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SKU: 00TCH04

10G SFP+ 10G-BX(BR10)-D Compact 2CH BiDi Transceiver Hot Pluggable, Dual BiDi LC, Tx1330nm DFB / Rx1270nm, SMF 10km, DDM, I-Temp

Part Number: FSPP-HC-C33-10Di



Overview

FSPP-HC-C33-10Di Small Form Factor Pluggable CSFP transceivers are compliant with the current SFP+ Multi-Source Agreement (MSA) Specification. It achieves operational compatibility with conventional SFP+ and no damage to CSFP/ host board if CSFP transceiver is plugged into a conventional SFP+ socket. The high performance uncooled 1330nm DFB transmitter and high sensitivity PIN receiver provide superior performance for 10GBASE Ethernet applications up to SMF 10km optical links in Industrial Temperature range.

Applications

- 10GBASE-BX(BR10) Ethernet @10.3125G
- Fiber Channel 800-SM-LC-L 8GFC @8.5G, 1200-SM-LL-L 10GFC @10.51875G
- SONET OC-192 & SDH STM-64 @9.953G
- CPRI Option #7 @9.83G, #8 @10.1376G

Features

- Compliant with IEEE802.3cp 10GBASE-BR10
- Compliant with CPRI Option 7, 8
- Compliant with SFF-8431, SFF-8432 SFP+ MSA
- Support 8.5Gb/s to 10.51875Gb/s
- Compliant with CSFP MSA Option 2
- Hot Pluggable
- 2CH BiDi unit with 1330nm DFB transmitter and 1270nm PIN receiver
- Dual BiDi LC connector
- 2-wire interface for management and diagnostic monitor compliant with SFF-8472
- Single +3.3V power supply
- Link distance 10km over SM fiber
- Operating Temperature -40~+85°C
- Maximum Power consumption 2.4W
- RoHS Compliant

Laser Safety

- This is a Class 1 Laser Product complies with 21 CFR 1040.10 and 1040.11 except for conformance with IEC 60825-1 Ed. 3., as described in Laser Notice No. 56, dated May 8, 2019.
- Caution: Use of control or adjustments or performance of procedure other than those specified herein may result in hazardous radiation exposure.

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Absolute Maximum Ratings

Parameters	Symbol	Min.	Max.	Unit
Storage Temperature	TST	-40	+85	°C
Relative Humidity	RH	5	85	%
Supply Voltage	VCC	-0.5	+3.6	V

Recommended Operating Conditions

Parameters	Symbol	Min.	Typ.	Max.	Unit
Case Operating Temperature	TOP	-40	-	+85	°C
Supply Voltage	VCC	+3.13	+3.3	+3.47	V
Supply Current	ICC			700	mA
Module Total Power	P			2.4	W

Transmitter Electro-optical Characteristics

VCC = 3.13V to 3.47V, TOP = -40 °C to +85 °C

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Line Rate		8.5	10.3125	10.5	Gb/s	
Optical Launch Power	Po	-5		+2	dBm	1
Optical Center Wavelength	λc	1320	1330	1340	nm	
Spectral Width (-20dB)	Δλ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Optical Extinction Ratio	ER	3.5			dB	
Optical Eye Mask		IEEE802.3cp				
Differential Data Input Swing	VIN	180		850	mV	
Tx Disable Input Voltage-Low (Tx ON)	TDISVL	GND		0.8	V	
Tx Disable Input Voltage-High (Tx OFF)	TDISVH	2.0		Vcc	V	
Tx Fault Output Voltage-Low (Tx Normal)	TFLTVL	GND		0.8	V	
Tx Fault Output Voltage-High (Tx Fault)	TFLTVH	2.0		Vcc	V	

Note1: The optical power is launched into a 9/125μm single mode fiber.

