

|                                                                                   |           |              |            |
|-----------------------------------------------------------------------------------|-----------|--------------|------------|
|  | Datasheet | No.          | DS10-U012  |
|                                                                                   |           | Initial Date | 2023-05-23 |
| OU                                                                                | OUB8Cxx41 | Written Team | R&D Dept.  |
|                                                                                   |           |              | GH Zheng   |

## I Preview

|             |                                                         |
|-------------|---------------------------------------------------------|
| PN          | OUB8Cxx41                                               |
| Description | 100G QSFP28 LR1 Bi-Di 1271/1331nm 10KM LC DDMI 10~70 °C |

## II Contents

1. Features
2. Applications
3. Description
4. Absolute maximum Ratings
5. Operating Environment
6. Optical and Electrical Characteristics
7. Digital Diagnostic Memory Map
8. Pin Descriptions
9. Mechanical Dimensions
10. Model Ordering Information

## III Revision History

| No. | Date       | Items | Change Recording     | Ver. | Rev. | Customer |
|-----|------------|-------|----------------------|------|------|----------|
| 1   | 2023-05-23 | All   | Initial registration | 000  | 000  | Standard |
| 2   |            |       |                      |      |      |          |
| 3   |            |       |                      |      |      |          |
| 4   |            |       |                      |      |      |          |
| 5   |            |       |                      |      |      |          |
| 6   |            |       |                      |      |      |          |

|                                                                                                           |           |                                    |                                     |       |
|-----------------------------------------------------------------------------------------------------------|-----------|------------------------------------|-------------------------------------|-------|
| <br>Communication Limited | Datasheet |                                    | DS10-U012<br>Final Rev.: 2023-05-23 |       |
|                                                                                                           | Product   | 100G QSFP28 transceiver OU serials | Ver.                                | 000   |
|                                                                                                           | Part No.  | OUB8Cxx41                          | Rev.                                | 000   |
|                                                                                                           |           |                                    | Page                                | 2 / 8 |

## 1. Features:

- ◆ Supports 100GBASE-LR1-10 BIDI
- ◆ Lane signaling rate 106.25Gb/s with PAM4
- ◆ Up to 10km transmission on SMF
- ◆ EML Laser and PIN 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 Voltage
- ◆ Maximum 1.3A Power Supply Current
- ◆ Support HW TX\_DIS and RX\_LOS for telecom application
- ◆ Maximum power consumption 4.5 W
- ◆ Operating case temperature: 0 to +70 °C
- ◆ Compliant to IEEE802.3bm, 100G single Lambda MSA
- ◆ Compliant to SFF-8636&SFF-8679 standard
- ◆ Complies with EU Directive 2015/863/EU

## 2. Applications

- ◆ 100GBASE-LR1-10 BIDI
- ◆ Other links

## 3. Description

The 100G QSFP28 LR1 Bi-Di transceivers are high-performance, cost-effective modules supporting 10KM on SMF. It integrates four electrical data lanes in each direction into transmission over a single LC single fiber optic cable. Each electrical lane operates at NRZ 25 Gbps and conforms to the PAM4 100GE optical interface. All modules satisfy class I laser safety requirements. The transceivers are compatible with 100GBASE-LR1-10 standard of IEEE802.3bm and SFF-8636&SFF-8679 specification.

## 4. Absolute Maximum Ratings

| Parameter           | Symbol | Min  | Max | Unit |
|---------------------|--------|------|-----|------|
| Supply Voltage      | Vcc    | -0.5 | 4   | V    |
| Storage Temperature | Ts     | -40  | +85 | °C   |
| Operating Humidity  | -      | 5    | 85  | %    |

## 5. Operating Environment

|                                                                                                                                                                                                                                     |        |       |       |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------|-------|----------|
| OCRE COMMUNICATION LIMITED<br>Web: www.ocrecom.com<br>E-Mail: sales@ocrecom.com<br>Add. Dist.A, Building 6, Bay on the six block, Xixiang,<br>Baoan Dist, Shenzhen, China 518000<br>Tel: + 86 755 2335 3855 Fax: + 86 755 2335 3855 | DESIGN | CHECK | CHECK | APPROVAL |
|                                                                                                                                                                                                                                     |        |       |       |          |

