

10Gb/s XFP BIDI 100km Transceiver HXXX-AL45/54W3x

Features

- Up to 11.3Gb/s data links
- 1490nm EML laser and APD receiver for HXXX-AL45W3x
- 1550nm EML laser and APD receiver for HXXX-AL54W3x
- Up to 100km on 9/125µm SMF
- Hot-pluggable XFP footprint
- BIDI LC optical connector
- RoHS-10 compliant and lead-free
- Single +3.3V power supply
- No Reference Clock required
- Maximum power consumption 2.0W
- Support Digital Monitoring interface
- Metal enclosure, for lower EMI
- Meet ESD requirements, resist 8KV direct contact voltage
- Case operating temperature
Commercial: 0 ~ +70°C
Extended: -10 ~ +80°C
Industrial: -40 ~ +85°C



Applications

- 10GBASE-BX 10.3125Gb/s Ethernet
- 10GBASE-BX 9.95Gb/s Ethernet
- SONET OC-192 ZR-1 SDH STMI-64.1

Part Number Ordering Information

Part Number	Data Rate (Gb/s)	Wavelength (nm)	Transmission Distance(km)	Temperature (°C) (Operating Case)
HXXX-AL45/54W3C	10.3125	1490Tx/1550Rx 1550Tx/1490Rx	100	0~70 commercial
HXXX-AL45/54W3E	10.3125		100	-10~80 Extended
HXXX-AL45/54W3I	10.3125		100	-40~85 Industrial

I. Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Max	Unit	Notes
Storage Temperature	T _S	-40	85	°C	
Power Supply Voltage	V _{CC}	-0.5	3.6	V	
Relative Humidity (non-condensation)	RH	5	95	%	
Damage Threshold	TH _d	0		dBm	

II. Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Case Temperature	T _{OP}	0		70	°C	commercial
		-10		80		extended
		-40		85		Industrial
Power Supply Voltage	V _{CC}	3.135	3.3	3.465	V	
Data Rate			10.3125		Gb/s	
Control Input Voltage High		2		V _{cc}	V	
Control Input Voltage Low		0		0.8	V	
Link Distance (SMF)	D			100	km	9/125um

III. General Description

Walsun'HXXX-AL45W3x/HXXX-AL54W3x XFP transceiver is designed for use in 10-Gigabit Ethernet links up to 100km over single mode fiber. The module consists of CWDM EML Laser, APD and Preamplifier in a high-integrated optical sub-assembly. Digital diagnostics functions are available via a 2-wire serial interface, as specified in XFP MSA.

HXXX-AL45W3x/HXXX-AL54W3x transceivers provide a unique enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, and received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

The XFP MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial interface at the 8bit address 1010000X (A0h). The digital diagnostic monitoring interface makes use of the 8bit address 1010001X (A2h), so the originally defined serial ID memory map remains unchanged.

