Pro**Labs**

3HE05036AA-DW5413-C

Alcatel-Lucent Nokia[®] 3HE05036AA-DW5413 Compatible TAA 10GBase-DWDM SFP+ Transceiver (SMF, 1554.13nm, 40km, LC, DOM)

Features:

- SFF-8432 and SFF-8472 Compliance
- Duplex LC Connector
- Temperature-stabilized EML transmitter and PIN receiver
- Single-mode Fiber
- Commercial Temperature 0 to 70 Celsius
- Hot Pluggable
- Metal with Lower EMI
- Excellent ESD Protection
- RoHS Compliant and Lead Free



Applications:

- 10x Gigabit Ethernet over DWDM
- 8x/10x Fibre Channel
- Access, Metro and Enterprise

Product Description

This Alcatel-Lucent Nokia[®] 3HE05036AA-DW5413 compatible SFP+ transceiver provides 10GBase-DWDM throughput up to 40km over single-mode fiber (SMF) using a wavelength of 1554.13nm 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'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."



Rev. 060922

Regulatory Compliance

- ESD to the Electrical PINs: compatible with MIL-STD-883E Method 3015.7.
- ESD to the Duplex LC Receptacle: compatible with IEC 61000-4-2
- Immunity compatible with IEC 61000-4-3.
- EMI compatible with FCC Part 15 Class B EN55022 Class B (CISPR 22B) VCCI Class B.
- Laser Eye Safety compatible with FDA 21CFR 1040.10 and 1040.11 EN60950, EN (IEC) 60825-1,2.
- RoHs compliant with 2002/95/EC 4.1&4.2 2005/747/EC.

Wavelength Guide (100GHz ITU-T Channel)

| Channel # | Frequency (THz) | Center Wavelength (nm) |
|-----------|-----------------|------------------------|
| 17 | 191.7 | 1563.86 |
| 18 | 191.8 | 1563.05 |
| 19 | 191.9 | 1562.23 |
| 20 | 192.0 | 1561.42 |
| 21 | 192.1 | 1560.61 |
| 22 | 192.2 | 1559.79 |
| 23 | 192.3 | 1558.98 |
| 24 | 192.4 | 1558.17 |
| 25 | 192.5 | 1557.36 |
| 26 | 192.6 | 1556.55 |
| 27 | 192.7 | 1555.75 |
| 28 | 192.8 | 1554.94 |
| 29 | 192.9 | 1554.13 |
| 30 | 193.0 | 1553.33 |
| 31 | 193.1 | 1552.52 |
| 32 | 193.2 | 1551.72 |
| 33 | 193.3 | 1550.92 |
| 34 | 193.4 | 1550.12 |
| 35 | 193.5 | 1549.32 |
| 36 | 193.6 | 1548.51 |
| 37 | 193.7 | 1547.72 |
| 38 | 193.8 | 1546.92 |
| 39 | 193.9 | 1546.12 |
| 40 | 194.0 | 1545.32 |
| 41 | 194.1 | 1544.53 |
| 42 | 194.2 | 1543.73 |
| 43 | 194.3 | 1542.94 |

| 44 | 194.4 | 1542.14 |
|----|-------|---------|
| 45 | 194.5 | 1541.35 |
| 46 | 194.6 | 1540.56 |
| 47 | 194.7 | 1539.77 |
| 48 | 194.8 | 1538.98 |
| 49 | 194.9 | 1538.19 |
| 50 | 195.0 | 1537.40 |
| 51 | 195.1 | 1536.61 |
| 52 | 195.2 | 1535.82 |
| 53 | 195.3 | 1535.04 |
| 54 | 195.4 | 1534.25 |
| 55 | 195.5 | 1533.47 |
| 56 | 195.6 | 1532.68 |
| 57 | 195.7 | 1531.90 |
| 58 | 195.8 | 1531.12 |
| 59 | 195.9 | 1530.33 |
| 60 | 196.0 | 1529.55 |
| 61 | 196.1 | 1528.77 |

Absolute Maximum Ratings

| Parameter | Symbol | Min. | Тур | Max. | Unit |
|----------------------------|--------|------|---------|------|------|
| Storage Temperature | TS | -40 | | 85 | °C |
| Supply Voltage | Vcc | -0.5 | | 4.0 | V |
| Operating Case Temperature | Тс | 0 | 25 | 70 | °C |
| Relative Humidity | RH | 5 | | 95 | % |
| Data Rate | | | 10.3125 | | Gb/s |

