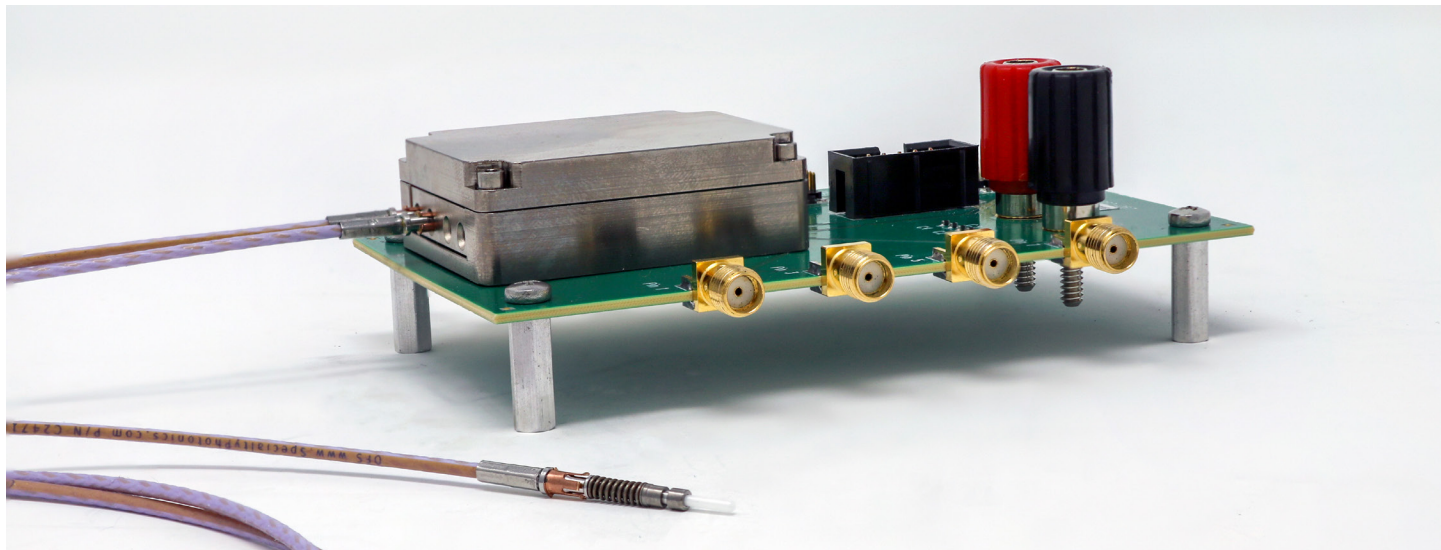


# NG-TRx

## BOARD MOUNT TRANSCEIVER

**Amphenol**  
Aerospace

PDS-297



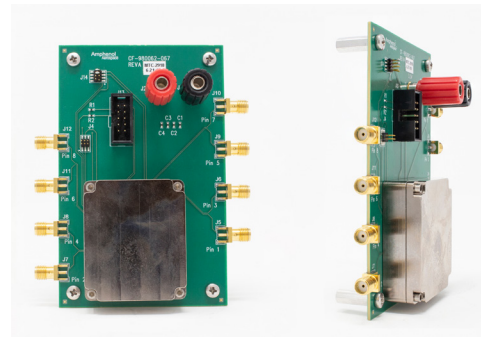
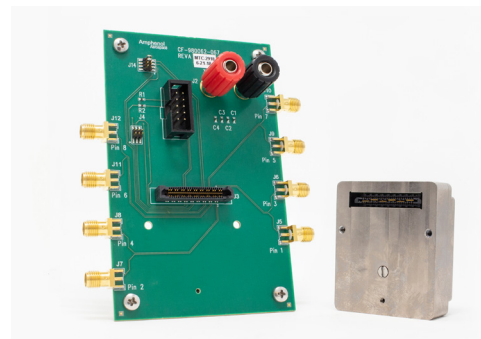
Amphenol provides a high performance ruggedized board mount transceiver, that is specifically developed for NAVAIR/ NAVSEA harsh environment applications capable of supporting up to 10Gbps data rates across four channels. The NG-TRx Board Mount Transceiver combines the interface features of NGCON, ARINC 801, and proven opto-electrical transceiver components. A standard NGCON termini or ARINC 801 can be inserted using common insertion and removal tools for a rugged proven fiber interface and secure connection for fault-free operation in the harshest environments.

