

# QSFP-100G-SL-BXU40

100G BIDI QSFP28 Single Lambda Tx 1304, Rx 1309nm 40km

## Features

- Supports 100GBASE-ER1-40 BIDI
- Lane signaling rate 106.25Gb/s with PAM4
- Up to 40km transmission on SMF
- EML laser and APD receiver
- 4x25.78Gb/s with NRZ electrical interface (CAUI-4)
- High speed I/O electrical interface
- I2C interface with integrated Digital Diagnostic monitoring
- QSFP28 MSA package with simplex LC connector
- Single +3.3V power supply
- Maximum power consumption 4.5 W
- Operating case temperature: 0 to +70 °C
- Compliant to 802.3cu, SFF-8636&SFF-8679 standard
- Complies with EU Directive 2015/863/EU

## Application

- 100GBASE-ER1-40 BIDI

## Absolute Maximum Ratings

**Table 1- Absolute Maximum Ratings**

| Parameter                   | Symbol          | Min  | Typical | Max  | Units | Notes |
|-----------------------------|-----------------|------|---------|------|-------|-------|
| Storage Temperature         | T <sub>s</sub>  | -40  |         | +85  | degC  |       |
| Supply Voltage              | V <sub>cc</sub> | -0.5 | -       | +4.0 | V     |       |
| Operating Relative Humidity | RH              | -    | -       | +85  | %     |       |

## Recommended Operating Environment

**Table 2 - Recommended Operating Environment**

| Parameter                  | Symbol          | Min  | Typical | Max  | Units | Notes    |
|----------------------------|-----------------|------|---------|------|-------|----------|
| Operating Case Temperature | T <sub>c</sub>  | 0    |         | 70   | °C    |          |
| Power Supply Voltage       | V <sub>CC</sub> | 3.13 | 3.3     | 3.47 | V     |          |
| Power Supply Current       | I <sub>CC</sub> | -    | -       | 1.3  | A     |          |
| Maximum Power Dissipation  | P <sub>D</sub>  | -    | -       | 4.5  | W     |          |
| Data Rate(optical)         | DRO             | -    | 106.25  | -    | Gb/s  |          |
| Transmission Distance      | TD              | -    | -       | 40   | km    | Over SMF |

## Optical Characteristics

**Table 3- Optical Characteristics**

| Transmitter                                                   |                     |           |         |         |      |           |
|---------------------------------------------------------------|---------------------|-----------|---------|---------|------|-----------|
| Parameter                                                     | Symbol              | Min.      | Typical | Max.    | Unit | Notes     |
| Center Wavelength                                             | CW                  | 1303.54   | 1304.58 | 1305.63 | nm   |           |
| Average Launch Power                                          | PTX                 | 1.7       | -       | 7.1     | dBm  | 1         |
| Outer Optical Modulation Amplitude                            | OMA                 | 4.5       | -       | 7.9     | dBm  | TEDCQ<1.4 |
|                                                               |                     | 3.3+TEDCQ | -       |         | dBm  | TEDCQ>1.4 |
| Transmitter and dispersion eye closure for PAM4 (TEDCQ) (max) | TDECQ               | -         | -       | 3.9     | dBm  |           |
| TEDCQ-TECQ  (max)                                             | -                   | -         | -       | 2.7     | dB   |           |
| Average Output Power (Laser Turn off)                         | POUT-OFF            | -         | -       | -15     | dBm  |           |
| Side Mode Suppression Ratio                                   | SMSR                | 30        | -       | -       | dB   |           |
| Extinction Ratio                                              | ER                  | 6         | -       | -       | dB   |           |
| Receiver                                                      |                     |           |         |         |      |           |
| Center Wavelength                                             | CW                  | 1308.09   | 1309.14 | 1310.19 | nm   |           |
| Damage threshold                                              | P <sub>damage</sub> | -2.4      | -       | -       | dBm  | 2         |
| Average Rx Power                                              | P <sub>RX</sub>     | -16.0     | -       | -3.4    | dBm  | 3         |
| Receive power_OMAouter                                        | P <sub>OMA</sub>    | -         | -       | -2.6    | dBm  |           |
| Receiver sensitivity _OMAouter                                | SEN_ OMA            | -         | -       | -13.8   | dBm  | 4         |
| Los Assert                                                    | LosA                | -26       | -       | -       | dBm  |           |
| Los De-Assert                                                 | LosDA               | -         | -       | -15     | dBm  |           |
| Los Hysteresis                                                | LosH                | 0.5       | -       | -       | dB   |           |

**Notes:**

1. The optical power is launched into SMF.
2. The receiver shall be able to tolerate, without damage, continuous exposure to an optical input signal having this average power level. The receiver does not have to operate correctly at this input power.
3. Average receive power, each lane (min) is informative and not the principal indicator of signal strength.
4. Measured with conformance test signal at TP3 using the test pattern PRBS31Q or scrambled idle for stressed receiver sensitivity for the BER= 2.4x10<sup>-4</sup>.

