

TS-C24LL292H10PC

200G CFP2 LR4

Features

- Supports 200GBASE-LR4;
- Lane signaling rate 53.125 Gb/s with PAM4;
- Up to 10km transmission on SMF;
- LAN WDM laser and PIN receiver;
- High speed I/O electrical interface (200GAUI-8);
- MDIO interface with integrated Digital Diagnostic monitoring;
- CFP2 MSA package with duplex LC connector;
- Single +3.3V power supply;
- Maximum power consumption 9 W;
- Operating case temperature: 0 to +70 °C;
- Compliant to IEEE 802.3bs and CFP2 MSA hardware specification;
- Complies with EU Directive 2015/863/EU;

Application

- 200GBASE-LR4;
- 200G Ethernet;

Order Information

Table 1- order information

Part No.	Data Rate	Laser	Fiber Type	Distance	Optical Interface	Temp	DDMI
TS-C24LL292H10PC	212.5Gb/s	LAN WDM	SMF	10km	LC	0~70C	Y

Absolute Maximum Ratings

Table 2-Absolute Maximum Ratings

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Storage Temperature	T _s	-40	-	+85	°C	
Supply Voltage	V _{CC}	-0.5	-	+3.6	V	
Operating Relative Humidity	RH	-	-	+85	%	

Recommended Operating Conditions

Table 3-Recommended Operating Conditions

Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Operating Case Temperature	T _c	0	-	+70	°C	
Power Supply Voltage	V _{CC}	3.14	3.3	3.47	V	
Power Supply Current	I _{CC}	-	-	3.75	A	
Maximum Power Dissipation	P _D	-	-	12	W	
Aggregate Bit Rate	BR _{AVE}	-	212.5	-	Gb/s	PAM4
Lane Signaling rate (optical)	DR _o	-	53.125	-	Gb/s	PAM4
Lane Signaling rate (Electrical)	DR _e	-	26.5625	-	Gb/s	
Transmission Distance	TD	2	-	10	km	Over SMF

Optical Characteristics

Table 4-Optical Characteristics

Transmitter						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Center Wavelength Lane 0	λ_0	1294.53	1295.56	1296.59	nm	
Center Wavelength Lane 1	λ_1	1299.02	1300.05	1301.09	nm	
Center Wavelength Lane 2	λ_2	1303.54	1304.58	1305.63	nm	
Center Wavelength Lane 3	λ_3	1308.09	1309.14	1310.19	nm	
Total Launch Power	P_{ALL}	2.6	-	11.3	dBm	1
Average Launch Power per Lane	P_{TX_LANE}	-3.4	-	5.3	dBm	1
Outer Optical Modulation Amplitude per Lane	OMA	-0.4	-	5.1	dBm	1
Launch power in OMA minus TDECQ, per lane	OMA-TDECQ	-1.8	-	-	dBm	ER \geq 4.5 dB
		-1.7	-	-	dBm	ER< 4.5 dB
Transmitter and dispersion eye closure for PAM4 (TDECQ), per lane	TDECQ	-	-	3.2	dB	
Difference in launch power between lanes	$P_{TX_DELTA_LANE}$	-	-	4	dB	
Average Output Power (Laser Turn off)	$P_{OUT-OFF}$	-	-	-30	dBm	
Side Mode Suppression Ratio	SMSR	30	-	-	dB	
Extinction Ratio	ER	3.5	-	-	dB	
Receiver						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Center Wavelength Lane 0	λ_0	1294.53	1295.56	1296.59	nm	
Center Wavelength Lane 1	λ_1	1299.02	1300.05	1301.09	nm	
Center Wavelength Lane 2	λ_2	1303.54	1304.58	1305.63	nm	
Center Wavelength Lane 3	λ_3	1308.09	1309.14	1310.19	nm	
Damage threshold, per lane	P_{damage}	6.3	-	-	dBm	
Average Rx Power per Lane	P_{RX_LANE}	-9.7	-	5.3	dBm	2
Maximum Receive Power (OMA)per Lane	P_{OMA_LANE}	-	-	5.1	dBm	2
Difference in receive power between any two lanes (OMA)	$P_{RX_DELTA_LANE}$	-	-	4.2	dB	
Receiver sensitivity (OMA), per lane	SENOMA	-	-	-7.2	dBm	2,3
Receiver Reflectance	Ref	-	-	-26	dB	

Notes:

1. The optical power is launched into SMF.
2. Receiver sensitivity(OMA), each lane(max) is informative. Measured with test pattern PRBS2^31-1.
3. Measured with a PRBS2^31-1 @53.125Gb/s, BER \leq 2.4E-5.

