

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"	Command Byte	Camera ID	Command Content	"#"
(1byte)	(1byte)	(1byte)	(0——n bytes)	(1byte)

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"	Received Command Byte	Camera ID	"#"
(1byte)	(1byte)	(1byte)	(1byte)

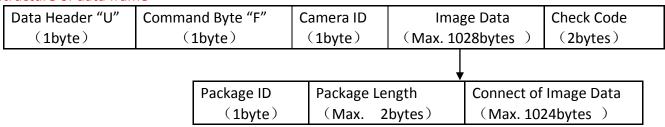
An ACK will be sent out by receiver after receiving expected (correct) commands frame.

NAK

Data Header "U"	?	Camera ID	"#"
(1byte)	(1byte)	(1byte)	(1byte)

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

∆Cnart	<u> </u>		
Command Byte	Command Content	Description	Example
I	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 3 # Hexadecimal representation (55 49 01 33 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
Н	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
R	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 00 5C 00 002E 00 23) "00 5C 00 00" these 4bytes represents snapshot size "2E 00" these 2bytes represents the number of data packages No.1 (camera ID) camera reports the picture data size is 23K and the number of data packages is 46
E	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 2E 00 23) Get the package with package ID 46 from No. 1 camera

F	2bytes: package ID	Camera transmits the data of	UF 0X01 0x2E 0x00 0x00 0x02
	(hexadecimal representation)	specified package to host	Data Content
			0x1E 0x13
	2Bytes:Package Size		Hexadecimal representation
	(hexadecimal representation,		(55 46 01 2E 00 00 02+image
	without including the fields of		data+check sum)
	package ID and check sum)		
	,		No.1 camera transmits the
	n Bytes : Image Data		package with package ID 46,
	m Bytes i illiage Bata		package size is 512 and check
	2Byte: Check Sum (the sum of		sum is 1E13.
	the whole package data except		Suili is 1L13.
	the check sum field)		
D	,	Host issues this sommand to	UD 0x01 0x02 #
l b	1Byte: The changed camera ID	Host issues this command to	
	(hexadecimal representation)	change the ID No. of camera	Change the ID No. of camera
			from 1 to 2
			UD 0xFF 0x02 #
			All the ID no. will be changed to
			2 after cameras receiving this
			command
Q	Set the compression ratio of	Set the compression rate:	UQ 01 30#(55 51 01 30 23)
	camera, it can vary from 20 to	For example:	Change the compression rate of
	250	Host issues command:	No.1 camera to 30
		UQ 01 30#	
	Note:		Camera responds
	1. Defaulted compression rate	Camera responds:	(ACK command):
	is 150 or 160	UQ 01#, it means the	UQ 01 #(55 51 01 23)
	2. Higher compression rate	compression rate is set	,
	means smaller size picture, but	success	
	the picture quality is not as good		
	as the one captured under lower		
	compression rate		
	compression rate		

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.

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E.g.
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"R" data frame: 10 bytes:
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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

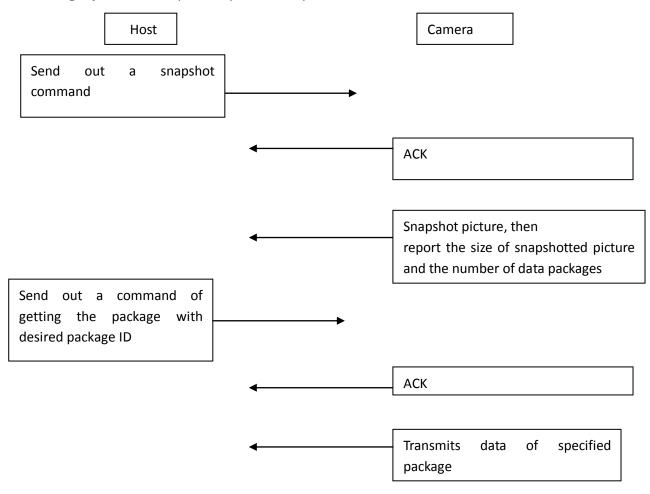
Notice for communication of 0.3 Mega pixels Camera:

- 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)



Ł.g.

