

# DATA SHEET

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

### Contents

- ◆ Description
- ◆ Features
- ◆ Applications
- ◆ Technical Specifications
- ◆ Connection with DPAX
- ◆ Operating Conditions
- ◆ Drawing of Module
- ◆ Drawing of Cable Connection
- ◆ DP Pin Description
- ◆ Revision History

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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

- ※ Default connection is direct connection to both source (Tx side) and display (RX side)
- ※ If direct connection is impracticable, 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 (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. 0.62UI
Optical	Link Power Budget	Min. 1dB
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 of 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

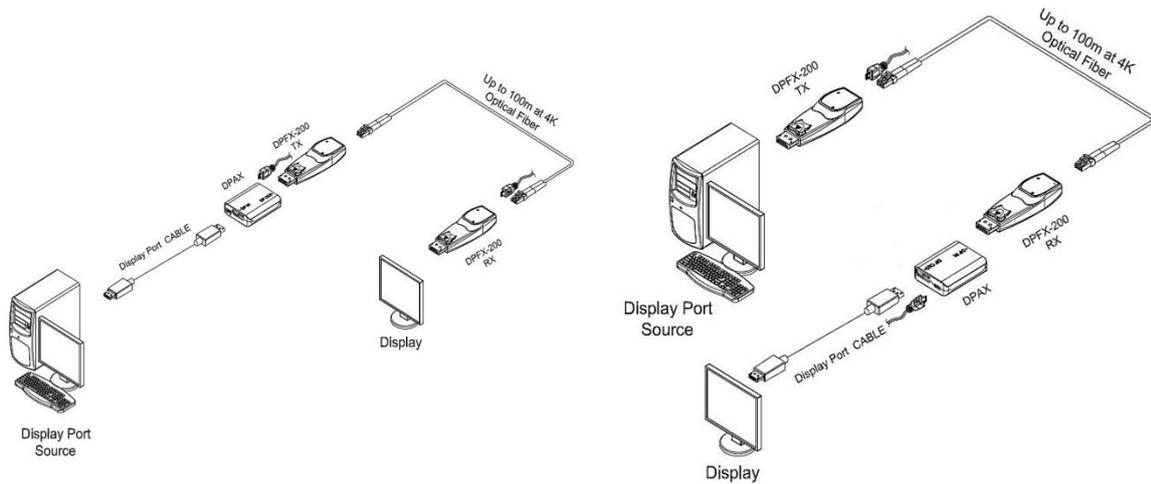
Note

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

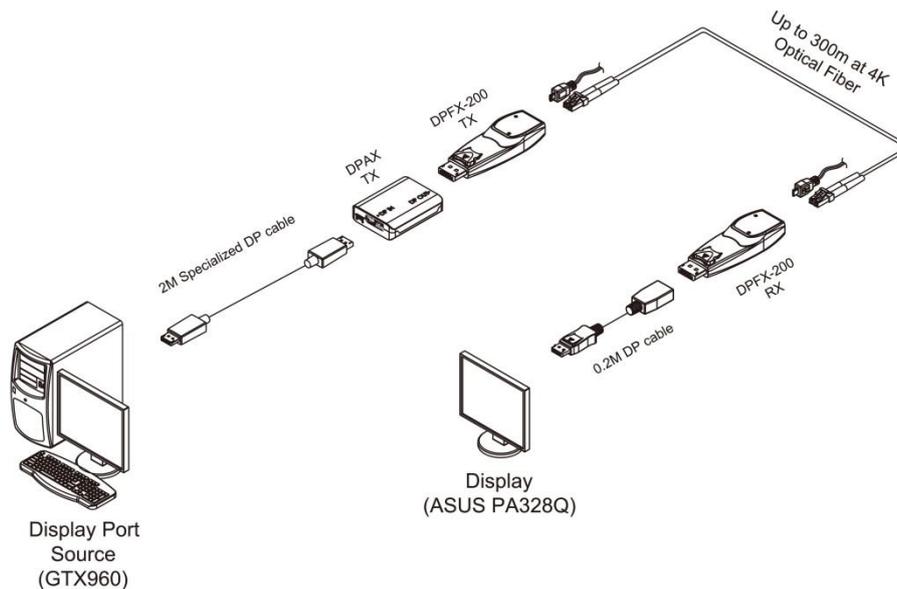
## Connection with DPAX

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>		230		mA
	Power Dissipation	P <sub>TX</sub>		1.15		W
	Power Supply Rejection (Note1)	PSR		50		mV <sub>p-p</sub>
	Supply Voltage (Internal)	V <sub>CC</sub>	3.0	3.3	3.6	V
	Supply Current (Internal)	I <sub>TCC</sub>	420	450	490	mA
	Power Dissipation (Internal)	P <sub>TX</sub>	1.39	1.49	1.62	W
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>	0			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>		270		mA
	Power Dissipation	P <sub>RX</sub>		1.35		W
	Power Supply Rejection (Note4)	PSR		50		mV <sub>p-p</sub>
