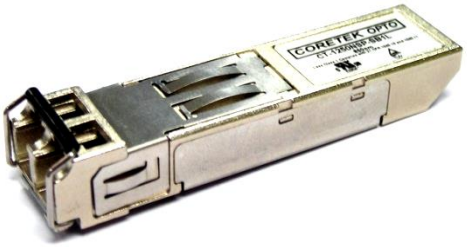
2 Mb/s IEEE C37.94 Multi-Mode Transceiver

SFP, Duplex LC Connector, 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: 2 Mb/s, NRZ
- Single +3.3 V Power Supply
- RoHS Compliant and Lead-free
- AC/AC Differential Electrical Interface
- DC-coupled between VCSEL and LD driver IC.
- Compliant with Multi-Source Agreement (MSA) Small Form Factor Pluggable (SFP)
- Compliant with SFF-8472 Digital Diagnostic Monitoring Interface
- Duplex LC Connector
- Compatible with IEEE C37.94 / IEC 62843 Standard

Applications

- IEEE C37.94 / IEC 62843
- Multi-mode fiber links
- Optical-Electrical Interface Conversion

Description

The CT-0155NSP-SB2L-E 2M from Coretek Opto Corp. is the high performance and cost-effective module for serial optical data communication applications specified for data-rates 2Mb/s. It operates with a +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 is integrated digital diagnostics functions via an I^2C serial interface.

The module is a duplex LC connector transceiver designed to provide an IEEE C37.94 compliant link for 2 Mb/s short reach applications. The characterization is performed in accordance to 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 transceiver 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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04/21/2017
Version：A

Product Information

Model Number	Operating Voltage & SD Output	Distance	Wavelength	Output Power	Sensitivity
CT-0155NSP-SB2L-E 2M	*3.3 V TTL AC/AC*	*2 km*	*850 nm*	*-16 ~ -13 dBm*	*≦ -32 dBm*

ABSOLUTE MAX RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
Storage Temperature	T_S	-40	85	℃	
Supply Voltage	V_{CC}	0	6	V	

OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Case Operating Temperature	T_C	-40		85	℃	
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					
Transmitter Supply Current	I_{CCT}		140	mA	
Tx_ Disable Input Voltage - Low	V_{IL}	0	0.8	V	
Tx_ Disable Input Voltage - High	V_{IH}	2.0	Vcc	V	
Tx_ Fault Output Voltage - Low	V_{OL}	0	0.8	V	
Tx_ Fault Output Voltage - High	V_{OH}	2.0	Vcc	V	
Receiver					
Receiver Supply Current	I_{CCR}		100	mA	
Receiver Data Output Differential Voltage	V_{OD}	0.4	1.3	V	
Rx_LOS Output Voltage - Low	V_{OL}	0	0.8	V	
Rx_LOS Output Voltage - High	V_{OH}	2.0	Vcc	V	
MOD_DEF (1) , MOD_DEF (2) - Low	V_{IL}	-0.6	Vcc × 0.3	V	
MOD_DEF (1) , MOD_DEF (2) - High	V_{IH}	Vcc × 0.7	Vcc + 0.5	V	

TRANSMITTER ELECTRO-OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTE
Optical Output Power	Po	-19		-11	dBm	1
Optical Output Power	Po	-23		-11	dBm	2
Extinction Ratio	ER	12			dB	2Mb/s
Center Wavelength	λ_c	830	850	860	nm	
Spectral Width (RMS)	$\Delta\lambda$			1	nm	
Optical Rise time (10%-90%)	t_r			10	ns p-p	
Optical Fall time (10%-90%)	t_f			10	ns p-p	
Output Eye	Compliant with ITU recommendation G.957					
* The laser shutdown is deactivated.						

