

The logo for SENTTECH, featuring the word "SENTTECH" in a bold, blue, sans-serif font. The letters "S", "E", "N", and "T" are larger and more prominent than "T", "E", and "C", which are smaller and positioned to the right. The "H" is also large and bold. The logo is set against a white rectangular background.

SENTTECH

Standard GigE Vision Protocol Specification

**STC-GE33A / GEC33A
STC-GE83A / GEC83A
STC-GE152A / GEC152A
STC-GE202A / GEC202A**

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This document is the protocol specifications for the Sentech Standard GigE Vision camera.

STC-GE33A
STC-GEC33A
STC-GE83A
STC-GEC83A
STC-GE152A
STC-GEC152A
STC-GE202A
STC-GEC202A

Note: All specifications are subject to change without prior notice.

I. Communication Protocol Specifications

This camera has a communication function that enables external devices (i.e. PC) to control the camera functions. Please use the “StCamGigEWare” or “StGigEctrl” communication software or use the following communication protocol to communicate to the camera.

A. The Communication Method

UART (RS232C), Binary communication

B. Communication Settings

	Settings
Baud Rate	115,200 bps
Data Bit	8bit
Parity	None
Stop Bit	1bit
Flow Control	None

C. The Communication Format

1. The format for sending data from the PC to the camera is as follows:

a. Sending the Read Command

SOF (8bit)	Device code (6bit)	Read (1bit)	Page selection (1bit)	Command code (8bit)	Data length (8bit)	Data (Dummy, 1byte)	EOF (8bit)
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b. Sending the Write Command

SOF (8bit)	Device code (6bit)	Write (1bit)	Page selection (1bit)	Command code (8bit)	Data length (8bit)	Data (Data length byte)	EOF (8bit)
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2. The format for receiving data from the camera is as follows

a. After sending the Read Command

SOF (8bit)	Data length (8bit)	Data (Data length byte)	EOF (8bit)
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b. After sending the Write Command

SOF (8bit)	Data length (8bit) “00”	Receiving code (8bit)	EOF (8bit)
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3. Descriptions of the Format

Name	Descriptions
SOF	Start of Frame Always set (or receives) the value as "02H"
Device Code	Set "000000" to access the camera function setting. Set "000010" to access the camera extend function setting. Please check the "Camera Command List" and "Description of the Camera Control Commands"
Read / Write	Set (or receive) "0" when sending the reading command. Set (or receive) "1" when sending the write command.
Page Selection	Set "0" to access the command register of the camera. Receives the current data from the command register when the read command is sent. The data of the command register is replaced by the sent data when the write command is sent. The data of the EEPROM is not replaced. Set "1" to access the EEPROM of the camera. The camera works with the data of the EEPROM when the camera is powered-on. Receives the data from the EEPROM when the read command is sent. The data of the EEPROM is replaced by the sent data when the write command is sent. The camera sends the receiving code as "01H" to the PC after the data of the EEPROM is replaced.
Command Code	Please check from the following page.
Data Length	Data length (Unit: byte) Receiving data The data length is dependent on the command after sending the read command. The data length is "00H" after sending the write command. Sending data The data length is 1 byte when sending the read command. The data length is dependent on the command when sending the write command.
Data	The value of the data is depending on the command.
EOF	End of Frame Always set (or receive) the value as "03H"
Receiving Code	Result of sending the command. 01H: OK (ACK) 14H: Time out error (1 second) 16H: Data length error (No Match) 17H: EEPROM write error

4. Command Example

Sending the read command to read the 00H address data of the register.

02, 00, 00, 01, 00, 03

SOF, (Device code/Read/Register), Command Code, Data Length, Data, EOF

The return command

02, 01, 00, 03

D. Camera Control Commands

1. The Camera Control Command List

Notes:

- The data unit of each command is 1byte (8bit)
- The data can be saved to the EEPROM if an “x” is present in the “Save to EEPROM” column.
- The camera is operating with the data of the EEPROM when the camera is powered on.

Device Code	Command No.	Read/Write	Save to EEPROM	Function	Initial Data	Data Range
00H	00 to 0FH			Reserved	-	-
	10H	Read/Write	X	The camera function mode 1 (8bit: D[7..0])	89H	
	11H	Read/Write	X	The camera function mode 2 (8bit: D[7..0])	08H	
	12H	Read/Write	X	The camera function mode 3 (8bit: D[7..0])	00H	
	13H	Read/Write	X	The camera function mode 4 (8bit: D[7..0])	60H	
	14 to 15H			Reserved	-	-
	16H	Read/Write	X	Software trigger mode (8bit: D[7..0])	00H	
	17H	Read/Write	X	Image data reset (8bit: D[7..0])	00H	-
	18 to 1FH			Reserved	-	-
	20H	Read/Write	X	The exposure time (useconds) of the electronic shutter (24bit: D[7..0])	0	0 to 16,777,216
	21H	Read/Write	X	The exposure time (useconds) of the electronic shutter (24bit: D[15..8])		
	22H	Read/Write	X	The exposure time (useconds) of the electronic shutter (24bit: D[24..16])		
	23-2FH			Reserved	-	-
	30H	Read/Write	X	CDS gain (8bit: D[7..0])	0	0 to 255
	31H	Read/Write	X	The digital gain (8bit: D[7..0])	The factory adjusted value	
	32H	Read/Write	X	The gain offset (8bit: D[7..0])		
	33 to 37H			Reserved	-	-
	38H	Read/Write	X	The clamp level (8bit: D[7..0])	9	0 to 31
	39 to 3DH			Reserved	-	-
	3EH	Read/Write	X	White clip for the test pattern (16bit: D[15..8])	1,023	0 to 4,095
	3FH	Read/Write	X	White clip for the test pattern (16bit: D[7..0])		
	40 to 4FH			Reserved	-	-
	50H	Read/Write	X	The trigger delay time (useconds) (Integer) (24bit: D[7..0])	0	0 to 2,000,000
	51H	Read/Write	X	The trigger delay time (useconds) (Integer) (24bit: D[15..8])		
	52H	Read/Write	X	The trigger delay time (useconds) (Integer) (24bit: D[23..16])		
	53H	Read/Write	X	The trigger delay time (useconds) (Decimal) (24bit: D[7..0])		
	54 to 57H			Reserved	-	-
	58H	Read/Write	X	Frame rate (Hz) (Integer) (24bit: D[7..0])	GE/GEC33A: 89.91172	GE/GEC33A: 0.72028 to 360.33325
	59H	Read/Write	X	Frame rate (Hz) (Integer) (24bit: D[15..8])	GE/GEC83A: 36.42113	GE/GEC83A: 0.44238 to 147.16356
	5AH	Read/Write	X	Frame rate (Hz) (Decimal) (24bit: D[7..0])	GE/GEC152A: 19.25954	
	5BH	Read/Write	X	Frame rate (Hz) (Decimal) (24bit: D[15..8])	GE/GEC202A: 15.31668	GE/GEC152A: 0.31387 to 71.66965
	5CH	Read/Write	X	Frame rate (Hz) (Decimal) (24bit: D[23..16])		GE/GEC202A: 0.29261 to 61.26673
	5DH to 77H			Reserved	-	-
78H	Read/Write	X	Test pattern selection (8bit: D[7..0])	00H		
79H	Read/Write	X	Image effect selection (8bit: D[7..0])	00H		
7A to 7FH			Reserved	-	-	
80H	Read/Write	X	EEPROM control (8bit: D[7..0])	00H		
81 to EFH			Reserved	-	-	
F0H	Read/Write	X	The signals of the power/IO connector (8bit: D[7..0])	20H		
F1H	Read/Write	X	User setting signal for the signals of the power/IO connector (8bit: D[7..0])	00H		
F2 to FFH			Reserved	-	-	

