

Shenzhen Touview Technology Co., Ltd

----Moving View, Touching World!

User Manual

OV528 Protocol

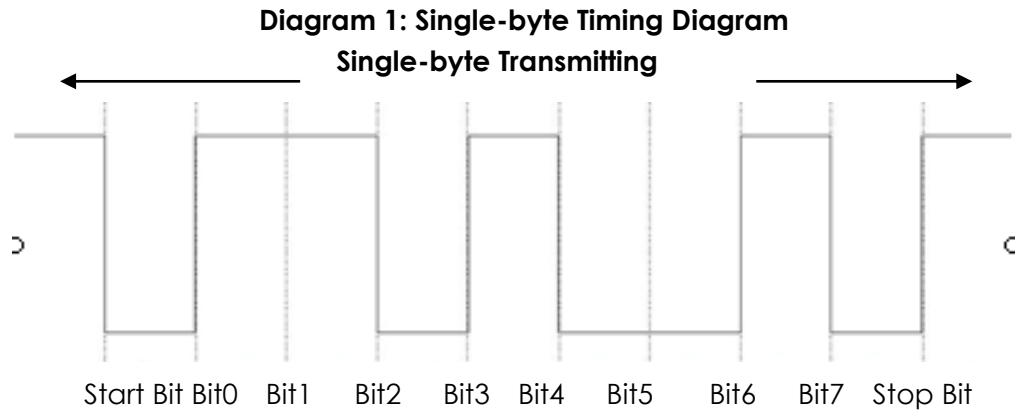
Notice: This is one kind of protocol standard among various standards,
if this protocol is some different from what you required, please kindly inform us,
we can amend protocol as per your instructions.

OV528 PROTOCOL

Serial Interface

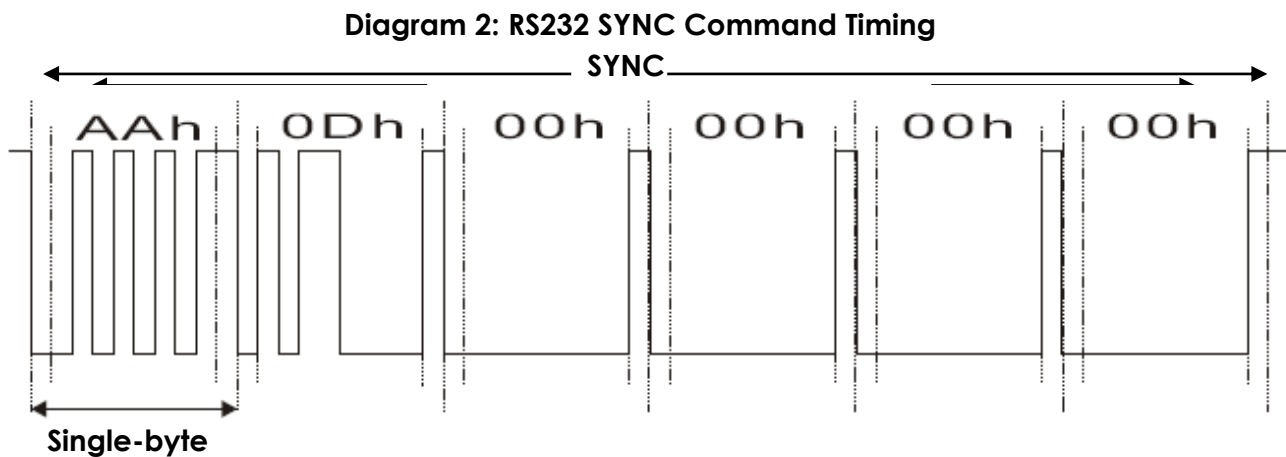
Single-byte Timing Diagram

A single-byte RS232 transmission consists of the start bit, 8-bit content and the stop bit. A start bit is always 0, while a stop bit is always 1. LSB is sent out first and is right after the start bit.



Command Timing Diagram

A single command consists of 6 continuous single-byte RS232 transmissions. The following is an example of SYNC (AA0D0000000h) command.



Command Set

The Camera module can support 11 commands for interfacing to host as following.

