



## 10G X2-ER Transceiver

### Hot Pluggable, Duplex SC, 1550nm EA-DFB, Single Mode, 40KM, DDM

**Part Number: FXF2-H1-S15-40D**



### Overview

FXF2-H1-S15-40D is a highly integrated serial optical transponder module for 10Gbit/s data transmission that is usable in typical router line card applications, Storage, IP network and LAN and compliant to X2 MSA. The MUX/DEMUX with clock and data recovery (CDR), XAUI interface and MDIO management functions are all integrated into the module. This transceiver uses a 1550nm EA-DFB Laser Diode to achieve 40km over single mode fiber as 10GBASE-ER of the IEEE 802.3ae.

### Applications

- 10G Gigabit Ethernet

### Features

- XAUI Electrical Interface: 4 Lanes @3.125Gb/s
- Hot Pluggable
- Cooled 1550nm EA-DFB transmitter
- Duplex SC connector
- MDIO Management Interface
- Support DDM function
- Link length up to 40km over single mode fiber
- Compliant to IEEE802.3ae 10GBASE-ER
- Compliant to X2 MSA
- RoHS compliant

### Absolute Maximum Ratings

Parameters	Symbol	Min.	Max.	Unit
Storage Temperature	T <sub>ST</sub>	-40	+85	°C
Storage Relative Humidity	RH	5	95	%
Supply Voltage 5V	V <sub>CC5</sub>	0	+5.5	V
Supply Voltage 3.3V	V <sub>CC3</sub>	0	+3.6	V
Supply Voltage 1.2V (APS)	V <sub>CC1</sub>	0	+1.5	V



## Recommended Operating Conditions

Parameters	Symbol	Min.	Typ.	Max.	Unit
Supply Voltage 5V	V <sub>CC5</sub>	+4.75	+5.0	+5.25	V
Supply Voltage 3.3V	V <sub>CC3</sub>	+3.14	+3.3	+3.47	V
Supply Voltage 1.2V (APS)	V <sub>CC1</sub>	+1.15	+1.2	+1.25	V
Supply Current 5V	I <sub>CC5</sub>			300	mA
Supply Current 3.3V	I <sub>CC3</sub>			400	mA
Supply Current 1.2V (APS)	I <sub>CC1</sub>			1100	mA
Module Total Power Consumption	P <sub>c</sub>		3.5	4.0	W
Operating Case Temperature	T <sub>c</sub>	0		70	°C

## Transmitter Electro-optical Characteristics

V<sub>CC1</sub>=1.15V to 1.25V, V<sub>CC3</sub>= 3.14V to 3.47V, V<sub>CC5</sub>= 4.75V to 5.25V, T<sub>OP</sub> = 0 °C to 70 °C

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR		10.3125		Gb/s	
Signaling speed variation from nominal		-100		+100	ppm	
Maximum Launch Power	P <sub>MAX</sub>	-1		+2	dBm	
Optical Center Wavelength	$\lambda$	1530	1550	1570	nm	
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Optical Extinction Ratio	ER	9			dB	
Off Transmitter Power	P <sub>OFF</sub>			-30	dBm	
Dispersion Penalty	DP			3.2	dB	

## Receiver Electro-optical Characteristics

V<sub>CC1</sub>=1.15V to 1.25V, V<sub>CC3</sub>= 3.14V to 3.47V, V<sub>CC5</sub>= 4.75V to 5.25V, T<sub>OP</sub> = 0 °C to 70 °C

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
Operating Data Rate	DR		10.3125		Gb/s	
Receiver Sensitivity (OMA)	SEN			-14.1	dBm	
Stressed Receiver Sensitivity (OMA)	P <sub>IN-S_min</sub>			-11.3	dBm	
Optical Center Wavelength	$\lambda$	1530		1570	nm	
Maximum Receive Power	P <sub>RX-MAX</sub>	+0.5			dBm	
Receiver Reflectance	R <sub>rx</sub>			-12	dB	

