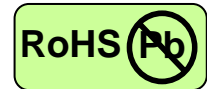


4.25 Gbps Fibre Channel Single-mode Transceiver



SFP, Duplex LC Connector, 1310nm DFB for Single-mode Fiber, RoHS Compliant

Digital Diagnostics Functions, Extended Operating Temperature from -40 to $+85$ °C



Features

- 1310nm DFB LD
- Multi Data Rate: from 1.062 to 4.25Gbps, NRZ
- Single +3.3V Power Supply
- RoHS Compliant and Lead-free
- AC/AC Differential Electrical Interface
- Compliant with Multi-Source Agreement (MSA) Small Form Factor Pluggable (SFP)
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Duplex LC Connector
- Compliance with ANSI specifications for Fibre Channel applications
- Eye Safety
Designed to meet Laser Class 1 comply with EN60825-1

Applications

- Fibre Channel Links

Description

The CT-4250TSP-NE4L-E from Coretek Opto Corp. is a high performance and cost-effective module for serial optical data communication applications specified for singlemode of multi-rate from 1.062 to 4.25 Gb/s. It operates with +3.3V power supply. The module is intended for singlemode fiber, operates at a nominal wavelength of 1310nm and complies with Multi-Source Agreement (MSA) Small Form Factor Pluggable (SFP). Each module is integrated digital diagnostics functions via an I²C serial interface.

The module is a duplex LC connector transceiver designed to provide Fibre Channel compliant link at 1.062 , 2.125 and 4.25 Gb/s short reach applications. The characteristics are performed in accordance with ANSI Fibre Channel Physical Interface (FC-PI-2) Rev 7.0

EMC

Most equipment utilizing high-speed transceivers will be required to meet the following requirements:

- 1) FCC in the United States
- 2) CENELEC EN55022 (CISPR 22) in Europe

To assist the customer in managing the overall equipment EMC performance, the transceivers have been designed to satisfy FCC class B limits and provide good immunity to radio-frequency electromagnetic fields.

Eye Safety

The transceivers have been designed to meet Class 1 eye safety and comply with EN 60825-1.

4.25 Gbps Fibre Channel Single-mode Transceiver



Product Information

Model Number	Operating Voltage & SD Output	Wavelength	Output Power	Sensitivity	Distance
CT-4250TSP-NE4L-E	3.3V TTL	1310 nm DFB	-8.5 ~ -1 dBm	≤ -18 dBm	10 km

ABSOLUTE MAX RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
Storage Temperature	T_S	-40	85	$^{\circ}\text{C}$	
Supply Voltage	V_{CC}	-0.5	4.0	V	
Data Input Voltage	---	0	V_{CC}	V	
Supply Current	I_S		240	mA	

OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Case Operating Temperature	T_A	-40		85	$^{\circ}\text{C}$	
Supply Voltage	V_{CC}	3.0	3.3	3.6	V	
Data Input Voltage Swing	V_{ID}	250		2200	mV	

ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
Input					
MOD_DEF (1), MOD_DEF (2), Tx_Disable, Rate Select - Low	V_{IL}	0	0.8	V	
MOD_DEF (1), MOD_DEF (2), Tx_Disable, Rate Select - High	V_{IH}	2.0	V_{CC}	V	
Output					
TX_Fault, LOS , MOD_DEF (2) - Low	V_{OL}	0	0.8	V	
TX_Fault, LOS , MOD_DEF (2) -High	V_{OH}	2.0	V_{CC}	V	

TRANSMITTER ELECTRO-OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTE
Optical Output Power	P_o	-8.5		-1	dBm	1
Optical Modulation Amplitude	OMA	500			μW	2
Center Wavelength	λ_c	1290	1310	1325	nm	
Spectral Width (-20dB)	$\Delta \lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
RIN	RIN			-117	dB/Hz	
Optical Rise time (20%-80%)	t_r			90	psec	3
Optical Fall time (20%-80%)	t_f			90	psec	3

