RoHS compliant
RJ45 gigabit Ethernet
Small Form Pluggable (SFP), 3.3V
1000BASE Ethernet

Features

- Compliant with IEEE 802.3z Gigabit Ethernet
- Standard
- Compliant with SFP MSA specifications.
- Supports auto-negotiation 10/100/1000BASE-T operation
- in host system with SGMII interface.
- Supports auto-negotiation follows IEEE 802.3u Clause 28
- (1000BASE-T) and IEEE 802.3.z Clause 37
- (1000BASE-X)
- With EEPROM Serial ID information
- Access to physical layer IC via 2-wire serial bus
- Hot-pluggable capability
- 3.3V single power supply
- Compliant with RoHS
- Dissipated power >1W

Description

The CL-SFP-T is a 3.3V copper SFP transceiver. It offers full duplex 1000Mbps Ethernet by transporting data over
standard CAT 5 UTP cable, with RJ-45 connection. It is also compatible with industry standard RFT electrical connector andcage.
Through CL-SFP-T, the 1000BASE-X fiber Auto-negotiation on the host board side is transparently converted
to 1000BASE-T Auto-negotiation on the copper side. The hostsystems used to work with fiber SFPs will also work with CL-SFP-T copper, so there is no need to change MACsoftware.
CL-SFP-T can also be configured to operate on SGMII mode, which provides with tri-speed mode, 10/100/1000Mbps operation over 1.25 GHz serial interfaces, aslong as the host system supports the SGMII interface in no-clockmode.
The CL-SFP-T physical layer IC can be accessed via I2C, allowing access to all PHY settings and features.

Applications

- Gigabit Ethernet over copper
- Switch to switch interface
- Switched backplane applications
- File server interface

Performance

CL-SFP-TX data link up to 100 m on standard CAT 5 UTP.

Ordering Information

PART NUMBER	INPUT/OUTPUT	SIGNAL DETECT	VOLTAGE	TEMPERATURE
CL-SFP-TX-1000	AC/AC	TTL	3.3V/5V	0°C to 70 °C
CL-SFP-TX-1000i	AC/AC	TTL	3.3V/5V	-40°C to 85 °C

Absolute Maximum Ratings

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTE
Storage Temperature	T_S	-40	85	°C	
Supply Voltage	V_{cc}	0	5	V	

Recommended Operating Conditions

PARAMETER	SYMBOL	MIN	MAX	UNITS	NOTE
Operating Temperature	T_C	0	70	°C	
Supply Voltage	V_{cc}	3.1	3.5	V	

Electrical Characteristics

V_{CC}=3.1 V to 3.5 V, T_C=0 °C to 70 °C

PARAMETER	SYMBOL	MIN	TYP.	MAX	UNITS	NOTE
Supply Current	I_{cc}	---	350	400	mA	
Transmitter						
Data Input Differential Voltage	$V_{D,TX}$	0.5	---	2.4	V	1
Differential Input Impedance	Z_{TX}	80	100	120	Ohm	
Transmitter Disable Input-High	V_{DISH}	2.0	---	V_{cc}+0.3	V	
Transmitter Disable Input-Low	V_{DISL}	0	---	0.8	V	
Receiver						
Data Output Differential Voltage	$V_{D,RX}$	0.35	---	2	mV	3
Differential Output Impedance	Z_{RX}	80	100	120	Ohm	
Data Output Rise/Fall Time	$t_{r,Rx}/t_{f,Rx}$	---	180	---	ps	4

Notes:
1. Internally AC coupled and terminated to 100-Ohm differential.
2. Pull up to V_{cc} with a 4.7K – 10K Ohm resistor on host.
3. Internally AC coupled, but requires a 100-Ohm differential termination at MAC side.
4. These are unfiltered 20%~80% values.

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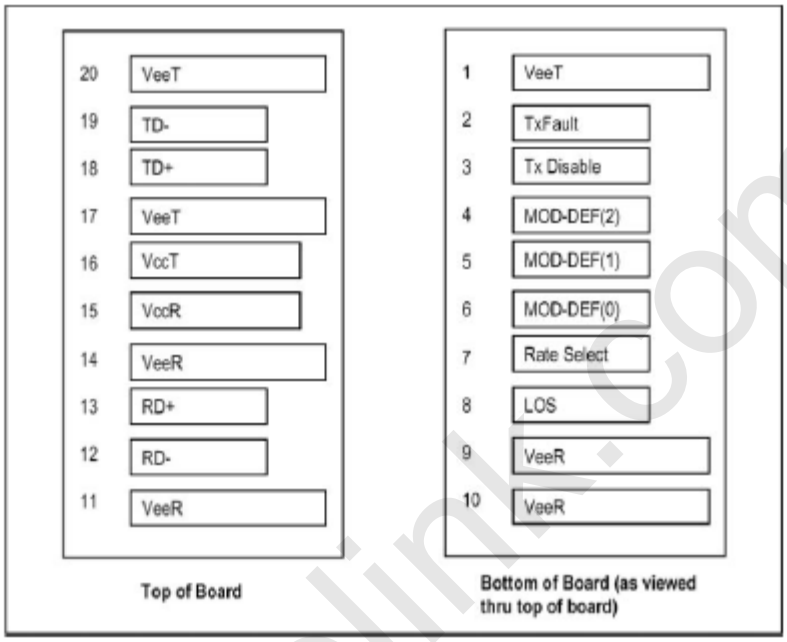
Pin Assignment