Device Code	Command No.	Read/Write	Save to EEPROM	Function	Initial Data	Data Range
100000	00 to 1FH			Reserved	-	-
	20H	Read/Write	X	Exposure mode (8bit: D[7..0])	00H	
	21H	Read/Write	X	AGC range (8bit: D[7..0])	255	0 to 255
	22H			Reserved	-	-
	23H	Read/Write	X	The upper limit of the electronic shutter for auto shutter (230bit: D[7..0])	GE/GEC33A: 11,122 GE/GEC83A: 27,458 GE/GEC152A: 51,925 GE/GEC202A: 65,292	0 to 1,048,575
	24H	Read/Write	X	The upper limit of the electronic shutter for auto shutter (230bit: D[15..8])		
	25H	Read/Write	X	The upper limit of the electronic shutter for auto shutter (230bit: D[20..16])		
	26H	Read/Write	X	The lower limit of the electronic shutter for auto shutter (230bit: D[7..0])	0	0 to 1,048,575
	27H	Read/Write	X	The lower limit of the electronic shutter for auto shutter (230bit: D[15..8])		
	28H	Read/Write	X	The lower limit of the electronic shutter for auto shutter (230bit: D[20..16])		
	29H	Read/Write	X	Weight1 for ALC (8bit: D[7..0])		
	2AH	Read/Write	X	Weight2 for ALC (8bit: D[7..0])	11H	D3 to D0: 0 to 15 D7 to D4: 0 to 15
	2BH	Read/Write	X	Weight3 for ALC (8bit: D[7..0])	11H	D3 to D0: 0 to 15 D7 to D4: 0 to 15
	2CH	Read/Write	X	Weight4 for ALC (8bit: D[7..0])	11H	D3 to D0: 0 to 15 D7 to D4: 0 to 15
	2DH	Read/Write	X	Weight5 for ALC (8bit: D[7..0])	01H	D3 to D0: 0 to 15 D7 to D4: 0
	2EH	Read/Write	X	Target brightness for ALC (8bit: D[7..0])	128	0 to 255
	2FH	Read/Write	X	ALC peak-average (8bit: D[7..0])	0	0 to 255
	30H	Read/Write	X	Vertical_1 position for the ALC weight area (16bit: D[7..0])	GE/GEC330X: 32 GE/GEC830X: 32 GE/GEC1520X: 32 GE/GEC2020X: 32	GE/GEC330X: 0 to 493 GE/GEC830X: 0 to 767 GE/GEC1520X: 0 to 1,039 GE/GEC2020X: 0 to 1,236
	31H	Read/Write	X	Vertical_1 position for the ALC weight area (16bit: D[15..8])	GE/GEC330X: 196 GE/GEC830X: 288 GE/GEC1520X: 378 GE/GEC2020X: 444	GE/GEC330X: 0 to 493 GE/GEC830X: 0 to 767 GE/GEC1520X: 0 to 1,039 GE/GEC2020X: 0 to 1,236
	32H	Read/Write	X	Vertical_2 position for the ALC weight area (16bit: D[7..0])		
	33H	Read/Write	X	Vertical_2 position for the ALC weight area (16bit: D[15..8])	GE/GEC330X: 298 GE/GEC830X: 480 GE/GEC1520X: 662 GE/GEC2020X: 792	GE/GEC330X: 0 to 493 GE/GEC830X: 0 to 767 GE/GEC1520X: 0 to 1,039 GE/GEC2020X: 0 to 1,236
	34H	Read/Write	X	Vertical_3 position for the ALC weight area (16bit: D[7..0])		
	35H	Read/Write	X	Vertical_3 position for the ALC weight area (16bit: D[15..8])	GE/GEC330X: 462 GE/GEC830X: 732 GE/GEC1520X: 1,008 GE/GEC2020X: 1,207	GE/GEC330X: 0 to 493 GE/GEC830X: 0 to 767 GE/GEC1520X: 0 to 1,039 GE/GEC2020X: 0 to 1,236
	36H	Read/Write	X	Vertical_4 position for the ALC weight area (16bit: D[7..0])		
	37H	Read/Write	X	Vertical_4 position for the ALC weight area (16bit: D[15..8])	GE/GEC330X: 36 GE/GEC830X: 36 GE/GEC1520X: 36 GE/GEC2020X: 36	GE/GEC330X: 0 to 647 GE/GEC830X: 0 to 1,023 GE/GEC1520X: 0 to 1,359 GE/GEC2020X: 0 to 1,623
	38H	Read/Write	X	Horizontal_1 position for the ALC weight area (16bit: D[7..0])		
	39H	Read/Write	X	Horizontal_1 position for the ALC weight area (16bit: D[15..8])	GE/GEC330X: 252 GE/GEC830X: 377 GE/GEC1520X: 489 GE/GEC2020X: 577	GE/GEC330X: 0 to 647 GE/GEC830X: 0 to 1,023 GE/GEC1520X: 0 to 1,359 GE/GEC2020X: 0 to 1,623
	3AH	Read/Write	X	Horizontal_2 position for the ALC weight area (16bit: D[7..0])		
	3BH	Read/Write	X	Horizontal_2 position for the ALC weight area (16bit: D[15..8])	GE/GEC330X: 396 GE/GEC830X: 647 GE/GEC1520X: 871 GE/GEC2020X: 1,047	GE/GEC330X: 0 to 647 GE/GEC830X: 0 to 1,023 GE/GEC1520X: 0 to 1,359 GE/GEC2020X: 0 to 1,623
	3CH	Read/Write	X	Horizontal_3 position for the ALC weight area (16bit: D[7..0])		
	3DH	Read/Write	X	Horizontal_3 position for the ALC weight area (16bit: D[15..8])	GE/GEC330X: 612 GE/GEC830X: 988 GE/GEC1520X: 1,324 GE/GEC2020X: 1,588	GE/GEC330X: 0 to 647 GE/GEC830X: 0 to 1,023 GE/GEC1520X: 0 to 1,359 GE/GEC2020X: 0 to 1,623
	3EH	Read/Write	X	Horizontal_4 position for the ALC weight area (16bit: D[7..0])		
	3FH	Read/Write	X	Horizontal_4 position for the ALC weight area (16bit: D[15..8])		

