Product Specification

RoHS-6 Compliant

10Gb/s 80km Multi-Rate XFP Optical Transceiver

PRODUCT FEATURES

- Supports 9.95Gb/s to 10.3Gb/s bit rates
- Hot-pluggable XFP footprint
- Maximum link length of 80km
- RoHS-6 compliant (lead-free)
- Temperature-stabilized EML transmitter
- Duplex LC connector
- Power dissipation <3.5W
- Built-in digital diagnostic functions
- Temperature range: 0°C to 70°C

APPLICATIONS

- SONET OC-192/SDH STM-64 with ITU-T G.709
- 10GBASE-ZR/ZW 80km 10G Ethernet
- Extended 80km 10G Fibre Channel
- 80km 10G Ethernet with ITU-T G.709 FEC

HOESN's 80km HXF-1055-80D Small Form Factor 10Gb/s (XFP) transceivers comply with the current XFP Multi-Source Agreement (MSA) Specification[1]. They comply with 80km SONET OC-192 and SDH STM-64 per ITU-T G.959.1 P1L1-2D2, and support 10GBASE-ZR/ZW 80km 10-Gigabit Ethernet, 10-Gigabit Fibre Channel, and 10-Gigabit Ethernet with FEC applications. Digital diagnostics functions are available via a 2-wire serial interface, as specified in the XFP MSA.

PRODUCT SELECTION

I. Pin Descriptions

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	

Add: 3F,6# Building, Xinguang Road, Xili Industrial Zone, Nanshan District, Shenzhen, China
Tel：0755-86023553 Fax：0755-86023552
Mail: sales@hoesn.com
Web: www.hoesn.com

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	LVTTLI/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; HOESN's 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	
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	
23		GND	Module Ground	1
24	PECL-I	RefCLK+	Reference Clock non-inverted input, AC coupled on the host board – Not required	
25	PECL-I	RefCLK-	Reference Clock inverted input, AC coupled on the host board – **Not required**	
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.

Add: 3F,6# Building, Xinguang Road, Xili Industrial Zone, Nanshan District, Shenzhen, China
Tel：0755-86023553 Fax：0755-86023552
Mail: sales@hoesn.com
Web: www.hoesn.com

2. Open collector; should be pulled up with 4.7k – 10kohms on host board to a voltage between 3.15V and 3.6V.

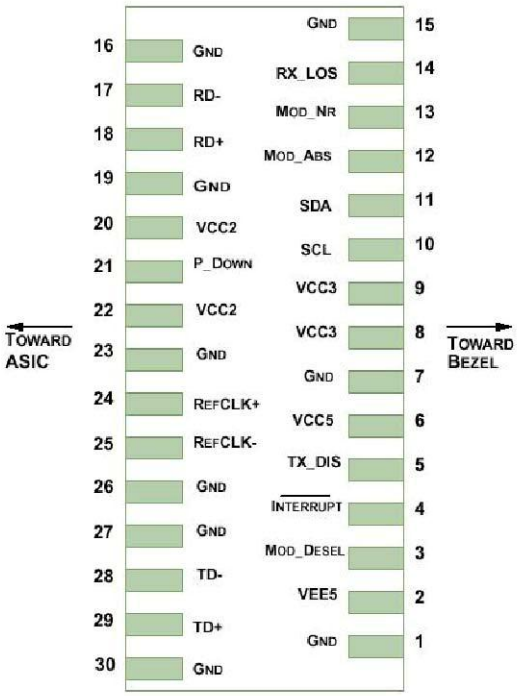


Diagram of Host Board Connector Block Pin Numbers and Names

II. Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage #1	Vcc3	-0.5		4.0	V	
Maximum Supply Voltage #2	Vcc5	-0.5		6.0	V	
Maximum Supply Voltage #3	Vcc2	-0.5		2.0	V	
Storage Temperature	Ts	-40		85	°C	
Case Operating Temperature	Top	-5		70	°C	

III. Electrical Characteristics (Top = -5 to 70 , Vcc5 = 4.75 to 5.25 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage #1	Vcc5	4.75		5.25	V	
Supply Voltage #2	Vcc3	3.13		3.46	V	
Supply Voltage #3	Vcc2	1.71		1.89	V	
Supply Current – Vcc5 supply	Icc5			350	mA	
Supply Current – Vcc3 supply	Icc3			400	mA	

