

PRODUCT SPECIFICATION

| | | |
|---------------------|---|------------------------------------|
| Part No.: | AC-XP-Q1G10-80 | |
| Description: | 10G SFP+ Transceiver, CWDM 1470-1610nm 80km | |
| Release Date | Rev. | Revision Change Description |
| 2017/06/07 | A0 | New Release |
| 2020/12/28 | A1 | Template Update |

Features

- ✧ Up to 11.1Gbps Data Links
- ✧ CWDM EML transmitter and APD receiver
- ✧ Metal enclosure, for lower EMI
- ✧ Single +3.3V power supply
- ✧ Hot-pluggable
- ✧ Without CDR or with CDR supported 9.95 to 11.3Gb/s reference-free
- ✧ Operating temperature range:
- ✧ Commercial: 0°C~+70°C Industry: -40°C~+85°C
- ✧ RoHS Compliant
- ✧ 2-wire interface with integrated Digital Diagnostic monitoring
- ✧ Up to 80km transmission distance over Single Mode Fiber(SMF)
- ✧ Low power dissipation
- ✧ AC-XP-Q1G10-80:1.4W power dissipation without CDR for Commercial temperature
- ✧ AC-XP-Q1G10-80C:1.6W power dissipation with CDR for Commercial temperature

Application

- ✧ 10GBASE-ZR/ZW
- ✧ 10G SONET/SDH, OTU2/2e

Standard

- ✧ Compliant with MSA SFP+ specification(SFF-8431)
- ✧ Compliant with SFF-8472
- ✧ Compliant with SFP+ MSA
- ✧ Compliant to IEEE 802.3ae

| Wavelength | xx | Clasp Color Code | Wavelength | xx | Clasp Color Code |
|------------|----|------------------|------------|----|------------------|
| 1470 nm | 47 | Gray | 1550 nm | 55 | Yellow |
| 1490 nm | 49 | Purple | 1570 nm | 57 | Orange |
| 1510 nm | 51 | Blue | 1590 nm | 59 | Red |
| 1530 nm | 53 | Green | 1610 nm | 61 | Brown |

Specification

| Absolute Maximum Ratings | | | | |
|--------------------------|--------|---------|---------|------|
| Parameter | Symbol | Min | Max | Unit |
| Storage temperature | TS | -40 | 85 | °C |
| Power Supply Voltage | Vcc3 | -0.3 | +4 | V |
| Relative Humidity | RH | 5 | 95 | % |
| Signal Input Voltage | | Vcc-0.3 | Vcc+0.3 | V |

| Recommended Operating Conditions | | | | | |
|---|--------|------|---------|------|------|
| Parameter | Symbol | Min | Typical | Max | Unit |
| Operating Case Temperature (Commercial) | Tc | 0 | | 70 | °C |
| Operating Case Temperature (Industrial) | Tc | -40 | | 85 | °C |
| Power Supply Voltage | Vcc3 | 3.13 | 3.3 | 3.47 | V |
| Supply Current | Icc3 | 430 | | 460 | mA |
| Data Rate | | | 10.3125 | 11.3 | Gbps |
| Fiber Length 9/125μm core SMF | | - | 80 | - | km |

| Electrical Characteristics | | | | | | |
|--|---------|-----|---------|---------|------|-------|
| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
| Transmitter differential input voltage | Vin,pp | 180 | | 700 | mV | |
| Receiver differential output Voltage | Vout,pp | 400 | | 800 | mV | |
| Input differential impedance | Rin | | 100 | | Ω | 1 |
| Transmit disable voltage | VIH | 2 | | Vcc | V | |
| Transmit enable voltage | VIL | Vee | | Vee+0.8 | V | |
| Data output rise time | Tr | 28 | | | ps | |
| Data output fall time | Tf | 28 | | | ps | |
| Transmit Disable Assert Time | | | | 10 | us | |
| LOS output high level | VLOS-H | 2.0 | | Vcchost | V | 2 |
| LOS output low level | VLOS-L | Vee | | Vee+0.8 | V | 2 |

