1-Fiber Detachable DVI module, DVFX-110

DATA SHEET

Contents

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1-Fiber Detachable DVI module, DVFX-110

Description

Optical graphic extension module consists of transmitter module and receiver module, each of which has one (1) SC 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 SC ferrules at the ends. It offers graphic TMDS signals to be extensible up to the limits of modal bandwidth of selected single-mode fiber or 9/125 um and multi-mode glass fiber, or, 50/125 um or 62.5/125um.

The module has a capability to transmit WUXGA (1920x1200) graphic signals with 60Hz refresh rate using CWDM Optical Sub-Assembly (OSA) that transmits four (4) data channels over only one (1) single and multi-mode fiber. At such data bandwidth, this module can extend up to 1,000meters (4920 feet) over one (1) SC single-mode fiber and 500meters over one (1) SC multi-mode fiber 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 DVFX-110 more easy and flexile at any variable resolution display systems.

The key features of **DVFX-110-TR** is, by using an optical splitter (OPS-116S), one (1) signal from transmitter can be copied up to sixteen (16) times and it gives you a cost effective and space saving installation for various application. For your convenience, UXGA EDID would have been done before shipment as a default.

The modules are constituted of three parts as follows;

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

Features

- Extends all VESA resolution up to WUXGA (1920x1200) at 60Hz DVI data up to 1,000 meters (4920 feet) over one (1) single-mode or 500 meters (1640ft) over one (1) multi-mode fiber
- Detachable feature with a simplex SC 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

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- Complies with Class 1 Laser Eye Safety in compliance with FDA/CDRH, UL/EN 60601-1, 60601-1-2
- Certifies FCC and CE standards for EMI/RFI emission
- Data security with negligible RFI/EMI emissions and loss of video quality due to no copper conductor present

Applications

- Digital FPDs, PDPs and projectors for medical appliances, aero, traffic control, factory, and bank
- Digital FPDs and projectors in conference room and auditorium
- Kiosk with digital FPDs showing full motion graphic displays from remote systems
- PDP displays for information in public sites
- LED signboards in streets and in stadiums

Technical Specifications

- General Specifications

	Parameter	Specifications
Components	Laser Diodes in Tx Module	1310nm/1550nm 2ch transmitter with FP-LD
	Photo Diodes in Rx Module	1310nm/1550nm 2ch receiver with GaAs PIN-PD
Electrical	Input and Output Signals	TMDS Level (complying with DVI1.0)
	Data Transfer Rate (Graphic Data)	Max. 1.65Gbps
	Total Jitter at the end of Rx output	Max. 309 ps
	Skew inter-channels	Max. 6ns
Optical	Link Power Budget	Min 13.9dB
Mechanical	Module dimension (mm)	39Wx14.6Hx68L
Connect	Optical Connector	Simplex SC connectors
	Electric Connector Type from Systems and to Displays	24 pin DVI-D plug
	Recommended Fiber	9um-single-mode Glass Fiber

- Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Supply Voltage	V_{CC}	-	+ 7.0	V
Operating Temperature	T_{op}	-20	65	°C
Storage Temperature	T_s	- 30	+ 70	°C
Storage Relative Humidity	H_s	10	95	%RH

- **Operating Conditions**

Transmitter module (E-to-O converter): DVFX-110-TX

	Parameter	Symbol	Minimum	Typical	Maximum	Units
Power Supply	Supply Voltage	Vcc	4.5	5.0	5.5	V
	Supply Current	I_{TCC}	650	680	710	mA
	Power Dissipation	P_{TX}	2.925	3.400	3.905	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	$GV_{ISW\ NG}$	0.4	-	0.6	V
Optical Link (Note3)	Output Optical Power	P_o	-6.0		0	dBm
	Wavelength	λ	1260 1480	1310 1550	1360 1600	nm
	Spectral width in RMS	Δλ			2	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): DVFX-110-RX

	Parameter	Symbol	Minimum	Typical	Maximum	Units
Power Supply	Supply Voltage	Vcc	4.5	5.0	5.5	V
	Supply Current	I_{RCC}	530	560	590	mA
	Power Dissipation	P_{RX}	2.385	2.8	3.245	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)	$GV_{ISW\ NG}$	0.2	-	0.4	V
Optical Link (Note9)	Receiving Optical Power	P_o	-21		0	dBm
	Receiving Wavelength	λ	1260 1480	1310 1550	1360 1600	nm
	Signal_Detect Good	SDg			-31	dBm
	Signal_Detect Fail	SDf	-21			dBm
	Link Power Budget	P_{bgt}	13.9			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.

