

### **QSFP28-100GB-LR4-20-N2-C**

Alcatel-Lucent Nokia® Compatible TAA 100GBase-LR4 QSFP28 Transceiver (SMF, 1295nm to 1309nm, 20km, LC, DOM)

#### **Features:**

- SFF-8665 Compliance
- Duplex LC Connector
- Single-mode Fiber
- Commercial Temperature 0 to 70 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free



#### **Applications:**

- 100GBase Ethernet

#### **Product Description**

This Alcatel-Lucent Nokia® QSFP28 transceiver provides 100GBase-LR4 throughput up to 20km over single-mode fiber (SMF) using a wavelength of 1295nm to 1309nm via an LC connector. It is guaranteed to be 100% compatible with the equivalent Alcatel-Lucent Nokia® transceiver. This easy to install, hot swappable transceiver has been programmed, uniquely serialized and data-traffic and application tested to ensure that it will initialize and perform identically. Digital optical monitoring (DOM) support is also present to allow access to real-time operating parameters. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

ProLabs' transceivers are RoHS compliant and lead-free.

TAA refers to the Trade Agreements Act (19 U.S.C. & 2501-2581), which is intended to foster fair and open international trade. TAA requires that the U.S. Government may acquire only "U.S. – made or designated country end products."



## Absolute Maximum Ratings

| Parameter                  | Symbol          | Min. | Typ.     | Max. | Unit |
|----------------------------|-----------------|------|----------|------|------|
| Maximum Supply Voltage     | V <sub>CC</sub> | -0.5 |          | 4.0  | V    |
| Storage Temperature        | T <sub>S</sub>  | -40  |          | 85   | °C   |
| Operating Case Temperature | T <sub>C</sub>  | 0    | 25       | 70   | °C   |
| Operating Humidity         | RH              | 5    |          | 95   | %    |
| Data Rate PER Channel      |                 |      | 25.78125 |      | Gb/s |

## Electrical Characteristics

| Parameter                                  | Symbol                | Min.  | Typ. | Max.  | Unit              | Notes |
|--|-----------------------|-------|------|-------|-------------------|-------|
| Power Supply Voltage                       | V <sub>CC</sub>       | 3.135 | 3.3  | 3.465 | V                 |       |
| Power Dissipation                          | PD                    |       |      | 3.5   | W                 |       |
| Module Supply Current                      | I <sub>CC</sub>       |       |      | 1500  | mA                |       |
| Transmitter                                |                       |       |      |       |                   |       |
| Single-ended Input Voltage Tolerance       |                       | -0.3  |      | 4.0   | V                 |       |
| Input Differential Impedance               | Z <sub>IN</sub>       |       | 100  |       | Ω                 |       |
| Differential Data Input Swing              | V <sub>IN, P-P</sub>  | 190   |      | 700   | mV <sub>p-p</sub> |       |
| AC Common Mode Input Voltage Tolerance     |                       | 15    |      |       | mV                |       |
| Differential Input Voltage Swing Threshold |                       | 50    |      |       | mV <sub>pp</sub>  |       |
| Receiver                                   |                       |       |      |       |                   |       |
| Single-ended Output Voltage                |                       | -0.3  |      | 4.0   | V                 |       |
| Output Differential Impedance              | Z <sub>O</sub>        | 90    | 100  | 110   | Ω                 |       |
| Differential Data Output Swing             | V <sub>OUT, P-P</sub> | 300   |      | 850   | mV <sub>p-p</sub> |       |
| AC Common Mode Output Voltage              |                       |       |      | 7.5   | mV                |       |