Device Code	Command No.	Read/Write	Save to EEPROM	Function	Initial Data	Data Range
20H	40H	Read/Write	X	White balance mode (8bit: D[7..0])	00H	
	41H	Read/Write	X	Preset_1 white balance (Red gain) (8bit: D[7..0])	0	0 to 255
	42H	Read/Write	X	Preset_1 white balance (Gr gain) (8bit: D[7..0])	0	0 to 255
	43H	Read/Write	X	Preset_1 white balance (Blue gain) (8bit: D[7..0])	0	0 to 255
	44H	Read/Write	X	Preset_1 white balance (Gb gain) (8bit: D[7..0])	0	0 to 255
	45H	Read/Write	X	Preset_2 white balance (Red gain) (8bit: D[7..0])	0	0 to 255
	46H	Read/Write	X	Preset_2 white balance (Gr gain) (8bit: D[7..0])	0	0 to 255
	47H	Read/Write	X	Preset_2 white balance (Blue gain) (8bit: D[7..0])	0	0 to 255
	48H	Read/Write	X	Preset_2 white balance (Gb gain) (8bit: D[7..0])	0	0 to 255
	49H	Read/Write	X	Preset_3 white balance (Red gain) (8bit: D[7..0])	0	0 to 255
	4AH	Read/Write	X	Preset_3 white balance (Gr gain) (8bit: D[7..0])	0	0 to 255
	4BH	Read/Write	X	Preset_3 white balance (Blue gain) (8bit: D[7..0])	0	0 to 255
	4CH	Read/Write	X	Preset_3 white balance (Gb gain) (8bit: D[7..0])	0	0 to 255
	4DH			Reserved	-	-
	4EH	Read/Write	X	Threshold for auto white balance (16bit: D[7..0])	3,072	0 to 4,095
	4FH	Read/Write	X	Threshold for auto white balance (16bit: D[16..8])		
	50H	Read/Write	X	Y_offset for AOI (8bit: D[7..0])	0	GE/GEC330X: 4 ≤ Y ≤ 494 GE/GEC830X: 4 ≤ Y ≤ 768 GE/GEC1520X: 4 ≤ Y ≤ 1,040 GE/GEC2020X: 4 ≤ Y ≤ 1,236 Y: X_offset + width
	51H	Read/Write	X	Y_offset for AOI (8bit: D[15..8])		
	52H	Read/Write	X	Height for AOI (8bit: D[7..0])	GE/GEC330X: 494 GE/GEC830X: 768 GE/GEC1520X: 1,040 GE/GEC2020X: 1,236	GE/GEC330X: 4 ≤ Y ≤ 494 GE/GEC830X: 4 ≤ Y ≤ 768 GE/GEC1520X: 4 ≤ Y ≤ 1,040 GE/GEC2020X: 4 ≤ Y ≤ 1,236 Y: Y_offset + Height
	53H	Read/Write	X	Height for AOI (8bit: D[15..8])		
	54H	Read/Write	X	X_offset for AOI (8bit: D[7..0])	0	GE/GEC330X: 4 ≤ Y ≤ 648 GE/GEC830X: 4 ≤ Y ≤ 1,024 GE/GEC1520X: 4 ≤ Y ≤ 1,360 GE/GEC2020X: 4 ≤ Y ≤ 1,624 X: X_offset + width
	55H	Read/Write	X	X_offset for AOI (8bit: D[15..8])		
	56H	Read/Write	X	Width for AOI (8bit: D[7..0])	GE/GEC330X: 648 GE/GEC830X: 1,024 GE/GEC1520X: 1,360 GE/GEC2020X: 1,624	GE/GEC330X: 4 ≤ Y ≤ 648 GE/GEC830X: 4 ≤ Y ≤ 1,024 GE/GEC1520X: 4 ≤ Y ≤ 1,360 GE/GEC2020X: 4 ≤ Y ≤ 1,624 X: X_offset + width
	57H	Read/Write	X	Width for AOI (8bit: D[15..8])		
	58H	Read/Write	X	Vertical_1 position for the white balance area (16bit: D[7..0])	0	GE/GEC330X: 493 GE/GEC830X: 767 GE/GEC1520X: 1,039 GE/GEC2020X: 1,235
	59H	Read/Write	X	Vertical_1 position for the white balance area (16bit: D[15..8])		
	5AH	Read/Write	X	Vertical_2 position for the white balance area (16bit: D[7..0])	GE/GEC330X: 493 GE/GEC830X: 767 GE/GEC1520X: 1,039 GE/GEC2020X: 1,235	GE/GEC330X: 493 GE/GEC830X: 767 GE/GEC1520X: 1,039 GE/GEC2020X: 1,235
	5BH	Read/Write	X	Vertical_2 position for the white balance area (16bit: D[15..8])		
	5CH	Read/Write	X	Horizontal_1 position for the white balance area (16bit: D[7..0])	0	GE/GEC330X: 647 GE/GEC830X: 1,023 GE/GEC1520X: 1,359 GE/GEC2020X: 1,623
	5DH	Read/Write	X	Horizontal_1 position for the white balance area (16bit: D[15..8])		
	5EH	Read/Write	X	Horizontal_2 position for the white balance area (16bit: D[7..0])	GE/GEC330X: 647 GE/GEC830X: 1,023 GE/GEC1520X: 1,359 GE/GEC2020X: 1,623	GE/GEC330X: 647 GE/GEC830X: 1,023 GE/GEC1520X: 1,359 GE/GEC2020X: 1,623
	5FH	Read/Write	X	Horizontal_2 position for the white balance area (16bit: D[15..8])		
	60H	Read/Write	X	Camera mode 1 (8bit: D[7..0])	00H	
	61 to 7FH			Reserved	-	-
	80H	Read/Write	X	Push set white balance (Red gain) (8bit: D[7..0])	0	0 to 255
	81H	Read/Write	X	Push set white balance (Gr gain) (8bit: D[7..0])	0	0 to 255
82H	Read/Write	X	Push set white balance (Blue gain) (8bit: D[7..0])	0	0 to 255	
83H	Read/Write	X	Push set white balance (Gb gain) (8bit: D[7..0])	0	0 to 255	
84 to 8FH			Reserved	-	-	
90H	Read/Write	X	Iris lens adjustment (8bit: D[7..0])	80	0 to 255	
91H			Reserved	-	-	
92H	Read/Write	X	Iris lens adjustment (8bit: D[7..0])	01H		
93 to FFH			Reserved	-	-	

Command No.	Command Description								
13H: MOD4[7..0]	<p>[The camera function mode 4] Initial data: 60H Sets the camera function mode.</p> <p>D[7..0]</p> <table border="1"> <tr> <td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td> </tr> </table> <p>D7: No Function <u>Please set as 0</u> D6: Trigger signal mask while image out 0: OFF <u>1: ON (invalid trigger signal while image is out)</u> D5: No Function <u>Please set as 1</u> D4 to D0: No Function <u>Please set as 00000</u></p>	D7	D6	D5	D4	D3	D2	D1	D0
D7	D6	D5	D4	D3	D2	D1	D0		
16H: SOFTRG[7..0]	<p>[Software trigger setting] Initial data: 00H Sets the source of the software trigger.</p> <p>D[7..0]</p> <table border="1"> <tr> <td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td> </tr> </table> <p>D7 to D6: Software trigger source selection <u>00: Programming software trigger</u> 01: No function (Prohibited setting. Do not set this value) 10: Command Software trigger (200 useconds pulse width trigger signal) 11: No function (Prohibited setting. Do not set this value)</p> <p>D5 to D1: No Function <u>Please set as 00000</u> D0: Generate command software trigger <u>0: Hold (Low state)</u> 1: Generate command software trigger (200 useconds high state)</p> <p>Note 1: The software trigger source selection is enabled when "Trigger signal type (MOD3-D5)" is the software trigger (Set as 0). Note 2: When using the "Programming software trigger", please make the program for setup the pulse duration, the trigger signal interval and generate the trigger signal with the "StGigE SDK". Note3: When "Command software trigger" is selected, it is necessary to generate the software trigger signal with "Generate command software trigger (SOFTRIG-D0)".</p>	D7	D6	D5	D4	D3	D2	D1	D0
D7	D6	D5	D4	D3	D2	D1	D0		
17H: IMAGEREST[7..0]	<p>[Image data reset] Initial data: 00H Reset the Image data (FVAL, LVAL and the image data). Change from the reset to the image data out after starting the image acquisition. The image data does not output when the image data is reset.</p> <p>D[7..0]</p> <table border="1"> <tr> <td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td> </tr> </table> <p>D7 to D1: No function <u>Please set as 0000000</u> D0: Image data reset <u>0: FVAL/LVAL/Image data reset (FVAL, LVAL and the image data are low state data)</u> <u>1: FVAL/LVAL/Image data out</u></p>	D7	D6	D5	D4	D3	D2	D1	D0
D7	D6	D5	D4	D3	D2	D1	D0		
20H: EXPTM[7..0] 21H: EXPTM[15..8] 22H: EXPTM[23..16]	<p>[The exposure time (useconds) of the electronic shutter] Initial data; EXPTM[23..0] = 0, data range: 0 to 16,777,216 Sets the exposure time for the electronic shutter. Exposure time = EXPTM[23..0] useconds When set as 0, the electronic shutter is OFF</p>								