Add: 3F,6# Building, Xinguang Road, Xili Industrial Zone, Nanshan District, Shenzhen, China
Tel：0755-86023553 Fax：0755-86023552
Mail: sales@hoesn.com
Web: www.hoesn.com

Supply Current – Vcc2 supply	Icc2			750	mA	
Module total power	P			3.5	W	1
Transmitter						
Input differential impedance	R_{in}		100		Ω	2
Differential data input swing	Vin,pp	120		820	mV	
Transmit Disable Voltage	V_D	2.0		Vcc	V	3
Transmit Enable Voltage	V_{EN}	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	t_r			38	ps	5
Data output fall time	t_f			38	ps	5
LOS Fault	$V_{LOS\ fault}$	Vcc – 0.5		V_{CCHOST}	V	6
LOS Normal	$V_{LOS\ norm}$	GND		GND+0.5	V	6
Power Supply Rejection	PSR	See Note 6 below				7
Reference Clock						
Clock differential input impedance	$Rclk_{in}$		100		Ω	
Reference Clock frequency	f0		Baud/64		MHz	
Differential clock input swing	Vclkin,pp	640		1600	mV	
Clock output rise/fall time	t_{rf}	200		1250	ps	5
Reference clock frequency tolerance	Df	-100		+100	PPM	

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 – 3.6V. Logic 0 indicates normal operation; logic 1 indicates no signal detected.
7. Per Section 2.7.1. in the XFP MSA Specification[1].

IV. Optical Characteristics (EOL, T_{OP} = -5 to 70, V_{CC5} = 4.75 to 5.25 Volts)

Please note that the Transmitter of the HXF-1055-80D becomes operational within 60 seconds of power-up. This is due to the time required for the EML to reach its optimum operating temperature.

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Transmitter						
Output Opt. Pwr: 9/125 SMF	P_{OUT}	0		+4	dBm	

Add: 3F,6# Building, Xinguang Road, Xili Industrial Zone, Nanshan District, Shenzhen, China
Tel：0755-86023553 Fax：0755-86023552
Mail: sales@hoesn.com
Web: www.hoesn.com

Optical Extinction Ratio	ER	9			dB	
Center Wavelength	λ c	1530		1565	pm	
Sidemode Supression ratio	SSR_{min}	30			dB	
Tx Jitter Generation (peak-to-peak)	Tx_j			0.1	UI	1
Tx Jitter Generation (RMS)	Tx_{jRMS}			0.01	UI	2
Relative Intensity Noise	RIN			-130	dB/Hz	
Receiver						
Receiver Sensitivity @ 9.95Gb/s	R_{SENS1}			-24	dBm	3,4
Receiver Sensitivity @ 11.1Gb/s	R_{SENS2}			-23	dBm	3
Maximum Input Power	P_{MAX}	-7			dBm	
Optical Center Wavelength	λ C	1270		1600	nm	
Receiver Reflectance	R_{rx}			-27	dB	
Path penalty at 1600 ps/nm @ 9.95Gb/s	DP_1			2	dB	5
Path penalty at 1600 ps/nm @ 10.7Gb/s	DP_2			3	dB	5
Path penalty at 1450 ps/nm @ 11.1Gb/s	DP_3			3	dB	5
LOS De-Assert	LOS_D			-30	dBm	
LOS Assert	LOS_A	-37	-35		dBm	
LOS Hysteresis		0.5			dB	

Notes:

1. Measured with a host jitter of 50 mUI peak-to-peak.
2. Measured with a host jitter of 7 mUI RMS.
3. Measured at 1528-1600nm with worst ER; BER<10^{-12}; PRBS31.
4. Equivalent to –22.1 dBm OMA at ER = 9 dB.
5. Dispersion penalty is measured in loopback using 18 ps/(nm*km) fiber (SMF-28).

V. General Specifications

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Bit Rate	BR	9.95		11.1	Gb/s	1
Bit Error Ratio	BER			10^{-12}		2
Max. Supported Link Length	L_{MAX}		80		km	1

VI. Environmental Specifications

HOESN's XFP transceivers have an operating temperature range from -5°C to +70°C case temperature.

