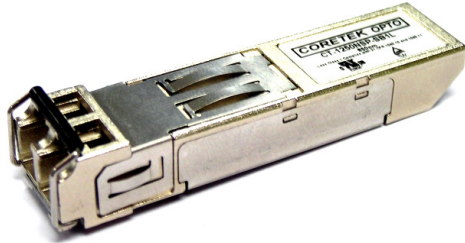
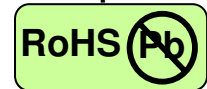


10-155 Mb/s ATM – Multi-mode Dual Transmitter



SFP, Duplex LC Connector, Dual 850 nm VCSEL for Multi-mode Fiber, RoHS Compliant
Digital Diagnostics Functions, Extended Operating Temperature from -40 to +85°C



Features

- 850 nm VCSEL
- Data Rate: 10-155 Mb/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)
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Duplex LC Connector
- Compliance with 100Base-FX of IEEE802.3u Standard
- Compliance with FDDI PMD Standard
- Compliance with ATM Standard

Applications

- Fast Ethernet
- FDDI
- ATM/SONET OC-3/SDH STM-1
- Multimode fiber links
- Optical-Electrical Interface Conversion

Description

The CT-0155NTP-SB2L-E P2 from Coretek Opto Corp. is the high performance and cost-effective module for serial optical data communication applications specified for data-rates of 10-155 Mb/s. It operates with +3.3 V power supply. The module is intended for multi-mode fiber, operates at a nominal wavelength of 850 nm and complies with Multi-Source Agreement (MSA) Small Form Factor Pluggable (SFP). Each module consists of dual transmitter optical subassembly and an electrical subassembly and it is integrated digital diagnostics functions via an I²C serial interface.

The module is a duplex LC connector transceiver designed to provide an ATM/SONET OC-3/SDH STM-1 compliant link for 155 Mb/s short reach applications. 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 multi-mode transceiver is a Class 1 product. It complies with IEC 60825-1/A2: 2001 and FDA performance standards for laser products (21 CFR 1040.10 and 1040.11) except for deviations pursuant to Laser Notice 50, dated July 26, 2001.

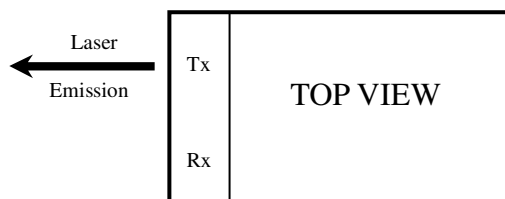
CLASS 1 LASER PRODUCT

To meet laser safety requirements the transceiver shall be operated within the Absolute Maximum Ratings.

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)).

Laser Emission Data

Wavelength	: 850 nm
Maximum total output power (as defined by IEC : 7 mm aperture at 14 mm distance)	: 712 μW / -1.5 dBm
Beam divergence (full angle) / NA (half angle)	: 20° / 0.18 rad



Required Labels

IEC : “Class 1 Laser Product”

FDA : “Complies with 21 CFR 1040.10 and 1040.11”

10-155 Mb/s ATM – Multi-mode Dual Transmitter



Product Information

Model Number	Operating Voltage & SD Output	Distance	Wavelength	Output Power
CT-0155NTP-SB2L-E P2	3.3 V TTL AC/AC	2 km	850 nm	-15 ~ -4 dBm

ABSOLUTE MAX RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
Storage Temperature	T _S	-40	85	°C	
Supply Voltage	V _{CC}	0	6	V	

OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Case Operating Temperature	T _C	-40		85	°C	
Supply Voltage	V _{CC}	3.1		3.5	V	
Data Input Voltage Swing	V _{ID}	400		1600	mV	

ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
Transmitter Supply Current	I _{CC}		280	mA	
Tx_Disable Input Voltage - Low	V _{IL}	0	0.8	V	
Tx_Disable Input Voltage - High	V _{IH}	2.0	V _{CC}	V	
Tx_Fault Output Voltage - Low	V _{OL}	0	0.8	V	
Tx_Fault Output Voltage - High	V _{OH}	2.0	V _{CC}	V	
I2C DATA , I2C CLK - Low	V _{IL}	-0.6	V _{CC} × 0.3	V	
I2C DATA , I2C CLK - High	V _{IH}	V _{CC} × 0.7	V _{CC} + 0.5	V	

TRANSMITTER ELECTRO-OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTE
Optical Output Power	P _o	-15		-4	dBm	1
Extinction Ratio	ER	8.2			dB	
Center Wavelength	λ _c	830	850	860	nm	
Spectral Width (FWHM)	Δλ			0.85	nm	
Optical Rise time (10%-90%)	t _r			3.0	ns p-p	
Optical Fall time (10%-90%)	t _f			3.0	ns p-p	
Output Eye		Compliant with ITU recommendation G.957				

Notes:

1. Measured average power coupled into 62.5/125 μm, 0.275 NA graded index multi-mode fiber.

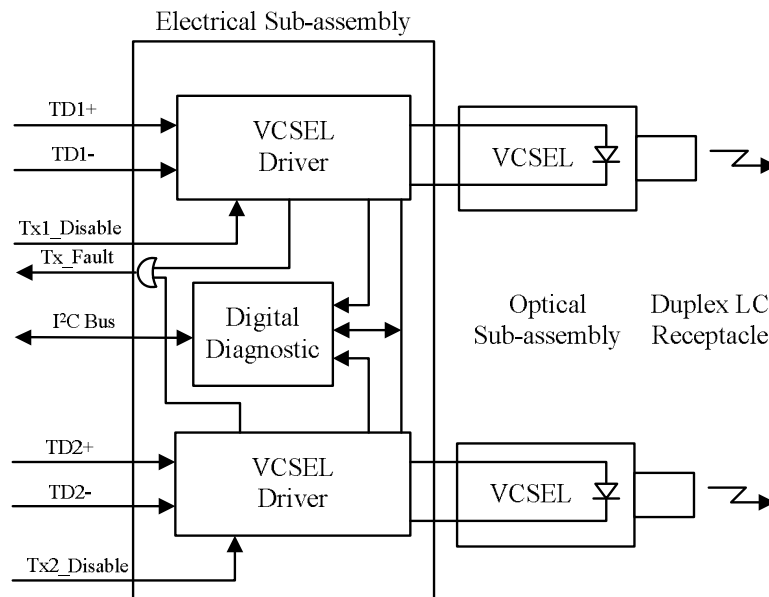
10-155 Mb/s ATM – Multi-mode Dual Transmitter



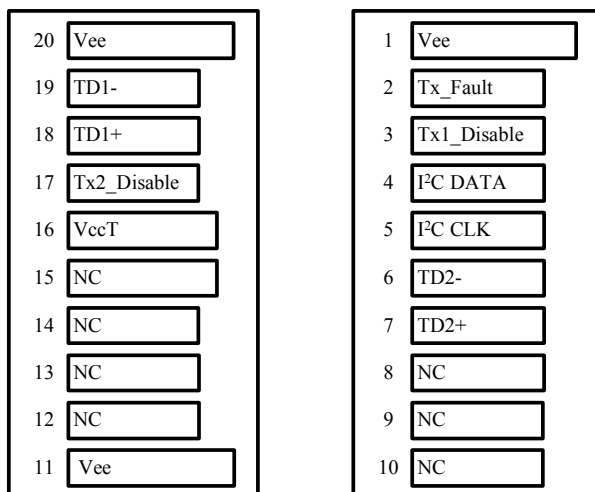
TIMING CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTE
Tx_DISABLE Assert Time	t_off			10	μs	
Tx_DISABLE Negate Time	t_on			1	ms	
Time to initialize, include reset of TX_FAULT	t_init			300	ms	
Tx_DISABLE time to start reset	t_reset	10			μs	

