

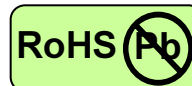
# 3 Gb/s Dual Optical Transmitter



SFP Bi-Di, Single LC Connector, 1550 nm / 1310 nm Dual Transmitter for Single Mode Fiber



## Features



- 1550 nm FP LD and 1310 nm DFB LD
- Data Rate: 50 Mb/s to 3 Gb/s, NRZ
- Single +3.3 V Power Supply
- RoHS Compliant and Lead-free
- AC Differential Electrical Interface
- Compliant with Multi-Source Agreement (MSA) Small Form Factor Pluggable (SFP)
- Single LC Connector
- Supports video pathological patterns for SD-SDI, HD-SDI and 3G-SDI
- Digital Diagnostic Monitoring Interface (TX Power, Bias current, Supply voltage and Operating temperature)
- Blue Colour Bail Roller and Dust Plug
- Eye Safety  
Designed to meet Laser Class 1 comply with EN60825-1

## Applications

- SMPTE 297-2006 compatible optical-to-electrical interfaces
- High-density video routers

## Description

The CT-2500TBP-CB5L-D ABT5531 from Coretek Opto Corp. are the high performance and cost-effective modules for serial optical data communication applications specified for data-rates of 3 Gb/s. It operates with +3.3 V power supply. The module is intended for single mode fiber, operates at a nominal wavelength of 1550 nm /1310 nm and complies with Multi-Source Agreement (MSA) Small Form Factor Pluggable (SFP). Each module is integrated with digital diagnostics functions via an I<sup>2</sup>C serial interface.

The module is a single LC connector with separated dual transmitter designed for robust performance in the presence of SDI pathological patterns for SMPTE 259M, SMPTE 344M, SMPTE 292M and SMPTE 424M serial rates including SD-SDI compliant link at 270 Mb/s, HD-SDI compliant link at 1.485 Gb/s and 3G-SDI compliant link at 2.97 Gb/s. It provides extensive operational status monitoring through I<sup>2</sup>C interface. For transmitter channel, output optical power, bias current, supply voltage and operating temperature are monitored. If a parameter monitored is outside the pre-defined range, the alarm flag associated with the parameter will be raised. The characteristics are performed in accordance with Telcordia Specification GR-468-CORE

## 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

This laser based single mode dual transmitter module is a CLASS 1 LASER PRODUCT, Hazard level 1. It complies with IEC 60825-1 Ed.2: 2007-03 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.

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## Product Information

Model Number	Operating Voltage & SD Output	Distance	LD1 Type & Wavelength	LD2 Type & Wavelength	Output Power	Sensitivity
CT-2500TBP-CB5L-D ABT5531	3.3 V TTL AC/AC	20 km	1550 nm DFB	1310 nm FP	-5~ 0 dBm	≤-20 dBm

## ABSOLUTE MAX RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
Storage Temperature	T <sub>S</sub>	-40	85	°C	
Supply Voltage	V <sub>CC</sub>	0	6	V	
Data Input Voltage	---	0	V <sub>CC</sub>	V	
Supply Current	I <sub>S</sub>		300	mA	

## OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Case Operating Temperature	T <sub>C</sub>	0		70	°C	
Supply Voltage	V <sub>CC</sub>	3.1		3.5	V	
Data Input Voltage Swing	V <sub>ID</sub>	300		1860	mV	

## ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
<b>Transmitter</b>					
Transmitter Supply Current	I <sub>CCT</sub>		200	mA	
Tx_Disable Input Voltage - Low	V <sub>IL</sub>	0	0.8	V	
Tx_Disable Input Voltage - High	V <sub>IH</sub>	2.0	V <sub>CC</sub>	V	
Tx_Fault Output Voltage - Low	V <sub>OL</sub>	0	0.8	V	
Tx_Fault Output Voltage - High	V <sub>OH</sub>	2.0	V <sub>CC</sub>	V	
MOD_DEF (1) , MOD_DEF (2) - Low	V <sub>IL</sub>	-0.6	V <sub>CC</sub> × 0.3	V	
MOD_DEF (1) , MOD_DEF (2) - High	V <sub>IH</sub>	V <sub>CC</sub> × 0.7	V <sub>CC</sub> + 0.5	V	

