# C306-36A

# *Camera Module*

# *Data Sheet*

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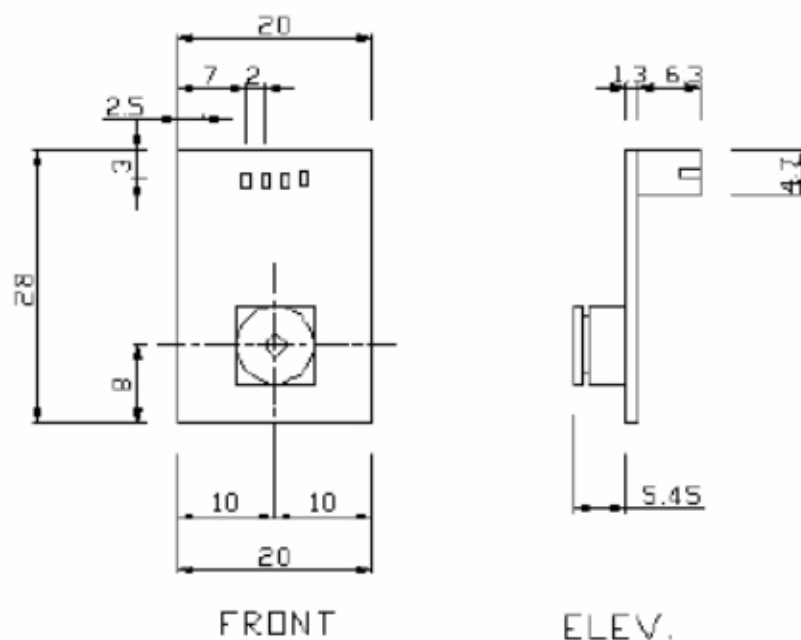330.482.9944 (P) / 330.266.7307 (F)

## ◆ Application

The **C306-36A** is a camera module for various embedded images acquisition system, such as: remote monitoring, vehicle monitoring, visible the doorbell, camera phones, digital image records, industry control, access control, etc. It especially suits for low speed remote control image transmission system, such as phone lines, GPRS based on CDMA, digital radio.
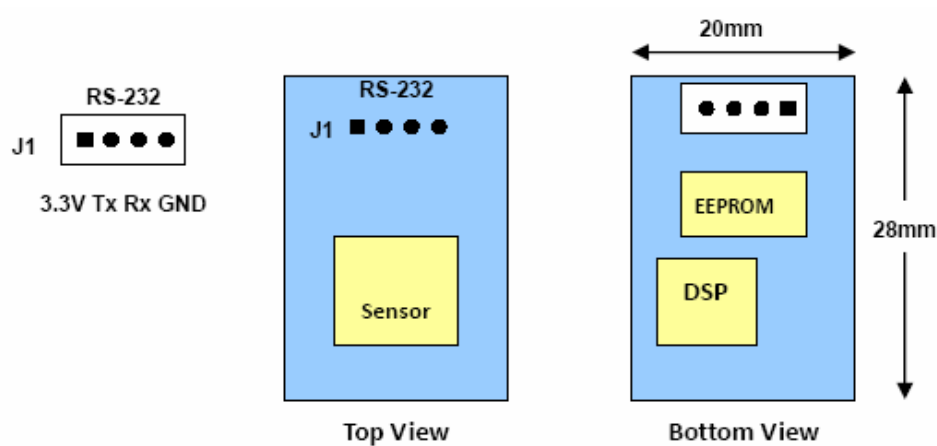
## ◆ Feature

- ◆ Small in size: 28mmX20mm (LxW)
- ◆ 0.3M. CMOS sensor, VGA resolution, down sample to QVGA.
- ◆ Video-out: VGA & 60fps.
- ◆ Low power consumption, 3.3V operation.
- ◆ UART interface support up to 115.2Kbps.
- ◆ Built-in JPEG CODE.
- ◆ Built-in lens, FOV 135°.

