

DATA SHEET

Optical HDMI Extension Module

M1-203H-TR

Contents

- ◆ Description
- ◆ Features
- ◆ Applications
- ◆ Technical Specifications
- ◆ Drawing of Modules
- ◆ Drawing of Cable Connections
- ◆ HDMI Pin Description
- ◆ Reliability Test

OPTICIS HQ

Opticis Co., Ltd.

304, Byucksan Technopia, 434-6
Sangdaewon-Dong, Chungwon-Ku,
Sungnam City, Gyeonggi-Do, 462-716
South Korea
Tel: +82 (31) 737-8033~8
Fax: +82 (31) 737-8079

www.opticis.com
tosales@opticis.com

North American Office

Opticis USA LLC

649 Route 206
Unit 9 Suite 307
Hillsborough, NJ 08844 USA
Tel : +1 (908) 837-9652
Fax: +1 (908) 837-9078

cdkim@opticis.com

Optical HDMI Extension Module

- One fiber detachable optical HDMI extender -

Description

The M1-203H-TR HDMI (High Definition Multimedia Interface) extension module is a new member of the Opticis family of products that stretches your HDMI connectivity, offering a benefit of detachable connection with one SC fiber, which makes it easier to install.

The Optical HDMI extender, M1-203H-TR offers extremely long-distance extension of digital video and audio of HDMI 1.3 up to 1 km (3,280 feet). It is an all-fiber extension product, no copper connection like CAT5 or 6e between transmitter and receiver, installed in one SC optical fiber for connection.

Optical technology makes the HDMI transmission stretch the performance beyond limitation of copper wire extension with various benefits of long distance, crystal-clear data, negligible RFI/EMI and elimination of costly distribution amplifiers unlike in analog extension.

The M1-203H-TR consists of a transmitter and receiver boxes, which are designed to multiplex and de-multiplex the HD video, Display Data Channel (DDC) and High Definition Copy Protection (HDCP) so as to be linked over only one optical fiber. All ports are deployed on the back panel and only indicators on the front panel.

The product is certified to EMI Class B by for FCC or CE for home uses as well as industrial or commercial uses.

The shipping group is shown as follows;

- 1) One transmitter converting electrical to optical signals, model name: M1-203H-T
- 2) One receiver converting optical to electrical signals, model name: M1-203H-R
- 3) HDMI copper cables: 2 x M1-HVCO-010 (1.0m)
- 4) AC/DC +5V power adapter:

Features

- ◆ Supports HDMI 1.3a up to 24 bits in color depth.
- ◆ Extends all HD resolution up to 1080p (1,920x1,080) 60Hz up to 1 km (3,280 feet).
- ◆ Provides lossless and uncompressed image quality without frame dropping.
- ◆ Supports embedded audio: 48 kHz
- ◆ Complies with HDCP.
- ◆ Includes two (2) +5V DC power adapters for the transmitter and receiver.
- ◆ Certifies FCC and CE standards for EMI/RFI emission.
- ◆ Not require S/W driver to install; just plug and play.

Applications

- ◆ Digital HD-TV of types of LCD, PDP, projection and projectors for Home or Commercial Entertainments
- ◆ Digital HD-TVs for industrial applications such as medical appliances, aero traffic control, factory, conference room, auditorium and bank
- ◆ Digital FPDs and projectors in conference room and auditorium
- ◆ Kiosk with digital FPDs showing full motion graphic displays from remote systems
- ◆ HD-TVs for information display in public sites
- ◆ LED signboards in streets or in stadiums

Technical Specifications

- General Specifications

| | Parameter | Specifications |
|------------|---|-------------------------------------|
| Components | Laser Diodes in Tx Module | InGaAs/InP 1310/1550 FP laser diode |
| | Photo Diodes in Rx Module | InGaAs/InP PIN type photo diode |
| Electrical | Input and Output Signals | TMDS Level |
| | Data Transfer Rate (Graphic Data) | Max. 1.65Gbps |
| | Total Jitter at the end of Rx output | Max. 300 ps |
| | Skew inter-channels | Max. 6ns |
| Optical | Link Power Budget | Min 7.0dB |
| Connect | Optical Connector | SC Connector |
| | Electric Connector Type from Modules and to HDTVs | HDMI receptacle |
| | Recommended Fiber | Standard single-mode fiber |

