Product Specification

25G SFPwire® SFP+ Active Optical Cable

FCBG125SD1Cxx-WX

PRODUCT FEATURES

- Hot-pluggable SFP+ cable ends
- Supports 25.7813 Gb/s bit rate
- SFI limiting interface
- Input equalization and output emphasis controls
- Single 3.3V power supply
- Low power dissipation
- Temperature range: 0°C to 70°C
- Rigid pull-tab

APPLICATIONS

- 25G Ethernet for Intra- and Inter-Rack datacenter interconnection

The 25G SFPwire® FCBG125SD1Cxx-WX is an SFP+ Active Optical Cable designed for use in 25G Ethernet links. The electrical interface of the 25G SFPwire® is compliant with SFF-8431[1] and the receiver side is limiting.

The 25G SFPwire® provides non-adaptive input equalization and output emphasis controls as per SFF-8472[2]. The mechanical specifications of the 25G SFPwire® SFP+ ends are compatible with SFF-8432[3] and is RoHS compliant as described in Application Note AN-2038[4,5].

PRODUCT SELECTION

	Cable Length Options (Orange Jacket Cables)	
FCBG125SD1Cxx-WX	xx = Z5 → 0.5m	xx = 05 → 5m
	xx = 01 → 1.0m	xx = 07 → 7m
	xx = A5 → 1.5m	xx = 09 → 9m
	xx = 02 → 2.0m	xx = 10 → 10m
	xx = B5 → 2.5m	xx = 15 → 15m
	xx = 03 → 3.0m	xx = 20 → 20m
	xx = C5 → 3.5m	xx = 30 → 30m

Please contact Coherent for custom length options.

I. Pin Descriptions

Pin	Symbol	Name/Description	Ref.
1	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T_{FAULT}	Transmitter Fault.	2,3
3	T_{DIS}	Transmitter Disable. Laser output disabled on high or open.	4
4	SDA	2-wire Serial Interface Data Line	2
5	SCL	2-wire Serial Interface Clock Line	2
6	MOD_ABS	Module Absent. Grounded within the module	5
7	RS0	No connection required	
8	RX_LOS	Loss of Signal indication. Logic 0 indicates normal operation.	6
9	RS1	No connection required	
10	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
11	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
12	RD-	Receiver Inverted DATA out. AC Coupled	
13	RD+	Receiver Non-inverted DATA out. AC Coupled	
14	V_{EER}	Receiver Ground (Common with Transmitter Ground)	1
15	V_{CCR}	Receiver Power Supply	7
16	V_{CCT}	Transmitter Power Supply	7
17	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC Coupled.	
19	TD-	Transmitter Inverted DATA in. AC Coupled.	
20	V_{EET}	Transmitter Ground (Common with Receiver Ground)	1

Notes:
1. Circuit ground is internally isolated from chassis ground.
2. Open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V.
3. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <0.8V.
4. Laser output disabled on T_{DIS} >2.0V or open, enabled on T_{DIS} <0.8V.
5. Internally pulled down per SFF-8431 Rev 4.1.
6. LOS is open collector output. Should be pulled up with 4.7k – 10kΩ on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.
7. Internally connected.

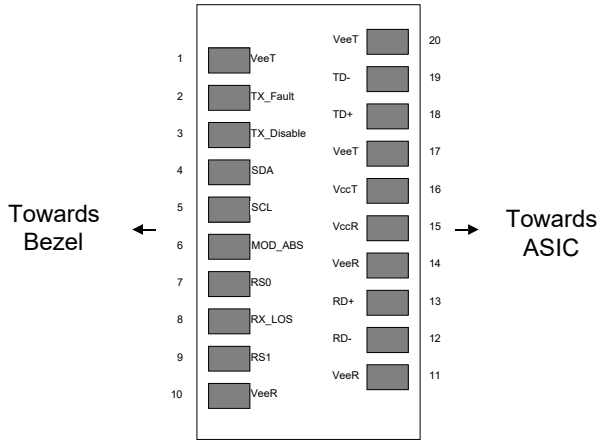


Figure 1. Diagram of Host Board Connector Block Pin Numbers and Names.

II. Absolute Maximum Ratings

Exceeding the limits below may damage the active optical cable permanently.

