

ESDxxX6-40D(I)

14.025Gbps SFP+ DWDM Transceiver, Single Mode, 40km Reach

PRODUCT FEATURES

- Supports up to 14.025Gbps bit rates
- Hot-pluggable SFP+ footprint
- 100GHz ITU, C Band DWDM Cooled EML laser and PIN photodiode, Up to 40km for SMF transmission
- Compliant with SFP+ MSA and SFF-8472 with duplex LC receptacle
- Compatible with RoHS
- Single +3.3V power supply
- Real Time Digital Diagnostic Monitoring
- Temperature Range:
 - Commercial: 0°C ~70°C
 - Industrial: -40°C ~85°C



APPLICATIONS

- 4.25/8.5/14.025G Fibre channel
- Other Optical links

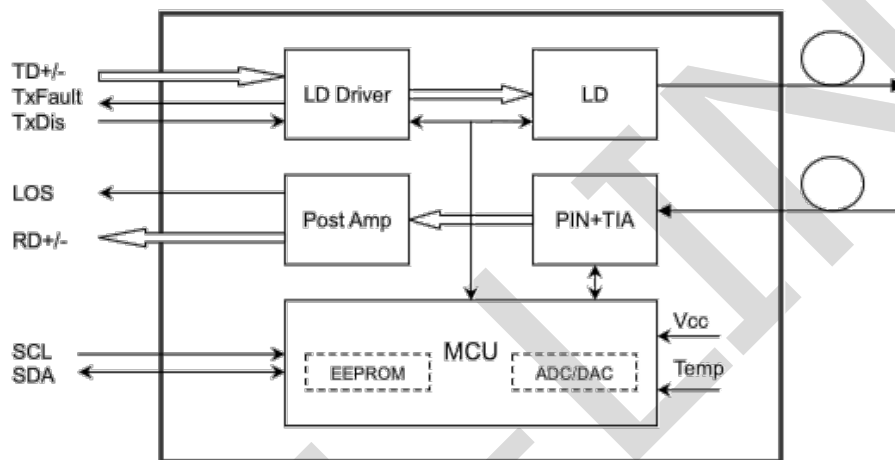
DESCRIPTIONS

The SFP+ transceivers are high performance, cost effective modules supporting data rate of 14.025Gbps and 40km transmission distance with SMF.

The transceiver consists of three sections: a Cooled EML laser transmitter, a PIN photodiode integrated with a trans-impedance preamplifier (TIA) and MCU control unit. All modules satisfy class I laser safety requirements.

The transceivers are compatible with SFP Multi-Source Agreement and SFF-8472 digital diagnostics functions.

Module Block Diagram



Ordering Information

Part No.	Data Rate(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI
ESDxxX6-40D	14.025Gbps	EML	SMF	40km	LC	0~70°C	Y
ESDxxX6-40DI	14.025Gbps	EML	SMF	40km	LC	-40~85°C	Y

Wavelength Guide Table

λC Wavelength Guide					
ITU Channel Product Code	Frequency(THz)	Wavelength	ITU Channel Product Code	Frequency(THz)	Wavelength
17	191.7	1563.86	40	194.0	1545.32
18	191.8	1563.05	41	194.1	1544.53
19	191.9	1562.23	42	194.2	1543.73

20	192.0	1561.42	43	194.3	1542.94
21	192.1	1560.61	44	194.4	1542.14
22	192.2	1559.79	45	194.5	1541.35
23	192.3	1558.98	46	194.6	1540.56
24	192.4	1558.17	47	194.7	1539.77
25	192.5	1557.36	48	194.8	1538.98
26	192.6	1556.55	49	194.9	1538.19
27	192.7	1555.75	50	195.0	1537.40
28	192.8	1554.94	51	195.1	1536.61
29	192.9	1554.13	52	195.2	1535.82
30	193.0	1553.33	53	195.3	1535.04
31	193.1	1552.52	54	195.4	1534.25
32	193.2	1551.72	55	195.5	1533.47
33	193.3	1550.92	56	195.6	1532.68
34	193.4	1550.12	57	195.7	1531.90
35	193.5	1549.32	58	195.8	1531.12
36	193.6	1548.51	59	195.9	1530.33
37	193.7	1547.72	60	196.0	1529.55
38	193.8	1546.92	61	196.1	1528.77
39	193.9	1546.12	-	-	-

