

Features:

- ☞ Single Mode fiber transmission
- ☞ SFP Multi-source Package with LC Receptacle
- ☞ Support multi protocol from 8.5Gb/s to 11.3Gb/s
- ☞ Hot-Pluggable Capability
- ☞ Single +3.3V Power Supply
- ☞ Transmission distance of 40km over single mode fiber
- ☞ 100GHz ITU Grid, C Band
- ☞ DWDM EML transmitter
- ☞ PIN Receiver
- ☞ Compliant with Specifications for IEEE802.3Z
- ☞ 2-wire interface for management and diagnostic monitor
- ☞ Eye Safety Designed to Meet Laser Class1, Compliant with IEC60825-1

Applications:

- ☞ 10GBASE-ER/EW Ethernet
- ☞ 10G Fiber channel
- ☞ SONET OC-192/SDH STM-64
- ☞ DWDM Networks

Specification:

● Electrical and Optical Characteristics: (Condition: $T_a=T_{OP}$)

Parameter	Symbol	Min.	Typical	Max.	Unit
Transmitter Differential Input Voltage	+/-TX_DAT	200		2400	mV p-p
Supply Current	I _{CC}		150	300	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 Differential Output Voltage	+/-RX_DAT	600		1400	mV p-p
Rx_LOS Output Voltage- Low	V _{OL}	0		0.8	V
Rx_LOS Output Voltage- High	V _{OH}	2.0		V _{CC}	V

● Characteristics of Transmitter

Transmitter :					
Parameter	Symbol	Min.	Typical	Max.	Unit
Data Rate	B	-	10	-	Gb/s

Centre Wavelength (Refer Ordering information)	λ_c	-	λ	-	nm
Output Spectral Width	$\Delta\lambda$	-	-	1	nm
Average Output Power	P_o	-1	-	+4	dBm
Side-mode Suppression Ratio	SMSR	30	-	-	dB
Extinction Ratio	EXT	4	-	-	dB
Data Input Voltage-High	V_{IHS}	$V_{cc}-1.16$	-	$V_{cc}-0.89$	V
Data Input Voltage -Low	V_{ILS}	$V_{cc}-1.82$	-	$V_{cc}-1.48$	V
Supply Current	I_{CC}	-	80	150	mA
Output Optical Eye	Compliant with IEEE802.3Z				
Receiver :					
Parameter	Symbol	Min.	Typical	Max.	Unit
Receive Sensitivity	P_{min}	-	-	-17	dBm
Operating Wavelength	λ_c	1260		1620	nm
Maximum Input Power	P_{MAX}	-3	-	-	dBm
Signal Detection-Asserted	SD_{HIGH}	-	-	-36	dBm
Signal Detection-Deserted	SD_{LOW}	-45	-	-	dBm
Hysteresis	-	-	3.0	-	dBm
Output High Voltage	V_{OH}	$V_{cc}-1.03$	-	$V_{cc}-0.89$	V
Output Low Voltage	V_{OL}	$V_{cc}-1.82$	-	$V_{cc}-1.63$	V
Supply Current	I_{CC}	-	80	150	mA

● **Absolute Maximum Ratings: ($T_C=25^\circ\text{C}$)**

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	T_{ST}	-40	+85	$^\circ\text{C}$
Operating Temperature	T_{IP}	0(-40)	+70(+85)	$^\circ\text{C}$
Input Voltage	T_{CC}	0	+5	V

● **Recommended Operating Environment:**

Parameter	Symbol	Min.	Typical	Max.	Unit
Supply Voltage	V_{CC}	+3.0	+3.3	+3.6	V

Operating Temperature	T _{OP}	0	-	+70	°C
-----------------------	-----------------	---	---	-----	----

● **Timing Characteristics:**

Parameter	Symbol	Min.	Typical	Max.	Unit
TX_DISABLE Assert Time	t _{off}		3	10	usec
TX_DISABLE Negate Time	t _{on}		0.5	1	msec
Time to Initialize Include Reset of TX_FAULT	t _{int}		30	300	msec
TX_FAULT from Fault to Assertion	t _{fault}		20	100	usec
TX_DISBEL Time to Start Reset	t _{reset}	10			usec
Receiver Loss of Signal Assert Time (Off to On)	T _{A,RX_LOS}			100	usec
Receiver Loss of Signal Assert Time (On to Off)	T _{d,RX_LOS}			100	usec

