WAVESPLITTER™
TECHNOLOGIES, INC.

Data Sheet

1000-BASE-T Copper SFP Transceiver
P/N: WST-SEAMCV-A6

Features:

- Hot-pluggable SFP Footprint
- Fully Metallic Enclosure for Low EMI
- Low Power Dissipation
- Compact RJ-45 Connector Assembly
- Detailed Product Information in EEPROM
- +3.3V Single Power Supply
- Access to Physical Layer IC via 2-wire Serial Bus
- 1000-BASE-T Operation in Host Systems with SGMII Interface
- Compliant with SFP MSA
- Compliant with IEEE 802.3TM-2002
- Operating case temperature range of 0℃ to 70℃

Applications:

- Switch/Route to Switch/Route Link
- LAN1000Base-T
- High Speed I/O for File Servers
- Gigabit Ethernet over Cat 5 cable

Description

The Copper SFP Transceiver 1000Base-T only SFP Copper Transceiver is high performance, cost effective module, compliant with the Gigabit Ethernet and 1000BASE-T standards as specified in IEEE 802. 3-2002 and IEEE 802.3ab, which supports 1000Mb/s data-rate up to 100 meters reach over twisted-pair category 5 cable.

The Copper SFP Transceiver supports 1000 Mb/s full duplex data-links with 5-level Pulse Amplitude Modulation (PAM) signals. All four pairs in the cable are used with symbol rate at 250Mb/s on each pair.

The Copper SFP Transceiver provides standard serial ID information compliant with SFP MSA, which can be accessed with address of A0h via the 2-wire serial CMOS EEPROM protocol. The physical IC can also be accessed via 2-wire serial bus at address ACh. The address of the PHY is 1010110x where x is the R/W bit.

General specifications

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Data Rate	BR		1000		Mbps	IEEE 802.3 compatible.
Cable Length	L			100	m	Category 5 UTP. BER <10-12

Notes:

1. Clock tolerance is +/- 50 ppm

2. By default, the YSP96-T is a full duplex device in preferred master mode

3. Automatic crossover detection is enabled. External crossover cable is not required

Environmental specifications

Parameter	Symbol	Min.	Typical	Max.	Unit
Power Supply Voltage	V_{CC}	0		3.6	V
Storage Temperature	Ts	-40		+85	°C
Operating Case Temperature	Tc	0		70	°C

Electrical Power Interface

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Supply Current	I_S		300	350	mA	
Input Voltage	V_{CC}	3.13	3.3	3.47	V	Referenced to GND
Maximum Voltage	V_{max}			3.6	V	

Low-speed signals, electronic characteristics

Parameter	Symbol	Min.	Max.	Unit	Note
SFP+ Output LOW	VOL	0	0.5	V	4.7k to 10k pull-up to host_Vcc, measured at host side of connector
SFP+ Output HIGH	VOH	host_Vcc - 0.5	host_Vcc + 0.3	V	
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	

High-speed electrical interface, transmission line-SFP

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Line Frequency	fL		125		MHz	5-level encoding, per IEEE 802.3
Tx Output Impedance	Zout,TX		100		Ohm	Differential, for all
Rx Input Impedance	Zin,RX		100		Ohm	Frequencies between 1MHz and 1250MHz

High-speed electrical interface, host-SFP

Parameter	Symbol	Min.	Typical	Max.	Unit	Note
Single Ended Data Input Swing	Vin	250		1200	mV	
Single Ended Data Output Swing	Vout	300		1000	mV	
Rise/Fall Time	Tr,Tf			250	ps	20%-80%
Tx Input Impedance	Zin		100		Ohm	Differential
Rx Output Impedance	Zout		100		Ohm	Differential

