SG4K-HDI UART CMD V0.8

UART setting

Baud Rate:	115200 bps
Data bits:	8 bits
Parity:	None
Stop bits:	1 bit
Flow control:	None

Command format(protocol)

	header		length	Group address	Device address	keyword	data	chksum
value	AA (from PC to device)/AB (from device to PC)	DEVICE ID(see note1)	Byte number except header	See note2	See note2	See table 2		
Byte number	1	2	2	1	1	2(lower byte first)		1

Note:
1. The device ID for signal generator is 0x0000.
2. Each device can be assigned a separate address. Address includes two bytes. Available group address and device are from 0x01 to 0xfe. If the address is 0x0000, that means this device has not been assigned with address. 0x0000 is the broadcast address. When computer send command with the address 0x0000, all devices will receive and execute the command. 0xffff is another broadcast address. All device need to receive and execute the command with address 0xffff but do not feed back any data to computer. The device address can be shown in the OSD menu on the OLED panel.

XX:01H~FEH
YY:01H~FEH

Group address	Device address	description
00H	FFH	Invalid (reserved)
XXH	FFH	Broadcast command to all the devices with the group address xxH(Device will not feedback any message to the controller)
FFH	FFH	Broadcast to all devices (No feedback from device)
00H	00H	Broadcast address. (With feedback from device)
XXH	00H	Broadcast to devices with the group address XXH.(with feedback from devcie)
FFH	00H	Invalid (reserved)
00H	XXH	Invalid (reserved)
FFH	XXH	Invalid (reserved)
XXH	YYH	Send command to the device with the address XX YY H. (With feedback from device)

Table-1

Command list:

Keyword	Function	length	description	note
0061H	Change Timing	1BYTE	See table-4	
0062H	Change Pattern	1BYTE	See table-5	
0063H	Change	1BYTE	See table-7	

		ColorSpace			
0064H		DeepColor setting	1BYTE	See table-8	
0065H		HDCP on/off	1BYTE	See table-9	
0066H		Set HDMI or DVI output	1BYTE	See table-10	
0067H		Audio Sampleing	1BYTE	See table-11	
0068H		Audio bit	1BYTE	See table-12	
0069H		Audio source(embedded or from external stereo analog audio	1BYTE	See table-13	
006Ah		Audio channel number	1BYTE	See table-21	
00a0H		User define timing	20BYTE	See table-14	
00AAH		Save SINK EDID to memory	1BYTE	See table-26	
00ABH		Power on/off the output		See table-27	
7801H		Address setting	2BYTE	See table-16	
7802H		Reset all settings			
8061H		Read Timing status			Device will reply as table-3
8062H		Read Pattern status			Device will reply as table-4
8063H		Read ColorSpace status			Device will reply as table-7
8064H		Read DeepColor status			Device will reply as table-8
8065H		Read HDCP status			Device will reply as table-9
8066H		Read HDMI/DVI status			Device will reply as table-10
8067H		Read Audio Sampleing satus			Device will reply as table-11
8068H		Read Audio bit status			Device will reply as table-12
8069H		Read audio source status(embedded or from external stereo audio)			Device will reply as table-13
806AH		Read Audio channel number			Device will reply as table-21
80a0H		Read user define timing data	1BYTE	USER INDEX 0~9	Device will reply as table-14
80a1H		Read TX NATIVE TIMING			Device will reply as table-22
80a9H		Read output status			When the device is in AUTO mode, the device will reply colorspace,color depth etc. Please refer to table-23

80AAH	Read stored EDID from memory	1BYTE	See table-26	Note3
80abH	Read output on/off status			Device will reply as table-27
B838H	Read EDID from the sink device	1BYTE	See table-18	Note2
B839H	Read HPD status of sink device			Device will reply as table-24
F801H	Read address of the device	0BYTE		Device will reply as table-16

Table-2

Note:
1. The keyword, which is less than 0x8000, is for setting. The keyword greater than 0x8000 is for status reading
2. Command example for EDID reading:
   PC->Device: AA +ID+06 00 00 00 38 B8 01+checksum
   If the device can't read EDID data from sink device, it will feedback data to PC as below:

   Device->PC: AB+ID+ 06 00 00 00 38B8 00+checksum
   If the device can read EDID data from sink device, it will feedback data to PC as below:
   MCU->PC: AB +ID+05 01 00 00 38 B8 ~~~~~~(256BYTE)+checksum

3. Command example for reading EDID from the first one stored in memory.
   PC->MCU:AA +ID+06 00 00 00 aa 80 01+checksum
   MCU->PC: AB +ID+06 01 00 00 aa 80 01~~~~~~(256BYTE)+checksum

