

# DATA SHEET

## Digital Video/Analogue Audio

### Optical Extender

#### M1-203D-TR

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## Digital Video/Audio Extender

### Description

Optical DVI and audio extender, M1-203D-TR offers a high-quality, uncompressed data link between video source and a display peripheral. 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 analogue distribution systems

The EDID in a display can be read and restored by just plugging the transmitter to the display. This self EDID programming feature makes the installation of M1-203D-TR more easy and flexible at any variable resolution display systems

M1-203D-TR gives benefits of all optical fiber transmission, long distance extension and cost effectiveness to realize digital signage including audio. It offers integrated extension of digital video and analogue stereo audio interface up to 2km (6,560 ft) for DVI. It maintains HD video signals up to WUXGA (1920x1200) at 60Hz refresh rate for PC.

It is designed to multiplex and de-multiplex the DVI video and analog audio over 2 LC fibers. It gives benefits of all-glass fiber transmission medium, data security, long distance extension up to 2km, easy plug-and-play installation and no RFI/EMI effects. In addition, a non-trivial feature is that both of Single and Multimode optical fibers are applicable.

The M1-203D-TR consists of a transmitter (Tx) and a receiver (Rx) connected by two duplex LC terminated single or multi-mode patch cords between them, which offers electrical perfect isolation. Each link module is driven by +12V/3A DC power adaptor.

The shipping group is as follows;

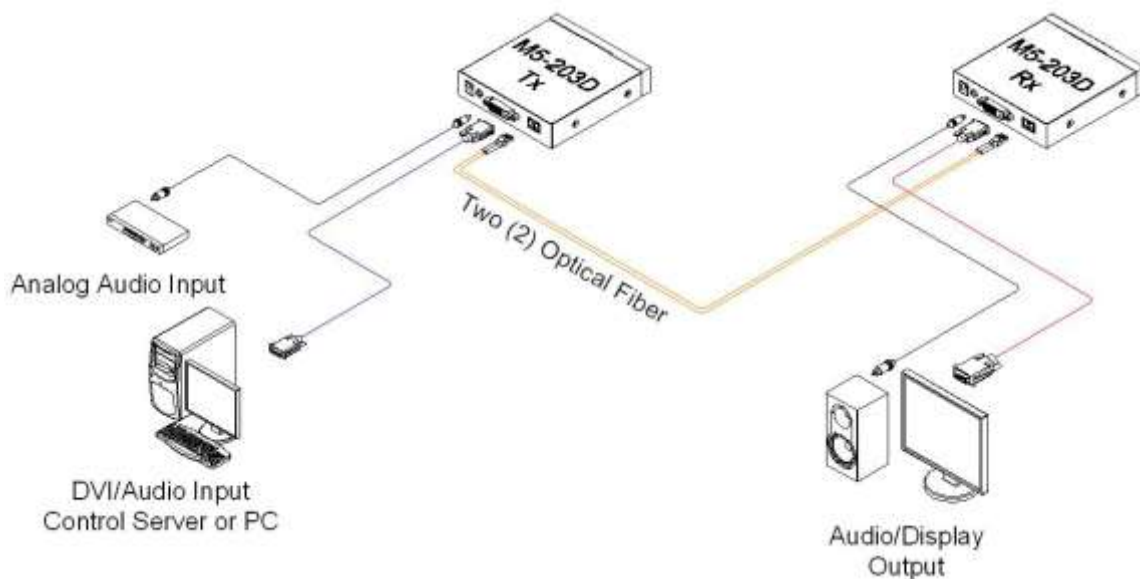
- 1) One pair of the transmitter and the Receiver
- 2) Two +12V/3A power adapters
- 3) User Manual

## Feature

- ◆ Support all VESA resolution up to WUXGA(1,920X1,200) 60Hz(1.62Gbps) DVI data up to 2,000m.
- ◆ Applicable to both single and multi-mode fibers without any change of optical components.
  - (1) Up to 2,000m with two LC single-mode fibers
  - (2) Up to 500m with two LC multi-mode fibers
- ◆ Audio interface: Analogue stereo audio
- ◆ Supports Self-EDID programming feature, detecting from a display and restoring to an EEPROM in the transmitter just by plugging to the display without any physical DDC connection
- ◆ Video data: WUXGA (1920X1200), 24bit color and 60Hz refresh rate for DVI.
- ◆ Interconnection between transmitter and receiver: Two(2) Duplex LC patch cords of single or multi mode fiber.
- ◆ Applicable of both single and multi-mode fiber.
- ◆ +12 V DC power supply to each module.
- ◆ Complies with DDC2B.
- ◆ No software to install; plug and play.
- ◆ Data security with negligible RFI/EMI emissions
- ◆ Certifications: CE / FCC

