3 Mega Pixels Serial JPEG Camera

SC30MPA User Manual, Rev. A (Nov, 2022)
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Introduction

The SC30MPA serial camera is a 3 MP serial JPEG color 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 image. The image is then compressed by the DSP and transferred to the host.

It can snap pictures at 2304x1296(Default), 1920x1080, 1600x1200, 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 3.5 seconds.

Features

- Module dimension: 32(W) x 32(L) x 25(H)mm (the height may vary for different lens options)
- Image size: 2304x1296(Default), 1920x1080, 1600x1200, 1280x960, 1280 x 720, 1024x768, 640 x480, 320 x 240, 160x120
- Wide voltage and low power: Typical: 125mA @5V, Max: 300mA (w/ LED's on), 145mA@4.2V,75mA@9V,65mA@12V,55mA@15V,45mA@18V
- UART/TTL interface support up to 921600 bps, RS232 interface up to 230400bps (default 115200bps)
- WDR: 85DB
- 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
RX	Data Receive (RS232/TTL
GND	Power Ground
VCC	Power 5V DC

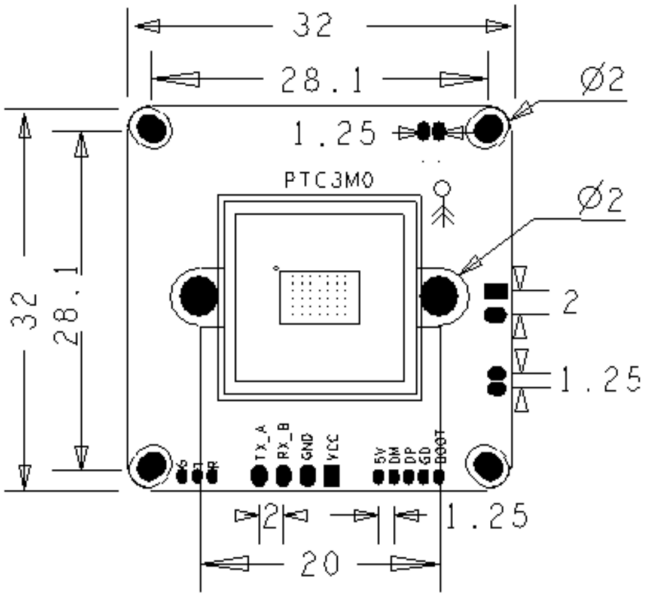
Electrical Specification:

Parameter	Min	TVp	Max	Unit
DC supply voltage	4.2	5.0	18	V
Operation Current	145	125	45	mA
Operating temperature range	-20	20	75	℃

DSP and Lens Specification:

Description	Parameter
DSP	Hi3518
Image Sensor	SC3335H
Imager Format	1/2.8"
F/#	2.0
Focal Length	3.6mm default (optional: 2.1, 2.4, 2.8, 6, 8, 12,16, 25mm and fisheye lens)
Field of View Diagonal	90 degree and other

Mechanical Specification (unit in mm):



Command Protocol (HEX format)

Once camera is powered up, it takes around 3.5 seconds to be ready for any commands, when camera is initialized after the 3.5S delay, the camera outputs the following data, which means the camera is ready for capturing images:

Version:PTC3M0 1.00

MEID_Num:00

ImageWidth:2304,ImageHeight:1296

Qp:0x54,WDT:1,Alg:0
Init end

1. GET VERSION：56 00 11 00
RETURN：76 00 11 00 0B 50 54 43 32 4D 30 20 31 2E 30 30
0B is the version data length 11.

50 54 43 32 4D 30 20 31 2E 30 30converts to character strings “PTC3M0 1.00”

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 **4s** 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 ----- 1 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 ---- 1 byte read 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）

Notes: 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.

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

RETURN：76 00 31 00 00

XX is default at value of 54, valid value ranges from 0x36 to 0x8f, the greater value the poorer 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 get saved after power-off**.