4. When PC send setting command (less than 0x8000) to device, device will reply with FFFFH at the position of keyword. After the keyword, there are 3 parameters. The first is the low byte of the keyword which is sent from PC to device, the second is the high byte of keyword, the third is the status related to the command(please refer to the table-3 below).
   Here is the example: When PC send command AA 00 00 06 00 00 00 00 61 00 00 EF (set the timing to the first timing 640x480)
   The device will reply : AB 00 00 08 00 00 00 FF FF 61 00(61 00 are keyword) 00(00 means executed correctly) EE (checksum)

parameter	Description	Note
1	Low byte of keyword	
2	High byte of keyword	
3	Status relate to the command	0-Execute correctly 1-Checksum error 2-Invalid command 3-Faild to execute the command 4-The command is invalid for the current working mode.

Table-3

parameter	Description	Note
1	Timing index	The index to the timing details, please refer to table-6

Table-4

parameter	Description	Note
1	Pattern index	0~32

Table-5

TIMING No.	TIMING	Note
0H	VESA640x480P_60HZ	
1H	VESA800x600P_60HZ	
2H	VESA1024x768P_60HZ	
3H	VESA1280x768P_60HZ	
4H	VESA1360x768P_60HZ	
5H	VESA1280x960P_60HZ	
6H	VESA1280x1024P_60HZ	
7H	VESA1400x1050P_60HZ	
8H	VESA1600x1200P_60HZ	
9H	VESA1920x1200P_60HZ	
aH	CEAVIC1440x480I_60HZ	
bH	CEAVIC720x480P_60HZ	
cH	CEAVIC1280x720P_60HZ	
dH	CEAVIC1280x720P_59.94HZ	
eH	CEAVIC1920x1080I_60HZ	
fH	CEAVIC1920x1080I_59.94HZ	
10H	CEAVIC1920x1080p_30HZ	
11H	CEAVIC1920x1080p_29.97HZ	
12H	CEAVIC1920x1080P_24HZ	
13H	CEAVIC1920x1080P_23.976HZ	
14H	CEAVIC1920x1080P_60HZ	
15H	CEAVIC1920x1080P_59.94HZ	
16H	CEAVIC1440x576I_50HZ	
17H	CEAVIC720x576P_50HZ	
18H	CEAVIC1280x720P_50HZ	
19H	CEAVIC1920x1080I_50HZ	
1aH	CEAVIC1920x1080p_25HZ	
1bH	CEAVIC1920x1080P_50HZ	
1cH	HDMIVIC4Kx2K_30HZ	
1dH	HDMIVIC4Kx2K_29.97HZ	
1eH	HDMIVIC4Kx2K_25HZ	
1fH	HDMIVIC4Kx2K_24HZ	
20H	HDMIVIC4Kx2K_23.98HZ	
21H	SMPTE4Kx2K_24HZ	
22H	H20_4KYUV420_60HZ	
23H	H20_4KYUV420_59.94HZ	
24H	H20_4KYUV420_50HZ	
25H	FP3D_1280x720P_60HZ	
26H	FP3D_1280x720P_59.94HZ	
27H	FP3D_1920x1080P_24HZ	
28H	FP3D_1920x1080P_23.976HZ	
29H	FP3D_1280x720P_50HZ	
2AH	SBSHALF3D_1280x720P_59HZ,	
2BH	SBSHALF3D_1920x1080I_59.94HZ,	
2CH	SBSHALF3D_1920x1080P_59.94HZ,	
2DH	SBSHALF3D_1920x1080P_23.976HZ,	
2EH	SBSHALF3D_1280x720P_50HZ,	
2FH	SBSHALF3D_1920x1080I_50HZ,	
30H	SBSHALF3D_1920x1080P_50HZ,	
31H	TAB3D_1280x720P_59.94HZ,	

32H	TAB3D_1920x1080P_59.94HZ,	
33H	TAB3D_1920x1080P_23.976HZ,	
34H	TAB3D_1280x720P_50HZ,	
35H	TAB3D_1920x1080P_50HZ,	
36H	AUTO	
37H	User1 define	
38H	User2 define	
39H	User3 define	
3AH	User4 define	
3BH	User5 define	
3CH	User6 define	
3DH	Use7 define	
3EH	User8 define	
3FH	User9 define	
40H	User10 define	

Table-6

parameter	Description	Note
1	ColorSpace index	0- RGB444 1- YUV444 2- YUV422 3- AUTO 4- YUV420(Note: colorspace 420 can only be set automatically in 4K 50/60Hz mode.)

