TSSLS-CEFCK8 Optical Transceiver

10G SFP+ BIDI Single-mode Transceiver, With Diagnostic Monitoring

Features

- Up to 11.3Gb/s data links
- 1490nm EML laser and APD receiver
- Up to 80km on 9/125μm SMF
- Hot-pluggable SFP+ footprint
- BIDI LC optical connector
- RoHS-10 compliant and lead-free
- Single +3.3V power supply
- Compliant with SFF+MSA and SFF-8472
- Support Digital Monitoring interface
- Metal enclosure, for lower EMI
- Meet ESD requirements, resist 8KV direct contact voltage
- Case operating temperature: Commercial: 0 ~ +70°C
  Extended: -10 ~ +80°C
  Industrial: -40 ~ +85°C

Applications

- 10GBASE-ZR/ZW & 10G Ethernet
- SDH STM64
- Other Optical Links

Product Description

The laser based 10Gigabit SFP+ Transceiver is designed to transmit and receive serial optical data over single mode optical fiber with 80Km.

They are compliant with SFF-8431, SFF-8432, 10GFC Rev 4.0, and 10GBASE-ZR/ZW. The transmitter converts serial DML electrical data into serial optical data compliant with the IEEE 802.3ae standard. The receiver converts serial optical data into serial DML electrical data. Digital diagnostics functions are available via a 2-wire serial interface, as specified in SFF-8472.

8 Jinxiu Middle Road, Pingshan, Shenzhen, Guangdong, 518118, P. R. China
+86 755 32983688 | info@china-tscom.com | www.china-tscom.com

Absolute Maximum Ratings

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

Parameters	Symbol	Min.	Max.	Unit
Power Supply Voltage	VCC	-0.5	+3.6	V
Storage Temperature	Ts	-40	+85	℃
Relative Humidity	RH	5	95	%
Damage Threshold	THd	0		dBm

Recommended Operating Conditions

Recommended Operating Environment specifies parameters for which the electrical and optical characteristics hold unless otherwise noted.

Parameter	Symbol		Min	Typical	Max	Unit
Supply Voltage	VCC		3.14	3.3	3.46	V
Operating Case Temperature	T	C	0	-	70	°C
		E	-10		80	
		T	-40		85	

Notes:
[1] Supply current is shared between VCCTX and VCCRX.
[1] In-rush is defined as current level above steady state current requirements.

Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max	Unit
Transmitter					
Data Rate	BR	-	11.3	-	Gbps
Input differential impedance[1]	RIN	90	100	110	Ω
Differential Input Voltage Swing[2]	Vin,pp	180	-	820	mVpp
Transmit Disable Voltage	Vdis	Vcc-1.3	-	Vcc	V
Transmit Enable Voltage	Ven	Vee	-	Vee +0.8	V
Receiver					
Data Rate	BR	-	11.3	-	Gbps
Output differential impedance[1]	Rout	90	100	110	Ω
Differential Data Output	VOD	350	-	850	mVp-p
Output Rise Time	tRISE	28	-	-	pS
Output Fall Time	tFALL	28	-	-	pS
LOS Assert Voltage	VlosH	Vcc-1.3	-	Vcc	V

LOS De-assert Voltage	VlosL	Vee	-	Vee +0.8	V

Notes:
[1] AC coupled.
[2] Or open circuit.