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

56 00 31 05 04 01 00 19 22 （160*120） **RETURN：76 00 31 00 00 //** image size is around 5kb

56 00 31 05 04 01 00 19 11 （320*240） **RETURN：76 00 31 00 00 //** image size is around 13kb

56 00 31 05 04 01 00 19 00 （640*480） **RETURN：76 00 31 00 00 //** image size is around 37kb

56 00 31 05 05 01 00 19 33 （1024*768）**RETURN：76 00 31 00 00 //** image size is around 82kb

56 00 31 05 05 01 00 19 44 （1280*720） **RETURN**：**76 00 31 00 00** // image size is around 105kb

56 00 31 05 05 01 00 19 55 （1280*960） **RETURN**：**76 00 31 00 00** // image size is around 127kb

56 00 31 05 05 01 00 19 77 （1600*1200）**RETURN**：**76 00 31 00 00** // image size is around 176kb

56 00 31 05 05 01 00 19 66 （1920*1080）**RETURN**：**76 00 31 00 00** // image size is around 192kb

56 00 31 05 05 01 00 19 88 （2304*1296）**RETURN**：**76 00 31 00 00** // image size is around 256kb

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 (for TTL only and Max)

Note: After any change, it's not required 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), in order to change it to 02, the host 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. LED CONTROL (supported only when the LED's is equipped on board)**:**

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

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

12. OSD CONTROL: 56 00 86 B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 BA BB BC DD DD...DD

RETURN: 76 00 86 01 ZZ

The last byte represents the number of OSD rows, total can be 4 rows, value ranges from 0-3, represents which row.

Command description:
56 //1 byte frame header
00 //1byte camera ID (0-255), default is 0
86 //1byte OSD command
B0 //1byte the length of command, it changes based on the characters content, fixed 12 bytes + total length of the characters content
B1 //1byte OSD status, 1: enabled; 2: disabled
B2 //1byte row number(0-3), max allowed to display is 4 rows
B3 //1byte font size 0: 16x16; font size 1: 24x24; font size 2:32x32
B4 B5 //2bytes X axis, 0-1279 (Decimal) for SC13MPA, 0-1918 (Decimal) for SC20MPB, it needs to be even numbers
B6 B7 //2bytes Y axis, 0-959 (Decimal) for SC13MPA, 0-1078 (Decimal) for SC20MPB, it needs to be even numbers
B8 B9 //2 bytes font color, follow RGB555 code
BA BB //2bytes background color, follow RGB555 code
BC //1byte length of content, max allowed 160 characters
DD…DD //N bytes, character content, please use ASCII table.

Example:
Send: 56 00 86 16 01 00 01 00 00 00 00 00 7C FF FF 0A 30 31 32 33 34 35 36 37 38 39

Return: 76 00 86 01 00

Command description:
Send command:
0x56 // frame header
0x00 // camera ID
0x86 // OSD command
0x16// length of command, it changes based on the characters content, fixed 12 bytes + total length of the characters content
0x01 //OSD status, 1: enabled; 2: disabled
0x00 //the first row
0x00 // font size 16x16
0x00, 0x00 // X axis, 0-1279 (Decimal) for SC13MPA, 0-1918 (Decimal) for SC20MPB, it needs to be even numbers
0x00, 0x00 // Y axis, 0-959 (Decimal) for SC13MPA, 0-1078 (Decimal) for SC20MPB, it needs to be even numbers
0x00, 0x7C // font color blue
0xff, 0xff //background color white
0x0A //length of content
0x30, 0x31, 0x32,0x33, 0x34, 0x35, 0x36, 0x37, 0x38, 0x39 // character content ASCII “0123456789”

Return:
0x76 // fixed return frame header
0x00 // camera ID
0x86 // command
0x01 // fixed data length 1
0x00 // setting number of rows

Common ASCII Table:

Character	ASCII Value			Character	ASCII Value		
	Decimal	Binary	HEX		Decimal	Binary	HEX
NUL	0	0000000	00	M	77	1001101	4D
Line Feed	10	0001010	A	N	78	1001110	4E
Space	32	0100000	20	O	79	1001111	4F
!	33	0100001	21	P	80	1010000	50
”	34	0100010	22	Q	81	1010001	51
#	35	0100011	23	R	82	1010010	52
$	36	0100100	24	S	83	1010011	53
%	37	0100101	25	T	84	1010100	54
&	38	0100110	26	U	85	1010101	55
‘	39	0100111	27	V	86	1010110	56
(	40	0101000	28	W	87	1010111	57

