# AB015 - 40G QSFP+ 2Km Optical Transceiver Module

## Features

- ✧ Up to 10.5Gb/s data rate per channel
- ✧ Distance up to 2Km on SMF
- ✧ 4 ×10G CWDM DFB transmitter
- ✧ Duplex LC receptacle optical interface
- ✧ Single +3.3V power supply
- ✧ XLPPI electrical interface
- ✧ Hot pluggable QSFP+ form factor
- ✧ Maximum power dissipation<3.5W
- ✧ Operating temperature range: 0℃ ~ +70 ℃
- ✧ Compliant with RoHS6

## Applications

- ✧ 40G Ethernet

## Standards

- ✧ Compliant with QSFP+ MSA(SFF-8436 v4.8)
- ✧ Compliant with IEEE 802.3ba

## Absolute Maximum Ratings

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Storage Temperature | Ts | -40 | | 85 | ºC |
| Supply Voltage | Vcc1,VccTx, VccRx | -0.5 | | +4.0 | V |
| Relative Humidity | RH | 5 | | 95 | % |

# Recommended Operating Conditions

| Parameter | Symbol | Min. | Typ. | Max. | Unit |
|---|---|---|---|---|---|
| Case Operating Temperature | $T_A$ | 0 | | 70 | ºC |
| Supply Voltage | VCC | 3.135 | 3.3 | 3.465 | V |
| Data Rate(Per channel) | | | 10.3125 | 10.5 | Gbps |

# Performance Specifications

(tested under recommended operating conditions ,unless otherwise noted)

## a. Electrical Characteristics(Top=0 to 70℃, Vcc=3.135 to 3.465V)

| Parameter | Symbol | Unit | Min | Typ. | Max | Notes |
|---|---|---|---|---|---|---|
| Supply Current | Icc | A | | | 1.1 | |
| **Transmitter(per Lane)** | | | | | | |
| Single ended input voltage | VinT | V | -0.3 | | 4.0 | |
| Differential Data Input Swing | Vin,pp | mVpp | 150 | | 1000 | |
| J2 Jitter Tolerance | Jt2 | UI | 0.17 | | V | |
| J9 Jitter Tolerance | Jt9 | UI | 0.29 | | | |
| Data Dependent Pulse Width Shrinkage | DDPWS | UI | 0.07 | | | |
| Eye mask {X1,X2, Y1,Y2} | | UI | | 0.11,0.31 | | 1 |
| | | mV | | 95,350 | | |
| **Receiver(per Lane)** | | | | | | |
| Single ended output voltage tolerance | | V | -0.3 | | 4.0 | |
| Differential Data output Swing | Vout,pp | mVpp | 300 | | 850 | |
| Output transition time,20% to 80% | | ps | 28 | | | |
| J2 Jitter output | Jo2 | UI | | | 0.42 | |
| J9 Jitter output | Jo9 | UI | | | 0.65 | |
| Eye mask {X1,X2, Y1,Y2} | | UI | | 0.29,0.5 | | 1 |
| | | mV | | 150,425 | | |

Note1. Hit ratio = 5 x 10E-5

## b. Optical Characteristics((Top=0 to 70℃, Vcc=3.135 to 3.465V)

| Parameter | Symbol | Unit | Min | Typ | Max | Notes |
|---|---|---|---|---|---|---|
| **Transmitter(per Lane)** | | | | | | |

