Product Specification
SFP+ 10G ZR 80km LC Optical Transceiver

1. Features

- Operating data rate up to 10.3Gbps
- 1550 nm cooled EML Transmitter
- Distance up to 80 km over SMF
- Single 3. 3V Power supply and TTL Logic Interface
- Duplex LC Connector Interface
- Hot Pluggable
- Operating Case Temperature
- Standard: 0°C ÷ +70°C Industrial: -40°C ÷ +85°C
- Compliant with MSA SFP Specification
- Digital diagnostic monitor are selectable

2. Standards

- Compliant with SFP MSA (INF-8074i)
- Compliant with IEEE802.3z Gigabit Ethernet
- Compatible with SFF-8472
- Compliant with ITU-T G. 695
- Compliant with FC-PI v2.0

3. Applications

- 10GBASE-ZR at 10.31Gbps
- 10GBASE-ZW at 9.95Gbps
- 1000 Base-ZX Ethernet
- 8XFC at 8.5Gbps
- 4XFC at 4.25Gpbs
- 2XFC at 2.125Gpbs
- 1xFC at 1.0625Gbps
- Other optical links

4. Absolute Maximum Ratings

Parameter	Symbol	Min.	Max.	Unit
Storage Temperature	Ts	-40	+85	°C
Relative Humidity	RH	5	95	%
Supply Voltage	Vcc	-0.5	4.0	V

5. Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit
Operating Case Temperature	TA	0		+70	°C
Power Supply Voltage	Vcc	3.15	3.3	3.45	V
Power Supply Current	Icc			300	mA
Surge Current	Isurge			+30	mA
Baud Rate			1.25		GBaud

6. Specifications-Electrical

Parameter	Symbol	Min.	Typ.	Max	Unit	Notes
TRANSMITTER						
LVPECL Inputs(Differential)	Vin	400		2500	mVp	AC coupled inputs
Input Impedanee (Differential)	Zin	85	100	115	ohms	Rin > 100 kohms @ DC
Tx_DISABLE Input Voltage - High		2		3.45	V	
Tx_DISABLE Input Voltage - Low		0		0.8	V	
Tx_FAULT Output Voltage - High		2		Vcc+0.3	V	Io = 400µA; Host Vcc
Tx_FAULT Output Voltage - Low		0		0.5	V	Io = -4.0mA
RECEIVER						
LVPECL Outputs (Differential)	Vout	400	800	1200	mVpp	AC coupled outputs
Output Impedance (Differential)	Zout	85	100	115	ohms	
Rx_LOS Output Voltage - High		2		Vcc+0.3	V	Io = 400 µA; Host Vcc
Rx_LOS Output Voltage - Low		0		0.8	V	Io = -4.0 mA
MOD_DEF (0:2)	VoH	2.5			V	With Serial ID
	VoL	0		0.5	V	

