

DATA SHEET

HDMI - HDCP Extension Cable

M1-1P0H

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Headquarter

Opticis Co., Ltd.

501, ByusanTechnopia, 434-6
Sangdaewon-Dong, Chungwon-Ku,
Sungnam City, Kyungki-Do, 463-120
South Korea
Tel: +82 (31) 737-8033~9
Fax: +82 (31) 707-8079

www.opticis.com

North American Office

Opticis North America Inc.

330 Richmond Street, Suite 100, Chatham,
Ontario N7M 1P7
Canada

Tel: +1 (519) 355-0819
Fax: +1 (519) 355-0502

Optical HDMI - HDCP Extension Cable

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

Description

The M1-1P0H HDMI extension cable is a new member of the Opticis family of products that stretches your High-Definition Multimedia Interface connectivity. The M1-1P0H 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: M1-1P0Hx-yyy, where x = I, E, and y = length in metres.
x = I : Uses host +5V source from the HDMI connector
E: Uses an external +5V power supply
- 2) Factory will stock "standard" lengths of 10m, 20m, 30m, 50m, 70m and 100m.
- 3) User's Manual

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.
- ◆ Optional external AC/DC power version of the cable is available upon request, complete with a universal power adaptor with North American pins.
- ◆ 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

- ◆ M1-1P0HE optionally available upon special order from the factory with an external +5V power supply where the HDTV source is unable to provide a minimum of +5V, 500mA on pin 18.
- ◆ 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 | 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 | | |
| 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

- For M1-1P0HI, where +5Volt PC power is derived from pin 18 of the HDMI connector: The power supply fully specified by the DDWG DVI spec has to have a capability more than 500mA.
- For M1-1P0HE with the external power adaptor, the characteristics are as follows;

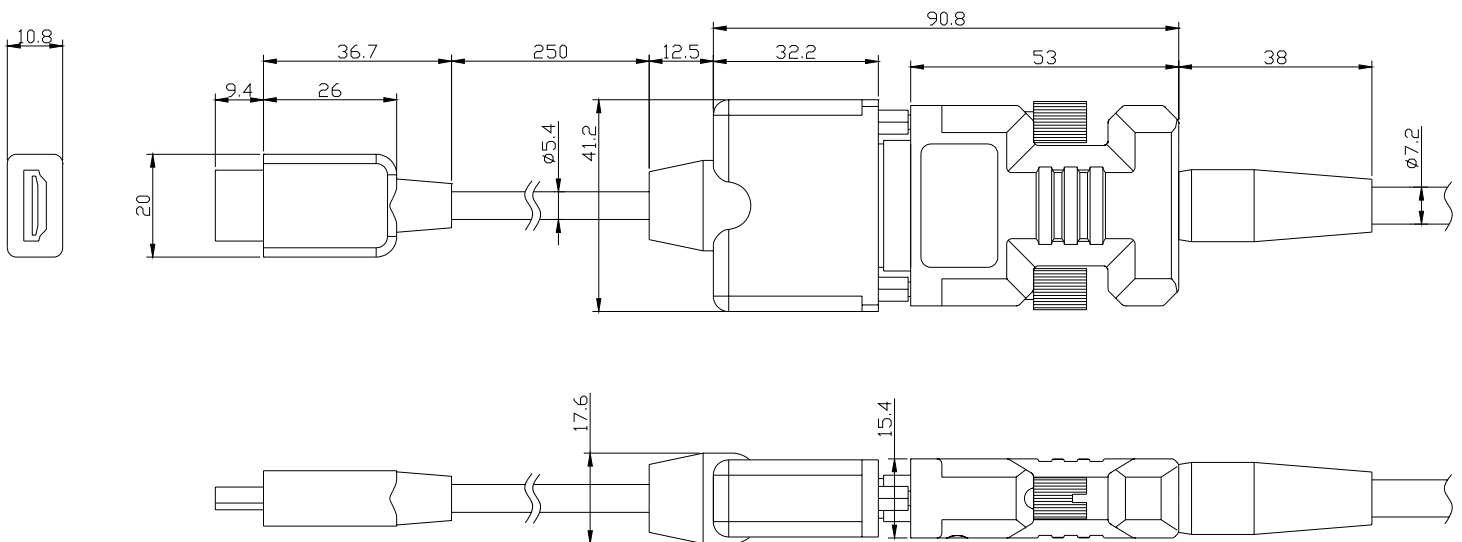
| Parameter | Symbol | Minimum | Typical | Maximum | Units | |
|-------------------|----------|-----------|---------|---------|-------|----|
| Supply Voltage | V_{CC} | 4.5 | 5 | 5.5 | V | |
| Supply Current | TX | I_{TCC} | - | 170 | 200 | mA |
| | RX | I_{RCC} | - | 130 | 150 | mA |
| Power Dissipation | 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 |

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 |

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. |
| 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. |