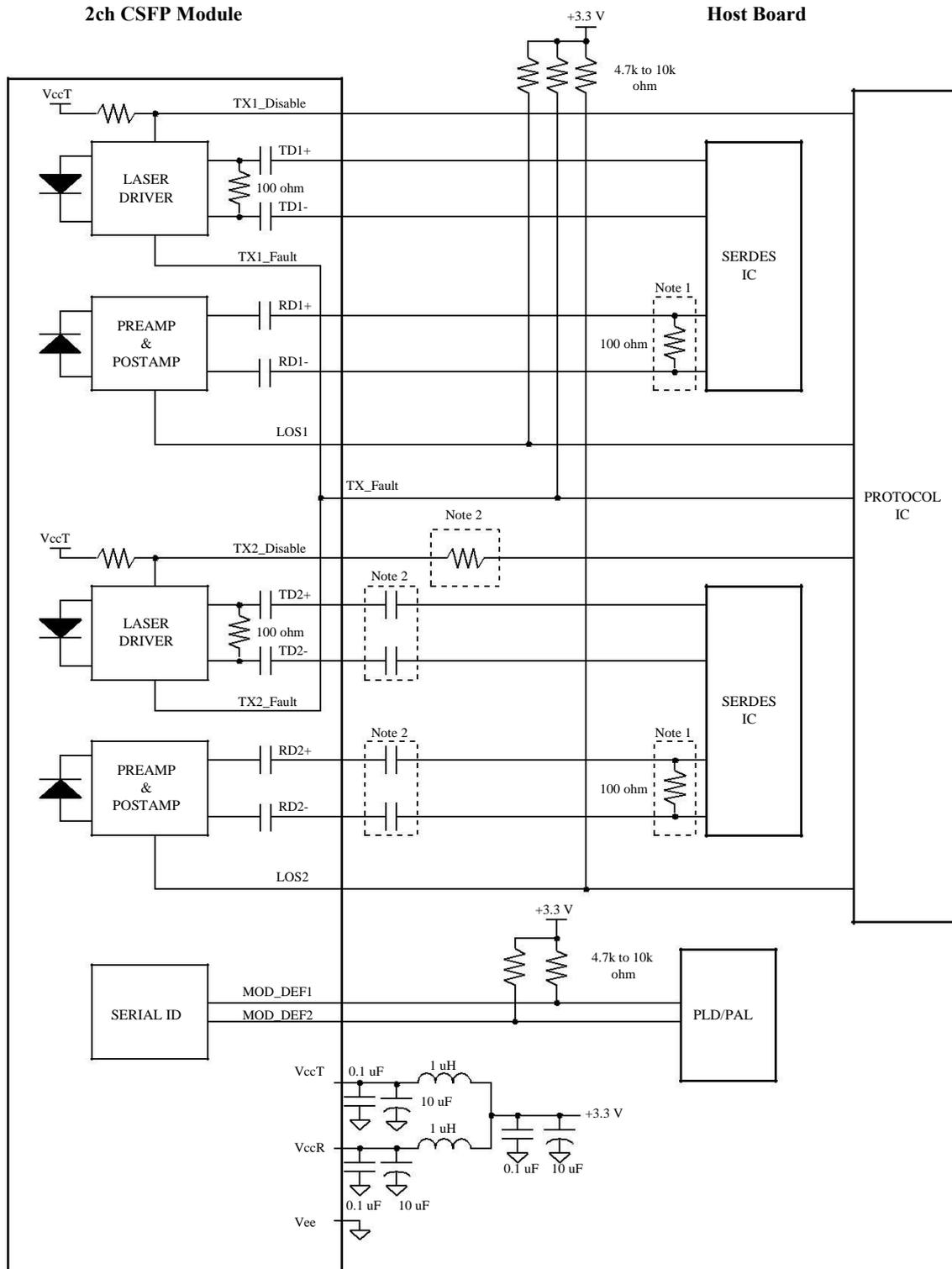
2ch Compact SFP (option 2) circuit diagram

Note 1. Consult the SERDES manufacturer for the termination method.

Note 2. Protections from incorrect insertion are strongly recommended.