| | | | | | | |
|---|---|---|---|---|---|---|
| Signaling Speed | | GBd | | 10.3125 | | |
| Center wavelength | | nm | 1264.5 | 1271 | 1277.5 | |
| | | | 1284.5 | 1291 | 1297.5 | |
| | | | 1304.5 | 1311 | 1317.5 | |
| | | | 1324.5 | 1331 | 1337.5 | |
| Average Launch Power per Lane | TXPx | dBm | -7 | | 3 | SMF |
| Side Mode Suppression Ratio | SMSR | dB | 30 | | | |
| Optical Extinction Ratio | ER | dB | 3.5 | | | |
| Optical Return Loss Tolerance | ORL | dB | | | 12 | |
| Average launch power of OFF transmitter | | dBm | | | -30 | |
| Relative Intensity Noise | RIN | dB/Hz | | | -128 | |
| Transmitter Eye mask definition{X1，X2，X3,Y1，Y2,Y3} | | | {0.25, 0.4, 0.45, 0.25, 0.28,0.4} | | | |
| **Receiver(per Lane)** | | | | | | |
| Signaling Speed | | GBd | | 10.3125 | | |
| Center wavelength | | nm | 1264.5 | 1271 | 1277.5 | |
| | | | 1284.5 | 1291 | 1297.5 | |
| | | | 1304.5 | 1311 | 1317.5 | |
| | | | 1324.5 | 1331 | 1337.5 | |
| Damage Threshold | Pmax | dBm | 5.5 | | | |
| Average Receive Power | RXPx | dBm | -13.7 | | 2.5 | SMF |
| Receive Power(OMA) | RxOMA | dBm | | | 3.5 | SMF |
| Receive Sensitivity(OMA) | RXsen | dBm | | | -11.5 | SMF |
| Stressed Receive Sensitivity(OMA) | RXsen | dBm | | | -9.6 | SMF |
| LOS De-Assert | LOSD | dBm | | | -16 | |
| LOS Assert | LOSA | dBm | -30 | | | |
| LOS Hysteresis | LOSA | dB | 0.5 | | | |

# Lower Memory Map

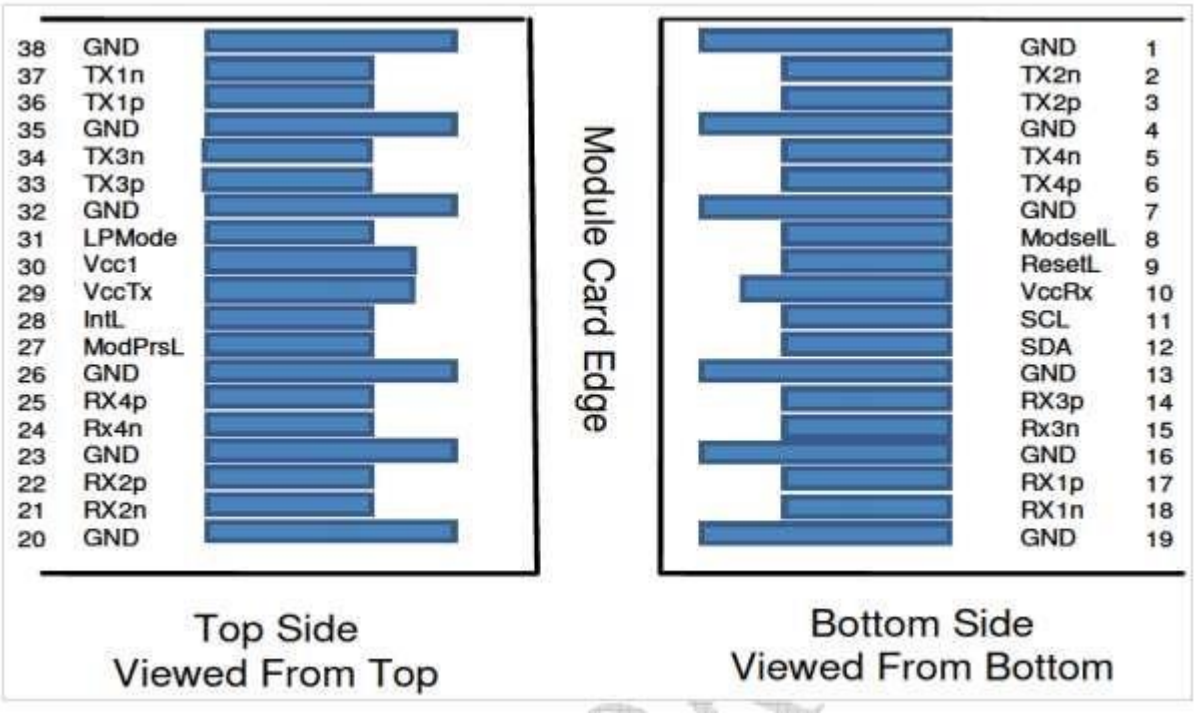
The lower 128 bytes of the 2-wire serial bus address space, see Table 1, is used to access a variety of measurements and diagnostic functions, a set of control functions, and a means to select which of the various upper memory map pages are accessed on subsequent reads.

