TSBR4-NCNMC3C Optical Transceiver

400G OSFP DR4 Transceiver, With Diagnostic Monitoring

Features

- Hot-pluggable OSFP form factor
- MPO-12 connector
- Four parallel 1310nm optical lanes
- Data Rate 106.25Gbps PAM4 per lane
- 8x53.125GBd (PAM4) electrical interface
- Up to 500m transmission on single mode fiber (SMF) with FEC
- Digital diagnostics functions are available via the I2C interface
- Single 3.3V Power Supply and Power Dissipation < 12W
- Operating Case Temperature: 0°C~+70°C
- Compliant with IEEE802.3bs and OSFP MSA
- Compliant with CMIS 4.0 I2C interface
- RoHS compliant

Applications

- 4x100G DR4 applications
- Data center

Production Description

This product is a 400Gb/s OSFP optical module designed for 500m optical communication applications. The module converts 8 channels of 50Gb/s (PAM4) electrical input data to 4 channels of parallel optical signals, each capable of 100Gb/s operation for an aggregate data rate of 400Gb/s. Reversely, on the receiver side, the module converts 4 channels of parallel optical signals of 100Gb/s each channel for an aggregate data rate of 400Gb/s into 8 channels of 50Gb/s (PAM4) electrical output data.

An optical fiber cable with an MPO-12 connector can be plugged into the OSFP DR4 module receptacle. Proper alignment is ensured by the guide pins inside the receptacle. The cable usually cannot be twisted for proper channel to channel alignment. Electrical connection is achieved through an OSFP MSA compliant edge type connector.

The product is designed with form factor, optical/electrical connection and digital diagnostic interface according to the OSFP Multi-Source Agreement (MSA) Type 2. It has been designed to meet the harshest external operating conditions including temperature, humidity and EMI interference.

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Absolute Maximum Rating

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.

Parameters	Symbol	Min.	Max.	Unit
Power Supply Voltage	VCC	-0.5	+3.6	V
Storage Temperature	Tc	-40	+85	°C
Relative Humidity	RH	0	85	%

Recommended Operating Environment

Recommended Operating Environment specifies parameters for which the electrical and optical characteristics hold unless otherwise noted.

Parameter	Symbol	Min.	Typical	Max	Unit
Power Supply Voltage	VCC	3.15	3.30	3.45	V
Operating Case Temperature	T_{Ca}	0		70	°C

Electrical Characteristics

The following electrical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Data Rate per lane	DR	-	53.125	-	Gbps	
Transmitter						
Input differential impedance	Rin	90	100	110	Ω	
Differential Input Voltage swing	Vin	900	-	1100	mVp-p	
Receiver						
Differential Output Swing	Vout	-	-	900	mVp-p	
Output differential impedance	Rout	90	100	110	Ω	

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Optical Characteristics

The following optical characteristics are defined over the Recommended Operating Environment unless otherwise specified.

Parameter	Symbol	Min.	Typical	Max	Unit	Notes
Transmitter						
Center Wavelength	λ	1304.5	1310	1317.5	nm	
Data rate, each lane		53.125±100ppm			GBd	
Side-mode Suppression Ratio	SMSR	30			dB	
Average Optical Power, per lane	Po	-2.9	-	4	dBm	1
Extinction Ratio	ER	3.5	-	-	dBm	
Outer Optical Modulation Amplitude	OMA_{outer}	-0.8	-	4.2	dBm	
Transmitter and Dispersion Eye	TDECQ			3.4	dB	
Optical Return Loss Tolerance	ORL	-	-	21.4	dB	
Receiver						
Center Wavelength	λ	1304.5	1310	1317.5	nm	
Data rate, each lane		53.125±100ppm			GBd	
Average Receive power ,each lane		-5.9		4.0	dBm	
Receive power (OMAouter), each lane				4.2	dBm	
Receiver sensitivity (OMAouter),				-4.4	dBm	2
LOS Asserted	Lsa	-15	-	-	dBm	
LOS De-Asserted	Lda	-	-	-8.9	dBm	
LOS Hysteresis	Lh	0.5	-	-	dB	