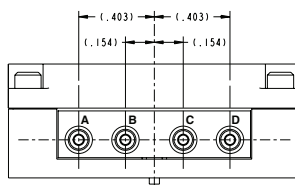
### FEATURES

- Four optical channels:
  - Each can be configured as either a fiber optic transmitter or receiver
  - Each can support 850nm multi-mode, 1310nm single-mode, or 1300 multi-mode
- Protocol agnostic - can support encoded or pathological data
- Supports data rates from 25 Mbps to 10.3125 Gbps
- MIL-PRF-62466 or ARINC 801 for MIL-PRF-29504/18 industry standard fiber termini interface
- Onboard monitor for status and diagnostics (I2C)
- Operating temperature range: -40° F (-40° C) to 185° F (85° C)
- Transmit enable pin for any and all transmitters
- LOS pin for any and all receivers
- Fault pin – for various errors

Supports network protocols:

- |                                   |                        |
|-----------------------------------|------------------------|
| • XFI/XGMII – 10G copper          | • 1GBASE-X – 1G copper |
| • 10GBASE-KX4 (XAUI) – 10G copper | • 1GBASE-SX – 1G MMF   |
| • 10GBASE-R – 10G copper          | • 1GBASE-LX – 1G SMF   |
| • 10GBASE-SR – 10G MMF            | • PCI express          |
| • 10GBASE-LR – 10G SMF            | • Infiniband           |
| • SGMII – 1G copper               | • Fibre Channel        |
|                                   | • SDI/HD/36-SDI        |





| Part Number                      | I                       | A   | B  | C  | D  |
|----------------------------------|-------------------------|-----|----|----|----|
| CF-020012-014                    | 850nm<br>(multi-mode)   | TX  | RX | TX | RX |
| CF-020012-016                    |                         | TX  | TX | TX | TX |
| CF-020012-017                    |                         | RX  | RX | RX | RX |
| Contact AAO for more information |                         | TX  | X  | X  | X  |
|                                  |                         | TX  | TX | X  | X  |
|                                  |                         | TX  | TX | TX | X  |
|                                  |                         | RX  | X  | X  | X  |
|                                  |                         | RX  | RX | X  | X  |
|                                  |                         | RX  | RX | RX | X  |
|                                  |                         | TX  | RX | X  | X  |
|                                  |                         | TX  | RX | RX | RX |
| RX                               |                         | TX  | TX | TX |    |
| CF-020012-015                    | 1310nm<br>(Single-mode) | TX  | RX | TX | RX |
| CF-020012-018                    |                         | TX  | TX | TX | TX |
| CF-020012-019                    |                         | RX  | RX | RX | RX |
| Contact AAO for more information |                         | TX  | X  | X  | X  |
|                                  |                         | TX  | TX | X  | X  |
|                                  |                         | TX  | TX | TX | X  |
|                                  |                         | RX  | X  | X  | X  |
|                                  |                         | RX  | RX | X  | X  |
|                                  |                         | RX  | RX | RX | X  |
|                                  |                         | TX  | RX | X  | X  |
|                                  |                         | TX  | RX | RX | RX |
| RX                               |                         | TX  | TX | TX |    |
| Contact Amphenol Aerospace       | 1300 nm                 | TBD |    |    |    |

## GENERAL SPECIFICATIONS

| Parameter                            | Min   | Nom | Max   | Units | Notes                             |
|--------------------------------------|-------|-----|-------|-------|-----------------------------------|
| Supply Voltage                       | 2.9   | 3.3 | 3.6   | V     | -40°F(-40°C) to 185°F (85°C), [1] |
| Supply Current (all channels active) | 298   | 345 | 402   | mA    | -40°F(-40°C) to 185°F (85°C), [1] |
| Data Rate                            | 0.025 |     | 10.75 | Gbps  | -40°F(-40°C) to 185°F (85°C), [2] |
| Operating Temperature                | -40   |     | +85   | °C    | [1]                               |

