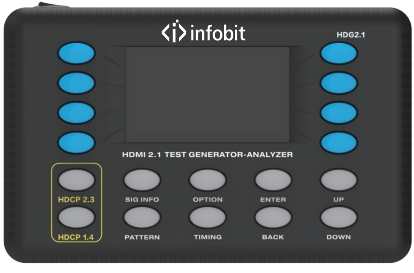
infobit

iTools G8K

HDMI 2.1 8K Signal Generator/ Analyzer/ Tester



User Manual

VER 1.0

www.infobitav.com info@infobitav.com

Thank you for purchasing this product

For optimum performance and safety, please read these instructions carefully before connecting, operating or adjusting this product. Please keep this manual for future reference.

Surge protection device recommended

This product contains sensitive electrical components that may be damaged by electrical spikes, surges, electric shock, lighting strikes, etc. Use of surge protection systems is highly recommended in order to protect and extend the life of your equipment.

Table of Contents

1. Introduction

This test signal generator is a specialized analyzer for the AV integration field, designed to confirm that the HDMI system device conforms to the HDMI 2.1 and HDCP 2.3 specifications. It can generate and analyze HDMI signal for any HDMI systems to make it easy for system integration, project installation and debugging, cable manufacturing, even for engineering and test in laboratory.

2. Features

- ☆ Support resolution up to 8K@50/60Hz 4:2:0 10-bit and 40Gbps video bandwidth, as specified in HDMI 2.1
- ☆ Up to 64 video resolutions and 33 patterns
- ☆ Color space: RGB/YCbCr444/YCbCr422/YCbCr420
- ☆ Color depth: 8/10/12-bit
- ☆ Built-in HDR test function in HDMI 2.1
- ☆ HDMI audio source can be from the internal audio or external S/PDIF input audio
- ☆ The internal audio signal supports LPCM 2CH format, 48kHz sample rate and 16bits width
- ☆ Support HDCP 2.3/1.4 encryption verification pass or fail indication
- ☆ With EDID Read/Write functionality
- ☆ Support analyzing Timing/Format/Info frame/HDCP of HDMI input signal
- ☆ Support CEC control
- ☆ Control via front panel buttons
- ☆ Portable design, built-in lithium battery of 2910mAh

3. Package Contents

① 1× HDMI 2.1 Test Signal Generator - Analyzer (Built-in lithium battery)
② 1× Serial Cable (3.5mm headphone connector to DB9 female connector, 1m)
③ 1× 5V/2A Power Adaptor
④ 1× User Manual

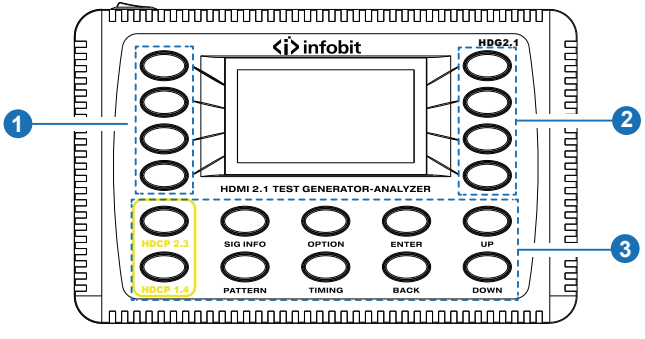
4. Specifications

Technical	
HDMI Compliance	HDMI 2.1
HDCP Compliance	HDCP 2.3/1.4
Video Bandwidth	40Gbps
Video Resolution	Up to 8K@50/60Hz (YUV4:2:0 10-bit)
Color Space	RGB, YCbCr 4:4:4, YCbCr 4:2:2, YCbCr 4:2:0
Color Depth	8/10/12-bit
Audio Formats	**Internal HDMI:** LPCM 2CH, 48kHz, 16bits **External S/PDIF:** LPCM 2/5.1CH, Dolby Digital, DTS 5.1 **HDMI Pass-through:** LPCM 2/5.1/7.1CH, Dolby Digital, DTS 5.1, Dolby Digital+, Dolby TrueHD, DTS-HD Master Audio, Dolby Atmos, DTS:X
ESD Protection	IEC 61000-4-2: ±8kV (Air-gap discharge) & ±4kV (Contact discharge)
Connection	
Input ports	1× HDMI In [Type A, 19-pin Female] 1× Optical In [S/PDIF]
Output ports	1× HDMI Out [Type A, 19-pin Female] 1× Optical Out [S/PDIF]
Control port	1× Service [3.5mm Mini-jack, Update port]

