

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, 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
 - (1) up to 100 meters (326 feet) with auxiliary channel
 - (2) up to 2 km (6562 feet) without auxiliary channel
- ◆ 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.

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

- ◆ Custom lengths up to 100m are also available from the factory.

Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Storage Temperature	T_{stg}	- 30	+ 70	°C
Supply Voltage	V_{CC}	- 0.3	+ 6.0	V
Transmitter Differential Input Voltage	V_d	-	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_A	0		+ 50	°C
Data Output Load	R_{LD}		50		Ω
Power Supply Rejection (Note1)	PSR		50		mV _{p-p}
Supply Voltage	V_{CC}	+ 4.5	+ 5.0	+ 5.5	V
Graphic Supply Voltage (Note2)	GV_{CC}	+ 3.0	+ 3.3	+ 3.6	V

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 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_{CC}	4.5	5	5.5	V	
Supply Current	TX	I_{TCC}	-	120	200	mA
	RX	I_{RCC}	-	350	400	mA
Power Dissipation	TX	P_{TX}	-	0.5	1.0	W
	RX	P_{RX}	-	1.5	2.0	W

Specifications of Fibre-Optic Cables

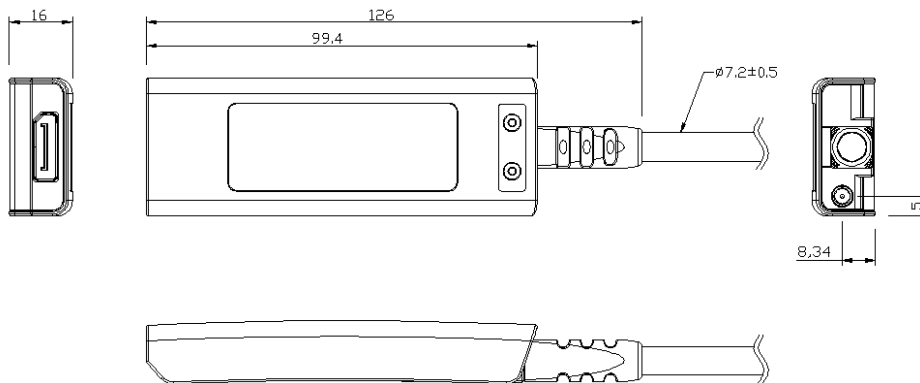
Parameter	Value
Core Diameter	62.5um (MMGOF)
Buffer Diameter	0.25mm (MMGOF)
Outside Diameter	7.2mm
Proof Test Level	0.53GPa

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)	VO_{p-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
Operating Test	Operating at each Temperature (See Note)	* - 0 ~ 50 °C (Interval: 10 °C)	30 Min (Each Temperature)	n=4	0	Note: Visual Test on the Display
Storage Test	Low Temperature	* T _S = -30 °C	96 HR	n=2	0	1. TS: Storage Temperature
	High Temperature	* T _S = 70 °C	96 HR	n=2	0	2. RH: Relative Humidity
	High Humidity High Temperature	* T _S : 85 °C * RH: 85%	96 HR	n=2	0	
Mechanical Test	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

- DDC Digital Display Channel. Latest specification is DDC2B.
- DVI-D Digital Visual Interface. Digital connection only – no analog.
- EDID Extended Display Identification Data. EDID parameters are sent over the DDC link.
- EMI Electro Magnetic Interference.
- EMS Electro Magnetic Susceptibility.
- PDP Plasma Display Panel. Large HDTV panels up to 63” use this display technology.
- RFI Radio Frequency Interference.
- TFT-LCD Thin Film Transistor Liquid Crystal Display – the technology of most computer display panels with VESA resolutions up to 1600x1200 pixels.
- TMDS Transmission Minimized Differential Signalling is the Silicon Image Inc. protocol for the digital signals.
- VCSEL Vertical Cavity Surface Emitting Laser transmitter diode. The receiver diode is the PIN-Photo Diode. These components are designed and manufactured by Opticis.
- VESA Video Electronics Standards Association.