



## OSFP-400G-DR4-AR-SKY

Arista Networks® OSFP-400G-DR4-AR Compatible 400GBase-DR4 OSFP-IHS Transceiver (SMF, 1310nm, 500m, MPO, DOM)

### Product Description

This Arista Networks® OSFP-400G-DR4-AR compatible OSFP-IHS Transceiver provides 400GBase-DR4 throughput up to 500m over single-mode fiber (SMF) using a wavelength of 1310nm via an MPO connector. It can operate at temperatures between 0 and 70C. Our transceiver is built to meet or exceed OEM specifications and is guaranteed to be 100% compatible with Arista Networks®. It has been programmed, uniquely serialized, and tested for data-traffic and application to ensure that it will initialize and perform identically. All of our transceivers comply with Multi-Source Agreement (MSA) standards to provide seamless network integration. Additional product features include Digital Optical Monitoring (DOM) support which allows access to real-time operating parameters. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

Skylane's transceivers are RoHS compliant and lead-free.

### Features:

- MPO Connector
- Commercial Temperature 0 to 70 Celsius
- Single-mode Fiber
- Hot Pluggable
- Excellent ESD Protection
- Metal with Lower EMI
- RoHS Compliant and Lead Free



### Applications:

- 400GBase Ethernet
- Access and Enterprise
- 1x Fibre Channel

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*For your product safety, please read the following information carefully before any manipulation of the transceiver:*



#### **ESD**

This transceiver is specified as ESD threshold 1kV for SFI pins and 2kV for all others electrical input pins, tested per MIL-STD-883G, Method 3015.4 /JESD22-A114-A (HBM). However, normal ESD precautions are still required during the handling of this module.



#### **LASER SAFETY**

This is a Class1 Laser Product according to IEC 60825-1:2007. This product complies with 21 CFR 1040.10 and 1040.11 except for deviations pursuant to Laser Notice No. 50, dated (June 24, 2007).

*The optical ports of the module need to be terminated with an optical connector or with a dust plug in order to avoid contamination.*

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### Absolute Maximum Ratings

| Parameter                          | Symbol | Min. | Max. | Unit |
|------------------------------------|--------|------|------|------|
| Power Supply Voltage               | VCC    | -0.5 | 3.6  | V    |
| Storage Temperature                | Ts     | -40  | 85   | °C   |
| Operating Case Temperature         | Top    | 0    | 70   | °C   |
| Relative Humidity (non-condensing) | RH     | 0    | 85   | %    |

### Recommended Operating Conditions

| Parameter                  | Symbol | Min.  | Typ.    | Max.                 | Unit | Notes |
|----------------------------|--------|-------|---------|----------------------|------|-------|
| Operating Case Temperature | TOP    | 0     |         | 70                   | °C   |       |
| Power Supply Voltage       | VCC    | 3.135 | 3.3     | 3.465                | V    |       |
| Data Rate, each Lane       |        |       | 26.5625 |                      | GBd  | PAM4  |
| Data Rate Accuracy         |        | -100  |         | 100                  | ppm  |       |
| Pre-FEC Bit Error Ratio    |        |       |         | $2.4 \times 10^{-4}$ |      |       |
| Post-FEC Bit Error Ratio   |        |       |         | $1 \times 10^{-12}$  |      | 1     |
| Link Distance              | D      | 0.5   |         | 500                  | m    | 2     |

