



EPON OLT PX20+ 1.25G-Tx / 1.25G-Rx SFP Transceiver

Hot Pluggable, BiDi SC, Tx1490nm DFB / Rx1310nm APD, SMF 20KM, DDM

Part Number: FSFP-C2-PE4-201



Overview

FSFP-C2-PE4-201 Small Form Factor Pluggable SFP transceivers are compliant with the current SFP Multi-Source Agreement (MSA) Specification. The High performance uncooled 1490nm DFB transmitter and high sensitivity 1310nm APD receiver provide superior performance for Giga EPON OLT PX20+ applications.

Applications

- GEAPON ONU IEEE802.3ah 1000BASE-PX20+
- FTTx Application

Features

- Compliant with SFP MSA
- Digital diagnostics SFF-8472 Compliant
- 1490 nm DFB laser transmitter
- 1310 nm APD-TIA receiver
- 1.25 Gbps continuous mode transmission
- 1.25 Gbps Burst mode receiver
- Simplex SC/UPC connector
- Burst Digital Receiving Signal Strength Indication (RSSI)
- Industrial temperature -40~85°C available
- Single +3.3V power supply
- Link distance 20km over SM fiber
- RoHS Compliant

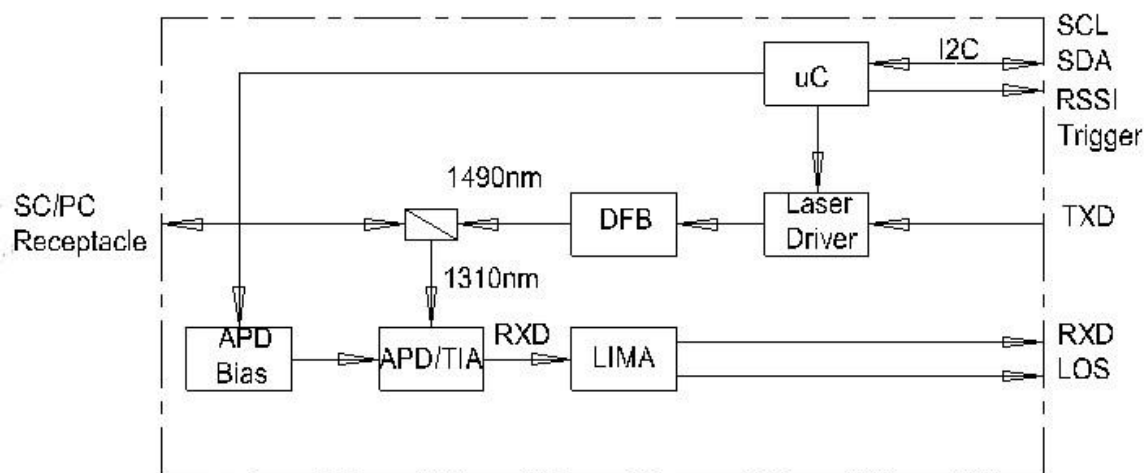
Laser Safety

- 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.

Absolute Maximum Ratings

Parameters	Symbol	Min.	Max.	Unit
Storage Temperature	T _{ST}	-40	+85	°C
Storage Relative Humidity	RH	5	95	%
Supply Voltage	V _{CC}	-0.5	+4.0	V

Function Diagram



Recommended Operating Conditions

Parameters	Symbol	Min.	Typ.	Max.	Unit
Case Operating Temp. (FSFP-C2-PE4-201)	T _{OP}	0		+70	°C
Case Operating Temp. (FSFP-C2-PE4-201i)	T _{OP}	-40		+85	°C
Supply Voltage	V _{CC}	+3.13	+3.3	+3.47	V
Supply Current	I _{CC}			300	mA
Damage Threshold for Receiver		0			dBm



Transmitter Electro-optical Characteristics

$V_{CC} = 3.13V$ to $3.47V$, $T_{OP} = 0^{\circ}C$ to $70^{\circ}C$ (FSFP-C2-PE4-201); $T_{OP} = -40^{\circ}C$ to $85^{\circ}C$ (FSFP-C2-PE4-201i)

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR		1.25		Gb/s	1
Optical Launch Power	Po	+4		+7	dBm	
Optical Center Wavelength	λ	1480		1500	nm	
Spectrum Width (-20dB)	$\Delta\lambda$			1.0	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Optical Extinction Ratio	ER	9			dB	1
Average Launch power of OFF Transmitter	P _{OFF}			-39	dBm	
Optical Eye Diagram	Compliant with IEEE Std 802.3ahTM-2004					
Optical Return Loss Tolerance		-12			dB	
Transmitter and dispersion Penalty (20km G.652)				2.3	dB	
Data Input Differential Voltage	V _{IN-PP}	200		1600	mV	
Input Differential Impedance	Z _{IN}	90	100	110	ohm	
Tx_Burst Input Voltage - High	VOH	2.4			V	
Tx_Burst Input Voltage - Low	VOL			0.4	V	
Tx_Burst ON Time	T _{ON}	2.0		-	V	
Tx_Burst OFF Time	T _{OFF}			0.8	V	

Note1: Measured with PRBS2⁷-1@1.25Gbps a 9/125μm single-mode fiber.