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Maximum Supply Voltage	Vcc	-0.5		4.0	V	
Storage Temperature	T_S	-40		85	°C	1
Case Operating Temperature	T_A	0		70	°C	
Relative Humidity	RH	0		85	%	2

Notes:
1. Assumes no mechanical load force on the unit. Ensuring no mechanical load force requires a cable bend radius of >70 mm. Otherwise, the storage temperature range is -20 to 75°C.
2. Non-condensing.

III. Electrical Characteristics (each cable end, T_{OP} = 0 to 70 °C, V_{CC} = 3.14 to 3.46 Volts)

Parameter	Symbol	Min	Typ	Max	Unit	Ref.
Supply Voltage	Vcc	3.14		3.46	V	
Supply Current	Icc			310	mA	
Transmitter						
Input differential impedance	R_{in}		100		Ω	1
Differential data input swing	Vin,pp	180		700	mV	
Transmit Disable Voltage	V_D	2		Vcc	V	
Transmit Enable Voltage	V_{EN}	Vee		Vee+ 0.8	V	
Receiver						
Differential data output swing	Vout,pp	300		850	mV	2
Data output rise time, fall time	t_r			28	ps	3
LOS Fault	$V_{LOS\ fault}$	2		Vcc_{HOST}	V	4
LOS Normal	$V_{LOS\ norm}$	Vee		Vee+0.8	V	4
Power Supply Noise Tolerance	VccT/VccR	Per SFF-8431 Rev 4.1			mVpp	5

Notes:
1. Connected directly to TX data input pins. AC coupling from pins into laser driver IC.
2. Into 100Ω differential termination.
3. 20 – 80% . Measured with Module Compliance Test Board and OMA test pattern. Use of four 1's and four 0's in sequence in the PRBS^9 is an acceptable alternative[1].
4. LOS is an open collector output. Should be pulled up with 4.7kΩ – 10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1. Maximum pull-up voltage is 5.5V.
5. Testing methodology per [1].

IV. Input Equalization and Output Emphasis Controls

Coherent FCBG125SD1Cxx-WX provide non-adaptive input equalization and output emphasis controls, allowing the host to select pre-set levels of optimization of the electrical high-speed signals of the transceiver's transmitter input and receiver output, via the 2-wire communication, as defined in the SFF-8472[2].

V. General Specifications

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Bit Rate	BR		25.78125		Gb/s	
Bit Error Ratio	BER			10^{-8}		1

Notes:
1. Pre-FEC, tested with a PRBS $2^{31} – 1$.

VI. Environmental Specifications

The following table shows the operating temperature range of the FCBG125SD1Cxx-WX.

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Case Operating Temperature	T_{op}	0		70	°C	

