

FPSPXX1ML-XX

155M SFP Duplex Transceiver Module

Features

- ✧ Operating data rate up to 155M
- ✧ 1310 nm FP/DFB LD Transmitter
- ✧ 1550 nm DFB Laser
- ✧ Distance up to 160KM
- ✧ Single 3.3V Power supply and TTL Logic Interface
- ✧ Duplex LC Connector Interface
- ✧ Hot Pluggable
- ✧ Operating Case Temperature
Standard: 0°C~+70°C;Industrial:-40°C~+85°C
- ✧ Compliant with MSA SFP Specification
- ✧ Digital diagnostic monitor interface and DDM optional



Applications

- ✧ Fast Ethernet
- ✧ ATM Switches and Routers
- ✧ Other Optical Links

Product Description

The FPSPXX1ML-XX series single mode transceivers is small form factor pluggable module for bi-directional serial optical data communications such as Fast Ethernet and OC-3/STM-1,SONET/SDH It is with the SFP 20-pin connector to allow hot plug capability. This module is designed for single mode fiber and operates at a nominal wavelength of 1310nm (1550nm)

The transmitter section uses a multiple quantum well laser and is a class 1 laser compliant according to International Safety Standard IEC-60825. The receiver section uses an integrated

InGaAs detector preamplifier (IDP) mounted in an optical header and a limiting post-amplifier IC.

The FPSPXX1ML-XXDI series are designed to be compliant with SFF-8472 SFP Multi-source Agreement (MSA) and Industry working temperature.

Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T _s	-40	+85	°C
Supply Voltage	V _{cc}	-0.5	3.6	V

Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Temperature	T _A	FPSPXX1ML-XXXX	0	+70	°C
		FPSPXX1ML-XXXI	-40	+85	
Power Supply Voltage	V _{cc}	3.15	3.3	3.45	V
Data Rate	FE OC-3 / STM-1		100 155		Mbps
Total Supply Current	I _{cc}			300	mA

PERFORMANCE SPECIFICATIONS - ELECTRICAL

Parameter	Symbol	Min.	Typ.	Max.	Unit	Notes
TRANSMITTER						
CML/PECL Inputs (Differential)	V _{in}	400		1800	mVpp	AC coupled inputs
Input Impedance (Differential)	Z _{in}	90	100	110	ohms	R _{in} > 100 kohms @ DC
Tx_DISABLE Input Voltage - High		2		3.45	V	
Tx_DISABLE Input Voltage - Low		0		0.8	V	
Tx_FAULT Output Voltage -- High		V _{cc} -0.5		V _{cc} +0.3	V	I _o = 400µA; Host V _{cc}
Tx_FAULT Output Voltage -- Low		0		0.5	V	I _o = -4.0mA
TX_Disable Assert Time	t _{off}			10	us	

TX_Disable Negate Time	t _{off}			1	us	
RECEIVER						
CML Outputs (Differential)	V _{out}	370		1800	mVpp	AC coupled outputs
Output Impedance (Differential)	Z _{out}	90	100	110	ohms	
Rx_LOS Output Voltage - High		V _{cc} -0.5		V _{cc} +0.3	V	I _o = 400μA; Host V _{cc}
Rx_LOS Output Voltage - Low		0		0.8	V	I _o = -4.0mA

Optical and Electrical Characteristics

Parameter		Symbol	Min.	Typical	Max.	Unit
9μm Core Diameter SMF	FPSP311ML-20XX			20		Km
	FPSP311ML-40XX			40		
	FPSP311ML-60XX			60		
	FPSP551ML-80XX			80		
	FPSP551ML-120XX			120		
	FPSP551ML-160XX			160		
Data Rate				100/155		Mbps
Transmitter						
Centre Wavelength		λ _c	1260	1310	1360	nm
			1510	1550	1580	
Spectral Width (RMS)		λ			1	nm
Average Output Power	FPSP311ML-20XX	P _{out}	-12		-3	dBm
	FPSP311ML-40XX		-8		-2	
	FPSP311ML-60XX		-5		0	
	FPSP551ML-80XX		-5		0	
	FPSP551ML-120XX		0		5	
	FPSP551ML-160XX		2		7	
Extinction Ratio		EX	9.5			dB
Output Optical Eye		ITU-T G.957.Compliant				
Receiver						
Centre Wavelength		λ _c	1260		1620	nm
Receiver Sensitivity	FPSP311ML-20XX	PIN			-32	dBm
	FPSP311ML-40XX				-32	
	FPSP311ML-60XX				-34	

