

# 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 signal up to 300m (985feet), 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 (1m)
- 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
- Transmits DP data up to 300m (985feet) 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
- Certifies FCC and CE standards for EMI/RFI emission

## Applications

- Medical imaging
- Military
- Control room
- Simulator

## Technical Specifications

	Parameter	Specifications	Remarks
Components	Laser diodes in Tx module	InGaAs/InP 850nm/ 1310nm laser diode	
	Photo diodes in Tx module	InGaAs/InP PIN type photo diode	
	Photo diodes in Rx module	InGaAs/InP PIN type photo diode	
	Laser diodes in Rx module	InGaAs/InP 1550nm laser diode	
Electrical	Input and Output signals	TMDS level	
	Data Transfer Rate	Max. 1.65Gbps	
	Total Jitter at the end of Rx output	Max. 300 ps	
	Skew inter-channels	Max. 10ns	
Optical	Link Power Budget	Min. 10.0 dB	
Mechanical	Module dimension (WDH)	35 x 72 x 16mm	
Connect	Optical Connector	LC/PC connector	
	Electrical connector type from modules and to HDTVs	DP receptacle	
	Recommended fiber	50um Multi-mode Glass fiber	
External Power	Input	100~240V, 50~60Hz	
	Output	5V, 1A	

## 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	$RH_{OP}$	5	80 <sup>1)</sup>	%RH
Storage Temperature	$T_{stg}$	-20	75	°C
Storage Relative Humidity	$RH_{stg}$	5	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	Min	Typ.	Max	Units
Power Supply	Supply Voltage	$V_{CC}$	4.5	5.0	5.5	V
	Supply current	$I_{TCC}$	400	460	580	mA
	Power Dissipation	$P_{TX}$	1.8	2.3	3.19	W
	Power Supply Rejection (Note1)	PSR	-	50	-	mV <sub>p-p</sub>
TMDS	Data Output Load	$R_{LD}$		50		$\Omega$
	Graphic Supply Voltage (Note2)	$GV_{CC}$	+ 3.1	+ 3.3	+ 3.5	V
	Single-Ended High Level Input Voltage	$GV_{IH}$	$GV_{CC} - 0.01$	$GV_{CC}$	$GV_{CC} + 0.01$	V
	Single-Ended Low Level Input Voltage	$GV_{IL}$	$GV_{CC} - 0.6$	-	$GV_{CC} - 0.4$	V
	Single-Ended Input Swing Voltage	$GV_{ISWING}$	0.4	-	0.6	V
Optical Link (Note3)	TX					
	Output Optical Power	$P_o$	-9	-7	-4	dBm
	Wavelength	$\lambda$	840	850	860	nm
	Output Optical Power	$P_o$	-6	-3	-1	dBm
	Wavelength	$\lambda$	1290	1310	1330	nm
	Differential output swing	$V_{diffout}$	600	800	1000	mV
	RX					
	Sensitivity@3.125Gbps (Note4)	$P_o$	-17	-20		dBm
	Receiving Wavelength	$\Lambda$	1530	1550	1570	nm
	Link Power Budget	$P_b$	11	17		dB
	Differential input swing	$V_{difiin}$	300		2400	mV

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

Note2. Graphic Supply Voltage is regulated reference voltage for signal processing in modules

Note3. Measure signals at the end of 2 meter 50/125um MMGOF

Note4. Use PPG (Pulse pattern Generator) source with jitter 50ps

▪ **Receiver module: DPFX-100-R**

	Parameter	Symbol	Min	Typ.	Max	Units
Power Supply	Supply Voltage	$V_{CC}$	4.5	5.0	5.5	V
	Supply current	$I_{TCC}$	330	370	470	mA
	Power Dissipation	$P_{TX}$	1.49	1.85	2.59	W
	Power Supply Rejection (Note5)	PSR	-	50	-	
TMDS	Data Input Load	$R_{LD}$		50		$\Omega$
	Graphic Supply Voltage (Note6)	$GV_{CC}$	+ 3.1	+ 3.3	+ 3.5	V
	Single-Ended Output Swing Voltage (Note7)	$GV_{ISWING}$	0.2	-	0.4	V
Optical Link	TX					
	Output Optical Power	$P_o$	-6	-3	1	dBm
	Wavelength	$\lambda$	1530	1550	1570	nm
	Differential output swing	$V_{diffout}$	600	800	1000	mV
	RX					
	Sensitivity@3.125Gbps(Note8)	$P_o$	-16	-19		dBm
	Receiving Wavelength	$\Lambda$	840	850	860	nm
	Signal Detector-Dessert	$SD_{DE}$	-16	-19		dBm
	Signal Detector-Assert	$SD_A$	1290	1310	1330	dBm
	Differential input swing	$V_{diffin}$	300		2400	mV

Note5. 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.

