

TITLE 10Gb/s SFP+ 1550nm 40km LC Transceiver	DOC No. RFD-20241217002-001	
	REVISION : 01	AUTHORIZED BY : Hawk Rong
	DATE : 2024.12.11	CLASSIFICATION : Transceiver

1. Description

The Small Form Factor Pluggable (SFP) transceivers are compatible with the Small Form Factor Pluggable Multi-Sourcing Agreement (MSA). The transceiver consists of four sections: the LD driver, the limiting amplifier, the EML laser and the PIN photo-detector. The module data link up to 40KM in 9/125um single mode fiber. The optical output can be disabled by a TTL logic high-level input of Tx Disable. 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.

2. Features

- Up to 11.1Gbps Data Links
- Up to 40km transmission on SMF
- EML Laser and PIN receiver
- Metal enclosure, for lower EMI
- 2-wire interface with integrated Digital Diagnostic monitoring
- Hot-pluggable SFP+ footprint
- Specifications compliant with SFF 8472
- Compliant with SFP+ MSA with LC connector
- Single 3.3V power supply
- Power dissipation < 1.5 W
- Case operating temperature
 - Commercial: 0°C to +70°C
 - Industrial: -40°C to +85°C

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3. Applications

- Data Center Backbone
- Switch to Switch Interface
- 10GBASE-LR/LW & 10G Ethernet
- Switched Backplane Applications
- Router/Server Interface
- Other Optical Links

4. Product Description

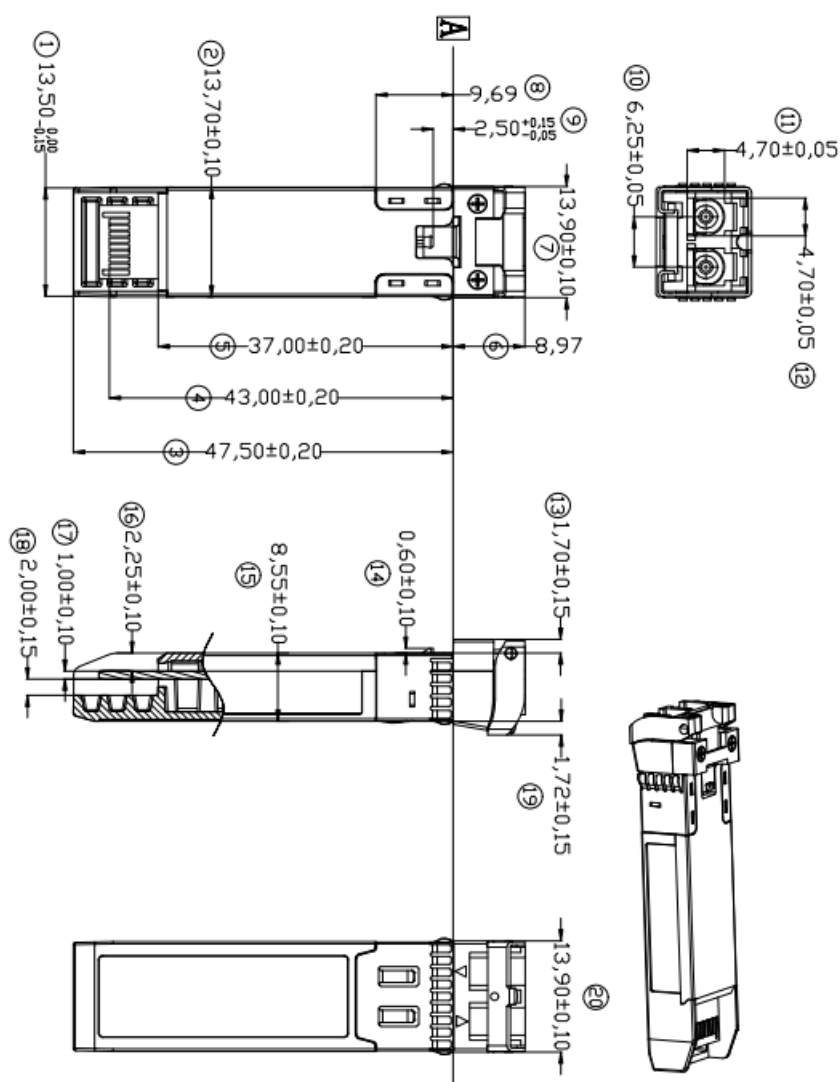
4.1 Product Name

10G 40Km SFP+ ER Transceiver

Data Rate	Wavelength (nm)	Distance	Fiber Type	Power (dBm)	Sen. (dBm)	Connector	Tem.
11.1Gbps	1550	40Km	SMF	-3~2.0	-16	LC	C
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4.2 Dimension, Materials, Platings And Marking



