



application note

USER MANUAL

OVMed[®]-A1 DVP (OH00000-EG02-1A-0093)

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OVMed®-A1 ISP board with DVP output

application note
USER MANUAL

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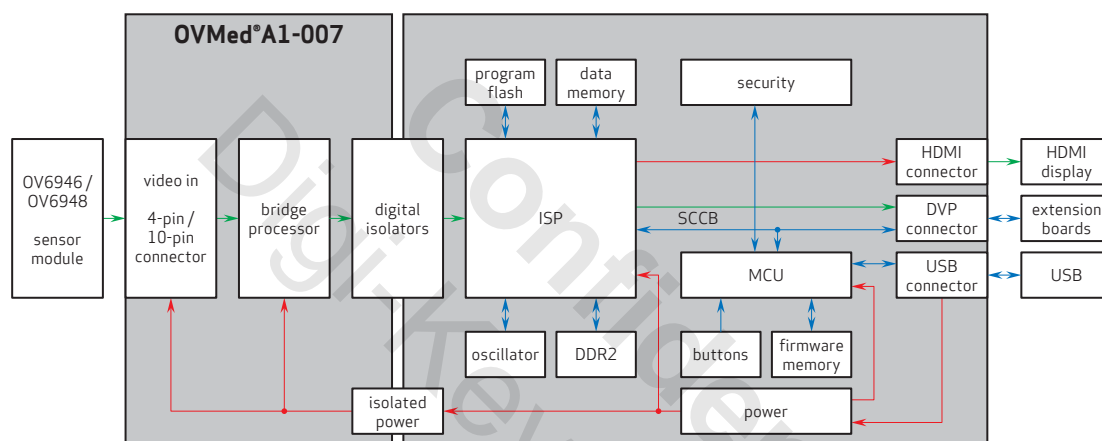
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1 overview

1.1 introduction

The OVMed®-A1 is a high quality image output board with a stand-alone ISP SoC. It integrates a high-performance ISP DSP solution, analog-digital converter, and support connection with host device for medical applications.

figure 1-1 OVMed-A1 DVP system diagram



It has one DVP port to output a video stream. The OVMed-A1 DVP has eight buttons to control the image effect, which can be controlled through SCCB command and the configure tool. When changing the image effect, the changes will be saved to the board.

When the OVMed-A1 DVP is rebooted, the image effect will be the same as the last time.

The OVMed-A1 DVP board is shown in **figure 1-2**.

figure 1-2 OVMed-A1 DVP board

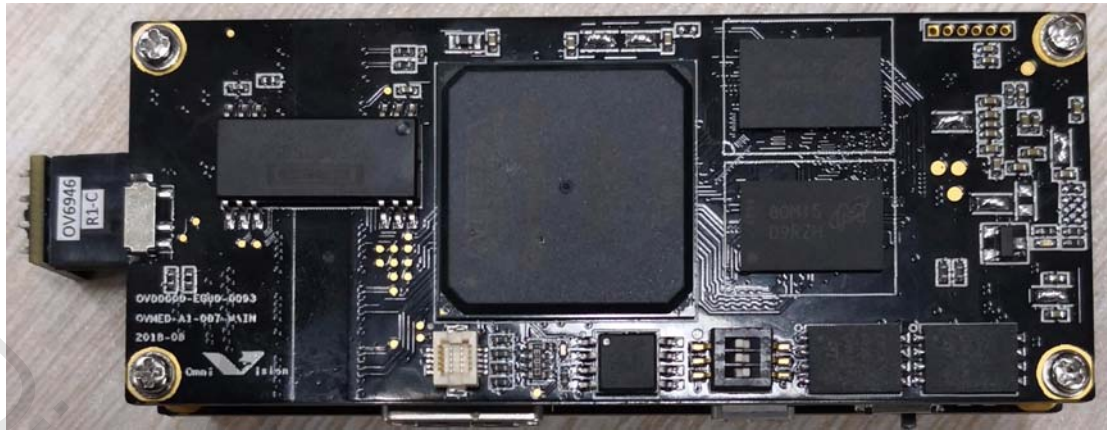


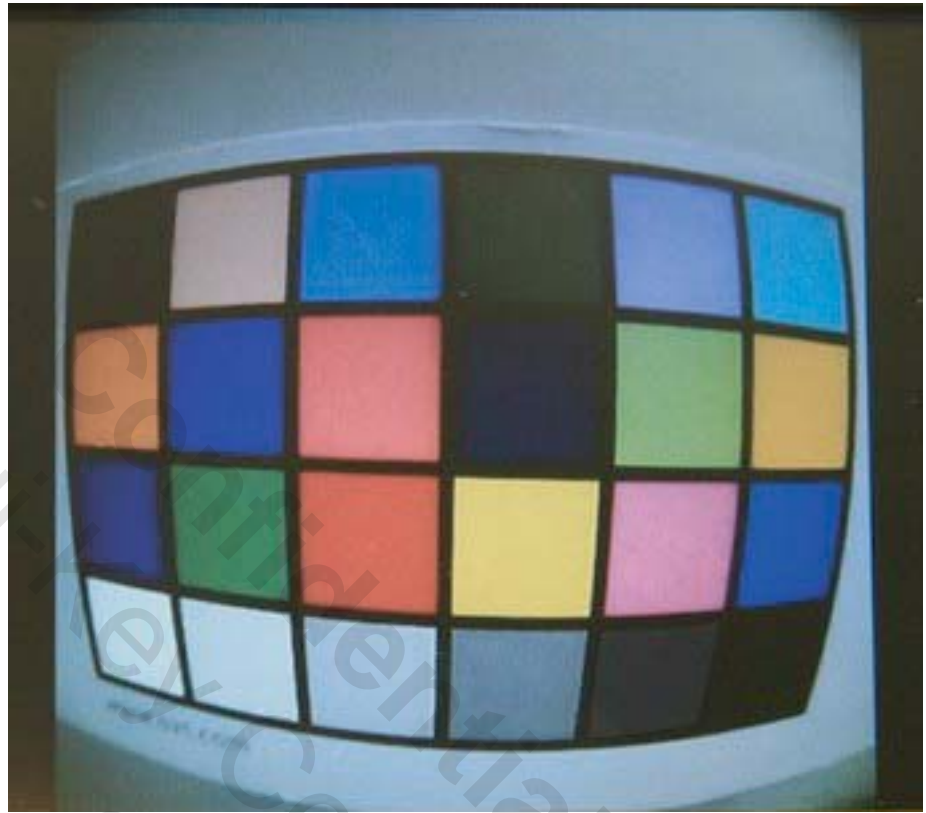
figure 1-3 image of fingerprint



figure 1-4 image output through OVMed-A1 DVP port



figure 1-5 image of color checker



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1.2 ordering information

Part number: OH00000-EG02-1A-0093

1.3 OVMed-A1 DVP package contents

The box of the OVMed-A1 DVP will contain the following items:

- OVMed-A1 DVP main board
- USB cable
- USB power adapter
- DVP cable
- CD-ROM

1.4 OVMed-A1 DVP requirements

To retrieve the video stream on the monitor through the DVP port, a monitor with an HDMI port must be configured. It is recommended to use 1280 x 720 resolution for the monitor.

figure 1-6 DVP connection



1.5 safety warnings

1.5.1 electrostatic discharge

This device must be installed on a properly grounded ESD protection surface to avoid damage to the components. A properly grounded ESD wrist strap must be worn during operation/installation of the device, or connection of cables.

1.5.2 input voltage

The input voltage of device is 5V. Please select the appropriate adapter to avoid damage to the components.

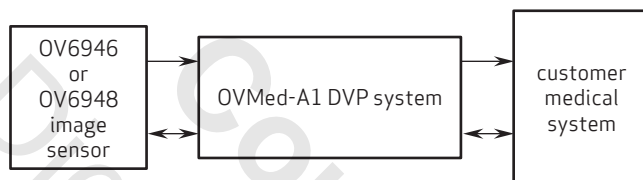
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2 system description

2.1 overview

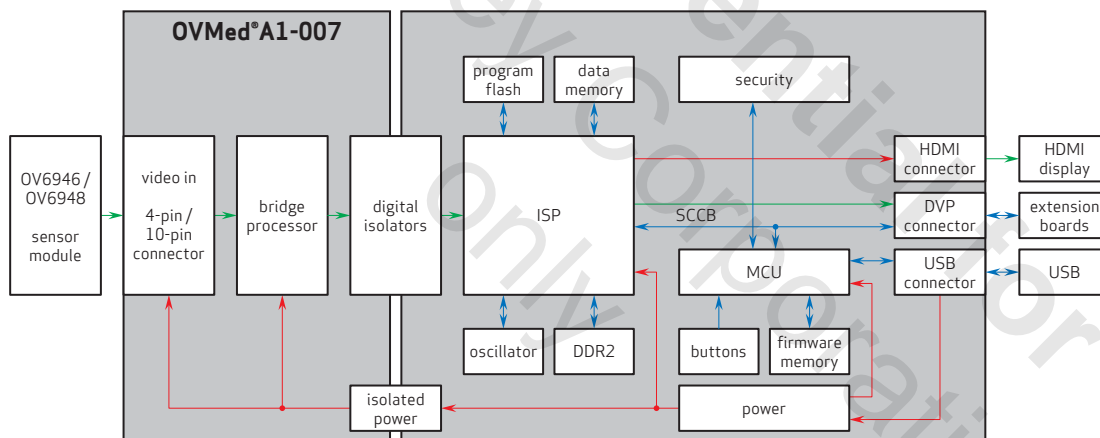
The OVMed-A1 DVP system is a single board solution for medical applications. It supports two sensors, OV6949 and OV6948, when combined with the sensor, it provides analog data and the OVMed-A1 DVP system provides digital data as shown in **figure 2-1**.

figure 2-1 system block diagram



2.2 functional block description

figure 2-2 OVMed-A1 DVP system function block



As shown in **figure 2-2**, during operation, the bridge processor in the OVMed-A1 DVP system synchronizes the analog output from the OV6946/OV6948 by a predefined communication protocol and provides an integrated analog-to-digital data conversion using a built-in A/D converter (ADC). The generated digital signals will then be processed by an image signal processor (ISP). Then finally, standard DVP outputs are sent out through the DVP transmitter.