● **Serial ID Memory Contents:**

Data Address	Length (Byte)	Name of Length	Description and Contents
Base ID Fields			
0	1	Identifier	Type of Serial transceiver (03h=SFP)
1	1	Reserved	Extended identifier of type serial transceiver (04h)
2	1	Connector	Code of optical connector type (07=LC)
3-10	8	Transceiver	Gigabit Ethernet 1000Base-SX & Fiber Channel
11	1	Encoding	8B10B (01h)
12	1	BR,Nominal	Nominal baud rate, unit of 100Mbps
13-14	2	Reserved	(0000h)
15	1	Length(9um)	Link length supported for 9/125um fiber, units of 100m
16	1	Length(50um)	Link length supported for 50/125um fiber, units of 10m
17	1	Length(62.5um)	Link length supported for 62.5/125um fiber, units of 10m
18	1	Length(Copper)	Link length supported for copper, units of meters
19	1	Reserved	
20-35	16	Vendor Name	SFP vendor name
36	1	Reserved	
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID
40-55	16	Vendor PN	Part Number
56-59	4	Vendor rev	Revision level for part number
60-62	3	Reserved	

63	1	CCID	Least significant byte of sum of data in address 0-62
Extended ID Fields			
64-65	2	Option	Indicates which optical SFP signals are implemented (001Ah = LOS, TX_FAULT, TX_DISABLE all supported)
66	1	BR, max	Upper bit rate margin, units of %
67	1	BR, min	Lower bit rate margin, units of %
68-83	16	Vendor SN	Serial number (ASCII)
84-91	8	Date code	Manufacturing date code
92-94	3	Reserved	
95	1	CCEX	Check code for the extended ID Fields (addresses 64 to 94)
Vendor Specific ID Fields			
96-127	32	Readable	specific date, read only

● Digital Diagnostic Monitoring Functions

2-wire serial bus address 1010001X (A2h) is used to access measurement of transceiver temperature, internally measured supply voltage, TX bias current, TX optical output power and RX optical input power which are shown in table 1. Each diagnostic parameter has a corresponding high alarm, low alarm, high warning and low warning threshold which are shown in table 2.

