



NETS

ООО "Группа Компаний "Сети"
Проектирование сетей, поставка оборудования,
оптимизация и поддержка IT-инфраструктуры.
<https://NewNets.ru>

Product Specification Sheet

NS-SFP+DXXL80D

RoHS Compliant 10Gb/s SFP+ DWDM 80km Optical Transceiver



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Особенности

- Поддержка скоростей от 9,95 до 11,3 Гбит/с.
- Дуплексный разъем LC
- Форм-фактор SFP+ с возможностью «горячей» замены
- Лазер Cooled EML и приемник APD
- Подходит для работы по SMF на расстоянии до 80 км.
- Низкое энергопотребление < 1,5 Вт
- Разнос каналов 100 ГГц
- Интерфейс цифровой диагностики сигнала
- Оптический интерфейс, совместимый с ITU-T 694.1 и G.698.1.
- Электрический интерфейс соответствует стандартам SFF-8431 и SFF-8432.
- Рабочая температура корпуса:
Коммерческая: от 0 до 70 °С,
Промышленная: от -40 до 85 °С

Применение

- 10G Ethernet
- 2x, 4x, 8x Fiber Channel
- ITU-T G.698.1

NewNets NS-SFP+DXXL80D Трансиверы Enhanced Small Form Factor Pluggable SFP+ предназначены для организации каналов 10-Gigabit Ethernet на расстоянии до 80 км по одномодовому волокну. Соответствуют стандартам SFF-8431, SFF-8432 и ITU-T G.698.1. Конструкции приемопередатчиков оптимизированы для обеспечения высокой производительности и экономичности.

Трансивер состоит из двух секций: секция передатчика включает в лазер Cooled-EML. А секция приемника состоит из фотодиода APD, интегрированного с TIA. Все модули соответствуют требованиям лазерной безопасности класса I. Функции цифровой диагностики доступны через 2-проводной последовательный интерфейс, в соответствии с SFF-8472, который обеспечивает доступ в реальном времени к рабочим параметрам устройства, таким как температура приемопередатчика, ток смещения лазера, передаваемая оптическая мощность, принимаемая оптическая мощность и напряжение питания приемопередатчика.

Product Channel Selection

| Channel# | Product Part No. | Frequency (THz) | Center Wavelength (nm) |
|----------|------------------|-----------------|------------------------|
| 17 | NS-SFP+D17L80D | 191.7 | 1563.86 |
| 18 | NS-SFP+D18L80D | 191.8 | 1563.05 |
| 19 | NS-SFP+D19L80D | 191.9 | 1562.23 |
| 20 | NS-SFP+D20L80D | 192.0 | 1561.42 |
| 21 | NS-SFP+D21L80D | 192.1 | 1560.61 |
| 22 | NS-SFP+D22L80D | 192.2 | 1559.79 |
| 23 | NS-SFP+D23L80D | 192.3 | 1558.98 |
| 24 | NS-SFP+D24L80D | 192.4 | 1558.17 |
| 25 | NS-SFP+D25L80D | 192.5 | 1557.36 |
| 26 | NS-SFP+D26L80D | 192.6 | 1556.55 |
| 27 | NS-SFP+D27L80D | 192.7 | 1555.75 |
| 28 | NS-SFP+D28L80D | 192.8 | 1554.94 |
| 29 | NS-SFP+D29L80D | 192.9 | 1554.13 |
| 30 | NS-SFP+D30L80D | 193.0 | 1553.33 |
| 31 | NS-SFP+D31L80D | 193.1 | 1552.52 |
| 32 | NS-SFP+D32L80D | 193.2 | 1551.72 |
| 33 | NS-SFP+D33L80D | 193.3 | 1550.92 |
| 34 | NS-SFP+D34L80D | 193.4 | 1550.12 |
| 35 | NS-SFP+D35L80D | 193.5 | 1549.32 |
| 36 | NS-SFP+D36L80D | 193.6 | 1548.51 |
| 37 | NS-SFP+D37L80D | 193.7 | 1547.72 |
| 38 | NS-SFP+D38L80D | 193.8 | 1546.92 |
| 39 | NS-SFP+D39L80D | 193.9 | 1546.12 |
| 40 | NS-SFP+D40L80D | 194.0 | 1545.32 |
| 41 | NS-SFP+D41L80D | 194.1 | 1544.53 |
| 42 | NS-SFP+D42L80D | 194.2 | 1543.73 |
| 43 | NS-SFP+D43L80D | 194.3 | 1542.94 |
| 44 | NS-SFP+D44L80D | 194.4 | 1542.14 |
| 45 | NS-SFP+D45L80D | 194.5 | 1541.35 |
| 46 | NS-SFP+D46L80D | 194.6 | 1540.56 |
| 47 | NS-SFP+D47L80D | 194.7 | 1539.77 |
| 48 | NS-SFP+D48L80D | 194.8 | 1538.98 |
| 49 | NS-SFP+D49L80D | 194.9 | 1538.19 |
| 50 | NS-SFP+D50L80D | 195.0 | 1537.40 |
| 51 | NS-SFP+D51L80D | 195.1 | 1536.61 |
| 52 | NS-SFP+D52L80D | 195.2 | 1535.82 |
| 53 | NS-SFP+D53L80D | 195.3 | 1535.04 |
| 54 | NS-SFP+D54L80D | 195.4 | 1534.25 |
| 55 | NS-SFP+D55L80D | 195.5 | 1533.47 |
| 56 | NS-SFP+D56L80D | 195.6 | 1532.68 |

