

2 Mega Pixels Serial JPEG Camera

SC20MPB User Manual, Rev. A (Mar, 2020)

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Introduction

The SC20MPB serial camera is a 2 mega pixels JPEG color compression camera module that performs as a JPEG compressed still camera and can be attached to a wireless or PDA host. 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 DSP and transferred to the host.

It can snap pictures at 1920x1080(Default), 1280x960, 1280 x 720, 1024x768, 640 x480, 320 x 240, 160x120 and they're pre-compressed JPEG images which makes them nice and small and easy to store or transfer. Perfect for a data-logging, security, or photography project. Startup time is 3 seconds, and 3 seconds for getting an image.

Features

- Module dimension: 32 x 32 x 25mm
- Image size: 1920x1080(Default), 1280x960, 1280 x 720, 1024x768, 640 x480, 320 x 240, 160x120
- Low power consumption, 5V operation, 12V can be customized with power converter board attached
- UART/TTL interface support up to 921600 bps, RS232 interface up to 230400bps (default 115200bps)
- WDR: 72DB
- Built-in JPEG CODEC
- Built-in lens, default 3.6mm lens, multi options
- VC0706 protocol compatible

Pin Definition

Pin	Description
TX	Data Transmit (RS232/TTL level)
RX	Data Receive (RS232/TTL level)
GND	Power Ground
VCC	Power 5V DC

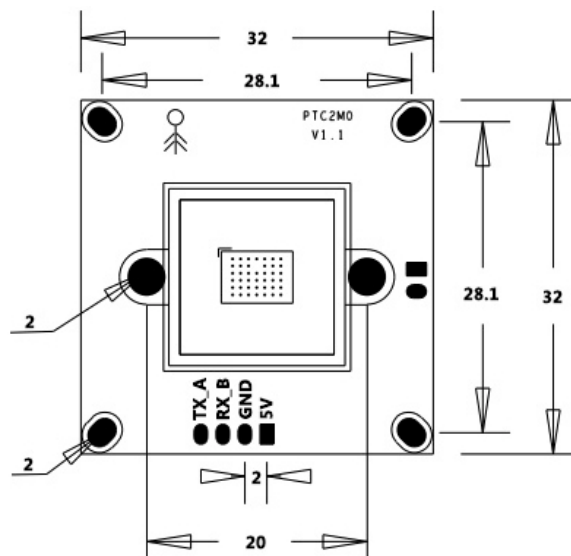
Electrical Specification:

Parameter	Min	TVp	Max	Unit
DC supply voltage	3.5	5.0	5.5	V
Operation Current	140	160	170	mA
Operating temperature range	-20	20	75	°C

DSP and Lens Specification:

Description	Parameter
DSP	Hi3518
Image Sensor	SC2235
Imager Format	1/2.7"
F/#	2.0
Focal Length	3.6mm
Field of View Diagonal	90 degree

Mechanical Specification (unit in mm):



Command Protocol (HEX format data)

After camera is powered up, it takes 3 seconds to be ready for any commands, when camera is initialized after 3s, the camera outputs the following data, which means the camera is ready for taking images:

```
Version:PTC2M0 1.02
MEID_Num:00
ImageWidth:1920,ImageHeight:1080
Init end
```

1. GET VERSION: 56 00 11 00 RETURN: 76 00 11 00 0B 50 54 43 31 4D 33 20 31 2E 30 30

0B is the version data length 11.

50 54 43 32 4D 30 20 31 2E 30 30 converts to strings "PTC2M0 1.02"

Once the version is read, the camera is ready for communications. Version number might be different due to regular upgrades.

2. RESET: 56 00 26 00 RETURN: 76 00 26 00

3. CAPTURE AN IMAGE: 56 00 36 01 00 RETURN: 76 00 36 00 00

Notes: when getting unclear images right after power-up, resetting or exiting power save mode, please wait for 3s till the camera is ready for stable images.

4. READ IMAGE DATA LENGTH: 56 00 34 01 II

RETURN: 76 00 34 00 04 XX XX XX XX

II ----- one byte represents reading different image buffer, value ranges from 0 to 5, “0” represents the current single image buffer, “1-5” represents continuous images triggered by motion detection or capturing multi images command.

