

EPON-OLT-PX20

EPON OLT T1490nm/R1310nm PX20, SFP Transceiver



Product Features

- ❖ Single fiber bi-directional data links symmetric 1.25Gbps application
- ❖ 1490nm continuous-mode DFB laser transmitter and 1310nm burst-mode APD-TIA receiver
- ❖ Reset-less burst-mode receiver simplify the system design
- ❖ More than 24dB wide dynamic range
- ❖ 0 to 70° C operating case temperature,
- ❖ Single 3.3V power supply

- ❖ Digital diagnostic monitoring interface
- ❖ Digital burst RSSI function to monitor the input optical power level
- ❖ LVPECL compatible data input/output interface
- ❖ LVTTTL transmitter disable control
- ❖ LVTTTL transmitter laser fault alarm
- ❖ LVTTTL receiver loss of signal indication
- ❖ Low EMI and excellent ESD protection
- ❖ Class I laser safety standard IEC-60825 compliant
- ❖ RoHS-6 compliance

Applications

- ❖ Gigabit Ethernet Passive Optical Networks (GEAPON) 20Km 1:32 application or 10Km 1:64 application.

STANDARDS

- ❖ Complies with SFP Multi-Source Agreement (MSA) SFF-8074i
- ❖ Complies with SFF-8472
- ❖ Complies with IEEE 802.3ah™-2004
- ❖ Complies with FCC 47 CFR Part 15, Class B
- ❖ Complies with FDA 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50.

Absolute Maximum Ratings

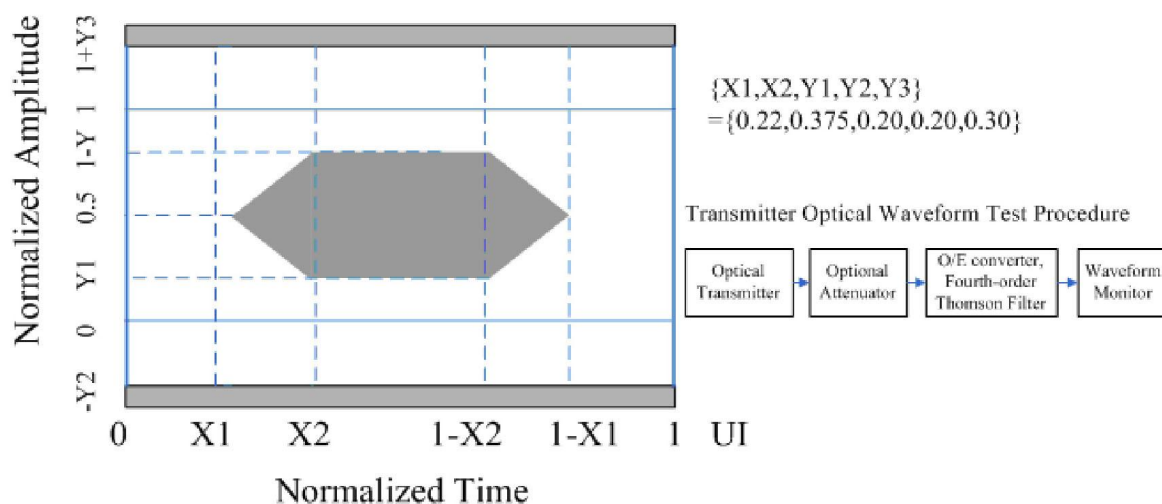
Parameter	Symbol	Min	Max	Unit	Note
Storage Ambient Temperature	T _{STG}	-40	85	°C	
Operating Case Temperature	T _c	0	70	°C	
Operating Humidity	OH	5	90	%	
Power Supply Voltage	V _{cc}	0	3.6	V	
Receiver Damaged Threshold		+4		dBm	

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Case Temperature	T_c	0		70	°C	
Power Supply Voltage	V_{cc}	3.13	3.3	3.47	V	
Operating Humidity Range	OH	5		90	%	
Data Rate			1.25		Gbit/s	
Data Rate Drift		-100		+100	PPM	

Transmitter Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Optical Center Wavelength	λ_c	1480	1490	1500	nm	
Optical Spectrum Width (-20dB)	$\Delta \lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Launch Optical Power	AOP	+2		+7	dBm	EOL, Over Temperature
Power-OFF Transmitter Optical Power				-39	dBm	Launched into SMF
Extinction Ratio	ER	9			dB	PRBS 2 ⁷ -1 test pattern @1.25Gbit/s
Total Jitter	TJ			0.43	UI	PRBS 2 ⁷ -1 test pattern @1.25Gbit/s
Rise / Fall Time (20%-80%)	T_R/T_F			260	ps	Bessel-Thompson Filter OFF
RIN ₁₅ OMA				-115	dB/Hz	
Optical Return Loss Tolerance				15	dB	
Transmitter Reflectance				-10	dB	
Transmitter and Dispersion Penalty	TDP			2.3	dB	Transmit on 20km SMF
Optical Waveform Diagram	Compliant with IEEE Std 802.3ah™-2004					See the figure below