IV. Pin Assignment and Pin Description

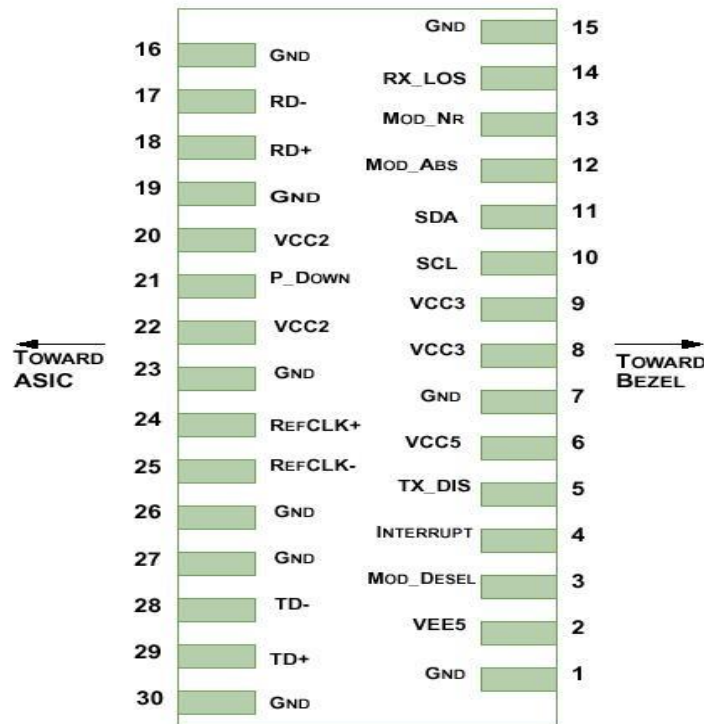


Figure1. Diagram of host board connector block pin numbers and names

Pin	Symbol	Name/Description	Notes
1	GND	Module Ground	1
2	VEE5	Optional -5.2 Power Supply – Not required	
3	Mod-Desel	Module De-select; When held low allows the module to respond to 2-wire serial interface commands	
4	Interrupt	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface	2
5	TX_DIS	Transmitter Disable; Transmitter laser source turned off	
6	VCC5	+5 Power Supply – Not required	
7	GND	Module Ground	1
8	VCC3	+3.3V Power Supply	
9	VCC3	+3.3V Power Supply	

10	SCL	Serial 2-wire interface clock	
11	SDA	Serial 2-wire interface data line	2
12	Mod_Abs	Module Absent; Indicates module is not present. Grounded in the module.	2
13	Mod_NR	Module Not Ready; Walsun's defines it as a logical OR between RX_LOS and Loss of Lock in TX/RX.	2
14	RX_LOS	Receiver Loss of Signal indicator	2
15	GND	Module Ground	1
16	GND	Module Ground	1
17	RD-	Receiver inverted data output	
18	RD+	Receiver non-inverted data output	
19	GND	Module Ground	1
20	VCC2	+1.8V Power Supply – Not required	
21	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	RefCLK+	Reference Clock non-inverted input, AC coupled on the host board – Not required	3
25	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	TD-	Transmitter inverted data input	
29	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 4.7kΩ-10kΩ on host board to a voltage between 3.15V and 3.6V.
3. A Reference Clock input is not required by the HXXX-AL45W3x/HXXX-AL54W3x. If present, it will be ignored.

V. Electrical Characteristics

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

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
Power Consumption	p			2.0	W	1
Supply Current	I _{cc}			580	mA	
Transmitter						
Single-ended Input Voltage Tolerance	V _{cc}	-0.3		4.0	V	
AC Common Mode Input Voltage Tolerance (RMS)		15			mV	
Differential Input Voltage Swing	V _{in,pp}	120		820	mV _{pp}	
Differential Input Impedance	Z _{in}	90	100	110	Ohm	2
Transmit Disable Assert Time				10	us	
Transmit Disable Voltage	V _{dis}	V _{cc} -1.3		V _{cc}	V	3
Transmit Enable Voltage	V _{en}	V _{ee}		V _{ee} +0.8	V	
Receiver						
Differential Output Voltage Swing	V _{out,pp}	350		850	mV _{pp}	
Differential Output Impedance	Z _{out}	90	100	110	Ohm	4
Data output rise/fall time	Tr/Tf	28			ps	5
LOS Assert Voltage	V _{losH}	V _{cc} -1.3		V _{cc}	V	6
LOS De-assert Voltage	V _{losL}	V _{ee}		V _{ee} +0.8	V	6
Power Supply Rejection	PSR	100			mV _{pp}	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. In to 100 ohms differential termination.
5. These are unfiltered 20-80% values
6. Loss of Signal is open collector to be pulled up with a 4.7kΩ-10kΩ resistor to 3.15-3.6V. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
7. Per Section 2.7.1. in the XFP MSA Specification1.

