

## Tunable SFP+ DWDM 10G 80Km ZR

SLSSD-10GE-ZR-T




### Overview

50GHz Full C-band Tunable SFP+ transceivers are designed for use in 10Gb/s to 11.1Gb/s 50GHz DWDM links up to 80km of G.652 fiber.

The SFP+ module supports 10GBASE-ZR and –ZW applications along with SONET OC-192 LR-2 and SDH STM-64 ITU-T G.959.1 P1L1-2D2 applications for Ethernet Switches, IP Routers or SONET/SDH optical interfaces. Digital Optical Monitoring interfaces are provided via the SFP+ standards compliant I2C interface.

### Features

- ◆ Hot-pluggable SFP+ footprint
- ◆ 50GHz DWDM ITU-T Full C-band Tunability
- ◆ Support 9.95Gb/s to 11.3Gb/s bit rates
- ◆ 80km 50GHz DWDM laser
- ◆ 80km APD photodiode receiver
- ◆ Single 3.3V power supply
- ◆ Power dissipation < 1.7W
- ◆ -5°C to +70°C Operating Case Temperature
- ◆ Duplex LC fiber connectors
- ◆ 10GBASE-ZR/ZW
- ◆ SDH STM-64 ITU-T G.959.1 P1L1-2D2
- ◆ RoHS6 compliant and lead free 

### Applications

- Full C-band Tunable 10GBASE-ZR 10GEtherne
- 8GB/10GB Fibre Channel
- SONET OC-192 LR-2
- SDH STM-64 ITU-T G.959.1 P1L1-2D2
- Access DWDM Ethernet Switch or IP Router Interconnect

### Ordering information

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

## Module Block Diagram

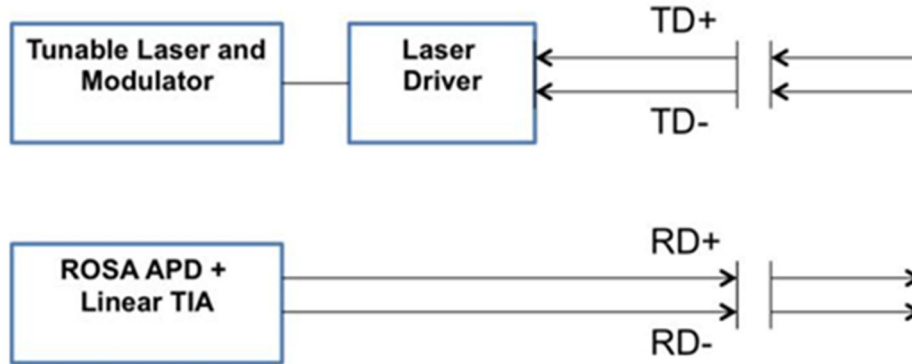


Figure1. Module Block Diagram

## Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Power Supply	Vcc	3.135	3.465	V
Storage Temperature	TSTORAGE	-40	85	C
Operating Temperature	TOP	-5	70	C
Relative Humidity (non condensing)	RH	5	85	%
Supply Current, Sustained	Icc		500	mA
Power Dissipation	PDIS		1.7	W

## Transmitter E-O Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Support data rate	-	9.95	10.3125	11.1	Gb/s	-
Center Wavelength (DWDM)		1528.38	-	1568.77	nm	ITU-T
Wavelength Stability after Startup	$\lambda_{EOL}$	i -25	-	i +25	pm	
DWDM Channel Spacing	fSPACING		50		GHz	
Tuning Time	TUNE			1	sec	
Average Optical Output Power	Po	-1.0	-	+3.0	dBm	
Optical Power of Off Transmitter	Poff	-	-	-30	dBm	
Extinction Ratio	Er	9.0	-	-	dB	1
Side Mode Suppression Ratio	SMSR	35			dB	1
Tx Eye Crossing		45		60	%	
Output Eye Diagram		Compliant with IEEE and GR-253-CORE				

Note(1): Measured with 10.709Gbps, PRBS 2<sup>31</sup>-1

## Receiver O-E Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Support data rate		9.95	10.3125	11.1	Gb/s	-
Operating Wavelength		1525	-	1570	nm	2
Sensitivity @ 10.3Gbps	Sen1			-24	dBm	3
Sensitivity @ 11.1Gbps	Sen2			-23	dBm	3
Saturation	Ps	-7			dBm	3
Optical Path Penalty @ 10.3Gbps 1600ps/nm	OPP1			2	dB	3
Optical Path Penalty @ 11.1Gbps 1600ps/nm	OPP2			2.5	dB	3
OSNR @ 10.3Gbps	OSNR1	24			dB	4
OSNR @ 10.3Gbps with Disp	OSNR2	26			dB	5
OSNR @ 11.1Gbps	OSNR3	16			dB	6
OSNR @ 11.1Gbps with Disp	OSNR4	18.5			dB	7
Rx Damage Threshold	RXDAMAGE			1	dBm	
LOS Asserted (EOL)	T_loss_on	-33.5			dBm	High
LOS De-Asserted	T_loss_off			-26	dBm	level:
LOS Hysteresis (EOL)	T_loss_Hs	0.5			dB	Alarm

