



GPON ONU B+ 1.244G-Tx / 2.488G-Rx SFP Transceiver

Hot Pluggable, BiDi SC, Tx1310nm DFB / Rx1490nm APD, SMF 20KM, DDM

Part Number: FSFP-Cx-PG3-20B



Overview

FSFP-Cx-PG3-20B Small Form Factor Pluggable SFP transceivers are compliant with the current SFP Multi-Source Agreement (MSA) Specification. The high performance uncooled 1310nm DFB transmitter and high sensitivity 1490nm APD receiver provide superior performance for GPON ONU Class B+ applications.

Applications

- GEAPON ONU for P2MP Application
- FTTx Application

Features

- Compliant with ITU-T G.984.2/984.5 GPON
- Compliant with SFP MSA
- Compliant with SFF8472 diagnostic monitoring interface
- 1244 Mbps Burst mode transmission
- 2488 Mbps Continuous mode receiver
- 1310nm DFB laser transmitter
- 1490nm APD-TIA receiver
- Simplex SC/UPC or SC/APC connector
- Transmitter Burst On (optional high active or low active)
- Transmitter state indication (Tx_SD)
- Receiver state indication (optional Rx_SD or Rx_LOS)
- Industrial temperature -40~85°C available
- Single +3.3V power supply
- Link distance 20km over SM fiber
- RoHS Compliant



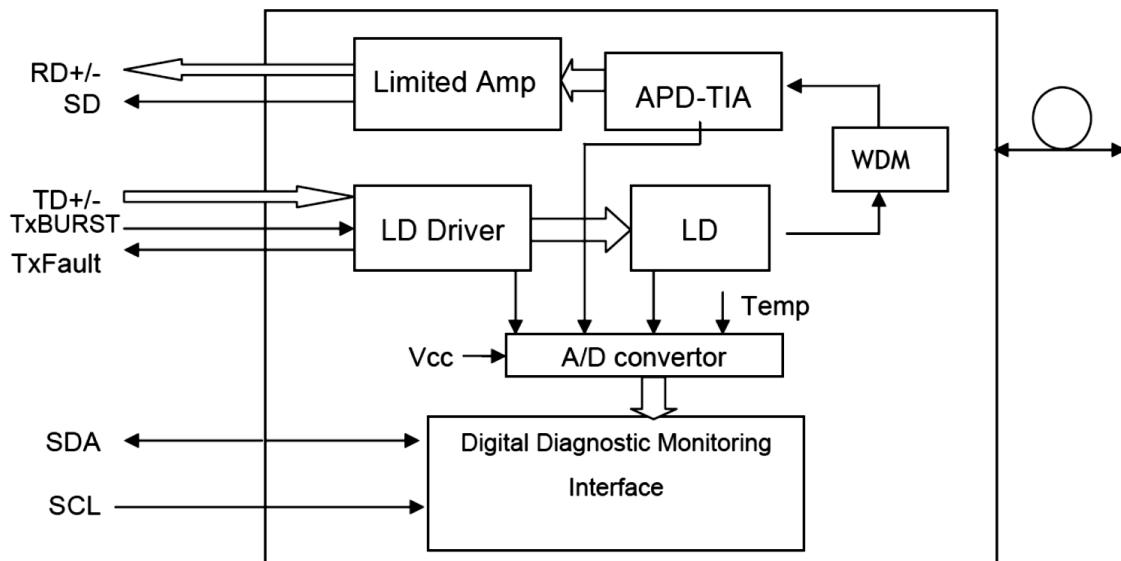
Laser Safety

- 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-Cx-PG3-20B)	T _{OP}	0	-	+70	°C
Case Operating Temp. (FSFP-Cx-PG3-20Bi)	T _{OP}	-40	-	+85	°C
Supply Voltage	V _{CC}	+3.13	+3.3	+3.47	V
Supply Current	I _{CC}		200	400	mA
Damage Threshold for Receiver		+4			dBm

Transmitter Electro-optical Characteristics

V_{CC}= 3.13V to 3.47V, T_{OP} = 0 °C to 70 °C (FSFP-Cx-PG3-20B); T_{OP} = -40 °C to 85 °C (FSFP-Cx-PG3-20Bi)

