

## DATA SHEET

### MODULETEK:SFP-10G-T-x-D23

10GBASE-T SFP Copper Transceiver  
10 Gigabit Ethernet

#### Overview

ModuleTek's SFP-10G-T-x-D23 is a small hot-pluggable RJ45 electrical port module, compliant with 10 Giga-bit Ethernet standards and SFP Multi-Source Agreement (MSA) standards, supporting 10G transmission rate, transfer distances up to 30 meters using Cat 6a/7 network cable, it is also backward compatible with 10M/100M/1000M/2.5G/5GBase-T applications. Low power consumption (2.3W TYP @ 10Gbps 30m), compatible with various brands of hosts, widely used in data centers and enterprise networks. Comply with certification requirements such as RoHS 2.0, Reach, CE and FCC.

The product is based on a standard RJ45 interface, compatible with traditional networks, the Ethernet transfer rates can be increased without changing existing wiring. It is a lowcost alternative to Ethernet upgrades.

#### Product Features

- Supports 10GBase-T using 30m Cat 6a/7 cable
- Supports 5GBase-T using 70m Cat 5e cable
- Supports 2.5GBase-T using 100m Cat 5e cable
- Supports 10/100/1000Base-T using 100m Cat 5e cable
- Low power consumption (2.3W TYP @10Gbps 30m)
- Auto-sense MDI/MDIX
- Compliant with IEEE 802.3az
- Compliant with SFF-8431 and SFF-8432 MSA
- Compliant with RoHS 2.0, Reach, CE, FCC standards



#### Applications

10 Gigabit Ethernet

## Ordering Information

Part Number	Product ID	Description	Operating Temperature Range
SFP-10G-T-C-D23	M551433	10M/100M/1000M/2.5G/5G/10GBase-T SFP+ Copper RJ-45 Connector	0°C to 70°C
<p><b>Note:</b></p> <ol style="list-style-type: none"> <li>Rx with auto squelch.</li> <li>Rx_LOS report copper interface link status.</li> <li>A0 and A2 table 00/01 with write protection function.</li> <li>Operating Temperature Range is case temperature.</li> </ol>			
<p><b>For More Information:</b>            ModuleTek Limited            Web: <a href="http://www.moduletek.com">www.moduletek.com</a>            Email: <a href="mailto:sales@moduletek.com">sales@moduletek.com</a></p>			

## General Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Data Rate	DR		10		Gb/s	1
Bit Error Rate	BER			10 <sup>-12</sup>		
Storage Temperature	T <sub>STO</sub>	-40		85	°C	2
Supply Current	I <sub>CC</sub>		700	750	mA	3
Input Voltage	V <sub>CC</sub>	3.14	3.3	3.46	V	
Maximum Voltage	V <sub>MAX</sub>	-0.5		4	V	
Surge Current	I <sub>surge</sub>			30	mA	

**Notes:**

- IEEE 802.3ae
- Ambient temperature
- Test at 10Gbps rate using 30m CAT 6A cable

## I2C Memory Map

Address A0					
IIC Addr	Size	Name	Description	Values (HEX)	Remarks
0	1	Identifier	SFP or SFP+	03	
1	1	Ext. Identifier	GBIC/SFP function is defined by two-wire interface ID only	04	
2	1	Connector	RJ45 (Registered Jack)	22	
3-10	8	Transceiver	Code for electronic or optical compatibility	00 00 00 00 00 04 00 00	
11	1	Encoding	64B/66B	06	
12	1	BR, Nominal	Nominal Bit Rate 10.3Gb/s	67	
13	1	Rate Identifier	Type of rate select functionality	00	
14	1	Length(SMF,km)	Link length supported for single mode fiber, units of km	00	
15	1	Length (SMF)	Link length supported for single mode fiber, units of 100 m	00	
16	1	Length (50um)	Link length supported for 50 um OM2 fiber, units of 10 m	00	
17	1	Length (62.5um)	Link length supported for 62.5 um OM1 fiber, units of 10 m	00	
18	1	Length (OM4 or copper cable)	30m	1E	
19	1	Length (OM3)	Link length supported for 50 um OM3 fiber, units of 10 m	00	
20-35	16	Vendor name	MODULETEK	4D 4F 44 55 4C 45 54 45 4B 20 20 20 20 20 20 20	
36	1	Transceiver	Code for electronic or optical compatibility	00	
37-39	3	Vendor OUI	SFP vendor IEEE company ID	00 00 00	
40-55	16	Vendor PN	Part number in Order information	-	
56-59	4	Vendor rev	Revision level for part number provided by vendor (ASCII)	-	

