**QSFP-100GB-DW41-N1-AO**

Alcatel-Lucent Nokia® Compatible TAA 100GBase-DWDM PAM4 QSFP28 Transceiver Single Lambda C-Band (SMF, 1544.53nm, 80km w/EDFA/DCM, LC, DOM)

**Features:**

- SFF-8636 MSA Compliance
- 100GHz DWDM ITU Grid
- Duplex LC Connector
- Commercial Temperature 0 to 70 Celsius
- PAM4 optical signal with integrated FEC
- Single-mode Fiber
- Metal with Lower EMI
- Hot Pluggable
- RoHS Compliant and Lead Free
- Excellent ESD Protection



**Applications:**

- 100GBase Ethernet
- Access, Metro and Enterprise

**Product Description**

This Alcatel-Lucent Nokia® compatible QSFP28 transceiver provides 100GBase-DWDM throughput up to 80km over single-mode fiber (SMF) PAM4 using a wavelength of 1544.53nm via an LC 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 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. This transceiver is Trade Agreements Act (TAA) compliant. We stand behind the quality of our products and proudly offer a limited lifetime warranty.

AddOn's 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."

**Regulatory Compliance**

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.4
- ESD to the LC Receptacle: compatible with IEC 61000-4-3
- EMI/EMC compatible with FCC Part 15 Subpart B Rules, EN55022:2010
- Laser Eye Safety compatible with FDA 21CFR, EN60950-1& EN (IEC) 60825-1,2
- RoHS compliant with EU RoHS 2.0 directive 2015/863/EU

**Wavelength Guide (100GHz ITU-T Channel)**

| Channel # | Frequency (GHz) | Center Wavelength (nm) | Channel # | Frequency (GHz) | Center Wavelength (nm) |
|---|---|---|---|---|---|
| **21** | 192.1 | 1560.61 | **41** | 194.1 | 1544.53 |
| **22** | 192.2 | 1559.79 | **42** | 194.2 | 1543.73 |
| **23** | 192.3 | 1558.98 | **43** | 194.3 | 1542.94 |
| **24** | 192.4 | 1558.17 | **44** | 194.4 | 1542.14 |
| **25** | 192.5 | 1557.36 | **45** | 194.5 | 1541.35 |
| **26** | 192.6 | 1556.55 | **46** | 194.6 | 1540.56 |
| **27** | 192.7 | 1555.75 | **47** | 194.7 | 1539.77 |
| **28** | 192.8 | 1554.94 | **48** | 194.8 | 1538.98 |
| **29** | 192.9 | 1554.13 | **49** | 194.9 | 1538.19 |
| **30** | 193.0 | 1553.33 | **50** | 195.0 | 1537.40 |
| **31** | 193.1 | 1552.52 | **51** | 195.1 | 1536.61 |
| **32** | 193.2 | 1551.72 | **52** | 195.2 | 1535.82 |
| **33** | 193.3 | 1550.92 | **53** | 195.3 | 1535.04 |
| **34** | 193.4 | 1550.12 | **54** | 195.4 | 1534.25 |
| **35** | 193.5 | 1549.32 | **55** | 195.5 | 1533.47 |
| **36** | 193.6 | 1548.51 | **56** | 195.6 | 1532.68 |
| **37** | 193.7 | 1547.72 | **57** | 195.7 | 1531.90 |
| **38** | 193.8 | 1546.92 | **58** | 195.8 | 1531.12 |
| **39** | 193.9 | 1546.12 | **59** | 195.9 | 1530.33 |
| **40** | 194.0 | 1545.32 | **60** | 196.0 | 1529.55 |

**Absolute Maximum Ratings**

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|---|---|---|---|---|---|
| **Storage Temperature (case)** | $T_S$ | -40 | | 85 | ˚C |
| **Operating Case Temperature** | $T_{op}$ | 0 | 25 | 70 | V |
| **Supply Voltage** | $V_{CC}$ | 0 | | 3.6 | V |
| **Relative Humidity (non-condensing)** | RH | 5 | | 85 | % |
| **Optical Receiver Damage Threshold** | Rxdmg | 5 | | | dBm |
| **ESD Sensitivity** | | 500 | | | V |

**Electrical Characteristics**

The host 4x25.78 Gbps electrical interface complies with the CAUI-4 standard.

