

# **C628 Enhanced JPEG Module**

## **User Manual**

v1.1

### **Release Note:**

- 1. May 2, 2006 – official released v1.0**
- 2. Dec 27, 2006 – revise electrical characteristics**

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## **PART I - Hardware**

### **Overview**

The Purpose of this document is the description of the features, functions and interfaces of **C628 Enhanced JPEG Camera Module**.

The **Enhanced JPEG Module** is a small, lightweight and low power consumption device including most of the features of a Digital Still Camera (DSC) such as snapshot, video capture, date-time stamp, file management and many system configurations.

A series of user-friendly command is well developed. By sending these commands to the camera, users can perform the functions of the camera.

In this document, all the functions of the JPEG Module will be taken into account and for each of the functions, a proper command sequence will be suggested.

### **Features**

- UART interface for camera control
- User friendly commands
- Different baud rate setting to meet most of MCU and PC software
- Mini-SD card interface
- Real time composite video data output
- USB mass storage

### **Module Specifications**

Image Sensor	MegaPixels CMOS sensor
Image Processor	ZORAN COACH-6E
On Board Memory	64 Mb (8 Mbytes)
Storage	External memory card up to 1GB Resident 16MB NAND Flash
Display Connector	Composite video out
Video Capture	640 × 480 (30 fps) 320 × 240 (30 fps) Unlimited Motion JPEG capturing time depends on available memory space
Photo Resolution	1280 × 960, 640 x 480 JPEG format
White Balance	Normal / Daylight / Tungsten / Fluorescent / Cloudy
UART Baud Rate	115200 / 57600 bps
TV out	NTSC / PAL
USB Interface	USB 1.1 Mass storage mode Supported OS: Win2000 / XP / ME
Power	DC 5V

## Electrical Characteristics

*\* Operation at DC 5.0V*

<b>Condition</b>	<b>Min.</b>	<b>Max.</b>	<b>Units</b>
Standby	–	1	mA
Idle (Peak @ downloading)	170	175	mA
Capture JPG (Peak @ capturing)	250	281	mA
Capture AVI (Peak @ recording)	250	302	mA
<b>TV output</b>			
<b>Condition</b>	<b>Min.</b>	<b>Max.</b>	<b>Units</b>
Standby	–	1	mA
Idle (Peak @ downloading)	170	175	mA
Capture JPG (Peak @ capturing)	250	281	mA
Capture AVI (Peak @ recording)	250	302	mA
Playback JPG	188	218	mA
Playback AVI	205	225	mA

## **General Product Description**

### **Voltage Supply**

The external power supply must be connected to the camera and fulfill the following requirements.

- Nominal operating voltage: DC 5.0V
- Operation voltage range: DC 4.5V – 5.5V

### **Sensor**

It is a CMOS type image sensor of Mega pixels. The flexible PCB connector is used to connect sensor board to main board.

### **Photo Capture**

The JPEG Module supports **1280 x 960, 640x480** resolution and different compression ratios from **1x – 45x**.

### **Video Capture**

The JPEG Module features unlimited video capturing, dependent on the memory size, with two optional resolutions: **640 x 480 (30fps), 320 x 240 (30fps)** in **AVI**, Audio Video Interleave, format which is currently the most common file format for storing audio / video data. The JPEG Module provides different compression ratios to users from **1x – 45x**

### **Storage**

The JPEG Module features a **16MB** (16M x 8 bits) on-board NAND flash and supports up to **1GB** (optional) external memory card.

### **Display**

The JPEG Module provides composite video output. Users can select between two different TV standards, NTSC and PAL.

### **Serial Interface**

The JPEG Module features an UART core, based on the industry standard PCI116550 UART device. It supports full duplex such that users can communicate with it on flexible platforms. The supported baud rates are: **115200bps, 57600bps**

### **USB**

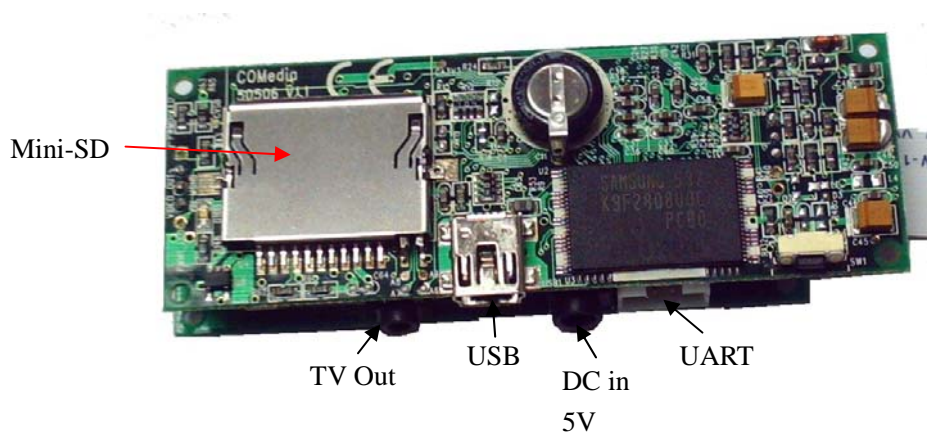
The JPEG Module provides a USB Mass Storage interface, such that user can upload the image from the module to PC without driver installation. (For Windows 2K, XP or Later Version)

## Interface Connectors

The JPEG Module has 4 interface connectors:

Connector	Description
USB	Mini USB to connect PC for data transfer
TVout	Phone Jack to connect TV for image display
DCin	Mini DC Jack to connect the DC adapter for power input
UART	UART cable connector to the backend device

The positions of the connectors are shown below:



**Figure 2 – Positions of the connectors**

The pin assignments of the interface connectors are shown in the following.

<b>USB I/F Pin-out</b>				
<b>USB mini-B</b>				
Pin	Signal	I/O	Function	Type
1	Vbus		Power from PC USB port (5VDC)	Power
2	D-	I/O	USB D minus signal	Data
3	D+	I/O	USB D plus signal	Data
4	NC		Not connected	NC
5	GND		Ground	Power
<b>UART I/F Pin-out</b>				
<b>4 x 1 – 2.0mm Pitch Socket DIP Type</b>				
Pin	Signal	I/O	Function	Type
1	C3V3		Digital +3.3V	Power
2	TXD	O	UART serial transmitter output	Data
3	RXD	I	UART serial receiver input	Data
4	DGND		Digital ground	Power

## PART II – Command List

### **Basic Operation**

#### **Hardware ON/OFF**

To turn on the JPEG Module, the PWRON-KEY, SW1, must be pressed for at least one second and then released.

The same circuitry can be used for power off.

#### **Software Shutdown**

To shutdown the camera through software,

- Send the shutdown command:

0xaa 00 01 55 aa

- and then wait for the “OK” response:

0xaa 00 01 00 56 aa

After sending the OK response, the camera will be shutdown immediately.

## Command

### Definitions of Commands

To perform the functions of the JPEG Module, corresponding commands must be sent to it. The commands are string of the hexadecimal number. There are three types of commands being used for the JPEG Module: **ID Command**, **Parameter Command** and **ACK Command**.

All the commands contain **synchronization bytes** and **checksum**.

**Synchronization byte** (0xaa), placed at the front and the end of every command, is used for the synchronization between the host machine and the JPEG Module.

**Checksum** is equal to the lowest eight bits of the sum of all the other bytes in the corresponding command. It is used for the verification of the command.

**ID Command** is a fixed five-byte command containing the command ID, the length of the parameters in the following parameter command and the checksum. Every function to be performed by the JPEG Module is labeled with a command ID. With the command ID, the camera knows which function will be performed and what kind of parameter will be received in the following. The format of ID command is shown in the following.