## Applications

- ◆ Digital display system integration for medical, military, aerospace, factory automation, and traffic control platforms.
- ◆ Digital FPD, PDP and projector installation in conference rooms, auditoriums and for kiosk systems
- ◆ LED signboards for large scale information display and stadiums



## Absolute Maximum Ratings

Parameter	Symbol	Minimum	Maximum	Units
Storage Temperature	$T_{stg}$	- 30	+ 70	°C
Supply Voltage	$V_{CC}$	10	16	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		$\Omega$
Power Supply Rejection (Note1)	PSR		50		mV <sub>p-p</sub>
Supply Voltage	$V_{CC}$	+ 11.4	+ 12.0	+ 12.6	V

Note1. Tested with a 50mV<sub>p-p</sub> sinusoidal signal in the frequency range from 500 Hz to 500 MHz on the  $V_{CC}$  supply with the recommended power supply filter in place. Typically less than a 0.25 dB change in sensitivity is experienced.

## Electrical Power Supply Characteristics

( $T_A = 0$  °C to +50 °C, unless otherwise noted)

Parameter	Symbol	Minimum	Typical	Maximum	Units	
Supply Voltage	$V_{CC}$	11.4	12	12.6	V	
Supply Current	TX	$I_{TCC}$	460	540	600	mA
	RX	$I_{RCC}$	400	480	540	mA
Power Dissipation	TX	$P_{TX}$	5.3	6.5	7.6	W
	RX	$P_{RX}$	4.6	5.8	6.8	W

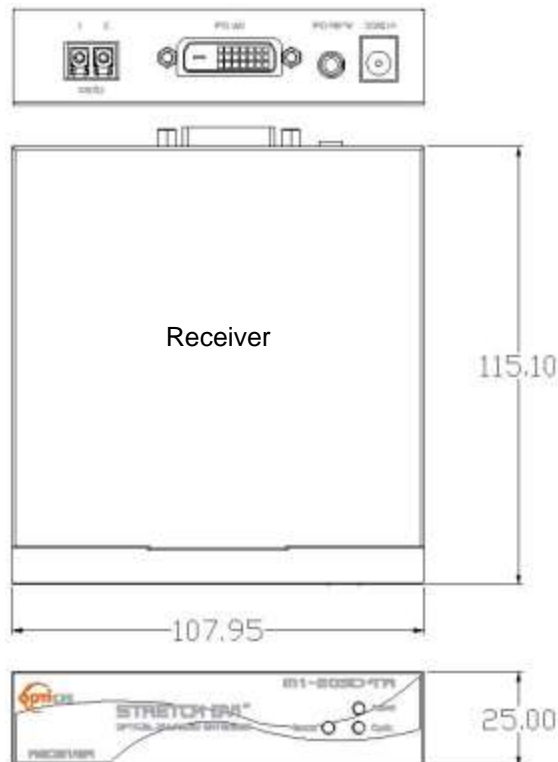
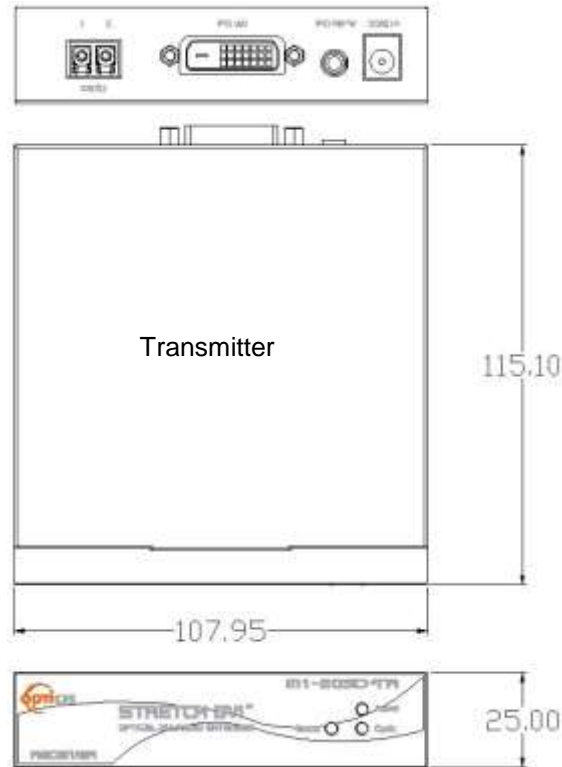
### Optical & Electrical Characteristics

(T<sub>op</sub> = 25°C)

