ESCxx03-20D(I)

155M SFP Optical Transceiver 20KM Reach

Features

- Data-rate of 1.25Gbps operation
- 18 CWDM DFB wavelengths laser and PIN photodetector for 20km transmission
- Compliant with SFP MSA and SFF-8472 with duplex LC receptacle
- Digital Diagnostic Monitoring:
  Internal Calibration or External Calibration
- Compatible with SONET OC-24-LR-1
- Compatible with RoHS
- +3.3V single power supply
- Operating case temperature:
  Commercial Temperature: 0 to +70°C
  Commercial Temperature: -20 to +80°C
  Industrial Temperature: -40 to +85°C

Applications

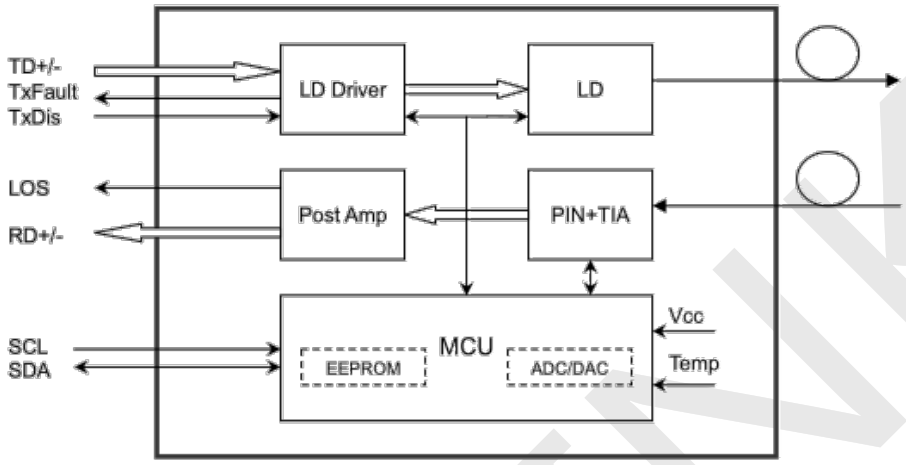
- SDH STM-1, S-1.1,L-1.1, L-1.2
- SONET OC-3 IR1,LR1,LR2
- Other optical links

Description

ETU-LINK's ESCxx03-20D(I) Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA), The transceiver consists of five sections: the LD driver, the limiting amplifier, the digital diagnostic monitor, the 13100nm FP laser and the PIN photo detector .The module data link up to 20KM in 9/125um single mode fiber.

The optical output can be disabled by a TTL logic high-level input of Tx Disable, and the system also can disable the module via I2C. Tx Fault is provided to indicate that degradation of the laser. Loss of signal (LOS) output is provided to indicate the loss of an input optical signal of receiver or the link status with partner. The system can also get the LOS (or Link)/Disable/Fault information via I2C register access.

Module Block Diagram



Ordering Information

Part No.	Data Rate(optical)	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI
ESCxx03-20D	155M	DFB	SMF	20km	LC	0~70℃	Y
ESCxx03-20DE	155M	DFB	SMF	20km	LC	-20~80℃	Y
EScxx03-20DI	155M	DFB	SMF	20km	LC	-40~85℃	Y

Product Selection

Wavelength	xx	Clasp Color Code	Wavelength	xx	Clasp Color Code
1270 nm	27	Gray	1450 nm	45	Brown
1290 nm	29	Gray	1470 nm	47	Gray
1310 nm	31	Gray	1490 nm	49	Purple
1330 nm	33	Purple	1510 nm	51	Blue
1350 nm	35	Blue	1530 nm	53	Green
1370 nm	37	Green	1550 nm	55	Yellow
1390 nm	39	Yellow	1570 nm	57	Orange
1410 nm	41	Orange	1590 nm	59	Red

1430 nm	43	Red	1610 nm	61	Brown

Absolute Maximum Ratings

It has to be noted that the operation in excess of any individual absolute maximum ratings might cause permanent damage to this module.