)	41	0101001	29	X	88	1011000	58
*	42	0101010	2A	Y	89	1011001	59
+	43	0101011	2B	Z	90	1011010	5A
,	44	0101100	2C	[	91	1011011	5B
-()	45	0101101	2D	\	92	1011100	5C
.	46	0101110	2E	]	93	1011101	5D
/	47	0101111	2F	^	94	1011110	5E
0	48	0110000	30	-	95	1011111	5F
1	49	0110001	31	a	97	1100001	61
2	50	0110010	32	b	98	1100010	62
3	51	0110011	33	c	99	1100011	63
4	52	0110100	34	d	100	1100100	64
5	53	0110101	35	e	101	1100101	65
6	54	0110110	36	f	102	1100110	66
7	55	0110111	37	g	103	1100111	67
8	56	0111000	38	h	104	1101000	68
9	57	0111001	39	i	105	1101001	69
:	58	0111010	3A	j	106	1101010	6A
;	59	0111011	3B	k	107	1101011	6B
<	60	0111100	3C	l	108	1101100	6C
=	61	0111101	3D	m	109	1101101	6D
>	62	0111110	3E	n	110	1101110	6E
?	63	0111111	3F	o	111	1101111	6F
@	64	1000000	40	p	112	1110000	70
A	65	1000001	41	q	113	1110001	71
B	66	1000010	42	r	114	1110010	72
C	67	1000011	43	s	115	1110011	73
D	68	1000100	44	t	116	1110100	74
E	69	1000101	45	u	117	1110101	75
F	70	1000110	46	v	118	1110110	76
G	71	1000111	47	w	119	1110111	77
H	72	1001000	48	x	120	1111000	78
I	73	1001001	49	y	121	1111001	79
J	74	1001010	4A	z	122	1111010	7A
K	75	1001011	4B	{	123	1111011	7B
L	76	1001100	4C	}	125	1111101	7D
Character	ASCII Value			Character	ASCII Value		
	Decimal	Binary	HEX		Decimal	Binary	HEX

13. SMART DETECTION:

13.1 Set smart detection: ***56 00 91 0C 02*** **B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10**

Return: ***76 00 91 02 02*** **ZZ**

B0 ----1 byte enable the detection at startup: 00—disabled(default), 01-enable,

Once enabled, the camera will start the detection automatically at startup.
B1 ----1 byte detection type: 00—motion detection(default), 01—facial detection,
02—vehicle detection
B2 ----1 byte detection sensitivity: range (0-4), 4 is most sensitive, default is 3
B3 ----1 byte detection mode:00—detection only(default), 01—detection + snap
B4 ----1 byte detection alert value: valid only in facial/vehicle detection mode, trigger alert when detect the number of people (range 1-19)/vehicle (range 1-5)
B5 ---1byte detect distance: valid only in facial/vehicle detection mode,0x02 means 10Meters(default)
B6 ----1 byte target area: 00—turn on, 01—turn off, valid only in facial/vehicle detection mode
B7 ----1byte number of images captured after detection trigger: the detection mode needs to be set 0x01, range (0x01-0x05)
B8 B9 ---2 bytes snap intervals: valid in detection mode=0x01 only, unit in ms
B10 ----1byte next detection time: delay for snapping, valid in detection mode=0x01 only, unit is second, range (0x01-0xff decimal 1-255)
ZZ ---- 1byte setting results:
0x00 setting success
0x01 wrong setting, please double check the values
0x02 setting not supported

Example:
Send: 56 00 91 0C 02 00 00 03 00 01 02 01 01 00 64 0A
Return: 76 00 91 02 02 00

Command description:
0x56 // fixed frame header
0x00 // ID
0x91 //configuration command
0x0C //Data length
0x02 //subcommand: set smart detection command
0x00 //startup detection: 00-Disable (default),01-Enable
0x00 //Detection mode: 00-motion detection (default),01-facial detection,02-vehicle detection
0x03//Detection sensitivity: range(0x00～0x04), 4 is most sensitive, default is 3
0x00 //Detection mode: 00 – detection only (default) , 01 – detection + snap
0x01 //Detection alert value: valid only in facial/vehicle detection mode, trigger alert when detect the number of people (range 1-19)/vehicle (range 1-5)
0x02 //Detection distance: reserved, valid only in facial/vehicle detection mode,0x02 means 10Meters(default)
0x01 //Target area: 00 – turn off, 01 – turn on (default)
0x01 // number of images captured after detection trigger: the detection mode needs to be set 0x01, range (0x01-0x05)
0x00,0x64 // snap intervals: valid in detection mode=0x01 only, unit in ms
0x0A //Next detection time.