60-61	2	Wavelength	Laser wavelength (Passive/Active Cable Specification Compliance)	00 00	
62	1	Unallocated		00	
63	1	CC BASE	Check code for Base ID Fields (addresses 0 to 62)	-	
64-65	2	Options	Indicates which optional transceiver signals are implemented	00 00	
66	1	BR, max	Upper bit rate margin	00	
67	1	BR, min	Lower bit rate margin	00	
68-83	16	Vendor SN	Serial number provided by vendor	Programmed by Factory	
84-91	8	Date code	Year,Month,Day	Programmed by Factory	
92	1	Diagnostic Monitoring Type	Indicates which type of diagnostic monitoring is implemented (if any) in the transceiver	00	
93	1	Enhanced Options	Indicates which optional enhanced features are implemented (if any) in the transceiver	00	
94	1	SFF-8472 Compliance	Indicates which revision of SFF-8472 the transceiver complies with.	00	
95	1	CC EXT	Check code for the Extended ID Fields (addresses 64 to 94)	-	
96-127	32	Vendor Specific	Vendor Specific EEPROM	-	
128-255	128	Vendor Specific	Vendor Specific EEPROM	-	
<b>Address A2 Low</b>					
IIC Addr	Size	Name	Description	Values (HEX)	Remarks
0-94	95	Reserved	Reserved	FF	
95	1	Checksum	0-94 Byte Checksum	-	
96-121	26	Reserved	Reserved	FF	
122	1	Security Level	Security Level: 00=Normal Mode; 01=User Mode (Level 1); 02=Factory Mode (Level 2);	-	
123-126	4	Password Entry	Password Entry Area	00 00 00 00	

127	1	Table Selection	Page Select Byte	00	
<b>Address A2 Page 00h/01h</b>					
IIC Addr	Size	Name	Description	Values (HEX)	Remarks
128-255	128	Upper Memory Map	User Code Area	-	
<b>Address A2 Page 8Ah</b>					
IIC Addr	Size	Name	Description	Values (HEX)	Remarks
128-131	4	Firmware Version Number[4]	Firmware Version Number	-	
132-135	4	Total Running Time In Second	Total Running Time In Second	-	
<b>Address A2 Page F0h</b>					
IIC Addr	Size	Name	Description	Values (HEX)	Remarks
128-131	4	Password1 Long	Level 1 Password	00 00 10 11	
132	1	WorkingMode	-	00	
133	1	DisableA0WP	00=A0 With Write Protection; 01=A0 Without Write Protection	00	
134	1	DisableA2T00T01WP	00=A2 T00T01 With Write Protection; 01=A2 T00T01 Without Write Protection	00	
135	1	DisableA2DomReport	00=Reprto VCC/TEMP DOM; 01=Not Report	00	

**Notes:**

- 1.Password entry area default 00000000, read out as last written value
- 2.Module with write protection, enter the security level 1 writeable

## User Mode

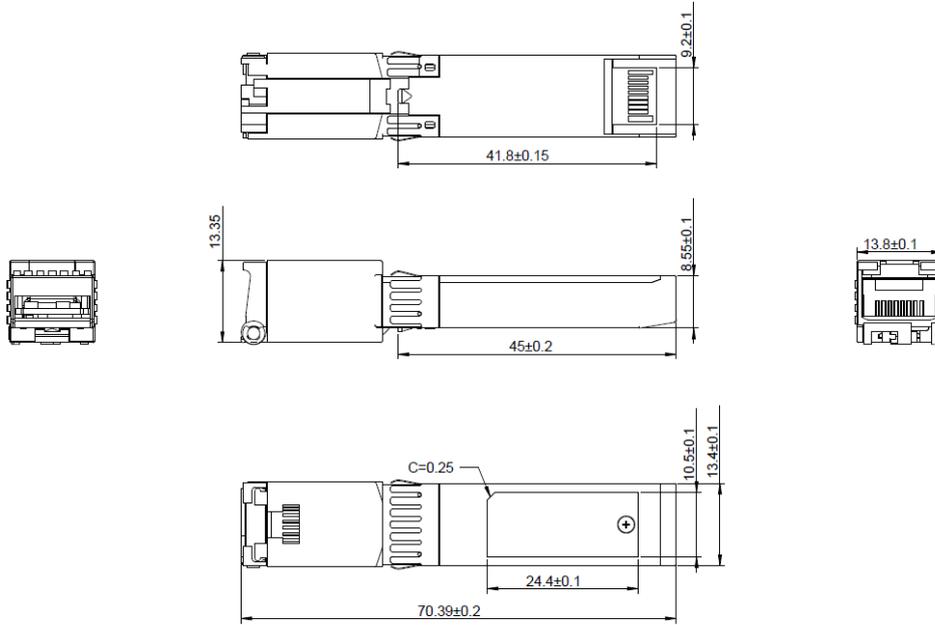
Level 1 Default Password	Password Can Be Changed	Permissions
00 00 10 11	YES(A2 TF0)	1、Read And Write A0
		2、Read And Write A2 T00/T01