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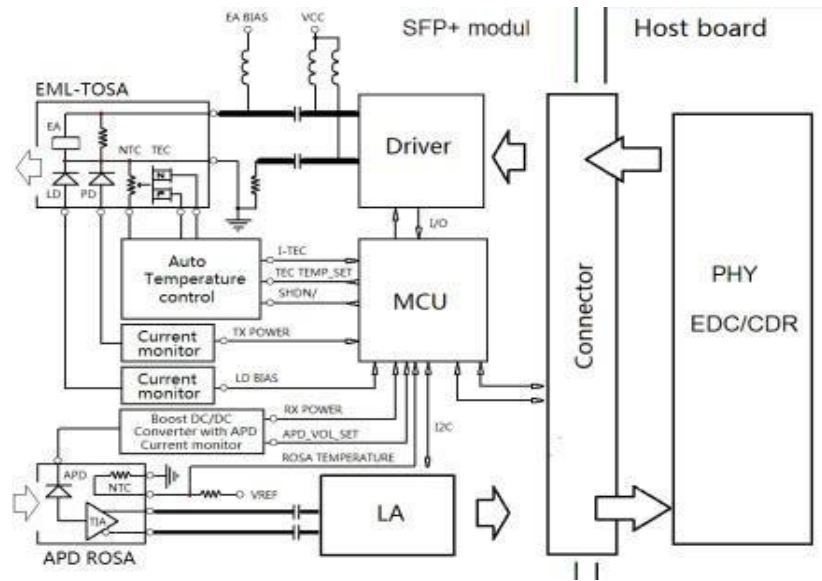
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| | | | |
|----|----------------|-------|---------|
| 57 | NS-SFP+D57L80D | 195.7 | 1531.90 |
| 58 | NS-SFP+D58L80D | 195.8 | 1531.12 |
| 59 | NS-SFP+D59L80D | 195.9 | 1530.33 |
| 60 | NS-SFP+D60L80D | 196.0 | 1529.55 |
| 61 | NS-SFP+D61L80D | 196.1 | 1528.77 |
| 62 | NS-SFP+D62L80D | 196,2 | 1527.99 |
| 63 | NS-SFP+D63L80D | 196,3 | 1527.22 |
| 64 | NS-SFP+D64L80D | 196,4 | 1526.44 |
| 65 | NS-SFP+D65L80D | 196,5 | 1525.56 |

Functional Diagram



Absolute Maximum Ratings

| Parameter | Symbol | Min. | Max. | Unit | Note |
|---------------------------|----------|------|------|------|------|
| Supply Voltage | Vcc | -0.5 | 4.0 | V | |
| Storage Temperature | Ts | -40 | 85 | °C | |
| Relative Humidity | RH | 0 | 85 | % | |
| Receiver Damage Threshold | RXDamage | +5 | | dBm | |

Note: Stress in excess of the maximum absolute ratings can cause permanent damage to the transceiver.