## TRANSMITTER ELECTRO-OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTE
Optical Output Power	P <sub>O</sub>	-5		0	dBm	1
Extinction Ratio	ER	8.2			dB	
LD1	Center Wavelength	λ <sub>c</sub>	1530	1550	1570	nm
	Spectral Width (-20 dB)	Δλ			1	nm
	Side Mode Suppression Ratio	SMSR	30			dB
LD2	Center Wavelength	λ <sub>c</sub>	1275		1355	nm
	Spectral Width (RMS)	Δλ			3	nm
RIN	RIN			-117	dB/Hz	
Optical Rise time (20%-80% )	t <sub>r</sub>			180	ps	2
Optical Fall time (20%-80% )	t <sub>f</sub>			180	ps	2
Jitter Generation (peak to peak)				0.1	UI	
Output Eye		Compliant with ITU recommendation G.957				

### Notes:

1. Measured average power coupled into 9/125 μm single mode fiber.
2. These are 20-80% values.

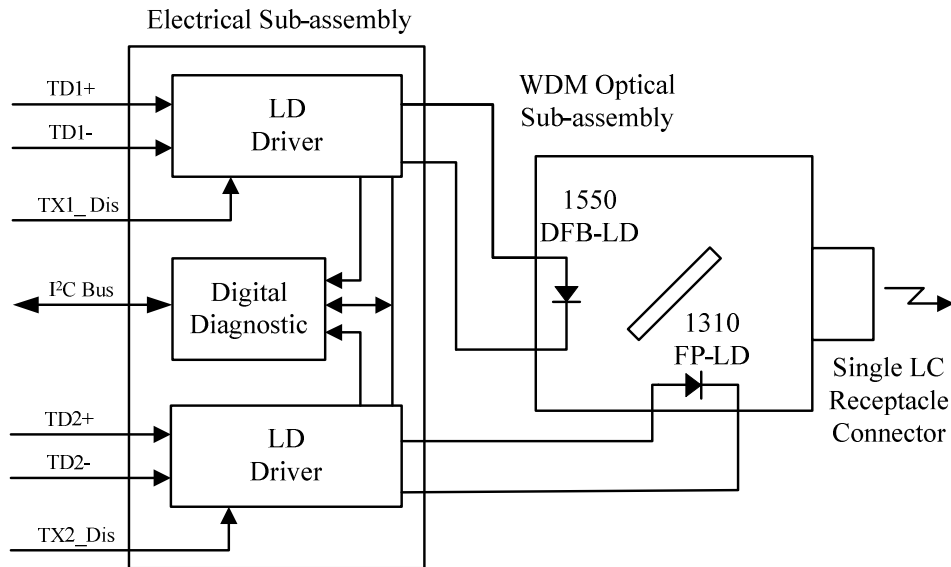
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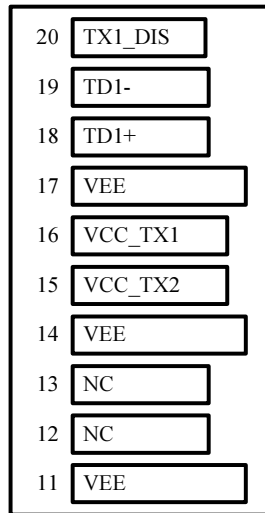
## TIMING CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTE
TX_DISABLE Assert Time	t <sub>off</sub>			10	μs	
TX_DISABLE Negate Time	t <sub>on</sub>			1	ms	
Time to initialize	t <sub>init</sub>			300	ms	
TX_DISABLE time to start reset	t <sub>reset</sub>	10			μs	

