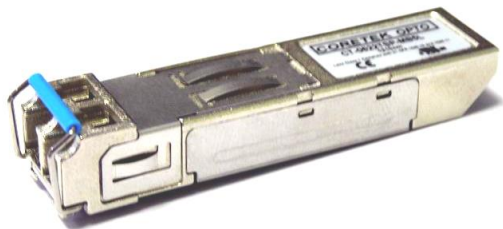


1.25 Gigabit Ethernet-Single Mode Transceiver



SFP, Duplex LC Connector, 1550nm DFB LD for Single Mode Fiber, RoHS Compliant

Features



- 1550nm DFB LD
- APD Receiver
- Data Rate: 1.25Gbps, 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 specifications for IEEE-802.3z Gigabit Ethernet at 1.25 Gbps
- Compliance with ANSI specifications for Fibre Channel applications at 1.06 Gbps
- Eye Safety
 - Designed to meet Laser Class 1 comply with EN60825-1

Applications

- Gigabit Ethernet Links
- Fibre Channel Links at 1.06 Gbps
- High Speed Backplane Interconnects
- Switched Backbones

Description

The CT-1250TSP-KBAL-D from Coretek Opto Corp. is the high performance and cost-effective module for serial optical data communication applications specified for single mode of 1.25 Gb/s. It operates with +3.3V power supply. The module is intended for single mode fiber, operates at a nominal wavelength of 1550nm 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 for use in Gigabit Ethernet applications and to provide IEEE-802.3z compliant link for 1.25Gb/s long 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 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.

1.25 Gigabit Ethernet-Single Mode Transceiver



Product Information

Model Number	Operating Voltage & SD Output	Distance	LD Type & Wavelength	Output Power	Sensitivity
CT-1250TSP-KBAL-D	3.3V TTL AC/AC	100 km	1550 nm DFB	2 ~ +7 dBm	≤ -34 dBm

ABSOLUTE MAX RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
Storage Temperature	T_S	-40	85	$^{\circ}\text{C}$	
Supply Voltage	V_{CC}	0	6	V	
Data Input Voltage	---	0	V_{CC}	V	
Supply Current	I_S		300	mA	

OPERATING CONDITIONS

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT	NOTE
Ambient Operating Temperature	T_A	0		70	$^{\circ}\text{C}$	
Supply Voltage	V_{CC}	3.1		3.5	V	
Data Input Voltage Swing	V_{ID}	300		1860	mV	

ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
Transmitter					
Transmitter Supply Current	I_{CCT}		200	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	
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	V_{CC}	V	
MOD_DEF (1) , MOD_DEF (2) - Low	V_{IL}	-0.6	$V_{CC} \times 0.3$	V	
MOD_DEF (1) , MOD_DEF (2) - High	V_{IH}	$V_{CC} \times 0.7$	$V_{CC} + 0.5$	V	

TRANSMITTER ELECTRO-OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTE
Optical Output Power	P_o	2		7	dBm	1
Extinction Ratio	ER	8.2			dB	
Center Wavelength	λ_c	1530	1550	1570	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			260	ps	2
Optical Fall time (20%-80%)	t_f			260	ps	2
Output Eye		Compliant with IEEE802.3z/D5.0				

1.25 Gigabit Ethernet-Single Mode Transceiver



RECEIVER ELECTRO-OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNIT	NOTE
Maximum Input Optical Power	P_{max}	-9			dBm	4
Minimum Input Optical Power	P_{min}			-32	dBm	3
Minimum Input Optical Power	P_{min}			-34	dBm	4
Operating Wavelength	λ	1480	1550	1580	nm	
Optical Return Loss	ORL	12			dB	
Receiver Electrical 3dB Upper Cutoff Frequency	---			1500	MHz	
LOS of Signal - Asserted	P_A	-45			dBm	
LOS of Signal - Deasserted	P_D			-34	dBm	
Loss of Signal -Hysterisis	$P_D - P_A$	0.5			dB	

