ASTRO

HDMI Signal Distributor

VD-1653

Instruction Manual

Ver.2.00

ASTRO

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VD-1653

Instruction Manual

ASTRODESIGN,Inc

Contents

BEFORE USING

To Begin With

We sincerely thank you for purchasing the VD-1653 HDMI distributor at this time.

This document describes the operating procedures and important points about using the VD-1653.
Improper handling may cause injury or damage. To properly use VD-1653, please make sure to read this document.
After reading this document, please carefully safeguard it against loss.

Safety Notices

⚠ Warnings

About This Equipment

Avoid actions such as applying strong shock to, or throwing this equipment. Such actions may cause equipment failure, explosion, heating, or fire.

Avoid using this equipment in places which have a risk of catching fire or exploding.

Do not insert this equipment in cooking heat chambers such as microwave ovens, or in high pressure chambers.   This will cause heating, fuming, and combustion of this equipment, or destroying its electronic circuit components.

There are high voltage components inside this equipment.   Due to risks of electric shock and skin burn, as well as equipment failure, do not carry out any dismantling, repairing, or modifying of this equipment.

In case of occurrence of thunder during outdoors usage, immediately shut off the power, unplug the power cord from the equipment, and move the equipment to a safe place.

About the Power Cord

When unplugging the power cord, do so only by holding the plug.

Do not forcefully bend or bundle the power cord, as this may cause fire.

Do not place heavy objects on top of the power cord, as this may damage the cord and cause fire or electric shock.

About Foreign Substances

Do not pour liquids into or drop inflammable material or metallic objects on the equipment.

Using the equipment in this fashion may cause fire, electric shock, or equipment failure.

⚠ Caution

About This Equipment

Because the connection between VD-1653 and external equipment is via the Frame Grabber (FG), before connecting external equipment, first connect the FG terminal to VD-1653.

About Mechanical Shock

There is a risk of equipment failure if mechanical shock is applied to precision equipment.   Please be very careful when moving this equipment.

Do not drop this equipment.

About Setup

Set up this equipment only on a stable place.   Also, do not place this equipment vertically on its sides, because this may cause a temperature rise due to heat generation, which may result in equipment failure.

In the Event of Abnormal Operation or Failure

In the unlikely event of abnormal operation or failure of this equipment, please unplug the power cable, and contact the place of purchase or the sales department at ASTRODESIGN, Inc.

Organization of This Document

This document is the instruction manual for VD-1653. The presentation of the operating procedures and important points are organized as follows. Please read and follow this document for operating the equipment correctly.

Safety Notices

Safety notices, organization of this document, and contents of product package are presented.

1. About VD-1653

Overview of VD-1653 is presented.

2. Examples of Connection and Usage

Examples of connection, and examples of usage are presented.

3. Detailed Functions

Detailed functionality and operating procedures are presented.

4. Specifications, Etc.

Specifications, limitations, important points, etc are presented.

Contents of Product Package

This product package contains the following items.
Because using other accessories may cause equipment failure, please make sure to use only the accessories provided with the product.

- VD-1653
- VD-1653 Instruction Manual (This document) : 1 copy
- Power Cable : 1 item

1   About VD-1653

1.1 Overview

    VD-1653 HDMI distributor (hereafter referred to as VD-1653) is a video signal distributor conforming to the HDMI digital signal standard.

It is capable of dividing the input signal into 8 channels. Also, it has 2 HDMI input terminals, and a button which enables switching between 2 input signals.

In addition, because it also conforms to the repeater functionality of HDCP, it is capable of distributing media content which conform to HDCP, such as content from DVD players.

Furthermore, because it is possible to change its EDID, VD-1653 is capable of wide usage, such as in manufacturing lines or development sites.

1.2 Benefits

Distributing the input signal

Capable of distributing HDMI video, audio, and control signals (each) to 8 ports.

Selecting the input signal

Capable of selecting 1 of the 2 HDMI input signals.
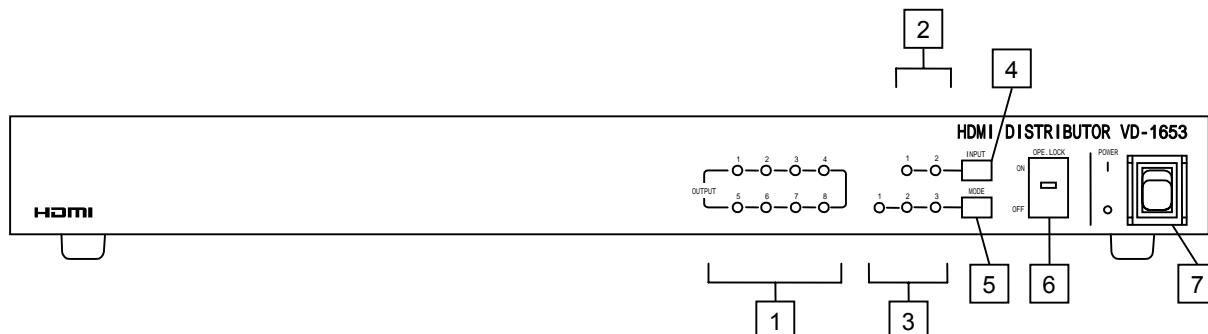
HDCP repeater functionality

Because of conforming to HDCP repeater functionality, capable of distributing the output from Source equipment which conform to HDCP, such as DVD players.

Changing the EDID

Capable of having its EDID changed according to application.

1.3 Names And Functions Of Each Section

1.3.1 Front Panel

No.	Name	Function	
1	OUTPUT LED	LED display of status of each output	p.10
2	INPUT LED	LED display of the selected input port and its signal status	p.9
3	MODE LED	LED display of VD-1653 EDID mode entry	p.13
4	INPUT BUTTON	Switches between inputs.	p.9
5	MODE BUTTON	Switches the EDID mode.	p.12
6	LOCK SWITCH	When switched to ON, all panel keys become disabled.	
7	POWER SWITCH	When switched to ON, power is applied to equipment.	