#### Notes:

1. FEC provided by host system.
2. FEC required on host system to support maximum distance.

## Electrical Characteristics

| Parameter                                          | Symbol          | Min.                             | Typ.  | Max. | Unit | Notes |
|----------------------------------------------------|-----------------|----------------------------------|-------|------|------|-------|
| Power Consumption                                  |                 |                                  |       | 12   | W    |       |
| Supply Current                                     | I <sub>cc</sub> |                                  |       | 3.64 | A    |       |
| <b>Transmitter (each lane)</b>                     |                 |                                  |       |      |      |       |
| Signaling Rate, each Lane                          | TP1             | 26.5625 ± 100 ppm                |       |      | GBd  |       |
| Differential pk-pk Input Voltage Tolerance         | TP1a            | 900                              |       |      | mVpp | 1     |
| Differential Termination Mismatch                  | TP1             |                                  |       | 10   | %    |       |
| Differential Input Return Loss                     | TP1             | IEEE 802.3-2015 Equation (83E-5) |       |      | dB   |       |
| Differential to Common Mode Input Return Loss      | TP1             | IEEE 802.3-2015 Equation (83E-6) |       |      | dB   |       |
| Module Stressed Input Test                         | TP1a            | See IEEE 802.3bs 120E.3.4.1      |       |      |      | 2     |
| Single-ended Voltage Tolerance Range (Min)         | TP1a            | -0.4 to 3.3                      |       |      | V    |       |
| DC Common Mode Input Voltage                       | TP1             | -350                             |       | 2850 | mV   | 3     |
| <b>Receiver (each lane)</b>                        |                 |                                  |       |      |      |       |
| Signaling Rate, each lane                          | TP4             | 26.5625 ± 100 ppm                |       |      | GBd  |       |
| Differential Peak-to-Peak Output Voltage           | TP4             |                                  |       | 900  | mVpp |       |
| AC Common Mode Output Voltage, RMS                 | TP4             |                                  |       | 17.5 | mV   |       |
| Differential Termination Mismatch                  | TP4             |                                  |       | 10   | %    |       |
| Differential Output Return Loss                    | TP4             | IEEE 802.3-2015 Equation (83E-2) |       |      |      |       |
| Common to Differential Mode Conversion Return Loss | TP4             | IEEE 802.3-2015 Equation (83E-3) |       |      |      |       |
| Transition Time, 20% to 80%                        | TP4             | 9.5                              |       |      | ps   |       |
| Near-end Eye Symmetry Mask Width (ESMW)            | TP4             |                                  | 0.265 |      | UI   |       |
| Near-end Eye Height, Differential                  | TP4             | 70                               |       |      | mV   |       |
| Far-end Eye Symmetry Mask Width (ESMW)             | TP4             |                                  | 0.2   |      | UI   |       |
| Far-end Eye Height, Differential                   | TP4             | 30                               |       |      | mV   |       |
| Far-end Pre-cursor ISI Ratio                       | TP4             | -4.5                             |       | 2.5  | %    |       |
| Common Mode Output Voltage (V <sub>cm</sub> )      | TP4             | -350                             |       | 2850 | mV   | 3     |

### Notes:

1. With the exception to IEEE 802.3bs 120E.3.1.2 that the pattern is PRBS31Q or scrambled idle.
2. Meets BER specified in IEEE 802.3bs 120E.1.1.
3. DC common mode voltage generated by the host. Specification includes effects of ground offset voltage.