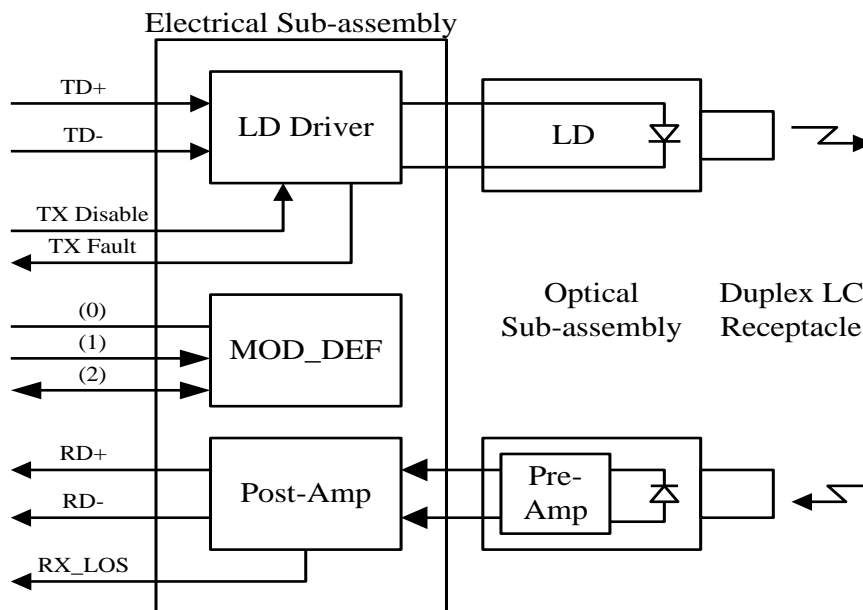
Notes:

1. Measured average power coupled into 9/125 μ m single mode fiber.
2. These are 20-80% values.
3. Measured with 1.25Gbit/s PRBS²⁷-1 at BER<10⁻⁹
4. Measured with 10Mbit/s PRBS²⁷-1 at BER<10⁻⁹

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	

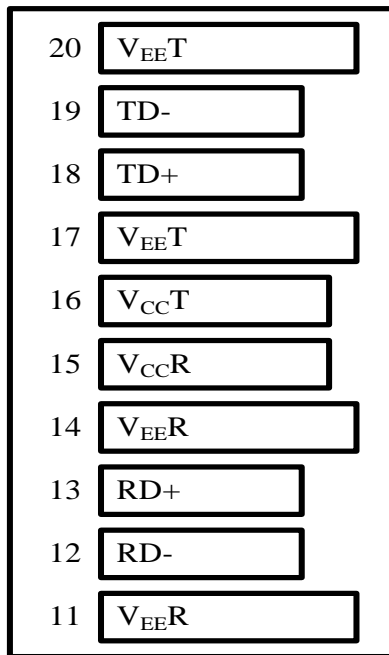
BLOCK DIAGRAM OF TRANSCEIVER



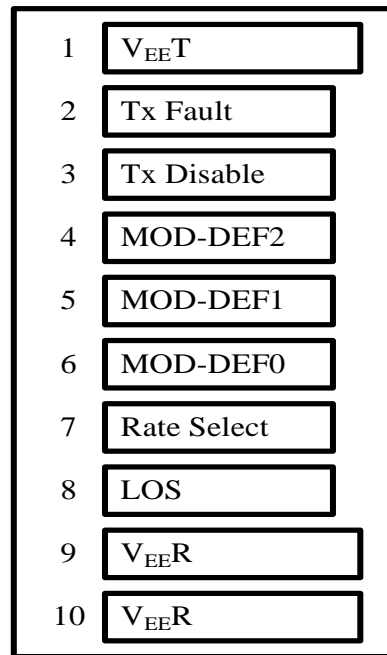
1.25 Gigabit Ethernet-Single Mode Transceiver



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

1.25 Gigabit Ethernet-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 02 10 10 01 01	
11	1	Encoding	01	
12	1	BR,nominal	0D	
13	1	Reserved	00	
14	1	Length (SMF)-km	64	100 Km
15	1	Length (SMF)-100m	FF	
16	1	Length (50um,OM2)	00	
17	1	Length (62.5um,OM1)	00	
18	1	Length (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	Unallocated	00	
37 ~ 39	3	OUI Code	00 00 00	
40 ~ 55	16	Vendor PN	43 54 2D 31 32 35 30 54 53 50 2D 4B 42 41 4C 44	CT-1250TSP-KBALD
56 ~ 59	4	Vendor Rev	30 30 30 31	0001
60 ~ 61	2	Wavelength	06 0E	1550 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	CFxxxxxxxxxxxxxxxx	

1.25 Gigabit Ethernet-Single Mode Transceiver



84 ~ 91	8	Date code		
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		

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 Table3.

