

## 10G SFP+ Direct Attach Passive Copper Cable

### NND-10G-5M

#### Overview:

The NETRO's NND-10G-5M 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.



#### 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 Form Factor(IPF) compliant for enhanced EMI/EMC performance
- Low Power Consumption < 0.5W
- Power Supply :+3.3V
- Compatible to SFP+
- Temperature Range: 0~ 70 °C
- RoHS Compatible

#### Application:

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

#### Standard:

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

## Performance Specifications:

### 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.

### 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	%

### Recommended Operating Conditions:

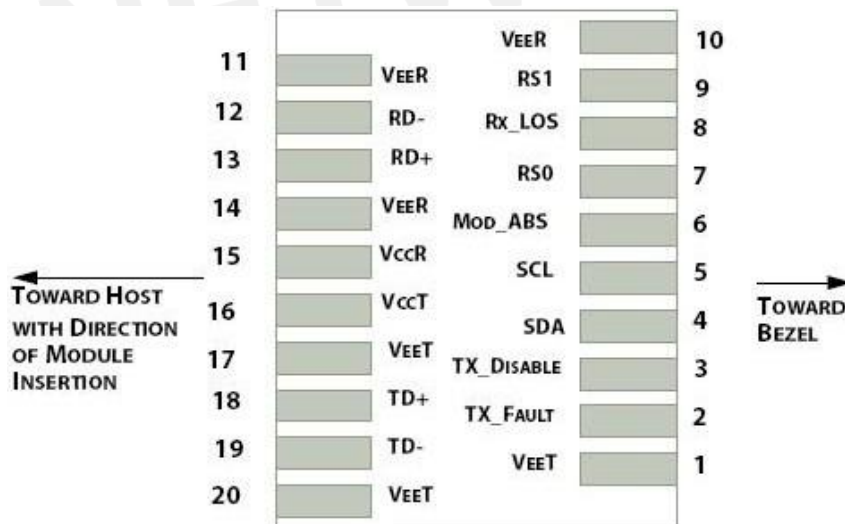
Parameter	Symbol	Min	Typical	Max	Unit
Operating Case Temperature	Standard Tc	0	25	70	°C
Storage Temperature	Ts	-40		85	°C
Power Supply Voltage	Vcc	3.13	3.30	3.47	V
Power Dissipation	PD			0.5	W
Relative Humidity	RH	5		95	%
Data Rate				25.78	Gbps

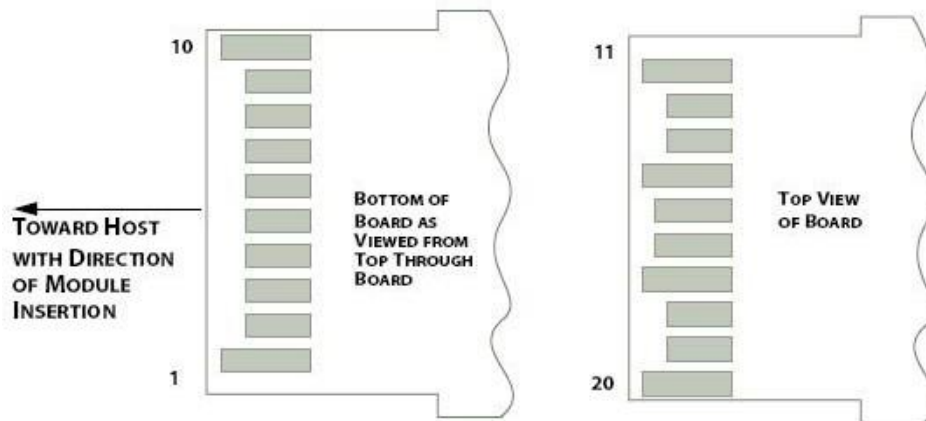
### Product Specifications:

Test Type	Test Item	Target	Reference
Electrical Characteristics	Differential Mode RL(SDDII)	$0.01 < f < 4.1$ ; $< -12 + 2 * \text{SQRT}(f)$ $4.1 < f < 11.1$ ; $< -6.3 + 13 * \log_{10}(f/5.5)$ 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,TestCond A
	Salt spray	48 hours salt spraying after shellcorrosive 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 for500 hours
Mechanical Characteristics	Mechanical Vibration	Performance meets the specification requirement	EIA-364-28E.11 TC-VII, Test Cond. D 15minutes inX,Y,Z axis.
	Cable Plug Retention in Cage	90N Min.	No functional damage to cable plug below 90N. PerSFF-8432 Rev 5.0
	Cable Retention in Plug	90N Min.	EIA-455-6B

### PIN Definitions:





PIN	Symbol	Description	Remarks
1	VEET	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
5	SCL	2-wire Serial Interface Clock Line	host board to a voltage between 2V and 3.6V
6	MOD_ABS	Module Absent. Grounded within the module.	
7	RS0	No connection required	
8	RX_LOS	Loss of Signal indication. Logic 0 indicates normal operation	LOS is open collector output
9	RS1	No connection required	
10	VEER	Receiver ground (common with transmitter ground)	Circuit ground is isolated from chassis ground
11	VEER	Receiver ground (common with transmitter ground)	
12	RD-	Receiver Inverted DATA out. AC coupled	
13	RD+	Receiver Non-inverted DATA out. AC coupled	
14	VEER	Receiver ground (common with transmitter ground)	Circuit ground is isolated from chassis ground
15	VCCR	Receiver power supply	
16	VCCT	Transmitter power supply	
17	VEET	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	VEET	Transmitter ground (common with receiver ground)	Circuit ground is isolated from chassis ground

## Mechanical Dimensions:

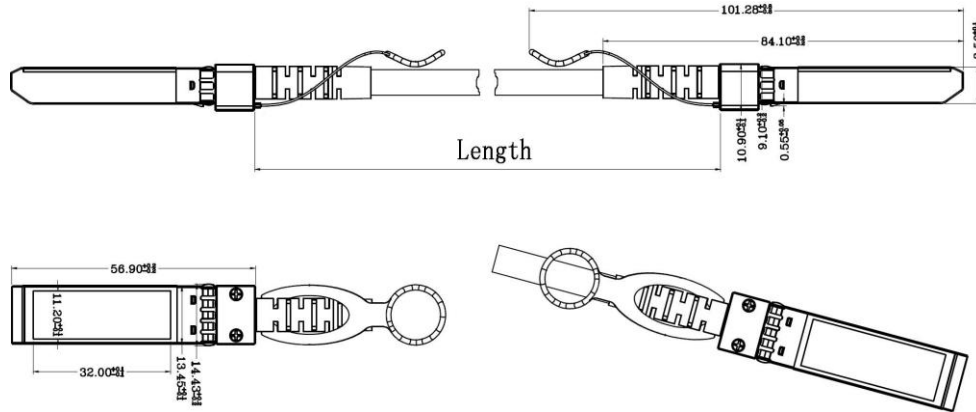


Diagram of Mechanical Dimensions

## Application Cautions:

### 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 ESDprotected environment.

### 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)


**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