
10G SFP+Direct Attach Passive Copper Cables

1. Applications

- 10G Ethernet
- InfiniBand, Fiber Channel 4G/8G/10G
- Sonet Multiplatform support
- High Performance Computing Clusters
- High End Servers
- Metro Network Switch/Cross Connect



2. Features

- Support for multi-gigabit data rates up to 10.5Gbps
- Data rates backward compatible to 1Gbps
- Support for 1x, 2x, 4x and 8x Fibre Channel data rates
- Hot-pluggable SFP 20PIN footprint
- I/O Connector designed for high speed differential signal applications
- Improved Pluggable FormFactor(IPF) compliant for enhanced EMI/EMC performance
- Low Power Consumption < 0.5W
- Power Supply :+3.3V
- Compatible SFP+MSA; Compatible SFF-8472, SFF-8431, SFF-8432
- Temperature Range: 0~ 70 °C
- RoHS Compatible
- BER $\leq 10^{-12}$
- Inflammingretarding: Compliance with IEC 60332-3 standards
- Compatibility: Compatible with Huawei, Ericsson, Nokia... optional.

3. Description

The high speed SFP+ Direct Attach Cable (DAC) provides high performance in 10 Gigabit Ethernet (10GbE) network applications, using an enhanced SFP+ connector to send 10Gbps data through one paired transmitters and receivers over a thin twinax cable. They are compliant with electrical standards SFF-8431, SFF-8083 and mechanical standard SFF-8432, EEPROM standard SFF-8472.

4. standard

- Compliant with electrical standards SFF-8431, SFF-8083
- Compliant with mechanical standard SFF-8432
- Compliant with EEPROM standard SFF-8472
- RoHS Compliant
- IEC60332-3 Compliant

5. Performance Specifications

5.1. Absolute Maximum Ratings

These values represent the damage threshold of the module. Stress in excess of any of the individual Absolute Maximum Ratings can cause immediate catastrophic damage to the module even if all other parameters are within Recommended Operating Conditions.

Table.1 Absolute maximum ratings

| Parameter | Symbol | Min | Max | Unit |
|------------------------|--------|-----|-----|------|
| Maximum Supply Voltage | Vcc | 0 | 3.6 | V |
| Storage Temperature | Ts | -40 | 85 | °C |
| Relative Humidity | RH | 5 | 95 | % |

5.2. Recommended Operating Conditions

Table.2 Recommended Operating Conditions

| Parameter | Symbol | Min | Typical | Max | Unit |
|----------------------------|-------------|------|---------|------|------|
| Operating Case Temperature | Standard Tc | 0 | 25 | 70 | °C |
| Storage Temperature | Ts | -40 | | 85 | °C |
| Power Supply Voltage | Vcc | 3.13 | 3.30 | 3.47 | V |
| Power Dissipation | PD | | | 0.5 | W |
| Relative Humidity | RH | 5 | | 95 | % |
| Data Rate | | | 10.5 | | Gbps |

