



CMOS TYPE CAMERA

JC409M-W01

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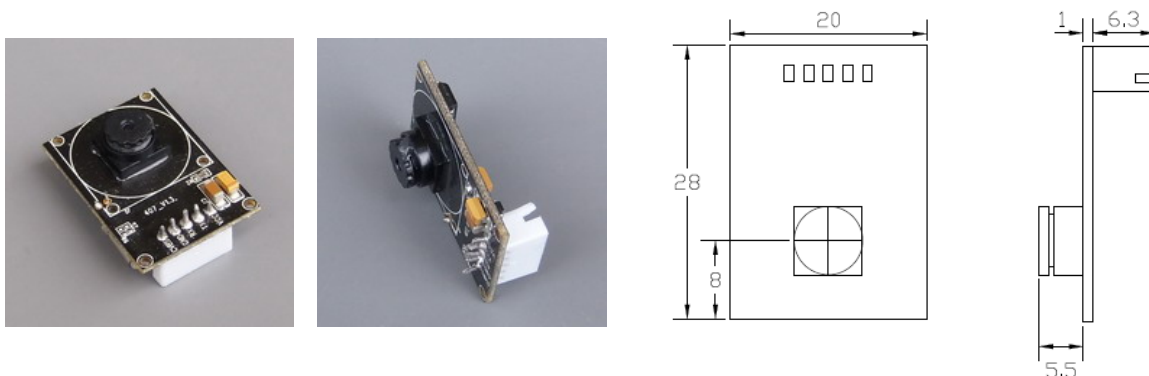
◆ Application

The JC409M-W01 JPEG compression module performs as a video camera or a JPEG compressed still camera and can be fixed into all kinds of system. For example: remote monitoring, vehicle monitoring, visible the doorbell, camera phones, digital image records, industry control, access control, etc. Users can send out a snapshot command from the host in order to capture a full resolution single-frame still picture. The picture is then compressed by the JPEG engine and transferred to the host.

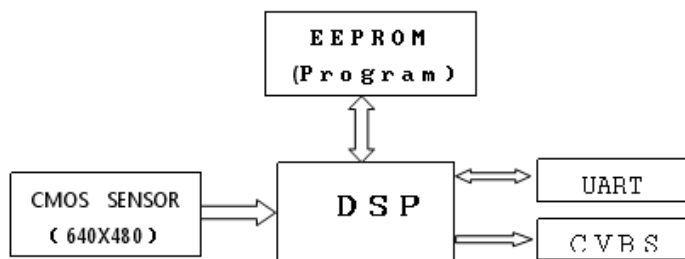
◆ Feature

1. Small size: 28mm x 20mm (L x W).
2. 0.3M CMOS sensor, VGA resolution, down sample to QVGA.
3. Video-out: VGA & 60fps, optional.
4. Low power consumption, 3.3V operation.
5. UART interface support up to 115.2Kbps.
6. Built-in JPEG CODE.
7. Built-in lens, optional.

