1.25G SFP Transceiver MMF Duplex LC 550m
HD-M8512-05LCD

Features

- ✓ Up to 1.25Gbps Data Links
- ✓ Compliant with SFP MSA and SFF-8472
- ✓ Hot Pluggable with Duplex LC Connector
- ✓ Up to 550m on 50/125μm MMF
- ✓ Up to 300m on 62.5/125μm MMF
- ✓ All-metal housing for superior EMI performance
- ✓ RoHS6 compliant (lead free)
- ✓ Operating case temperature:
  Commercial :   -5 to +70°C
  Extended: -20 to +80℃
  Industrial :   -40 to +85°C

Applications

- ✓ Gigabit Ethernet
- ✓ Fiber Channel
- ✓ Switch to Switch interface
- ✓ Switched backplane applications
- ✓ Router/Server interface
- ✓ Other optical transmission systems

Description

The SFP transceivers are high performance, cost effective modules supporting data-rate of 1.25Gbps and 550m transmission distance with MMF.

The transceivers are compatible with SFP Multi-Source Agreement (MSA) and SFF-8472. For further information, please refer to SFP MSA and SFF-8472.

Module Block Diagram
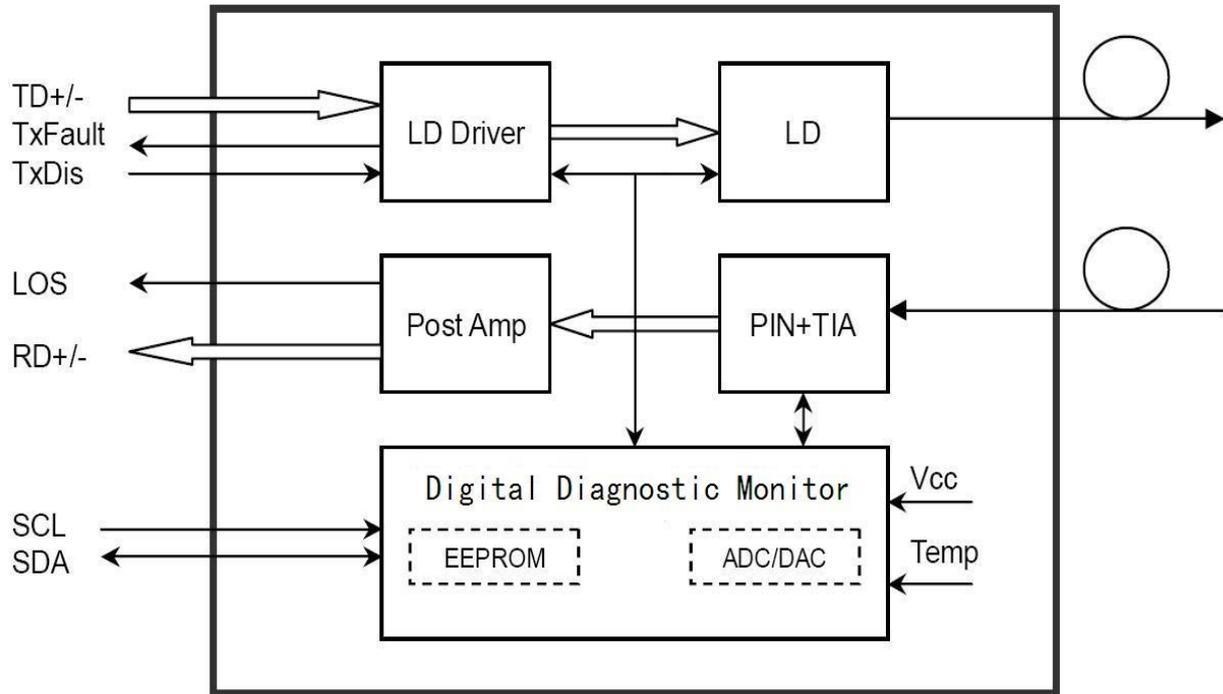
Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit
Power Supply Voltage	VCC	0		3.6	V
Storage Temperature	Ts	-40		+85	°C
Operating Case Temperature	Tc	-40		+85	°C
Relative Humidity	RH	0		85	%
RX Input Average Power	Pmax	-		0	dBm

Recommended Operating Environment:

Parameter		Symbol	Min.	Typical	Max.	Unit
Power Supply Voltage		VCC	3.13	3.3	3.46	V
Power Supply Current		Icc			300	mA
Operating Case Temperature	Commercial	TC	-5		+70	°C
	Extended		-20		+80	
	Industrial		-40		+85	
Data Rate				1.0625/1.25		Gbps

