DATA SHEET

HDMI - HDCP Extension Cable

M1-2000

Contents

- Description
- Features
- Absolute Maximum Ratings
- Recommended Operating Conditions
- Electrical Power Supply Characteristics
- Receiver Electrical Interface
- Specifications of fiber-optic cables
- Drawing of transmitter and receiver modules
- DVI Pin Description
- Reliability Test of Modules
- Terminology

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Optical HDMI - HDCP Extension Cable

* Point-to-point optical fibre cable *

Description

The M1-2000 HDMI extension cable is a new member of the Opticis family of products that stretches your High-Definition Multimedia Interface connectivity. The M1-2000 is a hybrid cable solution using multi-mode glass fibers for the Red, Green, Blue and Clock high-speed digital graphic signals and copper wires for the low frequency HDCP control signals, wrapped in a PVC jacket.

The reality of gigabit high-speed digital graphic interconnections mandates products that maintain front-of-screen video quality. Optical technology extends the ability to transmit hi-definition multimedia data beyond the physical limits of copper wires by, i) providing pure signal integrity over long distances for the optimum visual experience, ii) no EMI/RFI transmission or reception, iii) light weight, rugged cabling and connectors, iv) very cost effective per foot/metre, v) low power consumption, and vi) plug and go installation ease – no software requirements.

The product consists of a transmitter and a receiver, which are connected by bundled optical fibre and copper cables. There are male HDMI connectors at each end. The high-speed graphic data transmission is accomplished by using a VCSEL array inside the transmitter connector, and a Pin-PD array inside the receiver connector.

The shipping group is as follows;

1) One HDMI cable: M1-2000-xxx, where x = length in metres.
2) Factory will stock “standard” lengths of 10m, 20m, 30m, 50m, 70m and 100m.
3) User’s Manual

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Feature Checklist

- Extend HDMI signals up to 100m (330ft) with no signal degradation.
- Supports up to 1080p resolution.
- Complies with HDMI standard supporting HDCP parameters.
- Complies with DVI standard (165Mpixels/sec maximum) and supports DDC2B mode.
- Uses the host +5V source from the HDMI connector pin number 18 to drive the Tx and Rx modules, assuming a minimum of 500mA is available from the host
- If your HDTV source is unable to provide a minimum of +5V, 500mA on pin 18, just plug the external AC/DC power supply in Tx module for operation.
- Data security inherent with fibre & no RFI/EMI emissions.
- No software required; just plug and go.
- User Manual is available in non-supplier specific format for “white box” sales.

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.

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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	0	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}	-	170	200	mA
	RX	I_{RCC}	-	130	150	mA
Power Dissipation	TX	P_{TX}		0.85	1.1	W
	RX	P_{RX}	-	0.65	0.825	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

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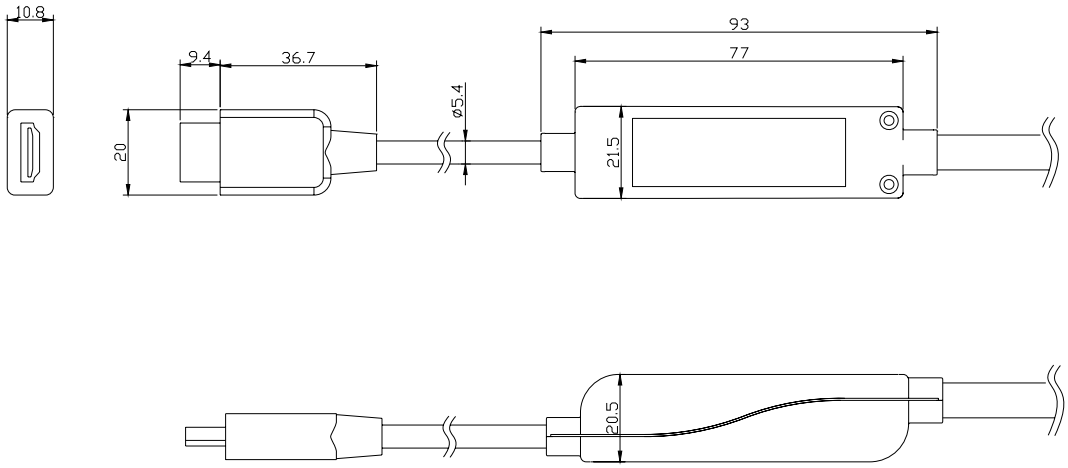
Drawing of transmitter and receiver modules

Dimension [mm]



HDMI Pin Description

Pin	Symbol	Functional Description
1	CH2+	TMDS Data Signal Channel 2 Positive
2	GND	TMDS Data Signal Channel 2 Shield
3	Ch2-	TMDS Data Signal Channel 2 Negative
4	CH1+	TMDS Data Signal Channel 1 Positive
5	GND	TMDS Data Signal Channel 1 Shield
6	CH1-	TMDS Data Signal Channel 1 Negative
7	CH0+	TMDS Data Signal Channel 0 Positive
8	GND	TMDS Data Signal Channel 0 Shield
9	CH0-	TMDS Data Signal Channel 0 Negative
10	CLK+	TMDS Clock Channel Positive
11	GND	TMDS Clock Signal Shield
12	CLK-	TMDS Clock Channel Negative
13	CEC	
14	Reserved	Not used
15	SCL	
16	SDA	
17	GND	DDC/CEC shield
18	5V	5 V Input for Transmitter from 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

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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	

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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.
HDCP	High Definition Content Protection. These parameters are part of the 2002 High Definition Multimedia Interface (HDMI) specification for Consumer Electronics.
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.

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