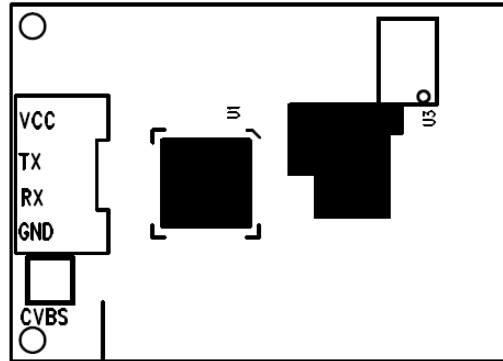
◆ Outline



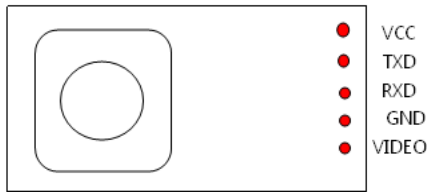
◆ Block Diagram



◆ Board Layout



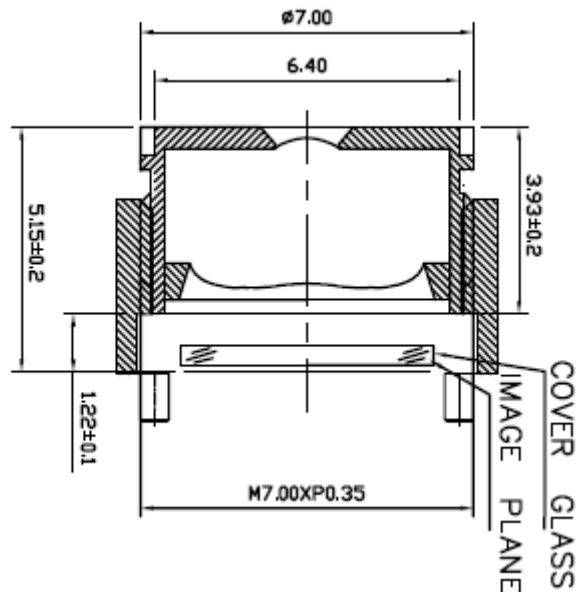
◆ Pin Function



| PIN | Description |
|-------|---------------------|
| VCC | Power 3.3VDC |
| TXD | Data Transmit(3.3V) |
| RXD | Data Receive (3.3V) |
| GND | Power Ground |
| VIDEO | 1V p-p |

*The default socket is 4 pins, we will not assemble the fifth pin (Video out) unless user specify.

◆ Lens Structure



◆ Specification

| Item | Specification | Remark |
|-------------------|----------------------------------|--------------------|
| Pixel Size | PAL:628 x 582 / NTSC:510 x 492 | NTSC default |
| Image Sensor | 1/5" | CMOS sensor OV7740 |
| Baud Rate | 9.6Kbps~115.2Kbps | 115.2Kbps default |
| Output | TTL | |
| Video Output | VGA & 60fps | 1V _{p-p} |
| Operating Voltage | 3.3V±10% | |
| Working Current | 110 mA | |
| Lens | Construction: 4P+IR filter | |
| | Effective Focal Length:3.27mm | |
| | F#:2.5 | |
| | FOV:58° | |
| | Distortion <1.0% | |
| | Relative illumination: 60% Ø3.44 | |
| Operating Temp. | -20°C~+60°C | |

User Manual

1. Serial Interface

1.1 Baud Rate

JC409M-W01 supports total 5 types of baud rate: 9,600bps, 19,200bps, 38,400bps, 57,600bps and 115,200bps. **Default** baud rate is **115,200bps**. In other words, host needs to use 115200bps at the first connection with JC409M-W01. After the first connection, host can change the baud rate to other supported values.

1.2 Single Byte Timing Diagram

A single byte RS-232 transmission consists of one start bit, 8-bit contents and one 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.

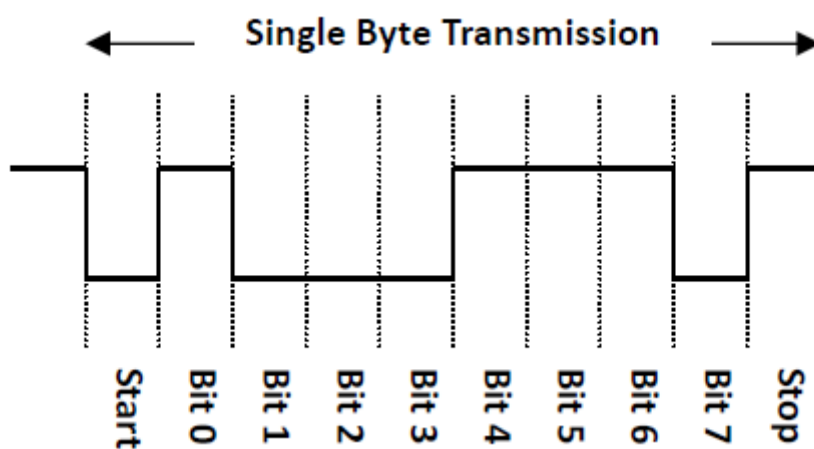


Figure 5 RS232 communications – single byte timing diagram

1.3 Command Timing Diagram

A single command consists of 4 or more (depends on **data length's** value) continuous single byte RS-232 transmissions. The following is an example of **GET VERSION** (56h, 00h, 11h, 00h) command.