|                                                                                                           |           |                                       |                                     |       |
|-----------------------------------------------------------------------------------------------------------|-----------|---------------------------------------|-------------------------------------|-------|
| <br>Communication Limited | Datasheet |                                       | DS10-U012<br>Final Rev.: 2023-05-23 |       |
|                                                                                                           | Product   | 100G QSFP28<br>transceiver OU serials | Ver.                                | 000   |
|                                                                                                           | Part No.  | OUB8Cxx41                             | Rev.                                | 000   |
|                                                                                                           |           |                                       | Page                                | 3 / 8 |

| Parameter                  | Symbol | Min   | Typical | Max   | Unit | Notes |
|----------------------------|--------|-------|---------|-------|------|-------|
| Operating Case Temperature | Tc     | 0     |         | +70   | °C   |       |
| Power Supply Voltage       | Vcc    | 3.135 | 3.30    | 3.465 | V    |       |
| Power supply Current       | Icc    | -     | -       | 1.3   | A    |       |
| Power Dissipation          | Pm     |       |         | 4.5   | W    |       |
| Data Rate                  |        |       | 106.25  |       | Gbps |       |
| Transmission Distance      | TD     | -     | -       | 10    | KM   | SMF   |

## 6. Optical and Electrical Characteristics

| Optical                                                       |                  |        |         |        |      |                  |
|---------------------------------------------------------------|------------------|--------|---------|--------|------|------------------|
| Parameter                                                     | Symbol           | Min    | Typical | Max    | Unit | Notes            |
| Transmitter                                                   |                  |        |         |        |      |                  |
| Centre Wavelength                                             | $\lambda_{c1}$   | 1264.5 | 1271    | 1277.5 | nm   | OUB8C0341        |
| Centre Wavelength                                             | $\lambda_{c2}$   | 1324.5 | 1331    | 1337.5 | nm   | OUB8C3041        |
| Average launch power                                          | P <sub>out</sub> | -1.4   |         | +4.5   | dBm  | 1                |
| Outer Optical Modulation Amplitude                            | OMA              | 0.7    | -       | 4.7    | dBm  | 1                |
| Launch power in OMA minus TDECQ(min)                          | OMA-TDECQ        | -0.7   | -       | -      | dBm  | ER $\geq$ 4.5 dB |
|                                                               |                  | -0.6   | -       | -      | dBm  | ER<4.5dB         |
| Transmitter and dispersion eye closure for PAM4 (TDECQ) (max) | TDECQ            | -      | -       | 3.4    | dBm  |                  |
| Extinction Ratio                                              | ER               | 3.5    |         |        | dB   |                  |
| Average launch power of OFF transmitter,each lane             | P <sub>off</sub> |        |         | -30    | dBm  |                  |
| Side Mode Suppression Ratio                                   | SMSR             | 30     | -       | -      | dB   |                  |
| Receiver                                                      |                  |        |         |        |      |                  |
| Centre Wavelength                                             | $\lambda_{c1}$   | 1324.5 | 1331    | 1337.5 | nm   | OUB8C0341        |
| Centre Wavelength                                             | $\lambda_{c2}$   | 1264.5 | 1271    | 1277.5 | nm   | OUB8C3041        |
| Damage threshold                                              | THd              | 5.5    |         |        | dBm  | 2                |
| Average power at receiver                                     |                  | -7.7   | -       | +4.5   | dBm  | 3                |
| Receive power_ OMAouter*                                      | POMA             | -      | -       | 4.7    | dBm  |                  |
| Receiver sensitivity_ OMAouter                                | SEN OMA          | -      | -       | -6.1   | dBm  | 4                |
| LOS De-Assert                                                 | LOS <sub>D</sub> |        |         | -10    | dBm  |                  |

|                                                                                                                                                                                                                                     |        |       |       |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------|-------|----------|
| OCRE COMMUNICATION LIMITED<br>Web: www.ocrecom.com<br>E-Mail: sales@ocrecom.com<br>Add. Dist.A, Building 6, Bay on the six block, Xixiang,<br>Baoan Dist, Shenzhen, China 518000<br>Tel: + 86 755 2335 3855 Fax: + 86 755 2335 3855 | DESIGN | CHECK | CHECK | APPROVAL |
|                                                                                                                                                                                                                                     |        |       |       |          |