Absolute Maximum Ratings

Parameter	Symbol	Min	Max	Unit
Supply Voltage	Vcc	-0.5	3.6	V
Storage Temperature	Ts	-40	+85	°C
Operating Humidity	-	5	85	%

Recommended Operating Conditions

Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Tc	0/-40		+70/+85	°C
Power Supply Voltage	Vcc	3.135	3.30	3.465	V
Power Supply Current	Icc			550	mA
Data Rate		4.25	14.025		Gbps

Optical and Electrical Characteristics

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Transmitter						

Centre Wavelength	λ_c	1528.77		1563.86	nm	
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Side-Mode Suppression Ratio	SMSR	30	-		dB	
Average Output Power	P_{out}	-1		+3	dBm	1
Extinction Ratio	ER	8.2			dB	
Data Input Swing Differential	V_{IN}	180		850	mV	2
Input Differential Impedance	Z_{IN}	90	100	110	Ω	
TX Disable	Disable	2.0		V_{cc}	V	
	Enable	0		0.8	V	
TX Fault	Fault	2.0		V_{cc}	V	
	Normal	0		0.8	V	
Receiver						
Centre Wavelength	λ_c	1260		1620	nm	
Receiver Sensitivity				-14	dBm	3
Receiver Overload		+2			dBm	3
LOS De-Assert	LOS_D			-15	dBm	
LOS Assert	LOS_A	-28			dBm	
LOS Hysteresis		0.5			dB	
Data Output Swing Differential	V_{out}	300		900	mV	4
LOS	High	2.0		V_{cc}	V	
	Low			0.8	V	

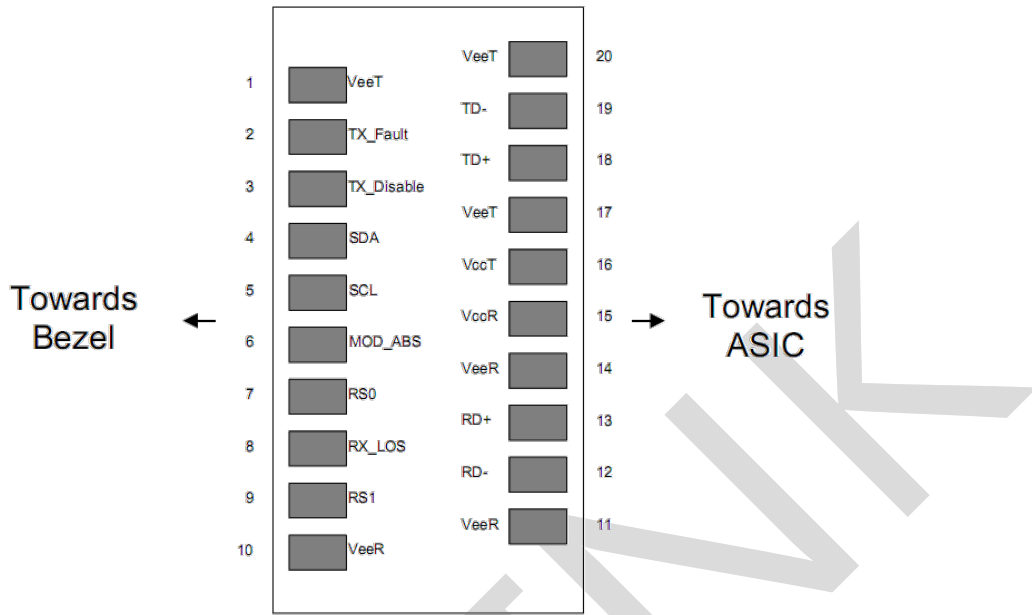
Notes:

1. The optical power is launched into SMF.
2. PECL input, internally AC-coupled and terminated.
3. Measured with a PRBS $2^{31}-1$ test pattern @14025Mbps, BER $\leq 1 \times 10^{-12}$.
4. Internally AC-coupled.