5.3. Product Specification

Table.3 Product Specification

| Test Type | Test Item | Target | Reference |
|-------------------------------|---------------------------------|---|---|
| Electrical Characteristics | Differential Mode RL(SDDII) | 0.01<f<4.1 ; < -12+2*SQRT(f) 4. 1<f<11. 1 ; <-6.3+13*log10(f/5.5) Where f is in GHz Measurements units: dB | SFF 8431 |
| | Common mode return loss (SCCII) | 0.01<f<2.5 ; <-7+1.6(f) 2.5<f<11.1 ; <-3 Where f is in GHz Measurements units: dB | SFF 8431 |
| | NEXT | <-26dB from 1MHz to 11GHz | / |
| | Cable assembly Impedence | 100+/-100hm Rise time of 30 ps (20 %- 80 %) | (20%~80 %) |
| | Insertion Loss Deviation | -1dB≤ILD≤1dB 300KHz≤f≤6GHz | / |
| Environmental Characteristics | Operating Temperature | -40~85°C | Cable operating temp. range |
| | Thermal Shock | Electrical performance meet the specification requirement | EIA-364-32D. Method A. TC-1. -55 10 85C,100 cycles, 15 min, dwells |
| | Cyclic Temp. & Humidity | Electrical performance meet the specification requirement | EIA-364-31 Method III, Test Cond A |
| | Salt spray | 48 hours salt spraying after shell corrosive area less than 5% | EIA-364-26 |
| | Temperature Life | Performance meets the specification requirement | EIA-364-17B w/ RH, Damp heat 85C at 85% RH for 500 hours |
| Mechanical Characteristics | Mechanical Vibration | Performance meets the specification requirement | EIA-364-28E.11 TC-VII, Test Cond. D 15minutes in X,Y,Z axis. |
| | Cable Plug Retention in Cage | 90N Min. | No functional damage to cable plug below 90N. Per SFF-8432 Rev 5.0 |
| | Cable Retention in Plug | 90N Min. | EIA-455-6B |
| | Mechanical Shock | Performance meets the specification requirement | Clamp and Shock per EIA-364-27B, TC-G, 3times in 6directions, 100g, 6ms |

| | | | |
|--|-----------------------|---|---|
| | Cable plug Insertion | 18N(Max.) | SFF-8432 Rev 5.0 |
| | Cable plug extraction | 12.5N(Max.) | SFF-8432 Rev 5.0 |
| | Durability | 50 Time. No evidence of physical damage | EIA-364-09; perform plug&unplug cycles Plug and Receptacle mate rate: 250times/hour |

