

TSBSQ-PCM-xxC

## 400G OSFP112 TO 400G112 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 8x 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.

400G QSFP112 passive cable assembly products, based on 4X100G or 4X112G structure, this product can well meet the next generation of 400G switches, servers, routers and other products application needs. The QSFP112 cable assembly is optimised to reduce crosstalk and insertion loss and has excellent signal integrity.

### Features

- Products Compliance with CMIS5.0 \OSFP\_MSA\QSFP112 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

- 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 $S_{CC11}/S_{CC22}$	$Return\_loss(f) \geq 1.8dB \quad 0.05 \leq f \leq 40$ 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
	$Insertion\_loss(f) \geq -19.75dB \quad 0.05 \leq f \leq 26.56$ 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 <math>f</math> is the frequency in GHz  <math>\text{Conversion\_loss}(f)</math> is the cable assembly differential to common-mode conversion loss  <math>\text{IL}(f)</math> 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

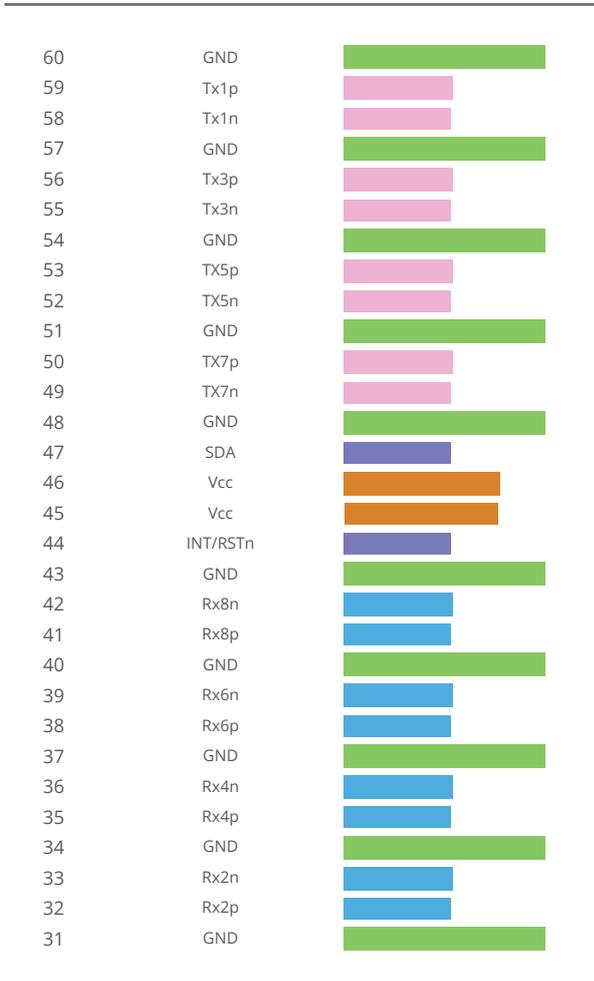
### Pin Definition @OSFP

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

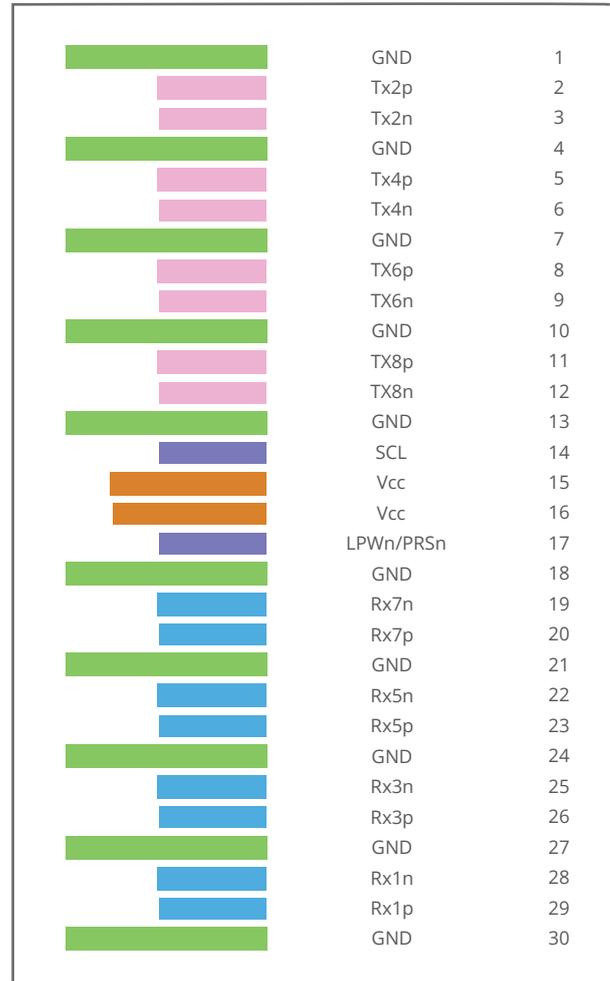
28	RX1n	Receiver Data Inverted
29	RX1p	Receiver Data Non-Inverted
30	GND	Ground
31	GND	Ground
32	RX2p	Receiver Data Non-Inverted
33	RX2n	Receiver Data Inverted
34	GND	Ground
35	RX4p	Receiver Data Non-Inverted
36	RX4n	Receiver Data Inverted
37	GND	Ground
38	RX6p	Receiver Data Non-Inverted
39	RX6n	Receiver 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)



Bottom Side (viewed from bottom)



