

# DATA SHEET

## Two (2) fibers Detachable DisplayPort Extender, DPFX-100-TR

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## Description

New optical DisplayPort DPFX extender, DPFX-100-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 WQXGA (2560x1600) at 60Hz and 4K at 30Hz signal up to 200m (656feet), avoiding any tricks like scaling or data compression for lessening a burden of data transmission. It provides total data throughput 10.8Gbps (2.7Gbps 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-100-TR can be operated by USB power without external DC power adapter by plugging the supplied USB to DC plug cables to each module.

In shipping group, two (2) short DP cables are also included so as to be mated to various types of DP connectors.

The shipping items are shown as follows;

- 1) One (1) Transmitter (Tx) and One (1) Receiver (Rx)
- 2) Two (2) DC +5V 1A power adapters
- 3) Two (2) DP cables (0.5m)
- 4) Two (2) USB to DC plug cables
- 4) User's Manual

※ Other options – contact with sales office

## Features

- Supports DisplayPort 1.1a standards
- Extends WQXGA (2560x1600) at 60Hz and 4K at 30Hz
- Transmits DP data up to 200m (656feet) over two (2) LC multi-mode fibers (50/125um).
- Offers total data rate 10.8Gbps (2.7Gbps per lane)
- Supports auxiliary channel
- Compact design allows direct connect to the DP display
- Has DP receptacle and provides intermediate cable for flexible installation
- Operated by USB power or DC power supplier
- Data security with negligible EMI emission.
- Includes two (2) +5V, 1A DC power adapters / two (2) USB to DC plug 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 DP1.1a)
	Data Transfer Rate (Graphic Data)	Max. 2.7Gbps
	Total Jitter at the end of Rx output	Max. 0.49UI
	Skew inter-channels	Max. 6ns
Optical	Link Power Budget	Min 9.4dB
Mechanical	Module dimension (WDH)	35 x 72 x 16mm
Connect	Optical Connector	Duplex LC connectors
	Electric Connector Type from Systems and to Displays	20pin DP Receptacle Connector
	Recommended Fiber	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

## Operating Conditions

### ▪ Transmitter module: DPFX-100-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>	250	270	290	mA
	Power Dissipation	P <sub>TX</sub>	1.13	1.35	1.60	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	850		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>			260	ps
	Jitter in p-p value (Note3)	T <sub>jitter</sub>			260	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-100-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>	250	270	290	mA
	Power Dissipation	P <sub>RX</sub>	1.13	1.35	1.60	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 (Note9)	Receiving Optical Power	P <sub>o</sub>	-11		1	dBm
	Receiving Wavelength	λ	850		990	nm
	Signal Detect Good	SDg			-15	dBm
	Signal Detect Fail	SDf	-23			dBm
	Link Power Budget	P <sub>bgt</sub>	9.45			dB
	Total Jitter (note 5)	TR <sub>jitter</sub>			0.49	UI

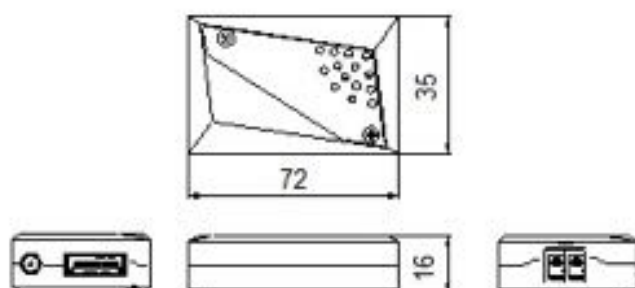
Note4. Tested with a 50mV<sub>p-p</sub> sinusoidal signal in the frequency range from 500 Hz to 500 MHz on the V<sub>CC</sub> supply with the recommended power supply filter in place. Typically less than a 0.25 dB change in sensitivity is experienced.

Note5. It is measured as total jitters including Tx and Rx modules under maximum extension, 200 meters with 2.7Gbps.

## Recommended specifications of fiber-optic cable

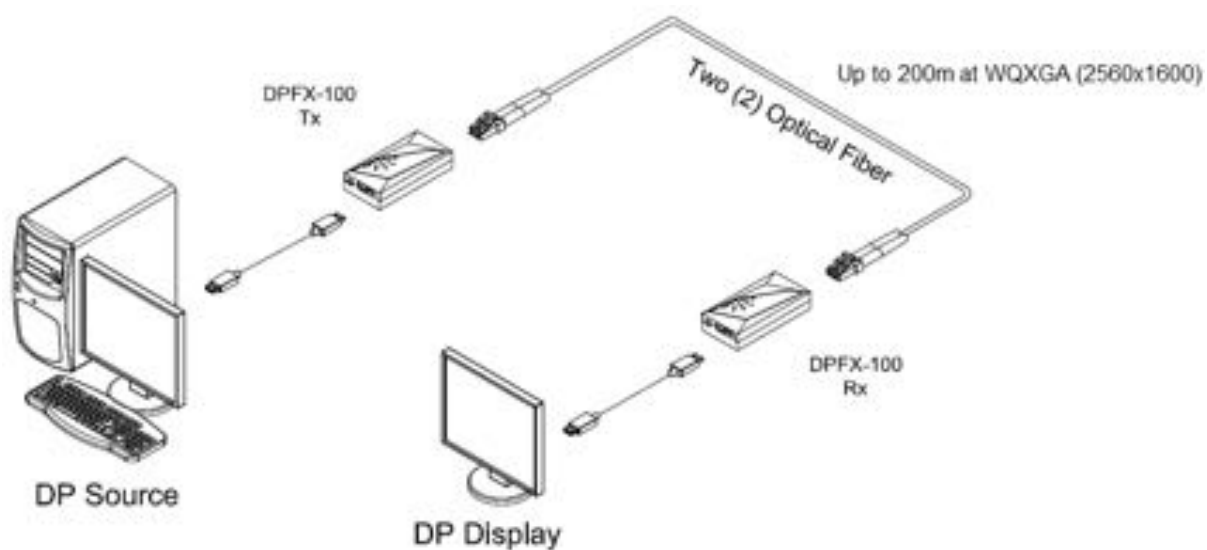
Parameters	Conditions	Specifications
Fiber Type		50μm Multi-mode Graded Index Glass Fiber
Modal Bandwidth	λ = 850nm	Min. 500 MHz km
Fiber Cable Attenuation	λ = 850nm	Max. 2.5dB/km
Extension Distance		10 – 1650ft (500 meters)
No. of Ferrules	Duplex LC	2 ferrule
Skew		Max. 3ns
Insertion Attenuation		Max. 0.5dB
Total Optical Attenuation	In 330 ft (100 meter) extension	Max. 1.5dB

### Drawing of Module



Note: The transmitter, DPFX-100-T and the receiver, DPFX-100-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	Main Power Input for Transmitter from Host

### 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
1.2	2014-11-06	Laser Safety updated
2.0	2016-03-21	Supply voltage, supply current, power dissipation, Skew updated
		DisplayPort Pin description – TX module updated.
		DPFX-100-CO changed (#20 connected)