

## DATA SHEET

### MODULETEK : DAC-SFP-10G-A-xxAWG-aa.aaM-C0C0B

SFP 10G Active Copper Cable Assembly

#### Overview

ModuleTek's 10G active cable uses shielded high-speed differential cables with high-speed electrical signal compensation such as pre-emphasis and equalization to increase the data transmission distance between uncompensated switches. The product is compliant with 10 Gigabit Ethernet standards and SFP Multi-Source Agreement (MSA) standards, supports 10G transmission rates, and is backward compatible with low-rate applications. Its biggest feature is the use of thinner cables and longer transmission distances. Low power consumption, low cost and high reliability are the preferred solutions for 10G rate short-range applications. They are commonly used for data transmission between data centers and cabinets or adjacent cabinets.

#### Product Features

- Up to 10 Gb/s bi-directional data links
- 24AWG through 30AWG cable available
- Dual SFP Connectors
- Industry standard small form pluggable (SFP) package
- Spans up to 15 meters
- Hot Pluggable
- Single power supply 3.3V
- RoHS Compliant
- Operating temperature range (Case Temperature) :  
Commercial Level : 0°C to 70°C



#### Applications

10G Ethernet  
10G Fiber Channel

## Ordering Information

Part Number	Product ID	Description	Gauge	Length
DAC-SFP-10G-A-30AWG-aa.aaM-C0C0B	M398701	SFP 10G Active Copper Cable, aa.aa $\leq$ 7	30AWG	$\leq$ 7m
DAC-SFP-10G-A-28AWG-aa.aaM-C0C0B	M450901	SFP 10G Active Copper Cable, aa.aa $\leq$ 10	28AWG	$\leq$ 10m
DAC-SFP-10G-A-24AWG-aa.aaM-C0C0B	M019801	SFP 10G Active Copper Cable, aa.aa $\leq$ 15	24AWG	$\leq$ 15m
<p><b>Note:</b></p> <ol style="list-style-type: none"> <li>"A" indicates active cable</li> <li>"aa.aa" indicates the cable length in meters.</li> <li>The product with write protection.</li> <li>The wire diameter of the products in the above list is the default value under different lengths. We can also provide other wire products to customers with special requirements.</li> <li>Product ID is the short order number of our product standard model.</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		10.3125		Gb/s	1
Bit Error Rate	BER			$10^{-12}$		
Operating Temperature	T <sub>C</sub>	0		70	°C	2
Storage Temperature	T <sub>STO</sub>	-40		85	°C	3
Input Voltage	V <sub>CC</sub>	3.14	3.3	3.46	V	4
Supply Current	I <sub>CC</sub>		100	300	mA	4

**Notes:**

- IEEE 802.3ae compatible
- Case temperature
- Ambient temperature
- For electrical power interface

## 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	Copper pigtail	21	
3-10	8	Transceiver	Active Cable	00 00 00 00 00 00 08 00	
11	1	Encoding	Code for high speed serial encoding algorithm	00	
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)	Link length supported for 50um OM4 fiber, units of 10m. Alternatively copper or direct attach cable, units of m	-	
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 electro nic or optical compatibility	0D	
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	64	
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
0-1	2	Temp High Alarm	75°C	4B 00	
2-3	2	Temp Low Alarm	-5°C	FB 00	
4-5	2	Temp High Warning	70°C	46 00	
6-7	2	Temp Low Warning	0°C	00 00	
8-9	2	Vcc High Alarm	3.9V	98 58	
10-11	2	Vcc Low Alarm	2.7V	69 78	

12-13	2	Vcc High Warning	3.7V	90 88	
14-15	2	Vcc Low Warning	2.9V	71 48	
16-17	2	Bias High Alarm	Bias High Alarm	00 00	
18-19	2	Bias Low Alarm	Bias Low Alarm	00 00	
20-21	2	Bias High Warning	Bias High Warning	00 00	
22-23	2	Bias Low Warning	Bias Low Warning	00 00	
24-25	2	TxPower High Alarm	TxPower High Alarm	00 00	
26-27	2	TxPower Low Alarm	TxPower Low Alarm	00 00	
28-29	2	TxPower High Warning	TxPower High Warning	00 00	
30-31	2	TxPower Low Warning	TxPower Low Warning	00 00	
32-33	2	RxPower High Alarm	RxPower High Alarm	00 00	
34-35	2	RxPower Low Alarm	RxPower Low Alarm	00 00	
36-37	2	RxPower High Warning	RxPower High Warning	00 00	
38-39	2	RxPower Low Warning	RxPower Low Warning	00 00	
40-55	16	Reserved	Reserved	00	
56-59	4	Ext RxPwr 4	Ext RxPwr 4	00 00 00 00	
60-63	4	Ext RxPwr 3	Ext RxPwr 3	00 00 00 00	
64-67	4	Ext RxPwr 2	Ext RxPwr 2	00 00 00 00	
68-71	4	Ext RxPwr 1	Ext RxPwr 1	00 00 00 00	
72-75	4	Ext RxPwr 0	Ext RxPwr 0	00 00 00 00	
76-77	2	Ext Bias Slope	Ext Bias Slope	00 00	
78-79	2	Ext Bias Offset	Ext Bias Offset	00 00	
80-81	2	Ext TxPower Slope	Ext TxPower Slope	00 00	
82-83	2	Ext TxPower Offset	Ext TxPower Offset	00 00	
84-85	2	Ext Temp Slope	Ext Temp Slope	01 00	
86-87	2	Ext Temp Offset	Ext Temp Offset	00 00	
88-89	2	Ext Vcc Slope	Ext Vcc Slope	01 00	
90-91	2	Ext Vcc Offset	Ext Vcc Offset	00 00	
92-94	3	Reserved	Reserved	00	
95	1	Checksum	0-94 Byte Checksum	30	
96-97	2	Temperature	Temperature	-	
98-99	2	Vcc	Vcc	-	

