EOLT-C12-02

1000BASE-T Copper SFP Transceiver
RoHS6 Compliant

Features

- Support 1000BASE-T Operation in Host Systems
- For 100m Reach Over UTP Cat5 Cable
- Hot-Pluggable SFP Footprint
- Fully Metallic Enclosure for Low EMI
- Low Power Dissipation (1.05W Typical)
- Compact RJ-45 Connector Assembly
- Access to Physical Layer IC via 2-Wire Serial Bus
- Detailed Product Information in EEPROM
- Compliant with SFP MSA
- Compliant with IEEE Std 802.3-2002

Applications

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

Order Information

Part No.	Data Rate	Media type	Distance	Connector
EOLT-C12-02	1000M	Cat5	100m	RJ45

Note1: Standard version

Regulatory Compliance

Feature	Standard	Performance
Electrostatic Discharge (ESD) to the Electrical Pins	MIL-STD-883G Method 3015.7	Class 1C (>1000 V)
Electrostatic Discharge to the enclosure	EN 55024:1998+A1+A2 IEC-61000-4-2 GR-1089-CORE	Compatible with standards
Electromagnetic Interference (EMI)	FCC Part 15 Class B EN55022:2006 CISPR 22B :2006 VCCI Class B	Compatible with standards Noise frequency range: 30MHz to 6GHz. Good system EMI design practice required to achieve Class B margins. System margins are dependent on customer host board and chassis design.
Immunity	EN 55024:1998+A1+A2 IEC 61000-4-3	Compatible with standards. 1KHz sine-wave, 80% AM, from 80MHz to 1GHz. No effect on transmitter/receiver performance is detectable between these limits.
Component Recognition	UL and CUL EN60950-1:2006	UL file E317337 TüV Certificate No. 50135086 (CB scheme)
RoHS6	2002/95/EC 4.1&4.2 2005/747/EC 5&7&13	Compliant with standards*note3

Note2: For update of the equipments and strict control of raw materials, EOPTOLINK has the ability to supply the customized products since Jan 1th, 2007, which meet the requirements of RoHS6 (Restrictions on use of certain Hazardous Substances) of European Union.

In light of item 5 in RoHS exemption list of RoHS Directive 2002/95/EC, Item 5: Lead in glass of cathode ray tubes, electronic components and fluorescent tubes.

In light of item 13 in RoHS exemption list of RoHS Directive 2005/747/EC, Item13: Lead and cadmium in optical and filter glass. The three exemptions are being concerned for Eoptolink's transceivers, because Eoptolink's transceivers use glass, which may contain Pb, for components such as lenses, windows, isolators, and other electronic components.

Product Description

EOLT-C12-02 1000BASE-T Copper Small Form Pluggable (SFP) modules are based on the SFP Multi Source Agreement (MSA). It is compliant with the Gigabit Ethernet and 1000BASE-T

standards as specified in IEEE STD 802.3 and 802.3ab.

Absolute Maximum Ratings

Parameter	Symbol	Min	Typ	Max	Units
Maximum Supply Voltage	Vcc	-0.5		4.0	V
Storage Temperature	T_S	-40		85	℃

Normal operating condition

Parameter	Symbol	Min	Typ	Max	Units	Ref.
Operating Temperature	Top	0		70	℃	
Supply Voltage	Vcc	3.14	3.3	3.46	V	

Electrical Characteristics

Parameter	Symbol	Min	Typ	Max	Units	Notes/Conditions
+3.3 Volt Electrical Power Interface						
Supply Current	Icc		300	350	mA	
Input Voltage	Vcc	3.13	3.3	3.47	V	
Surge Current	Isurge			30	mA	
Low-Speed Signals, Electronic Characteristics						
SFP Output LOW	V_{OL}	0		0.5	V	4.7k to 10k pull-up to host_Vcc, measured at host side of connector
SFP Output HIGH	V_{OH}	host_ Vcc - 0.5		host_ Vcc + 0.3	V	4.7k to 10k pull-up to host_Vcc, measured at host side of connector
SFP Input LOW	VIL	0		0.8	V	4.7k to 10k pull-up to Vcc, measured at SFP side of connector
SFP Input HIGH	VIH	2		Vcc + 0.3	V	4.7k to 10k pull-up to Vcc, measured at SFP side of connector
High-Speed Electrical Interface, Transmission Line-SFP						
Line Frequency	fL		125		MHz	5-level encoding, per IEEE 802.3
Tx Output impedance	Zout,TX		100		Ohm	Differential, for all frequencies between 1MHz

