

# SFP-MRC-SER-LOS-100M-D





## 1000BASE-T & Serdes interface Copper SFP Transceiver RoHS Compliant

### PRODUCT FEATURES

-  Support 1000BASE-T Operation in Host System
-  For 100m Reach over Cat 5 UTP Cable
-  Hot-Pluggable SFP Footprint
-  Fully Metallic Enclosure for Low EMI
-  Low Power Dissipation (1.05 W Typical)
-  Compact RJ-45 Connector Assembly
-  LOS 1000M Indicator
-  Access to Physical Layer IC via 2-Wire Serial Bus
-  Operating Case Temperature                  Standard: 0 °C ~ 70 °C  
Industrial: -40 °C ~ 85 °C
-  Detailed Product Information in EEPROM
-  Compliant with SFP MSA
-  Compliant with IEEE Std 802.3
-  Safety Certification: TUV/UL/FDA
-  RoHS Compliant



### APPLICATIONS

-  LAN 1000Base-T
-  Gigabit Ethernet Over Cat 5 Cable
-  Switch to Switch Interface
-  Router/Server Interface

## ORDER INFORMATION

Part Number	Data Rate	Cable Type	Distance	RX-LOS	Temp.
<b>SFP-MRC-SER-LOS-100M-D</b>	Line side: 1000 BASE-T preferred Master Host Side: SERDES interface, enable the auto-negotiation, Support Rx_LOS	Cat5	100m	YES	Standard

## PRODUCT DESCRIPTION

SFP-MRC-SER-LOS-100M-D 1000BASE-T Copper Small Form Pluggable (SFP) modules are based on the SFP Multi Source Agreement (MSA). It is compliant with the Gigabit Ethernet standard as specified in IEEE STD 802.3 and can fully satisfy the 1000BASE-T application.

## Absolute Maximum Ratings

Parameter	Symbol	Min	Max
<b>Maximum Supply Voltage</b>	Vcc	-0.5	4.0
<b>Storage Temperature</b>	TS	-40	85

## Normal operating condition

Parameter	Symbol	Min	Typ	Max	Units
<b>Operating Temperature</b>	EOLT-C12-02-X	0		70	°C
<b>Supply Voltage</b>	Vcc	3.15	3.3	3.45	V

## Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Unit	Note/Condition
<b>+3.3 Volt Electrical Power Interface</b>						
<b>Supply Current</b>	I <sub>cc</sub>		300	350	Ma	
<b>Input Voltage</b>	V <sub>cc</sub>	3.15	3.3	3.45	V	
<b>Surge Current</b>	I <sub>surge</sub>			30	Ma	
<b>Low-Speed Signals, Electronic Characteristics</b>						
<b>SFP Output LOW</b>	V <sub>OL</sub>	0		0.5		4.7k to 10k pull-up to host_V <sub>cc</sub> , measured at host side of connector
<b>SFP Output HIGH</b>	V <sub>OH</sub>	host_V <sub>cc</sub> -0.5			V	4.7k to 10k pull-up to host_V <sub>cc</sub> , measured at host side of connector
<b>SFP Input LOW</b>	V <sub>IL</sub>	0		0.8	V	4.7k to 10k pull-up to V <sub>cc</sub> , measured at SFP side of connector
<b>SFP Input HIGH</b>	V <sub>IH</sub>			V <sub>cc</sub> + 0.3	V	4.7k to 10k pull-up to V <sub>cc</sub> , measured at SFP side of connector
<b>High-Speed Electrical Interface, Transmission Line-SFP</b>						
<b>Line Frequency</b>	f <sub>L</sub>		125		MHz	5-level encoding, per IEEE 802.3
<b>TX Output Impedance</b>	Z <sub>out</sub> , TX		100		Ohm	Differential, for all frequencies between 1MHz and 125MHz
<b>RX Input Impedance</b>	Z <sub>in</sub> , RX		100		Ohm	Differential, for all frequencies between 1MHz and 125MHz
<b>High-Speed Electrical Interface, Host-SFP</b>						
<b>Single ended Data Input Swing</b>	V <sub>in</sub>	250		1200	Mv	Single ended
<b>Single Ended Data Output Swing</b>	V <sub>out</sub>	350		800	Mv	Single ended
<b>Rise/Fall Time</b>	T <sub>r</sub> , T <sub>f</sub>		175		psec	20%-80%
<b>TX Input Impedance</b>	Z <sub>in</sub>		50		Ohm	Single ended
<b>RX Output Impedance</b>	Z <sub>out</sub>		50		Ohm	Single ended