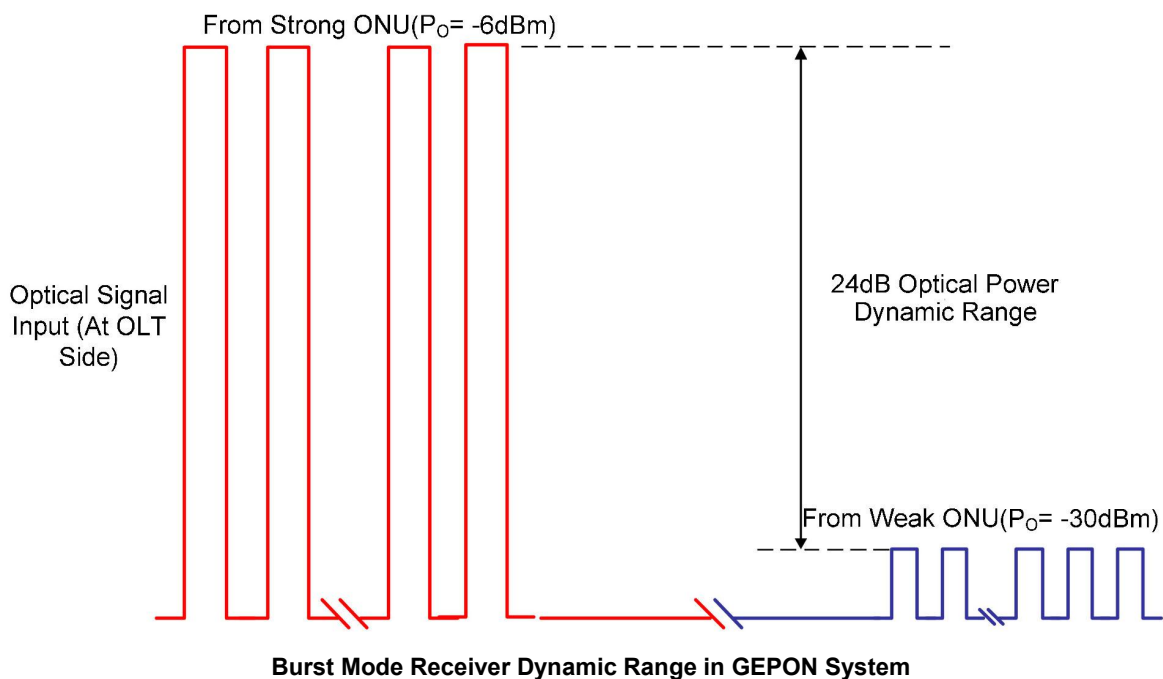
Transmitter Eye Mask Definitions and Test Procedure

Transmitter Electrical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Data Input Differential Swing		200		1600	mV	LVPECL input, AC coupled
Input Differential Impedance		90	100	110	Ω	
Power Supply Current				220	mA	Load free
Transmitter Disable Voltage - Low		0		0.8	V	
Transmitter Disable Voltage - High		2.0		V _{CC}	V	
Transmitter Fault Alarm Voltage - Low		0		0.4	V	
Transmitter Fault Alarm Voltage - High		2.4		V _{CC}	V	