BLOCK DIAGRAM OF TRANSCEIVER



PIN OUT DIAGRAM OF TRANSCEIVER



Top of Board

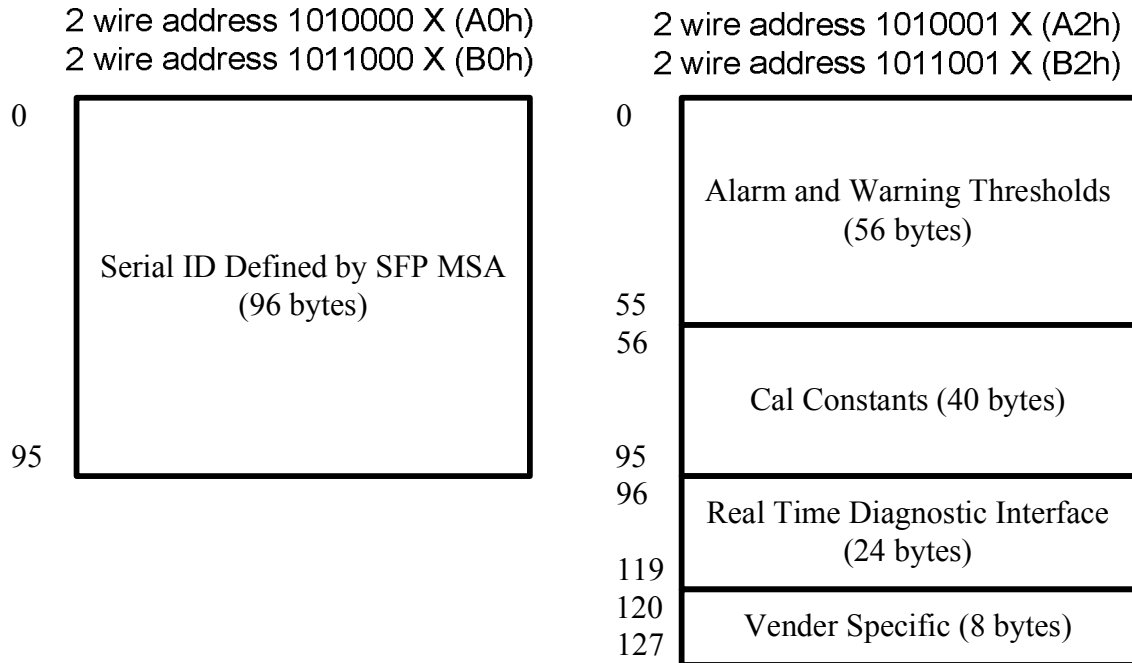
Bottom of Board (As Viewed through Top of Board)

PIN OUT TABLE

Pin	Symbol	Functional Description
1	Vee	Ground
2	Tx_Fault	Transmitter Fault Indication
3	Tx1_Disable	Transmitter Disable #1 – Module disables on high or open
4	I ² C DATA	Two wire serial ID interface - Data
5	I ² C CLK	Two wire serial ID interface - Clock
6	TD2-	Inverse Transmitter Data In #2
7	TD2+	Transmitter Data In #2
8	NC	Not Connect
9	NC	Not Connect
10	NC	Not Connect
11	Vee	Ground
12	NC	Not Connect
13	NC	Not Connect
14	NC	Not Connect
15	NC	Not Connect
16	VccT	Transmitter Power
17	Tx2_Disable	Transmitter Disable #2 – Module disables on high or open
18	TD1+	Transmitter Data In #1
19	TD1-	Inverse Transmitter Data In #1
20	Vee	Ground

ENHANCED DIGITAL DIAGNOSTIC INTERFACE

The memory map in the following describes an extension to the memory map. The enhanced interface uses the two wire serial bus address 1010001X (A2h) for channel 1 and 1011001X (B2h) for channel 2 to provide diagnostic information about the module's present operating conditions. The transceiver generates this diagnostic data by digitization of internal analog signals. Calibration and alarm/warning threshold data is written during device manufacture.



Note: A0h, A2h for channel 1 usage and B0h, B2h for channel 2 usage.