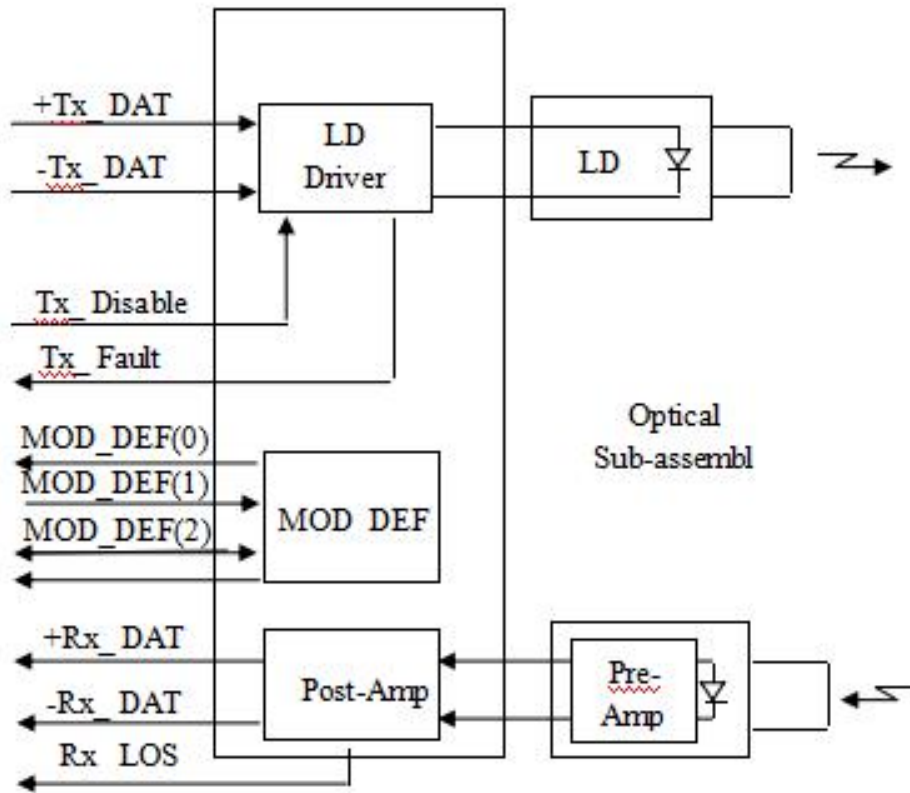
Table 1. Diagnostic Parameters

Diagnostic Parameter	Range		LSB	Accuracy	Address	Note
	Min	Max				
Transceiver Temperature (Temp)	-50[°C]	+80[°C]	1/256[°C]	±3[°C]	96-97	A 16bit signed two's complement value
Supply Voltage (Voltage)	+3.0[V]	+3.6[V]	100[μ V]	±3[%]	98-99	A 16bit unsigned integer
TX Bias Current (Bias)	3[mA]	95[mA]	2.0[μ A]	±10[%]	100-101	A 16bit unsigned integer
TX Optical Output Power (TX Power)	-1[dBm]	+4[dBm]	0.1[μ W]	±3 [dB]	102-103	A 16bit unsigned integer
RX Optical Input Power (RX Power)	-17[dBm]	+0[dBm]	0.1[μ W]	±3 [dB]	104-105	A 16bit unsigned integer

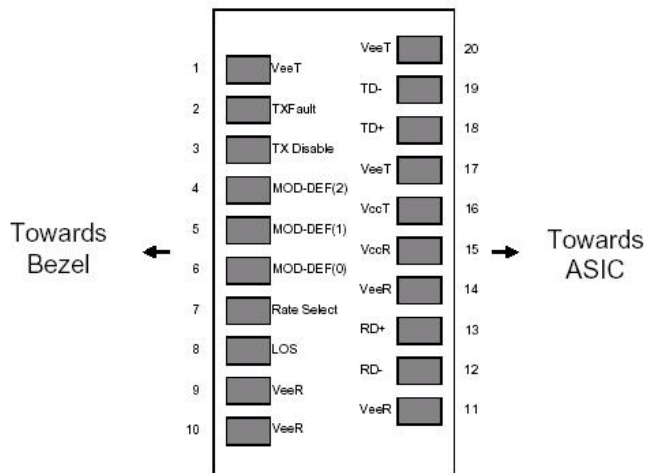
Table 2. Alarm and Warning Thresholds

Parameter	Warning		Alarm		Unit
	Low	High	Low	High	
Transceiver Temperature (Temp)	-10	+80	-20	+90	°C
Supply Voltage (Voltage)	+3.13	+3.47	+3.0	+3.6	V
TX Bias Current (Bias)	5	85	3	95	mA
TX Optical Output Power (TX Power)	-1	+4	-2	+5	dBm
RX Optical Input Power (RX Power)	-17	+1	-18	+2	dBm

Block Diagram of Transceiver:



Pin Assignment:



Pin out of Connector Block on Host Board

Pin Description:

Pin	Symbol	Name/Description	Ref.
1	V _{EET}	Transmitter Ground (Common with Receiver Ground)	1
2	T _{FAULT}	Transmitter Fault. Not supported.	
3	T _{DIS}	Transmitter Disable. Laser output disabled on high or open.	2
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.	3
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	3
6	MOD_DEF(0)	Module Definition 0. Grounded within the module.	3
7	Rate Select	No connection required	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	4
9	V _{EER}	Receiver Ground (Common with Transmitter Ground)	1
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	
16	V _{CCT}	Transmitter Power Supply	
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. Laser output disabled on TDIS >2.0V or open, enabled on TDIS <0.8V.
3. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V.
MOD_DEF(0) pulls line low to indicate module is plugged in.
4. LOS is open collector output. Should be pulled up with 4.7k – 10kohms on host board to a voltage between 2.0V and 3.6V. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