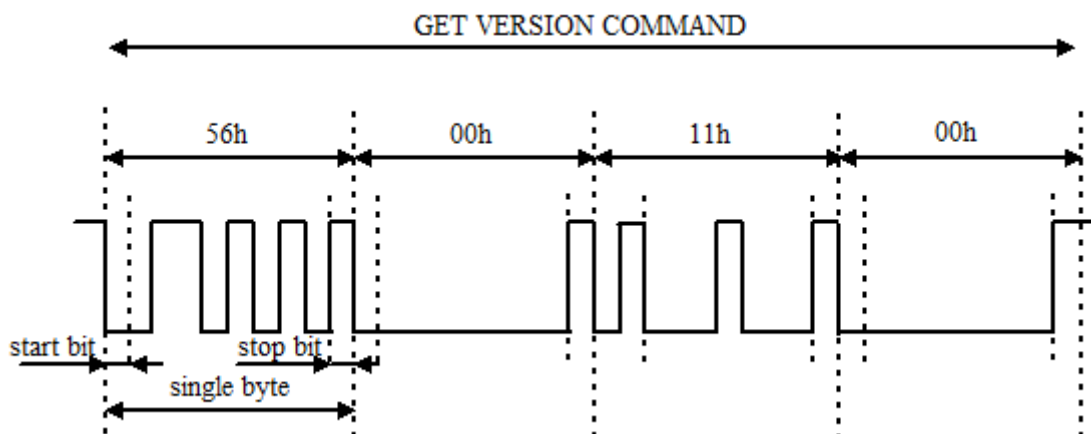


Figure 6 GET VERSION command timing diagram

1.4 Command summary

| Command | Functions |
|-------------------|---|
| GET VERSION | Get Firmware version information |
| SYSTEM RESET | System reset |
| FBUF CTRL | Control frame buffer |
| GET FBUF LEN | Get image lengths in frame buffer |
| READ FBUF | Read frame buffer |
| SET BAUDRATE | Set serial baud rate |
| SET SAMPLESIZE | Set image size(VGA/QVGA) |
| SET COMPRESSRATIO | Set image compressed rate |
| COM REPLY | Host will get reply command from JC409M-W01 |

Table 1 command summary

1.5 Command format

Protocol sign(1byte) + Serial No.(1byte) + Command(1byte) + Data length(1byte) + Control data(nbytes)

Protocol sign: This one byte field indicates the transmitting mode of the command.

| Protocol sign | value | definitions |
|------------------|-------|---|
| Sending command | 56h | The command is sent from the host to JC409M-W01 |
| Replying command | 76h | Command is received from JC409M-W01 to the host |

Table 2 protocol sign

Serial No.: Now this one byte field is invariably set to 0.

Command: This one byte field indicates the command function. About the detail, please refer to Table 3 command set.

Data length: This one byte field specifies the total length in bytes of **control data** by which is followed.

Control data: The data of this field is only meaningful when **Data length** is not equal to 0. This data depends on the different commands. About the details, please refer to the following sections.

1.6 Command protocol

| Command name | Protocol sign | Serial No. | Command value | Data length | Control data |
|-------------------|---------------|------------|---|-------------|--|
| GET VERSION | 56h | 00h | 11h | 00h | Don't care |
| SYSTEM RESET | 56h | 00h | 26h | 00h | Don't care |
| FBUF CTRL | 56h | 00h | 36h | 01h | To know data vaule of this field, please refer to the following sections |
| GET FBUF LEN | 56h | 00h | 34h | 01h | |
| READ FBUF | 56h | 00h | 32h | 0Ch | |
| SET BAUDRATE | 56h | 00h | 31h | 06h | To know data vaule of this field, please refer to the following sections |
| SET SAMPLESIZE | 56h | 00h | 31h | 05h | |
| SET COMPRESSRATIO | 56h | 00h | 31h | 05h | |
| COM REPLY | 76h | 00h | Depends on the different sending commands. To know data value of this field, please refer to the following sections | | |

