

ESDxx3X-10D(I)

SFP28 DWDM 32G FC 10KM Transceiver

PRODUCT FEATURES

- Hot-pluggable SFP28 form factor
- Supports 28.05Gb/s aggregate bit rate
- Transmitter: cooled DWDM EML TOSA
- Receiver: PIN ROSA
- Internal CDR circuits on both receiver and transmitter channels
- 1.8W maximum power dissipation
- Maximum link length of 10Km over SMF
- Duplex LC receptacle
- Operating case temperature range: -40 to 85°C
- Single 3.3V power supply
- RoHS 2.0 compliant (2011/65/EU, lead free)
- Temperature Range:
 - Commercial: 0°C ~70°C
 - Industrial: -40°C ~85°C



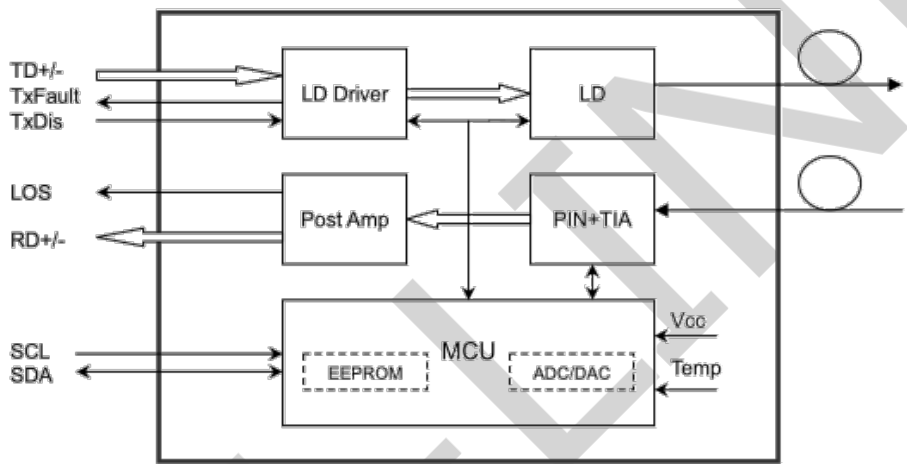
APPLICATIONS

- CPRI Option 10
- 32G FC

DESCRIPTIONS

This product is a 32G FC SFP28 transceiver designed for optical communication compliant with 32G FC standard. Its high performance DWDM EML transmitter and high sensitivity PIN receiver provide superior performance for 32G FC application up to 10km (with FEC) Links. The product is designed with SFP28 form factor, which is the optical/electrical connection according to the SFP+ Multi-Source Agreement (MSA).

Module Block Diagram



Ordering Information

Part No.	Data Rate(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI	Latch Color
ESDxx3X-10D	28.05G	EML	SMF	10km	LC	0°C ~ 70°C	Y	Red
ESDxx3X-10DI	28.05G	EML	SMF	10km	LC	-40°C ~ 85°C	Y	Red

Wavelength Guide Pin Descriptions

ITU Channel Product Code	Frequency(THz)	Wavelength	ITU Channel Product Code	Frequency(THz)	Wavelength
18	191.8	1563.05	40	194.0	1545.32
19	191.9	1562.23	41	194.1	1544.53
20	192.0	1561.42	42	194.2	1543.73
21	192.1	1560.61	43	194.3	1542.94

22	192.2	1559.79	44	194.4	1542.14
23	192.3	1558.98	45	194.5	1541.35
24	192.4	1558.17	46	194.6	1540.56
25	192.5	1557.36	47	194.7	1539.77
26	192.6	1556.55	48	194.8	1538.98
27	192.7	1555.75	49	194.9	1538.19
28	192.8	1554.94	50	195.0	1537.40
29	192.9	1554.13	51	195.1	1536.61
30	193.0	1553.33	52	195.2	1535.82
31	193.1	1552.52	53	195.3	1535.04
32	193.2	1551.72	54	195.4	1534.25
33	193.3	1550.92	55	195.5	1533.47
34	193.4	1550.12	56	195.6	1532.68
35	193.5	1549.32	57	195.7	1531.90
36	193.6	1548.51	58	195.8	1531.12
37	193.7	1547.72	59	195.9	1530.33
38	193.8	1546.92	60	196.0	1529.55
39	193.9	1546.12	61	196.1	1528.77