Pin Assignment

Top of Board		Bottom of Board (as viewed thru top of board)	
20	$V_{EE}T$	1	$V_{EE}T$
19	TD-	2	TX_FAULT
18	TD+	3	TX_DISABLE
17	$V_{EE}T$	4	MOD-DEF(2)
16	$V_{CC}T$	5	MOD-DEF(1)
15	$V_{CC}R$	6	MOD-DEF(0)
14	$V_{EE}R$	7	Rate Select
13	RD+	8	LOS
12	RD-	9	$V_{EE}R$
11	$V_{EE}R$	10	$V_{EE}R$
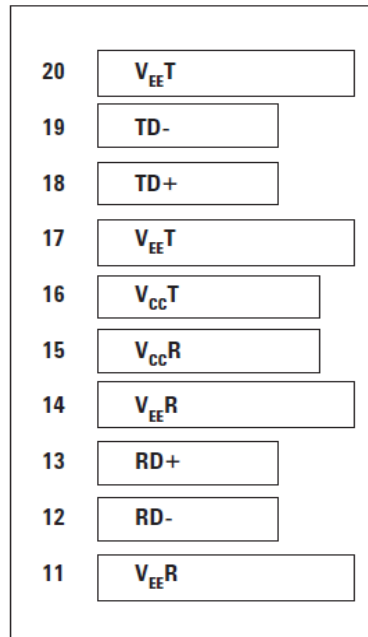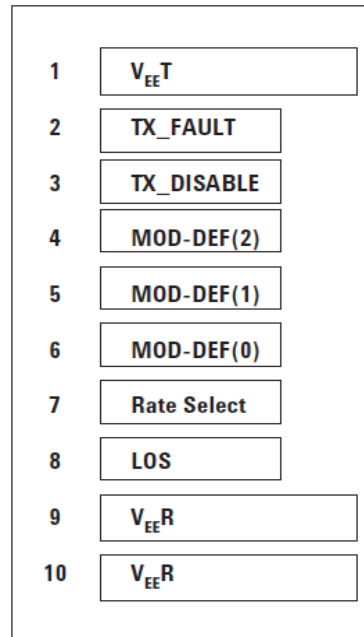
Top of Board **Bottom of Board (as viewed thru top of board)**

| Pin	Signal Name	Description	Notes
1	VeeT	Module Transmitter Ground	1
2	Tx_Fault	Transmitter Fault. Not supported, Grounded in module	2
3	Tx_Disable	Transmitter Disable - Module disables on high or open	3
4	MOD_DEF(2)	Module Definition 2. Data line for Serial ID.	
5	MOD_DEF(1)	Module Definition 1. Clock line for Serial ID.	
6	MOD_DEF(0)	Module Absent, connected to VeeT or VeeR in the module	
7	Rate Select	No connection	
8	Rx_LOS	Loss of Signal - High Indicates Loss of Signal	2
9	VeeR	Module Receiver Ground	1
10	VeeR	Module Receiver Ground	1
11	VeeR	Module Receiver Ground	1
12	RD-	Receiver Inverted Data Output	5
13	RD+	Receiver Non-Inverted Data Output	5
14	VeeR	Module Receiver Ground	1
15	VccR	Module Receiver 3.3 V Supply	4
16	VccT	Module Transmitter 3.3 V Supply	4
17	VeeT	Module Transmitter Ground	1
18	TD+	Transmitter Non-Inverted Data Input	6
19	TD-	Transmitter Inverted Data Input	6
20	VeeT	Module Transmitter Ground	1

Notes:

1. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case.

2. TX Fault is not used and is always tied to ground.

3. TX Disable as described in the MSA is not applicable to the 1000BASE-T module, but is used for convenience as an input to reset the internal ASIC. This pin is pulled up within the module with a 4.7kΩ to 10kΩ resistor.

   Low (0–0.8 V): Transceiver on

   Between (0.8 V and 2.0 V): Undefined

   High (2.0–3.465 V): Transceiver in reset disable state

   Open: Transceiver in reset disable state

4. VCCR and VCCT are the receiver and transmitter power supplies. They are defined as 3.3 V ± 5% at the SFP connector pin. The maximum supply current is about 300mA and the associated in-rush current will

typically be no more than 30 mA above steady state after 500 nanoseconds.

5. RD-/+: These are the differential receiver outputs. They are ac coupled 100 ohm differential lines which should be terminated with 100 ohm differential at the user SERDES. The ac coupling is done inside the module and is thus not required on the host board. The voltage swing on these lines will be between 600 and 2000 mV differential when properly terminated. These levels are compatible with CML and LVPECL voltage swings.

6. TD-/+: These are the differential transmitter inputs. They are ac coupled differential lines with 100 ohm differential termination inside the module. The ac coupling is done inside the module and is thus not required on the host board. The inputs will accept differential swings of 500 – 2400 mV, though it is recommended that values between 500 and 1200 mV differential (250 – 600 mV single ended) be used for best EMI performance. These levels are compatible with CML and LVPECL voltage swings.