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| **Data Rate per Lane (host side)** | $BR_{avg}$ | | 25.78125 | | Gbps | |
| **Data Rate Variation** | | -100 | | 100 | ppm | |
| **Power Supply Voltage** | $V_{CC}$ | 3.135 | 3.3 | 3.47 | V | |
| **Power Consumption** | PD | | 4.7 | 5.5 | W | |
| **Transmitter** | | | | | | |
| **Input Swing (Differential)** | $V_{in}$ | | | 900 | mVpp | AC coupled |
| **Input Impedance (Differential)** | $Z_{in}$ | 90 | 100 | 110 | Ohm | |
| **Receiver** | | | | | | |
| **Output Swing (Differential)** | $V_{out}$ | | | 900 | mVpp | AC coupled |
| **Output Impedance (Differential)** | $Z_{out}$ | 90 | 100 | 110 | Ohm | |
| **Low Speed Signals** | | | | | | |
| **LPMode, Reset, ModSel** | VIL | -0.3 | | 0.8 | V | |
| | VIH | 2 | | $V_{CC}$+0.3 | V | |
| **ModPrs, Int** | VOL | 0 | | 0.4 | V | IOL = 2.0mA |
| | VOH | $V_{CC}$-0.5 | | $V_{CC}$+0.3 | V | |
| **SCL, SDA** | VIL | -0.3 | | 0.3*$V_{CC}$ | V | |
| | VIH | 0.7*$V_{CC}$ | | $V_{CC}$+0.5 | V | |
| **SCL, SDA** | VOL | 0 | | 0.4 | V | $IOL_{max}$ = 3.0mA |
| | VOH | $V_{CC}$-0.5 | | $V_{CC}$+0.3 | V | |

**Optical Characteristics**

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Notes |
|---|---|---|---|---|---|---|
| **Data Rate** | BR | 103.125 | | | Gbps | 1 |
| **Data Rate Variation** | | -100 | | 100 | ppm | |
| **Transmitter** | | | | | | |
| **Central Wavelength** | $\lambda_C$ | 1527 | $\lambda$ | 1567 | nm | |
| **Central Wavelength Stability** | | $\lambda_C$-0.1 | | $\lambda_C$+0.1 | nm | |
| **Average Output Optical Power** | $P_0$ | -2 | -0.5 | 2 | dBm | 5 |
| **Optical Extinction Ratio (outer)** | ER | 6 | | | dB | |
| **Optical Output Power, TX: OFF** | $P_{off}$ | | | -30 | dBm | |
| **TX Reflectance** | | | | -26 | dB | |
| **Receiver** | | | | | | |
| **Operating Wavelength** | | 1527 | | 1567 | nm | |
| **RX Sensitivity, Avg Power** | $RX_{sens}$ | | -9 | -8 | dBm | 2, 5 |
| **RX Overload, Avg Power** | $RX_{sat}$ | 4 | | | dBm | 2 |
| **RX Damage Threshold** | $RX_{dmg}$ | 4 | | | dBm | |
| **RX Sensitivity, Avg Power at OSNR 32dB/0.1nm** | | | | -7 | dBm | 3, 5 |
| **Dispersion Tolerance** | | -30 | | +30 | ps/nm | 4, 5 |
| **RX Reflectance** | | | | -26 | dB | |
| **LOS Assert** | LOSA | -15 | | | dBm | |
| **LOS De-Assert** | LOSD | | | -10.5 | dBm | |
| **LOS Hysteresis** | | | 1 | | dB | |

**Notes:**

1. The raw data rate is minimum 103.125 Gbps, when FEC code is added, the actual optical signal data rate is higher.
2. Rx average power sensitivity and overload are for post-FEC BER < 1E-15 with integrated FEC without dispersion and noise load at BOL.
3. Rx average power sensitivity at OSNR 32dB is for post-FEC BER < 1E-15 with integrated FEC without dispersion at OSNR 32dB/0.1nm at BOL. A 100GHz spacing DWDM filter with enough bandwidth should be used to remove the extra noises of the optical signal with noises for the RX test.
4. Dispersion tolerance is for dispersion values that cause Rx OSNR penalty less than 2 dB when compared with no dispersion at RX power -6 dBm and PRBS15 signal at BER 2e-3 at the operating data rate at BOL. A 100GHz spacing DWDM filter with enough bandwidth should be used to remove the extra noises of the optical signal with noises for the RX BER test.
5. The Average output optical power, RX sensitivity, RX sensitivity at OSNR 32dB/0.1nm, and Dispersion tolerance parameters are specified for beginning of life (BOL) over the operating temperature with clean fiber connectors.