Note: the following specs/measurements are applicable for CF-020012-014

## ELECTRICAL SPECIFICATIONS

| Parameter                         | Min     | Nom  | Max      | Units | Notes                             |
|-----------------------------------|---------|------|----------|-------|-----------------------------------|
| Transmitter                       |         |      |          |       |                                   |
| Supply current (per channel)      | 18      | 22   | 37       | mA    | -40°F(-40°C) to 185°F (85°C), [3] |
| Input Differential Impedance      | 80      | 100  | 120      | Ω     | Differential (7)                  |
| Differential Input Voltage Swing  | 150 (8) | 1000 | 1200 (8) | mVpp  | -40°F(-40°C) to 185°F (85°C), [5] |
| Receiver                          |         |      |          |       |                                   |
| Supply current (per channel)      |         |      | 1        | mA    | -40°F(-40°C) to 185°F (85°C), [3] |
| Output termination impedance      |         | 50   |          | Ω     | Single-ended (7)                  |
| Differential Output Voltage Swing | 298     | 427  | 610      | mVpp  | -40°F(-40°C) to 185°F (85°C), [4] |

Note: the following specs/measurements are applicable for CF-020012-014

## OPTICAL SPECIFICATIONS

| Parameter            | Min  | Nom   | Max   | Units | Notes                             |
|----------------------|------|-------|-------|-------|-----------------------------------|
| Transmitter          |      |       |       |       |                                   |
| Output Optical Power | -10  |       | -1    | dBm   | -40°F(-40°C) to 185°F (85°C), [5] |
| Optical Wavelength   |      | 850   |       | nm    |                                   |
| Extinction Ratio     | 1.82 |       | 3.36  | dB    | -40°F(-40°C) to 185°F (85°C), [5] |
| Optical Rise Time    |      | 30(8) | 50(8) | ps    | -40°F(-40°C) to 185°F (85°C), [5] |
| Optical Fall Time    |      | 30(8) | 50(8) | ps    | -40°F(-40°C) to 185°F (85°C), [5] |
| Receiver             |      |       |       |       |                                   |
| Sensitivity          |      |       | -10   | dBm   | -40°F(-40°C) to 185°F (85°C), [6] |

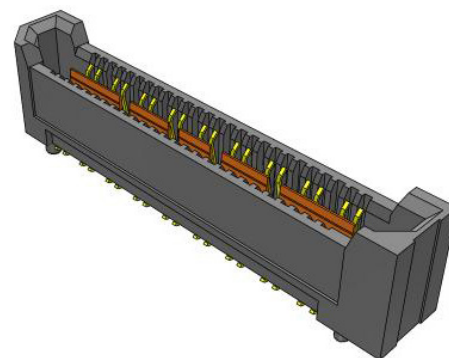
(7) Per manufacturer's datasheet.

(8) Untested, these values were provided by the manufacturer's datasheet.

Note: the following specs/measurements are applicable for CF-020012-014

## MATING ELECTRICAL CONNECTOR PIN-OUT

| Signal Name    | Description                                                                                                                                      |
|----------------|--------------------------------------------------------------------------------------------------------------------------------------------------|
| CH#_TX/RX_P/N  | High speed differential signal. The direction of this signal is from the perspective of transceiver                                              |
| CH#_TX_DISABLE | Optical transmit disable pin. To enable the optical transmitter, apply 0VDC. To disable the optical transmitter, apply 3.3VDC or leave floating. |
| CH#_RX_LOS     | Optical receive loss of signal indicator. High level indicates the amplitude is below the programmed threshold level.                            |
| FAULT          | The on board processor was unable to successfully write to the laser driver or limiting amplified over I2C.                                      |
| I2C_SCL        | I2C two wire serial clock input. Pulled to 3.3VDC internally via 4.7k ohm resistor. Able to operate up to 400kHz                                 |
| I2C_SDA        | I2C two wire serial data input. Pulled to 3.3VDC internally via 4.7k ohm resistor. Able to operate up to 400kHz                                  |
| VCC_3V3        | Apply 3.3VDC to power the CF-020012-0XX device                                                                                                   |
| GND            | Ground Return                                                                                                                                    |