Table 3 Command set

1.6.1 GET VERSION Command

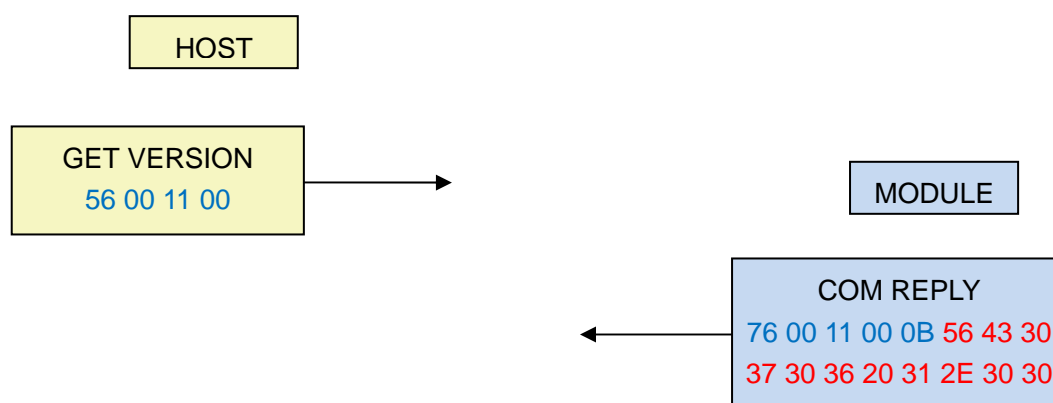
The GET VERSION command is used to get version information of the firmware running in JC409M-W01.

1.6.1.1 Command format: 56 00 11 00

1.6.1.2 COM REPLY: 76 00 11 00 0B 56 43 30 37 30 36 20 31 2E 30 30 ("VC0706 1.00")

6.6.1.3 Communication protocol:

To get the firmware version, please follow the below operations:



1.6.2 SYSTEM RESET Command

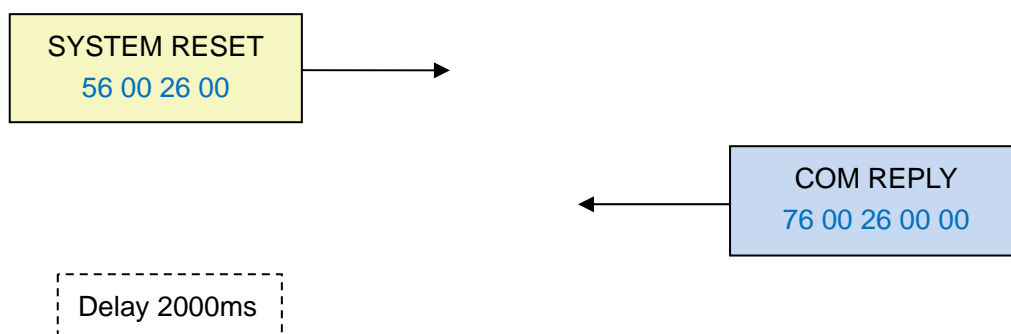
The SYSTEM RESET command is issued by the host in the following case:

- ✧ There is always no reply after several commands were sent by host.

1.6.2.1 Command format: 56 00 26 00

1.6.2.2 COM REPLY: 76 00 26 00 00

1.6.2.3 Communication protocol:



When the host has received the correct COM REPLY [76 00 26 00 00], after about ten milliseconds, JC409M-W01 is going to restart. About 2s later, JC409M-W01 works normally as usual.

1.6.3 FBUF CTRL command

The FBUF CTRL command is used to stop current frame image data update in frame buffer in order to get current frame still image.

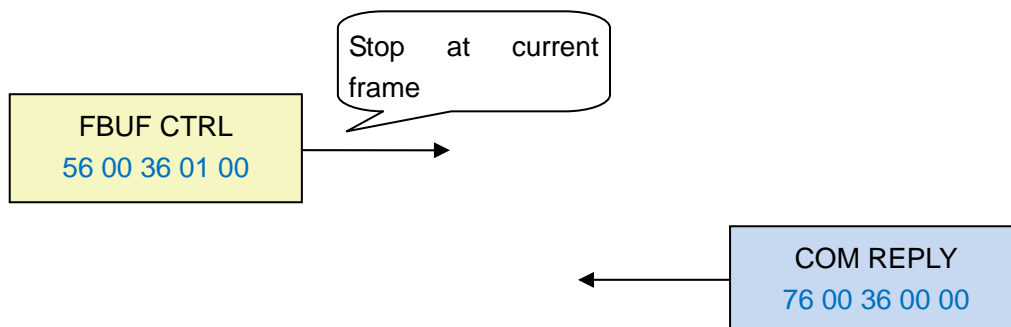
1.6.3.1 Command format: 56 00 36 01 P1 where P1 (one byte) is the control parameter of video frame buffer. Table 4 lists out the definition of P1.

