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10G EPON SFP+ Symmetric ONU Transceiver
Hot Pluggable, SC, Tx1270nm DFB / Rx1577nm, Single-Fiber, 20KM, DDM

Part Number: FSPP-H2-PE2-20P

Overview

FSPP-H2-PE2-20P Small Form Factor Pluggable SFP+ transceivers are compliant with the current SFP+ Multi-Source Agreement (MSA) Specification. The high performance un-cooled 1270nm DFB transmitter and high sensitivity 1577nm APD-TIA receiver provide superior performance for 10G EPON ONU PR30 applications.

Applications

- 10G EPON Application
- FTTx Application

Features

- Compatible IEEE802.3av PR30 standard
- Compliant with SFP MSA
- Compliant with SFF8472 diagnostic monitoring interface
- Single fiber bi-directional data link with symmetric 10.3125Gbps Tx and 10.3125Gbps Rx
- Hot Pluggable
- 1270nm burst mode transmitter with DFB laser
- 1577nm continuous mode receiver with APD-TIA
- Simplex SC/UPC connector
- Support Transmitter state indication (Tx_SD) and Receiver state indication (Rx_SD)
- 2-wire interface for management and diagnostic monitor
- Single +3.3V power supply
- 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	T_{ST}	-40	+85	°C
Storage Relative Humidity	RH	5	95	%
Supply Voltage	V_{CC}	-0.5	+4.0	V

Recommended Operating Conditions

Parameters	Symbol	Min.	Typ.	Max.	Unit
Case Operating Temp. (FSPP-H2-PE2-20Px)	T_{OP}	0	-	+70	°C
Case Operating Temp. (FSPP-H2-PE2-20Pxi)	T_{OP}	-40	-	+85	°C
Supply Voltage	V_{CC}	+3.13	+3.3	+3.47	V
Supply Current	I_{CC}			450	mA

Transmitter Electro-optical Characteristics

V_{CC} = 3.13V to 3.47V, T_{OP} = 0 °C to 70 °C (FSPP-H2-PE2-20P); **T_{OP} = -40 °C to 85 °C** (FSPP-H2-PE2-20Pi)

Parameter	Symbol	Min.	Typ.	Max.	Units	Note
Operating Data Rate	DR		10.3125		Gb/s	
Optical Launch Power	Po	+4		+9	dBm	1
Optical Center Wavelength	λ	1260	1270	1280	nm	2
Spectrum Width (-20dB)	Δλ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Optical Extinction Ratio	ER	6			dB	
Average Launch power of OFF Transmitter	P_{OFF}			-45	dBm	
Optical Eye Mask	IEEE802.3av					
Transmitter and Dispersion Penalty	DP			1.5	dB	
Optical Return Loss Tolerance		-15			dB	
Differential Data Input Swing	V_{IN}	200		1000	mV	
Input Differential Impedance	Z_{IN}	90	100	110	ohm	
Tx_Fault Output Voltage - High	V_{TFL-H}	2.4		Vcc	V	
Tx_Fault Output Voltage - Low	V_{TFL-L}	GND		0.4	V	
Tx_SD Output Voltage - High	V_{TSD-H}	2.4		Vcc	V	
Tx_SD Output Voltage - Low	V_{TSD-L}	GND		0.4	V	
Tx_Burst Input Voltage - High	V_{BUR-H}	2.0		Vcc	V	

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Tx_Burst Input Voltage - Low	V_{BUR-L}	GND		0.8	V	

Note1: The optical power is launched into a 9/125μm single mode fiber.
Note2: Measured with a PRBS 2^{31}-1 test pattern @10.3125Gbps.

Receiver Electro-optical Characteristics

V_{CC} = 3.13V to 3.47V, T_{OP} = 0 °C to 70 °C (FSPP-H2-PE2-20P); **T_{OP} = -40 °C to 85 °C** (FSPP-H2-PE2-20Pi)

