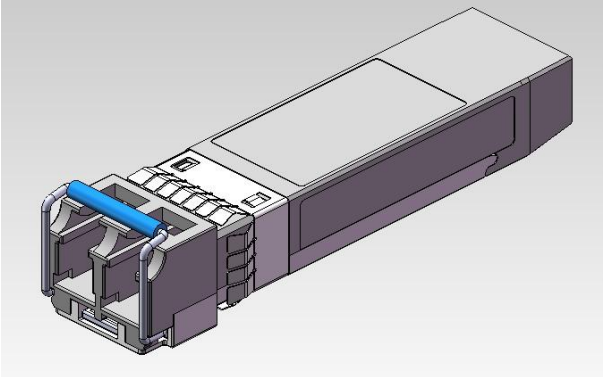
25 Gbps Single Mode Transceiver

SFP28, Duplex LC Connector, 1310nm DFB LD for Single Mode Fiber, RoHS Compliant

Digital Diagnostics Functions

RoHS Pb



Features

- 1310nm uncooled DFB LD
- Receiver limiting amplifier
- Data Rate: 25.78Gbps, NRZ
- RoHS Compliant and Lead-free
- Compliant to SFP+ Electrical MSA SFF-8419
- Compliant to SFP+ Mechanical MSA SFF-8432
- Compliant with specifications for 25GBASE-LR
- Digital Diagnostic Monitoring Interface
- Duplex LC Connector
- Transmission distance up to 10km
- Low power consumption < 1.2W
- Compliant with Laser Class 1 IEC / CDRH

Applications

- 25Gigabit Ethernet Links
- CPRI

Description

The CT-B500TPP-NB4L-D from Coretek Opto Corp. is a high performance, optimum heat dissipation and excellent electromagnetic shielding module for serial optical data communication applications specified for single mode of data rate 25.78 Gb/s. The module is intended for single mode fiber, operates at a nominal wavelength of 1310nm and complies with Multi-Source Agreement (MSA) SFP+. Each module is integrated digital diagnostics functions via an I^2C serial interface.

The module is a duplex LC connector transceiver designed to provide 25 Gigabit Ethernet compliant link at 25.78 Gb/s intermediate reach applications.

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.

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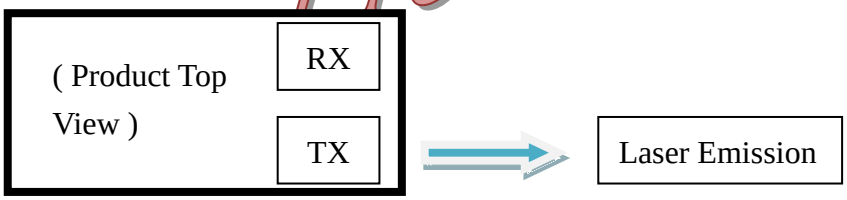
Eye Safety

This laser based single mode transceiver is a Class 1 product. It complies with IEC 60825-1 Ed.2: 2007 and FDA performance standards for laser products (21 CFR 1040.10 and 1040.11) except for deviations pursuant to Laser Notice 50, dated June 24, 2007.

CLASS 1 LASER PRODUCT
DO NOT VIEW DIRECTLY WITH OPTICAL INSTRUMENTS

Caution: use of controls or adjustments or performance of procedures other than those specified herein may result in hazardous radiation.

Note: All adjustments have been made at the factory prior to shipment of the devices. No maintenance or alteration to the device is required. Tampering with or modifying the performance of the device will result in voided product warranty. Failure to adhere to the above restrictions could result in a modification that is considered an act of "manufacturing", and will require, under law, recertification of the modified product with the U.S. Food and Drug Administration (ref. 21 CFR 1040.10 (i)).



Wavelength	> 1310 nm
Maximum total output power (as defined by IEC: 7 mm aperture at 70 mm distance)	< 15.6 mW / 11.9 dBm
Beam divergence (full angle) / NA (half angle)	11° / 0.1 rad

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Product Information

Model Number	Wavelength	Output Power	Sensitivity	Distance
CT-B500TPP-NB4L-D	*1310 nm*	*-5 ~ +3.5 dBm*	*≦-10.4 dBm*	*10km*

ABSOLUTE MAX RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
Storage Temperature	T_S	-40	85	℃	
Supply Voltage	V_{CC}	-0.5	3.6	V	
Relative Humidity	RH	5	95	%	

OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Case Operating Temperature	T_C	0		70	℃	
Supply Voltage	V_{CC}	3.14	3.30	3.47	V	
Supply Current	Icc			370	mA	
Data Rate			25.78		Gb/s	

ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
Transmitter					
Data Input Differential Voltage	V_{ID}	200	950	mV	
Tx_ Disable Input Voltage - Low	V_{IL}	-0.3	0.8	V	
Tx_ Disable Input Voltage - High	V_{IH}	2.0	Vcc + 0.3	V	
Tx_ Fault Output Voltage - Low	V_{OL}	-0.3	0.4	V	
Tx_ Fault Output Current - High	I_{OH}	-50	37.5	μ A	1
Receiver					
Data Output Differential Voltage	V_{OD}	300	850	mV	2
Rx_LOS Output Voltage - Low	V_{OL}	-0.3	0.4	V	
Rx_LOS Output Current - High	I_{OH}	-50	37.5	μ A	1
SDA, SCL - Low	V_{IL}	-0.3	Vcc × 0.3	V	
SDA, SCL - High	V_{IH}	Vcc × 0.7	Vcc + 0.5	V	

TRANSMITTER ELECTRO-OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTE
Optical Output Power (average)	Po	-5		3.5	dBm	
Optical Output Power	OMA	-2			dBm	
Center Wavelength	λ_c	1295		1325	nm	
Spectral Width (-20dB)	$\Delta\lambda$			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Transnmitter Dispersion Penalty	TDP			3.2	dB	
Extinction Ratio	ER	3.5			dB	
Relative Intensity Noise(OMA)	RIN			-128	dB/Hz	

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RECEIVER ELECTRO-OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTE
Maximum Input Optical Power	P_{max}	2.5			dBm	
Receiver Sensitivity (average)	P_{min}			-10.4	dBm	3
Receiver Sensitivity (OMA)	P_{min}			-12.6	dBm	3
LOS of Signal - Deasserted	P_D			-17	dBm	
LOS of Signal - Asserted	P_A	-30			dBm	
LOS of Signal - Hysteresis	Hys	0.5			dB	
Reflectance	RL			-26	dB	
Operating Wavelength	λ	1295		1325	nm	

Notes:

1. Measured with a 4.7kΩ load pulled up to Vcc_Host
2. Into 100Ω differential termination
3. Measured with 2^{31}-1 PRBS at BER<10^{-12}

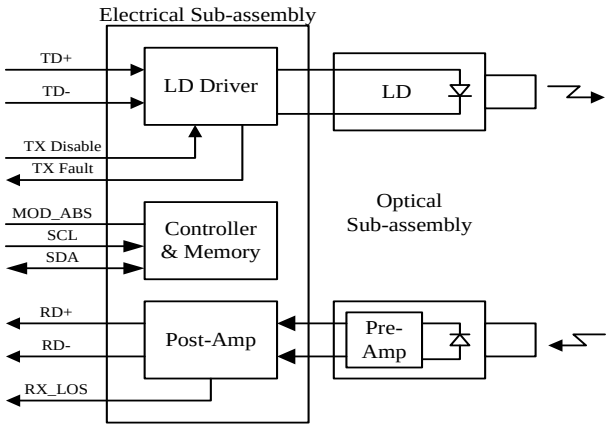
TIMING CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTE
TX_DISABLE Assert Time	t_off			10	μs	
TX_DISABLE Negate Time	t_on			2	ms	
Time to initialize, include reset of TX_FAULT	t_init			300	ms	
TX_FAULT from fault to assertion	t_fault			100	μs	
TX_DISABLE time to start reset	t_reset	10			μs	
Receiver Loss of Signal Assert Time (off to on)	t_{A,RX_LOS}			100	μs	
Receiver Loss of Signal Assert Time (on to off)	t_{D,RX_LOS}			100	μs	

DIGITAL DIAGNOSTIC MONITOR ACCURACY

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
Transceiver Temperature	T	-3	+3	℃	
Power Supply Voltage	V	-3	+3	%	
TX Bias Current	Tx_I	-10	+10	%	
TX Optical Power	Tx_PWR	-2	+2	dB	
RX Optical Power	Rx_PWR	-3	+3	dB	

