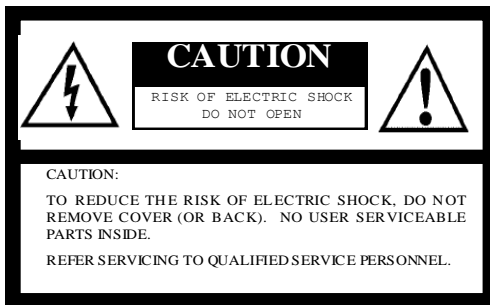




**STC-AF56 / AF66
Auto Focus Camera
Protocol Specification**

Safety Precautions



The lightning flash with arrowhead symbol, within an equilateral triangle, is intended to alert the user to the presence of uninsulated “dangerous voltage” within the product’s enclosure that may be of sufficient magnitude to constitute a risk of electric shock to persons.



The exclamation point within an equilateral triangle is intended to alert the user to the presence of important operating and maintenance (servicing) instructions in the literature accompanying the appliance.

For U.S.A.

Warning:

This equipment generates and uses radio frequency energy and if not installed and used properly, i.e., in strict accordance with the instruction manual, may cause harmful interference to radio communications. It has been tested and found to comply with the limits for a Class A computing device pursuant to Subpart J of Part 15 of FCC Rules, which are designed to provide reasonable protection against such interference when operated in a commercial environment.

For Canada

Warning:

This digital apparatus does not exceed the Class A limits for radio noise emissions from digital apparatus set out in the Radio Interference Regulations of the Canadian Department of Communications.

WARNING:

TO PREVENT FIRE OR SHOCK HAZARD, DO NOT EXPOSE THIS APPLIANCE TO RAIN OR MOISTURE.

Product Precautions

- Handle the camera with care. Do not abuse the camera. Avoid striking or shaking it. Improper handling or storage could damage the camera.
- Do not pull or damage the camera cable.
- During camera use, do not wrap the unit in any material. This will cause the internal temperature of the unit to increase.
- Do not expose the camera to moisture, or do not try to operate it in wet areas.
- Do not operate the camera beyond its temperature, humidity and power source ratings.
- While the camera is not being used, keep the lens or lens cap on the camera to prevent dust or contamination from getting in the CCD or filter area and scratching or damaging this area.
- Do not keep the camera under the following conditions:
 - In wet, moist, and high humidity areas
 - Under hot direct sunlight
 - In high temperature areas
 - Near an object that releases a strong magnetic or electric field
 - Areas with strong vibrations
- Use a soft cloth to clean the camera. Use pressured air spray to clean the surface of the glass. DO not scratch the surface of the glass.

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WARNING: Changing the register contents listed under section D on pages 18-25 is strictly prohibited. Any changes to those registers may cause permanent camera malfunction.

I. Communication Settings

Baud Rate	9600 bps
Data Bit	8 bits
Parity	None
Stop Bit	1 bit
Flow Control	None

II. Communication Format

A. The format for Sending/Receiving data between the PC and the Camera is as follows:

SOF (8 bits)	Command (8 bits)	Communication Direction (1 bit)	Data Length (15 bits)	Data ([Data Length] byte) (variable)	Check Sum (8 bits)	EOF (8 bits)
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B. Details of the format

SOF	Start of the Frame This value is always "0x02"
Command	Command Code Refer to: "III. The Camera Control Command" on the following page.
Communication Direction	"0": Reading or receiving data from the camera is always a "0" value. "1": Writing or sending data to the camera is always a "1" value. Note: This value is always "0" when the STC-AF56 camera responds.
Data Length	The "Data Length" must be specified in bytes. This "Data Length" value tells how many bytes the "Data" will contain.
Data	This field is for option, set value and/or acquired value. The size must be specified as "Data Length"
Check Sum	The "Check Sum" functions to verify the integrity of the communication transmission. The "Check Sum" value should equal the last (low) 8 bits of the summary of ["Command" + "Direction" + "Data Length" + "Data"]. If this value of "Check Sum" does not match with last (low) 8 bits of the summary data of ["Command" + "Direction" + "Data Length" + "Data"], the camera will generate the error message: "Check Sum Error"
EOF	End of the Frame. This value is always "0x03".

III. Camera Control Commands

All data in this section is described in Hexadecimal format (HEX).

