DVM-HDT-KIT (DESK)

4K HDMI® Signal Generator
Support HDMI® 2.0 4K60Hz (YUV420) HDCP2.2/HDCP1.4

Operation Manual
V1.0

CARDINAL DVM

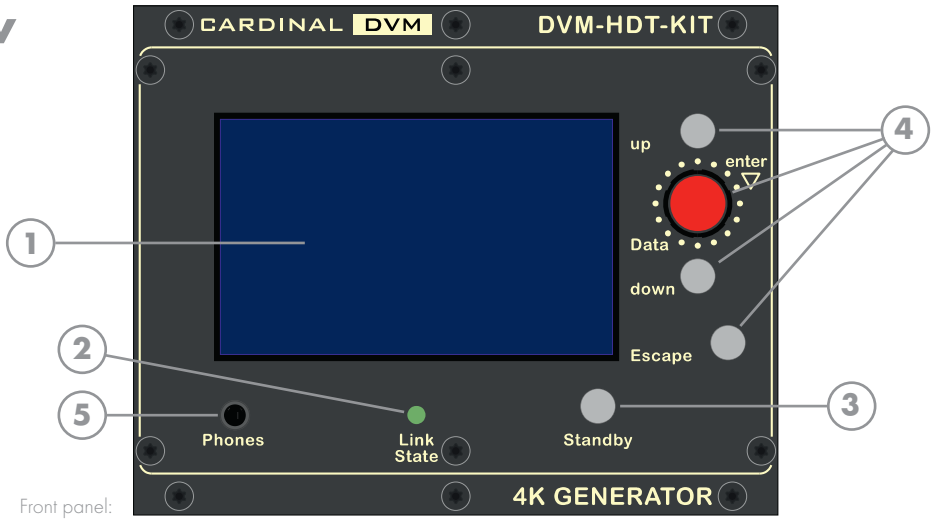
Contents

1. Introduction

The Generator in the DVM-HDT-KIT belongs to the product family of programmable HDMI® UHD (Ultra High Definition) test devices. It offers the functionality of a pattern generator, laden with features for video and audio testing of HDMI® sink devices and repeaters. The DVM-HDT-KIT GENERATOR creates a full range of resolutions with a maximum signal of 4K@ 60 Hz 4:2:0, as was laid down in the HDMI® 2.0 standard, and all currently available digital HDMI® and DVI signals. DVM-HDT-KIT GENERATOR has a built-in 3.0" (inch) LCD display that will show the graphic representation of the currently created pattern and also the menu settings including the settings and parameters of the output signal.
A professional, programmable sine wave generator is also integrated for performing sophisticated audio tests and, when needed, for connecting a specific stereo audio auxiliary audio source to the HDMI® output.
Available on the rear panel is also a 3.5 mm mini jack stereo socket to connect practically any unbalanced 1V/pp analog stereo audio source. The DVM-HDT-KIT GENERATOR is fully programmable via RS232 or USB interface using a PC-based control software. Moreover, the TCP/IP interface offers an integrated web server for a fast and easy management.
For the purpose of creating large test systems with multiple device measurement protocol functionality, the RS232 output may be used to dock more units. Owing to this functionality, users can realize a large test system with several DVM-HDT-KITs to test UHD distribution devices or complex UHD networks.

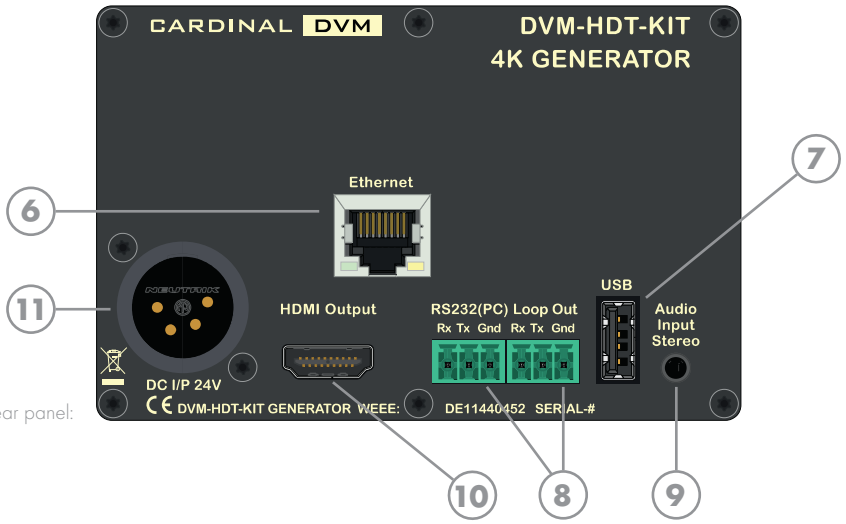
2. Product overview

(Only the rackmount version is shown – with identical controls/display, but a differently shaped housing!)



Front panel:

1. 3.0" LCD display. Shows the presently generated signal on the HDMI® output, the currently selected resolution/timing as well as menu settings.
2. Link Status LED – indicates the HDMI® link status. When the link is broken or no HPD* is present from the sink device, the LED will go off. In case of an EDID error the LED will start flashing.
3. Standby button to turn on or off the device (press and hold for at least 3s).
4. Up / Down / Esc buttons plus one rotary encoder (which o.k. as Enter button) to operate the device.
5. Headphone jack for analog audio output signal.