<i>Format (Fixed Length of 5 bytes)</i>	Sync Byte (8 bits)	Length of the parameter in unit of byte (8 bits)	Command ID in HEX (8 bits)	Checksum (8 bits)	Sync Byte (8 bits)
<i>Example (Set the system clock)</i>	0xaa	0x07	0x03	0x5e	0xaa

As shown in the example, the command ID is 0x03, setting the system clock and the size of the parameters in the following parameters is seven bytes.

Also, checksum = the lowest eight bits of  $(0xaa + 0x07 + 0x03 + 0xaa = 0x15e) = 0x5e$ .

**Parameter Command** is a varied length command containing the parameters corresponding to the previous ID command, such as the EV, white balance value and date-time need to set. It is normally sent following the ID command. If the size of the parameter contained in the ID command is zero, no parameter command is required. The format of parameter command is shown in the following.

<i>Format</i>	Sync Byte (8 bits)	Parameter (variable)	Checksum (8 bits)	Sync Byte (8 bits)
<i>Example (Set the system clock)</i>	0xaa	0x07 0xd5 0x04 0x0c 0x11 0x36 0x00 (2005-04-12 11:54:00)	0x87	0xaa



**ACK Command** is a varied length command containing the acknowledgement and the results returned for the ID and parameter commands, such as the requested date-time and the version code. It contained also the length of the results and checksum for verification. The format of ACK Command is shown in the following.

<i>Format</i>	Sync Byte (8 bits)	Length of the return in unit of byte (8 bits)	Command ID to ACK (8 bits)	Return (variable)	Checksum (8 bits)	Sync Byte (8 bits)
<i>Example (Request the system clock)</i>	0xaa	0x07	0x04	0x07 0xd5 0x04 0x0c 0x11 0x36 0x00 (2005-04-12 11:54:00)	0x92	0xaa

### Data Packet

Beside the three types of command discussed above, there is one more packet, called **Data Packet**, used for the JPEG Module. It is used to transmit the picture or video files from the camera to the host machine when performing the download function. The format of data packet is shown in the following.

<i>Format</i>	Sync Byte (8 bits)	Serial number of the packet (16 bits) (from 0x0001 – 0xffff)	File content	Checksum (16 bits)	Sync Byte (8 bits)
<i>Example</i>	0xaa	0x0001	0x03 0x12 0x77... 0x5e	0xf655	0xaa

Please notice that the checksum (16 bits) in the data packets is equal to the **lowest 16 bits** of the sum of the synchronization bytes, the serial number and the file content.

Please notice that the checksum (16 bits) in the data packet is equal to the lowest 16 bits of the sum of the synchronization

After receiving a data packet, the host machine should return an ACK command for acknowledgement. A list of return code for packet transmission is shown in the following.

- Return:
- 0x00 Verification pass, ask for the next packet
  - 0x01 Verification failed, ask to resent the current packet
  - 0xff Transmission termination

## Summary of Commands

<b>System Configurations</b>		
<b>ID in Dec</b>	<b>ID in Hex</b>	<b>Function</b>
0	0x00	<a href="#">Restore factory configuration</a>
1	0x01	<a href="#">Shutdown</a>
2	0x02	<a href="#">Request the revision identification</a>
3	0x03	<a href="#">Set the system clock</a>
4	0x04	<a href="#">Resquest the system time</a>
5	0x05	<a href="#">Select the light frequency</a>
6	0x06	<a href="#">Snapshot configuration</a>
30	0x1e	<a href="#">Select the operation mode</a>
31	0x1f	<a href="#">Request the current operation mode</a>
159	0x9f	<a href="#">Select the Baud rate</a>
176	0xb0	<a href="#">Synchronization signal</a>
<b>JPEG Capture</b>		
<b>ID in Dec</b>	<b>ID in Hex</b>	<b>Function</b>
50	0x32	<a href="#">Set the picture resolution and the compression ratio</a>
51	0x33	<a href="#">Request the current Luminance</a>
53	0x35	<a href="#">Date Time Stamping</a>
54	0x36	<a href="#">String Stamping</a>
56	0x38	<a href="#">Sequence capture</a>
<b>AVI Capture</b>		
<b>ID in Dec</b>	<b>ID in Hex</b>	<b>Function</b>
81	0x51	<a href="#">Set the resolution and the compression ratio of the AVI recorded</a>
83	0x53	<a href="#">Start / Stop recording AVI</a>

<b>File Management</b>		
<b>ID in Dec</b>	<b>ID in Hex</b>	<b>Function</b>
120	0x78	<a href="#">Request the file information</a>
121	0x79	<a href="#">Download file from the JPEG Module (Function in IDLE mode ONLY)</a>
122	0x7a	<a href="#">Delete the targeted file</a>
123	0x7b	<a href="#">Copy / Move the targeted file from the resident to the external memory</a>
200	0xc8	<a href="#">Playback the current AVI</a>
201	0xc9	<a href="#">Select the Previous / Next file</a>
202	0xca	<a href="#">Select a particular file</a>
<b>Storage Media Management</b>		
<b>ID in Dec</b>	<b>ID in Hex</b>	<b>Function</b>
100	0x64	<a href="#">Select the storage media</a>
101	0x65	<a href="#">Format the storage media</a>
<b>Interface Management</b>		
<b>ID in Dec</b>	<b>ID in Hex</b>	<b>Function</b>
155	0x9b	<a href="#">Select the TV Standard</a>
156	0x9c	<a href="#">Request the TV connection status</a>
169	0xa9	<a href="#">Request the connection status of the external memory</a>

## List of Commands

### 0 - 0x00 - Restore factory configuration

<b>ID</b>	0x00
<b>Description</b>	Restore the configuration of the JPEG Module to the factory one Parameter: n/a
<b>ID Command</b>	0xaa 00 00 54 aa
<b>Parameter Command</b>	n/ak
<b>Return from the JPEG Module</b>	0x00: OK / 0x01: Failed / 0x02: USB Mode
<p><i>Example:</i> Restore the configuration of the JPEG Module to the factory one</p> <p><i>Host:</i> <b>0xaa 00 00 54 aa</b> <i>Wait for OK</i></p> <p><i>Camera:</i> <b>0xaa 01 00 00 55 aa</b> # Length of the return = 1 byte; Command ID to ACK = 0x00; Return = 0x00 (OK); Checksum = 0x55</p>	

### 1 – 0x01 – Shutdown

<b>ID</b>	0x01
<b>Description</b>	Software shutdown the JPEG Module Parameter: n/a
<b>ID Command</b>	0xaa 00 01 55 aa
<b>Parameter Command</b>	n/a
<b>Return from the JPEG Module</b>	0x00: OK / 0x01: Failed
<p><i>Example,</i> Software shutdown the JPEG Module</p> <p><i>Host:</i> <b>0xaa 00 01 55 aa</b> <i>Wait for OK</i></p> <p><i>Camera:</i> <b>0xaa 01 01 00 56 aa</b> # Length of the return = 1 byte; Command ID to ACK = 0x01; Return = 0x00 (OK); Checksum = 0x56</p>	

