

### **Q28-100GP4-BXD3129-20-N-OPC**

Alcatel-Lucent Nokia® Compatible TAA 100GBase-BX LR1 PAM4 QSFP28 Transceiver Single Lambda (SMF, 1311nmTx/1291nmRx, 20km, LC, DOM)

#### **Features**

- Compliant with QSFP28 MSA
- Compliant with SFF-8636 Rev 2.10a
- Supports 100Gbps
- Single 3.3V Power Supply
- 4x25G Electrical Interface Compliant with OIF CEI-28G-VSR
- Bidi LC Connectors
- Single-mode Fiber
- Commercial Temperature 0 to 70 Celsius
- RoHS Compliant and Lead Free



#### **Applications:**

- 100GBase Ethernet
- Datacenter

#### **Product Description**

This Alcatel-Lucent Nokia® compatible QSFP28 transceiver provides 100GBase-BX LR1 throughput up to 20km over single-mode fiber (SMF) PAM4 using a wavelength of 1311nmTx/1291nmRx via an LC connector. This bidirectional unit must be used with another transceiver or network appliance of complementing wavelengths. 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 Alcatel-Lucent Nokia®. 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.

## Absolute Maximum Ratings

| Parameter                   | Symbol             | Min.  | Typ. | Max.  | Unit |
|-----------------------------|--------------------|-------|------|-------|------|
| Power Supply Voltage        | V <sub>CC</sub>    | 3.135 | 3.3  | 3.465 | V    |
| Supply Voltage              | V <sub>CC</sub>    | -0.5  |      | 3.6   | V    |
| Storage Temperature         | T <sub>stg</sub>   | -40   |      | 85    | °C   |
| Operating Case Temperature  | T <sub>c</sub>     | 0     |      | 70    | °C   |
| Operating Relative Humidity | RH                 | 5     |      | 85    | %    |
| Damage Threshold            | R <sub>x</sub> dmg | 7.6   |      |       | dBm  |
| Power Dissipation           | P <sub>DISS</sub>  |       |      | 4.5   | W    |

### Notes:

1. Exceeding any one of these values may damage the device permanently.
2. Power Supply Specifications, Instantaneous, Sustained, and Steady State Current are compliant with QSFP28 MSA Power Classification.

## Electrical Characteristics

| Parameter                                 | Symbol                         | Min. | Typ. | Max. | Unit  | Notes                   |
|-------------------------------------------|--------------------------------|------|------|------|-------|-------------------------|
| <b>Transmitter</b>                        |                                |      |      |      |       |                         |
| Differential Data Input Swing Per Lane    |                                | 900  |      |      | mVp-p |                         |
| Differential Input Impedance              | Z <sub>IN</sub>                | 90   | 100  | 110  | Ω     |                         |
| DC Common-Mode Voltage (V <sub>cm</sub> ) |                                | -350 |      | 2850 | mV    |                         |
| <b>Receiver</b>                           |                                |      |      |      |       |                         |
| Differential Output Amplitude             |                                |      |      | 900  | mVp-p |                         |
| Differential Output Impedance             | Z <sub>OUT</sub>               | 90   | 100  | 110  | Ω     |                         |
| Output Rise/Fall Time                     | T <sub>r</sub> /T <sub>f</sub> | 12   |      |      | ps    | 20-80%                  |
| Eye Width                                 |                                | 0.57 |      |      | UI    |                         |
| Eye Height Differential                   |                                | 228  |      |      | mV    | @TP4, 1E <sup>-15</sup> |
| DC Common-Mode Voltage (V <sub>cm</sub> ) |                                | -350 |      | 2850 | mV    | 1                       |

### Notes:

1. V<sub>cm</sub> is generated by the host. Specification includes effects of ground offset voltage.

## Optical Characteristics

| Parameter                                    | Symbol      | Min.      | Typ.   | Max.               | Unit | Notes |
|----------------------------------------------|-------------|-----------|--------|--------------------|------|-------|
| <b>Transmitter</b>                           |             |           |        |                    |      |       |
| Signaling Speed                              |             |           | 53.125 |                    | GBd  |       |
| Modulation Format                            |             | PAM4      |        |                    |      |       |
| Center Wavelength                            | $\lambda_C$ | 1304.5    | 1311   | 1317.5             | nm   |       |
| Side-Mode Suppression Ratio                  | SMSR        | 30        |        |                    | dB   |       |
| Extinction Ratio                             | ER          | 3.5       |        |                    | dB   |       |
| Transmit OMA for TDECQ<1.4dB                 | TxOMA       | 2.8       |        | 6.8                | dBm  |       |
| Transmit OMA for 1.4dB<TDECQ<TDECQ (Maximum) | TxOMA       | 1.4+TDECQ |        | 6.8                | dBm  |       |
| Transmit Average Power                       | TxAVG       | -0.2      |        | 6.6                | dBm  | 1     |
| Transmitter and Dispersion Eye Closure       | TDECQ       |           |        | 3.6                | dB   |       |
| Optical Return Loss Tolerance                |             |           |        | 15.6               | dB   | 2     |
| <b>Receiver</b>                              |             |           |        |                    |      |       |
| Signaling Speed                              |             |           | 53.125 |                    | GBd  |       |
| Center Wavelength                            | $\lambda_C$ | 1284.5    | 1291   | 1297.5             | nm   |       |
| Damage Threshold                             |             | 7.6       |        |                    | dBm  |       |
| Receive Power (OMA <sub>outer</sub> )        | RxOMA       |           |        | 6.8                | dBm  |       |
| Average Receive Power                        | RxAVG       | -10       |        | 6.6                | dBm  |       |
| Receiver Sensitivity (OMA <sub>outer</sub> ) | SenOMA      |           |        | MAX (-7.6, SECQ-9) | dBm  | 3     |
| Receiver Reflectance                         |             |           |        | -26                | dB   |       |
| LOS Assert                                   | LOSA        | -15       |        |                    | dBm  |       |
| LOS De-Assert                                | LOSD        |           |        | -12                | dBm  |       |
| LOS Hysteresis                               |             | 0.5       |        |                    | dB   |       |

