

Product Specification

XFP CWDM 10G LR 20km LC 10Gb/s 20km CWDM XFP Optical Transceiver



1. Product Features

- Hot-pluggable XFP footprint
- Supports 9.95Gb/s to 10.7Gb/s
- Uncooled 18-Wavelength CWDM DFB LD: 1270nm to 1450nm
- Uncooled 18-Wavelength CWDM DFB LD: 1270nm to 1610nm
- Power dissipation <2.0W
- Temperature range: -5°C to 70°C
- RoHS-6 Compliant (lead-free)
- Single power supply: 3.3V
- Maximum link length of 20km
- Full Duplex LC connector
- No Reference Clock required
- Built-in digital diagnostic functions
- Standard bail release mechanism

2. Applications

- 10GBASE-LR/LW 10G Ethernet
- 10G Fibre Channel
- SONET OC-192 SR-1 & SDH STM I-64.1

3. Description

A-GEAR's XFP CWDM 10G LR 20km LC Small Form Factor 10Gb/s (XFP) transceivers are compliant with the current XFP Multi-Source Agreement (MSA) Specification. They comply with 10-Gigabit Ethernet 10GBASE-LR/LW per IEEE 802.3ae and 10G Fibre Channel. Digital diagnostics functions are available via a 2-wire serial interface, as specified in the XFP MSA. The transceiver is RoHS compliant and lead free per Directive 2002/95/EC.

4. Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Maximum Supply Voltage	Vcc3	-0.5	4.0	V
Storage Temperature	TS	-40	85	°C
Case Operating Temperature	TOP	-5	70	°C

5. Electrical Characteristics

(T_{CASE} = -5°C to 70°C, V_{CC} = 3.13 to 3.45 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit
Supply Voltage #2	Vcc3	3.13		3.45	V
Supply Current - Vcc3 supply	Icc3			450	mA
Module total power	P			2.0	W ^[1]
Transmitter					
Input differential impedance	Rin		100		Ω ^[2]
Differential data input swing	Vin,pp	120		820	mV
Transmit Disable Voltage	VD	2.0		Vcc	V ^[3]
Transmit Enable Voltage	VEN	GND		GND+ 0.8	V
Transmit Disable Assert Time				10	us
Receiver					
Differential data output swing	Vout,pp	340	650	850	mV ^[4]
Data output rise time	tr			38	ps ^[5]
Data output fall time	tf			38	ps ^[5]
LOS Fault	VLOS fault	Vcc - 0.5		VCCHOST	V ^[6]
LOS Normal	VLOS norm	GND		GND+0.5	V ^[6]
Power Supply Rejection	PSR			See Note 6 below ^[7]	

Notes:

- [1] Maximum total power value is specified across the full temperature and voltage range.
- [2] After internal AC coupling.
- [3] Or open circuit.
- [4] Into 100 ohms differential termination.
- [5] 20 - 80%
- [6] Loss Of Signal is open collector to be pulled up with a 4.7k - 10kohm resistor to 3.15 - 3.6 V. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
- [7] Per Section 2.7.1. in the XFP MSA Specification.

6. Optical Characteristics

(T_{CASE} = -5°C to 70°C, V_{CC} = 3.13 to 3.45 Volts)

Parameter	Symbol	Min.	Typical	Max.	Unit
Transmitter					
Average Optical Power	Pf	-6		-1	dBm
Optical Wavelength	λ	X-6.5		$\lambda+6.5$	nm
Spectral Width (-20dB)	DL			0.35	nm
Sidemode Supression ratio	SSRmin	30			dB
Optical Extinction Ratio	ER	3.5	6		dB
Transmitter and Dispersion Penalty	TDP			2	dB
Average Launch power of OFF transmitter	POFF			-30	dBm
Tx Jitter	Txj	Per 802.3ae requirements			
Relative Intensity Noise	RIN			-130	dB/Hz
Receiver					
Receiver Sensitivity	RSNS1			-15	dBm ^[1]
Maximum Input Power	PMAX	0.5			dBm
Optical Center Wavelength	λ_C	1260		1600	nm
Receiver Reflectance	Rrx			-14	dB
LOS De-Assert	LOSD			-18	dBm
LOS Assert	LOSA	-32			dBm
LOS Hysteresis		0.5			dB

Notes:

[1] Measured with worst ER; BER<10⁻¹²; 2³¹ - 1 PRBS.