## 2 – 0x02 – Request the revision identification

<b>ID</b>	0x02
<b>Description</b>	Request the revision numbers of the hardware, COACH, Sensor, and HCE Parameter: n/a
<b>ID Command</b>	0xaa 00 02 56 aa
<b>Parameter Command</b>	n/a
<b>Return from the JPEG Module</b>	0xY <sub>15</sub> Y <sub>14</sub> Y <sub>13</sub> Y <sub>12</sub> Y <sub>11</sub> Y <sub>10</sub> Y <sub>9</sub> Y <sub>8</sub> Y <sub>7</sub> Y <sub>6</sub> Y <sub>5</sub> Y <sub>4</sub> Y <sub>3</sub> Y <sub>2</sub> Y <sub>1</sub> Y <sub>0</sub> Y <sub>15</sub> Y <sub>14</sub> Y <sub>13</sub> Y <sub>12</sub> : Hardware Version Y <sub>11</sub> Y <sub>10</sub> Y <sub>9</sub> Y <sub>8</sub> : Coach Version Y <sub>7</sub> Y <sub>6</sub> : Sensor Version Y <sub>5</sub> Y <sub>4</sub> : xx Y <sub>3</sub> Y <sub>2</sub> Y <sub>1</sub> Y <sub>0</sub> : HCE Version / 0x01: Failed
<p><i>Example,</i> <i>Request the revision numbers of the hardware, COACH, Sensor, and HCE</i></p> <p><i>Host:</i> <b>0xaa 00 02 56 aa</b> <i>Wait for Response</i></p> <p><i>Camera:</i> <b>0xaa 08 02 07 02 03 9e 08 03 01 08 1c aa</b> <i># Length of the return = 8 bytes;</i> <i>Command ID to ACK = 0x02;</i> <i>Return = 0x0702 (Hardware ver.),</i> <i>0x039e (COACH Ver.), 0x08 (Sensor Ver.),</i> <i>xx, 0x0108 (HCE Ver.);</i> <i>Checksum = 0x1c</i></p>	

## 3 – 0x03 – Set the system clock

<b>ID</b>	0x03
<b>Description</b>	Set the system clock Parameter: Year (2 bytes), Month (1 byte), Day (1 byte), Hour (1 byte), Minute (1 byte) and Second (1 byte)
<b>ID Command</b>	0xaa 07 03 5e aa
<b>Parameter Command</b>	0xaa Y <sub>3</sub> Y <sub>2</sub> Y <sub>1</sub> Y <sub>0</sub> M <sub>1</sub> M <sub>0</sub> D <sub>1</sub> D <sub>0</sub> H <sub>1</sub> H <sub>0</sub> Mi <sub>1</sub> Mi <sub>0</sub> S <sub>1</sub> S <sub>0</sub> Ch <sub>1</sub> Ch <sub>0</sub> aa Y <sub>3</sub> Y <sub>2</sub> Y <sub>1</sub> Y <sub>0</sub> : Year (in hex) M <sub>1</sub> M <sub>0</sub> : Month (in hex) D <sub>1</sub> D <sub>0</sub> : Day (in hex) H <sub>1</sub> H <sub>0</sub> : Hour (in hex) Mi <sub>1</sub> Mi <sub>0</sub> : Minutes (in hex) S <sub>1</sub> S <sub>0</sub> : Second (in hex) Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Return from the JPEG Module</b>	0x00: OK / 0x01: Failed
<p><i>Example</i> <i>Set the system clock to 2004/11/19 18:00:00</i></p> <p><i>Host:</i> <b>0xaa 07 03 5e aa</b> <b>0xaa 07 d4 0b 13 12 0a 00 69 aa</b> <i>Wait for OK</i></p> <p><i>Camera:</i> <b>0xaa 01 03 00 58 aa</b> <i># Length of the return = 1 byte;</i> <i>Command ID to ACK = 0x03;</i> <i>Return = 0x00 (OK)</i> <i>Checksum = 0x58</i></p>	

**4 – 0x04 – Request the system time**

<b>ID</b>	0x04
<b>Description</b>	Request the system time Parameter: n/a
<b>ID Command</b>	0xaa 00 04 58 aa
<b>Parameter Command</b>	n/a
<b>Return from the JPEG Module</b>	<p>0xY<sub>3</sub>Y<sub>2</sub> Y<sub>1</sub>Y<sub>0</sub> M<sub>1</sub>M<sub>0</sub> D<sub>1</sub>D<sub>0</sub> H<sub>1</sub>H<sub>0</sub> Mi<sub>1</sub>Mi<sub>0</sub> S<sub>1</sub>S<sub>0</sub></p> <p>0xY<sub>3</sub>Y<sub>2</sub> Y<sub>1</sub>Y<sub>0</sub>: Year (in hex)</p> <p>0xM<sub>1</sub>M<sub>0</sub>: Month (in hex)</p> <p>0xD<sub>1</sub>D<sub>0</sub>: Day (in hex)</p> <p>0xH<sub>1</sub>H<sub>0</sub>: Hour (in hex)</p> <p>Mi<sub>1</sub>Mi<sub>0</sub>: Minutes (in hex)</p> <p>S<sub>1</sub>S<sub>0</sub>: Second (in hex) /</p> <p>0x01: Failed</p>

*Example,*  
*Set the system clock*

*Host:*  
**0xaa 00 04 58 aa**  
*Wait for Response*

*Camera:*  
**0xaa 07 04 07 d5 04 0F 17 1e 05 81 aa**  
# Length of the return = 7 bytes;  
Command ID to ACK = 0x04;  
Return = 0x07d5 (Year: 2005), 0x04 (Month: 04),  
0x0f (Day: 15), 0x17 (Hour: 23),  
0x1e (Minute: 30); 0x05 (Second: 05)  
(2005/04/15 23:30:05);  
Checksum = 0x81

### 5 – 0x05 – Select the light frequency

<b>ID</b>	0x05
<b>Description</b>	Select the light frequency Parameter: 50Hz (Default) / 60Hz
<b>ID Command</b>	0xaa 01 05 Ch <sub>1</sub> Ch <sub>0</sub> aa Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Parameter Command</b>	0xaa Z <sub>1</sub> Z <sub>0</sub> Ch <sub>1</sub> Ch <sub>0</sub> aa Z <sub>1</sub> Z <sub>0</sub> : Light frequency 0x00: 50Hz, 0x01: 60Hz Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Return from the JPEG Module</b>	0x00: OK / 0x01: Failed
<p><i>Example,</i> <i>Select the light frequency (60Hz)</i></p> <p><i>Host:</i> <b>0xaa 01 05 5a aa</b> <b>0xaa 01 55 aa</b> <i>Wait for OK</i></p> <p><i>Camera:</i> <b>0xaa 01 05 00 5a aa</b> <i># Length of the return = 1 byte;</i> <i>Command ID to ACK = 0x05;</i> <i>Return = 0x00 (OK);</i> <i>Checksum = 0x5a</i></p>	

### 6 – 0x06 – Snapshot configuration

<b>ID</b>	0x06
<b>Description</b>	Set the snapshot parameter Parameter: WhiteBalance Mode, EV, Contrast, ColorEff and Sharpness
<b>ID Command</b>	0xaa 05 06 5f aa
<b>Parameter Command</b>	0xaa Z <sub>9</sub> Z <sub>8</sub> Z <sub>7</sub> Z <sub>6</sub> Z <sub>5</sub> Z <sub>4</sub> Z <sub>3</sub> Z <sub>2</sub> Z <sub>1</sub> Z <sub>0</sub> Ch <sub>1</sub> Ch <sub>0</sub> aa Z <sub>9</sub> Z <sub>8</sub> : White Balance 0x00: Normal (Default), 0x01: Day Light 0x02: Tungsten, 0x03: Fluorescent, 0x04: Cloudy Z <sub>7</sub> Z <sub>6</sub> : EV 0x00 – 0x08 represent -2.0 – 2.0 in step of 0.5 (Default: 0x04) Z <sub>5</sub> Z <sub>4</sub> : Contrast 0x00: Normal (Default), 0x01: Stretch Z <sub>3</sub> Z <sub>2</sub> : Color Effect 0x00: Normal (Default), 0x01: B&W, 0x02: Sepia Z <sub>1</sub> Z <sub>0</sub> : Sharpness 0x00: Normal (Default), 0x01: Smooth, 0x02: Sharpen Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Return from the JPEG Module</b>	0x00: OK / 0x01: Failed
<p><i>Example,</i> <i>Set daylight for White Balance, 0 for EV, normal for Contrast, B&amp;W for ColorEff, and Sharpen for sharpness</i></p> <p><i>Host:</i> <b>0xaa 05 06 5f aa</b> <b>0xaa 01 04 00 01 02 5c aa</b> <i>Wait for OK</i></p> <p><i>Camera:</i> <b>0xaa 01 06 00 5b aa</b> <i># Length of the return = 1 byte;</i> <i>Command ID to ACK = 0x06;</i> <i>Return = 0x00 (OK);</i> <i>Checksum = 0x5b</i></p>	

