XFP-10G-M 10G Ethernet XFP Transceiver

XFP, LC Connector, 850nm VCSEL with PIN Receiver, Multi Mode, 300M



Applications

- 10GBASE-SR at 10.3125Gbps
- 10GBASE-SW at 9.953Gbps

Features

- Hot Pluggable
- XFI Electrical interface
- Operating case temperature: 0 to 70 °C
- Optical interface compliant to IEEE802.3ae
- 850nm VCSEL transmitter, PIN photo-detector
- All-metal housing for superior EMI performance
- Advanced firmware allow customer system encryption information to be stored in transceiver
- No reference clock needed
- Low power consumption
- RoHS compliant

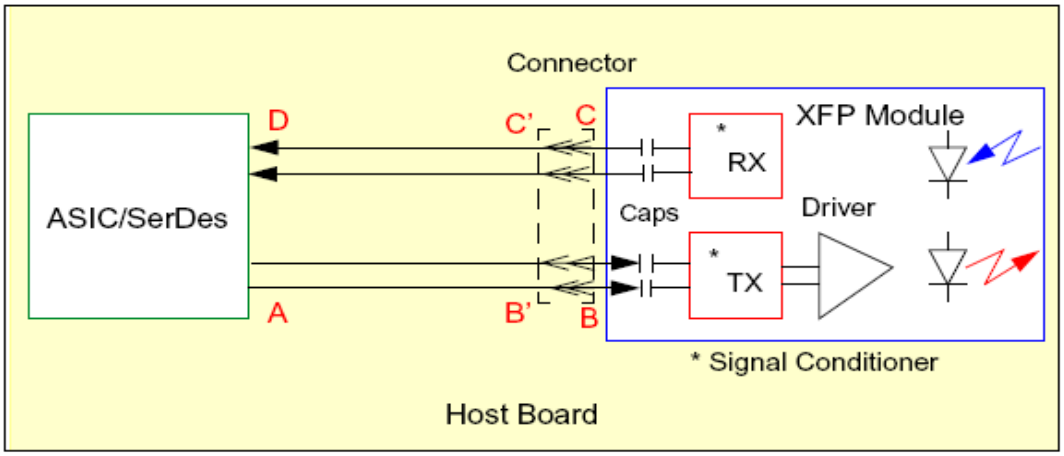


Figure 1: Interface to Host

PRODUCT DESCRIPTION

AAXEON's XFP SR transceiver is a high performance, cost effective module, which is optimized for 10G Ethernet, supporting data-rate of 10.3125Gbps (10GBASE-SR) or 9.953Gbps (10GBASE-SW). It is designed to transmit and receive optical data over 50/125 µm or 62.5/125 µm multimode optical fiber (Table 1).

Fiber type	Minimum modal bandwidth @ 850 nm (MHz•km)	Operating range (meters)
62.5 µm MMF	160	2 to 26
	200	2 to 33
50 µm MMF	400	2 to 66
	500	2 to 82
	2000	2 to 300

Table 1: XFP SR Operating Range for each Optical Fiber Type

The XFP SR transmitter section incorporates an 850nm VCSEL, driver and re-timer. The receiver section consists of a PIN photodiode integrated with a transimpedance preamplifier (TIA) and CDR. The module electrical interface is compliant to XFI electrical specifications. 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 XFI interface is the high speed serial electrical interface for XFP modules with a nominal baudrate of 9.95-11.1 Gb/s. XFI connects a serial 9.95-11.1 Gb/s SerDes to a module over 300mm of improved FR41 material or up to 200mm of standard FR4 with one connector. The electrical interface is based on high speed low voltage AC coupled logic with a nominal differential impedance of 100 Ω. The XFP module could be an Electrical-to-Optical or an Electrical-to-Electrical device.

Recommended Host Board Filtering

The example host board power supply filtering shown in Figure 2 will meet the noise filtering requirements in most systems. Other filtering implementations or local regulation may be used to meet the power noise output requirements.