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RECEIVER ELECTRO-OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTE
Maximum Input Optical Power	P_{max}	-3			dBm	3
Receiver Sensitivity	P_{min}			-32	dBm	3
Operating Wavelength	λ	770		860	nm	
Loss of Signal - Asserted	P_A	-45			dBm	
Loss of Signal - Deasserted	P_D			-31	dBm	
Loss of Signal -Hysterisis	P_D- P_A	0.5			dB	

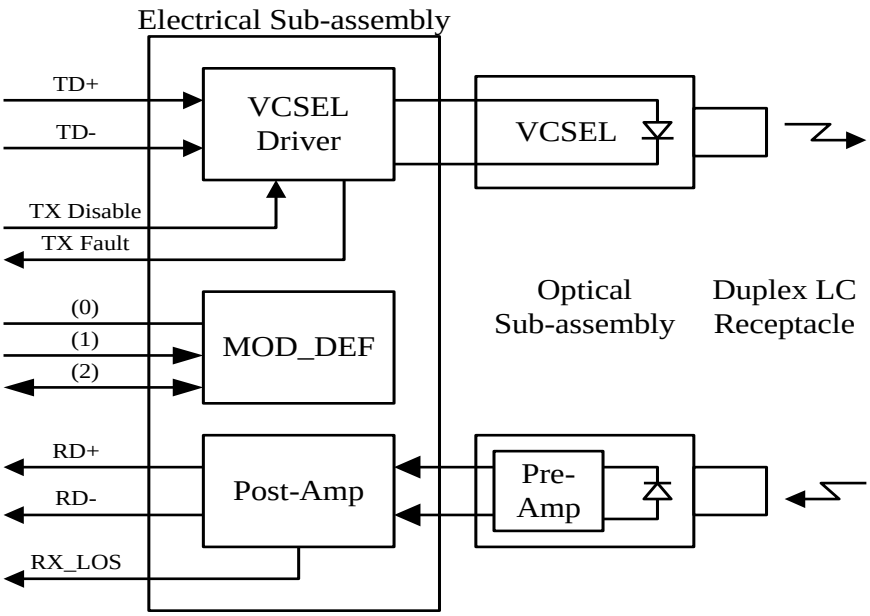
Notes:

1. Measured average power coupled into 62.5/125 µm, 0.275 NA graded index multi-mode fiber.
2. Measured average power coupled into 50/125 µm, 0.2 NA graded index multi-mode fiber.
3. Measured with 2^7-1 PRBS at BER<10^{-10}

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_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	

BLOCK DIAGRAM OF TRANSCEIVER



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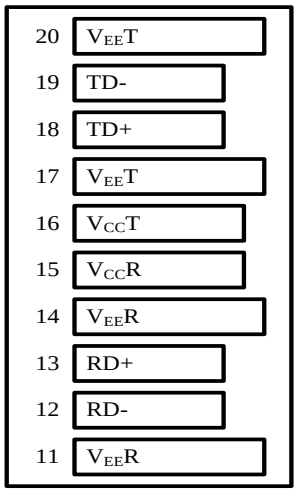
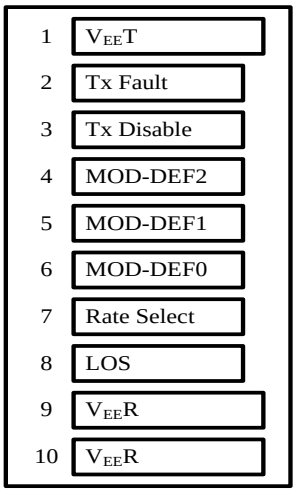
PIN OUT DIAGRAM OF TRANSCEIVER



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 (Not Connected)
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

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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	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	NRZ
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	Reserved	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	Reserved	00	
37 ~ 39	3	OUI Code	00 00 00	
40 ~ 55	16	Vendor PN	43 54 2D 30 31 35 35 4E 53 50 2D 53 42 32 4C 45	CT-0155NSP-SB2LE
56 ~ 59	4	Vendor Rev	30 30 30 31	0001
60 ~ 61	2	Wavelength	03 52	850 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	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	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 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	BiasCurrent Alarm/Warning (mA)	17 70 00 FA 13 88 02 58	Alarm_H/L : 12/0.5 Warning_H/L : 10/1.2
24 ~ 31	8	Tx Power Alarm/Warning (dBm)	03 E8 00 27 03 1A 00 32	Alarm_H/L : -10/-24 Warning_H/L : -11/-23
32 ~ 39	8	Rx Power Alarm/Warning (dBm)	18 A5 00 05 13 94 00 06	Alarm_H/L : -2/-33 Warning_H/L : -3/-32