XX XX XX XX ----- image length

For example, send: 56 00 34 01 00 return: 76 00 34 00 04 **00 01 4B C6**

0x00014BC6 / 1024 means image data length is around 82.9K.

5. READ IMAGE DATA: 56 00 32 0C II 0A SS SS SS SS LL LL LL LL 00 FF

RETURN: 76 00 32 00 00 FF D8 FF D9 76 00 32 00 00

II ---- one byte represents reading different image buffer, value ranges from 0 to 5, “0” represents the current single image buffer, “1-5” represents continuous images triggered by motion detection or capturing multi images command.

SS SS SS SS ---- start address (the address must be times of 8, for example **00 00**)

LL LL LL LL ----the length of image data (high byte, low byte)

Note: JPEG IMAGE DATA must start with FF D8 and end with FF D9.

If read all the image data at once, the start address shall be: “00 00 00 00”, the length to read is the same as what data length item 3 above has read; the data read starts with “FF D8”, and ends with “FF D9”.

If read the image data in multi attempts, the first start address shall be: “00 00 00 00”, each time after the start address shall be the last frame’s end address.

For example, send: 56 00 32 0C 00 0A 00 00 00 00 00 01 4B C6 00 FF

Return: 76 00 32 00 00 FF D8 ... FF D9 76 00 32 00 00

56 00 32 0C 00 0A 00 00 00 00 00 01 4B C6 00 FF

It means read the image data from the address 0x00000000 with data length 0x00014BC6.

6. STOP CAPTURE: 56 00 36 01 03

RETURN: 76 00 36 00 00

7. SETTING IMAGE COMPRESSION RATIO: 56 00 31 05 01 01 12 04 XX

RETURN: 76 00 31 00 00

XX is default at value of 36, valid value ranges from 0x36 to 0x90, the greater value the lower image quality and less image file size. Recommended values: 0x36 --- high image quality; 0x54 ---- good image quality; 0x72 ---- low image quality. The changed value can not be saved after power-off, it goes back to the default of 0x36.

8. SETTING IMAGE RESOLUTION: (default: 1920 * 1080)

- 56 00 31 05 04 01 00 19 11 (320*240) **RETURN: 76 00 31 00 00** // image size is around 11.2kb
- 56 00 31 05 04 01 00 19 00 (640*480) **RETURN: 76 00 31 00 00** // image size is around 36kb
- 56 00 31 05 04 01 00 19 22 (160*120) **RETURN: 76 00 31 00 00** // image size is around 45kb
- 56 00 31 05 05 01 00 19 33 (1024*768) **RETURN: 76 00 31 00 00** // image size is around 80kb
- 56 00 31 05 05 01 00 19 44 (1280*720) **RETURN: 76 00 31 00 00** // image size is around 92kb
- 56 00 31 05 05 01 00 19 55 (1280*960) **RETURN: 76 00 31 00 00** // image size is around 136kb
- 56 00 31 05 05 01 00 19 66 (1920*1080) **RETURN: 76 00 31 00 00** // image size is around 520kb

Note: after setting the desired image size, wait for 3 seconds and then the new setting would be saved in flash. The actual file size is subject to the field complexity and depth of field.

9. CHANGE DEFAULT BAUD RATE: 56 00 31 06 04 02 00 08 XX YY

RETURN: 76 00 31 00 00

XX YY	BAUD RATE
56 00 31 06 04 02 00 08 AE C8 AE C8	9600
56 00 31 06 04 02 00 08 AE C8 56 E4	19200

56 00 31 06 04 02 00 08 AE C8 2A F2	38400
56 00 31 06 04 02 00 08 AE C8 1C 4C	57600
56 00 31 06 04 02 00 08 AE C8 0D A6	115200 (default & Max for RS485)
56 00 31 06 05 02 00 08 EE A1 EE A1	230400 (Max for RS232)
56 00 31 06 05 02 00 08 EE A1 EE A2	460800 (for TTL only)
56 00 31 06 05 02 00 08 EE A1 EE A3	921600 (Max for TTL)

Note: After any change, no need to reset the camera, the new change will be valid and saved in flash after power-off.