	Supply Voltage (Internal)	V <sub>CC</sub>	3.0	3.3	3.6	V
	Supply Current (Internal)	I <sub>TCC</sub>	490	520	560	mA
	Power Dissipation (Internal)	P <sub>TX</sub>	1.47	1.72	1.85	W
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>		800		mV <sub>p-p</sub>
Optical Link	Receiving Optical Power	P <sub>o</sub>	-1			dBm
	Receiving Wavelength	λ	825		990	nm
	Link Power Budget	P <sub>bgt</sub>	1			dB
	Total Jitter (note 5)	TR <sub>jitter</sub>			0.5	UI

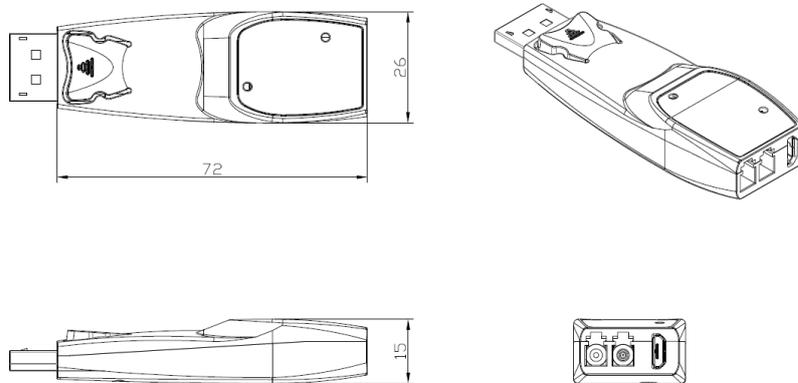
Note4. Tested with a 50mV<sub>p-p</sub> sinusoidal signal in the frequency range from 500 Hz to 500 MHz on the V<sub>CC</sub> supply with the recommended power supply filter in place. Typically less than a 0.25 dB change in sensitivity is experienced.

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

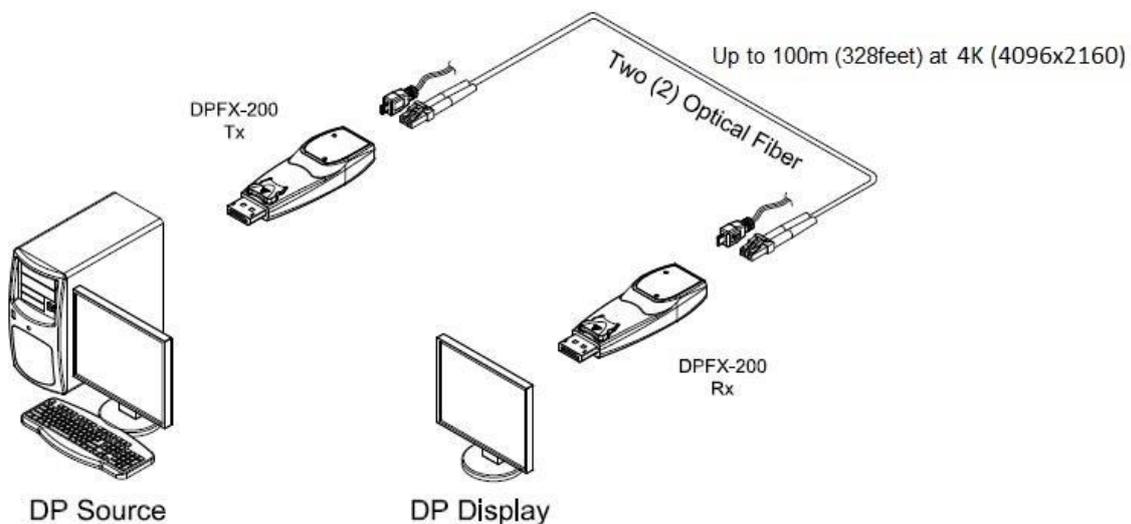
Parameters	Conditions	Specifications
Fiber Type		50µm Multi-mode Graded Index Glass Fiber
Modal Bandwidth	$\lambda = 850\text{nm}$	Min. 500 MHz km
Fiber Cable Attenuation	$\lambda = 850\text{nm}$	Max. 2.5dB/km
Extension Distance		10 – 328ft (100 meters)
No. of Ferrules	Duplex LC	2 ferrule
Skew		Max. 0.4ns
Insertion Attenuation		Max. 0.5dB
Total Optical Attenuation	In 328 ft (100 meter) extension	Max. 1dB

### 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)

## Revision History

Version	date	History
1.0	2016-04	First released
1.1	2016-06	Update description
1.2	2016-08	Update connection information with DPAX
1.3	2017-08	Update technical specification