Rear panel:

6. RJ45 for TCP/IP connection a network
7. USB port, type A
8. Euroblock sockets (RM3.5) for RS232 for input and slave output.
9. Analog audio input, L/R unbalanced, 3.5 mm mini jack
10. HDMI® output
11. XLR connector for DC24V input (Pin 1+2: +24V DC, Pin 3+4: 0V)

HPD* = Hot Plug Detect

3. Features

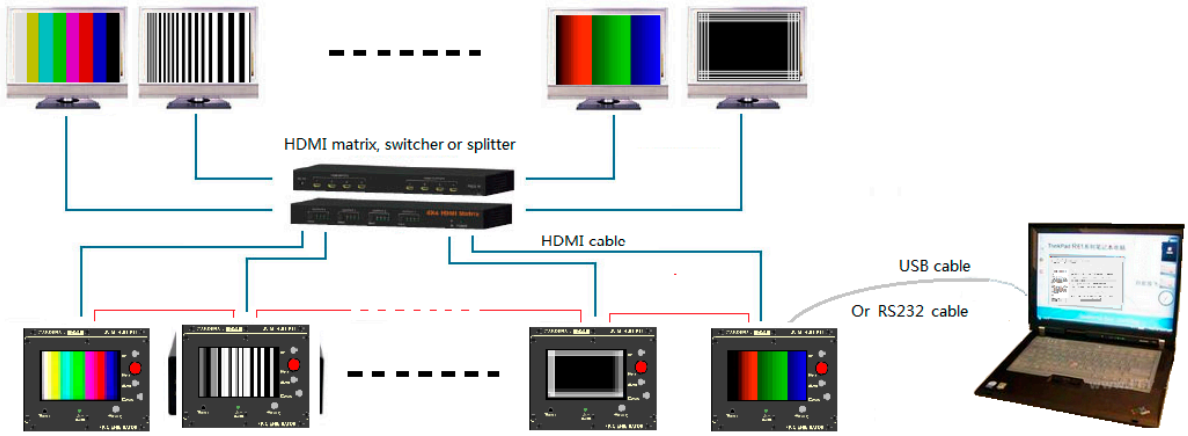
- Designed for R&D engineers, AV integrators and installers
- Supports the latest standards such as 4Kx2K 24 Hz / 25 Hz / 30 Hz / 50 Hz / 60 Hz and 3D
- Supports HDCP 2.2/1.4
- Supports RGB4:4:4, YUV4:2:2, YUV4:2:0
- 36 preset test patterns
- 54 non-rewritable presets for resolutions / video refresh rates, 10 user-defined resolutions plus 1 auto resolution mode
- Built-in LCD for test pattern preview and menu settings display
- Supports 7 different audio sample rates and one auto mode based on the EDID data of the HDMI® sink device
- Supports standard functions such as HDMI®/DVI, Deepcolor, HDCP (2.2, AUTO (2.2 or 1.x), Off), Color Space and many other crucial HDMI® parameters
- Supports EDID read functionality
- Can store 10 EDID sets of different TVs (or sink devices) or send (program) previously saved EDID to other devices
- Control software for widely extended pattern functions supplied with the DVM-HDT-KIT GENERATOR

4. Technical specifications

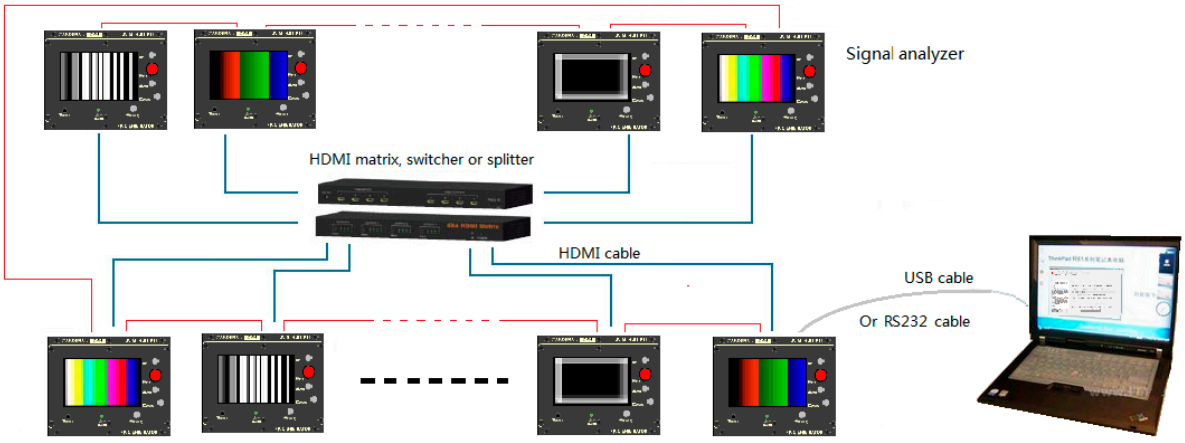
Product	HDMI®2.0 signal generator
HDMI® Version	HDMI®2.0 / DVI
HDCP Version	2.2/1.4
HDCP on/off	Yes
Video bandwidth	Up to 9.0GHz (3.0GHz per channel)
Color depth	24bits, 30bits, 36 bits, 48bits
Color space	RGB444, YUV444,YUV422, YUV420 (only available with HDMI®2.0)
Audio word size	26 bit, 20 bit, 24 bit
Test patterns	36 (35 2D patterns and one 3D pattern)
Resolution / video refresh rate	54 memory locations (including 4K (30), 4K (25), 4K (24), HDMI®2.0 4K (50), HDMI®2.0 4K(60), 720P-3D, 1080P-3D) as non-rewritable presets, 10 freely programmable memory locations plus one AUTO mode
Audio sampling rates	32kHz, 44kHz, 48kHz, 88kHz, 96kHz, 176kHz, 192kHz
Vertical fequency	<=120 Hz
Power supply	24V DC Onboard Li ion battery pack in the desktop version for mobile field applications. Power-on time with battery operation ca. 5-6h

Power consumption (max.)	2 W
Housing	metal
Dimensions (mm)	106.5 x 84 x 140 mm (rackmount version), 108 x 65 x 140 mm (desktop version)
Weight (g)	850 g (rackmount version), 970 g (desktop version)

5. Application



The DVM-HDT-KIT GENERATOR has been developed for testing other HDMI® devices such as HDMI® matrices, switchers, splitters, monitor screens, beamers etc.



The above application uses both the DVM-HDT-KIT GENERATOR and our DVM-HDT-KIT ANALYZER. The device pair makes a complex UHD test system. The system is controlled via a single RS232 bus.

