

10Gpbs 10km Range 1310nm XFP Optical Transceiver

Optical Transceivers

Overview

ARIA's 10Gbps 10km Range 1310nm XFP Optical Transceiver is compliant with the 10G Small Form-Factor Pluggable (XFP) Multi-Source Agreement (MSA) supporting data-rates of 10.3125 Gbps (10GBASE-LR) or 9.953 Gbps (10GBASE-LW), and transmission distance of up to 10km on SMF.

The transceiver module is comprised of a transmitter with 1310nm uncooled DFB laser and receiver with a PIN photodiode.

The transmitter and receiver are separate within a wide temperature range of 0°C to 70°C and offer optimum heat dissipation and excellent electromagnetic shielding enabling high port densities for 10G systems.



Features

- Supports 9.95 Gb/s to 11.1 Gb/s bit rates
- Applications are 10GBASE-LR, 10GBASE-LW and other optical links
- Diagnostic performance monitoring of module temperature, supply voltages, laser bias current, transmit optical power
- Hot-pluggable XFP footprint
- Maximum link length of 10km with SMF
- 1310nm uncooled DFB laser
- XFP MSA package with duplex LC connector
- No reference clock required
- +1.8V, +3.3V Supply voltage
- XFI and lineside loopback mode supported
- Operating case temperature: -5°C to 70°C
- RoHS6 compliant (lead free)



Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Supply Voltage 3	Vcc1	-0.5	4.0	V
Supply Voltage 2	Vcc2	-0.5	2	V
Storage Temperature	Tst	-40	85	°C
Case Operating Temperature	Top	-5	70	°C

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Electrical Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Units
Operating Case Temperature Range	T_C	0	-	+70	°C
Power Supply Voltage @ 3.3V	Vcc3	3.13	3.3	3.47	V
Module Total Power	P	-	-	2.5	W
Transmitter					
Input Differential Impedance¹	Rin	-	100	-	Ω
Differential Data Input Swing	Vin,pp	120	-	820	mV
Transmit Disable Voltage	VD	2.0	-	Vcc	mV
Transmit Enable Voltage	VEN	GND	-	GND+0.8	V
Transmit Disable Assert Time	-	-	-	10	us
Receiver					
Differential Data Output Swing	Vout,pp	500	-	850	mV
Data Output Rise Time²	t _r	-	-	40	ps
Data Output Fall Time²	t _f	-	-	40	ps
LOS Fault³	V _{LOS fault}	Vcc - 0.5	-	V _{CCHOST}	V
LOS Normal³	V _{LOS norm}	GND	-	GND+0.5	V
Power Supply Rejection^{3,4}	PSR	-	-	-	-

Notes:

1. After internal AC Coupling.
2. 20 - 80 %.
3. Loss of signal is open to be pulled up with a 4.7k Ω -10k Ω resistor to 3.15 - 3.6 V. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
4. Per section 2.7.1 in the XFP MSA Specification.

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Optical Characteristics

Parameter	Symbol	Minimum	Maximum	Units
Transmitter				
Optical Output Power	P	-6.5	+0.5	dBm
Optical Wavelength	λ	1260	1355	nm
Optical Extinction Ratio¹	ER	6	-	dB
Side Mode Suppression Ratio	SMSR	30	-	dB
Average Launch Power of OFF	POFF	-30	-	dBm
Tx Jitter	T_{Xj}	Compliant with the standards of each requirement		
Receiver				
Receiver Sensitivity²	RSSENS	-	-15	dBm
Receiver Sensitivity in OMA²	RSSENS	-	-12.5	dBm
Maximum Input Power	P _{MAX}	+0.5	-	dBm
Optical Center Wavelength	λ_C	1260	1600	nm
LOS De-Assert	LOS _D	-	-15	dBm
LOS Assert	LOS _A	-25	-	dBm
LOS Hysteresis	-	1	4	dB

Notes:

1. PRBS 2³¹-1 test pattern @ 10.3125Gbps
2. PRBS 2³¹-1 test pattern @ 10.3125Gbps, BER≤10⁻¹²

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Pin Description Diagram

Pin	Logic	Symbol	Name/Description
1	-	GND ¹	Module ground
2	-	VEE5	Optional -5.2 power supply - not required
3	LVTTL-I	Mod-Desel	Module De-select; When held low allows module to respond to 2-wire serial interface commands
4	LVTTL-O	Interrupt ²	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface
5	LVTTL-I	TX_DIS	Transmitter disable; transmitter laser source turned off
6	-	VCC5	+5 Power supply - not required
7	-	GND ¹	Module ground
8	-	VCC3	+3.3V Power supply
9	-	VCC3	+3.3V Power supply
10	LVTTL-I	SCL ²	Serial 2-wire interface clock
11	LVTTL-	SDA ²	Serial 2-wire interface data line
12	LVTTL-O	Mod_Abs ²	Module absent; Indicates module is not present. Grounded in the module
13	LVTTL-O	Mod_NR ²	Module not ready
14	LVTTL-O	RX_LOS ²	Receiver loss of signal indicator
15	-	GND ¹	Module ground
16	-	GND ¹	Module ground
17	CML-O	RD-	Receiver inverted data output
18	CML-O	RD+	Receiver non-inverted data output
19	-	GND ¹	Module ground
20	-	VCC2	+1.8V Power supply
21	LVTTL-I	P_Down/R ST	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
23	-	GND ¹	Module ground
24	PECL-I	RefCLK+ ³	Reference clock non-inverted input, AC coupled on the host board - not required
25	PECL-I	RefCLK- ³	Reference clock inverted input, AC coupled on the host board - not required
26	-	GND ¹	Module ground
27	-	GND ¹	Module ground
28	CML-I	TD-	Transmitter inverted data input
29	CML-I	TD+	Transmitter non-inverted data input
30	-	GND ¹	Module ground

Notes:

1. Module circuit ground is isolated from module chassis ground within the module.
2. Open collector; should be pulled up with 4.7kΩ-10kΩ on host board to a voltage between 3.15V and 3.6V.
3. A "Reference Clock" input is not required.

