DATA SHEET

2-Fiber Detachable Dual Link DVI module, DDFX-100-TR

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2-Fiber Detachable Dual Link DVI module, DDFX-100-TR

Description

Optical graphic extension module consists of transmitter module and receiver module, each of which has two (2) LC connectors and a 24-pins DVI-D plug. Users could decide extension length at their discretion by choosing the length of fiber-optic cables with LC ferrules at the ends. It offers two (2) graphic TMDS signals to be extensible up to the limits of modal bandwidth of selected multi-mode glass fiber(50/125 um or 62.5/125um).

The module has a capability to transmit up to WQXGA (2560x1600) at 60Hz or WQUXGA (3840x2400) at 33Hz graphic signals with 60Hz refresh rate using leading-edge OPTICIS fiber-optic component that transmits seven (7) data channels over two (2) multi-mode fibers. At such data bandwidth, this module can extend up to 1,640 feet (500 meters) much over the limits of copper wire extension, without any distribution amplifier or repeater.

The EDID in a display can be read and restored by just plugging it to the display. This self-EDID programming feature makes the installation of DDFX-100 easier and more flexile at any variable resolution display systems.

The modules are constituted of three parts as follows;

- One (1) transmitter converting electrical to optical signals, model name: DDFX-100-TX
- One (1) receiver converting optical to electrical signals, model name: DDFX-100-RX
- Two (2) AC Adaptors to 110V-240V with DC 5V 1A outlet

Features

- Extends all VESA resolution up to WQXGA (2560x1600) at 60Hz or WQUXGA (3840x2400) at 33Hz DVI data up to 500 meters (1,640ft) over two (2) multi-mode fibers
- Detachable feature with a duplex LC connector for each module
- Offers Self-EDID programming feature, detecting from a display and restoring to an EEPROM in the transmitter just by plugging to the display without any physical DDC connection
- The modules are compact enough to directly plug to graphic sources and displays by adopting DVI-plugs
- Includes two (2) +5V DC power adapters for the transmitter and receiver
- Certifications: FCC / CE, Class 1 Laser Eye Safety
- Data security with negligible RFI/EMI emissions and loss of video quality due to no copper conductor present

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Applications

- Medical imaging system
- Video wall system
- Digital signage
- Military / Aerospace
- Broadcast
- Conference room / Education

Technical Specifications

- General 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	TMDS Level (complying with DVI1.0)
	Data Transfer Rate (Graphic Data)	Max. 2.25Gbps
	Total Jitter at the end of RX output	Max. 309 ps
	Skew inter-channels	Max. 6ns
Optical	Link Power Budget	Min 1dB
Mechanical	Module dimension (WDH)	39 x 72 x 15mm
Connect	Optical Connector	Duplex LC connectors
	Electric Connector Type from Systems and to Displays	24 pin DVI-D plug
	Recommended Fiber	50/125 um Multi-mode Glass Fiber

- Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Supply Voltage	V_{CC}	-	+ 7.0	V
Operating Temperature	T_{op}	0	50	°C
Storage Temperature	T_s	- 30	+ 70	°C
Operating Humidity	H_s	10	85	%RH
Storage Relative Humidity	H_s	10	95	%RH

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- **Operating Conditions**

Transmitter module (E-to-O converter): DDFX-100-TX

	Parameter	Symbol	Minimum	Typical	Maximum	Units
Power Supply	Supply Voltage	Vcc	4.5	5.0	5.5	V
	Supply Current	I_{TCC}	300	360	430	mA
	Power Dissipation	P_{TX}	1.35	1.8	2.31	W
	Power Supply Rejection (Note1)	PSR		50		mV_{p-p}
TMDS	Data Output Load	R_{LD}		50		Ω
	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)	Output Optical Power	P_o			1	dBm
	Wavelength	λ	846.4		993.6	nm
	Spectral width in RMS	Δλ			3	nm
	Relative Intensity of Noise (Note4)	RIN		-20		dB/Hz
	Extinction Ratio	Ext	4			dB
	Rising/Falling Time	T_{rise}/T_{fall}			260	ps
	Jitter in p-p value (Note5)	T_{jitter}			260	ps