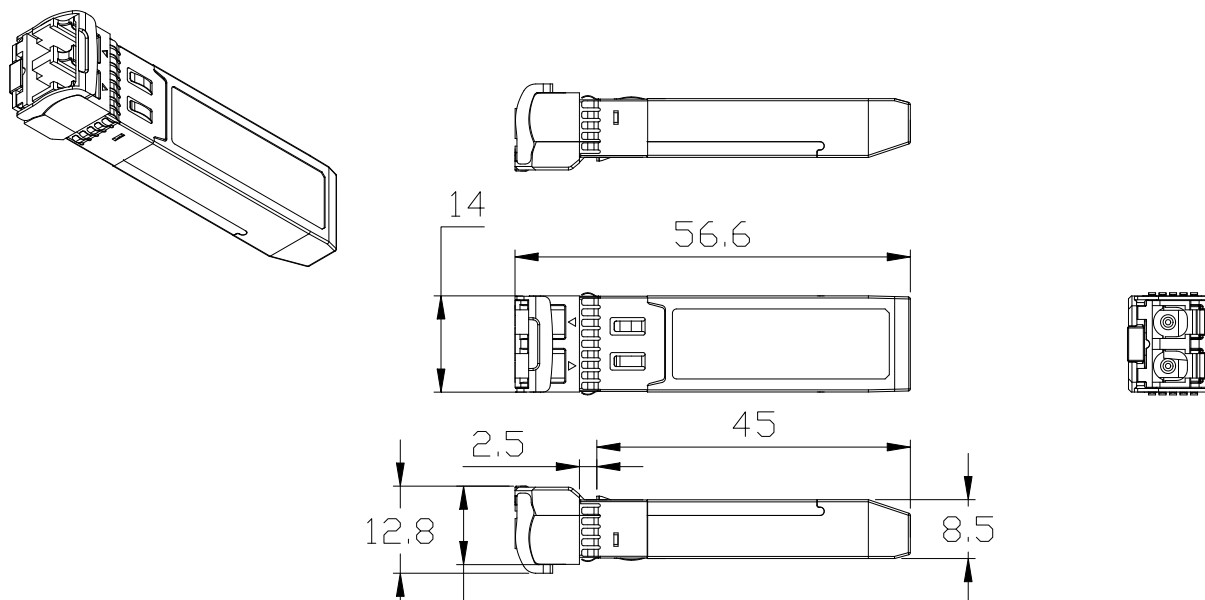
Ordering information:

Part Number	Package	Rate	Fiber type	Distance	Wavelength (nm)	Temperature (°C)
TM-EDDxx-443E-Cxxx	SFP	10Gbps	SMF	40km	Refer to table below	0/+70