Mechanical	
Housing	Plastic Enclosure
Color	Black
Dimensions	165mm [W] × 103mm [D] × 37.4mm [H]
Weight	320g
Power Supply	**Input:** AC 100-240V 50/60Hz, **Output:** DC 5V/2A (US/EU standard, CE/FCC/UL certified)
Power Consumption	7.5W (Max)
Operating Temperature	32 - 104°F / 0 - 40°C
Storage Temperature	-4 - 140°F / -20 - 60°C
Relative Humidity	20 - 90% RH (no-condensing)

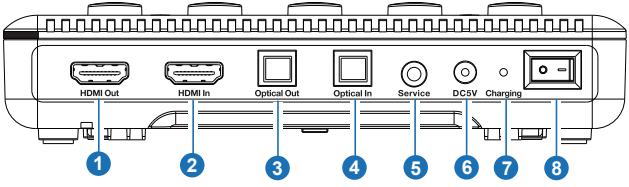
5. Operation Controls and Functions

5.1 Top Panel



NO.	Name	Function Description	
1	Selection keys (Left)	Select the left items (1~4) on the screen correspondingly.	
2	Selection keys (Right)	Select the right items (1~4) on the screen correspondingly.	
3	Function keys	HDCP 2.3	Enable HDCP 2.3 or None (HDCP OFF).
		HDCP 1.4	Enable HDCP 1.4 or None (HDCP OFF).
		SIG INFO	HDMI signal analyzing.
		PATTERN	Pattern menu selection.
		OPTION	Parameter setting options, including HDMI mode, color space, color depth, HDMI bypass, HDR, SPDIF, HDMI audio and system.
		TIMING	Timing menu selection.
		ENTER	Press to enter menu or confirm operation.
		BACK	Go back or exit menu.
		UP	Scroll to the previous page in pattern and timing menu.
		DOWN	Scroll to the next page in pattern and timing menu.

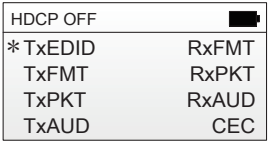
5.2 Rear Panel



NO.	Name	Function Description
1	HDMI Out	HDMI signal output port, connected to an HDMI display device such as TV or monitor.
2	HDMI In	HDMI signal input port, connected to an HDMI source device such as DVD.
3	Optical Out	Optical audio output port, connected to an audio receiver such as Amplifier.
4	Optical In	Optical audio input port, connected to an audio source device such as DVD.
5	Service	Connect to RS-232 port on PC via the included serial cable, used for firmware update.
6	DC 5V	5V/2A power supply input port.
7	Charging	Battery charging indicator.
8	Power switch	Power on/off switch.

