

TUNABLE XFP DWDM 10G 80Km ZR

SLXFD-10GE-ZR-T



Overview

Sourcelight SLXFD-10GE-ZR-T series optical transceiver is a high performance and cost effective XFP transceiver modules designed for 10G SDH/SONET, 10G Ethernet DWDM fiber optic transmission applications, designed to support the full range of C-band ITU-T wavelengths data rates from 9.95Gbps to 11.3Gbps and distances up to 80km.


This transceiver contains both transmit and receive sections. An MZM, (C-band tunable laser with a wavelength locker) a laser driver and the supporting circuits constitute the transmit path while an APD ROSA, a post amplifier and the supporting circuit form the receive section. A microcontroller handles the communications between the module and the host board as well as the control and monitoring functions for both transmit and receive sections. A Clock and Data Recovery circuit (CDR) functions for both transmit and receive.

Ordering information

Part Number	Product Description
SLXFD-10GE-ZR-T	Tunable XFP DWDM 10Gbps, 80km, C-band cover 80 ITU-based channel , -5°C ~ +70°C

The transceiver module is fully compliant with the XFP MSA standard and can be hot-plugged into the 30-pin XFP connector on the host board. By limiting inrush currents, the device will not disturb the operations of the host board. The high-speed electrical interface is fully compliant with the XFI standard, providing transmission paths for the 10G signals.

Features

- ◆ Supports 9.95Gb/s to 11.3Gb/s transmission
- ◆ Client side and Line side loopback functions
- ◆ XFP MSA compliant form factor connector
- ◆ XFI electrical interface compliant
- ◆ Hot-pluggable XFP footprint
- ◆ 80km MZM Tunable TOSA
- ◆ Supports 50GHz ITU-based channel spacing (C-Band), cover 80 ITU-based channel
- ◆ With wavelength locker function, wavelength precision about 0.02nm
- ◆ -300 to +1600ps/nm Dispersion Tolerance
- ◆ Power Dissipation < 3.5W
- ◆ I2C interface for diagnostic monitoring
- ◆ Operation Temperature: -5~70°C
- ◆ RoHS6 compliant (lead free) 

Applications

- ◆ DWDM 10Gb/s SONET/SDH
- ◆ DWDM 10Gb/s SONET/SDH with FEC
- ◆ DWDM 10Gb/s Ethernet & 10G Fiber Channel
- ◆ DWDM 10Gb/s Ethernet & 10Gb/s Fiber Channel with FEC

Module Block Diagram

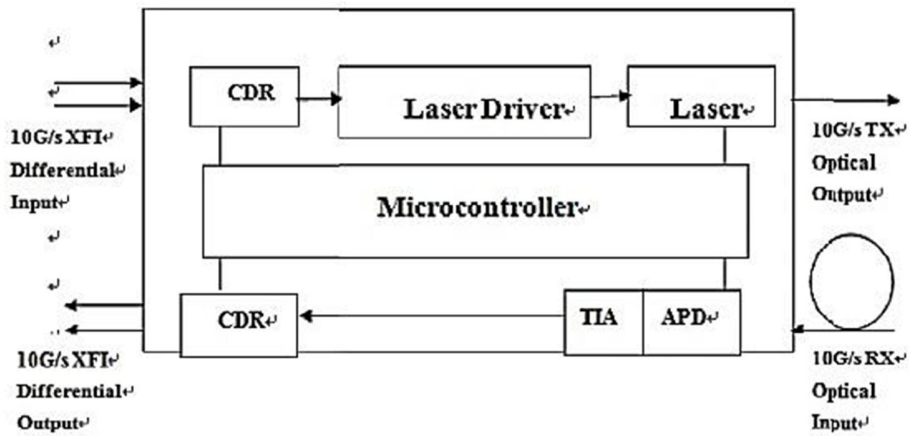


Figure1. Module Block Diagram

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit	Note
Supply Voltage #3	Vcc3	-0.5	3.6	V	
Supply Voltage #5	Vcc3	-0.5	6.0	V	
Storage Temperature	Tst	-40	85	°C	
Case Operating Temperature	Top	0	70	°C	1
Relative Humidity (non-condensation)	RH	-	85	%	
Voltage on LVTTTL Input	Vilvttl	-0.5	VCC3+0.5	V	
LVTTTL Output Current	Iolvttl	-	15	mA	
Voltage on Open Collector Output	Voco	0	6	V	
Receiver Input Optical Power(Average)	Mip	-	-7	dBm	2

