

Product Specification

10Gb/s RoHs Compliant Pluggable XFP Transceiver

AXFP6410S31C

Features:

- Hot pluggable
- 10Gb/s serial optical interface
- 1310nm DFB Laser and PIN receiver
- Up to 10km on 9/125um SMF
- XFP MSA package with duplex LC connector
- 2-wire interface for management
- XFI High Speed Electrical Interface
- Very low EMI and excellent ESD protection
- +3.3V single power supply
- Power consumption less than 2 W
- Operating case temperature: 0~+70°C



Applications:

- 10G Base-LR/LW, SDH/SONET STM64/OC192
- 10GE Storage, 8G Fiber Channel
- Other optical links

Standard

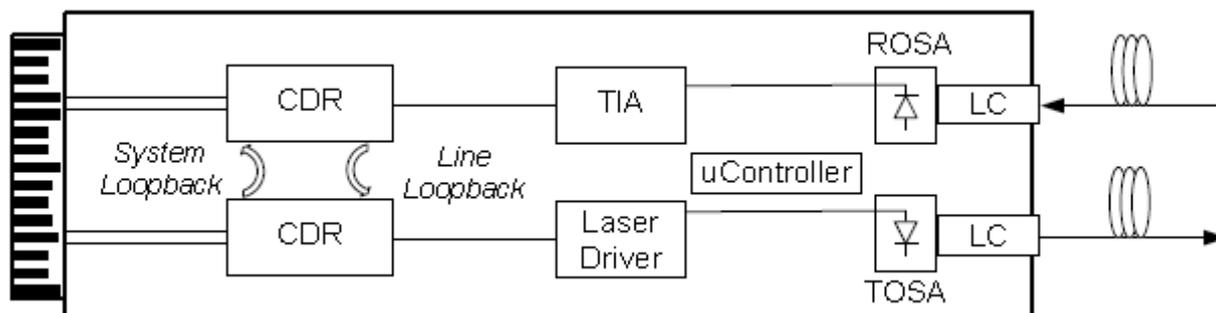
- Compatible with XFP MSA
- Compatible with IEEE 802.3ae-2002
- Compliant with ITU-T G.691
- Compatible with FCC Class B
- Compatible with IEC 60825-1 Class 1 laser eye safe
- RoHS compliance

Description:

AXFP6410S31C is a very compact 10Gb/s optical transceiver module for serial optical communication applications, supporting data-rate of 10.3125Gbps (10GBASE-LR) or 9.953Gbps (10GBASE-LW), and transmission distance up to 2~10 km on SMF.

The transceiver consists of two sections: The high performance 1310nm DFB Laser transmitter and high sensitivity PIN integrated with a TIA receiver.

A block diagram of the AXFP6410S31C XFP optical transceiver is shown below:



The module is hot pluggable into the 30-pin connector. The high-speed electrical interface is based on low voltage logic, with nominal 100 Ohms differential impedance and AC coupled in the module. The optical output can be disabled by LVTTTL logic high-level input of TX Disable. Loss of signal (RX_LOS) output is provided to indicate the loss of an input optical signal of receiver.

A 2-wire interface (SCL, SDA) is used for serial ID, digital diagnostics and other control /monitor functions

● Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Storage Temperature	T _{ST}	-40	+85	°C
Supply Voltage	V _{CC3}	-0.5	+3.6	V
Relative Humidity			85	%

● Recommend Operation Environment:

Parameter	Symbol	Min	Typ	Max	Unit
Date Rate		9.95		11.1	Gb/s
Supply Voltage	V _{CC}	+3.14	3.3	+3.47	V

Supply Current	I_{CC}			600	mA
Power Dissipation	PD			2.0	W
Operating Temperature	T_{OP}	0	-	+70	°C

● **Optical Characteristics (Condition: $T_a=T_{OP}$)**

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Date Rate		9.95	10.312 5	10.7	Gb/s	
Optical Wavelength	λ	1290	1310	1330	nm	
Average output power	P_o	-8		0	dBm	1
Optical Extinction Ratio	ER	6			dB	1
RMS spectral width	$\Delta\lambda$			1	nm	
Optical Modulation Amplitude	OMA	-5.2			dBm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average launch power of Tx OFF	Pave_off			-30	dBm	
Receiver						
Date Rate		9.95	10.312 5	10.7	Gb/s	
Optical Wavelength	λ	1260		1565	nm	
Receiver Sensitivity	R		-14.0	-11.0	dBm	2
Maximum Input Power	P _{MAX}	0.5			dBm	
LOS De-Assert	LOSD			-22	dBm	
LOS Assert	LOSA	-30			dBm	
LOS Hysteresis		1		4	dB	
Receiver Reflectance				-14	dB	

Notes:

Note 1) Measured at 10.3125b/s with PRBS $2^{31} - 1$ NRZ test pattern.