Note1. Tested with a $50mV_{p-p}$ 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. Measure in 1GHz of frequency bandwidth
Note5. Use PPG (Pulse Pattern Generator) source with jitter 50ps

Receiver module (O-to-E converter): DDFX-100-RX

	Parameter	Symbol	Minimum	Typical	Maximum	Units
Power Supply	Supply Voltage	Vcc	4.5	5.0	5.5	V
	Supply Current	I_{RCC}	230	280	340	mA
	Power Dissipation	P_{RX}	1.035	1.4	1.87	W
	Power Supply Rejection (Note6)	PSR		50		mV_{p-p}
TMDS	Data Input Load	R_{LD}		50		Ω
	Graphic Supply Voltage (Note7)	GV_{CC}	+ 3.1	+ 3.3	+ 3.5	V
	Single-Ended Output Swing Voltage (Note8)	GV_{ISWING}	0.2	-	0.4	V
Optical Link (Note9)	Receiving Optical Power	P_o	-11		1	dBm
	Receiving Wavelength	λ	846.4		993.6	nm
	Signal_Detect Good	SDg			-15	dBm
	Signal_Detect Fail	SDf	-23			dBm
	Link Power Budget	P_{bgt}	1			dB
	Total Jitter (note 10)	TR_{jitter}			309	ps

Note6. Tested with a $50mV_{p-p}$ 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.
Note7. Graphic Supply Voltage is regulated reference voltage for signal processing in modules
Note8. TMDS outputs are coupled in AC
Note9. Measure signals at the end of 2 meter 50/125um MMGOF
Note10. It is measured as total jitters including TX and RX modules under maximum extension, 500 meters with UXGA 60Hz.

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- **Recommended Specifications of Fiber-Optic Cables**

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 ferrules
Skew		Max. 0.4ns
Insertion Attenuation		Max. 0.5dB
Total Optical Attenuation	In 330 ft (100 meter) extension	Max. 1.5dB

Functions

- **Self-EDID Function**

The EDID in a display can be read and restored by just plugging it to the display. This Self-EDID programming feature makes the installation of DDFX-100-TR more easy and flexile at any variable resolution display systems.

- **Power Protection Circuit Mode in Transmitter Module**

The transmitter (TX) module of DDFX-100-TR is designed for power protection circuit from conflict of power supply between the external AC/DC power adapter and your DVI source by #14 pin.

We strongly recommend to use external AC/DC adapter for Transmitter (TX) for stable power supplying. In case of Receiver (RX), power should be supplied by AC/DC adapter due to no internal power supplying from the displays.

- **Signal Detect Mode in Receiver Module**

It offers optical signal monitoring LED when optical input power is lower than as specified in a certain case, for instance, loosing optical connectors.

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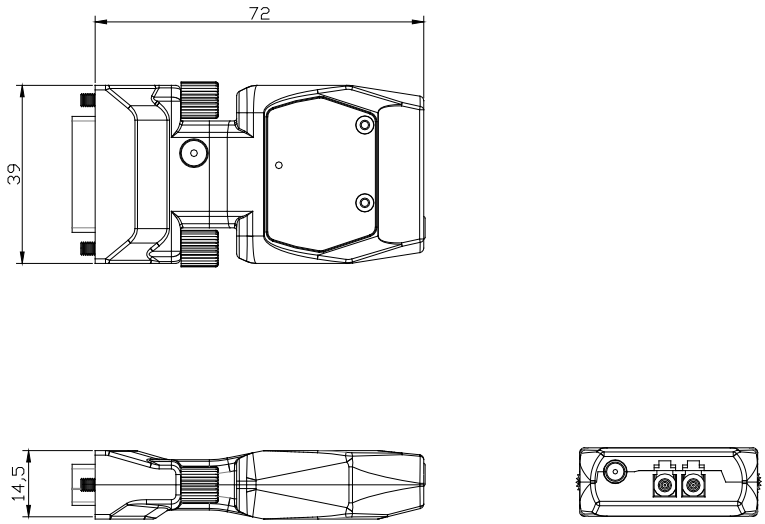
Drawing