Recommended Host Board Power Supply Circuit
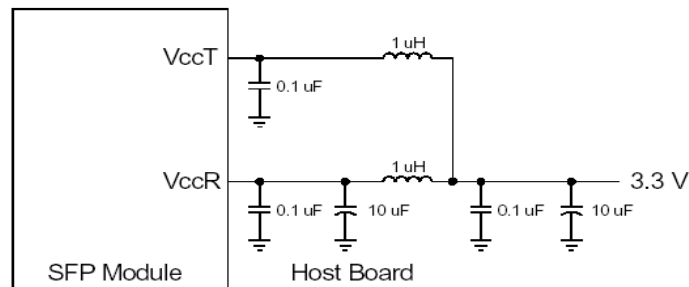
Recommended Typical Application Circuit
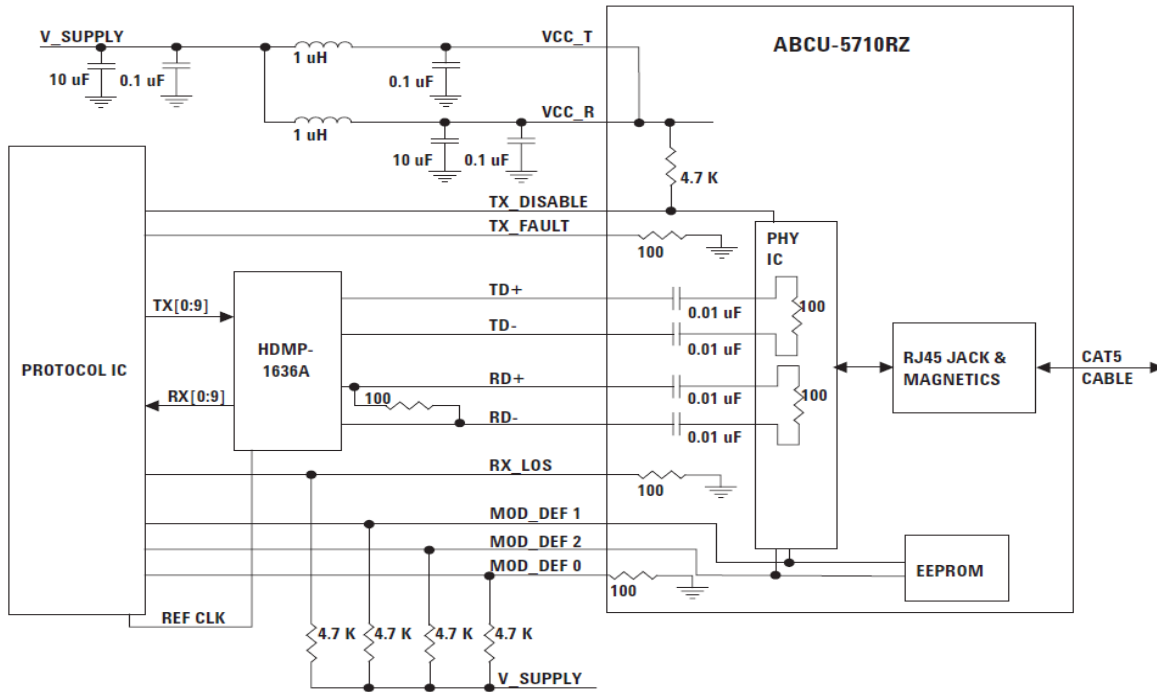
EEPROM Serial ID Memory Contents

Address	Byte	Name	Description and Contents	Hex
0	1	Identifier	Type of Serial transceiver (SFP)	03
1	1	Reserved	Extended identifier of type serial transceiver (MOD4)	04
2	1	Connector	Code of optical connector type (Copper)	22
3-10	8	Transceiver	Gigabit Ethernet 1000Base-T Copper	00 00 00 08 00 00 00 00
11	1	Encoding	8B10B	01
12	1	BR, Nominal	1.25G/s	0d
13	1	Reserved		00
14	1	Length (9um)	Link length supported for 9/125um fiber, units of 1km	00
15	1	Length (9um)	Link length supported for 9/125um fiber, units of 100m	00
16	1	Length (50um)	Link length supported for 50/125um fiber, units of 10m	00
17	1	Length (62.5um)	Link length supported for 62.5/125um fiber, units of 10m	00
18	1	Length (Copper)	Link length supported for copper, units of meters	64
19	1	Reserved		00
20-35	16	Vendor Name	"WAVESPLITTER" (ASCII)	57 41 56 45 53 50 4C 49 54 54 45 52 00 00 00 00
36	1	Reserved		00
37-39	3	Vendor OUI	SFP transceiver vendor OUI ID	00 0F 0E
40-55	16	Vendor PN	Part Number: "WST-SEAMCV-A6" (ASCII)	57 53 54 2D 53 45 41 4D 43 56 2D 41 20 20 20 20
56-59	4	Vendor rev	Revision level for part number (means 80 revision)	30 30 38 30
60-61	2	Wavelength	Least significant byte of Check sum of data in address 0-62	00 00
62	1	Reserved		00
63	1	CCID	Least significant byte of Check sum of data in address 0-62	xx
64-65	2	Option	Indicates which optical SFP signals are implemented	00 10
66	1	BR, max	Upper bit rate margin, units of %	00
67	1	BR, min	Lower bit rate margin, units of %	00
68-83	16	Vendor SN	Serial number "CYYMG30001" (ASCII)	43 59 YY MM 47 33 30 30 30 31 20 20 20 20 20 20
84-91	8	Date code	Manufacturing date code Year (4 bytes), Month (2 bytes), Day (2 bytes)	xx
92-94	3	Reserved		00 00 00