4.6. Pin Definitions

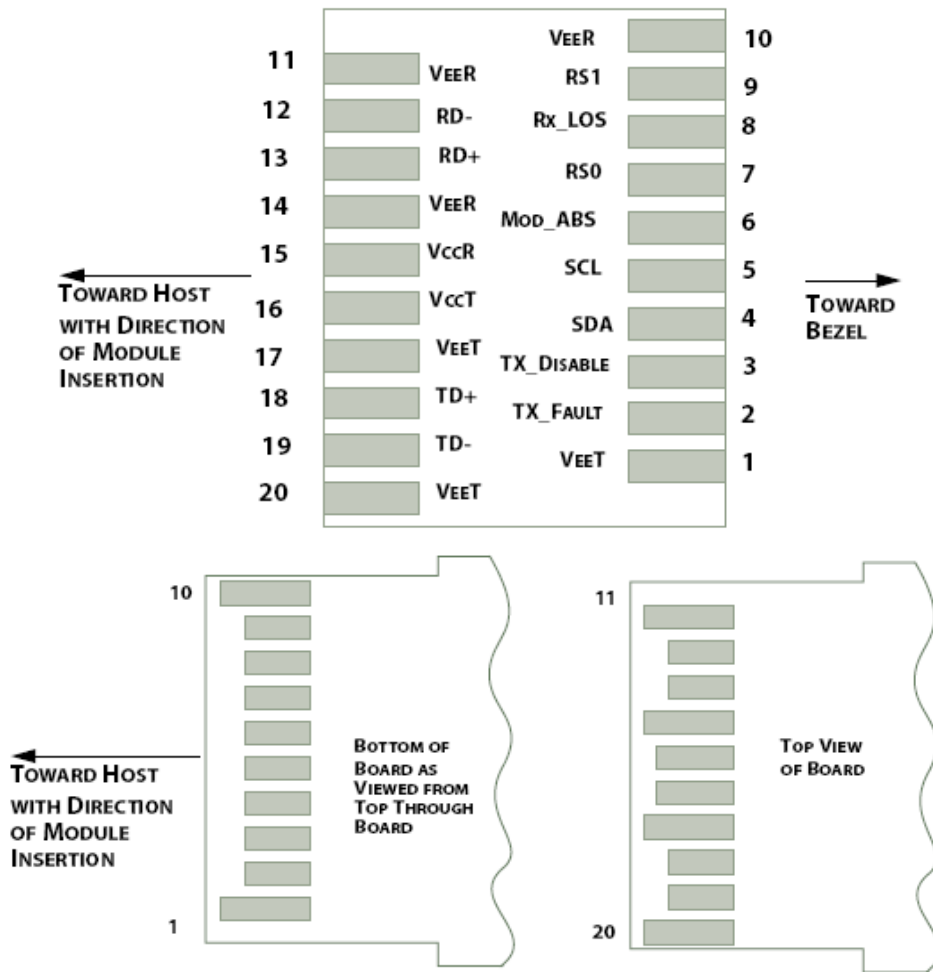


Table.8 Pin Definitions

| PIN | Symbol | Description | Remarks |
|-----|----------------------|---|--|
| 1 | V _{EE} T | Transmitter ground (common with receiver ground) | Circuit ground is isolated from chassis ground |
| 2 | Tx_Fault | Transmitter Fault. Not supported | |
| 3 | Tx_Disable | Transmitter Disable. Laser output disable on high or open | Disabled: TDIS>2V or open Enabled: TDIS<0.8V |
| 4 | SDA | 2-wire Serial Interface Data Line | Should Be pulled up with 4.7k – 10k ohm on host board to a voltage between 2V and 3.6V |
| 5 | SCL | 2-wire Serial Interface Clock Line | |
| 6 | M _{OD} _ABS | Module Absent. Grounded within the module. | |
| 7 | RS0 | No connection required | |
| 8 | RX_LOS | Loss of Signal indication. Logic 0 indicates | LOS is open collector output |

| | | normal operation | |
|----|-------------------|--|--|
| 9 | RS1 | No connection required | |
| 10 | V _{EE} R | Receiver ground (common with transmitter ground) | Circuit ground is isolated from chassis ground |
| 11 | V _{EE} R | Receiver ground (common with transmitter ground) | |
| 12 | RD- | Receiver Inverted DATA out. AC coupled | |
| 13 | RD+ | Receiver Non-inverted DATA out. AC coupled | |
| 14 | V _{EE} R | Receiver ground (common with transmitter ground) | Circuit ground is isolated from chassis ground |
| 15 | V _{CC} R | Receiver power supply | |
| 16 | V _{CC} T | Transmitter power supply | |
| 17 | V _{EE} T | Transmitter ground (common with receiver ground) | Circuit ground is isolated from chassis ground |
| 18 | TD+ | Transmitter Non-Inverted DATA in. AC coupled | |
| 19 | TD- | Transmitter Inverted DATA in. AC coupled | |
| 20 | V _{EE} T | Transmitter ground (common with receiver ground) | Circuit ground is isolated from chassis ground |