Table 1. Product ordering codes: the central wavelength is defined as per ITU-T 694.1

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	V _{cc}	-0.3	3.6	V
Input Voltage	V _{in}	-0.3	V _{cc} +0.3	V
Storage Temperature	T _s	-40	85	°C
Case Operating Temperature	T _c	-40	85	°C
Humidity (non-condensing)	Rh	0	85	%

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Supply Voltage	V _{cc}	3.13	3.3	3.47	V
Operating Case Temperature	T _c	-40		85	°C
Data Rate Per Lane	fd		28.05		Gb/s
Humidity	Rh	0		85	%

Power Dissipation	Pm			1.8	w
Fiber Bend Radius	Rb	3			cm

Note:

1. Differential input voltage amplitude is measured between TxnP and TxnN.
2. Differential output voltage amplitude is measured between RxnP and RxnN

Electrical Characteristics

High-Speed Signal: Compliant to CEI-28G-VSR

Low-Speed Signal: Compliant to SFF-8419

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Transmitter (Module Input)						
Differential Input Resistance	R _{Rdin}	90	100	110	Ω	
Input Differential Voltage	R _{Vdiff}	-	-	900	mVpp	
Tx_Disable	Normal Operation	V _{IL}	-0.3	-	0.8	V
	Laser Disable	V _{IH}	2.0	-	V _{CC} +0.3	V
Receiver (Module Output)						
Differential Resistance	T _{Rd}	90	100	110	Ohm	
Output Differential Voltage	T _{Vdiff}	-	-	900	mVpp	
Differential Termination Resistance Mismatch	T _{Rdm}	-	-	10	%	
Rx los	Normal Operation	V _{OL}	-0.3	-	0.4	V
	Loss Signal	V _{OH}	2	-	V _{CC} HOST	V

Optical and Characteristics

Parameter	Symbol	Min	Typical	Max	Unit
Transmitter					
Optical Wavelength	λ _c	per ITU-T 694.1			nm
Center Wavelength Deviation (End of Life)	□ d	±100			pm
Side-Mode Suppression Ratio	SMSR	30			dB
Average Launch Power	P _{out}	-5		2	dBm
Optical Modulation Amplitude	OMA	-2			dBm
Extinction Ratio	ER	4			dB
Average Launch Power of OFF Transmitter	P _{off}			-30	dB
Rin _{20OMA}				-130	dB/HZ
Optical return loss tolerance	ORL			20	dB
Receiver					

Center Wavelength	λ_c	1260		1600	nm
Receiver Sensitivity in OMA2	RSoma			-11.4	dBm
Average Power at Receiver Input (each lane)	Pin	-14		2	dBm
Receiver Reflectance	RR			-26	dB
LOS Assert	LOSA	-30			dBm
LOS De-Assert	LOSD			-18	dBm
LOS Hysteresis	LOSH	0.5			dB

Note:

1. Hit Ratio = 5×10^{-5}
2. Unstressed receiver OMA sensitivity.

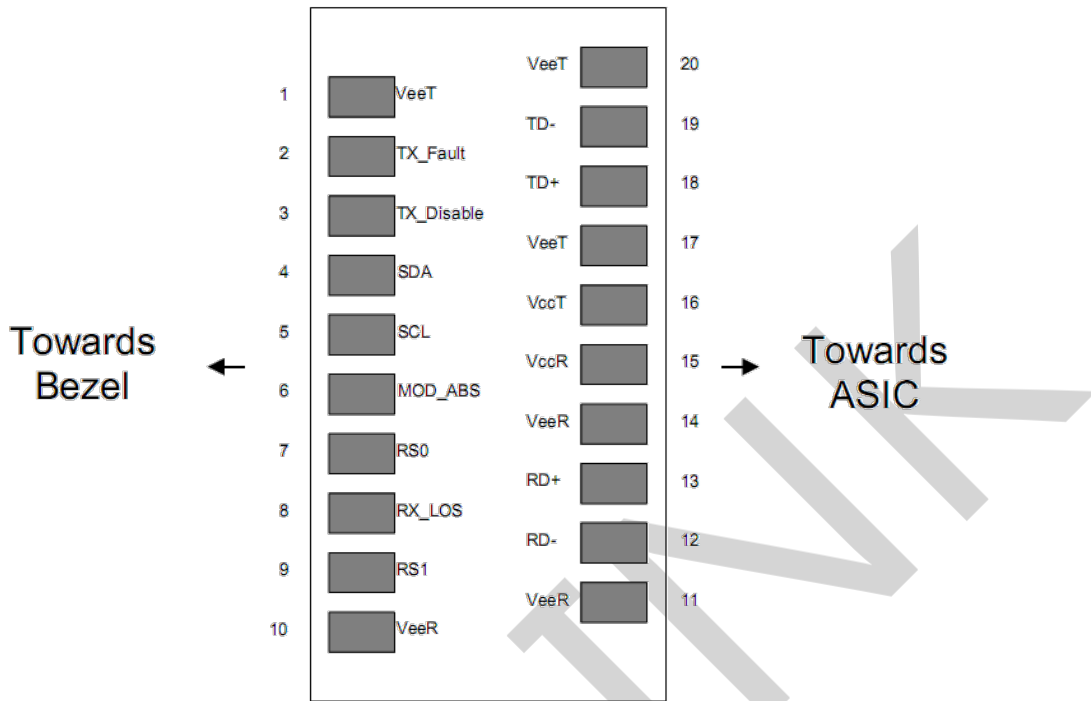
Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	-40 to 85	$\pm 3^\circ\text{C}$	$^\circ\text{C}$	Internal
Voltage	3 to 3.6	$\pm 3\%$	V	Internal
Bias Current	0 to 120	$\pm 10\%$	mA	Internal
TX Power	-5 to 2	$\pm 3\text{dB}$	dBm	Internal
RX Power	-14 to 2	$\pm 3\text{dB}$	dBm	Internal

Communication Interface Timing Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Tx Disable Negate Time	t_on			1	ms	
Tx Disable Assert Time	t_off			10	μs	
Time To Initialize, including Reset of Tx Fault	t_init			300	ms	
Tx Fault Assert Time	t_fault			100	μs	
Tx Disable To Reset	t_reset	10			μs	
LOS Assert Time	t_loss_on			100	μs	
LOS De-assert Time	t_loss_off			100	μs	
Serial ID Clock Rate	f_serial_clock		100	400	KHz	
MOD_DEF (0:2)-High	V _H	2		V _{cc}	V	
MOD_DEF (0:2)-Low	V _L			0.8	V	