100-101	2	Bias Current	Bias Current	00 00	
102-103	2	Tx Power	Tx Power	00 00	
104-105	2	Rx Power	Rx Power	00 00	
106-109	4	Reserved	Reserved	00 00 00 00	
110	1	Optional Status/Control Bits	00		
111	1	Reserved	Reserved	00	
112-113	2	Alarm Flags	Alarm Flags	00 00	
114-115	2	Reserved	Reserved	00 00	
116-117	2	Warning Flags	Warning Flags	00 00	
118-121	4	Reserved	Reserved	00 00 00 00	
122	1	Security Level	Security Level: 00=Normal Mode; 01=User Mode (Level 1); 02=Factory Mode (Level 2);	00	
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>					
<b>IIC Addr</b>	<b>Size</b>	<b>Name</b>	<b>Description</b>	<b>Values (HEX)</b>	<b>Remarks</b>
128-255	128	Upper Memory Map	User Code Area	-	

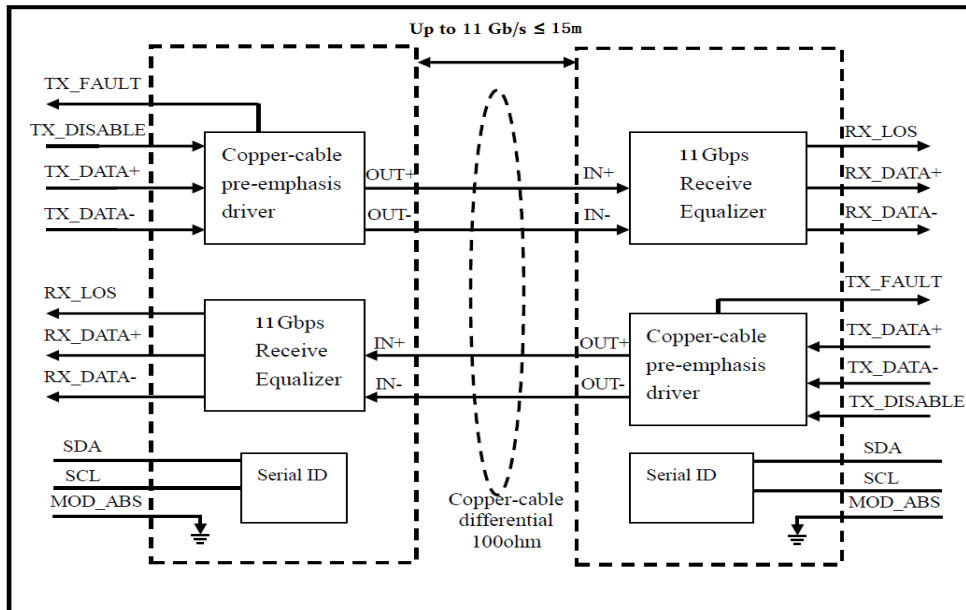
**Notes:**

- 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 00 00	NO	1.Read A0
		2. Read A2 T00

## Block Diagram of Transceiver



## Weight

Parameter	Symbol	Typ	Unit	Remarks
30AWG Product Weight	$G_{D30}$	72	g/PCS	1
28AWG Product Weight	$G_{D28}$	88	g/PCS	1
24AWG Product Weight	$G_{D26}$	96	g/PCS	1
30AWG Cable Weight	$G_{C30}$	26	g/M	
28AWG Cable Weight	$G_{C28}$	42	g/M	
24AWG Cable Weight	$G_{C26}$	50	g/M	
Dust Cap Weight	$G_S$	0.80	g/PCS	

