LinkPro™

# LPANLE31-K40C

QSFP+ 40Gb/s ER4 40km DDM

## PRODUCT FEATURES

- Compliant with 40G Ethernet IEEE802.3ba Standard
- Compliant with QDR/DDR Infiniband data rates
- Up to 11.2Gb/s data rate per wavelength
- 4 CWDM lanes MUX/DEMUX design
- Maximum link length of 40km on Single Mode Fiber
- QSFP+ MSA compliant
- Hot-pluggable QSFP+ footprint
- Duplex LC receptacles
- Single 3.3V power supply
- Support Digital Diagnostic Monitor interface
- Case operating temperature Commercial: 0°C to +70°C
- RoHS-6 compliant and lead-free

## APPLICATIONS

- 40GBASE-ER4 Ethernet
- Infiniband QDR and DDR interconnects

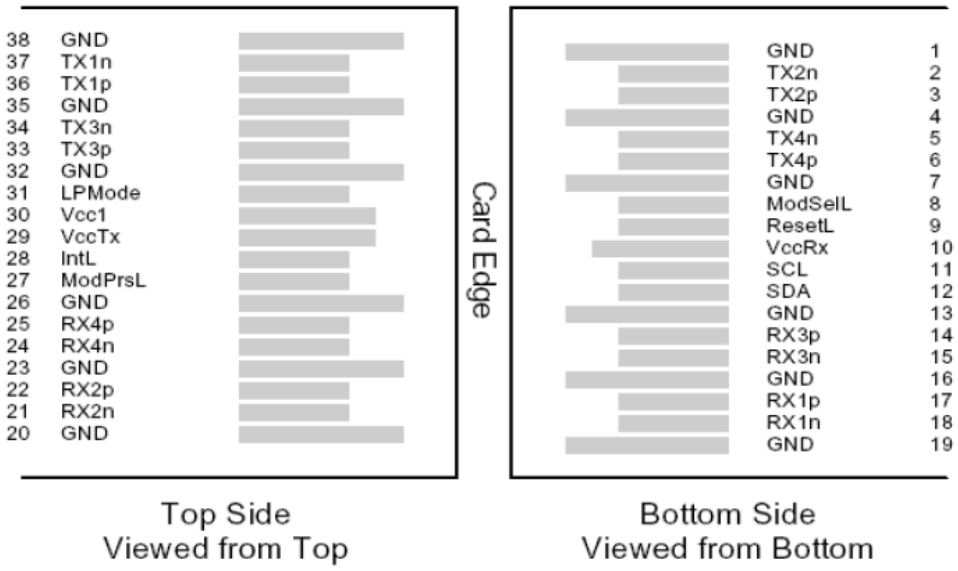
## Compliance

- QSFP+ MSA.
- IEEE802.3ba
- SFF-8436
- RoHS

## Ordering information

| Part NO. | Bit Rate (Gbps) | Laser (nm) | Distance (km) | Media | DDMI | Connector | Temp（℃） |
|---|---|---|---|---|---|---|---|
| LPANLE31-K40C | 10.3125 | 1271nm<br>1291nm<br>1311nm<br>1331nm | 40 | single-mode fiber | YES | LC | 0~70 |

## I. Pin Diagram




**QSFP+ MSA-compliant 38-pin connector**

## II. Pin Descriptions

| Pin | Symbol | Name/Description | Ref. |
|---|---|---|---|
| 1 | GND | Ground | 1 |
| 2 | Tx2n | Transmitter Inverted Data Input | |
| 3 | Tx2p | Transmitter Non-Inverted Data Input | |
| 4 | GND | Ground | 1 |
| 5 | Tx4n | Transmitter Inverted Data Input | |
| 6 | Tx4p | Transmitter Non-Inverted Data Input | |
| 7 | GND | Ground | 1 |
| 8 | ModSe1L | Module Select | |
| 9 | ResetL | Module Reset | |
| 10 | Vcc Rx | +3.3V Power supply receiver | |

