



## HydraX SM Optical Transceiver Module

### QSFP28 100G CWDM4 1310nm 2km

#### Design Reference

IEEE 802.3bm  
FCC Part 15 Class B  
EN 55022:2010, Class B  
EN 55024:2010  
IEC 60825 Class 1

#### Application

100GBASE Ethernet  
Proprietary High Speed  
Interconnections  
Data center  
100G CWDM4 application  
with FEC

#### Working Condition

Operation Temperature  
-0°C ~ +70°C (Case)  
Storage Temperature  
-40°C ~ +85°C (Ambient)  
Relative humidity  
5% ~ 95%

#### Compliance

CE Mark  
FCC Mark

#### Safety and EMI

Protection of over  
voltage/current



**Four-channel full-duplex transceiver modules**

**Transmission data rate up to 26 Gbit/s per channel**

**Up to 2km transmission of single mode fiber**

**Low power consumption <3.5W**

**3.3V power supply voltage**

**Hot Pluggable QSFP28 form factor**

**LC connector receptacle**

**Built-in digital diagnostic function**

## General Description

The Hermesys HydraXTM series SFP-21100020Q28X1DW 100Gb/s QSFP28 CWDM4 Optical Transceiver is a Four-Channel, Pluggable, dual LC, Fiber-Optic QSFP28 Transceiver for 100G Ethernet applications. The QSFP28 full-duplex optical module offers 4 independent transmit and receive channels, each capable of 26Gbps operation for an aggregate data rate of 104Gbps 2km using single mode fiber. These modules are designed to operate over single mode fiber systems using 1271nm-1331nm DFB laser array. QSFP28 CWDM4 is one kind of transceiver which provides increased port density and total system cost savings. They are compliant with the QSFP28 MSA, CWDM4 MSA and portions of IEEE P802.3bm.



## Maximum Ratings

| Parameter      | Symbol          | Min  | Typ | Max                  | Unit | Ref. |
|----------------|-----------------|------|-----|----------------------|------|------|
| Supply Voltage | V <sub>CC</sub> | -0.5 |     | 3.6                  | V    |      |
| Input Voltage  | V <sub>in</sub> | -0.5 |     | V <sub>CC</sub> +0.3 | V    |      |

## Recommended Operating Conditions

| Parameter                | Symbol          | Min   | Typ      | Max   | Unit | Ref. |
|--------------------------|-----------------|-------|----------|-------|------|------|
| Power Supply Voltage     | V <sub>CC</sub> | 3.135 | 3.3      | 3.465 | V    |      |
| Power Consumption        |                 | -     |          | 2.5   | W    |      |
| Data Rate                | D <sub>R</sub>  |       | 25.78125 |       | Gbps |      |
| Data Speed Tolerance     | ΔD <sub>R</sub> | -100  |          | +100  | ppm  |      |
| Link Distance with G.652 | D               | 0     |          | 70    | m    |      |

## Electrical Characteristics

| Parameter                             | Symbol            | Min                  | Typ | Max             | Unit  | Notes |
|---------------------------------------|-------------------|----------------------|-----|-----------------|-------|-------|
| Differential input impedance          | Z <sub>in</sub>   | 90                   | 100 | 110             | ohm   |       |
| Differential Output impedance         | Z <sub>out</sub>  | 90                   | 100 | 110             | ohm   |       |
| Differential input voltage amplitude  | ΔV <sub>in</sub>  | 300                  |     | 1100            | mVp-p |       |
| Differential output voltage amplitude | ΔV <sub>out</sub> | 500                  |     | 800             | mVp-p |       |
| Input Logic Level High                | V <sub>IH</sub>   | 2.0                  |     | V <sub>CC</sub> | V     |       |
| Input Logic Level Low                 | V <sub>IL</sub>   | 0                    |     | 0.7             | V     |       |
| Output Logic Level High               | V <sub>OH</sub>   | V <sub>CC</sub> -0.5 |     | V <sub>CC</sub> | V     |       |
| Output Logic Level Low                | V <sub>OL</sub>   | 0                    |     | 0.4             | V     |       |