Command No.	Command Description
30H: PGA[7..0]	<p>[CDS gain] Initial data: PGA[7..0] = 0, data range: 0 to 255 Sets the CDS gain (Programmable gain).</p> <p>CDS gain for STC-GE33A/GEC33A CDS gain = $6.16 + 0.04 \times (\text{PGA}[7..0] \times 2 + \text{GOFs}[7..0])$ dB</p> <p>CDS gain for STC-GE83A/GEC83A CDS gain = $7.44 + 0.04 \times (\text{PGA}[7..0] \times 2 + \text{GOFs}[7..0])$ dB</p> <p>CDS gain for STC-GE152A/GEC152A CDS gain = $7.44 + 0.04 \times (\text{PGA}[7..0] \times 2 + \text{GOFs}[7..0])$ dB</p> <p>CDS gain for STC-GE202A/GEC202A CDS gain = $8.72 + 0.04 \times (\text{PGA}[7..0] \times 2 + \text{GOFs}[7..0])$ dB</p> <p>*CDS_BASEGAIN[15..0]: The gain base offset (The value of the address 5EH and 5FH) *GOFs[7..0]: The gain offset (The value of the address 32H)</p>
31H: DGB [7..0]	<p>[The digital gain] Initial data: DGB[7..0] = The factory adjusted value (The value of the address 0EH)</p> <p>Video level = $(\text{Input video level} - \text{CLAMP level}) \times (1 + \text{DGB}[7..0] / 128) + \text{CLAMP level}$</p> <p>* Clamp level (The calculated value of the address 38H)</p>
32H: GOFs[7..0]	<p>[The gain offset] Initial data: GOFs[7..0] = The factory adjusted value data range: 0 to 255</p>
38H: CLAMP[7..0]	<p>[The clamp level] Initial data: CLAMP[7..0] = 9, data range: 0 to 31 Sets the clamp level (The clamp level of the black signal)</p> <p>Clamp level = $\text{CLAMP}[7..0] \times 8 + 56$ (for 12-bit output) Clamp level = $\text{CLAMP}[7..0] \times 8 + 56 / 4$ (for 10-bit output) Clamp level = $\text{CLAMP}[7..0] \times 8 + 56 / 16$ (for 8-bit output)</p> <p>When the value is set to be greater than 31, it will automatically set to 31.</p>
3EH: WHITE_CLIP[15..8] 3FH: WHITE_CLIP[7..0]	<p>[The white clip level for the white clip test pattern] Initial data: WHITE_CLIP[15..0] = 1,023, data range: 0 to 4,095 Set the white clip level for the white clip test pattern.</p>
50H: DELAY_I[7..0] 51H: DELAY_I[15..8] 52H: DELAY_I[23..16]	<p>[The delay time (usecond, integer) for the trigger signal] Initial data: DELAY_I[23..0] = 0, data range: 0 to 2,000,000 Sets the delay time from the trigger signal input to the start exposure as useconds.</p> <p>Delay time for the trigger signal = $(\text{DELAY_I}[23..0]) \cdot (\text{DELAY_F}[7..0])$ useconds</p>
53H: DELAY_F[7..0]	<p>[The delay time (usecond, decimal) for the trigger signal] Initial data: DELAY_F[23..0] = 0, data range: 0 to 99 Sets the delay time from the trigger signal input to start exposure as useconds.</p>

Delay time for the trigger signal = (DELAY_I[23..0]). (DELAY_F[7..0]) useconds

Command No.	Command Description								
58H: FPS_I[7..0]	[Frame rate (Hz, integer)] Initial data: FPS_F[15..0] = see below, data range: 0 to 99,999 Sets the frame rate as Hz.								
59H: FPS_I[15..8]	Frame rate = (FPS_I[15..0]). (FPS_F[23..0]) Hz STC-GE330X/GEC330X Data range: 0.72028 to 360.33325 Hz Max frame rate for full resolution: 89.91172 Hz (as initial data) STC-GE830X/GEC830X Data range: 0.44238 to 150.21358 Hz Max frame rate for full resolution: 36.42113 Hz (as initial data) STC-GE1520X/GEC1520X Data range: 0.31387 to 77.03817Hz Max frame rate for full resolution: 19.25954 Hz (as initial data) STC-GE2020X/GEC2020X Data range: 0.29261 to 61.26673 Hz Max frame rate for full resolution: 15.31668 Hz (as initial data)								
5AH: FPS_F[7..0] 5BH: FPS_F[15..8] 5CH: FPS_F[23..16]	[Frame rate (Hz, decimal)] Initial data: FPS_F[23..0] = see FPS_I[15..0], data range: 0 to 99,999 Sets the frame rate as Hz. Frame rate = (FPS_I[15..0]). (FPS_F[23..0]) Hz								
78H: TESTP[7..0]	[Test pattern selection] Initial data: TESTP[7..0] = 00H Sets the test pattern output from the camera. D[7..0] <table border="1" style="margin-left: 20px;"> <tr> <td>D7</td> <td>D6</td> <td>D5</td> <td>D4</td> <td>D3</td> <td>D2</td> <td>D1</td> <td>D0</td> </tr> </table> <u>00H: Video output</u> 01H: Gray scale 02H: Ramp wave 03H: 100% white 04H: White clip 05H: Color bar (RGB bayer) Others: Black	D7	D6	D5	D4	D3	D2	D1	D0
D7	D6	D5	D4	D3	D2	D1	D0		