Parameter	Symbol	Min	Max	Unit	Notes
Storage Temperature	T_S	-40	85	ºC	
Operating Case Temperature	T_{case}	See order Information		ºC	
Power Supply Voltage	V_{CC}	-0.5	3.6	V	
Relative Humidity (non-condensation)	RH	5	95	%	
Damage Threshold	TH_d	5		dBm	

Recommended Operating Conditions and Power Supply Requirements

Parameter	Symbol	Min	Typical	Max	Unit	Notes
Operating Case Temperature	T_{OP}	0		70	ºC	Commercial
		-40		85		Industrial
Power Supply Voltage	V_{CC}	3.135	3.3	3.465	V	
Power Supply Current	ICC			300	mA	
Data Rate			155		Mb/s	
Control Input Voltage High		2		Vcc	V	
Control Input Voltage Low		0		0.8	V	
Link Distance (SMF)	D			20	km	9/125um

Specification of Transmitter Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min.	Typical	Max	Unit	Notes

Transmitter						
Single-ended Input Voltage Tolerance	Vcc	-0.3		4.0	V	
Differential Input Voltage Swing	Vin,pp	200		2400	mVpp	
Differential Input Impedance	Zin	90	100	110	Ohm	
Transmit Disable Assert Time				5	us	
Transmit Disable Voltage	Vdis	Vcc-1.3		Vcc	V	
Transmit Enable Voltage	Ven	Vee-0.3		0.8	V	
Receiver						
Differential Output Voltage Swing	Vout,pp	500		900	mVpp	
Differential Output Impedance	Zout	90	100	110	Ohm	
Data output rise/fall time	Tr/Tf		100		ps	20% to 80%
LOS Assert Voltage	VlosH	Vcc-1.3		Vcc	V	
LOS De-assert Voltage	VlosL	Vee-0.3		0.8	V	

Optical Characteristics

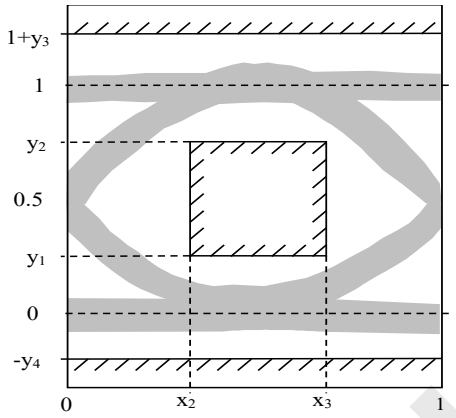
The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Average Output Power	POUT	-9		-3	dBm	1
Extinction Ratio	ER	8.2			dB	
Center Wavelength	λC	(1XX0)-Δλ	1XX0	(1XX0)+Δλ	nm	DFB Laser 2
Side Mode Suppression Ratio	SMSR	30			dB	
Spectrum Bandwidth(-20dB)	σ			1	nm	
Transmitter OFF Output Power	POff			-45	dBm	
Differential Line Input Impedance	RIN	90	100	110	Ohm	
Output Eye Mask	Compliant with G.957 (class 1 laser safety)					3
Receiver						
Input Optical Wavelength	λIN	1270		1610	nm	PIN
Receiver Sensitivity	PIN			-24	dBm	4

Input Saturation Power (Overload)	PSAT	-9			dBm	
Los Of Signal Assert	PA	-30			dBm	
Los Of Signal De-assert	PD			-28	dBm	5
LOS Hysteresis	PA-PD	0.5	2	6	dB	

Note:

1) Measure at 2^23-1 NRZ PRBS pattern
2) "XX" is: 27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59 and 61; "Δλ" is 7.5
3) Transmitter eye mask definition
4) 4Measured with Light source 1XX0 nm, ER=8.2dB; BER =<10^-12 @PRBS=2^23-1 NRZ ,"XX" is:27,29,31,33,35,37,39,41,43,45,47,49,51,53,55,57,59 and 61\
5) When LOS de-asserted, the RX data+/- output is High-level (fixed)