2.2.1 video in 4-pin/6-pin connector

The current OVMed-A1 DVP supports both OV6946 (size 400x400) and OV6948 (size 200x200) image sensor input and can auto detect the sensor type.

2.2.2 digital isolators

Digital isolators are used to isolate the signal.

2.2.3 bridge processor

The bridge processor in the OVMed-A1 DVP system synchronizes the analog output from the sensor by a predefined communication protocol and provides an integrated analog-to-digital data conversion using a built-in A/D converter (ADC). The output of the bridge processor is standard DVP signals and will be sent to the ISP of the OVMed-A1 DVP system for further process.

2.2.4 ISP

The image signal processor (ISP) is used to process the digital image signals generated by the bridge processor. The ISP has its own data-memory and security module.

2.2.5 MCU

The micro-controller unit (MCU) is used to control the OVMed-A1 DVP system and is in charge of processing host commands from the host SCCB through the SCCB port. It outputs a debug log through the UART port. The MCU has its own flash and firmware memory.

2.2.6 DVP connector

The DVP connector for the OVMed-A1 DVP system is used to connect the DVP transmitter to the DVP Rx of customer's platform. The pixel clock is 80 MHz. Operation is controlled via the SCCB interface and the system is considered to be the SCCB slave when the user writes or reads the registers of the OVMed-A1 DVP. The SCCB slave ID is 0x2D. The host SCCB used must be a SCCB master.

2.2.7 USB port

The USB port is used to supply power to the OVMed-A1 DVP.

2.2.8 data memory

Data memory is used to process image data by ISP.

2.2.9 security IC

The security module is used by MCU for authorization.

2.2.10 firmware memory

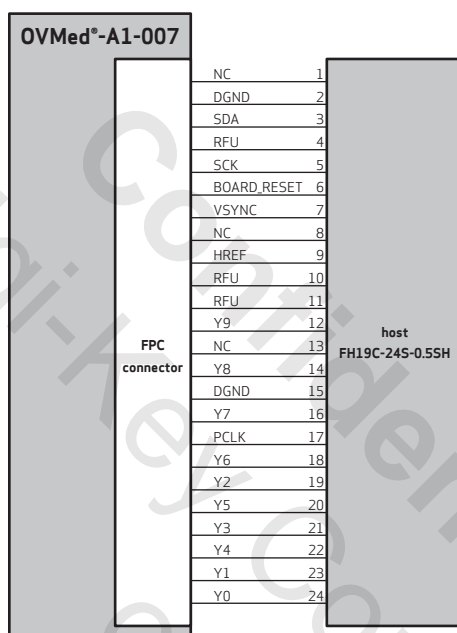
The flash is used to store the firmware of MCU.

3 hardware description

3.1 hardware mode switches

The interface definition of the OVMed-A1 DVP board as shown in **figure 3-1**.

figure 3-1 OVMed-A1 DVP interface definition



The pin descriptions are shown in **table 3-1**.

table 3-1 board pin description^a (sheet 1 of 2)

pin	net	definition
1	NC	NC
2	DGND	digital ground
3	SDA	I2C data
4	RFU	reserved DC-5V
5	SCK	I2C clock
6	BOARD_RESET	reset (active low)

table 3-1 board pin description^a (sheet 2 of 2)

pin	net	definition
7	VSYNC	vertical sync
8	NC	NC
9	HREF	horizontal reference
10	RFU	reserved DC-5V
11	RFU	reserved DC-5V
12	Y9	DVP output data 9
13	NC	NC
14	Y8	DVP output data 8
15	DGND	digital ground
16	Y7	DVP output data 7
17	PCLK	pixel clock
18	Y6	DVP output data 6
19	Y2	DVP output data 2
20	Y5	DVP output data 5
21	Y3	DVP output data 3
22	Y4	DVP output data 4
23	Y1	DVP output data 1
24	Y0	DVP output data 0

a. RFU is reserved for DC-5V

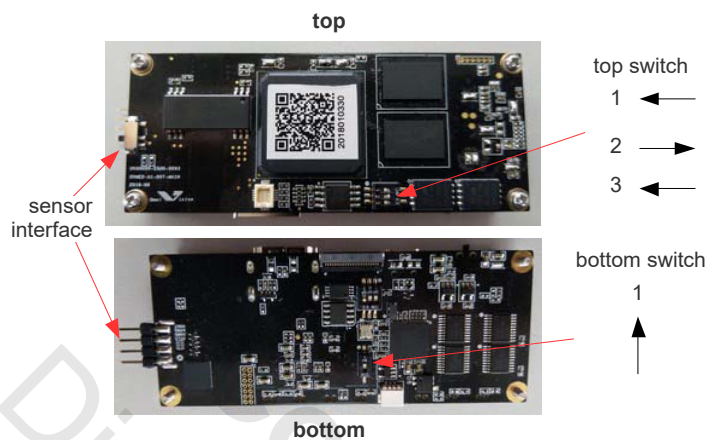
The length of the FPC cable that connects the OVMed-A1 DVP to the host board should be less than 3 cm. The SCCB bus of the host board must pull-up to 3.3V. The pull-up resistor should be 2k~4.7k. The OVMed-A1 DVP and host board should be powered together. The host must wait until the SCCB is stable before sending a SCCB command to the OVMed-A1 DVP. The host board must have four DGND location holes. It is recommend that the holes be connected to the OVMed-A1 DVP by double-screw bolts.

3.2 hardware mode switches

The OVMed-A1 DVP work mode is controlled by hardware mode switches.

When switching to OVMed-A1 DVP mode, keep the hardware mode switches in DVP mode as shown in [figure 3-2](#).

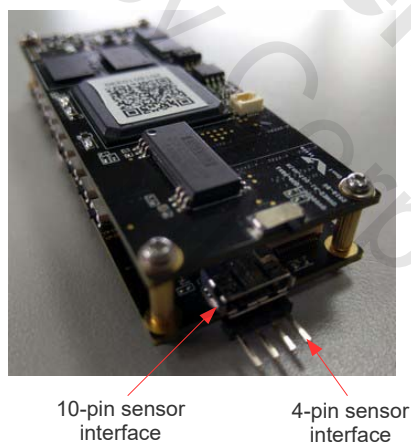
figure 3-2 hardware switches for HDMI mode



3.3 sensor interface

There are two sensor interfaces: 4-pin sensor interface and 10-pin sensor interface as shown in figure 3-3.

figure 3-3 sensor interface positions



The pin definitions are shown in table 3-2 and table 3-3.

table 3-2 4-pin sensor interface definitions

pin	definition
1	VOUT
2	AVDD
3	AGND
4	sensor clock

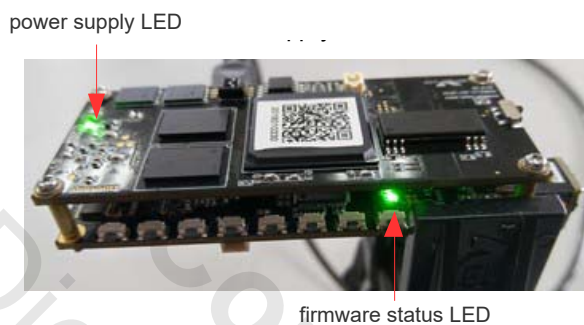
table 3-3 10-pin sensor interface definitions

pin	definition
1	sensor clock
2	SIOC
3	AGND
4	SIOD (when R484 is mounted)
5	sensor DOVDD (3.3V) (when R483 is mounted)
6	sensor DGND (when R485 is mounted)
7	AVDD
8	LED_P (connected to isolated 5V)
9	VOUT
10	LED_PWM_TRI (controlled by PWM wave from FPGA via a triode; it is isolated from FPGA)

3.4 LED

The OVMed-A1 DVP board has two LEDs: power supply and software status as shown in **figure 3-4**.

figure 3-4 position and definition of LEDs



When the power supply is connected and power switch is turned on, the LED of power supply will be lit.

When the OVMed-A1 DVP board is in the initialization process, the LED of firmware status will remain lit. When the initialization process of the OVMed-A1 DVP board is complete and if the sensor is plugged in, the firmware status LED will remain off with periodic double blinks; otherwise, the firmware status LED will remain lit with periodic double blinks.

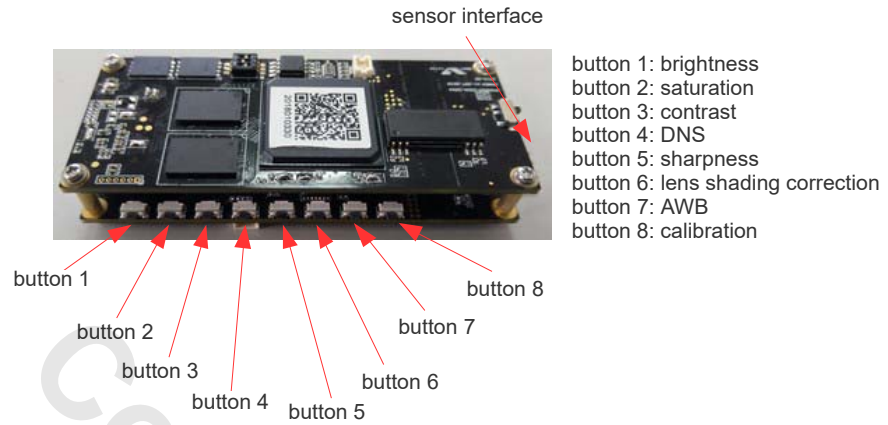
If the firmware LED continues to single blink after initialization, please check the hardware mode switches (see **section 3.1**).

3.5 buttons

The OVMed-A1 DVP board has eight buttons as shown in **figure 3-5**.

The buttons' functions can be changed using the configure tool. For more details, please refer to the documents about the OVMed-A1 DVP configure tool.

figure 3-5 position and definition of buttons



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4 SCCB protocol

The host can access the registers through the SCCB interface to control OVMed-A1 DVP. The data transfer of the OVMed-A1 DVP follows the SCCB protocol.

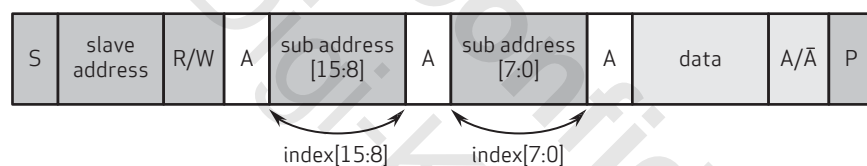
4.1 SCCB message type

The OVMed-A1 DVP supports the message format shown in **figure 4-1**.