Warning: Please do not try to issue the commands on RS485 interfaced cameras for baud rates over 115200bps, it will damage the camera immediately and the camera needs to be returned to Spinel for repair at client's cost.

10. CHANGE CAMERA ID ADDRESS: 56 YY 31 05 04 01 00 06 ZZ

RETURN: 76 YY 31 00 00

YY---- the current ID, ZZ---- the new ID you want to change to, range from 00 to FF

For example, the current ID is 00 (also the default ID), and if you want to change it to 02, you can issue the command: 56 00 31 05 04 01 00 06 02

Return: 56 00 31 00 00

// once the ID has been successfully changed, the 2nd byte of each command therefore shall be 02.

// the reset command would be: 56 02 26 00

11. SUPPLEMENTAL LIGHTING CONTROL (supported only when the hardware is equipped):

11.1 Turn lights on: **56 00 85 01 01** Return: 76 00 85 00

11.2 Turn lights off: **56 00 85 01 00** Return: 76 00 85 00

12. MOTION DETECTION:

The motion detection function is default as disabled after each power off, if the motion detection is enabled, the camera then will alert the host if the camera detects a change in the objects in the view by sending out "76 00 39 00 00" to the host through serial link. The host can enable or disable the motion detection by issuing following commands:

To enable the motion detection function, send the command: **56 00 37 01 01**, receiving ACK: 76 00 37 00 00

To disable the motion detection function, send the command: **56 00 37 01 00**, receiving ACK: 76 00 37 00 00

If receiving ACK: 76 00 37 00 00: 76 00 37 03 00, wrong setting, please try it again.

How it works: when the camera detects a change, it will send out "76 00 39 00 00" to host through serial link, when the host receives such information, it is recommended to disable the motion detection first before image capturing (to prevent image data interference from motion detection), the motion detection can be enabled again after image capturing is complete for next capture.

13.1 SET MOTION DETECTION SENSITIVITY

The host can set the sensitivity of motion detection for the camera by issuing this command.

56 00 31 05 01 01 1A 6E XX

Receiving ACK command 76 00 31 00 00

XX represents the sensitivity of motion detection, ranges from 00 to FF.

If XX is 00, most sensitive, might alert wrong detection.

If XX is FF, least sensitive, might not be able to alert.

XX = 03 is recommended.

Therefore, the recommended procedures to use motion detection in the field would be:

Step 1: set right motion detection sensitivity by issuing command: 56 00 31 05 01 01 1A 6E 03