Transmitter Specifications – Optical

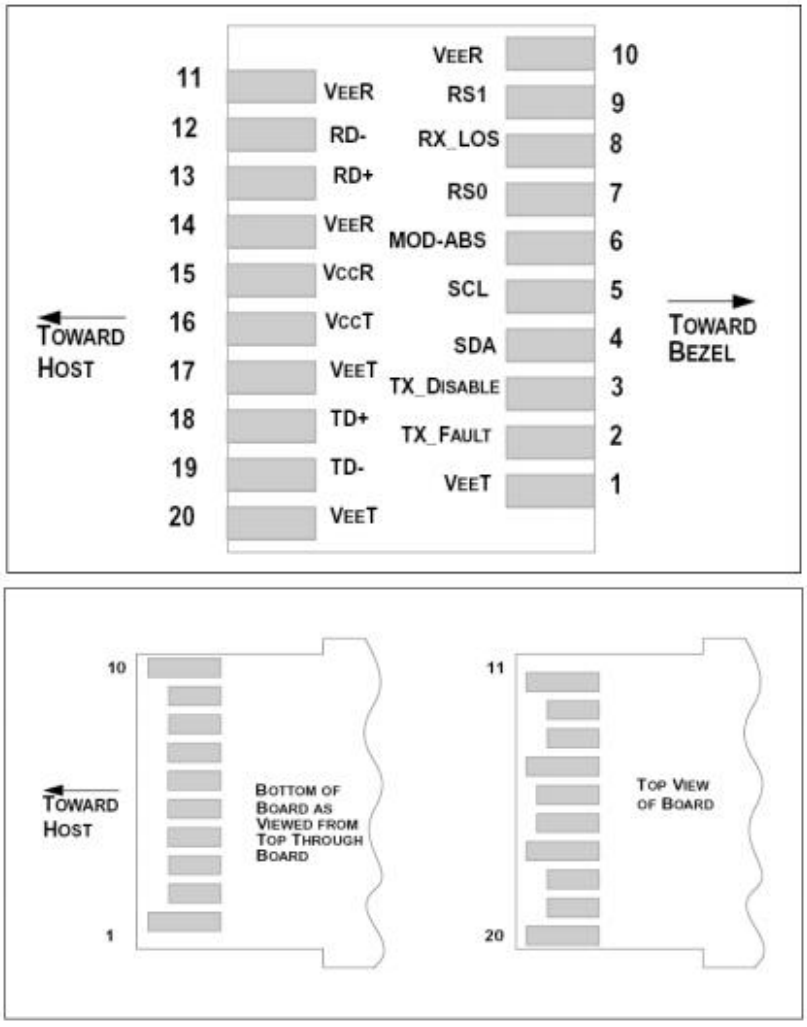
Parameter	Symbol	Min	Typical	Max	Unit
Center Wavelength	λ	1480	1490	1500	nm
Optical Spectral Width	Δλ	-	-	1	nm
Side Mode Suppression Ratio	SMSR	30	-	-	dB
Average Optical Power	Po	0	-	5	dBm
Extinction Ratio	ER	8.2	-	-	dB
Dispersion Penalty	DP	-	-	3.0	dB
Average Launch Power of OFF Transmitter	POFF	-	-	-30	dBm

Receiver Specifications – Optical

Parameter	Symbol	Min	Typical	Max	Unit
Center Wavelength	λ	1540	1550	1560	nm
Receiver Sensitivity	Sen.	-	-	-23	dBm
Input Saturation Power	Psat	-8	-	-	dBm
LOS Asserted	LSA	-35	-	-	dBm
LOS De-Asserted	LDA	-	-	-25	dBm
LOS Hysteresis	LH	0.5	-	-	dB

Notes:
[1] Measured with Light source 1490nm @1550nm, ER=8.2dB; BER≤1E-12 @10.3125Gbps, PRBS=2^{31} -1 NRZ.

SFP+ Transceiver Electrical Pad Layout



Pin definition

Pin	Symbol	Name/Description
1	VEET [1]	Transmitter Ground
2	Tx_FAULT [2]	Transmitter Fault
3	Tx_DIS [3]	Transmitter Disable. Laser output disabled on high or open
4	SDA [2]	2-wire Serial Interface Data Line
5	SCL [2]	2-wire Serial Interface Clock Line
6	MOD_ABS [4]	Module Absent. Grounded within the module
7	RS0 [5]	Rate Select 0
8	RX_LOS [2]	Loss of Signal indication. Logic 0 indicates normal operation
9	RS1 [5]	Rate Select 1
10	VEER [1]	Receiver Ground
11	VEER [1]	Receiver Ground
12	RD-	Receiver Inverted DATA out. AC Coupled

13	RD+	Receiver DATA out. AC Coupled
14	VEER [1]	Receiver Ground
15	VCCR	Receiver Power Supply
16	VCCT	Transmitter Power Supply
17	VEET [1]	Transmitter Ground
18	TD+	Transmitter DATA in. AC Coupled
19	TD-	Transmitter Inverted DATA in. AC Coupled
20	VEET [1]	Transmitter Ground

Notes:

[1] Module circuit ground is isolated from module chassis ground within the module.

[2] Should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15Vand 3.6V.

[3] Tx_Disable is an input contact with a 4.7 kΩ to 10 kΩ pullup to VCCT inside the module.

[4] Mod_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to VCC_Host with a resistor in the range 4.7 kΩ to10 kΩ.Mod_ABS is asserted "High" when the SFP+ module is physically absent from a host slot.

[5] RS0 and RS1 are module inputs and are pulled low to VeeT with > 30 kΩ resistors in the module.

Ordering Information

Part Number	Product Description
TSSLS-CEFCK8x	10Gbps SFP+ 80km Transceiver, 1490nm EML laser and APD receiver, C: 0 ~ +70°C; E: -10 ~ +80°C; T: -40 ~ +85°C

Important Notice

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