

# DATA SHEET

## DisplayPort Optical Extension Cable

### M1-5000

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# Optical DisplayPort Extension Cable

**\* Point-to-point optical fibre cable \***

## Description

The DisplayPort standard - which defined by VESA (Video Electronics Standard) - is an attractive alternative to digital display interface such as HDMI and DVI. Optical technology for this transmission stretches the performance beyond the limitations of copper wire with longer length, data security, negligible RFI/EMI and the elimination of costly analog distribution systems.

DisplayPort supports single-lane transfer rates as fast as 2.7 Gbps across as many as four data pairs for a maximum of 10.8 Gbps over a single cable. These features combine with support for color depth as great as 16 bits per color channel to give designers the option of improving image quality in applications that require screen resolution of as much as WQXGA (2560×1600), as well as increasing refresh rates to 120 Hz. The DisplayPort interface also carries embedded clock signals and provides a bidirectional auxiliary channel operating at 1 Mbps to enable link management and device control to comply with VESA's EDID (extended-display-identification) and MCCS (monitor-control-command-set) standards.

The M1-5000 consists of a transmitter and a receiver module, one side is connected by our creative multi channels optical connector and the other side is connected by short male DisplayPort copper cable. M1-5000 is fully compatible with DisplayPort 1.1.

The shipping group is as follows;

- 1) One DP cable: M1-5000-xxx, where x = length in metres.
- 2) Factory will stock "standard" lengths of 10m, 20m, 30m, 40m, 50m, 70m and 100m.
- 3) AC/DC power adaptor +5V : 1ea
- 4) User's Manual

## **Key Features**

- ◆ Supports DisplayPort 1.1 standards
- ◆ Offers total data rate 10.8 Gbps (2.7 Gbps per lane)
- ◆ Supports all VESA resolutions up to WQXGA (2560x1600), at 60Hz
- ◆ Hybrid cable with four multi mode fibers cables for the DP interface and embedded copper wires to support the auxiliary channel, Hot Plug Detect and power management.
- ◆ Extends high resolution DP data up to 100 meters (328 feet)
  
- ◆ Compact end connector design easily allows direct connect to the HDTV source and display peripheral.
- ◆ No software to install; just plug and go.
- ◆ Data security with negligible RFI/EMI emissions.
- ◆ Certifications: CE / FCC, Class 1 Laser Eye Safety

## **Applications**

- ◆ Home Theatre applications.
- ◆ Digital TFT-LCD FPDs, PDPs and projectors for medical imaging, air traffic control, factory automation, conference rooms, auditorium A/V systems, etc.
- ◆ Kiosks with digital FPDs showing full motion graphic displays from remote systems
- ◆ PDP displays for information display in public sites.
- ◆ LED signboards in streets and stadiums.

## **Options**

- ◆ 10, 20, 30, 40, 50, 70 and 100m are standard stock lengths. Other lengths up to 100m can be customized from the factory.

## Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Storage Temperature	T <sub>stg</sub>	- 30	+ 70	°C
Supply Voltage	V <sub>CC</sub>	- 0.3	+ 6.0	V
Transmitter Differential Input Voltage	V <sub>d</sub>	-	1	V
Relative Humidity	RH	10	85	%
Lead Soldering Temperature & Time	-	-	-	260°C, 10 sec

## Recommended Operating Conditions

Parameter	Symbol	Minimum	Typical	Maximum	Units
Ambient Operating Temperature	T <sub>A</sub>	0		+ 50	°C
Data Output Load	R <sub>LD</sub>		50		Ω
Power Supply Rejection (Note1)	PSR		50		mV <sub>p-p</sub>
Supply Voltage	V <sub>CC</sub>	+ 4.5	+ 5.0	+ 5.5	V
Graphic Supply Voltage (Note2)	GV <sub>CC</sub>	+ 3.0	+ 3.3	+ 3.6	V

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. Graphic Supply Voltage is only for the Graphic Signal Interface which is generated by regulator in the Transmitter and Receiver

## Electrical Power Supply Characteristics

Parameter	Symbol	Minimum	Typical	Maximum	Units
Supply Voltage	V <sub>CC</sub>	4.5	5	5.5	V
Supply Current	TX	I <sub>TCC</sub>	120	200	mA
	RX	I <sub>RCC</sub>	350	400	mA
Power Dissipation	TX	P <sub>TX</sub>	0.60	1.1	W
	RX	P <sub>RX</sub>	1.75	2.2	W

