Mini212

Communication Protocol

Total Pages 18

2024/08

1. Version Control

Revision No.	Date	Revision	Sig.
V1.0	202408	Initial Release	

Contents

1 Overview

This agreement supports both imaging applications and temperature measurement applications products.

1.1 Protocol Description

1) After successfully sending the protocol, a successful return is indicated by 55 AA 01 00 01 F0. In case of a reception error, a retransmission command is required: 55 AA 01 01 00 F0.
2) XOR bitwise exclusive OR check. The check starts after 55 AA, for example, for a shutter compensation command: 55 AA 07 02 01 08 00 00 00 01 0D F0。XOR =07 XOR 02 XOR 01 XOR 08 XOR 00 XOR 00 XOR 00 XOR 00 XOR 01= 0D。

2 Universal Downlink Protocol

Explanation: 1. After setting all the relevant parameters, you must send a command to save the settings for the parameters to be saved.

Note: Shutter compensation and scene compensation are set to be executed automatically by the product by default. For the manual scene compensation feature, please consult with sales or technical support for instructions.

Universal Function	Operation	Command	Remarks
Compensation	Shutter Compensation	55 AA 07 02 01 08 00 00 00 01 0D F0	

Universal Function	Operation	Command	Remarks
	Scene Compensation	55 AA 07 02 01 07 00 00 00 01 02 F0	
Image	Image Freezing On	55 AA 07 01 00 02 00 00 00 01 05 F0	
	Image Freezing Off	55 AA 07 01 00 02 00 00 00 00 04 F0	
Pseudo Color	White Hot	55 AA 07 02 00 04 00 00 00 00 01 F0	
	Black Hot	55 AA 07 02 00 04 00 00 00 09 08 F0	
	Red Highlight	55 AA 07 02 00 04 00 00 00 08 09 F0	
	Lava	55 AA 07 02 00 04 00 00 00 01 00 F0	
	Iron Red	55 AA 07 02 00 04 00 00 00 02 03 F0	
	Hot Iron	55 AA 07 02 00 04 00 00 00 03 02 F0	
	Medical	55 AA 07 02 00 04 00 00 00 04 05 F0	
	Arctic	55 AA 07 02 00 04 00 00 00 05 04 F0	
	Rainbow 1	55 AA 07 02 00 04 00 00 00 06 07 F0	
	Rainbow 2	55 AA 07 02 00 04 00 00 00 07 06 F0	

2.1 Image

2.1.1 Image Mode

2.1.1.1 Image Hue

Image Hue	Function	Operation Command	Remarks
	Warm Colors	55 AA 07 02 02 19 00 00 00 00 1E F0	
	Cool Colors	55 AA 07 02 02 19 00 00 00 01 1F F0	
	Green Hot	55 AA 07 02 02 19 00 00 00 02 1C F0	

2.1.1.2 Image Mode

Image Mode	Function	Operation Command	Remarks
	Soft	55 AA 07 02 02 06 00 00 00 00 01 F0	
	Standard	55 AA 07 02 02 06 00 00 00 01 00 F0	

Image Mode	Function	Operation Command	Remarks
	Enhanced	55 AA 07 02 02 06 00 00 00 02 03 F0	
	Highlight	55 AA 07 02 02 06 00 00 00 03 02 F0	
	User	55 AA 07 02 02 06 00 00 00 10 11 F0	
	Spatial Noise Reduction（1~4）	55 AA 07 02 02 1C 00 00 00 xx XOR F0	User Mode is Supported
	Temporal Noise Reduction（1~4）	55 AA 07 02 02 21 00 00 00 xx XOR F0	
	Detail Enhancement (1~4)	55 AA 07 02 02 1D 00 00 00 xx XOR F0	
	Brightness（1~5）	55 AA 07 02 02 1E 00 00 00 xx XOR F0	
	Contrast（1~5）	55 AA 07 02 02 1F 00 00 00 xx XOR F0	

2.1.1.3 Image Mirroring and Zooming

Image Mirroring	无	55 AA 07 02 00 05 00 00 00 00 00 F0	Remarks
	X-axis Mirroring	55 AA 07 02 00 05 00 00 00 01 01 F0	
	Y-axis Mirroring	55 AA 07 02 00 05 00 00 00 02 02 F0	
	XY-axis Mirroring	55 AA 07 02 00 05 00 00 00 03 03 F0	
Image Zooming	Zoom Area Center Point Coordinate X (0~ widht-1)	55 AA 07 02 00 07 00 00 xx xx XOR F0	
	Zoom Area Center Point Coordinate Y (0~ height-1)	55 AA 07 02 00 08 00 00 xx xx XOR F0	
	8x~64x（Actual Corresponding 1x to 8x Magnification）	55 AA 07 02 00 06 00 00 00 xx XOR F0	