Electrical Characteristics

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Input differential impedance	Rin	90	100	110		
Single ended data input swing	Vin PP	180		700	mVp-p	
Transmit Disable Voltage	VD	Vcc – 1.3		Vcc	V	
Transmit Enable Voltage	VEN	Vee		Vee+ 0.8	V	
Receiver Section:						
Single ended data output swing	Vout,pp	300		600	mv	2
LOS Fault	$V_{losfault}$	Vcc – 0.5		V_{CC_host}	V	3
LOS Normal	$V_{los\ norm}$	V_{ee}		V_{ee}+0.5	V	3

Notes:
1. Connected directly to TX data input pins. AC coupling from pins into laser driver IC.
2. Into 100Ω differential termination.
3. 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.

Optical Parameters

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Transmitter Section:						
Centre Wavelength	λ c	830	850	860	nm	
Spectral Width (RMS)	σ			0.85	nm	
Average Optical Power	Pavg	-9		-3	dBm	1
Laser Off Power	Poff	-	-	-45	dBm	
Extinction Ratio	ER	9	-	-	dB	
Relative Intensity Noise	Rin	-	-	-128	dB/Hz	12dB reflection
Transmitter jitter	UIp-p		-	0.1		3
Optical Return Loss Tolerance		-	-	12	dB	
Output Optical Eye	Compliant with IEEE802.3 z					4
Receiver Section:						
Receiver Center Wavelength	λ r	830		860	nm	
Receiver Sensitivity in Average Power	Sen	-18		-3	dBm	5
Los Assert	LosA	-35	-	-	dBm	
Los Dessert	LosD	-	-	-19	dBm	
Los Hysteresis	LosH	0.5	-	-	dB	
Overload	Pin	-	-	-3	dBm	5
Receiver Reflectance		-	-	-12	dB	
Receiver power (damage)		-	-	0	dBm	

Notes:

1. The optical power is launched into 50/125μm MMF.
2. Unfiltered, measured with a PRBS 2^{23}-1 test pattern @1.25Gbps
3. Meet the specified maximum output jitter requirements if the specified maximum input jitter is present.
4. Measured with a PRBS 2^{23}-1est pattern @1.25Gbps.
5. Measured with a PRBS 2^{23}-1 test pattern @1.25Gbps, worst-case extinction ratio, BER ≤1×10^{-10}

Timing Characteristics:

Parameter	Symbol	Min.	Typical	Max.	Unit
TX_Disable Assert Time	t_off			10	us
TX_Disable Negate Time	t_on			1	ms
Time to Initialize Include Reset of TX_FAULT	t_int			300	ms
TX_FAULT from Fault to Assertion	t_fault			100	us
TX_Disable Time to Start Reset	t_reset	10			us
Receiver Loss of Signal Assert Time	T_A,RX_LOS			100	us
Receiver Loss of Signal Deassert Time	T_d,RX_LOS			100	us
Rate-Select Change Time	t_ratesel			10	us
Serial ID Clock Time	t_serial-clock			100	kHz

Digital Diagnostic Monitor Characteristics (DDM)

The following digital diagnostic characteristics are defined over the Recommended Operating Environment unless otherwise specified. It is compliant to SFF8472 Rev10.2 with internal calibration mode. For external calibration mode please contact our sales stuff.

Parameter	Symbol	Min.	Max.	Unit
Temperature monitor absolute error	DMI_Temp	-3	3	degC
Laser power monitor absolute error	DMI_TX	-3	3	dB
RX power monitor absolute error	DMI_RX	-3	3	dB
Supply voltage monitor absolute error	DMI_VCC	-0.08	0.08	V
Bias current monitor absolute error	DMI_Ibias	-10%	10%	mA

Digital Diagnostic Memory Map (Compliant with SFF-8472)

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The diagnostic information with internal calibration or external calibration all are implemented, including received power monitoring, transmitted power monitoring, bias current monitoring, supply voltage monitoring and temperature monitoring.

The digital diagnostic memory map specific data field defines as following(For further information, please refer to SFF-8472.)

