

## QFP13C1440PD000

MSA 40GBase-PSM4 QSFP+ Transceiver (SMF, 1310nm, 2km, MPO, DOM)

### Product Description

This MSA Compliant QSFP+ transceiver provides 40GBase-PSM4 throughput up to 2km over single-mode fiber (SMF) using a wavelength of 1310nm via an MPO connector. It is built to MSA standards and is uniquely serialized and data-traffic and application tested to ensure that they will integrate into your network seamlessly. Digital optical monitoring (DOM) support is also present to allow 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:

- SFF-8436 Compliance
- 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:

- 40GBase Ethernet
- Access and Enterprise

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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. | Typ. | Max. | Unit |
|---------------------------|-----------------|------|------|------|------|
| Supply Voltage            | V <sub>CC</sub> | 0    |      | +3.6 | V    |
| Storage Temperature       | T <sub>st</sub> | -40  |      | +85  | °C   |
| Humidity (non-condensing) | Rh              | 5    |      | 85   | %    |

## Recommended Operating Conditions

| Parameter                  | Symbol          | Min.  | Typ. | Max.    | Unit |
|----------------------------|-----------------|-------|------|---------|------|
| Power Supply Voltage       | V <sub>CC</sub> | 3.13  | 3.3  | 3.47    | V    |
| Operating Case Temperature | T <sub>ca</sub> | 0     | 25   | +70     | °C   |
| Data Rate Per Channel      |                 |       |      | 10.3125 | Gbps |
| Power Supply Voltage       | V <sub>CC</sub> | 3.135 | 3.3  | 3.465   | %    |
| Power Supply Current       |                 |       |      | 2.5     | W    |

## Electrical Characteristics

| Parameter                              | Symbol                         | Min.            | Typ. | Max.                  | Unit             | Notes      |
|----------------------------------------|--------------------------------|-----------------|------|-----------------------|------------------|------------|
| Transmitter Differential Input Voltage | V <sub>IN</sub>                | 180             |      | 800                   | mV <sub>pp</sub> |            |
| Receiver Differential Output Voltage   | V <sub>O</sub>                 | 400             | 450  | 850                   | mV <sub>pp</sub> | 1          |
| Loss of Signal (LOS)                   | V <sub>CH</sub>                | 2               |      | V <sub>CC</sub>       | V                | 2          |
|                                        | V <sub>OL</sub>                | V <sub>EE</sub> |      | V <sub>EE</sub> + 0.8 |                  |            |
| Transmitter Disable (TX-Disable)       | V <sub>IH</sub>                | 2               |      | V <sub>CC</sub>       | V                |            |
|                                        | V <sub>IL</sub>                | V <sub>EE</sub> |      | V <sub>EE</sub> + 0.8 |                  |            |
| Rx Output Rise and Fall Time           | T <sub>r</sub> /T <sub>f</sub> | 28              |      |                       | P <sub>s</sub>   | 20% to 80% |

### Notes:

1. SFF-8431, SFP+ Module receiver output specifications at C'.
2. LOS is an open collector output. Should be pulled up with 4.7kΩ – 10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1.

