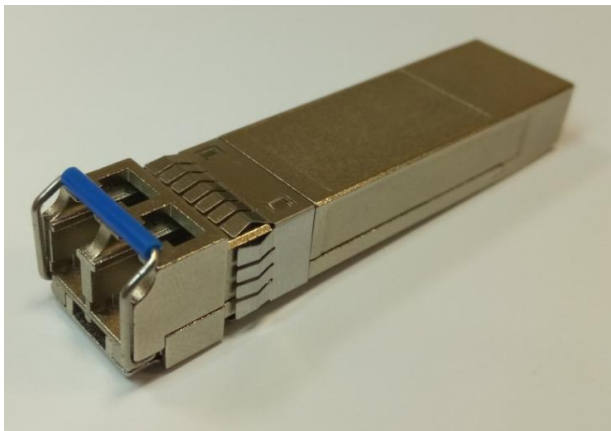
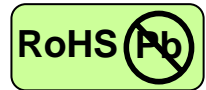


Compact SFP+ (CSFP) Transceiver



SFP BIDI, Dual LC Connector, 1490nm DFB LD for Single Mode Fiber, RoHS Compliant
Digital Diagnostics Functions, Extended Operating Temperature from -40 to +85 °C



Features

- Two Bi-Directional Transceivers in One SFP+ Package.
- CSFP MSA Option 2 Compliant
- 1490nm DFB LD
- Data Rate: 125Mb/s ~ 1.25Gb/s, 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)
- Digital Diagnostic
- Duplex LC Connector
- Compliance with specifications for IEEE-802.3ah 1000BASE-BX10-D

Applications

- Gigabit Ethernet Links
- Fast Ethernet Links
- High Speed Backplane Interconnects
- Switched Backbones

Description

The Compact Small Form Factor Pluggable (CSFP) optical transceiver CP-124MCMC-E 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. There are 2 single fiber duplex transmissions in current SFP form factor. It operates with +3.3V power supply. The module is intended for single mode fiber, operates at a nominal wavelength of Tx: 1490nm / Rx: 1310nm 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 intermediate 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.

Compact SFP+ (CSFP) Transceiver



Product Information

Model Number	Operating Voltage & SD Output	Distance	LD Type & Wavelength	Output Power	Sensitivity
CP-124MCMC-E	3.3V TTL AC/AC	10 km	1490 nm DFB/ 1310 nm	-9 ~ -3 dBm	≤-20 dBm

ABSOLUTE MAX RATINGS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
Storage Temperature	T _S	-40	85	°C	
Supply Voltage	V _{CC}	0	6	V	
Data Input Voltage	---	0	V _{CC}	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	
Supply current (TX+RX) for each channel	I _{CC}			300	mA	
Total supply current (2 channels)	ICC			600	mA	

ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	MAX	UNIT	NOTE
Transmitter					
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 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	
SCL, SDA - Low	V _{IL}	-0.6	V _{CC} × 0.3	V	
SCL, SDA - 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	-9		-3	dBm	1
Extinction Ratio	ER	9			dB	
Center Wavelength	λ _c	1480	1490	1500	nm	
Spectral Width (RMS)	Δλ			1	nm	
Side Mode Suppression Ratio	SMSR	30			dB	
Output optical power TX disabled	P _{O,OFF}			-45	dBm	
Optical Rise time (20%-80%)	t _r			260	ps	2
Optical Fall time (20%-80%)	t _f			260	ps	2
Output Eye diagram	Refer to IEEE802.3AH-2004 Figure 58-5 – Transmitter eye mask definition.					

Compact SFP+ (CSFP) Transceiver



RECEIVER ELECTRO-OPTICAL CHARACTERISTICS

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT	NOTE
Maximum Input Optical Power	P_{max}	-3			dBm	3
Minimum Input Optical Power	P_{min}			-20	dBm	3
1.25Gb/s				-23	dBm	3
Operating Wavelength	λ	1260		1360	nm	
Loss of Signal - Asserted	P_A	-35			dBm	
Loss of Signal - Deasserted	P_D			-20	dBm	
Loss of Signal - Hysteresis	$P_D - P_A$	0.5		4	dB	