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR		1.244		Gb/s	1
Optical Launch Power	P _o	+0.5		+5	dBm	
Optical Center Wavelength	λ	1290	1310	1330	nm	1
Spectrum Width (-20dB)	Δλ			1.0	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Optical Extinction Ratio	ER	10			dB	
Average Launch power of OFF Transmitter	P _{OFF}			-45	dBm	
Optical Eye Mask (PRBS2 ²³⁻¹ @1.244G)	Compliant With ITU-T G.984.2					
Optical Return Loss Tolerance		-15			dB	
Transmitter and dispersion Penalty				1	dB	
Data Input Differential Voltage	V _{IN-PP}	200		2000	mV	
Input Differential Impedance	Z _{IN}	90	100	110	ohm	

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



Receiver Electro-optical Characteristics

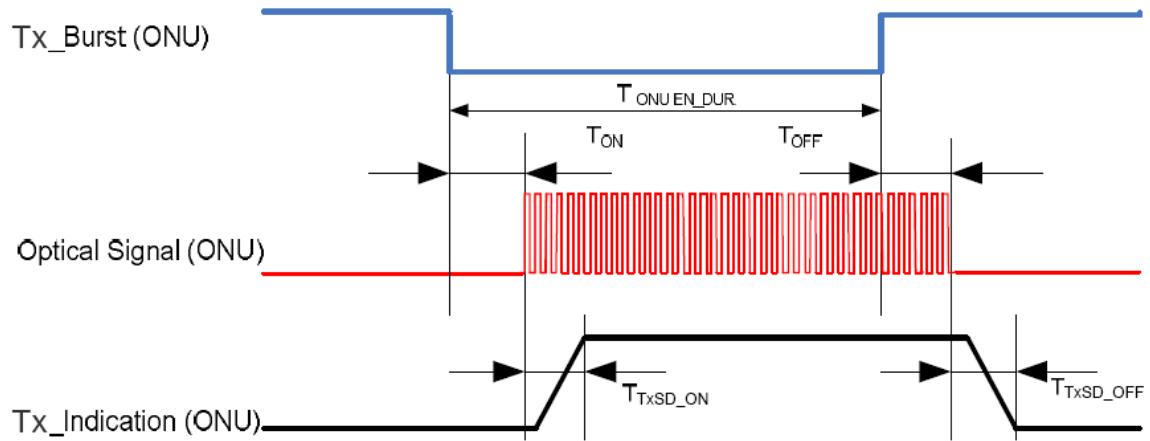
$V_{CC} = 3.13V$ to $3.47V$, $T_{OP} = 0\text{ }^{\circ}C$ to $70\text{ }^{\circ}C$ (FSFP-C2x-PG3-20B); $T_{OP} = -40\text{ }^{\circ}C$ to $85\text{ }^{\circ}C$ (FSFP-Cx-PG3-20Bi)

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR		2.488		Gb/s	
Optical Center Wavelength	λ_c	1480	1490	1500	nm	
Receiver Sensitivity	SEN			-28	dBm	1
Maximum Receive Power	P_{RX-MAX}	-8			dBm	1
Loss of signal De-assert Level	LOSA			-29	dBm	
Loss of signal assert Level	LOSD	-39			dBm	
SD Hysteresis	LOSHY	0.5		6	dB	
Data Output Differential Voltage	V_{OUT-PP}	400		1600	mV	
LVTTL Output High	V_{SD-H}	2.4		V_{CC}	V	
LVTTL Output Low	V_{SD-L}	GND		0.4	V	
Timing Characteristics						
Turn On Time at Burst mode	T_{ON}			12.8	ns	
Turn Off Time at Burst mode	T_{OFF}			12.8	ns	
Tx-SD Assert Time	T_{TXSD_ON}			100	ns	
Tx-SD De-assert Time	T_{TXSD_OFF}			100	ns	
LOS Assert Time	T_{LOSA}			100	us	
LOS De-assert Time	T_{LOSD}			100	us	