### 30 – 0x1e – Select the operation mode

<b>ID</b>	0x1e
<b>Description</b>	Select the operation mode Parameter: Idle Mode: For downloading and reviewing pictures and videos / Capture JPG (Default): Capture still picture(s) when receiving the snapshot command / Capture AVI: Capture a video when receiving the record command / Playback: Playback the taken pictures and video
<b>ID Command</b>	0xaa 01 1e 73 aa
<b>Parameter Command</b>	0xaa Z <sub>1</sub> Z <sub>0</sub> Ch <sub>1</sub> Ch <sub>0</sub> aa Z <sub>1</sub> Z <sub>0</sub> : Operation Mode 0x03: Idle, 0x04: Capture JPG, 0x05: Capture AVI, 0x06: Playback Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Return from the JPEG Module</b>	0x00: OK / 0x01: Failed / 0x02: USB mode
<p><i>Example,</i> <i>Select IDLE as the operation mode</i></p> <p><i>Host:</i> <b>0xaa 01 1e 73 aa</b> <b>0xaa 03 57 aa</b> <i>Wait for OK</i></p> <p><i>Camera:</i> <b>0xaa 01 1e 00 73 aa</b> <i># Length of the return = 1 byte;</i> <i>Command ID to ACK = 0x07;</i> <i>Return = 0x00 (OK);</i> <i>Checksum = 0x5c</i></p>	



### 31 – 0x1f – Request the current operation mode

<b>ID</b>	0x1f
<b>Description</b>	Request the current operation mode Parameter: n/a
<b>ID Command</b>	0xaa 00 1f 73 aa
<b>Parameter Command</b>	n/a
<b>Return from the JPEG Module</b>	0x01: Failed / 0x02: USB Mode: Connected with the host through the USB port / 0x03: Idle Mode: Perform no function / 0x04: Capture JPG: Capture still picture(s) when receiving the snapshot command / 0x05: Capture AVI: Capture a video when receiving the record command / 0x08: Playback: Playback the taken pictures and video
<p><i>Example,</i> <i>Request the current operation mode</i></p> <p><i>Host:</i> <b>0xaa 00 1f 73 aa</b> <i>Wait for Resopnse</i></p> <p><i>Camera:</i> <b>0xaa 01 1f 05 79 aa</b> <i># Length of the return = 1 byte;</i> <i>Command ID to ACK = 0x1f;</i> <i>Return = 0x05 (Mode: Capture AVI);</i> <i>Checksum = 0x79</i></p>	

### 50 – 0x32 – Set the picture resolution and the compression ratio

<b>ID</b>	0x32
<b>Description</b>	Set the picture resolution and the compression ratio Parameter: Resolution: 1280 x 960 / 640 x 480 Compression ratio: 1x – 45x (Default: 30x)
<b>ID Command</b>	0xaa 02 32 88 aa
<b>Parameter Command</b>	0xaa Z <sub>3</sub> Z <sub>2</sub> Z <sub>1</sub> Z <sub>0</sub> Ch <sub>1</sub> Ch <sub>0</sub> aa Z <sub>3</sub> Z <sub>2</sub> : Resolution 0x00: 1280 x 960, 0x01: 640 x 480 Z <sub>1</sub> Z <sub>0</sub> : Compression ratio 0x00 – 0x2c for 1x – 45x (Default: 0x18) Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Return from the JPEG Module</b>	0x00: OK / 0x01: Failed / 0x02: USB mode
<p><i>For example,</i> <i>Set 1280 x 960 for the picture resolution and 45x for the compression ratio</i></p> <p><i>Host:</i> <b>0xaa 02 32 88 aa</b> <b>0xaa 00 2c 80 aa</b> <i>Wait for OK</i></p> <p><i>Camera:</i> <b>0xaa 01 32 00 87 aa</b> <i># Length of the return = 1 byte;</i> <i>Command ID to ACK = 0x32;</i> <i>Return = 0x00 (OK);</i> <i>Checksum = 0x87</i></p>	

### 51 – 0x33 – Request the current Luminance

<b>ID</b>	0x33
<b>Description</b>	Request the current Luminance Parameter: n/a
<b>ID Command</b>	0xaa 00 33 87 aa
<b>Parameter Command</b>	n/a
<b>Return from the JPEG Module</b>	0xZ <sub>3</sub> Z <sub>2</sub> Z <sub>1</sub> Z <sub>0</sub> Z <sub>3</sub> Z <sub>2</sub> Z <sub>1</sub> Z <sub>0</sub> : Luminance / 0x01: Failed / 0x03: Mode error
<p><i>Example,</i> <i>Request the current light frequency</i></p> <p><i>Host:</i> <b>0xaa 00 33 87 aa</b> <i>Wait for Response</i></p> <p><i>Camera:</i> <b>0xaa 02 33 00 0d 96 aa</b> # Length of the return = 2 bytes; Command ID to ACK = 0x33; Return = 0x000d (Luminance: 0x000d); Checksum = 0x96</p>	

### 53 – 0x35 – Date Time Stamping

<b>ID</b>	0x35
<b>Description</b>	Stamp the date-time on the picture Parameter: Format (2 bits): The format to display the date-time Corner (2 bits): Which corner to stamp the date-time Style (2 bits): The style of the date-time Enable (1 bit): Enable the function NC (1 bit): Must be “0”
<b>ID Command</b>	0xaa 01 35 8a aa
<b>Parameter Command</b>	0xaa 0bb <sub>7</sub> b <sub>6</sub> b <sub>5</sub> b <sub>4</sub> b <sub>3</sub> b <sub>2</sub> b <sub>1</sub> b <sub>0</sub> 0xCh <sub>1</sub> Ch <sub>0</sub> aa b <sub>7</sub> b <sub>6</sub> : Format (2 bits) 00: yyyy mm dd, 01: yyyy/mm/dd, 10: dd/mm/yyyy, 11: mm/dd/yyyy b <sub>5</sub> b <sub>4</sub> : Corner (2 bits) 00: Bottom right, 01: Bottom left 10: Top right, 11: Top left b <sub>3</sub> b <sub>2</sub> : Style 00: Stamp only the date, 01: Stamp only the time 10: Stamp both the date and the time b <sub>1</sub> b <sub>0</sub> : Enable 00: Enable, 10: Disable Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Return from the JPEG Module</b>	0x00: OK / 0x01: Failed
<p><i>Example,</i> <i>Stamp the date in the format of dd/mm/yyyy and the time on the bottom right of the current picture</i></p> <p><i>Host:</i> <b>0xaa 01 35 8a aa</b> <b>0xaa 88 dc aa</b> <i>Wait for OK</i></p> <p><i>Camera:</i> <b>0xaa 01 35 00 8a aa</b> # Length of the return = 1 byte; Command ID to ACK = 0x35; Return = 0x00 (OK); Checksum = 0x8a</p>	