## ◆ Outline



FRONT          ELEV.
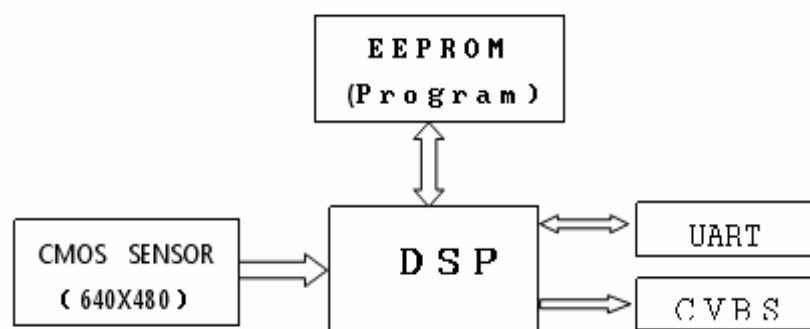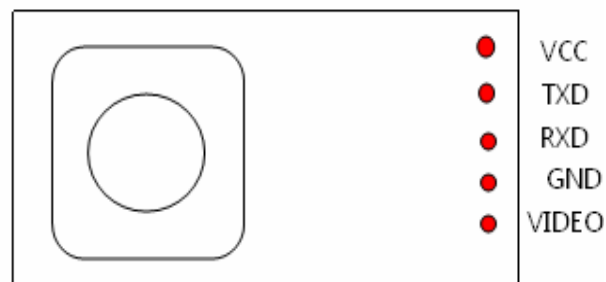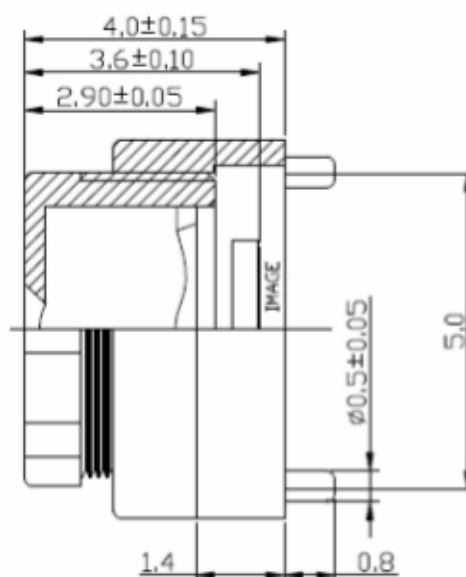
## ◆ Board Layout



## ◆ Block Diagram



## ◆ 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 |

## ◆ Specification

| Item | Specification | Remark |
|------|--------------|--------|
| Model | **C306-36** | |
| Pixel Size | PAL:628 x 582 / NTSC:510 x 492 | |
| Image Sensor | 1/5" | CMOS sensor OV7740 |
| Baud Rate | 9.6Kbps~115.2Kbps | |
| Output | TTL | |
| Video out | VGA & 60fps | |
| Operating Voltage | 3.3V±10% | |
| Working Current | 90 mA | |
| Lens | Construction: 2G2P+IR filter | |
| | Effective Focal Length:1.7mm | |
| | F#:2.0 | |
| | FOV:135° | |
| | Distortion <3.5% | |
| | Relative illumination: 60% Ø3.44 | |
| Dimension | 28mmX20mm (LxW) | |
| Operating Temp. | -20°C ~ +60°C | |

## ◆ Lens Structure

# ◆ Command Protocol

## 1.1. Interface instructions

The UART interface of DSP is based on the design of standard UART interface. It can be connected to the serial communication ports of a PC and an external MCU. DSP supports RXD and TXD,but not support the all pins that are related to MODEM functions.

Using Serial communicate Protocol,we can get information of DSP or control it,such as taking photo ,reading photo ,etc.

## 1.2.Communication Protocol

Communication Protocol format are as follows ：

Receive command format ：
Protocol sign（1byte）+Serial number（1byte）+Command（1byte）+Data-lengths（1byte）+Data（0~16bytes）

Return command format ：
Protocol sign（1byte）+Serial number（1byte）+Command（1byte）+Status（1byte）+Data-lengths（1byte）+Data（0~16bytes）

**Protocol sign** ： it marks that the protocol is DSP Serial Communication Protocol, the receive sign is 0x56('V'), return sign is 0x76('v').