- Absolute Maximum Ratings

| Parameter | Symbol | Minimum | Maximum | Units |
|-----------------------------|------------|---------|---------|-------|
| Supply Adaptor Voltage | V_{CC} | + 4.75 | +5.25 | V |
| Operating Temperature | T_{op} | -10 | 50 | °C |
| Operating Relative Humidity | RH_{op} | 5 | 80* | %RH |
| Storage Temperature | T_{sto} | - 30 | + 85 | °C |
| Storage Relative Humidity | RH_{sto} | 5 | 95* | %RH |

Note*: Under the condition of No drops of dew

- Optoelectronic Characteristics

Transmitter module : M1-203H-T

| | Parameter | Symbol | Minimum | Typical | Maximum | Units |
|----------------------|---------------------------------------|---------------------|------------------|-----------|------------------|-------------------|
| Power Supply | Supply Adaptor Voltage | AV_{CC} | 4.75 | 5 | 5.25 | V |
| | Supply Voltage | V_{CC} | 4.5 | 5 | 5.5 | V |
| | Supply Current | I_{TCC} | - | 800 | 1500 | mA |
| | Power Dissipation | P_{TX} | - | 4 | - | W |
| | Power Supply Rejection (Note1) | PSR | - | 50 | - | mV _{p-p} |
| TMDS | Data Output Load | R_{LD} | - | 50 | - | |
| | 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_{ISWING} | 0.2 | - | 0.8 | V |
| Optical Link (Notes) | Output Optical Power | P_o | -8 | - | -4 | dBm |
| | Wavelength | λ | - | 1310/1550 | - | nm |
| | Spectral width in RMS | $\Delta\lambda$ | - | - | 6.0 | nm |
| | Extinction Ratio | Ext | - | 6 | - | dB |
| | Rising/Falling Time | T_{rise}/T_{fall} | - | - | 120 | ps |
| | Jitter in p-p value (Note4) | T_{jitter} | - | - | 100 | 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. Use PPG (Pulse Pattern Generator) source with jitter 50ps

Receiver module: M1-203H-R

| | Parameter | Symbol | Minimum | Typical | Maximum | Units |
|----------------------|---|----------------------|---------|-----------|---------|-------------------|
| Power Supply | Supply Adaptor Voltage | AV _{CC} | 4.75 | 5 | 5.25 | V |
| | Supply Voltage | V _{CC} | 4.5 | 5 | 5.5 | V |
| | Supply Current | I _{RCC} | - | 800 | 1500 | mA |
| | Power Dissipation | P _{RX} | - | 4 | - | W |
| | Power Supply Rejection (Note5) | PSR | | 50 | | mV _{p-p} |
| TMDS | Data Input Load | R _{LD} | | 50 | | |
| | Graphic Supply Voltage (Note6) | GV _{CC} | + 3.1 | + 3.3 | + 3.5 | V |
| | Single-Ended Output Swing Voltage (Note7) | GV _{ISWING} | 0.4 | - | 0.8 | V |
| Optical Link (Note9) | Receiving Optical Power | P _o | -12 | | 0 | dBm |
| | Receiving Wavelength | λ | | 1550/1310 | | nm |
| | Signal_Detect Good | SDg | | | -18 | dBm |
| | Signal_Detect Fail | SDf | -23 | | | dBm |
| | Link Power Budget | P _{bgt} | | 7 | | dB |
| | Total Jitter (note 8) | TR _{jitter} | | 100 | 150 | ps |