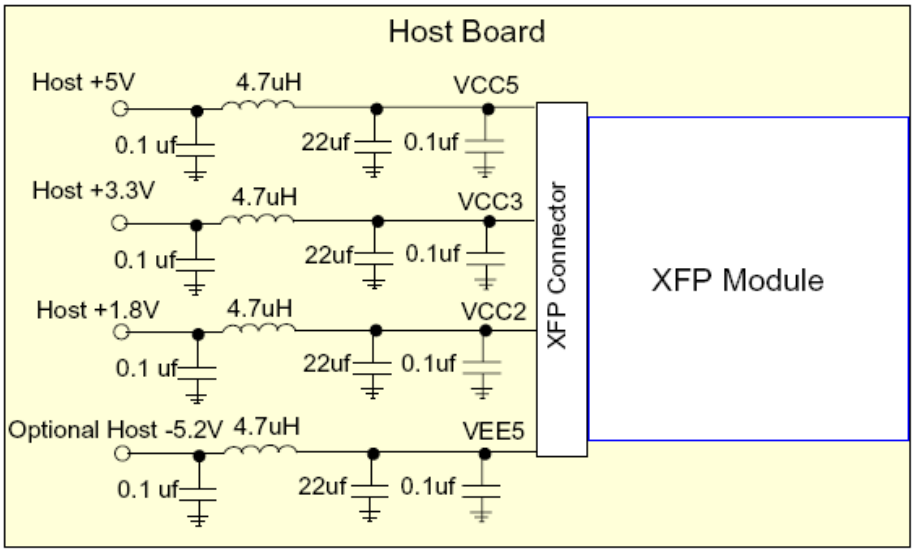


Figure 2: Example of Host Filtering

PIN DEFINITION

The XFP modules are hot-pluggable. Hot pluggable refers to plugging in or unplugging a module while the host board is powered. The XFP host connector is based on a 0.8 mm pitch 30 position right angle connector. Host PCB pin assignment is given by Figure 3 and pin definition are listed in Table 2. All XFP compliance points are defined using this connector. An improved version of this connector will be available from Tyco and possibly from other sources. It is recommended that host systems use the new improved connector for better signal integrity and EMI.