	FPSP551ML-80XX				-34	
	FPSP551ML-120XX				-34	
	FPSP551ML-160XX				-36	
Output Differential Impedance			90	100	110	Ω
Data Output Swing Differential		V_{OUT}	370		2000	mV
Rise/Fall Time		T_r/t_f			2.2	ns
LOS De-Assert		LOS_D			-35	dBm
LOS Assert		LOS_A	-45			dBm
LOS	High		2.0		$V_{CC}+0.3$	V
	Low		0		0.8	

SFP Transceiver Electrical Pad Layout

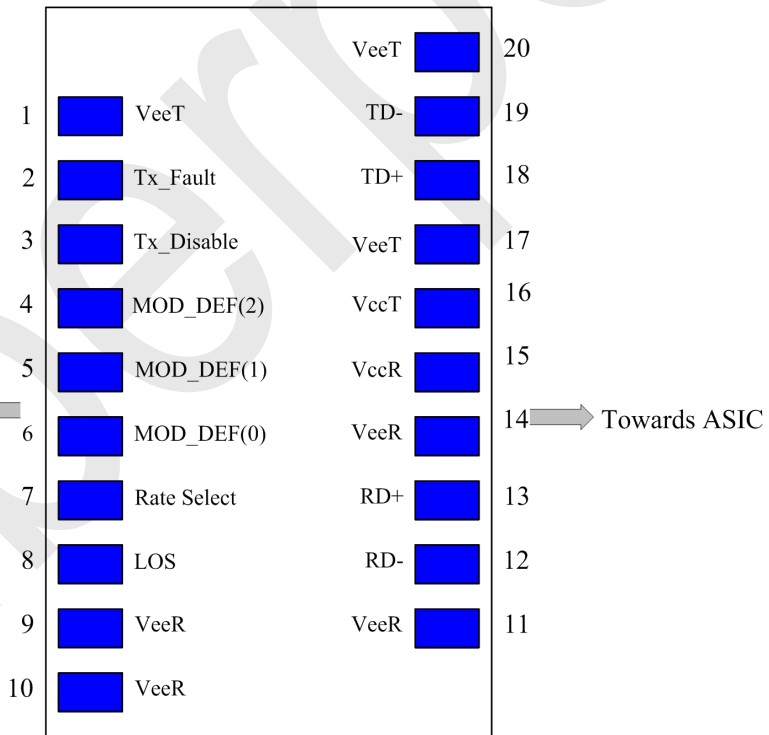


Figure 1 Transceiver pin descriptions

Pin Function Definitions

Pin Number	Name	FUNCTION	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	Note 1
3	TX Disable	Transmitter Disable	3	Note 2, Module disables on high or open
4	MOD-DEF2	Module Definition 2	3	Note 3, Data line for Serial ID.
5	MOD-DEF1	Module Definition 1	3	Note 3, Clock line for Serial ID.
6	MOD-DEF0	Module Definition 0	3	Note 3, Grounded within the module.
7	Rate Select	Not Connect	3	Function not available
8	LOS	Loss of Signal	3	Note 4
9	VeeR	Receiver Ground	1	Note 5
10	VeeR	Receiver Ground	1	Note 5
11	VeeR	Receiver Ground	1	Note 5
12	RD-	Inv. Received Data Out	3	Note 6
13	RD+	Received Data Out	3	Note 7
14	VeeR	Receiver Ground	1	Note 5
15	VccR	Receiver Power	2	3.3 ± 5%, Note 7
16	VccT	Transmitter Power	2	3.3 ± 5%, Note 7
17	VeeT	Transmitter Ground	1	Note 5
18	TD+	Transmit Data In	3	Note 8
19	TD-	Inv. Transmit Data In	3	Note 8
20	VeeT	Transmitter Ground	1	Note 5