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5.Product Specification

5.1 Absolute Maximum Ratings

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Storage Temperature	T _s	-40	-	85	°C	
Relative Humidity	R _H	5	-	95	%	
Power Supply Voltage	V _{CC}	-0.3	-	4	V	
Signal Input Voltage	V _{SI}	V _{CC} -0.3	-	V _{CC} +0.3	V	

5.2 Recommended Operating Conditions

Parameter	Symbol		Min.	Typ.	Max.	Unit	Note
Case Operating Temperature	T _{case}		0		70	°C	OFSF10G40C-F55-E
			-40		85	°C	OFSF10G40C-F55-E
Power Supply Voltage	V _{CC}		3.14	3.3	3.47	V	
Power Supply Current	I _{CC}		-		450	mA	
Data Rate	BR			10.3125		Gbps	TX Rate/RX Rate
Transmission Distance	TD			40		km	
Coupled fiber		Single mode fiber					9/125um SMF

5.3 Optical Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Transmitter						
Average Launched Power	P _O	-3		2	dBm	
Average Launched Power(Laser Off)	P _{off}	-	-	-30	dBm	
Center Wavelength Range	λ _C	1530	1550	1565	nm	

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Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Spectrum Bandwidth(-20dB)	$\Delta\lambda$	-	-	1	nm	
Side-Mode Suppression Ratio	SMSR	30	-	-	dB	
Transmitter and Dispersion Penalty	TDP			3.2	dB	
Extinction Ratio	ER	6		-	dB	Note (1)
Output Eye Mask	Compliant with IEEE 802.3ae					Note (2)
Receiver						
Input Optical Wavelength	λ_{IN}	1270	-	1610	nm	
Receiver Sensitivity	P _{sen}	-	-	-16	dBm	Note (3)
Input Saturation Power (Overload)	P _{SAT}	0.5	-	-	dBm	Note (3)
Los Of Signal Assert	P _A	-30	-	-	dBm	
Los Of Signal De-assert	P _D	-	-	-17	dBm	
LOS -Hysteresis	P _{Hys}	0.5	2	6	dB	

Note:

Note (1): Measured with a PRBS 231-1 test pattern, @10.3125Gb/s, BER<10⁻¹²

Note (2): Transmitter eye mask definition, Compliant with IEEE 802.3ae

Note (3): Measured with Light source 1550nm, ER=8.2dB; BER =<10⁻¹² @PRBS=231-1 NRZ.

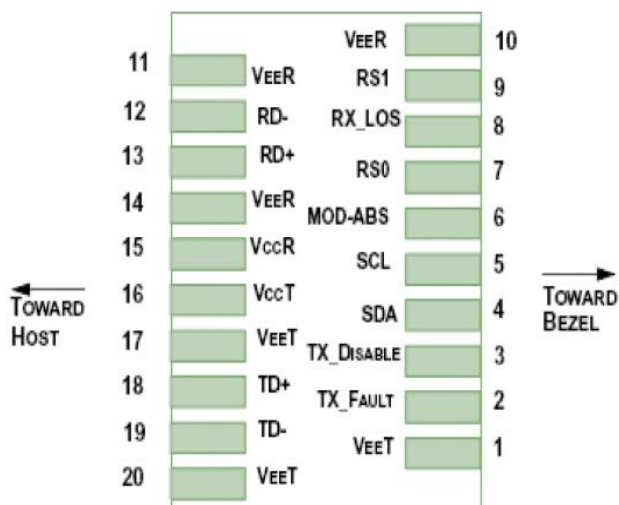
5.4 T Electrical Interface Characteristics

Parameter	Symbol	Min.	Typ.	Max.	Unit	Note
Total power supply current	I_{cc}			450	mA	