BLOCK DIAGRAM OF TRANSCEIVER



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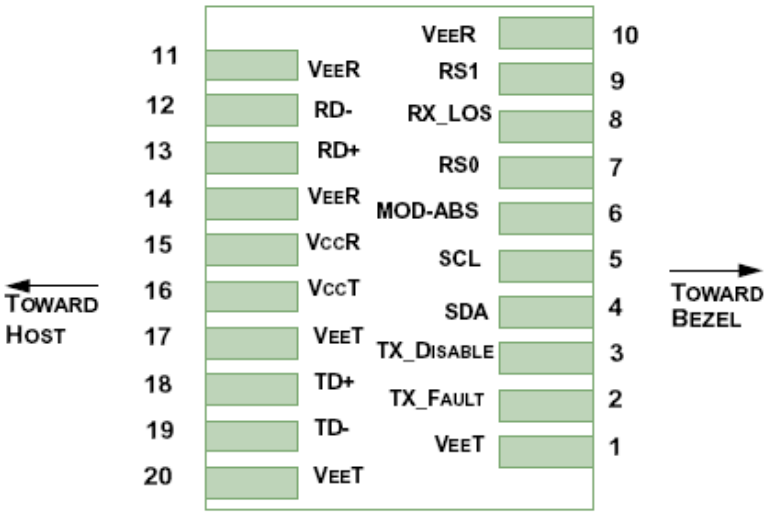
PIN OUT DIAGRAM OF TRANSCEIVER



PIN OUT TABLE

Pin	Symbol	Logic	Functional Description	Note
1	$V_{EE}T$		Transmitter Ground	1
2	TX_FAULT	LVTTL-O	Transmitter Fault Indication	2
3	TX_DISABLE	LVTTL-I	Transmitter Disable – Module disables on high or open	3
4	SDA	LVTTL-I/O	Two wire serial ID interface data line	4
5	SCL	LVTTL-I/O	Two wire serial ID interface clock	4
6	MOD-ABS		Module absent, connect to VeeT or VeeR in the module	5
7	RS0		No connection required	
8	RX_LOS	LVTTL-O	Loss of Signal	2
9	RS1		No connection required	
10	$V_{EE}R$		Receiver Ground	1
11	$V_{EE}R$		Receiver Ground	1
12	RD-	CML-O	Inverse Received Data Out	
13	RD+	CML-O	Received Data Out	
14	$V_{EE}R$		Receiver Ground	1
15	$V_{CC}R$		Receiver Power	
16	$V_{CC}T$		Transmitter Power	
17	$V_{EE}T$		Transmitter Ground	1
18	TD+	CML-I	Transmitter Data In	
19	TD-	CML-I	Inverse Transmitter Data In	
20	$V_{EE}T$		Transmitter Ground	1

Notes:

1. Module ground pins GND are isolated from the module case and chassis ground within the module.
2. This is an open collector/drain output that on the host board requires a 4.7-10 kΩ pullup resistor to Vcc_Host.
3. This is an input contact with a 4.7-10kΩ pullup to Vcc inside the module.
4. Two-wire serial interface clock and data lines require an external pullup resistor dependant on the capacitance load.
5. This is a ground return that on the host board requires a 4.7-10 kΩ pullup resistor to Vcc_Host.

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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	SFP28
01	1	Ext. Identifier	04	SFP function is defined by two-wire interface ID only
02	1	Connector	07	LC
03 ~ 10	8	Transceiver Codes	00 00 00 00 00 00 00 00	
11	1	Encoding	06	64B/66B
12	1	BR,nominal	FF	25Gbps
13	1	Rate Identifier	00	
14	1	Length (SMF)-km	0A	10KM
15	1	Length (SMF)-100m	64	10000M
16	1	Length (50um,OM2)	00	
17	1	Length (62.5um,OM1)	00	
18	1	Length (50um,OM4 or copper)	00	
19	1	Length (50um, 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	Transceiver Codes	03	25GBASE-LR
37 ~ 39	3	OUI Code	00 00 00	
40 ~ 55	16	Vendor PN	43 54 2D 42 35 30 30 54 50 50 2D 4E 42 34 4C 44	CT-B500TPP-NB4LD
56 ~ 59	4	Vendor Rev	31 20 20 20	1000
60 ~ 61	2	Wavelength	05 1E	1310nm
62	1	Reserved	00	
63	1	CC BASE	XX	Check sum
64 ~ 65	2	Options	12 1A	CDR indicator, Power Level 2, LOS, TX_FAULT and TX_DISABLE
66	1	BR max	68	
67	1	BR min	00	
68 ~ 83	16	Vendor SN	XXXXXXXXXXXXXXXX	
84 ~ 91	8	Date code		