6. Menu Instructions

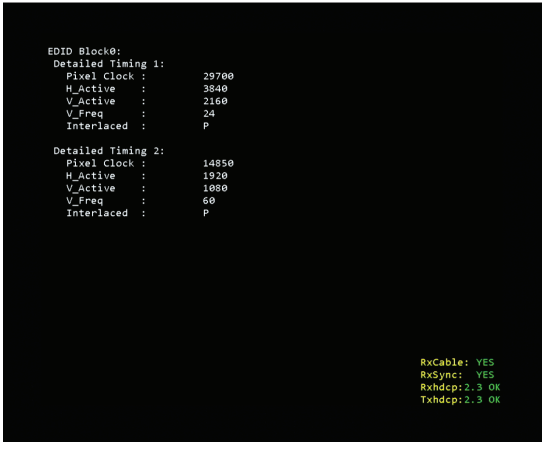
6.1 Sig Info Menu

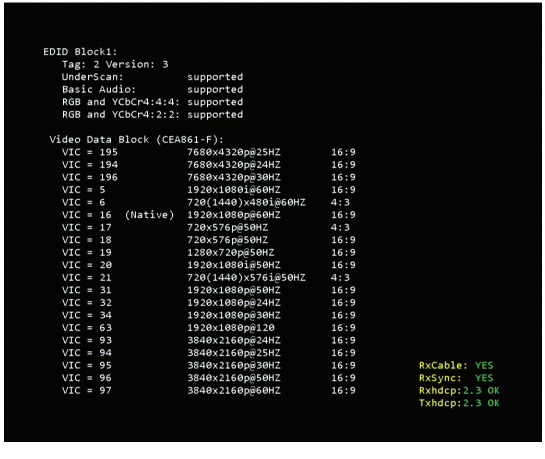


TxEDID: Displaying and analyzing HDMI output downstream device's EDID. Press the 1st key on the left to scroll to pages (Example below).

```
EDID Data(Block0-Block1):
 00:  00 FF FF FF FF FF FF 00 0D 04 30 00 01 00 00 00
 10:  01 20 01 03 80 8B 4E 78 2A 0D C9 A0 57 47 98 27
 20:  12 48 4C 21 08 00 81 80 81 C0 81 00 D1 C0 61 7C
 30:  81 FC 01 01 01 01 04 74 00 7C F6 70 5A 80 FC 58
 40:  8A 00 72 10 53 00 00 1E 02 3A 80 18 71 38 2D 40
 50:  58 2C 45 00 72 10 53 00 00 1E 00 00 00 FC 00 43
 60:  48 53 48 56 0A 20 20 20 20 20 20 00 00 00 FD
 70:  00 17 4C 0F 50 1E 00 0A 20 20 20 20 20 20 01 9B
 80:  02 03 7C F0 5F C3 C2 C4 05 06 90 11 12 13 14 15
 90:  1F 20 22 3F 5D 5E 5F 60 61 62 64 65 66 75 76 02
 A0:  03 04 C6 C7 32 09 17 07 15 07 50 57 06 01 67 04
 B0:  03 3D 07 C0 5F 7E 01 E6 11 46 D0 00 70 80 83 47
 C0:  00 00 6E 03 0C 00 10 00 B8 3C 20 00 80 01 02 03
 D0:  04 6D D8 5D C4 01 78 80 67 22 00 00 CF 67 1F E5
 E0:  0F 07 00 CC 63 E3 06 0D 01 E3 05 C3 01 E2 00 FF
 F0:  EB 01 46 D0 00 48 AF 40 A2 38 27 D7 00 00 00 FF
PASS  ->  Block0 Hearder
PASS  ->  Block0 CheckSum
PASS  ->  Block1 CheckSum

Manufacture      :  CHD
Product Code     :  3000
Serial Number    :  00000001
Manufacture W/Y  :  01,2022
Physical Address :  1000
Model Name       :  CHSHV                                    RxCable: YES
HDMI2.X Supported:  TMDS2/FRL(12x4)/DSC(12Gpbs)              RxSync:  YES
HDR Supported    :  HDR10/HLG/DolbyVision                    Rxhdcp:2.3 OK
VRR Supported    :  YES                                      Txhdcp:2.3 OK
```

```
EDID Block0:
 Established Timings I (VESA):
   640 x 480 @ 60Hz
   800 x 600 @ 60Hz

 Established Timings II (VESA):
   1024 x 768 @ 60Hz

 Manufacturer's Timings (VESA):
     NONE

 Standard Timings (VESA):
   1280x1024 @ 60HZ      5:4
   1280x720 @ 60HZ       16:9
   1280x800 @ 60HZ       16:10
   1920x1080 @ 60HZ      16:9
                         4:3
                         16:9

                                                  RxCable: YES
                                                  RxSync:  YES
                                                  Rxhdcp:2.3 OK
                                                  Txhdcp:2.3 OK
```


EDID Block0:
Detailed Timing 1:
Pixel Clock : 29700
H_Active : 3840
V_Active : 2160
V_Freq : 24
Interlaced : P
Detailed Timing 2:
Pixel Clock : 14850
H_Active : 1920
V_Active : 1080
V_Freq : 60
Interlaced : P
RxCable: YES
RxSync: YES
Rxhdcp:2.3 OK
Txhdcp:2.3 OK