A. The Command List for Communication:

Command Number (HEX)	Command Detail
49	<p>The command value 49 is for Reading from or Writing data to the camera ICS (i.e.: the EEPROM, the DSP and/or the CPU). Use the slave addresses described in “Table A: Slave address of the ICS (8 bits) list” on page 3 to address each IC. By setting “00” in [Start] and “FF” in [End], all data can be acquired with one communication. In the case of writing, since the maximum number of addresses that can be written at once is 16 addresses, the data must be written separately 16 times if all the data must be written.</p> <p>[SLV] :Slave address of ICs (See Table A below, on page 6.) [START] :First address (00 to FF) [END] :Last address (00 to FF) [DATA (i)] :Data of the address (i) [DataLenH] :Higher Byte of the two Bytes calculated as ([END] – [START] +4) [DataLenL] :Lower Byte of the two Bytes calculated as ([END] – [START] +4)</p> <p>1. The format for reading data from the IC’s is as follows:</p> <p>A. The command to prepare the camera IC’s to send data is: 02, 49, 00, 03, [SLV], [START], [END], [CHK], 03</p> <p>In this example, the value of [CHK] = the last (low) 8 bits of the summary of (49, 00, 03, [SLV], [START], [END]).</p> <p>B. The data received based on the command above will be in the following format: 02, 49, [DataLenH], [DataLenL], [SLV], [START], [END], [DATA_{START}], [DATA_{START+1}], ..., [DATA_{END}], [CHK], 03</p> <p>In this example, the value of [CHK] + the last (low) 8 bits of summary of (49, [DataLenH], [DataLenL], [SLV], [START], [END], [DATA_{START}], [DATA_{START+1}], ..., [DATA_{END}])</p> <p>*An example of sending a command to read out all data (address 00 to FF) from the IC (IC slave address is 50) is: (02, 49, 00, 03, 50, 00, FF, 9B, 03)</p> <p>2. The format for writing data to the camera IC’s is as follows:</p> <p>A. The command to the camera to receive data being sent to the IC’s is: 02, 49, [DataLenH]+80, [DataLenL], [SLV], [START], [END], [DATA_{START}], [DATA_{START+1}], ..., [DATA_{END}], [CHK], 03</p> <p>In this example, the value of [CHK] = the last (low) 8 bits of summary of (49, [DataLenH] + 80, [DataLenL], [SLV], [START], [END], [DATA_{START}], [DATA_{START+1}], ..., [DATA_{END}])</p> <p>B. The format used by the camera to confirm the data written to the camera’s IC’s is as follows: 02, 49, [DataLenH], [DataLenL], [SLV], [START], [END], [DATA_{START}], [DATA_{START+1}], ..., [DATA_{END}], [CHK], 03</p> <p>In this example, the value of [CHK] + the last (low) 8 bits of summary of (49, [DataLenH], [DataLenL], [SLV], [START], [END], [DATA_{START}], [DATA_{START+1}], ..., [DATA_{END}])</p> <p>*An example of the sending data to write 23 to address 10 of the IC (IC slave address is 50) is: 02, 49, 80, 04, 50, 10, 10, 23, 60, 03</p>

Command Number (HEX)	Command Detail
50	<p>This command is for sending an OSCD (On Screen Character Display) command to the camera. As stated above, when writing OSCD commands to the camera, 16 bytes is the maximum amount of data that can be written to the camera with one communication.</p> <p>For additional information, please check section “5. OSCD Command”, on page 29 of this document. In order to generate an OSCD, set the “Command” to a value of 50. Set OSCD command to Data, set the number of byte of the OSCD command to Data Length.</p> <p>1. The format for sending a command to the camera to clear the display and then to generate a display of [0123] on the 3rd row of the 1st column is as follows: 02, 50, 80, 0A, <u>00</u>, <u>1E</u>, <u>7E</u>, <u>88</u>, <u>60</u>, <u>C0</u>, <u>00</u>, <u>01</u>, <u>02</u>, <u>03</u>, 34, 03</p>
A0	<p>This command obtains “AD” value at “AD” terminal of the micro processor. Use one byte data portion to specify “External zoom control terminal (0x06)” or “External manual focus control terminal (0x07)”.</p> <p>*An example of the obtaining voltage value at the “External zoom control terminal” (5.0 x 116/1023 = approx. 0.57V):</p> <p>02, A0, 00, 01, 06, A7, 03 02, A0, 00, 03, 06, 74, 00 1D, 03</p> <p>*An example of the obtaining voltage value at the “External manual focus control terminal” (5.0 x 99/1023 = approx. 0.48V):</p> <p>02, A0, 00, 01, 07, A8, 03 02, A0, 00, 03, 07, 63, 00, 0D, 03</p>

Table A: Slave address of the ICS (8 bits) list

IC	Slave Address	Description of the Chip / IC
DSP	80	DSP (Sharp LR38643)
EEPROM	50	The EEPROM Zone for the Picture Mode DSP Data
EEPROM	51	The EEPROM Zone for the Brightness Mode DSP Data
EEPROM	52	The EEPROM Zone for the Pseudo Color Mode DSP Data
EEPROM	D0	The Virtual EEPROM Zone for the currently selected mode of the Picture Mode (50), Brightness Mode (51) or Pseudo Color Mode (52).
CPU	10	The CPU Zone for the Lens control , the Iris control and/or the Color Mode .
EEPROM	53	The EEPROM Zone for CPU Data.

Note: There is a maximum number of writing to EEPROM of 1,000,000 times.

B. Error Code List

If an error occurs, the camera sends an error code with the following format:
The Command number of the Error Message is FF (HEX). The Data length is 0002.