Note 2) Under the ER worst case, measured at 10.3125 Gb/s with PRBS $2^{31} - 1$ NRZ test pattern for BER < 1×10^{-12}

● **Electrical Characteristics (Condition: $T_a=T_{OP}$)**

Parameter	Symbol	Min	Typ	Max	Unit	Note
Transmitter:						
Differential input voltage swing		150		1600	mVpp	1
Transmit Disable Input	H	V_{IH}	2.0	$V_{CC}+0.3$	V	
	L	V_{IL}	0	0.8	V	
Transmit Enable Output	H	V_{OH}	2.4	$V_{CC}+0.3$	V	

	L	V_{OL}	0		0.4	V	2
Data Dependent Input Jitter		DDJ			0.1	UI	
Data Input Total Jitter		TJ			0.28	UI	
Input Differential Impedance		Z_{in}	80	100	120	Ω	
Receiver							
Differential output voltage swing			500		700	mVpp	3
LOS Output	H	V_{OH}	2.4		$V_{CC}+0.3$	V	2
	L	V_{OL}	0		0.4	V	
Rx Output Rise and Fall Time		T_r/T_f	30			ps	20% to 80%
Output Differential Impedance		Z_{on}	80	100	120	Ω	

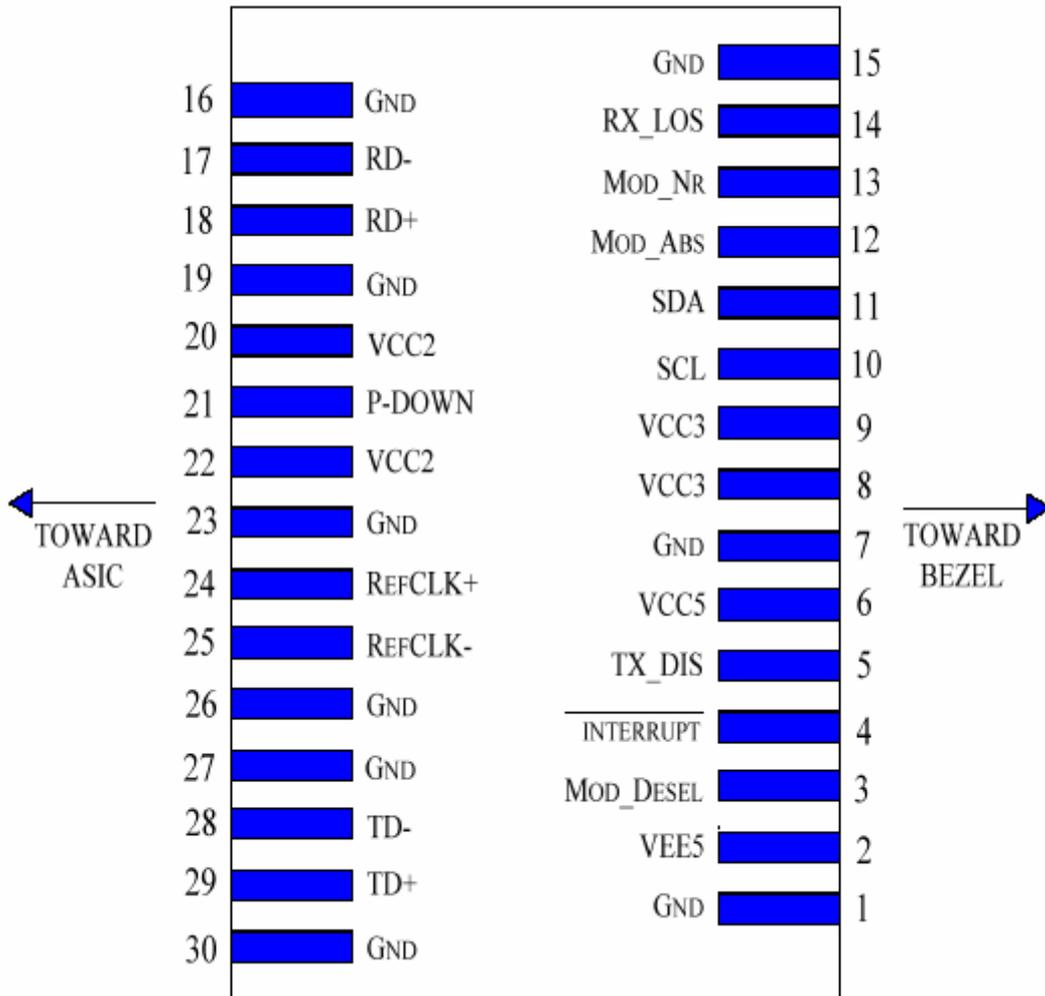
Note 1) TD+/- are internally AC coupled with 100 Ω differential termination inside the module.