Note:

1. Ta: -10 to 60°C with 1.5m/s airflow with an additional heat sink
2. APD Receiver

Operating Conditions

Parameter	Symbol	Min	Max	Unit
Operating Case Temperature	Topc	0	70	°C
Relative Humidity (non-condensing)	Rhop	-	85	%
Power Supply Voltage #3	Vcc3	3.135	3.465	V
Power Supply Current #3	Icc3	-	750	mA
Power Supply Voltage #5	Vcc5	4.75	5.25	V
Power Supply Current #5	Icc5	-	300	mA
Power Supply Voltage #2	Vcc2	1.71	1.91	V
Power Supply Current #5	Icc5	-	500	mA
Total Power Consumption	Pd	-	3.5	W

Datasheet

Optical Interface

Parameter	Symbol	Min	Typical	Max	Unit	Note	
Transmitter							
Operating Data Rate	-	9.95		11.30	Gb/s	1	
Wavelength range (ITU Grid)	λ	1528.77		1563.86	nm		
Center Wavelength-End Of Life	λ_c	$\lambda_c - 2.5$	λ_c	$\lambda_c + 2.5$	GHz		
Crossing Ratio		40		60	%		
Center Wavelength Spacing			50		GHz		
SMSR	SMSR	30		-	dB		
Wavelength tuning (Cold Start)				30	s		
Wavelength tuning (Warm)			0.5	2	s		
Average Output Power	Po	0	+2	+4	dBm	2	
Dispersion Penalty @9.95G	DP			2	dB	2	
Dispersion Penalty @10.3125G	DP			2.5	dB	3	
Disabled Power	Poff	-		-30	dBm	2	
Extinction Ratio	ER	9.0	10	-	dB	2	
Eye Mask 1(SONET/SDH)		GR-253-CORE/ITU-T G.691					2
Eye Mask 2 (10G Ethernet)		IEEE802.3ae					3
Spectral Width (-20dB from Peak)	FW20		0.25		nm		
RIN	RIN	-		-130	dB/Hz		
Receiver							
Operating Data Rate		9.95		11.30	Gb/s	1	
Input Center Wavelength	Irc	1250		1620	nm		
Overload	Rovl	-7.0		-	dBm		
Minimum Sensitivity	Pmin	-	- 25.5	-24.0	dBm	2	
LOS Assert	LOSA	-39			dBm		
LOS Deassert	LOSD			-26	dBm		
LOS Hysteresis	LOSH	0.5			dB		
Optical Path Penalty	PN	-		TBD	dB	1	
Optical Return Loss	ORL	27		-	dB		
Jitter Tolerance	JTL	GR-253-CORE/ITU-T G.783					

Note:

- Data rate tolerance:
 - IR-2/S-64.2b, 10GBASE-ZW: typ. +/-20ppm
 - 10GBASE-ZR: typ. +/-100ppm
- Measured at 9.95Gbps, Non-framed PRBS2³¹-1, NRZ
- Measured at 10.3125Gbps, Non-framed PRBS2³¹-1, NRZ

Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant with SFF8472 Rev10.7 with internal calibration mode. For external calibration mode, please contact our sales staff.

Datasheet

Parameter	Symbol	Min.	Max	Unit	Notes
Temperature monitor absolute error	DMI_Temp	-3	3	degC	Over operating temp
Laser power monitor absolute error	DMI_TX	-3	3	dB	
RX power monitor absolute error	DMI_RX	-3	3	dB	-1dBm to -15dBm range
Supply voltage monitor absolute error	DMI_VCC	-0.1	0.1	V	Full operating range
Bias current monitor	DMI_Ibias	-10%	10%	mA	

Tuning Management Interface for ITU Frequency Grid Applications

A desired wavelength can be commanded by the user by writing into Bytes 72 (MSB) and 73 (LSB). Wavelength control command:

Address	Bit	Name	Description
72 (MSB) & 73 (LSB)	All	Wavelength Set	User input of Wavelength set point (in units of 50 pm)
74 (MSB) & 75 (LSB)	All	Wavelength Error	Monitor of Current Wavelength Error (in units of 5 pm)

Thus for instance a target wavelength of 1556.55 nm would correspond to 79h (MSB) written to Byte address 72 and 9Bh (LSB) written to Byte address 73.