Receiving Data of Error	Error
02, FF, 00, 02, 01, 00, 02, 03	SOF is missing
02, FF, 00, 02, 02, 00, 03, 03	EOF is missing
02, FF, 00, 02, 03, 00, 04, 03	Check Sum does NOT match the data being transmitted
02, FF, 00, 02, 04, 00, 05, 03	The command being transmitted does not exist or is invalid
02, FF, 00, 02, 05, 00, 06, 03	Unprocessed data remains in the receiving buffer
02, FF, 00, 02, 06, 00, 07, 03	Time out
02, FF, 00, 02, 08, 00, 09, 03	Over run error
02, FF, 00, 02, 09, 00, 0A, 03	Framing error
02, FF, 00, 02, 0A, 00, 0B, 03	Parity error
02, FF, 00, 02, 0B, 00, 0C, 03	Data length error (too long)
02, FF, 00, 02, 10, 00, 11, 03	12C communication error

IV. The CPU Register Mapping List

A. The CPU Register Mapping List

The AF56 auto focus camera series has three methods of communicating commands. They are as follows:

1. RS-232
2. Wire Harness connection to external terminal pads
3. Push button controls (the buttons are located on the side of the camera)

In the table below, the hard wire connections are referred to as “external pins”.

Address	7	6	5	4	3	2	1	0	Details	Initial Data
00	X								Zoom control via the external pin 0: Disable (control by the software) 1: Enable (the external pin CN406-7 voltage controls zoom motor)	
		X							Manual focus control via the external pin 0: Disable (control by the software) 1: Enable (the external pin CN406-9 voltage controls focus motor)	0
			X						Select focus mode via the external pin 0: Disable (control by the software) 1: Enable (the external pin CN406-8 voltage controls focus mode. High: Auto, Low: Manual)	0
				X					Color mode select via external pin 0: Disable (control by the software) 1: Enable (the combination of three external pins CN406-4, 3 and 2 voltages selects a picture mode out of eight specified picture modes)	0
					X				Interlace mode select via the external pin 0: Disable (control by the software) 1: Enable (the external pin CN406-5 voltage controls interlace mode. High: Non-interlace, Low: Interlace)	0
							0	0	Reserved	0
									X “Push button” controls on the side of the camera 0: Disable 1: Enable When using or not using these Push Buttons, the following corresponding settings should also be set: * When controlling the zoom with the Push Buttons on the side of the camera, please disable the “Zoom control by the external pin”. * When controlling the focus with the Push Buttons on the side of the camera, please disable to the “Manual focus control by the external pin” and the “Select focus mode by the external pin”. * When selecting the color mode with the Push Buttons on the side of the camera, please disable the “Color mode select by external pin”.	1

The CPU Register Mapping List (Continued)

Address	7	6	5	4	3	2	1	0	Details	Initial Data
01	X								Focus control 0: Manual 1: Auto * If "Select focus mode via the external pin" is enabled, this setting is ignored.	0
		X							One-push auto focus 0: Disable 1: Enable * If One-push auto focus is enabled, the register automatically resets to Disable "0" after 1 auto focus function is executed.	0
			X						Iris mode control 0: Fixed 1: Auto * When auto iris is selected, target video output value is set through "ALC/AGC Brightness Target Value (BLC=OFF)[06H]" under "ALC/AGC" tab in the DSP software.	1
				X					One-push auto iris 0: Disable 1: Enable * If One-Push auto iris is Enabled, it will automatically rest to Disable after one auto iris function is executed.	0
					0	0			Reserved	0
								X		The STC-100AF is a prior generation auto focus camera to the STC-AF56 series. For users who want the STC-AF56 to be backwards compatible to the STC-100AF, this command is used to set the STC-AF56 to the compatible picture mode selection and works as the STC-100AF color mode selection. In order to set the STC-AF56 to a compatible External Color Mode with the STC-100AF, select "1" Enable: 0: Disable (Not compatible) 1: Enable (Compatible) Compatible Mode (to STC-100AF): * Color mode when Enable is selected 0, 1 and 2: Pseudo 1 Mode (White on Black), 3: Pseudo 2 Mode (Amber on Black), 4: Pseudo 3 Mode (Green on Black), 5: Pseudo 4 Mode (Yellow on Blue) 6: Picture Mode, 7: Bright Mode Not Compatible Mode * Color mode when Disable is selected 0: Picture Mode 1: Bright Mode 2: Pseudo 0 Mode (User Defined), 3: Pseudo 1 Mode (User Defined), 4: Pseudo 2 Mode (User Defined), 5: Pseudo 3 Mode (User Defined) 6: Pseudo 4 Mode (User Defined) 7: Pseudo 5 Mode (User Defined)
								0	Reserved	
								X	(CAUTION) Changing this set up may cause serious operational problem. Do not change from the default set up. .	