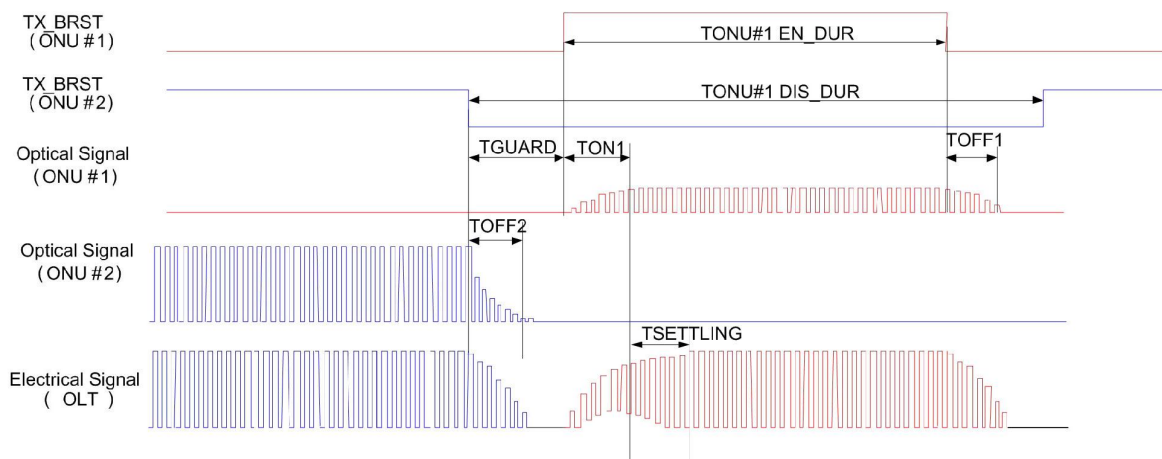
Receiver Optical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Wavelength		1260		1360	nm	
Sensitivity	SEN			-27	dBm	PRBS 2 ²³ -1+72CID@124Mbps BER ≤ 1 × 10 ⁻¹⁰
Saturation Optical Power	SAT	-6			dBm	
Loss Of Signal De-assert Level	LOSD			-31	dBm	
Loss Of Signal Assert Level	LOSA	-45			dBm	
Loss Of Signal Hysteresis		0.5		6	dB	
Receiver Reflectance				-12	dB	
Dynamic Range		30		-6	dBm	See the figure below



Receiver Electrical Characteristics

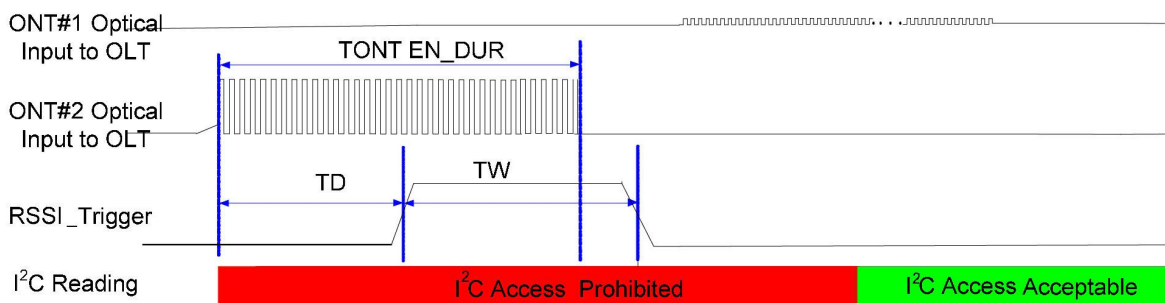
Parameter	Symbol	Min	Typical	Max	Unit	Notes
Power Supply Current				160	mA	Load free
Data Output Voltage - Low (-Vcc)		-1.81		-1.62	V	
Data Output Voltage - High (-Vcc)		-1.02		-0.88	V	
Data Output Differential Swing		400		1600	mV	LVPECL output, DC coupled
Loss Of Signal Assert Time			0.5		μ s	
Loss Of Signal Deassert Time			0.5		μ s	
Loss Of Signal Voltage - Low		0		0.4	V	
Loss Of Signal Voltage - High		2.4		Vcc	V	
Receiver Threshold Settling Time	T _{SETTLING}			250	ns	See the figure below



Timing Parameter Definitions in Burst More Sequence

Receiver Electrical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
RSSI Trigger-Low		0		0.8	V	
RSSI Trigger-High		2.0		Vcc	V	
RSSI Trigger width	T_w	10			us	
RSSI Trigger Delay	T_D		950		ns	Refer to first bit of the preamble
I2C Access Prohibited Time		150	200		μ s	
Optical Signal During Time	TONU EN_DUR	1000	1200		ns	400ns CDR time