No.	Command	Command ID	Parameter 1	Parameter 2	Parameter 3	Parameter 4
1	Initial	AA01h	00h	Color Type	Preview Resolution	JPEG Resolution
2	Get Picture	AA04h	Get Setting	00h	00h	00h
3	Snapshot	AA05h	Snapshot Type	Skip Frame (low byte)	Skip Frame (high byte)	00h
4	Set Package Size	AA06h	08h	Package Size (low byte)	Package Size (high byte)	00h
5	Set Baud-rate	AA07h	1 st Divider	2 nd Divider	00h	00h
6	Reset	AA08h	Reset Type	00h	00h	xxh *
7	Power Off	AA09h	00h	00h	00h	00h
8	Data	AA0Ah	Date Type	Length-byte 0	Length-byte 1	Length-byte 2
9	SNYC	AA0Dh	00h	00h	00h	00h
10	ACK	AA0Eh	Command ID	ACK counter	Package ID Byte 0	Package ID Byte 1
11	NAK	AA0Fh	00h	NAK counter	Error Number	00h

If the parameter is FFh, firmware performs it immediately.

Interface Commands Details

1. Initial (AA01h)

The host issues this command to configure the preview image size and color type. After receiving this command, the camera will send out an ACK command to the host if the configuration success. Otherwise, an NACK command will be sent out.

Color Type	
2-bit Gray-Scale	01h
4-bit Gray- Scale	02h
8-bit Gray- Scale	03h
2-bit Color	05h
16-bit Color	06h
JPEG	07h

Preview Resolution	
80*60	01h
160*120	03h

JPEG Resolution	
80*64	01h
160*128	03h
320*240	05h
640*480	07h

2. Get Picture (AA04h)

The host gets a picture from camera by sending this command.

Picture Type	
Snapshot	01h
Preview Picture	02h
JPEG Preview Picture	05h

3. Snapshot (AA05h)

Camera keeps a single frame of JPEG still picture data in the buffer after receiving this command..

Snapshot Type	
Compressed Picture	00h
Uncompressed Picture	01h

Skip Frame: the number of dropped frames can be defined before compression occurs. "0" keeps the current frame, "1" captures the next frame, and so forth.

4. Set Package Size (AA06h)

The host issues this command to change the size of data package which is used to transmit JPEG image data from the camera to host. This command should be issues before sending snapshot command or get picture command to camera. It is noted that the size of the last package varies for different image.

4.1 Package Size

The default size is 64bytes and the maximum size is 512 bytes.

ID (2 byte)	Date Size (2 byte)	Image Data (Package Size-6 byte)	Verify Code (2 byte)
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ID: Package ID, stars from zero for an image

Data Size: Size of image data in this package

Verify Code: Error detection code, equals to the lower byte of sum of the whole package data except the verify code field. The higher byte of this code is always zero. i.e. verify code=low byte(sum(byte **[0]** to byte **[N-2]**))

Note: As the transmission of uncompressed image is not in the package mode, it is not necessary to set the package size for the uncompressed image.

5. Set Baud Rate (AA07h)

Set camera baud rate by issuing this command. As the module can auto-detect the baud rate of the incoming command, host can make connection with one of the following baud rate in the table. The camera will keep using the detected baud rate until physically power off.

$$\text{Baud Rate} = 14.7456\text{MHz} / 2^{(2^{\text{nd}} \text{ divider} + 1)} / 2^{(1^{\text{st}} \text{ divider} + 1)}$$

Baud Rate	1 st Divider	2 nd Divider	Baud Rate	1 st Divider	2 nd Divider
7200bps	FFh	01h	28800bps	3Fh	01h
9600bps	BFh	01h	38400bps	2Fh	01h
14400bps	7Fh	01h	57600bps	1Fh	01h
19200bps	5Fh	01h	115200bps	0h	01h

6. Reset (AA08h)

The host resets camera by issuing this command.

Reset Type	
00h	Reset the whole system, Camera will reboot and reset all registers and state machine
01h	Reset state machine only

7. Power Off (AA09h)

Camera will go into sleep mode after receiving this command. SYNC command must be sent to wake up camera for certain period until receiving ACK command from camera.

8. Data (AA0Ah)

The type and size of image data ready for transmitting out to host would be advised to host when camera issuing this command.

Data Type	
Snapshot Picture	01h
Preview Picture	02h
JPEG Picture	05h

Data Length: these 3 bytes represent the length of Snapshot Picture, Preview Picture and JPEG Preview Picture.