## CF-020012-014 (MMF) /015(SMF):

| Pin Description | Pin # | Pin # | Pin Description |
|-----------------|-------|-------|-----------------|
| CH1_TX_P        | 1     | 2     | CH1_RX_P        |
| CH1_TX_N        | 3     | 4     | CH1_RX_N        |
| CH2_TX_P        | 5     | 6     | CH2_RX_P        |
| CH2_TX_N        | 7     | 8     | CH2_RX_N        |
| CH1_TX_DISABLE  | 9     | 10    | CH1_RX_LOS      |
| CH2_TX_DISABLE  | 11    | 12    | CH2_RX_LOS      |
| DNC             | 13    | 14    | FAULT           |
| DNC             | 15    | 16    | DNC             |
| DNC             | 17    | 18    | DNC             |
| DNC             | 19    | 20    | DNC             |
| I2C_SCL         | 21    | 22    | DNC             |
| I2C_SDA         | 23    | 24    | DNC             |
| DNC             | 25    | 26    | DNC             |
| DNC             | 27    | 28    | DNC             |
| VCC_3V3         | 29    | 30    | VCC_3V3         |
| VCC_3V3         | 31    | 32    | VCC_3V3         |
| GND             | 33    | 34    | GND             |
| GND             | 35    | 36    | GND             |
|                 |       |       |                 |
| GND             | G1    | G2    | GND             |
| GND             | G3    | G4    | GND             |

## CF-020012-016(MMF)/018(SMF):

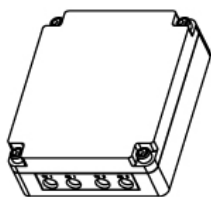
| Pin Description | Pin # | Pin # | Pin Description |
|-----------------|-------|-------|-----------------|
| CH1_RX_P        | 1     | 2     | CH3_RX_P        |
| CH1_RX_N        | 3     | 4     | CH3_RX_N        |
| CH2_RX_P        | 5     | 6     | CH4_RX_P        |
| CH2_RX_N        | 7     | 8     | CH4_RX_N        |
| CH1_TX_DISABLE  | 9     | 10    | CH3_TX_DISABLE  |
| CH2_TX_DISABLE  | 11    | 12    | CH4_TX_DISABLE  |
| DNC             | 13    | 14    | FAULT           |
| DNC             | 15    | 16    | DNC             |
| DNC             | 17    | 18    | DNC             |
| DNC             | 19    | 20    | DNC             |
| I2C_SCL         | 21    | 22    | DNC             |
| I2C_SDA         | 23    | 24    | DNC             |
| DNC             | 25    | 26    | DNC             |
| DNC             | 27    | 28    | DNC             |
| VCC_3V3         | 29    | 30    | VCC_3V3         |
| VCC_3V3         | 31    | 32    | VCC_3V3         |
| GND             | 33    | 34    | GND             |
| GND             | 35    | 36    | GND             |
|                 |       |       |                 |
| GND             | G1    | G2    | GND             |
| GND             | G3    | G4    | GND             |