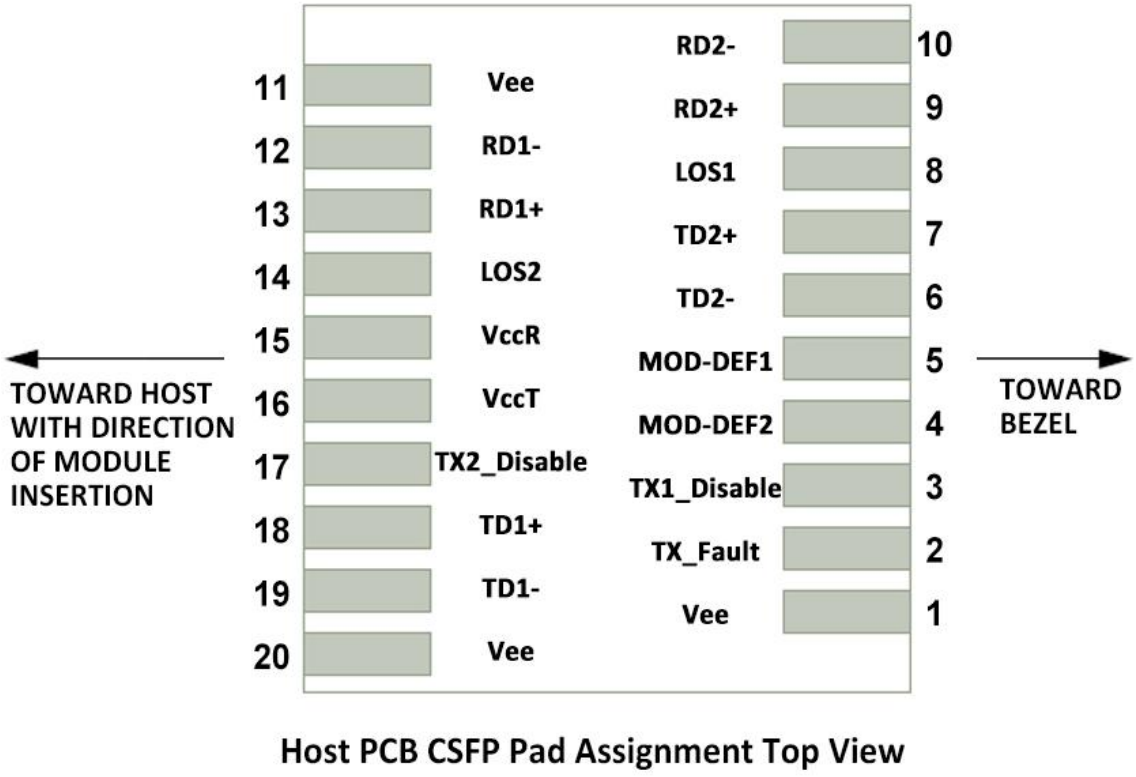
Receiver Electro-optical Characteristics

V_{CC} = 3.13V to 3.47V, T_{OP} = -40 °C to +85 °C

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Line Rate		8.5	10.3125	10.5	Gb/s	
Receiver Sensitivity	SEN			-12	dBm	1
Maximum Receive Power	P_{RX-MAX}	+0.5			dBm	1
Optical Center Wavelength	λc	1260	1270	1280	nm	
LOS De-Assert	LOS_D			-14	dBm	
LOS Assert	LOS_A	-30			dBm	
LOS Hysteresis	LOS_{HY}	0.5			dB	
Differential Data Output Swing	V_{OUT}	300		900	mV	
Receiver LOS Signal Output Voltage-Low	$LOSV_L$	GND		0.8	V	
Receiver LOS Signal Output Voltage-High	$LOSV_H$	2.0		Vcc	V	

Note1: Measured with a PRBS 2^{31}-1 test pattern @10.3125Gbps BER<10^{-12}.

Pin Assignment



Host PCB CSFP Pad Assignment Top View

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Pin Description

Pin	Name	Function / Description
1	Vee	Transceiver Ground
2	Tx_Fault	Transmitter Fault Indication (1)
3	Tx1_Disable	Transmitter Disable of CH1 (Turns off transmitter laser output of CH1)
4	MOD_DEF2	2-wire Serial Interface Data Line (SDA)
5	MOD_DEF1	2-wire Serial Interface Clock Line (SCL)
6	TD2-	Inverted Transmit Data Input of CH2
7	TD2+	Transmit Data Input of CH2
8	LOS1	Loss of signal for CH1
9	RD2+	Received Data Output of CH2
10	RD2-	Inverted Received Data Output of CH2
11	Vee	Transceiver Ground
12	RD1-	Inverted Received Data Output of CH1
13	RD1+	Received Data Output of CH1
14	LOS2	Loss of signal for CH2
15	VccR	Receiver Power
16	VccT	Transmitter Power
17	Tx2_Disable	Transmitter Disable of CH2 (Turns off transmitter laser output of CH2)
18	TD1+	Transmit Data Input of CH1
19	TD1-	Inverted Transmit Data Input of CH1
20	Vee	Transceiver Ground

