

# DATA SHEET

## Two (2) fibers Detachable DisplayPort 1.2 Extender, DPFX-200-TR

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## Description

New optical DisplayPort 1.2 extender, DPFX-200-TR consists of transmitter module and receiver module, each of which has Two (2) LC fibers connection and is designed compact enough to be fitted into various installation environments.

It enables to transmit 4K(4096x2160) at 60Hz signal up to 100m (328feet), avoiding any tricks like scaling or data compression for lessening a burden of data transmission. It provides total data throughput 21.6Gbps (5.4Gbps per lane).

The pure fiber connection by two (2) LC fibers connector between transmitter and receiver, gives clean, secure and easy installation with perfect electrical isolation, but without electrical hazard and interference.

The DPFX-200-TR can be operated by 3.3V power from DisplayPort interface, basically. Two (2) Micro USB to USB cables will be provided in shipping group.

The shipping items are shown as follows;

- 1) One (1) Transmitter (Tx) and One (1) Receiver (Rx)
- 2) One (1) 0.2m Male to Female DisplayPort copper cable
- 3) Two (2) Micro USB to USB cables
- 4) User's Manual

※ 0.2m DisplayPort copper cable is strongly recommended to use on TX(Display Source) side only

※ Other options – contact with sales office

## Features

- Supports DisplayPort 1.2 standards
- Extends 4K(4096x2160) at 60Hz
- Transmits DP data up to 100m (328feet) over two (2) LC multi-mode fibers (OM3).
- Offers total data rate 21.6Gbps (5.4Gbps per lane)
- Supports auxiliary channel
- Compact design allows direct connect to the DP display
- Directly connected with small form factor
- Operated by 3.3V from DisplayPort interface or USB power
- Data security with negligible EMI emission.
- Includes two (2) Micro USB to USB cables for the transmitter and receiver
- Certification: CE / FCC, UL IT, Laser Safety class 1

## Applications

- Medical imaging
- Military
- Control room
- Simulator

## Technical Specifications

|            | Parameter  | Specifications   |
|------------|--|--|
| Components | Laser Diodes in TX Module                            | Multi-mode VCSEL<br>(Vertical Cavity Surface Emitting Laser) |
|            | Photo Diodes in Rx Module                            | PIN-PD   |
| Electrical | Input and Output Signals                             | ANSI 8B/10 Level (complying with DP1.2)                      |
|            | Data Transfer Rate (Graphic Data)                    | Max. 5.4Gbps   |
|            | Total Jitter at the end of Rx output                 | Max. 0.6UI   |
|            | Skew inter-channels                                  | Max. 6ns   |
| Optical    | Link Power Budget                                    | TBD  |
| Mechanical | Module dimension (WDH)                               | 26 x 72 x 15mm   |
| Connect    | Optical Connector                                    | Duplex LC connectors   |
|            | Electric Connector Type from Systems and to Displays | 20pin DP Receptacle Connector                                |
|            | Recommended Fiber                                    | OM3(50/125 um) Multi-mode Glass Fiber                        |

## Absolute Maximum Ratings

Stresses in excess of the absolute maximum ratings can cause permanent damage to the device. These are absolute stress ratings only. Functional operation of the device is not implied at these or any other conditions in excess of those given in the operational sections of the datasheet. Exposure to absolute maximum ratings for extended periods can adversely affect device reliability.

| Parameter                   | Symbol     | Min | Max              | Unit |
|-----------------------------|------------|-----|------------------|------|
| Supply Adapter Voltage      | $V_{CC}$   | -   | 6.5              | V    |
| Operating Temperature       | $T_{OP}$   | 0   | 50               | °C   |
| Operating Relative Humidity | $RH_{OP}$  | 10  | 85 <sup>1)</sup> | %RH  |
| Storage Temperature         | $T_{stg}$  | -30 | 70               | °C   |
| Storage Relative Humidity   | $RH_{stg}$ | 10  | 95 <sup>2)</sup> | %RH  |