Notes:

- 1) Connected directly to TX data input pins. AC coupled thereafter.
- 2) Loss Of Signal is LVTTTL. Logic 0 indicates normal operation; logic 1 indicates no signal detected.

| Optical transmitter Characteristics | | | | | | |
|-------------------------------------|--|---------------|---------|---------------|------|-------|
| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
| Launched Power (avg.) | Pout | -1 | | 4 | dBm | 1 |
| Operating Wavelength Range | λ_c | $\lambda-6.5$ | | $\lambda+6.5$ | nm | 2 |
| Spectral Width(-20dB) | $\Delta\lambda$ | | | 1 | nm | |
| Side Mode Suppression Ratio | SMSR | 30 | | | dB | |
| Extinction Ratio | ER | 8.2 | | | dB | |
| Transmitter and Dispersion Penalty | TDP | | | 3 | dB | |
| Output Eye Diagram | Compliant with ITU-T G.691 eye mask and IEEE802.3ae eye mask | | | | | |
| Optical receiver Characteristics | | | | | | |
| Parameter | Symbol | Min | Typical | Max | Unit | Notes |
| Receiver Sensitivity | S | | | -23 | dBm | 3 |
| Wavelength Range | λ_c | 1270 | | 1610 | nm | |
| Optical Power Input Overload | P _{In-max} | -6 | | | dBm | |
| LOS | Optical De-assert | Pd | | -26 | dBm | |
| | Optical Assert | Pa | -35 | | | |
| LOS hysteresis | | 0.5 | | | dB | |

Notes:

- 3) Class 1 Laser Safety per FDA/CDRH and IEC-825-1 regulations.
- 4) “ λ ” is: 1470,1490,1510,1530,1550,1570,1590,1610, please the “product selection” .
- 5) Receiver Reflectance Measured with a PRBS 2³¹-1 test pattern, @10.3125Gbps, ER=3.5dB, BER<10⁻¹².