## Optical Characteristics

| Parameter                                    | Symbol                           | Min.    | Typ.    | Max.    | Unit | Notes |
|--|----------------------------------|---------|---------|---------|------|-------|
| Transmitter                                  |                                  |         |         |         |      |       |
| Launch Optical Power per lane                | P <sub>o</sub>                   | 0       |         | +5      | dBm  | 1     |
| Total Launch Optical Power                   | P <sub>o</sub>                   |         |         | +10.5   | dBm  | 1     |
| Center Wavelength                            | L1                               | 1294.53 | 1295.56 | 1296.59 | nm   |       |
|  | L2                               | 1299.02 | 1300.05 | 1301.09 | nm   |       |
|  | L3                               | 1303.54 | 1304.58 | 1305.63 | nm   |       |
|  | L4                               | 1308.09 | 1309.14 | 1310.19 | nm   |       |
| Extinction Ratio                             | EX                               | 4.0     |         |         | dB   | 2     |
| Spectral width (-20dB)                       | Δλ                               |         |         | 1       | nm   |       |
| Side Mode Suppression Ratio                  | SMSR                             | 30      |         |         | dB   |       |
| Optical Return Loss Tolerance                | ORLT                             |         |         | 20      | dB   |       |
| P <sub>out</sub> @TX-Disable Asserted        | P <sub>off</sub>                 |         |         | -30     | dBm  | 1     |
| Eye mask definitions: X1, X2, X3, Y1, Y2, Y3 | 0.25, 0.4, 0.45, 0.25, 0.28, 0.4 |         |         |         |      |       |
| Receiver                                     |                                  |         |         |         |      |       |
| Center Wavelength                            | L1                               | 1294.53 | 1295.56 | 1296.59 | nm   |       |
|  | L2                               | 1299.02 | 1300.05 | 1301.09 | nm   |       |
|  | L3                               | 1303.54 | 1304.58 | 1305.63 | nm   |       |
|  | L4                               | 1308.09 | 1309.14 | 1310.19 | nm   |       |
| Sensitivity per Channel (OMA)                | S                                |         |         | -9.0    | dBm  | 3     |
| Overload (each channel)                      | POL                              | 5.0     |         |         | dBm  | 3     |
| Damage Threshold (each channel)              | POL                              | 5.5     |         |         | dBm  |       |
| Optical Return Loss                          | ORL                              | 26      |         |         | dB   |       |
| LOS De-Assert                                | LOSD                             |         |         | -11.6   | dBm  |       |
| LOS Assert                                   | LOSA                             | -24     |         |         | dBm  |       |
| LOS Hysteresis                               |                                  | 0.5     |         |         | dB   |       |

### Notes:

1. The optical power is launched into SMF.
2. Measured with a PRBS 231-1 test pattern @25.78125Gbps.
3. Measured with PRBS 231-1 test pattern, 25.78125Gb/s.