Pin Descriptions

Pin	Logic	Symbol	Name/Description	Ref.
1		GND	Module Ground	1
2		VEE5	Optional -5V Power Supply – Not required	3
3	LVTTTL-I	Mod-Desel	Module De-select; When held low allows the module to, respond to 2-wire serial interface commands	
4	LVTTTL-O	Interrupt	Interrupt (bar); Indicates presence of an important condition which can be read over the serial 2-wire interface. This pin is an open collector output and must be pulled up to host_Vcc on the host board	2
5	LVTTTL-I	TX_DIS	Transmitter Disable; When asserted High, transmitter output is turned off. This pin is pulled up to VCC3 in the module	
6		VCC5	+5V Power Supply	3
7		GND	Module Ground	1
8		VCC3	+3.3V Power Supply	
9		VCC3	+3.3V Power Supply	
10	I/O	SCL	2-wire serial interface clock. Host shall resistor connected to host_Vcc of +3.3V.	2
11	I/O	SDA	2-wire serial interface data. Host shall use a pull-up resistor connected to host_Vcc of +3.3V	2
12	LVTTTL-O	MOD_ABS	Indicates Module is not present. Host shall pull up this pin, and grounded in the module. "High" when the XFP module is absent from a host board.	2
13	LVTTTL-O	MOD_NR	Module not ready; When High, Indicates Module Operational Fault. This pin is an open collector and must be pulled to host_Vcc on the host board.	2,3

Datasheet

14	LVTTTL-O	RX_LOS	Receiver Loss of Signal; When high, indicates insufficient optical input power to the module. This pin is an open collector and must be pulled to host_Vcc on the host board.	2
15		GND	Module Ground	
16		GND	Module Ground	
17	CML-O	RDN	Receiver Inverted Data Output; AC coupled inside the module.	
18	CML-O	RDP	Receiver Non-Inverted Data Output; AC coupled inside the module.	
19		GND	Module Ground	1
20		VCC2	+1.8V Power Supply	
21	LVTTTL-I	P_Down/RST	Power down; When High, module is limited power mode. Low for normal operation. Reset; The falling edge indicates complete reset of the module. This pin is pulled up to VCC3 in the module. (Power Down function support upon request)	
22		VCC2	+1.8V Power Supply; not in use	
23		GND	Module Ground	1
24	PECL-I	REFCLKP	Reference clock Non-Inverted Input; not in use	
25	PECL-I	REFCLKN	Reference clock Inverted Input; not in use	
26		GND	Module Ground	1
27		GND	Module Ground	1
28	CML-I	TDN	Transmitter Inverted Data Input; AC coupled inside the module.	
29	CML-I	TDP	Transmitter Non-Inverted Data Input; AC coupled inside the module.	
30		GND	Module Ground	1

Notes:

1. Module GND pins are isolated from the module case and chassis GND within the module.
2. Shall be pulled up with 4.7k ~ 10k ohm to a 3.15V ~ 3.45V on the host board.
3. MOD_NR = (TX LOL) OR (RX LOL).