Dimension [mm]

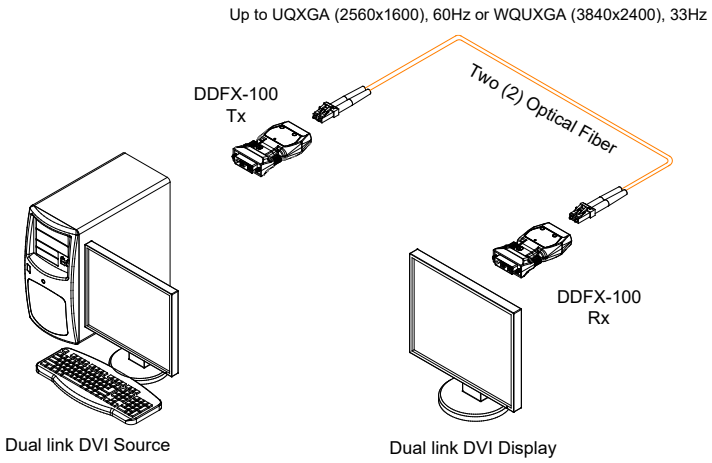


Note: The transmitter, DDFX-100-TX and the receiver, DDFX-100-RX have the same mechanical dimensions.

Fiber Connection

The diagram shows the connection of transmitter (TX; plug in PCs) and receiver (RX; plug in displays) modules by using two (2) LC patch cords fibers.

Connection Diagram



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DVI Pin Description

Pin	Symbol	Functional Description
1	**CH2-**	TMDS Data Signal Channel 2 Negative
2	**CH2+**	TMDS Data Signal Channel 2 Positive
3	**GND**	TMDS Data Signal Channel 2/4 Shield
4	**CH4-**	TMDS Data Signal Channel 4 Negative
5	**CH4+**	TMDS Data Signal Channel 4 Positive
6	**DDC Clock**	DDC Clock line for DDC2B communication
7	**DDC Data**	DDC Data line for DDC2B communication
8	**N.C.**	
9	**CH1-**	TMDS Data Signal Channel 1 Negative
10	**CH1+**	TMDS Data Signal Channel 1 Positive
11	**GND**	TMDS Data Signal Channel 1/3 Shield
12	**CH3-**	TMDS Data Signal Channel 3 Negative
13	**CH3+**	TMDS Data Signal Channel 3 Positive
14	**5 V**	Main Power Input for Transmitter from Host (Note11) 5 V Output for Receiver to monitor
15	**GND**	Ground
16	**Hot plug Detect**	Signal is driven by monitor to enable the system to identify the presence of a monitor
17	**CH0-**	TMDS Data Signal Channel 0 Negative
18	**CH0+**	TMDS Data Signal Channel 0 Positive
19	**GND**	TMDS Data Signal Channel 0/5 Shield
20	**CH5-**	TMDS Data Signal Channel 5 Negative
21	**CH5+**	TMDS Data Signal Channel 5 Positive
22	**GND**	TMDS Clock Signal Shield
23	**CLK+**	TMDS Clock Channel Positive
24	**CLK-**	TMDS Clock Channel Negative

Note11) The AC-to-DC adapter for transmitter is option for Desk Top PC user.
But Note PC user has to use the AC-to-DC adapter because the power of Note PC is not enough to drive DDFX-100 transmitter.

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Revision History

Version	date	History
1.0	2012-03	Official version released
1.2	2015-01	Updated resolution: WQXGA 2560×1600@60Hz → WQUXGA 3840×2400@33Hz; added Class 1 Laser Eye Safety and 10–85%RH operating humidity.
1.3	2018-03	Updated optical link power budget to Min. 1dB.
1.4	2021-05	Updated company address and document layout.
1.5	2026-07	Updated current and power consumption specifications

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