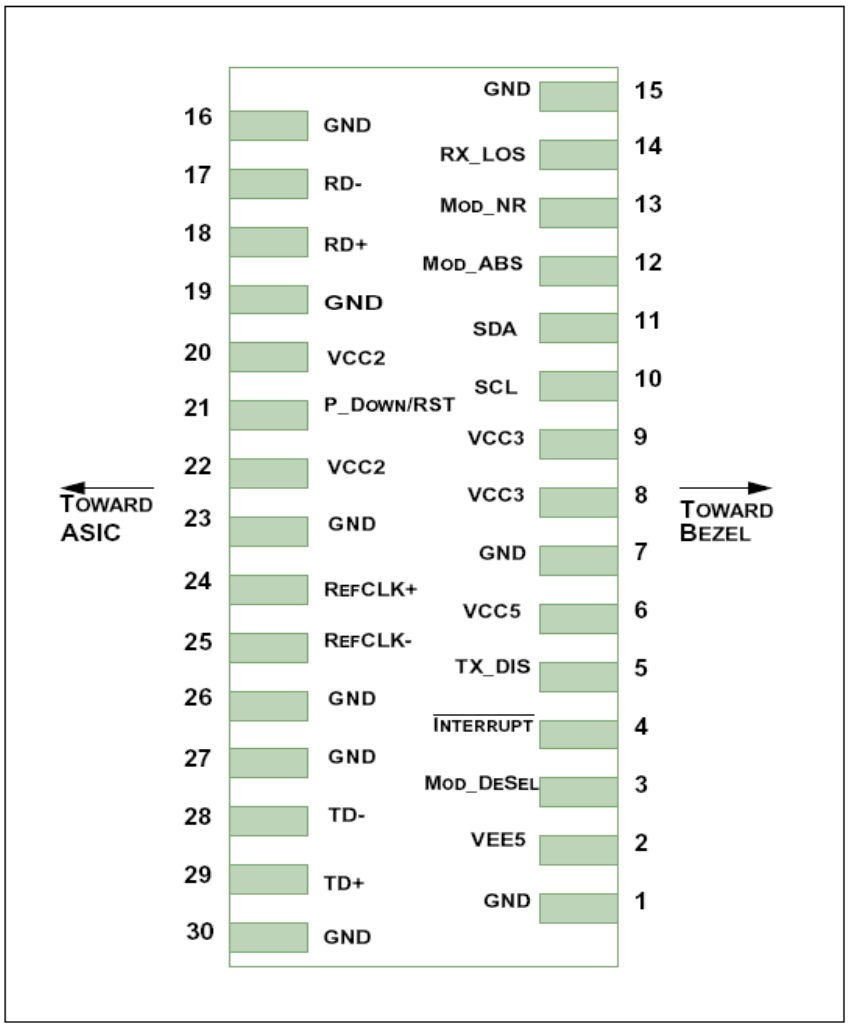


Figure 3: Interface to Host PCB

Pin	Logic	Symbol	Name/Description	Note
1		GND	Module Ground	1
2		VEE5	Optional -5.2V Power Supply	
3	LVTTL-I	Mod_DeSel	Module De-select; When held low allows module to respond to 2-wire serial interface	
4	LVTTL-O	$\overline{\text{Interrupt}}$	$\overline{\text{Interrupt}}$; Indicates presence of an important condition which can be read over the 2-wire serial interface	2
5	LVTTL-I	TX_DIS	Transmitter Disable; Turns off transmitter laser output	
6		VCC5	+5V Power Supply	
7		GND	Module Ground	1
8		VCC3	+3.3V Power Supply	
9		VCC3	+3.3V Power Supply	
10	LVTTL-I/O	SCL	2-Wire Serial Interface Clock	2
11	LVTTL-I/O	SDA	2-Wire Serial Interface Data Line	2
12	LVTTL-O	Mod_Abs	Indicates Module is not present. Grounded in the Module	2
13	LVTTL-O	Mod_NR	Module Not Ready; Indicating Module Operational Fault	2
14	LVTTL-O	RX_LOS	Receiver Loss Of Signal Indicator	2
15		GND	Module Ground	1
16		GND	Module Ground	1
17	CML-O	RD-	Receiver Inverted Data Output	
18	CML-O	RD+	Receiver Non-Inverted Data Output	
19		GND	Module Ground	1
20		VCC2	+1.8V Power Supply	3
21	LVTTL-I	P_Down/RST	Power down; When high, requires the module to limit power consumption to 1.5W or below. 2-Wire serial interface must be functional in the low power mode.	
			Reset; The falling edge initiates a complete reset of the module including the 2-wire serial interface, equivalent to a power cycle.	
22		VCC2	+1.8V Power Supply	3
23		GND	Module Ground	1
24	PECL-I	RefCLK+	Reference Clock Non-Inverted Input, AC coupled on the host board	
25	PECL-I	RefCLK-	Reference Clock Inverted Input, AC coupled on the host board	
26		GND	Module Ground	1
27		GND	Module Ground	1
28	CML-I	TD-	Transmitter Inverted Data Input	
29	CML-I	TD+	Transmitter Non-Inverted Data Input	
30		GND	Module Ground	1

1. Module ground pins Gnd are isolated from the module case and chassis ground within the module.
2. Shall be pulled up with 4.7K-10Kohms to a voltage between 3.15V and 3.45V on the host board.
3. The 1.8 V power supply can be optionally programmed to voltages lower than 1.8 V in modules supporting the variable power supply.

Table 2: XFP Module PIN Definition

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.

Parameters	Symbol	Min.	Max.	Unit
Power Supply Voltage	V_{CC}	0	+3.6	V
Storage Temperature	Tc	-40	+85	°C
Operating Case Temperature	Tc	0	+70	°C
Relative Humidity	RH	5	85	%
RX Input Average Power	Pmax	-	0	dBm

Table 3: Absolute Maximum Rating

RECOMMENDED OPERATING ENVIRONMENT

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

Parameters	Symbol	Min.	Typical	Max	Unit
Power Supply Voltage	V_{CC}	3.135	3.300	3.465	V
Operating Case Temperature	T_C	0	25	70	°C