The CPU Register Mapping List (Continued)

Address	7	6	5	4	3	2	1	0	Details	Initial Data
02	0	0	0	0	0	0			Reserved	
							X		Motion detection 0: Disable 1: Enable	1
								X	Progressive mode (the video output) 0: NTSC compatible 2:1 Interlace video 1: Progressive video	0
03	X	X	X	X	X	X	X	X	Initial push button operational mode 0: Zoom 1: Picture mode 2: Contrast 3-255: Setting inhibited * This sets the functions for the TELE/+ and WIDE/-buttons before the menu display.	0
04	0	0	0						Reserved	0
				X	X	X	X	X	Picture mode * When stored in EEPROM, the specified color mode is set at the power up. If "Color mode select via external pin" is Enabled, this setting is ignored. 0: Picture mode 1: Bright mode 2 to 31: Pseudo color mode 00 to 29	0
05	0	0	0						Reserved	0
				X	X	X	X	X	Maximum number of color modes (for button operation) * This sets the maximum number of color modes selected by the push button operation.	25
06	X	X	X	X	X	X	X	X	Contrast * This sets output gain (= Value/128)	128
07	X	X	X	X	X	X	X	X	Maximum contrast value (for button operation) * This set maximum contrast value when the button operation is used.	128
08	X	X	X	X	X	X	X	X	Zoom position [little-endian] The set range is 25: WIDE end to 1197: TELE end.	25
09	0	0	0	0	0	X	X	X	* If the zoom position setting is saved to the EEPROM, the zoom motor moves to this position at the power up. * If "Zoom control via the external pin" is Enabled, this setting is ignored.	
0A	X	X	X	X	X	X	X	X	Focus distance [little-endian] The set range is 78: Infinity to 1014: Approx. 0.5 m.	78
0B	0	0	0	0	0	0	X	X	* If the focus position setting is saved to the EEPROM, the focus motor moves to this position when the camera is powered-on. * If "Focus control via the external pin" is Enabled, this setting is ignored.	
0C	X	X	X	X	X	X	X	X	Iris open ratio The set range is 0: 100% closed to 1000: 100% open.	500
0D	0	0	0	0	0	0	X	X	* If the iris position setting is saved to the EEPROM, the iris motor moves to this position when the camera is powered-on.	
0E to 0F									(CAUTION) Changing this set up may cause serious operational problem. Do not change from the default set up.	
10	X	X	X	X	X	X	X	X	External pin zoom control minimum voltage (WIDE end) The set range is 0: 0V to 1023: 5.0V.	32
11	0	0	0	0	0	0	X	X	* When zoom control voltage at the external pin becomes lower than this value, zoom motor stops at the WIDE end.	

The CPU Register Mapping List (Continued)

Address	7	6	5	4	3	2	1	0	Details	Initial Data
12	X	X	X	X	X	X	X	X	External pin zoom control maximum voltage (TELE end) The set range is 0: 0V to 1023: 5.0V.	860
13	0	0	0	0	0	0	X	X	* When zoom control voltage at the external pin becomes higher than this value, zoom motor stops at the TELE end.	
14	X	X	X	X	X	X	X	X	External pin manual focus control minimum voltage (Infinity end) The set range is 0: 0V to 1023: 5.0V.	32
15	0	0	0	0	0	0	X	X	* When manual focus control voltage at the external pin becomes lower than this value, focus motor stops at the infinity end.	
16	X	X	X	X	X	X	X	X	External pin manual focus control maximum voltage The set range is 0: 0V to 1023: 5.0V.	895
17	0	0	0	0	0	0	X	X	* When manual focus control voltage at the external pin becomes higher than this value, focus motor stops at about 0.5m focus distance (in the case without close-up lens).	
18	X	X	X	X	X	X	X	X	External pin zoom control voltage absorbing range The set range is 0: 0V to 255: 1.3V. * Ignore changing voltage of the zoom control voltage within this setting voltage range.	8
19	X	X	X	X	X	X	X	X	External pin focus control voltage absorbing range The set range is 0: 0V to 255: 1.3V. * Ignore changing voltage of the focus control voltage within this setting voltage range.	8
1A	X	X	X	X	X	X	X	X	External pin / Push button zoom control WIDE end limiter The set range is 25: WIDE end to 1197: TELE end	25
1B	0	0	0	0	0	X	X	X	* This set the limiting value to the WIDE end position.	
1C	0	0	0	0	0	0	0	0	External pin / Push button zoom control TELE end limiter The set range is 25: WIDE end to 1197: TELE end	1197
1D	0	0	0	0	0	X	X	X	* This set the limiting value to the TELE end position.	
1E	0	0	0	X	X	X	X	X	Iris control center telemetric emphasis 0 to 16: Center emphasis disabled to only center * The amount of emphasis in the center zone is adjusted when auto iris is enabled.	
1F	0	0	0	X	X	X	X	X	Iris control peak detection setting The set range is 0: No peak detection to 16: full peak detection. * The amount of peak detection in the telemetric zone is adjusted when auto iris is enabled.	
20	X	X	X	X	X	X	X	X	Auto iris minimum aperture The set range is 0: 100% close to 1000: 100% open.	0
21	0	0	0	0	0	0	X	X	* When auto iris is selected, iris aperture is always larger than this set value.	
22	X	X	X	X	X	X	X	X	Auto iris maximum aperture The set range is 0: 100% close to 1000: 100% open.	1000
23	0	0	0	0	0	0	X	X	* When auto iris is selected, iris aperture is always smaller than this set value.	
24	X	X	X	X	X	X	X	X	Auto iris tolerance * When the difference between the current brightness and target brightness is within this value, iris control is holt.	5
25	X	X	X	X	X	X	X	X	Auto iris control threshold * When the difference between the current brightness and target brightness becomes beyond this value, iris control starts operating.	5
26	X	X	X	X	X	X	X	X	Auto iris step multiplier * Adjust the amount of change of iris control voltage Amount of change of iris control voltage= (Current brightness – target brightness) x (Auto iris step multiplier) / (Auto iris step divisor +1)	3