Figure 3.1: Digital Diagnostic Memory Map

Specific Data Field Descriptions

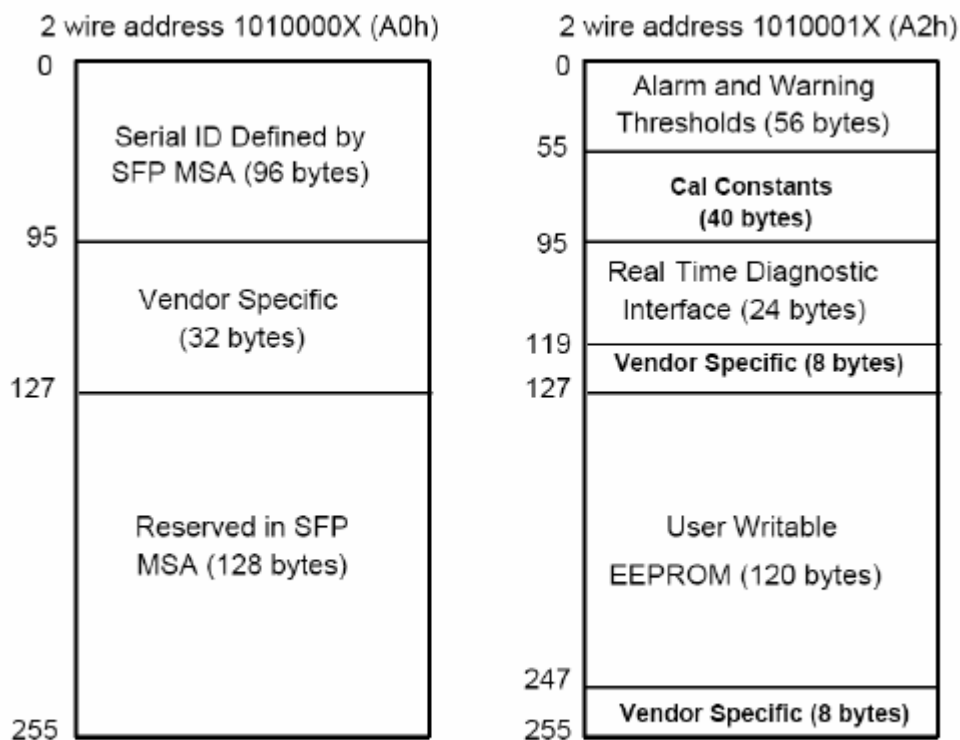


Figure 1, EEPROM Memory Map Specific Data Field Descriptions

1.25 Gigabit Ethernet-Single Mode Transceiver



Table 2- EEPROM Serial ID Memory Contents (A2h)

Addr.	Field Size (Bytes)	Name of Field	Hex	Description
00 ~ 07	8	Temperature Alarm/Warning (°C)	64 00 FB 00 5A 00 00 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	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)	F6 77 31 2D C3 C6 3D E8	Alarm_H/L : 8 /1 Warning_H/L : 7 /2
32 ~ 39	8	Rx Power Alarm/Warning (dBm)	06 30 00 03 04 EA 00 04	Alarm_H/L : -8/-35 Warning_H/L : -9/-34
128 ~ 143	16	Vendor Specific		