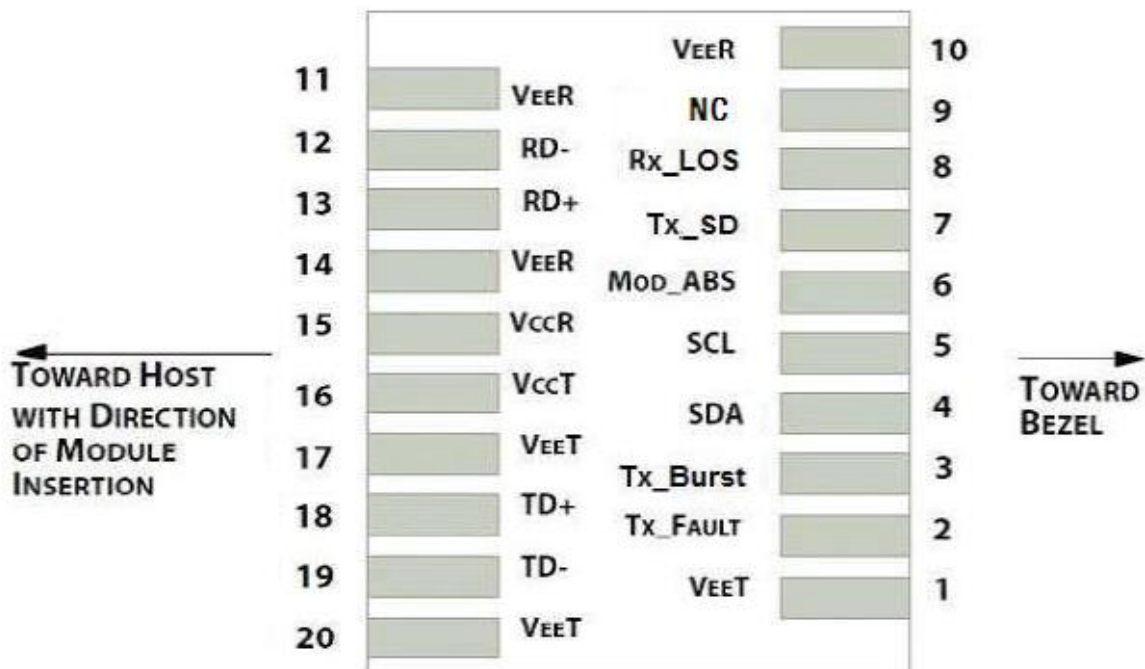
Note1: Measured with a PRBS 2²³-1 test pattern @2.488Gbps ER=8.2 BER<10⁻¹⁰ continuous mode.