## General specifications

Parameter	Min	Typ	Max	Units	Note/Conditions
<b>Data rate</b>		1000		Mbps	
<b>Distance</b>			100	m	Category 5 UTP. BER <math>10^{-12}</math>

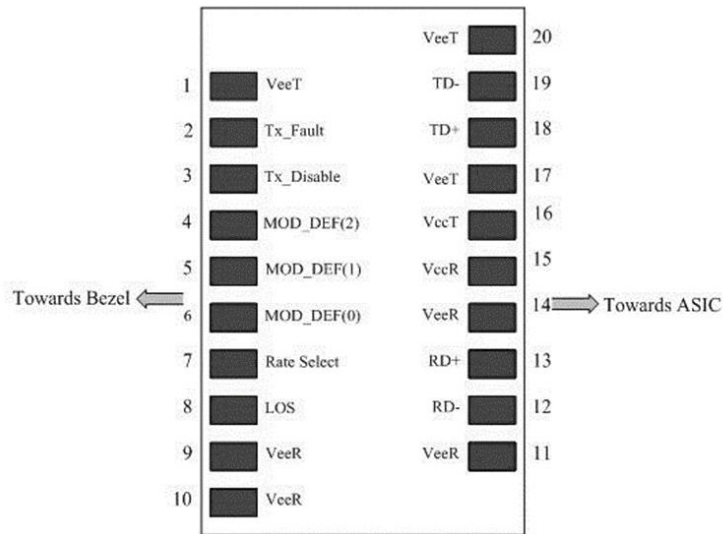
## Pin Descriptions

Pin No.	Name	Function	Plug Seq.	Note
<b>1</b>	VeeT	Transmitter Ground	1	
<b>2</b>	TX Fault	Transmitter Fault Indication	3	Not used
<b>3</b>	TX Disable		3	1
<b>4</b>	MOD-DEF2		3	2
<b>5</b>	MOD-DEF1	Module Definition 1	3	2
<b>6</b>	MOD-DEF0	Module Definition 0	3	2
<b>7</b>	Rate Select	Not Connected	3	
<b>8</b>	LOS	Loss of Signal	3	1000M indicator
<b>9</b>	VeeR	Receiver Ground	1	
<b>10</b>	VeeR	Receiver Ground	1	
<b>11</b>		Receiver Ground	1	
<b>12</b>	RD-	Inv. Received Data Out	3	
<b>13</b>	RD+	Received Data Out	3	
<b>14</b>	VeeR	Receiver Ground	1	
<b>15</b>	VccR	Receiver Power	2	
<b>16</b>	VccT	Transmitter Power	2	
<b>17</b>	VeeT	Transmitter Ground	1	
<b>18</b>	TD+	Transmit Data In	3	
<b>19</b>	TD-	Inv. Transmit Data In	3	
<b>20</b>	VeeT	Transmitter Ground	1	

Note:

- PHY disabled on  $T_{DIS} > 2.0V$  or open, enabled on  $T_{DIS} < 0.8V$ , used to reset the module.
- Should be pulled up with 4.7k – 10k ohm on host board to a voltage between 2.0 V and 3.6 V. MOD\_DEF (0) pulls line low to indicate module is plugged in.

The following is the Diagram of host board connector pin numbers and names



## Serial Communication Protocol

Cloudtron Copper SFP support the 2-wire serial communication protocol defined in the SFP MSA. These SFP use a 128 byte EEPROM with an address of A0H. The 1000BASE-T physical layer IC can also be accessed via the 2-wire serial bus at address 0XACH.

## EEPROM Serial ID Memory Contents

Accessing Serial ID Memory uses the 2 wire address 1010000X (A0H). Memory Contents of Serial ID are shown in Table 1.