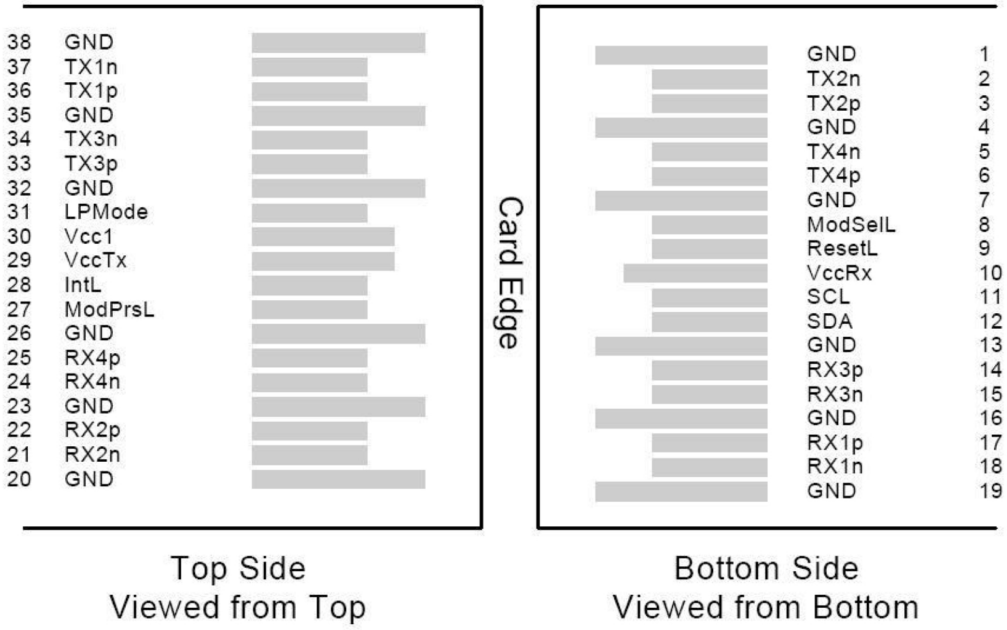
**Pin Descriptions**

| Pin | Logic | Symbol | Name/Descriptions | Plug Sequence | Ref. |
|---|---|---|---|---|---|
| **1** | | GND | Ground | 1 | 1 |
| **2** | CML-I | Tx2n | Transmitter Inverted Data Input | 3 | |
| **3** | CML-I | Tx2p | Transmitter Non-Inverted Data Input | 3 | |
| **4** | | GND | Ground | 1 | 1 |
| **5** | CML-I | Tx4n | Transmitter Inverted Data Input | 3 | |
| **6** | CML-I | Tx4p | Transmitter Non-Inverted Data Input | 3 | |
| **7** | | GND | Ground | 1 | 1 |
| **8** | LVTTL-I | ModSelL | Module Select | 3 | |
| **9** | LVTTL-I | ResetL | Module Reset | 3 | |
| **10** | | VccRx | +3.3V Power Supply Receiver | 2 | 2 |
| **11** | LVCMOS- I/O | SCL | 2-wire serial interface clock | 3 | |
| **12** | LVCMOS- I/O | SDA | 2-wire serial interface data | 3 | |
| **13** | | GND | Ground | 1 | 1 |
| **14** | CML-O | Rx3p | Receiver Non-Inverted Data Output | 3 | |
| **15** | CML-O | Rx3n | Receiver Inverted Data Output | 3 | |
| **16** | | GND | Ground | 1 | 1 |
| **17** | CML-O | Rx1p | Receiver Non-Inverted Data Output | 3 | |
| **18** | CML-O | Rx1n | Receiver Inverted Data Output | 3 | |
| **19** | | GND | Ground | 1 | 1 |
| **20** | | GND | Ground | 1 | 1 |
| **21** | CML-O | Rx2n | Receiver Inverted Data Output | 3 | |
| **22** | CML-O | Rx2p | Receiver Non-Inverted Data Output | 3 | |
| **23** | | GND | Ground | 1 | 1 |
| **24** | CML-O | Rx4n | Receiver Inverted Data Output | 3 | |
| **25** | CML-O | Rx4p | Receiver Non-Inverted Data Output | 3 | |
| **26** | | GND | Ground | 1 | 1 |
| **27** | LVTTL-O | ModPrsL | Module Present | 3 | |
| **28** | LVTTL-O | IntL/RX_LOS | Interrupt | 3 | 3 |
| **29** | | VccTx | +3.3V Power supply transmitter | 2 | 2 |
| **30** | | Vcc1 | +3.3V Power supply | 2 | 2 |
| **31** | LVTTL-I | LPMode/TX_DIS | Low Power Mode | 3 | 3 |
| **32** | | GND | Ground | 1 | 1 |
| **33** | CML-I | Tx3p | Transmitter Non-Inverted Data Input | 3 | |
| **34** | CML-I | Tx3n | Transmitter Inverted Data Input | 3 | |
| **35** | | GND | Ground | 1 | 1 |
| **36** | CML-I | Tx1p | Transmitter Non-Inverted Data Input | 3 | |
| **37** | CML-I | Tx1n | Transmitter Inverted Data Input | 3 | |
| **38** | | GND | Ground | 1 | 1 |