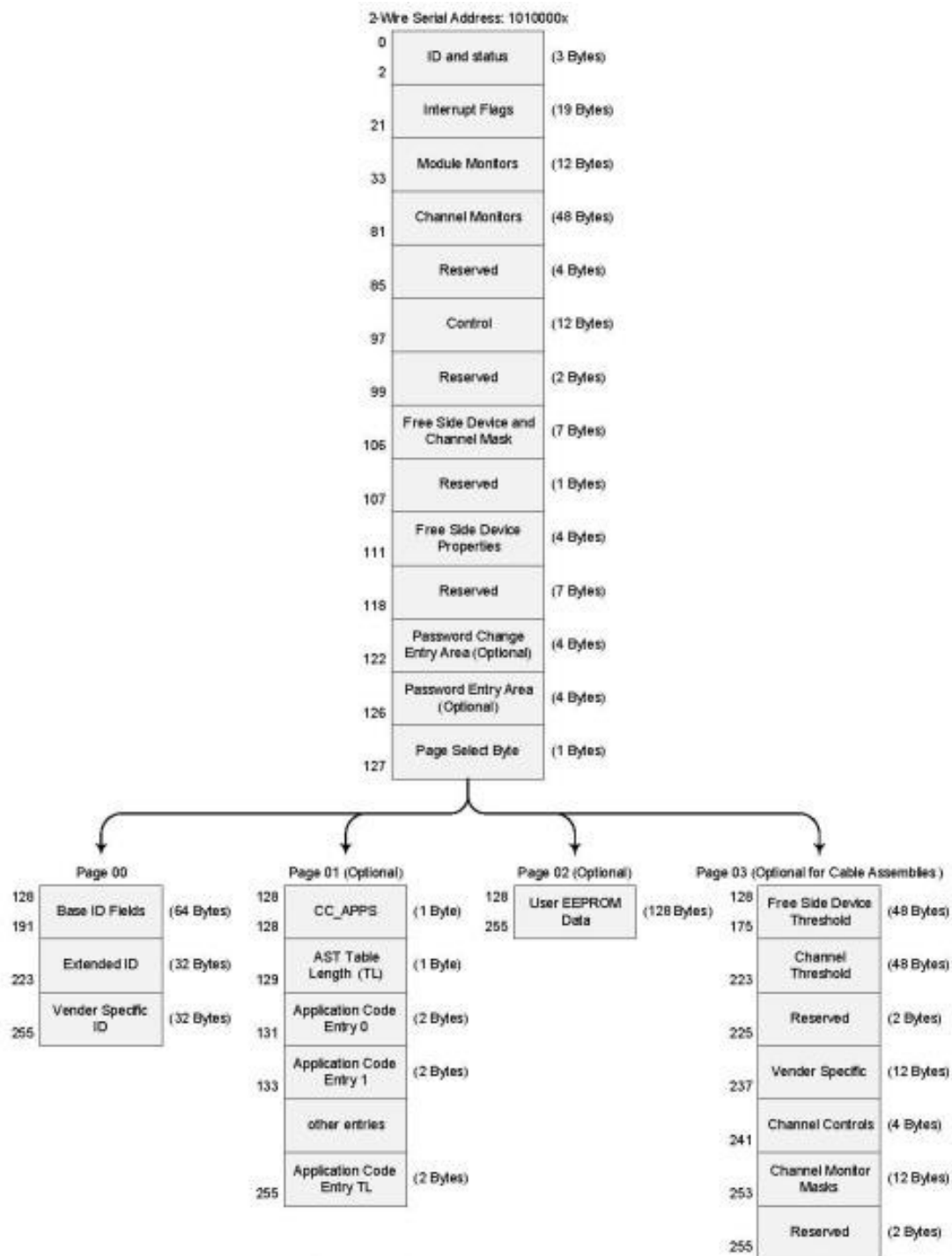
## Optical Characteristics

| Parameter                                          |           | Symbol                                                     | Unit                                | Min.  | Typ. | Max.  | Notes             |
|----------------------------------------------------|-----------|------------------------------------------------------------|-------------------------------------|-------|------|-------|-------------------|
| Transmitter                                        |           |                                                            |                                     |       |      |       |                   |
| Average Launch Power, each lane                    |           | P <sub>o</sub>                                             | dBm                                 | -8.2  |      | +0.5  |                   |
| Center wavelength                                  |           | λ <sub>c</sub>                                             | nm                                  | 1260  |      | 1355  |                   |
| Optical Spectral Width (RMS)                       |           | Δλ                                                         | nm                                  |       |      | 2.5   |                   |
| Extinction ratio                                   |           | ER                                                         | Db                                  | 3.0   |      |       |                   |
| Optical power OMA, each lane                       |           | P <sub>OMA</sub>                                           | dBm                                 | -5.2  |      | +1.5  | 1                 |
| Average launch power of OFF transmitted, each lane |           | P <sub>off</sub>                                           | dBm                                 |       |      | -30   |                   |
| RIN <sub>12</sub> OMA                              |           | RIN                                                        | dB/Hz                               |       |      | -128  |                   |
| Optical return loss tolerance                      |           | ORL <sub>T</sub>                                           | dB                                  | 12    |      |       | 2                 |
| Output eye                                         |           |                                                            | Compliant with IEEE802.3ba eye mask |       |      |       |                   |
| Receiver                                           |           |                                                            |                                     |       |      |       |                   |
| Center Wavelength                                  |           | λ <sub>c</sub>                                             | nm                                  | 1260  |      | 1355  |                   |