The 7-bit address of OVMed-A1 DVP is 0x2D. The maximum SCCB clock is 400K/bs.

figure 4-1 message type

message type: 16-bit sub-address, 8-bit data, and 7-bit slave address



from slave to master

from master to slave

direction depends on operation

S START condition

P STOP condition

Sr repeated START condition

A acknowledge

\bar{A} negative acknowledge

4.2 output image

The output formats that the OH00000-EG02-1A-0093 supports are shown in **table 4-1**. The default format of the DVP output is YUV422.

table 4-1 DVP supported formats

format	resolution	frame rate	pixel clock
YUV422 (OV6946)	400x400	30 fps	80 MBps
YUV422 (OV6948)	200x200	30 fps	80 MBps

4.3 DVP timing

figure 4-2 DVP YUV422 timing diagram

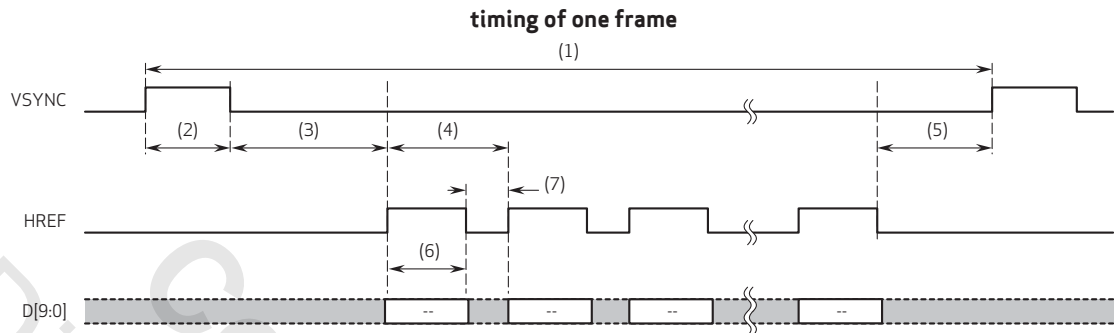


table 4-2 DVP YUV422 timing specifications

resolution	frame rate	timing
400x400 YUYV (OV6946)	30 fps	line length (HTS) = (6) + (7) = 3150 x PCLK
		(1) 2,666,666 x PCLK
		(2) 272 x PCLK
		(3) 313,600 x PCLK
		(4) 3,150 x PCLK
		(5) 84,800 x PCLK
		(6) 1,440 x PCLK
(7) 1,710 x PCLK		
200x200 YUYV (OV6948)	30 fps	line length (HTS) = (6) + (7) = 3182 x PCLK
		(1) 2,666,666 x PCLK
		(2) 262 x PCLK
		(3) 1,328,000 x PCLK
		(4) 3,182 x PCLK
		(5) 65,600 x PCLK
		(6) 800 x PCLK
(7) 2,382 x PCLK		

5 host commands

5.1 registers

The OVMed-A1 DVP system defines the control registers below. The host can control image effects settings using the SCCB registers. The HDMI mode's SCCB ID of OVMed-A1 DVP is 7'b0101100 (7 bits of binary).

Refer to **table 5-1** for registers definition.

table 5-1 OVMed-A1 DVP board SCCB register definitions

address	register name	function
0x2853	OVMED_HOSTCOMMAND_TRIGGER	To set host command ID and trigger OVMed-A1 DVP system to process host command
0x2854	OVMED_PARAMETER_NUMBER	Parameters' length of OVMed-A1 DVP host command
0x2855	OVMED_PARAMETER_DATA_LOW	Low byte of OVMed-A1 DVP host command's parameters
0x2856	OVMED_PARAMETER_DATA_HIGH	High byte of OVMed-A1 DVP host command's parameters
0x2857	OVMED_STATUS_ADDR	To check host command's status or boot status of OVMed-A1 DVP system

5.2 BOOT

The host must check the firmware running stage status (OVMED_STATUS_ADDR) and only if the value is STATUS_INIT_DONE, then it can begin to send host command to the OVMed-A1 DVP.

table 5-2 shows the value of register OVMED_STATUS_ADDR, which will occur when the OVMed-A1 DVP board boots.

STATUS_INIT_DONE, STATUS_ERROR_FPGABOOT, STATUS_ERROR_STREAM, and STATUS_ERROR_SETTING are special status.

The STATUS_ERROR_FPGABOOT means the board boot failed and the hardware must be checked.

Only after the host receives STATUS_INIT_DONE, the host can send a host command. But if the board is powered without the sensor, the status will show STATUS_ERROR_STREAM. In that case, all the host commands about image effects will return STATUS_ERRORCOMMANDID because the firmware cannot determine which sensor effect events should be used.

The STATUS_ERROR_SETTING means that the system cannot find the same sensor settings in setting file.

The user must plug-in an unsupported sensor.

table 5-2 OVMed-A1 DVP status value

status name	value	function
STATUS_IDLE	0x00	There is no host command processing and no error detected. Host needs to always set OVMED_STATUS_ADDR to STATUS_IDLE before sending new host command.
STATUS_ONGOING	0x01	OVMed-A1 DVP is processing host command.
STATUS_FINISHED	0x02	Host command has been finished and now host can send next command.
STATUS_INIT_DONE	0x56	Firmware boot up is successful and starts to run.
STATUS_ERRORPROC	0x80	Some error occurred during processing of host command.
STATUS_ERRORCOMMANDID	0x81	Host command ID is not supported.
STATUS_ERRORPARAMLEN	0x82	Length of parameter is not supported.
STATUS_ERRORPARAM	0x83	Parameter is not supported.
STATUS_ERROR_FPGABOOT	0xF0	FPGA failed to reboot.
STATUS_ERROR_STREAM	0xF1	There is something wrong with video stream.
STATUS_ERROR_SETTING	0xF2	There is something wrong with settings on OVMed-A1 DVP board

5.3 OVMed-A1 DVP host control

The OVMed-A1 DVP host control flows are shown in **figure 5-1** and **figure 5-2**.

figure 5-1 OVMed-A1 DVP host control set command flow chart

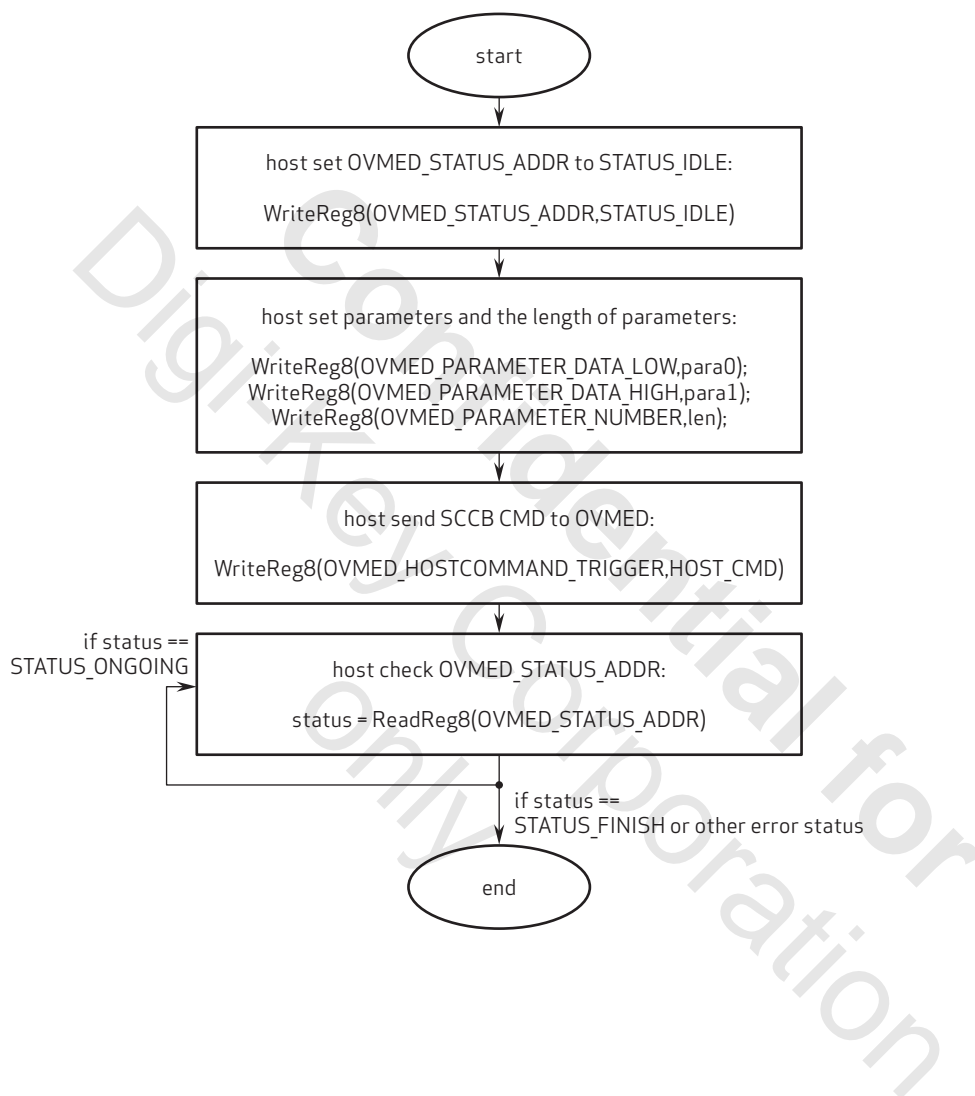
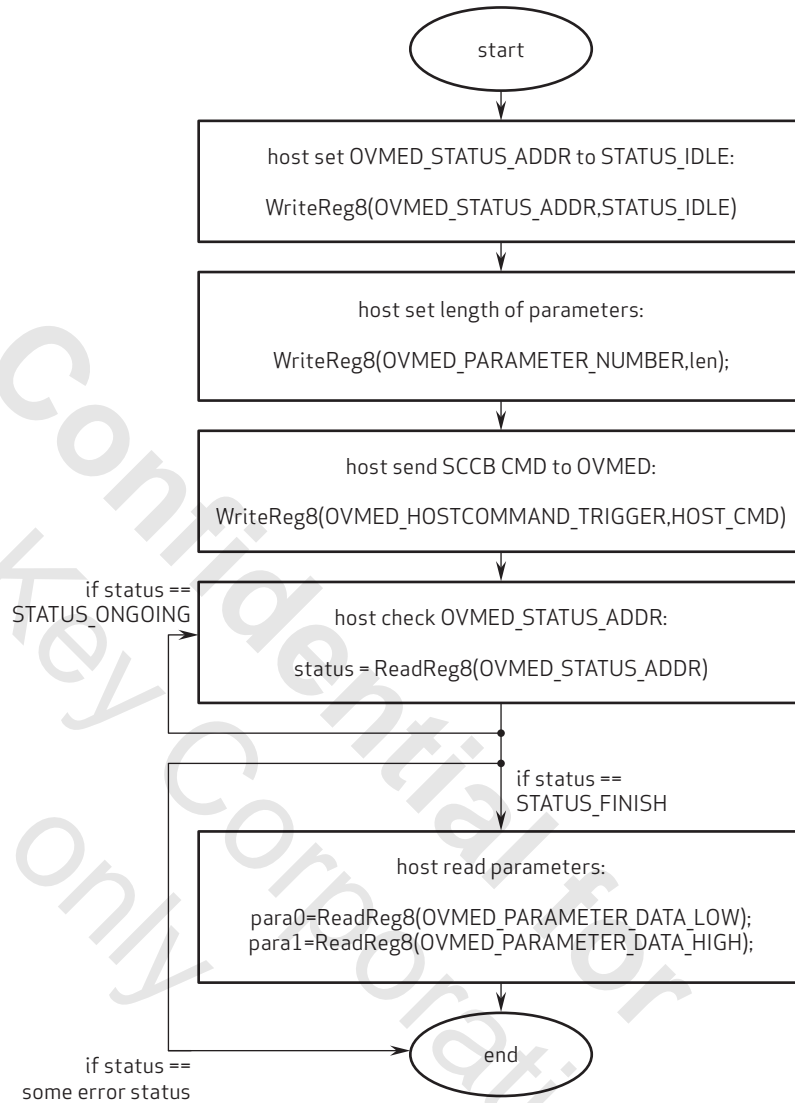