## Optical Characteristics

| Parameter                                                             | Symbol           | Min.                 | Typ. | Max.   | Unit  | Notes     |
|-----------------------------------------------------------------------|------------------|----------------------|------|--------|-------|-----------|
| Center Wavelength                                                     | $\lambda_c$      | 1304.5               | 1310 | 1317.5 | nm    |           |
| <b>Transmitter</b>                                                    |                  |                      |      |        |       |           |
| Data Rate, each Lane                                                  |                  | 53.125 $\pm$ 100 ppm |      |        | GBd   |           |
| Modulation Format                                                     |                  | PAM4                 |      |        |       |           |
| Side-mode Suppression Ratio                                           | SMSR             | 30                   |      |        | dB    | Modulated |
| Average Launch Power, each Lane                                       | PAVG             | -2.9                 |      | 4      | dBm   | 1         |
| Outer Optical Modulation Amplitude (OMA <sub>outer</sub> ), each Lane | POMA             | -0.8                 |      | 4.2    | dBm   | 2         |
| Launch Power in OMA <sub>outer</sub> minus TDECQ, each Lane           |                  | -2.2                 |      |        | dB    |           |
| Transmitter and Dispersion Eye Closer for PAM4, each Lane             | TDECQ            |                      |      | 3.4    | dB    |           |
| Extinction Ratio                                                      | ER               | 3.5                  |      |        | dB    |           |
| RIN <sub>21.4</sub> OMA                                               | RIN              |                      |      | -136   | dB/Hz |           |
| Optical Return Loss Tolerance                                         | TOL              |                      |      | 21.4   | dB    |           |
| Transmitter Reflectance                                               | TR               |                      |      | -26    | dB    |           |
| Average Launch Power of OFF Transmitter, each Lane                    | P <sub>off</sub> |                      |      | -15    | dBm   |           |
| <b>Receiver</b>                                                       |                  |                      |      |        |       |           |
| Data Rate, each Lane                                                  |                  | 53.125 $\pm$ 100 ppm |      |        | GBd   |           |
| Modulation Format                                                     |                  | PAM4                 |      |        |       |           |
| Damage Threshold, each Lane                                           | TH <sub>d</sub>  | 5                    |      |        | dBm   | 3         |
| Average Receive Power, each Lane                                      |                  | -5.9                 |      | 4      | dBm   | 4         |
| Receive Power (OMA <sub>outer</sub> ), each Lane                      |                  |                      |      | 4.2    | dBm   |           |
| Receiver Sensitivity (OMA <sub>outer</sub> ), each Lane               | SEN              |                      |      | -4.4   | dBm   | 5         |
| Stressed Receiver Sensitivity (OMA <sub>outer</sub> ), each Lane      | SRS              |                      |      | -1.9   | dBm   | 6         |
| Receiver Reflectance                                                  | RR               |                      |      | -26    | dB    |           |
| LOS Assert                                                            | LOSA             | -30                  |      |        | dBm   |           |
| LOS De-assert                                                         | LOSD             |                      |      | -12    | dBm   |           |
| LOS Hysteresis                                                        | LOSH             | 0.5                  |      |        | dB    |           |
| <b>Stressed Conditions for Stress Receiver Sensitivity (Note 7)</b>   |                  |                      |      |        |       |           |
| Stressed Eye Closure for PAM4 (SECQ), Lane under Test                 |                  |                      | 3.4  |        | dB    |           |
| OMA <sub>outer</sub> of each Aggressor Lane                           |                  |                      | 4.2  |        | dBm   |           |

### Notes:

1. Average launch power, each lane (min) is informative and not the principal indicator of signal strength. A transmitter with launch power below this value cannot be compliant; however, a value above this does

not ensure compliance.

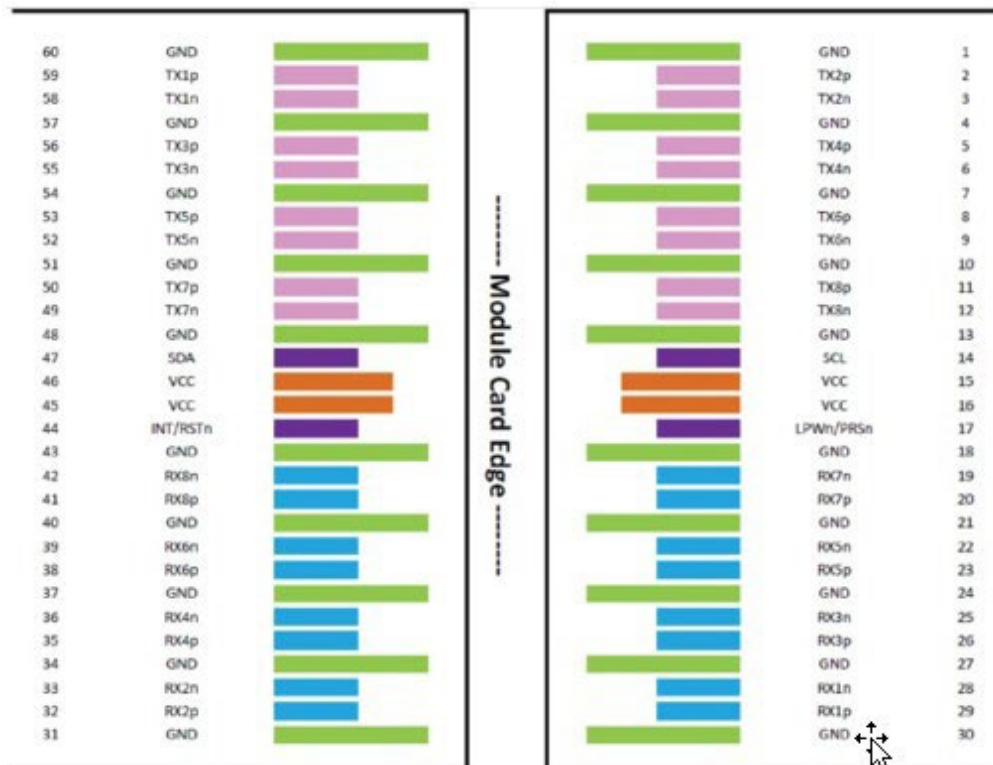
2. Even if the  $TDECQ < 1.4$  dB, the  $OMA_{outer}$  (min) must exceed the minimum value specified here.
3. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level.
4. Average receive power, each lane (min) is informative and not the principal indicator of signal strength. A received power below this value cannot be compliant; however, a value above this does not ensure compliance.
5. Receiver sensitivity ( $OMA_{outer}$ ), each lane (max) is informative and is defined for a transmitter with SECQ of 0.9 dB.
6. Measured with conformance test signal for  $BER = 2.4 \times 10^{-4}$ .
7. These test conditions are for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