| Receiver Overload in OMA, each lane                |           | R <sub>x</sub> OMA                                         | dBm                                 | +1.5  |      |       |                   |
| Receiver Overload in average power, each lane      |           | P <sub>max</sub>                                           | dBm                                 | +0.5  |      |       | 3                 |
| Average receive power, each lane                   |           | R <sub>x</sub> P <sub>x</sub>                              | dBm                                 | -11.5 |      |       | 4                 |
| Receiver Sensitivity in OMA, each lane             |           | Sen <sub>OMA</sub>                                         | dBm                                 |       |      | -9.5  | 5, for 1.0km type |
| Receiver Sensitivity in OMA, each lane             |           | Sen <sub>OMA</sub>                                         | dBm                                 |       |      | -10.5 | 5, for 1.5km type |
| Receiver Crossing                                  |           | RCP                                                        | %                                   | 45    |      | 55    |                   |
| Receiver Eye Mask                                  |           | SFF-8431, SFP+MODULE RECEIVER OUTPUT SPECIFICATIONS AT C'. |                                     |       |      |       |                   |
| Receiver Eye Mask Margin                           |           | REMM                                                       | %                                   | 0     |      |       |                   |
| Receiver Reflectance                               |           | R <sub>rx</sub>                                            | dB                                  |       |      | -12   |                   |
| LOS                                                | Assert    | LOSA                                                       | dBm                                 | -30   |      |       |                   |
|                                                    | De-assert | LOSD                                                       | dBm                                 |       |      | -12   |                   |
| LOS Hysteresis                                     |           | LOSH                                                       | dB                                  | 0.5   |      | 6     |                   |

### Notes:

1. Even if the TDP < 1 dB, the OMA (min) must exceed this value.
2. Transmitter reflectance is defined looking into the transmitter
3. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having a power level equal to the average receive power (max) plus at least 1 dB.
4. Average receive power (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. PRBS 231 -1 at BER 10<sup>-12</sup> , ER=3.0dB

