

# HSGQ-EPON OLT Model



## Product Specification

Specifications	Package	Data Rate	Wavelength	Laser	Transmit Optical Power	Interface	Receiving Sensitivity
EPON OLT PX20+	SFP	1.25Gbps/1.25Gbps	Tx1490/Rx1310	DFB/APD	3dBm~5dBm	SC	<=-30dBm
EPON OLT PX20++	SFP	1.25Gbps/1.25Gbps	Tx1490/Rx1310	DFB/APD	5dBm~7dBm	SC	<=-32dBm
EPON OLT PX20+++	SFP	1.25Gbps/1.25Gbps	Tx1490/Rx1310	DFB/APD	7dBm~10dBm	SC	<=-32dBm
EPON OLT PX20++++	SFP	1.25Gbps/1.25Gbps	Tx1490/Rx1310	DFB/APD	9dBm~10dBm	SC	<=-32dBm

## Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Data Rate	/	/	1.25	/	Gbps	/
Transmitter						
Single Ended Output Voltage Tolerance	/	-0.3	/	4	V	/
Common mode voltage tolerance	/	15	/	/	mV	/
Tx Input Diff Voltage	VI	180	/	1200	mV	/
Tx Fault	VoL	-0.3	/	0.4	V	At 0.7mA
Data Dependent inputJitter	DDJ	/	/	0.1	UI	/
Data Input Total Jitter	TJ	/	/	0.28	UI	/
Receiver						
Single Ended Output Voltage Tolerance	/	-0.3	/	4	mV	/
Receiver Threshold Settling Time	TSETTLING	/	/	250	ns	/
Rx Output Diff Voltage	Vo	400	/	2400	mV	/
LOS Assert Time	TAssert	/	/	500	ns	/
LOS De-assert Time	TDeassert	/	/	500	ns	/

## Product Features

- 1.25Gb/s serial optical interface compliant to 802.3AH specifications small form factor pluggable module "SFP"
- 2-wire interface for management specifications compliant with SFF8472 digital diagnostic monitoring interface for optical transceivers
- 1490 nm DFB transmitter, 1310 nm APD photo detector BURST receiver
- Operating case temperature: 0 to 70°C or -40 to 85°C
- All-metal housing for superior EMI performance
- Low power consumption
- Cost effective OLT solution
- RoHS compliant

## Absolute Maximum Rating

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

Parameter	Symbol	Min.	Max.	Unit
Power Supply Voltage	Vcc	0	3.6	V
Storage Temperature	Tc	-40	85	°C
Operating Case Temperature	Tc	0	70	°C
	TI	-40	85	
Relative Humidity	RH	5	95	%
RX Input Average Power	Pmax	/	-7	dBm

## General Description

- This 1490nm DFB EPON OLT SFP transceiver is designed to transmit and receive optical data over single mode optical fiber for link length 20km
- The transmitter input and receiver output impedance is 100 Ohms differential. Data lines are internally AC coupled. The module provides differential termination and reduce differential to common mode conversion for quality signal termination and low EMI.
- The transmitter converts 1.25Gbit/s serial CML electrical data into serial optical data compliant with the 10GBASE-LR standard. An open collector compatible Transmit Disable (Tx\_Dis) is provided. A logic "1" or no connection on this pin will disable the laser from transmitting. A logic "0" on this pin provides normal operation. The transmitter has an internal automatic power control loop (APC) to ensure constant optical power output across supply voltage and temperature variations. An open collector compatible Transmit Fault (TFault) is provided. TX\_Fault is a module output contact that when high, indicates that the module transmitter has detected a fault condition related to laser operation or safety. The TX\_Fault output contact is an open drain/collector and shall be pulled up to the Vcc\_Host in the host with a resistor in the range 4.7-10kΩ. TX\_Disable is a module input contact. When TX\_Disable is asserted high or left open, the SFP+ module transmitter output shall be turned off. This contact shall be pulled up to VccT with a 4.7 kΩ to 10 kΩ resistor
- The receiver converts 1.25Gbit/s serial optical data into serial PECL electrical data. An open collector compatible Loss of Signal is provided. Rx\_LOS when high indicates an optical signal level below that specified in the relevant standard. The Rx\_LOS contact is an open drain/collector output and shall be pulled up to Vcc\_Host in the host with a resistor in the range 4.7-10 kΩ, or with an active termination. Power supply filtering is recommended for both the transmitter and receiver. The Rx\_LOS signal is intended as a preliminary indication to the system in which the SFP is installed that the received signal strength is below the specified range. Such an indication typically points to non-installed cables, broken cables, or a disabled, failing or a powered off transmitter at the far end of the cable.