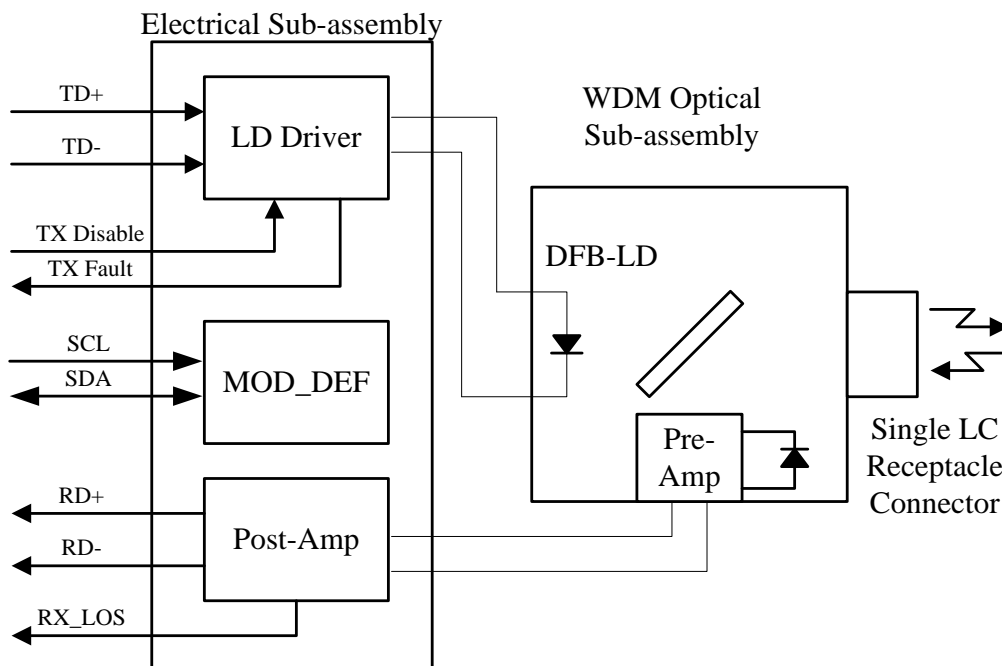
Notes:

1. Measured average power coupled into 9/125 μ m single mode fiber.
2. These are 20-80% values.
3. Measured with 2^7-1 PRBS at BER < 10^{-12} and 1.25Gb/s.

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	
Serial I2C Clock rate	f_{i2c}			100	kHz	
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	

