

## FPMPP8510GL-03D

### 10.3Gbps 850nm SFP+ Transceiver

#### Features

- ✧ Supports 9.95 to 11.7Gb/s bitrates, Hot-pluggable SFP+ footprint
- ✧ 850nm VCSEL Transmitter, PIN-Photo-detector
- ✧ Duplex LC connector, Built-in digital diagnostic monitoring functions
- ✧ All-Metal housing for superior EMI Performance
- ✧ Power dissipation < 1W, Single 3.3V power supply
- ✧ Max.link length of 300m on 2000MHZ-km Multi-mode Fiber
- ✧ Operating Case Temperature Standard: 0°C~+70°C
- ✧ Compliant with MSA SFP Specification
- ✧ Electrical Interface compliant with SFF-8431
- ✧ Digital Diagnostic Monitor Function Compatible with SFF-8472
- ✧ ROHS6 Compliant



#### Applications

- ✧ 10G Base-SR/SW
- ✧ 10G Ethernet
- ✧ 8G Fiber Channel

#### Product Description

The FPMPP8510GL-03D Multi-Mode Transceiver is SFP+ modules for duplex data communication as 10G Base-SR/SW. It is SFP+ 20-PIN Connector to allow hot plug capability. Digital diagnostic monitor functions are available via IP<sup>2</sup>PC. This module is designed and operates at nominal 850nm wavelength.

## Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit
Storage Temperature	Ts	-40		85	°C
Operating Case Temperature	Tc	-5		70	°C
Supply Voltage	VCC	-0.5		3.6	V

## Recommended Operating Conditions

Parameter	Symbol	Min.	Typ.	Max.	Unit
Ambient Operating Temperature	T <sub>AB</sub>	0		70	°C
Supply Voltage	VCC	3.15	3.3	3.45	V
Data Rate	10GBASE-LR		10.3		Gbps
	10GBASE-LW		9.95		
	8G FC		8.5		
Total Supply Current	I <sub>BCCB</sub>			300	mA

## Performance Specifications - Electrical

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
Input differential impedance	R <sub>i</sub>		100		Ω	1
Differential data input swing	V <sub>in,pp</sub>	180		700	mV	
Transmit disable voltage	V <sub>D</sub>	2		V <sub>cc</sub>	V	
Transmit enable voltage	V <sub>EN</sub>	V <sub>ee</sub>		V <sub>ee</sub> +0.8	V	
Data dependent input jitter	DDJ			0.1	U	
Data input Total Jitter	T <sub>J</sub>			0.28	U	
<b>Receiver</b>						
Differential data output swing	V <sub>out,pp</sub>	300		850	mV	2
Data output rise time,fall time	t <sub>r</sub>	28			P	3
Los Fault	V <sub>LOS fault</sub>	2		V <sub>ccB<sub>hostB</sub></sub>	V	4
Los Normal	V <sub>LOS norm</sub>	V <sub>ee</sub>		V <sub>ee</sub> +0.8	V	4
Total Jitter	T <sub>J</sub>			0.70	U	
Deterministic Jitter	DJ			0.42	U	

**Notes:**

1. Connected directly to TX data input pins, AC coupling from pins into laser driver
2. 2 Into 100Ω differential termination
3. 20 – 80 % . Measured with Module Compliance Test Board and OMA test pattern. Use of four 1’s and four 0’s in sequence in the PRBS<sup>9</sup> is an acceptable alternative. SFF-8431 Rev 2.1
4. 4. LOS is an open collector output. Should be pulled up with 4.7kΩ – 10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1. Maximum pull-up voltage is 5.5V