Step 2: enable motion detection by issuing command: 56 00 37 01 01

14. INCORRECT COMMAND RETURN: 65 72 72 6F 72

15. INITIAL OPERATION PROCESS:

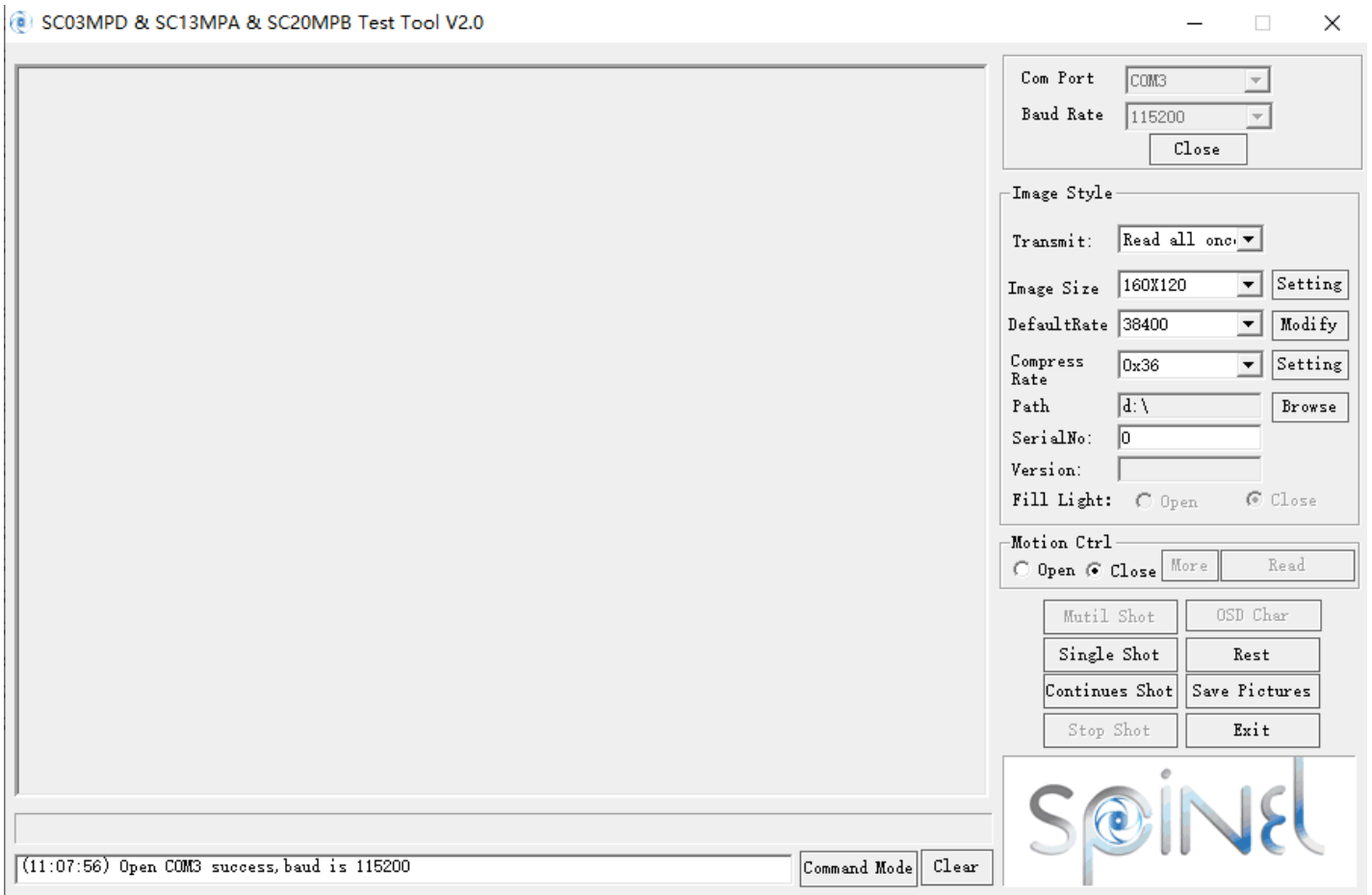
- (1) power up
- (2) delay 3s
- (3) camera outputs: “MEID_Num:” + camera ID, and “Init end”
- (4) set image resolution command (if it’s already set and no need to change, then skip this step)
- (5) capture an image command
- (6) read image data length command
- (7) read image data command
- (8) stop capture command (it can be skipped, but available to be compatible with SC03MPD/E)
- (9) for the next image, repeat from step (5)

16. TEST THE CAMERA WITH A PC

16.1 Test with Spinel PC test tool

The PC Test Tool can be downloaded from our website: www.spinelelectronics.com. The camera needs to have RS232 output or TTL to RS232 converter to connect to the serial port of the PC, or use a USB to TTL converter if the camera comes in TTL output and the computer doesn’t have a serial port, please make sure select the default baud rate to ensure proper running.

The following image illustrates the interface of the evaluation software.



16.2 TEST AND TROUBLESHOOTING

For any technical issue or error, please use “SSCOM serial debug tool” to test the camera and figure out the issue, the “SSCOM serial debug tool” and instruction can be downloaded from our websites:

www.spinelelectronics.com

17. HOW TO ORDER:

Part Number	Configuration
SC20MPB_TTL	Standard SC20MPB camera module with TTL interface
SC20MPB_232	Standard SC20MPB camera module with RS232 interface
SC20MPB_485	Standard SC20MPB camera module with RS485 interface

The standard camera module comes with 3.6mm lens with 650nm IR-cut filter and 20cm 4pin bare wires. If you need a different lens or camera assembled with housing/case and IR LED’s, please contact us.

For questions regarding this user manual, please email to info@spinelelectronics.com

Or Call +1(800) 837-5859. Thank you.