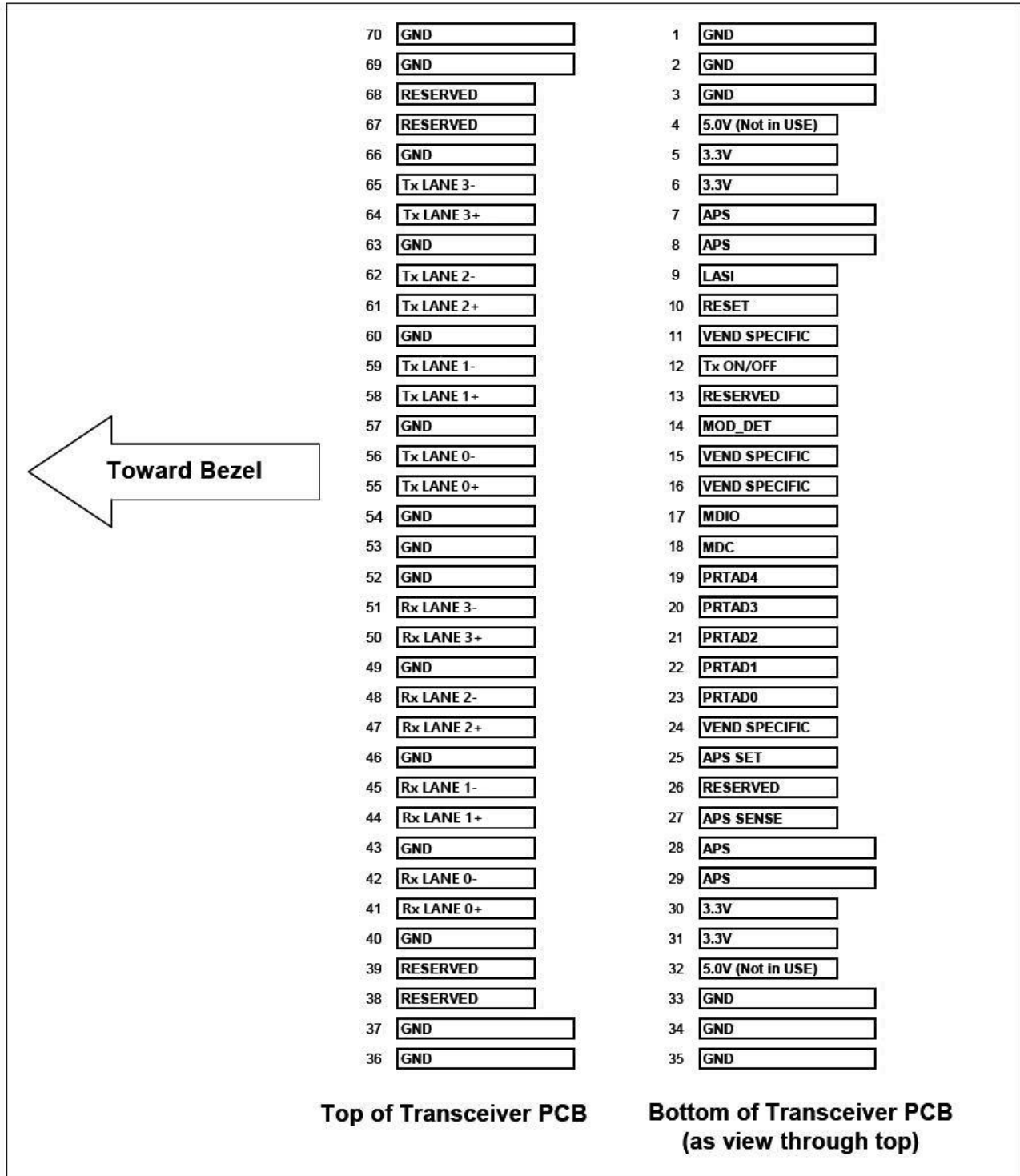


## **XAUI I/O Characteristics**

Parameters	Symbol	Min.	Typ.	Max.	Unit	Note
XAUI Data Rate			3.125		Gb/s	
XAUI Baud Rate Tolerance		-100		+100	dBm	Relative Tolerance
Differential Input Voltage Swing		220		1600	dBm	8B/10B Coded
Differential Output Voltage Swing		800		1600	dBm	RLoad=100Ω ± 5%
Differential Input Impedance		80	100	120	Ω	
Total Output Jitter				0.35	UI	no pre-equalization
Total Deterministic Output Jitter				0.17	UI	no pre-equalization



