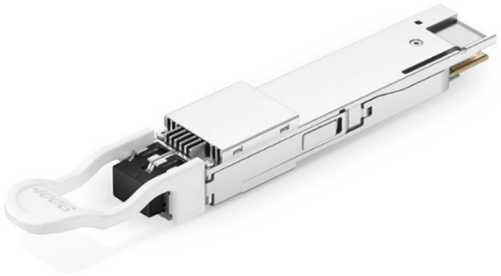
# Optical Transceiver: 400G QSFP-DD ZR+ DCO E1(-10dBm)

## 3C-QSFPD4-DCO-ZR

The 400G ZR+ QSFP-DD DCO E1 is a C-band frequency tunable coherent transceiver that integrates coherent DSP ASIC functionality, industry-leading ultra narrow linewidth tunable laser, high-speed modulator, and high-sensitivity coherent receiver. This transceiver achieves the longest transmission distance with the high-performance O-FEC algorithm. The transceiver complies with the OIF MSA standard and supports multi-vendor interoperability, enabling interoperability and rapid deployment with other standard compatible components. As the core component of DCI transmission, this transceiver has the characteristics of easy operation and open architecture, which helps service providers and cloud operators smoothly transition to 400G and higher bandwidth, while reducing TCO. Suitable for access, edge, core, and data centers, supporting an open and interconnected network ecosystem.

**Product features**

- Standard QSFP-DD Type 2a form factor
- Duplex LC connector
- Compliant with Open ZR+ MSA and OIF 400ZR MSA, support OFEC and CFEC FEC
- Line rate 100G/200G/300G/400G
- Client rate 1/2/3/4x100GbE or 1x400GbE
- Full C-band tunable with flexible grid support
- RoHS 2 compliant



**Application area**

- Edge DCI with extended Reach or with OLP protection
- IP Over Metro or Long Haul DWDM

**Technical specification**

| Parameter | OIF 400ZR | Metro | Regional | Long-haul | ULH |
|---|---|---|---|---|---|
| MSA compliance | OIF 400ZR Implementation Agreement (IA) | OpenZR+ MSA | | | |
| Speed | 1x400GbE<br>4x100GbE | 1x400GbE<br>4x100GbE | 3x100GbE | 2x100GbE | 1x100GbE |
| Modulation format | DP-16QAM | DP-16QAM | DP-8QAM | DP-QPSK | DP-QPSK |
| FEC types | Concatenated FEC (CFEC) | OFEC | | | |
| Max Pre-FEC BER | 1.25E-2 | 2.0E-2 | | | |
| Channel plan wavelength range | 1567.13 ~ 1528.77 nm | | | | |

| Parameter | OIF 400ZR | Metro | Regional | Long-haul | ULH |
|---|---|---|---|---|---|
| Channel plan frequency range | 191.3 ~ 196.1 THz | | | | |
| Channel spacing | 75GHz or greater | | | | 50GHz or greater |
| Channel tunability | 6.25GHz grid tuning | | | | |
| Optical transmitter output power (on) | -13 ~ -9 dBm | -13 ~ -9 dBm | -12 ~ -8 dBm | -10.5 ~ -6.5 dBm | -6 ~ -2 dBm |
| | Tx output power accuracy: +/–1.5dB | | | | |
| Optical transmitter output power (off) | Max. -30dBm | | | | |
| Range of provisionable TX power | Min. 10dB @Reduction below maximum provisionable TX power | | | | |
| Optical transmitter wavelength accuracy | +/-1.5GHz | | | | |
| Optical transmitter channel tuning time | 200s | | | | |
| Optical Transmitter OSNR (in-band) | 42dB | | | | |
| Optical Transmitter OSNR (out-of-band) | 42dB | | | | |
| Optical receiver input power range | -12 ~ +0dBm | -12 ~ +0dBm | -15 ~ +0dBm | -18 ~ +0dBm | -20 ~ +0dBm |
| Optical receiver damage input power threshold | Max.+13dBm | | | | |
| Optical receiver input sensitivity (ROSNR > 36dB) | -20dBm | -21dBm | -23dBm | -29dBm | -32dBm |
| Optical receiver minimum OSNR (back-to-back), worst-case, EOL | 26dB | 23.1dB | 19.5dB | 15dB | 11.8dB |
| Optical receiver chromatic dispersion tolerance | 2400ps/nm | 13000ps/nm | 26000ps/nm | 50000ps/nm | 80000ps/nm |
| Optical receiver PMD tolerance | 16.5ps (@ 0.5dB OSNR penalty) | 30ps (@ 0.5dB OSNR penalty) | 30ps (@ 0.5dB OSNR penalty) | 30ps (@ 0.5dB OSNR penalty) | 40ps (@ 0.5dB OSNR penalty) |
| Optical receiver polarization tracking | 50krad/s | 80krad/s | 100krad/s | 800krad/s | 400krad/s |
| Receiver PDL Tolerance | 3.5dB (@ 1.8dB OSNR penalty) | 3.5dB (@ 1.5dB OSNR penalty) | | | |
| Latency | 8us | 5us | 6us | 7us | 11us |
| Distance(unamplified) | 40km | 40km | 50km | 70km | 80km |
| Distance (amplified, CD limited 17 ps/nm) | 140km | 500km | 900km | >1400km | >2000km |
| Power consumption (EOL) | 19.3 W | 22.1W | 22.3W | 21.3W | 18.2W |
| DOM temperature normal operating range | +15 ~ +75 °C<br>(The module will turn up from cold start at ambient temperature as low as -5°C. After self-heating, the module will meet all specifications after reaching the specified low DOM operating temperature. ) | | | | |
| Storage temperature | -40 ~ +85 °C | | | | |