**Electrical Characteristics**
**Table 4- Electrical Characteristics**

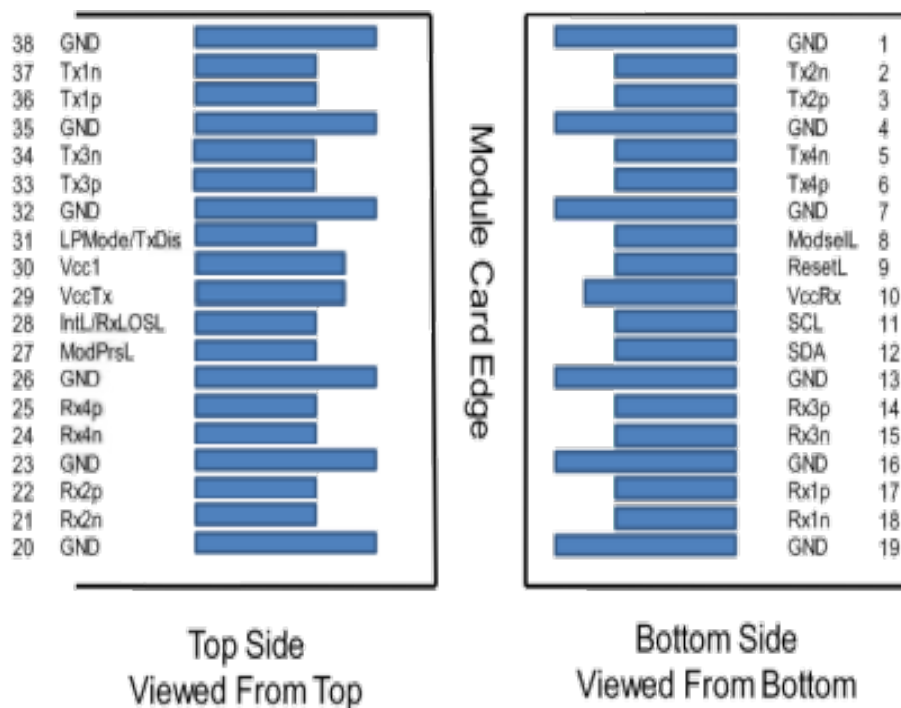
| Transmitter (Module Input)              |                      |                      |         |                      |      |       |
|-----------------------------------------|----------------------|----------------------|---------|----------------------|------|-------|
| Parameter                               | Symbol               | Min.                 | Typical | Max.                 | Unit | Notes |
| Input Differential Impedance            | R <sub>in</sub>      | -                    | 100     | -                    | Ohm  |       |
| Differential Data Input Amplitude       | V <sub>IN,P-P</sub>  | 80                   | -       | 900                  | mVpp |       |
| Differential termination mismatch (max) | D-mismatch           | -                    | -       | 10                   | %    |       |
| DC common-mode input voltage            |                      | -0.3                 | -       | 2.8                  | V    |       |
| Transition time(20%~80%)                | Tr Tf                | 10                   | -       | -                    | ps   |       |
| LPMODE, Reset and ModSelL / Tx dis      | V <sub>IL</sub>      | -0.3                 | -       | 0.8                  | V    |       |
| LPMODE, Reset and ModSelL / Tx dis      | V <sub>IH</sub>      | 2.0                  | -       | V <sub>CC</sub> +0.3 | V    |       |
| Receiver (Module Output)                |                      |                      |         |                      |      |       |
| Output Differential Impedance           | R <sub>out</sub>     | -                    | 100     | -                    | Ohm  |       |
| Differential Data Output Amplitude      | V <sub>OUT,P-P</sub> | -                    | -       | 900                  | mVpp |       |
| Differential termination mismatch (max) | D-mismatch           | -                    | -       | 10                   | %    |       |
| Transition time, 20% to 80%             | Tr Tf                | 12                   | -       |                      | ps   |       |
| ModPrsL and IntL/ Rx los                | V <sub>OL</sub>      | 0                    | -       | 0.4                  | V    |       |
| ModPrsL and IntL/ Rx los                | V <sub>OH</sub>      | V <sub>CC</sub> -0.5 | -       | V <sub>CC</sub> +0.3 | V    |       |

**Digital Diagnostics**
**Table 5- Digital Diagnostics**

| Parameter       | Range         | Accuracy | Unit | Calibration |
|-----------------|---------------|----------|------|-------------|
| Temperature     | 0 to 70       | ±3       | °C   | Internal    |
| Voltage         | 0 to VCC      | 0.1      | V    | Internal    |
| Tx Bias Current | 0 to 100      | 10%      | mA   | Internal    |
| Tx Output Power | 1.7 to 7.1    | ±3       | dBm  | Internal    |
| Rx Power        | -16.0 to -3.4 | ±3       | dBm  | Internal    |