Table 1 Lower Memory Map (A0h)

| Data Address | Size(Bytes) | Name of Field | Description |
|---|---|---|---|
| 0 | 1 | Identifier | Read-Only |
| 1-2 | 2 | Status | Read-Only |
| 3-21 | 19 | Interrupt Flags | Read-Only |
| 22-33 | 10 | Module Monitors | Read-Only |
| 34-81 | 48 | Channel Monitors | Read-Only |
| 82-85 | 4 | Reserved | Read-Only |
| 86-97 | 12 | Control | Read/Write |
| 98-99 | 2 | Reserved | Read/Write |
| 100-106 | 7 | Module and Channel Masks | Read/Write |
| 107-118 | 12 | Reserved | Read/Write |
| 119-122 | 4 | Password Change Entry | Read/Write |
| 123-126 | 4 | Password Change Entry Area (optional) | Read/Write |
| 127 | 1 | Page Select Byte | Read/Write |

Note. See SFF-8436 v4.8 for details.

# Pin Function Definitions




| Pin Number | Name | Description | Plug Seq. | Notes |
|---|---|---|---|---|

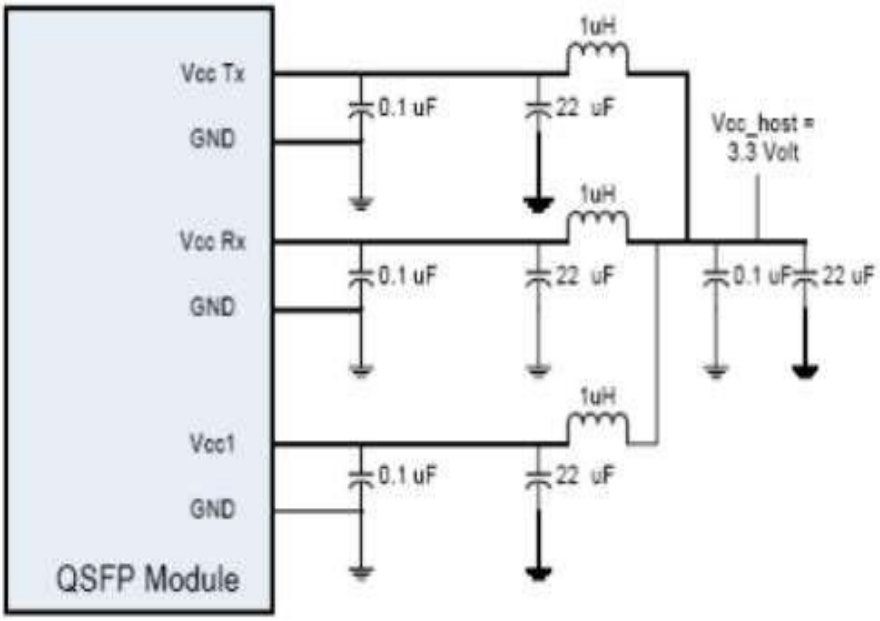
| | | | | |
|---|---|---|---|---|
| 1 | GND | Ground | 1 | 1 |
| 2 | Tx2n | Transmitter Inverted Data Input | 3 | |
| 3 | Tx2p | Transmitter Non-Inverted Data Input | 3 | |
| 4 | GND | Ground | 1 | 1 |
| 5 | Tx4n | Transmitter Inverted Data Input | 3 | |
| 6 | Tx4p | Transmitter Non-Inverted Data Input | 3 | |
| 7 | GND | Ground | 1 | 1 |
| 8 | ModSelL | Module Select | 3 | |
| 9 | ResetL | Module Reset | 3 | |
| 10 | Vcc Rx | +3.3 V Power supply receiver | 2 | |
| 11 | SCL | 2-wire serial interface clock | 3 | |
| 12 | SDA | 2-wire serial interface data | 3 | |
| 13 | GND | Ground | 1 | 1 |
| 14 | Rx3p | Receiver Non-Inverted Data Output | 3 | |
| 15 | Rx3n | Receiver Inverted Data Output | 3 | |
| 16 | GND | Ground | 1 | 1 |
| 17 | Rx1p | Receiver Non-Inverted Data Output | 3 | |
| 18 | Rx1n | Receiver Inverted Data Output | 3 | |
| 19 | GND | Ground | 1 | 1 |
| 20 | GND | Ground | 1 | 1 |
| 21 | Rx2n | Receiver Inverted Data Output | 3 | |
| 22 | Rx2p | Receiver Non-Inverted Data Output | 3 | |
| 23 | GND | Ground | 1 | 1 |