9. SYNC (AA0Dh)

Either the host or the camera can issue this command to make connection. An ACK command must be sent out after receiving this command.

10. ACK (AA0Eh)

This command indicates the success of the last operation. After receiving any valid command, ACK command must be sent out except when getting preview data. The host can issue this command to request image data package with desired package ID after receiving Data command from camera. The host should send this command with package ID F0F0h after receiving a package to end the package transfer.

Note that the field "Command ID" should be 00h when requests image data package.

Command ID: The command with that ID is acknowledged by this command.

ACK Counter: Not in use

Package ID: For acknowledging Data Command, these two bytes represent the requested package ID. While for acknowledging other commands, these two bytes are set to 00h.

11. NAK (AA0Fh)

This command shows corrupted transmission or unsupported features.

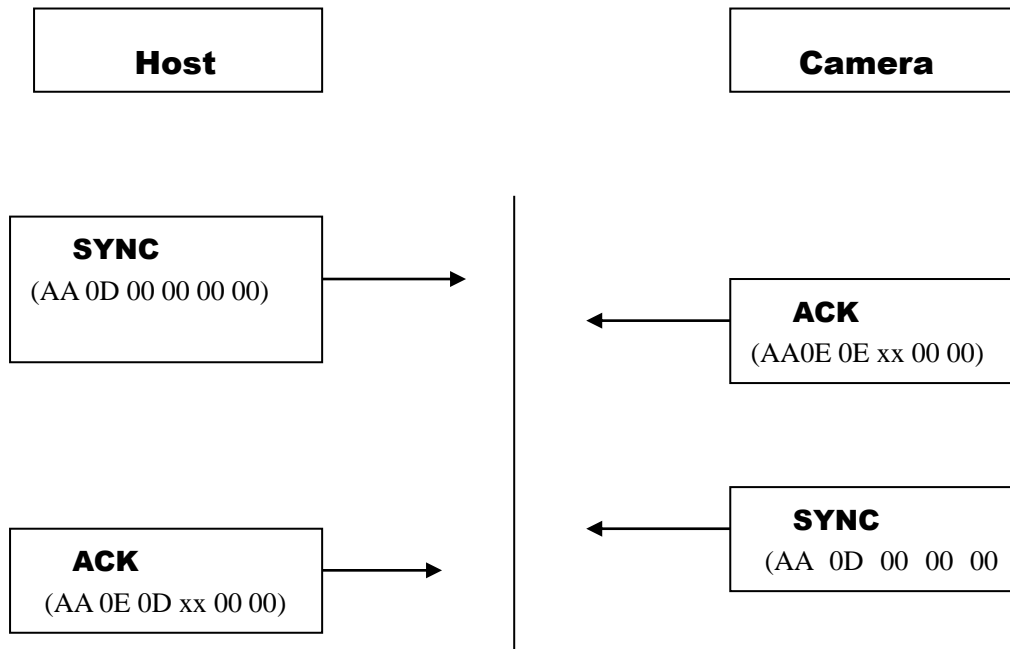
NAK Counter: Not in use

Error Number: (Please read the following chart)

Error Messages	NAK code	Error Messages	NAK code
Picture Type Error	01h	Parameter Error	0Bh
Picture Up Scale	02h	Send Register Timeout	0Ch
Picture Scale Error	03h	Command ID Error	0Dh
Unexpected Respond	04h	Picture Not Ready	0Fh
Send Picture Timeout	05h	Transfer Package Number Error	10h
Unexpected Command	06h	Set Transfer Package Size Wrong	11h
ASRAM JPEG Type Error	07h	Command Header Error	F0h
ASRAM JPEG Size Error	08h	Command Length Error	F1h
Picture Format Error	09h	Send Picture Error	F5h
Picture Size Error	0Ah	Send Command Error	FFh

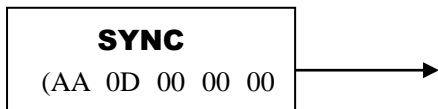
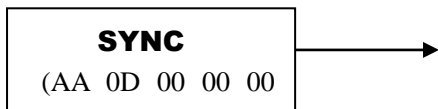
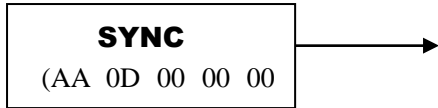
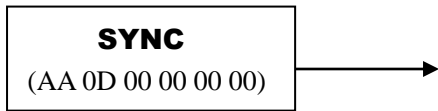
Command Protocol