1.3.2 Rear Panel
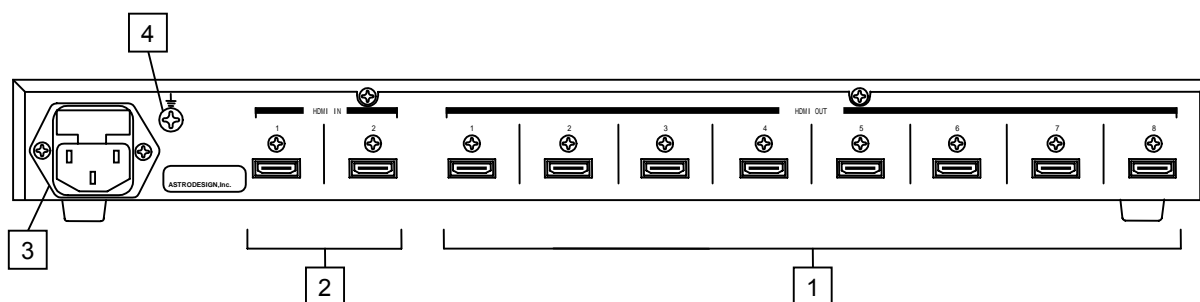
No.	Name	Function
1	OUTPUT	Connector for outputting HDMI(/DVI) signal CEC line is available only through OUTPUT1.
2	INPUT	Connector for inputting HDMI(/DVI) signal
3	AC INPUT TERMINAL	Please connect the power cable accessory.
4	FG TERMINAL	Ground terminal

Attn. Please connect any external equipment first to the FG terminal.

2 Examples of Connection and Usage

2.1 Simple Example Of Using Mode

An example of connecting to peripheral equipment is shown below.

VD-1653 is used as follows.

(1) Receiver is connected to OUTPUT (Port 1 to 8).
(2) EDID MODE is selected via MODE button and INPUT button (Only MODE1 is used).
     Refer to[
(3) Sending source is connected to INPUT (Port 1,2).
(4) Input port is selected via INPUT button.   Refer to[3.1.1 Selecting the Input Port]
(5) Signal is outputted from sending source.

Example of using EDID Mode

Depending on the application, it is possible to change the EDID contents (= Mode) of VD-1653.
An example of using the Mode is shown below.   For details of each Mode, please refer to [3.3 EDID Mode].

<Type of Mode>

```
MODE    1    default-value
                  user-set-value
        2
        3
```

In case of distributing signal to a receiver with the same performance (MODE1 → user-set-value, MODE2, MODE3)

In case of distributing signal to the receiver with the same performance (e.g. a monitor), such as when used in a production site, it is possible to use any of **MODE1　user-set-value, MODE2, or MODE3**.

Signal Generator　e.g. VG-849

e.g. LCDTV with HDMI terminal
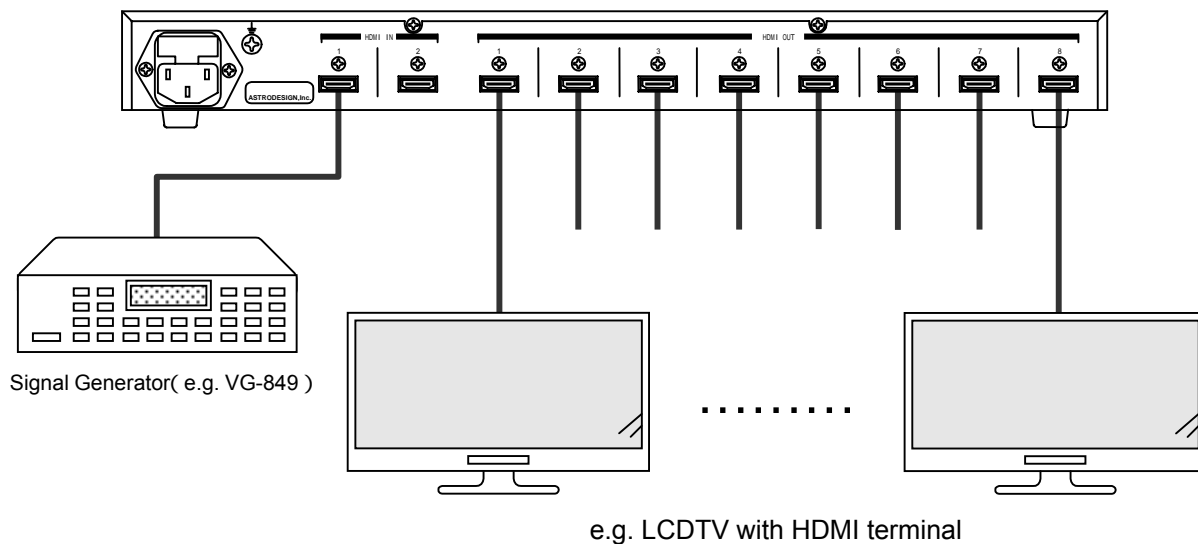
Note	• When using "MODE1→user-set-value", first connect the receiver to OUTPUT1, and save the EDID of the receiver in user-set-value. 　　Please refer to[3.3.1 MODE1　　Changing the user-set-value] 　* Once EDID is set, it is not necessary to set it again after restarting the system or changing the Mode. • In "MODE2" and "MODE3", there are no settings other than the Mode setting.

In case distributing signal to a receiver without the same performance (MODE1→ default-value)

In case of selecting the output video format of sending machine that is going to a receiver (e.g. a monitor) that does not always have the same performance, such as in a development site, MODE1 → default is used.

Because as seen from the sending source, the VD-1653 EDID is set to the default value of the VD-1653 internal EDID data, it is possible to select the output timing among the timings designated in [4.3 Internal EDID Data]

e.g. DVD Player

· · · · · · · · ·

e.g. LCDTV with HDMI terminal
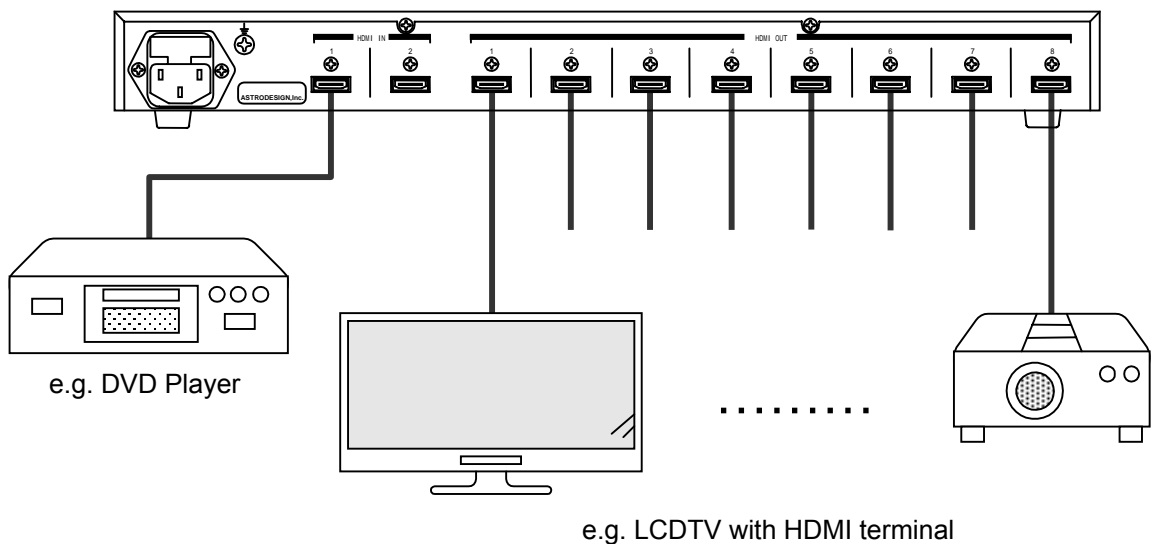
In case of distributing the signal to a receiver with a different performance
(MODE2)

In case of distributing the signal to a receiver (such as a monitor) with a different performance, such as in an event hall, **MODE2** is used.