**Serial number** ： it specify one device when there are serval devices in communication at the same time,the value of this byte range from 0 to 255 .
Command ： it marks a special command.
**Data-lengths** ： it shows the data lengths behind itself., not include Protocol sign, Serial number, Command, Data length.
**Data** ： used in commands, every command has different data lengths and format, range from 0 to 16 bytes.
**Status** ：this byte shows whether the receive command is right or wrong , 0 is right, others are wrong.

| Status code | Error instructions |
|---|---|
| 0 | Executing command right. |
| 1 | System don't receive the command. |
| 2 | The data-length is error. |
| 3 | Data format error. |
| 4 | The command can not execute now . |
| 5 | Command received,but executed wrong. |

●To multi-byte data type, the lower bytes follow the higher bytes.
●If serial number is wrong, the system will not return any content.

●The max communication data lengths are 16 bytes

●If the command format is wrong or command executes wrong , the status byte will be 1 byte and the data length byte will be 0.

## 1.3.communication command

### 1.3.1.SET_PORT

**Command function** ：Set the property of communication interface

**Command format** ：0x56+Serial number+0x24+Data-length+interface type1byte）+configuration data

Such as set **MCU UART**：

0x56+Serial number+0x24+0x03+0x01+S1RELH(1byte)+S1RELL(1byte)

**interface type**：

　　0x01：MCU UART

**Return format** ：

**OK:** 0x76+Serial number+0x24+0x00+0x00

**ERROR:** 0x76+Serial number+0x24+0x03+0x00

**E.g.**

● 0x56+0x00+0x24+0x03+0x01+0x0D+0xA6　　　The baud rate will be 115200.

●S1RELH and S1RELL are the values that be written to S1RELH register and S1RELL register.

●Baud rate and baud rate register：

| Baud rate | S1RELH | S1RELL |
|-----------|--------|--------|
| 9600 | 0xAE | 0xC8 |
| 19200 | 0x56 | 0xE4 |
| 38400 | 0x2A | 0xF2 |
| 57600 | 0x1C | 0x1C |
| 115200 | 0x0D | 0xA6 |

### 1.3.2.SYSTEM_RESET

**Command function** ：System reset

**Command format** ：0x56+Serial number+0x26+0x00

**Return format** ：0x76+Serial number+0x26+0x00+0x00

**E.g. 0x56+0x00+0x26+0x00**　　　The system will be reset.

When receiving return command, ten millisecond later, system will reset and receive some basic configuration information.

### 1.3.3.READ_FBUF

**Command function** ：read image data from FBUF.

**Command format** ：0x56+serial number+0x32+0x0C+FBUF type(1 byte)+control mode(1 byte)+starting address(4 bytes)+data-length(4 bytes)+delay(2 bytes)

**FBUF type**：current frame or next frame

  **0**：current frame

  **1**：next frame

**Control mode**：the mode by which image data transfer

  **Bit0**：**0**：data transfer by MCU mode

       **1**：data transfer by DMA mode

  **Bit[2:1]**：2'b11

  **Bit3**：   1'b11

**Starting address**： the address in fbuf to store the image data.

**Data-length**：the byte number ready to read, it must be the multiple of 4.

**Delay**：the delay time between command and data, the unit is 0.01 millisecond.

**Return format ：**

**Ok**：if execute right, return 0x76+serial number+0x32+0x00+0x00, the following is image data, at last, return 0x76+serial number+0x32+0x00+0x00 again.

**Error**：if execute wrong , 0x76+serial number+0x32+error code+0x01 will be received .

**E.g.**

0x56+0x00+0x32+0x0C+0x00+0x0F+0x00+0x00+0x00+0x10+0x00+0x00+0x02+0x00+0x10+0x00

Begin with the address 0x0100, read current frame data by DMA mode.The data-length is 0x0200, delay time is 40.96 millisecond.

After receiving command, return the ack command, then read the certain lengths data and send to the external MCU by SPI, the ack command will be sent again to indicate the data sending has finished.

Before using the command, we must stop the certain fbuf ,otherwise operation will fail because the image frames update all the time.

You can read the image data at one time or many times .

Suggest using DMA mode in order to get higher transmission speed.

## 1.3.4.WRITE_FBUF

**Command function ：**write image data to FBUF

**Command format ：**0x56+serial number+0x33+0x0B+control mode(1 byte)+starting address(4 bytes)+data-lengths(4 bytes)+delay(2 bytes)

**Control mode**：the mode by which image data transfer

  **Bit0**：**0**：data transfer by MCU mode

       **1**：data transfer by DMA mode

  **Bit[2:1]**：2'b11

  **Bit3**：   1'b11

  **Bit4**：   whether it is the first to write data to buffer.

      **0**：no     **1**：yes

If it need many times to write data, the bit4 is 1 at the first time, others are 0.

