

10G Base SFP+ Copper Transceiver Modules

WST-SFP+CucRM-D



Features:

- Support 10Gbase-T / 5Gbase-T / 2.5Gbase-T / 1000base-T on line port
- Support 10Gbase-R on host port
- Hot-pluggable SFP footprint
- Compact RJ-45 connector assembly
- RoHS compliant and lead-free
- Single +3.3V power supply
- 10 Gigabit Ethernet over Cat 6a cable
- Ambient Operating temperature: 0° C to +60° C

Applications:

- LAN 10GBase-T
- Switch to Switch Interface
- Router/Server interface
- Switched backplane applications

Standards:

- Compatible with SFP MSA
- Compatible with IEEE Std 802.3

Absolute Maximum Ratings

Parameter	Symbol	Unit	Min	Max
Storage Temperature Range	Ts	°C	-40	+85
Power Supply Voltage	V _{CC}	V	-0.5	+3.6

Recommended Operating Conditions

Parameter	Symbol	Unit	Min	Typ	Max	Note
Case Operating Temperature -CT	T _{C-CT}	°C	0		60	
Power Supply Voltage	V _{CC}	V	3.135	3.3	3.465	
Power Supply Current	I _{CC}	mA		700	900	@10 Gbs
				600	800	@2.5 Gbs

PRODUCT DESCRIPTION

SFP+-10GBASE-T Copper Small Form Pluggable (SFP) transceivers are based on the SFP Multi Source Agreement (MSA). They are compatible with the 10Gbase-T / 5Gbase-T / 2.5Gbase-T / 1000base-T standards as specified in IEEE Std 802.3. SFP+-10GBASE-T uses the SFP's RX_LOS (must be pulled up on host) pin for link indication. If pull up or open SFP's TX_DISABLE pin, PHY IC be reset.

Specifications (tested under recommended operating conditions, unless otherwise noted)

Low-Speed Signals

MOD_DEF(1) (SCL) and MOD_DEF(2) (SDA), are open drain CMOS signals (see section VII, "Serial Communication Protocol"). Both MOD_DEF(1) and MOD_DEF(2) must be pulled up to host_Vcc

Low-Speed Signals, Electronic Characteristics					
Parameter	Symbol	Min	Max	unit	Notes/Conditions
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	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

All high-speed signals are AC-coupled internally.

High-Speed Electrical Interface, Transmission Line-SFP						
Parameter	Symbol	Min	Typ	Max	unit	Notes/Conditions
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						
Parameter	Symbol	Min	Typ	Max	unit	Notes/Conditions
Single ended data input swing	Vinsing	250		1200	mV	Single ended

Single ended data output swing	Voutsing	350		800	mV	Single ended
Rise/Fall Time	T_r, T_f		175		psec	20%-80%
Tx Input Impedance	Zin		50		Ohm	Single ended
Rx Output Impedance	Zout		50		Ohm	Single ended

General Specifications

General						
Parameter	Symbol	Min	Typ	Max	unit	Notes/Conditions
Data Rate	BR	1		10	Gb/sec	IEEE 802.3 compatible. See Notes 1,2 below

Notes:

1. Clock tolerance is +/- 50 ppm

Memory Map

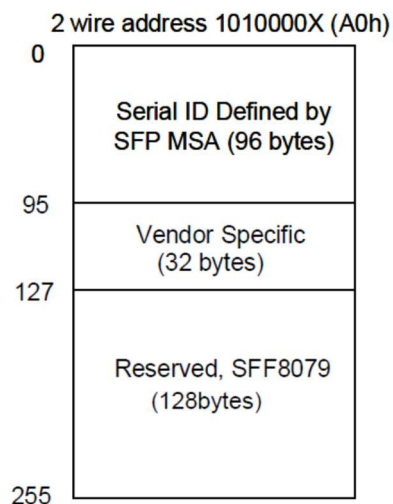
EEPROM Serial ID Memory Contents

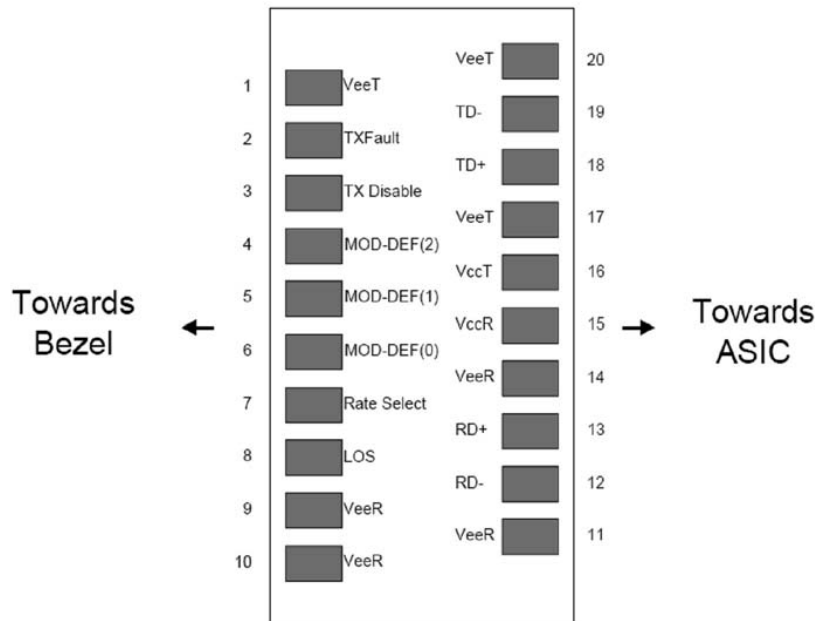
Accessing Serial ID Memory uses the 2 wire address 1010000X (A0h). Memory Contents of Serial ID are shown in Table 2.