## Pin Assignment





## Pin Description

PIN	Name	Dir	Logic	Function	Note
1	GND			Electrical Ground	
2	GND			Electrical Ground	
3	GND			Electrical Ground	
4	5.0V			Power	
5	3.3V			Power	
6	3.3V			Power	
7	APS			Adaptive Power Supply	
8	APS			Adaptive Power Supply	
9	LASI	O	1.2V CMOS Open Drain	Link Alarm Status Interrupt, low active, Open Drain Output A pull-up resistor with 10-22KΩ to 1,2V is expected. Logic High: Normal Operation Logic Low: Link Alarm is indicated	
10	Reset	I	1.2V CMOS Open Drain	Low active Reset Input 10KΩ pull-up on Transceiver Logic high = Normal Operation Logic Low = Reset asserted	
11	VEND SPECIFIC			Vendor Specific Pin, leave unconnected	
12	Tx ON/OFF	I	1.2V CMOS Open Drain	High active Transmitter Enable Input 10KΩ pull-up on Transceiver Logic high = Transmitter active (normal Operation) And Register Bit 1.9.0 set to low as well Logic Low = shut down of Transmitter	
13	RESERVED			RESERVED	
14	MOD DETECT	O		1kΩ to Ground On Transceiver	
15	VEND SPECIFIC			Vendor Specific Pin, leave unconnected	
16	VEND SPECIFIC			Vendor Specific Pin, leave unconnected	
17	MDIO	I/O	1.2V CMOS	Management Data I/O. Requires external 10-22 kΩ pull-up to 1.2 V on host.	
18	MDC	I	1.2V CMOS	Management Clock Input	
19	PRTAD4	I		Port Address Bit 4(LOW=0)	
20	PRTAD3	I		Port Address Bit 3(LOW=0)	
21	PRTAD2	I		Port Address Bit 2(LOW=0)	
22	PRTAD1	I		Port Address Bit 1(LOW=0)	
23	PRTAD0	I		Port Address Bit 0(LOW=0)	