2.1.2 Video Mode Control

2.1.2.1 Analog Video

Analog Video	Function	Operation Command	Remarks
Analog Video	Video Off	55 AA 07 02 00 01 00 00 00 00 04 F0	
	Video On	55 AA 07 02 00 01 00 00 00 01 05 F0	
	PAL	55 AA 07 02 00 02 00 00 00 02 05 F0	

Analog Video	Function	Operation Command	Remarks
Analog Video Standard	NTSC	55 AA 07 02 00 02 00 00 00 03 04 F0	

Note: Before using the analog video function, please consult with sales or technical support to check if the product supports this feature. PAL has a resolution of 360×288 or 720×576, while the NTSC standard has a resolution of 360×240 or 720×480.

2.1.2.2 Digital Video

- Frame Rate

Note: Before switching the digital video frame rate, please consult with salesman or FAE to confirm if the product supports this feature.

	Function	Operation Command	Remarks
Frame Rate	50Hz	55 AA 07 02 01 05 00 00 00 03 02 F0	
	30Hz	55 AA 07 02 01 05 00 00 00 00 01 F0	
	25Hz	55 AA 07 02 01 05 00 00 00 01 00 F0	
	9Hz	55 AA 07 02 01 05 00 00 00 02 03 F0	

- 数字口类型

Note: Before switching the digital output content, please consult with salesman or FAE to confirm if the product supports this feature.

	Function	Operation Command	Remarks
Digital Output Type	Off	55 AA 07 02 01 02 00 00 00 00 06 F0	
	USB2.0	55 AA 07 02 01 02 00 00 00 01 07 F0	
	CMOS	55 AA 07 02 01 02 00 00 00 02 04 F0	
	BT656	55 AA 07 02 01 02 00 00 00 04 02 F0	

	BT1120	55 AA 07 02 01 02 00 00 00 03 05 F0	Only 1k resolution is supported.
	LVDS	55 AA 07 02 01 02 00 00 00 07 01 F0	
	USB2.0+UART	55 AA 07 02 01 02 00 00 00 05 03 F0	
	LCD	55 AA 07 02 01 02 00 00 00 06 00 F0	
	LCD+DVP	55 AA 07 02 01 02 00 00 00 08 0E F0	
	UVC + CDC	55 AA 07 02 01 02 00 00 00 09 0F F0	

- CMOS interface

Type	Function	Operation Command	Remarks
数字口	CMOS16	55 AA 07 02 01 04 00 00 00 00 00 F0	
	CMOS8（MSB）	55 AA 07 02 01 04 00 00 00 01 01 F0	
	CMOS8（LSB）	55 AA 07 02 01 04 00 00 00 02 02 F0	

- CMOS Content

Type	Function	Operation Command	Remarks
Mode	YUV422	55 AA 07 02 01 03 00 00 00 00 07 F0	
	YUV422+Parameter Line	55 AA 07 02 01 03 00 00 00 01 06 F0	
	Y16	55 AA 07 02 01 03 00 00 00 02 05 F0	
	Y16+Parameter Line	55 AA 07 02 01 03 00 00 00 03 04 F0	
	Y16+YUV422	55 AA 07 02 01 03 00 00 00 04 03 F0	
	Y16+Parameter Line+YUV422	55 AA 07 02 01 03 00 00 00 05 02 F0	
	TMP	55 AA 07 02 01 03 00 00 00 08 0F F0	Only temperature measurement products support this feature.
	TMP+Parameter Line	55 AA 07 02 01 03 00 00 00 09 0E F0	
	TMP+YUV422	55 AA 07 02 01 03 00 00 00 0A 0D F0	
	TMP+Parameter Line+YUV422	55 AA 07 02 01 03 00 00 00 0B 0C F0	

- External Synchronization

External Synchronization	Function	Operation Command	Remarks
	Off	55 AA 07 02 01 01 00 00 00 00 05 F0	

	Slave Mode	55 AA 07 02 01 01 00 00 00 01 04 F0	
	Master Mode	55 AA 07 02 01 01 00 00 00 02 07 F0	

2.2 Diagnosis

Type	Function	Operation Command	Remarks
Parameter	Save Settings	55 AA 07 01 00 04 00 00 00 01 03 F0	
Parameter	Restore Factory Settings	55 AA 07 01 00 05 00 00 00 01 02 F0	

2.3 Lens/Calibration

2.3.1 Lens

- Optical Zoom

Note: This feature is only supported by zoom lenses. Use the zoom stop command after using the zoom+ / zoom- commands.