### Notes:

- [1] (1).Rx wavelength range is 1270nm to 1610nm with 2dB penalty outside of specified operating range
- [2] (2).Measured with PRBS 231-1 at 10-12 BE Measured with PRBS 231-1 at 10-12 BER, Ops/nm, -7 to -19dBm Rx power
- [3] (3).Measured with PRBS 231-1 at 10-12 BER, -400 to +1600ps/nm, -7 to -19dBm Rx power
- [4] (4).Measured with PRBS 231-1 at 10-4 BER, Ops/nm, -7 to -19dBm Rx power
- [5] (5).Measured with PRBS 231-1 at 10-4 BER, -400 to +1600ps/nm, -7 to -19dBm Rx power

## Wavelength supported

The following table provides correlation of the ITU-T DWDM channel number, wavelength and frequency

Frequency (THz)	Wavelength	ITU Channel	Frequency (THz)	Wavelength	ITU Channel
196.15	1528.38	61.5	193.45	1549.72	34.5
196.1	1528.77	61	193.4	1550.12	34
196.05	1529.16	60.5	193.35	1550.52	33.5
196	1529.55	60	193.3	1550.92	33
195.95	1529.94	59.5	193.25	1551.32	32.5
195.9	1530.33	59	193.2	1551.72	32
195.85	1530.72	58.5	193.15	1552.12	31.5
195.8	1531.12	58	193.1	1552.52	31
195.75	1531.51	57.5	193.05	1552.93	30.5
195.7	1531.9	57	193	1553.33	30
195.65	1532.29	56.5	192.95	1553.73	29.5
195.6	1532.68	56	192.9	1554.13	29
195.55	1533.07	55.5	192.85	1554.54	28.5
195.5	1533.47	55	192.8	1554.94	28
195.45	1533.86	54.5	192.75	1555.34	27.5

Datasheet

195.4	1534.25	54	192.7	1555.75	27
195.35	1534.64	53.5	192.65	1556.15	26.5
195.3	1535.04	53	192.6	1556.55	26
195.25	1535.43	52.5	192.55	1556.96	25.5
195.2	1535.82	52	192.5	1557.36	25
195.15	1536.22	51.5	192.45	1557.77	24.5
195.1	1536.61	51	192.4	1558.17	24
195.05	1537	50.5	192.35	1558.58	23.5
195	1537.4	50	192.3	1558.98	23
194.95	1537.79	49.5	192.25	1559.39	22.5
194.9	1538.19	49	192.2	1559.79	22
194.85	1538.58	48.5	192.15	1560.2	21.5
194.8	1538.98	48	192.1	1560.61	21
194.75	1539.37	47.5	192.05	1561.01	20.5
194.7	1539.77	47	192	1561.42	20
194.65	1540.16	46.5	191.95	1561.83	19.5
194.6	1540.56	46	191.9	1562.23	19
194.55	1540.95	45.5	191.85	1562.64	18.5
194.5	1541.35	45	191.8	1563.05	18
194.45	1541.75	44.5	191.75	1563.45	17.5
194.4	1542.14	44	191.7	1563.86	17
194.35	1542.54	43.5	191.65	1564.27	16.5
194.3	1542.94	43	191.6	1564.68	16
194.25	1543.33	42.5	191.55	1565.09	15.5
194.2	1543.73	42	191.5	1565.5	15
194.15	1544.13	41.5	191.45	1565.9	14.5
194.1	1544.53	41	191.4	1566.31	14
194.05	1544.92	40.5	191.35	1566.72	13.5
194	1545.32	40	191.3	1567.13	13
193.95	1545.72	39.5	191.25	1567.54	12.5
193.9	1546.12	39	191.2	1567.95	12
193.85	1546.52	38.5	191.15	1568.36	11.5
193.8	1546.92	38	191.1	1568.77	11
193.75	1547.32	37.5			
193.7	1547.72	37			
193.65	1548.11	36.5			
193.6	1548.51	36			
193.55	1548.91	35.5			
193.5	1549.32	35			