### Notes:

1. Average launch power (minimum) 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. Transmitter reflectance is defined looking into the transmitter.
3. Sensitivity is specified at  $2.4 \times 10^{-4}$  BER.

## Pin Descriptions

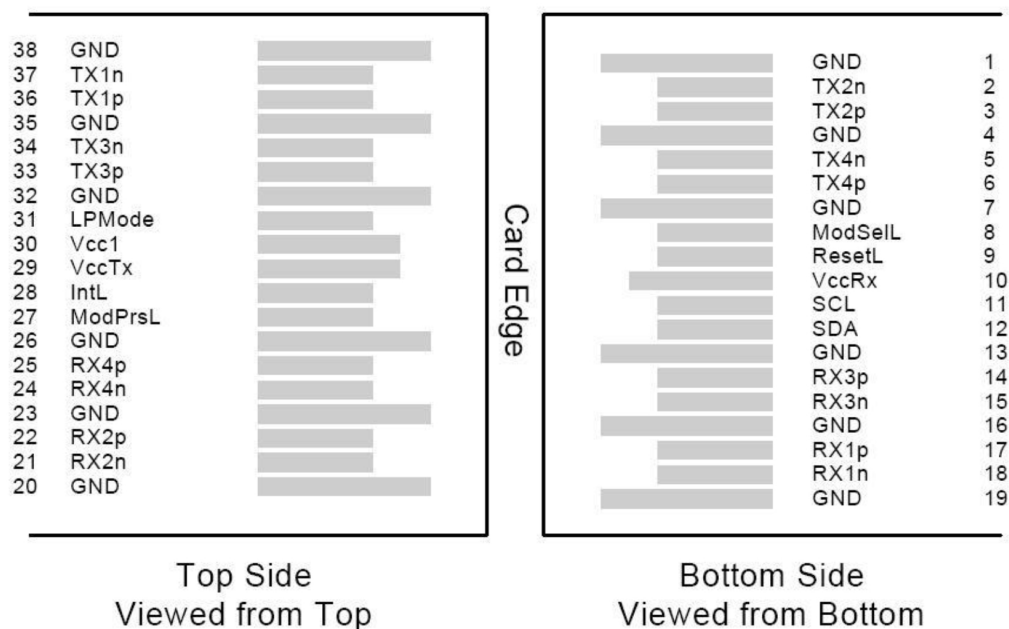
| Pin | Logic       | Symbol       | Name/Description                                                                          | Notes |
|-----|-------------|--------------|-------------------------------------------------------------------------------------------|-------|
| 1   |             | GND          | Module Ground.                                                                            | 1     |
| 2   | CML-I       | Tx2-         | Transmitter Inverted Data Input.                                                          |       |
| 3   | CML-I       | Tx2+         | Transmitter Non-Inverted Data Output.                                                     |       |
| 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   | LVTLL-I     | ModSelL      | Module Select.                                                                            |       |
| 9   | LVTLL-I     | ResetL       | Module Reset.                                                                             |       |
| 10  |             | VccRx        | +3.3V Receiver Power Supply.                                                              | 2     |
| 11  | LVC MOS-I/O | SCL          | 2-Wire Serial Interface Clock.                                                            |       |
| 12  | LVC MOS-I/O | SDA          | 2-Wire Serial Interface Data.                                                             |       |
| 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.                                                            | 1     |
| 25  | CML-O       | Rx4+         | Receiver Non-Inverted Data Output.                                                        |       |
| 26  |             | GND          | Module Ground.                                                                            | 1     |
| 27  | LVTTL-O     | ModPrsL      | Module Present.                                                                           |       |
| 28  | LVTTL-O     | IntL/RxLOSL  | Interrupt. Optionally configurable as RxLOSL via the management interface (SFF-8636).     |       |
| 29  |             | VccTx        | +3.3V Transmitter Power Supply.                                                           | 2     |
| 30  |             | Vcc1         | +3.3V Power Supply.                                                                       | 2     |
| 31  | LVTTL-I     | LPMode/TxDis | Low-Power Mode. Optionally configurable as TxDis via the management interface (SFF-8636). |       |
| 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 QSFP28 modules. All are common within the QSFP28 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 supplies and shall be applied concurrently. VccRx, Vcc1, and VccTx may be internally connected within the QSFP28 transceiver module in any combination. The connector pins are each rated for a maximum current of 1000mA.

#### Electrical Pin-Out Details



Mechanical Specifications