Pin Function Definitions

Pin Num.	Name	Function	Plug Seq.	Notes
1	VeeT	Transmitter Ground	1	Note 5
2	TX_Fault	Transmitter Fault Indication	3	Note 1 - Function not available
3	TX_Disable	Transmitter Disable	3	Note 2 - Module disables on high or open
4	MOD-DEF2	Module Definition 2	3	Note 3 - Two-wire serial ID interface
5	MOD-DEF1	Module Definition 1	3	Note 3 - Two-wire serial ID interface
6	MOD-DEF0	Module Definition 0	3	Note 3 - grounded in module
7	Rate Select	Not Connect	3	Function not available
8	LOS	Loss of Signal	3	Note 4 - Function not available
9	VeeR	Receiver Ground	1	Note 5
10	VeeR	Receiver Ground	1	Note 5
11	VeeR	Receiver Ground	1	Note 5
12	RD-	Inverse Received Data Out	3	Note 6
13	RD+	Received Data Out	3	Note 6
14	VeeR	Receiver Ground	1	Note 5
15	VccR	Receiver Power	2	Note 7 - 3.3V ± 5%
16	VccT	Transmitter Power	2	Note 7 - 3.3V ± 5%
17	VeeT	Transmitter Ground	1	Note 5
18	TD+	Transmitter Data In	3	Note 8
19	TD-	Inverse Transmitter Data In	3	Note 8
20	VeeT	Transmitter Ground	1	Note 5

Notes:
1) TX Fault is not used and tied to ground within the module.
2) TX disable is used to reset the physical IC inside the copper SFP. It is pulled up within the module with a 4.7 – 10 KΩ resistor.
Low (0 – 0.8V): PHY IC on
(>0.8, < 2.0V): Undefined
High (2.0 – 3.55V): PHY IC Disabled
Open: PHY IC Disabled
3) 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 in the module to indicate that the module is present. MOD-DEF 1 and
MOD-DEF 2 are the clock and data lines of the two-wire serial interface, respectively.
4) LOS (Loss of Signal) is not used and tied to ground within the module.
5) VeeR and VeeT are internally connected within the copper SFP.
6) RD+ and RD- are the received differential outputs, and they are AC-coupled 100~ differential lines that should be terminated
with 100~ (differential) at user's SERDES. The AC coupling is done inside the copper SFP and thus not required on the host board. The differential voltage swing will be between 250mV and 625 mV, while properly terminated.
7) VccR and VccT are the receiver and transmitter power supplies, and they are internally connected within the copper SFP. The
power rail is defined as 3.3V ±5% at the SFP connector pin.
8) TD+ and TD- are the transmitted differential inputs, and they are terminated with 100~ differential load inside the module. The
AC coupling is done inside the module, and thus not required on the host board.