7. General Specifications

Parameter	Symbol	Min.	Typical	Max.	Unit
Bit Rate	BR	9.95		10.7	Gb/s ^[1]
Bit Error Ratio	BER			10 ⁻¹²	^[2]
Max. Supported Link Length	LMAX		40		km ^[1]

Notes:

[1] 10GBASE-ER/EW.

[2] Tested with a 2³¹-1 PRBS

8. Environmental Specifications

A-GEAR XFP transceivers have an operating temperature range from -5°C to +75°C case temperature.

Parameter	Symbol	Min.	Max.	Unit
Case Operating Temperature	Top	-5	75	°C
Storage Temperature	Tsto	-40	85	°C

Notes:

Relative Humidity 5 - 85 %

Class 1 Laser Product EN 60825-1 Compliance

9. Pin Descriptions

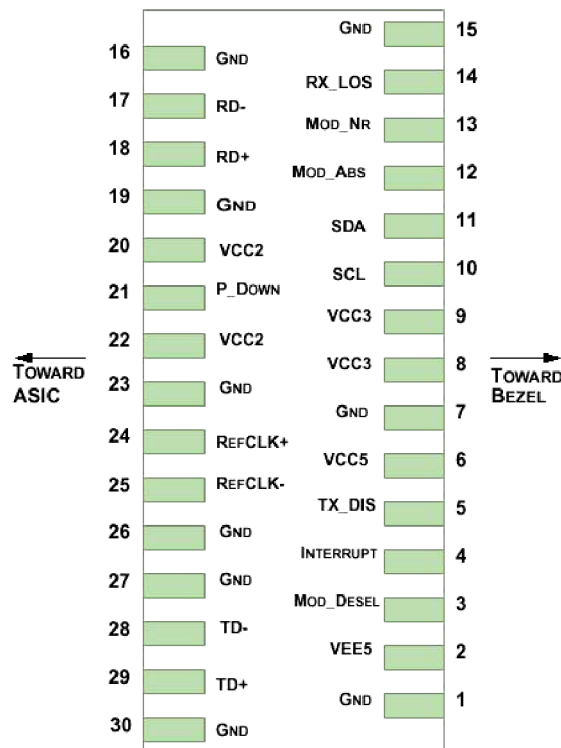


Diagram of Host Board Connector Block

Pin	Logic	Symbol	Name/Description
1		GND	Module Ground ^[1]
2		VEE5	Optional -5.2 Power Supply - Not required
3	LVTTL-I	Mod-Desel	Module De-select; When held low allows the module to respond to 2-wire serial interface commands

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Pin	Logic	Symbol	Name/Description
4	LVTTL-O	Interrupt	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface ^[2]
5	LVTTL-I	TX_DIS	Transmitter Disable; Transmitter laser source turned off
6		VCC5	+5 Power Supply
7		GND	Module Ground ^[1]
8		VCC3	+3.3 V Power Supply
9		VCC3	+3.3 V Power Supply
10	LVTTL-I	SCL	Serial 2-wire interface clock ^[2]
11	LVTTL/I/O	SDA	Serial 2-wire interface data line ^[2]
12	LVTTL-O	Mod_Abs	Module Absent; Indicates module is not present. Grounded in the module. ^[2]
13	LVTTL-O	Mod_NR	Module Not Ready; A-GEAR defines it as a logical OR between RX_LOS and Loss of Lock in TX/RX. ^[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 - Not required
21	LVTTL-I	P_Down/RST	Power Down; When high, places the module in the low power stand-by mode and on the falling edge of P_Down initiates a module reset 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 - Not required
23		GND	Module Ground ^[1]
24	PECL-I	RefCLK+	Reference Clock non-inverted input, AC coupled on the host board - Not required ^[3]
25	PECL-I	RefCLK-	Reference Clock inverted input, AC coupled on the host board - Not required ^[3]
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]

Notes:

- [1] Module circuit ground is isolated from module chassis ground within the module.
- [2] Open collector; should be pulled up with 4.7k - 10k ohms on host board to a voltage between 3.15V and 3.6 V.
- [3] A Reference Clock input is not required by the XFP-10GER. If present, it will be ignored.