13.2 READ SMART DETECTION: 76 00 91 02 02 ZZ
RETURN: 56 00 91 0C 02 B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10
B0…B10 ---- please refer to 14.1 set smart detection for detailed descriptions

Example:
Send: 56 00 90 01 02
Return: 76 00 90 0C 02 00 00 03 00 01 02 01 01 00 64 0A

Send command description:
56 // fixed frame header
00 //ID
90 //configuration command
01 //data length
02 //sub-command: detection parameters

Return description:
0x56 //fixed frame header
0x00 //ID
0x91 //configuration command
0x0C //Data length
0x02 //subcommand: set smart detection command
0x00 //startup detection: 00-Disable (default),01-Enable
0x00 //Detection mode: 00-motion detection (default),01-facial detection,02-vehicle detection
0x03//Detection sensitivity: range(0x00～0x04), 4 is most sensitive, default is 3
0x00 //Detection mode: 00 – detection only (default), 01 – detection + snap
0x01 //Detection alert value: valid only in facial/vehicle detection mode, trigger alert when detect the number of people (range 1-19)/vehicle (range 1-5)
0x02 //Detection distance: reserved, valid only in facial/vehicle detection mode,0x02 means 10Meters(default)
0x01 //Target area: 00 – turn off, 01 – turn on (default)
0x01 // number of images captured after detection trigger: the detection mode needs to be set 0x01, range (0x01-0x05)
0x00,0x64 // snap intervals: valid in detection mode=0x01 only, unit in ms
0x0A //Next detection time.

Notes: all the settings get saved after powered off.

14. SET MOTION/FACIAL/VEHILE DETECTION: 56 00 37 01 XX
RETURN: 76 00 37 00 00
XX –-- 00 means disable detection; 01 means enable detection.

15. DETECTION ALERT REPORT: 76 00 39 00 U1
U1 ----1byte when the mode is detection only, it's 0x00, when the mode is detection + snap, it will be

the number of image snapped, max 5 images, range (0x01-0x05).
When the camera detects facial/vehicles, report: **76 00 39 00 U1 U2 U3**
U1 ----1byte, detection type, 0x01-facial detection, 0x02—vehicle detection
U2 ----1byte detection mode, 0x00 – detection only, 0x01 – detection + snap
U3 ----1byte detection target, when detection type=0x00, it means the number of facial/vehicles detected, when detection type=0x01, it means the number of image snapped, max 5 images, range (0x01-0x05).

16. SET MOTION DETECTION SENSITIVITY: 56 00 31 05 01 01 1A 6E XX
RETURN: 76 00 31 00 00
XX ---- 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

17. MOTION DETECTION CONTINOUS CAPTURE: 56 00 87 04 B0 B1 B2 B3
RETURN: 76 00 87 01 ZZ
B1 ---- 1byte, number of images captured, range 0-5
B2 ---- 1byte, next detection time, unit is second, range 0-255
B2 B3 ---- 2byte, continuous capturing intervals, unit is ms, range 0-65535
ZZ ---- 1byte setting validity, 0x00 – valid, 0x01 –invalid

Example:
Send: 56 00 87 04 03 0A 00 64
Return: 76 00 87 01 00

Send command description:
0x56 //fixed frame header
0x00 //ID
0x87 //motion detection continuous capture command
0x04 //data length fixed at 4bytes
0x03 //3 continuous captured images, range 0-5
0x0A //next detection time is in 10 seconds
0x00 0x64 // 2bytes means the intervals for continuous capturing is 100ms

Return description:
0x76 // fixed frame header
0x00 //ID
0x87 //command
0x01 //fixed data length 1byte

0x00 //setting succeed

Notes:

1. It's only valid when the motion detection is enabled.
2. If only issue the command to enable the motion detection, the camera will report alert when detects motion: 76 00 39 00 00, but no image buffer, the host needs to issue image capture command. Once the motion detection continuous capturing is set, the camera will capture images automatically and save them in the buffer once detects motion, and report: 76 00 39 00 +the number of the images captured (for instance 76 00 39 00 05 means the camera auto captured 5 continuous images after motion is detected)
3. Issuing the read image data length and read image dada can get the 1-5 buffered images out.
4. If the buffered images are not transferred out, once next motion is detected, the old images will be overlayed by the new images.

18. MULTI IMAGES CONTINOUS CAPTURE: 56 00 88 03 B0 B1 B2
RETURN: 76 00 88 01 ZZ

B0 ---- 1byte number of images captured, range 0-5
B1 B2 ---- 2bytes the intervals between each image captures, unit in ms, range: 0x0000~0xFFFF
ZZ ----- 1byte the validation on the setting, 0x00--valid, 0x01—invalid.