## Pin Descriptions

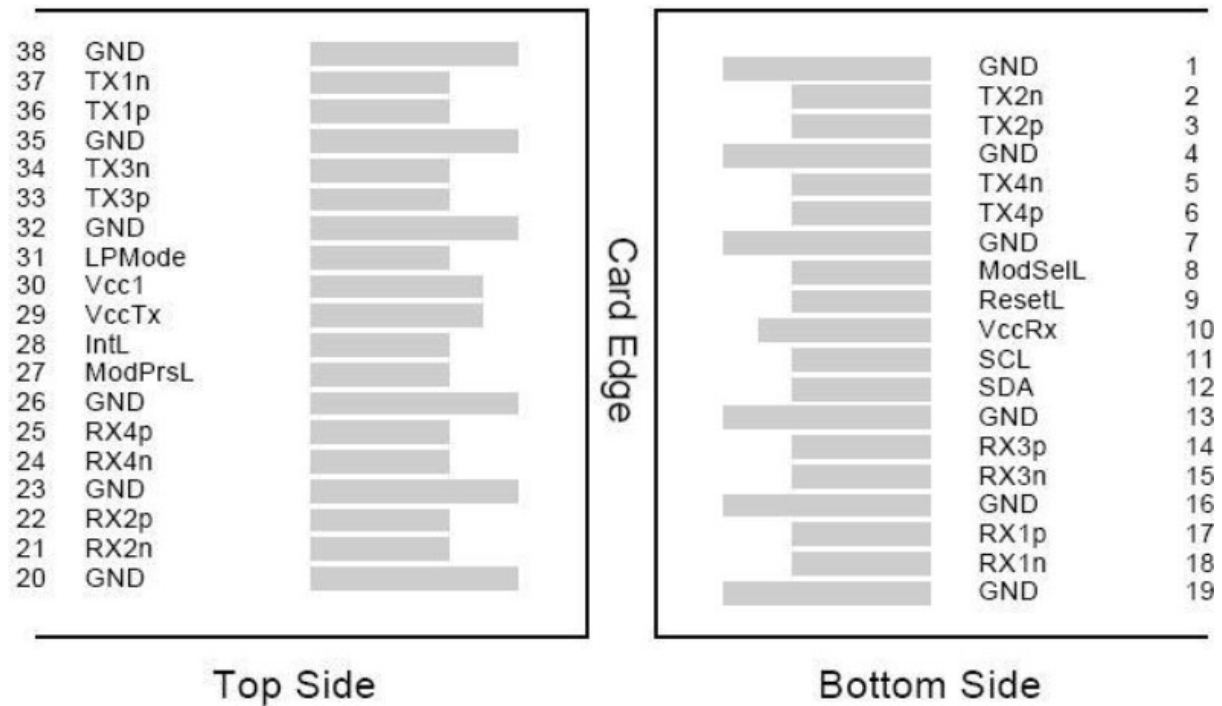
| Pin | Symbol  | Name/Descriptions                                | Ref. |
|-----|---------|--|------|
| 1   | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 2   | Tx2-    | Transmitter Inverted Data Input                  |      |
| 3   | Tx2+    | Transmitter Non-Inverted Data output             |      |
| 4   | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 5   | Tx4-    | Transmitter Inverted Data Input                  |      |
| 6   | Tx4+    | Transmitter Non-Inverted Data output             |      |
| 7   | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 8   | ModSelL | Module Select                                    | 2    |
| 9   | ResetL  | Module Reset                                     | 2    |
| 10  | VccRx   | 3.3V Power Supply Receiver                       |      |
| 11  | SCL     | 2-Wire serial Interface Clock                    | 2    |
| 12  | SDA     | 2-Wire serial Interface Data                     | 2    |
| 13  | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 14  | Rx3+    | Receiver Non-Inverted Data Output                |      |
| 15  | Rx3-    | Receiver Inverted Data Output                    |      |
| 16  | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 17  | Rx1+    | Receiver Non-Inverted Data Output                |      |
| 18  | Rx1-    | Receiver Inverted Data Output                    |      |
| 19  | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 20  | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 21  | Rx2-    | Receiver Inverted Data Output                    |      |
| 22  | Rx2+    | Receiver Non-Inverted Data Output                |      |
| 23  | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 24  | Rx4-    | Receiver Inverted Data Output                    | 1    |
| 25  | Rx4+    | Receiver Non-Inverted Data Output                |      |
| 26  | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 27  | ModPrsl | Module Present                                   |      |
| 28  | IntL    | Interrupt  | 2    |
| 29  | VccTx   | 3.3V power supply transmitter                    |      |
| 30  | Vcc1    | 3.3V power supply                                |      |
| 31  | LPMode  | Low Power Mode                                   | 2    |
| 32  | GND     | Transmitter Ground (Common with Receiver Ground) | 1    |
| 33  | Tx3+    | Transmitter Non-Inverted Data Input              |      |
| 34  | Tx3-    | Transmitter Inverted Data Output                 |      |

|    |      |  |   |
|----|------|--|---|
| 35 | GND  | Transmitter Ground (Common with Receiver Ground) | 1 |
| 36 | Tx1+ | Transmitter Non-Inverted Data Input              |   |
| 37 | Tx1- | Transmitter Inverted Data Output                 |   |
| 38 | GND  | Transmitter Ground (Common with Receiver Ground) | 1 |

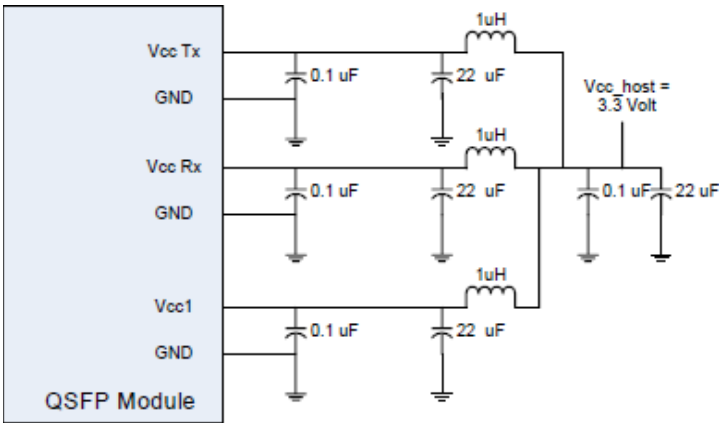
**Notes:**

1. The module signal grounds are isolated from the module case.
2. This is an open collector/drain output that on the host board requires a 4.7KΩ to 10KΩ pull-up resistor to VccHost.