## Optical Characteristics

| Transmitter Optical Characteristics              |                      |     |     |     |      |       |
|--------------------------------------------------|----------------------|-----|-----|-----|------|-------|
| Parameter                                        | Symbol               | Min | Typ | Max | Unit | Notes |
| RMS Spectral Width                               | λ <sub>rms</sub>     |     |     | 3.5 | nm   | 1     |
| Average Launch Power, each lane                  | PAVG                 |     |     | 2.5 | dBm  |       |
| Optical Modulation Amplitude (OMA)               | POMA                 | -4  |     | 2.5 | dBm  | 1     |
| Difference in Launch Power between any two lanes | P <sub>tx,diff</sub> |     |     | 4.0 | dB   |       |
| Transmitter and Dispersion Penalty per Lane      | TDP                  |     |     | 3   | dBm  |       |
| Rise/Fall Time                                   | Tr/Tf                |     |     | 30  | ps   |       |
| Extinction Ratio                                 | ER                   | 3.5 |     |     | dB   |       |
| Transmitter Reflectance                          | RT                   |     |     | -12 | dB   |       |
| Transmitter Eye Mask Margin                      | EMM                  | 10  |     |     | %    | 2     |



|                                                          |      |                                    |  |     |     |  |
|----------------------------------------------------------|------|------------------------------------|--|-----|-----|--|
| Average Launch Power OFF Transmitter, each Lane          | Poff |                                    |  | -30 | dBm |  |
| Transmitter Eye Mask Definition {X1, X2, X3, Y1, Y2, Y3} |      | {0.31, 0.4, 0.45, 0.34, 0.38, 0.4} |  |     |     |  |

| Receiver Optical Characteristics       |        |     |     |       |      |       |
|----------------------------------------|--------|-----|-----|-------|------|-------|
| Parameter                              | Symbol | Min | Typ | Max   | Unit | Notes |
| Damage Threshold                       | THd    | 3.5 |     |       | dBm  |       |
| Overload, each lane                    | OVL    | 2.5 |     |       | dBm  |       |
| Receiver Sensitivity in OMA, each Lane | SEN    |     |     | -10   | dBm  | 3     |
| Signal Loss Assert Threshold           | LOSA   | -24 |     | -13.6 | dBm  |       |
| Signal Loss Deassert Threshold         | LOSD   |     |     | -11.6 | dBm  |       |
| LOS Hysteresis                         | LOSH   |     | 1.5 |       | dB   |       |
| Optical Return Loss                    | ORL    |     |     | -12   | dBm  |       |

Notes:

Transmitter wavelength, RMS spectral width and power need to meet the OMA minus TDP specs to guarantee link performance.

The eye diagram is tested with 1000 waveform.

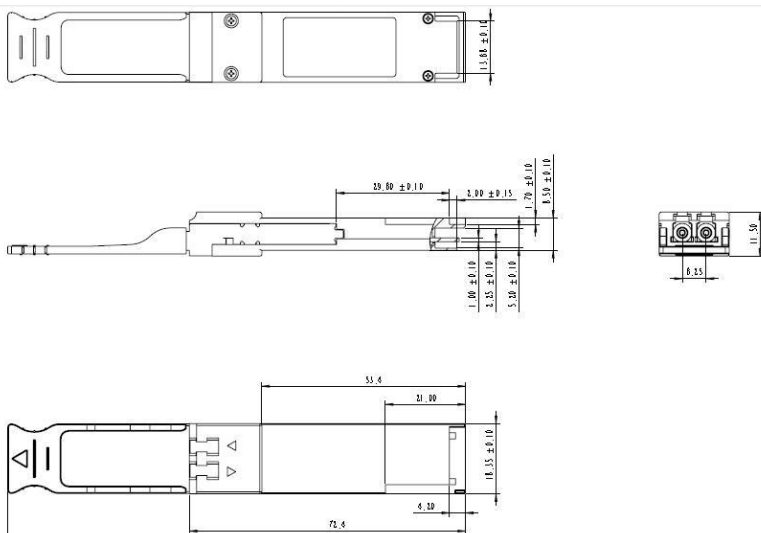
Sensitivity is specified at 5x10<sup>-5</sup> BER.

## Digital Diagnostic Functions

The following digital diagnostic characteristics are defined over the normal operating conditions unless otherwise specified

| Parameter                               | Symbol    | Min  | Max | Unit | Notes                |
|-----------------------------------------|-----------|------|-----|------|----------------------|
| Temperature monitor absolute error      | DMI_Temp  | -3   | 3   | degC | Over operating temp  |
| Supply voltage monitor absolute error   | DMI_VCC   | -0.1 | 0.1 | V    | Full operating range |
| Channel RX power monitor absolute error | DMI_RX    | -3   | 3   | dB   | Per channel          |
| Channel Bias current monitor            | DMI_Ibias | -10% | 10% | mA   | Per channel          |
| Temperature monitor absolute error      | DMI_Temp  | -3   | 3   | degC | Over operating temp  |

## Dimension of Case





## Order Information

| Part Number         | Grade               | Packing info                                                                          |
|---------------------|---------------------|---------------------------------------------------------------------------------------|
| SFP-21100020Q28X1DW | Commercial -0~70 °C | 400 pcs per carton<br>(10pcs per tray, 10 tray per inner box, 4 inner box per carton) |

Note:

X means compatible equipment code.