Zoom	Function	Operation Command	Remarks
	Zoom+	55 AA 07 03 00 07 00 00 00 01 02 F0	
	Zoom-	55 AA 07 03 00 07 00 00 00 02 01 F0	
	Stop Zoom	55 AA 07 03 00 07 00 00 00 00 03 F0	

- Optical Focus Adjustment

Note: This feature is only supported by lenses with focus adjustment. Use the focus stop command after using focus+ / focus- commands.

Focus	Function	Operation Command	Remarks
	focus+	55 AA 07 03 00 06 00 00 00 01 03 F0	
	focus-	55 AA 07 03 00 06 00 00 00 02 00 F0	
	Stop focus	55 AA 07 03 00 06 00 00 00 00 02 F0	
	Manual Focus Speed (1~10)	55 AA 07 03 00 02 00 00 00 03 XOR F0	
	Auto Focus	55 AA 07 03 00 06 00 00 00 03 01 F0	

2.3.2 NUC

- Shutter

	Function	Operation Command	Remarks
Shutter	OFF	55 AA 07 A0 02 08 00 00 00 00 AD F0	
	Pop open	55 AA 07 A0 02 08 00 00 00 01 AC F0	
Adaptive Compensation	ON	55 AA 07 01 00 07 00 00 00 01 00 F0	
	OFF	55 AA 07 01 00 07 00 00 00 00 01 F0	
	Time setting (0~100min，0 indicates that the shutter is not activated from now on)	55 AA 07 01 00 01 00 00 00 xx XOR F0	

Note: Please do not turn off the adaptive compensation switch, otherwise it will affect the automatic compensation of the image and affect the image effect.

- Bad spot correction

	Function	Operation Command	Remarks
Bad point	Bad point X coordinates (0~width-1)	55 AA 07 03 01 02 00 00 xx xx XOR F0	
	Bad point Y coordinates (0~height-1)	55 AA 07 03 01 03 00 00 xx xx XOR F0	
	Add bad point	55 AA 07 03 01 04 00 00 00 01 00 F0	
	Save bad points	55 AA 07 03 01 05 00 00 00 01 01 F0	

2.4 Temperature measurement

Before using the temperature measurement function, check with the salesman or FAE whether the product supports the temperature measurement function.

2.4.1 Change the temperature measuring gear

Gear position	Function	Operation Command	Remarks
High gain	(-20~150℃)	55 AA 07 04 00 09 00 00 00 00 0A F0	Low temperature range
Low gain	(0~550℃)	55 AA 07 04 00 09 00 00 00 01 0B F0	High temperature range
Auto-ranging	ON	55 AA 07 04 00 1A 00 00 00 01 18 F0	/
	OFF	55 AA 07 04 00 1A 00 00 00 00 19 FO	/

2.4.2 Parameter setting

Note: Before setting the temperature measurement parameters, please consult FAE to avoid affecting the factory temperature of the product.

Function	Parameter setting	Operation Command	Remarks
Distance setting	(0~300) (for 0~30)	55 AA 07 04 00 01 00 00 xx xx XOR F0	
Emissivity setting	(0~100) %	55 AA 07 04 00 02 00 00 00 xx XOR F0	
Humidity setting	(0~100) %	55 AA 07 04 00 08 00 00 00 xx XOR F0	
Reflection temperature setting	-100~1000℃	55 AA 07 04 00 07 00 00 xx xx XOR F0	
Ambient temperature setting	-100~1000℃	55 AA 07 04 00 18 00 00 xx xx XOR F0	
Restore Factory Settings	/	55 AA 07 04 00 06 00 00 00 04 F0	

2.4.3 Temperature correction

Please refer to the Temperature Correction Manual for the use of temperature correction.