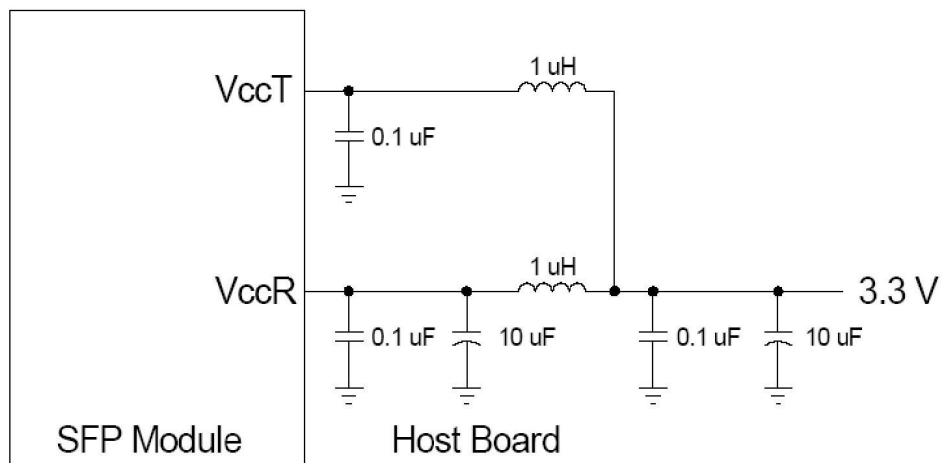


RSSI Timing Sequence

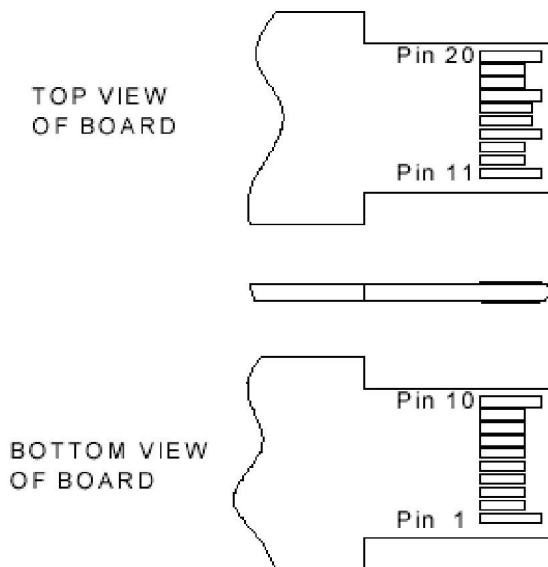
Pin Descriptions

Pin	Name	Description	Note
1	V _{EE} T	Transmitter Ground	
2	TX Fault	Transmitter Fault Indication	High: abnormal; Low: normal
3	TX Disable	Transmitter Disable	High: transmitter disable; Low: transmitter enable
4	MOD-DEF2	Module Definition 2	The data line of two wire serial interface
5	MOD-DEF1	Module Definition 1	The clock line of two wire serial interface
6	MOD-DEF0	Module Definition 0	Connected to Ground in the transceiver
7	RSSI Trigger	RSSI Trigger for Transceiver A/D Conversion	High: enable RSSI A/D conversion
8	LOS	Loss of Signal	High: Loss of signal Low: Signal Detected
9	V _{EE} R	Receiver Ground	
10	V _{EE} R	Receiver Ground	
11	V _{EE} R	Receiver Ground	
12	RD-	Inv. Receiver Data Out	LVPECL logic output, DC coupled
13	RD+	Receiver Data Out	LVPECL logic output, DC coupled
14	V _{EE} R	Receiver Ground	
15	V _{CC} R	Receiver Power	
16	V _{CC} T	Transmitter Power	
17	V _{EE} T	Transmitter Ground	
18	TD+	Transmit Data In	LVPECL logic input, AC coupled
19	TD-	Inv. Transmit Data In	LVPECL logic input, AC coupled
20	V _{EE} T	Transmitter Ground	

SFP Recommended Host Board Power Supply Filtering Network



SFP Pin (Golden Finger) Drawing



The schematic diagram illustrates the internal circuitry of the MAC module and its connection to the Transceiver Module. The MAC module is shown on the left, and the Transceiver Module is on the right. The MAC module includes a power supply section with VCC (+3.3V) and VeeT (1,17,20) pins, connected to a 10uF capacitor and a 2x1uH inductor. The Transceiver Module has a VccR pin connected to a 2KΩ resistor. The MAC module's Ser Data In and Ser Data Out pins are connected to the Transceiver Module's RD- (12), RD+ (13), TD+ (18), and TD- (19) pins. The MAC module's SerDes pin is connected to the Transceiver Module's TD+ (18) pin. The MAC module's TX_Disable (3) pin is connected to the Transceiver Module's VccT (+3.3V) pin. The MAC module's TX_Fault pin is connected to the Transceiver Module's VccT (+3.3V) pin. The MAC module's RSSI_Trigger pin is connected to the Transceiver Module's RSSI_Trigger (7) pin. The MAC module's SDA and SCL pins are connected to the Transceiver Module's MOD-DEF 2 (4) and MOD-DEF 1 (5) pins. The MAC module's Module Present pin is connected to the Transceiver Module's MOD-DEF 0 (6) pin. The Transceiver Module contains a Limiting Amplifier, a Laser Driver, and a Monitoring block. The Monitoring block outputs Temperature, Supply Voltage, Bias Current, Output Power, and Received Power. The EEPROM block is also connected to the Monitoring block.