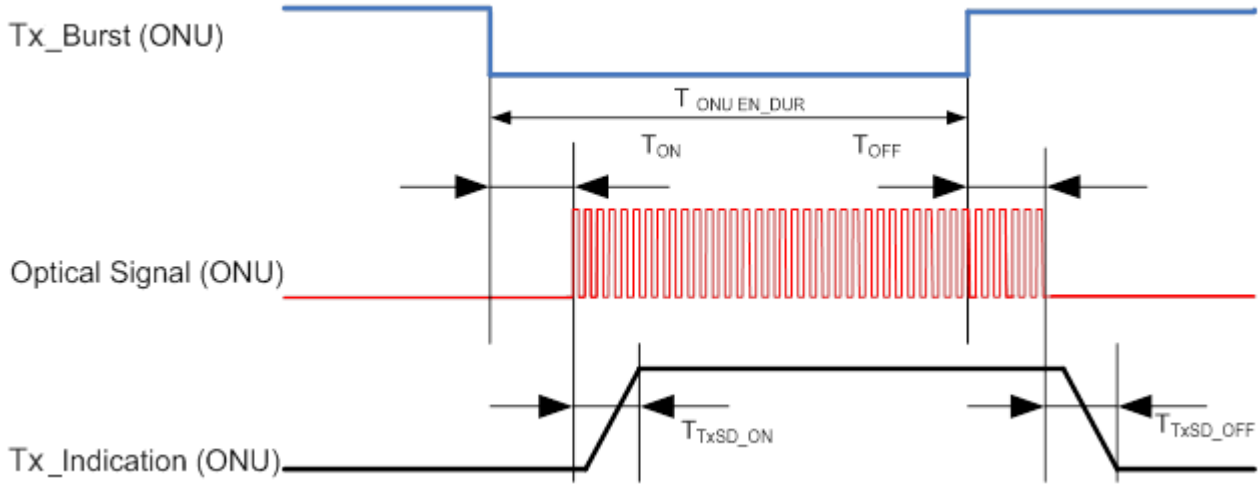
Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR		10.3125		Gb/s	
Receiver Sensitivity	SEN			-28.5	dBm	1
Maximum Receive Power	P_{RX_MAX}	-8			dBm	1
Optical Center Wavelength	λc	1575	1577	1580	nm	
LOS De-Assert	LOS_D			-30	dBm	
LOS Assert	LOS_A	-39			dBm	
LOS Hysteresis	LOS_{HY}	0.5		5	dB	
Differential Data Output Swing	V_{OUT}	300		850	mV	
Receiver LOS Signal Output Voltage-Low	$LOSV_L$	GND		0.5	V	
Receiver LOS Signal Output Voltage-High	$LOSV_H$	2.4		Vcc	V	

Note1: Measured with a PRBS 2^{31}-1 test pattern @10.3125Gbps BER<10^{-3}, ER=6.

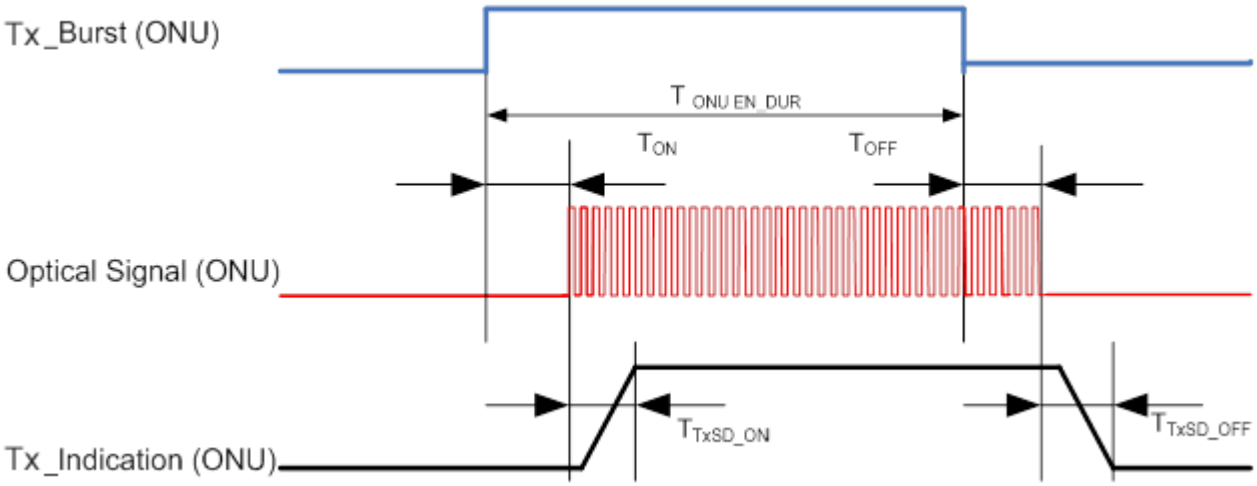
Timing Characteristics

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Turn On Time at Burst mode	T_{ON}			30	ns	
Turn Off Time at Burst mode	T_{OFF}			30	ns	
Tx_SD Assert Time	T_{TxSD_ON}			100	ns	
Tx_SD Assert Time	T_{TxSD_ON}			100	ns	
Tx_SD De-assert Time	T_{TxSD_OFF}			100	ns	
Rx_LOS Assert Time	T_{LOSA}			100	us	
Rx_LOS De-assert Time	T_{LOSD}			100	us	