- Single point correction

Single point correction	Function	Operation Command	Remarks
Single point temperature setting	-400 ~8000,for(-40℃ ~800℃)	55 AA 07 04 01 08 00 00 xx xx XOR F0	
	Gather Ingredients	55 AA 07 04 01 04 00 00 00 01 07 F0	
	Single point correction	55 AA 07 04 01 05 00 00 00 01 06 F0	
	Save the temperature calibration parameters	55 AA 07 01 00 04 00 00 00 01 03 F0	

- Two-point correction

Two-point correction	Function	Operation Command	Remarks
Low temperature blackbody setting	-400 ~8000,for(-40℃ ~800℃)	55 AA 07 04 01 06 00 00 xx xx XOR F0	
	Low temperature acquisition	55 AA 07 04 01 01 00 00 00 01 02 F0	
High temperature setting	-400 ~8000,for(-40℃ ~800℃)	55 AA 07 04 01 07 00 00 xx xx XOR F0	
	High-temperature acquisition	55 AA 07 04 01 02 00 00 00 01 01 F0	
	Two-point correction	55 AA 07 04 01 03 00 00 00 01 00 F0	
	Save the temperature calibration parameters	55 AA 07 01 00 04 00 00 00 01 03 F0	

2.4.4 Regional analysis

Regional analysis	Function	Operation Command	Remarks
	Close analysis	55 AA 07 03 03 01 00 00 00 00 06 F0	

Regional analysis	Function	Operation Command	Remarks
	Full-screen analysis	55 AA 07 03 03 01 00 00 00 01 07 F0	
	Section 1	55 AA 07 03 03 01 00 00 00 02 04 F0	
	Section 2	55 AA 07 03 03 01 00 00 00 03 05 F0	
	Section 3	55 AA 07 03 03 01 00 00 00 04 02 F0	
	Region analysis top-left x-coordinate (0~width-1)	55 AA 07 03 03 02 00 00 xx xx XOR F0	
	Region analysis top-left y-coordinate (0~height-1)	55 AA 07 03 03 03 00 00 xx xx XOR F0	
	Region width W(0~width-1)	55 AA 07 03 03 04 00 00 xx xx XOR F0	
	Region high H(0~height-1)	55 AA 07 03 03 05 00 00 xx xx XOR F0	

2.4.5 Thermometric analysis

Thermometric analysis	Function	Operation Command	Remarks
Isotherm switch	OFF	55 AA 07 03 05 06 00 00 00 00 07 F0	
	ON	55 AA 07 03 05 06 00 00 00 01 00 F0	
Isotherm mode	Up and Down	55 AA 07 03 05 07 00 00 00 00 06 F0	
	Middle	55 AA 07 03 05 07 00 00 00 01 07 F0	
Isothermal threshold Lower limit Temperature measurement	-400~5500（for-40.0~550.0）	55 AA 07 03 05 09 00 00 xx xx XOR F0	
Isothermal threshold Upper limit Temperature measurement	-400~5500（for-40.0~550.0）	55 AA 07 03 05 08 00 00 xx xx XOR F0	

2.5 Set custom characters

55 AA 12 B0 01 01 xx xx xx xx xx xx xx xx xx xx xx xx xx xx xx XOR F0

3 Universal Uplink Protocol (Query Protocol)

3.1 Status page query

3.1.1 Send query protocol

Function	Operation Command	Remarks
Status page query	55 AA 07 00 00 80 00 00 00 00 87 F0	

3.1.2 Return protocol format

Byte	Command	Parameter description	Remarks
Byte0	0x55	Frame header byte 1	
Byte1	0xAA	Frame header byte 2	
Byte2	0x13	length19	
Byte3	0x00	Status page (Functional classification)	
Byte4	0x00	Page 1 (Page number)	
Byte5	xx	Product ID and product type	
byte6	xx	TBD	
Byte7	year	Firmware version number	
Byte8	month		
Byte9	day		
Byte10	xx	The focal temperature is eight places higher	
Byte11	xx	The focal temperature is eight digits lower	
Byte12~byte13	xx	TBD	
Byte14	xx	Machine identification code [31:24]	
Byte15	xx	Machine identification code [23:16]	

Byte	Command	Parameter description	Remarks
Byte16	xx	Machine identification code [15:8]	
Byte17	xx	Machine identification code [7:0]	
Byte18~ Byte21	xx	TBD	
Byte22	xx	checksum	
Byte23	0XF0	Frame end	