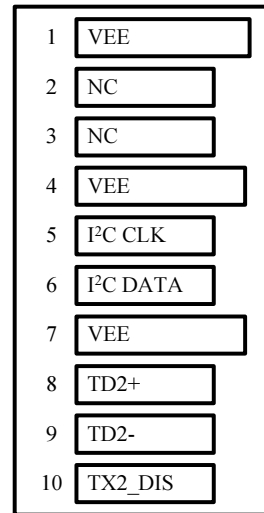
## BLOCK DIAGRAM OF TRANSCEIVER



## 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	VEE	Transmitter Ground
2	NC	Not Connect
3	NC	Not Connect
4	VEE	Transmitter Ground
5	I2C CLK	Two wire serial ID interface - Clock
6	I2C DATA	Two wire serial ID interface - Data
7	VEE	Transmitter Ground
8	TD2+	Transmitter Data In 2
9	TD2-	Inverse Transmitter Data In 2
10	TX2_DIS	Transmitter 2 Disable – Module disables on high or open
11	VEE	Transmitter Ground
12	NC	Not Connect
13	NC	Not Connect
14	VEE	Transmitter Ground
15	VCC_TX2	Transmitter Power 2
16	VCC_TX1	Transmitter Power 1
17	VEE	Transmitter Ground
18	TD1+	Transmitter Data In 1
19	TD1-	Inverse Transmitter Data In 1
20	TX1_DIS	Transmitter 1 Disable – Module disables on high or open

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## EEPROM Serial ID Memory Contents

Table 1 - EEPROM Serial ID A0H/B0H Memory Contents

Addr.	Field Size (Bytes)	Name of Field	Hex	Description
00	1	Identifier	81	Dual Tx SFP
01	1	Ext. Identifier	04	MOD4
02	1	Connector	07	LC
03 ~ 10	8	Transceiver Codes	00 00 00 00 00 00 00 00	
11	1	Encoding	03	
12	1	BR, Nominal	1E	
13	1	Reserved	00	
14	1	Length (SMF)-km	14	20 km
15	1	Length (SMF)-100m	C8	20 km
16	1	Length (50µm,OM2)	00	
17	1	Length (62.5µm,OM1)	00	
18	1	Length (copper)	00	
19	1	Length (50µm, 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 32 35 30 30 54 42 50 43 42 35 4C 44 54	CT-2500TBPCB5LDT
56 ~ 59	4	Vendor Rev	30 30 30 30	0000
60 ~ 61	2	Wavelength	06 0E	1550 nm for A0h
			05 1E	1310 nm for B0h
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	4B 53 xxxxxxxxxxxx	KS xxxxxxxxxxxx

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84 ~ 91	8	Date code		
92	1	Diagnostic Monitoring Type	68	
93	1	Enhanced Options	80	
94	1	SFF-8472	01	Rev 9.3 of SFF-8472 Compliance
95	1	CC BASE	XX	Check sum
96 ~ 127	32	Vendor Specific		