| | | | | |
|---|---|---|---|---|
| 24 | Rx4n | Receiver Inverted Data Output | 3 | |
| 25 | Rx4p | Receiver Non-Inverted Data Output | 3 | |
| 26 | GND | Ground | 1 | 1 |
| 27 | ModPrsL | Module Present | 3 | |
| 28 | IntL | Interrupt | 3 | |
| 29 | Vcc Tx | +3.3 V Power supply transmitter | 2 | |
| 30 | Vcc1 | +3.3 V Power Supply | 2 | |
| 31 | LPMode | Low Power Mode | 3 | |
| 32 | GND | Ground | 1 | 1 |
| 33 | Tx3p | Transmitter Non-Inverted Data Input | 3 | |
| 34 | Tx3n | Transmitter Inverted Data Input | 3 | |
| 35 | GND | Ground | 1 | 1 |
| 36 | Tx1p | Transmitter Non-Inverted Data Input | 3 | |
| 37 | Tx1n | Transmitter Inverted Data Input | 3 | |
| 38 | GND | Ground | 1 | 1 |

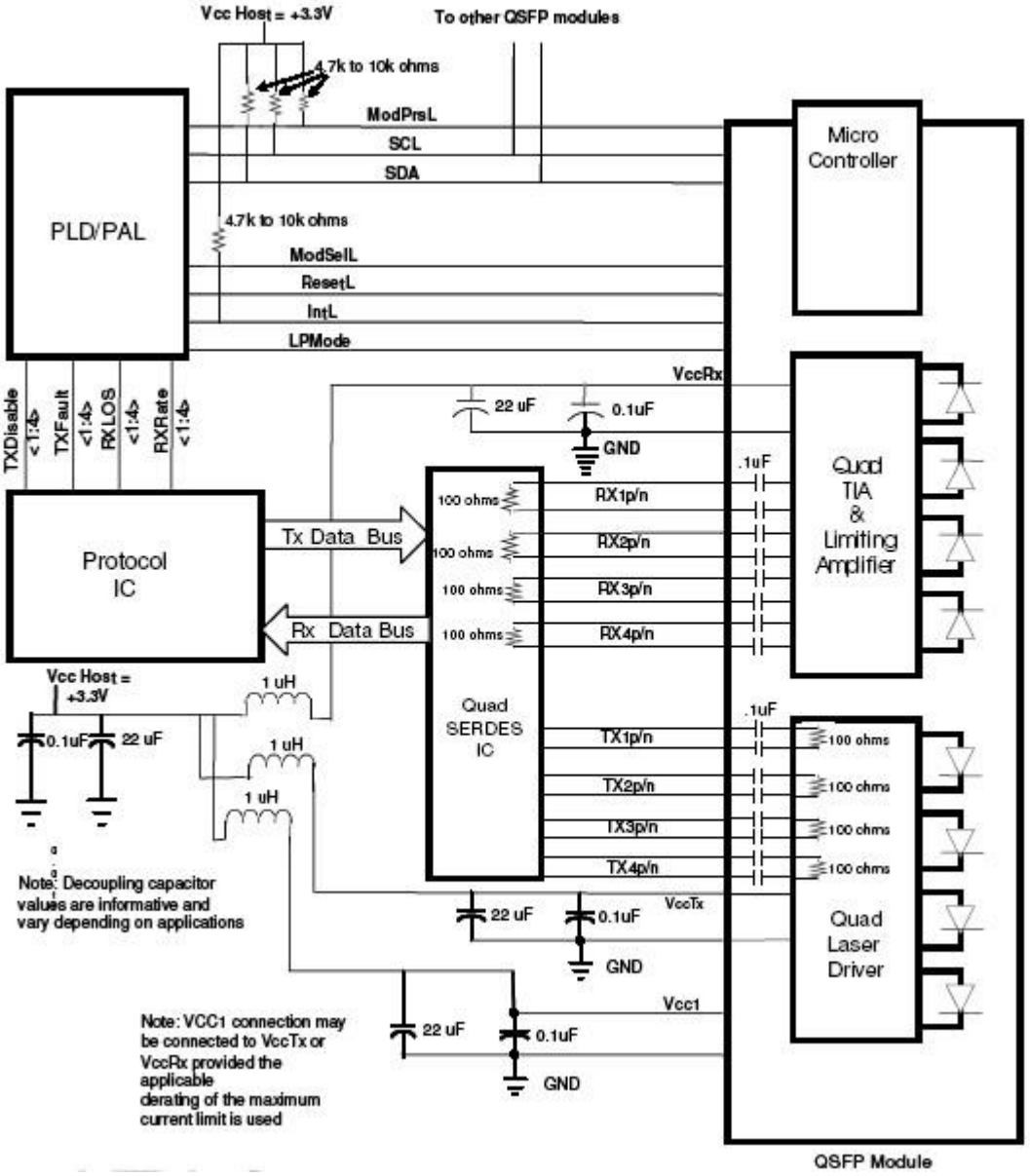
**Note** 1.Circuit ground is internally isolated from chassis ground.

