

DWDM SFP+ CH17~CH61 80km DDM LC SMF Transceiver

P/N: AE-SFP+-D80-XX

Features

- Supports up to 11.3Gbps
- Available in all C-Band Wavelengths on the 100GHz DWDM ITU Grid
- Temperature-Stabilized DWDM EML Transmitter
- Duplex LC Connector
- Power Dissipation < 1.5W
- Dispersion tolerance from -500ps/nm to 1600ps/nm
- Hot-Pluggable SFP+ Footprint
- Compliant with SFF-8431 MSA
- Compliant with SFF-8432 MSA
- Operating Case Temperature Standard: 0°C to 70°C Extended: -20°C to 75°C

Applications

- 10GBASE-ZR/ZW
- 10G FC
- OBSAI rates 6.144 Gb/s, 3.072 Gb/s, 1.536 Gb/s, 0.768Gb/s
- CPRI rates 10.138Gb/s ,9.830 Gb/s,7.373Gb/s, 6.144 Gb/s, 4.915 Gb/s,
- 2.458 Gb/s, 1.229 Gb/s, 0.614Gb/s
- Other optical links

I. Absolute Maximum Ratings

| Parameter | Symbol | Min. | Max. | Unit |
|-----------------------------|--------|------|------|------|
| Storage Temperature | Ts | -40 | +85 | °C |
| Supply Voltage | Vcc | -0.5 | 3.6 | V |
| Operating Relative Humidity | | - | 95 | % |

II. Recommended Operating Conditions

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|----------------------------|---------------------|----------|---------|------|------|
| Operating Case Temperature | Tc | Standard | 0 | +70 | °C |
| | | Extended | -20 | +75 | °C |
| Power Supply Voltage | Vcc | 3.15 | 3.3 | 3.45 | V |
| Power Supply Current | Icc (0°C to 70°C) | | | 350 | mA |
| | Icc (-20°C to 75°C) | | | 522 | mA |
| Data Rate | DR | 0.6 | 10.3 | 11.3 | Gbps |

III. Performance Specifications – Electrical

| Parameter | Symbol | Min. | Typ. | Max | Unit | Notes |
|---------------------------------|---------|------|------|---------|------|---------------------------|
| Transmitter | | | | | | |
| CML Inputs(Differential) | Vin | 250 | | 1000 | mVpp | AC coupled input*(note6) |
| Input Impedance (Differential) | Zin | 85 | 100 | 115 | ohm | Rin > 100 kohm @ DC |
| TX_Dis | Disable | 2 | | Vcc+0.3 | V | |
| | Enable | 0 | | 0.8 | | |
| TX_FAULT | Fault | 2 | | Vcc+0.3 | V | |
| | Normal | 0 | | 0.5 | | |
| Receiver | | | | | | |
| CML Outputs (Differential) | Vout | 350 | | 700 | mVpp | AC coupled output*(note6) |
| Output Impedance (Differential) | Zout | 85 | 100 | 115 | ohm | |
| RX_LOS | LOS | 2 | | Vcc+0.3 | V | |
| | Normal | 0 | | 0.8 | V | |
| MOD_DEF (0:2) | VoH | 2.5 | | | V | With Serial ID |
| | VoL | 0 | | 0.5 | V | |

IV. Performance Specifications – Optical

| Parameter | Symbol | Min. | Typical | Max. | Unit |
|---------------------------|--------|------|---------|------|------|
| Data Rate | DR | 0.6 | 10.3 | 11.3 | Gbps |
| Transmitter | | | | | |
| Center Wavelength Spacing | | | 100 | | GHz |
| | | | 0.8 | | nm |