Notes:

1) TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

2) TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 – 10 K Ω resistor. Its states are:

◇ Low (0 – 0.8V): Transmitter on

- ✧ (>0.8, < 2.0V): Undefined
- ✧ High (2.0 – 3.465V): Transmitter Disabled
- ✧ Open: Transmitter Disabled

3) Mod-Def 0,1,2. These are the module definition pins. They should be pulled up with a 4.7K – 10K Ω resistor on the host board. The pull-up voltage shall be VccT or VccR (see Section IV for further details). Mod-Def 0 is grounded by the module to indicate that the module is present Mod-Def 1 is the clock line of two wire serial interface for serial ID Mod-Def 2 is the data line of two wire serial interface for serial ID

4) LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10K Ω resistor. Pull up voltage between 2.0V and VccT, R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

5) VeeR and VeeT may be internally connected within the SFP module.

6) RD-/+: These are the differential receiver outputs. They are AC coupled 100 Ω differential lines which should be terminated with 100 Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 370 and 2000 mV differential (185 –1000 mV single ended) when properly terminated.

7) VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V \pm 5% at the SFP connector pin. Maximum supply current is 300mA. Recommended host board power supply filtering is shown below. Inductors with DC resistance of less than 1 ohm should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply-filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP transceiver module.

8) TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 500 – 2400 mV (250 – 1200mV single-ended), though

it is recommended that values between 500 and 1200 mV differential (250 – 600mV single-ended) be used for best EMI performance.