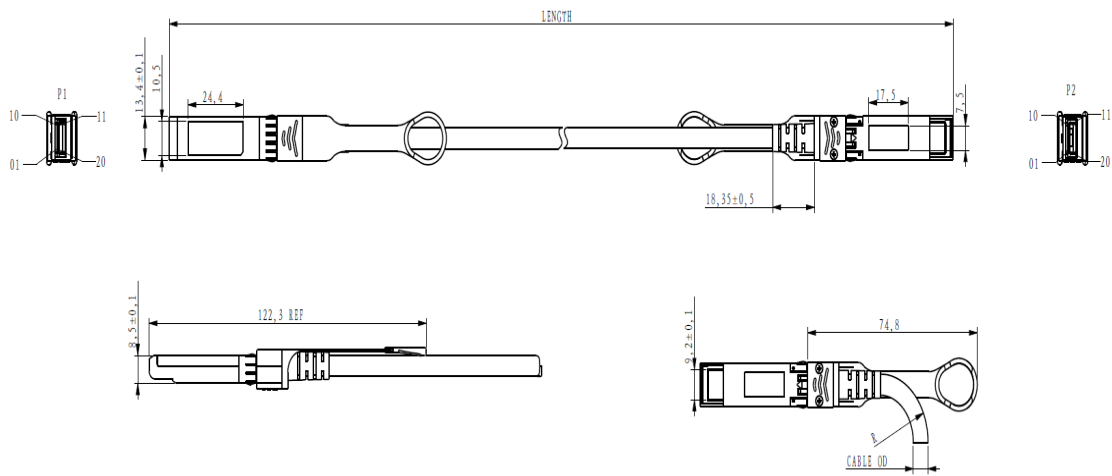
### Notes:

1. The weight of DAC-SFP-10G-A-xxAWG-1M-C0C0B . For example: the weight of DAC-SFP-10G-A-28AWG-10M-C0C0B is:  $88+42*(10-1)+0.80*2=467.6g$

## Cable Specifications

Parameter	Symbol	Min	Typ	Max	Unit	Remarks
Wire Gauge		30		24	AWG	
Cable Impedance	Z	90	100	110	Ohm	

## Dimensions



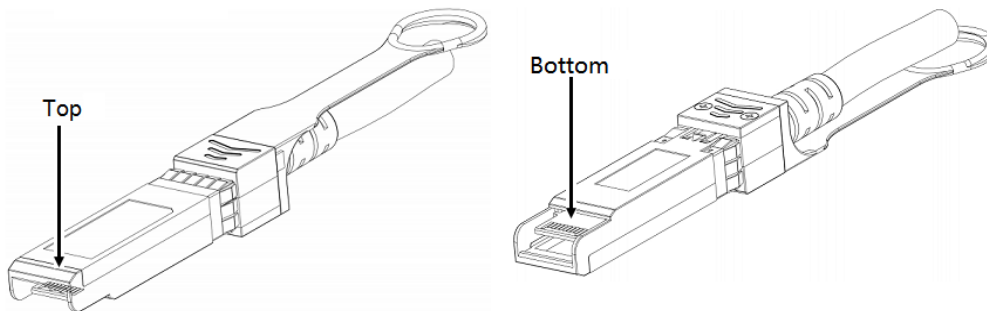
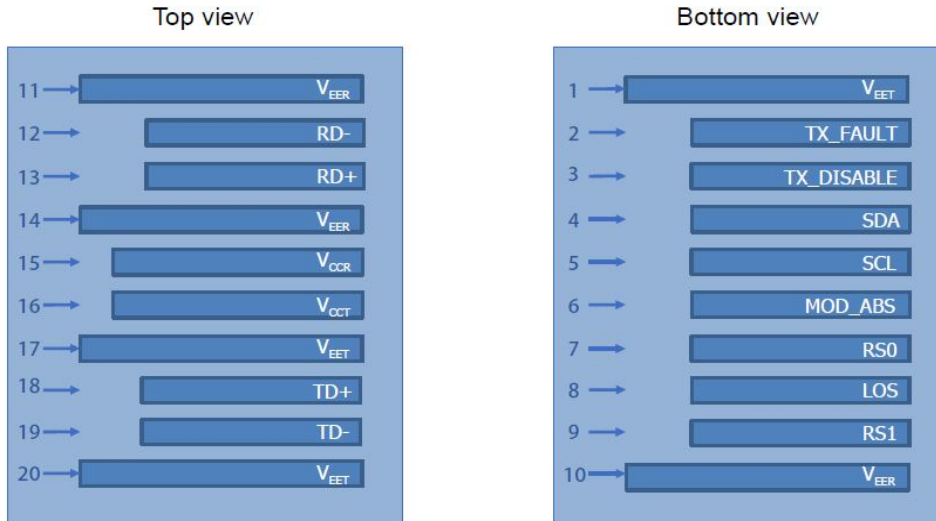
ALL DIMENSIONS ARE  $\pm 0.2\text{mm}$  UNLESS OTHERWISE SPECIFIED  
UNIT: mm

## Length Tolerance

Serial number	Nominal length (m)	Tolerance range $\pm$ (cm)
1	Length $\leq 2$	2
2	$2 < \text{Length} \leq 4$	4
3	$4 < \text{Length} \leq 6$	6
4	$6 < \text{Length}$	8



## Electrical Pad Layout



## Pin Assignment

PIN #	Symbol	Description	Remarks
1	V <sub>EET</sub>	Transmitter ground (common with receiver ground)	1
2	TX_FAULT	Transmitter Fault.	
3	TX_DISABLE	Transmitter Disable. Laser output disabled on high or open	2
4	SDA	Data line for serial ID	3
5	SCL	Clock line for serial ID	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	4
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 transmitter 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 isolated from 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
4. LOS is open collector output

## References

1. IEEE standard 802.3ae. IEEE Standard Department, 2005.