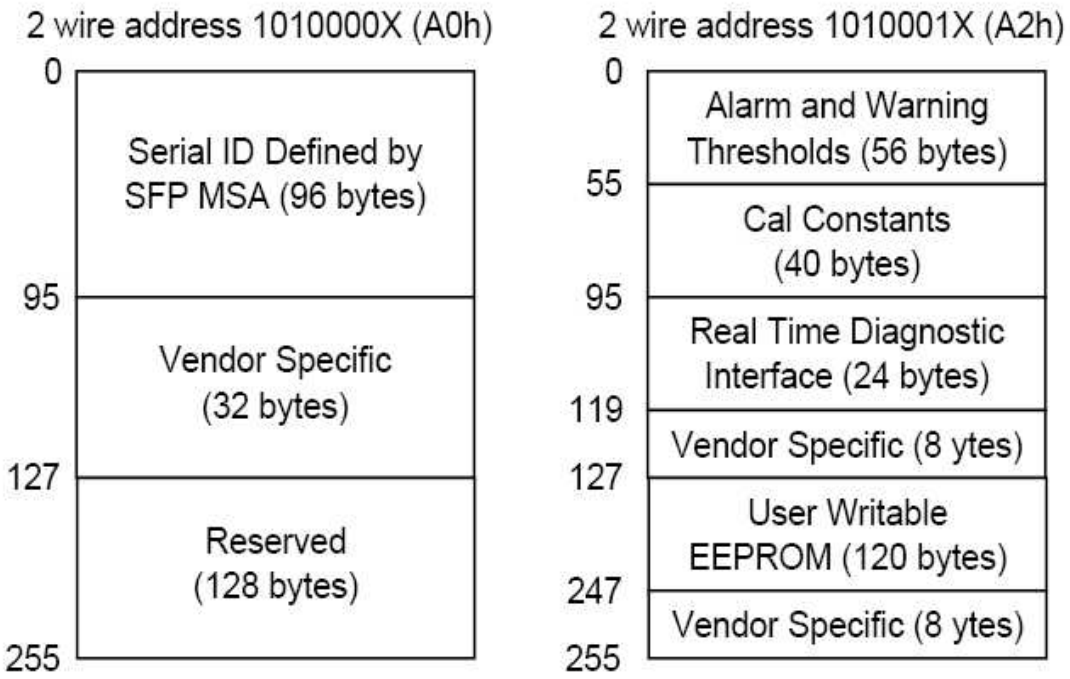
7. Optical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit
9µm Core Diameter SMF for OST-SFP-10G-ZR			80		Km
Data Rate			9.953/10.3125		Gbps
Transmitter					
Centre Wavelength	c	1528	1550	1565	nm
Spectral Width (RMS)				1	nm
Average Output Power	Pout	0		5	dBm
Extinction Ratio	EX	3.5			dB
Rise/Fall Time (20% ÷ 80%)	tr/tf	10			ns
Total Jitter	TJ			56.5	ps
Output Optical Eye			IUT-T G.957 Compliant		
Data Input Swing Differential	Vin	500		2000	mV
Input Differential Impedance	Zin	90	100	110	
TX_Disable	Disable		2.0	VCC+0.3	V
	Enable		0	0.8	
TX_Fault	Fault		2.0	VCC+0.3	V
	Normal		0	0.8	
TX_Disable Assert Time	t_off			10	us
	Receiver				
Centre Wave length	c	1260		1600	nm
Receiver Sensitivity	Se	-8		-23	dBm
Output Differential Impedance	Pin	90	100	110	
Data Output Swing Differential	Vout	370		2000	mV
Rise/Fall Time	Tr/tf			2.2	ns
LOS De-AssertS	LOS_D			-22	dBm
LOS Assert	LOS_A	-35			dBm
LOS	High		2.0	VCC+0.3	V
	LOW		0	0.8	

8. EEPROM Serial ID Memory Contents

The serial interface uses the 2-wire serial CMOS EEPROM protocol defined for the ATMEL AT24C02/04 family of components. When the serial protocol is activated, the host generates the serial clock signal (SCL). The positive edge clocks data into those segments of the EEPROM that are not write protected within the SFP transceiver. The negative edge clocks data from the SFP transceiver. The serial data signal (SDA) is bi-directional for serial data

transfer. The host uses SDA in conjunction with SCL to mark the start and end of serial protocol activation. The memories are organized as a series of 8-bit data words that can be addressed individually or sequentially.
The Module provides diagnostic information about the 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. Received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring all are implemented. The diagnostic data are raw A/D values and must be converted to real world units using calibration constants stored in EEPROM locations 56-95 at wire serial bus address A2h. The digital diagnostic memory map specific data field define as following. For detail EEPROM information, please refer to the related document of SFF 8472 Rev 9.3.