Note1: Tx_Fault is internally OR output for Tx fault conditions in either Channel 1 or Channel 2. In order to determine which channel is at fault, the Host can read the internal memory bits for status:
- Bit2 in (A2h Byte#110) for TX1 fault
- Bit2 in (B2h Byte#110) for TX2 fault

Digital Diagnostic Functions

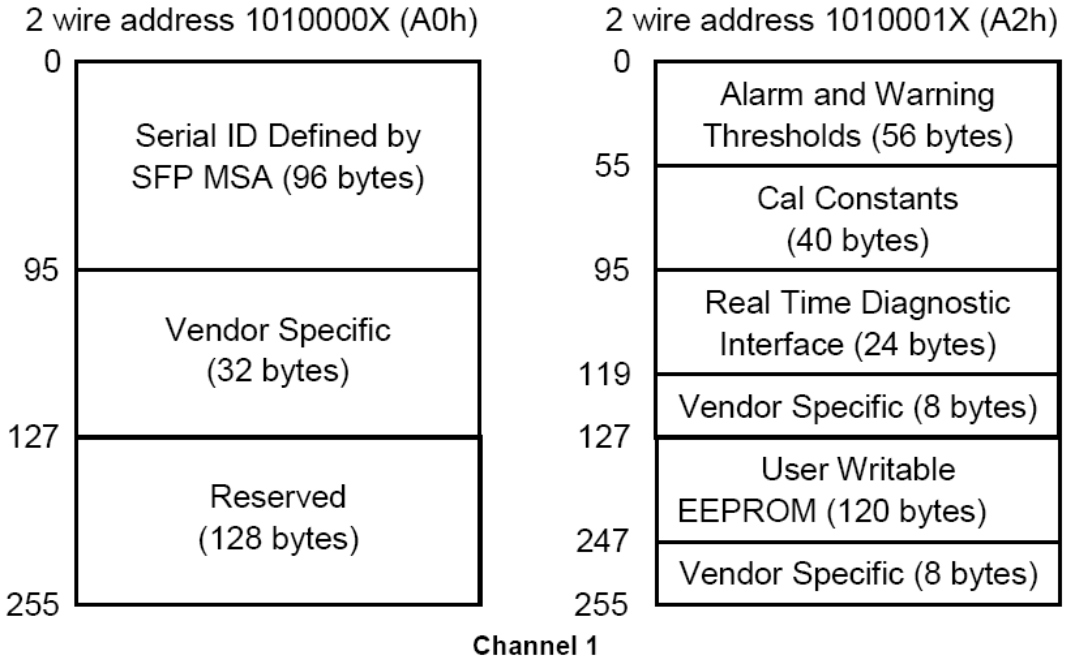
As defined by the SFP MSA (SFF-8472) Ficer's CSFP+ transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

- Transceiver temperature
- Laser bias current
- Transmitted optical power
- Received optical power
- Transceiver supply voltage