**54 – 0x36 – String Stamping**

<b>ID</b>	0x36
<b>Description</b>	<p>Stamp a string on the picture</p> <p>Parameter:</p> <p>Enable (1 byte): Enable the function</p> <p>FontW (1 byte): Width of the font(s)</p> <p>FontH (1 byte): Height of the font(s)</p> <p>PosX (2 bytes): X coordinate of the string (increase from left to right)</p> <p>PosY (2 bytes): Y coordinate of the string (increase from top to bottom)</p> <p>Red (1 byte): Red component of the RGB value</p> <p>Green (1 byte): Green component of the RGB value</p> <p>Blue (1 byte): Blue component of the RGB value</p> <p>StringLength (1 byte): Number of characters in the string (at most 11)</p> <p>String (at most 11 bytes): ASCII code of the characters to display</p>
<b>ID Command</b>	<p>0xaa N<sub>1</sub>N<sub>0</sub> 36 Ch<sub>1</sub>Ch<sub>0</sub> aa</p> <p>N<sub>1</sub>N<sub>0</sub>: Number of parameters</p> <p>Ch<sub>1</sub>Ch<sub>0</sub>: Checksum</p>
<b>Parameter Command</b>	<p>0xaa Z<sub>21</sub>Z<sub>20</sub> Z<sub>19</sub>Z<sub>18</sub> Z<sub>17</sub>Z<sub>16</sub> Z<sub>15</sub>Z<sub>14</sub> Z<sub>13</sub>Z<sub>12</sub> Z<sub>11</sub>Z<sub>10</sub> Z<sub>9</sub>Z<sub>8</sub> Z<sub>7</sub>Z<sub>6</sub> Z<sub>5</sub>Z<sub>4</sub> Z<sub>3</sub>Z<sub>2</sub> Z<sub>1</sub>Z<sub>0</sub> (String) Ch<sub>1</sub>Ch<sub>0</sub> aa</p> <p>Z<sub>21</sub>Z<sub>20</sub>: 0x00: Enable, 0x01: Disable</p> <p>Z<sub>19</sub>Z<sub>18</sub>: 0x00 – 0xff</p> <p>Z<sub>17</sub>Z<sub>16</sub>: 0x00 – 0xff</p> <p>Z<sub>15</sub>Z<sub>14</sub>Z<sub>13</sub>Z<sub>12</sub>: 0x00 – Width of the picture</p> <p>Z<sub>11</sub>Z<sub>10</sub>Z<sub>9</sub>Z<sub>8</sub>: 0x00 – Height of the picture</p> <p>Z<sub>7</sub>Z<sub>6</sub>: 0x00 – 0xff</p> <p>Z<sub>5</sub>Z<sub>4</sub>: 0x00 – 0xff</p> <p>Z<sub>3</sub>Z<sub>2</sub>: 0x00 – 0xff</p> <p>Z<sub>1</sub>Z<sub>0</sub>: 0x01 – 0x0b</p> <p>(String): ASCII code of the characters to display</p> <p>Ch<sub>1</sub>Ch<sub>0</sub>: Checksum</p>
<b>Return from the JPEG Module</b>	<p>0x00: OK /</p> <p>0x01: Failed</p>
<p><i>Example</i></p> <p>Stamp the string “Hello” of that the font size is (W:80, H:90) and the RGB ratio is(0:0:255) at the (160, 150) of the picture</p> <p><i>Host:</i></p> <p><b>0xaa 10 36 9a aa</b></p> <p><b>0xaa 01 50 5a 00 a0 00 96 00 00 ff 03 48 65 6c 6c 6f 2b aa</b></p> <p><i>Wait for OK</i></p>	
<p><i>Camera:</i></p> <p><b>0xaa 01 36 00 8b aa</b></p> <p># Length of the return = 1 byte;</p> <p>Command ID to ACK = 0x36;</p> <p>Return = 0x00 (OK);</p> <p>Checksum = 0x8b</p>	

**56 – 0x38 – Sequence capture**

<b>ID</b>	0x38		
<b>Description</b>	Capture a number of pictures in a chain (Available for Capture JPG Mode ONLY) Parameter: Number of picture(s) (1 byte)		
<b>ID Command</b>	0xaa 01 38 8d aa		
<b>Parameter Command</b>	0xaa Z <sub>1</sub> Z <sub>0</sub> Ch <sub>1</sub> Ch <sub>0</sub> aa Z <sub>1</sub> Z <sub>0</sub> : Number of picture(s) 0x01 – 0xff Ch <sub>1</sub> Ch <sub>0</sub> : Checksum		
<b>Return from the JPEG Module</b>	0x00: OK / 0x01: Failed / 0x02: USB mode / 0x03: Mode error / 0x04: Not enough memory (RAM) / 0x05: Not enough memory (Flash) / 0x06: External memory card write-protect		
<p><i>Example.</i> Set to take a chain of 5 pictures with a single snapshot</p> <table style="width: 100%; border: none;"> <tr> <td style="width: 50%; vertical-align: top;"> <p><i>Host:</i></p> <p><b>0xaa 01 38 8d aa</b></p> <p><b>0xaa 05 59 aa</b></p> <p><i>Wait for OK</i></p> </td> <td style="width: 50%; vertical-align: top;"> <p><i>Camera:</i></p> <p><b>0xaa 01 38 00 8c aa</b></p> <p><i># Length of the return = 1 byte;</i></p> <p><i>Command ID to ACK = 0x38;</i></p> <p><i>Return = 0x00 (OK);</i></p> <p><i>Checksum = 0x8d</i></p> </td> </tr> </table>		<p><i>Host:</i></p> <p><b>0xaa 01 38 8d aa</b></p> <p><b>0xaa 05 59 aa</b></p> <p><i>Wait for OK</i></p>	<p><i>Camera:</i></p> <p><b>0xaa 01 38 00 8c aa</b></p> <p><i># Length of the return = 1 byte;</i></p> <p><i>Command ID to ACK = 0x38;</i></p> <p><i>Return = 0x00 (OK);</i></p> <p><i>Checksum = 0x8d</i></p>
<p><i>Host:</i></p> <p><b>0xaa 01 38 8d aa</b></p> <p><b>0xaa 05 59 aa</b></p> <p><i>Wait for OK</i></p>	<p><i>Camera:</i></p> <p><b>0xaa 01 38 00 8c aa</b></p> <p><i># Length of the return = 1 byte;</i></p> <p><i>Command ID to ACK = 0x38;</i></p> <p><i>Return = 0x00 (OK);</i></p> <p><i>Checksum = 0x8d</i></p>		



<p><i>Example,</i> <i>Start recording AVI</i></p> <p><i>Host:</i></p> <p><b>0xaa 01 53 a8 aa</b></p> <p><b>0xaa 00 54 aa</b></p> <p><i>Wait for OK</i></p>	<p><i>Camera:</i></p> <p><b>0xaa 01 53 00 a8 aa</b></p> <p><i># Length of the return = 1 byte;</i></p> <p><i>Command ID to ACK = 0x53;</i></p> <p><i>Return = 0x00 (OK);</i></p> <p><i>Checksum = 0xa8</i></p>
<p><i>Example,</i> <i>Stop recording AVI</i></p> <p><i>Host:</i></p> <p><b>0xaa 01 53 a8 aa</b></p> <p><b>0xaa 01 55 aa</b></p> <p><i>Wait for OK</i></p>	<p><i>Camera:</i></p> <p><b>0xaa 01 53 00 a8 aa</b></p> <p><i># Length of the return = 1 byte;</i></p> <p><i>Command ID to ACK = 0x53;</i></p> <p><i>Return = 0x00 (OK);</i></p> <p><i>Checksum = 0xa8</i></p>

### 100 – 0x64 – Select the storage media

<b>ID</b>	0x64
<b>Description</b>	Select the storage media Parameter: Resident / external
<b>ID Command</b>	0xaa 01 64 b9 aa
<b>Parameter Command</b>	0xaa Z <sub>1</sub> Z <sub>0</sub> Ch <sub>1</sub> Ch <sub>0</sub> aa Z <sub>1</sub> Z <sub>0</sub> : Resident / external 0x00: Resident, 0x01: External Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Return from the JPEG Module</b>	0x00: OK / 0x01: Failed / 0x02: USB mode / 0x03: Mode error
<p><i>Example,</i> <i>Select the external memory as the storage media</i></p> <p><i>Host:</i></p> <p><b>0xaa 01 64 b9 aa</b></p> <p><b>0xaa 00 54 aa</b></p> <p><i>Wait for OK</i></p>	
<p><i>Camera:</i></p> <p><b>0xaa 01 64 00 b9 aa</b></p> <p><i># Length of the return = 1 byte;</i></p> <p><i>Command ID to ACK = 0x64;</i></p> <p><i>Return = 0x00 (OK);</i></p> <p><i>Checksum = 0xb9</i></p>	