- Recommended Specifications of Fiber-Optic Cables

Parameters	Conditions	Specifications
Fiber Type		9μm Single-mode Graded Index Glass Fiber
Modal Bandwidth	λ = 1310nm λ = 1550nm	Min. 400 MHz km
Fiber Cable Attenuation	λ = 1310nm λ = 1550nm	Max. 3.5dB/km
Extension Distance		10 – 1650ft (500 meter)
No. of Ferrules	Simplex SC*	1 ferrule
Skew		Max. 0.4ns
Insertion Attenuation		Max. 0.5dB
Total Optical Attenuation	In 330 ft (100 meter) extension	Max. 1.5dB

Note*: Some plastic couplers to clamp two LC connectors could not fit in.

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 DVFX-110 more easy and flexile at any variable resolution display systems.

- Power Protection Circuit Mode in Transmitter Module

The transmitter (Tx) module of DVFX-110-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 squelch function blocking output signals when optical input power is lower than as specified in a certain case, for instance, loosing optical connectors.

- Signal Splitting Function

One (1) signal from transmitter can be copied up to sixteen (16) times by using an optical splitter (OPS-116S) and it gives you a cost effective and space saving installation for various application.

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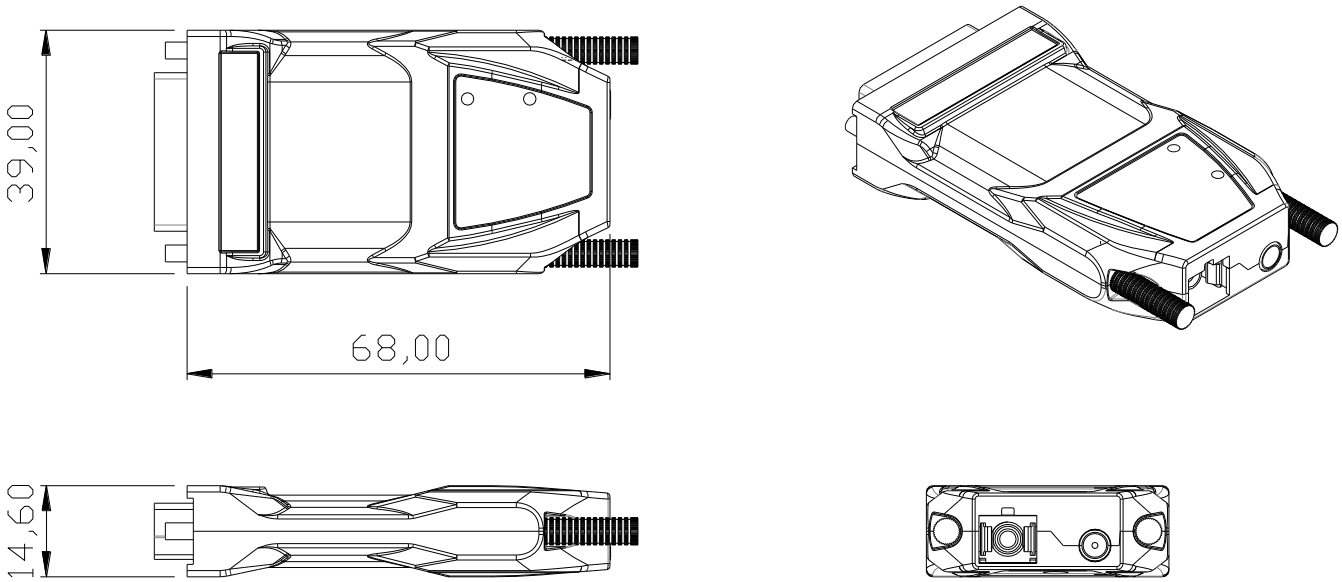
Drawing

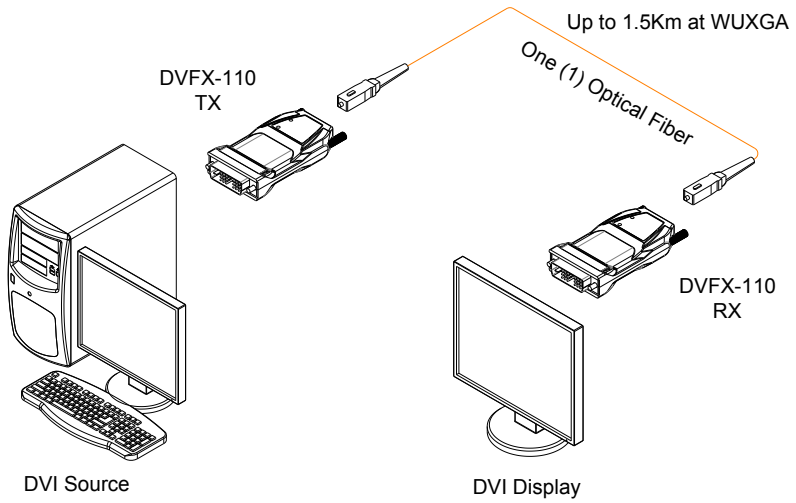
Dimension [mm]



Note: The transmitter, DVFX-110-T and the receiver, DVFX-110-R 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 one (1) SC patch cords fiber.



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 DVFX-110 transmitter.