

400G QSFP-DD ZR+ HP Coherent

400G, DWDM, QSFP-DD, ZR+, HP, Coherent, LC, SM

CDD-4S-ZP-CCH22

OVERVIEW

The CDD-4S-ZP-CCH22 is a high-power QSFP-DD (Type 2a) coherent DWDM transceiver designed for flexible optical transport using both OIF 400ZR and OpenZR+ profiles for 100G to 400G Ethernet services. It integrates a tunable coherent optical engine, advanced DSP, and CMIS 5.0 management interface to support multi-rate, multi-reach coherent links.

With up to +1 dBm transmit output power (provisionable) and high OSNR performance, the module enables 400G transport over existing 100 GHz ROADM architectures, extending deployment options in brownfield DWDM networks. It supports multiple host interface mappings (400GAUI-8, 200GAUI-4, 100GAUI-2, CAUI-4) and automatically configures operating modes via CMIS application codes.

The module performs GMP mapping of Ethernet client signals into a 400ZR frame structure, applies CFEC or oFEC, and transmits a dual-polarization coherent signal using DP-16QAM, DP-8QAM, or DP-QPSK depending on the selected mode. It is compatible for use in routers, switches, and muxponder platforms and aligns with specifications from OIF and OpenZR+ MSA.

KEY SPECIFICATIONS

- QSFP-DD form factor for high-density deployments
- Up to 400G Ethernet using 4x106.25G PAM4 electrical lanes
- Supports OpenZR+ protocol and CMIS 5.0 management
- Tunable C-band DWDM, 75 GHz spacing
- Coherent transmission with integrated DSP
- Software-tunable output power and wavelength
- Power consumption below 16 W
- I2C interface for digital diagnostics

TECHNICAL DATA

Parameter	Value	Parameter	Value
Form Factor	QSFP-DD	Tx Power	Min 1dBm ²⁾
Transmission Media	SM (2x LC)	Tx In-band OSNR	Min 38dB/0.1nm
Nominal Wavelengths	191.3 – 196.1THz (tunable) 6.25GHz Grid	Tx Out-Of-Band OSNR	Min 42dB/0.1nm
Interface standards	OIF 400ZR / OpenZR+	Rx LOS Assert	-28dBm ³⁾
Operating Temperature	+15°C to 75°C ¹⁾	Receiver turn-up	Max 30ms from warm start Max 120s from cold start
Storage Temperature	-40°C to 85°C		
DDM	Total received power Coherent channel power OSNR, eSNR, PDL, dispersion, DGD Case Temperature	Absolute max conditions	Rx signal input power: +13dBm Rx total input power: +15dBm
MSA	QSFP-DD MSA's, CMIS5.0	Power consumption, 23.1W @ 400G EOL @ Default CD Range ⁴⁾	23.4W @ 300G 21.9W @ 200G 18.0W @ 100G
MISC	Sync-E support, LLDP, RMON		

¹⁾ The module will turn up from cold start at ambient temperature as low as -5C and will reach specifications after self-heating up to min temperature.

²⁾ The module transmit power can be provisioned up to the maximum available TX power.

³⁾ Set to comply with 400G modes. Can be changed on individual modules to fully support other modes.

⁴⁾ Increasing the CD range with 2x of default range will increase the power consumption by 0.6W.

Safety/Regulatory Compliance

- Class 1 laser safe
- RoHS Compliance

The below table lists the OIF 400ZR and OpenZR+ modes supported by CDD-4S-ZP-CCH22.

CMIS Application Code	Host format	Electrical Interface	Payload	FEC	Modulation	Line Symbol Baud Rate	Operating Reach	MSA Format	Media ID (hex)
1	400GBASE-R	1x 400GAUI-8 (8x 50G)	400G	CFEC	DP-16QAM	59.8GBd	80km	OIF 400ZR, app code 0x01	0x3E
2	400GBASE-R	1x 400GAUI-8 (8x 50G)	400G	CFEC	DP-16QAM	59.8GBd	25km	OIF 400ZR, app code 0x02	0x3F
3	400GBASE-R	1x 400GAUI-8 (8x 50G)	400G	oFEC	DP-16QAM	60.1GBd	120km	OpenZR+ MSA	0x46
4	2 × 200GBASE-R	2x 200GAUI-4 (2x 200G)	400G	oFEC	DP-16QAM	60.1GBd	450km	OpenZR+ MSA	0x46
5	4 × 100GBASE-R	4x 100GAUI-2 (2x 50G)	400G	oFEC	DP-16QAM	60.1GBd	450km	OpenZR+ MSA	0x46
6	400GBASE-R	1x 400GAUI-8 (8x 50G)	400G	oFEC	DP-16QAM	60.1GBd	450km	OpenZR+ MSA, Enhanced	0xCE
7	2 × 200GBASE-R	2x 200GAUI-4 (2x 200G)	400G	oFEC	DP-16QAM	60.1GBd	450km	OpenZR+ MSA, Enhanced	0xCE
8	4 × 100GBASE-R	4x 100GAUI-2 (2x 50G)	400G	oFEC	DP-16QAM	60.1GBd	450km	OpenZR+ MSA, Enhanced	0xCE
9	2 × 100GBASE-R	2x 100GAUI-2 (2x 50G)	200G	oFEC	DP-QPSK	60.1GBd	1000km	OpenZR+ MSA	0x48
10	1 × 100GBASE-R	1x 100GAUI-2 (2x 50G)	100G	oFEC	DP-QPSK	30.1GBd	1000km	OpenZR+ MSA	0x49
11	3 × 100GBASE-R	3x 100GAUI-2 (2x 50G)	300G	oFEC	DP-8QAM	60.1GBd	1000km	OpenZR+ MSA	0x47
13	4 × 100GBASE-R	4x 100GAUI-2 (2x 50G)	400G	CFEC	DP-16QAM	59.8GBd	80km	OIF400ZR app code 0x01	0x3E
14	2 × 100GBASE-R	2x 100GAUI-2 (2x50G)	200G	oFEC	DP-16QAM	30.1GBd	2000km	OpenZR+ MSA, Enhanced	0xF3
15	100GBASE-R	1x CAUI-4 w/o FEC	100G	oFEC	DP-QPSK	30.1GBd	2000km	OpenZR+ MSA	0x49