Burst Mode Transmitter Timing



Pin Assignment



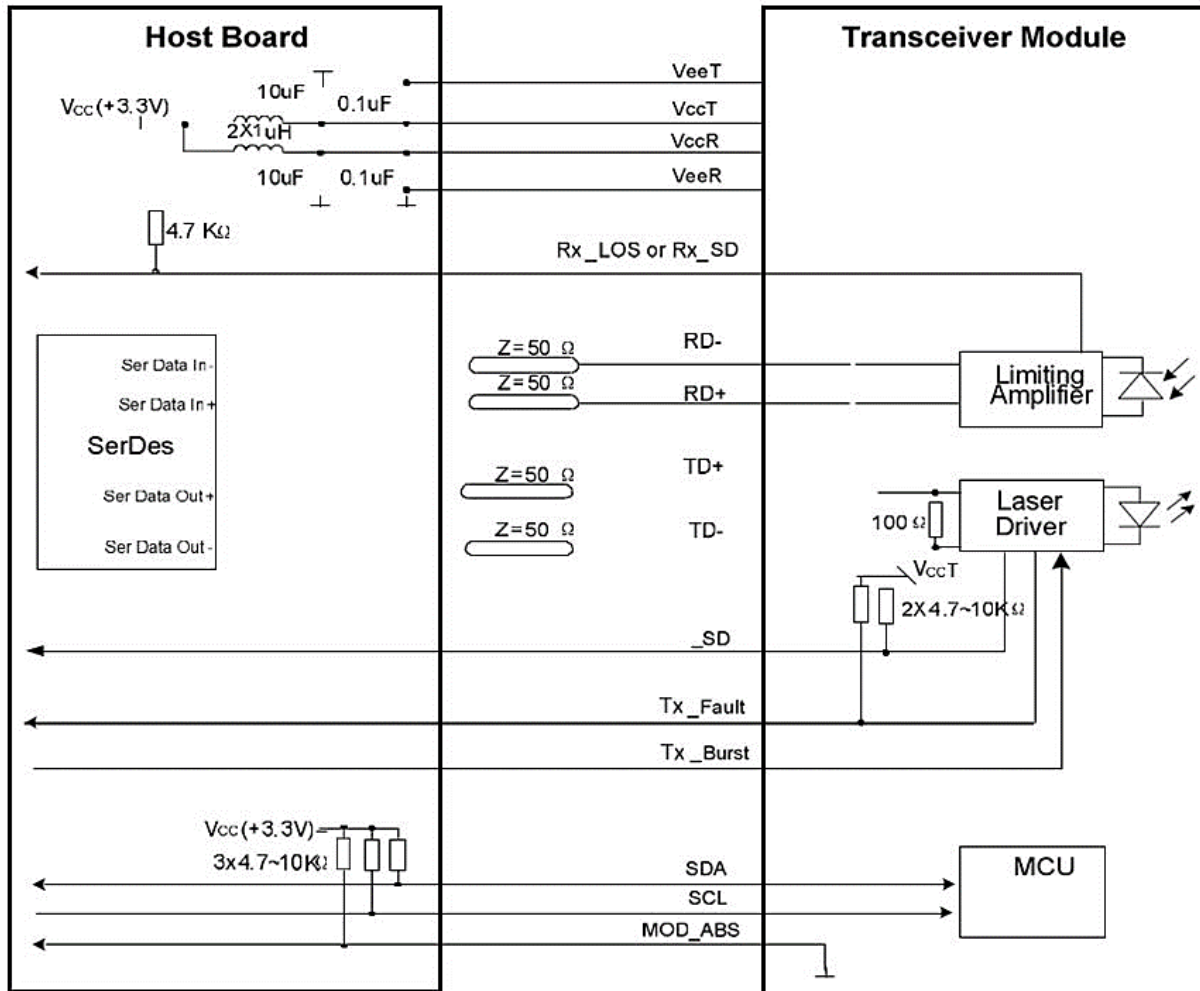


Pin Description

Pin	Name	Function / Description
1	VEET	Transmitter Ground
2	Tx_Fault	Transmitter Fault Indication (LVTTL Output level, High=Tx Fault)
3	Tx_Burst	Active Low for transmitter or Active High for Transmitter (Option)
4	SDA	2-wire Serial Interface Data Line (SDA: Serial Data Signal)
5	SCL	2-wire Serial Interface Clock (SCL: Serial Clock Signal)
6	MOD_ABS	Module Absent, connected to VEET or VEER in the module
7	Tx_SD	Tx Signal Detect, active high when transmitter on
8	Rx_LOS Or Rx_SD	Receiver Signal Detected Indication Rx_LOS, active high when loss of input optical signal Rx_SD, active high when received input optical signal
9	NC	
10	VEER	Receiver Ground
11	VEER	Receiver Ground
12	RD-	Receiver Inverted Data output, AC-coupled
13	RD+	Receiver Non-Inverted Data output, AC-coupled
14	VEER	Receiver Ground
15	VCCR	Receiver Power +3.3V Supply
16	VcCT	Transmitter Power 3.3V Supply
17	VEET	Transmitter Ground
18	TD+	Transmitter Non-Inverted Data Input, DC-coupled
19	TD-	Transmitter Inverted Data Input, DC-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

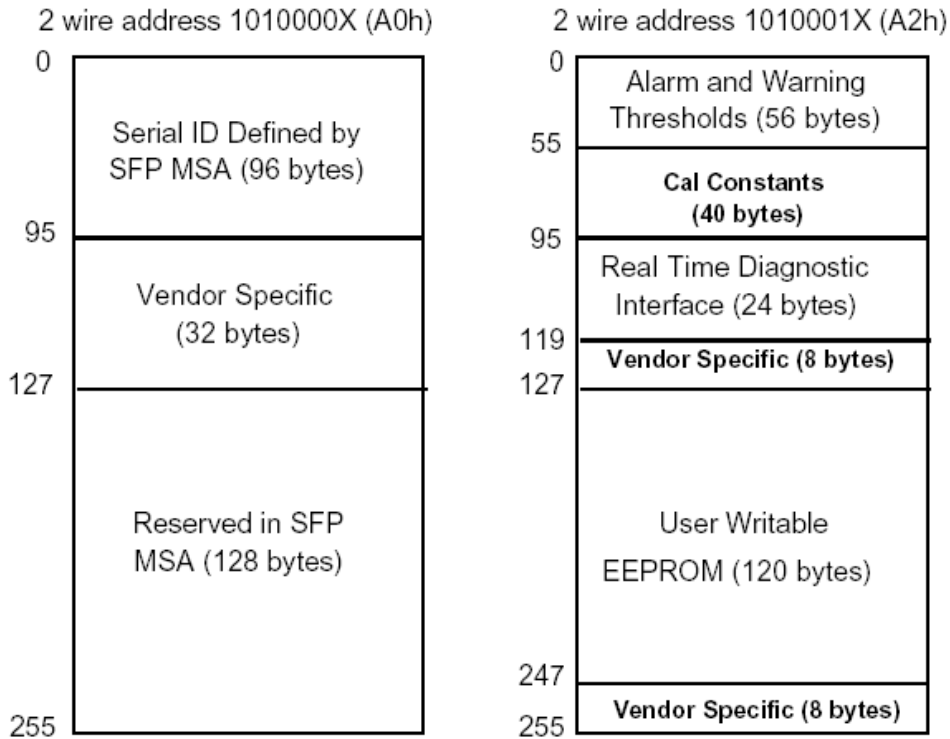
It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range.