Pin Descriptions

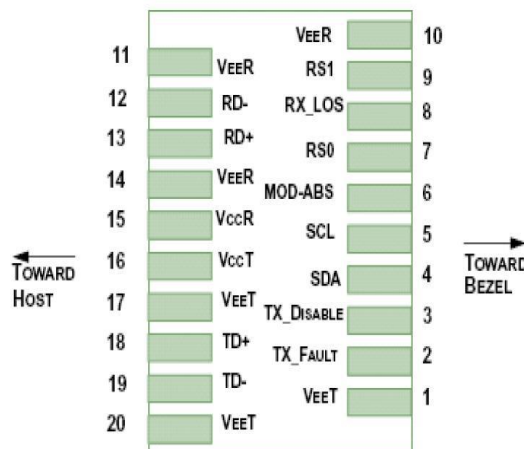


Figure 1 SFP+ Pad assignment Top View

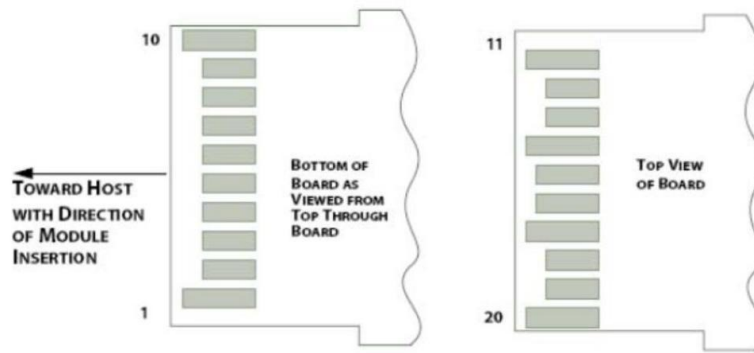


Figure 2 SFP+ Module Contact Assignments

Pin Assignment

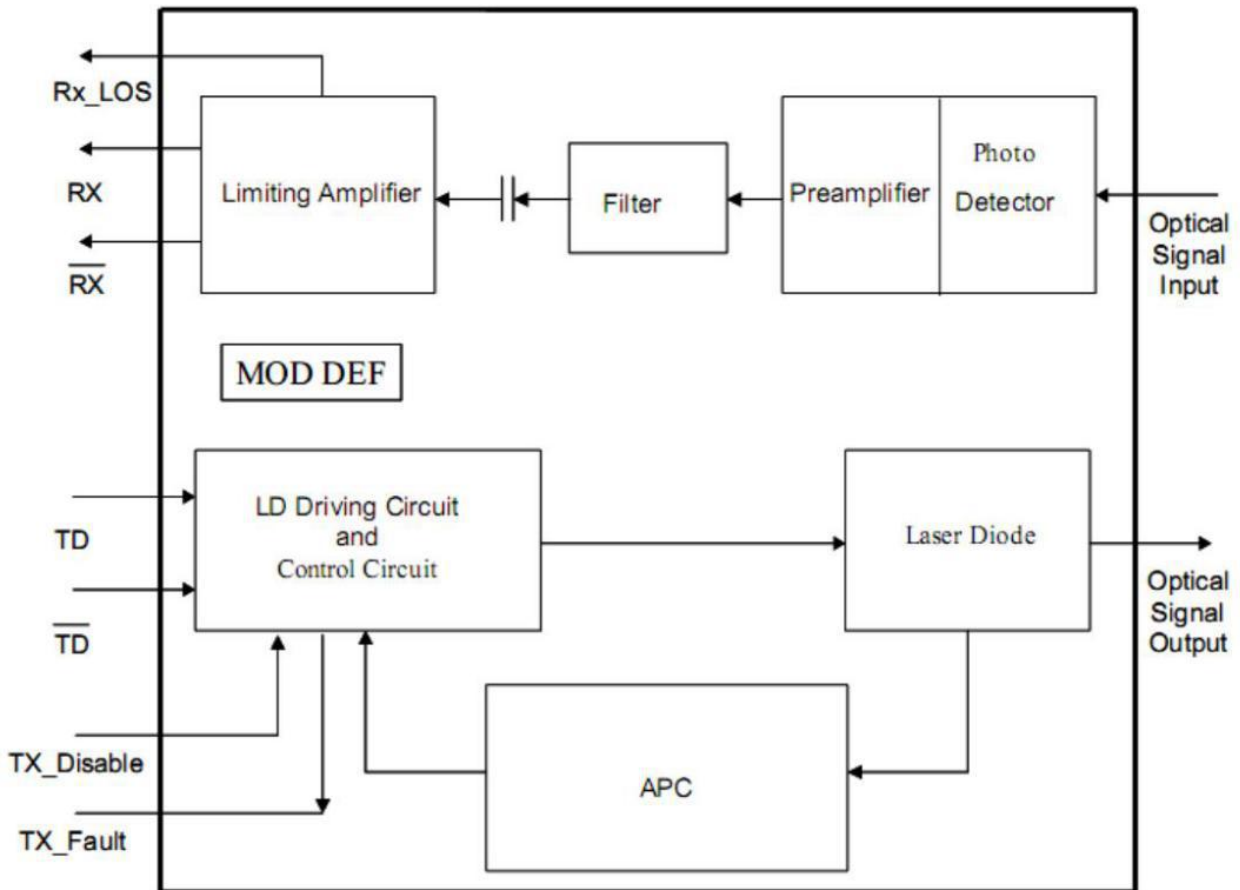
| Pin | Symbol | Description | Notes |
|-----|------------|--|-------|
| 1 | VeeT | Module Ground(Common with Receiver Ground) | 1 |
| 2 | TX_Fault | Transmitter Fault, Low: normal; High: abnormal | 2 |
| 3 | TX_Disable | Transmitter Disable High: Transmitter off Low: Transmitter on | 3 |
| 4 | SDA | 2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i) | 4 |
| 5 | SCL | 2-Wire Serial Interface Data Line (Same as MOD-DEF2 in INF-8074i) | 4 |
| 6 | Mod_ABS | Module Absent, Connect to VeeT or VeeR in Module | 4 |
| 7 | RS0 | no connection | |
| 8 | RX_LOS | Receiver Loss of Signal indication High: loss of signal Low: signal detected | 5 |
| 9 | RS1 | No connection required | |
| 10 | VeeR | Receiver Ground | 1 |
| 11 | VeeR | Receiver Ground | 1 |
| 12 | RD- | Receiver Inverted DATA out. AC Coupled. CML-O | |
| 13 | RD+ | Receiver Non-inverted DATA out. AC Coupled. CML-O | |
| 14 | VeeR | Receiver Ground | 1 |
| 15 | VccR | Receiver Power Supply | |
| 16 | VccT | Transmitter Power Supply | |
| 17 | VeeT | Transmitter Ground | 1 |
| 18 | TD+ | Transmitter Non-Inverted DATA in. AC Coupled. CML-I | |
| 19 | TD- | Transmitter Inverted DATA in. AC Coupled. CML-I | |
| 20 | SDA | Transmitter Ground | 1 |