CDD-4S-ZP-CCH22 will automatically configure the above via the Application modes. For 400G applications, the CDD-4S-ZP-CCH22 asynchronously (GMP) maps an Ethernet signal from a switch/router to an intermediate 400ZR frame structure, then adapts the frame structure to the selected FEC engine. The encoded signal is subsequently DSP framed and modulated for transmission as a coherent Dual Polarity signal.

OPTICAL SPECIFICATION – APPLICATION CODES

The table below lists the primary optical specifications for each supported application code

Appl code	Line rate	Host format	Tx power ¹⁾	Rx sens @ OSNR > 36dB	Rx @ OSNR ²⁾	Rx OSNR @ 0.5dB penalty ²⁾	Rx OSNR @ 1dB penalty ²⁾	Default CDC range ³⁾	Maximum CDC search range ³⁾
1	400G	1x 400GAUI-8	1dBm	-20dBm	26dB@-12dBm	26.5dB@-14dBm	27.0dB@-15dBm	4,000 ps/nm	4,000 ps/nm
2	400G	1x 400GAUI-8	1dBm	-20dBm	26dB@-12dBm	26.5dB@-14dBm	27.0dB@-15dBm	4,000 ps/nm	4,000 ps/nm
3	400G	1x 400GAUI-8	1dBm	-21dBm	23.0dB@-12dBm	23.5dB@-14dBm	24.0dB@-16dBm	13,000 ps/nm	52,000 ps/nm
4	400G	2x 200GAUI-4	1dBm	-21dBm	23.0dB@-12dBm	23.5dB@-14dBm	24.0dB@-16dBm	13,000 ps/nm	52,000 ps/nm
5	400G	4x 100GAUI-2	1dBm	-21dBm	23.0dB@-12dBm	23.5dB@-14dBm	24.0dB@-16dBm	13,000 ps/nm	52,000 ps/nm
6	400G	1x 400GAUI-8	1dBm	-21dBm	22.5dB@-12dBm	23.0dB@-14dBm	23.5dB@-16dBm	13,000 ps/nm	52,000 ps/nm
7	400G	2x 200GAUI-4	1dBm	-21dBm	22.5dB@-12dBm	23.0dB@-14dBm	23.5dB@-16dBm	13,000 ps/nm	52,000 ps/nm
8	400G	4x 100GAUI-2	1dBm	-21dBm	22.5dB@-12dBm	23.0dB@-14dBm	23.5dB@-16dBm	13,000 ps/nm	52,000 ps/nm
9	200G	2x 100GAUI-2	1dBm	-29dBm	14.8dB@-18dBm	15.3dB@-20dBm	15.8dB@-22dBm	50,000 ps/nm	100,000 ps/nm
10	100G	1x 100GAUI-2	1dBm	-32dBm	11.5dB@-20dBm	12.0dB@-23dBm	12.5dB@-25dBm	80,000 ps/nm	100,000 ps/nm
11	300G	3x 100GAUI-2	1dBm	-22dBm	20.3dB@-15dBm	20.8dB@-17dBm	20.5dB@-19dBm	50,000 ps/nm	100,000 ps/nm
13	400G	4x 100GAUI-2	1dBm	-20dBm	26dB@-12dBm	26.5dB@-14dBm	27.0dB@-15dBm	4,000 ps/nm	4,000 ps/nm
14	200G	2x 100GAUI-2	1dBm	-24dBm	19.3dB@-15dBm	19.8dB@-18dBm	20.3dB@-20dBm	21,000 ps/nm	85,000 ps/nm
15	100G	1x CAUI-4 w/o FEC	1dBm	-32dBm	11.5dB@-20dBm	12.0dB@-23dBm	12.5dB@-25dBm	80,000 ps/nm	160,000 ps/nm

¹⁾ Minimum Tx power without attenuation. The module Tx power can be attenuated with 10dB from the maximum available Tx power. If the Tx power is not provisioned by the host, the module Tx power will default to the maximum available power.

²⁾ Specified as [Min OSNR Value @ Min Rx power for the OSNR value].

³⁾ Maximum provisionable CD search range. Increasing the search range will increase the power consumption of the transceiver.

ABSOLUTE MAX RATING

Exceeding these limits can cause permanent damage to the transceiver

Parameter	Value	Parameter	Value
Supply Voltage	3.3V±5%V	Max Rx Optical Power	+15dBm
Storage Temp	-40°C to 85°C		

ORDERING INFORMATION

Ordering Code	Description
CDD-4S-ZP-CCH22	400G QSFP-DD, DWDM, ZR+, HP, LC, SM, 15C to 75C

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