Digital Diagnostic Memory Map



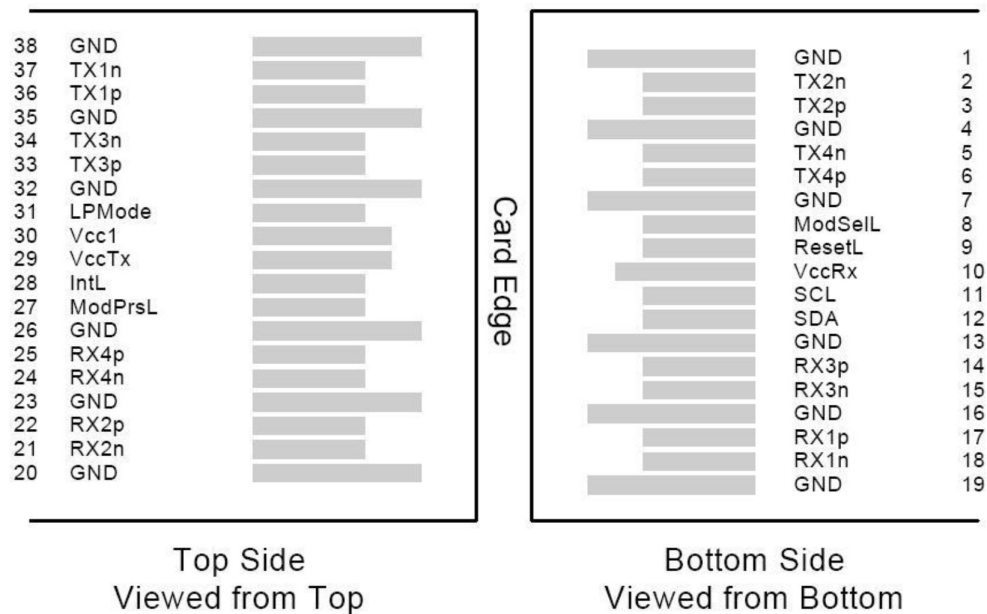
## Pin Descriptions

| Pin | Logic       | Symbol              | Name/Descriptions                                  | Ref. |
|-----|-------------|---------------------|----------------------------------------------------|------|
| 1   |             | GND                 | Module Ground                                      | 1    |
| 2   | CML-I       | Tx2-                | Transmitter inverted data input                    |      |
| 3   | CML-I       | Tx2+                | Transmitter non-inverted data input                |      |
| 4   |             | GND                 | Module Ground                                      | 1    |
| 5   | CML-I       | Tx4-                | Transmitter inverted data input                    |      |
| 6   | CML-I       | Tx4+                | Transmitter non-inverted data input                |      |
| 7   |             | GND                 | Module Ground                                      | 1    |
| 8   | LVTTL-I     | MODSEIL             | Module Select                                      | 2    |
| 9   | LVTTL-I     | ResetL              | Module Reset                                       | 2    |
| 10  |             | VCCR <sub>x</sub>   | +3.3v Receiver Power Supply                        |      |
| 11  | LVC MOS-I   | SCL                 | 2-wire Serial interface clock                      | 2    |
| 12  | LVC MOS-I/O | SDA                 | 2-wire Serial interface data                       | 2    |
| 13  |             | GND                 | Module Ground                                      | 1    |
| 14  | CML-O       | RX3+                | Receiver non-inverted data output                  |      |
| 15  | CML-O       | RX3-                | Receiver inverted data output                      |      |
| 16  |             | GND                 | Module Ground                                      | 1    |
| 17  | CML-O       | RX1+                | Receiver non-inverted data output                  |      |
| 18  | CML-O       | RX1-                | Receiver inverted data output                      |      |
| 19  |             | GND                 | Module Ground                                      | 1    |
| 20  |             | GND                 | Module Ground                                      | 1    |
| 21  | CML-O       | RX2-                | Receiver inverted data output                      |      |
| 22  | CML-O       | RX2+                | Receiver non-inverted data output                  |      |
| 23  |             | GND                 | Module Ground                                      | 1    |
| 24  | CML-O       | RX4-                | Receiver inverted data output                      |      |
| 25  | CML-O       | RX4+                | Receiver non-inverted data output                  |      |
| 26  |             | GND                 | Module Ground                                      | 1    |
| 27  | LVTTL-O     | ModPrsL             | Module Present, internal pulled down to GND        |      |
| 28  | LVTTL-O     | IntL                | Interrupt output should be pulled up on host board | 2    |
| 29  |             | VCCT <sub>x</sub>   | +3.3v Transmitter Power Supply                     |      |
| 30  |             | VCC1                | +3.3v Power Supply                                 |      |
| 31  | LVTTL-I     | LPM <sub>Mode</sub> | Low Power Mode                                     | 2    |
| 32  |             | GND                 | Module Ground                                      | 1    |
| 33  | CML-I       | Tx3+                | Transmitter non-inverted data input                |      |
| 34  | CML-I       | Tx3-                | Transmitter inverted data input                    |      |
| 35  |             | GND                 | Module Ground                                      | 1    |
| 36  | CML-I       | Tx1+                | Transmitter non-inverted data input                |      |
| 37  | CML-I       | Tx1-                | Transmitter inverted data input                    |      |
| 38  |             | GND                 | Module Ground                                      | 1    |