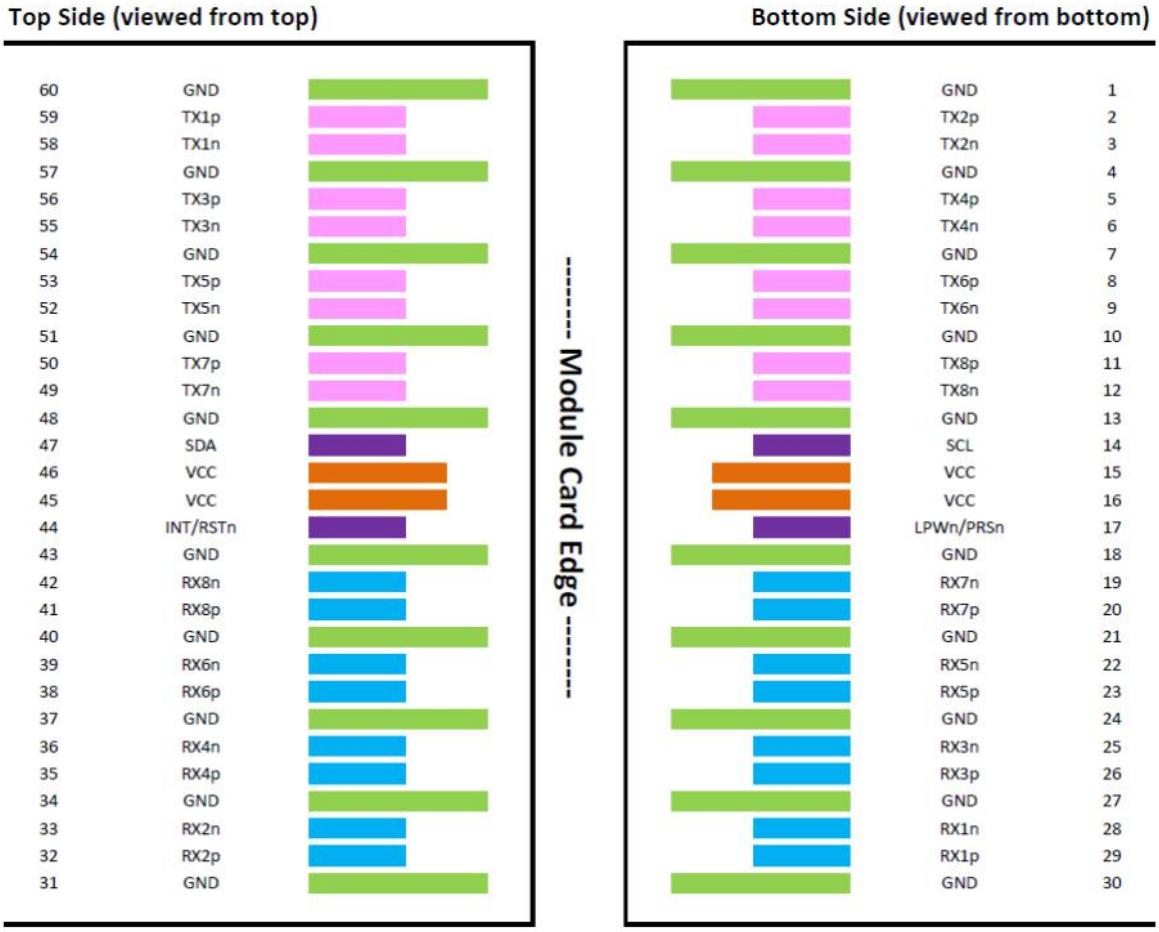
Note:

[1] Average launch power, each lane (min) is informative and not the principal indicator of signal strength.

[2] A transmitter with launch power below this value cannot be compliant; however, a value above this does not ensure compliance.

[3] Receiver sensitivity (OMAouter), each lane (max) is informative and is defined for a transmitter with SECQ of 0.9 dB.

1. Osfp Transceiver Electrical Pad Layout



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 Non-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

Ordering Information

Part Number	Product Description
TSBR4-NCNMC3C	400Gbps OSFP DR4 Transceiver, 0°C ~ +70°C

Important Notice

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