						and 125MHz
Rx Input Impedance	Zin,RX		100		Ohm	Differential, for all frequencies between 1MHz and 125MHz
High-Speed Electrical Interface, Host-SFP						
Single ended data input swing	Vin	250		1200	mV	Single ended
Single ended data output swing	Vout	350		800	mV	Single ended
Rise/Fall Time	Tr,Tf		175		psec	20%-80%
Tx Input Impedance	Zin		50		Ohm	Single ended
Rx Output Impedance	Zout		50		Ohm	Single ended

General specifications

Parameter	Symbol	Min	Typ	Max	Units	Notes/ Conditions
Data rate			1000		Mbps	
Distance				100	m	Cat 5 UTP. BER <10-12

Pin Descriptions

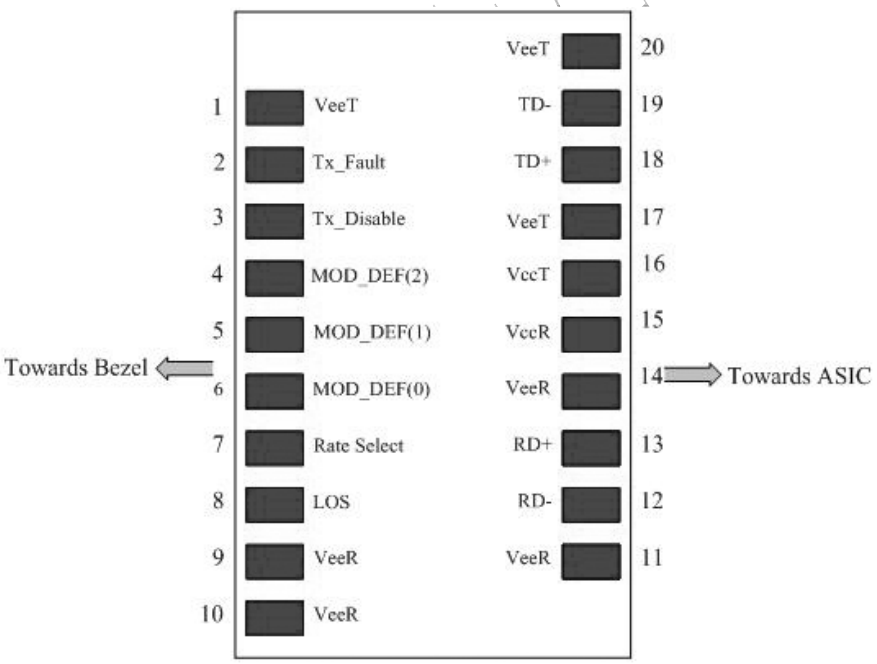
Pin No.	Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	
2	TX Fault	Transmitter Fault Indication	3	Not used
3	TX Disable	Transmitter Disable	3	1
4	MOD-DEF2	Module Definition 2	3	2
5	MOD-DEF1	Module Definition 1	3	2
6	MOD-DEF0	Module Definition 0	3	2
7	Rate Select	Not Connected	3	
8	LOS	Loss of Signal	3	Not Used
9	VeeR	Receiver Ground	1	
10	VeeR	Receiver Ground	1	
11	VeeR	Receiver Ground	1	
12	RD-	Inv. Received Data Out	3	
13	RD+	Received Data Out	3	

14	VeeR	Receiver Ground	1	
15	VccR	Receiver Power	2	
16	VccT	Transmitter Power	2	
17	VeeT	Transmitter Ground	1	
18	TD+	Transmit Data In	3	
19	TD-	Inv. Transmit Data In	3	
20	VeeT	Transmitter Ground	1	

Notes:

1. PHY disabled on TDIS > 2.0V or open, enabled on TDIS < 0.8V,used to reset the module.
2. 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 block pin numbers and names



Serial Communication Protocol

Eoptolink Copper SFPs support the 2-wire serial communication protocol outlined 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 ACH.