| Frame control parameter (P1) | Definition |
|------------------------------|--|
| 0 | Stop frame buffer data update at current frame |
| 3 | Resume normal video state |

Table 4 Frame control parameter

1.6.3.2 COM REPLY: 76 00 36 00 00

1.6.3.3 Communication protocol:



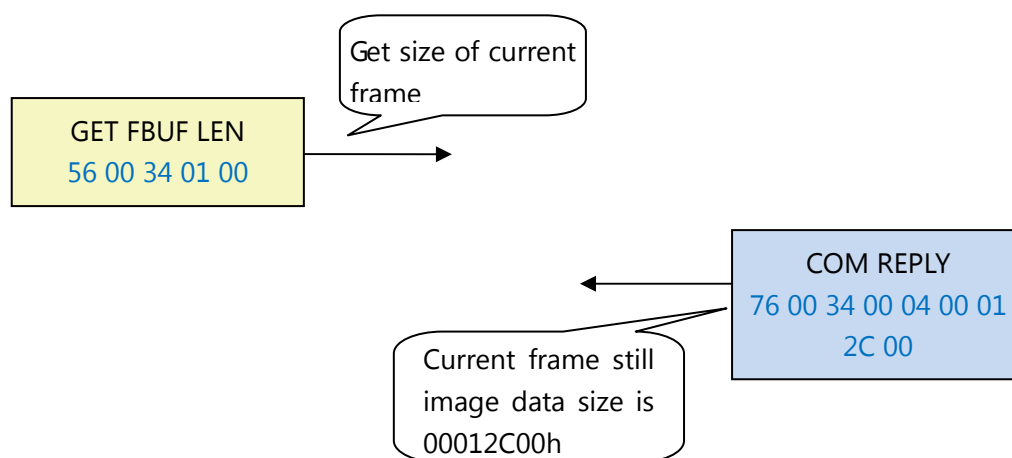
1.6.4 GET FBUF LEN command

The GET FBUF LEN command is used to get size of current frame still image in frame buffer.