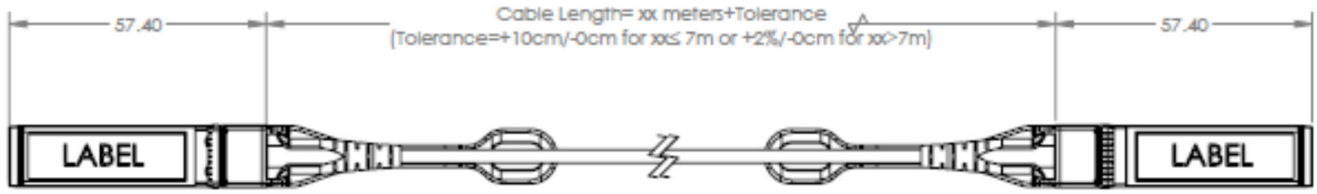
VII. Regulatory Compliance

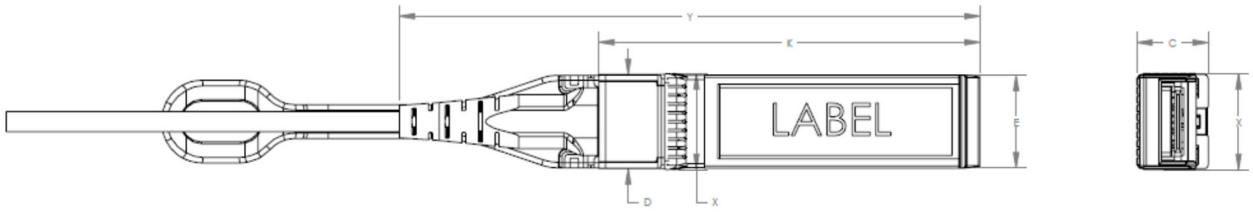
The FCBG125SD1Cxx-WX SFPwire, which contains laser devices, is a Class 1 laser product and complies with 21CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated June 24, 2007, and it complies with EN(IEC) 60825 Edition 1.2 regulations. The 25G SFPwire® is RoHS compliant per Directive 2011/65/EU[4,5].

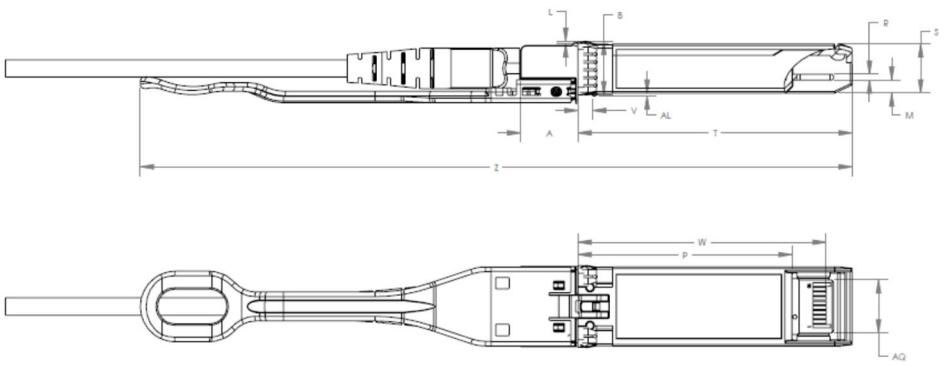
Copies of certificates are available at Coherent upon request.

VIII. Mechanical Specifications

The FCBG125SD1Cxx-WX SFPwire SFP+ cable ends are compatible with the SFF-8432 specifications and provide a black rigid pull tab.







Num	DIM(MM)	TOL(MM)
A	9.90	+0.1/-0.2
B	9.28	±0.5
C	10.75	REF
D	13.90	±0.1
E	13.70	±0.1
K	57.40	REF
L	0.45	±0.3
M	2.25	±0.1
P	37.10	±0.30
R	1.00	±0.1
S	8.55	±0.15
T	47.50	±0.20
V	2.55	±0.10
W	43.00	±0.2
X	14.20	REF
Y	87.45	REF
Z	123.30	±0.30
AL	0.50	±0.10
AQ	9.20	±0.10

Figure 2. FCBG125SD1Cxx-WX Mechanical Dimensions.

FCBG125SD1Cxx-WX SFPwire® cable details

Description	Min	Typ	Max	Units	Notes
Jacket Material		PVC			PVC
Jacket Color		Orange			Aqua available upon request
Flammability Rating		OFNR			Plenum Cable option available upon request
Outer Diameter	2.8	3.0	3.2	mm	
Tensile Load (Short Term)			200	N	
Tensile Load (Long Term)			100	N	
Crush Resistance	10			N/mm	FOTP-41
Impact Resistance	0.5			N·m	FOTP-25
Flexing	300			Cycles	FOTP-104
Twist Bend					Exceeds FOTP-85
Cable to SFP+ Plug Connection			90	Newtons	
Bend Radius (Short Term)	25			mm	
Bend Radius (Long Term)	30			mm	
Durability	100			Cycle Min	

