



Shenzhen Quick Zoom Technology Co., Ltd

## 0.3 & 1.3 & 5.0 Megapixel Serial Interface Camera (ZM Series)

### Communication Protocol

( Version A1.3, updated on August 24, 2011 )

Notice:

1. This protocol applies to 0.3 Mega pixels, 1.3 Mega pixels and 5.0 Mega pixel Camera;
2. This protocol applies to RS485, RS232 and TTL camera;
3. The camera ID is always “zero” for RS232 and TTL camera.

The information in this manual was current when published. The manufacturer reserves the right to revise and improve its product. All specifications are therefore subject to change without any notice.

#### 1. General Description

ZM Serial Camera series has a standard RS232/RS485 interface; it supports RS232 and TTL input/output signals and can connect to PC or any other device with RS232/RS485 interface. The communication speed (baud rate) can be set as 2400 bps, 9600bps, 14400 bps, 19200bps, 38400bps, 57600bps, 115200pbs (default value).

#### 2. Data Frame Type

There are three types of data frame transmitting between camera and host, they are: Command Frame, ACK/NAK Frame and Data Frame.

### Structure of command frame:

Data Header "U" (1byte)	Command Byte (1byte)	Camera ID (1byte)	Command Content (0—n bytes)	"#" (1byte)
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Notice: 1. The details of **command byte** advised in chart 1.

2. The length of command content is subject to specific command byte.

3. Camera ID varies from 0 to 33. If the command is 0xff, the firmware performs it immediately.

4. The command frame is used to set the working status of serial camera and start up snapshotting.

### Structure of ACK/NAK frame

#### ACK

Data Header "U" (1byte)	Received Command Byte (1byte)	Camera ID (1byte)	"#" (1byte)
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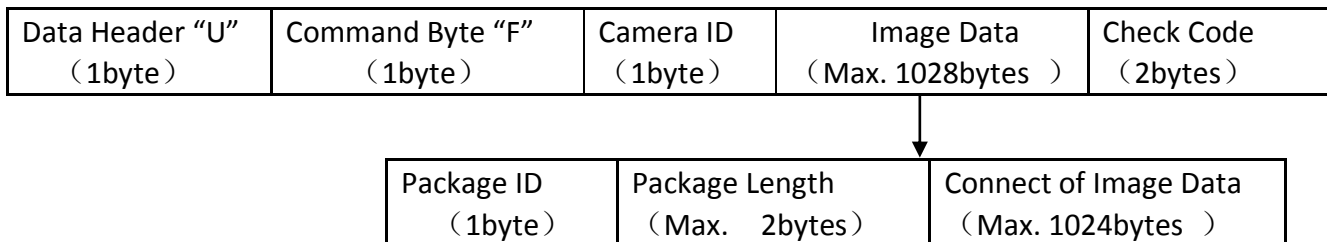
An ACK will be sent out by receiver after receiving expected (correct) commands frame.

#### NAK

Data Header "U" (1byte)	? (1byte)	Camera ID (1byte)	"#" (1byte)
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A NAK will be sent out by receiver after receiving unexpected command or failing to process incoming command.

### Structure of data frame



Notice:

- (1) All data transmits from LSB;
- (2) All package size except the last one equals to the one set by snapshot command, the last one varies for different image.
- (3) Check sum equals to the sum of the whole package data except the check sum field( from U to the byte before check sum field)

### 3. Command Instruction

△Chart 1

Command Byte	Command Content	Description	Example
<b>I</b>	Change the baud rate of camera '0' represents 9600 '1' represents 19200 '2' represents 38400 '3' represents 57600 '4' represents 115200 '5' represents 2400 '6' represents 14400	Host issues this command to change the baud rate of camera, and an ACK will be sent out by camera after receiving incoming command.  Camera will keep using this changed baud rate to communicate with host once the baud rate is changed successfully.	UI 01 <b>3</b> # Hexadecimal representation (55 49 01 <b>33</b> 23 ) Change the baud rate of no.1(camera ID) camera to 57600, and camera responds "UI 01 # (55 49 01 23)" to host after receiving incoming command
<b>H</b>	1Byte : Image(Picture) size 1: 160×128 pixel 2: 320×240 pixel 3: 640×480 pixel 4: 1280X1024 pixel (the last one is used for 1.3megapixel camera)  2Bytes: package size (hexadecimal representation)	Host issues this command for requesting camera to snapshot a picture of specified size and divide it into packages according to directed size, and "UH # " responded by camera after receiving incoming command. )	UH 0x01 2 0x00 0x02 # Hexadecimal representation (55 48 01 32 00 02 23 )  No.1 ( camera ID ) camera snapshots a picture with size 320x240 and divide it into packages according to the size of 512 bytes
<b>R</b>	4Bytes: Snapshot size (hexadecimal representation)  2Bytes: number of data packages (hexadecimal representation)	Camera issues this command to report the size of the snapshot and the number of data packages	UR 0X01 0x00 0x5C 0x00 0x00 0x2E 0x00 # Hexadecimal representation (55 58 01 <b>00 5C 00 00</b> <b>2E 00</b> 23 )  <b>"00 5C 00 00" these 4bytes represents snapshot size</b>  <b>"2E 00" these 2bytes represents the number of data packages</b>  No.1 ( camera ID ) camera reports the picture data size is 23K and the number of data packages is 46
<b>E</b>	2bytes: package ID (hexadecimal representation)	Host issues this command to camera for getting the package with desired package ID	U E 0X01 0x2E 0x00 # Hexadecimal representation (55 45 01 <b>2E 00</b> 23 )  Get the package with package ID <b>46</b> from No. 1 camera