figure 5-2 OVMed-A1 DVP host control get command flow chart



5.3.1 host command example code

```

unsigned char HostControl_Set(unsigned char host_cmd, unsigned char* para, unsigned char
lenParam)
{
    unsigned char ret;

    //Host set OVMED_status_register to STATUS_IDLE;
    Sccb_Write8(OVMED_STATUS_ADDR, STATUS_IDLE);

    //Host set the length of parameter
    Sccb_Write8(OVMED_PARAMETER_NUMBER, lenParam);

    // Host write parameters to OVMED;
    Sccb_Write8(OVMED_PARAMETER_DATA_LOW, *para);
    if(lenParam>1)
    {
        Sccb_Write8(OVMED_PARAMETER_DATA_HIGH, *(para+1) );
    }

    //Host send SCCB CMD to OVMED to start task:
    Sccb_Write8(OVMED_HOSTCOMMAND_TRIGGER, host_cmd);

    // Host check OVMED_STATUS_ADDR to determine whether the task is finished or not
    while(1)
    {
        ret = Sccb_Read8(OVMED_STATUS_ADDR);
        if(ret == STATUS_FINISH)
        {
            break;
        }
        else if(ret >= STATUS_ERRORPROC || ret == STATUS_INIT_DONE)
        {
            return ret;
        }
        else
        {
            // if task is not finished, wait n ms;
            wait(n);
        }
    }

    return 0;
}

unsigned char HostControl_Get(unsigned char host_cmd, unsigned char* para, unsigned char
lenParam)

```

```

{
    unsigned char ret;

    //Host reset  OVMED_STATUS_ADDR
    Sccb_Write8(OVMED_STATUS_ADDR, STATUS_IDLE);

    //Host set the length of parameter
    Sccb_Write8(OVMED_PARAMETER_NUMBER, lenParam);

    //Host send Sccb CMD to OVMED to start task:
    Sccb_Write8(OVMED_HOSTCOMMAND_TRIGGER, host_cmd);

    // Host check OVMED_STATUS_ADDR to determine whether the task is finished or not
    while(1)
    {
        ret = Sccb_Read8(OVMED_STATUS_ADDR);
        if(ret == STATUS_FINISH)
        {
            break;
        }
        else if(ret >= STATUS_ERRORPROC || ret == STATUS_INIT_DONE)
        {
            return ret;
        }
        else
        {
            // if task is not finished, wait n ms;
            wait(n);
        }
    }

    // Host read results from OVMED;
    if( lenParam)
    {
        *param = Sccb_Read8( OVMED_PARAMETER_DATA_LOW
    }

    if(lenParam>1)
    {
        *(para+1) = Sccb_Read8(OVMED_PARAMETER_DATA_HIGH);
    }

    return 0;
}

```

5.4 SCCB host commands

Each OVMed-A1 DVP host command includes eight bits as shown in [table 5-3](#).

table 5-3 8-bit host command description

bit	description
Bit[7]	R/W Identifier 0: Read 1: Write
Bit[6:5]	Process Identifier 00: Application command 01: Current level command 10: Default level command 11: Level number command
Bit[4:0]	Event Identifier

The command ID value 0x00 is used as none and the parameter value 0xFFFF is used as none.

The host commands that have a level number command in the process identifier only support read process.

5.4.1 application class commands

To use application class commands, the host needs to set process identifier to application command (2'b00).

The supported event identifiers of application class commands are shown in [table 5-4](#).

table 5-4 event identifiers of application class commands (sheet 1 of 2)

name	command ID	R/W	param len	value range	default value	function
APPCMDID_REBOOT	0x02	W	0	NULL	NULL	To reboot OVMed-A1 DVP
APPCMDID_BOOTSPECIFIC	0x03	W	1	0~4	NULL	To boot to specific mode
APPCMDID_GET_BOARDID	0x01	R	2	0x0007	0x0007	To get board ID
APPCMDID_GET_FWINFO_1	0x02	R	2	0x0000~0xFFFF	NULL	To get firmware version information
APPCMDID_GET_FWINFO_2	0x03	R	2	0x0000~0xFFFF	NULL	To get firmware version information
APPCMDID_GET_FWINFO_3	0x04	R	2	0x0000~0xFFFF	NULL	To get firmware version information

table 5-4 event identifiers of application class commands (sheet 2 of 2)

name	command ID	R/W	param len	value range	default value	function
APPCMDID_BUTTONLOCK	0x10	RW	2	0x0000~0x0001	0x0000	To control button process function
APPCMDID_FRESH_SETTING	0x11	W	0	NULL	NULL	To refresh setting for debug
APPCMDID_GET_SENSOR_TYPE	0x11	R	2	NULL	NULL	To get sensor type information
APPCMDID_SKIPSETTINGSAVE	0x12	RW	2	0x0000~0x0001	0x0000	To control setting change save function
APPCMDID_WB_RGAIN	0x13	RW	2	0x0400~0x0FFF	NULL	To control white balance RGain
APPCMDID_WB_GGAIN	0x14	RW	2	0x0400~0x0FFF	NULL	To control white balance GGain
APPCMDID_WB_BGAIN	0x15	RW	2	0x0400~0x0FFF	NULL	To control white balance BGain
APPCMDID_GET_BUTTON_STATUS	0x16	R	2	0x0000~0x00FF	NULL	To get button trigger status
APPCMDID_GET_ISP_INFO0	0x1F	R	2	0x0000~0xFFFF	NULL	To get ISP hardware information
APPCMDID_GET_ISP_INFO1	0x1E	R	2	0x0000~0xFFFF	NULL	To get ISP hardware information
APPCMDID_GET_ISP_INFO2	0x1D	R	2	0x0000~0xFFFF	NULL	To get ISP hardware information
APPCMDID_GET_ISP_INFO3	0x1C	R	2	0x0000~0xFFFF	NULL	To get ISP hardware information
APPCMDID_GET_ISP_INFO4	0x1B	R	2	0x0000~0xFFFF	NULL	To get ISP hardware information
APPCMDID_GET_VALID_EFFECT_INFO_HIGH	0x1A	R	2	0x0000~0xFFFF	NULL	To get valid effect flag information
APPCMDID_GET_VALID_EFFECT_INFO_LOW	0x19	R	2	0x0000~0xFFFF	NULL	To get valid effect flag information

5.4.1.1 APPCMDID_REBOOT

APPCMDID_REBOOT command is a write-only command.

This event ID only supports 0x82 (0x80|0x00|0x02). This command does not need a parameter.

For example, when the host wants to reboot the OVMed-A1 DVP, it should use this command as follows:

```
HostControl_Set (0x82, NULL, 0);
```

5.4.1.2 APPCMDID_BOOTSPECIFIC

APPCMDID_BOOTSPECIFIC command is a write-only command.

This event ID only supports 0x83 (0x80|0x00|0x03). This command needs one parameter:

- 0: Bootloader
- 1: USB
- 2: HDMI
- 3: DVP

For example, when the host wants to switch the OVMed-A1 DVP to bootloader mode, it should use this command as follows:

```
unsigned char param[2];
param[0]=0x00;
HostControl_Set (0x82, param, 1);
```

5.4.1.3 APPCMDID_GET_BoardID

APPCMDID_GET_BoardID command is a read-only command.

This event ID only supports 0x01(0x00|0x00|0x01). This command returns two bytes' parameters, which is always 0x0007 for the OVMed-A1 DVP.