Command No.	Command Description																												
79H: EFFCT[7..0]	<p>[Image effect selection] Initial data: EFFCT[7..0] = 00H Sets the image effect.</p> <p>D[7..0]</p> <table border="1"> <tr> <td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td> </tr> </table> <p>D7: Negative video / Positive video selection D6 to D0: Image effect</p> <table> <tr> <td><u>0: Positive image</u></td> <td>1: Negative image</td> </tr> <tr> <td><u>00H: No effect (Original)</u></td> <td>01H: 9bit gradation</td> </tr> <tr> <td>02H: 8bit gradation</td> <td>03H: 7bit gradation</td> </tr> <tr> <td>04H:6bit gradation</td> <td>05H: 5bit gradation</td> </tr> <tr> <td>06H: 4bit gradation</td> <td>07H: 3bit gradation</td> </tr> <tr> <td>08H: 2bit gradation</td> <td>09H: 1bit gradation</td> </tr> <tr> <td colspan="2">0A to 7FH: No function (Prohibited setting. Do not set these values)</td> </tr> </table>	D7	D6	D5	D4	D3	D2	D1	D0	<u>0: Positive image</u>	1: Negative image	<u>00H: No effect (Original)</u>	01H: 9bit gradation	02H: 8bit gradation	03H: 7bit gradation	04H:6bit gradation	05H: 5bit gradation	06H: 4bit gradation	07H: 3bit gradation	08H: 2bit gradation	09H: 1bit gradation	0A to 7FH: No function (Prohibited setting. Do not set these values)							
D7	D6	D5	D4	D3	D2	D1	D0																						
<u>0: Positive image</u>	1: Negative image																												
<u>00H: No effect (Original)</u>	01H: 9bit gradation																												
02H: 8bit gradation	03H: 7bit gradation																												
04H:6bit gradation	05H: 5bit gradation																												
06H: 4bit gradation	07H: 3bit gradation																												
08H: 2bit gradation	09H: 1bit gradation																												
0A to 7FH: No function (Prohibited setting. Do not set these values)																													
80H: E2P[7..0]	<p>[EEPROM control] Initial data: E2P[7..0] = 00H</p> <p>D[7..0]</p> <table border="1"> <tr> <td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td> </tr> </table> <p>D7 to D1: No function <u>Please set as 000000</u> D0: Write control to the EEPROM <u>0: Prohibited</u> 1: Accept</p> <p>Note 1: This bit is automatically cleared to "0" by the internal process after the execution of the command.</p>	D7	D6	D5	D4	D3	D2	D1	D0																				
D7	D6	D5	D4	D3	D2	D1	D0																						
F0H: OUTSEL[7..0]	<p>[The output signal selection for the power/IO connector] Initial data: OUTSEL[7..0]=20H</p> <p>D[7..0]</p> <table border="1"> <tr> <td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td> </tr> </table> <p>D7 to D4: Output signal for 3pin of the power/IO</p> <table> <tr> <td>0: Trigger ready signal,</td> <td>1: User setup signal</td> </tr> <tr> <td>2: Exposure time</td> <td>3: Trigger signal</td> </tr> <tr> <td><u>4: Trigger signal (after mask and delay process)</u></td> <td></td> </tr> <tr> <td>5: Image out time (SensorReadOut),</td> <td></td> </tr> <tr> <td>6: No function (Prohibited setting. Do not set this value)</td> <td></td> </tr> </table> <p>D3 to D0: Output signal for 2pin of the power/IO</p> <table> <tr> <td><u>0: Trigger ready signal,</u></td> <td>1: User setup signal</td> </tr> <tr> <td>2: Exposure time</td> <td>3: Trigger signal</td> </tr> <tr> <td>4: Trigger signal (after mask and delay process)</td> <td></td> </tr> <tr> <td>5: Image out time (SensorReadOut),</td> <td></td> </tr> <tr> <td>6: No function (Prohibited setting. Do not set this value)</td> <td></td> </tr> </table> <p>Note: When "User setup signal" is selected, it will set the status of the signal with "User setup signal output for the power/IO connector (TEST2-D3.4)".</p>	D7	D6	D5	D4	D3	D2	D1	D0	0: Trigger ready signal,	1: User setup signal	2: Exposure time	3: Trigger signal	<u>4: Trigger signal (after mask and delay process)</u>		5: Image out time (SensorReadOut),		6: No function (Prohibited setting. Do not set this value)		<u>0: Trigger ready signal,</u>	1: User setup signal	2: Exposure time	3: Trigger signal	4: Trigger signal (after mask and delay process)		5: Image out time (SensorReadOut),		6: No function (Prohibited setting. Do not set this value)	
D7	D6	D5	D4	D3	D2	D1	D0																						
0: Trigger ready signal,	1: User setup signal																												
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5: Image out time (SensorReadOut),																													
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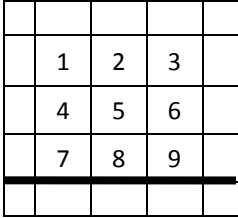
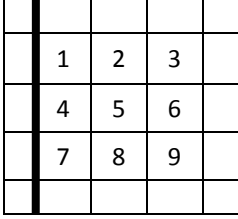
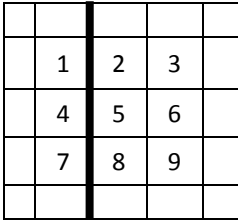
Command No.	Command Description								
F1H: TEST2[7..0]	<p data-bbox="300 310 885 340">[User setup signal output for the power/IO connector]</p> <p data-bbox="300 342 617 371">Initial data: TEST2[7..0] = 00H</p> <p data-bbox="300 409 373 438">D[7..0]</p> <table border="1" data-bbox="300 438 873 472"> <tr> <td>D7</td> <td>D6</td> <td>D5</td> <td>D4</td> <td>D3</td> <td>D2</td> <td>D1</td> <td>D0</td> </tr> </table> <p data-bbox="311 508 1120 537">D7 to D5: No function <u>Please set as 000</u></p> <p data-bbox="311 539 1239 569">D4: User setup signal output for 3pin of the <u>0: Low</u> 1: High</p> <p data-bbox="311 571 1239 600">D3: User setup signal output for 2pin of the <u>0: Low</u> 1: High</p> <p data-bbox="311 602 1120 632">D2 to D0: No function <u>Please set as 000</u></p> <p data-bbox="300 667 1372 697">Note: User setup signal is enabled when "Output signal selection (OUTSEL)" is the user setup signal.</p>	D7	D6	D5	D4	D3	D2	D1	D0
D7	D6	D5	D4	D3	D2	D1	D0		

3. Description of the camera control commands (Device code: 100000)
 (The underline settings are the factory default settings)

Command No.	Command Description								
20H: [7..0]	<p>[Exposure mode] Initial data: 00H Sets the exposure mode (the AGC), the shutter mode and the iris lens control method.</p> <p>D[7..0]</p> <table border="1"> <tr> <td>D7</td> <td>D6</td> <td>D5</td> <td>D4</td> <td>D3</td> <td>D2</td> <td>D1</td> <td>D0</td> </tr> </table> <p>D7 to D4: No function <u>Please set as 0000</u></p> <p>D3: AGC <u>0: OFF (Fixed gain)</u> 1: ON (AGC)</p> <p>D2: Shutter mode <u>0: OFF (Fixed shutter)</u> 1: ON (Auto shutter)</p> <p>D1: Iris lens control method <u>0: OFF (Manual control)</u> 1: ON (Auto control)</p> <p>D0: No function <u>Please set as 0</u></p>	D7	D6	D5	D4	D3	D2	D1	D0
D7	D6	D5	D4	D3	D2	D1	D0		
21H: [7..0]	<p>[AGC range] Initial data: 255, data range: 0 to 255 Sets the range of the AGC (Maximum)</p>								
23H: [7..0] 24H: [15..8] 25H: [20..16]	<p>[The upper limit of the electronic shutter for the auto shutter] Initial data: 65,292, data range: 0 to 1,048,575 Sets the upper limit of the electronic shutter for the auto shutter as usecond.</p> <p>Initial data:</p> <p>STC-GE33A/GEC33A 11,122 useconds STC-GE83A/GEC83A 27,458 useconds STC-GE152A/GEC152A 51,925 useconds STC-GE202A/GEC202A 65,292 useconds</p>								
26H: [7..0] 27H: [15..8] 28H: [20..16]	<p>[The lower limit of the electronic shutter for auto shutter] Initial data: 0, data range: 0 to 1,048,575 Sets the lower limit of the electronic shutter for the auto shutter as usecond.</p>								
29H: [7..0]	<p>[Weight1 for ALC] Initial data: 11H Sets the weight for ALC weight area 1 and 2.</p> <p>D[7..0]</p> <table border="1"> <tr> <td>D7</td> <td>D6</td> <td>D5</td> <td>D4</td> <td>D3</td> <td>D2</td> <td>D1</td> <td>D0</td> </tr> </table> <p>D7 to D4: Weight for ALC weight area 2 <u>1</u> Range: 0 to 15 D3 to D0: Weight for ALC weight area 1 <u>1</u> Range: 0 to 15</p> <p>*Please set the ALC weight area with "30H to 3FH".</p>	D7	D6	D5	D4	D3	D2	D1	D0
D7	D6	D5	D4	D3	D2	D1	D0		

