MFi Software Specification

CH5841

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1. Stream Header and Image Data

1.1 Stream In:

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
B0	**Header Length**							
B1 (BFH)	**EOH**	**ERR**	**STI**	**RES**	**SCR**	**PTS**	**EOF**	**FID**
B2	**PTS**							
B3	**PTS**							
B4	**PTS**							
B5	**PTS**							
B6	**Image Data Size Lo**							
B7	**Image Data Size Hi**							
B8	**0**							
B9	**0**							
B10	**0**							
B11	**0**							
B12	**Image Data (0)**							
…	**Image Date (…)**							
Bn	**Image Data (n-12)**							

2. Device Response Definition

2.1 Stream In & Device Response

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
B0	**Header Length**							
B1 (BFH)	**EOH**	**ERR**	**STI**	**RES**	**SCR**	**PTS**	**EOF**	**FID**
B2	**PTS**							
B3	**PTS**							
B4	**PTS**							
B5	**PTS**							
B6	**Image Data Size Lo**							
B7	**Image Data Size Hi**							
B8	**0**							
B9	**CMD Tag (Counter 1~F)**				**0**			
B10	**CMD ID**							
B11	**CMD Status**							
B12	**Image (0)**							
…	**Image (…)**							
Bn	**Image (n-12)**							

2.2 Steam buffer off & Device Response

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
B0	**Header Length**							
B1	**EOH**	**ERR**	**STI**	**RES**	**SCR**	**PTS**	**EOF**	**FID**
(BFH)	**1**	**1/0**	**x**	**0**	**1**	**1**	**x**	**x**
B2	**Don't care**							
B3	**Don't care**							
B4	**Don't care**							
B5	**Don't care**							
B6	**0**							
B7	**0**							
B8	**CMD Response Data Length Lo**							
B9	**CMD Tag (Counter 1~F)**				**CMD Response Data Length Hi**			
B10	**CMD ID**							
B11	**CMD Status**							
B12	**Response Data (0)**							
…	**Response Data (…)**							
Bn	**Response Data (n-12)**							

2.3 Host Out

	Bit7	Bit6	Bit5	Bit4	Bit3	Bit2	Bit1	Bit0
B0	**CMD Data Length Lo**							
B1	**CMD Tag (Counter 1~F)**				**CMD Data Length Hi**			
B2	**CMD ID**							
B3	**CMD Dir (Get:0, Set:1)**							
B4	**Data (0)**							
…	**Data (…)**							
Bn	**Data (n-4)**							

3. Command Definition

3.1 CMD ID Table

CMD ID	Content	CMD Data Length
0x01	**Set Stream On/Off**	**1**
0x02	**Get Device Config**	**12*number of resolutions**
0x03	**Set Stream Setting**	**6**
0x04	**Get Property Page Info**	**9*number of properties**
0x05	**Get Property Value or Mode**	**9**
0x06	**Set Property Value or Mode**	**3**
0x07	**Extension Unit**	**Please refer to XU CMD table**
0x08		
0x09		
0x0A		
0x0B		

3.2 Response CMD Status Table

CMD Status	Content
0x01	**AP_REQ_ACK**
0x80	**AP_REQ_UNKOWN**
0x81	**AP_REQ_FAIL**
0x82	**AP_REQ_ERROR_NO_LEN**
0x83	**AP_REQ_ERROR_LEN**
0x84	**AP_REQ_ERROR_FORMAT**
0x85	**AP_REQ_ERROR_RES**
0x86	**AP_REQ_ERROR_FPS**