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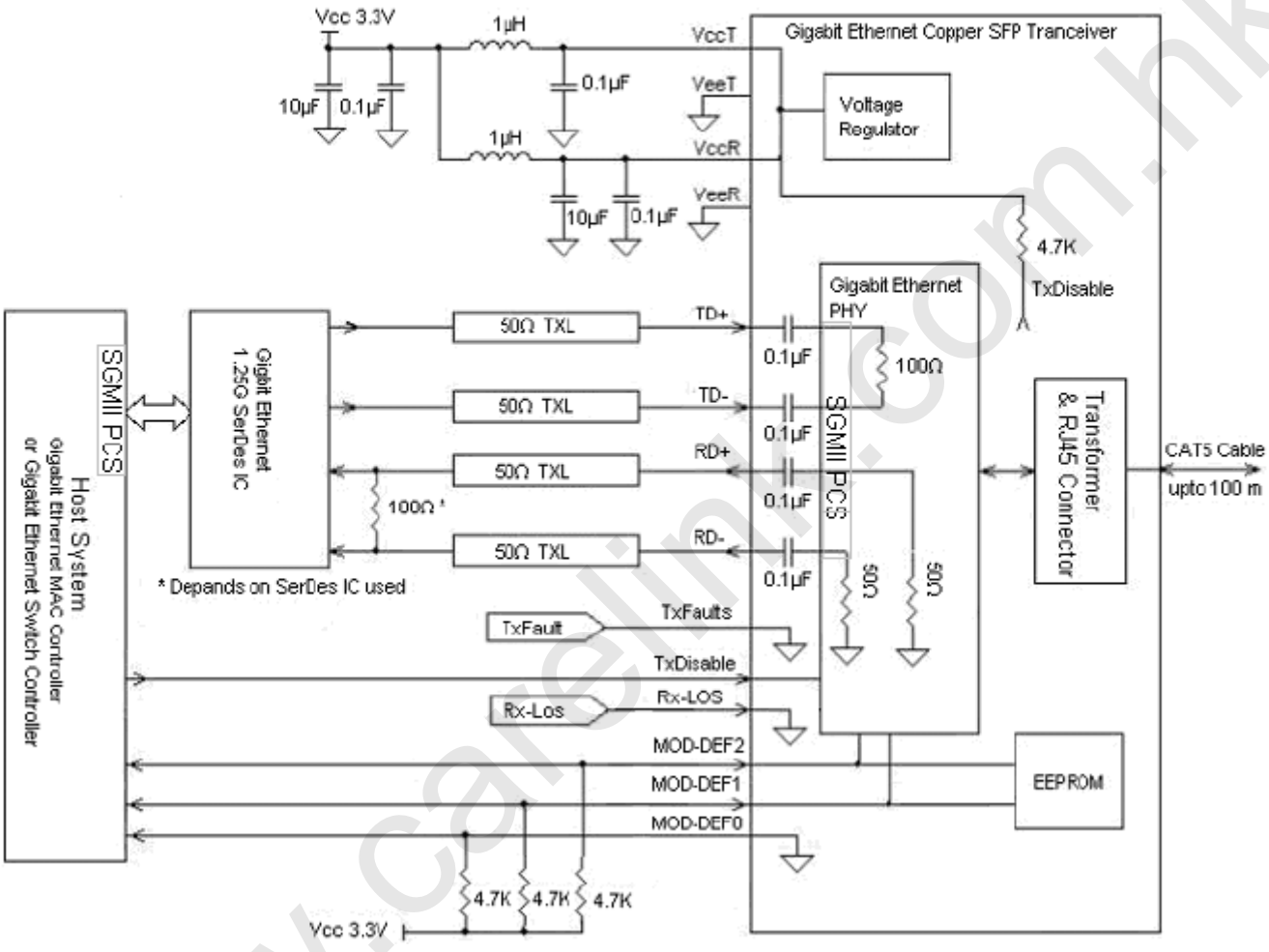
Recommend Interface Circuit