| 95 | 1 | CC_EX | Check code for the extended ID Fields (addresses 64 to 94) | xx |
| 96-127 | 32 | Vendor specific | specific date, read only | |

Mechanical Drawing

The mechanical specifications outlined in the SFP MSA. The front portion of the SFP (part extending beyond the face plate of the host) is larger to accommodate the RJ-45 connector.
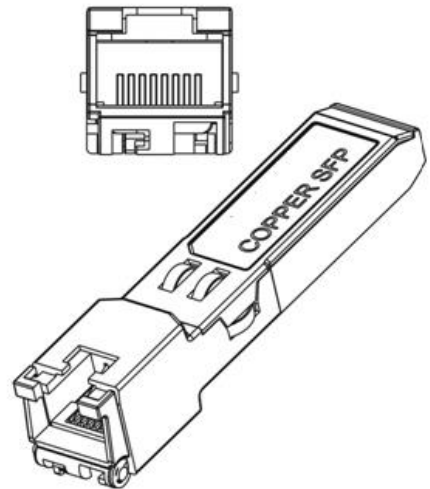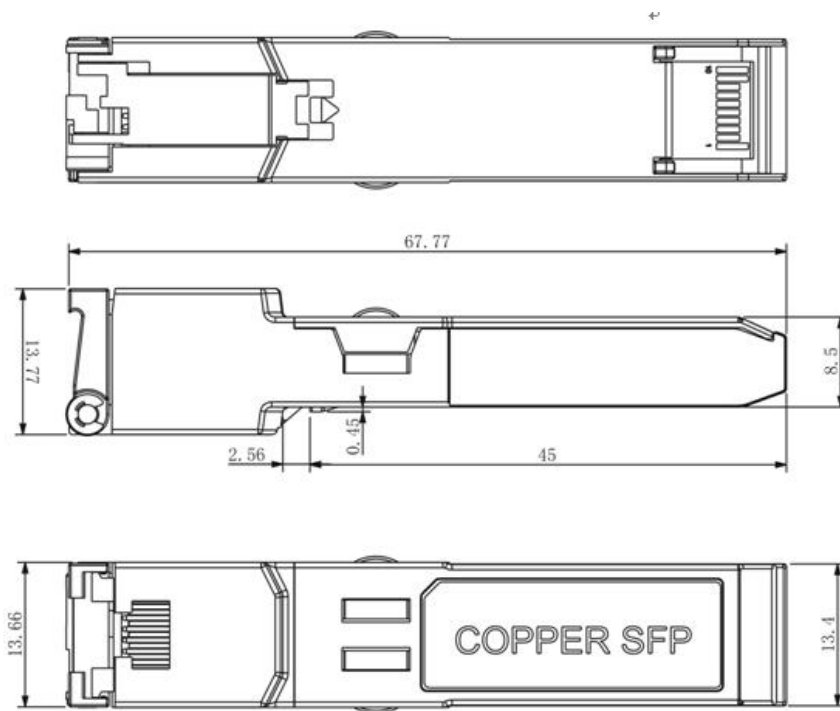
(Unit: mm   View: ◁ ⊕)

Unit: mm

Ordering Information

Part No	Specification								
	Package	Media	Data rate	MAC interface	TX Disable function	Link Indicator on RX_LOS Pin	Temp	Reach	Application code
WST-SEAMCV-A6	SFP	Cat-5	1000Mbps	SGMII Interface	YES	No	0~70°C	100m	Gigabit Ethernet

Modification History

Revision	Date	Description	Originator	Review	Approved
V1.0	21-Jun-2019	New Issue	Ivy Chen	Wayne Liao	Wayne Liao

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