0x87	**AP_REQ_ERROR_VALUE**
0x88	**AP_REQ_ERROR_OVERFLOW**

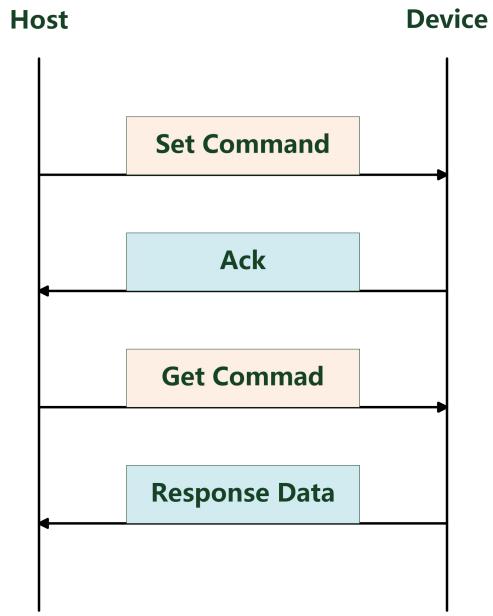
3.3 Property Page Table

Property ID	Content
0x01	**Backlight**
0x02	**Brightness**
0x03	**Contrast**
0x04	**Gain**
0x05	**Powerline**
0x06	**Hue**
0x07	**Saturation**
0x08	**Sharpness**
0x09	**Gamma**
0x0A	**White Balance Temperature**
0x0B	**AWB Mode**
0x0C	**Exposure Time**
0x0D	**AE Mode**
…	**Reserved**

3.4 Set/Get CMD

3.4.1 Set/Get CMD flow

- **Schematic:**



- **4 bytes CMD Header:**

CMD Data Len (0): Data length of CMD Content.

CMD Tag (1): CMD Tag synchronized between APP and FW, used to confirm which CMD is returned.

CMD ID (2): Please refer to 3.1 CMD ID table to select the required ID.

Out:

CMD Dir (3): Decide whether CMD is set (0x01) or get (0x00).

In:

CMD Status (3): Please refer to 3.2 Response CMD Status Table to handle error in APP.

- **CMD Content:**

Data to be sent and received according to different functions.

- **Set CMD:**
    1. Send 4 bytes CMD Header + CMD Content.
    2. Get the response CMD status, whether streaming is on or off, it can be received.
- **Get CMD:**

1. Send 4 bytes CMD Header + CMD Content.
2. Get response CMD status and data, which can only be received when streaming is closed.

- **Streaming on/off flow:**

  Get Device Config=> Set Stream Setting=> Set Stream On=> Set Stream Off

  1. Get Device Config (Out)=> Get Device Config (In, Receive status and DATA)
  2. Set Stream Setting (Out, set format, resolution and fps)=> Set Stream Setting(In, Receive status)
  3. Set Stream On (Out)=> Set Stream On (In, Receive status)
  4. Receive streams through bulk pipe (Refer to the payload table of 2.1), receive image according to the Image Data Size of the sixth and seventh bytes.
  5. Set Stream Off (Out)=> Set Stream Off (In, Receive status)

- **Property page:**

  The next version will be updated.

- **Extension Unit:**

  The next version will be updated.

3.4.2 Set Stream On/Off

Set(Out), Close the streaming before changing the stream settings.

CMD Data Len Lo	CMD Tag	CMD Data Len Hi	CMD ID	CMD Dir
B0	B1		B2	B3
0x01	Bit7-4	Bit3-0	0x01	0x01(Set)
	0x01~0x0F	0x00		

CMD Content	
Stream On/off	
B4	
Bit7-4	Bit0
Reserved	0: Stream off 1: Stream On

Set(In): Please refer to 3.4.8.

3.4.3 Get Device Config

Get(Out):

CMD Data Len Lo	CMD Tag	CMD Data Len Hi	CMD ID	CMD Dir
B0	B1		B2	B3
0x00	Bit7-4	Bit3-0	0x02	0x00(Get)
	0x01~0x0F	0x00		

Get(In):

CMD Data Len Lo	CMD Tag	CMD Data Len Hi	CMD ID	CMD Status
B0	B1		B2	B3
12*number of resolutions	Bit7-4	Bit3-0	0x02	0x01(ACK)
	0x01~0x0F	12*number of resolutions		

CMD Content				
Format ID	Res ID	Width	Height	FPS
B4	B5	B6-B7	B8-B9	B10-B15
0x01: YUV 0x02: MJ	Resolution ID	Image Width	Image Height	fps (6 settings)
…		…	…	…
0x01: YUV 0x02: MJ	Resolution ID	Image Width	Image Height	Fps (6 settings)

3.4.4 Set Stream Setting

Set(Out):

CMD Data Len Lo	CMD Tag		CMD Data Len Hi	CMD ID	CMD Dir
B0	B1			B2	B3
0x03	Bit7-4		Bit3-0	0x03	0x01(Set)
	0x01~0x0F		0x00		

CMD Content		
Format ID	Res ID	FPS
B4	B5	B6
0x01: YUV 0x02: MJ	Resolution ID	fps

Set(In): Please refer to 3.4.8.