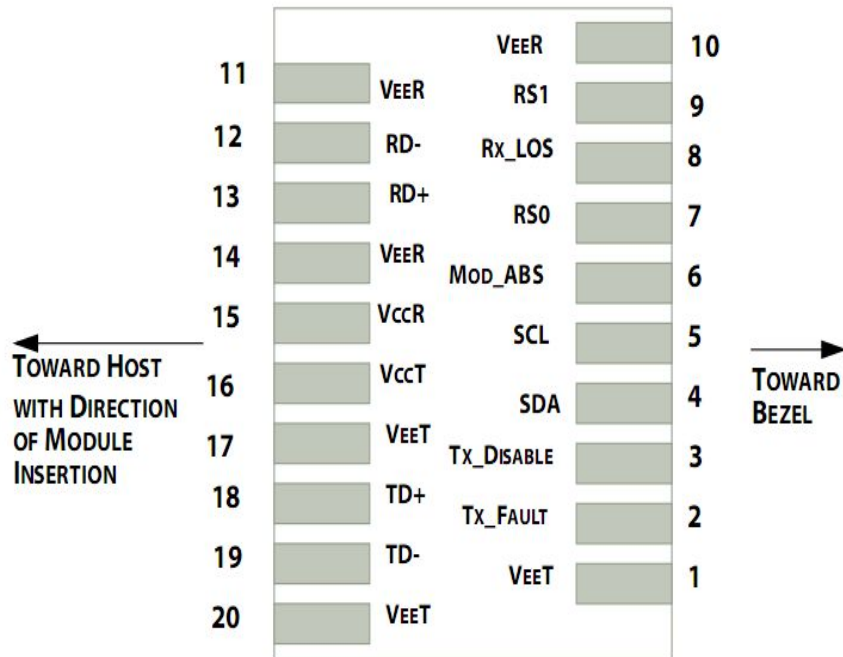
**Performance Specifications-Optical**

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
<b>Transmitter</b>						
Center Wavelength	λt	840	850	860	nm	
RMS Spectral width	Pm			Note1	nm	1
Average Optical Power	Pavg	-6.5		-1	dBm	2
Extinction Ratio	ER	3.6	5.0		dB	
Transmitter dispersion	TDP			3.9	dB	
Relative intensity Noise	Rin			-128	dB/Hz	
Output Eye Mask	Compliant with IEEE 802.3ae					
<b>Receiver</b>						
Center Wavelength	λR	840	850	860	nm	
Receiver Sensitivity	Psen			-11	dBm	2
Stressed Sensitivity in OMA				-7.5	dBm	
Return Loss Tolerance				-12	dB	
Receiver Overload	Pmax	-1			dBm	
LOS De-Assert	LOS <sub>DB</sub>			-12	dBm	
LOS Assert	LOS <sub>AB</sub>	-30			dBm	
LOS	High	2.0		Vcc+0.3	V	
	Low	0		0.8		

**Notes:**

1. The optical power is launched into MMF
2. Measured with a PRBS 2<sup>31</sup>-1 test pattern @10.3125Gbps, BER≤10<sup>-12</sup>.

## SFP+ Transceiver PIN Description



Pin out of Connector Block on Host Board

## Pin Function Definitions

Pin	Symbol	Name/Description	Ref.
1	VEET	Transmitter Ground(Common with Receiver Ground)	1
2	TFAULT	Transmitter Fault.	2
3	TDIS	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	No connection required	1
8	RX_LOS	Loss of Signal indication. Logic 0 indicates normal operation.	5
9	RS1	No connection required	1
10	VEER	Receiver Ground (Common with Transmitter Ground)	1
11	VEER	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	VEER	Receiver Ground (Common with Transmitter Ground)	1

15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	VEET	Transmitter Ground (Common with Receiver Ground)	1

**Notes:**

1. Circuit ground is internally isolated from chassis ground.
2. Tfault is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
3. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
4. Should be pulled up with 4.7kΩ – 10kΩ on host board to a voltage between 2.0V and 3.6V. MOD\_ABS pulls line low to indicate module is plugged in.
5. LOS is open collector output. Should be pulled up with 4.7kΩ – 10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

**Digital Diagnostic Functions**

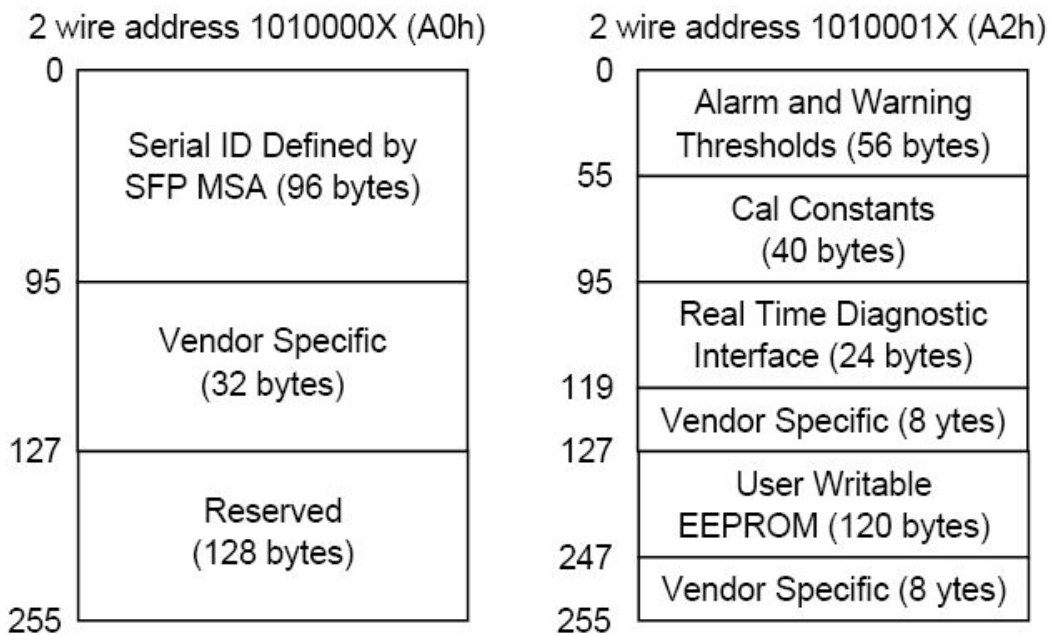
The FPMPP8510GL-03D transceivers support the 2-wire serial communication protocol as defined in the S MSA. The standard S serial ID provides access to identification information that describes the transceiver’s capabilities, standard interfaces, manufacturer, and other information.