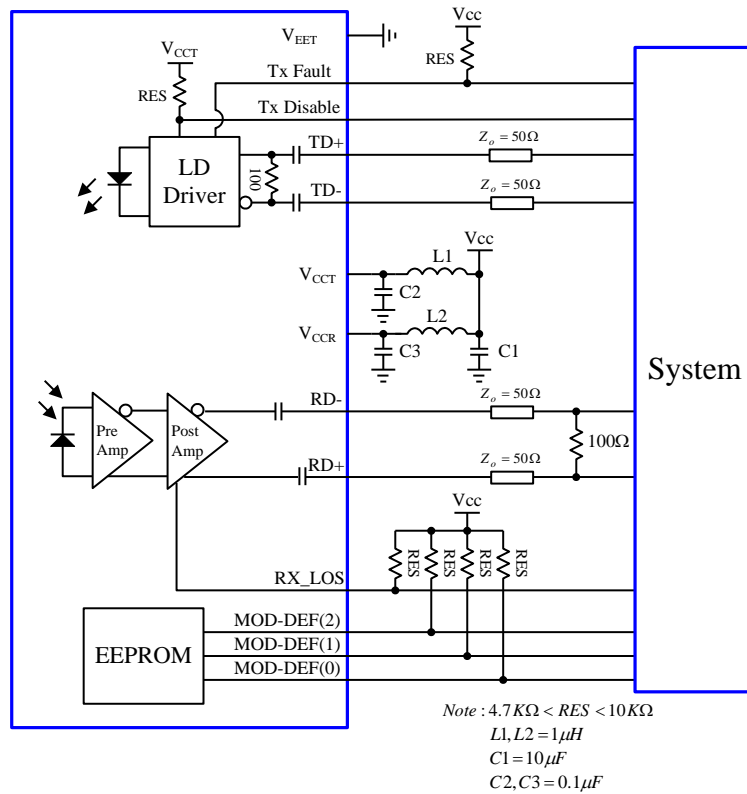
Table 3- Monitoring Specification

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 100mA	±10%	Internal
TX Power	2 to 7 dBm	±3dB	Internal
RX Power	-30 to -9 dBm	±3dB	Internal

1.25 Gigabit Ethernet-Single Mode Transceiver

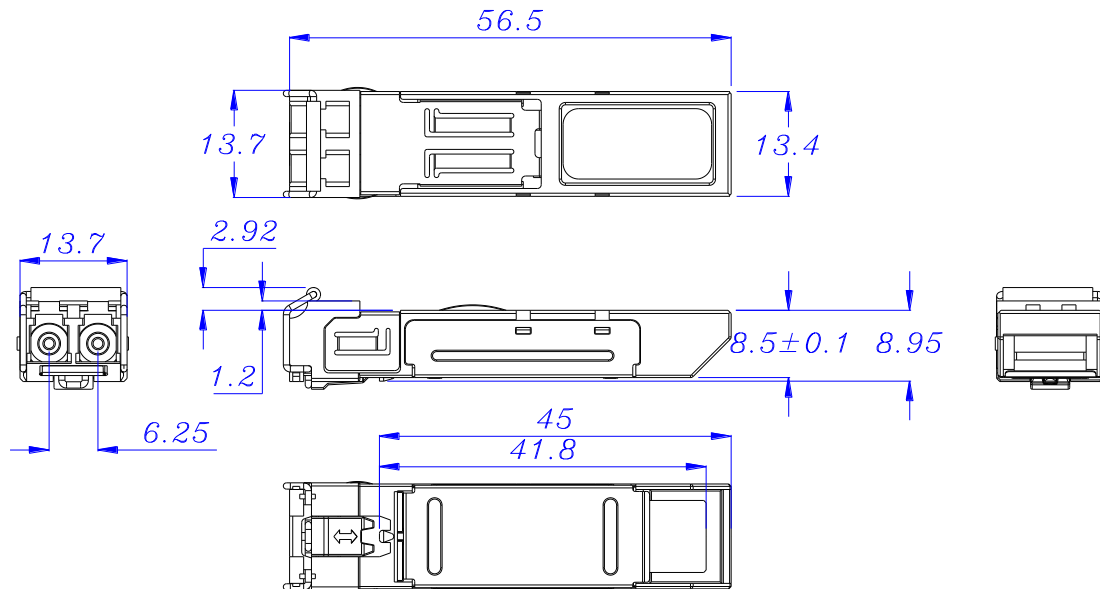


RECOMMENDED CIRCUIT SCHEMATIC



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.