1. SYNC Command

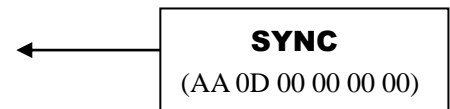
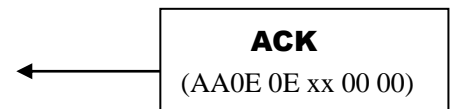
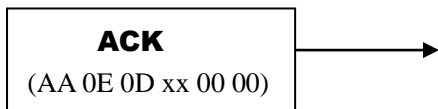


2. Make connection with camera

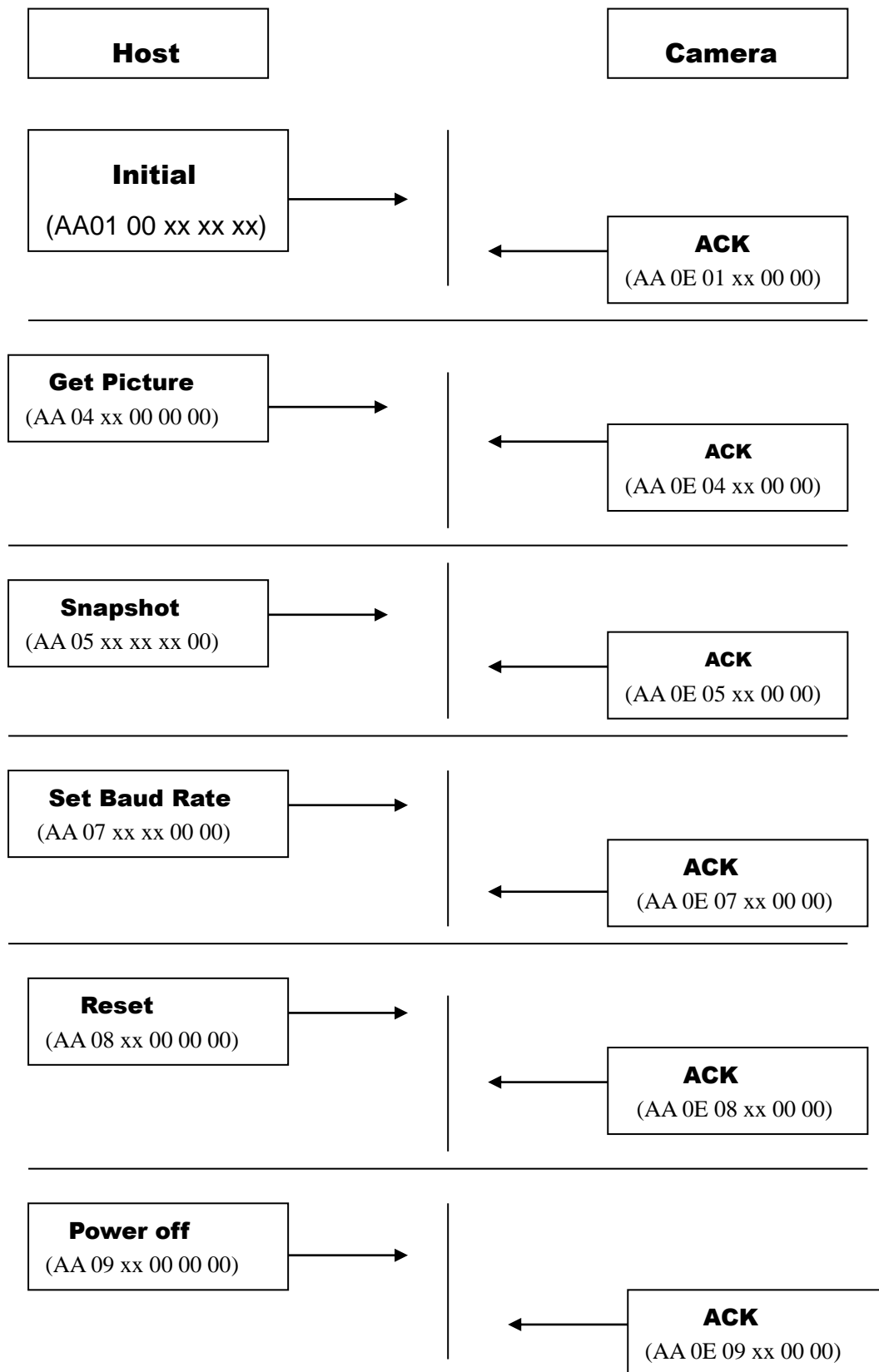
Host issues SYNC (baud rate: 14400bps) until receiving ACK from camera (usually an ACK command is received after sending 25 times of SYNC command).