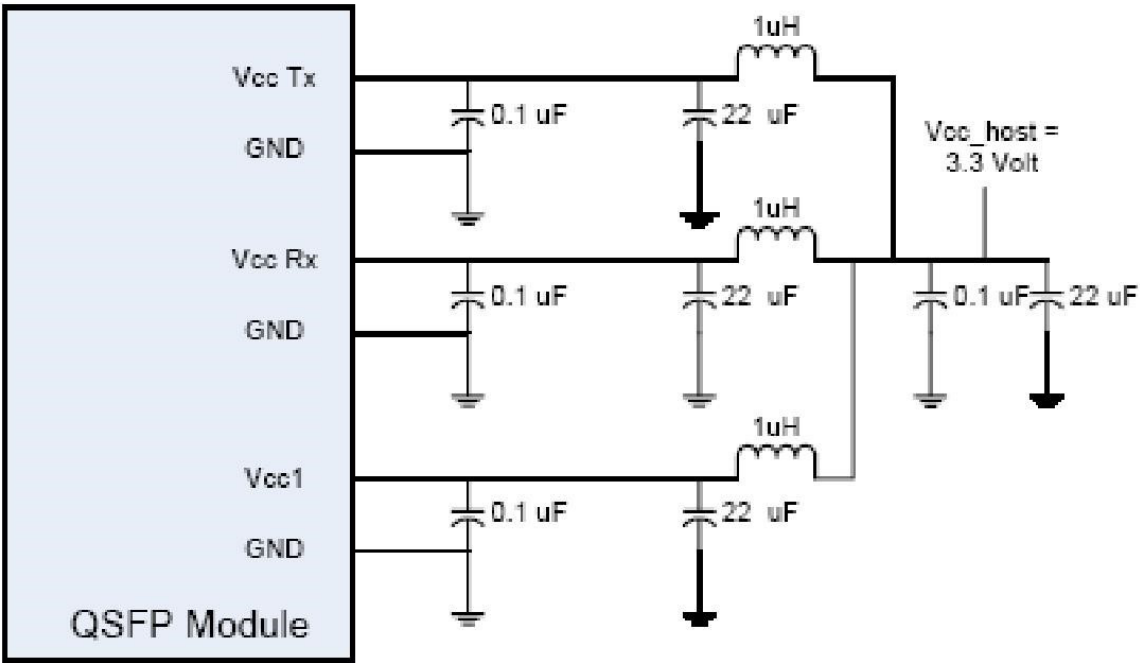
**Notes:**

1. GND is the symbol for signal and supply (power) common for QSFP+ modules. All are common within the QSFP+ module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal common ground plane.
2. VccRx, Vcc1 and VccTx are the receiver and transmitter power suppliers and shall be applied concurrently. Recommended host board power supply filtering is shown in the figure below. Vcc Rx, Vcc1 and VccTx may be internally connected within the QSFP+ transceiver module in any combination. The connector pins are each rated for a maximum current of 500mA.