Example:
Send: 56 00 88 03 03 00 64
Return: 76 00 88 01 00

Notes:

1. Multi images continuous capture command (Cmd=0x88) and motion detection continuous capture command (cmd=0x87) share the same 1-5th images buffer, they can not be issued at the same time.
2. The delay for the command (cmd=0x88) to return is subject to the intervals for each image, the interval is not recommended to be too long, as the camera can not respond to any other new command till it responds to the cmd=0x88.

19. AUTO-SNAP AT STARTUP/REBOOT (SUB-COMMAND:0x01): 56 00 91 04 01 B0 B1 B2
RETURN: 76 00 91 01 ZZ

B0 ---- 1byte, number of images snapped, range from 0 to 5, 0x00 – disable the auto-snap
B1 B2 ----2bytes intervals for each image captured, unit in ms, range 0~65535ms
ZZ ---- 1byte the validation on the setting, 0x00--valid, 0x01—invalid.

Example:
Send: 56 00 91 04 01 03 00 64
Return: 76 00 91 01 00

Once the auto-snapping is complete, the camera outputs: **76 00 92 02 01 B0**

B0 ---- 1byte the number of images captured, range 1-5, 0xEE – error
Please issue 1-5th image buffer to read the image length and data, for instance, to read the 1st image length please issue" 56 00 34 01 01", and to read 1st image data please issue "56 00 32 0C 01 0A + 4 bytes start address + 4bytes the image data length 00 FF

Example:
The camera outputs: 76 00 92 02 01 03
Description:
0x76 //fixed return header
0x00 //ID
0x92 //configuration command at startup
0x02 //fixed data length 2
0x01 //auto snap command at startup
0x03 //complete 3 image snapping

Check the snap command at startup: 56 00 90 01 01
Return: 76 00 90 04 01 B0 B1 B2
B0 ---- 1byte the number of the images captured, range 0-5
B1 B2 ---- 2bytes intervals for each continuous snapping, unit in ms, range 0~65535 (00 ~ 0xFF 0XFF)

Example:
Send: 56 00 90 01 01
Return: 76 00 90 04 01 03 00 64

20. SET AREA CROPPING COMMAND
20.1 SET CROPPING AREA: 56 00 8B 0A 01 B0 B1 B2 B3 B4 B5 B6 B7 B8
RETURN: 76 00 8B 02 01 ZZ

B0 ---- cropping status: 0x01—enabled, 0x00 – disabled
B1 B2 ---- cropping start X axis, must be multiple of 16
B3 B4 ---- cropping start Y axis, must be multiple of 2
B5 B6 ---- cropping width, must be multiple of 4, and can not exceed horizontal pixels
B7 B8 ---- cropping height, must be multiple of 4, and can not exceed vertical pixels

ZZ ---- results: 0x00 setting succeed
0x01 X axis error, must be multiple of 16
0x02 Y axis error, must be multiple of 2
0x03 cropping width error, must be multiple of 4, and can not exceed horizontal pixels
0x04 cropping height error, must be multiple of 4, and can not exceed horizontal pixels
0x05 exceed resolution error, X + width/Y + height exceed the H/V pixels
0x06 other error

Example:
Send: 56 00 8B 0A 01 01 00 A0 00 78 01 40 00 F0

Return: 76 00 8B 02 01 00

Send command description:
0x56 //fixed frame header
0x00 //ID
0x8B //area cropping command
0x0A //data length 10bytes
0x01 //sub-command: set cropping area
0x01 //cropping status: enabled
0x00 0xA0 // X axis 160 (Decimal)
0x00 0x78 //Y axis 120 (Decimal)
0x01 0x40 //cropping width 320 pixels
0x00 0xF0 //cropping height 240 pixels

Return description:
0x76 //fixed return header
0x00 //ID
0x8B //cropping command
0x02 // data length 2bytes
0x01 //sub-command: set cropping area
0x00 //results, setting succeed

21.2 READ CROPPING AREA PARAMETERS: 56 00 8B 01 02
RETURN: 76 00 8B 0E 02 B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10 B11 B12
B0 ---- cropping status
B1 B2 --- cropping start X axis
B3 B4 ---- cropping start Y axis
B5 B6 ---- cropping width
B7 B8 ---- cropping height
B9 B10 ---- cropped image horizontal pixels
B11 B12 ---- cropped image vertical pixels

Example:
Send: 56 00 8B 01 02
Return: 76 00 8B 0E 02 01 00 A0 00 78 01 40 00 F0 02 80 01 E0

21. SET COLOR OR B/W SWITCHING: 56 00 8C 01 B1
RETURN: 76 00 8C 01 00

B1 ---- 1byte the image color switched 00 – color, 01 – B/W
Warning: must be set prior to image capturing, can't be saved after power-off, it also switch the IR-cut filter when switching the color.