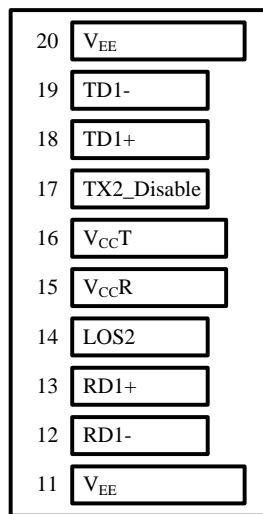
BLOCK DIAGRAM OF TRANSCEIVER



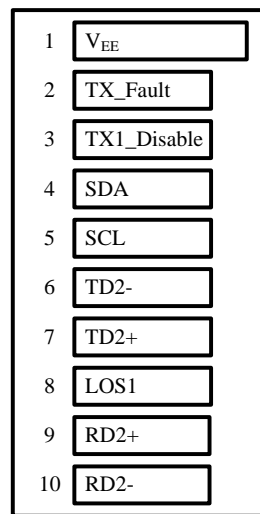
Compact SFP+ (CSFP) Transceiver



PIN OUT DIAGRAM OF TRANSCEIVER



Top of Board



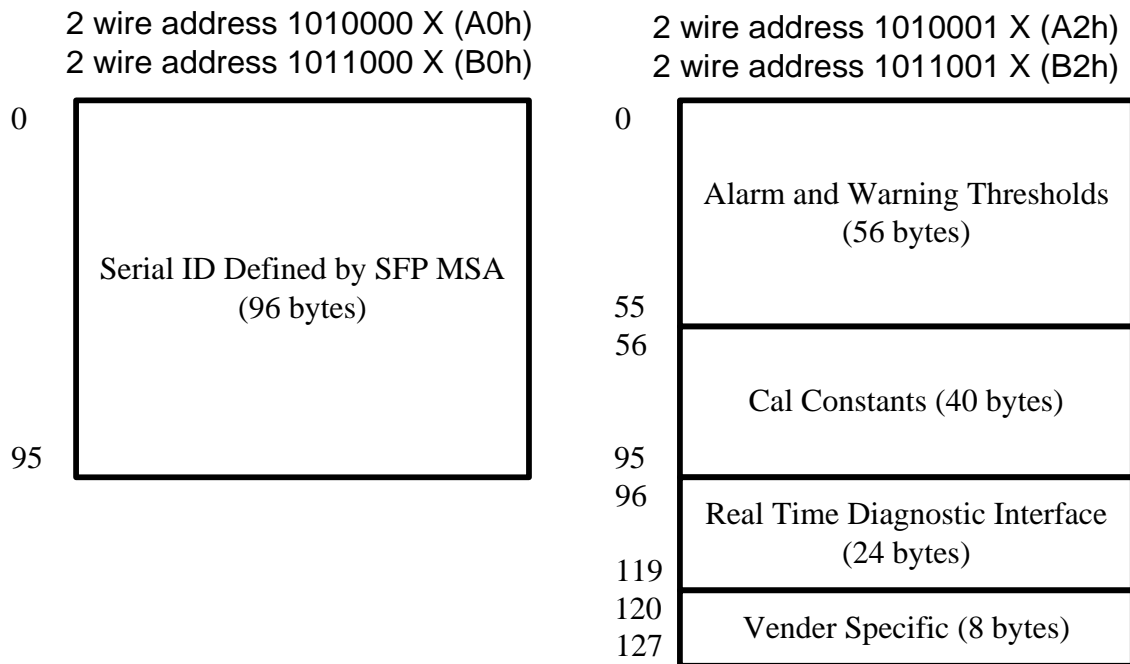
Bottom of Board (As Viewed through Top of Board)

PIN OUT TABLE

Pin	Symbol	Functional Description
1	V _{EE}	Transceiver ground, common for 2 channels.
2	TX_Fault	Transmitter Fault Indication
3	TX_DIS1	Transmitter Disable 1– Module disables on high or open
4	SDA	I ² C data (SDA)
5	SCL	I ² C clock (SCL)
6	TD2-	Inverted transmitter data input of channel 2
7	TD2+	Non-inverted transmitter data input of channel 2
8	LOS1	Loss of Signal in RX channel 1
9	RD2+	Non-Inverted receiver data output of channel 2
10	RD2-	Inverted receiver data output of channel 2
11	V _{EE}	Transceiver ground, common for 2 channels.
12	RD1-	Inverted receiver data output of channel 1
13	RD1+	Non-inverted receiver data output of channel 1
14	LOS2	Loss of Signal in RX channel 2
15	V _{ccR}	Receiver power, common for 2 channels
16	V _{ccT}	Transmitter power, common for 2 channels
17	TX_DIS2	Transmitter Disable 2– Module disables on high or open
18	TD1+	Non-Inverted transmitter data input of channel 2
19	TD1-	Inverted transmitter data input of channel 2
20	V _{EE}	Transceiver ground, common for 2 channels.

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 channel1 usage and B0h , B2h for channel2 usage.

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	SFP function is defined by two-wire interface ID only
02	1	Connector	07	LC
03 ~ 10	8	Transceiver Codes	00 00 00 40 00 00 00 00	
11	1	Encoding	03	NRZ

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12	1	BR,nominal	0D	1300Mb/s
13	1	Reserved	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 (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 50 2D 31 32 34 4D 43 4D 43 2D 45 20 20 20 20	CP-124MCMC-E
56 ~ 59	4	Vendor Rev	30 30 30 30	0000
60 ~ 61	2	Wavelength	05 D2	1490 nm
62	1	Reserved	00	
63	1	CC BASE	XX	Check sum
64 ~ 65	2	Options	00 12	LOS and TX_DISABLE
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		

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

Compact SFP+ (CSFP) Transceiver



				Warning_H/L : 3.5/3.1
16 ~ 23	8	BiasCurrent Alarm/Warning (mA)	75 30 03 E8 61 A8 07 D0	Alarm_H/L : 60/2 Warning_H/L : 50/4
24 ~ 31	8	Tx Power Alarm/Warning (dBm)	18 A6 03 E8 13 94 04 EB	Alarm_H/L : -2/-10 Warning_H/L : -3/-9
32 ~ 39	8	Rx Power Alarm/Warning (dBm)	18 A6 00 4F 13 94 00 64	Alarm_H/L : -2/-21 Warning_H/L : -3/-20
40-55	16	Reserved		

Table 3- Calibration Constants (2 Wire Address A2h)

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.