Table 4: Recommended Operating Environment

OPTICAL CHARACTERISTICS

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

Parameters	Symbol	Min.	Typical	Max	Unit	Notes
Transmitter						
Center Wavelength	λt	840	850	860	nm	
RMS spectral width	Pm	-	-	Note 1	nm	
Average Optical Power	Pavg	-6.5	-	-1.0	dBm	
Optical Power OMA	Poma	-	-	Note 1	dBm	
Extinction Ratio	ER	3.5	-	-	dB	
Transmitter Dispersion Penalty	TDP	-	-	3.9	dB	
Relative Intensity Noise	Rin	-	-	-128	dB/Hz	12dB reflection
Optical Return Loss Tolerance		-	-	12	dB	
Receiver						
Center Wavelength	λr	840	850	860	nm	
Receiver Sensitivity (OMA)	Psens	-	-	-11.1	dBm	
Stressed Sensitivity (OMA)		-	-	-7.5	dBm	
Overload	Pin	-	-	-1.0	dBm	
Receiver Reflectance		-	-	-12	dB	

* Note 1: Trade-offs are available between spectral width, center wavelength and minimum OMA, as shown in table 6.

Table 5: Optical Characteristics

Center Wavelength (nm)	RMS Spectral width (nm)								
	Up to 0.05	0.05 to 0.1	0.1 to 0.15	0.15 to 0.2	0.2 to 0.25	0.25 to 0.3	0.3 to 0.35	0.35 to 0.4	0.4 to 0.45
840 to 842	-4.2	-4.2	-4.1	-4.1	-3.9	-3.8	-3.5	-3.2	-2.8
842 to 844	-4.2	-4.2	-4.2	-4.1	-3.9	-3.8	-3.6	-3.3	-2.9
844 to 846	-4.2	-4.2	-4.2	-4.1	-4.0	-3.8	-3.6	-3.3	-2.9
846 to 848	-4.3	-4.2	-4.2	-4.1	-4.0	-3.8	-3.6	-3.3	-2.9
848 to 850	-4.3	-4.2	-4.2	-4.1	-4.0	-3.8	-3.6	-3.3	-3.0
850 to 852	-4.3	-4.2	-4.2	-4.1	-4.0	-3.8	-3.6	-3.4	-3.0
852 to 854	-4.3	-4.2	-4.2	-4.1	-4.0	-3.9	-3.7	-3.4	-3.1
854 to 856	-4.3	-4.3	-4.2	-4.1	-4.0	-3.9	-3.7	-3.4	-3.1
856 to 858	-4.3	-4.3	-4.2	-4.1	-4.0	-3.9	-3.7	-3.5	-3.1
858 to 860	-4.3	-4.3	-4.2	-4.2	-4.1	-3.9	-3.7	-3.5	-3.2

Table 6: Minimum 10GBASE-SR OMA as a Function of Wavelength and Spectral Width

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		-	9.953/ 10.3125	-	Gbps	
Power Consumption		-	-	1.5	W	
Transmitter						
Single Ended Output Voltage Tolerance		-0.3	-	4.0	V	
Tx Input Diff Voltage	VI	120		1200	mV	
Tx Fault	VoL	-0.3		0.4	V	
Input Differential Impedance	Ohm		100			
Receiver						
Single Ended Output Voltage Tolerance		-0.3	-	4.0	V	
Rx Output Diff Voltage	Vo	500		800	mV	
Output Differential Impedance	Ohm		100			