Digital Diagnostic Memory Map

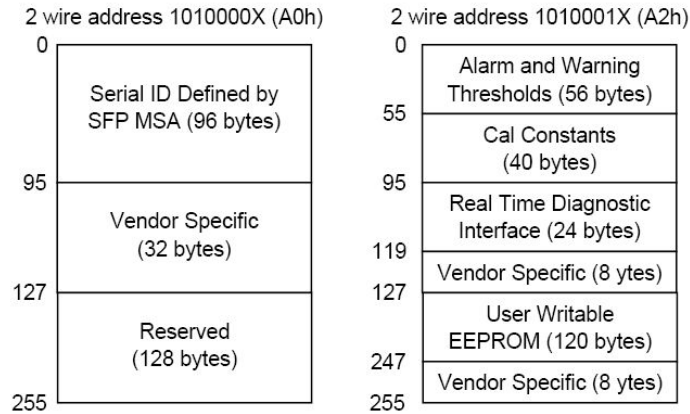


Figure 2 Digital Diagnostic Memory Map

Recommend Circuit Schematic

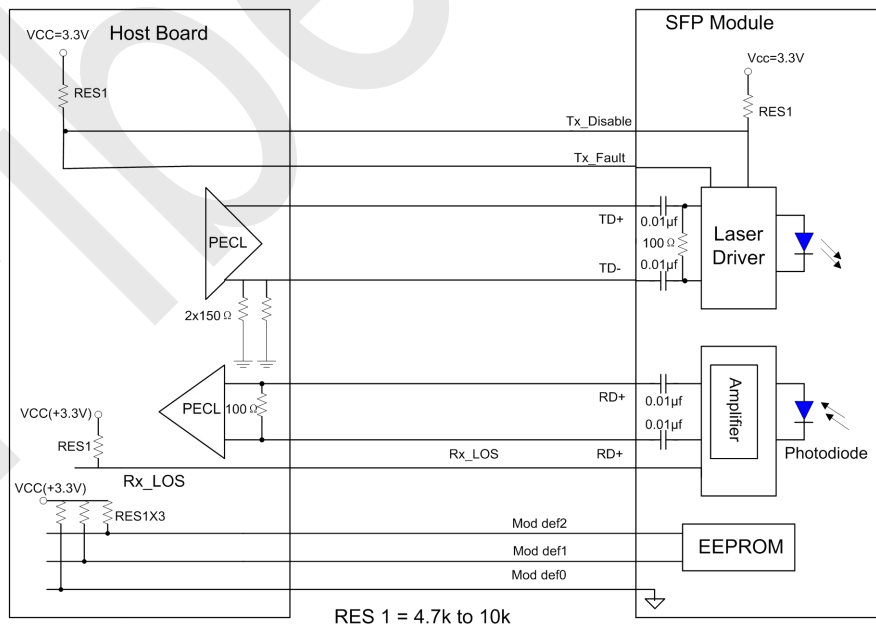
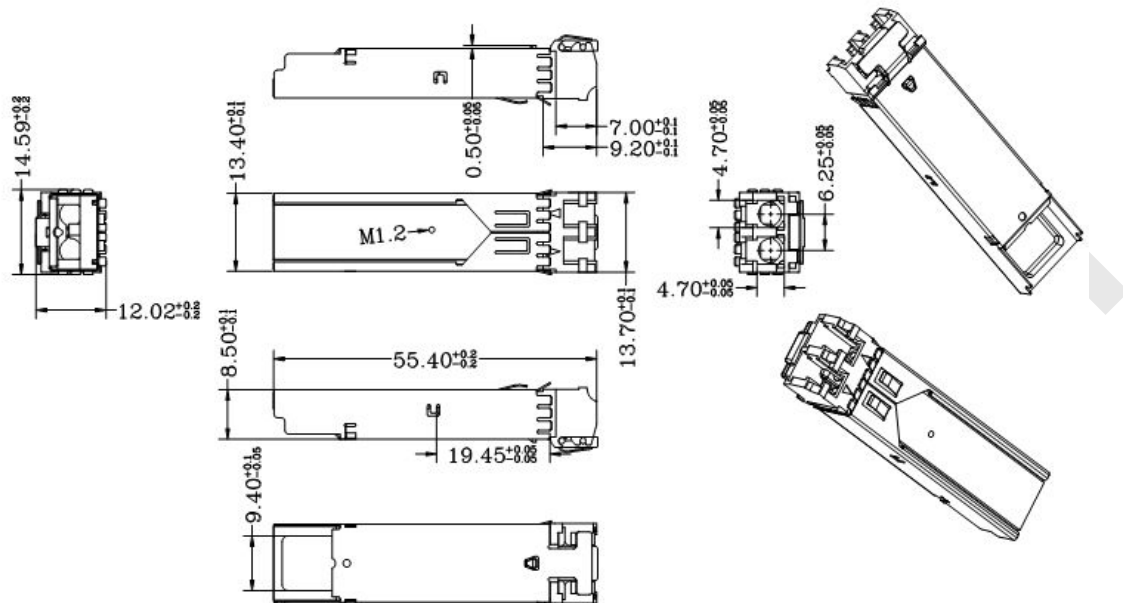


Figure 3 Recommend Circuit Schematic

Mechanical Specifications



Ordering information

Product Number	Data Rate	Laser	Receiver	Distance	Interface	DDM	Temp.
FPSP311ML-20	155Mbps	FP	PIN-TIA	20Km	LC	NO	C
FPSP311ML-20DI	155Mbps	FP	PIN-TIA	20Km	LC	YES	I
FPSP311ML-40D	155Mbps	FP	PIN-TIA	20Km	LC	YES	C
FPSP311ML-60DI	155Mbps	FP	PIN-TIA	60Km	LC	YES	I
FPSP551ML-80D	155Mbps	DFB	PIN-TIA	80Km	LC	YES	C
FPSP551ML-120DI	155Mbps	DFB	PIN-TIA	120Km	LC	YES	I
FPSP551ML-160DI	155Mbps	DFB	PIN-TIA	160Km	LC	YES	I

*I--- Industrial operating temperature

*C--- Commercial Temperature

*D--- DDM / DOM

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