|                                                                                                           |           |                                       |                                     |       |
|-----------------------------------------------------------------------------------------------------------|-----------|---------------------------------------|-------------------------------------|-------|
| <br>Communication Limited | Datasheet |                                       | DS10-U012<br>Final Rev.: 2023-05-23 |       |
|                                                                                                           | Product   | 100G QSFP28<br>transceiver OU serials | Ver.                                | 000   |
|                                                                                                           | Part No.  | OUB8Cxx41                             | Rev.                                | 000   |
|                                                                                                           |           |                                       | Page                                | 4 / 8 |

|                                         |                      |                      |                |                      |             |              |
|-----------------------------------------|----------------------|----------------------|----------------|----------------------|-------------|--------------|
| LOS Assert                              | LOS <sub>A</sub>     | -26                  |                |                      | dBm         |              |
| LOS Hysteresis                          |                      | 0.5                  |                |                      | dB          |              |
| <b>Electrical</b>                       |                      |                      |                |                      |             |              |
| <b>Parameter</b>                        | <b>Symbol</b>        | <b>Min</b>           | <b>Typical</b> | <b>Max</b>           | <b>Unit</b> | <b>Notes</b> |
| <b>Transmitter</b>                      |                      |                      |                |                      |             |              |
| 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           |              |
| <b>Receiver</b>                         |                      |                      |                |                      |             |              |
| 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           |              |

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>.