This is a sophisticated, reasonably priced UHD trouble-shooting and testing system which, in combination with our DVM-HDT-KIT ANALYZER, can perform analyses even down to bit error level) and may be used for time/event based long-term tests which are extremely difficult or almost impossible to do manually.

6. Package content

- Main unit: DVM-HDT-KIT GENERATOR
- 24V 0.5A power supply
- RM3.5 3-pole EUROBLOCK connector (2x)
- 0.75 m HDMI® line SOMMER CABLE HIMM

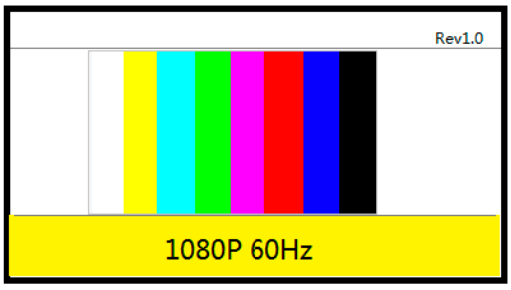
7. Operation controls and functions

1. Connect the HDMI® cable to the UHD TV set or another HDMI® sink device
2. If desired, connect your PC to the RS232 or USB port on the device
3. Connect the included 24V/0.5A power supply to the power socket (the charge time of the integrated battery pack in the desktop version is approx. 1h)

8. DVM-HDT-KIT GENERATOR Control options

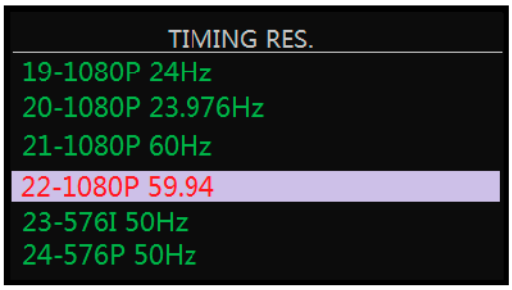
8.1. Local operation via encoder and pushbuttons

The controls on the right side of the display serve to perform the menu navigation and full local operation of the device.
Use the encoder as a multifunctional input key for the menu navigation – it also doubles as „enter" key or to call up the menu mode.
The „Up" & „Down" buttons provide the navigation in the menu mode; in the display mode they are used to change the test pattern. To exit the menu mode, press the „escape" button.



Normal display

The display shows the current resolution together with the refresh rate, the presently output test pattern, the HDCP status (if HDCP is activated) and also the software version of the unit.



Now call up the menu mode with a push on the data encoder. With 'Up' oder 'Down' you will go to the next or previous menu page.
Select the desired setting by turning the encoder and confirm with a push on the encoder.

List of menu pages:

Resolution/ Timing	
31	3840x2160 25Hz
32	3840x2160 24Hz
33	3840x2160 23.98Hz
34	4096x2160 24Hz
35	2160P(Y420) 60Hz
36	2160P(Y420) 59.94Hz

Resolution/Timing
Here the desired resolution including a video refresh rate may be selected. There are 54 preset resolutions, one AUTO resolution (depending on the EDID information coming from the connected HDMI® sink device) and 10 freely definable settings (via PC software) available.

Color Space	
01	RGB444
02	YUV444
03	YUV422
04	YUV420
05	AUTO

Color Space
This feature allows to adjust the color space of the output signal. Available are RGB444 (permanently defined when the device is in DVI mode) and YUV 444, 422, 420 (YUV420 is also non-rewritable when the device is in 4K mode with more than 30 frames per second) as well as one AUTO color space (depending on the EDID information coming from the connected HDMI® sink device).

Deep Color Depth	
01	8 Bit
02	10 Bit
03	12 Bit
04	16 Bit
05	AUTO

Color Depth
Here the color depth of the output signal can be adjusted. Available are 8 bit (= 24 bit), 10 bit (= 30 bit), 12 bit (= 36 bit), 16 bit (= 48 bit) as well as one EDID-dependent AUTO value. In DVI mode and also with 4K resolutions the color depth is limited to 24 bit.

HDCP Setup	
01	HDCP OFF
02	HDCP 2.2
03	AUTO

HDCP setup
The HDCP menu allows to set the "High-bandwidth Digital Content Protection" contained within the HDMI® signal. The available options are HDCP OFF, HDCP 2.2 and AUTO. In HDCP mode 2.2 the output signal is invariably encoded according to the HDCP 2.2 standard, which allows to check HDMI® 2.0 equipment for HDCP 2.2 capability. In AUTO mode the signal is encoded pursuant to the decoding facilities of the sink device.

HDMI/DVI Setup	
01	DVI
02	HDMI
03	AUTO

HDMI®/DVI Setup

This feature is used to set the output signal mode. In DVI mode only 8 bit of color depth (24 bit in total) and RGB444 as the exclusive color space are available. Moreover, in DVI mode the output signal does not carry any audio signals.

CAUTION: checking DVI cables with the DVM-HDT-KIT ANALYZER works only with HDCP switched off!/DVI

Audio Sampling Rate	
01	32K
02	44.1K
03	48K
04	88K
05	96K
06	176K

Audio Sampling Rate

This feature allows to set the audio sampling rate to a value between 32 kHz and 192 kHz. The AUTO mode will automatically set an EDID dependent sampling rate.

Audio Sampling Size	
01	16 Bit
02	20 Bit
03	24 Bit
04	AUTO

Audio Sampling Size

This feature allows to set the audio word size to a value between 16 and 24 bit.
The AUTO mode will automatically set an EDID dependent sampling rate.

Audio Source	
01	INT.SineWaveTone(1K)
02	EXT.Stereo

Audio Source

This feature allows to select the audio signal source for the HDMI® stream. You can choose between the internal sine wave generator (1kHz sinusoidal tone) and the stereo input located on the rear panel.

Audio Channels	
01	2CH
02	3CH
03	4CH
04	88K
05	96K
06	176K

Audio Channels

This feature allows to determine the number of audio channels. The DVM-HDT-KIT GENERATOR can create up to 8 channels of PCM audio.

Audio Volume

Audio Volume

This feature allows to adjust the audio send level.