Add: 3F,6# Building, Xinguang Road, Xili Industrial Zone, Nanshan District, Shenzhen, China
Tel：0755-86023553 Fax：0755-86023552
Mail: sales@hoesn.com
Web: www.hoesn.com

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Case Operating Temperature	T_{op}	-5		70	°C	
Storage Temperature	T_{sto}	-40		85	°C	

VII. Regulatory Compliance

HOESN's XFP transceivers are Class 1 Laser Products. They are certified per the following standards:

Feature	Agency	Standard	Certificate Number
Laser Eye Safety	FDA/CDRH	CDRH 21 CFR 1040 and Laser Notice 50	TBD
Laser Eye Safety	TÜV	EN 60825-1: 1994+A11:1996+A2:2001 IEC 60825-1: 1993+A1:1997+A2:2001 IEC 60825-2: 2000, Edition 2	TBD
Electrical Safety	TÜV	EN 60950	TBD
Electrical Safety	UL/CSA	CLASS 3862.07 CLASS 3862.87	TBD

Copies of the referenced certificates are available at HOESN's Corporation upon request.

VIII. Digital Diagnostics Functions

As defined by the XFP MSA[1], HOESN's 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 (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

Add: 3F,6# Building, Xinguang Road, Xili Industrial Zone, Nanshan District, Shenzhen, China
Tel：0755-86023553 Fax：0755-86023552
Mail: sales@hoesn.com
Web: www.hoesn.com

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

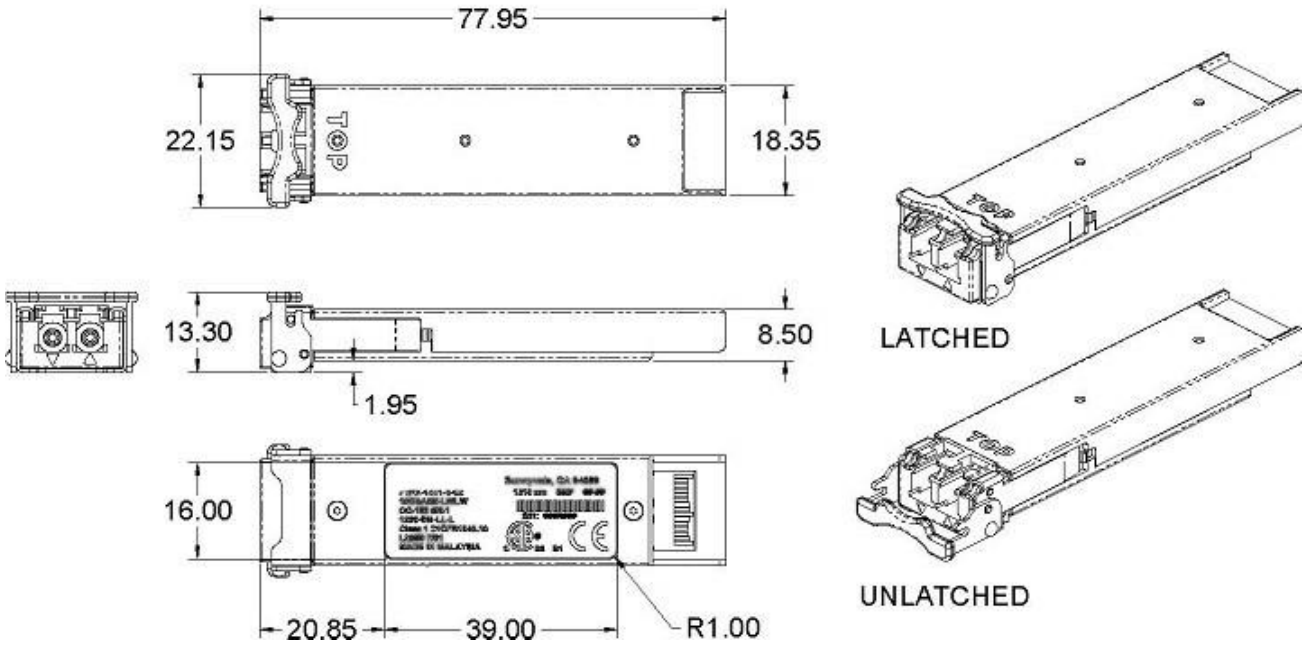
2-wire serial interface provides sequential or random access to the 8 bit parameters, addressed from

000h to the maximum address of the memo •

For more detailed information, including memory map definitions, please see the XFP MSA documentation[1].