Electrical Characteristics

| Parameter | | Symbol | Min. | Тур. | Max. | Unit | Notes |
|----------------------------------|----------------------|----------|-------|------|---------|-------|-------|
| Supply Voltage | | Vcc | 3.135 | 3.3 | 3.465 | V | |
| Module Supp | ly Current | lcc | | | 450 | mA | |
| Power Dissipa | ation | PD | | | 1500 | mW | |
| Transmitter | | | | 1 | 1 | | 1 |
| Input Differen | ntial Impedance | Zin | | 100 | | Ω | |
| Differential D | ata Input Swing | Vin,p-p | 180 | | 700 | mVp-p | |
| TX_FAULT | Transmitter Fault | Voн | 2.0 | | VccHost | V | |
| | Normal Operation | VOL | 0 | | 0.8 | V | |
| TX_DISABLE | Transmitter Disable | VIH | 2.0 | | VccHost | V | |
| | Transmitter Enable | VIL | 0 | | 0.8 | V | |
| Receiver | | | | | | | |
| Output Differ | ential Impedance | Zo | | 100 | | Ω | |
| Differential Data Output Swing | | Vout,p-p | 300 | | 850 | mVp-p | 1 |
| Data Output Rise Time, Fall Time | | tr, tf | 28 | | | ps | 2 |
| RX_LOS | Loss of Signal (LOS) | VOH | 2.0 | | VccHost | V | 3 |
| | Normal Operation | VOL | 0 | | 0.8 | V | 3 |

Notes:

1. Internally AC coupled, but requires an external 100Ω differential load termination.

2. 20-80%.

3. LOS is an open collector output. Should be pulled up with $4.7K\Omega$ on the host board.

Optical Characteristics

| Parameter | Symbol | Min. | Тур. | Max. | Unit | Notes |
|------------------------------------|--------|---------|------|---------|-------|-------|
| Transmitter | | | | | | |
| Launch Optical Power | РО | -1 | | 4 | dBm | 1 |
| Center Wavelength Range | λς | 1528.77 | | 1563.86 | nm | |
| Center Wavelength Spacing | | | 100 | | GHZ | |
| Center Wavelength Tolerance | Δλς | -100 | | 100 | pm | |
| Extinction Ratio | EX | 8.2 | | | dB | |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Transmitter and Dispersion Penalty | TDP | | | 2.0 | dB | |
| Relative Intensity Noise | RIN | | | -128 | dB/Hz | |

| Optical Return Loss Tolerance | ORLT | | | 21 | dB | |
|-------------------------------|-------------|-------------------|------------------|--------------|-----|--|
| Pout @ TX-Disable Asserted | Poff | | | -30 | dBm | |
| Eye Diagram | IEEE Std 80 | 2.3-2005 10Gb Eth | ernet 10GBASE-EF | R compatible | | |
| Receiver | | | | | | |
| Center Wavelength | λς | 1528 | | 1565 | nm | |
| Receiver Sensitivity (Pavg) | S | | | -15 | dBm | |
| Receiver Overload (Pavg) | POL | -1 | | | dBm | |
| Optical Return Loss | ORL | 26 | | | dB | |
| LOS De-Assert | LOSD | | | -16 | dBm | |
| LOS Assert | LOSA | -35 | | | dBm | |
| LOS Hysteresis | | 0.5 | | | dB | |

Notes:

- 1. The optical power is launched into $9/125\mu m$ SMF.
- 2. Measured with a PRBS 2^{31} -1 test pattern @10.3125Gbps.
- 3. Measured with PRBS 2^{31} -1 test pattern, 10.3125Gb/s, BER<10⁻¹².
- 4. Comply with IEEE 802.3-2005.

Pin Descriptions

| Pin | Symbol | Name/Descriptions | Ref. |
|-----|------------|---|------|
| 1 | VeeT | Transmitter Ground | 1 |
| 2 | TX_Fault | Transmitter Fault (LVTTL-O) - High indicates a fault condition | 2 |
| 3 | TX_Disable | Transmitter Disable (LVTTL-I) – High or open disables the transmitter | 3 |
| 4 | SDA | Two wire serial interface Data Line (LVCMOS-I/O) (MOD-DEF2) | 4 |
| 5 | SCL | Two wire serial interface Clock Line (LVCMOS-I/O) (MOD-DEF1) | 4 |
| 6 | MOD_ABS | Module Absent (Output), connected to VeeT or VeeR in the module | 5 |
| 7 | RSO | Rate Select 0 – Not used, Presents high input impedance | |
| 8 | RX_LOS | Receiver Loss of Signal (LVTTL-O) | 2 |
| 9 | RS1 | Rate Select 1 – Not used, Presents high input impedance | |
| 10 | VeeR | Receiver Ground | 1 |
| 11 | VeeR | Receiver Ground | 1 |
| 12 | RD- | Inverse Received Data out (CML-O) | |
| 13 | RD+ | Received Data out (CML-O) | |
| 14 | VeeR | Receiver Ground | |
| 15 | VccR | Receiver Power - +3.3V | |
| 16 | VccT | Transmitter Power - +3.3 V | |
| 17 | VeeT | Transmitter Ground | 1 |
| 18 | TD+ | Transmitter Data In (CML-I) | |
| 19 | TD- | Inverse Transmitter Data In (CML-I) | |
| 20 | VeeT | Transmitter 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 4.7K Ω to 10K Ω pull-up resistor to VccHost.
- 3. This input is internally biased high with a $4.7K\Omega$ to $10K\Omega$ pull-up resistor to VccT.
- 4. Two-Wire Serial interface clock and data lines require an external pull-up resistor dependent on the capacitance load.
- 5. This is the ground return that on the host board requires a 4.7KΩ to 10KΩ pull-up resistor to VccHost.