Notes:

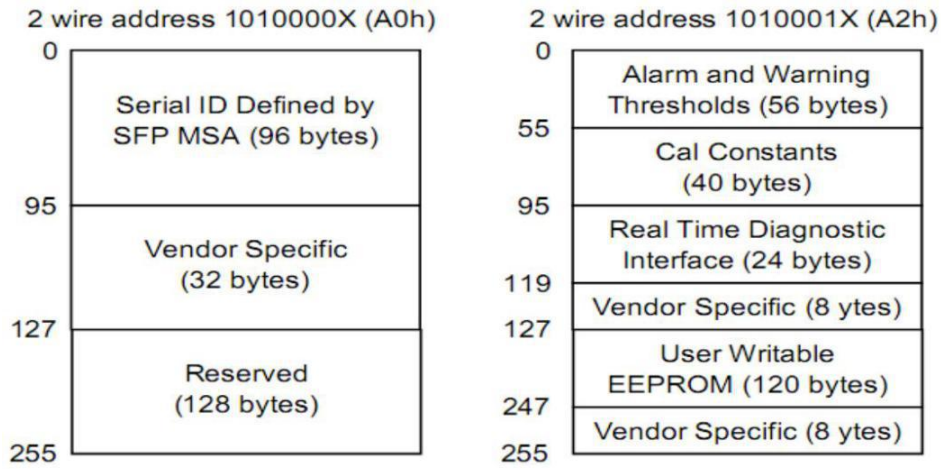
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- 1) Circuit ground is internally isolated from chassis ground.
- 2) TFAULT is an open collector/drain output, which should be pulled up with a 4.7k – 10k Ohms resistor on the host board if intended for use. Pull up voltage should be between 2.0V to Vcc + 0.3V. A high output indicates a transmitter fault caused by either the TX bias current or the TX output power exceeding the preset alarm thresholds. A low output indicates normal operation. In the low state, the output is pulled to <math><0.8V</math>.
- 3) Laser output disabled on TDIS >2.0V or open, enabled on TDIS <math><0.8V</math>.
- 4) Should be pulled up with 4.7k Ω - 10k Ω host board to a voltage between 2.0V and 3.6V. MOD_ABS pulls line low to indicate module is plugged in.
- 5) LOS is open collector output. It should be pulled up with 4.7k Ω – 10k Ω on host board to a typical 3.3V voltage. Logic 0 indicates normal operation; logic 1 indicates loss of signal.