## CF-020012-017(MMF)/019(SMF):

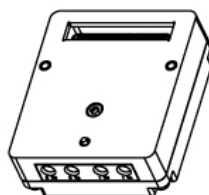
| Pin Description | Pin # | Pin # | Pin Description |
|-----------------|-------|-------|-----------------|
| CH1_TX_P        | 1     | 2     | CH3_TX_P        |
| CH1_TX_N        | 3     | 4     | CH3_TX_N        |
| CH2_TX_P        | 5     | 6     | CH4_TX_P        |
| CH2_TX_N        | 7     | 8     | CH4_TX_N        |
| CH1_RX_LOS      | 9     | 10    | CH3_RX_LOS      |
| CH2_RX_LOS      | 11    | 12    | CH4_RX_LOS      |
| DNC             | 13    | 14    | FAULT           |
| DNC             | 15    | 16    | DNC             |
| DNC             | 17    | 18    | DNC             |
| DNC             | 19    | 20    | DNC             |
| I2C_SCL         | 21    | 22    | DNC             |
| I2C_SDA         | 23    | 24    | DNC             |
| DNC             | 25    | 26    | DNC             |
| DNC             | 27    | 28    | DNC             |
| VCC_3V3         | 29    | 30    | VCC_3V3         |
| VCC_3V3         | 31    | 32    | VCC_3V3         |
| GND             | 33    | 34    | GND             |
| GND             | 35    | 36    | GND             |
|                 |       |       |                 |
| GND             | G1    | G2    | GND             |
| GND             | G3    | G4    | GND             |

# MECHANICAL SPECIFICATIONS

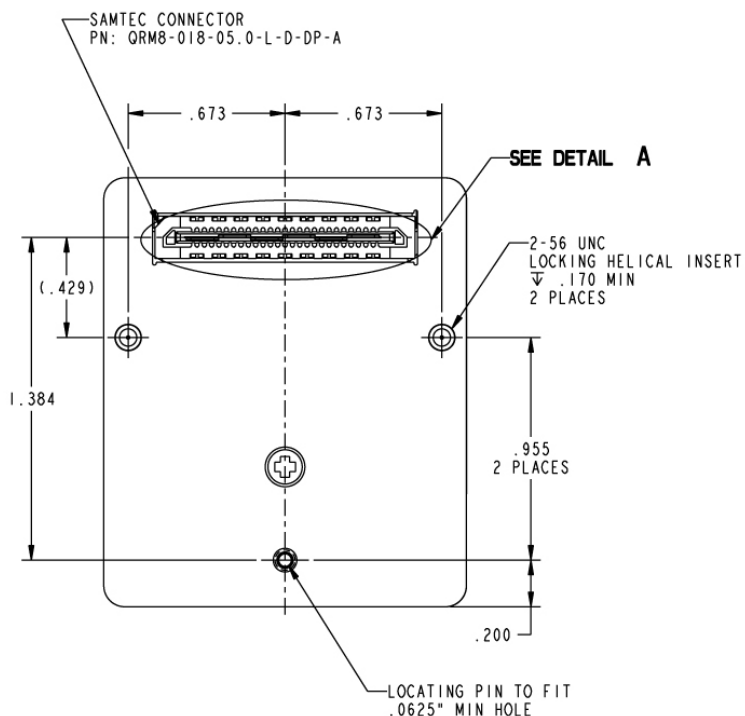
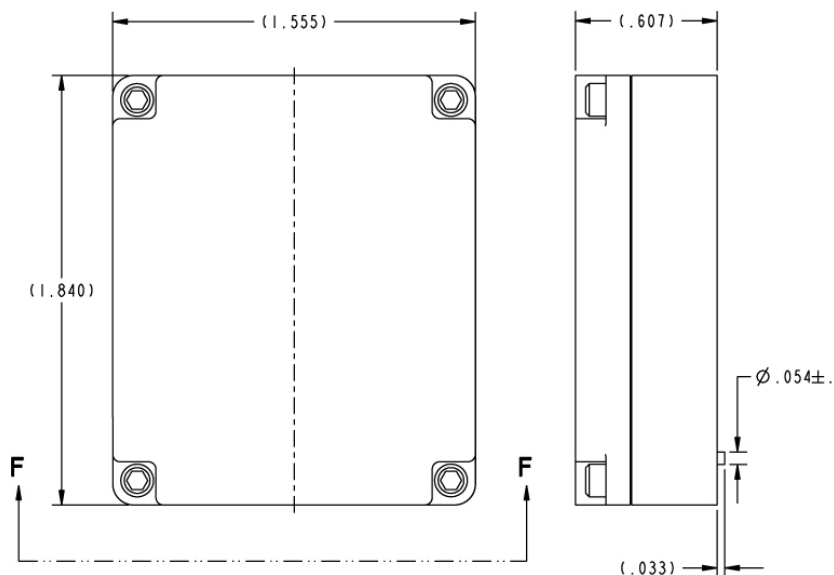
**Amphenol**  
Aerospace