Note 3. CSFP option 2 is designed to be backward compatible with conventional SFP. In order to prevent mistakenly insertion with conventional SFP into CSFP option 2 connector, resistor on Tx disable2 and capacitors on TD2 and RD2 lines are recommended to protect the circuit on linecard. Tx disable1, TD1 and RD1 are the same pin layout as conventional SFP and protection circuit is not required.

VI. Pin Definition and Descriptions

```
20  Vee              1  Vee
19  TD1-             2  TX_Fault
18  TD1+             3  TX1_Disable
17  TX2_Disable      4  MOD-DEF2
16  VccT             5  MOD-DEF1
15  VccR             6  TD2-
14  LOS2             7  TD2+
13  RD1+             8  LOS1
12  RD1-             9  RD2+
11  Vee             10  RD2-

   Top of Board      Bottom of Board
               (as view through top of board)
```
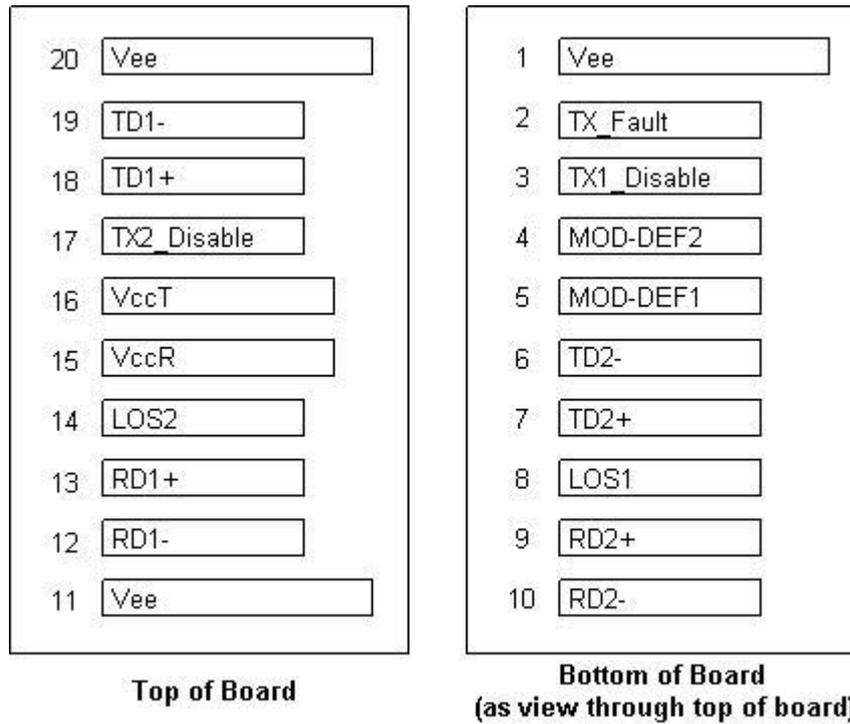
2ch Compact SFP (option 2) Electrical Pad Layout

Pin	Name	Input-Output /Level	Description	Ref.
1	VEE	Input	Transceiver ground, common for 2 channels	
2	Tx_Fault	Output	Open collector/drain output, high signal indicates fault in one of the TX channels	
3	TX_DIS1	Input/LVTTL	Transmitter disable control of channel 1, high signal disables optical output	
4	SDA	Input/Output	I2C data (SDA)	
5	SCL	Input	I2C clock (SCL)	
6	TD-2	Input	Inverted transmitter data input of channel 2 (internally AC coupled)	
7	TD+2	Input	Non-inverted transmitter data input of channel 2 (internally AC coupled)	
8	LOS1	Output	Open collector/drain output, high signal indicates los of signal in RX channel 1	
9	RD+2	Output	Non-inverted receiver data output of channel 2 (internally AC coupled)	
10	RD-2	Output	Inverted receiver data output of channel 2 (internally AC coupled)	
11	VEE	Input	Transceiver ground, common for 2 channels	