Digital Diagnostics

Parameter	Range	Unit	Accuracy	Calibration
Temperature	0 to +70	$^{\circ}C$	$\pm 3^{\circ}C$	Internal
Voltage	3.0 to 3.6	V	$\pm 3\%$	Internal
Bias Current	0 to 100	mA	$\pm 10\%$	Internal
TX Power	-1 to +3	dBm	$\pm 3dB$	Internal
RX Power	-16 to +3	dBm	$\pm 3dB$	Internal

Pin Diagram



Pin Definitions

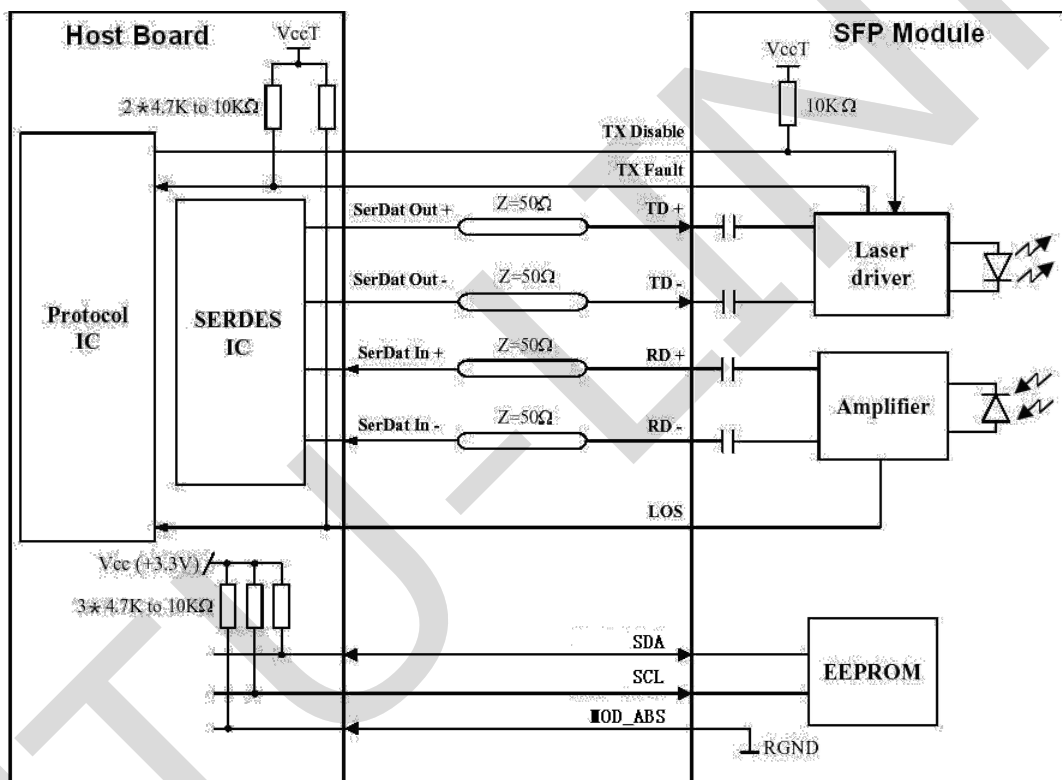
Pin	Signal Name	Description	Plug Seq.	Notes
1	V _{EET}	Transmitter Ground	1	
2	TX_FAULT	Transmitter Fault Indication	3	Note 1
3	TX_DISABLE	Transmitter Disable	3	Note 2
4	SDA	SDA Serial Data Signal	3	
5	SCL	SCL Serial Clock Signal	3	
6	MOD_ABS	Module Absent. Grounded within the module	3	
7	RS0	Not Connected	3	
8	LOS	Loss of Signal	3	Note 3
9	RS1	Not Connected	3	
10	V _{EER}	Receiver ground	1	
11	V _{EER}	Receiver ground	1	
12	RD-	Inv. Received Data Out	3	Note 4
13	RD+	Received Data Out	3	Note 4
14	V _{EER}	Receiver ground	1	
15	V _{CCR}	Receiver Power Supply	2	
16	V _{CCT}	Transmitter Power Supply	2	
17	V _{EET}	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 5
19	TD-	Inv. Transmit Data In	3	Note 5
20	V _{EET}	Transmitter Ground	1	