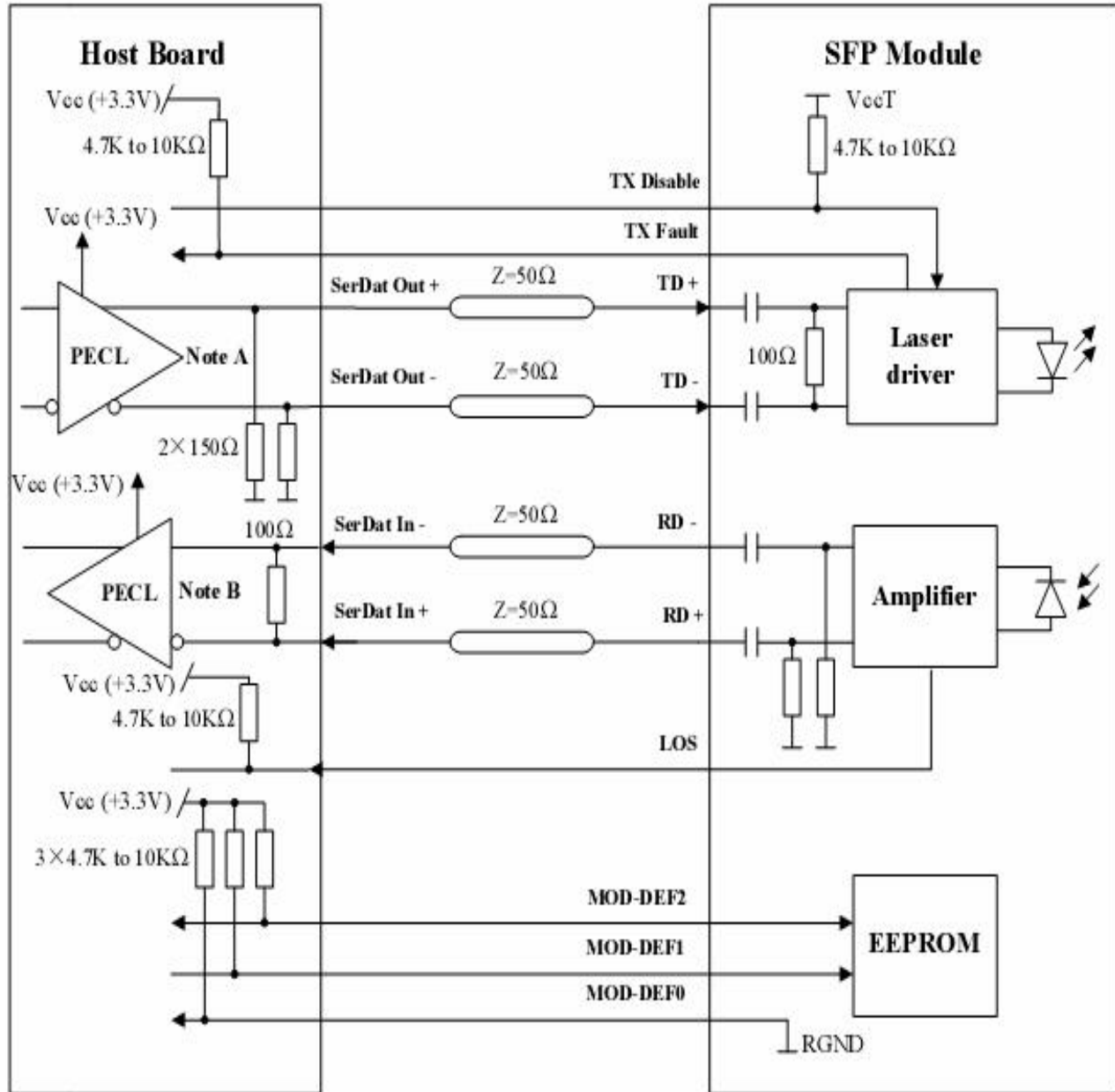
Cxxx/Cxx:DWDM Channel representation (C563 or C18 Representative 1563.05nm)						
Channel	Wavelength	frequency		Channel	Wavelength	frequency
C18	1563.05	191.8		C19	1562.23	191.9
C20	1561.419	192.0		C21	1560.606	192.1
C22	1559.794	192.2		C23	1558.983	192.3
C24	1558.173	192.4		C25	1557.363	192.5

C26	1556.555	192.6		C27	1555.747	192.7
C28	1554.940	192.8		C29	1554.134	192.9
C30	1553.329	193.0		C31	1552.524	193.1
C32	1551.721	193.2		C33	1550.918	193.3
C34	1550.116	193.4		C35	1549.315	193.5
C36	1548.515	193.6		C37	1547.715	193.7
C38	1546.917	193.8		C39	1546.119	193.9
C40	1545.322	194.0		C41	1544.526	194.1
C42	1543.730	194.2		C43	1542.936	194.3
C44	1542.142	194.4		C45	1541.349	194.5
C46	1540.557	194.6		C47	1539.766	194.7
C48	1538.976	194.8		C49	1538.186	194.9
C50	1537.397	195.0		C51	1536.61	195.1
C52	1535.82	195.2		C53	1535.04	195.3
C54	1534.25	195.4		C55	1533.47	195.5
C56	1532.68	195.6		C57	1531.90	195.7
C58	1531.12	195.8		C59	1530.33	195.9
C60	1529.55	196.0		...		

Mechanical Dimensions:



Recommended Circuit:



Note A: Circuit assumes open emitter output

Note B: Circuit assumes high impedance internal bias @Vcc-1.3V