### 101 – 0x65 – Format the storage media

<b>ID</b>	0x65
<b>Description</b>	Format the storage media Parameter: Resident / external
<b>ID Command</b>	0xaa 01 65 ba aa
<b>Parameter Command</b>	0xaa Z <sub>1</sub> Z <sub>0</sub> Ch <sub>1</sub> Ch <sub>0</sub> aa Z <sub>1</sub> Z <sub>0</sub> : Resident / external 0x00: Resident, 0x01: External Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Return from the JPEG Module</b>	0x00: OK / 0x01: Failed / 0x02: USB mode / 0x03: Mode error / 0x06: External memory card write-protect
<p><i>Example</i> <i>Format the external memory</i></p> <p><i>Host:</i> <b>0xaa 01 65 ba aa</b> <b>0xaa 01 55 aa</b> <i>Wait for OK</i></p> <p><i>Camera:</i> <b>0xaa 01 65 00 ba aa</b> # Length of the return = 1 byte; Command ID to ACK = 0x65; Return = 0x00 (OK); Checksum = 0xba</p>	

### 102 – 0x66 – Request the information of the current storage media

<b>ID</b>	0x66
<b>Description</b>	Request the information of the current storage media Parameter: n/a
<b>ID Command</b>	0xaa 00 66 ba aa
<b>Parameter Command</b>	n/a
<b>Return from the JPEG Module</b>	0xY <sub>19</sub> Y <sub>18</sub> Y <sub>17</sub> Y <sub>16</sub> Y <sub>15</sub> Y <sub>14</sub> Y <sub>13</sub> Y <sub>12</sub> Y <sub>11</sub> Y <sub>10</sub> Y <sub>9</sub> Y <sub>8</sub> Y <sub>7</sub> Y <sub>6</sub> Y <sub>5</sub> Y <sub>4</sub> Y <sub>3</sub> Y <sub>2</sub> Y <sub>1</sub> Y <sub>0</sub> Y <sub>19</sub> Y <sub>18</sub> Y <sub>17</sub> Y <sub>16</sub> Y <sub>15</sub> Y <sub>14</sub> Y <sub>13</sub> Y <sub>12</sub> : Empty space Y <sub>11</sub> Y <sub>10</sub> Y <sub>9</sub> Y <sub>8</sub> : File count Y <sub>7</sub> Y <sub>6</sub> Y <sub>5</sub> Y <sub>4</sub> : Picture left (for JPG) Y <sub>3</sub> Y <sub>2</sub> Y <sub>1</sub> Y <sub>0</sub> : Available time (for AVI) / 0x01: Failed / 0x02: USB mode
<p><i>Example,</i> <i>Request the information of the current storage media</i></p> <p><i>Host:</i> <b>0xaa 00 66 ba aa</b> <i>Wait for Response</i></p> <p><i>Camera:</i> <b>0xaa 10 66 00 66 fd 00 00 11 00 09 00 18 5f aa</b> # Length of the return = 10 bytes; Command ID to ACK = 0x66; Return = 0x0066fd00 (Empty space: 6749440 bytes), 0x0011 (File count: 17), 0x0009 (Picture left: 9), 0x0018 (Time available for AVI: 24 seconds); Checksum = 0x5f</p>	

**120 – 0x78 – Request the file information**

<b>ID</b>	0x78
<b>Description</b>	Request the targeted file information, File name, File size and Video length (For AVI ONLY) Memory Unit: Byte Time Unit: Second Parameter: File ID
<b>ID Command</b>	0xaa 02 78 ce aa
<b>Parameter Command</b>	0xaa Z <sub>3</sub> Z <sub>2</sub> Z <sub>1</sub> Z <sub>0</sub> Ch <sub>1</sub> Ch <sub>0</sub> aa Z <sub>3</sub> Z <sub>2</sub> Z <sub>1</sub> Z <sub>0</sub> : File ID 0x0001 – 0xffff (The upper limit depend on the memory size) Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Return from the JPEG Module</b>	0xY <sub>35</sub> Y <sub>34</sub> Y <sub>33</sub> Y <sub>32</sub> Y <sub>31</sub> Y <sub>30</sub> Y <sub>29</sub> Y <sub>28</sub> Y <sub>27</sub> Y <sub>26</sub> Y <sub>25</sub> Y <sub>24</sub> Y <sub>23</sub> Y <sub>22</sub> Y <sub>21</sub> Y <sub>20</sub> Y <sub>19</sub> Y <sub>18</sub> Y <sub>17</sub> Y <sub>16</sub> Y <sub>15</sub> Y <sub>14</sub> Y <sub>13</sub> Y <sub>12</sub> Y <sub>11</sub> Y <sub>10</sub> Y <sub>9</sub> Y <sub>8</sub> Y <sub>7</sub> Y <sub>6</sub> Y <sub>5</sub> Y <sub>4</sub> Y <sub>3</sub> Y <sub>2</sub> Y <sub>1</sub> Y <sub>0</sub> Y <sub>35</sub> Y <sub>34</sub> Y <sub>33</sub> Y <sub>32</sub> Y <sub>31</sub> Y <sub>30</sub> Y <sub>29</sub> Y <sub>28</sub> Y <sub>27</sub> Y <sub>26</sub> Y <sub>25</sub> Y <sub>24</sub> Y <sub>23</sub> Y <sub>22</sub> Y <sub>21</sub> Y <sub>20</sub> Y <sub>19</sub> Y <sub>18</sub> Y <sub>17</sub> Y <sub>16</sub> Y <sub>15</sub> Y <sub>14</sub> Y <sub>13</sub> Y <sub>12</sub> : Filename Y <sub>11</sub> Y <sub>10</sub> Y <sub>9</sub> Y <sub>8</sub> Y <sub>7</sub> Y <sub>6</sub> Y <sub>5</sub> Y <sub>4</sub> : File size Y <sub>3</sub> Y <sub>2</sub> Y <sub>1</sub> Y <sub>0</sub> : Video length (for AVI ONLY) / 0x01: Failed / 0x02: USB mode / 0x09: File does not exist

*Example,  
Request the information of the file of that the ID is 2*

*Host:*

**0xaa 02 78 ce aa**

**0xaa 00 02 56 aa**

*Wait for Response*

*Camera: (For requesting a JPG file)*

**0xaa 18 78 50 49 43 54 30 30 30 32 2e 4a 50 47 00  
00 00 08 0f b2 ae aa**

*# Length of the return = 18 bytes;*

*Command ID to ACK = 0x78;*

*Return = 0x50494354303030322e4a50470000  
(File name: PICT0002.JPG ),  
0x00080fb2 (File size: 528306 bytes);  
Checksum = 0x87*

*Camera: (For requesting an AVI file)*

**0xaa 20 78 50 49 43 54 30 30 30 32 2e 41 56 49 00  
00 00 22 ef 80 00 06 83 aa**

*# Length of the return = 20 bytes;*

*Command ID to ACK = 0x78;*

*Return = 0x50494354303030322e4156490000  
(File name: PICT0002.AVI ),  
0x0022ef80 (File size: 2289536 bytes),  
0x0006 (Video length: 6 seconds);  
Checksum = 0x83*