9. EEPROM Serial ID Memory Contents

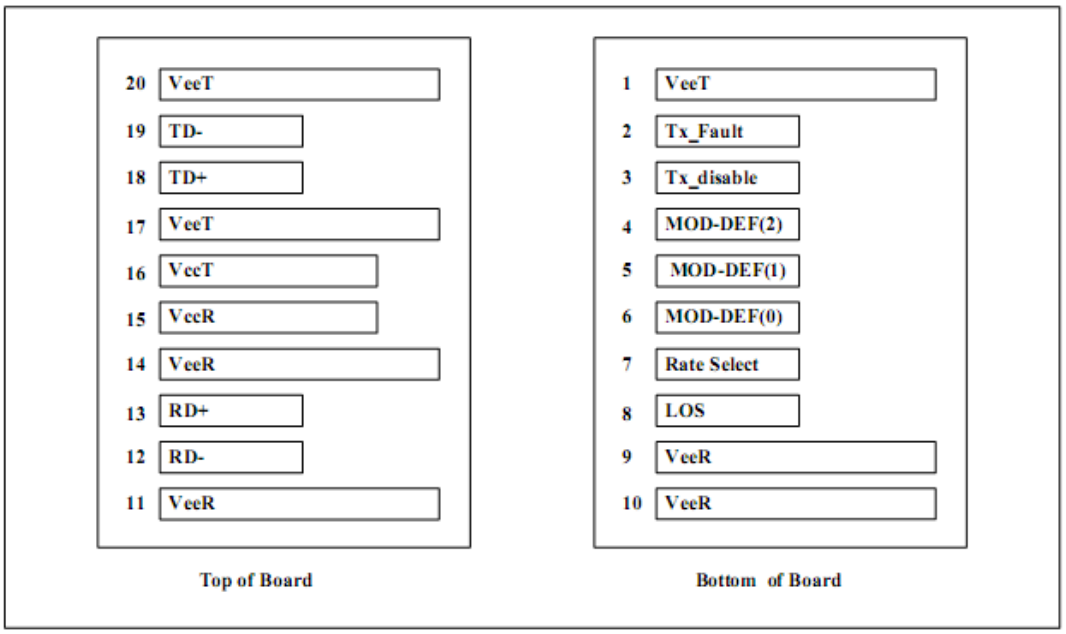
Accessing Serial ID Memory uses the 2 wire address 1010000X(A0). Memory Contents of Serial ID are shown in Table 2.

Table 2. Serial ID Memory Contents

Data Address	Size (Bytes)	Name of Field	Contents (Hex)	Description
		BASE ID FIELDS		
0	1	Identifier	03	SFP
1	1	Ext. Identifier	04	SFP function is defined by serial ID only
2	1	Connector	07	LC Connector
3-10	8	Transceiver		Transceiver Codes
11	1	Encoding	03	NRZ
12	1	BR, Nominal	0C	10Gbit/s
13	1	Reserved	00	
14	1	Length (9 µm) km	14	
15	1	Length (9 µm) 100 m	C8	
16	1	Length (50 µm) 10 m	00	
17	1	Length(62.5 µm) 10 m	00	
18	1	Length (Copper)	00	Not compliant
19	1	Reserved	00	
20-35	16	Vendor name	4F 75 73 65 6E 74 20 20 20 20 20 20 20 20 20 20	«Ousen» (ASCII)
36	1	Reserved	00	
37-39	3	Vendor OUI	00 00 00	
40-55	16	Vendor PN		Transceiver part number
56-59	4	Vendor rev	20 20 20 20	
60-61	2	Wavelength	05 1E	Transceiver wavelength
62	1	Reserved	00	
63	1	CC_BASE	CheckSum (Variable)	Check code for Base ID Fields
		EXTENDED ID FIELDS		
64-65	2	Options	00 1A	TX_DISABLE, X_FAULT and Loss of Signal implemented.
66	1	BR, max	00	

Data Address	Size (Bytes)	Name of Field	Contents (Hex)	Description
67	1	BR, min	00	
68-83	16	Vendor SN	42 30 39 38 32 32 20 20 20 20 20 20 20 20 20 20	Serial Number of transceiver (ASCII). For example «B009822».
84-91	8	Date code	30 32 31 30 30 35 20 20	Manufactory date code. For example «021005».
92-94	3	Reserved	00 00 00	
95	1	CC_EXT	CheckSum (Variable)	Check sum for Extended ID Field.
		VENDOR SPECIFIC ID FIELDS		
96-127	32	Vendor Specific	Read only	Depends on customer information
128-155	128	Reserved	Read only	Filled by zero