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92	1	Diagnostic Monitoring Type	68	
93	1	Enhanced Options	90	
94	1	SFF-8472	08	
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)	55 00 FB 00 50 00 E6 00	Alarm_H/L : 85/-5 Warning_H/L : 80/0
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	BiasCurrent 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)	62 1F 0B 02 4D F1 0C 5A	Alarm_H/L : 4/-5.5 Warning_H/L :3.5/-5
32 ~ 39	8	Rx Power Alarm/Warning (dBm)	4D F1 03 2D 45 77 03 90	Alarm_H/L :3/-10.9 Warning_H/L : 2.5/-10.4

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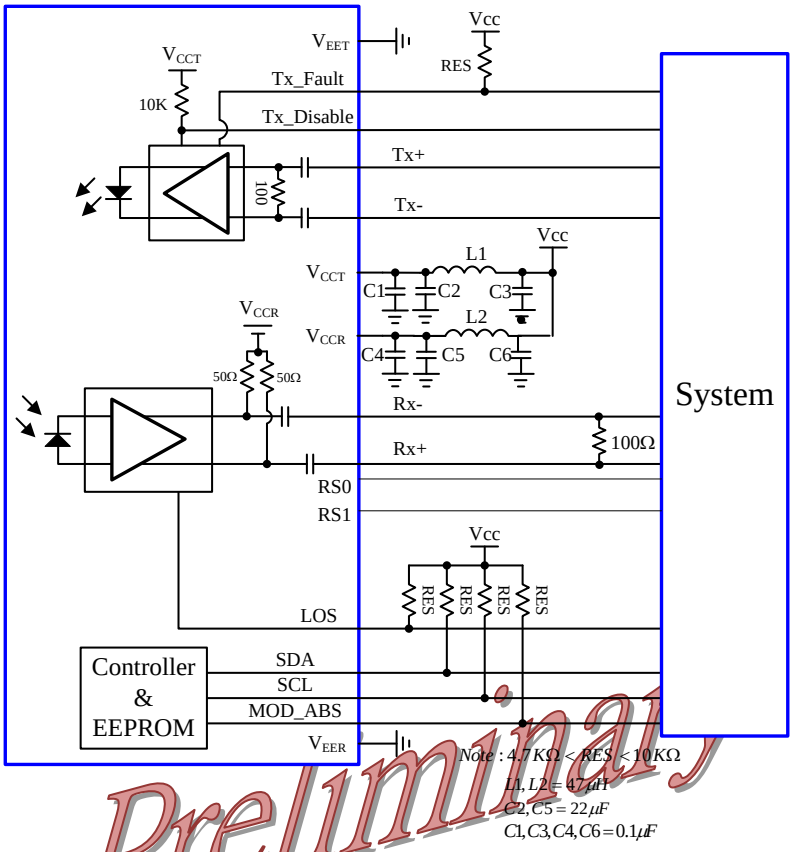
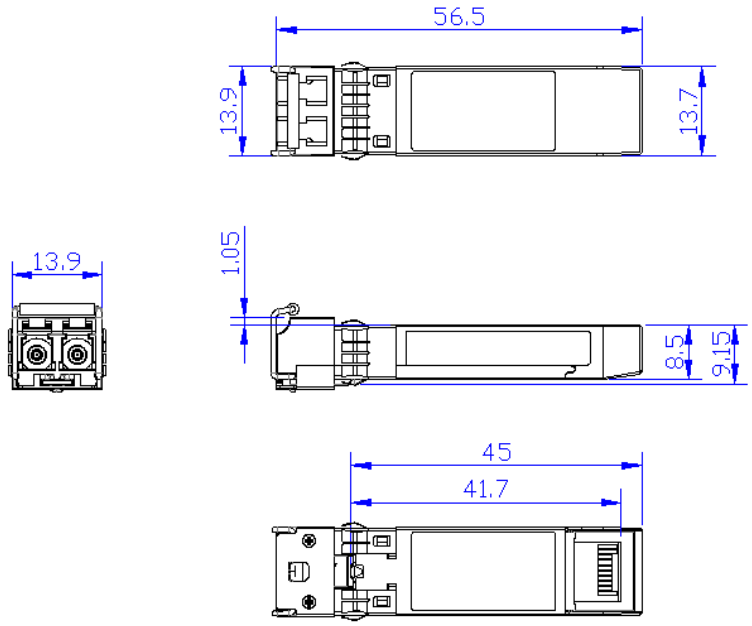
RECOMMENDED CIRCUIT SCHEMATIC



MECHANICAL DIMENSIONS

Units in mm



All dimensions are ±0.2mm unless otherwise specified.

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REVISION HISTORY

Formulate (Revise) Record		
D/M/Y	**Version**	**Description**
27/04/2017	A	Initial version

Claim:

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

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