Note: SYNC commands are maximum 60 times.



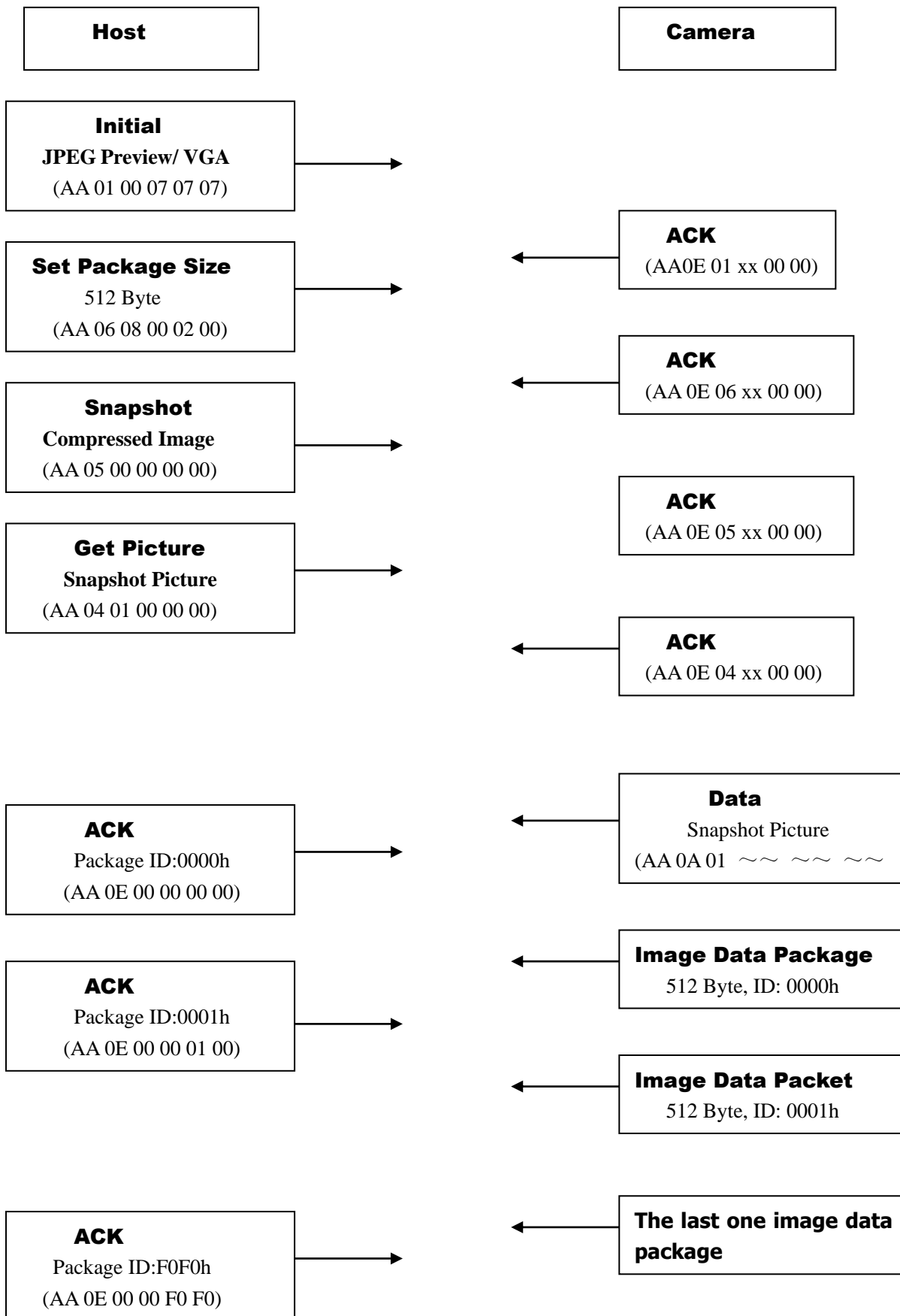
3. Initial/ Get Picture/ Snapshot/Set Baud Rate / Reset/ Power off Command