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Transmitter						
Differential line input Impedance	R_{IN}	85	100	115	Ohm	
Differential Data Input Voltage	V_{DT}	100	-	1000	mVp-p	
Transmitter Fault Output-High	V_{FaultH}	2	-	$V_{CC}+0.3$	V	
Transmitter Fault Output-Low	V_{FaultL}	0	-	0.8	V	
Transmitter Disable Voltage- High	V_{DisH}	2	-	$V_{CC}+0.3$	V	
Transmitter Disable Voltage- low	V_{DisL}	0	-	0.8	V	
Receiver						
Differential line Output Impedance	R_{OUT}	80	100	120	Ohm	
Differential Data Output Voltage	V_{DR}	300	-	850	mVp-p	
Data Output Rise/Fall time	tr/tf		-	38	ps	
LOS Output Voltage-High	V_{LOSH}	2	-	$V_{CC}+0.3$	V	
LOS Output Voltage-Low	V_{LOSL}	0	-	0.8	V	

6.Pin function definitions



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Electrical Pin Definition (SFP+)

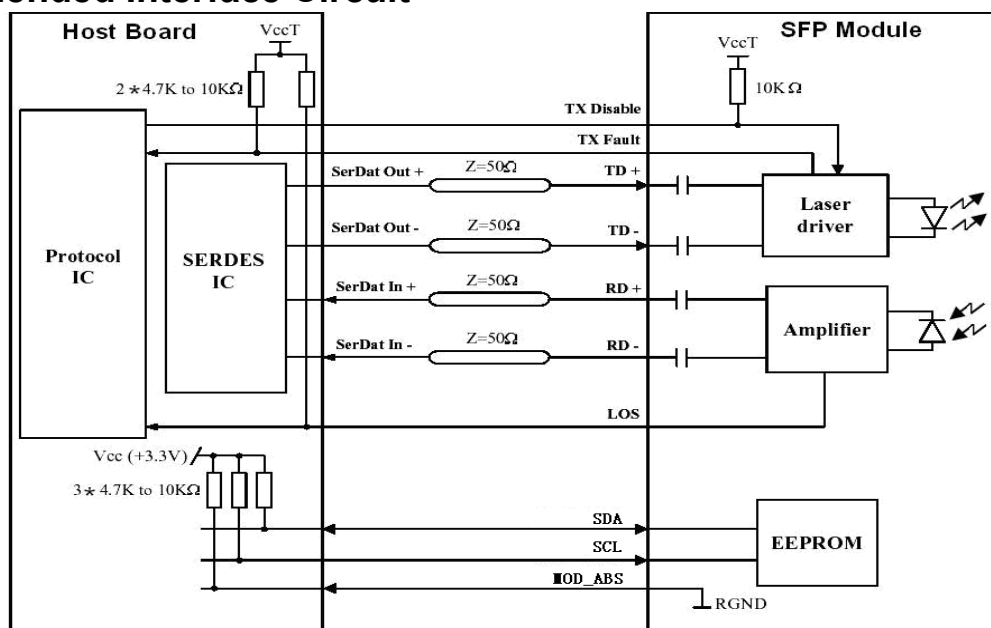
Pin	Symbol	Name/Description	NOTE
1	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T _{FAULT}	Transmitter Fault.	2
3	T _{DIS}	Transmitter Disable. Laser output disabled on high or open.	3
4	SDA	2-wire Serial Interface Data Line	4
5	SCL	2-wire Serial Interface Clock Line	4
6	MOD_ABS	Module Absent. Grounded within the module	4
7	RS0	Rate Select 0	5
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	6
9	RS1	No connection required	1
10	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V _{EER}	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	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
15	V _{CCR}	Receiver Power Supply	
16	V _{CCT}	Transmitter Power Supply	
17	V _{EET}	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	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1

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Notes:

1. Circuit ground is internally isolated from chassis ground.
2. TFAULT is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to $V_{cc} + 0.3V$. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to $<0.8V$.
3. Laser output disabled on $TDIS > 2.0V$ or open, enabled on $TDIS < 0.8V$.
4. Should be pulled up with 4.7k Ω - 10k Ω host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
5. Internally pulled down per SFF-8431 Rev 4.1.
6. LOS is open collector output. It should be pulled up with 4.7k Ω – 10k Ω on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

7.Recommended Interface Circuit



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8.Digital Diagnostic Monitor Accuracy

The following characteristics are defined over recommended operating conditions

Parameter	Accuracy	Unit
Internally measured transceiver temperature	+/-3	deg.C
Internally measured transceiver supply voltage	+/-3	%
Measured Tx bias current	+/-10	%
Measured Tx output power	+/-3	dB
Measured Rx received average optical power	+/-3	dB

9.Modification History

Rev.	Comments	Date	Originator	Approval
01	Preliminary Draft	2024/12/11	Hawk Rong	Mike Sun