Block Diagram

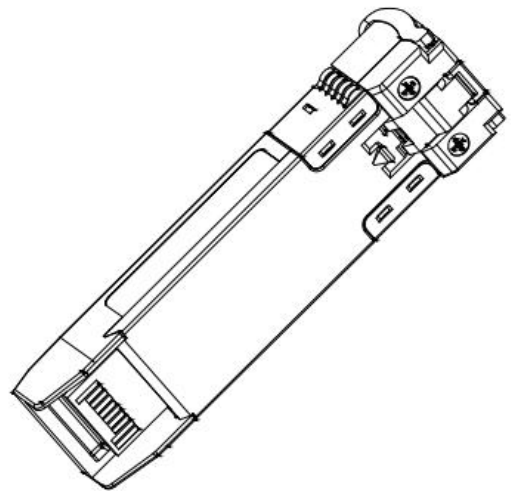
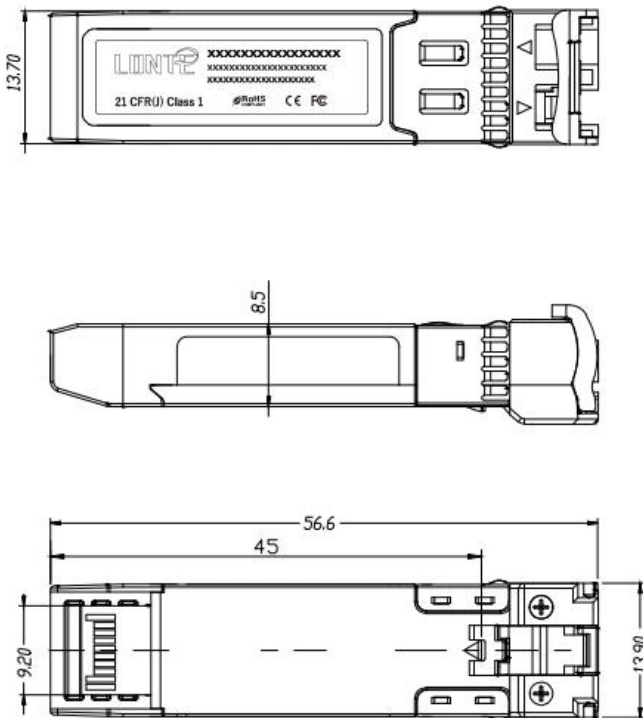


Digital Diagnostic Memory Map



Package Outline

Dimensions are in millimeters. All dimensions are $\pm 0.2\text{mm}$ unless otherwise specified. (Unit: mm)



All dimensions are $\pm 0.2\text{mm}$ unless otherwise specified.
Unit: mm

Regulatory Compliance

| Feature | Test | Method |
|--|---|---|
| Electrostatic Discharge (ESD) to the Electrical Pins | MIL-STD-883E Method 3015.7 | Class 1(>1000V for SFI pins, >2000Vfor other pins.) |
| Electrostatic Discharge (ESD) Immunity | IEC61000-4-2 | Class 2(>4.0kV) |
| Electromagnetic Interference (EMI) | CISPR22 ITE Class B FCC Class B CENELEC EN55022 VCCI Class 1 | Comply with standard |
| Immunity | IEC61000-4-3 | Comply with standard |
| Eye Safety | FDA 21CFR 1040.10 and 1040.11 EN (IEC) 60825-1,2 | Compatible with Class I laser Product |

Ordering information

| Part. No | Specifications | | | | | | | | | |
|------------------|----------------|-------------|-------------|----------|-----|-----------|-----------|------------|-----|-----|
| | Pack | Rate (Gbps) | Tx (nm) | Po (dBm) | RX | Sen (dBm) | Temp (°C) | Reach (km) | DDM | CDR |
| AC-XP-Q1G10-80 | SFP+ | 10.3125 | CWDM EML | -1~4 | APD | <-23 | 0~70 | 80 | Y | N |
| AC-XP-Q1G10-80C | SFP+ | 10.3125 | CWDM EML | -1~4 | APD | <-23 | 0~70 | 80 | Y | Y |
| AC-XP-Q1G10-80F | SFP+ | 10.3125 | CWDM EML | -1~4 | APD | <-23 | -40~85 | 80 | Y | N |
| AC-XP-Q1G10-80CF | SFP+ | 10.3125 | CWDM EML | -1~4 | APD | <-23 | -40~85 | 80 | Y | Y |