**Table 2- EEPROM Serial ID A2h/B2h Memory Contents**

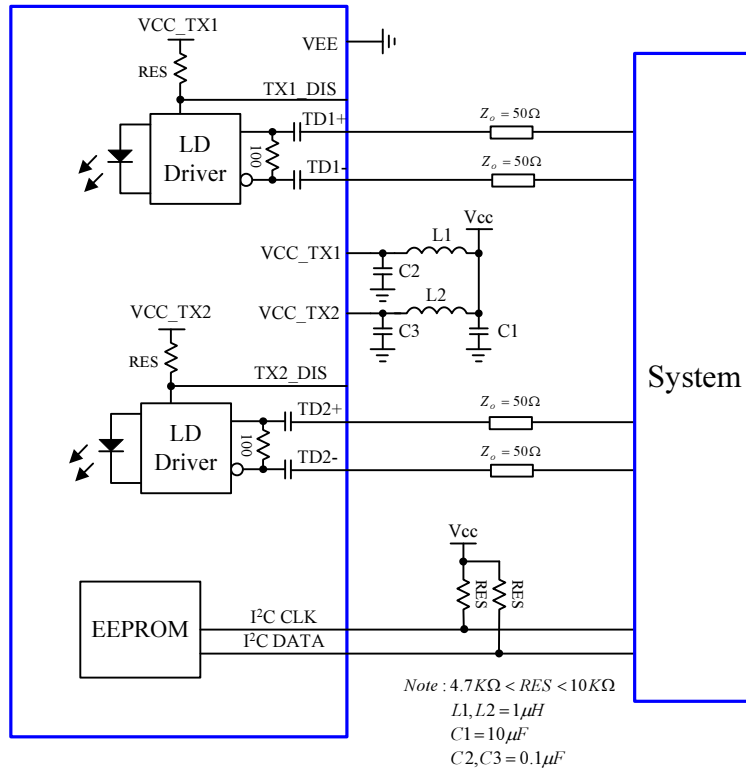
Addr.	Field Size (Bytes)	Name of Field	Hex	Description
00 ~ 07	8	Temperature Alarm/Warning (°C)	64 00 FB 00 50 00 5A 00	Alarm_H/L : 100/-5 Warning_H/L : 90/0
08 ~ 15	8	Voltage Alarm/Warning (V)	8C A0 75 30 88 B8 79 18	Alarm_H/L : 3.6/3 Warning_H/L : 3.5/3.1
16 ~ 23	8	Bias Current Alarm/Warning (mA)	9C 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)	31 2D 09 D0 27 10 0C 5A	Alarm_H/L : 1 /-6 Warning_H/L : 0 /-5
32 ~ 39	8	Rx Power Alarm/Warning (dBm)		
128 ~ 143	16	Vendor Specific		

**Table 3- Monitoring Specification**

Parameter	Range	Accuracy	Calibration
Temperature	0°C to 70°C	±3°C	Internal
Voltage	3.0 to 3.6V	±3%	Internal
Bias Current	0 to 80mA	±10%	Internal
TX Power	-5 to 0 dBm	±3 dB	Internal

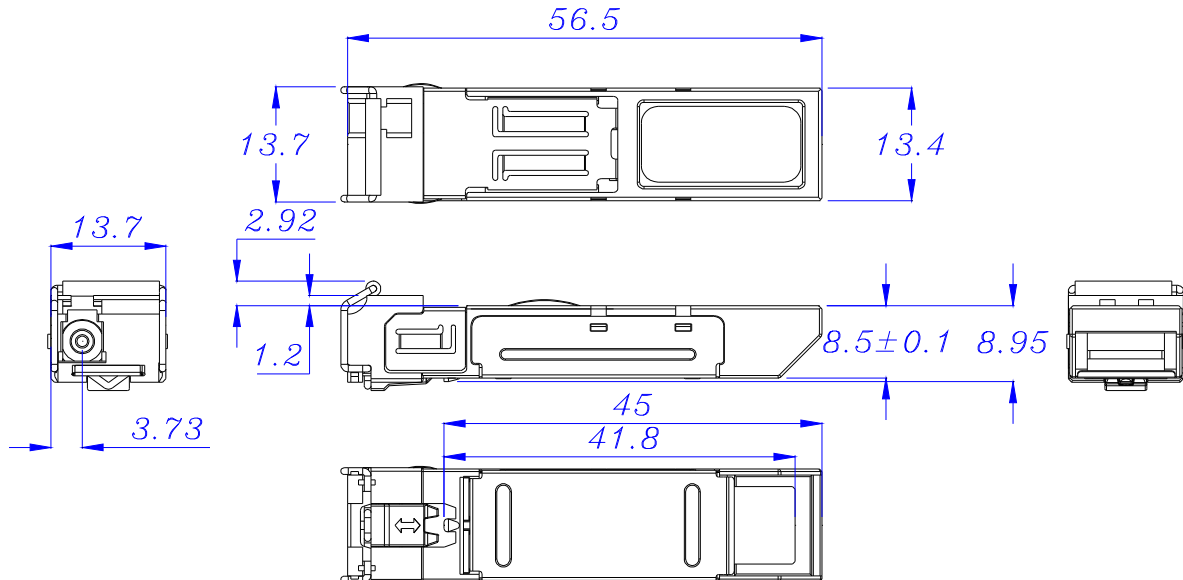
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## RECOMMENDED CIRCUIT SCHEMATIC



## 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.