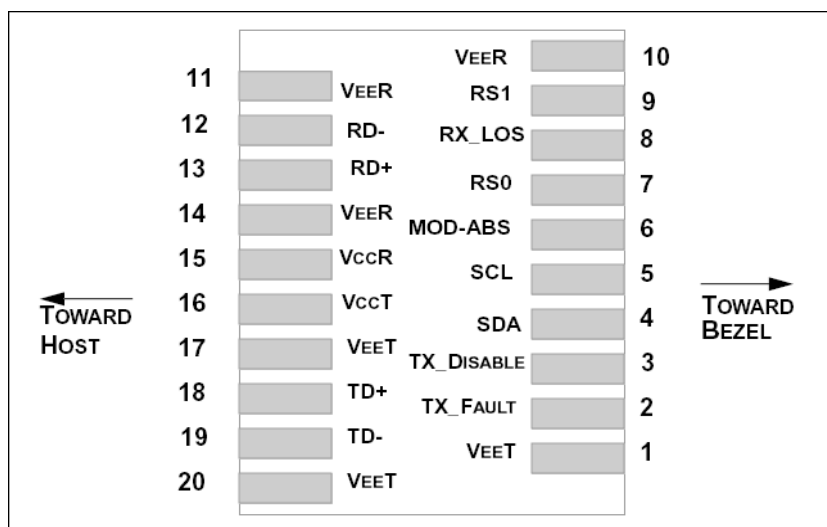
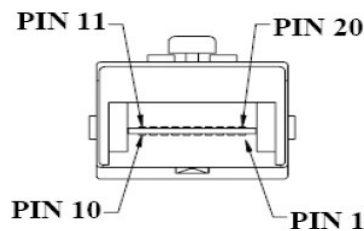
| | | | | | |
|--|-----------------|--------------------------|------|------|-------|
| Spectral width(RMS) | $\Delta\lambda$ | | 0.15 | 0.3 | nm |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB |
| Average Output Power*(note4) | Pout | 1 | | 5 | dBm |
| Average Launch Power (Tx: OFF) | Poff | | | -30 | dBm |
| Extinction Ratio | ER | 6 | | | dB |
| Pout@TX Disable Asserted | Pout | | | -45 | dBm |
| Transmitter Dispersion Penalty@1600ps/nm | TDP | | | 3.5 | dB |
| Relative Intensity Noise | RIN | | | -128 | dB/Hz |
| TX Jitter | TXj | Per 802.3ae requirements | | | |
| Receiver | | | | | |
| Receiver Sensitivity*(note5) | Pmin | | | -23 | dBm |
| Receiver Overload | Pmax | -7 | | | dBm |
| LOS De-Assert | LOSD | | | -24 | dBm |
| LOS Assert | LOSA | -40 | | | dBm |
| LOS Hysteresis | | 1 | | | dB |

Note4: Output is coupled into a 9/125 μ m single-mode fiber.

Note5: Minimum average optical power measured at the BER less than 1E-12, OSNR > 30dB. The measure pattern is PRBS 231-1.

Note6: CML logic, internally AC coupled.

V. SFP+ Transceiver Electrical Pad Layout



VI. Pin Function Definition

| Pin Num. | Name | FUNCTION | Plug Seq. | Notes |
|----------|------------|------------------------------|-----------|---|
| 1 | VeeT | Transmitter Ground | 1 | Note 5 |
| 2 | TX Fault | Transmitter Fault Indication | 3 | Note 1 |
| 3 | TX Disable | Transmitter Disable | 3 | Note 2, Module disables on high or open |
| 4 | SDA | Module Definition 2 | 3 | 2-wire Serial Interface Data Line. |
| 5 | SCL | Module Definition 1 | 3 | 2-wire Serial Interface Clock. |
| 6 | MOD-ABS | Module Definition 0 | 3 | Note 3 |
| 7 | RS0 | RX Rate Select (LVTTTL). | 3 | No Function Implement. |
| 8 | LOS | Loss of Signal | 3 | Note 4 |
| 9 | RS1 | TX Rate Select (LVTTTL). | 1 | No Function Implement. |
| 10 | VeeR | Receiver Ground | 1 | Note 5 |
| 11 | VeeR | Receiver Ground | 1 | Note 5 |
| 12 | RD- | Inv. Received Data Out | 3 | Note 6 |
| 13 | RD+ | Received Data Out | 3 | Note 7 |
| 14 | VeeR | Receiver Ground | 1 | Note 5 |
| 15 | VccR | Receiver Power | 2 | 3.3 ± 5%, Note 7 |
| 16 | VccT | Transmitter Power | 2 | 3.3 ± 5%, Note 7 |
| 17 | VeeT | Transmitter Ground | 1 | Note 5 |
| 18 | TD+ | Transmit Data In | 3 | Note 8 |
| 19 | TD- | Inv. Transmit Data In | 3 | Note 8 |
| 20 | VeeT | Transmitter Ground | 1 | Note 5 |

Notes:

1. TX Fault is an open collector/drain output, which should be pulled up with a 4.7K – 10KΩ resistor on the host board. Pull up voltage between 2.0V and VccT, R+0.3V. When high, output indicates a laser fault of some kind. Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.