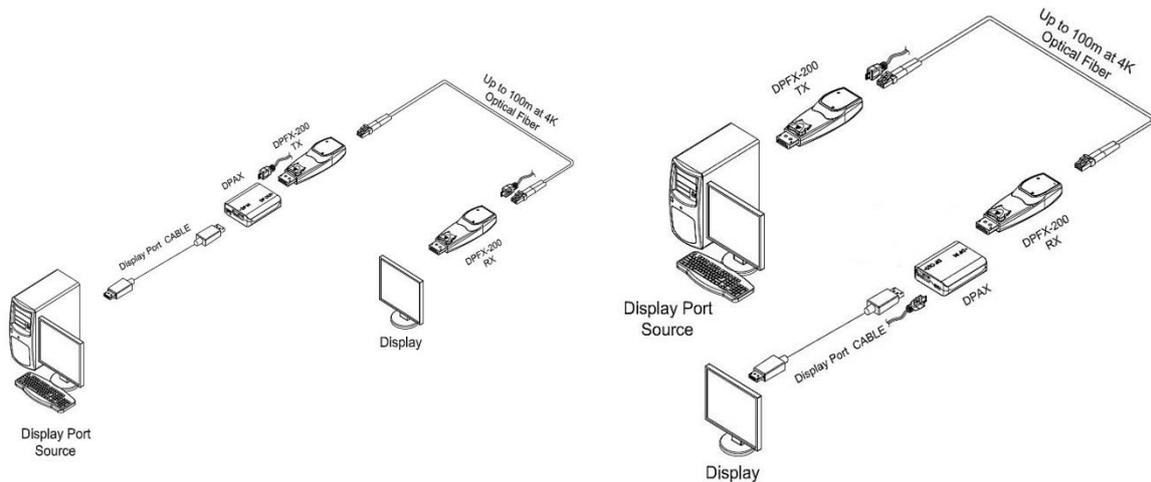
Note

1), 2) Under the conditions of No drops of dew

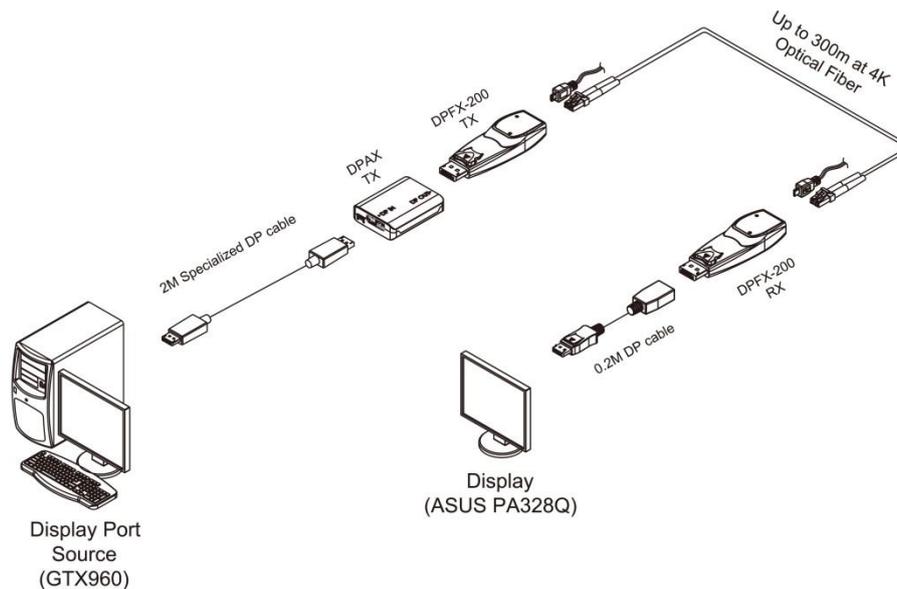
## Connection with DPAX

Opticis DisplayPort Data Recovery Repeater, DPAX, is an active repeater for DisplayPort video signal to increase video transmission.

With using DPAX, DPFX-200 can extend its total transmission length even longer. DPAX can be connected any side of DPFX-200, however, to connect on TX side of DPFX-200, customized copper cable has to be used.