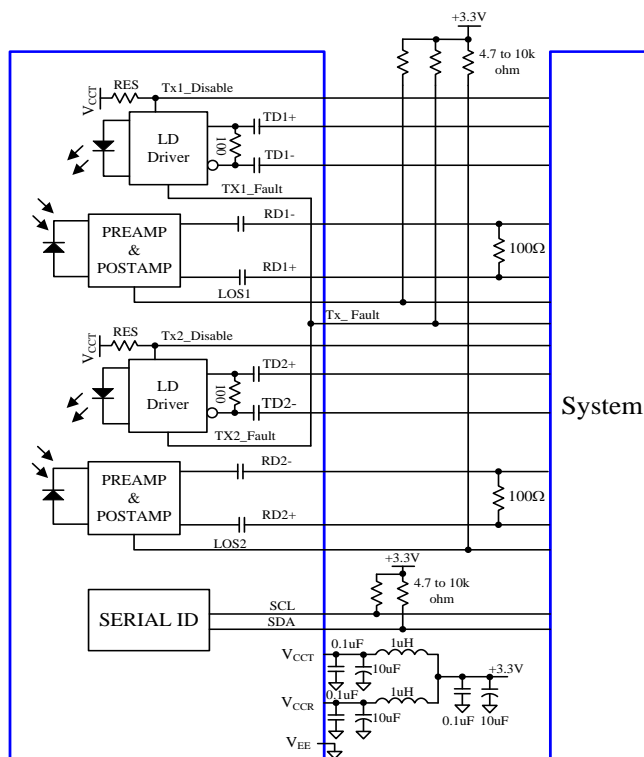
Table3 - Monitoring Specification

Parameter	Range	Accuracy	Calibration
Temperature	-40°C to 110°C	±3°C	Internal
Voltage	3.0 to 3.6V	±3%	Internal
Bias Current	0 to 60mA	±10%	Internal
TX Power	-10 to -2 dBm	±3dB	Internal
RX Power	-21 to -2 dBm	±3dB	Internal

Compact SFP+ (CSFP) Transceiver

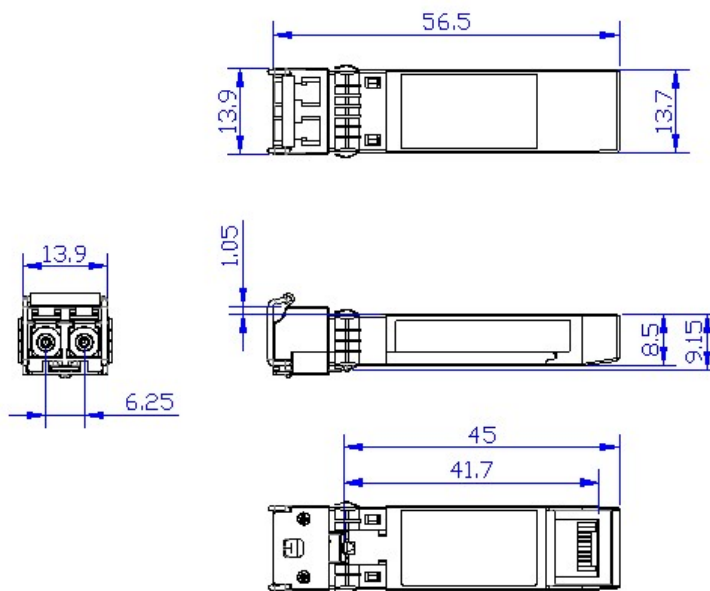


RECOMMENDED CIRCUIT SCHEMATIC



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.