2. TX disable is an input that is used to shut down the transmitter optical output. It is pulled up within the module with a 4.7 – 10 K Ω resistor. Its states are:
 3. Low (0 – 0.8V): Transmitter on (>0.8, < 2.0V): Undefined
 4. High (2.0 – 3.465V): Transmitter Disabled Open: Transmitter Disabled
 5. Module absent, connected to VEET or VEER in the module.
6. LOS (Loss of Signal) is an open collector/drain output, which should be pulled up with a 4.7K – 10K Ω resistor. Pull up voltage between 2.0V and VccT, R+0.3V. When high, this output indicates the received optical power is below the worst-case receiver sensitivity (as defined by the standard in use). Low indicates normal operation. In the low state, the output will be pulled to < 0.8V.
7. The module signal ground contacts, VeeR and VeeT, should be isolated from the module case
8. RD-/+: These are the differential receiver outputs. They are AC coupled 100 Ω differential lines which should be terminated with 100 Ω (differential) at the user SERDES. The AC coupling is done inside the module and is thus not required on the host board.
9. VccR and VccT are the receiver and transmitter power supplies. They are defined as 3.3V
10. $\pm 5\%$ at the SFP+ connector pin. Maximum supply current is 300mA. Inductors with DC resistance of less than 1 ohm 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 30mA greater than the steady state value. VccR and VccT may be internally connected within the SFP+ transceiver module.
11. TD-/+: These are the differential transmitter inputs. They are AC-coupled, differential lines with 100 Ω differential termination inside the module. The AC coupling is done inside the module and is thus not required on the host board.

VII. C-band λ c Wavelength Guide

| ITU Channel Product Code | Frequency (THz) | Wavelength | ITU Channel Product Code | Frequency (THz) | Wavelength |
|--------------------------|-----------------|------------|--------------------------|-----------------|------------|
| 17 | 191.7 | 1563.86 | 40 | 194.0 | 1545.32 |
| 18 | 191.8 | 1563.05 | 41 | 194.1 | 1544.53 |
| 19 | 191.9 | 1562.23 | 42 | 194.2 | 1543.73 |
| 20 | 192.0 | 1561.42 | 43 | 194.3 | 1542.94 |
| 21 | 192.1 | 1560.61 | 44 | 194.4 | 1542.14 |
| 22 | 192.2 | 1559.79 | 45 | 194.5 | 1541.35 |
| 23 | 192.3 | 1558.98 | 46 | 194.6 | 1540.56 |
| 24 | 192.4 | 1558.17 | 47 | 194.7 | 1539.77 |
| 25 | 192.5 | 1557.36 | 48 | 194.8 | 1538.98 |
| 26 | 192.6 | 1556.55 | 49 | 194.9 | 1538.19 |
| 27 | 192.7 | 1555.75 | 50 | 195.0 | 1537.40 |
| 28 | 192.8 | 1554.94 | 51 | 195.1 | 1536.61 |
| 29 | 192.9 | 1554.13 | 52 | 195.2 | 1535.82 |
| 30 | 193.0 | 1553.33 | 53 | 195.3 | 1535.04 |
| 31 | 193.1 | 1552.52 | 54 | 195.4 | 1534.25 |
| 32 | 193.2 | 1551.72 | 55 | 195.5 | 1533.47 |
| 33 | 193.3 | 1550.92 | 56 | 195.6 | 1532.68 |

| | | | | | |
|----|-------|---------|----|-------|---------|
| 34 | 193.4 | 1550.12 | 57 | 195.7 | 1531.90 |
| 35 | 193.5 | 1549.32 | 58 | 195.8 | 1531.12 |
| 36 | 193.6 | 1548.51 | 59 | 195.9 | 1530.33 |
| 37 | 193.7 | 1547.72 | 60 | 196.0 | 1529.55 |
| 38 | 193.8 | 1546.92 | 61 | 196.1 | 1528.77 |
| 39 | 193.9 | 1546.12 | | | |

VIII. Ordering information

| Part Number | Product Description |
|----------------|--|
| AE-SFP+-D80-XX | SFP+, 10Gbps, SMF, 80KM, DDM, LC connector, -5°C ~ +70°C, XX= ITU Grid 17~61 |