2 wire address 1010000X (A0h)

```
0   ┌─────────────────────────┐
    │   Serial ID Defined by   │
    │   SFP MSA (96 bytes)     │
95  ├─────────────────────────┤
    │   Vendor Specific        │
    │   (32 bytes)             │
127 ├─────────────────────────┤
    │                          │
    │   Reserved in SFP        │
    │   MSA (128 bytes)        │
    │                          │
255 └─────────────────────────┘
```

2 wire address 1010001X (A2h)

```
0   ┌─────────────────────────┐
    │   Alarm and Warning      │
    │   Thresholds (56 bytes)  │
55  ├─────────────────────────┤
    │   Cal Constants          │
    │   (40 bytes)             │
95  ├─────────────────────────┤
    │   Real Time Diagnostic   │
    │   Interface (24 bytes)   │
119 ├─────────────────────────┤
    │   Vendor Specific (8 bytes) │
127 ├─────────────────────────┤
    │                          │
    │   User Writable          │
    │   EEPROM (120 bytes)     │
    │                          │
247 ├─────────────────────────┤
    │   Vendor Specific (8 bytes) │
255 └─────────────────────────┘
```
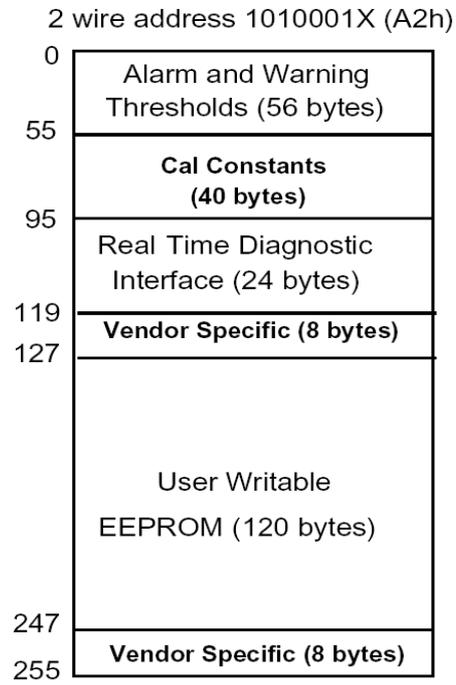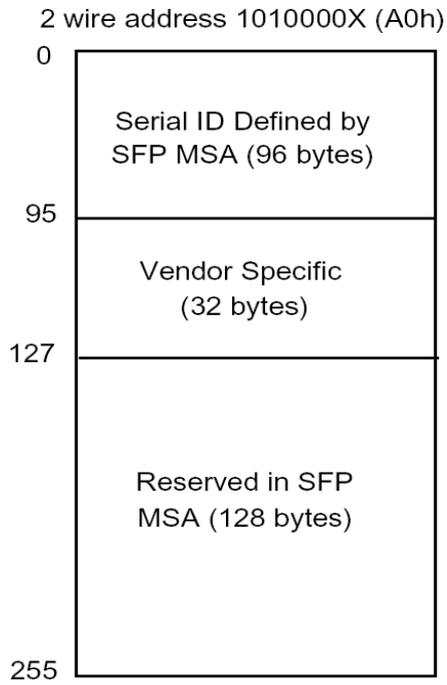
Pin Definitions
Pin Diagram

Top of Board		Bottom of Board (as viewed thru top of board)	
20	VeeT	1	VeeT
19	TD-	2	TxFault
18	TD+	3	Tx Disable
17	VeeT	4	MOD-DEF(2)
16	VccT	5	MOD-DEF(1)
15	VccR	6	MOD-DEF(0)
14	VeeR	7	Rate Select
13	RD+	8	LOS
12	RD-	9	VeeR
11	VeeR	10	VeeR
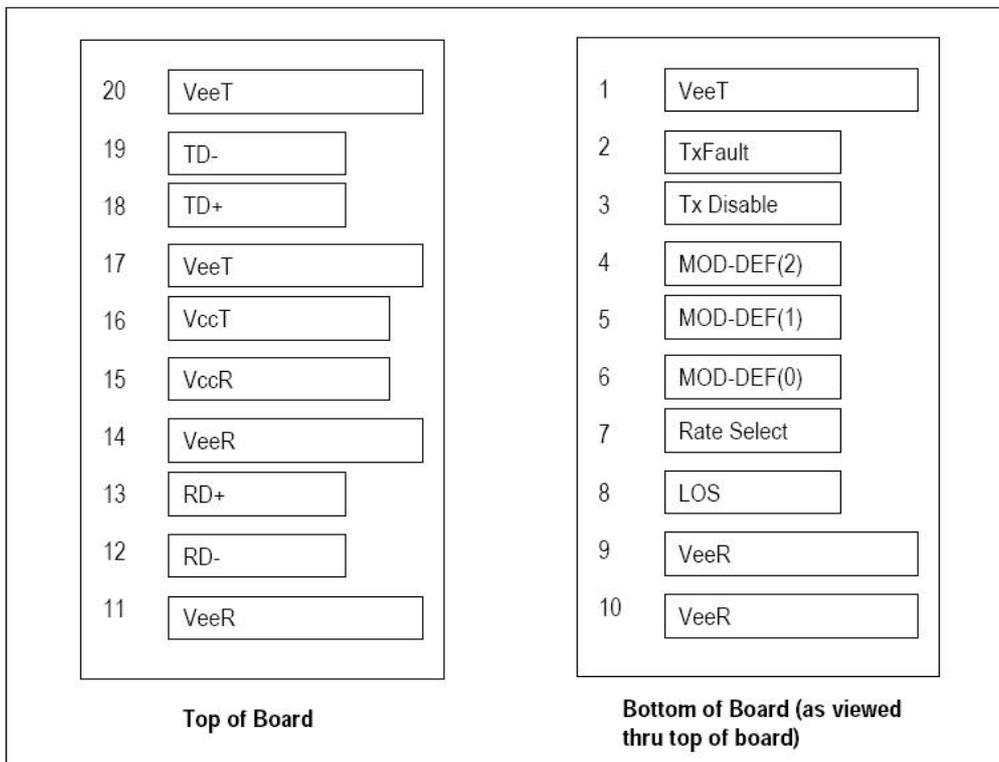
Pin Descriptions