12	RD-1	Output	Inverted receiver data output of channel 1 (internally AC coupled)	
13	RD+1	Output	Non-inverted receiver data output of channel 1 (internally AC coupled)	
14	LOS2	Output	Open collector/drain output, high signal indicates los of signal in RX channel 2	
15	VccR	Input	Receiver power, common for 2 channels	
16	VccT	Input	Transmitter power, common for 2 channels	
17	TX_DIS2	Input/LVTTL	Transmitter disable control of channel 2, high signal disables optical output	
18	TD+1	Input	Non-inverted transmitter data input of channel 1 (internally AC coupled)	
19	TD-1	Input	Inverted transmitter data input of channel 1 (internally AC coupled)	
20	VEE	Input	Transceiver ground, common for 2 channels	

2ch Compact SFP (option 2) Pin descriptions

VII Diagram of Host Board Connector Block Pin Numbers and Names
****Same as the ones defined in SFP MSA except for pin assignment and functions. See INF-8074i for the details**
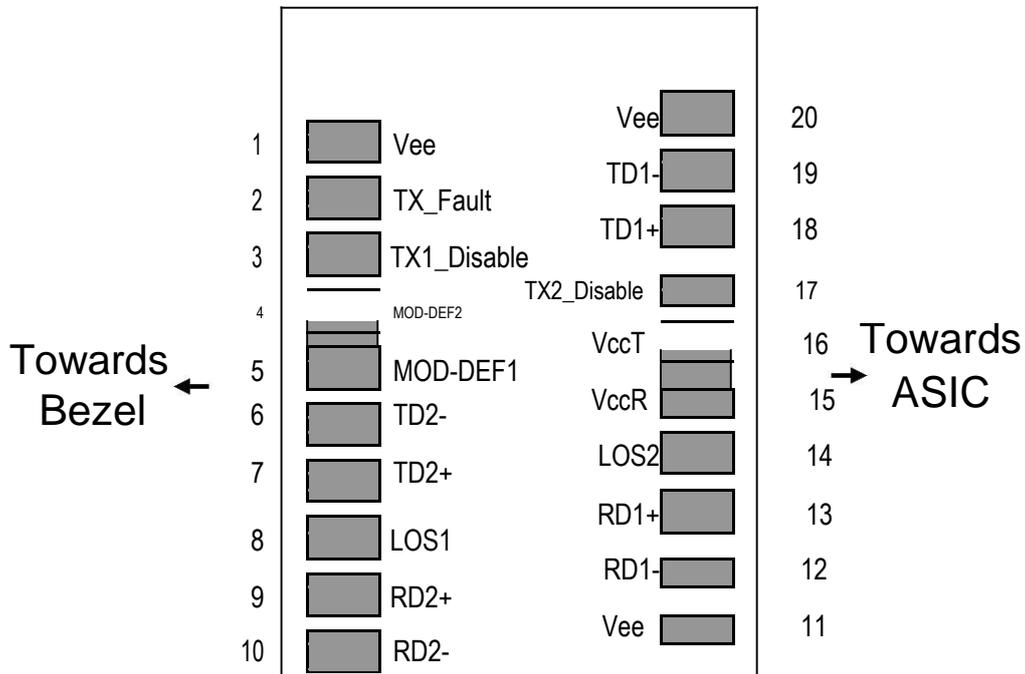
Diagram of Host Board Connector Block Pin Numbers and Names (option 2)