**TOP ISO VIEW**  
SCALE 1.000



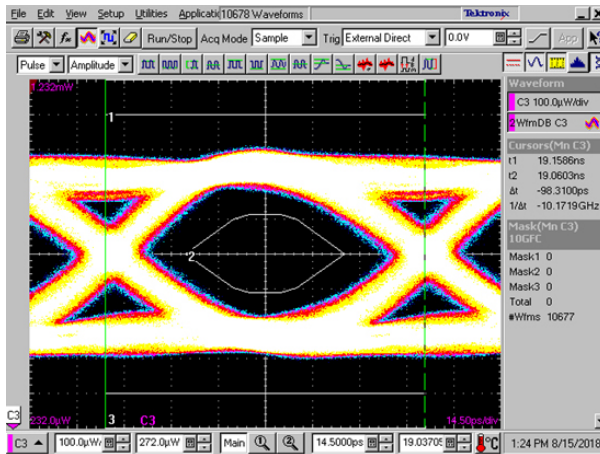
**BOTTOM ISO VIEW**  
SCALE 1.000



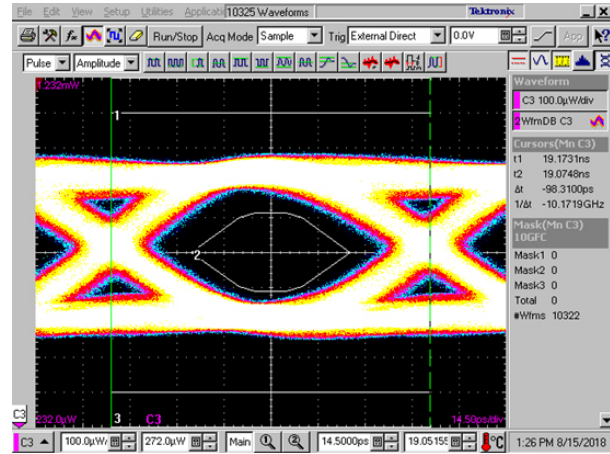


# EYE DIAGRAMS

## OPTIC EYE DIAGRAMS, 77°F(25°C)

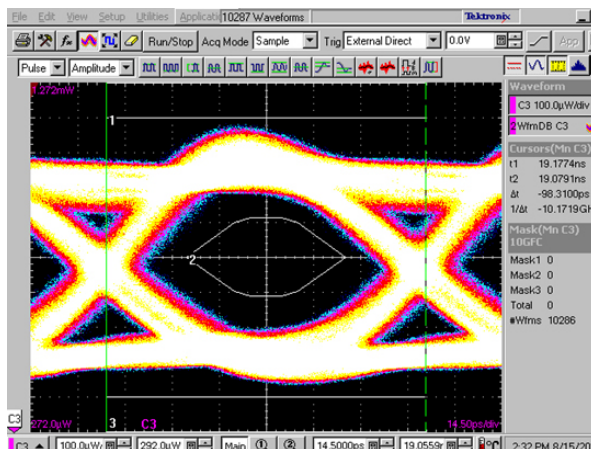


CH1

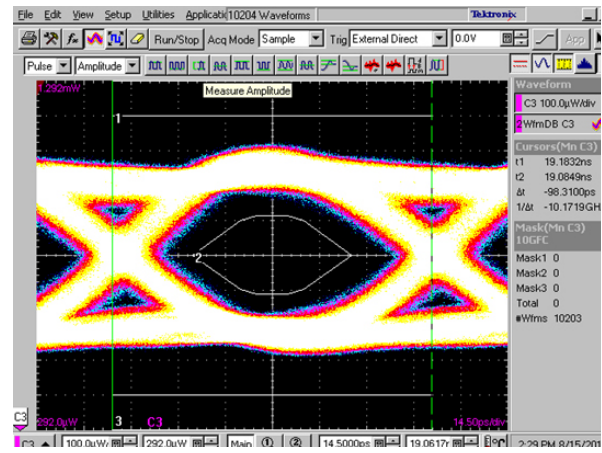


CH2

## OPTIC EYE DIAGRAMS, -40°F(-40°C)

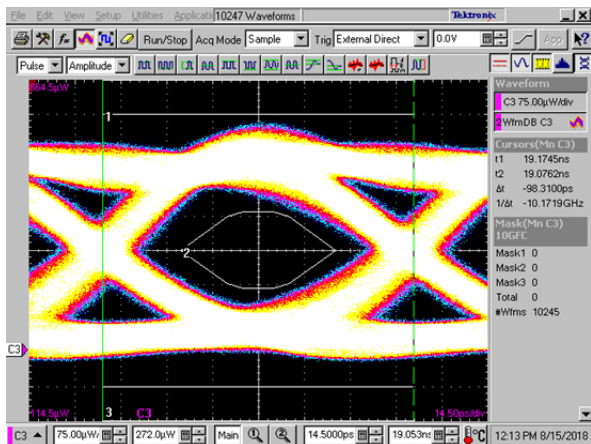


CH1

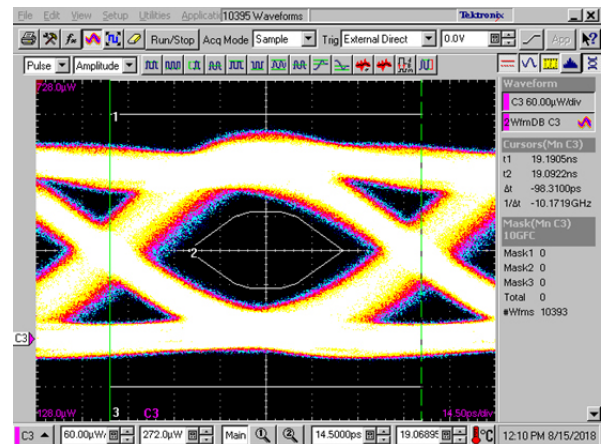


CH2

## OPTIC EYE DIAGRAMS, 185°F(85°C)



CH1



CH2

Note: The above images were captured from XPCF-020012-014

## [1] SUPPLY VOLTAGE AND CURRENT TESTING

| Temperature | Supply Voltage | Unit Operates | Supply Current (mA) |
|-------------|----------------|---------------|---------------------|
| -40°C       | 2.9 V          | Yes           | 298                 |
|             | 3.3 V          | Yes           | 313                 |
|             | 3.6 V          | Yes           | 316                 |
| 25°C        | 2.9 V          | Yes           | 337                 |
|             | 3.3 V          | Yes           | 345                 |
|             | 3.6 V          | Yes           | 348                 |
| 85°C        | 2.9 V          | Yes           | 346                 |
|             | 3.3 V          | Yes           | 396                 |
|             | 3.6 V          | Yes           | 402                 |

Note: Testing performed with all channels active on XPCP-020012-014

## [2] DATA RATE TESTING

| Temperature | Channel | Min Data Rate (Gbps) | Max Data Rate (Gbps) |
|-------------|---------|----------------------|----------------------|
| -40°C       | 1       | 0.01                 | 10.75                |
|             | 2       | 0.01                 | 10.75                |
| 25°C        | 1       | 0.01                 | 10.75                |
|             | 2       | 0.01                 | 10.75                |
| 85°C        | 1       | 0.025                | 10.75                |
|             | 2       | 0.025                | 10.75                |

Note: Testing performed with a supply voltage of 3.3V, and a AWG amplitude of 1.0V on XPCF-020012-014