DPAX can improve transmission length of DPFX-200 via optical fiber. It has been confirmed that DisplayPort signal transmission length has improved up to 300m when using DPFX-200 with DPAX under certain environment such as below configuration. Each 200m and 300m of DisplayPort signal transmission has successfully tested when using GTX960 as a display source and ASUS PA328Q as a display.



## Operating Conditions

### ▪ Transmitter module: DPFX-200-T

|                             | Parameter   | Symbol                               | Minimum | Typical | Maximum         | Units             |
|-----------------------------|---|--------------------------------------|---------|---------|-----------------|-------------------|
| Power Supply                | Supply Voltage  | V <sub>CC</sub>                      | 4.5     | 5.0     | 5.5             | V                 |
|                             | Supply Current  | I <sub>TCC</sub>                     | 180     | 230     | 280             | mA                |
|                             | Power Dissipation   | P <sub>TX</sub>                      | 0.81    | 1.15    | 1.54            | W                 |
|                             | Power Supply Rejection (Note1)                              | PSR                                  |         | 50      |                 | mV <sub>p-p</sub> |
| DATA ANSI 8b/10b            | Data Output Load  | R <sub>LD</sub>                      |         | 50      |                 | Ω                 |
|                             | Transmitter Differential Input Voltage Swing (Peak-to-Peak) | V <sub>ID</sub>                      | 0.4     | 1.6     | V <sub>ID</sub> | V                 |
| Optical Link (Note3)        | Output Optical Power  | P <sub>o</sub>                       |         |         | 1               | dBm               |
|                             | Wavelength  | λ                                    | 825     |         | 990             | nm                |
|                             | Spectral width in RMS                                       | Δλ                                   |         |         | 3               | nm                |
|                             | Relative Intensity of Noise (Note2)                         | RIN                                  |         | -20     |                 | dB/Hz             |
|                             | Extinction Ratio  | Ext                                  | 4       |         |                 | dB                |
|                             | Rising/Falling Time   | T <sub>rise</sub> /T <sub>fall</sub> |         |         | 100             | ps                |
| Jitter in p-p value (Note3) | T <sub>jitter</sub>   |                                      |         | 100     | ps              |                   |

Note1. Tested with a 50mV<sub>p-p</sub> sinusoidal signal in the frequency range from 500 Hz to 500 MHz on the V<sub>CC</sub> supply with the recommended power supply filter in place. Typically less than a 0.25 dB change in sensitivity is experienced.

Note2. Measure in 1GHz of frequency bandwidth

Note3. Use PPG (Pulse Pattern Generator) source with jitter 50ps

### ▪ Receiver module: DPFX-200-R

|                  | Parameter   | Symbol               | Minimum | Typical | Maximum | Units             |
|------------------|---|----------------------|---------|---------|---------|-------------------|
| Power Supply     | Supply Voltage                                    | V <sub>CC</sub>      | 4.5     | 5.0     | 5.5     | V                 |
|                  | Supply Current                                    | I <sub>RCC</sub>     | 220     | 270     | 320     | mA                |
|                  | Power Dissipation                                 | P <sub>RX</sub>      | 0.99    | 1.35    | 1.76    | W                 |
|                  | Power Supply Rejection (Note4)                    | PSR                  |         | 50      |         | mV <sub>p-p</sub> |
| DATA ANSI 8b/10b | Data Input Load                                   | R <sub>LD</sub>      |         | 50      |         | Ω                 |
|                  | Receiver Data Output Voltage Swing (Peak-to-Peak) | V <sub>ODp-p</sub>   |         | 600     |         | mV <sub>p-p</sub> |
| Optical Link     | Receiving Optical Power                           | P <sub>o</sub>       | TBD     |         | 1       | dBm               |
|                  | Receiving Wavelength                              | λ                    | 825     |         | 990     | nm                |
|                  | Signal_Detect Good                                | SDg                  |         |         | TBD     | dBm               |
|                  | Signal_Detect Fail                                | SDf                  | TBD     |         |         | dBm               |
|                  | Link Power Budget                                 | P <sub>bgt</sub>     | TBD     |         |         | dB                |
|                  | Total Jitter (note 5)                             | TR <sub>jitter</sub> |         |         | 0.6     | UI                |