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

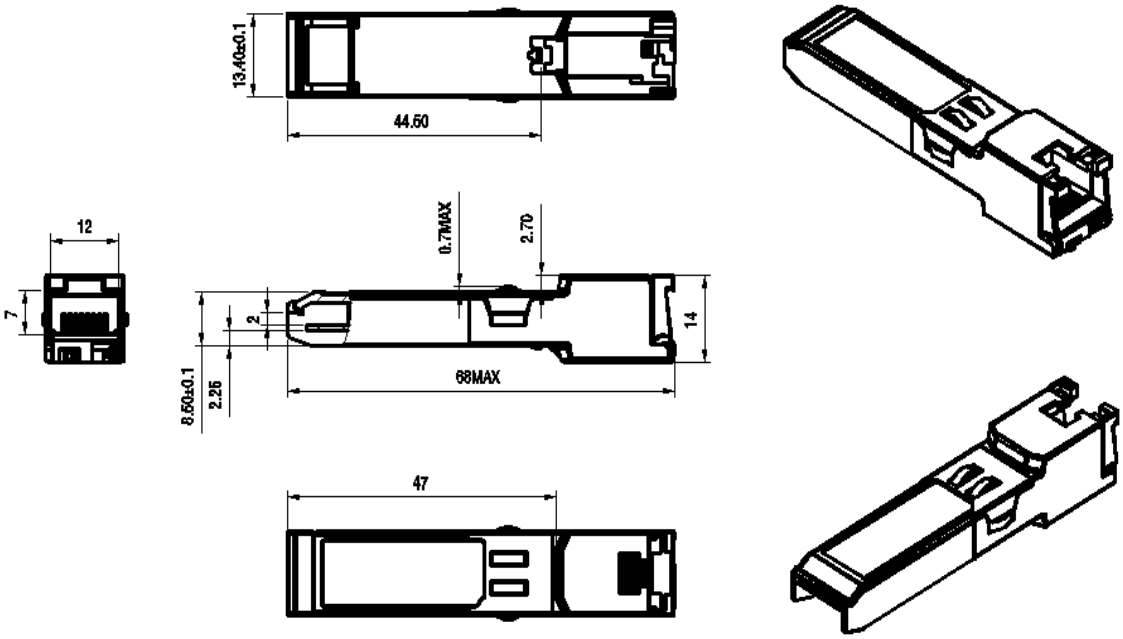
Addr.	Size (Bytes)	Name of Field	Hex	Description
BASE ID FIELDS				
0	1	Identifier	03	SFP
1	1	Ext. Identifier	04	SFP function is defined by serial ID only
2	1	Connector	00	-
3-10	8	Transceiver	00 00 00 30 00 00 00 00	Transmitter Code
11	1	Encoding	01	8B10B
12	1	BR, Nominal	0D	1000Mbps
13	1	Reserved	00	-
14	1	Length (9μm)km	-	Transceiver transmit distance
15	1	Length(9μm)100m	-	
16	1	Length (50μm) 10m	-	
17	1	Length(62.5μm)10m	-	
18	1	Length (Copper)	64	100m
19	1	Reserved	00	-
20-35	16	Vendor name	XX XX XX XX XX XX XX XX[(note3)]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	XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX XX[(note3)]	Transceiver part number
56-59	4	Vendor rev	XX XX XX XX[(note3)]	-
60-61	2	Wavelength	00	-
62	1	Reserved	00	-
63	1	CC_BASE	Check Sum (Variable)	Check code for Base ID Fields
EXTENDED ID FIELDS				
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	Vendor SN	XX XX XX XX XX XX XX XX	Serial Number of transceiver (ASCII). For example

			20 20 20 20 20 20 20 20[(note3)]	"B000822".
84-91	8	Date code	XX XX XX XX XX XX XX XX[(note3)]	Manufactory 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.
VENDOR SPECIFIC ID FIELDS				
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

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



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Revision History

Revision	Initiated	Review	Approved	**Revision History**	Release Date
V1.a	Tim.Liang	Kelly.Cao Florence.Dai		Released.	Sep 16, 2007
V1.b	Phlio	Kelly		Delete the item7 in Note2.	2009-6-20
V1.c	Kelly			Change the logo.	2010-1-6

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