Table-7

parameter	Description	Note
1	DeepColor index	0- 24BIT 1- 30BIT 2- 36BIT 3- 48BIT 4- AUTO

Table-8

parameter	Description	Note
1	HDCP enable	0- OFF 1- ON

Table-9

parameter	Description	Note

1	HDMI/DVI output setting	0- DVI 1- HDMI 2- AUTO

Table-10

parameter	Description	Note
1	Audio Sampling	0- 32K 1- 44.1K 2- 48K 3- 88K 4- 96K 5- 176K 6- 192K 7- AUTO

Table-11

parameter	Description	Note
1	Audio bit	0- 16BIT 1- 20BIT 2- 24BIT 3- AUTO

Table-12

parameter	Description	Note
1	External audio	0- OFF 1- ON

Table-13

parameter	Description	Note
1	User index	0~9
2	CLK low byte	CLK=PIXEL CLK/10000, PIXEL CLK. The maximum is 300M
3	CLK high byte	Please refer to note-1 following this table
4	General Flag	Bit0-interlace mode, 1-interlace, 0-progressive Bit1-Hsync polarity ,1-positive,0-negative Bit2-Vsync polarity ,1-positive, 0-nagative
5	HACTIVE low byte	
6	HACTIVE high byte	
7	HBANK low byte	
8	HBANK high byte	
9	HFRONT PORCH low byte	
10	HFRONT PORCH high byte	
11	HSYNC TIME low byte	
12	HSYNC TIME high byte	
13	VACTIVE low byte	

14	VACTIVE high byte	
15	VBANK low byte	
16	VBANK high byte	
17	VFRONT PORCH low byte	
18	VFRONT PORCH high byte	
19	VSYNC TIME low byte	
20	VSYNC TIME high byte	

Table-14

Note:

1. For example, if the pixel clock is 148.5MHz, then CLK=148500000/10000=14850, the low byte of CLK is 02, the high byte is 3A.

parameter	Description	Note
1	Group address	01H~FEH
2	Device address	Can set the address to 0 when want to delete the address for this device.

Table-16

parameter	Description	Note
1	Audio channel number	0- 2CH 1- 3CH 2- 4CH 3- 5CH 4- 6CH 5- 7CH 6- 8CH 7- AUTO

Table-21

parameter	Description	Note
1	Release	0
2	CLK low byte	CLK=PIXEL CLK/10000, the maximum PIXEL CLK is 300MHz
3	CLK high byte	
4	General Flag	Bit0-interlace mode, 1-interlace, 0-progressive Bit1-Hsync polarity ,1-positive,0-negative Bit2-Vsync polarity ,1-positive, 0-nagative
5	HACTIVE low byte	
6	HACTIVE high byte	
7	HBANK low byte	
8	HBANK high byte	
9	HFRONT PORCH low byte	
10	HFRONT PORCH high byte	
11	HSYNC TIME low byte	
12	HSYNC TIME high byte	

13	VACTIVE low byte	
14	VACTIVE high byte	
15	VBLANK low byte	
16	VBLANK high byte	
17	VFRONT PORCH lowbyte	
18	VFRONT PORCH high byte	
19	VSYNC TIME low byte	
20	VSYNC TIME high byte	

Table-22

parameter	Description	Note	
1	Color spcace	Will reply base on table-7	When in 'AUTO' mode, if there is sink device connected and HPD is high, all information will feedback to PC. If the HPD is low in 'AUTO' mode, will only reply the status of AUTO
2	DeepColor	Will reply base on table-8	
3	HDMI/DVI	Will reply base on table-10	
4	Audio Sampleing	Will reply base on table-11	
5	Audio sample bit	Will reply base on table-12	
6	Audio channel number	Will reply base on table-21	

Table-23

parameter	Description	Note
1	HPD状态	0- low 1- high

Table-24

parameter	Description	Note
1	LOGO Index	0- Default 1- USER1

Table-25

parameter	Description	Note
1	EDID Buffer Index	0~9

Table-26

parameter	Description	Note
1	Power on or power off the output port	0- Normal 1- Output in Standby mode

Table-27

Command example for reading EDID from the first one stored in memory.

Command for read EDID from HDMI port.
PC->MCU:AA +00+06 00 00 00 38 b8 01+5f   length, device address (can be always 00 00), command , parameter, checksum

paremeter	description	note
1	output port	1-OUT1,2-OUT2,....

table 18

Below is the command sample for change pattern.
PC->MCU:AA +00+06 00 00 00 62 00 02+ec   length, device address (can be always 00 00), command , parameter(02--- 8 step graybar), checksum