The CPU Register Mapping List (Continued)

Address	7	6	5	4	3	2	1	0	Details	Initial Data
27	X	X	X	X	X	X	X	X	Auto iris step divisor * Adjust the amount of change of iris control voltage Amount of change of iris control voltage= (Current brightness – target brightness) x (Auto iris step multiplier) / (Auto iris step divisor +1)	1
28	X	X	X	X	X	X	X	X	Amount of change of maximum voltage for auto iris The set range is 1: Minimum to 16383: Maximum.	100
29	0	0	X	X	X	X	X	X	* Set the limit on the amount of change of iris control voltage derived from Auto iris step multiplier and divider. When small value is set in this field, smooth auto iris operation is achieved but the movement becomes slower.	
2A	X	X	X	X	X	X	X	X	Auto iris maximum number of operation * This setup defines maximum number of the auto iris adjustments before the auto focus operation initiates.	50
2B	0	0	0	0	0	0	0	0	Reserved	0
2C to 2F									(CAUTION) Changing this set up may cause serious operational problem. Do not change from the default set up.	
30	0	0	0	0	0	0	0	0	Reserved	0
31	X	X	X	X	X	X	X	X	Shadow masking density The set range is 0: No masking to 255: Invisible to black. *This changes the depth (or contrast) of the shadow mask. The shadow mask does not appear when this setup is zero.	0
32	X	X	X	X	X	X	X	X	Horizontal shadow mask upper position	0
33	0	0	0	0	0	0	X	X	The set range is 0 to 270.	
34	X	X	X	X	X	X	X	X	Horizontal shadow mask upper position	0
35	0	0	0	0	0	0	X	X	The set range is 0 to 270.	
36	0	0	0	0	0	0	0	0	Reserved	
37	0	0	0	0					Reserved	
					X	X	X	X	Horizontal line marker color *Refer color code chart on page 12.	
38	X	X	X	X	X	X	X	X	Horizontal line marker position	0
39	0	0	0	0	0	0	0	X	The set range is 0 to 270	
3A	X	X	X	X	X	X	X	X	Horizontal line marker size	0
3B	0	0	0	0	0	0	0	X	The set range is 0 to 270 * The line marker does not appear when this setup is zero.	
3C to 41	0	0	0	0	0	0	0	0	Reserved	
42	X	X	X	X	X	X	X	X	Vertical shadow mask left position	0
43	0	0	0	0	0	0	X	X	0 to 530	
44	X	X	X	X	X	X	X	X	Vertical shadow mask right position	0
45	0	0	0	0	0	0	X	X	The set range for STC-AF56 is 0 to 530 The set range for STC-AF66 is 0 to 820	
46	0	0	0	0	0	0	0	0	Reserved	0
47	0	0	0	0					Reserved	0
					X	X	X	X	Vertical line marker color *Refer to the color code chart on page 12.	0
48	X	X	X	X	X	X	X	X	Vertical line marker position	AF56: 530 AF66: 820
49	0	0	0	0	0	0	X	X	The set range for STC-AF56 is 0 to 530. The set range for STC-AF66 is 0 to 820.	
4A	X	X	X	X	X	X	X	X	Vertical line marker size The set range for STC-AF56 is 0 to 530. The set range for STC-AF66 is 0 to 820. *The line marker does not appear when this setup is zero.	0
4C to 5F	0	0	0	0	0	0	0	0	Reserved	

The CPU Register Mapping List (Continued)