Command No.	Command Description								
2AH: [7..0]	<p>[Weight2 for ALC] Initial data: 11H Sets the weight for ALC weight area 3 and 4.</p> <p>D[7..0]</p> <table border="1"> <tr> <td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td> </tr> </table> <p>D7 to D4: Weight for ALC weight area 4 <u>1</u> Range: 0 to 15 D3 to D0: Weight for ALC weight area 3 <u>1</u> Range: 0 to 15 *Please set the ALC weight area with "30H to 3FH".</p>	D7	D6	D5	D4	D3	D2	D1	D0
D7	D6	D5	D4	D3	D2	D1	D0		
2BH: [7..0]	<p>[Weight3 for ALC] Initial data: 1AH Sets the weight for ALC weight area 5 and 6.</p> <p>D[7..0]</p> <table border="1"> <tr> <td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td> </tr> </table> <p>D7 to D4: Weight for ALC weight area 6 <u>1</u> Range: 0 to 15 D3 to D0: Weight for ALC weight area 5 <u>10</u> Range: 0 to 15 *Please set the ALC weight area with "30H to 3FH".</p>	D7	D6	D5	D4	D3	D2	D1	D0
D7	D6	D5	D4	D3	D2	D1	D0		
2CH: [7..0]	<p>[Weight4 for ALC] Initial data: 11H Sets the weight for ALC weight area 7 and 8.</p> <p>D[7..0]</p> <table border="1"> <tr> <td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td> </tr> </table> <p>D7 to D4: Weight for ALC weight area 8 <u>1</u> Range: 0 to 15 D3 to D0: Weight for ALC weight area 7 <u>1</u> Range: 0 to 15 *Please set the ALC weight area with "30H to 3FH".</p>	D7	D6	D5	D4	D3	D2	D1	D0
D7	D6	D5	D4	D3	D2	D1	D0		
2DH: [7..0]	<p>[Weight5 for ALC] Initial data: 01H Sets the weight for ALC weight area 9.</p> <p>D[7..0]</p> <table border="1"> <tr> <td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td> </tr> </table> <p>D7 to D4: No function <u>Please set as 0000</u> D3 to D0: Weight for ALC weight area 9 <u>1</u> Range: 0 to 15 *Please set the ALC weight area with "30H to 3FH".</p>	D7	D6	D5	D4	D3	D2	D1	D0
D7	D6	D5	D4	D3	D2	D1	D0		
2EH: [7..0]	<p>[Target brightness for ALC] Initial data: 128, data range: 0 to 255 Sets the target brightness for the ALC function (AGC, auto shutter or iris lens auto control).</p>								
2FH: [7..0]	<p>[ALC peak-average] Initial data: 0, data range: 0 to 255 Sets the control standard for the ACL function (AGC, auto shutter or iris lens auto control).</p> <p>When it is set as 0 (the Average: 100%, Peak: 0%), the ALC function with the average brightness of the photometry area. When it is set as 255 (the Average: 0%, Peak: 100%), the ALC function with the peak brightness of the photometry area.</p>								




Command No.	Command Description																									
30H: [7..0] 31H: [15..8]	<p>[Vertical_1 position for the ALC weight area] Initial data: check below, data range: check below Sets the vertical 1 position for ALC weight area.</p> <p>STC-GE330X/GEC330X Initial data: 32 Data range: 0 to 493</p> <p>STC-GE830X/GEC830X Initial data: 32 Data range: 0 to 767</p> <p>STC-GE1520X/GEC1520X Initial data: 32 Data range: 0 to 1,039</p> <p>STC-GE2020X/GEC2020X Initial data: 32 Data range: 0 to 1,235</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>1</td><td>2</td><td>3</td><td></td></tr> <tr><td></td><td>4</td><td>5</td><td>6</td><td></td></tr> <tr><td></td><td>7</td><td>8</td><td>9</td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table>							1	2	3			4	5	6			7	8	9						
	1	2	3																							
	4	5	6																							
	7	8	9																							
32H: [7..0] 33H: [15..8]	<p>[Vertical_2 position for the ALC weight area] Initial data: check below, data range: check below Sets the vertical 2 position for ALC weight area.</p> <p>STC-GE330X/GEC330X Initial data: 196 Data range: 0 to 493</p> <p>STC-GE830X/GEC830X Initial data: 288 Data range: 0 to 767</p> <p>STC-GE1520X/GEC1520X Initial data: 378 Data range: 0 to 1,039</p> <p>STC-GE2020X/GEC2020X Initial data: 444 Data range: 0 to 1,235</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>1</td><td>2</td><td>3</td><td></td></tr> <tr><td></td><td>4</td><td>5</td><td>6</td><td></td></tr> <tr><td></td><td>7</td><td>8</td><td>9</td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table>							1	2	3			4	5	6			7	8	9						
	1	2	3																							
	4	5	6																							
	7	8	9																							
34H: [7..0] 35H: [15..8]	<p>[Vertical_3 position for the ALC weight area] Initial data: check below, data range: check below Sets the vertical 3 position for ALC weight area.</p> <p>STC-GE330X/GEC330X Initial data: 298 Data range: 0 to 493</p> <p>STC-GE830X/GEC830X Initial data: 480 Data range: 0 to 767</p> <p>STC-GE1520X/GEC1520X Initial data: 662 Data range: 0 to 1,039</p> <p>STC-GE2020X/GEC2020X Initial data: 792 Data range: 0 to 1,235</p> <table border="1" style="margin-left: auto; margin-right: auto;"> <tr><td></td><td></td><td></td><td></td><td></td></tr> <tr><td></td><td>1</td><td>2</td><td>3</td><td></td></tr> <tr><td></td><td>4</td><td>5</td><td>6</td><td></td></tr> <tr><td></td><td>7</td><td>8</td><td>9</td><td></td></tr> <tr><td></td><td></td><td></td><td></td><td></td></tr> </table>							1	2	3			4	5	6			7	8	9						
	1	2	3																							
	4	5	6																							
	7	8	9																							


Command No.	Command Description
36H: [7..0] 37H: [15..8]	<p>[Vertical_4 position for the ALC weight area] Initial data: check below, data range: check below Sets the vertical 4 position for ALC weight area.</p> <p>STC-GE330X/GEC330X Initial data: 462 Data range: 0 to 493</p> <p>STC-GE830X/GEC830X Initial data: 736 Data range: 0 to 767</p> <p>STC-GE1520X/GEC1520X Initial data: 1,008 Data range: 0 to 1,039</p> <p>STC-GE2020X/GEC2020X Initial data: 1,204 Data range: 0 to 1,235</p> 
38H: [7..0] 39H: [15..8]	<p>[Horizontal_1 position for the ALC weight area] Initial data: Check below, data range: check below Sets the horizontal 1 position for ALC weight area.</p> <p>STC-GE330X/GEC330X Initial data: 36 Data range: 0 to 647</p> <p>STC-GE830X/GEC830X Initial data: 36 Data range: 0 to 1,023</p> <p>STC-GE1520X/GEC1520X Initial data: 36 Data range: 0 to 1,359</p> <p>STC-GE2020X/GEC2020X Initial data: 36 Data range: 0 to 1,623</p> 
3AH: [7..0] 3BH: [15..8]	<p>[Horizontal_2 position for the ALC weight area] Initial data: Check below, data range: check below Sets the horizontal 2 position for ALC weight area.</p> <p>STC-GE330X/GEC330X Initial data: 252 Data range: 0 to 647</p> <p>STC-GE830X/GEC830X Initial data: 377 Data range: 0 to 1,023</p> <p>STC-GE1520X/GEC1520X Initial data: 489 Data range: 0 to 1,359</p> <p>STC-GE2020X/GEC2020X Initial data: 577 Data range: 0 to 1,623</p> 