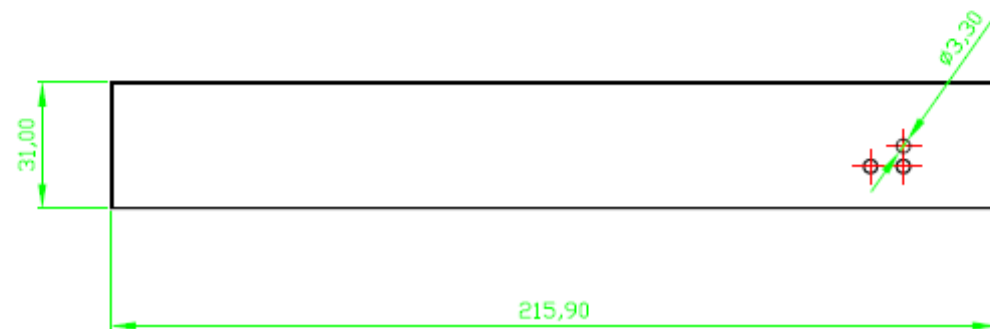
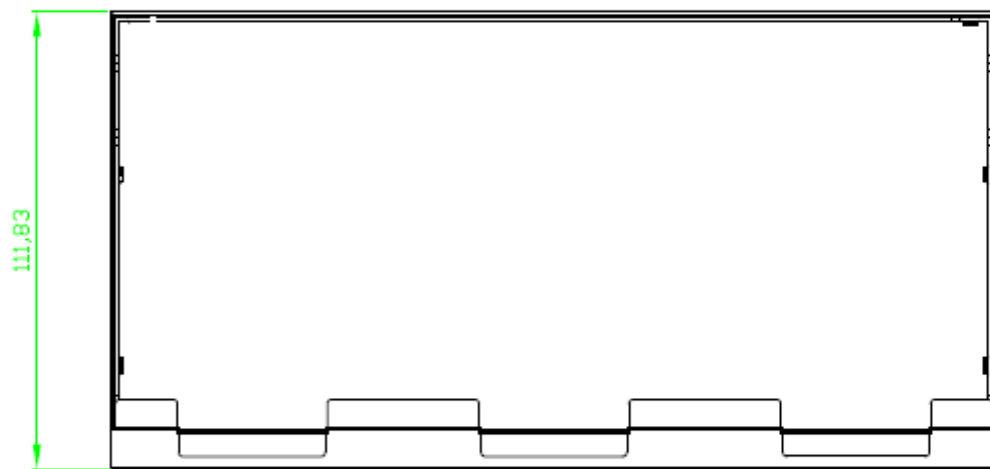
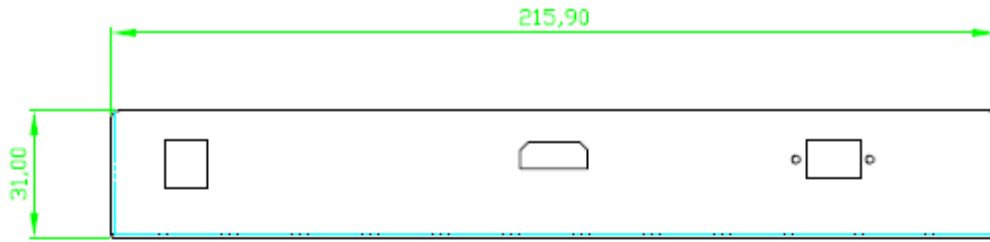
- Note5. Tested with a 50mV_{p-p} sinusoidal signal in the frequency range from 500 Hz to 500 MHz on the V_{CC} supply with the recommended power supply filter in place. Typically less than a 0.25 dB change in sensitivity is experienced.
- Note6. Graphic Supply Voltage is regulated reference voltage for signal processing in modules
- Note7. TMDS outputs are coupled in AC
- Note8. 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 | Glass single-mode Fiber | 9.5 / 125 2μm |
| Modal Bandwidth | λ = 1310nm, 1550nm | Min. 400 MHz km |
| Fiber Cable Attenuation | λ = 1310nm, 1550nm | >0.3dB/km |
| No. of Ferrules | SC Connector | 1 ferrules |
| Maximum Cladding Noncircularity | | 2% |
| Maximum Core/Cladding Noncircularity | | 1.6% |
| Minimum Fiber Bending Radius | | 30mm |