IX. Mechanical Specifications

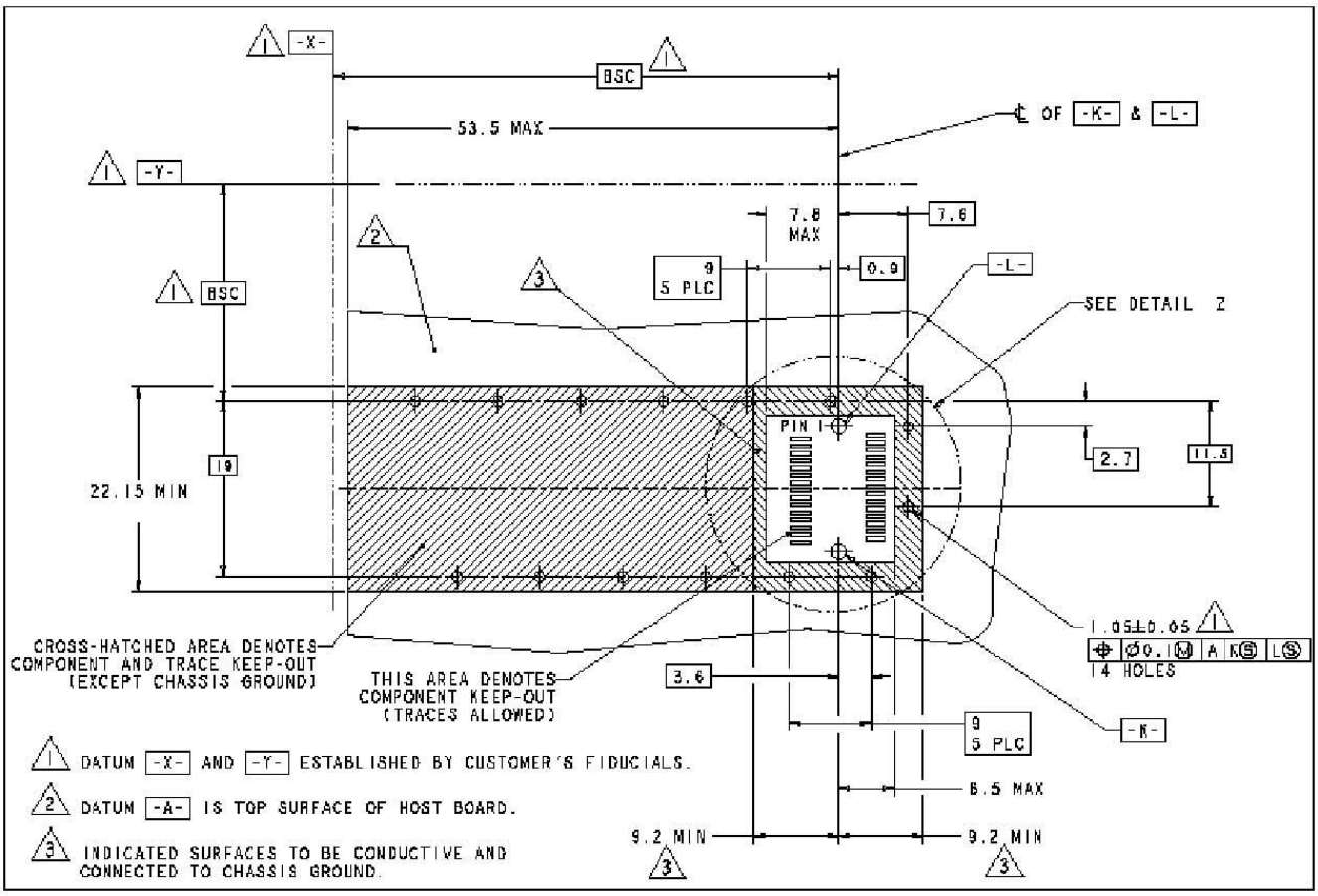
HOESN's XFP transceiver are compliant with the dimensions defined by the XFP Multi-Sourcing Agreemeng(MSA).