## [3] CURRENT PER CHANNEL TESTING

| Temperature | Tx1 Active | Tx2 Active | Rx1 Active | Rx2 Active | Supply Current (mA) |
|-------------|------------|------------|------------|------------|---------------------|
| -40°C       |            |            |            |            | 275                 |
|             | *          | *          | *          | *          | 313                 |
| 25°C        |            |            |            |            | 301                 |
|             | *          | *          | *          | *          | 344                 |
| 85°C        |            |            |            |            | 330                 |
|             | *          | *          | *          | *          | 404                 |

Note: Testing performed with a supply voltage of 3.3V on XPCF-020012-014

## [4] RECEIVER OUTPUT VOLTAGE TESTING

| Temperature | Channel | Output Voltage Register Value | Output Voltage (Vpp) |
|-------------|---------|-------------------------------|----------------------|
| -40°C       | 1       | 0x00 (350 mVpp)               | 298                  |
|             |         | 0x02 (550 mVpp)               | 386                  |
|             |         | 0x07 (850 mVpp)               | 508                  |
|             | 2       | 0x00 (350 mVpp)               | 341                  |
|             |         | 0x02 (550 mVpp)               | 445                  |
|             |         | 0x07 (850 mVpp)               | 595                  |
| 25°C        | 1       | 0x00 (350 mVpp)               | 311                  |
|             |         | 0x02 (550 mVpp)               | 406                  |
|             |         | 0x07 (850 mVpp)               | 515                  |
|             | 2       | 0x00 (350 mVpp)               | 325                  |
|             |         | 0x02 (550 mVpp)               | 427                  |
|             |         | 0x07 (850 mVpp)               | 555                  |
| 85°C        | 1       | 0x00 (350 mVpp)               | 364                  |
|             |         | 0x02 (550 mVpp)               | 465                  |
|             |         | 0x07 (850 mVpp)               | 633                  |
|             | 2       | 0x00 (350 mVpp)               | 353                  |
|             |         | 0x02 (550 mVpp)               | 453                  |
|             |         | 0x07 (850 mVpp)               | 610                  |

Testing performed with a supply voltage of 3.3V on XPCF-020012-014

## [5] TRANSMITTER OPTICAL PARAMETER TESTING

| Temperature | Channel | Input Voltage Swing (mVpp) | Extinction Ratio (dB) | Optical Power (uW) [dBm] |
|-------------|---------|----------------------------|-----------------------|--------------------------|
| -40°C       | 1       | 500                        | 2.12                  | 704 (-3.05)              |
|             |         | 1000                       | 2.12                  | 704 (-3.05)              |
|             | 2       | 500                        | 1.82                  | 756 (-2.43)              |
|             |         | 1000                       | 1.82                  | 756 (-2.43)              |
| 25°C        | 1       | 500                        | 3.02                  | 691 (-3.21)              |
|             |         | 1000                       | 3.02                  | 691 (-3.21)              |
|             | 2       | 500                        | 2.53                  | 717 (-2.89)              |
|             |         | 1000                       | 2.53                  | 717 (-2.89)              |
| 85°C        | 1       | 500                        | 3.36                  | 468 (-6.60)              |
|             |         | 1000                       | 3.35                  | 468 (-6.60)              |
|             | 2       | 500                        | 3.04                  | 402 (-7.92)              |
|             |         | 1000                       | 3.00                  | 402 (-7.92)              |

Testing performed with a supply voltage of 3.3V on XPCF-020012-014, with a data rate of 10.3125 Gbps.

## [6] BER TESTING

| Temperature | A-B Errors @ 1 hr | C-D Errors @ 1 hr |
|-------------|-------------------|-------------------|
| -40°C       | 0                 | 0                 |
| 25°C        | 0                 | 0                 |
| 85°C        | 0                 | 0                 |

| Temperature | A-B-C-D Errors @ 1 hr | C-D-A-B Errors @ 1 hr |
|-------------|-----------------------|-----------------------|
| -40°C       | 0                     | 0                     |
| 25°C        | 0                     | 0                     |
| 85°C        | 0                     | 0                     |

All BER testing was performed at 10.3125Gbps with a PRBS pattern of 2<sup>31</sup>-1

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