General Operating Characteristics

| Parameter | Symbol | Min. | Typ | Max. | Unit | Note |
|----------------------|--------|------|---------|------|------|------|
| Data Rate | DR | 9.95 | 10.3125 | 11.3 | Gb/s | |
| Supply Voltage | Vcc | 3.13 | 3.3 | 3.47 | V | |
| Supply Current | Iccs | | | 450 | mA | |
| Operating Case Temp. | Tc | 0 | | 70 | °C | |
| | Tl | -40 | | 85 | | |

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Electrical Characteristics (T_{OP(C)} = 0 to 70 °C, T_{OP(I)} = -40 to 85 °C, V_{CC} = 3.13 to 3.47 V)

| Parameter | Symbol | Min. | Typ | Max. | Unit | Note |
|--------------------------------|---------------------------------|----------------------|-----|----------------------|------------------|------|
| Transmitter | | | | | | |
| Differential data input swing | V _{IN,PP} | 120 | | 850 | mV _{pp} | 1 |
| Transmit Disable Voltage | V _D | V _{CC} -0.8 | | V _{CC} | V | |
| Transmit Enable Voltage | V _{EN} | V _{EE} | | V _{EE} +0.8 | | |
| Input differential impedance | R _{in} | | 100 | | Ω | |
| Receiver | | | | | | |
| Differential data output swing | V _{out,pp} | 300 | | 850 | mV _{pp} | 1 |
| Output rise time and fall time | T _r , T _f | 28 | | | Ps | 2 |
| LOS asserted | V _{LOS_F} | V _{CC} -0.8 | | V _{CC} | V | 3 |
| LOS de-asserted | V _{LOS_N} | V _{EE} | | V _{EE} +0.8 | V | 3 |

Notes:

- Internally AC coupled. Data pins connect directly to the CDR.
- 20 – 80%. Measured with Module Compliance Test Board and OMA test pattern. Use of four 1's and four 0's sequence in the PRBS 9 is an acceptable alternative.
- LOS is an open collector output. Should be pulled up with 4.7kΩ – 10kΩ on the host board. Normal operation is logic 0; loss of signal is logic 1.

Optical Characteristics (T_{OP(C)} = 0 to 70 °C, T_{OP(I)} = -40 to 85 °C, V_{CC} = 3.13 to 3.47 V)

| Parameter | Symbol | Min. | Typ | Max. | Unit | Note |
|---------------------------------|--------------------------------|---------|-----------------------|---------|-------|------|
| Transmitter | | | | | | |
| Center Wavelength | λ _c | 1528.77 | | 1563.86 | nm | |
| Center Wavelength (End of Life) | λ _{c_EOL} | | λ _c ±100pm | | | |
| Ave. output power (Enabled) | P _{AVE} | 0 | | 5 | dBm | 1 |
| Side-Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Extinction Ratio | ER | 8.2 | | | dB | |
| RMS spectral width | Δλ | | | 1 | nm | |
| Rise/Fall time (20%~80%) | T _r /T _f | | | 50 | ps | |
| Relative Intensity Noise | RIN | | | -128 | dB/Hz | |
| Receiver | | | | | | |
| Operating Wavelength | λ | 1260 | | 1600 | nm | |
| Sensitivity | P _{SEN1} | | | -23 | dBm | 2 |
| Overload | P _{AVE} | -7 | | | dBm | |
| LOS Assert | P _a | -35 | | | dBm | |
| LOS De-assert | P _d | | | -24 | dBm | |
| LOS Hysteresis | P _d -P _a | 0.5 | | | dB | |

Notes:

- Measured 2³¹⁻¹ PRBS@10.3125G
- Measured with worst ER=8.2dB; 2³¹⁻¹ PRBS@10.3125G