EEPROM Serial ID Memory Contents

Table 1 - EEPROM Serial ID Memory Contents (A0h/B0h)

Addr.	Field Size (Bytes)	Name of Field	Hex	Description
00	1	Identifier	03	SFP
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 10 00 00 00 00 00 00	
11	1	Encoding	02	4B/5B

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12	1	BR, Nominal	02	
13	1	Reserved	00	
14	1	Length (SMF)-km	00	
15	1	Length (SMF)-100 m	00	
16	1	Length (50 μm, OM2)	C8	2 km
17	1	Length (62.5 μm, OM1)	C8	2 km
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 30 31 35 35 4E 54 50 2D 53 42 32 4C 45	CT-0155NTP-SB2LE
56 ~ 59	4	Vendor Rev	30 30 30 30	0000
60 ~ 61	2	Wavelength	03 52	850 nm
62	1	Reserved	00	
63	1	CC BASE	XX	Check sum
64 ~ 65	2	Options	00 00	
66	1	BR max	00	
67	1	BR min	00	
68 ~ 83	16	Vendor SN		
84 ~ 91	8	Date code		
92	1	Diagnostic Monitoring Type	68	
93	1	Enhanced Options	F0	
94	1	SFF-8472	01	
95	1	CC BASE	XX	Check sum
96 ~ 127	32	Vendor Specific		

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Table 2- EEPROM Serial ID Memory Contents (A2h/B2h)

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)	1D 4C 00 32 17 70 00 FA	Alarm_H/L : 15/0.1 Warning_H/L : 12/0.5
24 ~ 31	8	Tx Power Alarm/Warning (dBm)	0F 8D 01 3C 0C 5A 01 8E	Alarm_H/L : -4/-15 Warning_H/L : -5/-14
32 ~ 39	8	Rx Power Alarm/Warning (dBm)		
40-55	16	Reserved		

Table 3- Calibration Constants (2 Wire Address A2h/B2h)

Address	# Bytes	Name of Field	HEX	Description
56-59	4	Rx_PWR (4)	00 00 00 00	Set to zero for “internally calibrated” devices.
60-63	4	Rx_PWR (3)	00 00 00 00	Set to zero for “internally calibrated” devices.
64-67	4	Rx_PWR (2)	00 00 00 00	Set to zero for “internally calibrated” devices.
68-71	4	Rx_PWR (1)	3F 80 00 00	Set to 1 for “internally calibrated” devices.
72-75	4	Rx_PWR (0)	00 00 00 00	Set to zero for “internally calibrated” devices.
76-77	2	Tx_I (Slope)	01 00	Set to 1 for “internally calibrated” devices.
78-79	2	Tx_I (Offset)	00 00	Set to zero for “internally calibrated” devices.
80-81	2	Tx_PWR (Slope)	01 00	Set to 1 for “internally calibrated” devices.
82-83	2	Tx_PWR (Offset)	00 00	Set to zero for “internally calibrated” devices.
84-85	2	T (Slope)	01 00	Set to 1 for “internally calibrated” devices.
86-87	2	T (Offset)	00 00	Set to zero for “internally calibrated” devices.
88-89	2	V (Slope)	01 00	Set to 1 for “internally calibrated” devices.
90-91	2	V (Offset)	00 00	Set to zero for “internally calibrated” devices.
92-94	3	Reserved	00 00 00	Reserved
95	1	Checksum	XX	Checksum of bytes 0 – 94.