4. Getting a Snapshot for RS232

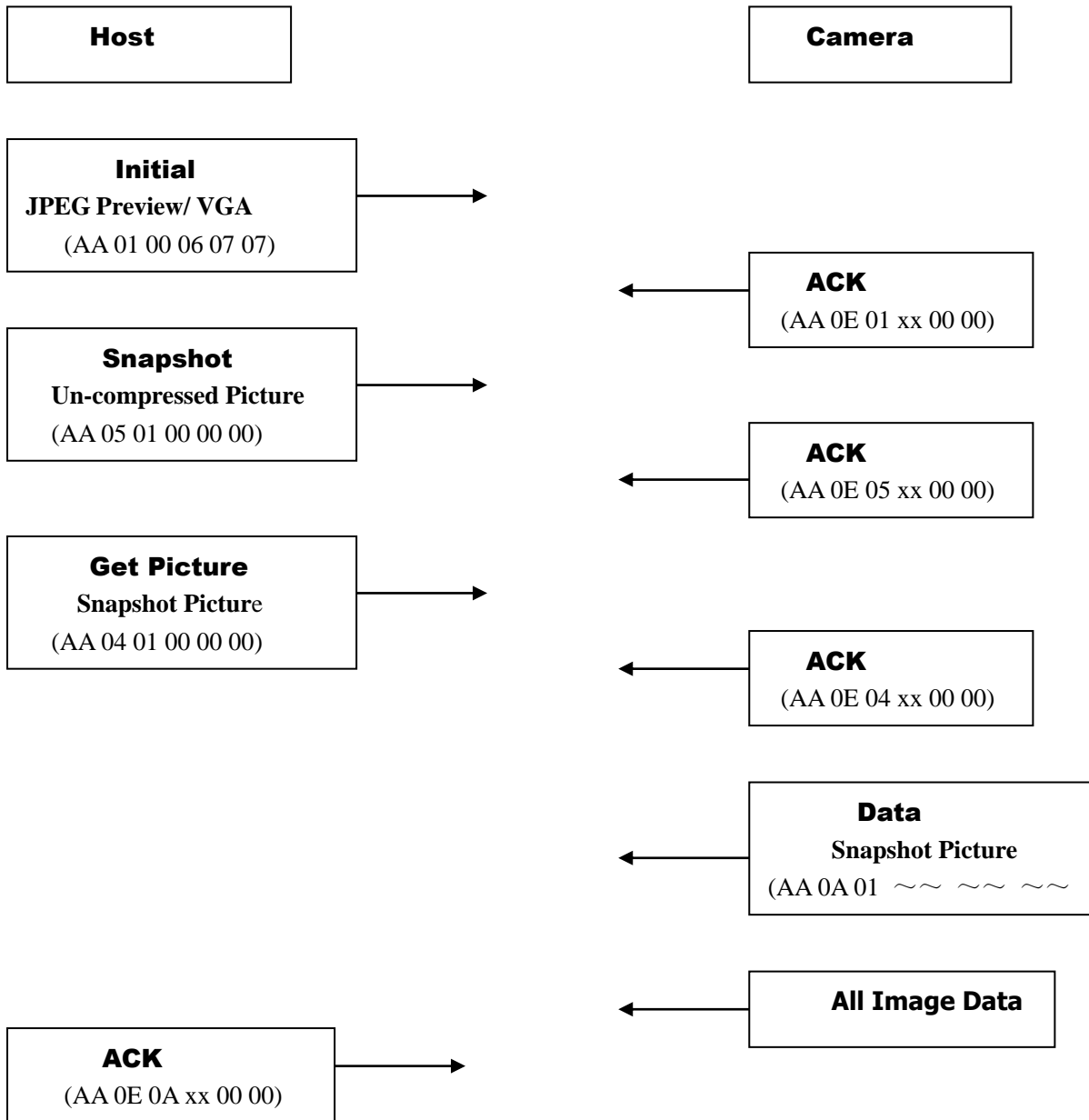
Please make assure that connection is already made before the following communication.