## Pin Descriptions

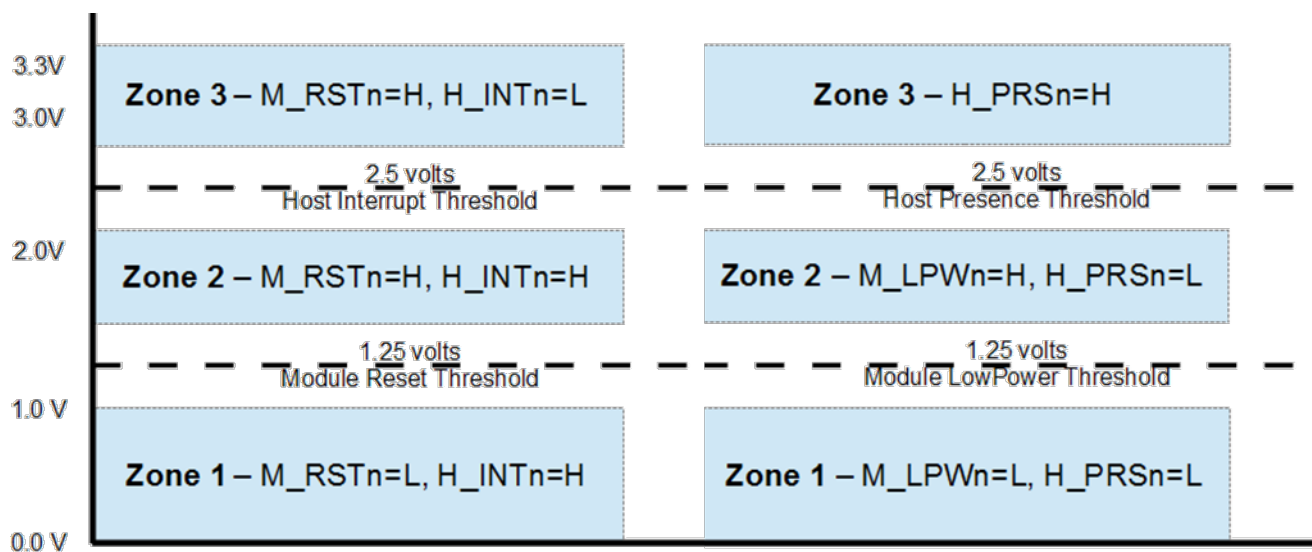
| Pin | Symbol    | Description                     | Logic        | Direction       | Plug Sequence |
|-----|-----------|---------------------------------|--------------|-----------------|---------------|
| 1   | GND       |                                 | Ground       |                 | 1             |
| 2   | TX2p      | Transmitter Data Non-Inverted   | CML-I        | Input from Host | 3             |
| 3   | TX2n      | Transmitter Data Inverted       | CML-I        | Input from Host | 3             |
| 4   | GND       |                                 | Ground       |                 | 1             |
| 5   | TX4p      | Transmitter Data Non-Inverted   | CML-I        | Input from Host | 3             |
| 6   | TX4n      | Transmitter Data Inverted       | CML-I        | Input from Host | 3             |
| 7   | GND       |                                 | Ground       |                 | 1             |
| 8   | TX6p      | Transmitter Data Non-Inverted   | CML-I        | Input from Host | 3             |
| 9   | TX6n      | Transmitter Data Inverted       | CML-I        | Input from Host | 3             |
| 10  | GND       |                                 | Ground       |                 | 1             |
| 11  | TX8p      | Transmitter Data Non-Inverted   | CML-I        | Input from Host | 3             |
| 12  | TX8n      | Transmitter Data Inverted       | CML-I        | Input from Host | 3             |
| 13  | GND       |                                 | Ground       |                 | 1             |
| 14  | SCL       | 2-wire Serial interface clock   | LVC MOS- I/O | Bi-directional  | 3             |
| 15  | VCC       | +3.3V Power                     |              | Power from Host | 2             |
| 16  | VCC       | +3.3V Power                     |              | Power from Host | 2             |
| 17  | LPWn/PRSn | Low-Power Mode / Module Present | Multi-Level  | Bi-directional  | 3             |
| 18  | GND       |                                 | Ground       |                 | 1             |
| 19  | RX7n      | Receiver Data Inverted          | CML-O        | Output to Host  | 3             |
| 20  | RX7p      | Receiver Data Non-Inverted      | CML-O        | Output to Host  | 3             |
| 21  | GND       |                                 | Ground       |                 | 1             |
| 22  | RX5n      | Receiver Data Inverted          | CML-O        | Output to Host  | 3             |
| 23  | RX5p      | Receiver Data Non-Inverted      | CML-O        | Output to Host  | 3             |
| 24  | GND       |                                 | Ground       |                 | 1             |
| 25  | RX3n      | Receiver Data Inverted          | CML-O        | Output to Host  | 3             |
| 26  | RX3p      | Receiver Data Non-Inverted      | CML-O        | Output to Host  | 3             |
| 27  | GND       |                                 | Ground       |                 | 1             |
| 28  | RX1n      | Receiver Data Inverted          | CML-O        | Output to Host  | 3             |