**Starting address**：the address in fbuf to store the image data.

**Data-lengths**：the byte number of ready writing, it must be the multiple of 4.

**Delay**：the delay time between command and data, the measure is 0.01 millisecond.

**Return format ：**

**Ok：** if execute right, return 0x76+serial number+0x33+0x00+0x00, then wait for receiving image data.Until the data receiving all have finished, the second return command 0x76+serial number+0x33+0x00+0x00.

**Error：** 0x76+serial number+0x33+error code+0x00

**E.g.**

●0x56+0x00+0x33+0x0B+0x0F+0x00+0x00+0x00+0x10+0x00+0x00+0x02+0x00+0x10+ 0x00

Begin from the address 0x0100, write data by DMA mode.The data-lengths is 0x0200.

After receiving command, wait for program responding and returning command, there will be the second return command till the data receiving all have finished.

Must stop the certain frame before using the command.

Suggest using DMA mode in order to get higher transmission speed.

## 1.3.5.GET_FBUF_LEN

**Command function ：** get byte-lengths inFBUF

**Command format ：** 0x56+serial number+0x34+0x01+FBUF type(1 byte)

**FBUF type：** current frame or next frame

   **0：** current frame

   **1：** next frame

**Return format ：**

**OK：** 0x76+serial number+0x34+0x00+0x04+FBUF data-lengths(4 bytes)

**Error：** 0x76+serial number+0x34+0x03+0x00

**E.g.**

● 0x56+0x00+0x34+0x01+0x00

   get current frame byte-lengths in buffer register

● 0x56+0x00+0x34+0x01+0x01

   get next frame byte-lengths in buffer register

Generally, the command is used before reading FBUF.

## 1.3.6.SET_FBUF_LEN

**Command function ：** set byte-lengths in FBUF

**Command format ：** 0x56+serial number+0x35+0x04+FBUF byte-lengths(4 bytes)

The largest length is 65535.

**Return format ：**

**OK：** 0x76+serial number+0x35+0x00+0x00

**E.g.**

● 0x56+0x00+0x35+0x04+0x00+0x00+0xA0+0xB0

   Set the FBUF byte-lengths with 0xA0B0.

The length and the byte-lengths of writing must be the same, otherwise the image will be error on TV.

## 1.3.7.FBUF_CTRL

**Command function** ：control frame buffer register

**Command format** ：0x56+serial number+0x36+0x01+control flag(1 byte)

**control flag**：

    0：stop current frame

    1：stop next frame

    2：resume frame

    3：step frame

**Return format** ：

**OK**：0x76+serial number+0x36+0x00+0x00

**Error**：0x76+serial number+0x36+0x03+0x00

**E.g.**

- 0x56+0x00+0x36+0x01+0x00              stop current frame
- 0x56+0x00+0x36+0x01+0x01              stop next frame
- 0x56+0x00+0x36+0x01+0x02              resume frame
- 0x56+0x00+0x36+0x01+0x03              step frame

## 1.3.8.DOWNSIZE_SIZE

**Command function** ：control downsize attribute

**Command format** ：0x56+serial number+0x53+0x01+control item(1 byte)

**control item**：zooming image proportion

    Bit[1:0]：width zooming proportion

        2b'00：1:1, no zoom

        2b'01：1:2, the proportion is 1/2.

        2b'10：1:4, the proportion is 1/4.

        2b'11：reservation

    Bit[3:2]：height zooming proportion

        2b'00：1:1, no zoom

        2b'01：1:2, the proportion is 1/2.

        2b'10：1:4, the proportion is 1/4.

        2b'11：reservation

**Notice**：

1. The image width must be the multiple of 16 in FBUF, image height is the multiple of 8, so the configuration information could satisfy the condition.

2. The zooming proportion of image height is not more than the zooming proportion of width.

**Return format** ：0x76+serial number+0x53+0x00+0x00

**E.g.**

- 0x56+0x00+0x53+0x01+0x05      the width and height will be the half of previous attribute.