3.4.5 Get Property Page Info

Get(Out):

CMD Data Len Lo	CMD Tag		CMD Data Len Hi	CMD ID	CMD Dir
B0	B1			B2	B3
0x00	Bit7-4		Bit3-0	0x04	0x00(Get)
	0x01~0x0F		0x00		

Get(In):

CMD Data Len Lo	CMD Tag	CMD Data Len Hi	CMD ID	CMD Status
B0	B1		B2	B3
9*number of resolutions	Bit7-4	Bit3-0	0x04	0x01(ACK)
	0x01~0x0F	9*number of resolutions		

CMD Content				
Property ID	Min	Max	Res	Def
B4	B5-B6	B7-B8	B9-B10	B11-B12
0x01~0x0D	Value (Int16)	Value (Int16)	Value (Int16)	Value (Int16)
…	…	…	…	…
0x01~0x0D	Value (Int16)	Value (Int16)	Value (Int16)	Value (Int16)

3.4.6 Get Property Value or Mode

Get(Out):

CMD Data Len Lo	CMD Tag	CMD Data Len Hi	CMD ID	CMD Dir
B0	B1		B2	B3
0x01	Bit7-4	Bit3-0	0x05	0x00(Get)
	0x01~0x0F	0x00		

CMD Content
Property ID
B4
0x01~0x0D

Get(In):

CMD Data Len Lo	CMD Tag	CMD Data Len Hi	CMD ID	CMD Status
B0	B1		B2	B3
0x03	Bit7-4	Bit3-0	0x05	0x01(ACK)
	0x01~0x0F	0x00		

CMD Content	
Property ID	Value or Mode
B4	B5-B6
0x01~0x0D	-32768~32767

3.4.7 Set Property Value or Mode

Set(Out)

CMD Data Len Lo	CMD Tag	CMD Data Len Hi	CMD ID	CMD Dir
B0	B1		B2	B3
0x03	Bit7-4	Bit3-0	0x06	0x01(Set)
	0x01~0x0F	0x00		

CMD Content	
Property ID	Value or Mode
B4	B5-B6
0x01~0x0D	-32768~32767

Set(In): Please refer to 3.4.8.

3.4.8 Set(In):

CMD Data Len Lo	CMD Tag	CMD Data Len Hi	CMD ID	CMD Status
B0	B1		B2	B3
0	Bit7-4	Bit3-0	0x01~0x07	0x01(ACK)
	0x01~0x0F	0		

4. Extension Unit (Xu command)

4.1 XU CMD Table

Name	Xu Ctrl ID	Data Length
VC_XU_FW_VER (FW Rom code Version)	**0x01**	**15**
VC_XU_SYS_STATUS (Sensor & Memory Info)	**0x02**	**5**
VC_XU_IO_STATUS (GPIO IO Ctrl)	**0x03**	**8**
VC_XU_WE (Write Protect)	**0x04**	**2**
VC_XU_EXT_MEM_8B (External Rom R/W, 8 bytes)	**0x05**	**12**
VC_XU_EXT_MEM_32B (External Rom R/W, 32 bytes)	**0x06**	**36**
VC_XU_RAM (Register R/W)	**0x07**	**15**
VC_XU_CODE (8051 R/W)	**0x08**	**15**
VC_XU_SENSOR (Sensor R/W)	**0x09**	**12**
~~**VC_XU_INT**~~	~~**0x0A**~~	~~**12**~~
VC_XU_QUERY_MEM (SPI Flash Info R/W)	**0x0B**	**15**
VC_XU_FLASH_STATUS (Flash Status R/W)	**0x0C**	**15**
VC_XU_RST (Device software reset)	**0x0D**	**1**
VC_XU_EEPROM_SIZE (Test EEPROM Size)	**0x0E**	**15**
VC_XU_EXT_MEM_128B (External Rom R/W, 128 bytes)	**0x0F**	**132**
VC_XU_MIRROR/FLIP (Mirror/Flip)	**0x10**	**1**

VC_XU_FW_VER

VC_XU_IO_STATUS

VC_XU_WE

VC_XU_EXT_MEM_8B

Control Command