| 29  | RX1p      | Receiver Data Non-Inverted      | CML-O        | Output to Host  | 3             |
| 30  | GND       |                                 | Ground       |                 | 1             |
| 31  | GND       |                                 | Ground       |                 | 1             |
| 32  | RX2p      | Receiver Data Non-Inverted      | CML-O        | Output to Host  | 3             |
| 33  | RX2n      | Receiver Data Inverted          | CML-O        | Output to Host  | 3             |
| 34  | GND       |                                 | Ground       |                 | 1             |
| 35  | RX4p      | Receiver Data Non-Inverted      | CML-O        | Output to Host  | 3             |
| 36  | RX4n      | Receiver Data Inverted          | CML-O        | Output to Host  | 3             |
| 37  | GND       |                                 | Ground       |                 | 1             |
| 38  | RX6p      | Receiver Data Non-Inverted      | CML-O        | Output to Host  | 3             |
| 39  | RX6n      | Receiver Data Inverted          | CML-O        | Output to Host  | 3             |
| 40  | GND       |                                 | Ground       |                 | 1             |

|    |          |                                 |             |                 |   |
|----|----------|---------------------------------|-------------|-----------------|---|
| 41 | RX8p     | Receiver Data Non-Inverted      | CML-O       | Output to Host  | 3 |
| 42 | RX8n     | Receiver Data Inverted          | CML-O       | Output to Host  | 3 |
| 43 | GND      |                                 | Ground      |                 | 1 |
| 44 | INT/RSTn | Module Interrupt / Module Reset | Multi-Level | Bi-directional  | 3 |
| 45 | VCC      | +3.3V Power                     |             | Power from Host | 2 |
| 46 | VCC      | +3.3V Power                     |             | Power from Host | 2 |
| 47 | SDA      | 2-wire Serial interface data    | LVCMOS- I/O | Bi-directional  | 3 |
| 48 | GND      |                                 | Ground      |                 | 1 |
| 49 | TX7n     | Transmitter Data Inverted       | CML-I       | Input from Host | 3 |
| 50 | TX7p     | Transmitter Data Non-Inverted   | CML-I       | Input from Host | 3 |
| 51 | GND      |                                 | Ground      |                 | 1 |
| 52 | TX5n     | Transmitter Data Inverted       | CML-I       | Input from Host | 3 |
| 53 | TX5p     | Transmitter Data Non-Inverted   | CML-I       | Input from Host | 3 |
| 54 | GND      |                                 | Ground      |                 | 1 |
| 55 | TX3n     | Transmitter Data Inverted       | CML-I       | Input from Host | 3 |
| 56 | TX3p     | Transmitter Data Non-Inverted   | CML-I       | Input from Host | 3 |
| 57 | GND      |                                 | Ground      |                 | 1 |
| 58 | TX1n     | Transmitter Data Inverted       | CML-I       | Input from Host | 3 |
| 59 | TX1p     | Transmitter Data Non-Inverted   | CML-I       | Input from Host | 3 |
| 60 | GND      |                                 | Ground      |                 | 1 |