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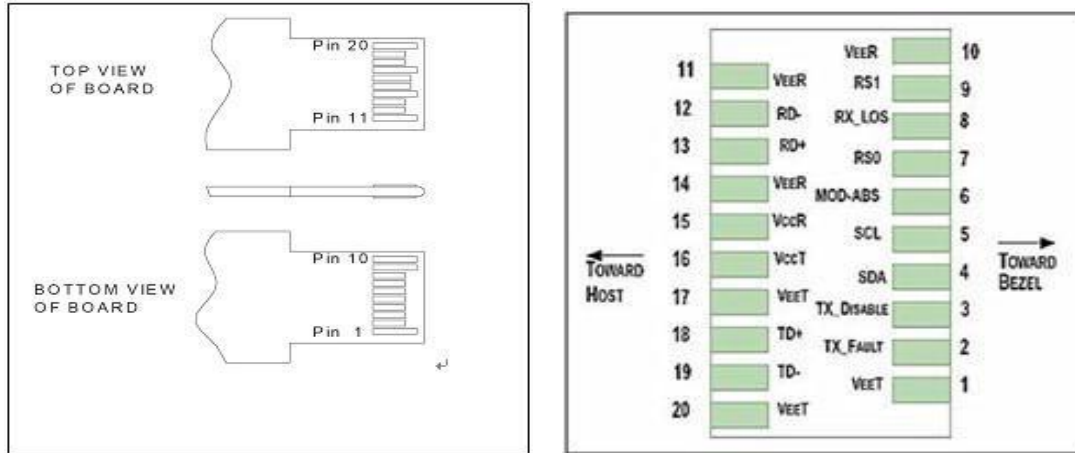
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Pin Defintion And Functions



| Pin | Symbol | Name/Description |
|-----|--------------|---|
| 1 | VEET [1] | Transmitter Ground |
| 2 | Tx_FAULT [2] | Transmitter Fault |
| 3 | Tx_DIS [3] | Transmitter Disable. Laser output disabled on high or open |
| 4 | SDA [2] | 2-wire Serial Interface Data Line |
| 5 | SCL [2] | 2-wire Serial Interface Clock Line |
| 6 | MOD_ABS [4] | Module Absent. Grounded within the module |
| 7 | RS0 | Rate Select 0 |
| 8 | RX_LOS [2] | Loss of Signal indication. Logic 0 indicates normal operation |
| 9 | RS1 | Rate Select 1 |
| 10 | VEER [1] | Receiver Ground |
| 11 | VEER [1] | Receiver Ground |
| 12 | RD- | Receiver Inverted DATA out. AC Coupled |
| 13 | RD+ | Receiver DATA out. AC Coupled |
| 14 | VEER [1] | Receiver Ground |
| 15 | VCCR | Receiver Power Supply |
| 16 | VCCT | Transmitter Power Supply |
| 17 | VEET [1] | Transmitter Ground |
| 18 | TD+ | Transmitter DATA in. AC Coupled |
| 19 | TD- | Transmitter Inverted DATA in. AC Coupled |
| 20 | VEET [1] | Transmitter Ground |

Notes:

1. Module circuit ground is isolated from module chassis ground within the module.
2. should be pulled up with 4.7k – 10k ohms on host board to a voltage between 3.15V and 3.6V.
3. Tx_Disable is an input contact with a 4.7 kΩ to 10 kΩ pullup to VccT inside the module.
4. Mod_ABS is connected to VeeT or VeeR in the SFP+ module. The host may pull this contact up to Vcc_Host with a resistor in the range 4.7 kΩ to 10 kΩ. Mod_ABS is asserted “High” when the SFP+ module is physically absent from a host slot.

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Serial Interface for ID and Digital Diagnostic Monitor

The NS-SFP+DXXL80D transceiver support the 2-wire serial communication protocol as defined in the SFP+ MSA. The standard SFP+ serial ID provides access to identification information that describes the transceiver’s capabilities, standard interfaces, manufacturer, and other information. Additionally, This SFP+ transceivers provide an enhanced digital diagnostic monitoring interface, which allows real-time access to device operating parameters such as transceiver temperature, laser bias current, transmitted optical power, received optical power and transceiver supply voltage. It also defines a sophisticated system of alarm and warning flags, which alerts end-users when particular operating parameters are outside of a factory set normal range.