1.6.4.1 Command format: `56 00 34 01 00`

1.6.4.2 COM REPLY: `76 00 34 00 04 P2` where P2 (4 bytes) is the size of image data which host wants to get.

1.6.4.3 Communication protocol:



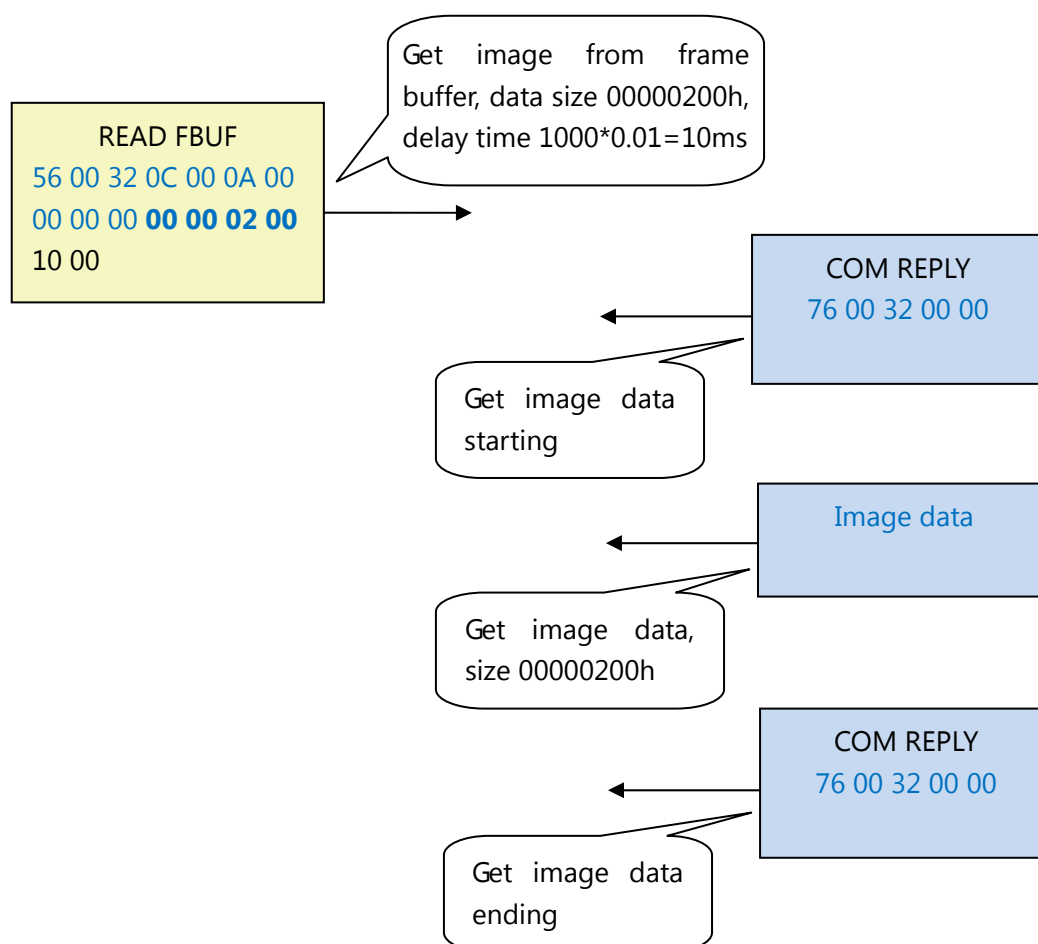
1.6.5 READ FBUF command

The host sends this command to get the image data from frame buffer.

1.6.5.1 Command format: `56 00 32 0C 00 0A 00 00 00 00 P3 P4` where P3 (4 bytes) informs JC409M-W01 that how many bytes of data the host is going to read. It must be multiple of 4. P4 (2 bytes) represents the delay time between the command and data received from COM REPLY (see 6.6.5.2). The time unit is 0.01 millisecond. For example: P4 = `10 00`, delay time is 10 milliseconds.

1.6.5.2 COM REPLY: `76 00 32 00 00 P5 76 00 32 00 00` where P5 (n bytes) is the image data which host wants to get. n is equal to P3 in this case.

1.6.5.3 Communication protocol:



Note: Before sending this command, users should issue GET FBUF LEN command to get the image size first.

1.6.6 SET BAUDRATE command

The host issues this command to set the UART baud rate.

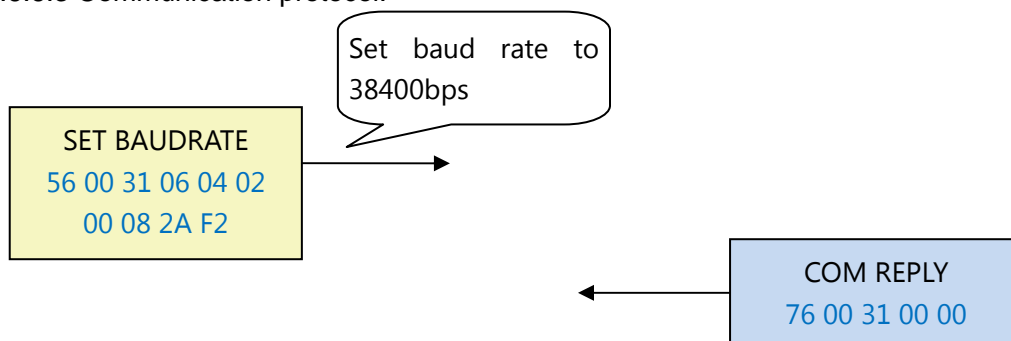
1.6.6.1 Command format: `56 00 31 06 04 02 00 08 P6` where P6 (2 bytes) is the configuration value of UART baud rate. The relationship between configuration value and baud rate is shown in Table 5.

| Baud rate(bps) | Configuration value |
|----------------|---------------------|
| 9600 | 0xAEC8 |
| 19200 | 0x56E4 |
| 38400 | 0x2AF2 |
| 57600 | 0x1C4C |
| 115200 | 0x0DA6 (default) |

Table 5 Baud rate relationship

1.6.6.2 COM REPLY: 76 00 31 00 00

1.6.6.3 Communication protocol:



1.6.7 SET SAMPLESIZE command

The host issues this command to set the sample size of image (image resolution).