**121 – 0x79 – Download file from the JPEG Module (Function in IDLE mode ONLY)**

<b>ID</b>	0x79
<b>Description</b>	Download the targeted file from the Module (Function in IDLE mode ONLY) Parameter: File ID
<b>ID Command</b>	0xaa 02 79 cf aa
<b>Parameter Command</b>	0xaa Z <sub>3</sub> Z <sub>2</sub> Z <sub>1</sub> Z <sub>0</sub> Ch <sub>1</sub> Ch <sub>0</sub> aa Z <sub>3</sub> Z <sub>2</sub> Z <sub>1</sub> Z <sub>0</sub> : File ID 0x0000 – 0xffff (The upper limit depend on the memory size) Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Return from the JPEG Module</b>	0xY <sub>35</sub> Y <sub>34</sub> Y <sub>33</sub> Y <sub>32</sub> Y <sub>31</sub> Y <sub>30</sub> Y <sub>29</sub> Y <sub>28</sub> Y <sub>27</sub> Y <sub>26</sub> Y <sub>25</sub> Y <sub>24</sub> Y <sub>23</sub> Y <sub>22</sub> Y <sub>21</sub> Y <sub>20</sub> Y <sub>19</sub> Y <sub>18</sub> Y <sub>17</sub> Y <sub>16</sub> Y <sub>15</sub> Y <sub>14</sub> Y <sub>13</sub> Y <sub>12</sub> Y <sub>11</sub> Y <sub>10</sub> Y <sub>9</sub> Y <sub>8</sub> Y <sub>7</sub> Y <sub>6</sub> Y <sub>5</sub> Y <sub>4</sub> Y <sub>3</sub> Y <sub>2</sub> Y <sub>1</sub> Y <sub>0</sub> Y <sub>35</sub> Y <sub>34</sub> Y <sub>33</sub> Y <sub>32</sub> Y <sub>31</sub> Y <sub>30</sub> Y <sub>29</sub> Y <sub>28</sub> : File size Y <sub>27</sub> Y <sub>26</sub> Y <sub>25</sub> Y <sub>24</sub> : Number of packets Y <sub>23</sub> Y <sub>22</sub> Y <sub>21</sub> Y <sub>20</sub> Y <sub>19</sub> Y <sub>18</sub> Y <sub>17</sub> Y <sub>16</sub> Y <sub>15</sub> Y <sub>14</sub> Y <sub>13</sub> Y <sub>12</sub> Y <sub>11</sub> Y <sub>10</sub> Y <sub>9</sub> Y <sub>8</sub> Y <sub>7</sub> Y <sub>6</sub> Y <sub>5</sub> Y <sub>4</sub> Y <sub>3</sub> Y <sub>2</sub> Y <sub>1</sub> Y <sub>0</sub> : File name / 0x01: Failed / 0x02: USB mode / 0x03: Mode error / 0x09: File does not exist

*Example*

*Download the file of that the ID is 3 from the JPEG Module*

*Host:*

**0xaa 02 79 cf aa**

**0xaa 00 02 56 aa**

*Wait for Response*

*Camera:*

**0xaa 12 79 00 1a 7d 6e 00 1d 50 49 43 54 30 30 30 33 2e 41 56 49 02 aa**

*# Length of the return = 18 bytes;*

*Command ID to ACK = 0x79;*

*Return = 0x001a7d6e (File size: 1736046 bytes), 0x001d (Number of packets: 29),*

*0x50494354303030332e415649 (File name: PICT0003.AVI);*

*Checksum = 0x02*

*Host: (ACK)*

**0xaa 01 79 00 ce aa**

*Wait for Packet 0001*

*Camera:*

**0xaa 00 01 (File data: 61434 bytes) (checksum: 2 bytes) aa**

*(Packet total size: 0xf000 = 61440 bytes)*

*Host: (ACK)*

**0xaa 01 79 00 ce aa**

*Wait for Packet 0002*

*Camera:*

**0xaa 00 02 (File data: 61434 bytes) (checksum: 2 bytes) aa**

*(Packet total size: 0xf000 = 61440 bytes)*

*Host: (ACK)*

**0xaa 01 79 00 ce aa**

*Wait for Packet 0003*

.

**0xaa 00 1d (File data: 15894 bytes) (checksum: 2 bytes) aa**

*(Packet total size: 0xf000 = 15900 bytes)*

*Host: (ACK)*

**0xaa 01 79 00 ce aa**

*Download Completed*

### 122 – 0x7a – Delete the targeted file

<b>ID</b>	0x7a
<b>Description</b>	Delete the targeted file Parameter: File ID
<b>ID Command</b>	0xaa 02 7a d0 aa
<b>Parameter Command</b>	0xaa Z <sub>3</sub> Z <sub>2</sub> Z <sub>1</sub> Z <sub>0</sub> Ch <sub>1</sub> Ch <sub>0</sub> aa Z <sub>3</sub> Z <sub>2</sub> Z <sub>1</sub> Z <sub>0</sub> : File ID 0x0000 – 0xffff (The upper limit depend on the memory size) Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Return from the JPEG Module</b>	0x00: OK / 0x01: Failed / 0x02: USB mode / 0x06: External memory card write-protect / 0x09: File does not exist
<p><i>Example,</i> <i>Delete the file of that the ID is 3</i></p> <p><i>Host:</i> <b>0xaa 02 7a d0 aa</b> <b>0xaa 00 03 57 aa</b> <i>Wait for OK</i></p> <p><i>Camera:</i> <b>0xaa 01 7a 00 cf aa</b> <i># Length of the return = 1 byte;</i> <i>Command ID to ACK = 0x7a;</i> <i>Return = 0x00 (OK);</i> <i>Checksum = 0xcf</i></p>	

### 123 – 0x7b – Copy / Move the targeted file from the resident to the external memory

<b>ID</b>	0x7b
<b>Description</b>	Copy / Move the targeted file form the resident to the external memory Parameter: File ID (2 bytes), Operation (Copy / Move) (1 byte)
<b>ID Command</b>	0xaa 03 7b d2 aa
<b>Parameter Command</b>	0xaa Z <sub>5</sub> Z <sub>4</sub> Z <sub>3</sub> Z <sub>2</sub> Z <sub>1</sub> Z <sub>0</sub> Ch <sub>1</sub> Ch <sub>0</sub> aa Z <sub>5</sub> Z <sub>4</sub> Z <sub>3</sub> Z <sub>2</sub> : File ID 0x0000 – 0xffff (The upper limit depend on the memory size) Z <sub>1</sub> Z <sub>0</sub> : Operation 0x00: Copy, 0x01: Move Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Return from the JPEG Module</b>	0x00: OK / 0x01: Failed / 0x02: USB mode / 0x03: Mode error / 0x05: Not enough memory (Flash) / 0x06: External memory card write-protect 0x09: File does not exist
<p><i>Example,</i> <i>Move the file of that the ID is 3854 from the resident to the external memory</i></p> <p><i>Host:</i> <b>0xaa 03 7b d2 aa</b> <b>0xaa 0f 0e 01 7b aa</b> <i>Wait for OK</i></p> <p><i>Camera:</i> <b>0xaa 01 7b 09 d9 aa</b> <i># Length of the return = 1 byte;</i> <i>Command ID to ACK = 0x7b;</i> <i>Return = 0x09 (File does not exist);</i> <i>Checksum = 0xd9</i></p>	

### 155 –0x9b – Select the TV Standard

<b>ID</b>	0x9b
<b>Description</b>	Select the TV Standard Parameter: NTSC / PAL
<b>ID Command</b>	0xaa 01 9b f0 aa
<b>Parameter Command</b>	0xaa Z <sub>1</sub> Z <sub>0</sub> Ch <sub>1</sub> Ch <sub>0</sub> aa Z <sub>1</sub> Z <sub>0</sub> : NTSC / PAL 0x00: NTSC, 0x01: PAL (Default) Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Return from the JPEG Module</b>	0x00: OK 0x01: Failed
<p><i>Example,</i> <i>Select NTSC as the TV standard</i></p> <p><i>Host:</i> <b>0xaa 01 9b f0 aa</b> <b>0xaa 00 54 aa</b> <i>Wait for OK</i></p> <p><i>Camera:</i> <b>0xaa 01 9b 00 f0 aa</b> <i># Length of the return = 1 byte;</i> <i>Command ID to ACK = 0x9b;</i> <i>Return = 0x00 (OK);</i> <i>Checksum = 0xf0</i></p>	