EDID Block1:
Tag: 2 Version: 3
UnderScan: supported
Basic Audio: supported
RGB and YCbCr4:4:4: supported
RGB and YCbCr4:2:2: supported
Video Data Block (CEA861-F):
VIC = 195 7680x4320p@25HZ 16:9
VIC = 194 7680x4320p@24HZ 16:9
VIC = 196 7680x4320p@30HZ 16:9
VIC = 5 1920x1080i@60HZ 16:9
VIC = 6 720(1440)x480i@60HZ 4:3
VIC = 16 (Native) 1920x1080p@60HZ 16:9
VIC = 17 720x576p@50HZ 4:3
VIC = 18 720x576p@50HZ 16:9
VIC = 19 1280x720p@50HZ 16:9
VIC = 20 1920x1080i@50HZ 16:9
VIC = 21 720(1440)x576i@50HZ 4:3
VIC = 31 1920x1080p@50HZ 16:9
VIC = 32 1920x1080p@24HZ 16:9
VIC = 34 1920x1080p@30HZ 16:9
VIC = 63 1920x1080p@120 16:9
VIC = 93 3840x2160p@24HZ 16:9
VIC = 94 3840x2160p@25HZ 16:9
VIC = 95 3840x2160p@30HZ 16:9
VIC = 96 3840x2160p@50HZ 16:9
VIC = 97 3840x2160p@60HZ 16:9
RxCable: YES
RxSync: YES
Rxhdcp:2.3 OK
Txhdcp:2.3 OK

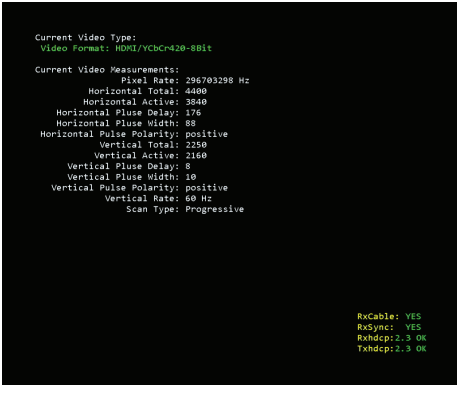
```
EDID Block1:
 Video Data Block (CEA861-F):
   VIC = 100            4096x2160p@30HZ         256:135
   VIC = 101            4096x2160p@50HZ         256:135
   VIC = 102            4096x2160p@60HZ         256:135
   VIC = 117            3840x2160p@100HZ        16:9
   VIC = 118            3840x2160p@120HZ        16:9
   VIC = 2              720x480p@60HZ           4:3
   VIC = 3              720x480p@60HZ           16:9
   VIC = 4              1280x720p@60HZ          16:9
   VIC = 198            7680x4320p@50HZ         16:9
   VIC = 199            7680x4320p@60HZ         16:9

 Audio Data Block (CEA861-F):
   Linear PCM:     (2ch) 32k 44.1k 48k 96k
                         16bit,20bit,24bit
   AC-3:           (6ch) 32k 44.1k 48k
                         Maximum bit rate:640kps
   Dolby Digital+:(8ch) 44.1k 48k
   MAT(MLP):       (8ch) 48k
   DTS:            (6ch) 32k 44.1k 48k
                         Maximum bit rate:1536kps
   DTS-HD:         (8ch) 44.1k 48k 88.2k 96k 176.4k 192k

 Speaker Data Block:
     FL/FR LFE FC RLC/RRC                                    RxCable: YES
                                                             RxSync:  YES
                                                             Rxhdcp:2.3 OK
                                                             Txhdcp:2.3 OK
```

```
EVendor Specific Data Block:
     DC_Y444  DC_30bit DC_36bit Supports_AI
     TMDS clock: 300 MHz
     HDMI VIC: 4

 Vendor Specific Data Block(HDMI2.X):
     Version: 1        TMDS clock: 600 MHz
       3D_OSD_Disparity    :          N
       Dual_View           :          N
       Independent_View    :          N
       LTE_340Mcsc_scramble:          N
       RR_Capable          :          N
       SCDC_Present        :          Y
       DC_30bit_420        :          Y
       DC_36bit_420        :          Y
       DC_38bit_420        :          Y
       Mdelta              :          Y
       CinemaVRR           :          N
       CNMVRR              :          N
       FVA                 :          N
       ALLM                :          Y
       FAPA_start_location :          N
       DSC_10bpc           :          N
       DSC_12bpc           :          Y
       DSC_16bpc           :          Y
       DSC_1p2             :          N                    RxCable: YES
       DSC_All_bpp         :          N                    RxSync:  YES
       DSC_Native_420      :          N                    Rxhdcp:2.3 OK
                                                           Txhdcp:2.3 OK
```