## Specifications of Fibre-Optic Cables

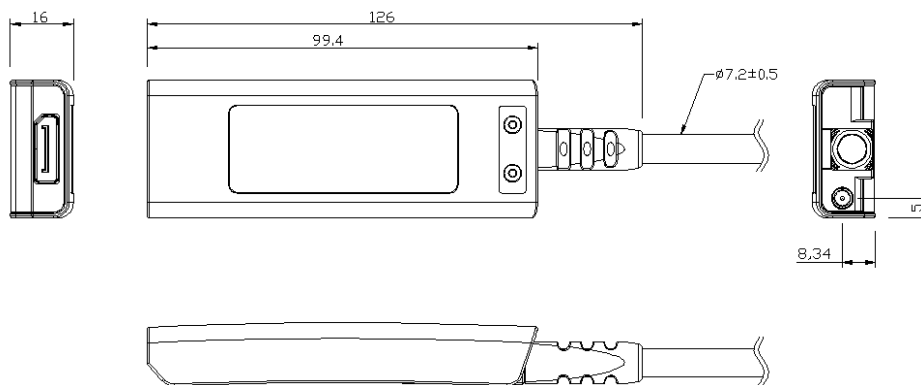
Parameter	Value
Core Diameter	62.5um (MMGOF)
Buffer Diameter	0.25mm (MMGOF)
Outside Diameter	7.2mm
Proof Test Level	0.53GPa

## Electrical Interface

Parameter	Symbol	Minimum	Maximum	Units
Transmitter Differential Input Voltage Swing (Peak-to-Peak)	$V_{ID}$	0.4	1.6	V
Receiver Data Output Voltage Swing (Peak-to-Peak)	$V_{Op-p}$	0.6	0.8	V

## Drawing of transmitter and receiver modules

Dimension [mm]



\*. Both transmitter and receiver have the same dimensions.

## 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	These pins are connected to ground
14	CONFIG2	Bottom	
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	None

### 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	These pins are connected to ground
14	CONFIG2	Bottom	
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	None

## Reliability Test

Opticis utilizes three types of test criteria for a reduction of variability and a continuous improvement of the process by its FEMA (Failure Mode and Effective Analysis) program.

- 1) Mechanical test (vibration, shock)
- 2) Temperature & humidity tests
- 3) EMC test (FCC class A and CE Verification)

### Mechanical and Temperature & Humidity Test Data

Heading	Test	Conditions	Duration	Sample Size	Failure	Remarks
<b>Operating Test</b>	Operating at each Temperature (See Note)	* - 0 ~ 50 °C (Interval: 10 °C)	30 Min (Each Temperature)	n =4	0	<b>Note:</b> Visual Test on the Display
<b>Storage Test</b>	Low Temperature	* T <sub>s</sub> = -30 °C	96 HR	n=2	0	1. TS: Storage Temperature
	High Temperature	* T <sub>s</sub> = 70 °C	96 HR	n=2	0	2. RH: Relative Humidity
	High Humidity High Temperature	* T <sub>s</sub> : 85 °C * RH: 85%	96 HR	n=2	0	
<b>Mechanical Test</b>	Mechanical Shock	* Pulse: 11 ms * Peak level: 30 g * Shock pulse: 3 times/Axis	-	n=2	0	
	Mechanical Vibration	* Peak acceleration: 20 g * Frequency: 20~2000 Hz * Sweep time: 30 Minutes * 4 Times/Axis	-	n=2	0	

**EMC Test Data**

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

STANDARDS		CONDITIONS
EN 55 022 (CISPR22) FCC; PART 15 SUBPART 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	Meet Class A

**2) EMS: Meet CE standards (EN 55024) and CISPR24 equivalents**

STANDARDS		CONDITIONS
EN 61 000-4-2:1995	Electrostatic Discharge Immunity (Air: 8kv, Contact: 4kv)	Meet Criterion B
EN 61 000-4-3:1996	Radiated RF E-Field (80~1000 MHz) 3V/m (AM 80%, 1kHz)	Meet Criterion A
EN 61 000-4-4:1995	Fast Transients (5kHz, 60Seconds)	Meet Criterion B
EN 61 000-4-5:1995	Surge Transients	Meet Criterion B
EN 61 000-4-6:1996	Conducted Susceptibility (CS) Radiated Susceptibility (RS)	Meet Criterion A
EN 61 000-4-11:1994	Voltage Dips, Interruption & Variation	Meet Criterion C

**Terminology**

- DISPLAYPORT** Digital display interface standard put forth by the Video Electronics Standards Association (VESA) since 2006. It defines a new royalty-free, digital audio/video interconnect, intended to be used primarily between a computer and its display monitor, or a computer and a home-theater system.
- EDID** Extended Display Identification Data. EDID parameters are sent over the DDC link.
- EMI** Electro Magnetic Interference.
- EMS** Electro Magnetic Susceptibility.
- MCCS** Monitor Control Command Set standard (VESA)
- RFI** Radio Frequency Interference.
- WQXGA** Display resolution of 2560×1600 pixels with a 16:10 aspect ratio or 2560×1440 with 16:9 aspect ratio (1440p). The name comes from the fact that it is a wide version of QXGA and has four times as many pixels as an WXGA display.
- VESA** Video Electronics Standards Association.