Burst Mode Transmitter Timing (Tx_Burst = Low(0), Transmitter ON)



Burst Mode Transmitter Timing (Tx_Burst = High(1), Transmitter ON)



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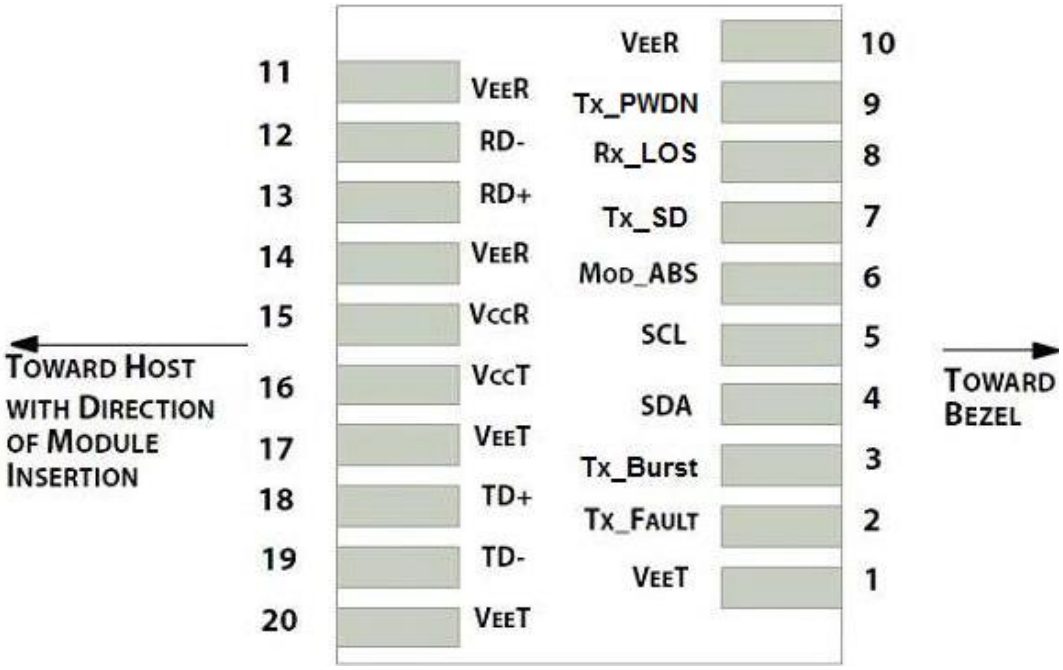
Pin Assignment



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	Transmitter Burst Control (LVTTL Input level) FSPP-H2-PE2-20PL: Low(0) = Transmitter ON FSPP-H2-PE2-20PH: High(1) = Transmitter ON
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	Loss of Receiver Signal Indication
9	Tx_PWDN	Power saving of Tx side, On/Off time less than 1ms, active Low to active Tx power saving. if this feature will not be used, main board connection should be NC (No Connection)
10	VEER	Receiver Ground
11	VEER	Receiver Ground
12	RD-	Receiver Inverted Data output