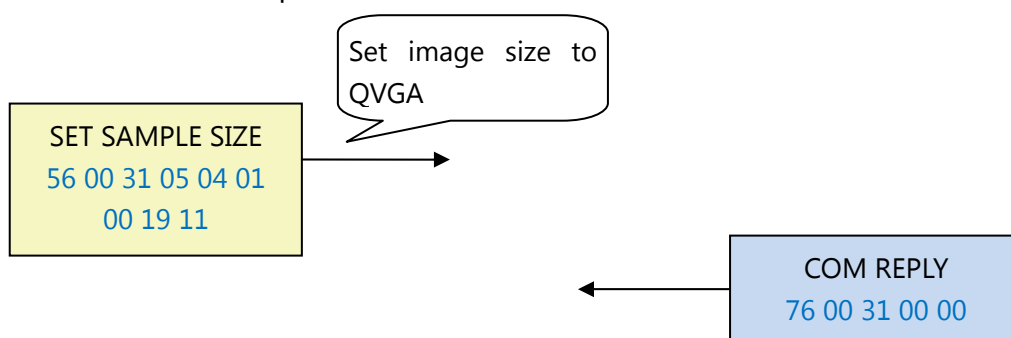
1.6.7.1 Command format: 56 00 31 05 04 01 00 19 P7 where P7 (1 byte) is the configuration value of image sample size. The relationship between configuration value and image resolution is shown in Table 6.

| Image resolution | Configuration value |
|------------------|---------------------|
| VGA | 0x00 (default) |
| QVGA | 0x11 |
| QQVGA | 0x22 |

Table 6 image resolution size relationship

1.6.7.2 COM REPLY: 76 00 31 00 00

1.6.7.3 Communication protocol:



1.6.8 SET COMPRESSRATIO command

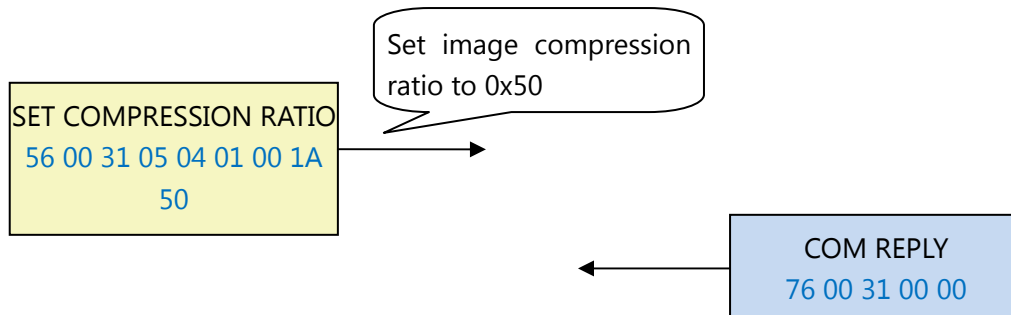
The host issues this command to set compressing rate of the image.

1.6.8.1 Command format: 56 00 31 05 04 01 00 1A P8 where P8 (1 byte) is the configuration value of image compression ratio. This compression ratio value is ranged from

0x00 to 0xFF. The bigger the value is, the higher the compression ratio. Default compression ratio is **0x35**.