IX. Mechanical Outlines:

Channel 2

Channel 1
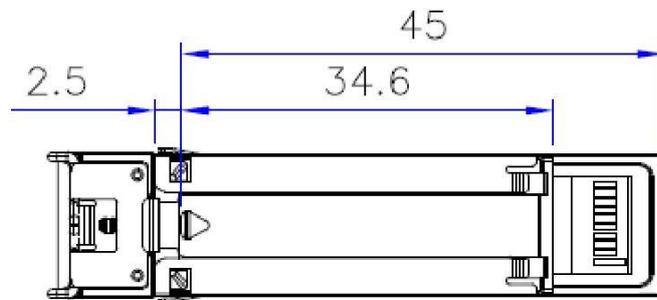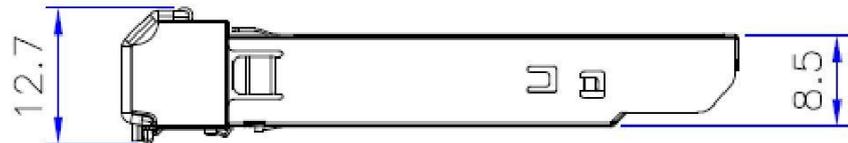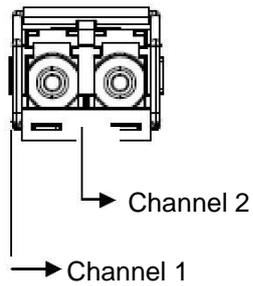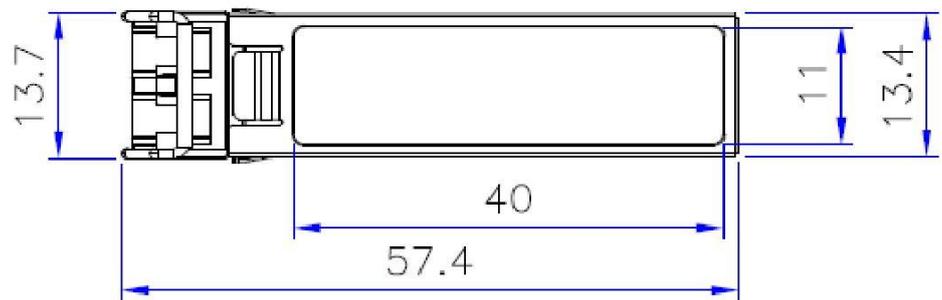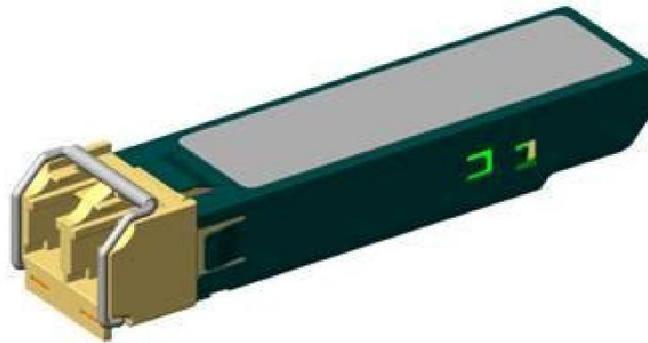
X. EEPROM memory contents:
Two-wire interface ID: addresses A0h (Note 4)

Addr.	Field Size (Byte)	Name of Filed	Description	Hex
0	1	Identifier	SFP	03
1	1	Ext. Identifier	GBIC/SFP function is defined by serial ID only	04
2	1	Connector type	LC connector	07
3~10	8	Transceiver	GbE compliance codes: BASE-BX10	00 00 00 40 00 00 00 00
11	1	Encoding	NRZ	03
12	1	BR, Nominal	1300Mbps	0D
13	1	Rate identifier		00
14	1	length (SMF)-Km	10Km 20Km	0A (10Km option) 14 (20Km option) 28 (40km option)
15	1	Length (SMF)	100 of 100m	64 (10Km option) C8 (20Km option) 00 (40km option)
16	1	Length (50 µm)		00
17	1	Length (62.5 µm)		00
18	1	Length (Copper)		00
19	1	Length (OM3)		00
20~35	16	Vendor name	Xenya d.o.o.	45 5A 43 4F 4E 4E 20 43 4F 52 50 2E 20 20 20 20
36	1	Reserved		00
37~39	3	Vendor OUI		00 00 00
40~55	16	Vendor PN	Varies from module ordered (see "Ordering info" on page 1.	
56~59	4	Vendor rev		00 00 00 00
60~61	2	Wavelength	Varies from module ordered (see "Ordering info" on page 1.	
62	1	Unallocated		00
63	1	CC_BASE	Check sum of byte 0 to 62	xx
64	1	Reserved		00
65	1	Options	TX-DIS, RX-LOS	12 (CSFP option 2)
66	8	BR Max(%)		00
67	1	BR Min(%)		00
68~83	16	Serial Number(ASCII)	Varies from module to module	xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx
84~91	8	Date code	ASCII Year (2 Byte), Month (2 Byte), Day (2 Byte)	xx xx xx xx xx xx 20 20
92	1	Diagnostic Monitoring Type		68

93	1	Enhanced Options	Not implemented	00
94	1	SFF-8472 Compliance	Includes functionality described in Rev 9.3 of SFF-8472.	01
95	1	CC_TXT	Check sum of byte 64 to 94	xx

Note 4. CSFP option 1 has Two-wire interface ID address of A0H. CSFP option 2 has serial ID address for A0H and B0H for channel 1 and channel 2 respectively. Please refer to CSFP MSA for more detail.