Out Standby	
01	Standby Off
02	Standby On

Out Standby

In this menu item the HDMI® interface of the DVM-HDT-KIT GENERTOR can be set to standby mode. This is very useful for resting HDMI® installations. In the "Standby On" setting the interface is disabled, "Standby Off" will enable the interface again.

Network Setup
IP Address:
192. 168. 001. 111
Subnet Mask:
255. 255. 255. 000
Gateway:
192. 168. 001. 001

Network Setup

Here you can set the IP address, the subnet mask and the gateway for the internal web server.

Save EDID	
01	Save To BUF1
02	Save To BUF2
03	Save To BUF3
04	Save To BUF4
05	Save To BUF5
06	Save To BUF6

Save EDID

6 memory locations for saving EDID data sets of the currently connected sink device are available.
These can be read out from the device with the PC software.

Battery Status

Battery Stats

(only with the DVM-HDT-KIT-DESK model version)
Indicates the state of charge of the built-in battery pack. During the charging process the word "charging" is also displayed.

Sink EDID INFO

Manufacture:

MXX

Sink Device:

HDMI

Preferred Timing:

1920x1080 60Hz

Sink EDID INFO

On this information page the basic EDID information of the currently connected sink device will be shown.

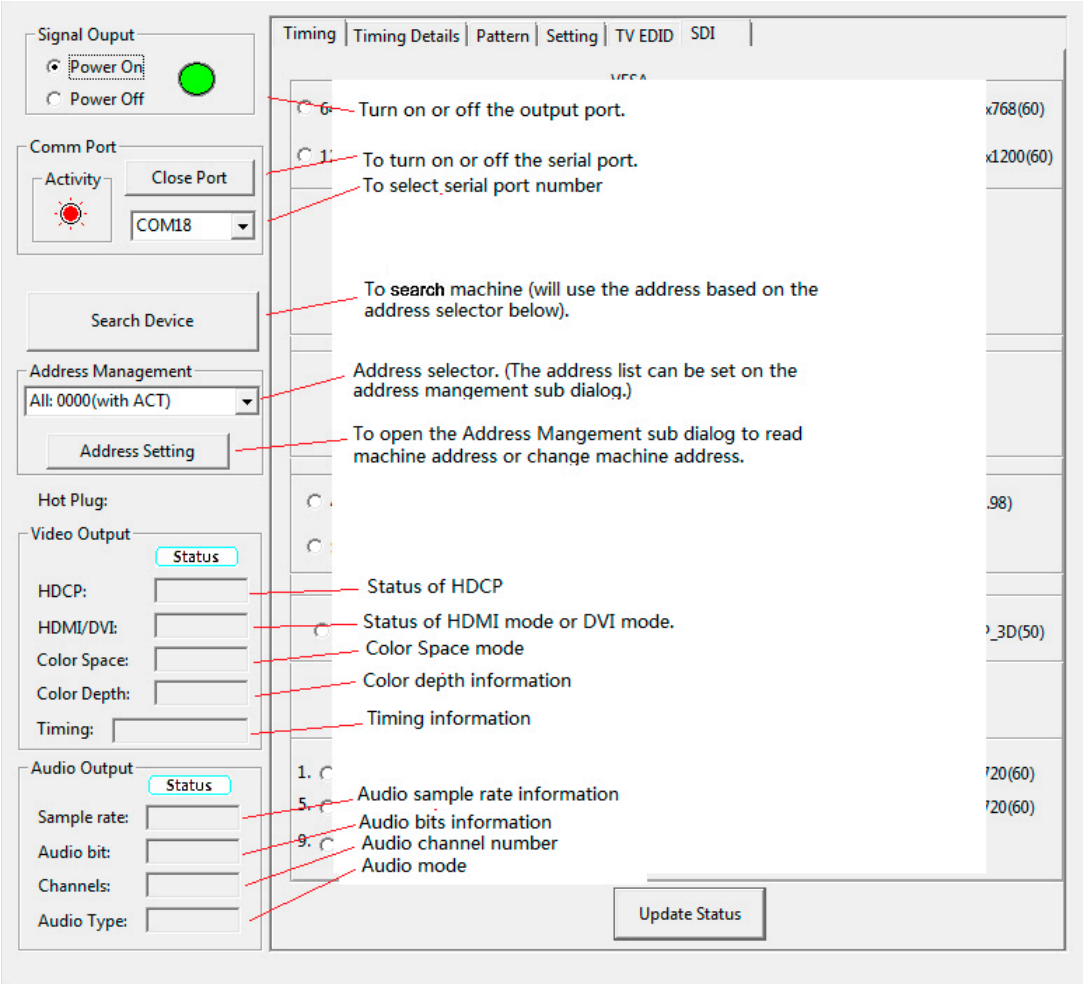
Address Setup
Group Address:
000
Device Address:
000