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Monitoring Specification

The digital diagnostic monitoring interface also defines another 256-byte memory map in EEPROM, which makes use of the 8 bit address 1010001X (A2h). Please see Figure 1. For detail EEPROM information, please refer to the related document of SFF-8472 Rev 9.5.The monitoring specification of this product is described in Table 3.

Figure 3.1: Digital Diagnostic Memory Map

Specific Data Field Descriptions

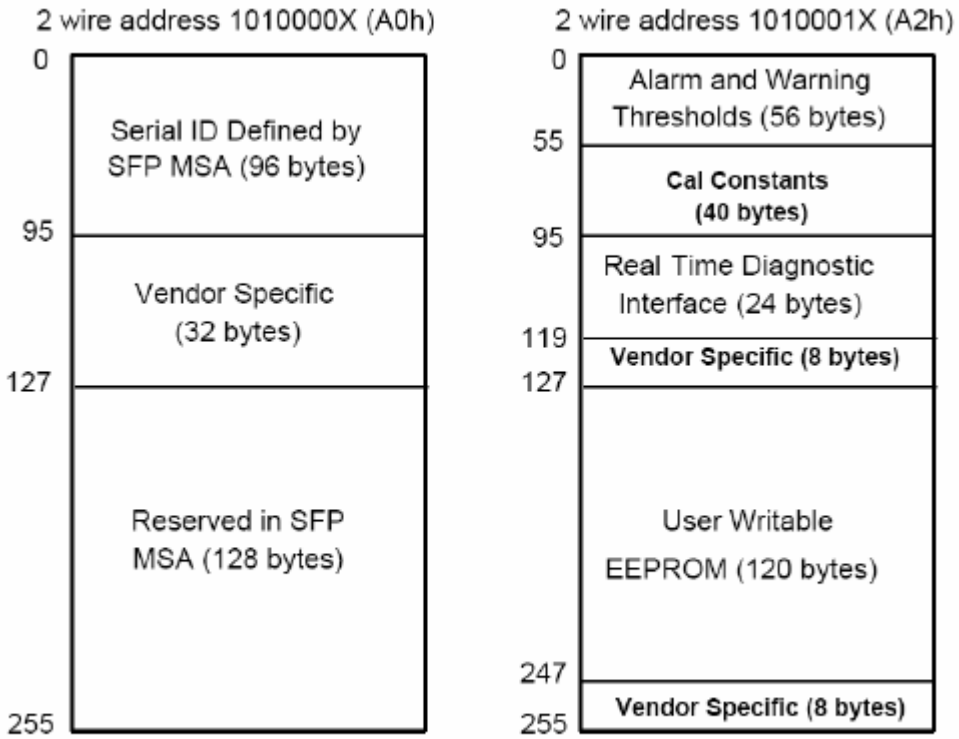

Figure 1, EEPROM Memory Map Specific Data Field Descriptions

Table 3 - Monitoring Specification

Parameter	Range	Accuracy	Calibration
Temperature	-40°C to 85°C	±3°C	Internal
Voltage	3.0 to 3.6 V	±3%	Internal
Bias Current	0 to 12 mA	±10%	Internal
TX Power	-16 to -13 dBm	±3 dB	Internal
RX Power	-32 to -3 dBm	±3 dB	Internal