<b>F</b>	<p>2bytes: package ID (hexadecimal representation)</p> <p>2Bytes:Package Size (hexadecimal representation, without including the fields of package ID and check sum)</p> <p>n Bytes : Image Data</p> <p>2Byte: Check Sum (the sum of the whole package data except the check sum field)</p>	Camera transmits the data of specified package to host	<p>UF 0X01 0x2E 0x00 0x00 0x02 .....Data Content..... 0x1E 0x13 Hexadecimal representation (55 46 01 2E 00 00 02+image data+check sum )</p> <p>No.1 camera transmits the package with package ID 46, package size is 512 and check sum is 1E13.</p>
<b>D</b>	1Byte: The changed camera ID (hexadecimal representation)	Host issues this command to change the ID No. of camera	<p>UD 0x01 0x02 # Change the ID No. of camera from 1 to 2</p> <p>UD 0xFF 0x02 # All the ID no. will be changed to 2 after cameras receiving this command</p>
<b>Q</b>	<p>Set the compression ratio of camera, it can vary from 20 to 250</p> <p>Note: 1. Defaulted compression rate is 150 or 160 2. Higher compression rate means smaller size picture, but the picture quality is not as good as the one captured under lower compression rate</p>	<p>Set the compression rate: For example: Host issues command: UQ 01 30#</p> <p>Camera responds: UQ 01#, it means the compression rate is set success</p>	<p>UQ 01 30#(55 51 01 30 23) Change the compression rate of No.1 camera to 30</p> <p>Camera responds (ACK command): UQ 01 #(55 51 01 23)</p>

**Notice: All letters are capitalized, and command can be represented as hexadecimal.**

## 5. Receiving Data Rule

**Judging the received data frame correct or not, just need to check its length.**

**E.g.**

**“R”** data frame: 10 bytes:

1byte ('U') +1byte ('R') +1byte(Camera ID No.) +4bytes (Image Size) +  
2bytes(Quantity of sub-package) +1byte('#');

**“E”** command frame: 6 bytes:

1byte ('U') +1byte ('E') +1byte (Camera ID No.) +2bytes (Package ID) + 1byte ('#');

“F” command frame: 9+N bytes, “N” means the quantity of byte of image data  
1byte ('U') +1byte('F') +1byte(Camera ID No.) + 2bytes (package ID) +  
2bytes (size of valid data in this package)+ N bytes(content of image data in this package)  
+ 2bytes (check sum field);