XFP Transceiver (dimensions are in mm)

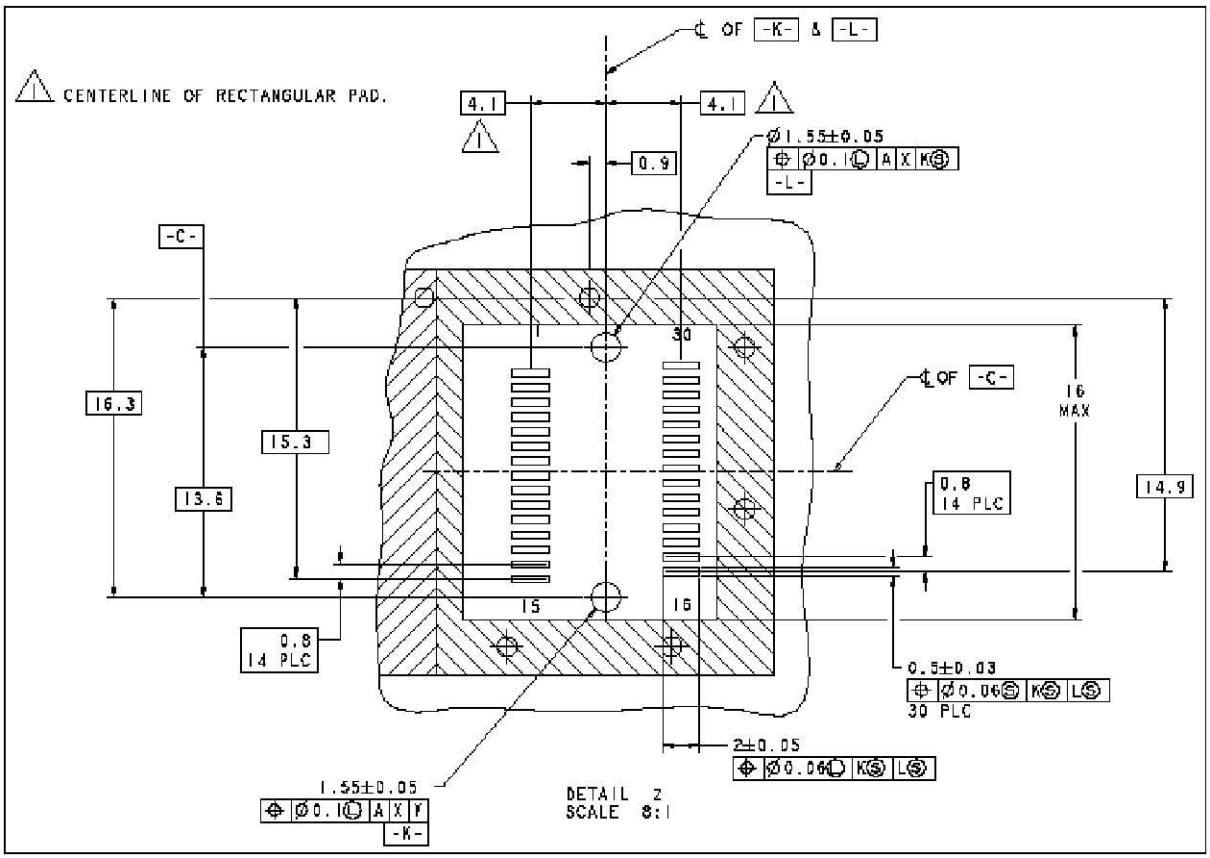
Add: 3F,6# Building, Xinguang Road, Xili Industrial Zone, Nanshan District, Shenzhen, China
Tel：0755-86023553 Fax：0755-86023552
Mail: sales@hoesn.com
Web: www.hoesn.com