As seen from the sending source, all the timings which are receivable by all receivers that can possibly be connected to VD-1653 output are set in the VD-1653 EDID.

If there is not a timing that is receivable by all receivers, VD-1653 EDID becomes set as VGA.

e.g. DVD Player

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e.g. LCDTV or Projector with HDMI terminal
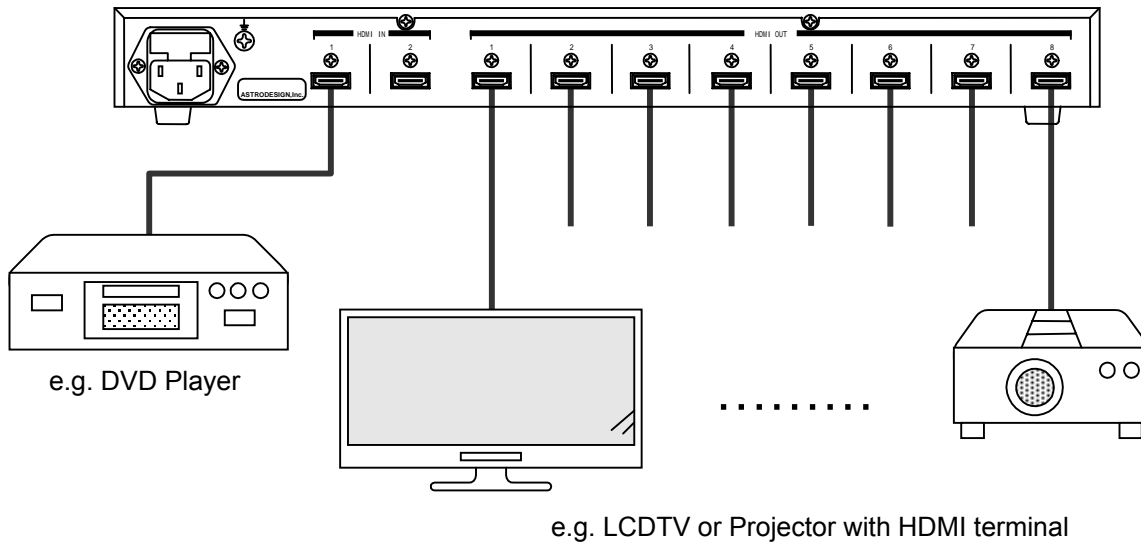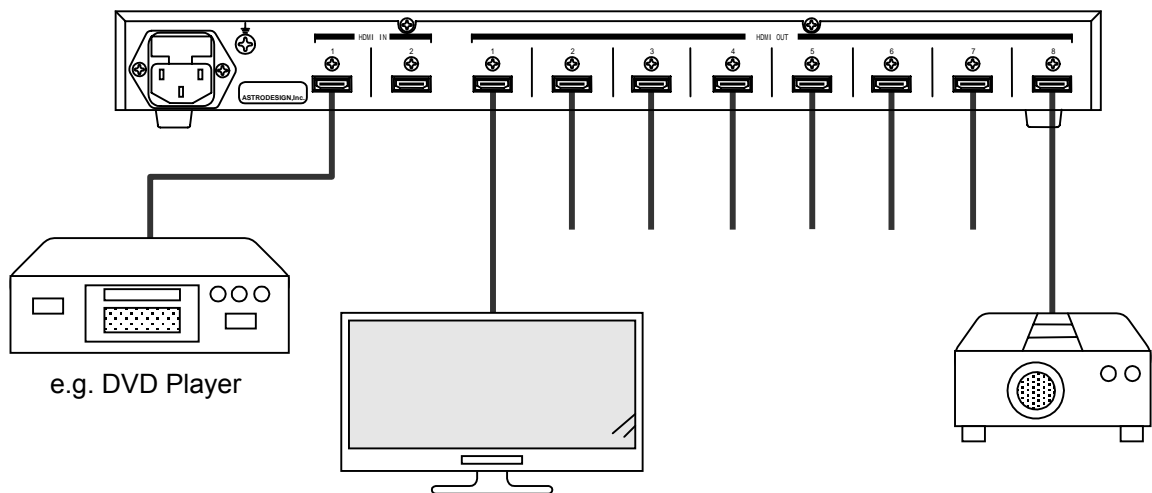
In case of no EDID is set in the device that is connecting VD-1653 (MODE3)

In case EDID is not set in the connecting device that is connected to VD-1653, **MODE3** is used.

VD-1653 outputs the signal nevertheless the EDID of the connecting the device.

As seen from sending source, the VD-1653 EDID is set to the default value of the VD-1653 internal EDID data

e.g. DVD Player

3 Detailed Functions

3.1 Input

3.1.1 Selecting the Input Port

It is possible to select the input signal from one of the 2 input ports in VD-1653.
Input port is switched by pressing the INPUT button.   INPUT1   INPUT2
When a port is selected, the INPUT LED corresponding to the port number is turned on.

3.1.2 INPUT LED Display

INPUT LED displays the status of the input signal of the selected port.

Table 3-1-1   Details of INPUT LED

INPUT1,2 LED Condition		Status	
On		Indicates the currently selected input port	
	Red		No input signal
	Amber		HDCP non-compliant input signal is present
	Green		HDCP compliant input signal is present
Off		Indicates the currently not selected input port	

3.2 Output

3.2.1 Output Distribution

Although the VD-1653 distributes an input signal to 8 outputs, depending on the receiver connected to its output, VD-1653 alters its output as follows:

Output to HDMI receivers

In case of HDMI or DVI input, input signal is outputted without change.

Output to DVI receiver

In case of HDMI input, input signal is converted to DVI and then outputted.
In case of DVD input, input signal is outputted without change.