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

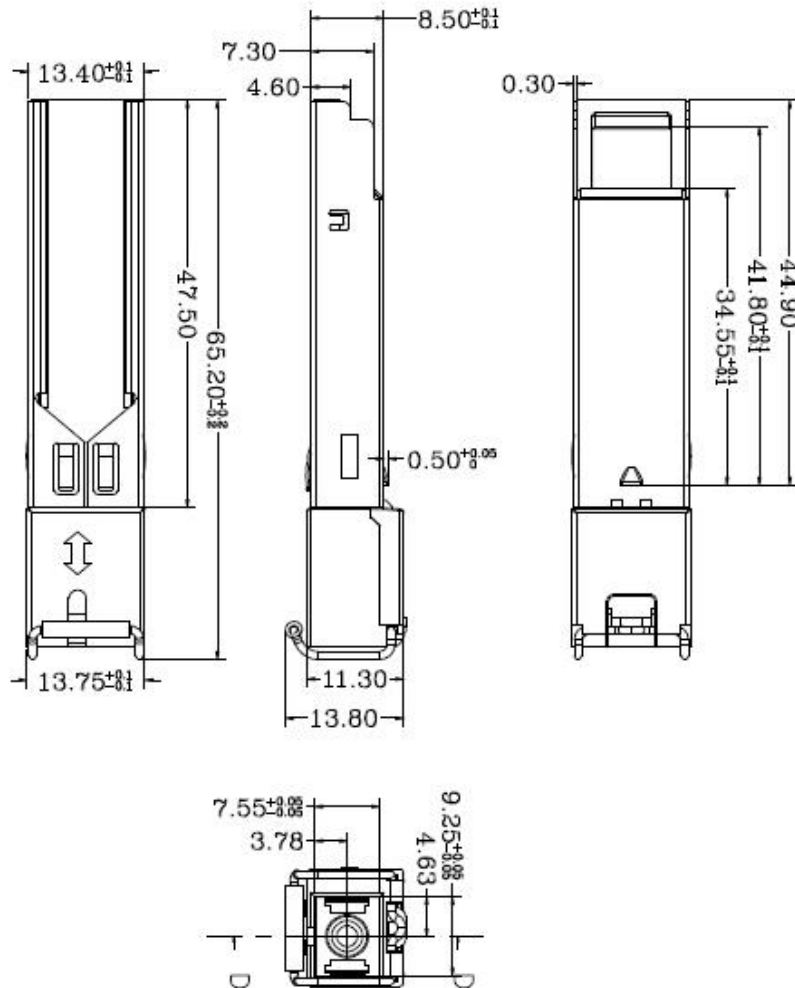


Digital Diagnostic Monitoring Characteristics

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

FSFP-C -PG3-20B

Connector Type

2: SC/UPC
 A: SC/APC

Electrical Level Option

- L: Tx_Burst=Low → turn ON the Transmitter
 Loss of input signal → Rx_LOS=High
- H: Tx_Burst=High → turn ON the Transmitter
 Loss of input signal → Rx_LOS=High
- Y: Tx_Burst=Low → turn ON the Transmitter
 Receiving input signal → Rx_SD=High
- T: Tx_Burst=High → turn ON the Transmitter
 Receiving input signal → Rx_SD=High

Operating Temperature

Blank: 0 ~ +70°C
 i: -40 ~ +85°C