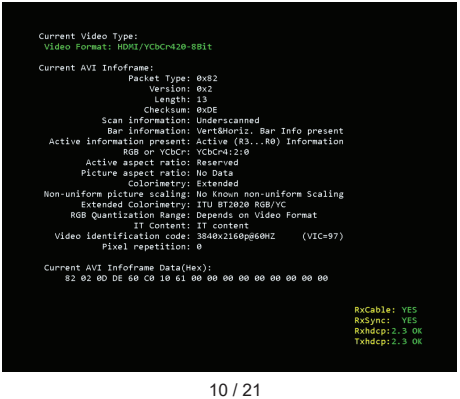
```
EDID Block1:
 Extended Data Block:
     Video Capability          (0x00): (Length 2)
         QY   :                      Y
         QS   :                      Y
         S_PT1:                      Y
         S_PT0:                      N
         S_IT1:                      Y
         S_IT0:                      N
         S_CE1:                      Y
         S_CE0:                      Y

     Colorimetry               (0x05): (Length 3)
         xvYCC_601                   Y
         xvYCC_709                   Y
         sYCC_601                    N
         AdobeYCC_601                N
         AdobeRGB                    N
         BT2020cYCC                  N
         BT2020YCC                   Y
         BT2020RGB                   Y

     HDR Static Metadata       (0x06): (Length 2)
         Traditional-SDR Range       Y
         Traditional-HDR Range       N
         SMPTE ST 2084[2]            Y                    RxCable: YES
         Hybrid Log-Gamma(HLG)       Y                    RxSync:  YES
         ET_4..ET_5 Reserved(0)      N                    Rxhdcp:2.3 OK
         Static Metadata Type 1      Y                    Txhdcp:2.3 OK
```

```
EDID Block1:
 Extended Data Block:
     YCbCr420 Capablitity Map(0x0F): (Length 4)
       VIC = 195      7680x4320p@25HZ       16:9
       VIC = 194      7680x4320p@24HZ       16:9
       VIC = 196      7680x4320p@30HZ       16:9
       VIC = 96       3840x2160p@50HZ       16:9
       VIC = 97       3840x2160p@60HZ       16:9
       VIC = 101      4096x2160p@50HZ       256:135
       VIC = 102      4096x2160p@60HZ       256:135
       VIC = 117      3840x2160p@100HZ      16:9
       VIC = 118      3840x2160p@120HZ      16:9
       VIC = 198      7680x4320p@50HZ       16:9
       VIC = 199      7680x4320p@60HZ       16:9

                                            RxCable: YES
                                            RxSync:  YES
                                            Rxhdcp:2.3 OK
                                            Txhdcp:2.3 OK
```

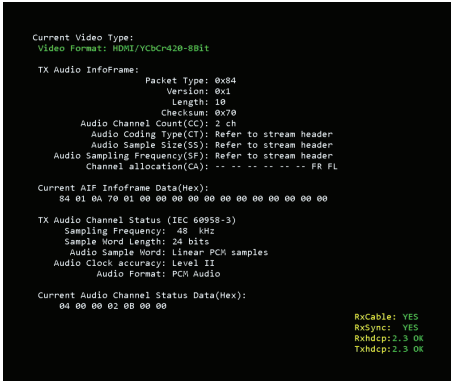
TxFMT: Displaying HDMI output mode, color depth and timing format information.