X. PCB Layout and Bezel Recommendations

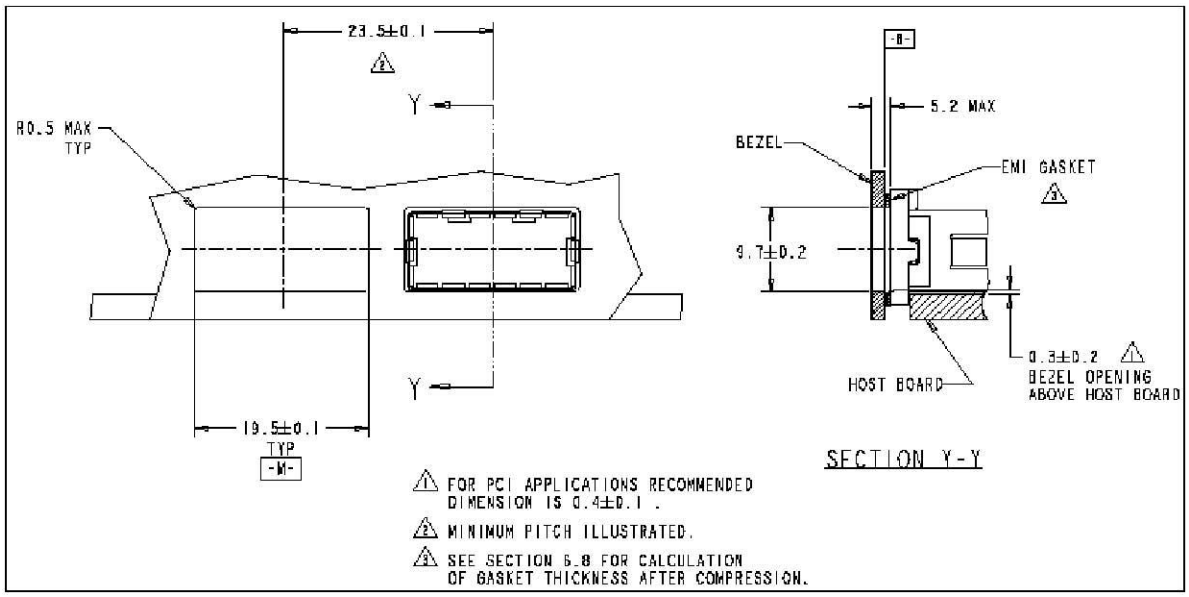


XFP Host Board Mechanical Layout (dimensions are in mm)

Add: 3F,6# Building, Xinguang Road, Xili Industrial Zone, Nanshan District, Shenzhen, China
Tel：0755-86023553 Fax：0755-86023552
Mail: sales@hoesn.com
Web: www.hoesn.com



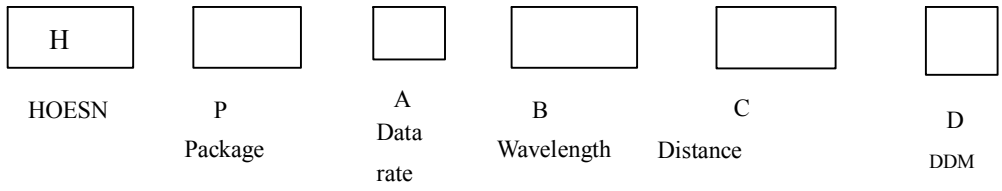
XFP Detail Host Board Mechanical Layout (dimensions are in mm)



XFP Recommended Bezel Design (dimensions are in mm)

Add: 3F,6# Building, Xinguang Road, Xili Industrial Zone, Nanshan District, Shenzhen, China
Tel：0755-86023553 Fax：0755-86023552
Mail: sales@hoesn.com
Web: www.hoesn.com

Ordering Information



Item	Parameter	Description		
P	package	X2：X2	XK:XENPAK	XF:XFP
		XP:SFP+		
A	Data-rate		10=10.3GB/s	
B	wavelength	85= 850nm	31 = 1310nm	55 = 1550nm
C	Distance	01：300M	10:10KM	40:40KM
		80:80KM		
D	DDM	D: withDDM		

Add: 3F,6# Building, Xinguang Road, Xili Industrial Zone, Nanshan District, Shenzhen, China
Tel：0755-86023553 Fax：0755-86023552
Mail: sales@hoesn.com
Web: www.hoesn.com