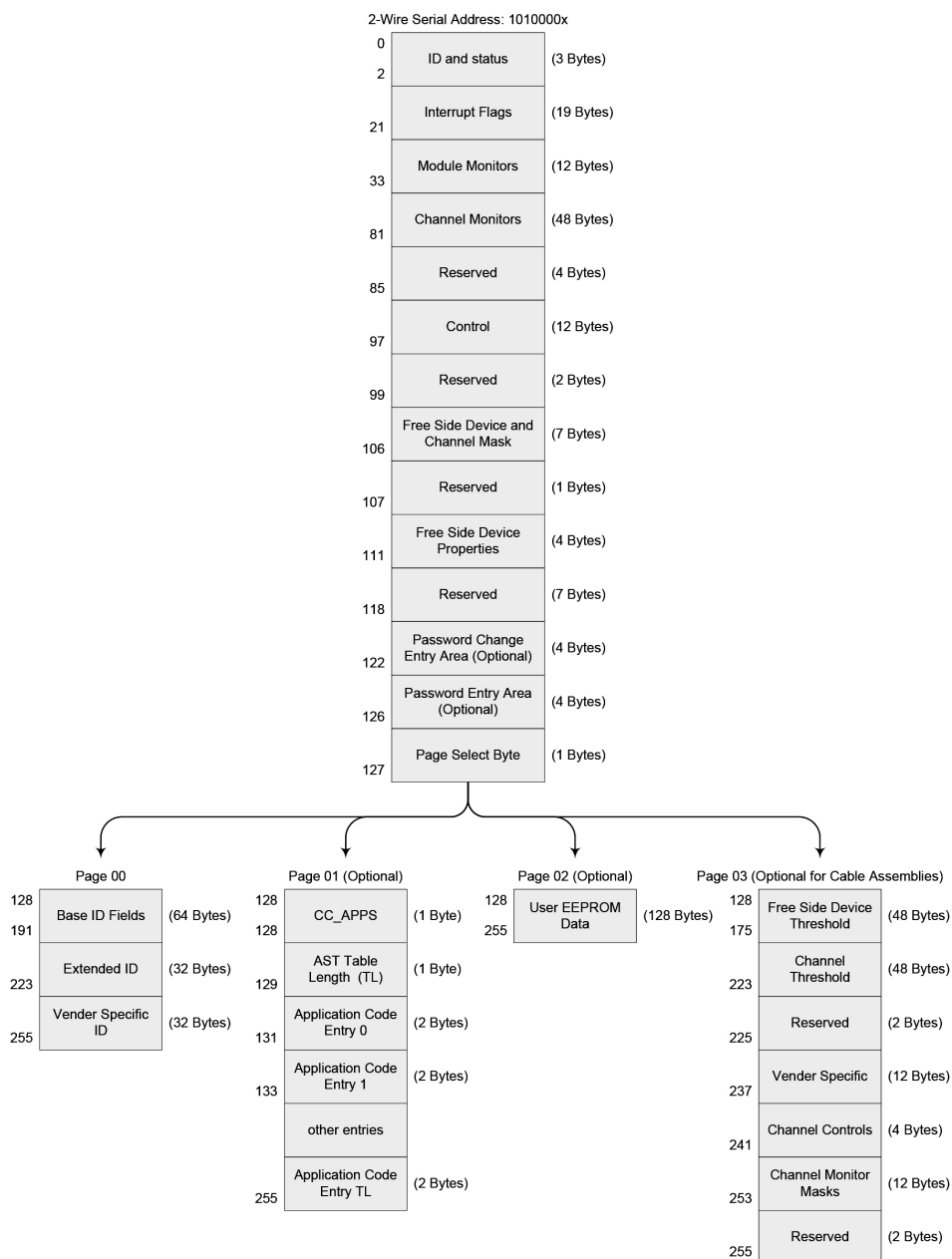
## 7. Digital Diagnostic Memory Map

The transceivers provide serial ID memory contents and diagnostic information about the present operating conditions by the 2-wire serial interface (SCL, SDA).

The digital diagnostic memory map specific data field defines as following.

|                                                                                                                                                                                                                                     |        |       |       |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------|-------|----------|
| OCRE COMMUNICATION LIMITED<br>Web: www.ocrecom.com<br>E-Mail: sales@ocrecom.com<br>Add. Dist.A, Building 6, Bay on the six block, Xixiang,<br>Baoan Dist, Shenzhen, China 518000<br>Tel: + 86 755 2335 3855 Fax: + 86 755 2335 3855 | DESIGN | CHECK | CHECK | APPROVAL |
|                                                                                                                                                                                                                                     |        |       |       |          |

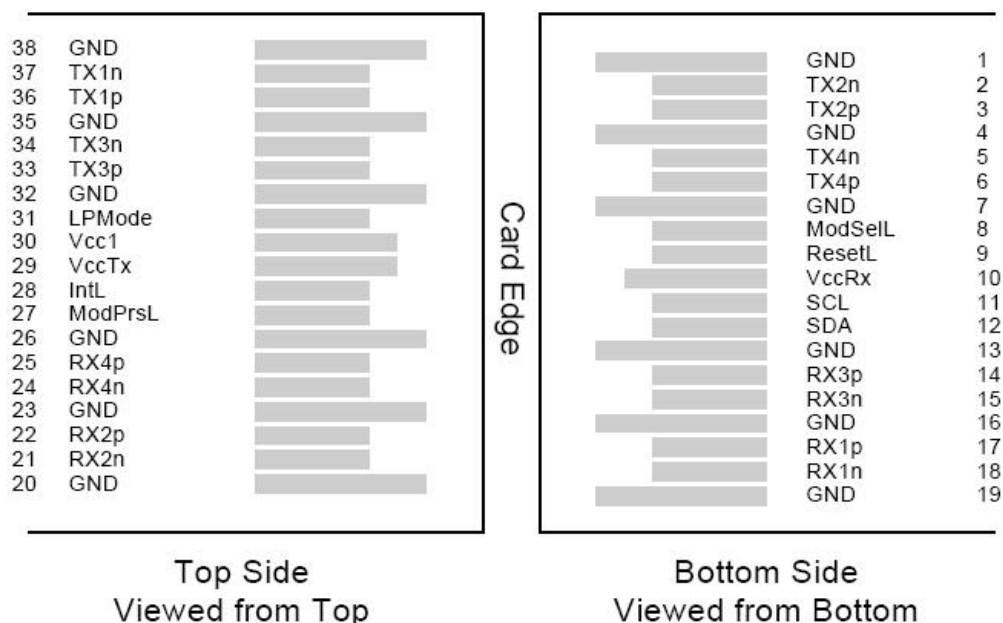
|                                                                                                               |           |                                       |                                     |       |
|---------------------------------------------------------------------------------------------------------------|-----------|---------------------------------------|-------------------------------------|-------|
| <br>CRE Communication Limited | Datasheet |                                       | DS10-U012<br>Final Rev.: 2023-05-23 |       |
|                                                                                                               | Product   | 100G QSFP28<br>transceiver OU serials | Ver.                                | 000   |
|                                                                                                               | Part No.  | OUB8Cxx41                             | Rev.                                | 000   |
|                                                                                                               |           |                                       | Page                                | 5 / 8 |