Note 2) Tx Fault and Rx LOS are open collector outputs, which should be pulled up with 4.7k to 10k Ω resistors on the host board. Pull up voltage between 2.0V and $V_{CC}+0.3V$.

Note 3) RD+/- outputs are internally AC coupled, and should be terminated with 100 Ω (differential) at the user SERDES.

Pin Assignment:

Diagram of Host Board Connector Block Pin Numbers and Name



Pin Function Definitions

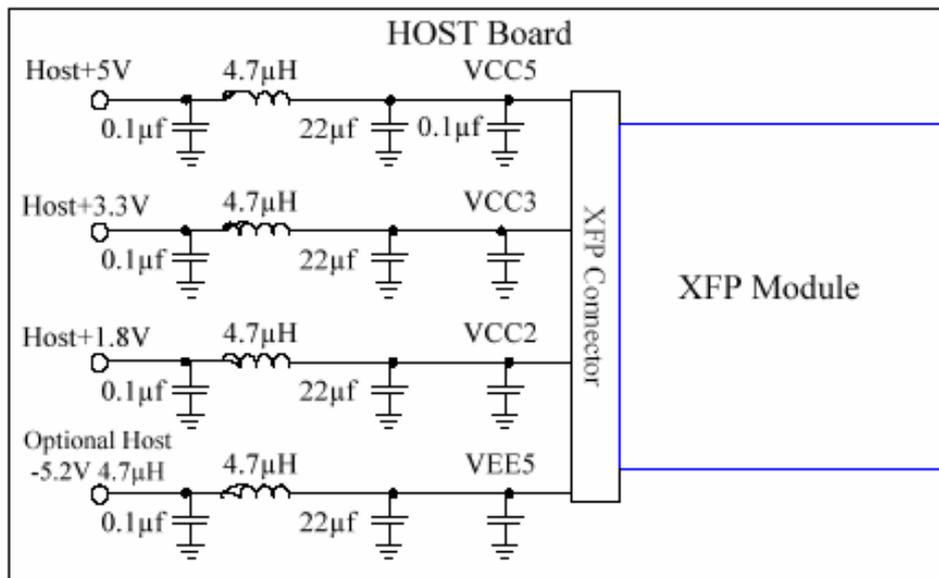
Pin	Logic	Symbol	Name/Description	Ref.
1		GND	Module Ground	1
2		VEE5	Optional –5.2 Power Supply – Not required	
3	LVTTL-I	Mod-Desel	Module De-select; When held low allows the module to , respond to 2-wire serial interface commands	
4	LVTTL-O	Interrupt	Interrupt (bar); Indicates presence of an important 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	+3.3V Power Supply	
9		VCC3	+3.3V 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;	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

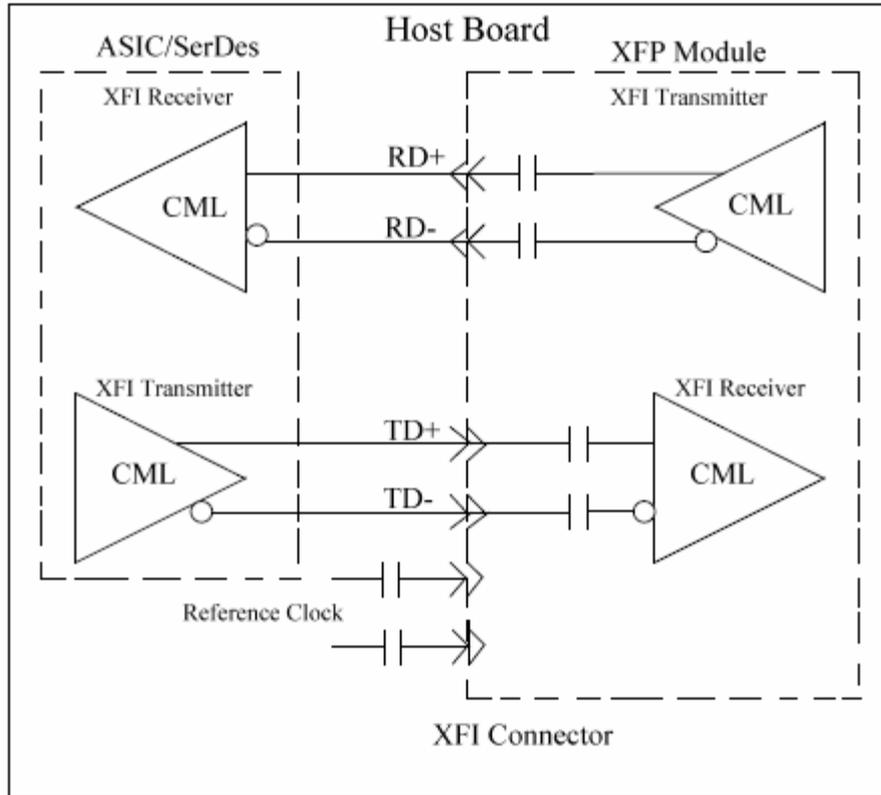
Notes:

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 3.6V.
3. A Reference Clock input is not required .

Recommended Circuit:

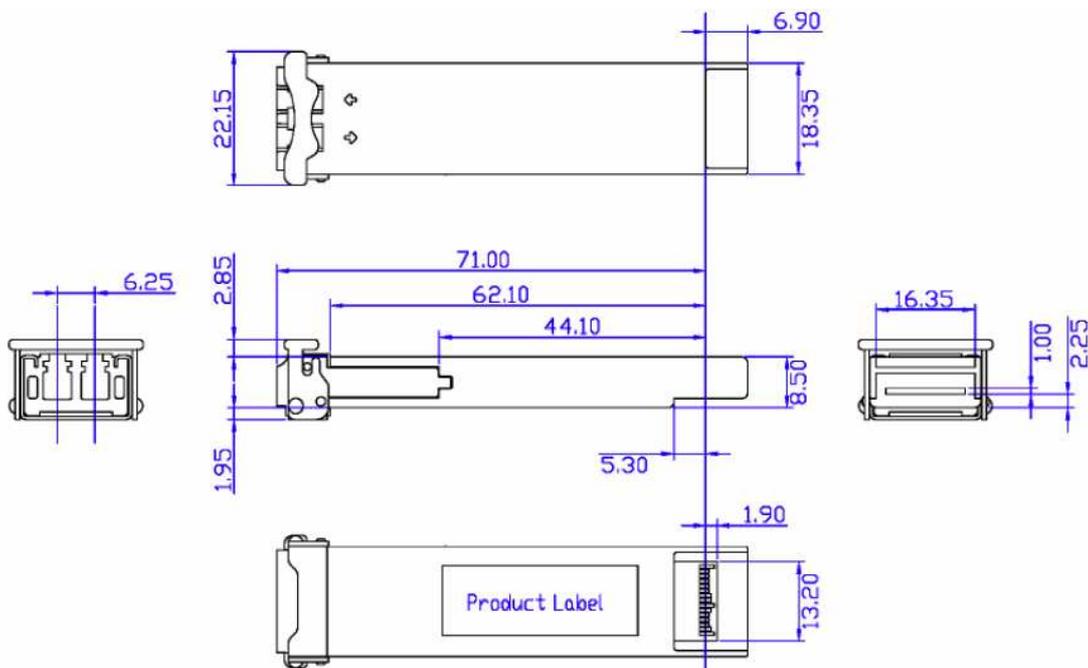


Recommended Host Board Power Supply Circuit



Recommended High Speed Interface Circuit

Mechanical Dimensions:



Digital Diagnostic Functions

Atech's AXFP6410S31C Small Form Factor 10Gb/s (XFP) transceivers are compliant with the current XFP Multi-Source Agreement (MSA) Specification Rev4.5. As defined by the XFP MSA, Atech 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
- 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 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.

Part Number Definition and Ordering Information:

Company	A
Package	XFP:XFP BFP: BIDI XFP
Data Rate	64: 9.958G~11.1G
Distance	xx: xx kilometer
Fiber Mode	S: Single Mode M: Multi Mode X: Not defined
Wavelength	31: 1310nm 55: 1550nm 85: 850nm XX: Not defined
Temperature	C: 0 – 70℃ I: -45~+85℃
DDM	D: with DDM Blank: without DDM
Connector	Blank: LC S: SC P: Pigtail/SC

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Contact:

Atech Technical corp. ltd
 Tel: +8628-68264126
 Email:sales@atongcd.com
 Website: www.atongcd.com