Command No.	Command Description																				
3CH: [7..0] 3DH: [15..8]	<p>[Horizontal_3 position for the ALC weight area] Initial data: Check below, data range: check below Sets the horizontal 3 position for ALC weight area.</p> <p>STC-GE330X/GEC330X Initial data: 396 Data range: 0 to 647</p> <table border="1" style="margin-left: 200px;"> <tr><td></td><td></td><td></td><td></td></tr> <tr><td>1</td><td>2</td><td>3</td><td></td></tr> <tr><td>4</td><td>5</td><td>6</td><td></td></tr> <tr><td>7</td><td>8</td><td>9</td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> </table> <p>STC-GE830X/GEC830X Initial data: 647 Data range: 0 to 1,023</p> <p>STC-GE1520X/GEC1520X Initial data: 871 Data range: 0 to 1,359</p> <p>STC-GE2020X/GEC2020X Initial data: 1,047 Data range: 0 to 1,623</p>					1	2	3		4	5	6		7	8	9					
1	2	3																			
4	5	6																			
7	8	9																			
3EH: [7..0] 3FH: [15..8]	<p>[Horizontal_4 position for the ALC weight area] Initial data: Check below, data range: check below Sets the horizontal 4 position for ALC weight area.</p> <p>STC-GE330X/GEC330X Initial data: 612 Data range: 0 to 647</p> <table border="1" style="margin-left: 200px;"> <tr><td></td><td></td><td></td><td></td></tr> <tr><td>1</td><td>2</td><td>3</td><td></td></tr> <tr><td>4</td><td>5</td><td>6</td><td></td></tr> <tr><td>7</td><td>8</td><td>9</td><td></td></tr> <tr><td></td><td></td><td></td><td></td></tr> </table> <p>STC-GE830X/GEC830X Initial data: 988 Data range: 0 to 1,023</p> <p>STC-GE1520X/GEC1520X Initial data: 1,324 Data range: 0 to 1,359</p> <p>STC-GE2020X/GEC2020X Initial data: 1,588 Data range: 0 to 1,623</p>					1	2	3		4	5	6		7	8	9					
1	2	3																			
4	5	6																			
7	8	9																			
40H: [7..0]	<p>[White balance mode] Initial data: 00H Sets the white balance mode for the color camera.</p> <p>D[7..0]</p> <table border="1" style="margin-left: 20px;"> <tr> <td>D7</td><td>D6</td><td>D5</td><td>D4</td><td>D3</td><td>D2</td><td>D1</td><td>D0</td> </tr> </table> <p>D7 to D4: No function <u>Please set as 0000</u></p> <p>D3: Push to set white balance operation 0: OFF 1: ON</p> <p>D2 to D0: White balance mode 000: OFF 001: Preset 1</p> <p style="margin-left: 200px;">010: Preset 2 011: Preset 3</p> <p style="margin-left: 200px;">100: Auto white balance 101: Push to set white balance</p> <p style="margin-left: 200px;">110 to 111: No function (Prohibited setting. Do not set these values)</p> <p>*When use the push to set white balance, set the white balance mode as "Push to set white balance" then change "0" to "1" for Push to set white balance operation.</p>	D7	D6	D5	D4	D3	D2	D1	D0												
D7	D6	D5	D4	D3	D2	D1	D0														

Command No.	Command Description
41H: [7..0]	[Preset_1 white balance (Red gain)] Initial data 0, data range: 0 to 255 Sets the Red gain for the preset_1 white balance.
42H: [7..0]	[Preset_1 white balance (Gr gain)] Initial data 0, data range: 0 to 255 Sets the Gr gain for the preset_1 white balance.
43H: [7..0]	[Preset_1 white balance (Blue gain)] Initial data 0, data range: 0 to 255 Sets the Blue gain for the preset_1 white balance.
44H: [7..0]	[Preset_1 white balance (Gb gain)] Initial data 0, data range: 0 to 255 Sets the Gb gain for the preset_1 white balance.
45H: [7..0]	[Preset_2 white balance (Red gain)] Initial data 0, data range: 0 to 255 Sets the Red gain for the preset_2 white balance.
46H: [7..0]	[Preset_2 white balance (Gr gain)] Initial data 0, data range: 0 to 255 Sets the Gr gain for the preset_2 white balance.
47H: [7..0]	[Preset_2 white balance (Blue gain)] Initial data 0, data range: 0 to 255 Sets the Blue gain for the preset_2 white balance.
48H: [7..0]	[Preset_2 white balance (Gb gain)] Initial data 0, data range: 0 to 255 Sets the Gb gain for the preset_2 white balance.
49H: [7..0]	[Preset_3 white balance (Red gain)] Initial data 0, data range: 0 to 255 Sets the Red gain for the preset_3 white balance.
4AH: [7..0]	[Preset_3 white balance (Gr gain)] Initial data 0, data range: 0 to 255 Sets the Gr gain for the preset_3 white balance.
4BH: [7..0]	[Preset_3 white balance (Blue gain)] Initial data 0, data range: 0 to 255 Sets the Blue gain for the preset_3 white balance.
4CH: [7..0]	[Preset_3 white balance (Gb gain)] Initial data 0, data range: 0 to 255 Sets the Gb gain for the preset_3 white balance.
4EH: [7..0] 4FH: [15..8]	[Bright level threshold for auto white balance] Initial data: 3,072, data range: 0 to 4,095 Sets the bright level threshold for the auto white balance process. The auto white balance process uses the color information of the pixel, which is when pixel brightness is greater than this value.
50H: [7..0] 51H: [15..8]	[Y_offset for AOI] Initial data: 0, data range: check below Sets the Y_offset, which is the vertical start position of the image for the AOI. STC-GE33A / GEC33A Data range: $4 \leq \text{"Y_offset + Height"} \leq 494$ STC-GE83A / GEC83A Data range: $4 \leq \text{"Y_offset + Height"} \leq 768$ STC-GE152A / GEC152A Data range: $4 \leq \text{"Y_offset + Height"} \leq 1,040$ STC-GE202A / GEC202A Data range: $4 \leq \text{"Y_offset + Height"} \leq 1,236$