| | | | |
|---|---|---|---|
| 11 | SCL | 2-wire serial interface clock | |
| 12 | SDA | 2-wire serial interface data | |
| 13 | GND | Ground | 1 |
| 14 | Rx3p | Receiver Non-Inverted Data Output | |
| 15 | Rx3n | Receiver Inverted Data Output | |
| 16 | GND | Ground | 1 |
| 17 | Rx1p | Receiver Non-Inverted Data Output | |
| 18 | Rx1n | Receiver Inverted Data Output | |
| 19 | GND | Ground | 1 |
| 20 | GND | Ground | 1 |
| 21 | Rx2n | Receiver Inverted Data Output | |
| 22 | Rx2p | Receiver Non-Inverted Data Output | |
| 23 | GND | Ground | 1 |
| 24 | Rx4n | Receiver Inverted Data Output | |
| 25 | Rx4p | Receiver Non-Inverted Data Output | |
| 26 | GND | Ground | 1 |
| 27 | ModPrSL | Module Present | |
| 28 | IntL | Interrupt | |
| 29 | Vcc Tx | +3.3V Power supply transmitter | |
| 30 | Vcc1 | +3.3V Power Supply | |
| 31 | LPMode | Low Power Mode | |
| 32 | GND | Ground | 1 |
| 33 | Tx3p | Transmitter Non-Inverted Data Input | |
| 34 | Tx3n | Transmitter Inverted Data Input | |
| 35 | GND | Ground | 1 |
| 36 | Tx1p | Transmitter Non-Inverted Data Input | |
| 37 | Tx1n | Transmitter Inverted Data Input | |
| 38 | GND | Ground | 1 |

Note1: Circuit ground is internally isolated from chassis ground.

## III. Absolute Maximum Ratings

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Ref. |
|---|---|---|---|---|---|---|
| Storage Temperature | $T_S$ | -40 | | 85 | ºC | |
| Storage Ambient Humidity | $H_A$ | 5 | | 85 | % | 1 |
| Maximum Supply Voltage | $V_{CC}$ | -0.5 | | 3.6 | V | |
| Signal Input Voltage | | -0.3 | | Vcc+0.3 | V | |
| Receiver Damage Threshold | | +3.4 | | | dBm | |

note1: non-condensation

## IV. Optical Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Ref. |
|---|---|---|---|---|---|---|
| Center Wavelength | L0 | 1264.5 | 1271 | 1277.5 | nm | |
| | L1 | 1284.5 | 1291 | 1297.5 | nm | |
| | L2 | 1304.5 | 1311 | 1317.5 | nm | |
| | L3 | 1324.5 | 1331 | 1337.5 | nm | |
| ***Transmitter*** | | | | | | |
| Total Average Launch Power | PT | | | 10.5 | dBm | |
| Average Launch Power, each Lane | PAVG | -2.7 | | 4.5 | dBm | |
| Optical Modulation Amplitude (OMA), each Lane | POMA | -0.3 | | 5 | dBm | 1 |
| Difference in Launch Power between any Two Lanes (OMA) | Ptx,diff | | | 4.7 | dB | |
| Sidemode Suppression ratio | SMSR | 30 | | | dB | |
| TDP, each Lane | TDP | | | 2.6 | dB | |
| Extinction Ratio | ER | 5.5 | | | dB | |
| Relative Intensity Noise | RIN | | | -128 | dB/Hz | |
| OpticalRet urnLossTolerance | TOL | | | 20 | dB | |
| TransmitterReflectance | RT | | | -12 | dB | |
| Transmitter eye mask definition {X1,X2,X3,Y1,Y2,Y3} | | 0.25,0.4,0.45,0.25,0.28,0.4 | | | | |
| ***Receiver*** | | | | | | |
| Damage Threshold, each Lane | THd | 3.8 | | | dBm | 2 |
| Average Receive Power, each Lane | | -19 | | -4.5 | dBm | |
| Receiver Reflectance | RR | | | -26 | dB | |
| Receive Power (OMA), each Lane | | | | -4 | dBm | |
| Receiver Sensitivity (OMA), each Lane | SEN | | | -19 | dBm | 3 |
| Average receive power, each laneb (min) | | | | -21.2 | dBm | |
| Difference in Receive Power between any Two Lanes (OMA) | Prx,diff | | | 7.5 | dB | |
| LOS Assert | LOSA | -35 | | | dBm | |
| LOS Deassert | LOSD | | | -23 | dBm | |
| LOS Hysteresis | LOSH | 0.5 | | | dB | |
| Receiver Electrical 3dB upper Cutoff Frequency, each Lane | FC | | | 12.3 | GHz | |
| Vertical Eye Closure Penalty, each Lane | | | 2.2 | | dB | 4 |
| Stressed Eye J2 Jitter, each Lane | | Per OTL3.4, G.8251 | | | UI | |
| Stressed Eye J9 Jitter, each Lane | | Per OTL3.4, G.8251 | | | UI | |