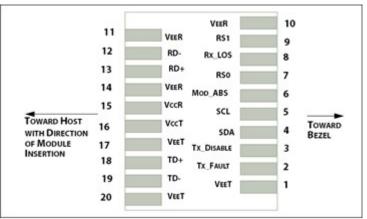


Figure 1. Host PCB SFP+ pad assignment top view

Recommended Host Board Power Supply Filter Network

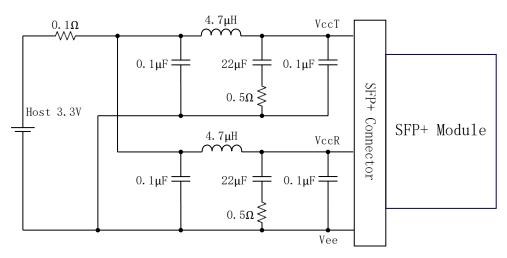
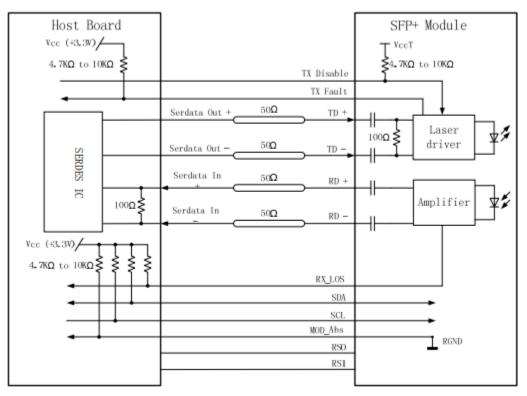


Figure 2. Recommended Host Board Power Supply Filter Network

Recommended Application Interface Block Diagram



Mechanical Specifications



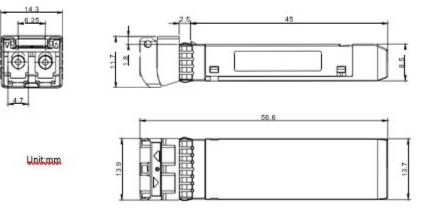
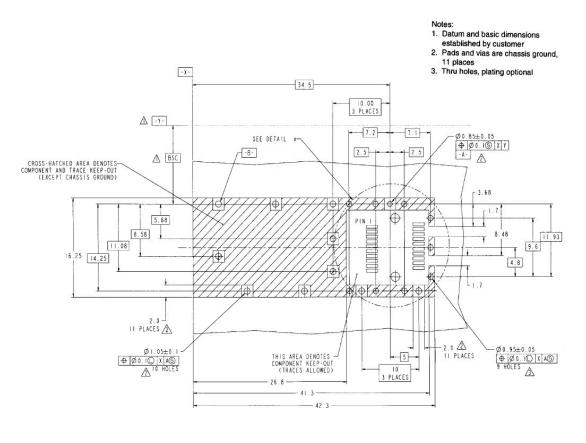
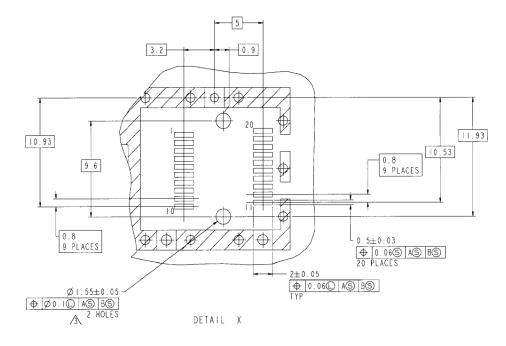


Figure 4. Outline Drawing

PCB Layout Recommendation





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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