## Optical Characteristics

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Unit	Values
Operating Reach	m	2-20K
Transmitter		
Center wavelength (range)	nm	1490
Side Mode Suppression Ratio (min)	dB	30
Average launch power of OFF transmitter (max)	dBm	-30
Extinction ratio (min)	dB	9
Optical Return Loss Tolerance (min)	dB	12
Receiver		
Center wavelength (range)	nm	1310
Receive overload (max) in average power (note 1)	dBm	-8
Receiver Reflectance (max)	dB	-12
Los Assert (min)	dBm	-33
Los Dessert (max)	dBm	-30
Los Hysteresis (min)	dB	0.5
Receiver power (damage, Max)	dBm	-7

- Notes:
- Average optical power shall be measured using the methods specified in TIA/EIA-455-95.
  - Power bud get is defined as the different between the Rx sensitivity and the Tx output power of the interface.

## Recommended Operating Environment

Recommended Operating Environment specifies parameters for which the electrical and optical characteristics hold unless otherwise noted.

Parameter	Symbol	Min	Typical	Max	Unit
Power Supply Voltage	Vcc	3.135	3.3	3.465	V
Power Supply Current	Icc	/	/	350	mA
Operating Case Temperature	Tc	0	25	70	°C
	Ti	-40	25	85	

## Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales staff.

Parameter	Symbol	Min	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	degC	Over operating temp
Laser power monitor absolute error	DMI_TX	-3	3	dB	/
Supply voltage monitor absolute error	DMI_VCC	-0.08	0.08	V	Full operating range
Bias current monitor	DMI_lbias	-10%	10%	mA	/

## ESD

This transceiver is specified as ESD threshold 2kV for all electrical input pins, tested per MIL-STD-883, Method 3015.4/JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

## Laser Safty

This is a Class 1 Laser Product according to IEC 60825-1:1993+A1:1997+A2:2001. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (July 26, 2001)

## Applications

- GEPON networks
- FTTX

## Pin Definition

The SFP modules are hot-pluggable. Hot pluggable refers to plugging in or unplugging a module while the host board is powered. The SFP host connector is a 0.8 mm pitch 20 position right angle improved connector specified by SFF-8083, or stacked connector with equivalent with equivalent electrical performance. Host PCB contact assignment is shown in Figure 2 and contact definitions are given in Table 2. SFP module contacts mates with the host in the order of ground, power, followed by signal as illustrated by Figure 3 and the contact sequence order listed in Table 2.

PIN	Logic	Symbol	Name / Description	Note
1	/	VeeT	Module Transmitter Ground	1
2	LVTTTL-O	TX_Fault	Module Transmitter Fault	-
3	LVTTTL-I	TX_Dis	Transmitter Disable; Turns off transmitter laser output	-
4	LVTTTL-I/O	SDA	2-Wire Serial Interface Data Line	2
5	LVTTTL-I	SCL	2-Wire Serial Interface Clock	2
6	/	MOD_DEF0	Module Definition, Grounded in the module	-
7	LVTTTL-I	RS0	Receiver Rate Select	-
8	LVTTTL-O	RX_LOS	Receiver Loss of Signal Indication Active LOW	-
9	LVTTTL-I	RS1	Transmitter Rate Select (not used)	1
10	/	VeeR	Module Receiver Ground	1
11	/	VeeR	Module Receiver Ground	-
12	LVPECL-O	RD-	Receiver Inverted Data Output	-
13	LVPECL-O	RD+	Receiver Data Output	1
14	/	VeeR	Module Receiver Ground	-
15	/	VccR	Module Receiver 3.3 V Supply	-
16	/	VccT	Module Receiver 3.3 V Supply	1
17	/	VeeT	Module Transmitter Ground	-
18	CML-I	TD+	Transmitter Non-Inverted Data Input	-
19	CML-I	TD-	Transmitter Inverted Data Input	1
20	/	VeeT	Module Transmitter Ground	-

- Note:
- Module ground pins GND are isolated from the module case.
  - Shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.45V on the hostboard.

For more information, please visit: <http://www.hsgq.com>

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