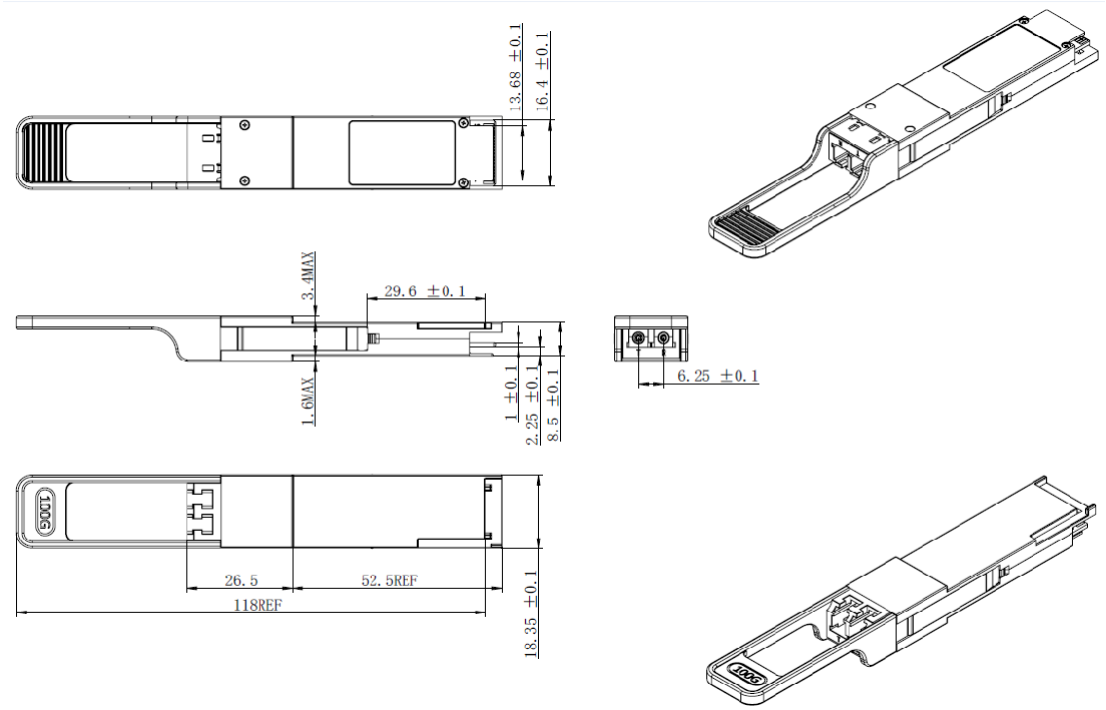
**Notes:**

1. GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the QSFP28 module and all module voltages are referenced to this potential unless otherwise noted.
2. Vcc Rx, Vcc1 and Vcc Tx are the receiver and transmitter power supplies and shall be applied concurrently

**Electrical Pin-out Details**



## Mechanical Specifications



**About AddOn Networks**

In 1999, AddOn Networks entered the market with a single product. Our founders fulfilled a severe shortage for compatible, cost-effective optical transceivers that compete at the same performance levels as leading OEM manufacturers. Adhering to the idea of redefining service and product quality not previously had in the fiber optic networking industry, AddOn invested resources in solution design, production, fulfillment, and global support.

Combining one of the most extensive and stringent testing processes in the industry, an exceptional free tech support center, and a consistent roll-out of innovative technologies, AddOn has continually set industry standards of quality and reliability throughout its history.

Reliability is the cornerstone of any optical fiber network and is ingrained in AddOn's DNA. It has played a key role in nurturing the long-term relationships developed over the years with customers. AddOn remains committed to exceeding industry standards with certifications ranging from NEBS Level 3 to ISO 9001:2015 with every new development while maintaining the signature reliability of its products.




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