**Notes:**

- 1.detail in I2C memory map

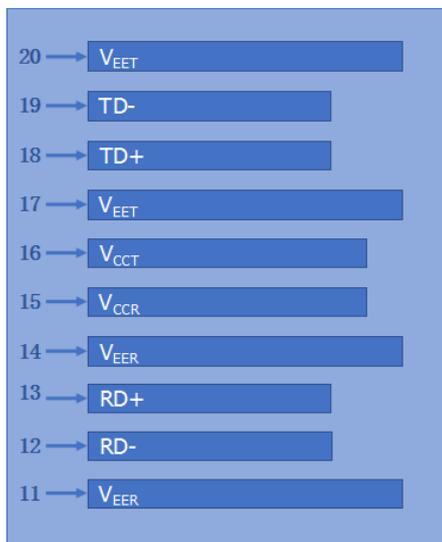
## Dimensions

Weight: 26g

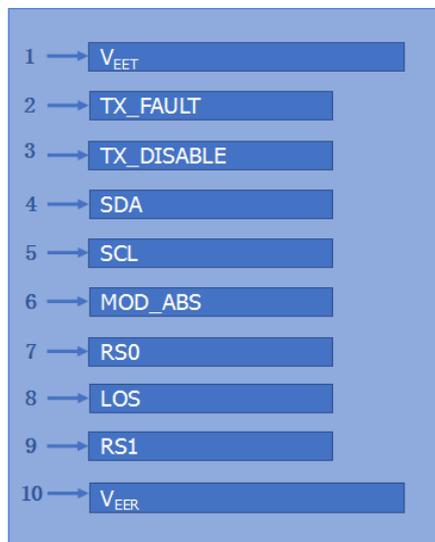
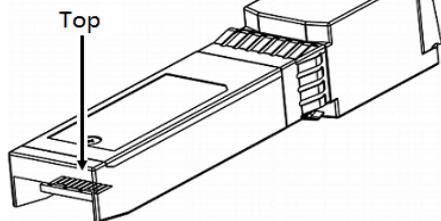


ALL DIMENSIONS ARE  $\pm 0.2$ mm UNLESS OTHERWISE SPECIFIED  
UNIT: mm

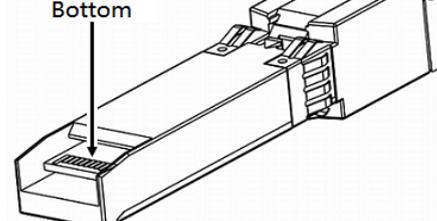
## Electrical Pad Layout



Top of Board



Bottom of Board



## Pin Assignment

PIN #	Symbol	Description	Remarks
1	V <sub>EET</sub>	Transmitter ground (common with receiver ground)	1
2	TX_FAULT	Transmitter Fault. Not supported	
3	TX_DISABLE	Transmitter Disable. PHY disabled on high or open	2
4	SDA	2-wire Serial Interface Data Line	3
5	SCL	2-wire Serial Interface Clock Line	3
6	MOD_ABS	Module Absent. Grounded within the module	3
7	RS0	No Connection Required	
8	LOS	Loss of Signal indication. Logic 0 indicates normal operation.	
9	RS1	No Connection Required	
10	V <sub>EER</sub>	Receiver ground (common with transmitter ground)	1
11	V <sub>EER</sub>	Receiver ground (common with transmitter ground)	1
12	RD-	Receiver Inverted DATA out. AC coupled	
13	RD+	Receiver Non-inverted DATA out. AC coupled	
14	V <sub>EER</sub>	Receiver ground (common with receiver ground)	1
15	V <sub>CCR</sub>	Receiver power supply	
16	V <sub>CCT</sub>	Transmitter power supply	
17	V <sub>EET</sub>	Transmitter ground (common with receiver ground)	1
18	TD+	Transmitter Non-Inverted DATA in. AC coupled	
19	TD-	Transmitter Inverted DATA in. AC coupled	
20	V <sub>EET</sub>	Transmitter ground (common with receiver ground)	1

### Notes:

- 1.Circuit ground is connected to chassis ground
- 2.Disabled: T<sub>DIS</sub>>2V or open, Enabled: T<sub>DIS</sub><0.8V
- 3.Should Be pulled up with 4.7k –10k ohm on host board to a voltage between 2V and 3.6V