Table 2 Serial ID Memory Contents

Data Address	Size (Bytes)	Name of Field	Contents (Hex)	Description
BASE ID FIELDS				
0	1	Identifier	03	SFP
1	1	Ext. Identifier	04	GBIC/SFP function is defined by two Wire interface ID only
2	1	Connector	00	
3-10	8	Transceiver	00 00 00 00 00 00 00 00	10GBASE-T
11	1	Encoding	06	8B/10B
12	1	BR-Normal	67	10Gbps
13	1	Rate Identifier	00	unspecified
14	1	Length (9um)-km	00	
15	1	Length (9um)	00	
16	1	Length(50um)	00	
17	1	Length(62.5um)	00	

18	1	Length (Copper)	1E	30m
19	1	Length(OM3)	00	
20-35	16	Vendor name	57 41 56 45 53 50 4C 49 54 54 45 52 20 20 20 20	"WAVESPLITTER"(ASCII)
36	1	Channel Spacing	00	
37-39	3	Vendor OUI	00 0F 0E	
40-55	16	Vendor PN	57 53 54 2D 53 46 50 2B 43 75 63 4D 2D 44 20 20	Transceiver part number "WST-SFP+CucRM-D"
56-59	4	Vendor rev	33 2E 20 20	
60-61	2	Wavelength	00 00	NA
62	1	Reserved	00	
63	1	CC Base	xx	
64-65	2	Options	00 1A	
66	1	BR,max	00	
67	1	BR,min	00	
68-83	16	Vendor SN	xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx	CW02U1xxxxxx
84-91	8	Data code	xx xx xx xx xx xx xx xx	YYMMDDLL
92-94	3	Reserved	00 00 00	
95	1	CC EXT	xx	
96-255	160	Vendor specific		



Pin Description

Pin	Name	Function/Description	Engagement order	Notes
1	VEET	Transmitter Ground	1	1
2	TX Fault	Transmitter Fault Indication	3	2
3	TX Disable	Transmitter Disable-Module disables on	3	3
4	MOD_DEF2	Module Definition 2-Two wire serial ID	3	
5	MOD_DEF1	Module Definition 1-Two wire serial ID	3	
6	MOD_DEF0	Module Definition 0-Two wire serial ID	3	2
7	Rate Select	Not connected	3	
8	LOS	Loss of Signal indication. Logic 0 indicates	3	2
9	VEER	Receiver Ground	1	
10	VEER	Receiver Ground	1	1
11	VEER	Receiver Ground	1	1
12	RD-	Receiver Inverted DATA out.	3	
13	RD+	Receiver Non-inverted DATA out.	3	
14	VEER	Receiver Ground	1	1
15	VCCR	Receiver Power Supply	2	
16	VCCT	Transmitter Power Supply	2	
17	VEET	Transmitter Ground	1	1
18	TD+	Transmitter Non-Inverted DATA in.	3	
19	TD-	Transmitter Inverted DATA in.	3	
20	VEET	Transmitter Ground	1	1

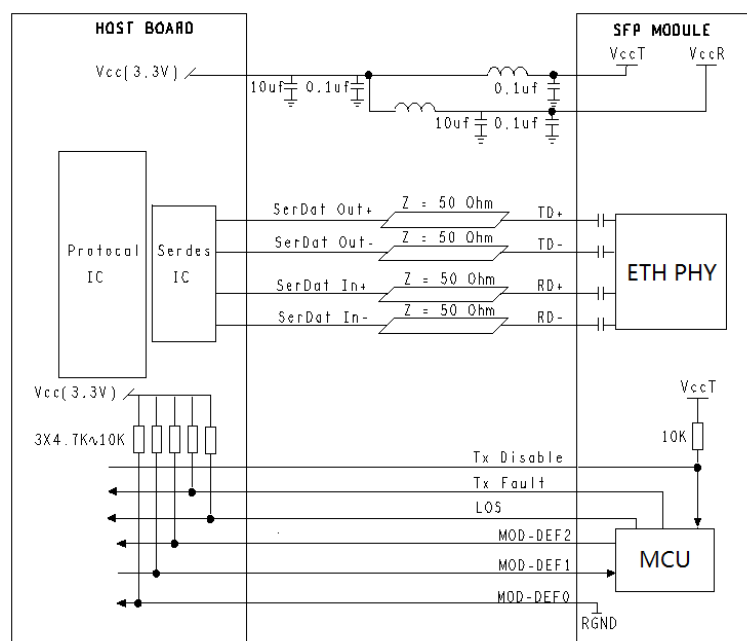
Notes:

1. Circuit ground is connected to chassis ground
2. PHY disabled on $T_{DIS} > 2.0V$ or open, enabled on $T_{DIS} < 0.8V$
3. Should be pulled up with 4.7k - 10k Ohms on host board to a voltage between 2.0 V and 3.6 V. MOD_DEF(0) pulls line

Serial Communication Protocol

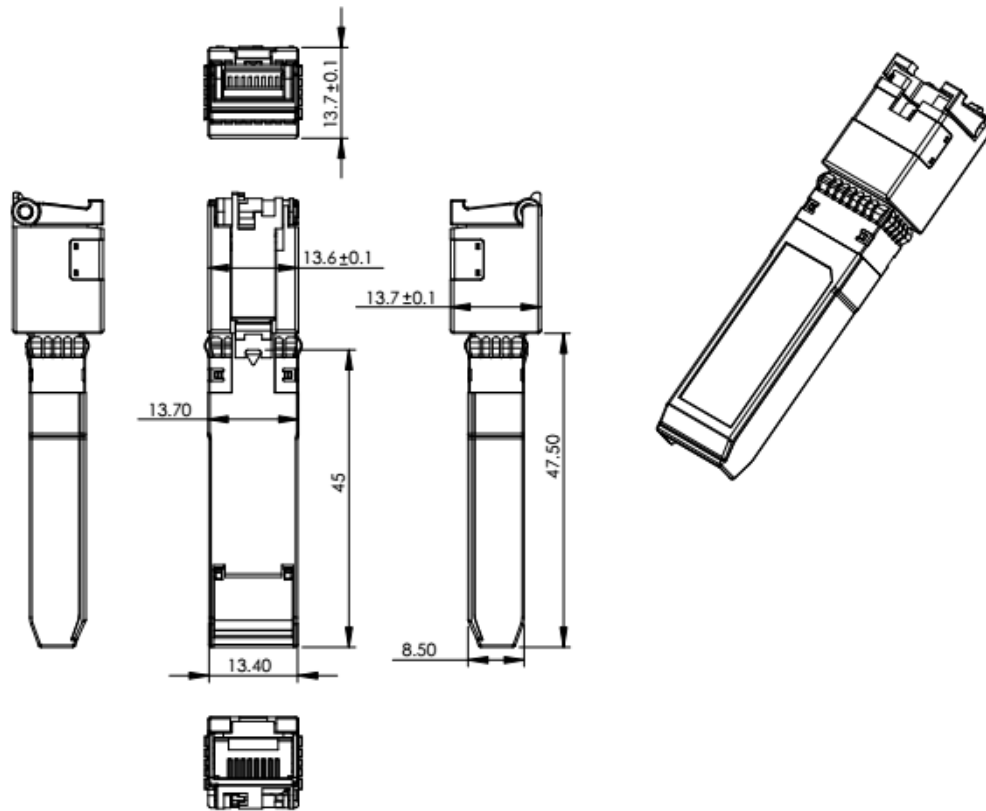
All Wavesplitter SFPs support the 2-wire serial communication protocol outlined in the SFP MSA. These SFPs use an MCU, can be accessed with address of A0h.

Serial Bus Timing, Requirements						
Parameter	Symbol	Min	Typ	Max	unit	Notes/Conditions
I ² C Clock Rate		0		200,000	Hz	

Typical Application Circuit

Package Outline

Unit is millimeter. All dimensions are ± 0.1 mm unless otherwise specified.

**Regulatory Compliance**

Feature	Test Method	Performance
RoHS6	BS EN 1122: 2001 US EPA METHOD 3050B US EPA METHOD 3052 US EPA METHOD 3060A	Pb <1000ppm Cr6+ <1000ppm Hg <1000ppm PBB <1000ppm PBDE <1000ppm Cd <100ppm

Ordering Information

Specification								
Part No.	Packag e	Interfac e	Media	Data Rate	Temp	Reach	Note	RoHS
WST-SFP+CucRM-D	SFP+	Electric, SGMII	Copper (see table below)	Multi rate	0~60℃	See table below	Auto- Negotiation enable	RoHS

Line Port	Cable	Reach	Host Port
10Gbase-T	CAT6A	30m	10GBase-R
5Gbase-T	CAT5E	50m	10GBase-R
2.5Gbase-T	CAT5E	50m	10GBase-R
1000base-T	CAT5E	100m	10GBase-R
100base-Tx	CAT5E	100m	10GBase-R
10base-Tx	CAT5E	100m	10GBase-R

Modification History

Revision	Date	Description	Originator	Review	Approved
V1.0	14-Dec-2019	New Issue	Min Liu	Min Liu	Wayne Liao
V1.1	24-Dec-2021	Update temperature 0~60℃, Power Supply Current @ 2.5Gbps	Shao-Yu Lee	Tom Tang	Wayne Liao



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