Address	7	6	5	4	3	2	1	0	Details	Initial Data
60	X	X	X	X	X	X	X	X	User definable color 0 Red	255
61	X	X	X	X	X	X	X	X	User definable color 0 Green	128
62	X	X	X	X	X	X	X	X	User definable color 1 Blue	0
63	X	X	X	X	X	X	X	X	User definable color 1 Red	255
64	X	X	X	X	X	X	X	X	User definable color 1 Green	0
65	X	X	X	X	X	X	X	X	User definable color 1 Blue	128
66	X	X	X	X	X	X	X	X	User definable color 2 Red	128
67	X	X	X	X	X	X	X	X	User definable color 2 Green	255
68	X	X	X	X	X	X	X	X	User definable color 2 Blue	0
69	X	X	X	X	X	X	X	X	User definable color 3 Red	0
67A	X	X	X	X	X	X	X	X	User definable color 3 Green	255
6B	X	X	X	X	X	X	X	X	User definable color 3 Blue	128
6C	X	X	X	X	X	X	X	X	User definable color 4 Red	128
6D	X	X	X	X	X	X	X	X	User definable color 4 Green	0
6E	X	X	X	X	X	X	X	X	User definable color 4 Blue	255
6F	X	X	X	X	X	X	X	X	User definable color 5 Red	0
70	X	X	X	X	X	X	X	X	User definable color 5 Green	128
71	X	X	X	X	X	X	X	X	User definable color 5 Blue	255
72	X	X	X	X	X	X	X	X	User definable color 6 Red	128
73	X	X	X	X	X	X	X	X	User definable color 6 Green	128
74	X	X	X	X	X	X	X	X	User definable color 6 Blue	128
75	X	X	X	X	X	X	X	X	User definable color 7 Red	255
76	X	X	X	X	X	X	X	X	User definable color 7 Green	207
77	X	X	X	X	X	X	X	X	User definable color 7 Blue	0
78 to 7F	X	X	X	X	X	X	X	X	Reserved	0
80	X	X	X	X	X	X	X	X	Binary process threshold * This defines the threshold level to create a binary signal	48
81	X	X	X	X	X	X	X	X	Binary process slope * This defines the slope (or inclination) in the binary process of the signal. The slope is defined as (Set value +8)/8. When the set value is "0", the binary process does not occur at all and it keeps full gray scale representation. When a larger number is set, pixel flickering may occur at the edge of the letters.	16
82	X	X	X	X					Pseudo color 00 foreground color code	1
					X	X	X	X	Pseudo color 00 background color code	0
83	X	X	X	X					Pseudo color 01 foreground color code	3
					X	X	X	X	Pseudo color 01 background color code	0
84	X	X	X	X					Pseudo color 02 foreground color code	8
					X	X	X	X	Pseudo color 02 background color code	0
85	X	X	X	X					Pseudo color 03 foreground color code	5
					X	X	X	X	Pseudo color 03 background color code	0
86	X	X	X	X					Pseudo color 04 foreground color code	7
					X	X	X	X	Pseudo color 04 background color code	0
87	X	X	X	X					Pseudo color 05 foreground color code	6
					X	X	X	X	Pseudo color 05 background color code	0
88	X	X	X	X					Pseudo color 06 foreground color code	2
					X	X	X	X	Pseudo color 06 background color code	0

The CPU Register Mapping List (Continued)

Address	7	6	5	4	3	2	1	0	Details	Initial Data
89	X	X	X	X					Pseudo color 07 foreground color code	1
					X	X	X	X	Pseudo color 07 background color code	3
8A	X	X	X	X					Pseudo color 08 foreground color code	1
					X	X	X	X	Pseudo color 08 background color code	2
8B	X	X	X	X					Pseudo color 09 foreground color code	1
					X	X	X	X	Pseudo color 09 background color code	6
8C	X	X	X	X					Pseudo color 10 foreground color code	1
					X	X	X	X	Pseudo color 10 background color code	4
8D	X	X	X	X					Pseudo color 11 foreground color code	7
					X	X	X	X	Pseudo color 11 background color code	4
8E	X	X	X	X					Pseudo color 12 foreground color code	0
					X	X	X	X	Pseudo color 12 background color code	1
8F	X	X	X	X					Pseudo color 13 foreground color code	0
					X	X	X	X	Pseudo color 13 background color code	3
90	X	X	X	X					Pseudo color 14 foreground color code	0
					X	X	X	X	Pseudo color 14 background color code	8
91	X	X	X	X					Pseudo color 15 foreground color code	0
					X	X	X	X	Pseudo color 15 background color code	5
92	X	X	X	X					Pseudo color 16 foreground color code	0
					X	X	X	X	Pseudo color 16 background color code	7
93	X	X	X	X					Pseudo color 17 foreground color code	0
					X	X	X	X	Pseudo color 17 background color code	6
94	X	X	X	X					Pseudo color 18 foreground color code	0
					X	X	X	X	Pseudo color 18 background color code	2
95	X	X	X	X					Pseudo color 19 foreground color code	3
					X	X	X	X	Pseudo color 19 background color code	1
96	X	X	X	X					Pseudo color 20 foreground color code	2
					X	X	X	X	Pseudo color 20 background color code	1
97	X	X	X	X					Pseudo color 21 foreground color code	6
					X	X	X	X	Pseudo color 21 background color code	1
98	X	X	X	X					Pseudo color 22 foreground color code	4
					X	X	X	X	Pseudo color 22 background color code	1
99	X	X	X	X					Pseudo color 23 foreground color code	4
					X	X	X	X	Pseudo color 23background color code	7
9A	X	X	X	X					Pseudo color 24 foreground color code	8
					X	X	X	X	Pseudo color 24 background color code	0
9B	X	X	X	X					Pseudo color 25 foreground color code	9
					X	X	X	X	Pseudo color 25 background color code	0
9C	X	X	X	X					Pseudo color 26 foreground color code	10
					X	X	X	X	Pseudo color 26 background color code	0
9D	X	X	X	X					Pseudo color 27 foreground color code	11
					X	X	X	X	Pseudo color 27 background color code	0
9E	X	X	X	X					Pseudo color 28 foreground color code	12
					X	X	X	X	Pseudo color 28 background color code	0
9F	X	X	X	X					Pseudo color 29 foreground color code	13
					X	X	X	X	Pseudo color 29 background color code	0
A0 to FF	X	X	X	X	X	X	X	X	Reserved (Warning) These areas are assigned for the setup values for individual cameras. Never override these areas. By doing so, it may cause malfunction of the camera.	