Eg：55 aa 13 00 00 2e 00 17 0a 11 0e 30 02 01 8f 3c da 97 01 04 03 00 f4 f0

Focal temperature：0e 30 means 3632/100 = 36.32℃

Firmware version number：17 0a 11 means 231017

Machine identification code：8f 3c da 97 means 2403130007

3.2 Digital video page query

3.2.1 Sending query protocol

Function	Operation Command	Remarks
Digital page query	55 AA 07 02 01 80 00 00 00 00 84 F0	

3.2.2 Return protocol format

Byte	Command	Parameter description	Remarks
Byte0	0x55	Frame header byte 1	
Byte1	0xAA	Frame header byte 2	
Byte2	0x13	length19	
Byte3	0x02	Status page (Functional classification)	
Byte4	0x01	Digital video page	
Byte5	0x00	External synchronous shutdown	
	0x01	External synchronous slave mode	

Byte	Command	Parameter description	Remarks
	0x02	External synchronous master mode	
Byte6	0x00	Digital port parallel port close	
	0x01	USB2.0	
	0x02	CMOS	
	0x03	BT1120	
	0x04	BT656	
	0x05	USB2.0+UART	
	0x06	LCD	
	0x07	LVDS	
	0x08	LCD + DVP	
	0x09	UVC + CDC	
Byte7	0x00	YUV422	
	0x01	YUV422+ Parameter line	
	0x02	Y16	
	0x03	Y16+ Parameter line	
	0x04	Y16+YUV422	
	0x05	Y16+ Parameter line +YUV422	
	0x08	TMP	
	0x09	TMP+ Parameter line	
	0x0A	TMP+YUV422	
	0x0B	TMP+ Parameter line +YUV422	
Byte8	0x00	CMOS16	
	0x01	CMOS8(MSB)	
	0x02	CMOS8(LSB)	
Byte9	0x00	30HZ	
	0x01	25HZ	
	0x02	9HZ	
	0x03	50HZ	
Byte10	xx	TBD	
Byte11	0x00	Rising edge alignment	
	0x01	Falling edge alignment	

Byte	Command	Parameter description	Remarks
Byte12- Byte21	xx	TBD	
Byte22	xx	Checksum	
Byte23	0XF0	Frame end	

Eg: 55 aa 13 02 01 00 01 05 01 00 00 01 00 00 00 00 00 00 00 00 00 00 14 f0;

External synchronous mode：00 means off;

Digital port type：01 means USB2.0

CMOS content：05 means Y16+ Parameter line +YUV422

CMOS interface：01 means CMOS8(MSB)

Frame frequency：00 means 30Hz

Clock phase：01 means Falling edge

3.3 Set page query

3.3.1 Send query protocol

Function	Operation Command	Remarks
Set page query	55 AA 07 01 00 80 00 00 00 00 86 F0	

3.3.2 Return protocol format

Byte	Command	Parameter description	Remarks
Byte0	0x55	Frame header byte 1	
Byte1	0xAA	Frame header byte 2	
Byte2	0x13	length19	
Byte3	0x01	Settings page (Functional categories)	
Byte4	0x00	Page 1 (Page number)	
Byte5	xx	Automatic compensation time	

Byte6~byte7	xx	TBD	
Byte8	0x00	Temperature compensation switch off	
	0x01	Temperature compensation switch on	
Byte9~Byte21	xx	TBD	
Byte22	xx	Checksum	
Byte23	0XF0	Frame end	

3.4 Focusing page

3.4.1 Send query protocol

Function	Operation Command	Remarks
Set page query	55 AA 07 03 00 80 00 00 00 00 84 f0	

3.4.2 Return protocol format

Byte	Command	Parameter description	Remarks
Byte0	0x55	Frame header byte 1	
Byte1	0xAA	Frame header byte 2	
Byte2	0x13	length19	
Byte3	0x03	Status page (Functional classification)	
Byte4	0x00	Focusing page	
Byte5	0xxx	lens type	
Byte5~ Byte21	xx	TBD	
Byte22	xx	Checksum	
Byte23	0XF0	Frame end	

3.5 Query custom characters

55 AA 07 B0 01 80 00 00 00 00 36 F0

Byte	Command	Parameter description	Remarks
0x55	xx	Frame header	
0xAA	xx	Frame header	

0x13	xx	Command length	
0xB0	xx	Functional classification	
0x01	xx	pagination	
xx	Place 15 bytes of custom data in the order they were received	Options	
xx	TBD	Options	
xx	TBD	Options	
0xXX	Check bit	Check bit	
0xF0	Frame end	Frame end	