1.6.8.2 COM REPLY: 76 00 31 00 00

1.6.8.3 Communication protocol:



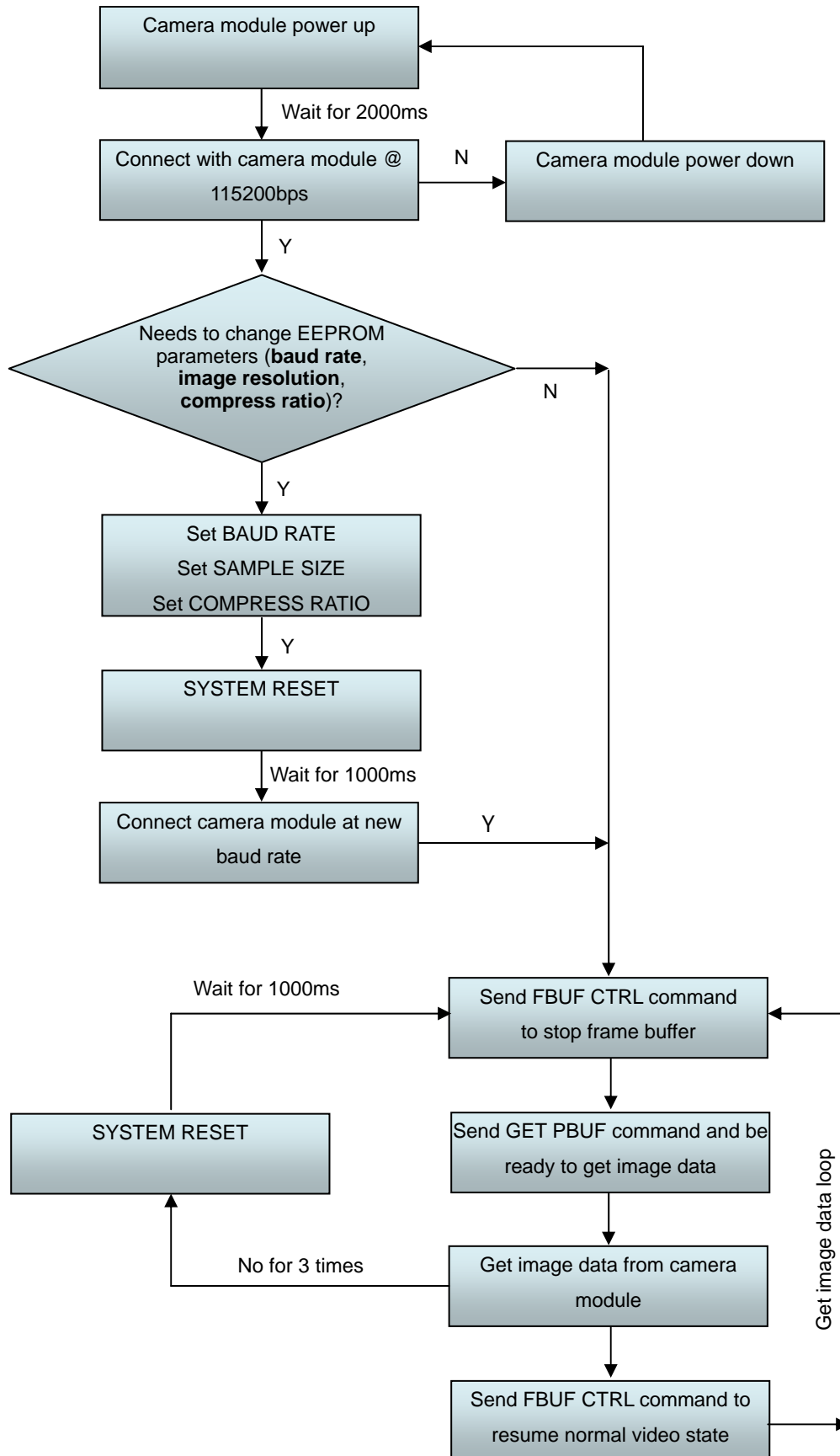
1.6.8 COM REPLY command

The COM REPLY is a UART command which is sent from JC409M-W01 in order to inform the host whether the command which was just sent is executed well or in order to transmit the data which the host wants to get. About all cases of COM REPLY command please refer to the above commands sections.

NOTE: When the host issues SET BAUDRATE command, SET SAMPLE SIZE command or SET COMPRESS RATIO command, the system needs to restart to take effect. These parameters are stored into camera module's built-in EEPROM. So next time module boots up, these parameters still work.

Appendix A – Flow diagram for getting an image

Below is the flow diagram for getting one or more images:



Appendix B: Communication example for getting an image

Below is the example for how to get a QVGA image by UART @ baud rate 57600bps and higher compression ratio.