Output to receivers that have improper EDID

Output will not be sent to receivers that have an improper EDID. VD-1653 will determine an "Improper EDID" if any of the following conditions apply:

● There are [00h] or [FFh] in all the Blocks in EDID Data value.
● The BASE, Block Map, or Extension headers in EDID Data are not proper.
● The Checksum values in any Block of EDID Data is not proper.

| Note | The result of determination of (Proper or Improper) EDID can be verified via OUTPUT LEDs.   Please refer to the next topic[3.2.2   OUTPUT LED Display]. |

| Attn. | When selecting MODE3, VD-1653 outputs the signal nevertheless the connecting device of output side.   In case the connecting receiver is a DVI receiver, the signal is converted to DVI.   In case the connecting receiver is a HDMI receiver or the receiver that does not have EDID, signal is output as HDMI. |

3.2.2 OUTPUT LED Display

OUTPUT LED displays the status of each of the outputs.

Table 3-2-1 Details Of OUTPUT LED

OUTPUT1 8 LED Condition		Status
On or Blinking Green		A receiver is connected to the port.
	On	EDID is proper, and In case of carrying out HDCP HDCP verification is successful.
	Blinking 2 Times/Sec	There is a possibility that EDID of the connecting instrument is improper, or that a signal which is non-compliant with EDID is being inputted, etc. For details, please refer to [4.4.5 Troubleshooting].
Off		A receiver is not connected to the port.

3.2.3 HOTPLUG

When HOTPLUT happens in the connecting device of the output side, VD-1653 reacts as below.

Table 3-2-2 HOTPLUG Reaction

OUTPUT HOTPLUG Status	VD-1653 Reaction
HDCP available	Not only the connecting port that happens HOTPLUG, HOTPLUG happens to the sending source.
HDCP not available OUTPUT1	Read EDID, then HOTPLUG happens to the sending source
HDCP not available OUTPUT2 to 8	Read EDID, however HOTPLUG does not happen to the sending source

3.3 EDID Mode

It is possible to change the VD-1653 EDID by selecting the MODE (1 to 3).

Switching the MODE is performed by pressing the MODE button.   (MODE1   MODE2   MODE3   MODE1…)

When a MODE is selected, the MODE LED corresponding to the MODE number is on or blinks.

3.3.1 MODE1

In MODE1, the VD-1653 EDID is set to the internal data.

It is possible to select the internal data from the 2 types of   1 default-value   2 user-set-value .   (Default value is set in   2   as well in the factory setting.)

EDID default-value

Please refer to[4.3 Internal EDID Data] (p16)

Changing the user-set-value

Changing the user-set-value is performed by saving the EDID of an optional receiver connected to OUTPUT1.

(1) Connect the receiver to OUTPUT1.

(2) Press and hold the MODE button (about 3 seconds) until all the MODE LEDs (MODE1 to 3) are turned on.

The saved value will be valid until saving again the EDID of another receiver. (Restarting the system or switching the MODE will not change the saved value.)

Attn.   If there is no receiver connected to OUTPUT1, EDID data will be all set to 0.

Switching between   1 default-value   2 user-set-value

Press and hold the INPUT button until all INPUT LEDs (INPUT1,2) are turned on.

If   1   is selected, MODE1 LED will be on.

If   2   is selected, MODE1 LED will be blinking (1 Time/Second).

For details about MODE LED, please refer to[3.3.4   MODE LED Display] p.13   .

The relationship between operation and the resulting action becomes as follows:

Action	Operation Button
User-set EDID Default EDID	Holding INPUT button
Saves the EDID of the optional receiver in the user-set EDID	Holding MODE button

Attn.   Switching between default-value and user-set-value is completed when INPUT1,2 LEDs are all on. Saving the user-set-value is completed when MODE1 to 3 LEDs are all on.   Please hold the button until then (About 3 seconds).

3.3.2 MODE2

In MODE2, VD-1653 EDID is set by checking the EDID of all of the receivers which are connected to OUTPUT1 to 8, and taking into account that, video and audio are able to be outputted through all of the ports.
For details of the content, please refer to[4.2 MODE2 EDID].

Attn. | If a receiver with an EDID not conforming to HDMI standard is connected, it is possible that the EDID of VD-1653 is not set correctly.

3.3.3 MODE3

In MODE3, EDID is set to the internal EDID data as default.
Please refer to [4.3 Internal EDID Data] (p.16) about details of internal EDID data.

3.3.4 MODE LED Display

MODE LED displays the status of EDID Mode.

Table 3-3-1   Details of MODE LED

MODE1 to 3 LED Green Condition	Status
Only MODE1 LED is on or blinking	MODE1 is selected.
On	VD-1653 default EDID is set.
Blinking(1 Time/Sec)	User-set arbitrary receiver EDID is set.
Only MODE2 LED is on	MODE2 is selected.
Only MODE3 LED is on	MODE3 is selected.
MODE1 to 3 LEDs are all on	MODE1 EDID save process was completed.

4 Specifications, Etc

4.1 Main Specifications

General		
Power Voltage		AC 100 to 120V. AC 200 to 240V
Power Consumption		About 30 W
External Dimensions		430(W) X 44(H) X 250(D)mm (Excluding Projections)
Weight		About 3.5Kg
Operating Temperature		+5 to +40
Storage Temperature		-10 to +60
Humidity		30 to 80 % (However, non-condensation)
Input		
Signal Format		TMDS Single Link
Number Of Connectors		HDMI A Connector X 2
Video Signal	Pixel Clock	25 to 165MHz
	Color Space	RGB, YC444, YC422
Audio Signal	Sampling Frequency	32 to 192kHz
	Number Of Channels	Maximum 8CH
	SACD	N/A
Output		
Signal Format		TMDS Single Link
Number Of Connectors		HDMI A Connector to 8
Video Signal	Pixel Clock	25 to 165MHz
	Color Space	RGB, YC444, YC422
Audio Signal	Sampling Frequency	32 to 192kHz
	Number Of Channels	Maximum 8CH
HDMI HDCP		
HDMI Version		Ver. 1.2 (However, SACD is N/A)
HDCP Version		Ver. 1.1
Device Category		Repeater
Maximum Number Of Divisions When Cascade Connection		Maximum 12
CEC		Non-compliant (However, input CEC line and output CEC line are connected.)
DDC		DDC2B compliant
E-EDID		Ver. 1.3
CEA EDID Timing Extension		Ver. 3
EDID Size	When power is ON	Up to 512byte
	When power is of	256byte

4.2 MODE2 EDID Specifications

Block0　BASE

Header	Uses VD-1653 default.
Vendor/Product Identification	Uses VD-1653 default.
EDID Structure Version/Revision	Uses VD-1653 default.
Basic Display Parameters/Features	Uses VD-1653 default.
Color Characteristics	Uses VD-1653 default.
Established Timings	Only those Timings are enabled which can be enabled by all the receivers connected to the output side.　(In case there is no Timing which can be enabled by all the receivers, all the Timings will be disabled.)
Standard Timing Identification	If the settings are identical in all of the receivers connected to the output side, that setting will be used. Otherwise, VD-1653 default is used (This Field will be set to unused).
Detailed Timing Description	Fundamentally, the 2 in the first half are used for Detailed Timing Description, and the 2 in the second half are used as Monitor Descriptor.
	Detailed Timing Section	Detailed Timing Descriptors after Block1 are also acquired, and will be entered only if they are all the same. If there is not the same item in all, it will be determined whether the same video code is in all the Short Video Descriptors after Block1, and in case it is, that Timing will be entered. Furthermore, if the same video code is not in all, the 640x480(VGA) Timing will be entered. (In this case, the Detailed Timing Section becomes only Block1.)
	Monitor Descriptor	Uses VD-1653 default.
Extension Flag	Sets the Extension number of the created EDID.
Check Sum	Is computed.

