

TSBSB-PCM-xxC

400G OSFP112 Direct Attach Cable

Description

The 400G OSFP112 Passive Direct Attach Copper Twinax Cable is designed for use in 400GBASE Ethernet. OSFP112 is the module and cage/connector system based on current OSFP, targeting to support the 112Gb/s per lane speed in a 4x lane OSFP system and to enable the OSFP 400G interconnect ecosystem. This will greatly help the legacy OSFP users upgrade the link bandwidth to 400G per port with lower cost and shorter transition time.

Features

- Products Compliance with CMIS5.0 , OSFP_MSA
- Ethernet-Compliance with IEEE802.3ck
- Support 112G (PAM4) electrical data rates/channel
- Support I2C two - line string interface, easy to control
- Support for hot plugging
- Low crosstalk/Low power
- Maximum Link Length: up to 3m
- ROHS Compliance

Applications

- NVIDIA ConnectX-7 series VPI network card
- SWITCH/Router
- Data storage and communication industry
- Data center, cloud server

Recommended Operation Condition

Parameters	Symbol	Min.	Max.	Unit
Operating Case Temperature	Topc	0	70	degC
Storage Temperature	Tst	-40	85	degC
Relative Humidity (non-condensation)	RS	35	60	%
Supply Voltage	Vcc3	3.135	3.465	V
Voltage on LVTTTL Input	Vilvttl	-0.3	Vcc3+0.2	V
Power Supply Current	Icc3	-	15	mA
Total Power Consumption	Pd	-	0.05	W

Notes:

Stress or conditions exceed the above range may cause permanent damage to the device.

This is a stress rating only and functional operation of the device at these or any other conditions above those listed in the operational sections of this specification is not applied. Exposure to absolute maximum rating conditions for extended periods may affect device reliability.

High Speed Characteristics

Item	Requirement	Test Condition
Differential Impedance	Cable Impedance	100±5Ω
	Paddle Card Impedance	100±10Ω
	Cable Termination Impedance	100±10Ω
Differential (Input/Output)Return loss S_{DD11}/S_{DD22}	$Return_loss(f) \geq \begin{cases} 16.5-2\sqrt{f} & 0.05 \leq f < 4.1 \\ 10.66-14\log_{10}(f/5.5) & 4.1 \leq f \leq 40 \end{cases}$ Where f is the frequency in GHz Return loss(f) is the return loss at frequency f	10MHz≤f≤40GHz
Differential to common-mode (Input/Output)Return loss S_{CD11}/S_{CD22}	$Return_loss(f) \geq \begin{cases} 22-10(f/26.56) & 0.05 \leq f < 26.56 \\ 15-3(f/26.56) & 26.56 \leq f \leq 40 \end{cases}$ Where f is the frequency in GHz Return_loss(f) is the Differential to common-mode return loss at frequency f	50MHz≤f≤40GHz
Common-mode to Common-mode (Input/Output)Return loss S_{CC11}/S_{CC22}	$Return_loss(f) \geq 1.8\text{dB} \quad 0.05 \leq f \leq 40$ Where f is the frequency in GHz Return_loss(f) is the Differential to common-mode return loss at frequency f	50MHz≤f≤40GHz
Differential Insertion Loss (S_{DD21} Max.)	(Differential InsertionLoss Max. For TPa to TPb Excluding Test fixture)	50MHz≤f≤40GHz
	$Insertion_loss(f) \geq -19.75\text{dB} \quad 0.05 \leq f \leq 26.56$ Where f is the frequency in GHz Insertion Loss (f) Differential Insertion Loss at frequency f	
Insertion Loss Deviation	$-0.176 * f - 0.7 \leq ILD \leq 0.176 * f + 0.7$	50MHz≤f≤26.56GHz

Differential to common-mode Conversion Loss-Differential Insertion Loss(S_{CD21} - S_{DD21})	$\text{Conversion_loss}(f) - \text{IL}(f) \geq \begin{cases} 10 & 0.05 \leq f < 12.89 \\ 14 - 0.3108f & 12.89 \leq f < 40 \end{cases}$ <p>Where f is the frequency in GHz $\text{Conversion_loss}(f)$ is the cable assembly differential to common-mode conversion loss $\text{IL}(f)$ is the cable assembly insertion loss</p>	50MHz ≤ f ≤ 40GHz
MDNEXT(multiple disturber near-end crosstalk)	≥35dB @26.5GHz	10MHz ≤ f ≤ 26.5GHz
Intra Skew	10ps/m,	10MHz ≤ f ≤ 26.5GHz

Pin Definition

Pin	Symbol	Name/Description
1	GND	Ground
2	Tx2p	Transmitter Data Non-Inverted
3	Tx2n	Transmitter Data Inverted
4	GND	Ground
5	Tx4p	Transmitter Data Non-Inverted
6	Tx4n	Transmitter Data Inverted
7	GND	Ground
8	TX6p	Transmitter Data Non-Inverted
9	TX6n	Transmitter Data Inverted
10	GND	Ground
11	TX8p	Transmitter Data Inverted
12	TX8n	Transmitter Data Inverted
13	GND	Ground
14	SCL	2-wire Serial interface clock
15	Vcc	+3.3V Power
16	Vcc	+3.3V Power
17	LPWn/PRSn	Low-Power Mode / Module Present
18	GND	Ground
19	RX7n	Receiver Data Inverted
20	RX7p	Receiver Data Non-Inverted
21	GND	Ground
22	RX5n	Receiver Data Inverted
23	RX5p	Receiver Data Non-Inverted
24	GND	Ground
25	RX3n	Receiver Data Inverted
26	RX3p	Receiver Data Non-Inverted
27	GND	Ground