Command No.	Command Description
52H: [7..0] 53H: [15..8]	<p>[Height for AOI] Initial data: check below, data range: check below Sets the height, which is the vertical size of the image for the AOI.</p> <p>STC-GE33A / GEC33A Initial data: 494 Data range: $4 \leq \text{"Y_offset + Height"} \leq 494$</p> <p>STC-GE83A / GEC83A Initial data: 768 Data range: $4 \leq \text{"Y_offset + Height"} \leq 768$</p> <p>STC-GE152A / GEC152A Initial data: 1,040 Data range: $4 \leq \text{"Y_offset + Height"} \leq 1,040$</p> <p>STC-GE202A / GEC202A Initial data: 1,236 Data range: $4 \leq \text{"Y_offset + Height"} \leq 1,236$</p>
54H: [7..0] 55H: [15..8]	<p>[X_offset for AOI] Initial data: 0, data range: check below Sets the X_offset, which is the horizontal start position of the image for the AOI.</p> <p>STC-GE33A / GEC33A Data range: $8 \leq \text{"X_offset + Width"} \leq 648$</p> <p>STC-GE83A / GEC83A Data range: $8 \leq \text{"X_offset + Width"} \leq 1,024$</p> <p>STC-GE152A / GEC152A Data range: $8 \leq \text{"X_offset + Width"} \leq 1,360$</p> <p>STC-GE202A / GEC202A Data range: $8 \leq \text{"X_offset + Width"} \leq 1,624$</p>
56H: [7..0] 57H: [15..8]	<p>[Width for AOI] Initial data: 0, data range: check below Sets the width, which is the horizontal size of the image for the AOI.</p> <p>STC-GE33A / GEC33A Initial data: 648 Data range: $8 \leq \text{"X_offset + Width"} \leq 648$</p> <p>STC-GE83A / GEC83A Initial data: 1,024 Data range: $8 \leq \text{"X_offset + Width"} \leq 1,024$</p> <p>STC-GE152A / GEC152A Initial data: 1,360 Data range: $8 \leq \text{"X_offset + Width"} \leq 1,360$</p> <p>STC-GE202A / GEC202A Initial data: 1,624 Data range: $8 \leq \text{"X_offset + Width"} \leq 1,624$</p>

Command No.	Command Description
58H: [7..0] 59H: [15..8]	<p>[Vertical_1 position for the white balance area] Initial data: check below, data range: check below Sets the vertical 1 position, which is the vertical start position for the white balance area. This area is used for gain calculation for the auto white balance and the push to set white balance.</p> <p>STC- GEC33A Initial data: 0 Data range: 0 to 493</p> <p>STC- GEC83A Initial data: 0 Data range: 0 to 767</p> <p>STC- GEC152A Initial data: 0 Data range: 0 to 1,039</p> <p>STC- GEC202A Initial data: 0 Data range: 0 to 1,235</p> 
5AH: [7..0] 5BH: [15..8]	<p>[Vertical_2 position for the white balance area] Initial data: check below, data range: check below Sets the vertical 2 position, which is the vertical start position for the white balance area. This area is used for gain calculation for the auto white balance and the push to set white balance.</p> <p>STC- GEC33A Initial data: 493 Data range: 0 to 493</p> <p>STC- GEC83A Initial data: 767 Data range: 0 to 767</p> <p>STC- GEC152A Initial data: 1,039 Data range: 0 to 1,039</p> <p>STC- GEC202A Initial data: 1,235 Data range: 0 to 1,235</p> 
5CH: [7..0] 5DH: [15..8]	<p>[Horizontal_1 position for the white balance area] Initial data: check below, data range: check below Sets the horizontal 1 position, which is the horizontal start position for the white balance area. This area is used for gain calculation for the auto white balance and the push to set white balance.</p> <p>STC- GEC33A Initial data: 0 Data range: 0 to 647</p> <p>STC- GEC83A Initial data: 0 Data range: 0 to 1,023</p> <p>STC- GEC152A Initial data: 0 Data range: 0 to 1,359</p> <p>STC- GEC202A Initial data: 0 Data range: 0 to 1,623</p> 

Command No.	Command Description								
5EH: [7..0] 5FH: [15..8]	<p>[Horizontal_2 position for the white balance area] Initial data: check below, data range: check below Sets the horizontal 2 position, which is the horizontal end position for white balance area. This area is used for the gain calculation for the auto white balance and the push to set white balance.</p> <p>STC- GEC33A Initial data: 647 Data range: 0 to 647</p> <p>STC- GEC83A Initial data: 1,023 Data range: 0 to 1,023</p> <p>STC- GEC152A Initial data: 1,359 Data range: 0 to 1,359</p> <p>STC- GEC202A Initial data: 1,623 Data range: 0 to 1,623</p> 								
60H: [7..0]	<p>[Camera mode1] Initial data: 00H Sets the white balance area ON/OFF and the gamma table ON/OFF.</p> <p>D[7..0]</p> <table border="1" data-bbox="298 953 875 989"> <tr> <td>D7</td> <td>D6</td> <td>D5</td> <td>D4</td> <td>D3</td> <td>D2</td> <td>D1</td> <td>D0</td> </tr> </table> <p>D7 to D5: No function <u>Please set as 000</u> D4: White balance area ON/OFF <u>0: OFF (Full screen), 1: ON (setup area)</u> D3 to D1: No function <u>Please set as 000</u> D0: Gamma table ON/OFF <u>0: OFF (Gamma=1.0), 1: ON</u></p>	D7	D6	D5	D4	D3	D2	D1	D0
D7	D6	D5	D4	D3	D2	D1	D0		
80H: GainRP [7..0]	<p>[Push to set white balance (Red gain)] Initial data: 0, data range: 0 to 255 Sets the Red gain for the Push to set white balance.</p> <p>Red of the camera output image data = (CCD_R - CLAMP Level) x (1 + GainRP[7..0] / 64) + CLAMP Level</p> <p>*CCD_R: Red of the CCD output image data *CLAMP Level: Clamp level (the calculated value of 38H)</p>								
81H: GainGrP [7..0]	<p>[Push to set white balance (Gr gain)] Initial data: 0, data range: 0 to 255 Sets the Gr gain for the Push to set white balance.</p> <p>Gr of the camera output image data = (CCD_Gr - CLAMP Level) x (1 + GainGrP[7..0] / 64) + CLAMP Level</p> <p>*CCD_Gr: Gr of the CCD output image data *CLAMP Level: Clamp level (the calculated value of 38H)</p>								
82H: GainBR [7..0]	<p>[Push to set white balance (Blue gain)] Initial data: 0, data range: 0 to 255 Sets the Blue gain for the Push to set white balance.</p> <p>Blue of the camera output image data = (CCD_B - CLAMP Level) x (1 + GainBR[7..0] / 64) + CLAMP Level</p> <p>*CCD_B: Blue of the CCD output image data *CLAMP Level: Clamp level (the calculated value of 38H)</p>								

Revision

Rev	Date	Changes	Note
1.0	2010/12/6	New Document	
1.1	2010/12/21	Updated Receiving code 14H (Change the time out time to 2 seconds) Change the camera function mode 2 (Change the initial data) Change the exposure time of the electronic shutter (Change the data range) Change from "AGC range" to "AGC maximum limit" Change the upper limit of the electronic shutter for auto shutter (Change the initial data) Change the weight for the ALC (Change the initial data) Change the pulse duration for the software trigger to 200 useconds Change the formula for the CDS gain Change the description for the EEPROM control Change the description for the output signal selection for the power/IO connector (Add the selection 7 to F) Change the camera function mode 1 Change the camera function mode 4	
1.2	2011/1/14	Update Added the image data reset Added the bright level threshold for auto white balance process Added the ALC peak-average	
1.3	2011/2/18	Update Changed the "Weight for ALC"	
1.4	2011/4/1	Update Changed "White balance area" (Deleted the monochrome model) Changed the description for the device code.	
1.5	2011/5/31	Update Changed the range for the frame rate (83 and 152)	
1.6	2011/6/27	Update Revised the formula or the CDS gain Revise the formula for the video level Revise the formula for the clamp level Add the formula for the white balance gain	

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