The SFP MSA defines a 256-byte memory map in EEPROM that is accessible over a 2-wire serial interface at the 8 bit address 1010000X(A0h), so the originally monitoring interface makes use of the 8 bit address(A2h), so the originally defined serial ID memory map remains unchanged. The structure of the memory map is shown in Table1.

| 2 wire address 1010000X (A0h) | | 2 wire address 1010001X (A2h) | |
|-------------------------------|---|-------------------------------|---|
| Address | Information | Address | Information |
| 0~95 | Serial ID Defined by SFP MSA (96 bytes) | 0~55 | Alarm and Warning Thresholds (56 bytes) |
| | | 56~95 | Calibration Constants (40 bytes) |
| 96~127 | Vendor Specific (32 bytes) | 96~119 | Real Time Diagnostic Interface (24 bytes) |
| | | 120~127 | Vender Specific (8 bytes) |
| 128~255 | Reserved,SFF8079 (128 bytes) | 128~247 | User Writable EEPROM (120 bytes) |
| | | 248~255 | Vender Specific (8 bytes) |

Table 1. Digital Diagnostic Memory Map (Specific Data Field Descriptions)

Digital Diagnostic Specifications

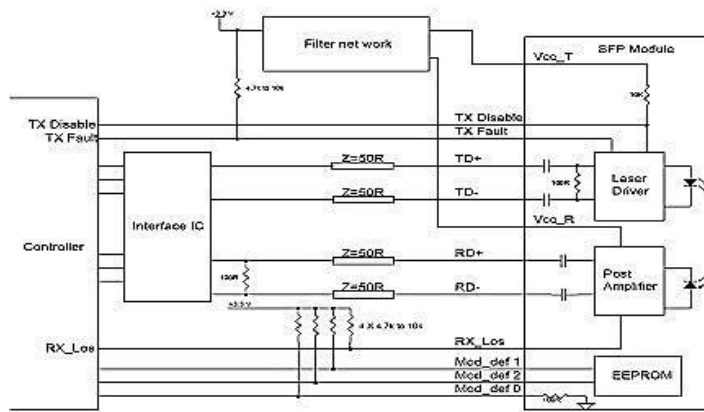
The NS-SFP+DXXL80D transceivers can be used in host systems that require either internally or externally calibrated digital diagnostics.

| Parameter | Symbol | Units | Min. | Max. | Accuracy | Note |
|------------------------------|-----------|-------|------|------|----------|------|
| Transceiver temperature | DTemp-E | °C | -10 | +90 | ±5°C | 1,2 |
| Transceiver supply voltage | DVoltage | V | 2.8 | 4.0 | ±3% | |
| Transmitter bias current | DBias | mA | 2 | 127 | ±10% | 3 |
| Transmitter output power | DTx-Power | dBm | -2 | +7 | ±2dB | |
| Receiver average input power | DRx-Power | dBm | -25 | 0 | ±2dB | |

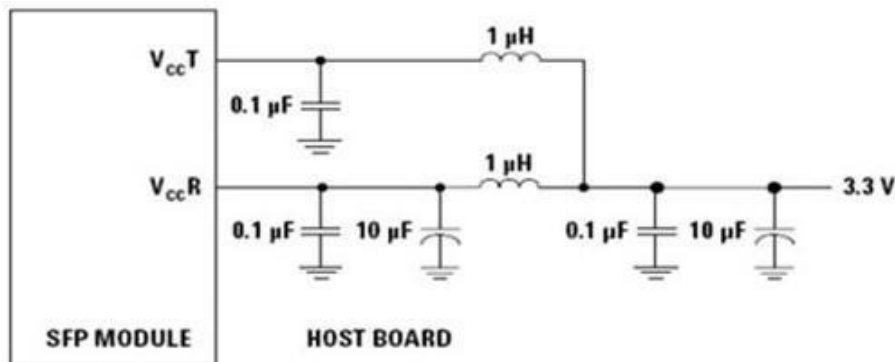
Notes:

1. When Operating temp.=0~70 °C,the range will be min=-5,Max=+75
2. Internally measured
3. The accuracy of the Tx bias current is 10% of the actual current from the laser driver to the laser