For example, when the host wants to get the OVMed-A1 DVP board ID information, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get (0x01, param, 2);
```

5.4.1.4 APPCMDID_GET_FWINFO_1/APPCMDID_GET_FWINFO_2/APPCMDID_GET_FWINFO_3

APPCMDID_GET_FWINFO_1, APPCMDID_GET_FWINFO_2, and APPCMDID_GET_FWINFO_3 host commands are read-only commands.

These event IDs only support 0x02 (0x00|0x00|0x02) for APPCMDID_GET_FWINFO_1, 0x03 (0x00|0x00|0x03) for APPCMDID_GET_FWINFO_2, and 0x04 (0x00|0x00|0x04) for APPCMDID_GET_FWINFO_3. These commands return two bytes' parameters.

For example, when the host wants to get the firmware version information of the OVMed-A1 DVP, it should use this command as follows:

```

unsigned char param[6];
HostControl_Get (0x02, &param[0], 2);
HostControl_Get (0x03, &param[2], 2);
HostControl_Get (0x04, &param[4], 2);

```

After that, param[0], param[1], param[2] is the firmware version for the OVMed-A1 DVP. If the current firmware version is v1.2.3, then param[0] should be 0x01, param[1] should be 0x02, and param[2] should be 0x03.

The other bytes are for internal use only.

5.4.1.5 APPCMDID_BUTTONLOCK

APPCMDID_BUTTONLOCK command is a R/W command.

This event ID supports 0x10 (0x00|0x00|0x10) for getting button lock status and 0x90 (0x80|0x00|0x10) for setting button lock status. This command needs two bytes' parameters:

- 0x0000: Board will process button event
- 0x0001: Board will not process button event

For example, when the host wants to get the button lock status of the OVMed-A1 DVP, it should use this command as follows:

```

unsigned char param[2];
HostControl_Get (0x90, param, 2);

```

When the host wants to stop the OVMed-A1 DVP from processing a button event, it should use this command as follows:

```

unsigned char param[2];
param[0]=0x01;
param[1]=0x00;
HostControl_Set (0x10, param, 2);

```

5.4.1.6 APPCMDID_FRESH_SETTING (for internal use)

APPCMDID_FRESH_SETTING command is a write-only command.

This event ID only supports 0x91 (0x80|0x00|0x11). This command does not need a parameter.

For example, when the host wants to refresh the OVMed-A1 DVP setting file, it should use this command as follows:

```

HostControl_Set (0x91, NULL, 0);

```

5.4.1.7 APPCMDID_GET_SENSOR_TYPE

APPCMDID_GET_SENSOR_TYPE command is a read-only command.

This event ID only supports 0x11 (0x00|0x00|0x11). This command returns two bytes' parameters which is always 0x0007 for the OVMed-A1 DVP.

For example, when the host wants to get the current sensor type of the OVMed-A1 DVP, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x11,param,2);
```

If the current connected sensor is the OV6946, after that process, param[0] should be 0x69 and param[1] should be 0x46.

5.4.1.8 APPCMDID_SKIPSETTINGSAVE

APPCMDID_SKIPSETTINGSAVE command is a R/W command.

This event ID supports 0x12 (0x00|0x00|0x12) for getting skip-setting-save status and 0x92 (0x80|0x00|0x12) for skip-setting-save status. This command needs two bytes' parameters:

- 0x0000: Board will save the changes about image effect
- 0x0001: Board will not save any changes about image effect

For example, when the host wants to get the skip-setting-save status of the OVMed-A1 DVP, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x92,param,2);
```

When the host wants to stop the OVMed-A1 DVP from saving any changes from the image effects, it should use this command as follows:

```
unsigned char param[2];
param[0]=0x01;
param[1]=0x00;
HostControl_Set(0x12,param,2);
```

5.4.1.9 APPCMDID_WB_RGAIN/APPCMDID_WB_GGAIN/APPCMDID_WB_BGAIN

APPCMDID_WB_RGAIN, APPCMDID_WB_GGAIN, and APPCMDID_WB_BGAIN are used to set/get the R/G/B gain of the white balance if the white balance is set to manual mode.

These event IDs support 0x13 (0x00|0x00|0x13) for getting the R gain of the white balance and 0x93 (0x80|0x00|0x13) for setting the R gain of the white balance; 0x14 (0x00|0x00|0x14) for getting the G gain of the white balance and 0x94 (0x80|0x00|0x14) for setting the G gain of the white balance; 0x15 (0x00|0x00|0x15) for getting the B gain of the white balance and 0x95 (0x80|0x00|0x15) for setting the B gain of the white balance. This command needs two bytes' parameters whose range is [0x0400, 0x0FFF].

For example, when the host wants to get the current B gain of the OVMed-A1 DVP, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get (0x15, param, 2);
```

When the host wants to set the current B gain of the OVMed-A1 DVP to 0x412, it should use this command as follows:

```
unsigned char param[2];
param[0]=0x12;
param[1]=0x04;
HostControl_Set (0x95, param, 2);
```

5.4.1.10 APPCMDID_GET_BUTTON_STAT US

APPCMDID_GET_BUTTON_STAT US command is a read-only command which is used to get the current button trigger status after setting APPCMDID_BUTTONLOCK to 0x0001.

This event ID only supports 0x16 (0x00|0x00|0x16). This command returns two bytes' parameters.

For example, when the host wants to get the current button triggered status of the OVMed-A1 DVP, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get (0x16, param, 2);
```

After that, OVMed-A1 DVP[0] is the button trigger status. Bit[7:0] corresponds to button8-button1. The 1'b1 means this button is triggered.

5.4.1.11 APPCMDID_GET_ISP_INFO0/APPCMDID_GET_ISP_INFO1/APPCMDID_GET_ISP_INFO2/ APPCMDID_GET_ISP_INFO3/APPCMDID_GET_ISP_INFO4

APPCMDID_GET_ISP_INFO0, APPCMDID_GET_ISP_INFO1, APPCMDID_GET_ISP_INFO2, APPCMDID_GET_ISP_INFO3, and APPCMDID_GET_ISP_INFO4 are read-only commands, which are used to get the ISP version information for the OVMed-A1 DVP.

These event IDs support 0x1F (0x00|0x00|0x1F) for getting ISP information0, 0x1E (0x00|0x00|0x1E) for getting ISP information1, 0x1D (0x00|0x00|0x1D) for getting ISP information2, 0x1C (0x00|0x00|0x1C) for getting ISP information3, and 0x1B (0x00|0x00|0x1B) for getting ISP information4. These commands return two parameters.

For example, when the host wants to get the ISP version information of the OVMed-A1 DVP, it should use this command as follows:

```
unsigned char param[10];
HostControl_Get(0x1F, &param[0], 2);
HostControl_Get(0x1E, &param[2], 2);
HostControl_Get(0x1D, &param[4], 2);
HostControl_Get(0x1C, &param[6], 2);
HostControl_Get(0x1B, &param[8], 2);
```

After that, param[4], param[5], param[6] is the ISP version of OVMedA1-007. If current ISP version is v1.2.3, then OVMed-A1 DVP[4] should be 0x01, OVMed-A1 DVP[5] should be 0x02, and param[6] should be 0x03.

The other bytes are for internal use only.

5.4.1.12 APPCMDID_GET_VALID_EFFECT_INF O_HIGH/APPCMDID_GET_VALID_EFFECT_INF O_LOW (for internal use)

APPCMDID_GET_VALID_EFFECT_INF O_HIGH and APPCMDID_GET_VALID_EFFECT_INF O_LOW are read-only commands who are used to get current valid effect flags.

These event IDs support 0x1A (0x00|0x00|0x1A) for getting the high two bytes of valid effect flags, 0x19 (0x00|0x00|0x19) for getting the low two bytes of valid effect flags. These commands return two parameters.

For example, when the host wants to get the ISP version information of the OVMed-A1 DVP, it should use this command as follows:

```
unsigned char param[4];
HostControl_Get(0x1A, &param[0], 2);
HostControl_Get(0x19, &param[2], 2);
```

5.4.2 image effect class commands

The process identifier of the image effect class commands supports current level command (2'b01), default level command (2'b10), and level number command (2'b11).

The supported event identifiers of the image effect class commands are shown in [table 5-5](#).

table 5-5 event identifiers of image effect class commands (sheet 1 of 2)

name	command ID	R/W	param len	value range	default value	function
IMGCMDID_LENC	0x00	RW	2/0	0~4	0	To set/get lens shading correction level
IMGCMDID_SHARPNESS	0x01	RW	2/0	0~4	2	To set/get sharpness level
IMGCMDID_DNS	0x02	RW	2/0	0~9	4	To set/get de-noise level

table 5-5 event identifiers of image effect class commands (sheet 2 of 2)

name	command ID	R/W	param len	value range	default value	function
IMGCMDID_CONTRAST	0x03	RW	2/0	0~6	4	To set/get contrast level
IMGCMDID_SATURATION	0x04	RW	2/0	0~8	2	To set/get saturation level
IMGCMDID_BRIGHTNESS	0x05	RW	2/0	0~16	11	To set/get brightness level
IMGCMDID_GAMMA	0x06	RW	2/0	0~10	6	To set/get gamma level
IMGCMDID_HGAIN1	0x11	RW	2/0	0	0	To set/get HGain1 level
IMGCMDID_HGAIN2	0x12	RW	2/0	0	0	To set/get HGain2 level
IMGCMDID_BLACKENHANCE	0x13	RW	2/0	0~1	0	To set/get black-enhance level
IMGCMDID_LIGHTMETERING	0x14	RW	2/0	0~7	4	To set/get light metering level
IMGCMDID_DPC	0x15	RW	2/0	0~7	0	To set/get DPC level
IMGCMDID_FPN	0x18	RW	2/0	0~2	1	To set/get FPN level
IMGCMDID_AWB	0x19	RW	2/0	0~2	0	To set/get AWB level

The value range and default value can be changed by our configure tool. For more information, please refer to the documents about the Configure Tool.

The host should always use a level number command and default level command in the process identifier to determine the value range and default level.

5.4.2.1 IMGCMDID_LENC

IMGCMDID_LENC command is a R/W command which is used to set/get lens shading correction level.

table 5-6 shows this event ID supported host command ID.

table 5-6 supported host commands of IMGCMDID_LENC (sheet 1 of 2)

status name	parameter length	function
0x20 (0x00 0x20 0x00)	2	To get current lens shading correction level
0xA0 (0x80 0x20 0x00)	2	To set current lens shading correction level
0x40 (0x00 0x40 0x00)	2	To get default lens shading correction level
0xC0 (0x80 0x40 0x00)	0	To set current lens shading correction level to default level

table 5-6 supported host commands of IMGCMDID_LENC (sheet 2 of 2)

status name	parameter length	function
0x60 (0x00 0x60 0x00)	2	To get level number of lens shading correction

The meaning of the two bytes' parameters are shown as follows:

- 0x0000: OV lens shading correction
- 0x0001: Chiyi lens shading correction
- 0x0002: FJK lens shading correction
- 0x0003: OVM lens shading correction
- 0x0004: FISBA lens shading correction

For example, when the host wants to get the current lens shading correction level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x20, param, 2);
```

When the host wants to set the current lens shading correction level to OV lens, it should use this command as follows:

```
unsigned char param[2];
param[0]=0x00;
param[1]=0x00;
HostControl_Set(0xA0, param, 2);
```

When the host wants to get the default lens shading correction level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x40, param, 2);
```

When the host wants to set the current lens shading correction level to default level, it should use this command as follows:

```
HostControl_Set(0xC0, NULL, 0);
```

When the host wants to get level number of lens shading correction levels, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x60, param, 2);
unsigned char maxLevel = (param[1]<<8) | param[0];
```

The parameter's range should be [0, maxLevel].