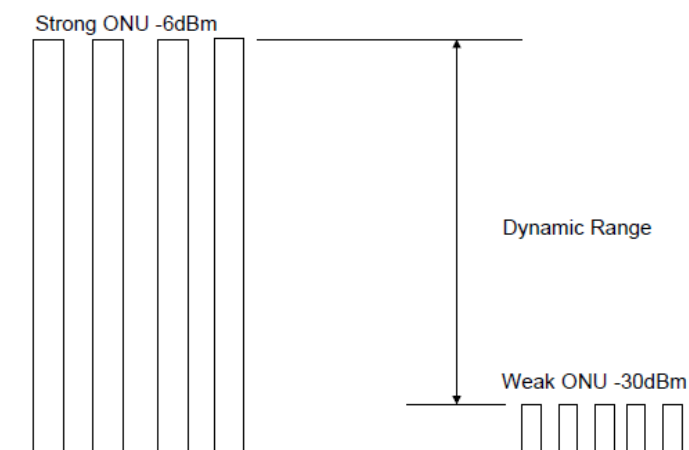
Receiver Electro-optical Characteristics

$V_{CC} = 3.13V$ to $3.47V$, $T_{OP} = 0^{\circ}C$ to $70^{\circ}C$ (FSFP-E2-PE4-201); $T_{OP} = -40^{\circ}C$ to $85^{\circ}C$ (FSFP-E2-PE4-201i)

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR		1.25		Gb/s	
Optical Center Wavelength	λ_c	1260		1360	nm	
Receiver Sensitivity	SEN			-30	dBm	1
Maximum Receive Power	P_{Rx-MAX}	-6			dBm	
Receiver Threshold Settling Time				250	ns	
Rx Dynamic Range		-30		-6	dBm	2
LOS De-Assert	LOS_D			-31	dBm	
LOS Assert	LOS_A	-45			dBm	
LOS Hysteresis	LOS_{HY}	0.5		-6	dB	
Receiver Reflectance				-12	dB	
Data Output Differential Voltage	V_{OUT-PP}	400		1600	mV	
Signal Detect Output Voltage - High	V_{SD-H}	2.4		V_{CC}	V	
Signal Detect Output Voltage - Low	V_{SD-L}	GND		0.4	V	
TTL Input Low		0		0.8	V	
TTL Input High		2.0		V_{CC}	V	
LOS Assert Time				500	ns	
LOS De-Aassert Time				500	ns	

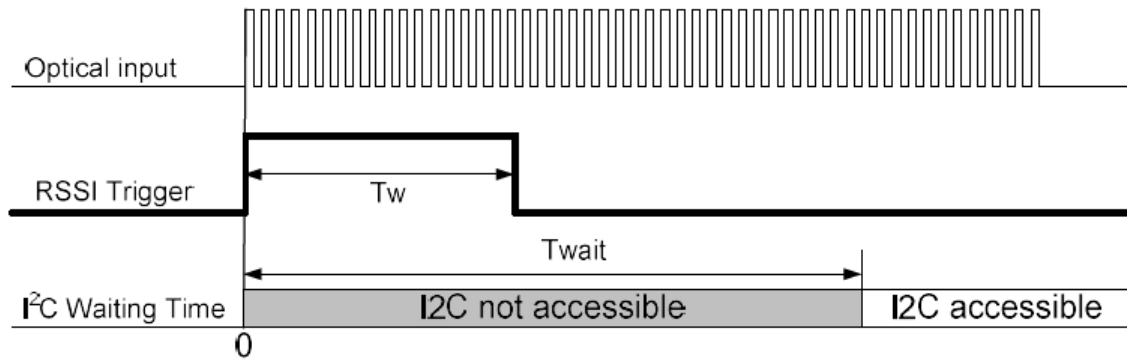
Note1: Measured with a PRBS 2⁷-1 test pattern @1.25Gbps and ER=10dB, BER <10⁻¹².