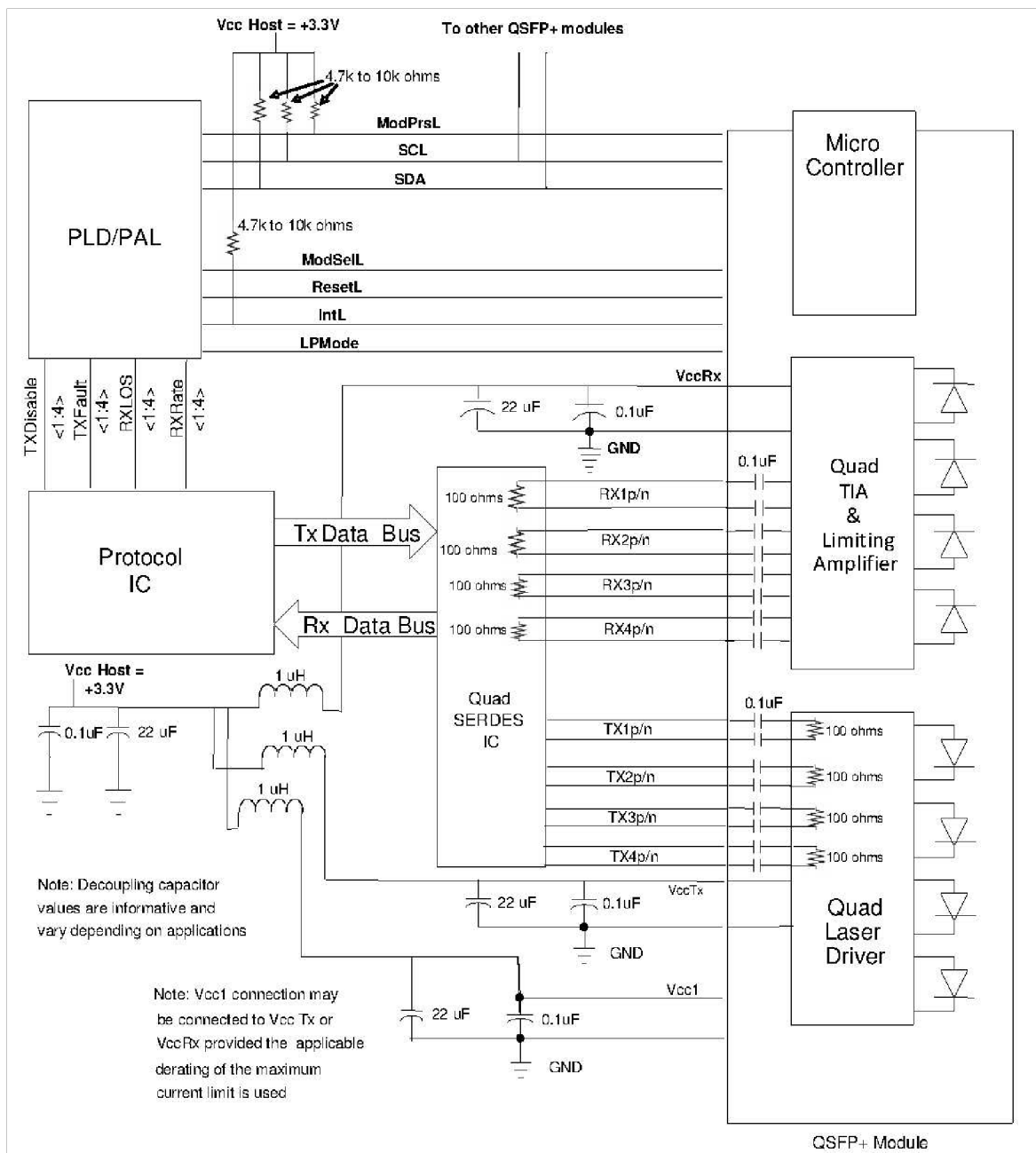
**Electrical Pin-out Details**



Recommended Power Supply Filter

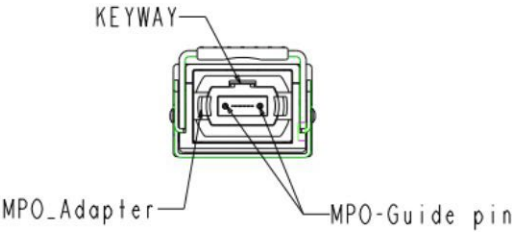
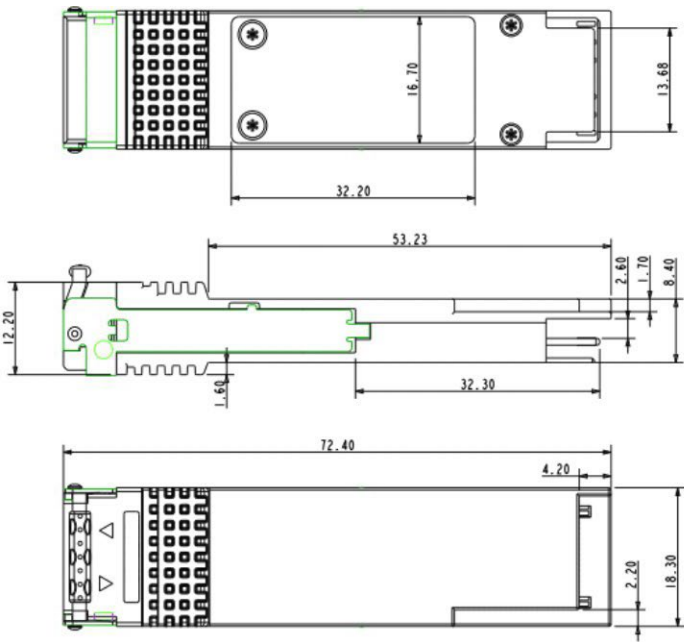


## Typical Application Circuit





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.