Parameters		Symbol	Condition	Unit	Min.	Typ.	Max.	Remark
Data Bit Rate	1310 Tx		PRBS 2 <sup>23</sup> -1,NRZ	Mbps		1250		
	1550 Rx							
	1550 Tx		PRBS 2 <sup>23</sup> -1,NRZ	Mbps		1250		
	1310 Rx							
Fiber Length 9μm core SMF			10 <sup>-10</sup> BER, 155Mbps/1.25Gbps	km	2			
<b>TRANSMITTER</b>								
Average Power Output		P <sub>OUT</sub>	I <sub>f</sub> =I <sub>BIAS</sub> + I <sub>mod</sub> /2	dBm	-11	-9	-7	
Extinction Ratio		ER		dB	5			
Center Wavelength		c	CW, @ P <sub>OUT</sub>	nm	1270 1500	1310 1550	1355 1600	@1.31 μm @1.55 μm
Spectral Width			RMS Width	nm			4.0	
RIN				dB/Hz			-120	
Optical Rise/Fall Time		t <sub>r</sub> /t <sub>f</sub>	20 – 80%	nsec			0.26 2.0	
<b>RECEIVER</b>								
Sensitivity (Average Input Power)		P <sub>IN,MIN</sub>	PRBS 2 <sup>23</sup> -1, 10 <sup>-10</sup> BER	dBm	-19			1.25G Rx
Wavelength	1310 1550			nm	1260 1500	1310 1550	1360 1600	
Receiver Overload		P <sub>IN,MAX</sub>		dBm	-3.0			
Signal Detect Threshold Decreasing light input Increasing light input		P <sub>D</sub> P <sub>A</sub>		dBm dBm		P <sub>IN,MIN</sub> -3 P <sub>IN,MIN</sub> -2		
Signal Detect Hysteresis		P <sub>A</sub> - P <sub>D</sub>		dB	0.5			
Parameters		Symbol	Condition	Unit	Min.	Typ.	Max.	Remark
<b>Audio (Analog)</b>								
Analog Sample Rate		F <sub>audio_a</sub>		kHz		48		
Input level		A <sub>in</sub>		V <sub>pp</sub>		0.56V <sub>ss</sub>		
output level		A <sub>out</sub>	V <sub>pp</sub> =3.3V/Analog	V <sub>pp</sub>		0.65		
Input Impedance				kΩ		25		
Output Impedance				Ω		100		

### Drawing of transmitter and receiver modules

Dimension [mm]



## DVI Pin Description

Pin	Symbol	Functional Description
1	<b>CH2-</b>	TMDS Data Signal Channel 2 Negative
2	<b>CH2+</b>	TMDS Data Signal Channel 2 Positive
3	<b>GND</b>	TMDS Data Signal Channel 2 Shield
4		
5		
6	<b>DDC Clock</b>	DDC Clock line for DDC2B communication
7	<b>DDC Data</b>	DDC Data line for DDC2B communication
8	<b>N.C.</b>	
9	<b>CH1-</b>	TMDS Data Signal Channel 1 Negative
10	<b>CH1+</b>	TMDS Data Signal Channel 1 Positive
11	<b>GND</b>	TMDS Data Signal Channel 1 Shield
12		
13		
14	<b>5 V</b>	5 V Input for Transmitter from Host 5 V Output for Monitor from Receiver
15	<b>GND</b>	Ground
16	<b>Hot plug Detect</b>	Signal is driven by monitor to enable the system to identify the presence of a monitor
17	<b>CH0-</b>	TMDS Data Signal Channel 0 Negative
18	<b>CH0+</b>	TMDS Data Signal Channel 0 Positive
19	<b>GND</b>	TMDS Data Signal Channel 0 Shield
20		
21		
22	<b>GND</b>	TMDS Clock Signal Shield
23	<b>CLK+</b>	TMDS Clock Channel Positive
24	<b>CLK-</b>	TMDS Clock Channel Negative

Note: Channels 3, 4 and 5 dual-link data signal pins are not used

## 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=3	0	<b>Note:</b> Visual Test on the Display
<b>Storage Test</b>	<b>Low Temperature</b>	* T <sub>s</sub> = -30 °C	96 HR	n=3	0	1. TS: Storage Temperature
	<b>High Temperature</b>	* T <sub>s</sub> = 70 °C	96 HR	n=3	0	2. RH: Relative Humidity
	<b>High Humidity High Temperature</b>	* T <sub>s</sub> : 60 °C * RH: 95%	96 HR	n=3	0	
<b>Mechanical Test</b>	<b>Mechanical Shock</b>	* Pulse: 11 ms * Peak level: 30 g * Shock pulse: 3 times/Axis	-	n=2	0	
	<b>Mechanical Vibration</b>	* 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**

<b>STANDARDS</b>		<b>CONDITIONS</b>
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**

<b>STANDARDS</b>		<b>CONDITIONS</b>
EN 61 000-4-2:1995	Electrostatic Discharge Immunity (Air: 8kv, Contact: 4kv)	Meet Criterion A
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 A
EN 61 000-4-5:1995	Surge Transients	Meet Criterion A
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 A and C