4.25 Gbps Fibre Channel Single-mode Transceiver



RECEIVER ELECTRO-OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTE
Maximum Input Optical Power	P_{max}	0			dBm	4
Minimum Input Optical Power	P_{min}	4.25Gb/s		-18	dBm	4
		2.125Gb/s		-20		
		1.063Gb/s		-20		
Operating Wavelength	λ	1100		1600	nm	
Optical Return Loss	ORL	12			dB	
Loss of Signal – Asserted	P_A	-30			dBm	5
Loss of Signal – Deasserted	P_D			-18	dBm	6
Loss of Signal –Hysterisis	$P_D - P_A$	0.5			dB	

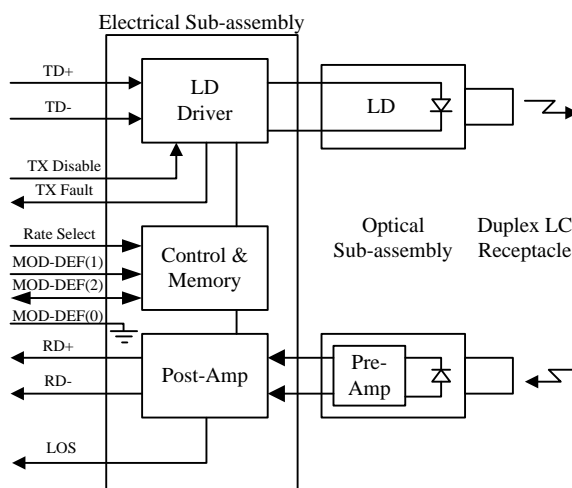
Notes:

1. Measured average power coupled into 9/125 μ m single-mode fiber.
2. Equivalent extinction ratio specification for Fibre Channel. Allows smaller ER at higher average power.
3. These are 20-80% values.
4. Measured with 2^7-1 PRBS at $BER < 10^{-12}$
5. Measured on transition – low to high.
6. Measured on transition – high to low.

TIMING CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTE
TX_DISABLE Assert Time	t_{off}			10	μ s	
TX_DISABLE Negate Time	t_{on}			1	ms	
Time to initialize, include reset of TX_FAULT	t_{init}			300	ms	
TX_FAULT from fault to assertion	t_{fault}			100	μ s	
TX_DISABLE time to start reset	t_{reset}	10			μ s	
Receiver Loss of Signal Assert Time (off to on)	t_{A,RX_LOS}			100	μ s	
Receiver Loss of Signal Assert Time (on to off)	t_{D,RX_LOS}			100	μ s	

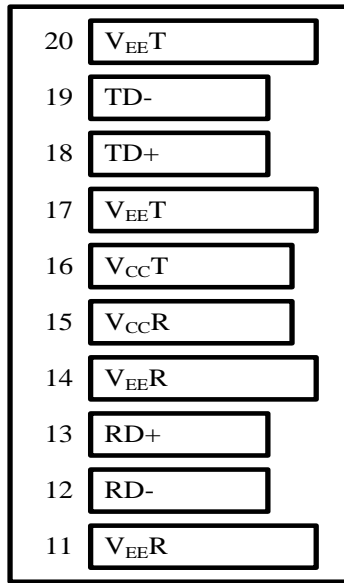
BLOCK DIAGRAM OF TRANSCEIVER



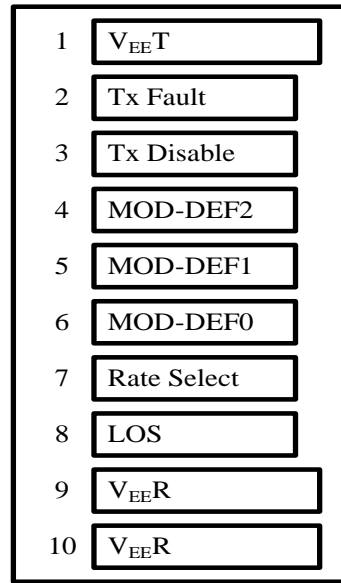
4.25 Gbps Fibre Channel Single-mode Transceiver



PIN OUT DIAGRAM OF TRANSCEIVER



Top of Board



Bottom of Board (As Viewed through Top of Board)