Pin Diagram



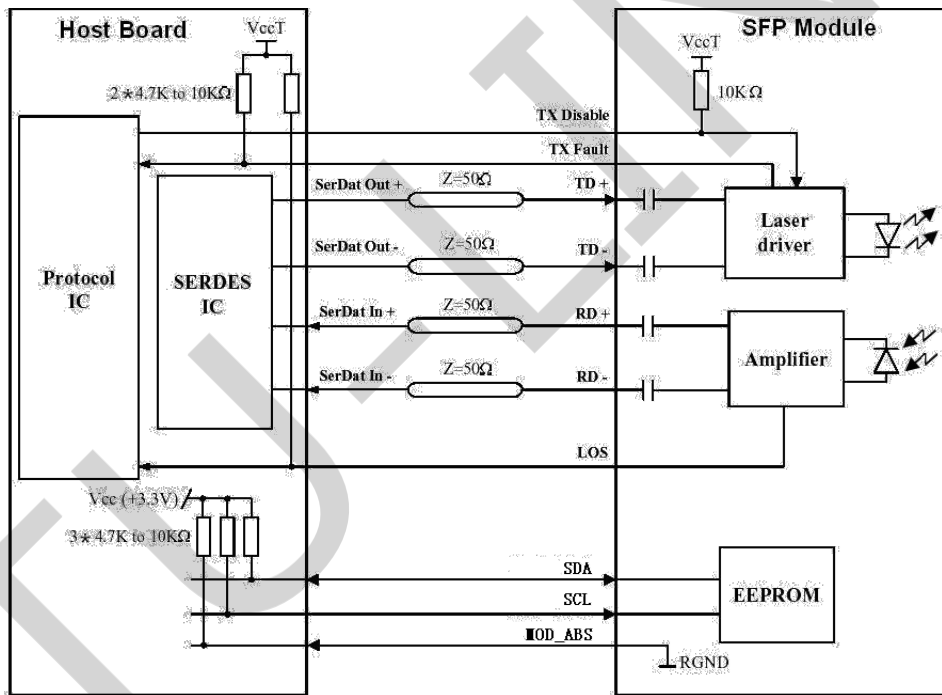
Pin Definitions

PIN #	Name	Function	Notes
1	VEET	Transmitter Ground	
2	TX FAULT	Transmitter Fault Indication	Note 1
3	TX DISABLE	Transmitter Disable	Note 2
4	SDA	SDA Serial Data Signal	
5	SCL	SCL Serial Clock Signal	
6	MOD_ABS	Module Absent. Grounded within the module	
7	RS0	Not Connected	
8	LOS	Loss of Signal	Note 3
9	RS1	Not Connected	
10	VEER	Receiver ground	
11	VEER	Receiver ground	
12	RD-	Inv. Received Data Out	Note 4
13	RD+	Received Data Out	Note 4
14	VEER	Receiver ground	
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	Transmitter Ground	
18	TD+	Transmit Data In	Note 5
19	TD-	Inv. Transmit Data In	Note 5
20	VEET	Transmitter Ground	

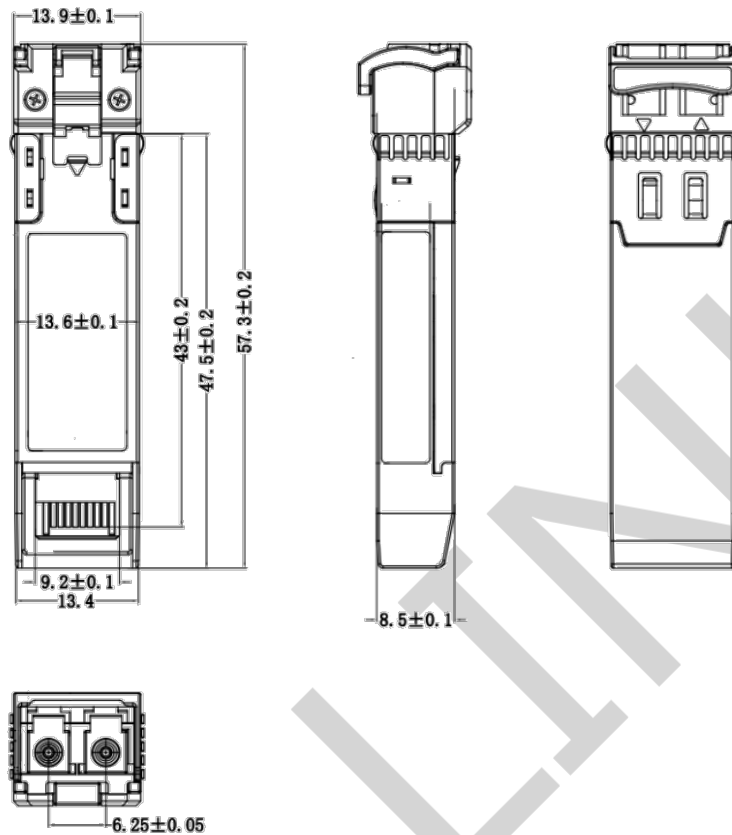
Notes:

1. TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.
2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
3. LOS is open collector output. Should be pulled up with 4.7k~10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
4. RD-/+ : These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.
5. TD-/+ : These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

Recommended Interface Circuit



Mechanical Diagram



Revision History

Version No.	Date	Description
1.0	May12, 2019	Preliminary datasheet
2.0	September 28,2023	Product upgrades
2.1	Aug 27, 2024	Format change

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