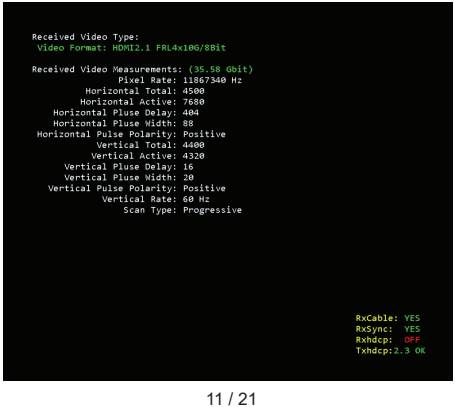
TxPKT: Displaying HDMI output mode, color depth and AVI info frames.



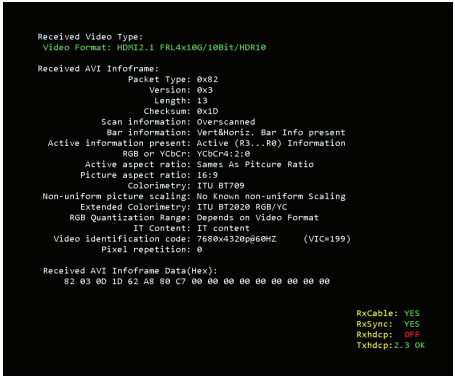
TxAUD: Displaying HDMI output mode, color depth, audio info frame and audio channel status.



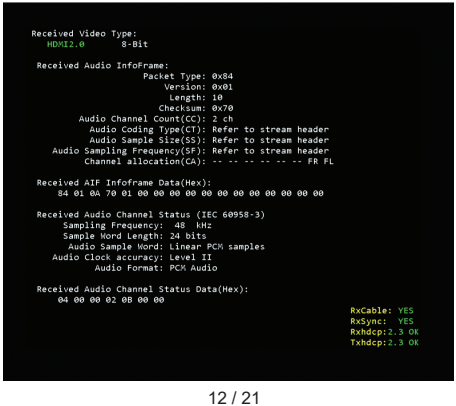
RxFMT: Displaying HDMI input mode, color depth and timing format information.



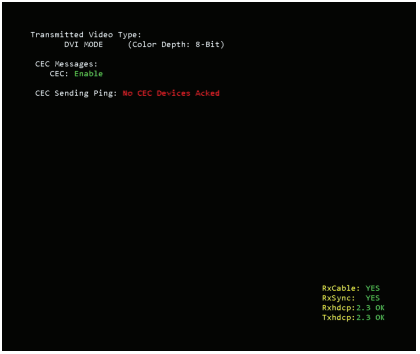
RxPKT: Displaying HDMI input mode, color depth and AVI/VSIF/ HDR info frames.



RxAUD: Displaying HDMI input mode, color depth, audio info frame and audio channel status.

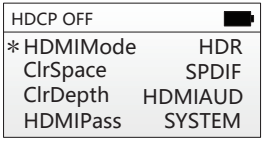


CEC: Displaying all the connected HDMI devices controlled by CEC.

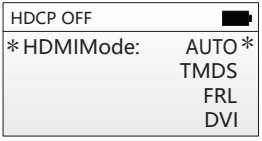


6.2 Option Menu

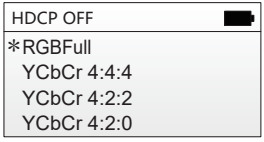
Option menu includes eight items: HDMIMode, ClrSpace, ClrDepth, HDMIPass, HDR, SPDIF, HDMIAUD and SYSTEM.



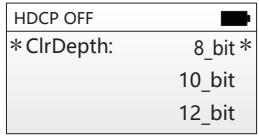
HDMIMode includes four signal modes: AUTO, TMDS, FRL and DVI.



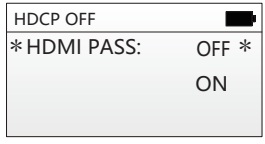
ClrSpace includes four color space modes: RGBFull, YCbCr 4:4:4, YCbCr 4:2:2 and YCbCr 4:2:0.



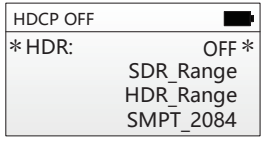
ClrDepth includes three color depth modes: 8-bit, 10-bit, 12-bit.



HDMIPass includes two items: OFF and ON.
OFF means the output device comes with internal pattern.
ON means the signal pass through from HDMI input port to HDMI output port.