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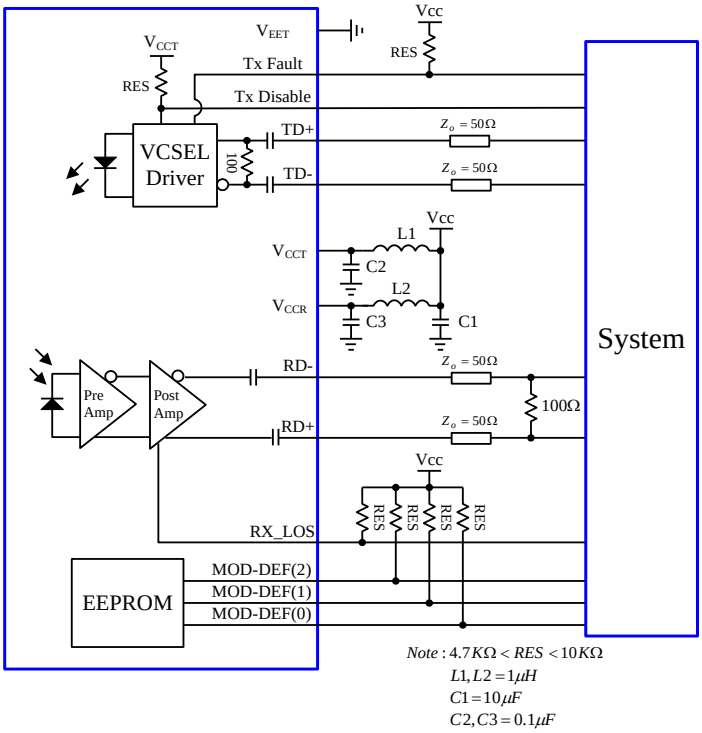
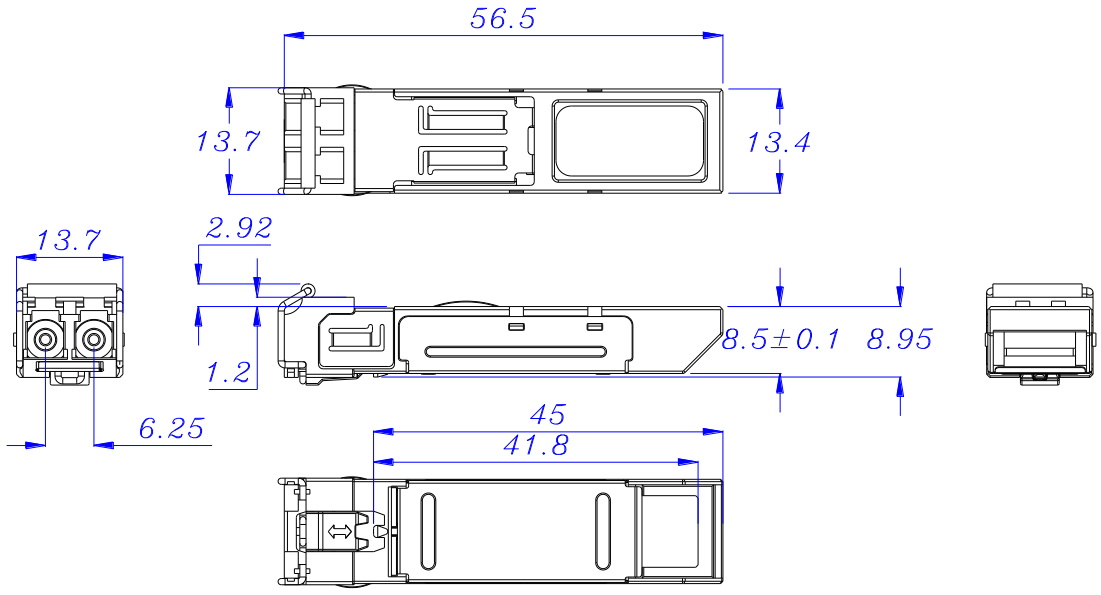
RECOMMENDED CIRCUIT SCHEMATIC



MECHANICAL DIMENSIONS

Units in mm



All dimensions are ±0.2mm unless otherwise specified.

Claim:

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

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