Additionally, the SFP+ transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

The S MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial

interface at the 8 bit address 1010000X (A0h).The digital diagnostic monitoring interface makes use of the 8 bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged.

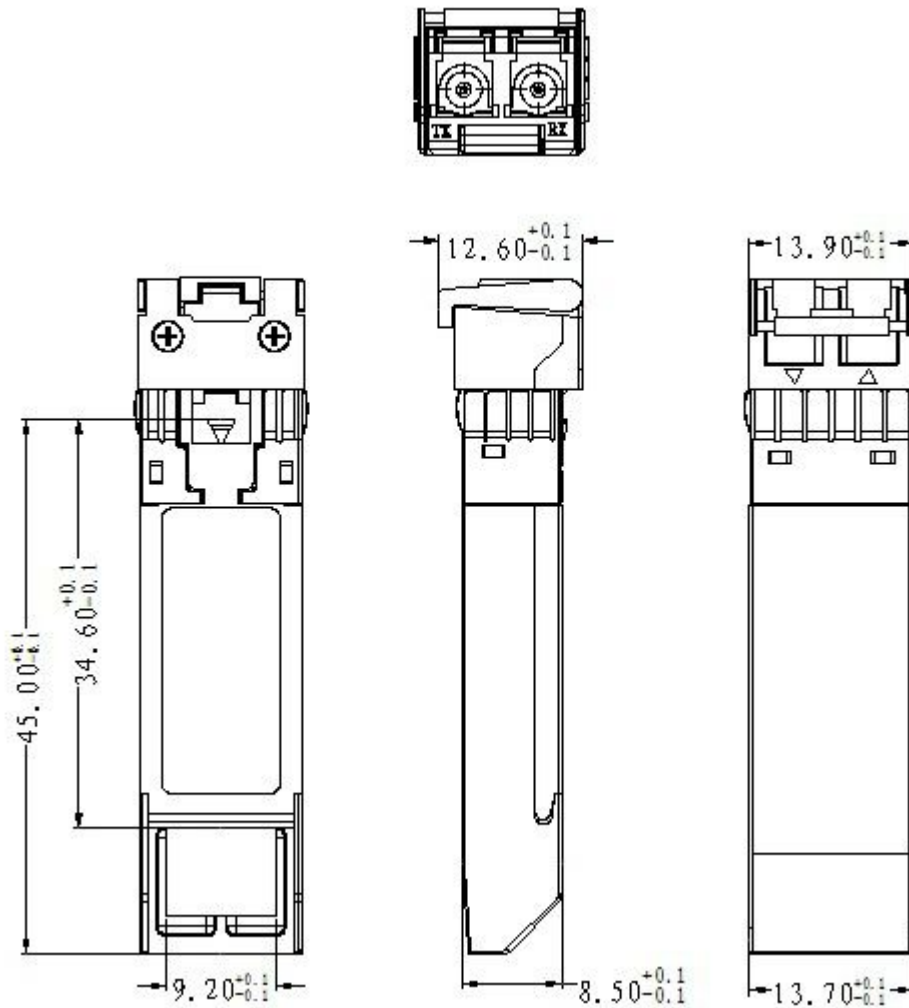
The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) inside the transceiver, which is accessed through a 2-wire serial interface. When the serial protocol is activated, the serial clock signal (SCL, Mod Def 1) is generated by the host. The positive edge clocks data into the S transceiver into those segments of the E2PROM that are not write-protected. The negative edge clocks data from the S transceiver. The serial data signal (SDA, Mod Def 2) 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.



**Digital Diagnostic Memory Map**



## Mechanical Specifications



## 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.





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## Ordering information

Part No.	Data Rate	Laser	Receiver	Distance	Interface	DDM	Temp.
FPMPP8510GL-03D	10.3Gbps	VCSEL	PIN-TIA	300M	LC	YES	C

\* **03D---** 300m with DDM/DOM Functional

\* **C---** Commercial temperature

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