Electrical Characteristics

High-Speed Signal: Compliant to 200GAUI-8 (IEEE 802.3bs)

Low-Speed Signal: Compliant to CFP2 MSA Hardware Specification

Table 5-Electrical Characteristics

Transmitter (Module Input)						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Input Differential Impedance	R _{in}	-	100	-	Ohm	
Differential Data Input Amplitude	V _{IN,P-P}	80	-	900	mVpp	
Differential Termination Mismatch	Diff	-	-	10	%	
Tx_Disable	Normal Operation	V _{IL}	-0.3	-	0.8	V
	Laser Disable	V _{IH}	2.0	-	V _{CC} +0.3	V
Receiver (Module Output)						
Parameter	Symbol	Min.	Typical	Max.	Unit	Notes
Output Differential Impedance	R _{out}	-	100	-	Ohm	
Differential Data Output Amplitude	V _{OUT,P-P}	200	-	900	mVpp	
Differential Termination Mismatch (1MHZ)		-	-	10	%	
Transition time (min, 20% to 80%)	Tr Tf	12			ps	
Rx_LOS	Normal Operation	V _{OL}	0	-	0.4	V
	Lose Signal	V _{OH}	V _{CC} -0.5	-	V _{CC} +0.3	V

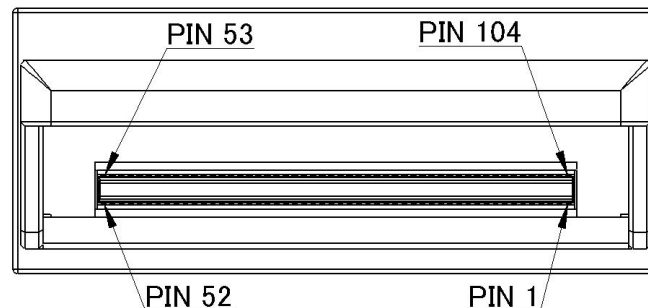
Digital Diagnostics

Table 6-Digital Diagnostics

Parameter	Range	Accuracy	Unit	Calibration
Temperature	0 to 70	±3	°C	Internal
Voltage	0 to V _{CC}	±3%	V	Internal
Tx Bias Current Per Lane	0 to 100	±10%	mA	Internal
Tx Output Power Per Lane	-3.4 to 5.3	±2	dBm	Internal
Rx Power (Each Lane)	LOS A to 5.1	±2	dBm	Internal

Pin Definitions

The CFP2 connector has 104 pins which are arranged in Top and Bottom rows .The CFP2 connector supports the eight (8) 25Gbit/s TX lanes plus eight (8) 25Gbit/s RX lanes configurations.