10. SFP Transceiver Electrical Pad Layout



As Viewed Through Top of Board

Pin Description

Pin	Name	Function/Description	Engagement order	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	1
3	TXDisable	Transmitter Disable - Module disables on high or open	3	2
4	MOD-DEF2	Module Definition 2 - Two wire serial ID interface	3	3
5	MOD-DEF1	Module Definition 1 - Two wire serial ID interface	3	3
6	MOD-DEFO	Module Definition 0 - Two wire serial ID interface	3	3
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	4
9	VeeR	Receiver Ground	1	
10	VeeR	Receiver Ground	1	
11	Veer	Receiver Ground	1	
12	RD-	Inverse Received Data out	3	5
13	RD+	Received Data out	3	5
14	VeeR	Receiver Ground	1	
15	VccR	Receiver Power - +3.3V±5%	2	6
16	VccT	Transmitter Power - +3.3 V±5%	2	6
17	VeeT	Transmitter Ground	1	
18	TD+	Transmitter Data In	3	7
19	TD-	Inverse Transmitter Data In	3	7
20	VeeT	Transmitter Ground	1	

Note:

[1] TX Fault is open collector/drain output which should be pulled up externally with a 4.7 - 10 KΩ resistor on the host board to supply <VccT+0.3V or VccR+0.3V. When high, this output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to <0.8V.

[2] TX Disable input is used to shut down the laser output per the state table below. It is pulled up within the module with a 4.7 - 10 KΩ resistor. Low (0-0.8V): Transmitter on Between (0.8V and 2V): Undefined High (2.0 - VeeT): Transmitter Disabled Open : Transmitter Disabled

[3] Mod-Def 0, 1, 2. These are the module definition pins. They should be pulled up with a 4.7 - 10KΩ resistor on the host board to supply less than VeeT+0.3V or VeeR+0.3V. Mod-Def 0 is grounded by the module to indicate that the module is present. Mod-Def 1 is clock line of two wire serial interface for optional serial ID. Mod-Def 2 is data line of two wire serial interface for optional serial ID.

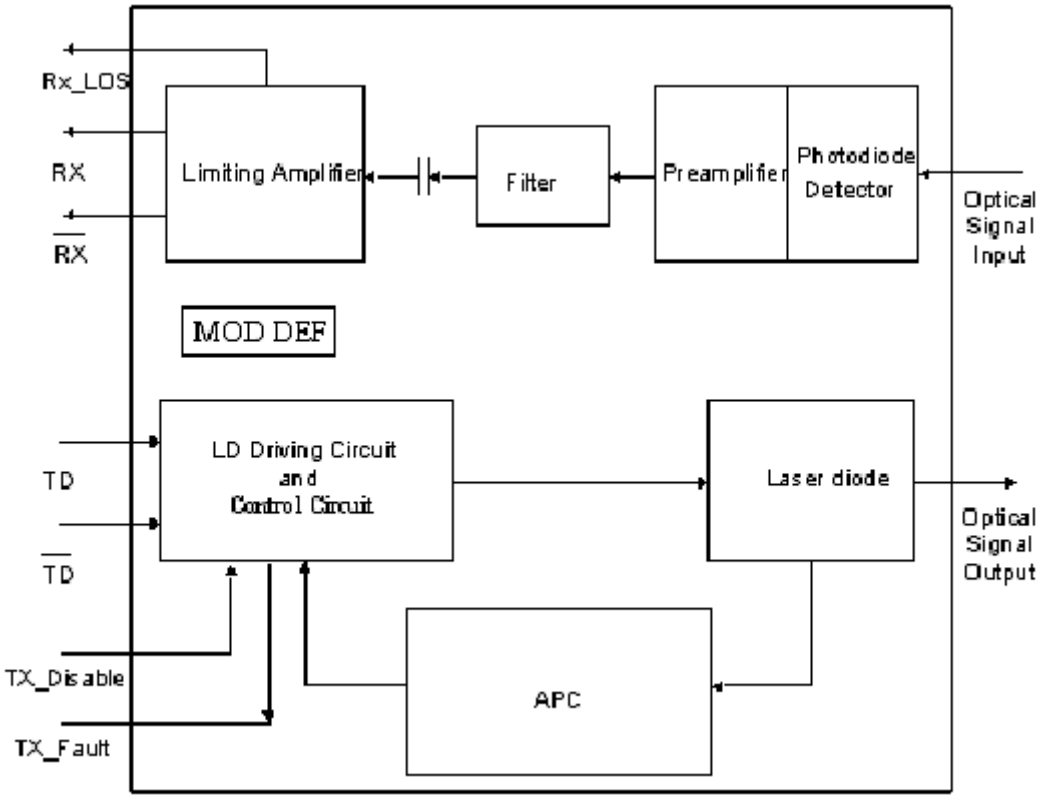
[4] LOS (Loss of signal) is an open collector/drain output which should be pulled up externally with a 4.7 - 10KΩ resistor on the host board to supply <VeeT+0.3V or VeeR+0.3V. When high, this output indicates the received optical power is below the worst ease receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to <0.8V.