## Pin Assignment

### Pin Diagram



## Pin Descriptions

**Table 6- Pin Descriptions**

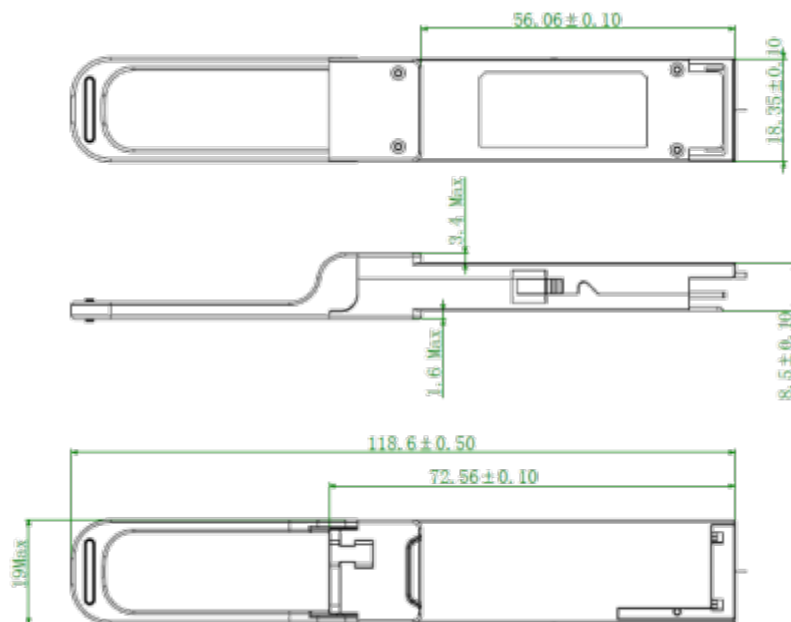
| PIN | Logic       | Symbol  | Description                          | Plug Seq. | Notes |
|-----|-------------|---------|--------------------------------------|-----------|-------|
| 1   |             | GND     | Ground                               | 1         | 1     |
| 2   | CML-I       | Tx2n    | Transmitter Inverted Data Input      | 3         |       |
| 3   | CML-I       | Tx2p    | Transmitter Non-Inverted Data output | 3         |       |
| 4   |             | GND     | Ground                               | 1         | 1     |
| 5   |             | NC      |                                      | 3         |       |
| 6   |             | NC      |                                      | 3         |       |
| 7   |             | GND     | Ground                               | 1         | 1     |
| 8   | LVTLL-I     | ModSelL | Module Select                        | 3         |       |
| 9   | LVTLL-I     | ResetL  | Module Reset                         | 3         |       |
| 10  |             | VccRx   | +3.3V Power Supply Receiver          | 2         | 2     |
| 11  | LVC MOS-I/O | SCL     | 2-Wire Serial Interface Clock        | 3         |       |
| 12  | LVC MOS-I/O | SDA     | 2-Wire Serial Interface Data         | 3         |       |

|    |         |         |                                     |   |   |
|----|---------|---------|-------------------------------------|---|---|
| 13 |         | GND     | Ground                              | 1 |   |
| 14 |         | NC      |                                     | 3 |   |
| 15 |         | NC      |                                     | 3 |   |
| 16 |         | GND     | Ground                              | 1 | 1 |
| 17 | CML-O   | Rx1p    | Receiver Non-Inverted Data Output   | 3 |   |
| 18 | CML-O   | Rx1n    | Receiver Inverted Data Output       | 3 |   |
| 19 |         | GND     | Ground                              | 1 | 1 |
| 20 |         | GND     | Ground                              | 1 | 1 |
| 21 | CML-O   | Rx2n    | Receiver Inverted Data Output       | 3 |   |
| 22 | CML-O   | Rx2p    | Receiver Non-Inverted Data Output   | 3 |   |
| 23 |         | GND     | Ground                              | 1 | 1 |
| 24 |         | NC      |                                     | 3 |   |
| 25 |         | NC      |                                     | 3 |   |
| 26 |         | GND     | Ground                              | 1 | 1 |
| 27 | LVTTL-O | ModPrsL | Module Present                      | 3 |   |
| 28 | LVTTL-O | IntL    | Interrupt                           | 3 |   |
| 29 |         | VccTx   | +3.3 V Power Supply transmitter     | 2 | 2 |
| 30 |         | Vcc1    | +3.3 V Power Supply                 | 2 | 2 |
| 31 | LVTTL-I | LPMode  | Low Power Mode                      | 3 |   |
| 32 |         | GND     | Ground                              | 1 | 1 |
| 33 |         | NC      |                                     | 3 |   |
| 34 |         | NC      |                                     | 3 |   |
| 35 |         | GND     | Ground                              | 1 | 1 |
| 36 | CML-I   | Tx1p    | Transmitter Non-Inverted Data Input | 3 |   |
| 37 | CML-I   | Tx1n    | Transmitter Inverted Data Output    | 3 |   |
| 38 |         | GND     | Ground                              | 1 | 1 |

**Note :**

1. GND is the symbol for signal and supply (power) common for the QSFP28 module. All are common within the QSFP28 module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal-common ground plane.
2. VccRx, Vcc1 and VccTx are the receiver and transmitter power supplies and shall be applied concurrently. Requirements defined for the host side of the Host Edge Card Connector are listed in MSA. The connector pins are each rated for a maximum current of 1000 mA.

## Mechanical Dimension



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