### 156 – 0x9c – Request the TV connection status

<b>ID</b>	0x9c
<b>Description</b>	Request the TV connection status Parameter: n/a
<b>ID Command</b>	0xaa 00 9c f0 aa
<b>Parameter Command</b>	n/a
<b>Return from the JPEG Module</b>	0x07: Connect / 0x08: Disconnect
<p><i>Example,</i> <i>Request the TV connection status</i></p> <p><i>Host:</i> <b>0xaa 00 9c f0 aa</b> <i>Wait for Response</i></p> <p><i>Camera:</i> <b>0xaa 01 9c 08 f9 aa</b> <i># Length of the return = 1 byte;</i> <i>Command ID to ACK = 0x9c;</i> <i>Return = 0x08 (Disconnect);</i> <i>Checksum = 0xf9</i></p>	

**159 – 0x9f – Select the Baud rate**

<b>ID</b>	0x9f
<b>Description</b>	Select the Baud rate Parameter: 115200 / 57600
<b>ID Command</b>	0xaa 01 9f f4 aa
<b>Parameter Command</b>	0xaa Z <sub>1</sub> Z <sub>0</sub> Ch <sub>1</sub> Ch <sub>0</sub> aa Z <sub>1</sub> Z <sub>0</sub> : Baud rate 0x04: 57600bps, 0x05: 115200bps (Default) Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Return from the JPEG Module</b>	0x00: OK / 0x01: Failed
<p><i>Example,</i> <i>Select 115200bps for baud rate</i></p> <p><i>Host:</i> <b>0xaa 01 9f f4 aa</b> <b>0xaa 05 59 aa</b> <i>Wait for OK</i></p> <p><i>Camera:</i> <b>0xaa 01 9f 00 f4 aa</b> <i># Length of the return = 1 byte;</i> <i>Command ID to ACK = 0x9f;</i> <i>Return = 0x00 (OK);</i> <i>Checksum = 0x5f</i></p>	

**169 – 0xa9 – Request the connection status of the external memory**

<b>ID</b>	0xa9
<b>Description</b>	Request the connection status of the external memory Parameter: n/a
<b>ID Command</b>	0xaa 00 a9 fd aa
<b>Parameter Command</b>	n/a
<b>Return from the JPEG Module</b>	0x06: External memory card write-protect / 0x07: Connect / 0x08: Disconnect
<p><i>Example,</i> <i>Request the connection status of the external memory</i></p> <p><i>Host:</i> <b>0xaa 00 a9 fd aa</b> <i>Wait for Response</i></p> <p><i>Camera:</i> <b>0xaa 01 a9 07 05 aa</b> <i># Length of the return = 1 byte;</i> <i>Command ID to ACK = 0xa9;</i> <i>Return = 0x07 (connect);</i> <i>Checksum = 0x05</i></p>	

**176 – 0xb0 – Synchronization signal**

<b>ID</b>	0xb0
<b>Description</b>	Send this command to the camera for synchronization until receiving “OK” Parameter: n/a
<b>ID Command</b>	0xaa 00 b0 04 aa
<b>Parameter Command</b>	n/a
<b>Return from the JPEG Module</b>	0x00: OK
<i>Example, Send a series of sychronization signal to the camera</i>	
<p><i>Host:</i>  <b>0xaa 00 b0 04 aa</b>  <i>Wait for Response (10ms for 115200bps)</i>  <i>Camera:</i>  <i>No response</i></p> <p><i>Host:</i>  <b>0xaa 00 b0 04 aa</b>  <i>Wait for Response (10ms for 115200bps)</i>  <i>Camera:</i>  <i>No response</i></p> <p style="text-align: center;">.</p> <p style="text-align: center;">.</p> <p style="text-align: center;">.</p> <p><i>Host:</i>  <b>0xaa 00 b0 04 aa</b>  <i>Wait for Response (10ms for 115200bps)</i>  <i>Camera:</i>  <b>0xaa 01 b0 00 05 aa</b>  <i># Length of the return = 1 byte;</i>  <i>Command ID to ACK = 0xb0;</i>  <i>Return = 0x00 (OK);</i>  <i>Checksum = 0x05</i></p>	

### 200 – 0xc8 – Playback the current AVI

<b>ID</b>	0xc8
<b>Description</b>	Playback the current AVI Parameter: Play / Pause / Stop / Fast Forward / Backward
<b>ID Command</b>	0xaa 01 c8 1d aa
<b>Parameter Command</b>	0xaa Z <sub>1</sub> Z <sub>0</sub> Ch <sub>1</sub> Ch <sub>0</sub> aa Z <sub>1</sub> Z <sub>0</sub> : Playback operation 0x00: Play, 0x01: Pause, 0x02: Stop, 0x03: Fast Forward, 0x04: Backward Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Return from the JPEG Module</b>	0x00: OK / 0x01: Failed / 0x02: USB mode / 0x03: Mode error
<p><i>Example.</i></p> <p><i>Play the current AVI</i></p> <p><i>Host:</i> 0xaa 01 c8 1d aa 0xaa 00 54 aa Wait for OK</p> <p><i>Camera:</i> 0xaa 01 c8 00 1d aa # Length of the return = 1 byte; Command ID to ACK = 0xc8; Return = 0x00 (OK); Checksum = 0x1d</p>	

### 201 – 0xc9 – Select the Previous / Next file

<b>ID</b>	0xc9
<b>Description</b>	Select the Previous / Next file Parameter: Previous / Next
<b>ID Command</b>	0xaa 01 c9 1e aa
<b>Parameter Command</b>	0xaa Z <sub>1</sub> Z <sub>0</sub> Ch <sub>1</sub> Ch <sub>0</sub> aa Z <sub>1</sub> Z <sub>0</sub> : Direction 0x00: Previous, 0x01: Next Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Return from the JPEG Module</b>	0x00: OK / 0x01: Failed / 0x02: USB mode / 0x03: Mode error
<p><i>Example</i></p> <p><i>Select the next file</i></p> <p><i>Host:</i> 0xaa 01 c9 1e aa 0xaa 01 55 aa Wait for OK</p> <p><i>Camera:</i> 0xaa 01 c9 00 1e aa # Length of the return = 1 byte; Command ID to ACK = 0xc9; Return = 0x00 (OK); Checksum = 0x1e</p>	

**202 – 0xca – Select a particular file**

<b>ID</b>	0xca
<b>Description</b>	Select a particular file Parameter: File ID
<b>ID Command</b>	0xaa 02 ca 20 aa
<b>Parameter Command</b>	0xaa Z <sub>3</sub> Z <sub>2</sub> Z <sub>1</sub> Z <sub>0</sub> Ch <sub>1</sub> Ch <sub>0</sub> aa Z <sub>3</sub> Z <sub>2</sub> Z <sub>1</sub> Z <sub>0</sub> : File ID 0x0000 – 0xffff (The upper limit depend on the memory size) Ch <sub>1</sub> Ch <sub>0</sub> : Checksum
<b>Return from the JPEG Module</b>	0x00: OK / 0x01: Failed / 0x02: USB mode
<p><i>Example,</i> <i>Select the file of that the ID is 20</i></p> <p><i>Host:</i> <b>0xaa 02 ca 20 aa</b> <b>0xaa 00 14 68 aa</b> <i>Wait for OK</i></p> <p><i>Camera:</i> <b>0xaa 01 ca 00 1f aa</b> <i># Length of the return = 1 byte;</i> <i>Command ID to ACK = 0xca;</i> <i>Return = 0x00 (OK);</i> <i>Checksum = 0x1f</i></p>	

## **Document Change Log**

**1. May 2, 2006 – official released v1.0**