Extension

Tag	Used VD-1653 default.
Revision Number	Uses VD-1653 default.
Byte Number of offset d where Detailed Timing data begins	Determined by EDID entry.
DTV Monitor Support	Only the ones which can be enabled by all of the receivers connected to the output side will be enabled. However, Basic Audio is always enabled.
Total Number of native (preferred) formats	The lowest value of "Total Number of native formats" among those in all of the receivers connected to the output side is adopted. However, if the enterable Detailed Timing Descriptor(Including Block0) number is smaller that the above minimum, Total Number of native formats will be reduced to that number.
Video Data Block	Only the Video Code which is entered in the Video Data Block of all of the receivers connected to the output side is entered. However, if the Video Code is not the same in all the receivers, 640x480p Video Code is entered.
Audio Data Block	Among all of the receivers connected to the output side, if Basic Audio is in Disable state in even one of them, the corresponding Data Block will not be used. If the Basic Audio is in Enable state, only the combination of sampling rate frequency, Audio Format, and bit size which is entered in the Audio Data Block of all of the receivers connected to the output side is entered. However, when there is no such combination and also the BASIC AUDIO of DTV Monitor Support is ON, the setting will be 32, 44.1, 48kHz Enable, LPCM Audio Format, and 16bit size. (Basic Audio setting).
Speaker Allocation	Among all of the receivers connected to the output side, if Basic Audio is in Disable state in even one of them, the corresponding Data Block will not be used. If the Basic Audio is in Enable state, only the Speaker which is entered in the Audio Data Block of all of the receivers connected to the output side is entered. However, when there is no Speaker which is entered in all, only 2CH(FL, FR) will be ON.
Vendor Specific Data Block	If the Support_AI in all of the receivers connected to the output side are [1], the setting will be [1] . If the Support-AI is [0] in even one of the receivers , the setting will be [0]. Physical Address is considered to be increasing from the Physical Address of EDID of Port1.
Detailed Timing Section	Same as Block0.

4.3 Internal EDID Data

Default values of Internal EDID data (for INPUT1) are shown below.

	00	01	02	03	04	05	06	07	08	09	0A	0B	0C	0D	0E	0F
00	00	FF	FF	FF	FF	FF	FF	00	06	8F	0A	B0	01	00	00	00
10	02	10	01	03	80	0C	09	78	0A	1E	AC	98	59	56	85	28
20	29	52	57	00	00	00	01	01	01	01	01	01	01	01	01	01
30	01	01	01	01	01	01	8C	0A	D0	8A	20	E0	2D	10	10	3E
40	96	00	81	60	00	00	00	18	01	1D	80	18	71	1C	16	20
50	58	2C	25	00	81	49	00	00	00	9E	00	00	00	FC	00	56
60	44	2D	31	36	35	33	0A	20	20	20	20	20	00	00	00	FD
70	00	17	3D	0D	2E	10	00	0A	20	20	20	20	20	20	01	B2
80	02	03	36	71	4A	82	05	04	01	10	11	14	13	1F	15	3B
90	0F	1F	07	09	7F	07	17	1F	38	1F	07	30	27	07	28	2F
A0	07	72	37	17	72	3F	7F	72	47	7F	72	83	2F	00	00	66
B0	03	0C	00	10*1	00	80	01	1D	00	72	51	D0	1E	20	6E	28
C0	55	00	81	49	00	00	00	1E	01	1D	80	D0	72	1C	16	20
D0	10	2C	25	80	81	49	00	00	00	9E	8C	0A	D0	90	20	40
E0	31	20	0C	40	55	00	81	60	00	00	00	18	01	1D	00	BC
F0	52	D0	1E	20	B8	28	55	40	81	49	00	00	00	1E	00	4D*2

1   20 for INPUT2

2   3D for INPUT2

byte	bit	Item	Set Value
07-00		Header	0x00FFFFFFFFFFFF00
09-08		ID Manufacture Name	0x8F06 = ATO
0B-0A		ID Product Code	0xB00A
0F-0C		ID Serial Number	0x00000001
10		Week of Manufacture	0x02 = 2
11		Year of Manufacture	0x10 = 2006
12		EDID Version	0x01 = ver.1
13		EDID Revision	0x03 = Rev.3
14		[Video Input Definition]	0x80
	7	Analog or Digital	0b1 = Digital
	6-1	Reserved	0b00000
	0	DFP1.X	0b0 = not support
15		Max.Horizontal Image Size	0x0C = 12cm
16		Max.Vertical Image Size	0x09 = 9cm
17		Display Transfer Characteristic	0x78 = 2.22
18		[Feature Support]	0x0A
	7	Standby	0b0 = not support
	6	Suspend	0b0 = not support
	5	Active Off/Very Low Power	0b0 = not support
	4-3	Display Type	0b01 = RGB color display
	2	Standard Default Color Space sRGB	0b0 = not support
	1	Preferred Timing Mode is indicated in the first detailed timing block	0b1 = support
	0	Default GTF supported	0b0 = not support
22-19		[Color Characteristic]	0x5752292885565998AC1E
		Red-x	0x260 = 0.594
		Red-y	0x165 = 0.349
		Green-x	0x15B = 0.339
		Green-y	0x216 = 0.521
		Blue-x	0x0A2 = 0.158
		Blue-y	0x0A6 = 0.162
		White-x	0x14B = 0x323
		White-y	0x15C = 0.340
23		[Established Timing 1]	0x00
	7	720×400@70Hz	0b0 = not support
	6	720×400@88Hz	0b0 = not support
	5	640×480@60Hz	0b0 = not support
	4	640×480@67Hz	0b0 = not support
	3	640×480@72Hz	0b0 = not support
	2	640×480@75Hz	0b0 = not support
	1	800×600@56Hz	0b0 = not support
	0	800×600@60Hz	0b0 = not support