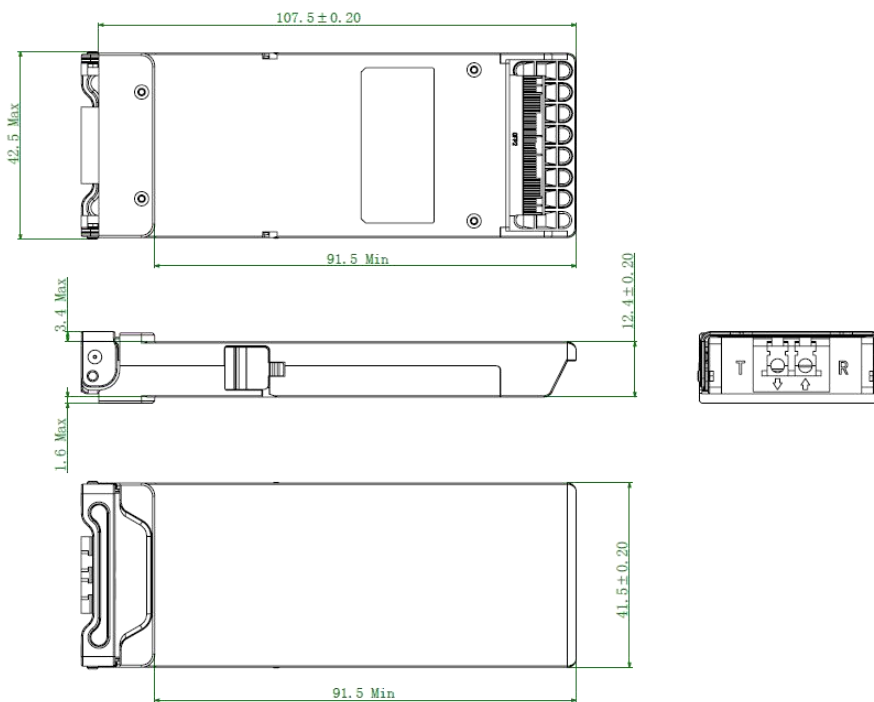


Bottom		Top	
1	GND	104	GND
2	TX_MCLKn	103	TX7n
3	TX_MCLKp	102	TX7p
4	GND	101	GND
5	N.C.	100	TX6n
6	N.C.	99	TX6p
7	3.3V_GND	98	GND
8	3.3V_GND	97	TX5n
9	3.3V	96	TX5p
10	3.3V	95	GND
11	3.3V	94	TX4n
12	3.3V	93	TX4p
13	3.3V_GND	92	GND
14	3.3V_GND	91	TX3n
15	VND_IO_A	90	TX3p
16	VND_IO_B	89	GND
17	PRG_CNTL1	88	TX2n
18	PRG_CNTL2	87	TX2p
19	PRG_CNTL3	86	GND
20	PRG_ALARM1	85	TX1n
21	PRG_ALARM2	84	TX1p
22	PRG_ALARM3	83	GND
23	GND	82	TX0n
24	TX_DIS	81	TX0p
25	RX_LOS	80	GND
26	MOD_LOPWR	79	REFCLKn
27	MOD_ABS	78	REFCLKp
28	MOD_RSTn	77	GND
29	GLB_ALARMn	76	RX7n
30	GND	75	RX7p
31	MDC	74	GND
32	MDIO	73	RX6n
33	PRTADR0	72	RX6p
34	PRTADR1	71	GND
35	PRTADR2	70	RX5n
36	VND_IO_C	69	RX5p
37	VND_IO_D	68	GND
38	VND_IO_E	67	RX4n
39	3.3V_GND	66	RX4p
40	3.3V_GND	65	GND
41	3.3V	64	RX3n
42	3.3V	63	RX3p
43	3.3V	62	GND
44	3.3V	61	RX2n
45	3.3V_GND	60	RX2p
46	3.3V_GND	59	GND
47	N.C.	58	RX1n
48	N.C.	57	RX1p
49	GND	56	GND
50	RX_MCLKn	55	RX0n
51	RX_MCLKp	54	RX0p
52	GND	53	GND

PIN No.	Name	I/O	Logic	Description
2	TX_MCLKn	O	CML	For optical waveform testing.Not for normal use.
3	TX_MCLKp	O	CML	For optical waveform testing.Not for normal use.
15	VND_IO_A	O	3.3V LVCMOS	No Connects
16	VND_IO_B	I/O	1.8V LVCMOS	No Connects
17	PRG_CNTL1	I	3.3V LVCMOS	Programmable Control 1 set over MDIO
18	PRG_CNTL2	I	3.3V LVCMOS	Programmable Control 2 set over MDIO
19	PRG_CNTL3	I	3.3V LVCMOS	Programmable Control 3 set over MDIO
20	PRG_ALARM1	O	3.3V LVCMOS	Programmable Alarm 1 set over MDIO
21	PRG_ALARM2	O	3.3V LVCMOS	Programmable Alarm 2 set over MDIO
22	PRG_ALARM3	O	3.3V LVCMOS	Programmable Alarm 3 set over MDIO
24	TX_DIS	I	3.3V LVCMOS	Transmitter Disable for all lanes, "1" or NC=transmitter disabled,"0"=transmitter enabled
25	RX_LOS	O	3.3V LVCMOS	Receiver Loss of Optical Signal, "1": low optical signal, "0": normal condition
26	MOD_LOPWR	I	LVCOMS	Module Low Power Mode. "1" or NC: module in low power (safe) mode, "0": power-on enabled
27	MOD_ABS	O	3.3V LVCMOS	Module Absent. "1" or NC: module absent, "0": module present, Pull Up Resistor on Host
28	MOD_RSTn	I	3.3V LVCMOS	Module Reset. "0" resets the module, "1" or NC = module enabled, Pull Down Resistor in Module
29	GLB_ALRMn	O	3.3V LVCMOS	Global Alarm. "0": alarm condition in any MDIO Alarm register, "1": no alarm condition, Open Drain, Pull Up Resistor on Host
31	MDC	I	1.2V LVCMOS	Management Data Clock (electrical specs as per IEEE Std 802.3-2012)
32	MDIO	I/O	1.2V LVCMOS	Management Data I/O bi-directional data (electrical specs as per IEEE Std 802.3-2012)
33	PRTADR0	I	1.2V LVCMOS	MDIO Physical Port address bit 0
34	PRTADR1	I	1.2V LVCMOS	MDIO Physical Port address bit 1
35	PRTADR2	I	1.2V LVCMOS	MDIO Physical Port address bit 2
36	VND_IO_C	I/O	1.8V LVCMOS	No Connects

37	VND_IO_D	O	3.3V LVCMOS	MSA_BER_Threshold,Connect to FPGA
38	VND_IO_E	I/O	3.3V LVCMOS	No Connects
50	RX_MCLKn	O	CML	For optical waveform testing.Not for normal use.
51	RX_MCLKp	O	CML	For optical waveform testing.Not for normal use.
78	REFCLKp	I	See electrical specs	Internally AC Coupled, Terminated and Biased
79	REFCLKn	I		Internally AC Coupled, Terminated and Biased
N/A	TX0-7(n/p)	I	See electrical specs	Please refer to PINOUT for each lane and polarity
N/A	RX0-7(n/p)	O		Please refer to PINOUT for each lane and polarity
N/A	N.C.			No Connects

Mechanical Dimension



Warnings

Handling Precautions: This device is susceptible to damage as a result of electrostatic discharge (ESD). A static free environment is highly recommended. Follow guidelines according to proper ESD procedures.

Laser Safety: Radiation emitted by laser devices can be dangerous to human eyes. Avoid eye exposure to direct or indirect radiation.