



#### **Features:**

- ♦ Supports 9.95Gb/s to 11.3Gb/s bit rates
- ♦ Hot-pluggable XFP footprint
- ♦ Single LC for Bi-directional Transmission
- $\diamond$  Maximum link length of 80km
- ♦ Single 3.3V voltage supply

- ♦ Uncooled 1550nm CWDM EML Laser, APD receiver
- $\diamond$  Power dissipation < 3.5W
- ♦ No Reference Clock required
- ♦ Built- in digital diagnostic functions
- $\diamond$  Temperature range 0°C to 70°C
- ♦ Very low EMI and excellent ESD protection
- ♦ RoHS Compliant Part

### **Applications:**

- ♦ 10GBASE-LR/LW Ethernet
- ♦ SONET OC-192 /SDH STM-64
- ♦ 1200-SM-LL-L 10G Fibre Channel

# **Description:**

SWEDISH TELECOM's STC-10G-XFP-BIDI-80KM-1550 Bi-directional 10Gb/s (XFP) transceivers are compliant with the current XFP Multi-Source Agreement (MSA) Specification. They comply with 10-Gigabit Ethernet

10GBASE-LR/LW per IEEE 802.3ae, SONET OC-192/SDH STM-64 and 10G Fibre Channel 1200-SM-LL-L. Digital diagnostics functions are available via a 2-wire serial interface, as specified in the XFPMSA.

#### Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Storage Temperature	T <sub>ST</sub>	-40	+85	S
Case Operating Temperature	T <sub>IP</sub>	0	+70	°C
Supply Voltage	V <sub>CC3</sub>	-0.5	+4.0	V

### • Electrical Characteristics ( $T_{OP} = 0$ to 70 °C)

	N		1			
Parameter	Symbol	Min	Тур	Max	Unit	Note

10Gb/s 80km BiDi XFP Transceiver (STC-10G-XFP-BIDI-80KM-1550) Datasheet

Supply Voltage	Vcc3	3.13		3.45	V		
Supply Current	Icc3			500	mA		
Module total power	Р			3.5	W		
Transmitter							
Input differential impedance	Rin		100		Ω	1	
Differential data input swing	Vin,pp	150		820	mV		
Transmit Disable Voltage	VD	2.0		Vcc	V		
Transmit Enable Voltage	V <sub>EN</sub>	GND		GND+0.8	V		
Transmit Disable Assert Time	T_off			100	ms		
Tx Enable Assert Time	T_on			100	ms		
Receiver							
Differential data output swing	Vout,pp	300	500	850	mV		
Data output rise time	tr			35	ps	2	
Data output fall time	tf			35	ps	2	
LOS Fault	$V_{LOS\ fault}$	Vcc- 0.5		Vcc <sub>HOST</sub>	V	3	
LOS Normal	V <sub>LOS norm</sub>	GND		GND+0.5	V	3	
Power Supply Rejection	PSR	See Note 4 below	4				

#### Notes

1. After internal AC coupling.

2.20 - 80%

3. 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.

4. Per Section 2.7.1. in the XFP MSA Specification.

# • Optical Characteristics (TOP = 0 to $70^{\circ}$ C)

Parame ter	Symbol	Min	Тур	Max	Unit	Re f.	
Transmitte r							
Operating Date Rate	BR	9.95		11.3	Gb/s		
Bit Error Rate	BER			10 <sup>-12</sup>			
Average Optical Power	P <sub>MAX</sub>	+1		+5	dBm	1	
Optical Center Wavelength	λ	1540	1550	1560	nm		
Optical Extinction Ratio	ER	6			dB		
Spectral Width	Δλ			1	nm		
Side mode Suppression ratio	$\mathbf{SMSR}_{\min}$	30			dB		
Rise/Fall Time (20%~80%)	Tr/Tf			50	ps		
Average Launch power of OFF Transmitter	P <sub>OFF</sub>			-30	dBm		
Tx Jitter	Txj	Compliant with each standard requirements					
Optical Eye Mask		IEEE802.3ae				2	
Receiver							
Operating Date Rate	BR	9.95		11.3	Gb/s		
Receiver Sensitivity	Sen			-23	dBm	2	
Maximum Input Power	P <sub>MAX</sub>	-7			dBm	2	
Optical Center Wavelength	$\lambda_{\rm C}$	1480	1490	1500	nm		
Receiver Reflectance	Rrx			-27	dB		
LOS De-Assert	LOSD			-24	dBm		
LOS Assert	LOSA	-35			dBm		
LOS Hysteresis	LOS <sub>H</sub>	0.5		5	dB		

#### Notes:

- 1. The optical power is launched into SMF.
- 2. Measured with a PRBS  $2^{31}$ -1 test pattern @10.3125Gbps BER< $10^{-12}$ .

#### **Pin Assignment:**

Diagram of Host Board Connector Block Pin Numbers and Name



Bottom of Board (As view through top of board)



Top of Board

### ► Pin Function Definitions

Pin	Logic	Symbol	Name /De scription	
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	
			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

#### Note

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 3.45V.

3. A Reference Clock input is not required.

### **Digital Diagnostic Functions**

As defined by the XFP MSA 1, SWEDISH TELECOM'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 endusers 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 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.

For more detailed information including memory map definitions, please see the XFP MSA Specification.





#### **Recommended Circuit:**





**Recommended High-speed Interface Circuit** 

## **Mechanical Dimensions:**



SWEDISH TELECOM reserves the right to make changes to the products or information contained herein without notice. No liability is assumed as a result of their use or application. No rights under any patent accompany the sale of any such products or information. Published by SWEDISH TELECOM Copyright © SWEDISH TELECOM All Rights Reserved