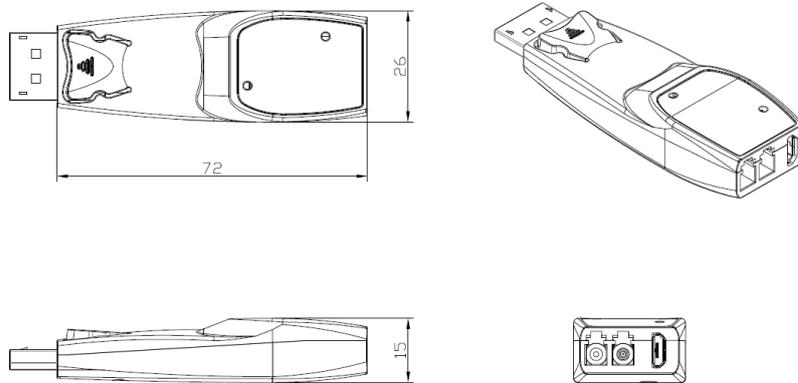
Note4. Tested with a 50mV<sub>p-p</sub> sinusoidal signal in the frequency range from 500 Hz to 500 MHz on the V<sub>CC</sub> supply with the recommended power supply filter in place. Typically less than a 0.25 dB change in sensitivity is experienced.

Note5. It is measured as total jitters including Tx and Rx modules under maximum extension, 100 meters with 5.4Gbps.

## Recommended specifications of fiber-optic cable

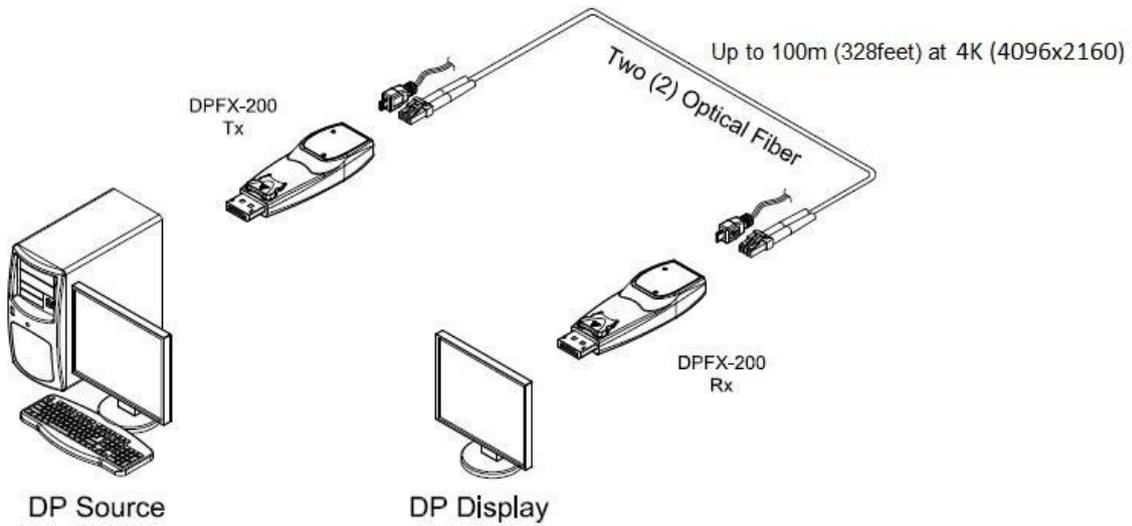
| Parameters                | Conditions                      | Specifications                           |
|---------------------------|---------------------------------|--|
| Fiber Type                |                                 | 50μm Multi-mode Graded Index Glass Fiber |
| Modal Bandwidth           | λ = 850nm                       | Min. 500 MHz km                          |
| Fiber Cable Attenuation   | λ = 850nm                       | Max. 2.5dB/km                            |
| Extension Distance        |                                 | 10 – 1650ft (500 meters)                 |
| No. of Ferrules           | Duplex LC                       | 2 ferrule                                |
| Skew                      |                                 | Max. 0.4ns                               |
| Insertion Attenuation     |                                 | Max. 0.5dB                               |
| Total Optical Attenuation | In 330 ft (100 meter) extension | Max. 1.5dB                               |