22. CHECK THE BRIGHTNESS ON PHOTOSENSOR: 56 00 8D 01 00
RETURN: 76 00 8D 02 00 ZZ
ZZ ---- 1byte 0x01 – dark, 0x00 – bright

23. SET POWER SAVE MODE: 56 00 3E 03 00 01 B1
RETURN: 76 00 3E 00 ZZ

B1 ---- 1byte power save mode status: 0x01—enter power save mode, 0x00—exit power save mode
ZZ ---- 1byte setting results: 0x00 setting succeed, 0x0E—already in power save mode

Notes:
After issuing the command, the delay for response takes about 800ms, and it can save around 50% power. Once the camera is set in power save mode, the host must issue “exit power save mode” first to wake up the camera, as when the camera is still in power save mode, it only responds to check version/reset/set power save commands, and outputs “76 00 3E 00 0E” for any other command. If the motion detection is enabled, the host must disable the motion detection before setting the camera into power save mode.

24. CHECK DEFAULT PARAMETERS: 56 00 90 01 00
RETURN: 76 00 90 07 00 B0 B1 B2 B3 B4 B5

B0 ----1byte camera ID
B1 ----1byte image resolution, it matches the set image size command, 0x88 – 2304x1296
B2 B3 ---- 2bytes baud rate, Hex format, it matches the setting baud rate command: 0xAEC8:9600; 0x56E4:19200; 0x2AF2:38400; 0x1c4c:57600; 0xda6:115200; 0xeea1:230400; 0xeea2:460800; 0xeea3:921600
B4 ---- 1byte compression ratio, range 0x36-ox8F
B5 ---- 1byte start detection type: 0x00—motion detection, 0x01—facial detection, 0x02—vehicle detection

Example:
Send: 56 00 90 01 00
Return: 76 00 90 07 00 66 0D A6 36 01

25. ISP IMAGE SETTING/READ/RESET
25.1 ISP IMAGE SETTING: 56 00 91 0C 04 B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10
RETURN: 76 00 91 02 04 ZZ

B0 ---- 1byte, set different time periods, 0x00 – daytime, 0x01 -- night time.
B1 ----1byte brightness, range:0x00～0xFF (decimal 0-255), default 0x80=128.
B2 ---- 1byte contrast, range:0x00～0xFF, daytime default 0x80=128; nighttime default 0xAA =170
B3 ---- 1byte sharpness ange:0x00～0xFF, day time default 0x80 and night time default 0x0A . when there is noise at night time, recommend to use 0x00～x0A to reduce the noise.

B4 ---- 1byte saturation, range:0x00～0xFF, default 0x80.
B5 ----- 1byte tone, range:0x00～0xFF, default 0x80.
B6 --- 1byte white balance mode, 0x00: auto (default), 0x01: manual mode
B7 B8 ---- 2byte white balance parameter, range 0x12C ～ 0x258 (decimal 300-600), default 0x155=341, only valid in manual mode.
B9 ----1byte exposure compensation, range:0x00～0xFF (decimal 0-255), default 0x80=128, its to adjust the brightness around the bright background area, not the overall brightness of the image.
B10 -- 1byte backlight compensation, range:0x00～0x0A (decimal 0-10), default 0x04.

ZZ ---- results: 0x00 setting succeed
0x01 wrong white balance parameters
0x02 wrong white balance mode
0x03 wrong backlight compensation

Note: all ISP image settings get saved after reboot.

Example:
Send: 56 00 91 0C 04 00 80 80 80 80 00 01 55 80 04
Return: 76 00 91 02 04 00

25.2 READ ISP IMAGE PARAMETER: 56 00 90 02 04 XX
RETURN: 76 00 90 0C 04 B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10

XX ---- 1byte check the parameters for specific time period, 0x00 – day time, 0x01 – night time
B0…..B10 10 bytes, please refer to 26.1 ISP image setting

Example:
Send: 56 00 90 02 04 00
Return: 76 00 90 0C 04 00 80 80 80 80 00 01 55 80 04

25.3 RESET ISP IMAGE SETTINGS TO DEFAULT: 56 00 91 02 04 XX
RETURN: 76 00 91 0C 04 B0 B1 B2 B3 B4 B5 B6 B7 B8 B9 B10
XX ---- 1byte reset the settings for different time period, 0x00 – day time, 0x01 – night time
B0…..B10 10 bytes, please refer to 26.1 ISP image setting

Example:
Send: 56 00 91 02 04 00
Return: 76 00 91 0C 04 00 80 80 80 80 00 01 55 80 04

Notes: the reset on all ISP image settings gets saved after reboot.