Pin	Signal Name	Description	Plug Seq	Notes
1	VeeT	Transmitter Ground	1	
2	TX FAULT	Transmitter Fault Indication	3	Note 1
3	TX Disale	Transmitter Disable	3	Note 2
4	MOD_DEF(2)	I^2C Serial Data Signal SDA	3	Note 3
5	MOD_DEF(1)	I^2C Serial Clock Signal SCL	3	Note 3
6	MOD_DEF(0)	Grounded in Module	3	Note 3
7	Rate Select	Not Connected	3	
8	LOS	Receiver Loss of Signal Indicator (Active high, open-drain)	3	Note 4
9	VeeR	Receiver Ground	1	
10	VeeR	Receiver Ground	1	
11	VeeR	Receiver Ground	1	
12	RD-	Inv. Received Data Out	3	Note 5
13	RD+	Received Data Out	3	Note 5
14	VeeR	Receiver Ground	1	
15	VccR	Receiver Power Supply	2	
16	VccT	Transmitter Power Supply	2	
17	VeeT	Transmitter Ground	1	
18	TD+	Transmit Data In	3	Note 6
19	TD-	Inv. Transmit Data In	3	Note 6
20	VeeT	Transmitter Ground	1	Note 2

Notes:

Plug Seq.: Pin engagement sequence during hot plugging.

1) TX Fault is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor on the host board to a voltage between 2.0V and Vcc+0.3V. Logic 0 indicates normal operation; Logic 1 indicates a laser fault of some kind. In the low state, the output will be pulled to less than 0.8V.

2) TX Disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7k~10kΩ resistor. Its states are:
Low (0 to 0.8V):   Transmitter on
(>0.8V, < 2.0V):   Undefined
High (2.0 to 3.465V):   Transmitter Disabled
Open: Transmitter Disabled

3) Mod-Def 0,1,2 : These are the module definition pins. They should be pulled up with a 4.7k~10kΩ resistor on the host board. The pull-up voltage shall be VccT or VccR.
MOD_DEF(0) is grounded by the module to indicate that the module is present
MOD_DEF(1) is the clock line of two wire serial interface for serial ID   SCL
MOD_DEF(2) is the data line of two wire serial interface for serial ID   SDA

4) LOS is an open collector output, which should be pulled up with a 4.7k~10kΩ resistor. Pull up voltage between 2.0V and Vcc+0.3V. Logic 1 indicates loss of signal; Logic 0 indicates normal operation. In the low state, the output will be pulled to less than 0.8V.

5) RD-/+: These are the differential receiver outputs. They are internally AC-coupled 100 differential lines which should be terminated with 100Ω (differential) at the user SERDES.

6) TD-/+: These are the differential transmitter inputs. They are internally AC-coupled, differential lines with 100Ω differential termination inside the module.