byte	bit	Item	Set Value
24		[Established Timing 2]	0x00
	7	800×600@72Hz	0b0 = not support
	6	800×600@75Hz	0b0 = not support
	5	832×624@75Hz	0b0 = not support
	4	1024×768@87Hz	0b0 = not support
	3	1024×768@60Hz	0b0 = not support
	2	1024×768@70Hz	0b0 = not support
	1	1024×768@75Hz	0b0 = not support
	0	1280×1024@75Hz	0b0 = not support
25		[Manufacture's Reverse Timings]	0x00
	7	1152×870@75Hz	0b0 = not support
	6-0	Reserved	0b0 = 0000000
27-26		Standard Timing Identification #1	0x0101 = Unused field in this section
29-28		Standard Timing Identification #2	0x0101 = Unused field in this section
2B-2A		Standard Timing Identification #3	0x0101 = Unused field in this section
2D-2C		Standard Timing Identification #4	0x0101 = Unused field in this section
2F-2E		Standard Timing Identification #5	0x0101 = Unused field in this section
31-30		Standard Timing Identification #6	0x0101 = Unused field in this section
33-32		Standard Timing Identification #7	0x0101 = Unused field in this section
35-34		Standard Timing Identification #8	0x0101 = Unused field in this section
47-36		[Detailed Timing Descriptions #1]	
37-36		Pixel Clock	0x0A8C = 27.000MHz
3A-38		Horizontal Active Pixels	0x2D0 = 720dot
		Horizontal Blanking Pixels	0x8A = 138dot
3D-3B		Vertical Active Lines	0x1E0 = 480H
		Vertical Blanking Lines	0x2D = 45H
41-3E		Horizontal sync offset	0x010 = 16dot
		Horizontal sync pulse width	0x03E = 62dot
		Vert sync offset	0x09 = 9H
		Vert sync pulse width	0x06 = 6H
44-42		Horizontal Image Size	0x81 = 129mm
		Vertical Image Size	0x60 = 96mm
45		Horizontal Border	0x00 = 0dot
46		Vertical Border	0x00 = 0H
47	7	Interlace	0b0 = non-interlace
	6,5	Stereo Mode	0b0 = Normal display ,no stereo
	4,3	sync signal description1	0x3 = Digital Separate
	2	sync signal description2	0b0 = Vertical Polarity negative
	1	sync signal description3	0b0 = Horizontal Polarity negative
	0	Stereo Mode	0b0 = don't care
59-48		[Detailed Timing Descriptions #2]	
49-48		Pixel Clock	0x1D01 = 74.250MHz
4C-4A		Horizontal Active Pixels	0x780 = 1920dot
		Horizontal Blanking Pixels	0x118 = 280dot
4F-4D		Vertical Active Lines	0x21C = 540H
		Vertical Blanking Lines	0x016 = 22H

byte	bit	Item	Set Value
53-50		Horizontal sync offset	0x058 = 88dot
		Horizontal sync pulse width	0x02C = 44dot
		Vert sync offset	0x02 = 2H
		Vert sync pulse width	0x05 = 5H
56-54		Horizontal Image Size	0x81 = 129mm
		Vertical Image Size	0x49 = 73mm
57		Horizontal Border	0x00 = 0dot
58		Vertical Border	0x00 = 0H
59	7	Interlace	0b1 = interlace
	6,5	Stereo Mode	0b0 = Normal display ,no stereo
	4,3	sync signal description1	0x3 = Digital Separate
	2	sync signal description2	0b1 = Vertical Polarity positive
	1	sync signal description3	0b1 = Horizontal Polarity positive
	0	Stereo Mode	0b0 = don't care
6B-5A		[Monitor Descriptor Description #1]	
5B-5A		Flag	0x0000 = Monitor Descriptor
5C		Reserved	0x00
5D		Data Type Tag	0xFC = Monitor name,stored as ASCII
5E		Reserved	0x00
6B-5F		Monitor Name	0x56442D313635330A2020202020 = VD-1653
7D-6C		[Monitor Descriptor Description #1]	
6D-6C		Flag	0x0000 = Monitor Descriptor
6E		Reserved	0x00
6F		Data Type Tag	0xFD = Monitor range limits,binary coded
70		Reserved	0x00
71		Min Vertical rate	0x17 = 23Hz
72		Max. Vertical rate	0x3D = 61Hz
73		Min. Horizontal	0x0D = 13kHz
74		Max. Horizontal	0x2E = 46kHz
75		Max. Supported Pixel Clock	0x10 = 160MHz
76		Secondary timing formula support	0x00 = No secondary timing formula supported
77			0x0A
7D-78			0x202020202020
7E		Extension Flag	0x01
7F		Check Sum	0xB2
80		Extended Block Type	0x02 = CEA861
81		Revision Number	0x03 = ver.3
82		Detailed Timing Blocks start at Byte	0x36
83		[DTV Monitor Support]	0x71
	7	under scan	0b0 = not support
	6	Basic Audio	0b1 = support
	5	YCbCr4:4:4	0b1 = support
	4	YCbCr4:2:2	0b1 = support
	3-0	total number of native formats	0b1 = 1

byte	bit	Item	Set Value
84		[Video Short Description]	0x4A
	7-5	Tag Code	0x02 = Video Short Description
	4-0	Length	0x0A
85		Video Code/Native Format	0x82 = [2] 720×480p/Native Format
86			0x05 = [5] 1920×1080i
87			0x04 = [4] 1280×720p
88			0x01 = [1] 640×480p
89			0x10 = [16] 1920×1080p
8A			0x11 = [17] 720×576p
8B			0x14 = [20] 1920 ×1080i
8C			0x13 = [19] 1280×720p
8D			0x1F = [31] 1920×1080p
8E			0x15 = [21] 1440×576i
8F		[Audio Short Description 1]	0x3B
		Tag Code	0x01 = Audio Short Block Description
		Length	0x1B
92-90			0x071F0F
	90	7 Reserved	0b0
		6-3 Audio Format Code #1	0x1 = Linear PCM
		2-0 Max. Number of Audio #1	0x7 = 8ch
	91	7 Reserved	0b0
		6-0 Supported Sampling Frequency #1	0x1F = 32,44.1,48,88.2,96kHz
	92	7-3 Reserved	0b00000
		2-0 Supported Bit Size#1	0X7 = 16,20,24bit
95-93			0x077F09
	93	7 Reserved	0b0
		6-3 Audio Format Code #2	0x1 = Linear PCM
		2-0 Max. Number of Audio #2	0x1 = 2ch
	94	7 Reserved	0b0
		6-0 Supported Sampling Frequency #2	0x7F = 32,44.1,48,88.2,96,176.4,192kHz
	95	7-3 Reserved	0b00000
		2-0 Supported Bit Size#2	0x7 = 16,20,24bit
98-96			0x381F17
	96	7 Reserved	0b0
		6-3 Audio Format Code #3	0x2 = AC-3
		2-0 Max. Number of Audio #3	0x7 = 8ch
	97	7 Reserved	0b0
		6-0 Supported Sampling Frequency #3	0x1F = 32,44.1,48,88.2,96kHz
	98	7-0 Max. bit rate divided by 8kHz #3	0x38 = 448kHz
9B-99			0x30071F
	99	7 Reserved	0b0
		6-3 Audio Format Code #4	0x3 = MPEG 1
		2-0 Max. Number of Audio #4	0x7 = 8ch
	9A	7 Reserved	0b0
		6-0 Supported Sampling Frequency #4	0x07 = 32,44.1,48kHz
	9B	Max. bit rate divided by 8kHz #4	0x30 = 384kHz