[5] RD-/+: These are the differential receiver outputs. They are AC coupled 100Ω differential lines which should be terminated with 100Ω differential at the user SERDES. The AC coupling is done inside the module and thus not required on the host board.

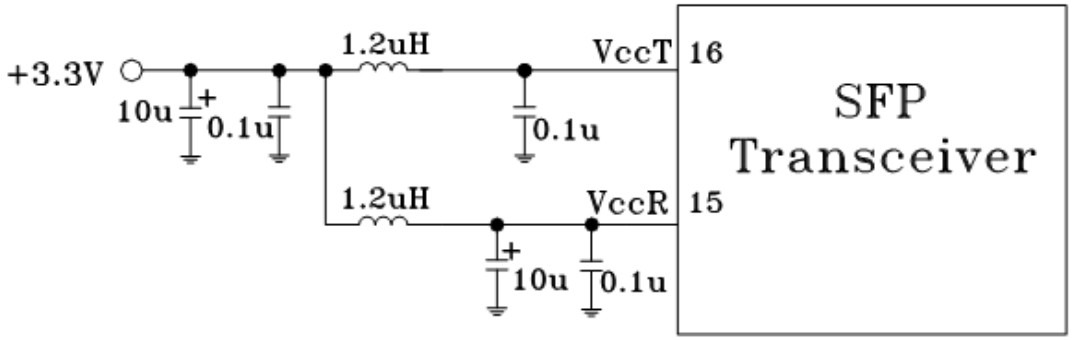
[6] **VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V±5% at the SFP connector pin. The in-rush current will typically be no more than 30mA above steady state supply current after 500ns.**

[7] **TD-/+: These are the differential transmitter inputs. They are AC coupled differential lines with 100Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on host board.**