B. Color Code Chart

The line marker colors and pseudo colors can be selected from the following 15 colors. The last 8 colors are user definable and they can be defined through the serial communication.

Color Code	Color
0	Black
1	White
2	Red
3	Green
4	Blue
5	Cyan
6	Magenta
7	Yellow
8	User defined color 0
9	User defined color 1
10	User defined color 2
11	User defined color 3
12	User defined color 4
13	User defined color 5
14	User defined color 6
15	User defined color 7

C. DSP Register Mapping List

Address	7	6	5	4	3	2	1	0	Details	Initial Data									
02		X							Interlace / n on-interlace selection 0: Interlace 1: Non-interlace	0									
							X		Gain Selection 0: AGC (Automatic gain control) 1: Fixed Gain	1									
04	X								Mirror Image Selection 0: Normal Image 1: Mirror Image (Horizontal Mirror)	1									
			X	X	X	X			Shutter Speed Selection 0: 1/60 second shutter speed 1: 1/100 second shutter speed 2: 1/250 second shutter speed 3: 1/500 second shutter speed 4: 1/1000 second shutter speed 5: 1/2000 second shutter speed 6: 1/5000 second shutter speed 7: 1/10,000 second shutter speed 8: 1/20,000 second shutter speed 9: 1/50,000 second shutter speed 10: 1/100,000 second shutter speed 11 to 15: Prohibited	1									
							X	X	White balance selection 0: Auto white balance 1: Manual white balance 1 2: Manual white balance 2 3: Manual white balance 3	2									
06	X	X	X	X	X	X	X	X	ALC/AGC Target Brightness Level The set range is 0: Dark image to 255: Bright image.	105									
1B	X	X	X	X	X	X	X	X	AGC Maximum Gain The set range is 0: 6.02 dB to 255: 30.01 dB.	255									
1C	X	X	X	X	X	X	X	X	AGC Minimum Gain The set range is 0: 6.02 dB to 255: 30.01 dB.	0									
1D	X	X	X	X	X	X	X	X	Fixed Gain <table border="1" style="display: inline-table; vertical-align: middle;"> <tr> <td>1E.3</td> <td>1D.7</td> <td>1D.6</td> <td>1D.5</td> <td>1D.4</td> <td>1D.3</td> <td>1D.2</td> <td>1D.1</td> <td>1D.0</td> </tr> </table>	1E.3	1D.7	1D.6	1D.5	1D.4	1D.3	1D.2	1D.1	1D.0	0
1E.3	1D.7	1D.6	1D.5	1D.4	1D.3	1D.2	1D.1	1D.0											
1E				X					The set range is 0: 6.02 dB to 511: 30.05 dB.										
24			X	X	X				Color Gamma The set range is 0 to 7: Gamma = 1.0.	3									
26	X	X	X	X	X	X	X	X	AWB Maximum R Gain The set range is 0 to 255.	33									
27	X	X	X	X	X	X	X	X	AWB Minimum R Gain The set range is 0 to 255.	24									
28	X	X	X	X	X	X	X	X	AWB Maximum B Gain The set range is 0 to 255.	38									
29	X	X	X	X	X	X	X	X	AWB Minimum B Gain The set range is 0 to 255.	28									
41					X	X	X	X	AWB Q direction target position The set range is -8 to 7 (0: White).	0									
	X	X	X	X					AWB I direction target position The set range is -8 to 7 (0: White).	0									
42	X	X	X	X	X	X	X	X	WB1 R gain The set range is 0 to 255.	52									
43	X	X	X	X	X	X	X	X	WB1 B gain The set range is 0 to 255.	73									
44	X	X	X	X	X	X	X	X	WB2 R Gain The set range is 0 to 255.	60									
45	X	X	X	X	X	X	X	X	WB2 B gain The set range is 0 to 255.	62									
46	X	X	X	X	X	X	X	X	WB3 B gain The set range is 0 to 255.	64									