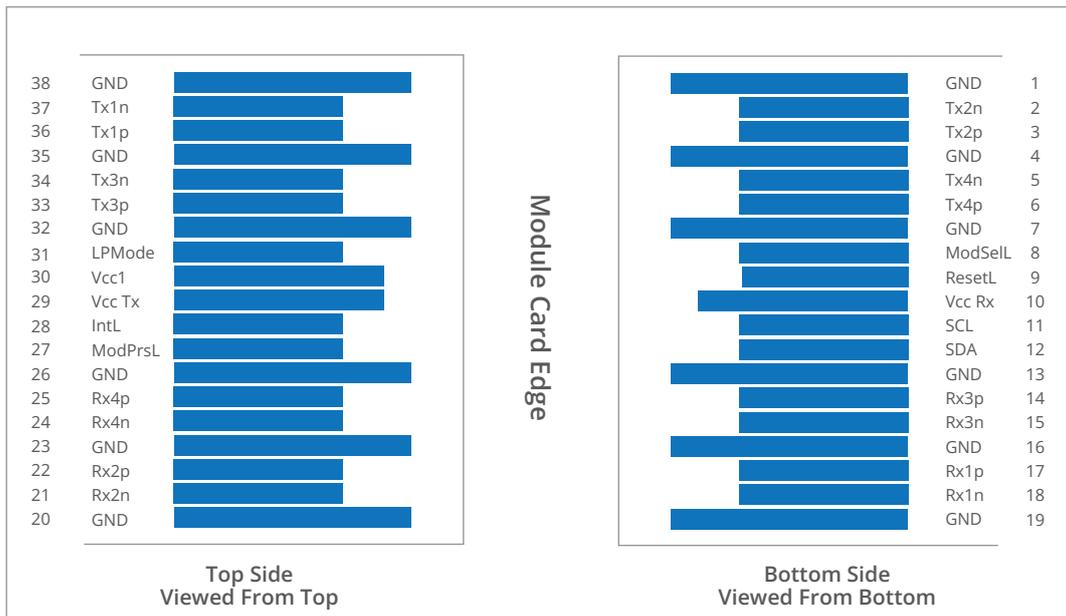
Module Card Edge

### Pin definition @QSFP

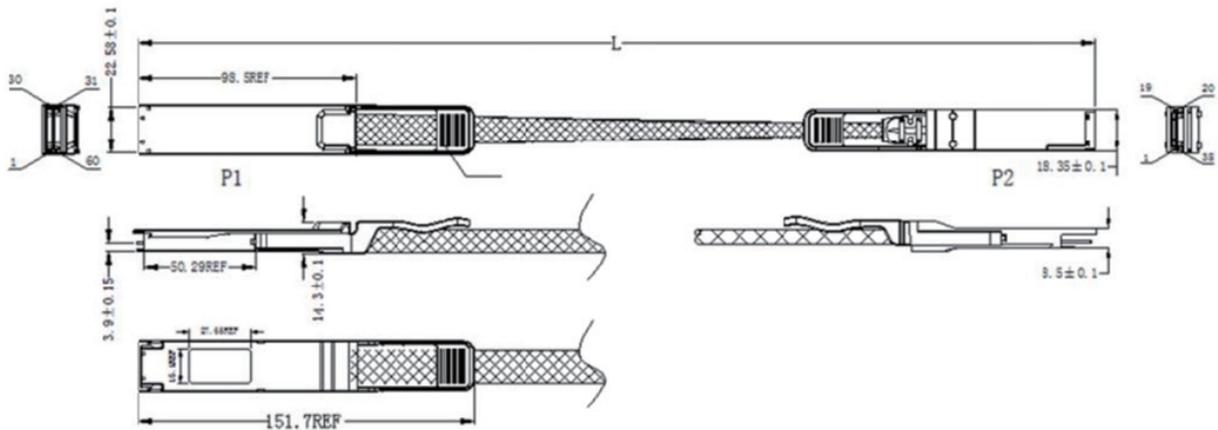
Pin	Symbol	Name/Description
1	GND	Ground
2	Tx2n	Transmitter Inverted Data Input
3	Tx2p	Transmitter Non-Inverted Data Input
4	GND	Ground
5	Tx4n	Transmitter Inverted Data Input
6	Tx4p	Transmitter Non-Inverted Data Input
7	GND	Ground
8	ModSelL	Module Select
9	ResetL	Module Reset
10	Vcc Rx	+3.3V Power supply receiver
11	SCL	2-wire serial interface clock
12	SDA	2-wire serial interface data

13	GND	Ground
14	Rx3p	Receiver Non-Inverted Data Output
15	Rx3n	Receiver Inverted Data Output
16	GND	Ground
17	Rx1p	Receiver Non-Inverted Data Output
18	Rx1n	Transmitter Inverted DATA in. AC Coupled
19	GND	Ground
20	GND	Ground
21	Rx2n	Receiver Inverted Data Output
22	Rx2p	Receiver Non-Inverted Data Output
23	GND	Ground
24	Rx4n	Receiver Inverted Data Output
25	Rx4p	Receiver Non-Inverted Data Output
26	GND	Ground
27	ModPrsL	Module Present
28	IntL	Interrupt
29	Vcc Tx	+3.3V Power supply transmitter
30	Vcc1	+3.3V Power Supply
31	LPMODE	Low Power Mode
32	GND	Ground
33	Tx3p	Transmitter Non-Inverted Data Input
34	Tx3n	Transmitter Inverted Data Input
35	GND	Ground
36	Tx1p	Transmitter Non-Inverted Data Input
37	Tx1n	Transmitter Inverted Data Input
38	GND	Ground

### Pin Descriptions @QSFP



### Mechanical Specifications @OSFP Flat Top



### Ordering Information

400G OSFP TO QSFP112 Copper Cable Assemblies, Passive.

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