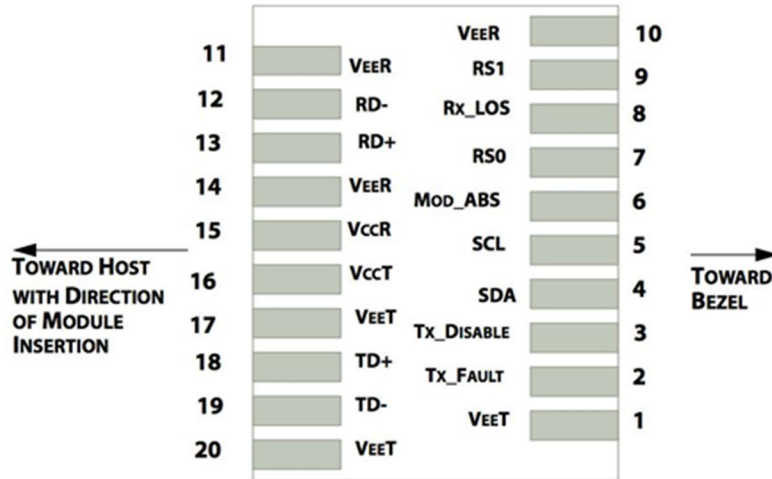


Figure2. Electrical Pin-out Details

### Pin Descriptions

Pin	Symbol	Name/Description
1	VeeT	Module Transmitter Ground
2	Tx_Fault	Module Transmitter Fault
3	Tx_Disable	Transmitter Disable; Turns off transmitter
4	SDA	2-wire Serial Interface Data Line
5	SCL	2-wire Serial Interface Clock
6	Mod_ABS	Module Absent
7	RS0	Rate Select 0 (Not used)
8	Rx_LOS	Receiver Loss of Signal Indication
9	RS1	Rate Select 1 (Not used)
10	VeeR	Module Receiver Ground
11	VeeR	Module Receiver Ground
12	RD-	Receiver Inverted Data Output
13	RD+	Receiver Non-Inverted Data Output
14	VeeR	Module Receiver Ground
15	VccR	Module Receiver 3.3 V Supply
16	VccT	Module Transmitter 3.3 V Supply
17	VeeT	Module Transmitter Ground
18	TD+	Transmitter Non-Inverted Data Input
19	TD-	Transmitter Inverted Data Input
20	VeeT	Module Transmitter Ground

**Notes:**

- (1).The case makes electrical contact to the cage before any of the board edge contacts are made.
- (2).The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.
- (3).This contact is an open collector/drain output contact and shall be pulled up on the host.
- (4).Tx. Disable is an input contact with a 4.7 kΩ to 10 kΩ pullup to VccT inside the module.

## Mechanical Dimensions

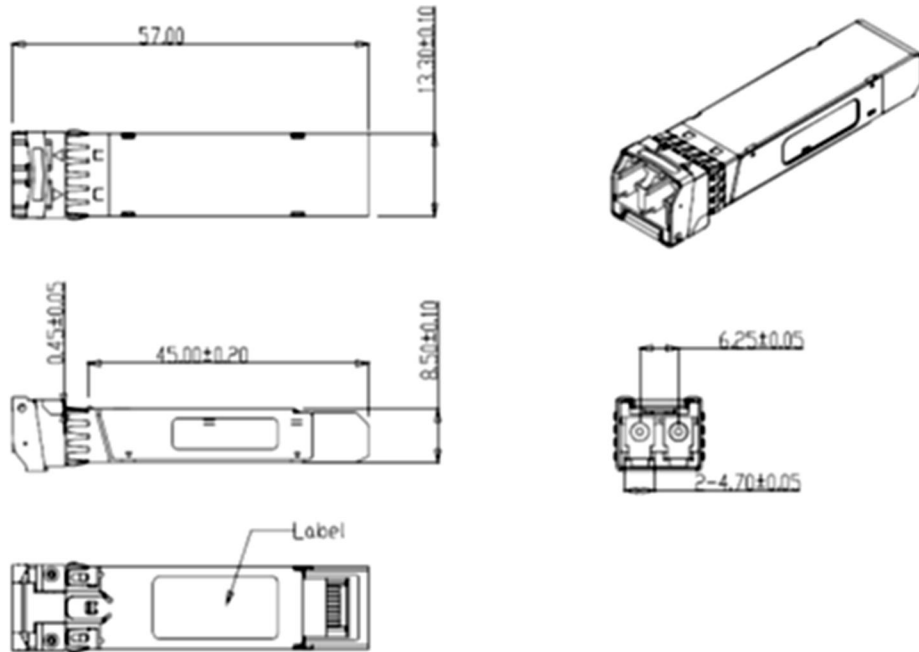


Figure3. Mechanical Specifications

## References

1. "Specifications for Enhanced Small Form Factor Pluggable Module SFP+", SFF-8431, Rev 4.1, July 6, 2009.
2. "Improved Pluggable Formfactor", SFF-8432, Rev 4.2, Apr 18, 2007
3. IEEE802.3ae – 2002
4. "Diagnostic Monitoring Interface for Optical Transceivers" SFF-8472, Rev 10.3, Dec 1, 2007

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