VIX. PCB Layout and Bezel Recommendations

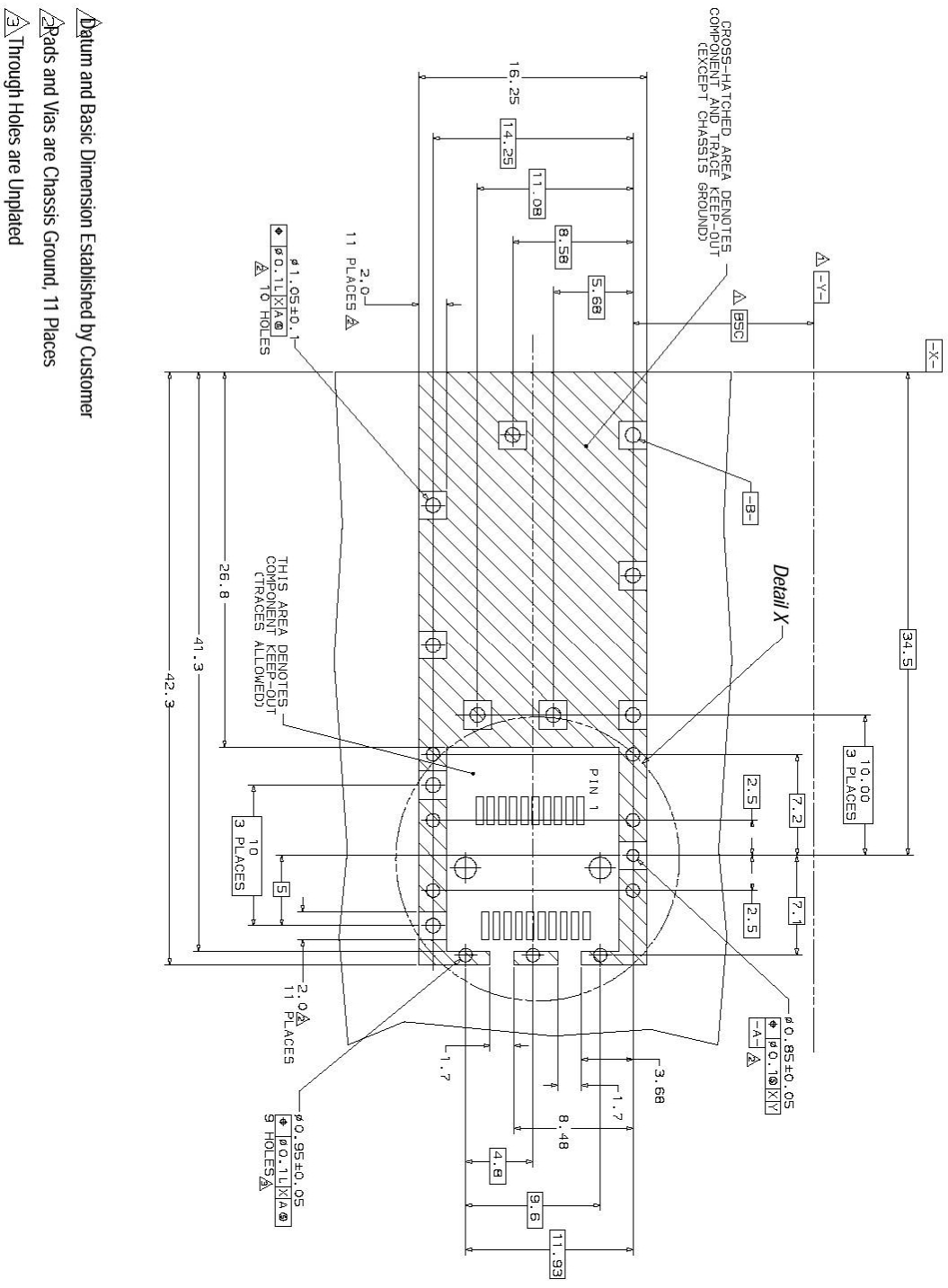