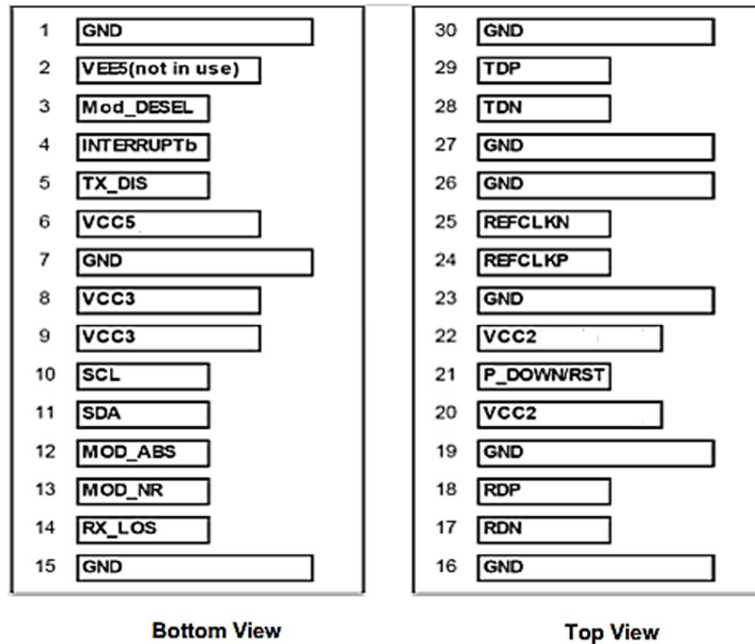


Figure 2: Electrical Pin-out Details

Low Speed Control and Alarm Signals Electrical Interface

Parameter	Symbol	Min	Max	Units	Note
XFP Interrupt, Mod_NR, RX_LOS	Vol	0.0	0.4	V	1
	Voh	Vcc-0.5	Vcc+0.3		2
XFP TX_DIS, P_DOWN/RST	Vil	-0.3	0.8	V	3
	Vih	2.0	VCC3+0.3		4
XFP SCL and SDA Output	Vol	0.0	0.4	V	1
	Voh	Vcc-0.5	Vcc+0.3		2
XFP SCL and SDA Input	Vil	-0.3	VCC3*0.3	V	5
	Vih	VCC3*0.7	VCC3+0.5		6
Capacitance for XFP SCL and SDA I/O pin	Ci	-	14	pF	
Total bus capacitive load for SCL and SDA	Cb	-	100	pF	7
			400	pF	8

Notes:

4. Pull-up resistor must be connected to host_Vcc on the host board. Iol(max)=3mA
5. Pull-up resistor must be connected to host_Vcc on the host board.
6. Pull-up resistor connected to VCC3 within XFP module. Iil (max) = -10µA.
7. Pull-up resistor connected to VCC3 within XFP module. Iih (max) = 10µA.
8. Pull-up resistor must be connected to host_Vcc on the host board. Iol (max) = -10µA.
9. Pull-up resistor must be connected to host_Vcc on the host board. Iol (max) = 10µA.
10. At 400KHz, 3.0kohms pull-up resistor, at 100kHz 8.0kohms pull-up resistor max.
11. At 400KHz, 0.8kohms pull-up resistor, at 100kHz 2.0kohms pull-up resistor max.

Mechanical Dimensions

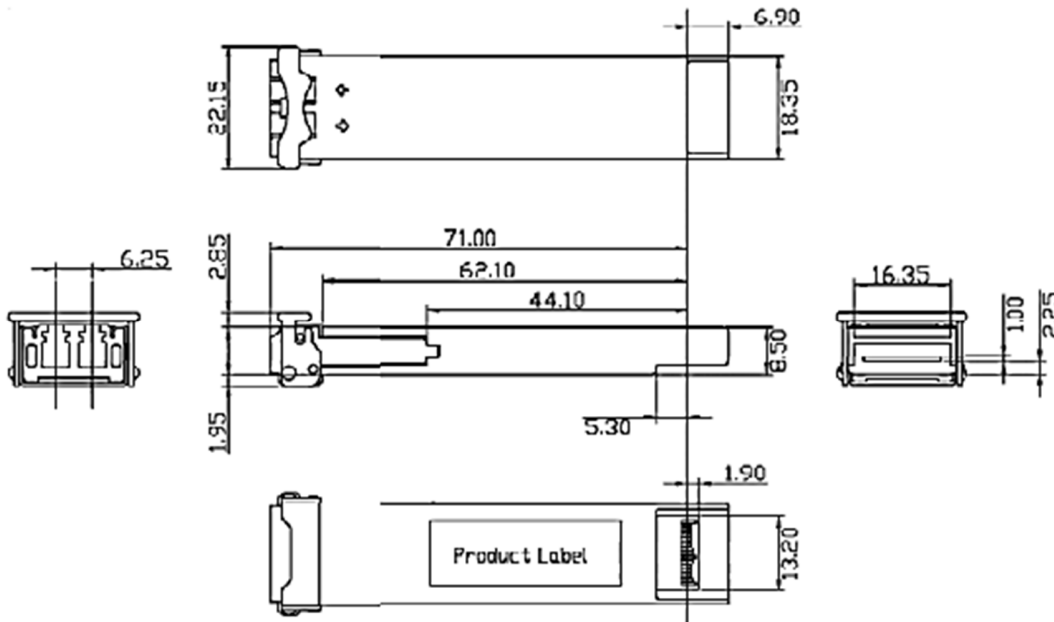


Figure3. Mechanical Specifications

ESD

This transceiver is specified as ESD threshold 1kV for XFI pins and 2kV for all others electrical input pins, tested per MIL-STD-883, Method 3015.4/JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

Laser Safety

This is a Class 1 Laser Product according to IEC 60825-1:2007. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007)

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