Note 2: Rx Dynamic Range Definition.





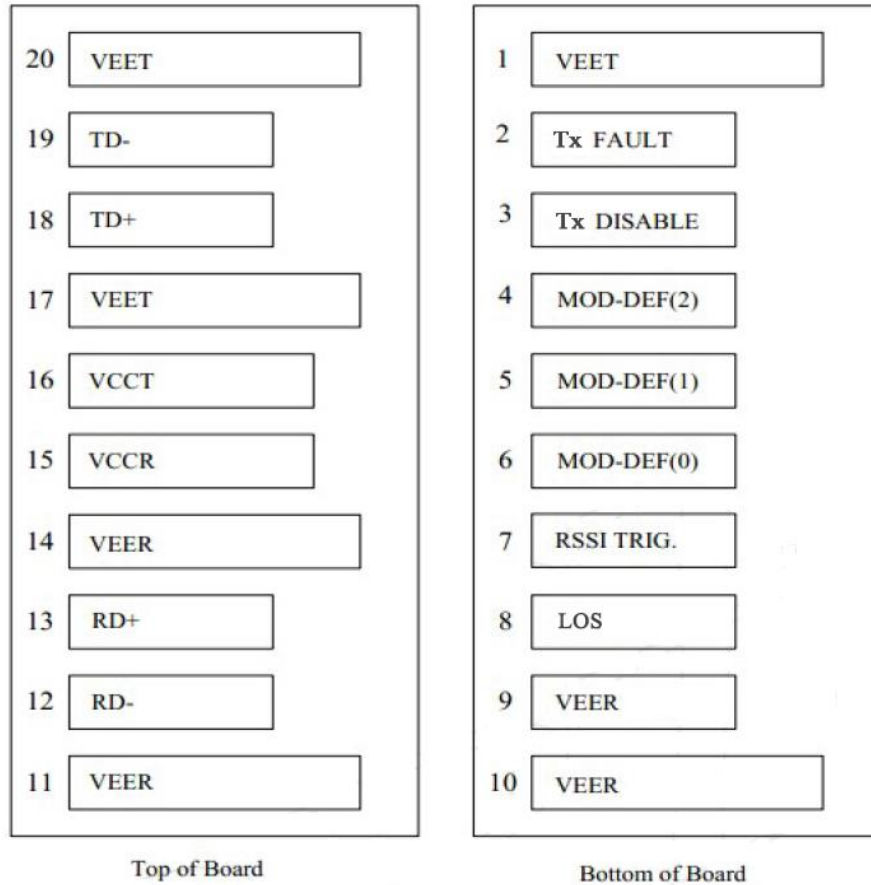
RSSI Trigger Timing Sequence



Item	Symbol	Min	Max	Unit
Trigger width	T_w	1	1.25	us
I2C Waiting Time	T_{Wait}		500	us