Recommended Interface Circuit
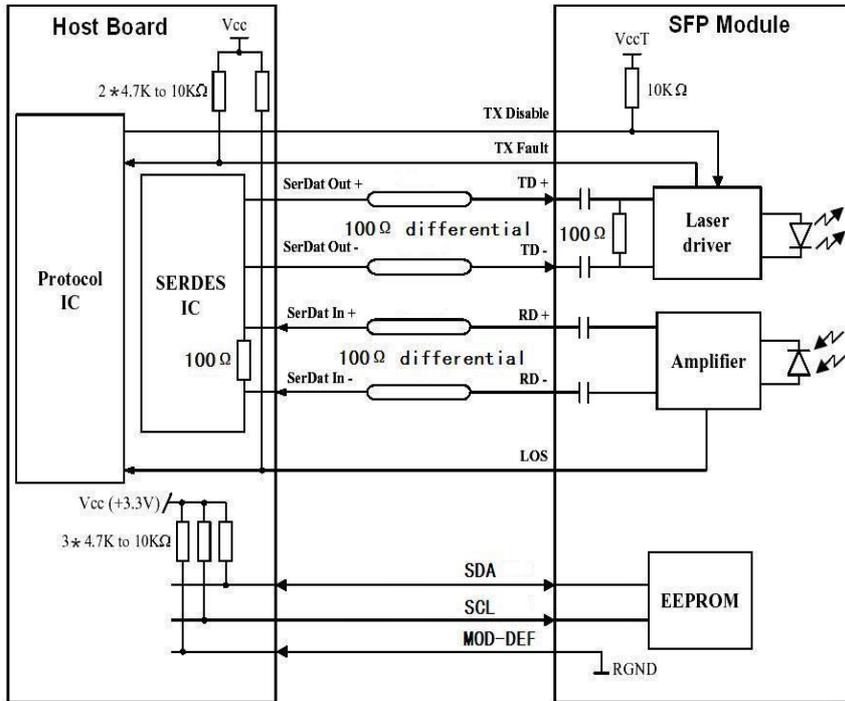
Mechanical Dimensions
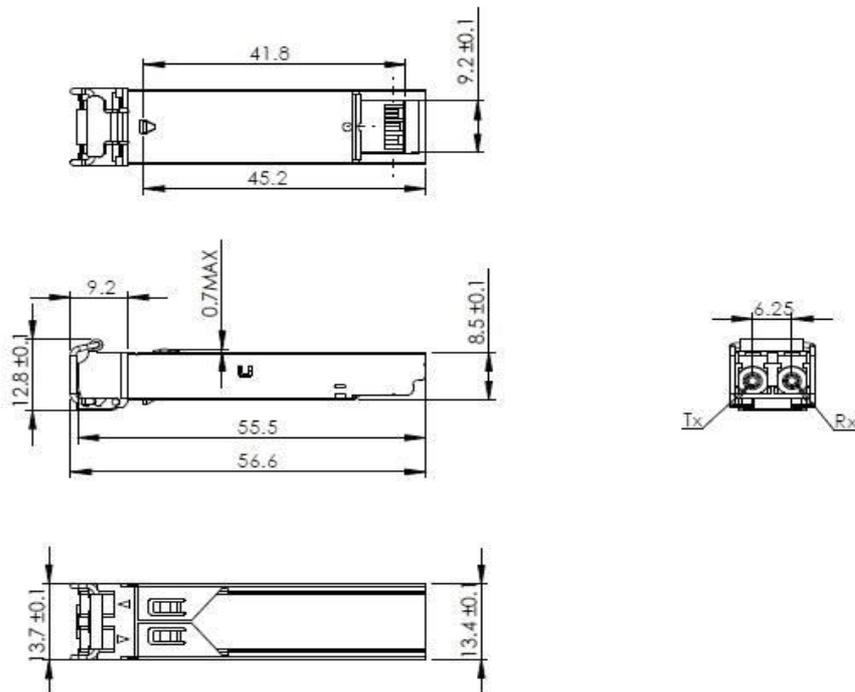
Ordering information

Part Number	Product Description
HD-M8512-05LCD	850nm, 1.25Gbps, 550m, Duplex LC SFP Transceiver, -5ºC ~ +70ºC , With DDM.
HD-M8512-05LCD-I	850nm, 1.25Gbps, 550m, Duplex LC SFP Transceiver ,-40ºC ~ +85ºC, With DDM.

References

1. Small Form Factor Pluggable (SFP) Transceiver Multi-Source Agreement (MSA),September 2000.
2. Telcordia GR-253-CORE Specifications.
3. "Diagnostic Monitoring Interface for Optical Transceivers" SFF-8472, Rev 10.2, June 1, 2007

Important Notice

Performance figures, data and any illustrative material provided in this data sheet are typical and must be specifically confirmed in writing by Handar before they become applicable to any particular order or contract. In accordance with the Handar policy of continuous improvement specifications may change without notice. The publication of information in this data sheet does not imply freedom from patent or other protective rights of Handar or others. Further details are available from any Handar sales representative.