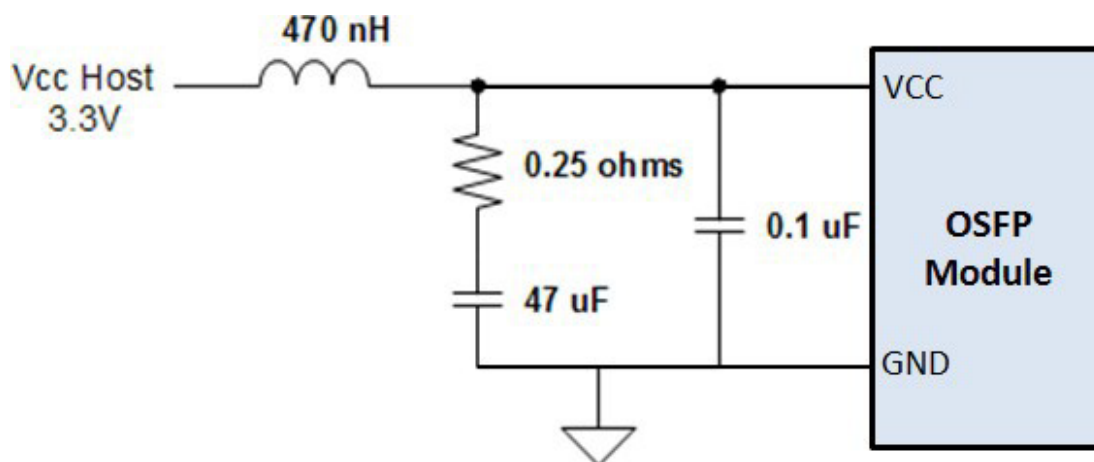
## MSA Compliant Connector



## Voltage Zones



## Recommended Power Supply Filter



Digital Diagnostic Functions

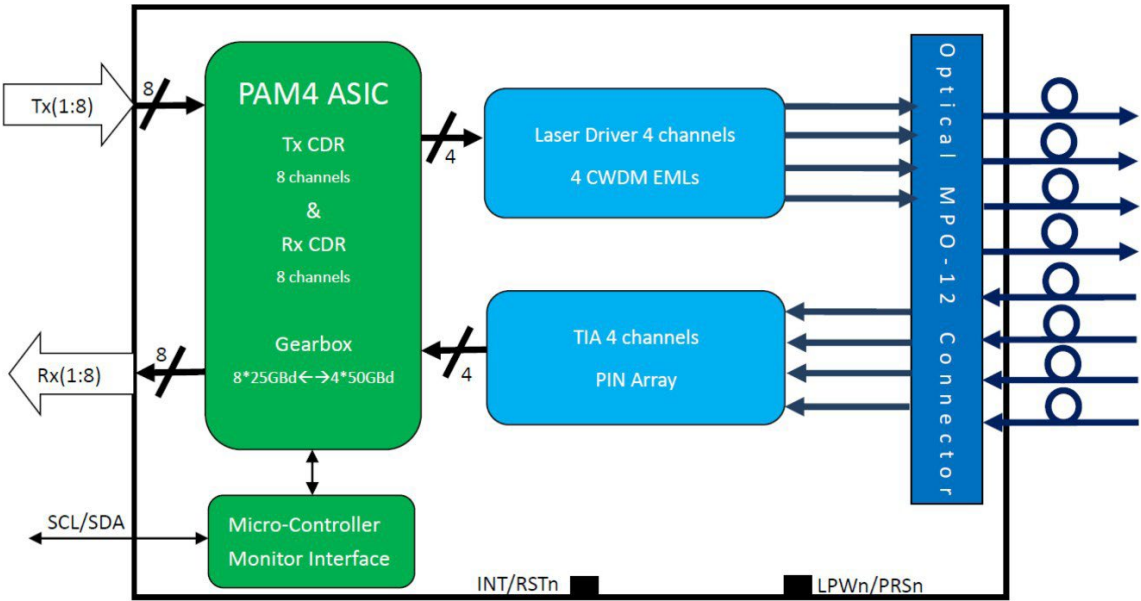
The following digital diagnostic characteristics are defined over the normal operating conditions unless otherwise specified.