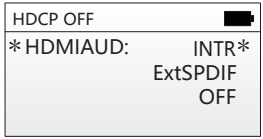


HDR includes four options: OFF, SDR_Range, HDR_Range, SMPT_2084.

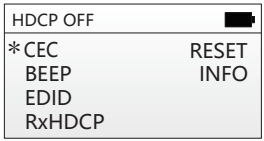


SPDIF includes two options: ON, OFF.
ON means the SPDIF OUT is enabled. OFF means the SPDIF OUT is disabled.

HDMIAUD includes three options: INTR, ExtSPDIF, OFF.
It can be used to select an audio source for the HDMI output port.



SYSTEM includes six options: CEC, BEEP, EDID, RxHDCP, RESET, INFO.

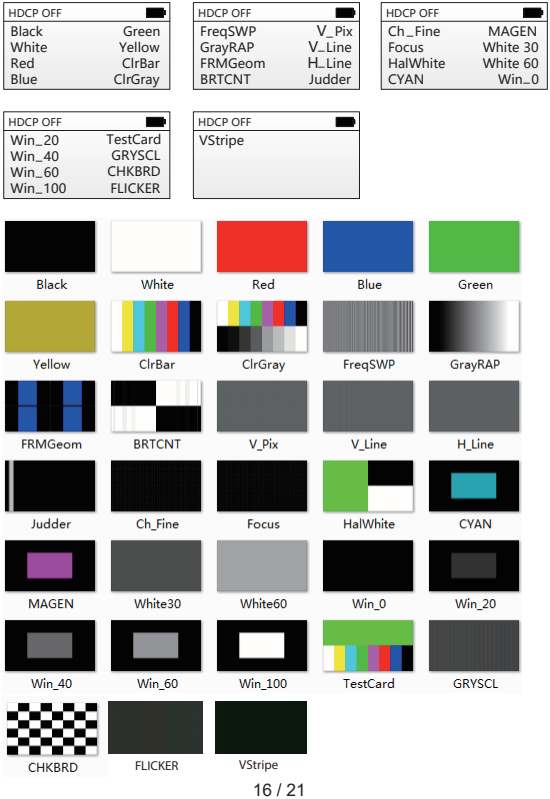


Options	Items	Description
CEC	ON	Enable CEC function.
	OFF	Disable CEC function.
BEEP	ON	Turn on the beep.
	OFF	Turn off the beep.
EDID	PASS	Copy the EDID of display devices to HDMI input.
	LOAD	Load current EDID saved by MCU FLASH to HDMI input.
	SAVE	Save the EDID of display devices to MCU FLASH.
RxHDCP	AUTO	HDCP of the input source follows the display device connected to the output port.
	2.3	Enable HDCP 2.3 on Receiver.
	1.4	Enable HDCP 1.4 on Receiver.
	OFF	Disable HDCP function.
RESET	/	Reset the system in real time.
INFO	/	Display the version info of MCU.

7. Pattern and Timing

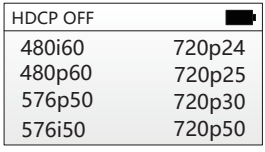
7.1 Pattern

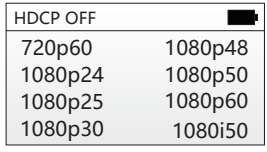
33 patterns are provided in this test generator as shown below:

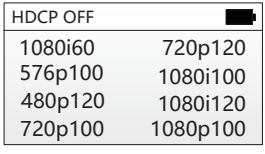


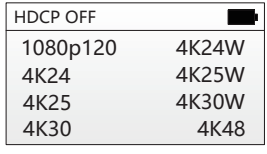
7.2 Timing Format

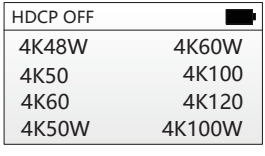
64 video resolutions are supported in this test generator as shown below:

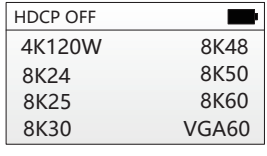


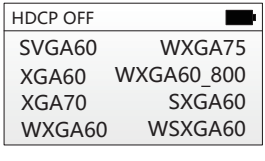


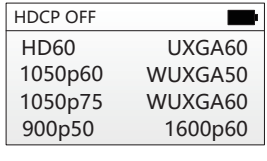












Supported CEA timing as shown below:

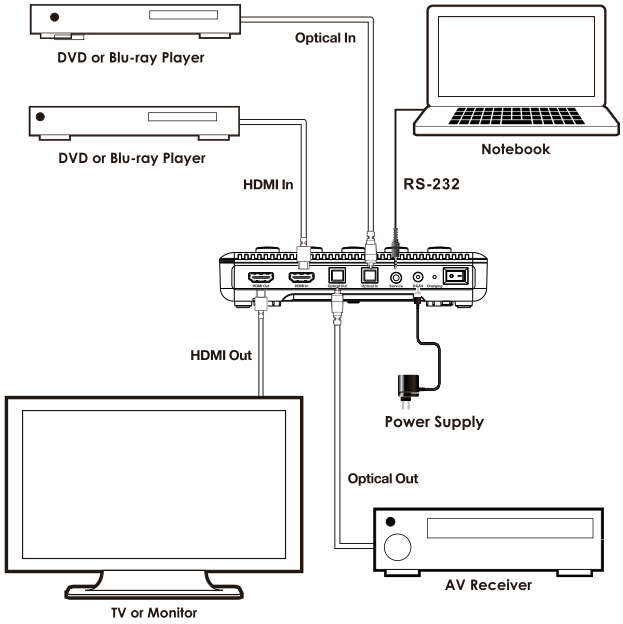
Timing	CEA VIC	Resolution
480i60	6	1440x480i60
480p60	2	720x480p60
576p50	17	720x576p50
576i50	21	1440x576i50
720p24	60	1280x720p24
720p25	61	1280x720p25
720p30	62	1280x720p30
720p50	19	1280x720p50
720p60	4	1280x720p60
1080p24	32	1920x1080p24
1080p25	33	1920x1080p25
1080p30	34	1920x1080p30
1080p48	111	1920x1080p48
1080p50	31	1920x1080p50
1080p60	16	1920x1080p60
1080i50	20	1920x1080i50
1080i60	5	1920x1080i60
576p100	42	720x576p100
480p120	48	720x480p120
720p100	41	1280x720p100
720p120	47	1280x720p120
1080i100	40	1920x1080i100
1080i120	46	1920x1080i120

Timing	CEA VIC	Resolution
1080p100	64	1920x1080p100
1080p120	63	1920x1080p120
4K24	93	3840x2160p24
4K25	94	3840x2160p25
4K30	95	3840x2160p30
4K24W	98	4096x2160p24
4K25W	99	4096x2160p25
4K30W	100	4096x2160p30
4K48	114	3840x2160p48
4K48W	115	4096x2160p48
4K50	96	3840x2160p50
4K60	97	3840x2160p60
4K50W	101	4096x2160p50
4K60W	102	4096x2160p60
4K100	117	3840x2160p100
4K120	118	3840x2160p120
4K100W	218	4096x2160p100
4K120W	219	4096x2160p120
8K24	194	7680x4320p24
8K25	195	7680x4320p25
8K30	196	7680x4320p30
8K48	197	7680x4320p48
8K50	198	7680x4320p50
8K60	199	7680x4320p60

Supported VESA timing as shown below:

Timing	VESA	Resolution
VGA60	0	640x480p60
SVGA60	0	800x600p60
XGA60	0	1024x768p60
XGA70	0	1024x768p70
WXGA60	0	1280x768p60
WXGA75	0	1280x768p75
WXGA60_800	0	1280x800p60
SXGA60	0	1280x1024p60
WSXGA60	0	1360x768p60
HD60	0	1366x768p60
1050p60	0	1400x1050p60
1050p75	0	1400x1050p75
900p50	0	1440x900p50
UXGA60	0	1600x1200p60
WUXGA50	0	1920x1200p50
WUXGA60	0	1920x1200p60
1600p60	0	2560x1600p60

8. Connection Diagram



HIGH-DEFINITION MULTIMEDIA INTERFACE

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