Address Setup

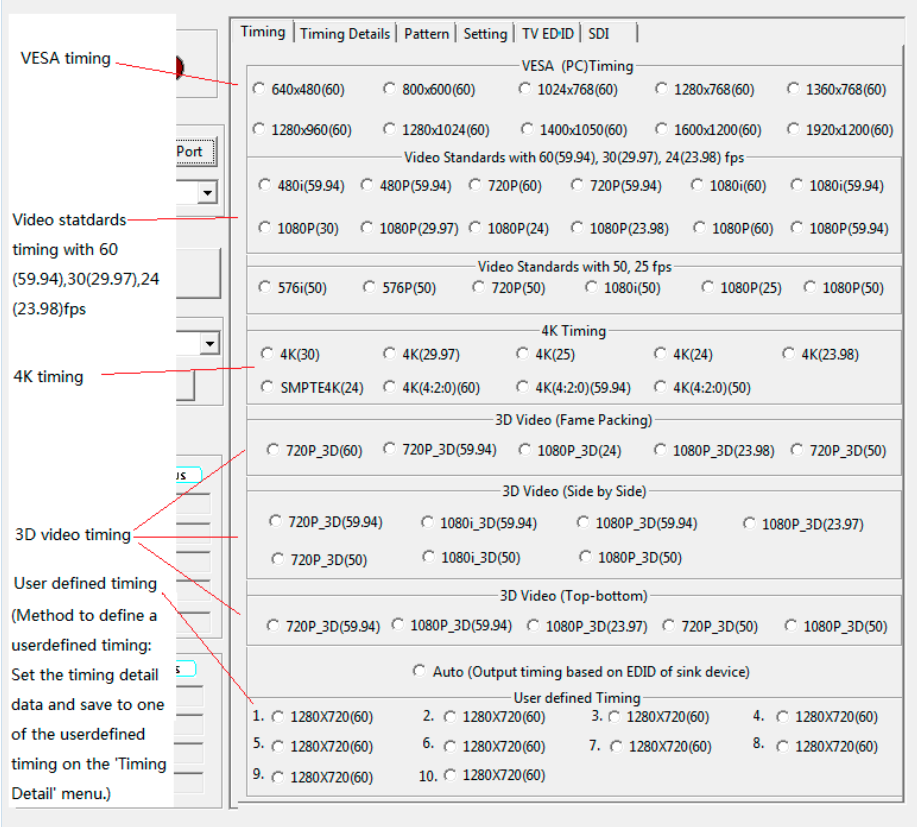
The serial communication address is displayed here. Shown are group and device address; modifications can only be implemented via the PC software.

8.2. Control via RS232 or USB

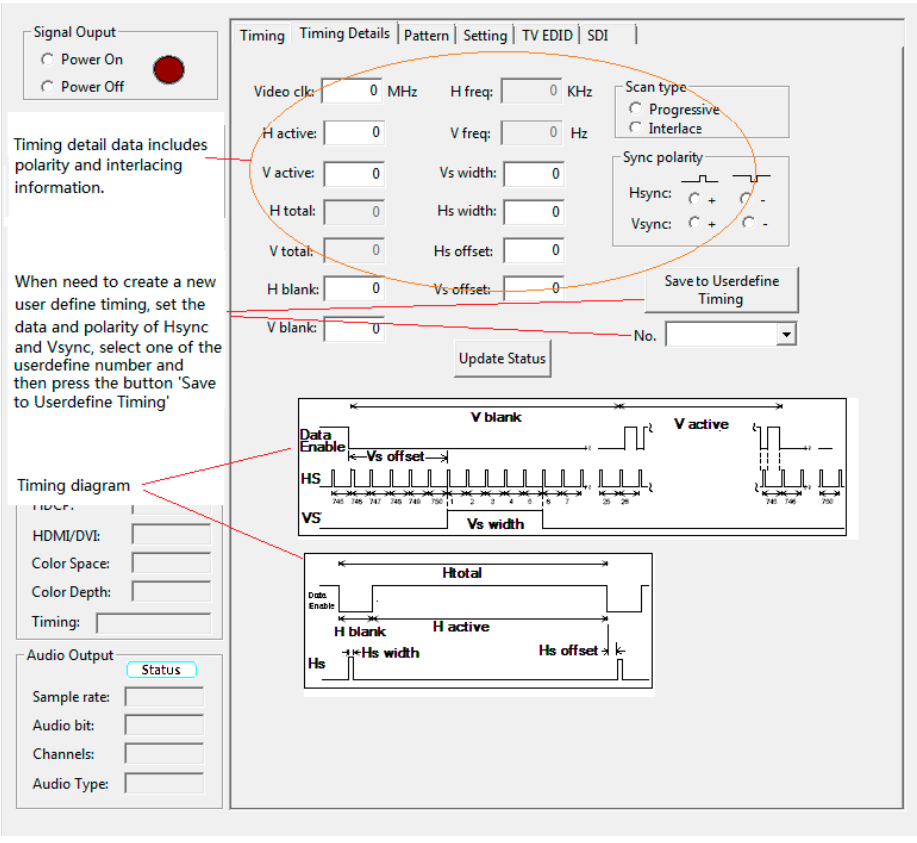
Connect the DVM-HDT-KIT GENERATOR to your computer (via USB or RS232) and run our software DVM-HDT-SG.exe. The following menu pages will show up:



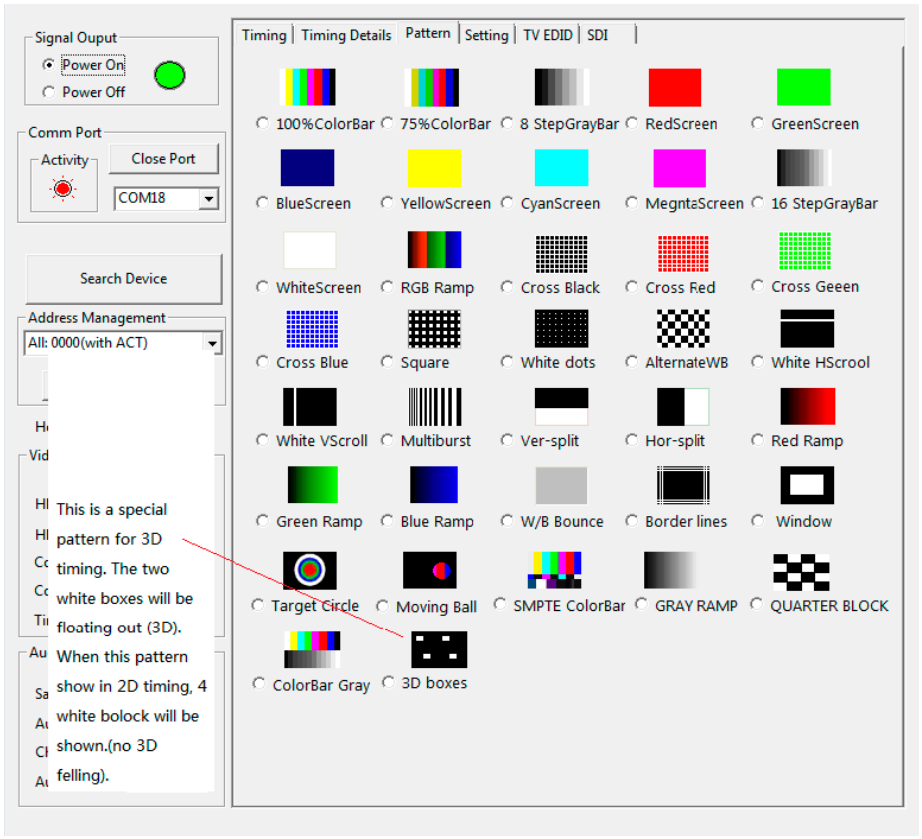
Timing control menu



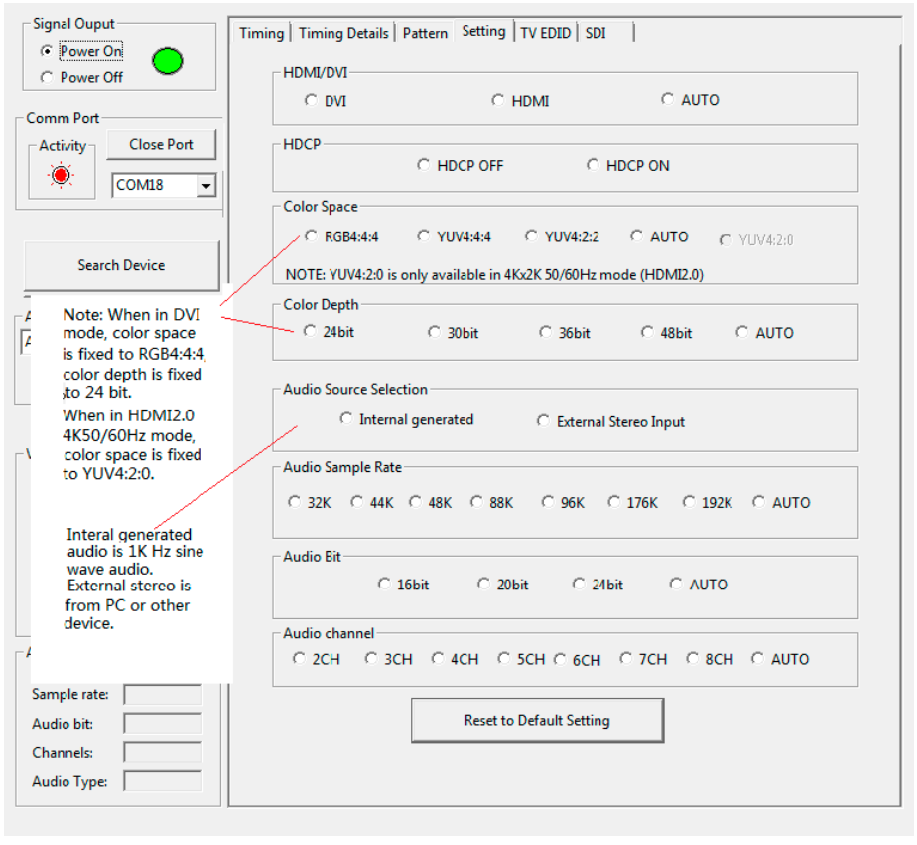
Timing detail menu



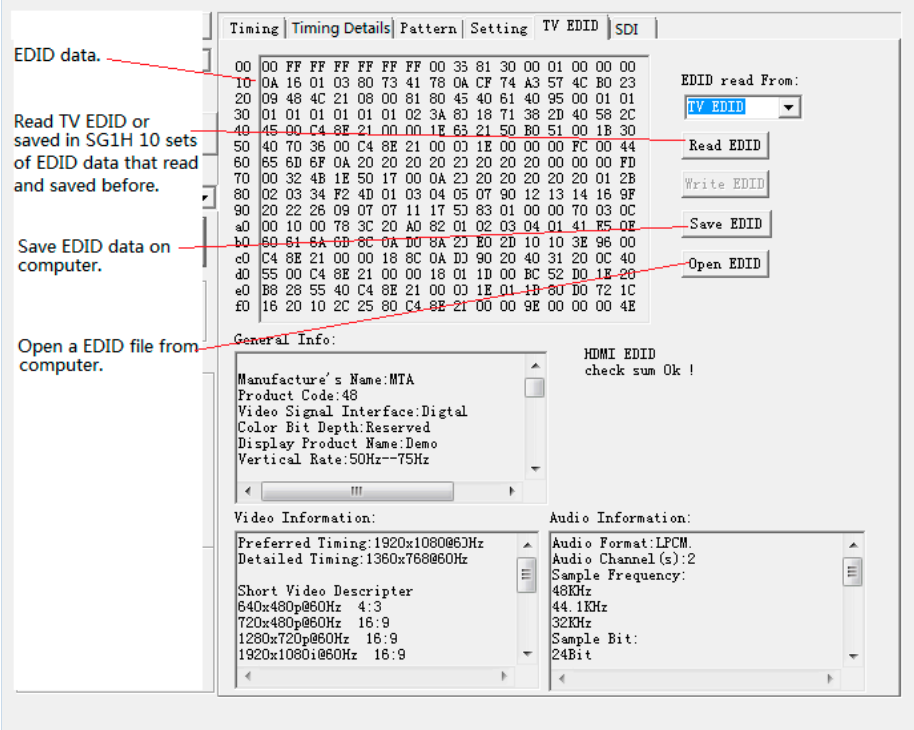
Pattern select menu



Settings menu

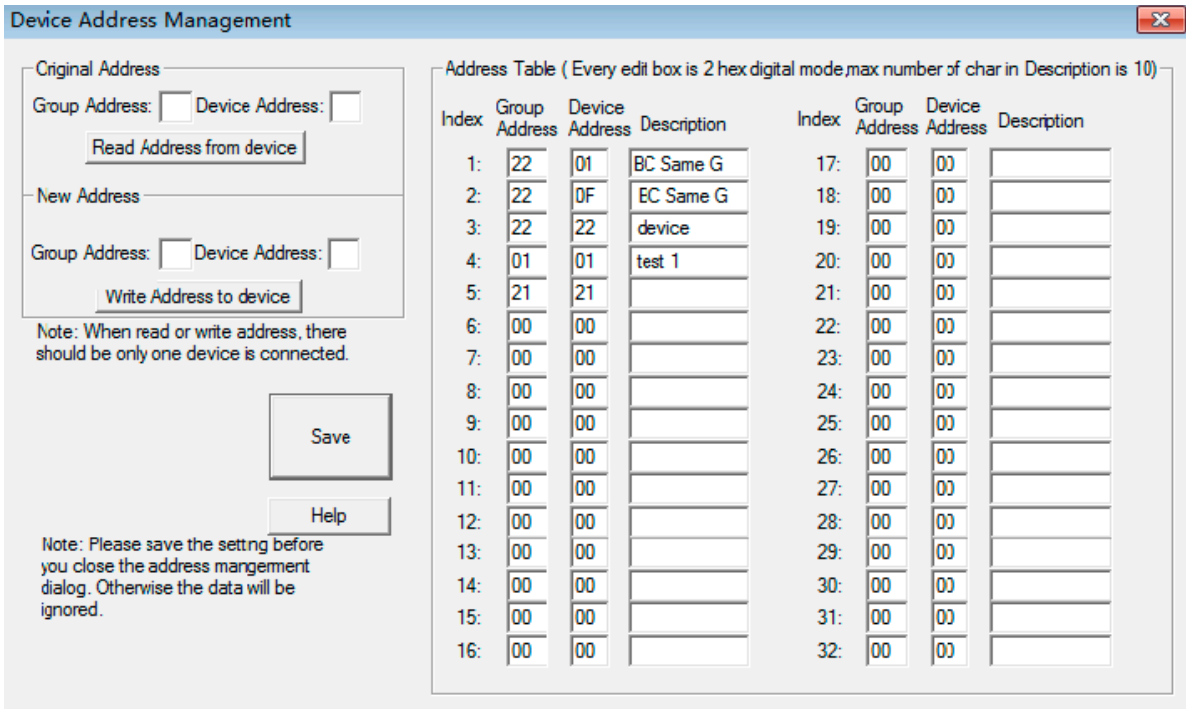


EDID management menu



The DVM-HDT-KIT GENERATOR can store 10 EDID sets.
This function is useful for field techs analyzing HDMI® system problems.

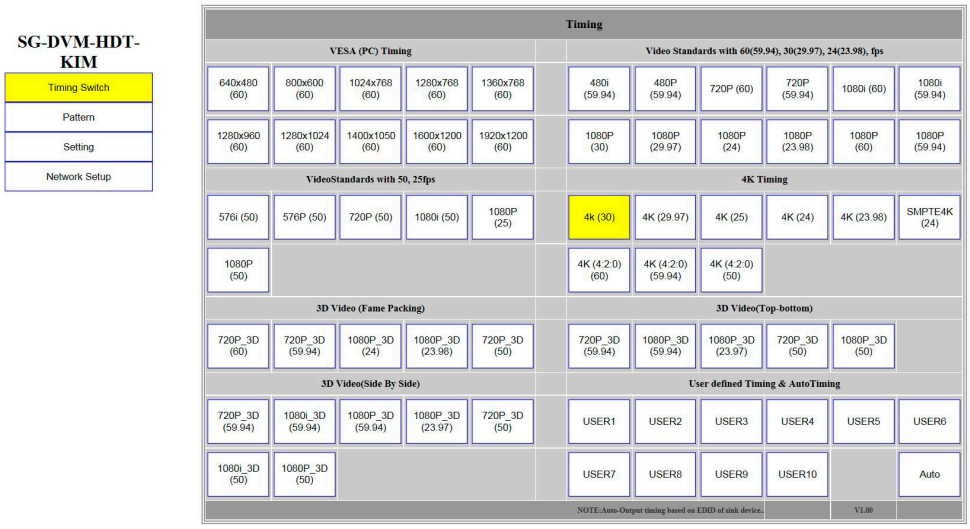
Address management menu



The DVM-HDT-KIT GENERATOR can be used to set up a large test system.
All employed DVM-HDT-KIT GENERATORs and DVM-HDT-KIT ANALYZERs can be cascaded via the RS232 (3-pole) Euroblock connector. If more than one DVM-HDT-KIT GENERATOR is connected to a single serial bus, those devices must be assigned different ID addresses.