byte		bit	Item	Set Value
9E-9C				0x280727
	9C	7	Reserved	0b0
		6-3	Audio Format Code #5	0x4 = MP3
		2-0	Max. Number of Audio #5	0x07 = 8ch
	9D	7	Reserved	0b0
		6-0	Supported Sampling Frequency #5	0x7 = 32,44.1,48kHz
	9E	7-0	Max. bit rate divided by 8kHz #5	0x28 = 320kHz
A1-9F				0x72072F
	9F	7	Reserved	0b0
		6-3	Audio Format Code #4	0x05 = MPEG2
		2-0	Max. Number of Audio #4	0x7 = 8ch
	A0	7	Reserved	0b0
		6-0	Supported Sampling Frequency #4	0x7 = 32,44.1,48kHz
	A1		Max. bit rate divided by 8kHz #6	0x72 = 912kHz
A4-A2				0x721737
	A2	7	Reserved	0b0
		6-3	Audio Format Code #7	0x6 = AAC
		2-0	Max. Number of Audio #7	0x7 = 8ch
	A3	7	Reserved	0b0
		6-0	Supported Sampling Frequency #7	0x17 = 32,44.1,48,96kHz
	A4		Max. bit rate divided by 8kHz #7	0x72 = 912kHz
A7-A5				0x727F3F
	A5	7	Reserved	0b0
		6-3	Audio Format Code #8	0x7 = DTS
		2-0	Max. Number of Audio #8	0x7 = 8ch
	A6	7	Reserved	0b0
		6-0	Supported Sampling Frequency #8	0x7F = 32,44.1,48,88.2,96,176.4,192kHz
	A7		Max. bit rate divided by 8kHz #8	0x72 = 912kHz
AA-A8				0x47
	A8	7	Reserved	0b0
		6-3	Audio Format Code #9	0x08 = ATRAC
		2-0	Max. Number of Audio #9	0x07 = 8ch
	A9	7	Reserved	0b0
		6-0	Supported Sampling Frequency #9	0x7F = 32,44.1,48,88.2,96,176.4,192kHz
	AA		Max. bit rate divided by 8kHz #9	0x72 = 912kHz
AB			[Speaker Allocation Data Block]	0x83
		7-5	Tag Code	0x04 = Speaker Allocation Data Block
		4-0	Length	0x03
AC			Speaker	0x2F = FLC/FRC,RC,RL/RR,FC,LFE,FL/FR
AE-AD			Reserved	0x0000
AF			[Vendor Specific Data Block]	0x66
		7-5	Tag Code	0x03 = Vendor Specific Data Block
		4-0	Length	0x06
B2-B0			24-bit IEEE Registration Identifier	0x000C03
B4-B3			Physical Address	INPUT1 = 0x1000 = 1.0.0.0 , INPUT2 = 0x2000 = 2.0.0.0
B5		7	Support_AI	0b1 = Support
		6-0	Reserved	0x00

byte	bit	Item	Set Value
		[Detailed Timing Description #1]	
B7-B6		Pixel Clock	0x1D01 = 74.25MHz
BA-B8		Horizontal Active Pixels	0x500 = 1280dot
		Horizontal Blanking Pixels	0x172 = 370dot
BD-BB		Vertical Active Lines	0x2D0 = 720H
		Vertical Blanking Lines	0x1E = 30H
C1-BE		Horizontal sync offset	0x6E = 110dot
		Horizontal sync pulse width	0x28 = 40dot
		Vert sync offset	0x5 = 5H
		Vert sync pulse width	0x5 = 5H
C4-C2		Horizontal Image Size	0x81 = 129mm
		Vertical Image Size	0x49 = 73mm
C5		Horizontal Border	0x0 = 0dot
C6		Vertical Border	0x0 = 0H
C7	7	Interlace	0x00 = non-interlace
	6,5	Stereo Mode	0x0 = Normal display,no stereo
	4,3	sync signal description1	0x3 = Digital Separate
	2	sync signal description2	0x1 = Vertical Polarity positive
	1	sync signal description3	0x1 = Horizontal Polarity positive
	0	Stereo Mode	0b0 = don't care
		[Detailed Timing Description #2]	
C9-C8		Pixel Clock	0x1D01 = 74.25MHz
CC-CA		Horizontal Active Pixels	0x780 = 1920dot
		Horizontal Blanking Pixels	0x2D0 = 720H
CF-CD		Vertical Active Lines	0x21C = 540H
		Vertical Blanking Lines	0x16 = 22H
D3-D0		Horizontal sync offset	0x210 = 528dot
		Horizontal sync pulse width	0x2C = 44dot
		Vert sync offset	0x2 = 2H
		Vert sync pulse width	0x5 = 5H
D6-D4		Horizontal Image Size	0x81 = 129mm
		Vertical Image Size	0x49 = 73mm
D7		Horizontal Border	0x00 = 0dot
D8		Vertical Border	0x0 = 0H
D9	7	Interlace	0x1 = Interlace
	6,5	Stereo Mode	0x0 = Normal display,no stereo
	4,3	sync signal description1	0x3 = Digital Separate
	2	sync signal description2	0x1 = Vertical Polarity positive
	1	sync signal description3	0x1 = Horizontal Polarity positive
	0	Stereo Mode	0b0 = don't care