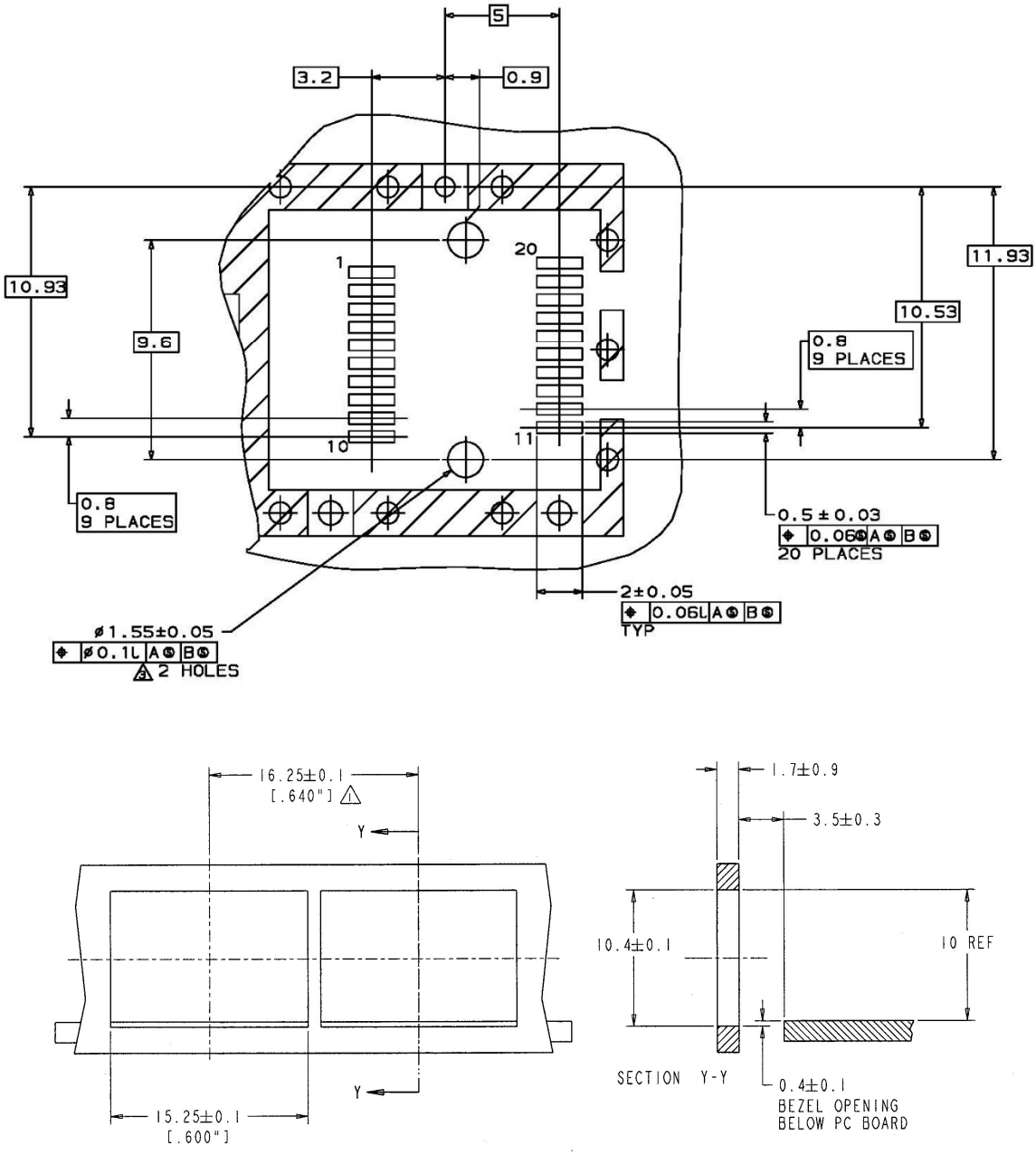