10. Digital Diagnostic Functions

As defined by the XFP MSAi, A-GEAR XFP 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 T
- Transceiver supply voltage

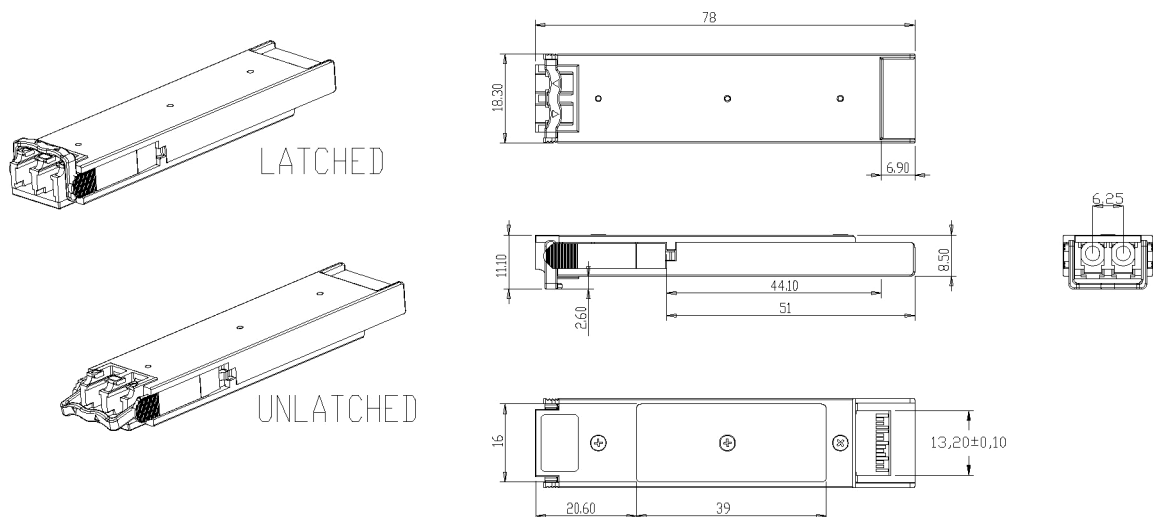
It also provides a sophisticated system of alarm and warning flags, which may be used to alert end-users when particular operating parameters are outside of a factory-set normal range.

The operating and diagnostics information is monitored and reported by a Digital Diagnostics Transceiver Controller (DDTC) 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 XFP transceiver into those segments of its memory map that are not write-protected. The negative edge clocks data from the XFP 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. The 2-wire serial interface provides sequential or random access to the 8 bit parameters, addressed from 000h to the maximum address of the memory.

For more detailed information including memory map definitions, please see the XFP MSA Specification.