5.9. Mechanical Dimensions

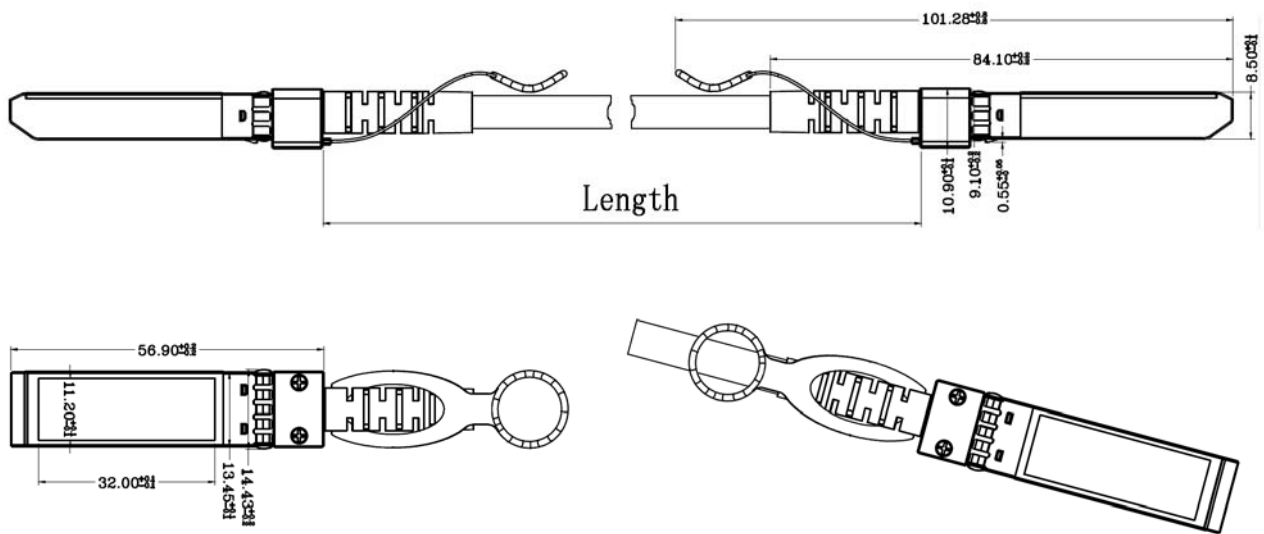
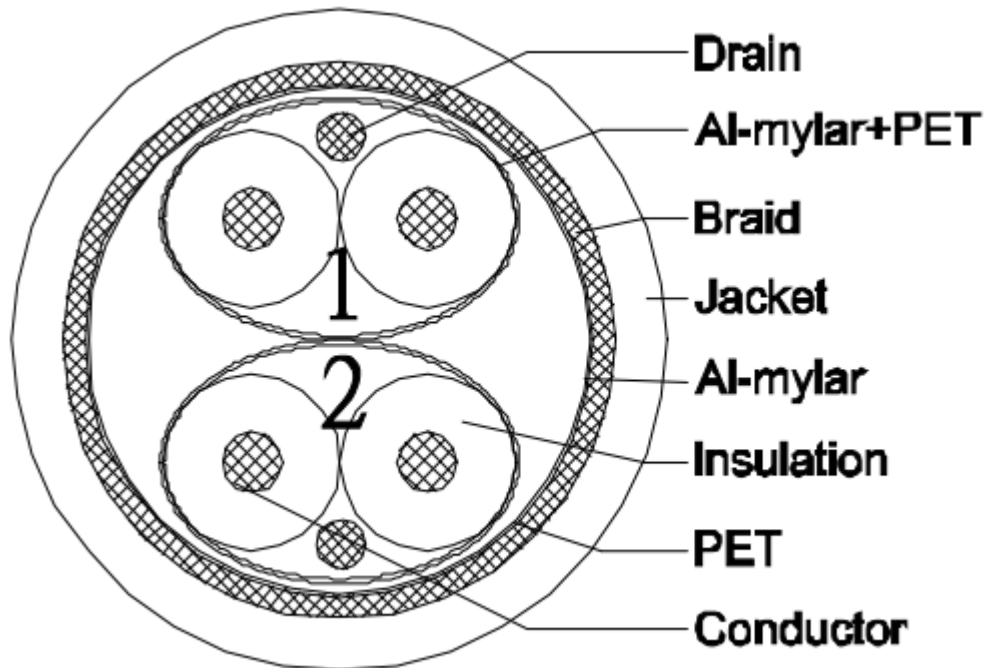


Diagram of Mechanical Dimensions

6. Wire specification

6.1 Cross Section



6.2 Wire Marking

BELDEN L-Skew 24A1B01-0 E357317-S (UL) TYPE CL2 FT4 30AWG 75°C OR C(UL) CMG - - - -LF-
YYYY/MM/DD XXXXXXM

Note:YYYY/MM/DD means year/month/date;XXXXXXM means continuous length.