4.1 JPEG Snapshot Picture



Remark: 1) "xx" any number;
2) "~ ~" image size returned.

4.2 Uncompressed Snapshot Picture)

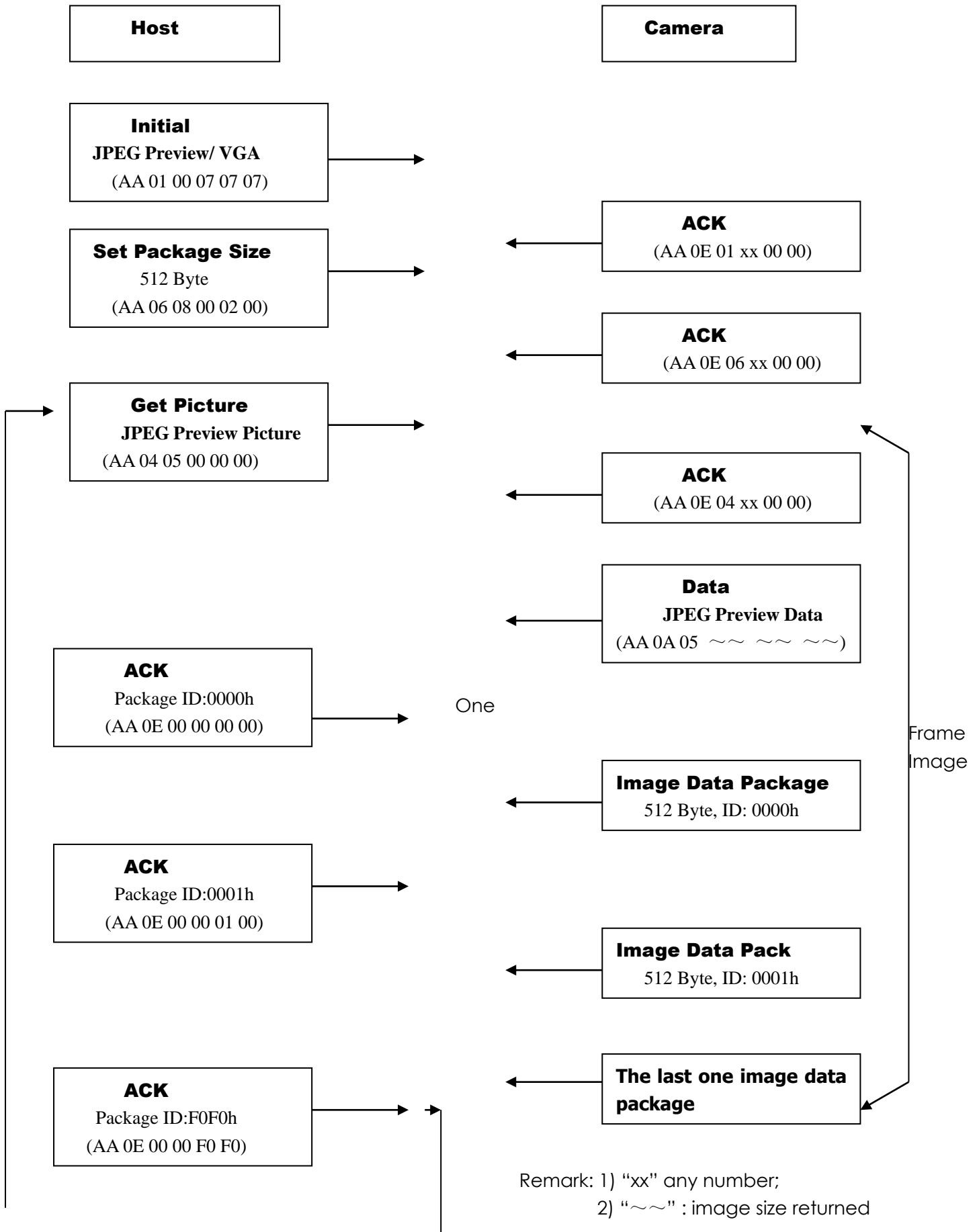


Remark: 1) "xx" any number;
2) "~ ~" image size returned.