Figure 3.



NOTES:

1. MINIMUM PITCH ILLUSTRATED, ENGLISH DIMENSIONS ARE FOR REFERENCE ONLY
2. NOT RECOMMENDED FOR PCI EXPANSION CARD APPLICATIONS

Figure 4.

X. Host - Active optical cable end Interface Block Diagram

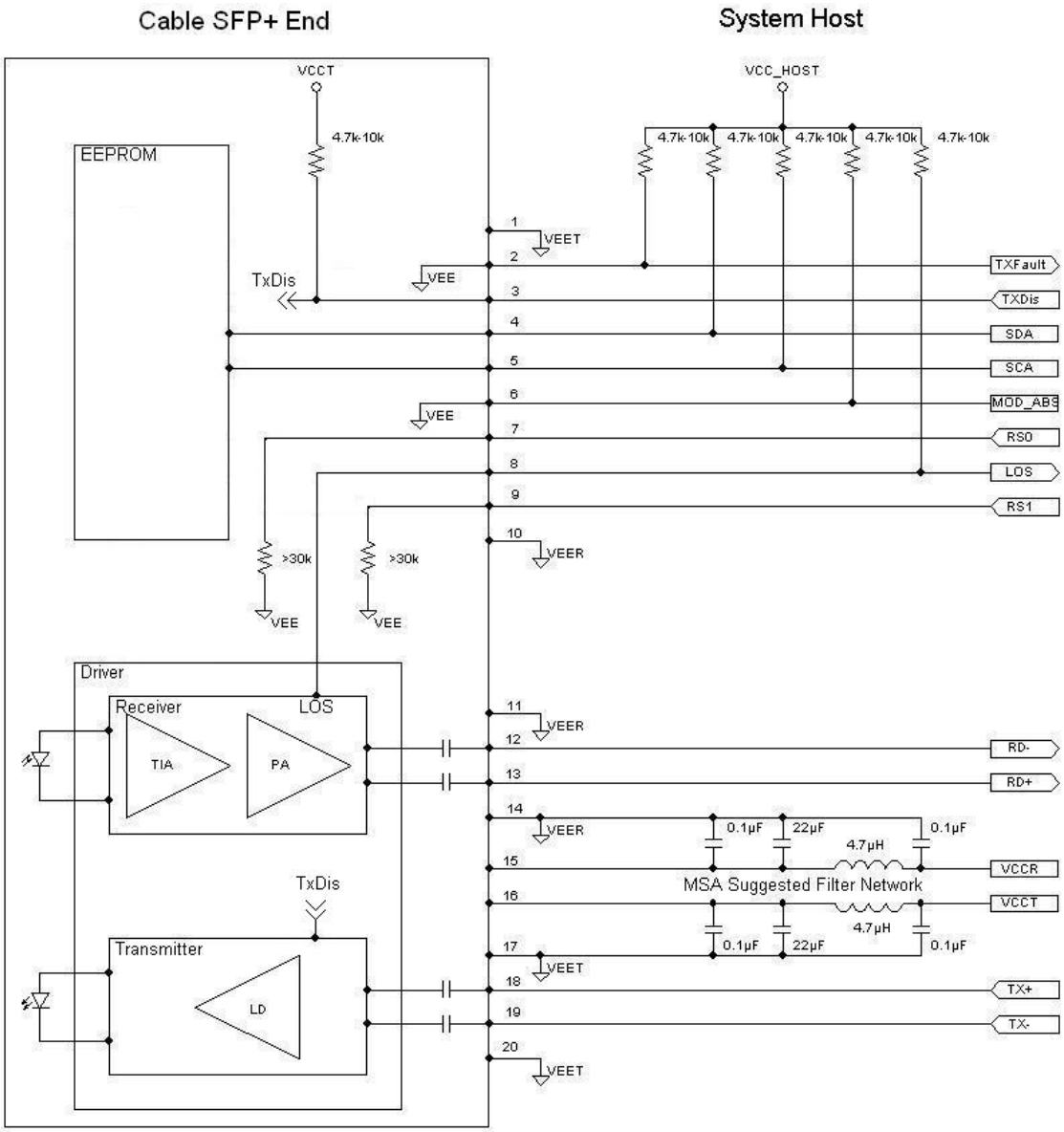


Figure 5.

XI. References

1. “Specifications for Enhanced 8.5 and 10 Gigabit Small Form Factor Pluggable Module ‘SFP+ ‘”, SFF Document Number SFF-8431, Revision 4.1.

2. “Diagnostic Monitoring Interface for Optical Transceivers”, SFF Document Number SFF-8472, revision 12.2, November 21, 2014.

3. “Improved Pluggable Formfactor”, SFF Document Number SFF-8432, Revision 4.2, April 18, 2007.

4. Directive 2011/65/EU of the European Parliament and of the Council “on the restriction of the use of certain hazardous substances in electrical and electronic equipment”. Certain products may use one or more exemption as allowed by the directive.

5. “Application Note AN-2038: II-VI Implementation of RoHS Compliant Transceivers”, Coherent Corp., January 21, 2005.

XII. For More Information

Coherent Corp.
375 Saxonburg Boulevard
Saxonburg, PA 16056
sales@coherent.com
www.coherent.com