Notes1: Even if the TDP < 0.8 d B, the OMA min must exceed the minimum value specified here.

Notes2: The receiver shall be able to tolerate, without damage, continuous exposure to a modulated optical input

signal having this power level on one lane. The receiver does not have to operate correctly at this input power.

Notes3: Measured with conformance test signal at receiver input for BER = 1x10- 12 .

Notes4: MVertical eye closure penalty and stressed eye jitter are test conditions for measuring stressed receiver sensitivity. They are not characteristics of the receiver.

## V. Memory Map and Control Registers

Compatiable with SFF-8436 Rev.4.8 (QSFP+).

## VI. Electrical Interface Characteristics

| Parameter | Symbol | Min. | Typ. | Max. | Unit | Ref. |
|---|---|---|---|---|---|---|
| Power Consumption | | | | 3.5 | W | |
| Supply Current | $I_{CC}$ | | | 1.06 | A | |
| Transceiver Power-on Initialization Time | | | | 2000 | ms | note1 |
| ***Transmitter*** | | | | | | |
| Single-ended Input Voltage Tolerance Referred to TP1 signal common | | -0.3 | | 4.0 | V | note2 |
| AC Common Mode Input Voltage Tolerance | | 15 | | | mV | RMS |
| Differential Input Voltage Swing Threshold (LOSA Threshold) | | 50 | | | mVpp | |
| Differential Input Voltage Swing | Vin,pp | 190 | | 700 | mVpp | |
| Differential Input Impedance | Zin | 90 | 100 | 110 | ohm | |
| Differential Input Return Loss | | See IEEE 802.3ba 86A 4 .11 | | | dB | 10MHz- 11.1GHz |
| J2 Jitter Tolerance | Jt2 | 0.17 | | | UI | |
| J9 Jitter Tolerance | Jt9 | 0.29 | | | UI | |
| Eye Mask Coordinates {X1, X2, Y1, Y2} | | 0.11, 0.31 ; 95, 350 | | | UI; mV | 10MHz- 11.1GHz |
| ***Receiver*** | | | | | | |
| AC Common Mode Output Voltage | | | | 7.5 | mV | RMS |
| Differential Output Voltage Swing | Vout,pp | 300 | | 850 | mVpp | |
| Differential Output Impedance | Zout | 90 | 100 | 110 | ohm | |
| Termination Mismatch at 1MHz | | | | 5 | % | |
| Differential Output Return Loss | | See IEEE 802.3ba 86A .4.2.1 | | | dB | 10MHz- 11.1GHz |
| Common Mode Output Return Loss | | See IEEE 802.3ba 86A 4.2.2 | | | dB | 10MHz- 11.1GHz |
| Output Transition Time | | 28 | | | Ps | 20% to 80% |
| J2 Jitter Output | Jo2 | | | 0.42 | UI | |
| J9 Jitter Output | Jo9 | | | 0.65 | UI | |
| Eye Mask Coordinates {X1, X2, Y1, Y2} | | 0.29, 0.5; 150, 425 | | | UI; mV | Hit Ratio = 5x10E5 |

Note1: MPower-on Initialization Time is the time from when the power supply voltages reach and remai n above the minimum recommended operating supply voltages to the time when the module is fully functional.

Note2:The single ended input voltage tolerance is the allowable range of the instantaneous input signals.

## VII. Mechanical Specifications (Unit: mm)