| Parameter                               | Symbol       | Min  | Max | Units | Notes                            |
|-----------------------------------------|--------------|------|-----|-------|----------------------------------|
| Temperature monitor absolute error      | DMI_Temp     | -3   | 3   | degC  | Over operating temperature range |
| Supply voltage monitor absolute error   | DMI_VCC      | -0.1 | 0.1 | V     | Over full operating range        |
| Channel RX power monitor absolute error | DMI_RX_Ch    | -2   | 2   | dB    | 1                                |
| Channel Bias current monitor            | DMI_Ibias_Ch | -10% | 10% | mA    |                                  |
| Channel TX power monitor absolute error | DMI_TX_Ch    | -2   | 2   | dB    | 1                                |

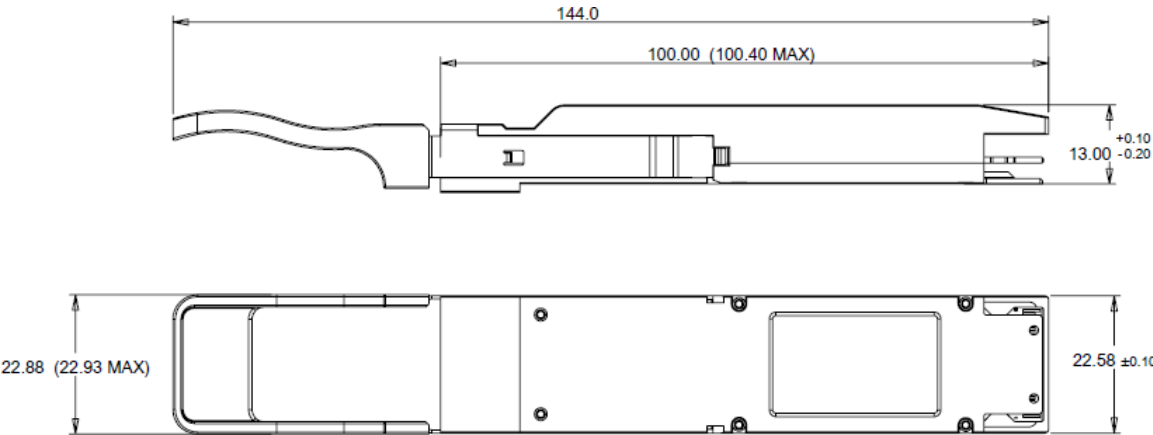
Notes:

- 1. Due to measurement accuracy of different single mode fibers, there could be an additional +/-1 dB fluctuation, or a +/- 3 dB total accuracy.

Transceiver Block Diagram



Mechanical Specifications



# About Skylane Optics

Skylane is a leading provider of transceivers for optical communication.

We offer an extensive portfolio for the enterprise, access, datacenter and metropolitan fiber optical market as well as for smart home applications and home networks.

We cover the European, South American and North American market with a strong partner network and have offices in Belgium, Brazil, Sweden and USA.

Our offerings are characterized by high quality and performance. In combination with our strong technical support, we enable our customers to build cost optimized network solutions.

We offer an extensive range of high-quality products including transceivers (Optical and copper), Active Optical Cable (AOC), Direct Attach Cable (DAC), Mux/Demux, Coding Box.