# Required Host Board Components

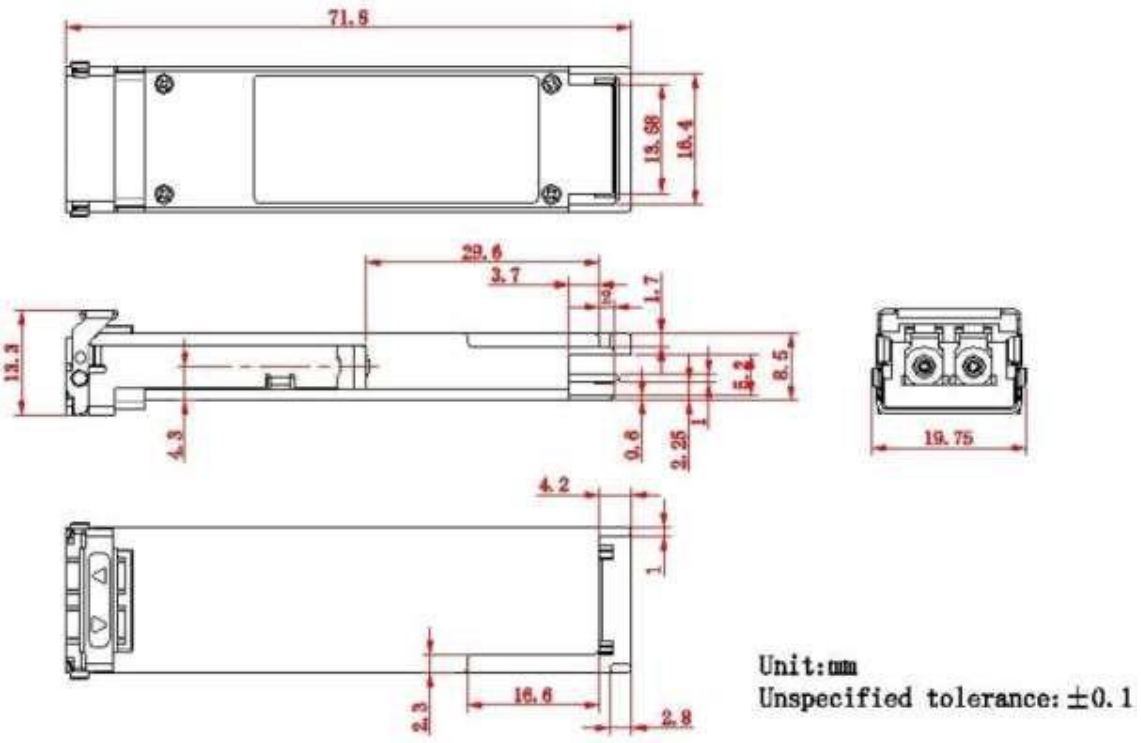
Any voltage drop across a filter network on the host is counted against the host DC set point accuracy specification. Inductors with DC Resistance of less than 0.1 Ohm should be used in order to maintain the required voltage at the Host Edge Card Connector. Figure is the suggested transceiver/host interface.



# Typical application circuit



# Package Outline




# Ordering information

| Product Number | package | Data Rate | Laser | Detector | Distance | Application | Temp. |
|---|---|---|---|---|---|---|---|
| ABC-QP-S31L-2D | QSFP+ | 40Gbps | CWDM DFB | PIN | 2Km@SMF | 40GbE | 0~70℃ |