6. Communication Processing between Camera and Host

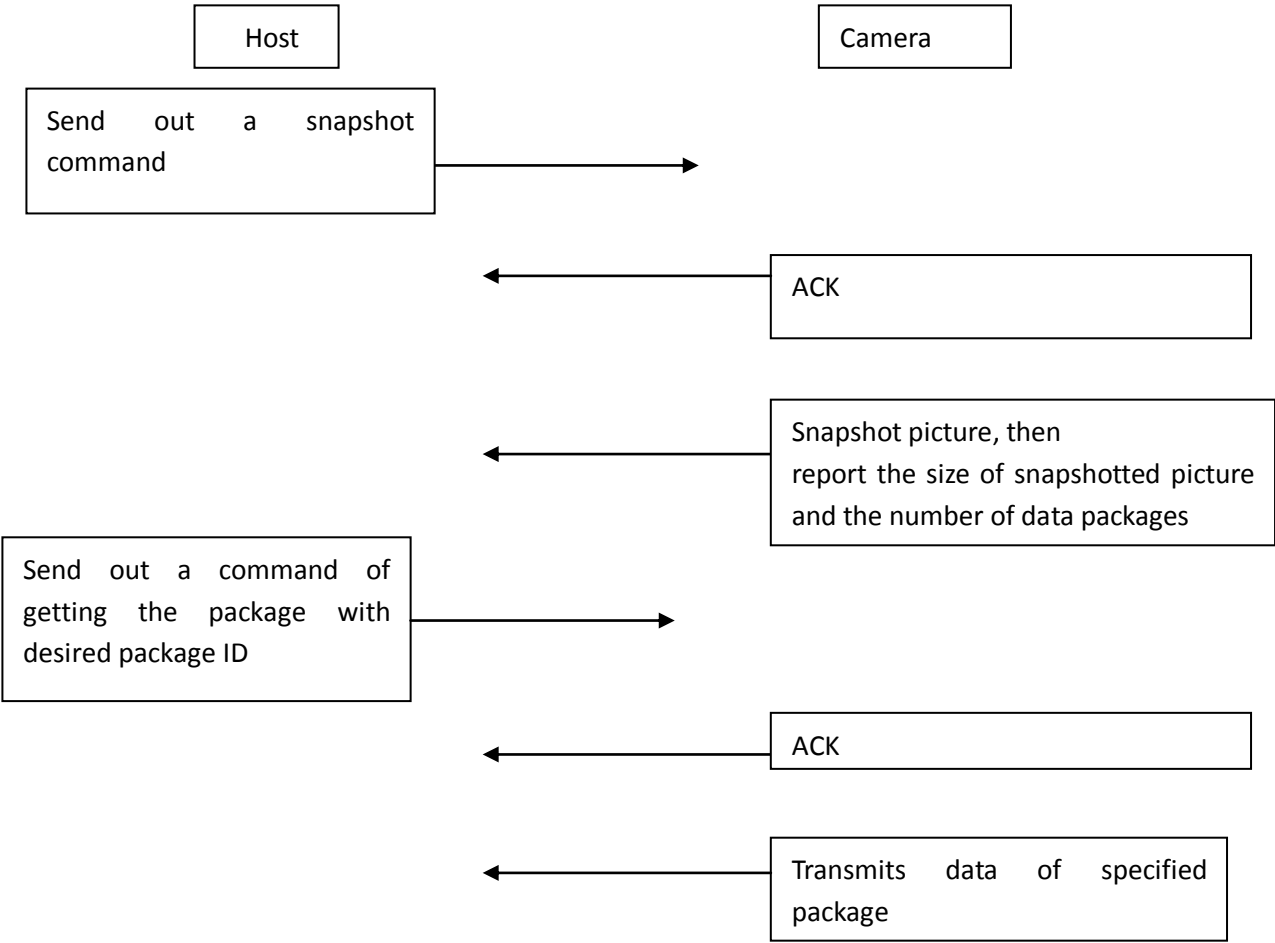
Notice for communication of 0.3 Mega pixels Camera:

- 1. The camera should be initialed after power on, and it takes about 2S to complete the initialization.
- 2. The consumed time of snapshotting: it takes  $T_p$  to snapshot a picture after camera receiving the snapshot command. The min. of  $T_p$  is 200ms is that when takes a white-black picture.

Notice for communication of 1.3 Mega pixels Camera:

- 1. The camera should be initialed after power on, and it takes about 16S-30S to complete the initialization.
- 2. The consumed time of snapshotting: it takes  $T_p$  to snapshot a picture after camera receiving the snapshot command. The min. of  $T_p$  is 150ms, if the current picture size is not the expected one which will be snapshotted, the configuration of camera should be reset, and then, the  $T_p$  is about 3s.

Snapshot a single picture (snapshot a picture of specified size)



E.g.

Host requests to snapshot a picture with size 160x128 from no.1 (camera ID) camera:

- (1) Host sends out snapshot command as follows:



UE 0x01 # ( 55 45 01 23 )

And then camera transmits the data of the sixth package:

//UF the sixth package 116bytes

( the last package is not full of 512bytes, the actual size is 1801 )

554606001801693484D20026909A696A4C93484422A1B9E262C380DC8A941A528B201B8E00AAB8342DC6A97B7  
9FEBEE1DC7A741F9557DCCDD4D5B48ADD4648DC7D2A749E341F2C23FEFAA134B61599452091FEEA1356134D9  
DFAA85AB1F6C973F290A3D00A63CAF21CBB1345C761DFD98B1F32CC00F4C54A21B28C6465CFD0D57CD2E695D  
8EC59F3D02E16203F1A8CCAC7BFE951668CD21D87E68CD33346EA007E69334C2D49BA8B8126EA6934DC934633  
45C2C05A93934E0B4F0940116DA50952EDC518A0928034A0D301A5069B192034A0D301A5CD202406941A8F751  
BA8192E6973516EA50690C97349BA9A3EB4A0501617752649A705A784A03423C5382D481453B02815C88253C2  
629F8A3140AE3714B4B8A5E2810DC518A7710188 //Check Sum

All data is transmitted to host according to the above way.