Pin Assignment



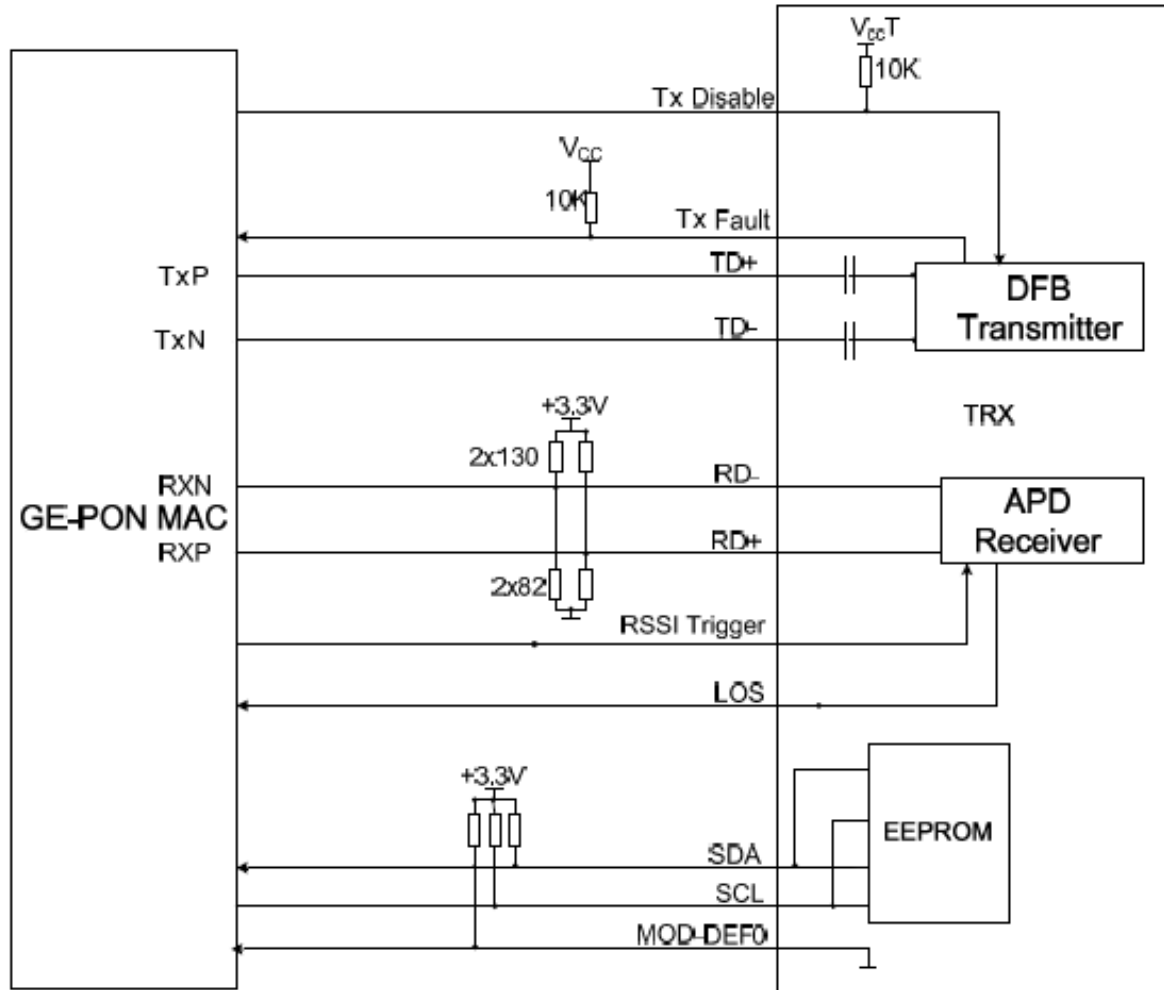


Pin Description

Pin	Name	Function / Description
1	VEET	Transmitter Ground
2	Tx FAULT	Transmitter Fault Indication (LVTTL Output level, High=Tx Fault)
3	Tx DISABLE	Laser output is disabled when this pin is asserted high or left unconnected
4	MOD-DEF(2)	2-wire Serial Interface Data Line (SDA: Serial Data Signal)
5	MOD-DEF(1)	2-wire Serial Interface Clock (SCL: Serial Clock Signal)
6	MOD-DEF(0)	Module Absent, connected to VEET or VEER in the module
7	RSSI TRIG.	Receiver RSSI Trigger signal
8	LOS	Loss of Signal Asserted when light is off
9	VEER	Receiver Ground
10	VEER	Receiver Ground
11	VEER	Receiver Ground
12	RD-	Receiver Inverted Data output, DC coupled
13	RD+	Receiver Non-Inverted Data output, DC coupled
14	VEER	Receiver Ground
15	VCCR	Receiver Power
16	VCCT	Transmitter Power
17	VEET	Transmitter Ground
18	TD+	Transmitter Non-Inverted In, AC coupled
19	TD-	Transmitter Inverted Data In, AC coupled
20	VEET	Transmitter Ground



Recommended Application Circuit





Digital Diagnostic Functions

As defined by the SFP MSA (SFF-8472) Ficer's SFP 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