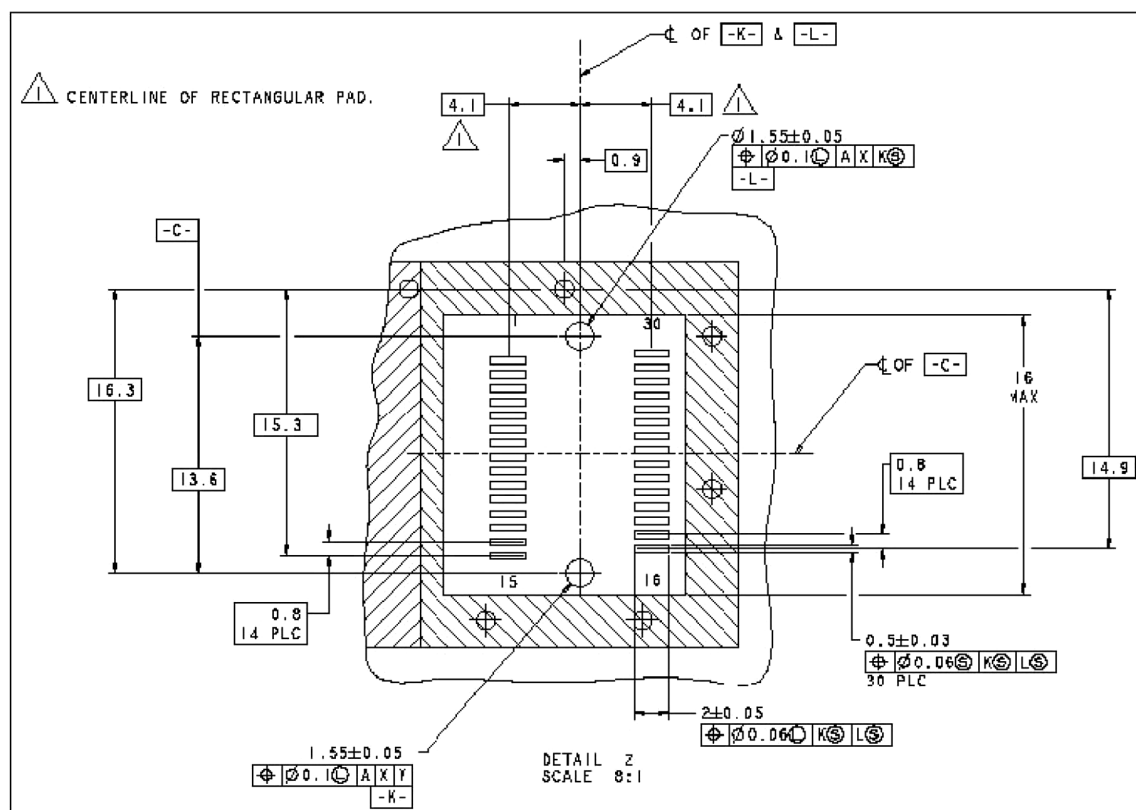
11. Mechanical Specifications

A-GEAR's XFP transceivers are compliant with the dimensions defined by the XFP Multi-Sourcing Agreement (MSA).

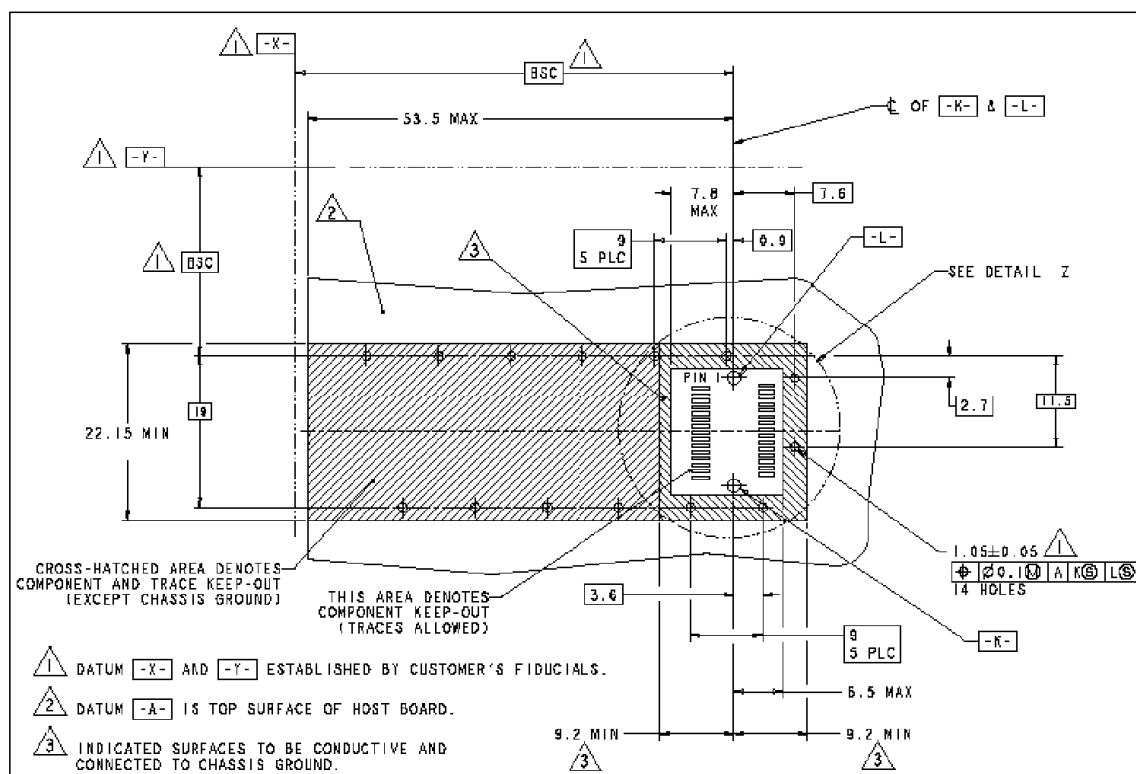


XFP Transceiver (dimensions are in mm)

12. PCB Layout and Bezel Recommendations



XFP Host Board Mechanical Layout (dimensions are in mm)



XFP Detail Host Board Mechanical Layout (dimensions are in mm)