Each address can have a unique identifier with a max. number of 10 characters each.
After saving the address table, these can be called up via the address selection in the main menu.

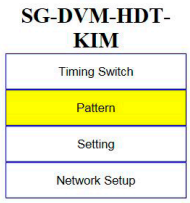
8.3. Controlling via TCP/IP (internal web server)

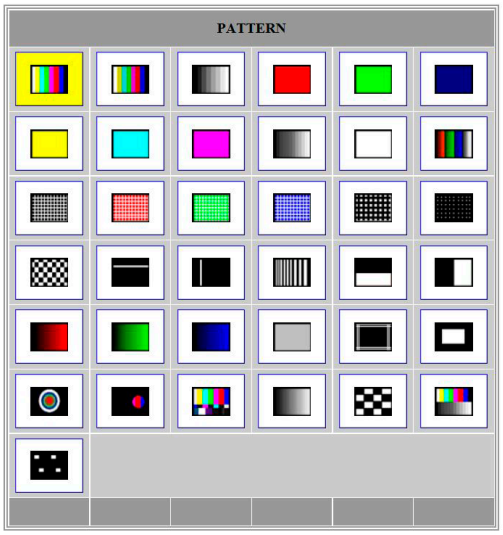
The integrated web server in the DVM-HDT-KIT GENERATOR provides a super easy, quick access using any standard browser software. Please first check the device IP address in the "Network setup" menu.
Enter this address into your browser and the main page will open:



The buttons give direct access to all resolutions and video refresh rates.

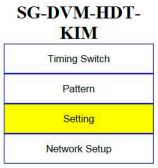
Use the "Pattern" button to open the pattern page.