PIN OUT TABLE

Pin	Symbol	Functional Description
1	VeeT	Transmitter Ground
2	TX Fault	Transmitter Fault Indication
3	TX Disable	Transmitter Disable – Module disables on high or open
4	MOD-DEF(2)	Module Definition 2 – Two wire serial ID interface
5	MOD-DEF(1)	Module Definition 1 – Two wire serial ID interface
6	MOD-DEF(0)	Module Definition 0 – Grounded in module
7	Rate Select	Not Connected
8	LOS	Loss of Signal
9	VeeR	Receiver Ground
10	VeeR	Receiver Ground
11	VeeR	Receiver Ground
12	RD-	Inverse Received Data Out
13	RD+	Received Data Out
14	VeeR	Receiver Ground
15	VccR	Receiver Power
16	VccT	Transmitter Power
17	VeeT	Transmitter Ground
18	TD+	Transmitter Data In
19	TD-	Inverse Transmitter Data In
20	VeeT	Transmitter Ground

4.25 Gbps Fibre Channel Single-mode Transceiver



EEPROM Serial ID Memory Contents

Table 1 - EEPROM Serial ID Memory Contents (A0h)

Addr.	Field Size (Bytes)	Name of Field	Hex	Description
00	1	Identifier	03	SFP
01	1	Ext. Identifier	04	MOD4
02	1	Connector	07	LC
03 ~ 10	8	Transceiver Codes	00 00 00 01 08 00 01 00	
11	1	Encoding	01	8B/10B
12	1	BR, Nominal	2A	4200 Mbit/s
13	1	Reserved	00	
14	1	Length (SMF)-km	0A	
15	1	Length (SMF)-100m	64	
16	1	Length (50 μm, OM2)	00	
17	1	Length (62.5 μm, OM1)	00	
18	1	Length (copper)	00	
19	1	Length (50 μm, OM3)	00	
20 ~ 35	16	Vendor Name	43 4F 52 45 54 45 4B 20 20 20 20 20 20 20 20 20	CORETEK
36	1	Unallocated	00	
37 ~ 39	3	OUI Code	00 00 00	
40 ~ 55	16	Vendor PN	43 54 2D 34 32 35 30 54 53 50 2D 4E 45 34 4C 45	CT-4250TSP-NE4LE
56 ~ 59	4	Vendor Rev	30 30 30 31	0001
60 ~ 61	2	Wavelength	051E	1310 nm
62	1	Reserved	00	
63	1	CC BASE	XX	Check sum
64 ~ 65	2	Options	00 1A	LOS, TX_FAULT and TX_DISABLE
66	1	BR max	00	
67	1	BR min	00	
68 ~ 83	16	Vendor SN	FF0007J5100001	
84 ~ 91	8	Date code		

4.25 Gbps Fibre Channel Single-mode Transceiver



92	1	Diagnostic Monitoring Type	68	
93	1	Enhanced Options	90	
94	1	SFF-8472	06	Rev 11.3 of SFF-8472 Compliance
95	1	CC BASE	XX	Check sum
96 ~ 127	32	Vendor Specific		

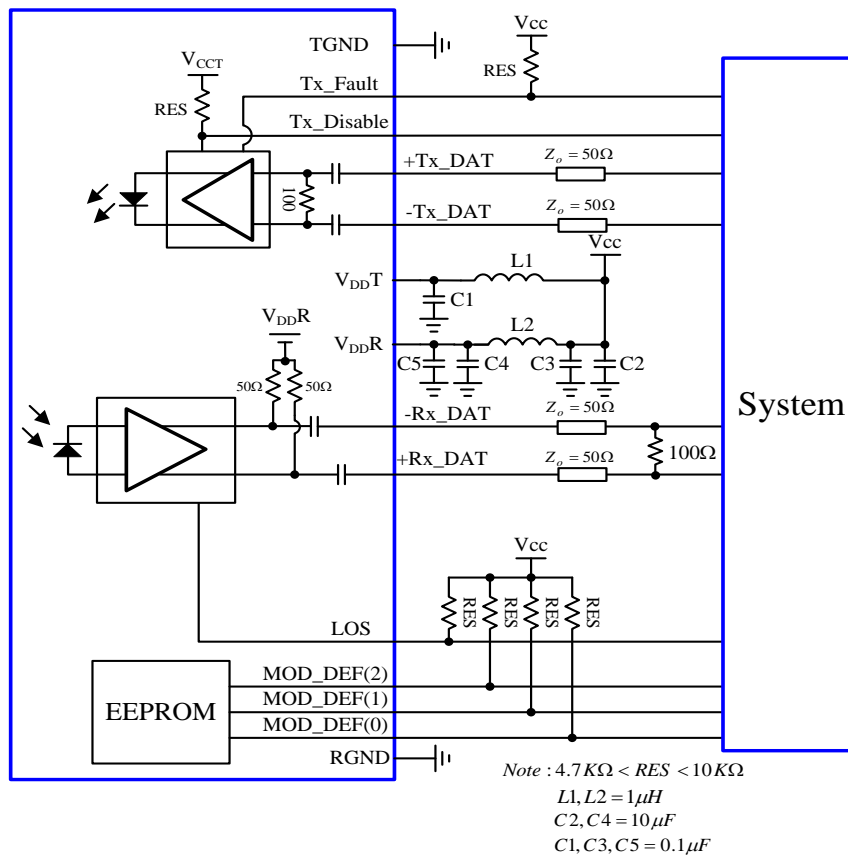
Table 2- EEPROM Serial ID Memory Contents (A2h)