26. GET CAMERA ID: 56 FF 90 01 21
RETURN: 76 FF 90 02 21 ZZ

ZZ ---- the current ID

Example:
Send: 56 FF 90 01 21
Return: 76 FF 90 02 21 04

Notes: when setting the ID for RS485 cameras, if the camera ID is unknown, there are two methods to find out, one is from the “MEID_Num” outputs when the camera gets powered up, another is to issue “get camera ID” command, 0xff from command is the broadcasting ID, which is only valid for checking/getting ID.

27. ABNORMAL RETURN: 65 72 72 6F 72 (65 72 72 6F 72 means “error” in hex format)

28. INITIAL OPERATION PROCESS:

（1）power up with the matching voltage, delay 3.5s

（2）camera outputs: “MEID_Num:” + camera ID, and “Init end”

（3）set image resolution command (optional, if it’s already set once and no need to change, then skip this step)

（4）set area cropping command (optional, doesn’t get saved after reboot, set once only after power-up and prior to set image resolution)

（5）set image compression ratio command (optional, doesn’t get saved after reboot)

（6）set color or B/W command (optional, doesn’t get saved after reboot)

（7）capture an image command

（8）read image data length command

（9）read image data command

（10）stop capture command (it can be skipped, but available to be compatible with SC03MPD/E)

（11）for the next image, repeat from step (7)

29. CONTINUOUS CAPTURING IN MOTION DETECTION PROCESS:

（1）set motion detection continuous capturing command, such as: 56 00 88 04 05 0A 00 64

（2）set the sensitivity in motion detection command, such as 56 00 31 05 01 01 1A 6E 03

（3）enable the motion detection command, such as 56 00 37 01 01

（4）when the camera outputs/reports: 76 00 39 00 05, meaning motion detected and captured 5 images in the buffer

（5）disable the motion detection: 76 00 37 01 00, optional, when the next detection time is set, the camera needs to wait for all buffered images to read out or host to issue disable motion detection command, or pass the time to enter new motion detection.

（6）issue read image length command to read 1-5th images each time, such as 56 00 34 01 01

（7）issue read image data command to read out 1-5th images, such as: 56 00 32 0C 01 0A + 4-bytes starting address + 4bytes image length 00 FF

（8）once all images are transferred out, re-enable the motion detection: 76 00 37 01 01, optional, its related to step (5), if the step (5) is executed, step (8) is also required.

30. SMART DETECTION OPERATION PROCESS:

Smart detection is extended from the motion detection continuous capturing, it follows the similar process.

（1）set smart detection command, such as: 56 00 91 0C 02 00 01 03 01 01 02 01 05 00 64 0A

（2）enable smart detection command, such as 56 00 31 05 01 01 1A 6E 03

（3）when the camera outputs/reports:

（4）when the camera outputs/reports: 76 00 39 03 01 01 05, meaning people detected and captured 5 images in the buffer

（5）disable the motion detection: 76 00 37 01 00, optional, when the next detection time is set, the camera needs to wait for all buffered images to read out or host to issue disable motion detection command, or pass the time to enter new motion detection.

（6）issue read image length command to read 1-5th images each time, such as 56 00 34 01 01

（7）issue read image data command to read out 1-5th images, such as: 56 00 32 0C 01 0A + 4-bytes starting address + 4bytes image length 00 FF

（8）once all images are transferred out, re-enable the motion detection: 76 00 37 01 01, optional, its related to step (5), if the step (5) is executed, step (8) is also required.