Table 7: Electrical Characteristics

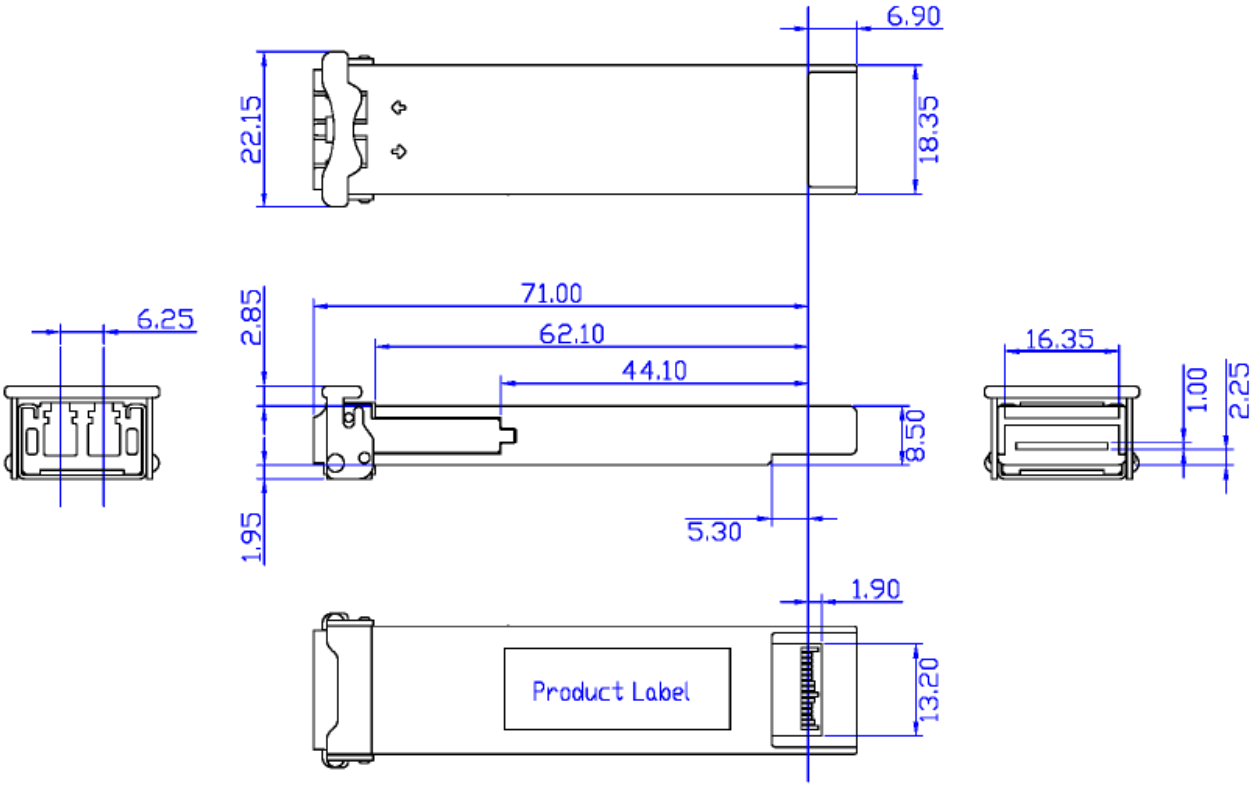
CONTROL AND STATUS I/O TIMING CHARACTERISTICS

Timing characteristics of control and status I/O are included in Table 8.

Parameter	*Symbol*	*Min.*	*Max.*	*Unit*	*Conditions*
TX_DIS assert time	t_off		10	µsec	rising edge of TX_DIS to fall of output signal below 10% of nominal
TX_DIS negate time	t_on		2	msec	Falling edge of TX_DIS to rise of output signal above 90% of nominal
Time to initialize	t_init		300	msec	From power on or hot plug after supply meeting Table 4 or from falling edge of P_Down/RST.
$\overline{\text{Interrupt}}$ assert delay	$\overline{\text{Interrupt}}$_on		200	msec	From occurrence of the condition triggering $\overline{\text{Interrupt}}$
$\overline{\text{Interrupt}}$ negate delay	$\overline{\text{Interrupt}}$_off		500	µsec	From clear on read $\overline{\text{Interrupt}}$ flags
P_Down/RST assert delay	P_Down/RST_on		100	µsec	From Power down initiation
Mod_NR assert delay	Mod_nr_on		1	msec	From Occurrence of fault to assertion of MOD_NR
Mod_NR negate delay	Mod_nr_off		1	msec	From clearance of signal to negation of MOD_NR
P-Down reset time		10		µsec	Min length of P-Down assert to initiate reset
RX_LOS assert delay	t_loss_on		100	µsec	From Occurrence of loss of signal to assertion of RX_LOS
RX_LOS negate delay	t_loss_off		100	µsec	From Occurrence of presence of signal to negation of RX_LOS

Table 8: Timing Characteristics

Mechanical Dimensions



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.

Safety Information

- All versions of this laser are Class 1 laser products per IEC* 60825-1:2001. Users should observe safety precautions such as those recommended by ANSI** Z136.1-2000, ANSI Z36.2-1997 and IEC 60825-1:2001.
- Caution: use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation exposure.



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