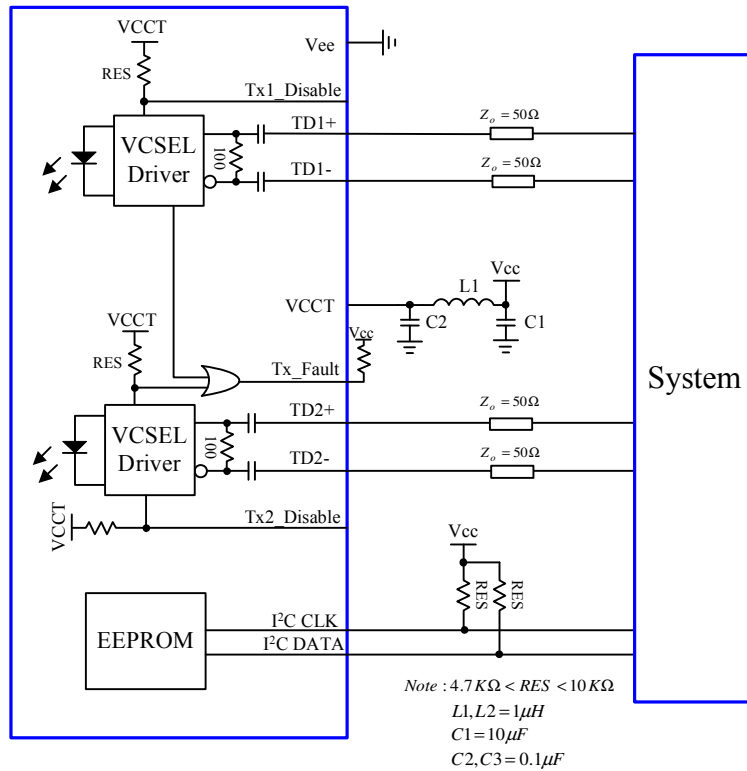
Table3 - Monitoring Specification

Parameter	Range	Accuracy	Calibration
Temperature	-40°C to 110°C	±3°C	Internal
Voltage	3.0 to 3.6 V	±3%	Internal
Bias Current	0 to 15 mA	±10%	Internal
TX Power	-15 to -4 dBm	±3dB	Internal

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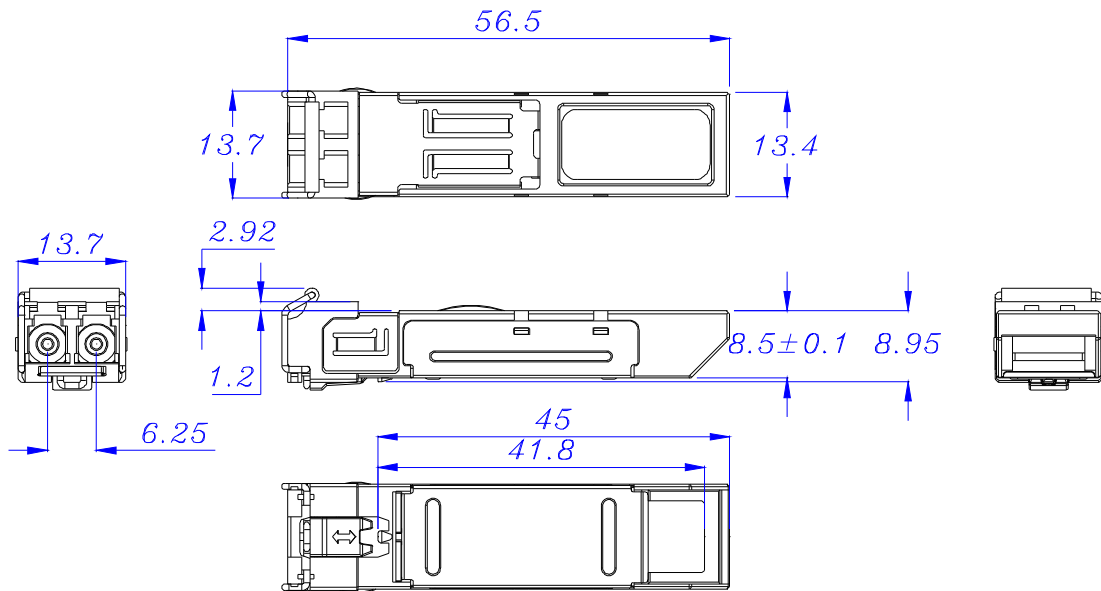


RECOMMENDED CIRCUIT SCHEMATIC



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.