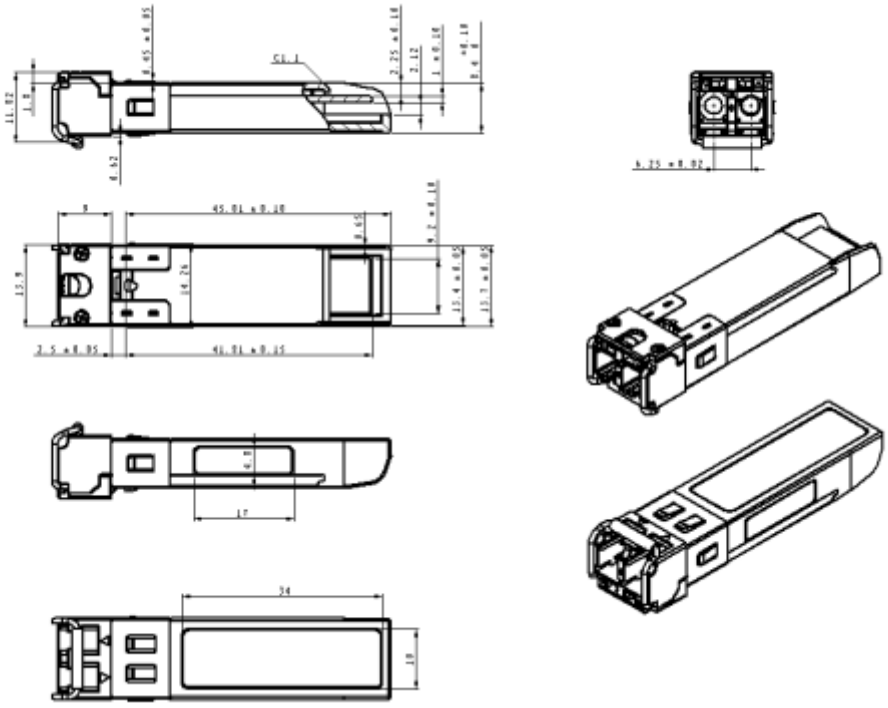
11. Block Diagram

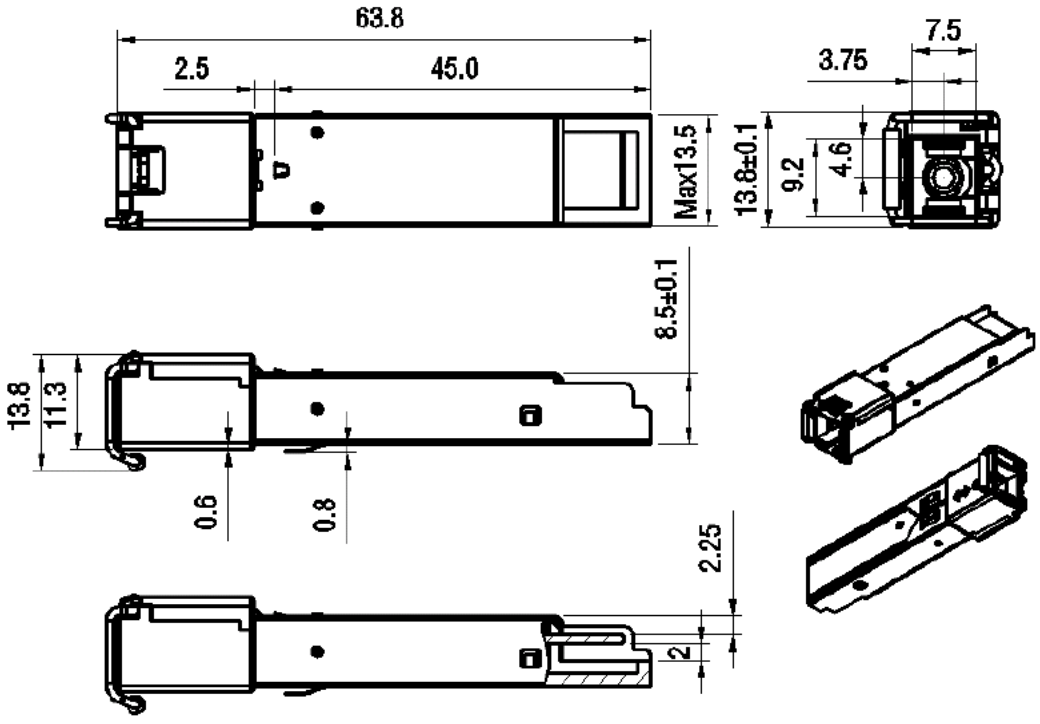


12. Required Host Board Components



13. Package Outline





14. Ordering information of LC BIDI SFP

Part No.	Data Rate	Laser	Fiber Type	Distance	Optical Interface	Industry Temperature	DDM
SFP+ 10G ZR 80km LC	l.O625Gbps to lO.3Gbps	l55Onm DFB	SMF	80 km	LC	Yes	Yes

*** D - DDMI, I - Industry temperature**

Notice:

Ousent reserves the right to make changes to or discontinue any optical link product or service identified in this publication, without notice, in order to improve design and/or performance. Applications that are described herein for any of the optical link products are for illustrative purposes only. Ousent makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.