28	RX1n	Receiver Data Inverted
29	RX1p	Receiver Data Non-Inverted
30	GND	Ground
31	GND	Ground
32	RX2p	Receiver Data Non-Inverted
33	RX2n	Receiver Data Inverted
34	GND	Ground
35	RX4p	Receiver Data Non-Inverted
36	RX4n	Receiver Data Inverted
37	GND	Ground
38	RX6p	Receiver Data Non-Inverted
39	RX6n	Receiver Data Inverted
40	GND	Ground
41	RX8p	Receiver Data Non-Inverted
42	RX8n	Receiver Data Inverted
43	GND	Ground
44	INT/RSTn	Module Interrupt / Module Reset
45	Vcc	+3.3V Power
46	Vcc	+3.3V Power
47	SDA	2-wire Serial interface data
48	GND	Ground
49	TX7n	Transmitter Data Inverted
50	TX7p	Transmitter Data Non-Inverted
51	GND	Ground
52	TX5n	Transmitter Data Inverted
53	TX5p	Transmitter Data Non-Inverted
54	GND	Ground
55	TX3n	Transmitter Data Inverted
56	TX3p	Transmitter Data Non-Inverted
57	GND	Ground
58	TX1n	Transmitter Data Inverted
59	TX1p	Transmitter Data Non-Inverted
60	GND	Ground

Pin Descriptions @OSFP

Top side (viewed from top)

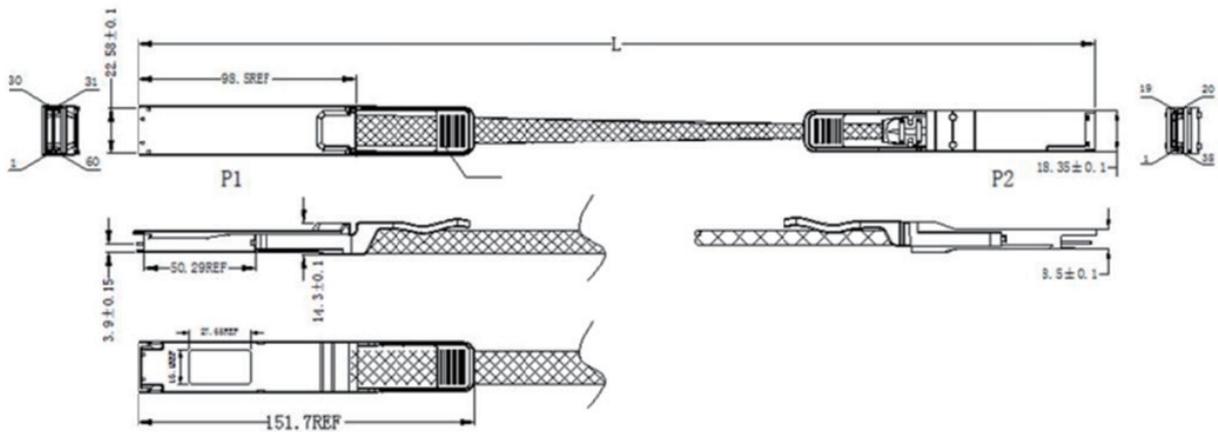
60	GND	[Green bar]
59	Tx1p	[Pink bar]
58	Tx1n	[Pink bar]
57	GND	[Green bar]
56	Tx3p	[Pink bar]
55	Tx3n	[Pink bar]
54	GND	[Green bar]
53	TX5p	[Pink bar]
52	TX5n	[Pink bar]
51	GND	[Green bar]
50	TX7p	[Pink bar]
49	TX7n	[Pink bar]
48	GND	[Green bar]
47	SDA	[Purple bar]
46	Vcc	[Orange bar]
45	Vcc	[Orange bar]
44	INT/RSTn	[Purple bar]
43	GND	[Green bar]
42	Rx8n	[Blue bar]
41	Rx8p	[Blue bar]
40	GND	[Green bar]
39	Rx6n	[Blue bar]
38	Rx6p	[Blue bar]
37	GND	[Green bar]
36	Rx4n	[Blue bar]
35	Rx4p	[Blue bar]
34	GND	[Green bar]
33	Rx2n	[Blue bar]
32	Rx2p	[Blue bar]
31	GND	[Green bar]

Bottom Side (viewed from bottom)

[Green bar]	GND	1
[Pink bar]	Tx2p	2
[Pink bar]	Tx2n	3
[Green bar]	GND	4
[Pink bar]	Tx4p	5
[Pink bar]	Tx4n	6
[Green bar]	GND	7
[Pink bar]	TX6p	8
[Pink bar]	TX6n	9
[Green bar]	GND	10
[Pink bar]	TX8p	11
[Pink bar]	TX8n	12
[Green bar]	GND	13
[Purple bar]	SCL	14
[Orange bar]	Vcc	15
[Orange bar]	Vcc	16
[Purple bar]	LPWn/PRSn	17
[Green bar]	GND	18
[Blue bar]	Rx7n	19
[Blue bar]	Rx7p	20
[Green bar]	GND	21
[Blue bar]	Rx5n	22
[Blue bar]	Rx5p	23
[Green bar]	GND	24
[Blue bar]	Rx3n	25
[Blue bar]	Rx3p	26
[Green bar]	GND	27
[Blue bar]	Rx1n	28
[Blue bar]	Rx1p	29
[Green bar]	GND	30

Module Card Edge

Mechanical Specifications@ Flat Top



Ordering Information

400G OSFP112 Copper Cable Assemblies, Passive.

P/N	Length	Data Rate	AWG	Length Tolerance
TSBSB-PCM-01C	1 m	400G	28/30	+3.5/-3.5 cm
TSBSB-PCM-02C	2 m	400G	26/28	+3.5/-3.5 cm
TSBSB-PCM-03C	3 m	400G	26	+3.5/-3.5 cm