byte	bit	Item	Set Value
		[Detailed Timing Description #3]	
DB-DA		Pixel Clock	0x0A8C = 27.000MHz
DE-DC		Horizontal Active Pixels	0x2D0 = 720H
		Horizontal Blanking Pixels	0x90 = 144dot
E1-DF		Vertical Active Lines	0x240 = 576H
		Vertical Blanking Lines	0x31 = 49H
E5-E2		Horizontal sync offset	0x0C = 12dot
		Horizontal sync pulse width	0x40 = 64dot
		Vert sync offset	0x5 = 5H
		Vert sync pulse width	0x5 = 5H
E8-E6		Horizontal Image Size	0x81 = 129mm
		Vertical Image Size	0x60 = 96mm
E9		Horizontal Border	0x00 = 0dot
EA		Vertical Border	0x00 = 0H
EB	7	Interlace	0x0 = non-Interlace
	6,5	Stereo Mode	0x0 = Normal display,no stereo
	4,3	sync signal description1	0x3 = Digital Separate
	2	sync signal description2	0x0 = Vertical Polarity negative
	1	sync signal description3	0x0 = Horizontal Polarity negative
	0	Stereo Mode	0b0 = don't care
		[Detailed Timing Description #4]	
ED-EC		Pixel Clock	0x1D01 = 74.25MHz
F0-EE		Horizontal Active Pixels	0x500 = 1280dot
		Horizontal Blanking Pixels	0x2BC = 700dot
F3-F1		Vertical Active Lines	0x2D0 = 720H
		Vertical Blanking Lines	0x1E = 30H
F7-F4		Horizontal sync offset	0x1B8 = 440dot
		Horizontal sync pulse width	0x28 = 40dot
		Vert sync offset	0x5 = 5H
		Vert sync pulse width	0x5 = 5H
FA-F8		Horizontal Image Size	0x81 = 129mm
		Vertical Image Size	0x49 = 73mm
FB		Horizontal Border	0x00 = 0dot
FC		Vertical Border	0x00 = 0H
FD	7	Interlace	0x0 = non-Interlace
	6,5	Stereo Mode	0x0 = Normal display,no stereo
	4,3	sync signal description1	0x3 = Digital Separate
	2	sync signal description2	0x1 = Vertical Polarity positive
	1	sync signal description3	0x1 = Horizontal Polarity positive
	0	Stereo Mode	0b0 = don't care
FE		Reserved	0x00
FF		Check Sum	INPUT1 = 0x4D , INPUT2 = 0x3D

4.4 Limitations And Important Points

4.4.1 Distribution Limitation

In case of existence of HDCP

It is possible to connect up to 12 units on the output side of VD-1653.

In case of without HDCP

There is no particular limitation. However, it depends on the input signal.

4.4.2 CEC

Although CEC lines of INPUT1,2 and output OUTPUT1 are connected, VD-1653 itself does not receive, recognize, or issue CEC commands.

4.4.3 EDID

EDID size is limited to up to 512bytes.

4.4.4 DVI

In case of DVI input, regardless of the Mode setting, signal is outputted without again distinguishing between the EDID of output side.
In case there is even one DVI monitor connected to the output port, only a timing which conforms to the EIA standard is distinguished.

4.4.5 Troubleshooting

In case of no video output upon connecting VD-1653, please confirm the following:

Condition	Please confirm this
No picture (OUTPUT LED is blinking)	Is not an improper EDID set in the connecting equipment? For details, refer to [Output to receivers that have improper EDID] Is a receivable signal being inputted from the connecting equipment? (In case of carrying out HDCP) Does the connecting equipment comply with HDCP? Is not a color-difference signal being inputted to a connecting equipment which can receive only an RGB signal?
No picture (OUTPUT LED is off)	Is the power turned on in the connecting equipment? Is the HDMI cable firmly connected?
No picture (OUTPUT LED is on)	Is the signal being transmitted from input equipment to VD-1635? (Is the INPUT LED on with amber or green color?)
No sound	Is not an HDMI1.1 signal being inputted to an HDMI1.0 compliant receiver? Is not the input signal DVI? Is not the receiver HDMI non-compliant (DVI monitor) ?

Attn.

Receivability of the connecting equipment is determined according to the Video Code of AVI Info Frame.
In case of DVI input, output is unrelated to the EDID of the connecting equipment.
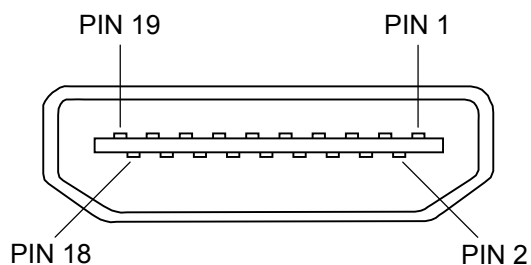
4.5 Connector Pinout

● Format HDMI

Figure 4-5-1 Connector Pinout

Table 4-5-1 Connector Pin Assignment

Pin Number	IO Signal
1	TMDS DATA2+
2	TMDS DATA2 SHIELD
3	TMDS DATA2-
4	TMDS DATA1+
5	TMDS DATA1 SHIELD
6	TMDS DATA1-
7	TMDS DATA0+
8	TMDS DATA0 SHIELD
9	TMDS DATA0-
10	TMDS CLK+
11	TMDS CLK SHIELD
12	TMDS CLK-
13	CEC
14	RESERVE
15	DDC CLK
16	DDC DATA
17	GROUND for +5V
18	+5V POWER
19	HOT PLUG DETECT
Shell	FG

4.6 Glossary

EDID   Extended Display Identification Data

Parameter containing the monitor model, settings, etc of the connecting equipment, which is sent to the connected equipment by using DDC.

It serves the purpose of making it possible to read the display parameters when re-connecting or powering up the display, so that the connected equipment can transmit with appropriate resolution.

CEC   Consumer Electronics Control

The so-called CEC functionality for performing mutual control between connected HDMI equipment.

For example, it is possible to control the playback of a DVD player from a TV, or turn on or off the power of TV or DVD player from AV Amp (AV Center).

HDCP   High-bandwidth Digital Content Protection

A method of encrypting digital image signals for copyright protection, with the aim of preventing unfair copying of digital content transmitted via HDMI and DVI terminals.   The HDCP Transmitter equipment on the transmit side performs verification of the HDCP Receiver equipment on he receive side, and in order to prevent the leakage of content during transmission, encryption based on pre-determined shared encryption key is performed according to the verification protocol, and decryption is performed on the receive side.   Data regeneration is not possible unless both output and input sides comply with HDCP.

HDMI   High-Definition Multimedia Interface

A standard based on and developed beyond the "DVI" digital interface used for connections between PCs and displays.   It is a digital AV interface capable of connecting high definition video, multi-channel audio, and two-way transmission control signals via a single cable.

DVI   Digital Visual Interface

One of the interface standards for connecting computers to displays, with the capability of directly transmitting digital signals from computers to displays having digital drivers, such as Liquid Crystal Displays.

Conventionally, the picture information stored on the computer side as digital data, is converted to analog signal and sent to the display.   However, if DVI is used, signal degradation due to analog conversion is eliminated, and image quality is improved.

ASTRO

VD-1653   Instruction Manual

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