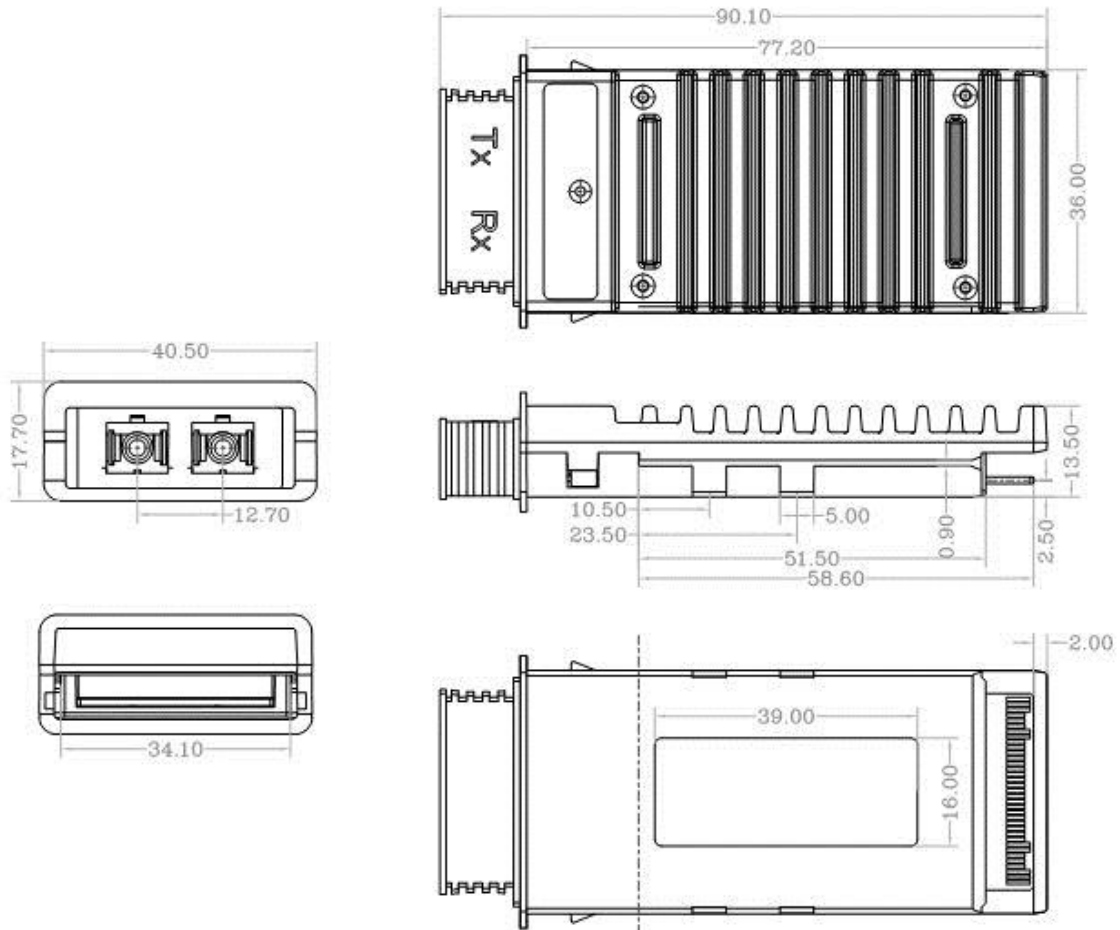
24	VEND SPECIFIC			Vendor Specific Pin, leave unconnected	
25	APS SET	I		Feedback Input for APS, Input of APS Setting Resistor	
26	RESERVED			RESERVED	
27	APS SENSE	O		APS Sense Output for APS Control Circuit	
28	APS			Adaptive Power Supply	
29	APS			Adaptive Power Supply	
30	3.3V			Power	
31	3.3V			Power	
32	5.0V			Power	
33	GND			Electrical Ground	
34	GND			Electrical Ground	
35	GND			Electrical Ground	
36	GND			Electrical Ground	
37	GND			Electrical Ground	
38	RESERVED			RESERVED	
39	RESERVED			RESERVED	
40	GND			Electrical Ground	
41	Rx LANE 0+			Module XAUI Output Lane 0+	
42	Rx LANE 0-			Module XAUI Output Lane 0-	
43	GND			Electrical Ground	
44	Rx LANE 1+			Module XAUI Output Lane 1+	
45	Rx LANE 1-			Module XAUI Output Lane 1-	
46	GND			Electrical Ground	
47	Rx LANE 2+			Module XAUI Output Lane 2+	
48	Rx LANE 2-			Module XAUI Output Lane 2-	
49	GND			Electrical Ground	
50	Rx LANE 3+			Module XAUI Output Lane 2+	
51	Rx LANE 3-			Module XAUI Output Lane 2-	
52	GND			Electrical Ground	
53	GND			Electrical Ground	
54	GND			Electrical Ground	
55	Rx LANE 0+			Module XAUI Output Lane 0+	
56	Rx LANE 0-			Module XAUI Output Lane 0-	
57	GND			Electrical Ground	



58	Tx LANE 1+			Module XAUI Output Lane 1+	
59	Tx LANE 1-			Module XAUI Output Lane 1-	
60	GND			Electrical Ground	
61	Tx LANE 2+			Module XAUI Output Lane 2+	
62	Tx LANE 2-			Module XAUI Output Lane 2-	
63	GND			Electrical Ground	
64	Tx LANE 3+			Module XAUI Output Lane 2+	
65	Tx LANE 3-			Module XAUI Output Lane 2-	
66	GND			Electrical Ground	
67	RESERVED			RESERVED	
68	RESERVED			RESERVED	
69	GND			Electrical Ground	
70	GND			Electrical Ground	



## Mechanical Dimensions



(All Dimensions are  $\pm 0.20\text{mm}$  Unless Otherwise Specified, Unit: mm)

## Ordering Information

Part No.	Tx	Rx	Link	DDM	Temp.
FXF2-H1-S15-40D	1550nm	1550nm	40km	Yes	0~70°C

**Note1:** Distances are indicative only. To calculate a more precise link budget based on specific conditions in your application, please refer to the optical characteristics.