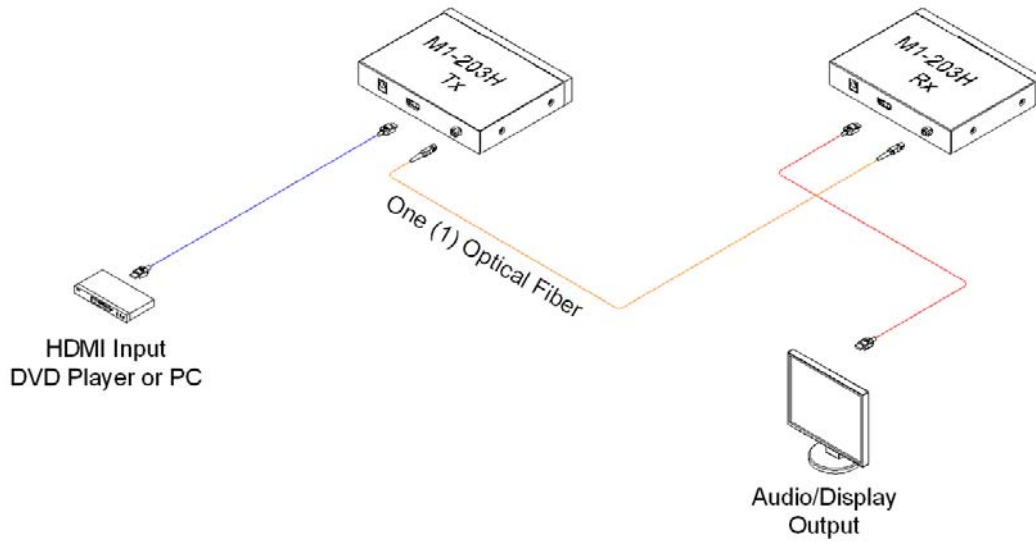
Drawing of Modules

Dimension [mm]



Note: The transmitter, M1-203H-T and the receiver, M1-203H-R have the same mechanical dimensions.

Drawing of Cable Connections



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 | Consumer Electronics Control |
| 14 | Reserved | Not used |
| 15 | SCL | HDCP/DDC communication clock |
| 16 | SDA | HDCP/DDC communication data |
| 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

We have three kinds of test criteria for a reduction of variability and a continuous improvement of the process by our FMEA (Failure Mode and Effective Analysis) program.

- 1) Mechanical test (Vibration, Shock)
- 2) Temp. & Humidity test
- 3) EMC test (*FCC class B and CE Verification for M1-203H-TR*)

Mechanical and Temp. & Humidity Test

| Heading | Test | Conditions | Duration | Sample Size | Remarks |
|-----------------|--|---|---------------------------|-------------|---|
| Operating Test | Operating at each Temperature (See Note) | -10~60 (Interval: 10) | 30 Min (Each Temperature) | n=3 | Note: Evaluate display quality of Laser Beam Projector connected to Graphic Signal Generator (Quantum Data: GD-802B) at each temperature. 1. T _S : Storage Temperature 2. RH: Relative Humidity |
| Storage Test | Low Temperature | T _S = -20 | 96 HR | n=3 | |
| | High Temperature | T _S = 60 | 96 HR | n=3 | |
| | High Humidity / High Temperature | T _S : 60 RH: 85% | 96 HR | n=3 | |
| Mechanical Test | Mechanical Shock | Pulse: 11 ms Peak level: 30 g Shock pulse: 6times/Axis | - | n=3 | |
| | Mechanical Vibration | Peak acceleration: 5 g Frequency: 10~55 Sweep time: 5 Minutes 2 Times/Axis | - | n=3 | |

EMC Test



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

| STANDARDS | | CONDITIONS |
|--|---|-------------------|
| EN 55 022 (CISPR22) FCC; PART 15 SUBPART B | CE (Conducted Emission) & RE (Radiated Emission) | Meet Class A or B |
| EN 61000-3-2 (IEC 61000-3-2) | Harmonics | Meet Class A or B |
| EN 61000-3-3 (IEC 61000-3-3) | Flickers | Meet Class A or B |

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 A or B |
| EN 61 000-4-3:1996 | Radiated RF E-Field (80~1000 MHz) 3V/m (AM 80%, 1kHz) | Meet Criterion A or B |
| EN 61 000-4-4:1995 | Fast Transients (5kHz, 60Seconds) | Meet Criterion A or B |
| EN 61 000-4-5:1995 | Surge Transients | Meet Criterion A or B |
| EN 61 000-4-6:1996 | Conducted Susceptibility (CS) Radiated Susceptibility (RS) | Meet Criterion A or B |
| EN 61 000-4-11:1994 | Voltage Dips, Interruption & Variation | Meet Criterion A or B, and C |

Terminology

| | |
|---------|--|
| HDMI | High Definition Multimedia Interface. Digital connection only – no analog. |
| HDCP | High-bandwidth Digital Content Protection. These parameters are part of the 2002 High Definition Multimedia Interface (HDMI) specification for Consumer Electronics. |
| DDC | Digital Display Channel. Latest specification is DDC2B. |
| EDID | Extended Display Identification Data. EDID parameters are sent over the DDC link. |
| EMI | Electro Magnetic Interference. |
| RFI | Radio Frequency Interference. |
| EMS | Electro Magnetic Susceptibility. |
| PDP | Plasma Display Panel. Large HDTV panels up to 63" use this display technology. |
| 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. |