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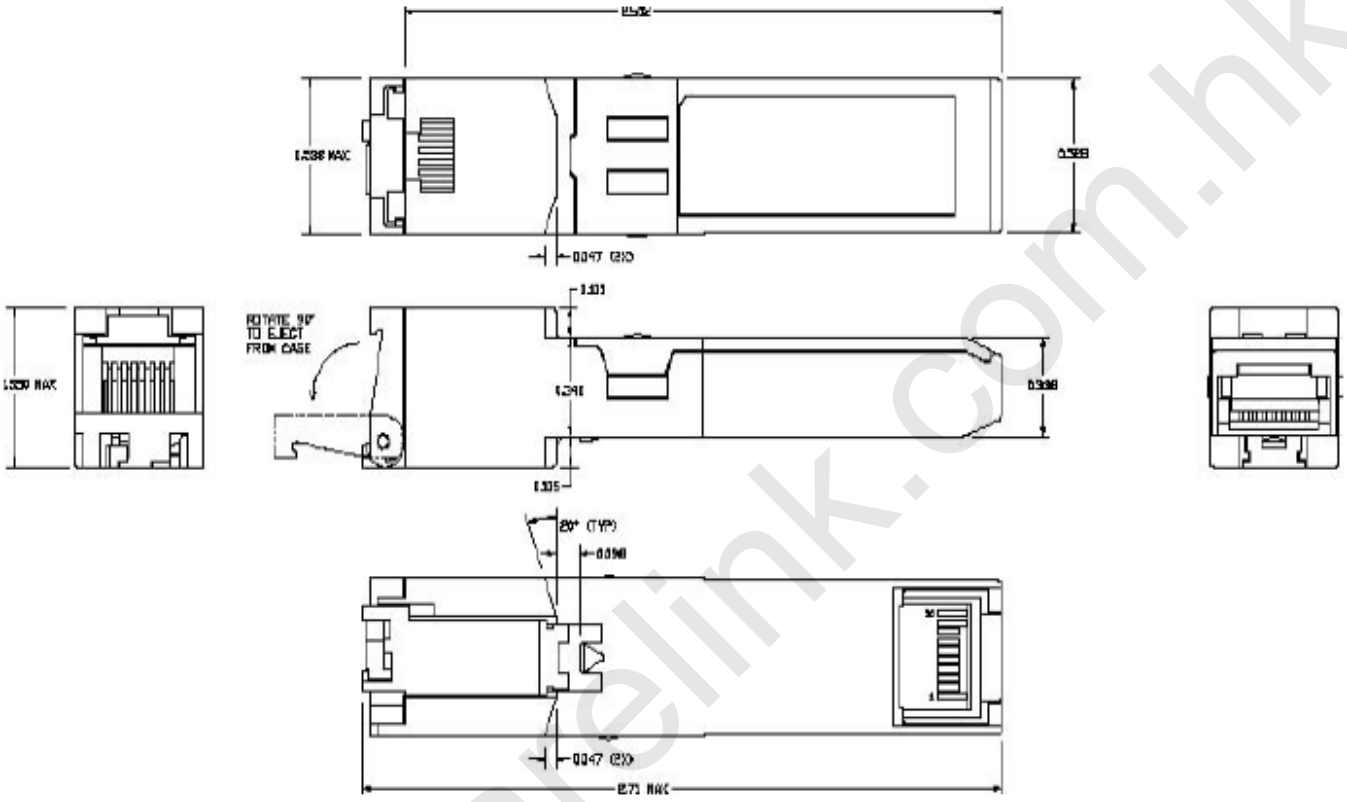
Dimensions



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CL-SFP-TX EEPROM Serial ID Information

CL-SFP-TX Provides 128 byte EEPROM, which can be accessed via the 2-wire serial communication protocol per SFP MSA with a device address of 0xA0.

Address	Hex	ASCII	Address	Hex	ASCII	Address	Hex	ASCII	Address	Hex	ASCII	Address	Hex	Address	Hex	ASCII
00	03		25	68	h	50	30	0	75	SN		100	00	125	00	
01	04		26	20		51	2D	-	76	SN		101	00	126	00	
02	00		27	20		52	43	C	77	SN		102	00	127	00	Note 5
03	00		28	20		53	33		78	SN		103	00			
04	00		29	20		54	20		79	SN		104	00			
05	00		30	20		55	20		80	SN		105	00			
06	08		31	20		56	30	0	81	SN		106	00			
07	00		32	20		57	30	0	82	SN		107	00			
08	00		33	20		58	30	0	83	SN		108	00			
09	00		34	20		59	30	0	84	DC	Note 3	109	00			
10	00		35	20		60	00		85	DC		110	00			
11	01		36	00		61	00		86	DC		111	00			
12	0D		37	00		62	00		87	DC		112	00			
13	00		38	00		63	CS1	Note 1	88	DC		113	00			
14	00		39	00		64	00		89	DC		114	00			
15	00		40	4F	O	65	12		90	DC		115	00			
16	00		41	50	P	66	00		91	DC		116	00			
17	00		42	36	6	67	00		92	00		117	00			
18	64		43	43	C	68	SN	Note 2	93	00		118	00			
19	00		44	2D	-	69	SN		94	00		119	00			
20	4F	O	45	54	T	70	SN		95	CS2	Note 4	120	00			
21	70	p	46	58	X	71	SN		96	00		121	00			
22	74	t	47	31	1	72	SN		97	00		122	00			
23	65	e	48	2D	-	73	SN		98	00		123	00			
24	63	c	49	30	0	74	SN		99	00		124	00			

Notes:
1) Byte 63(CS1): Check sum of bytes 0-62.
2) Byte 68-83 (SN): Serial number.
3) Byte 84-91 (DC): Date code.
4) Byte 95 (CS2): Check sum of bytes 64-94.
5) Bytes 128-255 had been set hex. 00.

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Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883 Method 3015
- ESD to the Duplex LC Receptacle: compatible with IEC 61000-4-2
- Immunity compatible with IEC 61000-4-3
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2
- RoHS compliant with 2002/95/EC 4.1&4.2 2005/747/EC

Ordering information

MANUFACTURE	PART NUMBER	PROTOTYPE
Carelink	CL-SFP-TX-1000	-
Cisco	CL-SFP-TX-1000-C	ex. GLC−T other p/h on demand
Alcatel	CL-SFP-TX-1000-AL	ex. S1GT-A other p/h on demand