Notes:

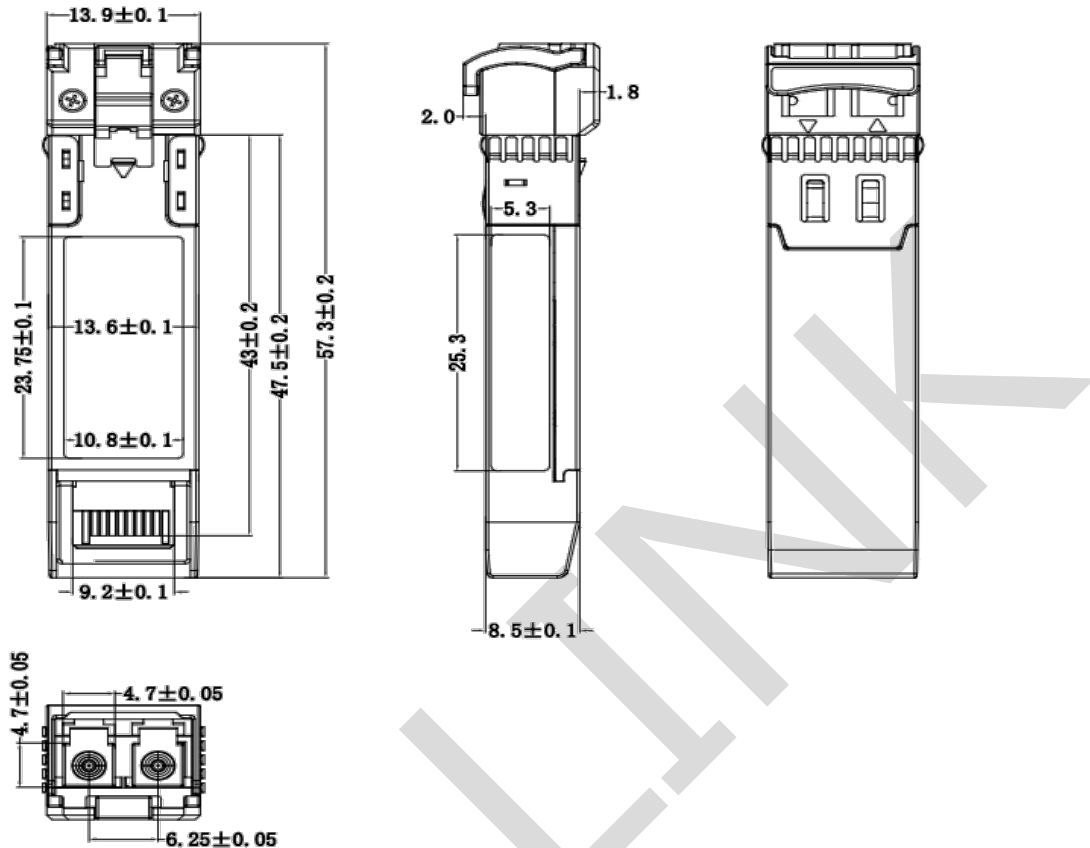
Plug Seq.: Pin engagement sequence during hot plugging.

- 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	May 11 2021	Preliminary datasheet
2.0	Aug 20, 2024	Format change

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