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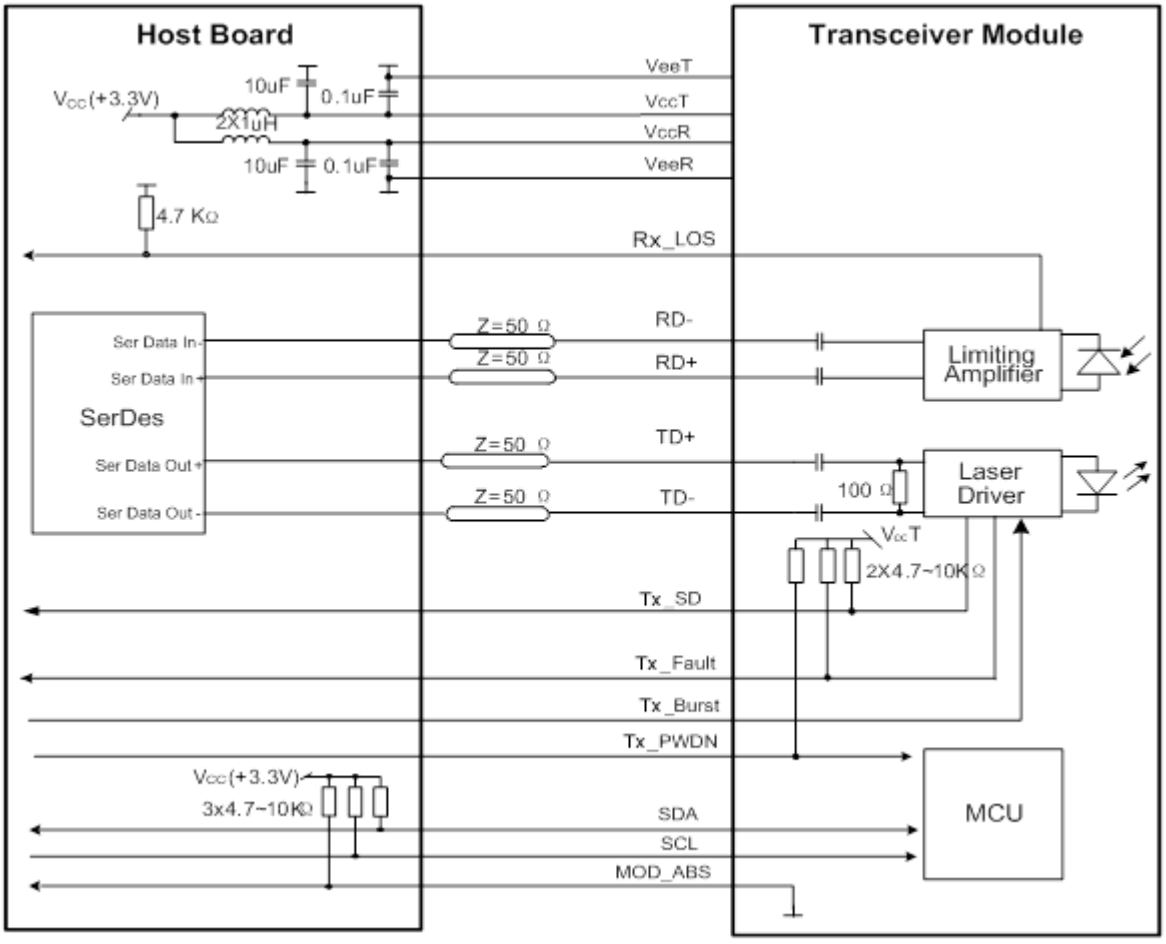
13	RD+	Receiver Non-Inverted Data output
14	VEER	Receiver Ground
15	VCCR	Receiver Power
16	VCCT	Transmitter Power
17	VEET	Transmitter Ground
18	TD+	Transmitter Non-Inverted Data Input
19	TD-	Transmitter Inverted Data Input
20	VEET	Transmitter Ground

Recommended Application Circuit



Digital Diagnostic Functions

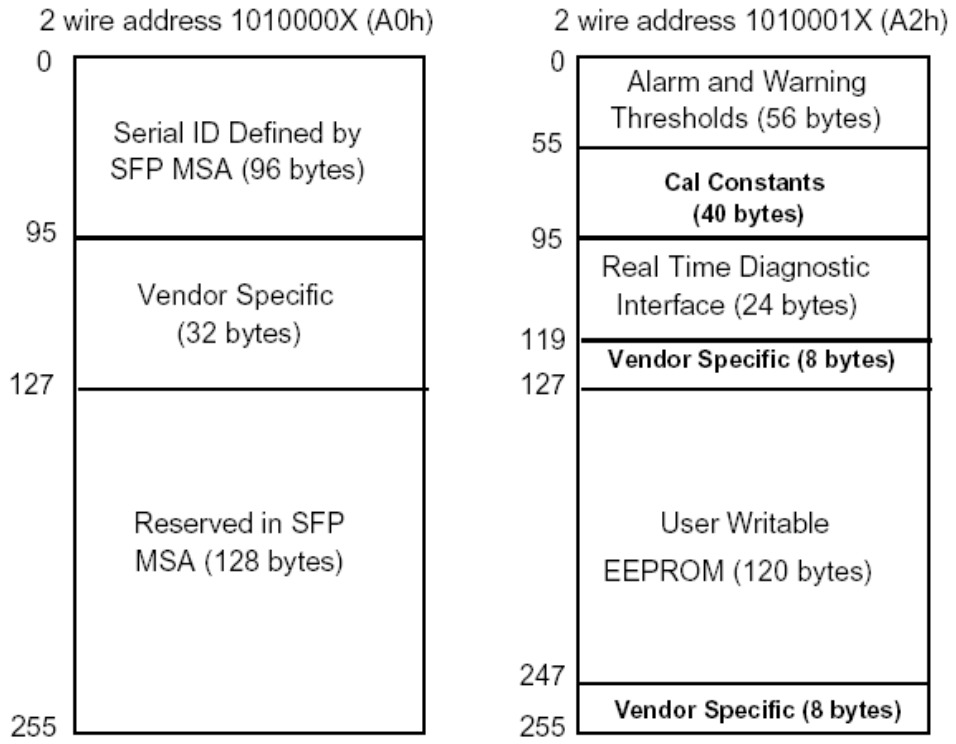
As defined by the SFP MSA (SFF-8472) Ficer's SFP transceivers provide digital diagnostic functions via a 2-wire serial interface, which allows real-time access to the following operating parameters:

- 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

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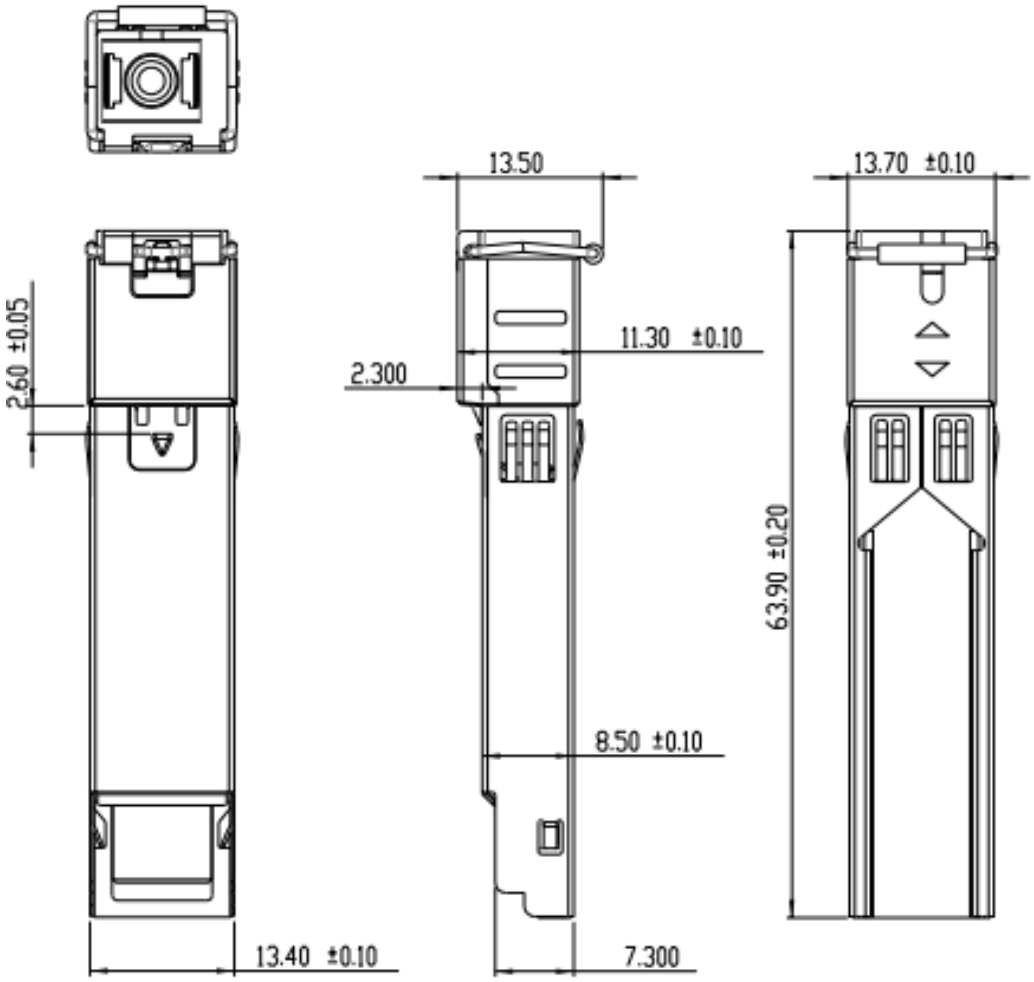
Mechanical Dimensions



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

Ordering Information

Part No.	Tx	Rx	Link	Tx_Burst Type	DDM	Temp.
FSPP-H2-PE2-20PL	1270nm	1577nm	20km	0 (Low) = Tx ON	Yes	0~70°C
FSPP-H2-PE2-20PLi	1270nm	1577nm	20km	0 (Low) = Tx ON	Yes	-40~85°C
FSPP-H2-PE2-20PH	1270nm	1577nm	20km	1 (High) = Tx ON	Yes	0~70°C
FSPP-H2-PE2-20PHi	1270nm	1577nm	20km	1 (High) = Tx ON	Yes	-40~85°C