Addr.	Field Size (Bytes)	Name of Field	Hex	Description
00 ~ 07	8	Temperature Alarm/Warning (°C)	6E 00 D8 00 64 00 DD 00	Alarm_H/L : 110/-40 Warning_H/L : 100/-35
08 ~ 15	8	Voltage Alarm/Warning (V)	8C A0 75 30 88 B8 79 18	Alarm_H/L : 3.6/3 Warning_H/L : 3.5/3.1
16 ~ 23	8	Bias Current Alarm/Warning (mA)	9C 40 03 E8 88 B8 07 D0	Alarm_H/L : 80/2 Warning_H/L : 70/4
24 ~ 31	8	Tx Power Alarm/Warning (dBm)	27 10 04 98 1F 07 05 85	Alarm_H/L : 0/-9.5 Warning_H/L : -1/-8.5
32 ~ 39	8	Rx Power Alarm/Warning (dBm)	27 10 00 9E 1F 07 00 C7	Alarm_H/L : 0/-18 Warning_H/L : -1/-17

4.25 Gbps Fibre Channel Single-mode Transceiver

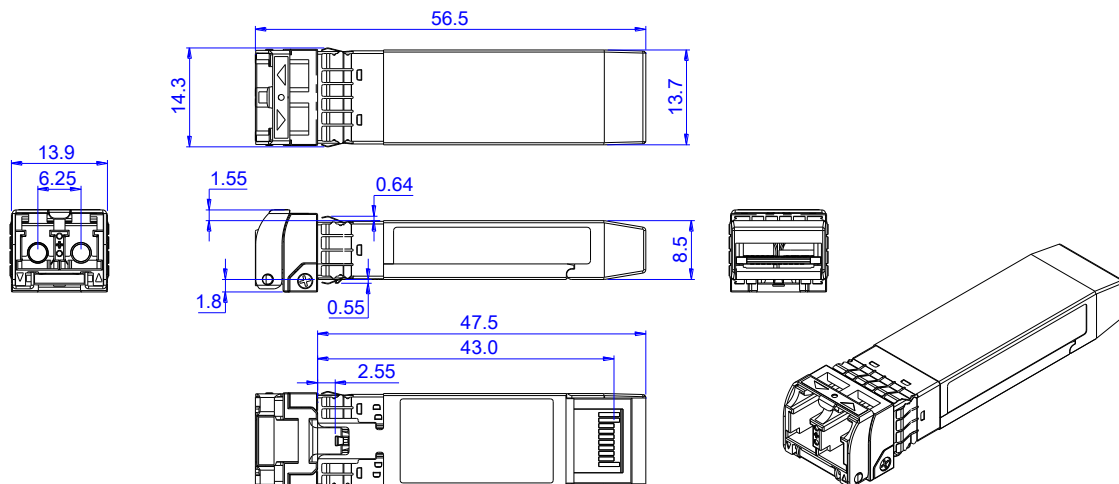


RECOMMENDED CIRCUIT SCHEMATIC



MECHANICAL DIMENSIONS

Units in mm



All dimensions are $\pm 0.2\text{mm}$ unless otherwise specified.

Claim:

CORETEK Opto Corp. reserves the right to make changes in the specification described hereinafter without prior notice.