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

(1) Host sends out snapshot command as follows:

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UH 0x01 1 0x00 0x02 #(55 48 01 32 00 02 23) //(snapshot a picture with size 160X128, and divide it into
packages with size 512bytes.)
ACK from camera:
 UH 0x01 # (55 48 01 23 ) //ACK command frame
Then camera reports the information of the snapshotted picture (image) data:
 UR 0x01 0x74 0x0A 0x00 0x00 0x06 0x00 #
                                             //snapshot size is 2676bytes, number of packages is 6.
  UE 0x01 0x01 0x00 # (55 45 01 01 00 23 )
                                               //Request to get the data of first package
 ACK from camera:
```

(2) Host sends out command of getting the package with desired package ID:

UE 0x01 # (55 45 01 23)

And then camera transmits the data of first package as follows:

```
//UF the first package 520bytes
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5546<mark>01000002</mark>FFD8FFE000114A464946000102030405060708090AFFDB004300100C0C0E0C0A100E0E0E1212101 418281A181616183224261E283A343E3C3A34383840485C4E404458463838506E525860626868683E4E727A7064 00000000000102030405060708090A0BFFC400B5100002010303020403050504040000017D0102030004110512 2131410613516107227114328191A1082342B1C11552D1F02433627282090A161718191A25262728292A343536 3738393A434445464748494A535455565758595A636465666768696A737475767778797A838485868788898A929 39495969798999AA2A3A4A5A6A7A8A9AAB2B3B4B5B6B7B8B9BAC2C3C4C5C6C7C8C9CAD2D3D4D5D6D7D8D9D 405060708090A0BFFC400B511000201020404030407050404000102770001020311040521310612415107617113 22328108144291A1B1C109233352F0156272D10A162434E125F11718191A262728292A35363738393A43444546 4748494A535455565758595A6364650006 //check sum

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Host sends out:
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UE 0x01 0x02 0x00 # (55 45 02 02 00 23) // Request to get the data of second package ACK from camera:

0x01 # (55 45 02 23)

And then camera transmits the data of second package:

//UF the second package 520bytes

5546<mark>02000002</mark>7475767778797A82838485868788898A92939495969798999AA2A3A4A5A6A7A8A9AAB2B3B4B5B 6B7B8B9BAC2C3C4C5C6C7C8C9CAD2D3D4D5D6D7D8D9DAE2E3E4E5E6E7E8E9EAF2F3F4F5F6F7F8F9FAFFC00011 08008000A003012200021101031101FFDA000C03010002110311003F00E934E9231690CED1992793BE31C67078F A7F2AD6B70CB028906D6F4CD430C969112B16010013807BF23F9D5A2096539E9DBD686F4B19A168A28A4329EA 881EC1FD8823F3AE4EE5765C230E3A1CFE35D8DE2EEB4917D4572B78A08FC3FAD6B4C3A0CD5154EB12EC5DB8C 2E07183B40FE75DA57157EE1AF9A41DC293F5DA33FAD749A35CACFA7A26ECBC636B0F41938FD289AD0465B851 E32DCD8C6E03F1F2C549E27404DA7FC0FF00F65A86E7E5F150247FCB58C7FE3AB56BC46326D7FE05FD28EA85D6 E6ED14515914145145001451450067EB480E9539F61FCC566D94132F877308CB3B17EA38C1F7FA569EB4C069536 7BE00FCC553824F2BC2523E718864C7D7271557B442C72167034BA836D1911C65DBD8703FA8A76A134912208D B05B3938AB5A3286BAB894A6E0A00FBD8EA7FF00AD5775482D255791A3C4D818393FFEAABBDF40EA58D37505 9ED0DC344864023DC79F9B8C7D076ED5D4D725E1CB6173A7C60270010ED9E9F313FD2BAC1850173CE2A256B21 585A28A2A464738DD0B0AE4EEFA0FF76BB0EA2B9900F4 //check sum

Host sends out:

UE 0x01 0x06 0x00 # (55 45 01 06 00 23) // Request to get the data of the last package(the sixth package) ACK from camera:

UE 0x01 # (55 45 01 23)

And then camera transmits the data of the sixth package:

//UF the sixth package 116bytes

(the last package not full of 512bytes, the actual size is 1801) 5546<mark>060018016</mark>93484D20026909A696A4C93484422A1B9E262C380DC8A941A528B201B8E00AAB8342DC6A97B7 9FEBEE1DC7A741F9557DCCDD4D5B48ADD4648DC7D2A749E341F2C23FEFAA134B61599452091FEEA1356134D9 DFAA85AB1F6C973F290A3D00A63CAF21CBB1345C761DFD98B1F32CC00F4C54A21B28C6465CFD0D57CD2E695D 8EC59F3D02E16203F1A8CCAC7BFE951668CD21D87E68CD33346EA007E69334C2D49BA8B8126EA6934DC934633 45C2C05A93934E0B4F0940116DA50952EDC518A0928034A0D301A5069B192034A0D301A5CD202406941A8F751 BA8192E6973516EA50690C97349BA9A3EB4A0501617752649A705A784A03423C5382D481453B02815C88253C2 629F8A3140AE3714B4B8A5E2810DC518A7710188 //Check Sum

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