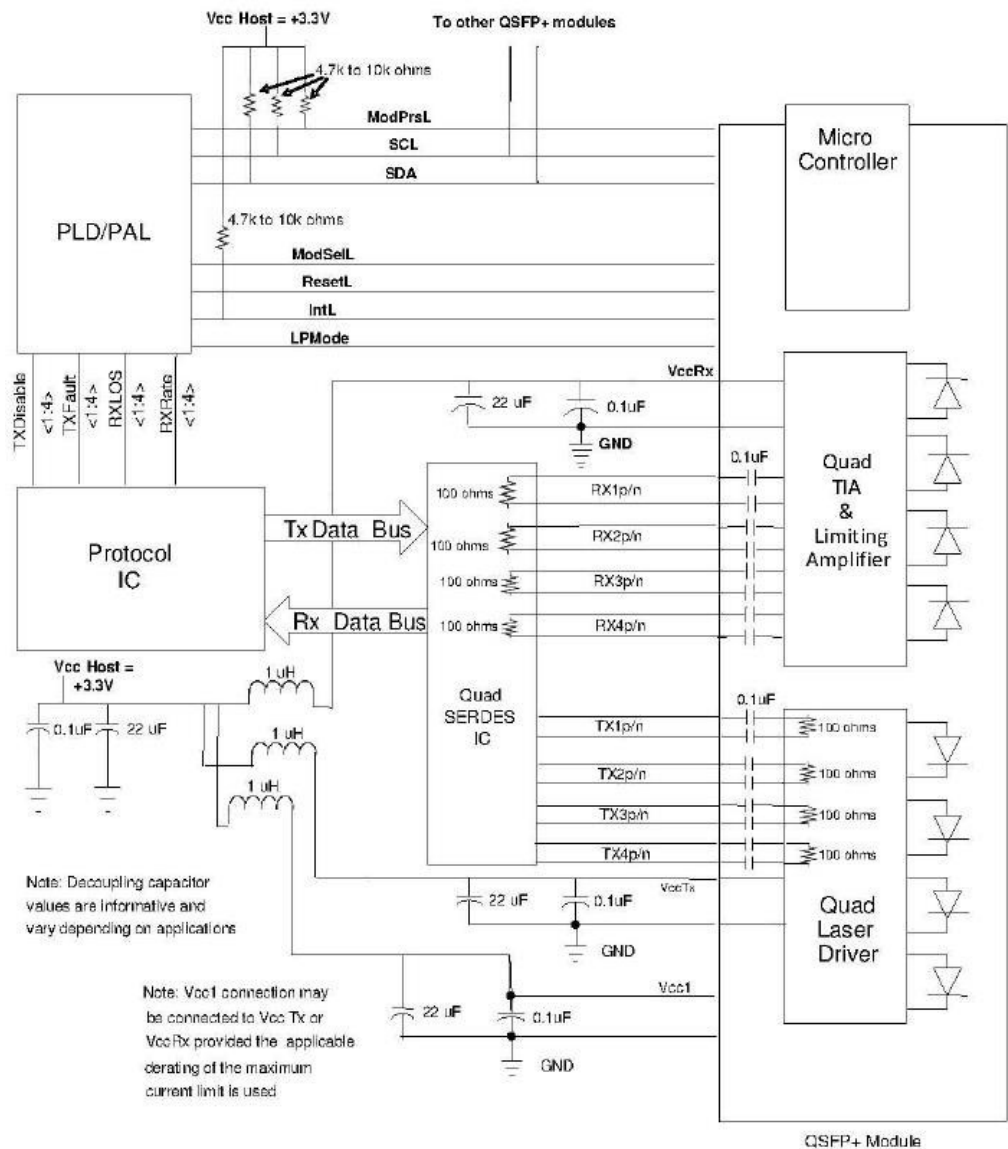
**Electrical Pin-out Details**



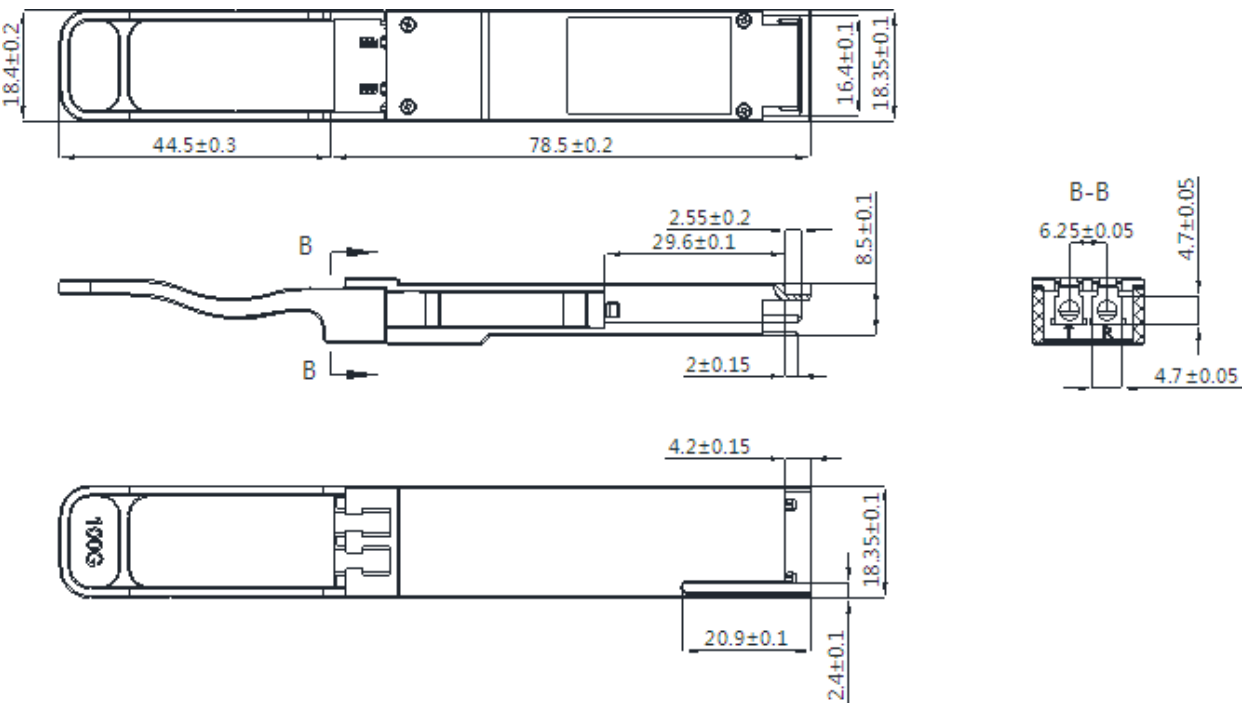
Recommended Host Board Power Supply Filter Network



Recommended Application Interface Block Diagram



Mechanical Specifications





## About ProLabs

Our experience comes as standard; for over 15 years ProLabs has delivered optical connectivity solutions that give our customers freedom and choice through our ability to provide seamless interoperability. At the heart of our company is the ability to provide state-of-the-art optical transport and connectivity solutions that are compatible with over 90 optical switching and transport platforms.

## Complete Portfolio of Network Solutions

ProLabs is focused on innovations in optical transport and connectivity. The combination of our knowledge of optics and networking equipment enables ProLabs to be your single source for optical transport and connectivity solutions from 100Mb to 400G while providing innovative solutions that increase network efficiency. We provide the optical connectivity expertise that is compatible with and enhances your switching and transport equipment.

## Trusted Partner

Customer service is our number one value. ProLabs has invested in people, labs and manufacturing capacity to ensure that you get immediate answers to your questions and compatible product when needed. With Engineering and Manufacturing offices in the U.K. and U.S. augmented by field offices throughout the U.S., U.K. and Asia, ProLabs is able to be our customers best advocate 24 hours a day.



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