The diagram illustrates the memory layout for two types of SFP components: a standard SFP MSA and a User Writable EEPROM.

SFP MSA Memory Layout (Left):

- Serial ID Defined by SFP MSA (96 bytes):** Located at the top, starting at address 0 and ending at 95.
- Vendor Specific (32 bytes):** Located in the middle, starting at address 96 and ending at 127.
- Reserved in SFP MSA (128 bytes):** Located at the bottom, starting at address 128 and ending at 255.

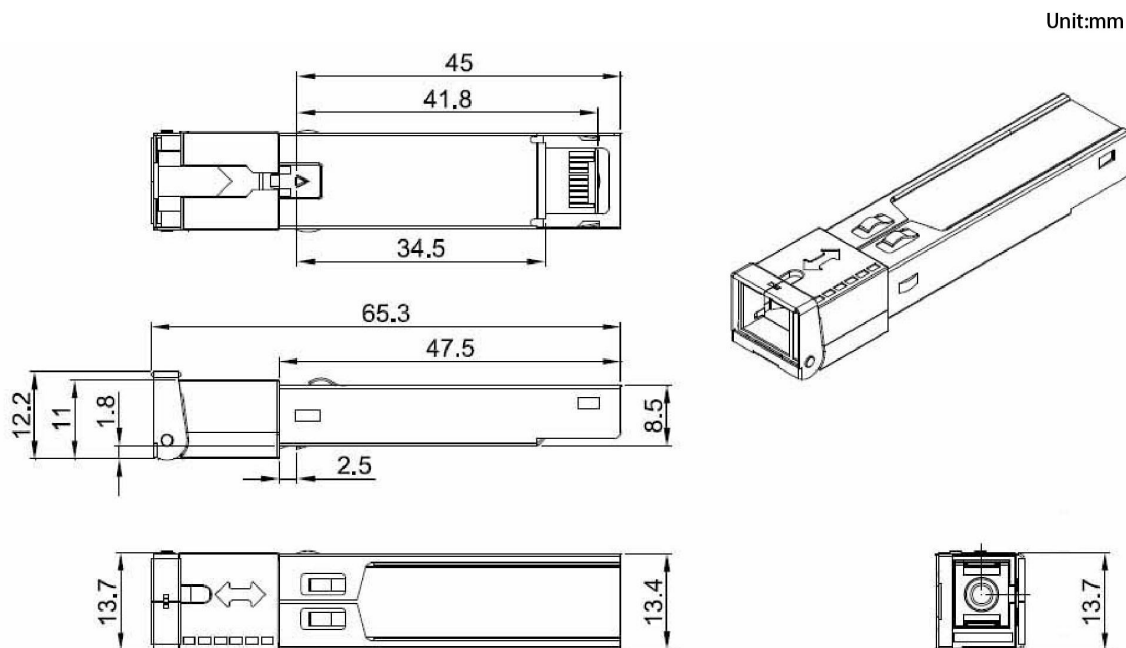
User Writable EEPROM Memory Layout (Right):

- Alarm and Warning Thresholds (56 bytes):** Located at the top, starting at address 0 and ending at 55.
- Cal Constants (40 bytes):** Located below the thresholds, starting at address 56 and ending at 95.
- Real Time Diagnostic Interface (24 bytes):** Located below the constants, starting at address 96 and ending at 119.
- Vendor Specific (8 bytes):** Located below the interface, starting at address 120 and ending at 127.
- User Writable EEPROM (120 bytes):** Located in the middle, starting at address 128 and ending at 247.
- Vendor Specific (8 bytes):** Located at the bottom, starting at address 248 and ending at 255.

Digital Diagnostic Monitoring

Parameter	Range	Accuracy	Calibration	Note
Temperature	0 to +70 °C	±3°C	Internal	LSB: 1/256° C
Voltage	2.97 to 3.63 V	±3%	Internal	LSB: 0.1mV
Bias Current	0 to 100 mA	±10%	Internal	LSB: 2uA
TX Power	-2 to 8 dBm	±3dB	Internal	LSB: 0.1uW
RX Power Monitor	-30 to -6 dBm	±3dB	Internal	LSB: 0.1uW

Mechanical Specifications



Ordering Information

Part Number	Product Description
EPON-OLT-PX20	SFP, 1.25G, T1490nm/R1310nm, SC/UPC, EPON OLT PX20, 0 ~ +70°C, with DDM