VI. Optical Characteristics

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

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Transmitter						
Center Wavelength	λ	1480	1490	1500	nm	45W3x
		1540	1550	1560		54W3x
Optical Spectral Width	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Average Optical Power	P _{AVG}	1		6	dBm	
Optical Extinction Ratio	ER	8.2			dB	
Transmitter and Dispersion Penalty	TDP			3.0	dB	
Transmitter OFF Output Power	P _{Off}			-30	dBm	
Transmitter Eye Mask	Compliant with IEEE802.3ae					
Receiver						
Center Wavelength	λ	1540	1550	1560	nm	54W3x
		1480	1490	1500		45W3x
Receiver Sensitivity (Average Power)	Sen.			-25	dBm	1
Input Saturation Power (overload)	P _{sat}	-8			dBm	
LOS Assert	LOSA	-35			dBm	
LOS De-assert	LOSD			-27	dBm	
LOS Hysteresis	LOSH	0.5			dB	

Notes:

1. Measured with Light source 1490nm @1550nm, ER=8.2dB; BER≤1E-12 @10.3125Gbps, PRBS=2³¹-1 NRZ.

VII. Digital Diagnostic Functions

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

Parameter	Symbol	Min.	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	°C	Over operating temp
Supply voltage monitor absolute error	DMI_VCC	-0.15	0.15	V	Full operating range
RX power monitor absolute error	DMI_RX	-3	3	dB	
Bias current monitor	DMI_bias	-10%	10%	mA	
TX power monitor absolute error	DMI_TX	-3	3	dB	

VIII. Mechanical Dimensions

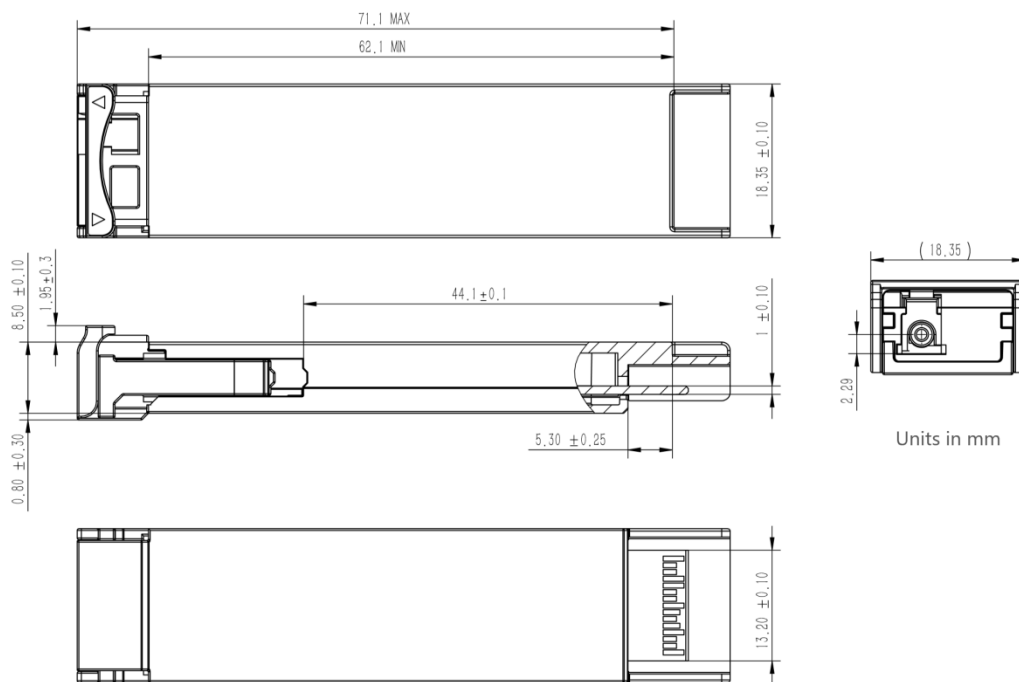


Figure2. Mechanical Outline

IX. Revision History

Version No.	Initiated	Revised contents	Release Date
1.0	Andy Zhang	Preliminary datasheet	2014-06-11
1.1	Andy Zhang	Mechanical Change	2016-04-08

X. Contact us

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