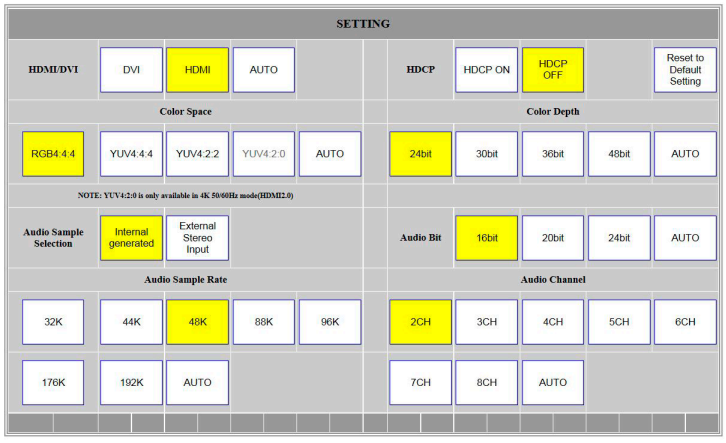




Here the desired pattern can be selected with only one click.

Click on the "Setting" button to open the settings page:

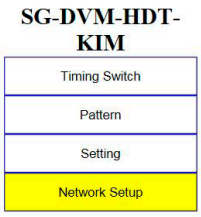


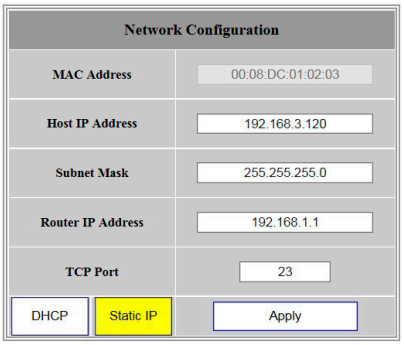


All detailed settings can be found here:

- *DVI/HDMI® mode*
- *Color Space*
- *Color Depth*
- *HDCP*
- *full audio settings (audio source, sampling rate & format, channels)*

Click on the "Network Setup" button to access the network settings page:





All network settings can be found here:

- *MAC address (read only)*
- *IP address / subnet mask / gateway address*
- *DHCP/static IP setting (only available here!)*

9. USB port driver installation guide

For Windows operating systems an exe file is available. Download this exe file (CDM v2.12.00 WHQL Certified.exe) from the website http://www.ftdichip.com/Drivers/VCP.htm and run it to install the driver for the USB RS232 emulation.

Currently Supported VCP Drivers:

Download driver files

Download executable file

Operating System	Release Date	Processor Architecture							Comments
		x86 (32-bit)	x64 (64-bit)	PPC	ARM	MIPSII	MIPSIV	SH4	
Windows*	2014-09-29	2.12.00		-	-	-	-	-	2.12.00 WHQL Certified Available as setup executable Release Notes
Linux	2009-05-14	1.5.0	1.5.0	-	-	-	-	-	All FTDI devices now supported in Ubuntu 11.10, kerne Refer to TN-101 if you need a custom VCP VID/PID i
Mac OS X	2012-08-10	2.2.18	2.2.18	2.2.18	-	-	-	-	Refer to TN-105 if you need a custom VCP VID/PID in
Windows CE 4.2-5.2**	2012-01-06	1.1.0.20	-	-	1.1.0.20	1.1.0.10	1.1.0.10	1.1.0.10	
Windows CE 6.0/7.0	2012-01-06	1.1.0.20 CE 6.0 CAT CE 7.0 CAT	-	-	1.1.0.20 CE 6.0 CAT CE 7.0 CAT	1.1.0.10	1.1.0.10	1.1.0.10	For use of the CAT files supplied for ARM and x86 builds re

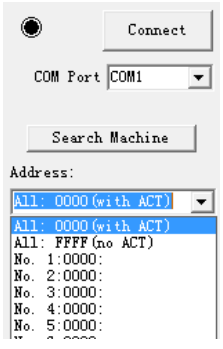
You can also download the driver files only and install them manually.
For other operating systems the driver files must be downloaded and the FTDI USB-UART installed manually.

10. Cascading application guide

- A 19" rack mounting frame is optionally available to hold the required number of DVM-HDT-KIT GENERATORs and DVM-HDT-KIT ANALYZERs. The units can be easily mounted into the SOMMER CABLE SYSBOXX frames:

SYG12-02-02

- Connect the DVM-HDT-KIT ANALYZER to the appropriate HDMI® input on the sink device.
- Connect the power supply to the DVM-HDT-KIT ANALYZER.
- Assign a different serial address to each DVM-HDT-KIT ANALYZER.
- The RS232 & USB ports can be used to connect the device to a PC for control.
- Set up an address table in the address management menu.
- Please note! During the first setup each device should be addressed independently (please save the settings before closing the dialog window).
- Choose the desired unit by clicking on the respective address in the address select window (pull down menu). Upon address selection the signal status indicated in the menu will be updated automatically.



11. Warranty and Contact information

To the first owner the manufacturer warranties this DVM-HDT-KIT GENERATOR Signal (Pattern) Generator, under normal use, to be free from defects in workmanship and materials when received in its original packaging. This warranty is only valid for first owner, and proof of purchase is required to assert warranty claims.
If there is no proof of purchase provided with a warranty claim, the manufacturer reserves the right to reject the warranty described above. Therefore, labor and parts costs may be charged to the consumer.
This warranty does not apply to the housing or cosmetic appearancs of the unit. Abuse, abnormal handling, ESD impact on the HDMI® circuitry, alterations or modifications in design or construction will void this warranty.
A very small number of pixels on the LCD screen – no more than three – is considered normal to fail on the periphery of the active viewing area of the display.
The manufacturer reserves the option to refuse service for a display pixel failure if deemed harmless by our technicians to the effective use of the monitor. Neither the sales staff of the seller nor any other persons shall be authorized to grant any warranties other than those described above, or to extend the duration of any warranties beyond the period of time described above on behalf of the manufacturer.
Due to our ongoing effort to improve products and product features, specifications may be changed without prior notice.

DVM-HDT-KIT

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