Figure 1: Electrical Pin-out Details

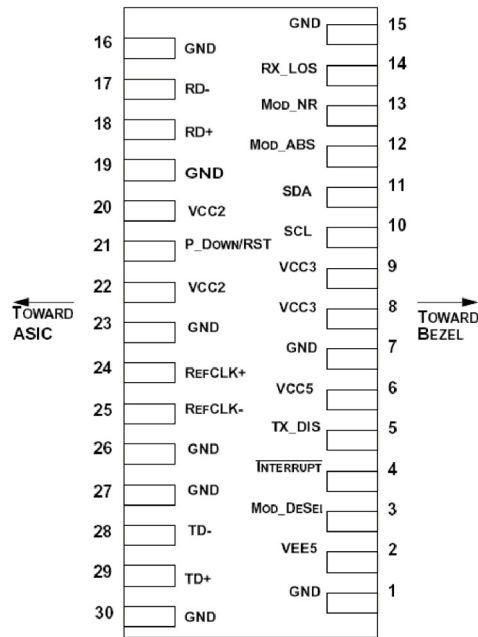


Figure 2: Mechanical Specifications

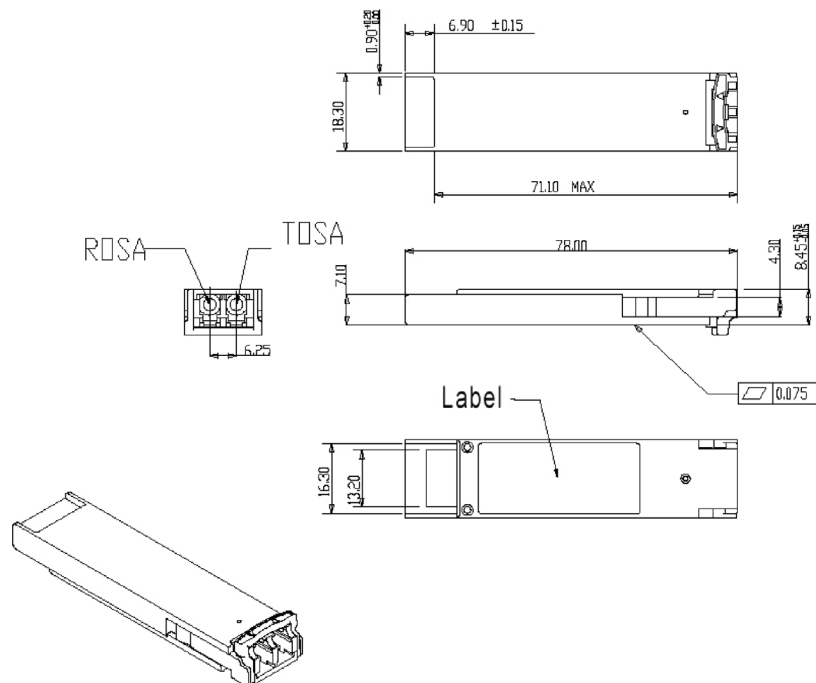
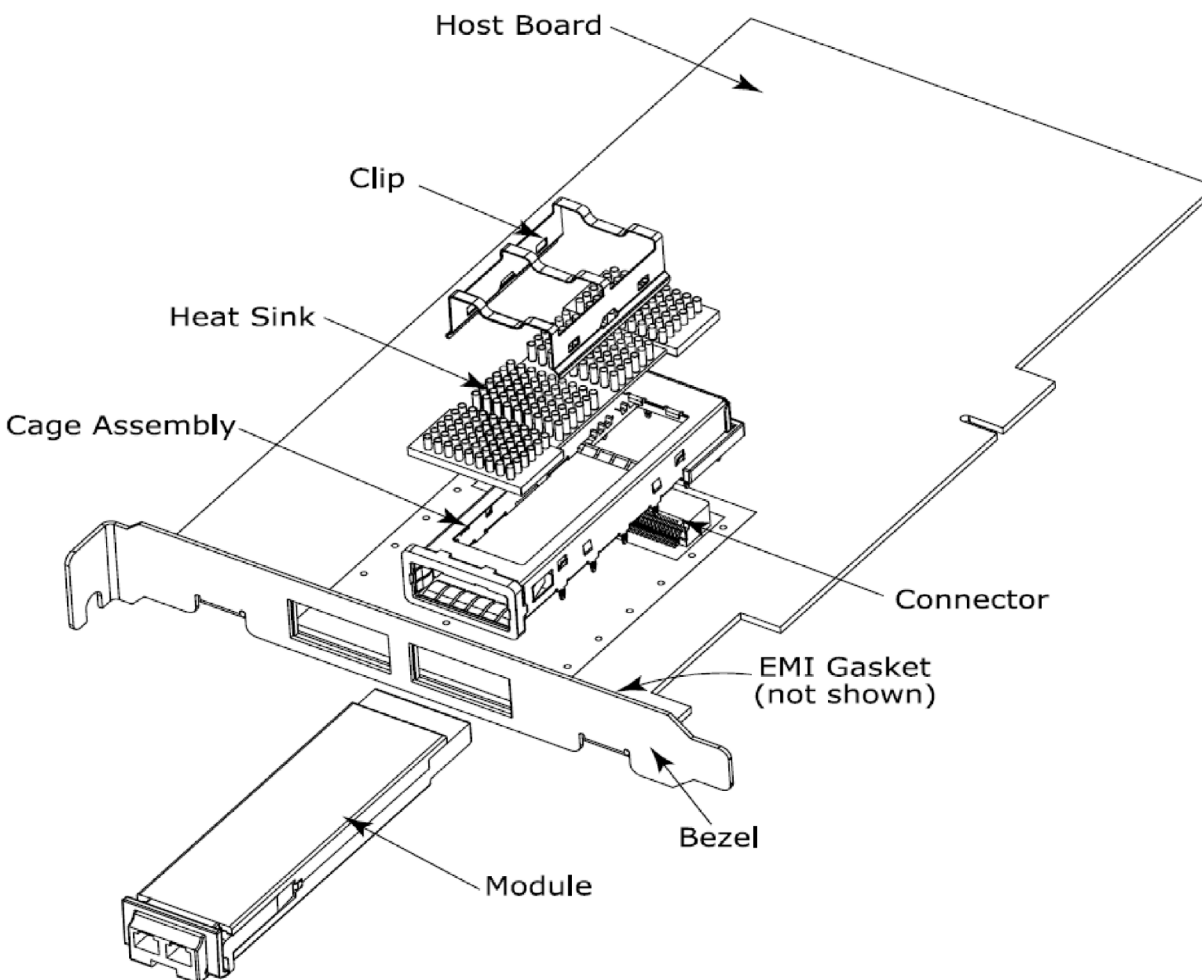


Figure 3: XFP Mechanical Components



Mechanical Components Description:

1. The module, clip and connector dimensions are constant for all applications. While the bezel, cage assembly, EMI gasket and heat sink can be designed and/or adjusted for the individual application.
2. The relatively small form factor of the XFP module combined with an adaptable heatsink option allows host system design optimization of the module location, heatsink shape/dimension/fins design, and airflow control. The module can be inserted and removed from the cage with the heat sink and clip attached.

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Revision date 12/03/2015

Regulatory Compliance

The XFP transceiver is designed to be Class I laser compliant and is certified per the following standards :

Feature	Agency	Standard	Certificate / Comments
Laser Safety	FDA	CDRH 21 CFR 1040 and Laser Notice No. 50	1120288-000
Product Safety	UL	UL and CUL EN60950-2:2007	E347511
Environmental Protection	SGS	RoHS Directive 2002/95/EC	GZ1001008706/CHEM
EMC	WALTEK	EN 55022:2006+A1:2007 EN 55024:1998+A1+A2:2003 -	WT10093768-D-E-E

Ordering Information

Part Number	Product Description
AT-XFP10km-LRCE	1310nm DFG, 10Gbps, 10km, 0°C - 70°C, Ethernet Version
AT-XFP10km-LRCKS	1310nm DFG, 10Gbps, 10km, 0°C - 70°C, SDH Version

References

1. 10 Gigabit Small Form Factor Pluggable Module (XFP) Multi-Source Agreement (MSA), Rev 4.5 - August 2005.
Documentation is currently available at <http://www.xfpmsa.org/>
2. IEEE802.3ae - 2002
3. ITU-T G.709 / ITU-T G.959.1 <http://www.itu.int/>
4. Telcordia GR-253-CORE