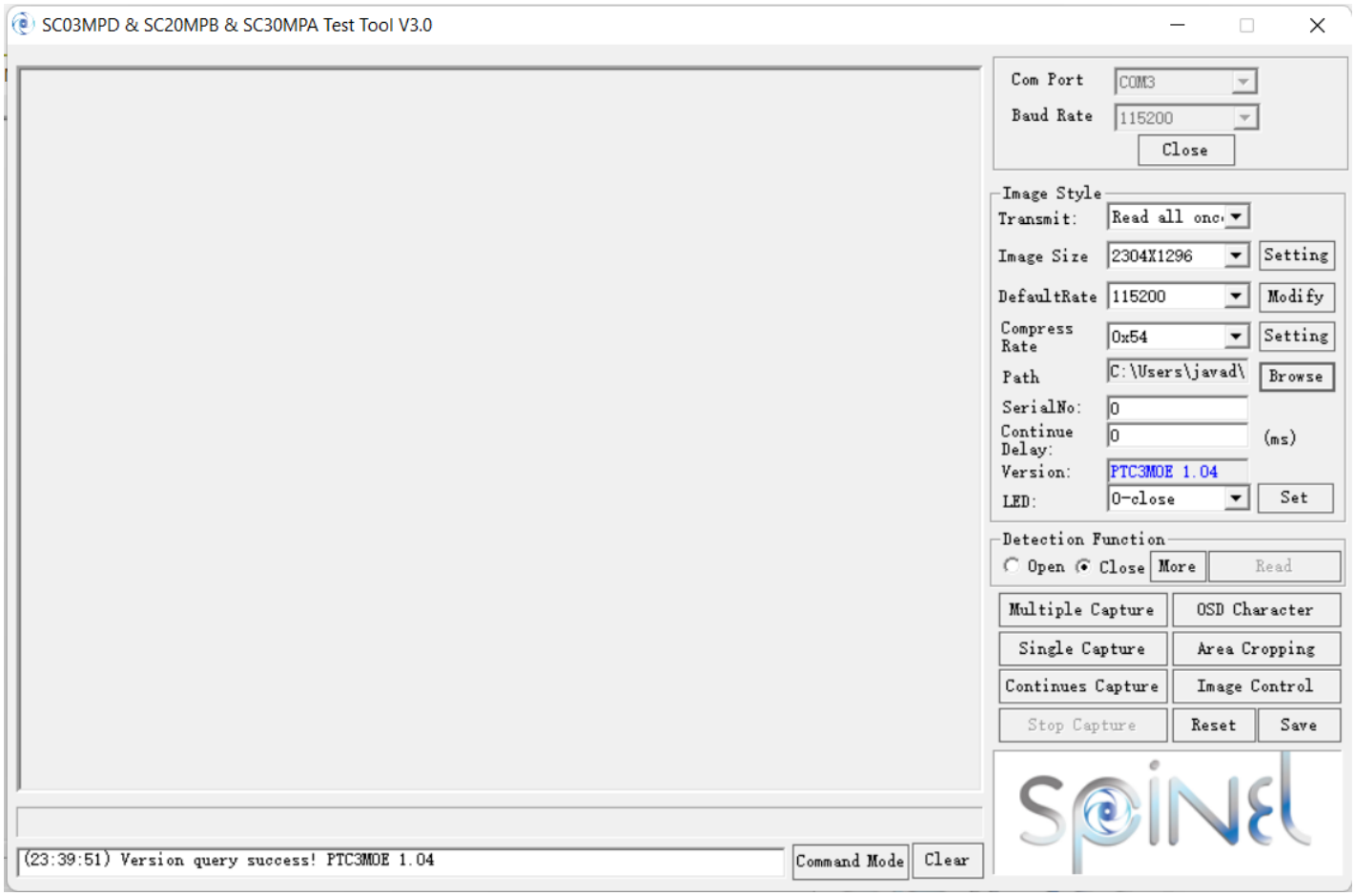
31. TEST THE CAMERA WITH A PC

31.1 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

please use an USB to TTL/RS232/RS485 converter if connecting the camera to the USB port from a windows computer, please make sure select the default baud rate to ensure proper running.

The following image illustrates the interface of the test tool software.



Step 1: After the camera is connected, run the test tool, select the right COM port and default baud rate, open the port.

Step 2: once the camera reads the version info as “PTC3M0E 1.04”, the camera is ready to take commands, before capture an image, please make sure set the right path for the images to get saved to once taken, otherwise error might occur on the test tool.

31.2 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

32. HOW TO ORDER:

Part Number	Configuration
SC20MPB_TTL	SC20MPB camera module with TTL interface w/3.6mm lens
SC20MPB_232	SC20MPB camera module with TTL interface w/3.6mm lens
SC20MPB_485	SC20MPB camera module with TTL interface w/3.6mm lens
SC20MPB_TTL/232/485_LXX	XX is the focal length for a different lens option other than the standard 3.6mm, the options are L21=2.1mm, L24=2.4mm, L28=2.8mm, L60=6.0mm, L80=8.0mm, L120=12mm, L160=16mm, L250=25mm, F185=fisheye 185 degree lens.

The standard camera module comes with 3.6mm lens with 650nm IR-cut filter and 20cm 4pin bare wires. If you need the camera assembled with enclosure/housing 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.