### Drawing of Module



Note: The transmitter, DPFX-200-T and the receiver, DPFX-200-R have the same mechanical dimensions

### Drawing of Cable Connection



## DisplayPort Pin Description

### TX Module

| Pin | Symbol          | Mating Row Contact Location | Functional Description                                   |
|-----|-----------------|-----------------------------|--|
| 1   | ML_Lane0(p)     | Top                         | Displayport Data Lane0 Positive                          |
| 2   | GND             | Bottom                      | Ground   |
| 3   | ML_Lane0(n)     | Top                         | Displayport Data Lane0 Negative                          |
| 4   | ML_Lane1(p)     | Bottom                      | Displayport Data Lane1 Positive                          |
| 5   | GND             | Top                         | Ground   |
| 6   | ML_Lane1(n)     | Bottom                      | Displayport Data Lane1 Negative                          |
| 7   | ML_Lane2(p)     | Top                         | Displayport Data Lane2 Positive                          |
| 8   | GND             | Bottom                      | Ground   |
| 9   | ML_Lane2(n)     | Top                         | Displayport Data Lane2 Negative                          |
| 10  | ML_Lane3(p)     | Bottom                      | Displayport Data Lane3 Positive                          |
| 11  | GND             | Top                         | Ground   |
| 12  | ML_Lane3(n)     | Bottom                      | Displayport Data Lane3 Negative                          |
| 13  | CONFIG1         | Top                         | Cable Adaptor Detect                                     |
| 14  | CONFIG2         | Bottom                      | None   |
| 15  | AUX CH(p)       | Top                         | Displayport Aux Channel Positive                         |
| 16  | GND             | Bottom                      | Ground   |
| 17  | AUX CH(n)       | Top                         | Displayport Aux Channel Negative                         |
| 18  | Hot Plug Detect | Bottom                      | HPD is used to detect a sink device by the source device |
| 19  | Return          | Top                         | None   |
| 20  | DP_PWR          | Bottom                      | Power for Connector (3.3V 500mA)                         |

### RX Module

| Pin | Symbol          | Mating Row Contact Location | Functional Description                                   |
|-----|-----------------|-----------------------------|--|
| 1   | ML_Lane3(n)     | Top                         | Displayport Data Lane3 Negative                          |
| 2   | GND             | Bottom                      | Ground   |
| 3   | ML_Lane3(p)     | Top                         | Displayport Data Lane3 Positive                          |
| 4   | ML_Lane2(n)     | Bottom                      | Displayport Data Lane2 Negative                          |
| 5   | GND             | Top                         | Ground   |
| 6   | ML_Lane2(p)     | Bottom                      | Displayport Data Lane2 Positive                          |
| 7   | ML_Lane1(n)     | Top                         | Displayport Data Lane1 Negative                          |
| 8   | GND             | Bottom                      | Ground   |
| 9   | ML_Lane1(p)     | Top                         | Displayport Data Lane1 Positive                          |
| 10  | ML_Lane0(n)     | Bottom                      | Displayport Data Lane0 Negative                          |
| 11  | GND             | Top                         | Ground   |
| 12  | ML_Lane0(p)     | Bottom                      | Displayport Data Lane0 Positive                          |
| 13  | CONFIG1         | Top                         | Cable Adaptor Detect                                     |
| 14  | CONFIG2         | Bottom                      | None   |
| 15  | AUX CH(p)       | Top                         | Displayport Aux Channel Positive                         |
| 16  | GND             | Bottom                      | Ground   |
| 17  | AUX CH(n)       | Top                         | Displayport Aux Channel Negative                         |
| 18  | Hot Plug Detect | Bottom                      | HPD is used to detect a sink device by the source device |
| 19  | Return          | Top                         | None   |
| 20  | DP_PWR          | Bottom                      | Power for Connector (3.3V 500mA)                         |