Diagnostics: Data Fields – Address A2h (Note 5)

Addr.	Field Size (Byte)	Name of Filed	Description	Hex
0~1	2	Temp high alarm	85℃[1] 100℃[2]	5500 6400
2~3	2	Temp low alarm	-10℃[1] -40℃[2]	F600 D800
4~5	2	Temp high warning	80℃[1] 95℃[2]	5000 5F00
6~7	2	Temp low warning	-5℃[1] -30℃[2]	FB00 E200
8~9	2	Voltage high alarm	3.8Volt	94 70
10~11	2	Voltage low alarm	2.8Volt	6D 60
12~13	2	Voltage high warning	3.6Volt	8C A0
14~15	2	Voltage low warning	3.0Volt	75 30
16~17	2	Tx bias high alarm	60mA	75 30
18~19	2	Tx bias low alarm	0mA	00 00
20~21	2	Tx bias high warning	50mA	61 A8
22~23	2	Tx bias low warning	0mA	00 00
24~25	2	Tx power high alarm	-2dBm +3dBm[1]	18A5 4DF1
26~27	2	Tx power low alarm	-11dBm -8dBm[3]	031A 0630
28~29	2	Tx power high warning	-3dBm +2dBm[3]	1393 3DE9
30~31	2	Tx power low warning	-9dBm -6dBm[3]	04EA 09CF
32~33	2	Rx power high alarm	-2dBm	18A5
34~35	2	Rx power low alarm	-21dBm	004F
36~37	2	Rx power high warning	-3dBm	1393
38~39	2	Rx power low warning	-20dBm	0064
40~55	16	Unallocated		00 00
56~59	4	Rx_PWR(4)		00 00 00 00
60~63	4	Rx_PWR(3)		00 00 00 00
64~67	4	Rx_PWR2)		00 00 00 00
68~71	4	Rx_PWR(1)		3F 80 00 00
72~75	4	Rx_PWR(0)		00 00
76~77	2	Tx_I(Slope)		01 00
78~79	2	Tx_I(Offset)		00 00

80~81	2	Tx_PWR(Slope)		01 00
82~83	2	Tx_PWR(Offset)		00 00
84~85	2	T(Slope)		01 00
86~87	2	T(Offset)		00 00
88~89	2	V(Slope)		01 00
90~91	2	V(Offset)		00 00
92~94	3	Unallocated		00 00
95	1	Check sum		xx
96~119	24	Real time diagnostic values		

(1). Commercial temp option

(2). Industrial temp option

(3). 40km option

Note 5. CSFP option 1 has Diagnostic of A2H. CSFP option 2 has serial ID address for A2H and B2H for channel 1 and channel 2 respectively. Please refer to CSFP MSA for more detail.

Ordering information

Part number	Operating Case temperature
XDBxx1-xxLx	1250 Mbps, Bi-Di, LC receptacle, Single 3.3V Power Supply

XDB*xx*1-*xx*L*x*

34 = (TX 1310nm/Rx1490nm) [1] [2]
43 = (TX 1490nm/Rx1310nm) [1] [2]
53 = (TX 1550nm/Rx1310nm) [1] [2]

10 = 10km, (BX10)
20 = 20km, (BX20)
40 = 40km, (BX40)
Multi-rate (customer specific), 10Km
Multi-rate (customer specific), 20Km

Y= 0°C~70°C CSFP MSA option 2
M= -40°C~85°C CSFP MSA option 2

[1]. 10km and 20km option
[2]. 40km option

E-mail: info@xenya.si
Web: http://www.xenya.si