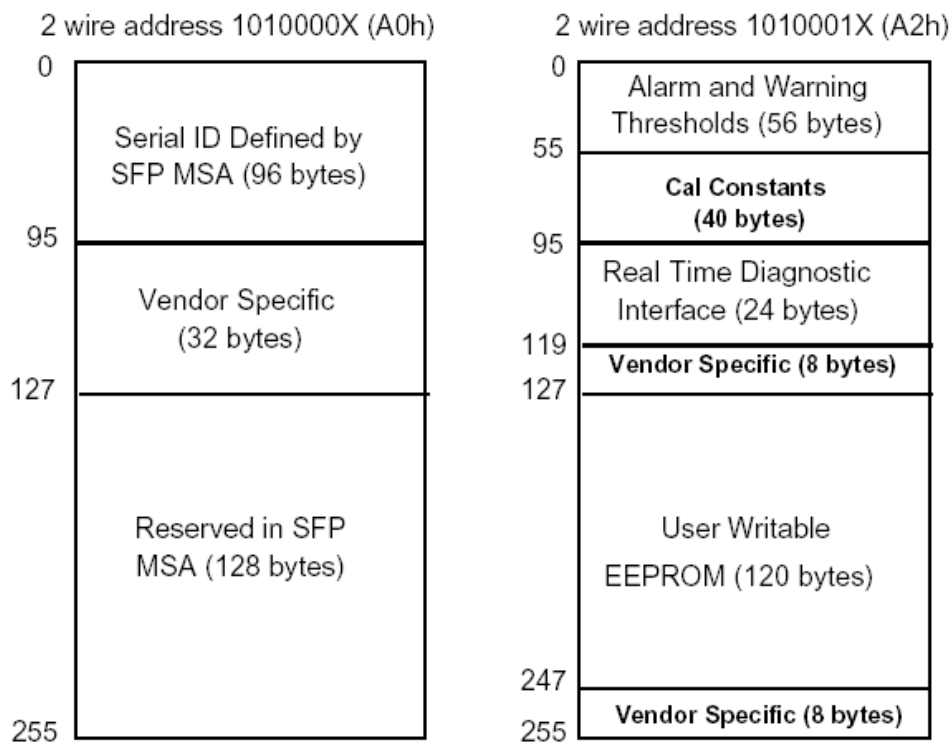
It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range.

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

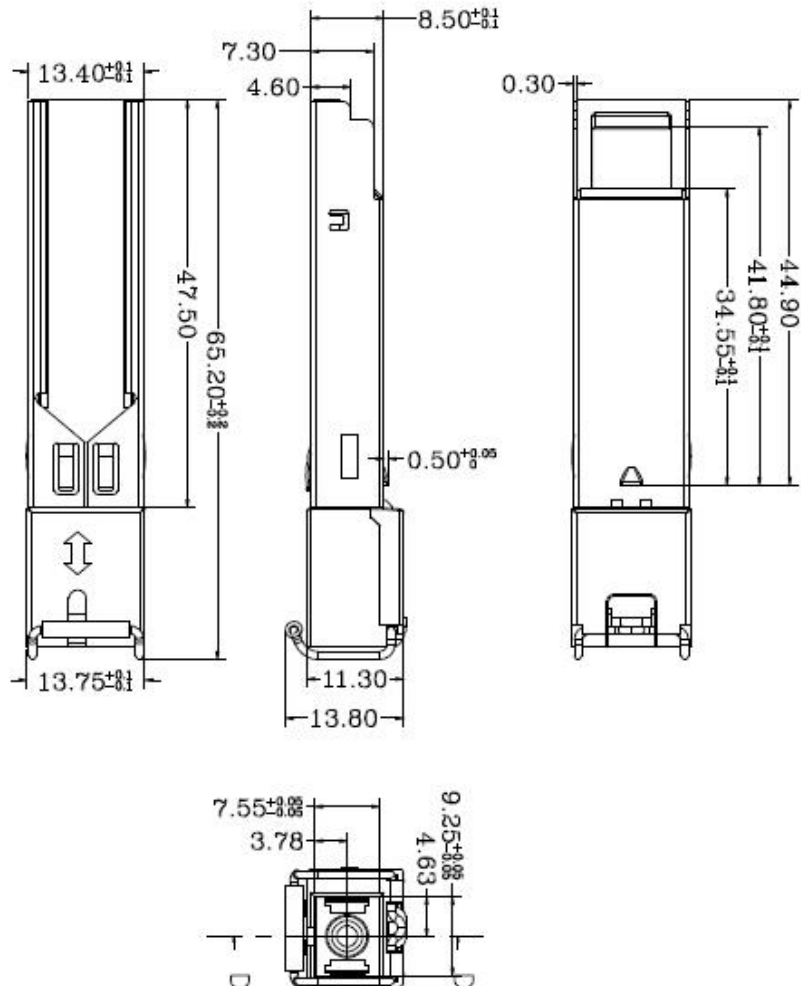


Digital Diagnostic Monitoring Characteristics

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 ± 0.20 mm Unless Otherwise Specified, Unit: mm)

Ordering Information

Part No.	Tx	Rx	Link	DDM	Option	Temp.
FSFP-C2-PE4-201	1490nm	1310nm	SMF 20km	Yes	EPON OLT PX20+, Tx:1.25Gbps, Rx:1.25Gbps	0~70°C
FSFP-C2-PE4-201i	1490nm	1310nm	SMF 20km	Yes	EPON OLT PX20+, Tx:1.25Gbps, Rx:1.25Gbps	-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.