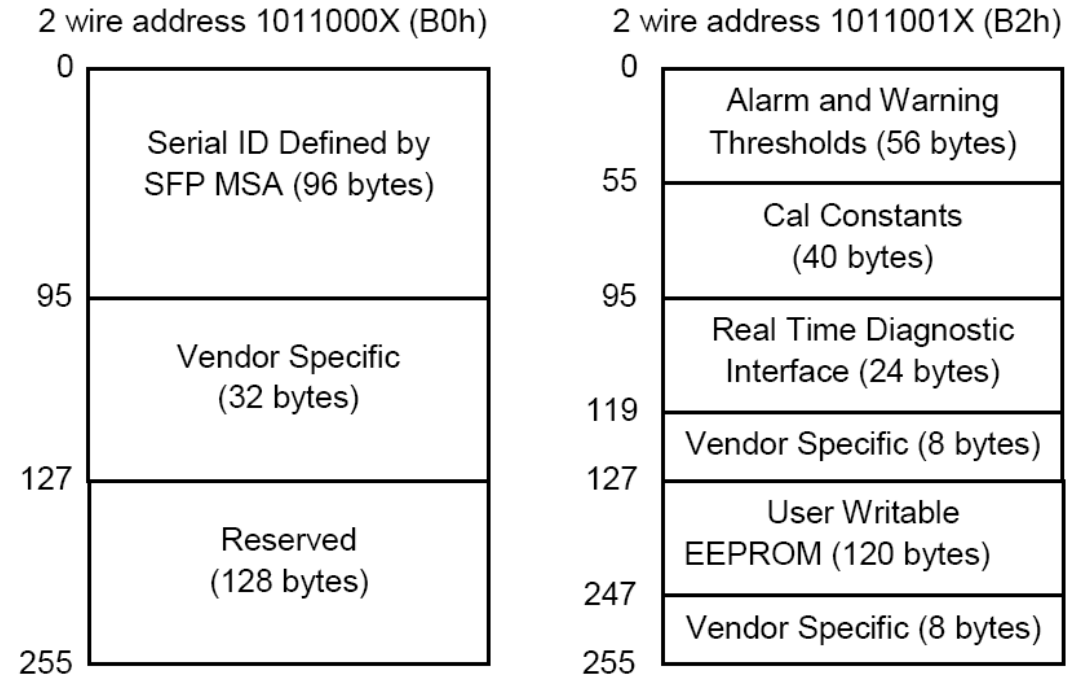
It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Controller (DDC) inside the transceiver, which is accessed through the 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL pin) is generated by the host. The positive edge clocks data into the SFP transceiver into those segments of its memory map that are not write-protected. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA pin) is bi-directional for serial data transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.
For more detailed information including memory map definitions, please see the SFP MSA (SFF-8472) Specification.

Digital Diagnostic Memory Map



Channel 1

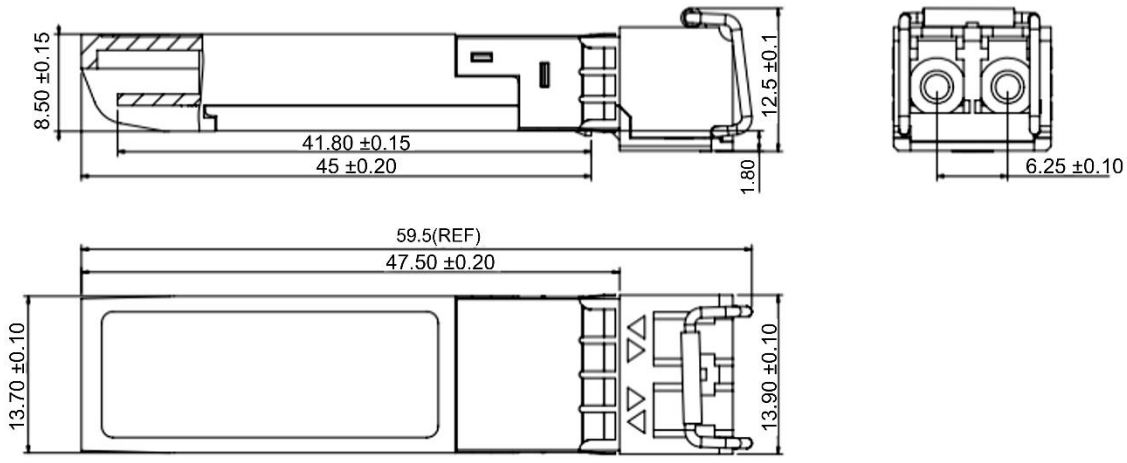


Channel 2

Digital Diagnostic Monitoring Characteristics

Parameter	Accuracy	Unit	Note
Temperature	±3	°C	Internal Calibration
Supply Voltage	±0.1	V	Internal Calibration
Tx Bias Current	±5	mA	Internal Calibration
Tx Output Power	±3	dB	Internal Calibration
Rx Received Optical Power	±3	dB	Internal Calibration

Mechanical Dimensions



(All Dimensions are ±0.20mm Unless Otherwise Specified, Unit: mm)

Ordering Information

Part No.	Tx	Rx	Link	DDM	Temp.
FSPP-HC-C33-10Di	1330nm	1260nm ~ 1280nm	SMF 10km	Yes	-40~+85°C

Note: Distances are indicative only. To calculate a more precise link budget based on specific conditions in your application, please refer to the optical characteristics.