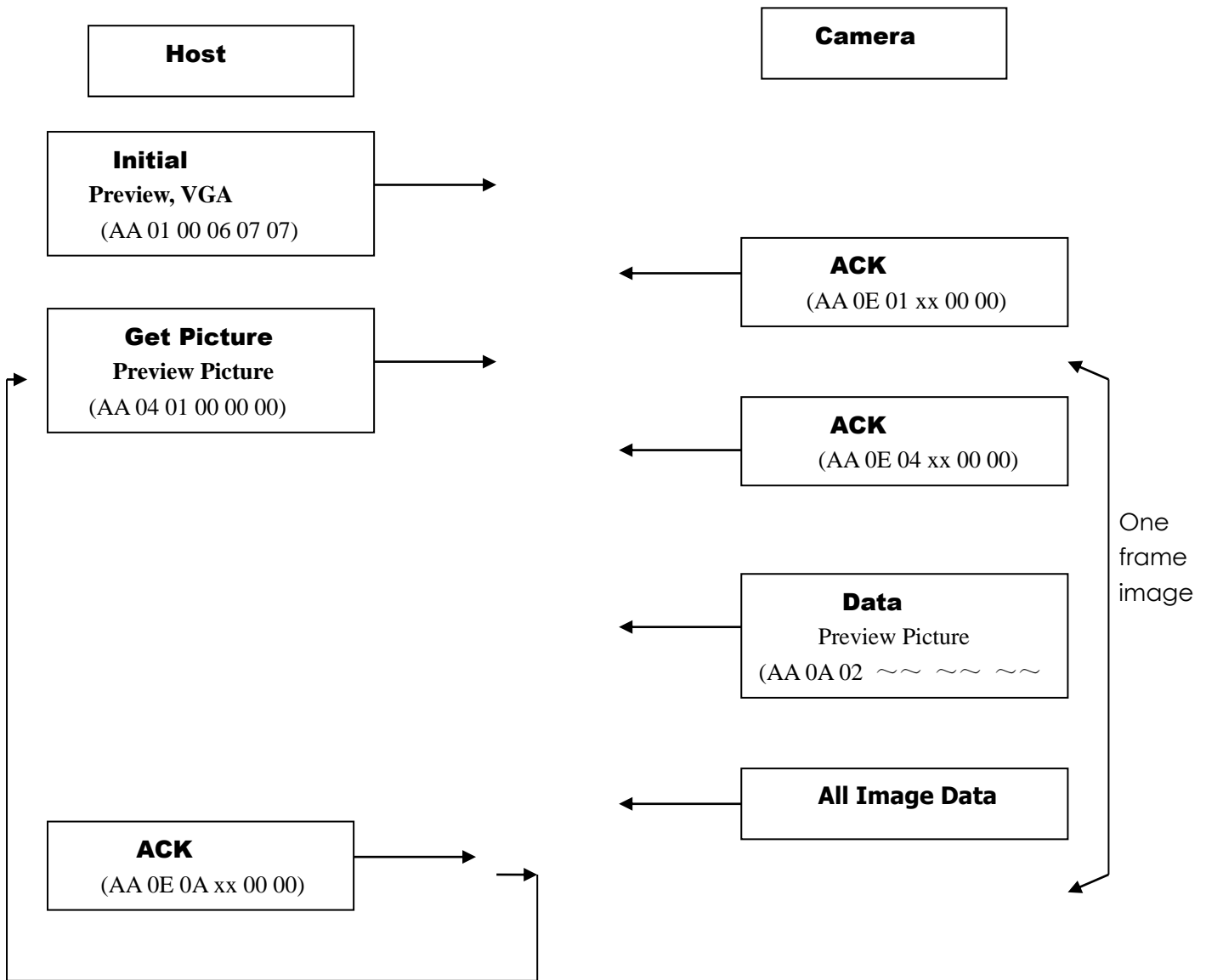
5. Getting a JPEG preview Picture for RS232

Please make assure that connection is already made before the following communication.

5.1 JPEG Preview Picture



5.2. Preview uncompressed image



Remark: 1) "xx" any number;
2) "~ ~" image size returned.