5.4.2.2 IMGCMDID_SHARPNESS

IMGCMDID_SHARPNESS command is a R/W command which is used to set/get sharpness level.

table 5-7 shows this event ID supported host command ID.

table 5-7 supported host commands of IMGCMDID_SHARPNESS

status name	parameter length	function
0x21 (0x00 0x20 0x01)	2	To get current sharpness level
0xA1 (0x80 0x20 0x01)	2	To set current sharpness level
0x41 (0x00 0x40 0x01)	2	To get default sharpness level
0xC1 (0x80 0x40 0x01)	0	To set current sharpness level to default level
0x61 (0x00 0x60 0x01)	2	To get level number of sharpness

The higher the level is, the higher the image sharpness will be.

For example, when the host wants to get the current sharpness level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get (0x21, param, 2);
```

When the host wants to set the current sharpness level to level-1, it should use this command as follows:

```
unsigned char param[2];
param[0]=0x01;
param[1]=0x00;
HostControl_Set (0xA1, param, 2);
```

When the host wants to get the default sharpness level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get (0x41, param, 2);
```

When the host wants to set the current sharpness level to default level, it should use this command as follows:

```
HostControl_Set (0xC1, NULL, 0);
```


When the host wants to get the level number of sharpness levels, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x61, param, 2);
unsigned char maxLevel = (param[1]<<8) | param[0];
```

The parameter's range should be [0, maxLevel].

5.4.2.3 IMGCMDDID_DNS

IMGCMDDID_DNS command is a R/W command which is used to set/get de-noise level.

table 5-8 shows this event ID supported host command ID.

table 5-8 supported host commands of IMGCMDDID_DNS

status name	parameter length	function
0x22 (0x00 0x20 0x02)	2	To get current DNS level
0xA2 (0x80 0x20 0x02)	2	To set current DNS level
0x42 (0x00 0x40 0x02)	2	To get default DNS level
0xC2 (0x80 0x40 0x02)	0	To set current DNS level to default level
0x62 (0x00 0x60 0x02)	2	To get level number of DNS

The higher the level is, the less the image noise will be.

For example, when the host wants to get current DNS level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x22, param, 2);
```

When the host wants to set the current DNS level to level-1, it should use this command as follows:

```
unsigned char param[2];
param[0]=0x01;
param[1]=0x00;
HostControl_Set(0xA2, param, 2);
```

When the host wants to get the default DNS level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x42, param, 2);
```

When the host wants to set the current DNS level to default level, it should use this command as follows:

```
HostControl_Set(0xC2, NULL, 0);
```

When the host wants to get the level number of DNS levels, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x62, param, 2);
unsigned char maxLevel = (param[1]<<8) | param[0];
```

The parameter's range should be [0, maxLevel].

5.4.2.4 IMGCMCID_CONTRAST

IMGCMCID_CONTRAST command is a R/W command which is used to set/get contrast level.

table 5-9 shows this event ID supported host command ID.

table 5-9 supported host commands of IMGCMCID_CONTRAST

status name	parameter length	function
0x23 (0x00 0x20 0x03)	2	To get current contrast level
0xA3 (0x80 0x20 0x03)	2	To set current contrast level
0x43 (0x00 0x40 0x03)	2	To get default contrast level
0xC3 (0x80 0x40 0x03)	0	To set current contrast level to default level
0x63 (0x00 0x60 0x03)	2	To get level number of contrast

The higher the level is, the higher the image contrast will be.

For example, when the host wants to get the current contrast level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x23, param, 2);
```

When the host wants to set the current contrast level to level-1, it should use this command as follows:

```
unsigned char param[2];
param[0]=0x01;
param[1]=0x00;
HostControl_Set(0xA3, param, 2);
```

When the host wants to get the default contrast level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x43, param, 2);
```

When the host wants to set the current contrast level to default level, it should use this command as follows:

```
HostControl_Set(0xC3, NULL, 0);
```

When the host wants to get the level number of contrast levels, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x62, param, 2);
unsigned char maxLevel = (param[1]<<8) | param[0];
```

The parameter's range should be [0, maxLevel].

5.4.2.5 IMGCMCID_SATURATION

IMGCMCID_SATURATION command is a R/W command which is used to set/get saturation level.

table 5-10 shows this event ID supported host command ID.

table 5-10 supported host commands of IMGCMCID_SATURATION

status name	parameter length	function
0x24 (0x00 0x20 0x04)	2	To get current saturation level
0xA4 (0x80 0x20 0x04)	2	To set current saturation level
0x44 (0x00 0x40 0x04)	2	To get default saturation level
0xC4 (0x80 0x40 0x04)	0	To set current saturation level to default level
0x64 (0x00 0x60 0x04)	2	To get level number of saturation

The higher the level is, the higher the image saturation will be.

For example, when the host wants to get the current saturation level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x24, param, 2);
```

When the host wants to set the current saturation level to level-1, it should use this command as follows:

```
unsigned char param[2];
param[0]=0x01;
param[1]=0x00;
HostControl_Set(0xA4, param, 2);
```

When the host wants to get the default saturation level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x44, param, 2);
```

When the host wants to set the current saturation level to default level, it should use this command as follows:

```
HostControl_Set(0xC4, NULL, 0);
```

When the host wants to get the level number of saturation levels, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x64, param, 2);
unsigned char maxLevel = (param[1]<<8) | param[0];
```

The parameter's range should be [0, maxLevel].

5.4.2.6 IMGCMCID_BRIGHTNESS

IMGCMCID_BRIGHTNESS command is a R/W command which is used to set/get brightness level.

table 5-11 shows this event ID supported host command ID.

table 5-11 supported host commands of IMGCMCID_BRIGHTNESS

status name	parameter length	function
0x25 (0x00 0x20 0x05)	2	To get current brightness level
0xA5 (0x80 0x20 0x05)	2	To set current brightness level
0x45 (0x00 0x40 0x05)	2	To get default brightness level
0xC5 (0x80 0x40 0x05)	0	To set current brightness level to default level
0x65 (0x00 0x60 0x05)	2	To get level number of brightness

The meaning of brightness levels is shown as follows:

- 0: Fixed level 0
- 1: Fixed level 1
- 2: Fixed level 2
- 3: Fixed level 3
- 4: Fixed level 4
- 5: Fixed level 5
- 6: Fixed level 6
- 7: Fixed level 7
- 8: Fixed level 8
- 9: Auto range3
- 10: Auto range2-1
- 11: Auto range2
- 12: Auto range2+1
- 13: Auto range1-1
- 14: Auto range1
- 15: Auto range1+1
- 16: Auto range

The levels 0~8 are fixed levels for debug only.

The other levels are auto control levels. The higher the level is, the higher the image brightness will be.

For example, when the host wants to get the current brightness level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x25,param,2);
```

When the host wants to set the current brightness level to Auto Range3, it should use this command as follows:

```
unsigned char param[2];
param[0]=0x09;
param[1]=0x00;
HostControl_Set(0xA5,param,2);
```

When the host wants to get the default brightness level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x45,param,2);
```

When the host wants to set the current brightness level to default level, it should use this command as follows:

```
HostControl_Set(0xC5,NULL,0);
```

When the host wants to get the level number of brightness levels, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x65,param,2);
unsigned char maxLevel = (param[1]<<8) | param[0];
```

The parameter's range should be [0, maxLevel].

5.4.2.7 IMGCMDID_GAMMA

IMGCMDID_GAMMA command is a R/W command which is used to set/get gamma level.

table 5-12 shows this event ID supported host command ID.

table 5-12 supported host commands of IMGCMDID_GAMMA

status name	parameter length	function
0x26 (0x00 0x20 0x06)	2	To get current gamma level
0xA6 (0x80 0x20 0x06)	2	To set current gamma level
0x46 (0x00 0x40 0x06)	2	To get default gamma level
0xC6 (0x80 0x40 0x06)	0	To set current gamma level to default level
0x66 (0x00 0x60 0x06)	2	To get level number of gamma

The meaning of gamma levels is shown as follows:

- 0: gamma 1.0 (off)
- 1: gamma 1.6
- 2: gamma 1.7
- 3: gamma 1.8
- 4: gamma 1.9
- 5: gamma 2.0
- 6: gamma 2.1
- 7: gamma 2.2
- 8: gamma 2.3
- 9: gamma 2.4
- 10: gamma 2.5

For example, when the host wants to get the current gamma level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get (0x26, param, 2);
```

When the host wants to set the current gamma level to gamma 2.0, it should use this command as follows:

```
unsigned char param[2];
param[0]=0x05;
param[1]=0x00;
HostControl_Set (0xA6, param, 2);
```

When the host wants to get the default gamma level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get (0x46, param, 2);
```

When the host wants to set the current gamma level to default level, it should use this command as follows:

```
HostControl_Set (0xC6, NULL, 0);
```

When the host wants to get the level number of gamma levels, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get (0x66, param, 2);
unsigned char maxLevel = (param[1]<<8) | param[0];
```

The parameter's range should be [0, maxLevel].

5.4.2.8 IMGCMCID_HGAIN1

IMGCMCID_HGAIN1 command is a R/W command which is used to set/get HGain1 level.

table 5-13 shows this event ID supported host command ID.

table 5-13 supported host commands of IMGCMCID_HGAIN1

status name	parameter length	function
0x31 (0x00 0x20 0x11)	2	To get current HGain1 level
0xB1 (0x80 0x20 0x11)	2	To set current HGain1 level
0x51 (0x00 0x40 0x11)	2	To get default HGain1 level
0xD1 (0x80 0x40 0x11)	0	To set current HGain1 level to default level
0x71 (0x00 0x60 0x11)	2	To get level number of HGain1

The higher the level is, the higher the image sharpness will be.