6.3 Color

6.3.1 Cores

White-White

6.3.2 AL-mylar Print

1.A01, 2.A02

Pair identification on the same side of drain wire Print A01, A02 marked on entire length of the pair with a 12mm max spacing.

6.3.3 Jacket

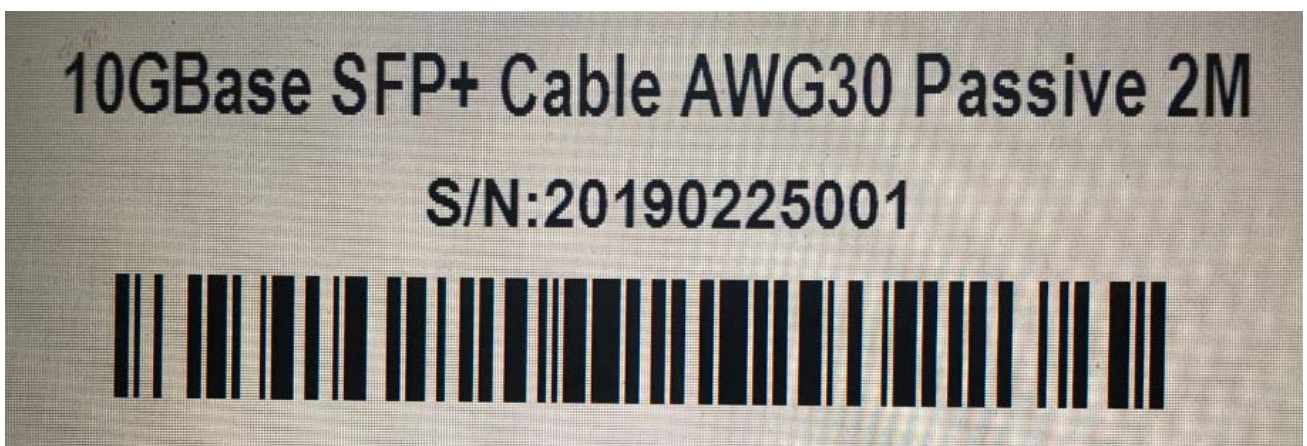
According to the customer's requirements.

7. Lable

7.1 SFP Lable



7.2 Cable Lable



8. Application Cautions

8.1. ESD


This transceiver is specified as ESD threshold 1kV for high speed pins and 2kV for all other electrical input pins, tested per MIL-STD-883, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module. This transceiver is shipped in ESD protective packaging. It should be removed from the packaging and handled only in an ESD protected environment.

8.2. LASER SAFETY

This is a Class 1 Laser Product according to IEC 60825-1:1993:+A1:1997+A2:2001. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (July 26, 2001)

8.3. Important Notice


Important Notice:




DO NOT
Kink the Cable

DO NOT
Over-Bend the Cable Behind the Connector

DO NOT
Twist the Connector



ANTISTATIC



FRAGILE

Note:

- 1)Copper type maximum length recommended at 15 meters;
- 2)Various cable lengths available for all types;
- 3)Latch/tab available"on top"or"bottom"position.

9. Order Information

| Part Number | Data Rate | Cable Length | Wire Gauge | Connector Type | Temp. Range |
|---------------|----------------|--------------|------------|----------------|-------------|
| SFP+ 10G-PA1M | Up to 10.5Gbps | 0.5-1M | 30AWG | Passive Copper | 0~70°C |
| SFP+ 10G-PA2M | Up to 10.5Gbps | 1-2M | 30AWG | Passive Copper | 0~70°C |
| SFP+ 10G-PA3M | Up to 10.5Gbps | 2-3M | 30AWG | Passive Copper | 0~70°C |
| SFP+ 10G-PA5M | Up to 10.5Gbps | 3-5M | 24AWG | Passive Copper | 0~70°C |
| SFP+ 10G-PA7M | Up to 10.5Gbps | 5-7M | 24AWG | Passive Copper | 0~70°C |