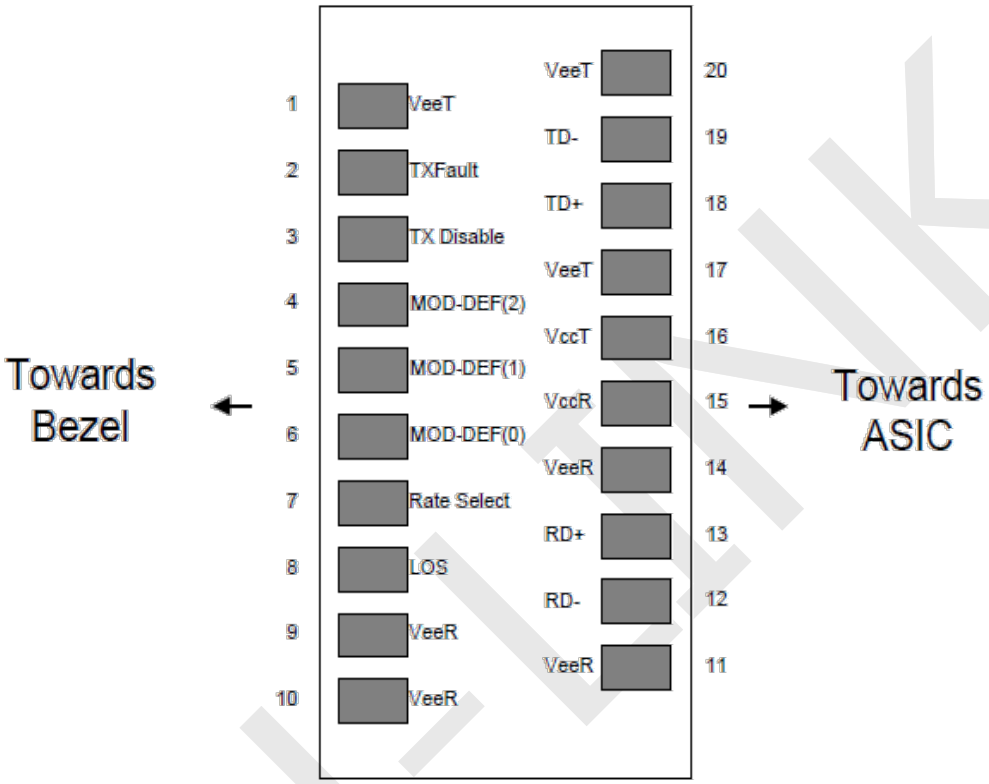
x_3-x_2	0.2
y_1	0.25
y_2	0.75
y_3	0.25
y_4	0.25

Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF-8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales staff.

Parameter	Symbol	Min.	Max	Unit	Notes
Temperature monitor absolute error	DMI_ Temp	-3	3	degC	Over operating temp
Supply voltage monitor absolute error	DMI _VCC	-0.15	0.15	V	Full operating range
RX power monitor absolute error	DMI_RX	-3	3	dB	
Bias current monitor	DMI_ bias	-10%	10%	mA	
TX power monitor absolute error	DMI_TX	-3	3	dB	

Pin Assignment



Pin Description

PIN	Name	Name/Description	Notes
1	VEET	Transmitter Ground (Common with Receiver Ground)	1
2	TXFAULT	Transmitter Fault.	
3	TXDIS	Transmitter Disable. Laser output disabled on high or open.	2
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.	3
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	3
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	3
7	Rate Select	No connection required	4
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	5
9	VEER	Receiver Ground (Common with Transmitter Ground)	1

10	VEER	Receiver Ground (Common with Transmitter Ground)	1
11	VEER	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	VEER	Receiver Ground (Common with Transmitter Ground)	1
15	VCCR	Receiver Power Supply	
16	VCCT	Transmitter Power Supply	
17	VEET	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	VEET	Transmitter Ground (Common with Receiver Ground)	1

Notes:

6) 1. Circuit ground is internally isolated from chassis ground.

7) 2. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.

8) 3. Should be pulled up with 4.7k-10k ohms on host board to a voltage between 2.0V and 3.6V.MOD_DEF (0) pulls line low to indicate module is plugged in.

9) 4. This is an optional input used to control the receiver bandwidth for compatibility with multiple data rates (most likely Fiber Channel 1x and 2x Rates).If implemented, the input will be internally pulled down with > 30kΩ resistor. The input states are:

10) 1) Low (0 – 0.8V): Reduced Bandwidth

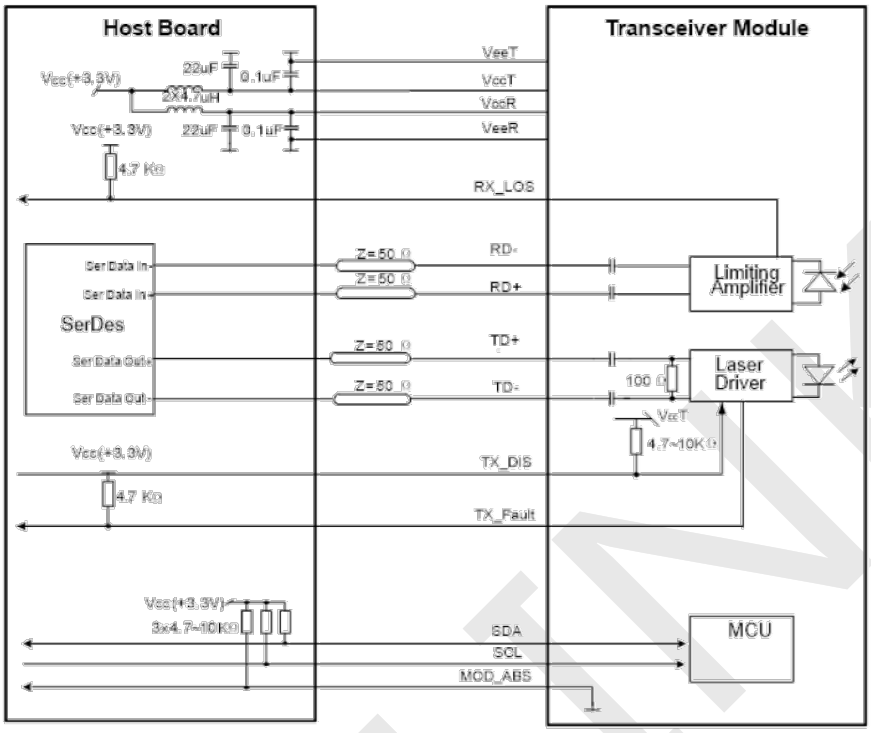
11) 2) (>0.8, < 2.0V): Undefined

12) 3) High (2.0 – 3.465V): Full Bandwidth

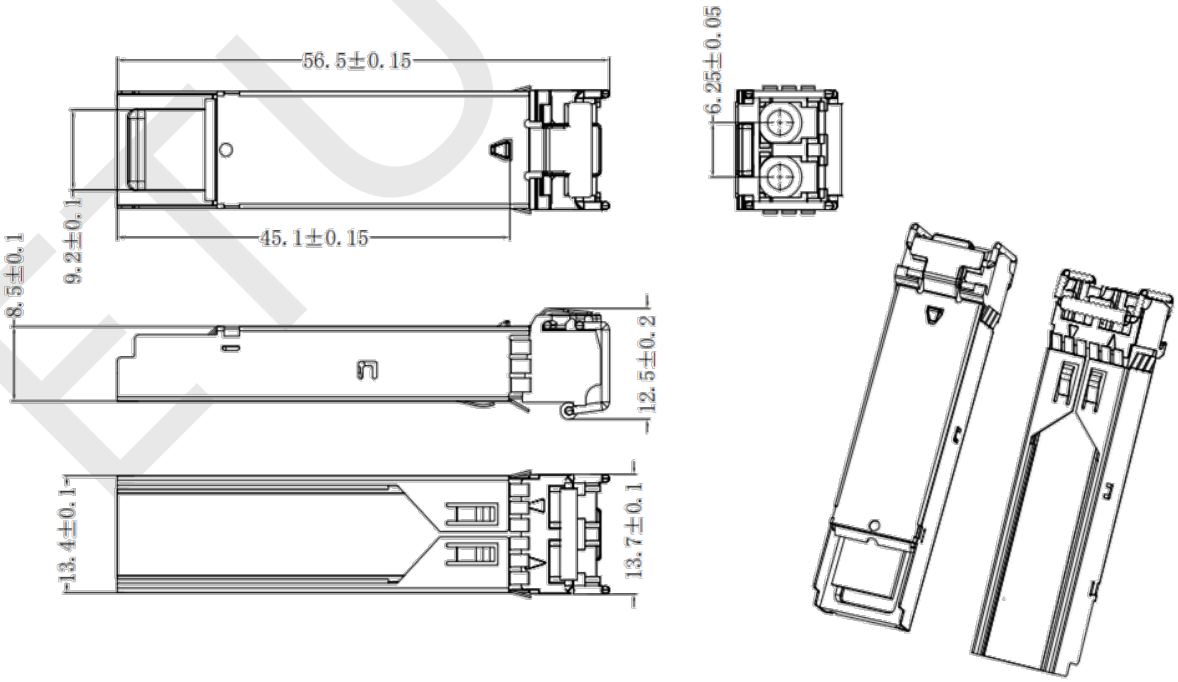
13) 4) Open: Reduced Bandwidth

14) 5. LOS is open collector output should be pulled up with 4.7k-10k ohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

Recommended Interface Circuit



Mechanical Dimensions



Revision History

Version No.	Date	Description
1.0	Sep,12, 2014	Preliminary datasheet
2.0	October 18,207	Product upgrades
3.0	July 26, 2024	Format change

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