For example, when the host wants to get the current HGain1 level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x31, param, 2);
```

When the host wants to set the current HGain1 level to level-0, it should use this command as follows:

```
unsigned char param[2];
param[0]=0x00;
param[1]=0x00;
HostControl_Set(0xB1, param, 2);
```

When the host wants to get the default HGain1 level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x51, param, 2);
```

When the host wants to set the current HGain1 level to default level, it should use this command as follows:

```
HostControl_Set(0xD1, NULL, 0);
```

When the host wants to get the level number of HGain1 levels, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x71, param, 2);
unsigned char maxLevel = (param[1]<<8) | param[0];
```

The parameter's range should be [0, maxLevel].

5.4.2.9 IMGCMDID_HGAIN2

IMGCMDID_HGAIN2 command is a R/W command which is used to set/get HGain2 level.

table 5-14 shows this event ID supported host command ID.

table 5-14 supported host commands of IMGCMDID_HGAIN2

status name	parameter length	function
0x32 (0x00 0x20 0x12)	2	To get current HGain2 level
0xB2 (0x80 0x20 0x12)	2	To set current HGain2 level
0x52 (0x00 0x40 0x12)	2	To get default HGain2 level
0xD2 (0x80 0x40 0x12)	0	To set current HGain2 level to default level
0x72 (0x00 0x60 0x12)	2	To get level number of HGain2

The higher the level is, the higher the image sharpness will be.

For example, when the host wants to get the current HGain2 level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x32, param, 2);
```

When the host wants to set current the HGain2 level to level-0, it should use this command as follows:

```
unsigned char param[2];
param[0]=0x00;
param[1]=0x00;
HostControl_Set(0xB2, param, 2);
```

When the host wants to get the default HGain2 level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x52, param, 2);
```

When the host wants to set the current HGain2 level to default level, it should use this command as follows:

```
HostControl_Set(0xD2, NULL, 0);
```

When the host wants to get the level number of HGain2 levels, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x72, param, 2);
unsigned char maxLevel = (param[1]<<8) | param[0];
```

The parameter's range should be [0, maxLevel].

5.4.2.10 IMGCMDID_BLACKENHANCE

IMGCMDID_BLACKENHANCE command is a R/W command which is used to set/get black enhance level.

table 5-15 shows this event ID supported host command ID.

table 5-15 supported host commands of IMGCMDID_BLACKENHANCE

status name	parameter length	function
0x33 (0x00 0x20 0x13)	2	To get current black enhance level
0xB3 (0x80 0x20 0x13)	2	To set current black enhance level
0x53 (0x00 0x40 0x13)	2	To get default black enhance level
0xD3 (0x80 0x40 0x13)	0	To set current black enhance level to default level
0x73 (0x00 0x60 0x13)	2	To get level number of black enhance

The meaning of black enhance levels is shown as follows:

- 0: Black enhance off
- 1: Black enhance on

For example, when the host wants to get current black enhance level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x33, param, 2);
```

When the host wants to open black enhance function, it should use this command as follows:

```
unsigned char param[2];
param[0]=0x01;
param[1]=0x00;
HostControl_Set(0xB3, param, 2);
```

When the host wants to get default black enhance level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x53, param, 2);
```

When the host wants to set current black enhance level to default level, it should use this command as follows:

```
HostControl_Set(0xD3, NULL, 0);
```

When the host wants to get level number of black enhance levels, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x73, param, 2);
unsigned char maxLevel = (param[1]<<8) | param[0];
```

The parameter's range should be [0, maxLevel].

5.4.2.11 IMGCMCID_LIGHTMETERING

IMGCMCID_LIGHTMETERING command is a R/W command which is used to set/get light metering level.

table 5-16 shows this event ID supported host command ID.

table 5-16 supported host commands of IMGCMCID_LIGHTMETERING

status name	parameter length	function
0x34 (0x00 0x20 0x14)	2	To get current light metering level
0xB4 (0x80 0x20 0x14)	2	To set current light metering level
0x54 (0x00 0x40 0x14)	2	To get default light metering level
0xD4 (0x80 0x40 0x14)	0	To set current light metering level to default level
0x74 (0x00 0x60 0x14)	2	To get level number of light metering

The higher the level is, the higher the weight of image center will be.

For example, when the host wants to get the current light metering level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x34, param, 2);
```

When the host wants to set the current light metering level to level-1, it should use this command as follows:

```
unsigned char param[2];
param[0]=0x01;
param[1]=0x00;
HostControl_Set(0xB4, param, 2);
```

When the host wants to get the default light metering level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x54, param, 2);
```

When the host wants to set the current light metering level to default level, it should use this command as follows:

```
HostControl_Set(0xD4, NULL, 0);
```

When the host wants to get the level number of light metering levels, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x74, param, 2);
unsigned char maxLevel = (param[1]<<8) | param[0];
```

The parameter's range should be [0, maxLevel].

5.4.2.12 IMGCMDDID_DPC

IMGCMDDID_DPC command is a R/W command which is used to set/get defected pixel correction level.

table 5-17 shows this event ID supported host command ID.

table 5-17 supported host commands of IMGCMDDID_DPC

status name	parameter length	function
0x35 (0x00 0x20 0x15)	2	To get current defected pixel correction level
0xB5 (0x80 0x20 0x15)	2	To set current defected pixel correction level
0x55 (0x00 0x40 0x15)	2	To get default defected pixel correction level
0xD5 (0x80 0x40 0x15)	0	To set current defected pixel correction level to default level
0x75 (0x00 0x60 0x15)	2	To get level number of defected pixel correction

The higher the level is, the less the image defected pixel will be.

For example, when the host wants to get the current defected pixel correction level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get (0x35, param, 2);
```

When the host wants to set the current defected pixel correction level to level-1, it should use this command as follows:

```
unsigned char param[2];
param[0]=0x01;
param[1]=0x00;
HostControl_Set (0xB5, param, 2);
```

When the host wants to get the default defected pixel correction level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get (0x55, param, 2);
```

When the host wants to set the current defected pixel correction level to default level, it should use this command as follows:

```
HostControl_Set (0xD5, NULL, 0);
```

When the host wants to get the level number of defected pixel correction levels, it should use this command as follows:

```

unsigned char param[2];
HostControl_Get(0x75,param,2);
unsigned char maxLevel = (param[1]<<8) | param[0];
    
```

The parameter's range should be [0, maxLevel].

5.4.2.13 IMGCMCID_FPN

IMGCMCID_FPN command is a R/W command which is used to set/get FPN level.

table 5-18 shows this event ID supported host command ID.

table 5-18 supported host commands of IMGCMCID_FPN

status name	parameter length	function
0x38 (0x00 0x20 0x18)	2	To get current FPN level
0xB8 (0x80 0x20 0x18)	2	To set current FPN level
0x58 (0x00 0x40 0x18)	2	To get default FPN level
0xD8 (0x80 0x40 0x18)	0	To set current FPN level to default level
0x78 (0x00 0x60 0x18)	2	To get level number of FPN

The meaning of FPN levels is shown as follows:

- 0: FPN off
- 1: FPN on
- 2: FPN calibration

In order to recalibrate the FPN, a lens hood must be placed before the sensor lens first, then select level-2. After some time passes, the calibration will be finished, and the level will automatically be set to FPN on.

For example, when the host wants to get the current FPN level, it should use this command as follows:

```

unsigned char param[2];
HostControl_Get(0x38,param,2);
    
```

When the host wants to set the current FPN level to FPN on, it should use this command as follows:

```

unsigned char param[2];
param[0]=0x01;
param[1]=0x00;
HostControl_Set(0xB8,param,2);
    
```

When the host wants to get the default FPN level, it should use this command as follows:

```

unsigned char param[2];
HostControl_Get(0x58,param,2);
    
```

When the host wants to set the current FPN level to default level, it should use this command as follows:

```
HostControl_Set(0xD8, NULL, 0);
```

When the host wants to get the level number of FPN levels, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x78, param, 2);
unsigned char maxLevel = (param[1]<<8) | param[0];
```

The parameter's range should be [0, maxLevel].

5.4.2.14 IMGCMCID_AWB

IMGCMCID_AWB command is a R/W command which is used to set/get the white balance level.

table 5-19 shows this event ID supported host command ID.

table 5-19 supported host commands of IMGCMCID_AWB

status name	parameter length	function
0x39 (0x00 0x20 0x19)	2	To get current white balance level
0xB9 (0x80 0x20 0x19)	2	To set current white balance level
0x59 (0x00 0x40 0x19)	2	To get default white balance level
0xD9 (0x80 0x40 0x19)	0	To set current white balance level to default level
0x79 (0x00 0x60 0x19)	2	To get level number of white balance

The meaning of FPN levels is shown as follows:

- 0: WB manual mode
- 1: WB auto mode
- 2: WB calibration mode

In order to re-calibrate the white balance, a gray chart must be placed before the sensor with a well lit scene first, then select level-2. After some time passes, the calibration will be finished and the level will automatically be set to WB manual mode.

For example, when the host wants to get the current white balance level, it should use this command as follows:

```
unsigned char param[2];
HostControl_Get(0x39, param, 2);
```

When the host wants to set the current white balance level to WB auto mode, it should use this command as follows:

```
unsigned char param[2];
param[0]=0x01;
param[1]=0x00;
HostControl_Set(0xB9, param, 2);
```

When the host wants to get the default white balance level, it should use this command as follows:

```
unsigned char param[2];  
HostControl_Get(0x59,param,2);
```

When the host wants to set the current white balance level to default level, it should use this command as follows:

```
HostControl_Set(0xD9,NULL,0);
```

When the host wants to get the level number of white balance levels, it should use this command as follows:

```
unsigned char param[2];  
HostControl_Get(0x79,param,2);  
unsigned char maxLevel = (param[1]<<8) | param[0];
```

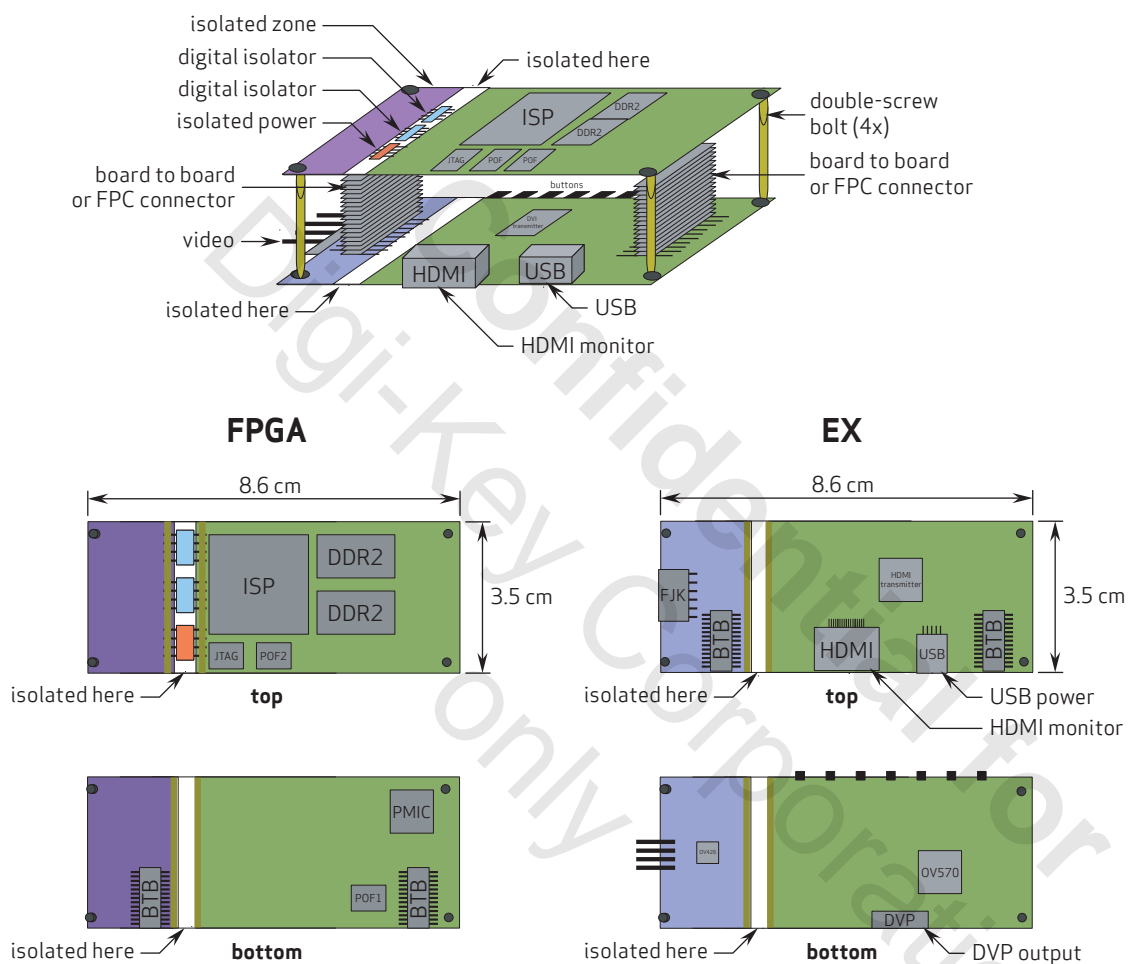
The parameter's range should be [0, maxLevel].

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appendix A mechanical outline

The physical outline and dimensions of the OVMed-A1 DVP is shown **figure A-1**.

figure A-1 OVMed-A1 DVP system mechanical outline



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appendix B sensor interface definitions

table B-1 4-pin sensor interface definitions

pin	definition
1	VOUT
2	AVDD
3	AGND
4	sensor clock

table B-2 10-pin sensor interface definitions

pin	definition
1	sensor clock
2	SIOC
3	AGND
4	SIOD (when R484 is mounted)
5	sensor DOVDD (3.3V) (when R483 is mounted)
6	sensor DGND (when R485 is mounted)
7	AVDD
8	LED_P (connected to isolated 5V)
9	VOUT
10	LED_PWM_TRI (controlled by PWM wave from FPGA via a triode; it is isolated from FPGA)

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appendix C event identifiers of application class commands

table C-1 event identifiers of application class commands (sheet 1 of 2)

name	command ID	R/W	param len	value range	default value	function
APPCMDID_REBOOT	0x02	W	0	NULL	NULL	To reboot OVMed-A1 DVP
APPCMDID_BOOTSPECIFIC	0x03	W	1	0~4	NULL	To boot to specific mode
APPCMDID_GET_BOARDID	0x01	R	2	0x0007	0x0007	To get board ID
APPCMDID_GET_FWINFO_1	0x02	R	2	0x0000~0xFFFF	NULL	To get firmware version information
APPCMDID_GET_FWINFO_2	0x03	R	2	0x0000~0xFFFF	NULL	To get firmware version information
APPCMDID_GET_FWINFO_3	0x04	R	2	0x0000~0xFFFF	NULL	To get firmware version information
APPCMDID_BUTTONLOCK	0x10	RW	2	0x0000~0x0001	0x0000	To control button process function
APPCMDID_FRESH_SETTING	0x11	W	0	NULL	NULL	To refresh setting for debug
APPCMDID_GET_SENSOR_TYPE	0x11	R	2	NULL	NULL	To get sensor type information
APPCMDID_SKIPSETTINGSAVE	0x12	RW	2	0x0000~0x0001	0x0000	To control setting change save function
APPCMDID_WB_RGAIN	0x13	RW	2	0x0400~0x0FFF	NULL	To control white balance GGain
APPCMDID_WB_GGAIN	0x14	RW	2	0x0400~0x0FFF	NULL	To control white balance GGain
APPCMDID_WB_BGAIN	0x15	RW	2	0x0400~0x0FFF	NULL	To control white balance BGain
APPCMDID_GET_BUTTON_STATUS	0x16	R	2	0x0000~0x00FF	NULL	To get button trigger status
APPCMDID_GET_ISP_INFO0	0x1F	R	2	0x0000~0xFFFF	NULL	To get ISP hardware information
APPCMDID_GET_ISP_INFO1	0x1E	R	2	0x0000~0xFFFF	NULL	To get ISP hardware information
APPCMDID_GET_ISP_INFO2	0x1D	R	2	0x0000~0xFFFF	NULL	To get ISP hardware information

table C-1 event identifiers of application class commands (sheet 2 of 2)

name	command ID	R/W	param len	value range	default value	function
APPCMDID_GET_ISP_INFO3	0x1C	R	2	0x0000~0xFFFF	NULL	To get ISP hardware information
APPCMDID_GET_ISP_INFO4	0x1B	R	2	0x0000~0xFFFF	NULL	To get ISP hardware information
APPCMDID_GET_VALID_EFFECT_INFO_HIGH	0x1A	R	2	0x0000~0xFFFF	NULL	To get valid effect flag information
APPCMDID_GET_VALID_EFFECT_INFO_LOW	0x19	R	2	0x0000~0xFFFF	NULL	To get valid effect flag information

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appendix D event identifiers of image effect class commands

table D-1 event identifiers of image effect class commands

name	command ID	R/W	param len	value range	default value	function
IMGCMDID_LENC	0x00	RW	2/0	0~4	0	To set/get lens shading correction level
IMGCMDID_SHARPNESS	0x01	RW	2/0	0~4	2	To set/get sharpness level
IMGCMDID_DNS	0x02	RW	2/0	0~9	4	To set/get de-noise level
IMGCMDID_CONTRAST	0x03	RW	2/0	0~6	4	To set/get contrast level
IMGCMDID_SATURATION	0x04	RW	2/0	0~8	2	To set/get saturation level
IMGCMDID_BRIGHTNESS	0x05	RW	2/0	0~16	11	To set/get brightness level
IMGCMDID_GAMMA	0x06	RW	2/0	0~10	6	To set/get gamma level
IMGCMDID_HGAIN1	0x11	RW	2/0	0	0	To set/get HGain1 level
IMGCMDID_HGAIN2	0x12	RW	2/0	0	0	To set/get HGain2 level
IMGCMDID_BLACKENHANCE	0x13	RW	2/0	0~1	0	To set/get black-enhance level
IMGCMDID_LIGHTMETERING	0x14	RW	2/0	0~7	4	To set/get light metering level
IMGCMDID_DPC	0x15	RW	2/0	0~7	0	To set/get DPC level
IMGCMDID_FPN	0x18	RW	2/0	0~2	1	To set/get FPN level
IMGCMDID_AWB	0x19	RW	2/0	0~2	0	To set/get AWB level

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appendix E other characteristics

table E-1 operating and storage conditions

parameter	specification
operating temperature	0°C to 70°C
storage temperature	-20°C to 80°C
relative humidity	5% to 95%, non-condensing

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appendix F test standards

table F-1 OVMed-A1 DVP system test standards

test	standards
electrostatic discharge	EN/IEC 61000-4-2
external disturbance experiment	
conducted emission	GB/T 9254-2008 EN55011:2007/ EN55022 GB/T24338.4-2009/IEC62236-3:2003
radiated emission	EN/IEC 61326-1-2
radio frequency induced conduction harassment	
power port noise immunity	GB/T17626.6-2006 GB/T24338.4-2009 GB/T24338.5-2009
device port noise immunity	GB/T17626.6-2006 GB/T24338.4-2009 GB/T24338.5-2010
high temperature test	
low temperature test	
high temperature to reboot	
low temperature to reboot	
drop test	

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revision history

version 1.0 04.26.2019

- initial release

version 1.01 08.02.2019

- on cover, changed product name in title to OVMed-A1 DVP (OH00000-EG02-1A-0093)
- in section 1.2, changed part number to OH00000-EG02-1A-0093
- in section 2.2.1, changed section description to "The current OVMed-A1 DVP supports both OV6946 (size 400x400) and OV6948 (size 200x200) image sensor input and can auto detect the sensor type"
- in table 4-1, changed resolution for YUV422 (OV6946) to 400x400 and changed resolution for YUV422 (OV6948) to 200x200
- in table 4-2, changed resolution 720x720 YUYV (OV6946) to 400x400 YUYV (OV6946) and changed resolution 400x400 YUYV (OV6948) to 200x200 YUYV (OV6948)

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