Typical Interface Circuit



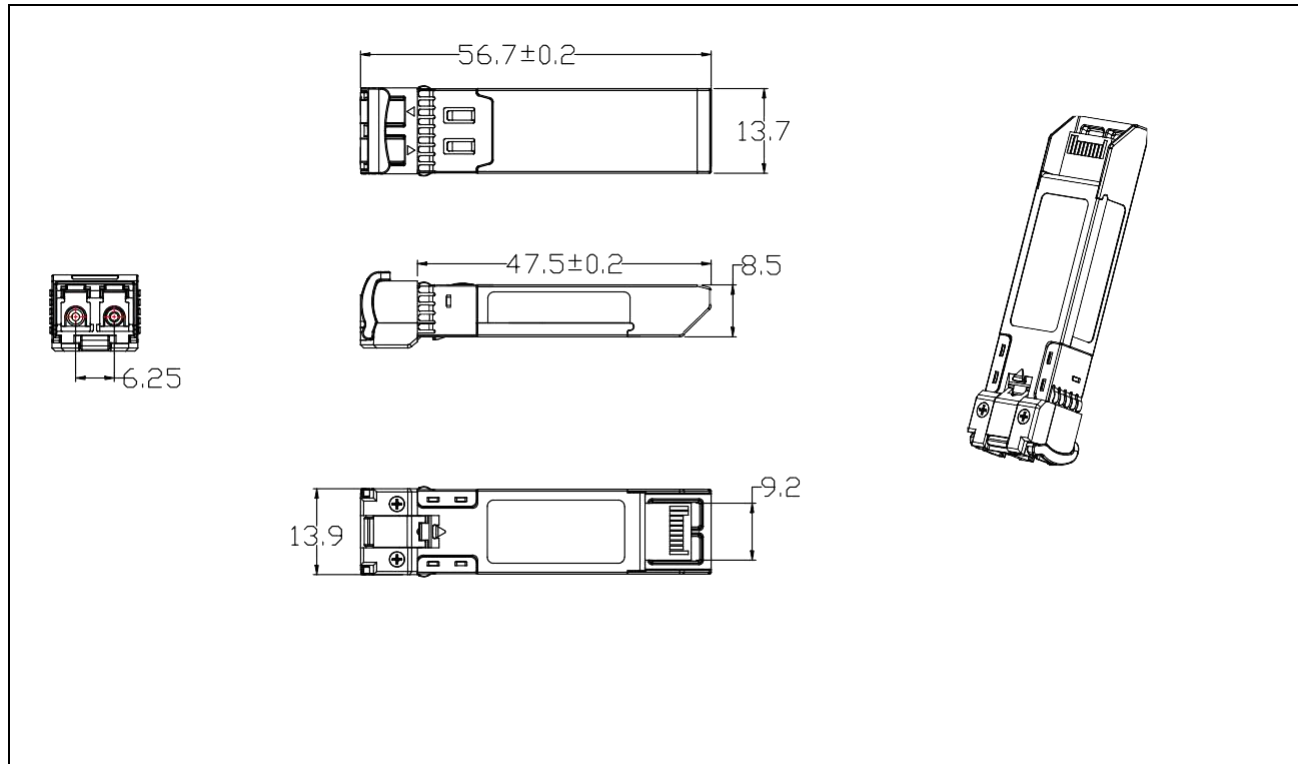
Recommended power supply filter



Note:

Inductors with DC resistance of less than 1Ω should be used in order to maintain the required voltage at the SFP input pin with 3.3V supply voltage. When the recommended supply filtering network is used, hot plugging of the SFP transceiver module will result in an inrush current of no more than 30 mA greater than the steady state value

Package Dimensions



Ordering Information

| Part Number | Description |
|----------------|---|
| NS-SFP+DXXL80D | SFP+, 9.95 to 11.3Gb/s, DWDM wavelengths, 80km, 0~70°C, with Digital Diagnostic Monitor |
| NS-SFP+DXXL80D | SFP+, 9.95 to 11.3Gb/s, DWDM wavelengths, 80km, -40~85°C, with Digital Diagnostic Monitor |