**Table 1 Serial ID Memory Contents**

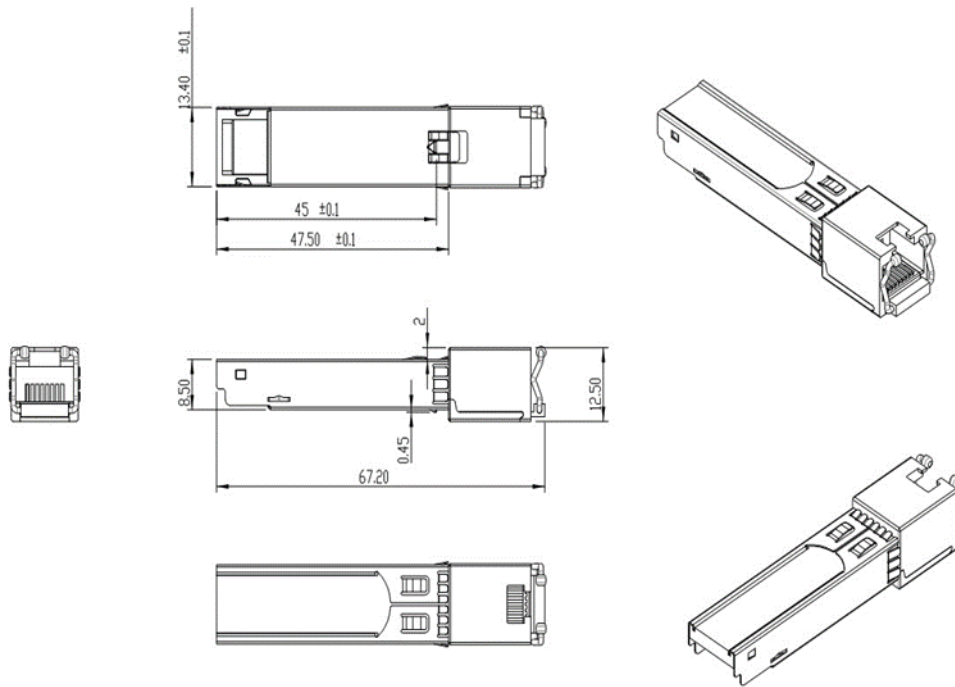
Address	Size (Bytes)	Name of Field	Hex	Description
<b>BASE ID FIELDS</b>				
<b>0</b>	1	Identifier	03	SFP
<b>1</b>	1	Ext. Identifier	04	SFP function is defined by serial ID only
<b>2</b>	1	Connector	00	
<b>3-10</b>	8	Transceiver	00 00 00 08 00 00 00 00	Transceiver Code
<b>11</b>	1	Encoding	XX (note3)	
<b>12</b>	1	BR, Nominal	XX (note3)	
<b>13</b>	1	Reserved	00	
<b>14</b>	1	Length (9µm) km		Transceiver transmit distance
<b>15</b>	1	Length(9µm) 100m		
<b>16</b>	1	Length (50µm) 10m		
<b>17</b>	1	Length(62.5µm)10 m		
<b>18</b>	1	Length (Copper)	64	100m

Address	Size (Bytes)	Name of Field	Hex	Description
19	1	Reserved	00	
20-35	16	Vendor name	XX XX XX XX XX XX XX XX <sup>(note3)</sup> 20 20 20 20 20 20 20 20	Vendor name (ASCII)
36	1	Reserved	00	
37-39	3	Vendor OUI	XX XX XX (note3)	
40-55	16	Vendor PN		Transceiver part number
56-59	4	Vendor rev	XX XX XX XX (note3)	
60-61	2	Wavelength	00	
62	1	Reserved		
63	1	CC_BASE	Check Sum (Variable)	Check code for Base ID Fields
<b>EXTENDED ID FIELDS</b>				
64-65	2	Options	00 00	TX_DISABLE, TX_FAULT and Loss of Signal implemented
66	1	BR,max	00	
67	1	BR,min	00	
68-83	16		XX XX XX XX XX XX XX XX 20 20 20 20 20 20 20 20(note3)	Serial Number of transceiver (ASCII). For example, "B000822"
84-91	8	Date code	XX XX XX XX XX XX XX XX (note3)	Manufacture date code. For example, "080405"
92	1	Diagnostic Monitoring Type	XX (note3)	Digital diagnostic monitoring implemented
93	1	Enhanced Options	XX (note3)	Optional flags
94	1	SFF_8472 Compliance	XX (note3)	01 for diagnostics (Rev9.3 SFF-8472)
95	1	CC_EXT	Check Sum (Variable)	Check sum for Extended ID Field.
<b>VENDOR SPECIFIC ID FIELDS</b>				
96-127	32	Vendor Specific	Read only	Depends on customer information
128-255	128	Reserved	Read only	

Note3: The "XX" byte should be filled in according to practical case. For more information, please refer to the related document of SFP Multi-Source Agreement (MSA).

## Mechanical Specifications

Cloudtron's Copper SFP transceivers are compliant with the dimensions defined by the SFP Multi-Sourcing Agreement (MSA).



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