Note6. Graphic Supply Voltage is regulated reference voltage for signal processing in modules

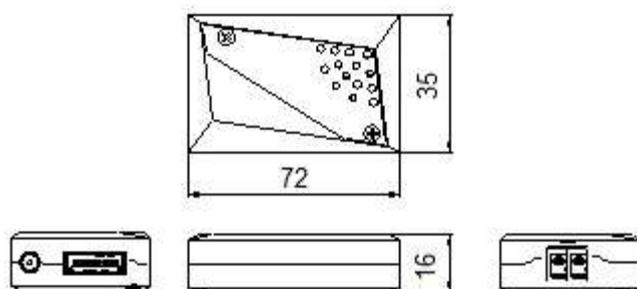
Note7. TMDS outputs are coupled in AC

Note8. Use PPG (Pulse pattern Generator) source with jitter 50ps

**Recommended specifications of fiber-optic cable**

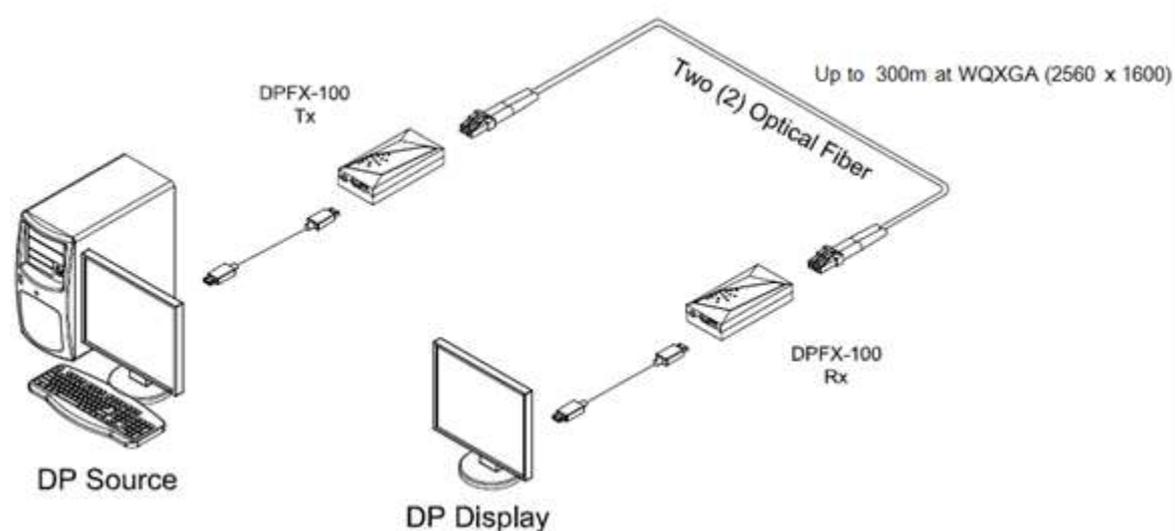
Parameters	Conditions	Specifications
Fiber Type		50 $\mu$ m Multi-mode Graded Index Glass Fiber
Modal Bandwidth	$\lambda = 850$ nm	Min. 500 MHz km
Fiber Cable Attenuation	$\lambda = 850$ nm	Max. 2.5dB/km
Extension Distance		10 – 1650ft (500 meters)
No. of Ferrules	Duplex LC	2 ferrule
Skew		Max. 0.4ns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

### Drawing of Module



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

### Drawing of Cable Connection



## DisplayPort Pin Description

No	Pin Assignment	Functional Description
1	TMDS2+	TMDS Data Signal Channel 2 Positive
2	TMDS2 Shield	TMDS Data Signal Channel 2 Shield
3	TMDS2-	TMDS Data Signal Channel 2 Negative
4	TMDS1+	TMDS Data Signal Channel 1 Positive
5	TMDS1 Shield	TMDS Data Signal Channel 1 Shield
6	TMDS1-	TMDS Data Signal Channel 1 Negative
7	TMDS0+	TMDS Data Signal Channel 0 Positive
8	TMDS0 Shield	TMDS Data Signal Channel 0 Shield
9	TMDS0-	TMDS Data Signal Channel 0 Negative
10	TMDS Clock+	TMDS Clock Channel Positive
11	TMDS Clock Shield	TMDS Clock Channel Shield
12	TMDS1Clock-	TMDS Clock Channel Negative
13	CEC	Consumer Electronics Control
14	Reserved	Not used
15	SCL	HDCEP/DDC communication clock
16	SDA	HDCEP/DDC communication data
17	DDC/CEC Ground	DDC/CEC shield
18	+5V Power	5 V Input for Transmitter for Host
		5 V Output for Monitor from Receiver
19	Hot Plug Detect	Signal is driven by monitor to enable the system to identify the presence of a monitor

## Reliability Test

We have two kinds of test criteria for a continuous improvement of characteristics of Optical DP interface module by our failure mode analysis program

- 1) Temperature & Humidity test
- 2) EMC test - FCC

### ◆ Temp. & Humidity Test

Items	Test	Conditions	Duration	Sample Size
Operation Test	Operating at each Temperature <sup>(1)</sup>	-10 ~ 60 °C (step: 10 °C)	30 min. (each Temperature)	N = 5
Storage Test	Low Temperature	Ts <sup>(2)</sup> = -20 °C	96HR	N = 5
	Low Temperature	Ts = 75 °C RH <sup>(3)</sup> : 85%	96HR	N = 5

Note 1) Evaluate display quality of Full HD TV connected to Graphic signal Generator (Quantum Data: GE-802B) at each temperature.

Note 2) Ts: Storage Temperature

Note 3) RH: Relative Humidity

### ◆ EMC Test

#### 1) EMI: Meet FCC class A (ICES-003) and CE class A

STANDARDS		CONDITIONS
EN 55 022 (CISPR22) <b>FCC; PART 15 SUBPART B</b>	CE (Conducted Emission) & RE (Radiated Emission)	Meet Class A
EN 61000-3-2 (IEC 61000-3-2)	Harmonics	Meet Class A
EN 61000-3-3 (IEC 61000-3-3)	Flickers	

## Laser Safety Information

### <US FDA CDRH Class 1>

Ensure to avoid exposure of human eyes to high power laser diode emitted laser beams.

Especially do not look into the laser diode or the collimated laser beam when the diode is activated.

US FDA CDRH Class 1, IEC60950, 60825-1.