|                                                                                                                                                                                                                                     |        |       |       |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------|-------|----------|
| OCRE COMMUNICATION LIMITED<br>Web: www.ocrecom.com<br>E-Mail: sales@ocrecom.com<br>Add. Dist.A, Building 6, Bay on the six block, Xixiang,<br>Baoan Dist, Shenzhen, China 518000<br>Tel: + 86 755 2335 3855 Fax: + 86 755 2335 3855 | DESIGN | CHECK | CHECK | APPROVAL |
|                                                                                                                                                                                                                                     |        |       |       |          |

|                                                                                                           |           |                                       |                                     |       |
|-----------------------------------------------------------------------------------------------------------|-----------|---------------------------------------|-------------------------------------|-------|
| <br>Communication Limited | Datasheet |                                       | DS10-U012<br>Final Rev.: 2023-05-23 |       |
|                                                                                                           | Product   | 100G QSFP28<br>transceiver OU serials | Ver.                                | 000   |
|                                                                                                           | Part No.  | OUB8Cxx41                             | Rev.                                | 000   |
|                                                                                                           |           |                                       | Page                                | 6 / 8 |

## 8. Pin Descriptions



| PIN | Logic       | Symbol  | Name/Description                     | Plug Seq. | Note |
|-----|-------------|---------|--------------------------------------|-----------|------|
| 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   | CML-I       | Tx4n    | Transmitter Inverted Data Input      | 3         |      |
| 6   | CML-I       | Tx4p    | Transmitter Non-Inverted Data output | 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  | CML-O       | Rx3p    | Receiver Non-Inverted Data Output    | 3         |      |
| 15  | CML-O       | Rx3n    | Receiver Inverted Data Output        | 3         |      |
| 16  |             | GND     | Ground                               | 1         | 1    |

|                                                                                                                                                                                                                                     |        |       |       |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------|-------|----------|
| OCRE COMMUNICATION LIMITED<br>Web: www.ocrecom.com<br>E-Mail: sales@ocrecom.com<br>Add. Dist.A, Building 6, Bay on the six block, Xixiang,<br>Baoan Dist, Shenzhen, China 518000<br>Tel: + 86 755 2335 3855 Fax: + 86 755 2335 3855 | DESIGN | CHECK | CHECK | APPROVAL |
|                                                                                                                                                                                                                                     |        |       |       |          |

|                                                                                                           |           |                                       |                                     |       |
|-----------------------------------------------------------------------------------------------------------|-----------|---------------------------------------|-------------------------------------|-------|
| <br>Communication Limited | Datasheet |                                       | DS10-U012<br>Final Rev.: 2023-05-23 |       |
|                                                                                                           | Product   | 100G QSFP28<br>transceiver OU serials | Ver.                                | 000   |
|                                                                                                           | Part No.  | OUB8Cxx41                             | Rev.                                | 000   |
|                                                                                                           |           |                                       | Page                                | 7 / 8 |

|    |         |         |                                     |   |   |
|----|---------|---------|-------------------------------------|---|---|
| 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 | CML-O   | Rx4n    | Receiver Inverted Data Output       | 3 | 1 |
| 25 | CML-O   | Rx4p    | Receiver Non-Inverted Data Output   | 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 |         | VccI    | +3.3 V Power Supply                 | 2 | 2 |
| 31 | LVTTL-I | LPMode  | Low Power Mode                      | 3 |   |
| 32 |         | GND     | Ground                              | 1 | 1 |
| 33 | CML-I   | Tx3p    | Transmitter Non-Inverted Data Input | 3 |   |
| 34 | CML-I   | Tx3n    | Transmitter Inverted Data Output    | 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 |

Notes:

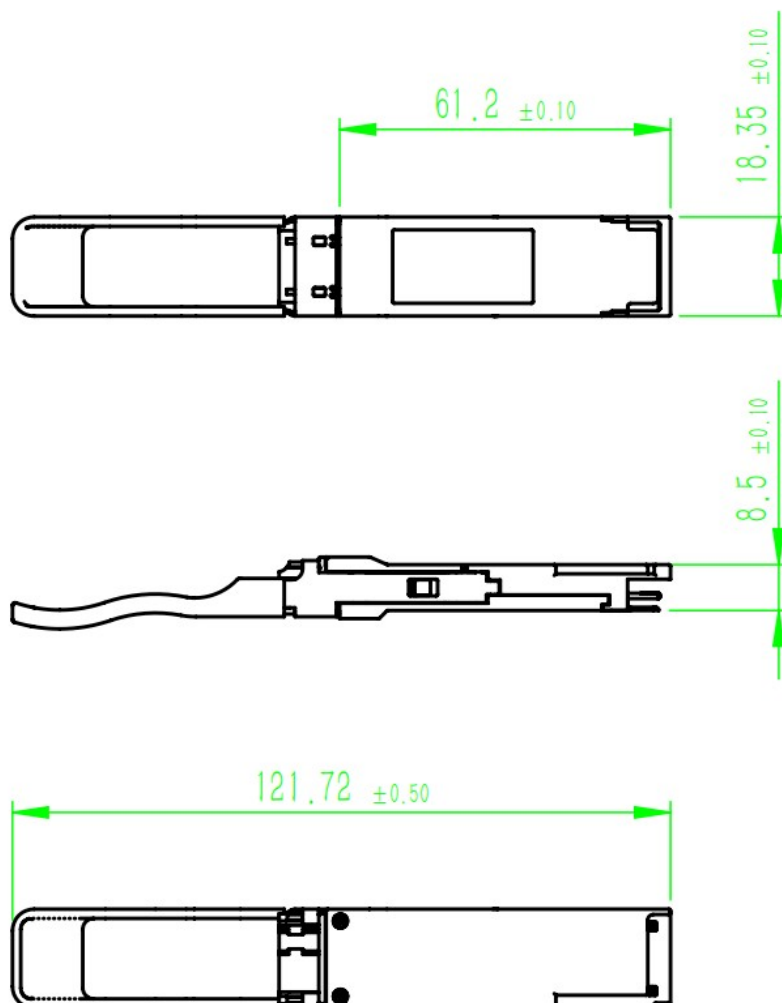
1. GND is the symbol for signal and supply (power) common for QSFP28 modules. All are common within the QSFP28 module and all module voltages are referenced to this potential unless otherwise noted. Connect these directly to the host board signal common ground plane.

2. VccRx, VccI and VccTx are the receiver and transmitter power supplies and shall be applied concurrently. Recommended host board power supply filtering is shown below. VccRx, VccI and VccTx may be internally connected within the QSFP28 transceiver module in any combination. The connector pins are each rated for a maximum current of 1000mA.

|                                                                                                                                                                                                                                     |        |       |       |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------|-------|----------|
| OCRE COMMUNICATION LIMITED<br>Web: www.ocrecom.com<br>E-Mail: sales@ocrecom.com<br>Add. Dist.A, Building 6, Bay on the six block, Xixiang,<br>Baoan Dist, Shenzhen, China 518000<br>Tel: + 86 755 2335 3855 Fax: + 86 755 2335 3855 | DESIGN | CHECK | CHECK | APPROVAL |
|                                                                                                                                                                                                                                     |        |       |       |          |

|                                                                                                               |           |                                    |                                     |       |
|---------------------------------------------------------------------------------------------------------------|-----------|------------------------------------|-------------------------------------|-------|
| <br>CRE Communication Limited | Datasheet |                                    | DS10-U012<br>Final Rev.: 2023-05-23 |       |
|                                                                                                               | Product   | 100G QSFP28 transceiver OU serials | Ver.                                | 000   |
|                                                                                                               | Part No.  | OUB8Cxx41                          | Rev.                                | 000   |
|                                                                                                               |           |                                    | Page                                | 8 / 8 |

## 9. Mechanical Dimensions



## 10. Module Ordering information

| PN        | Description                                                 |
|-----------|-------------------------------------------------------------|
| OUB8C0341 | 100G QSFP28 LR1 Bi-Di Tx1271/Rx1331nm 10KM LC DDMI 10~70 °C |
| OUB8C3041 | 100G QSFP28 LR1 Bi-Di Tx1331/Rx1271nm 10KM LC DDMI 10~70 °C |

|                                                                                                                                                                                                                                     |        |       |       |          |
|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------|-------|-------|----------|
| OCRE COMMUNICATION LIMITED<br>Web: www.ocrecom.com<br>E-Mail: sales@ocrecom.com<br>Add. Dist.A, Building 6, Bay on the six block, Xixiang,<br>Baoan Dist, Shenzhen, China 518000<br>Tel: + 86 755 2335 3855 Fax: + 86 755 2335 3855 | DESIGN | CHECK | CHECK | APPROVAL |
|                                                                                                                                                                                                                                     |        |       |       |          |