C. DSP Register Mapping List (Continued)

Address	7	6	5	4	3	2	1	0	Details	Initial Data
47	X	X	X	X	X	X	X	X	WB3 gain The set range is 0 to 255.	57
70		X							Chroma suppress switch 0: On 1: Off	0
			X	X	X	X	X	X	Low luminance chroma suppression slope The set range is 0 to 63.	0
71	X	X	X	X	X	X	X	X	AGC interlock chroma suppress start level The set range is 0 to 255.	80
72			X	X	X	X	X	X	AGC interlock chroma suppress slope The set range is 0 to 63.	3
73	X	X	X	X	X	X	X	X	High luminance chroma suppress start level The set range is 0 to 255.	215
74	X	X	X	X	X	X	X	X	Low luminance chroma suppress start level The set range is 0 to 255.	32
75	X	X	X	X					High luminance chroma suppress slope The set range is 0 to 15.	1
					X	X	X	X	Low luminance chroma suppress slope The set range is 0 to 15.	2
77	X	X	X	X	X	X	X	X	Horizontal edge chroma suppression start level The set range is 0 to 255.	135
78	X	X	X	X	X	X	X	X	Vertical edge chroma suppression start level The set range is 0 to 255.	98
79	X	X	X	X					Horizontal edge chroma suppression slope The set range is 0 to 15.	1
					X	X	X	X	Vertical edge chroma suppression slope The set range is 0 to 15.	1
7A	X	X	X	X					R-Y base clip The set range is 0: Dark red to 15: Light red.	0
					X	X	X	X	B-Y base clip The set range is 0: Dark blue to 15: Light blue.	0
7B		X	X	X	X				Y Gamma The set range is 0 to 7: Gamma =1.0.	5
							X		Vertical Aperture Gain (edge enhancement) switch 0: On 1: Off	0
								X	Horizontal Aperture Gain (edge enhancement) switch 0: On 1: Off	0
7C				X	X	X	X	X	Horizontal Aperture Gain The set range is 0: Soft Focus to 31: Sharp Focus.	18
7D			X	X	X	X	X	X	Horizontal Aperture Coring The set range is 0: Sharp Focus to 63: Soft Focus.	10
7E				X	X	X	X	X	Vertical Aperture Gain The set range is 0: Soft Focus to 31: Sharp focus.	18
7F			X	X	X	X	X	X	Vertical Aperture Coring The set range is 0: Sharp Focus to 63: Soft Focus.	10
80	X	X	X	X	X	X	X	X	AGC Interlocked Aperture Suppression Start Level The set range is 0 to 255.	128
81			X	X	X	X	X	X	AGC Interlocked Aperture Suppression Slope The set range is 0 to 63.	6
82			X	X	X	X	X	X	AGC Maximum Gain Low Luminance Suppression Slope The set range is 0 to 63.	0
83	X	X	X	X	X	X	X	X	Luminance Suppression Point of High Luminance Aperture The set range is 0 to 255.	180
9F	X	X	X	X	X	X	X	X	Aperture Output Limiter This is the Maximum Setting of the Aperture Setting Range: 0 to 255	128

WARNING: Changing the following register contents strictly prohibited. Any changes to these registers may cause permanent camera malfunction.

D. *Prohibited* DSP Register Mapping List

NO	Only Reading	Page	Address	Name
1	0	D)Other3	00H	Stop Reading EEPROM
2	0	D)Other1	01H.0-1	CDS
3	0	D)Other2	01H.2	Input Digital Data Phase
4	0	D)Other2	01H.3-4	Input Digital Data Clock
5	0	D)Other1	01H.5-6	CCD
6	0	D)ALC/AGC	01H.7	ALC/AGC Luminance Signal LPF
7	0	D)Ape/Chr	02H.0	Auto/Fixed Carrier Balance
12	0	D)ALC/AGC	02H.7	ALC Switch Pin Count
13	0	D)Other3	03H.0	Output Signal From DCK2 Pin(In Analog Video Output)
14	0	D)Other3	03H.1-2	Output Signal From DCK1 Pin(In Analog Video Output)
15	0	D)Other3	03H.3-4	Output Signal From VD Pin
16	0	D)Other3	03H.5-6	Output Signal From HD Pin
17	0	D)Blank	03H.7	BLANK_03_7
25	0	D)ALC/AGC	07H	ALC/AGC Brightness control Fine Turning Area
26	0	D)ALC/AGC	08H	ALC/AGC Brightness control Tolerance Area
28	0	D)ALC/AGC	0AH	ALC/AGC Luminance Data Clip Level Before Addition
38	0	D)Blank	13H.7	BLANK_13_7
42	0	D)Blank	15H.6-7	BLANK_15_6_7
43	0	D)ALC/AGC	16H.0-1	ALC/AGC Luminance Signal LPF Average Time(Fine Turning)
44	0	D)ALC/AGC	16H.2-3	ALC/AGC Luminance Signal LPF Average Time(Normal Turning)
45	0	D)ALC/AGC	16H.4-6	ALC Speed Parameter(Divisor)
46	0	D)Blank	16H.7	BLANK_16_7
49	0	D)ALC/AGC	19H.0-1	ALC/AGC Skip Control Time(Fine Turning)
50	0	D)ALC/AGC	19H.2-3	ALC/AGC Skip Control Time(Normal Turning)
51	0	D)ALC/AGC	19H.4	ALC/AGC Peak Luminance Accumulation
52	0	D)Blank	19H.5-7	BLANK_19_5_7
53	0	D)ALC/AGC	1AH.0-4	AGC Speed Parameter(Multiplier)
54	0	D)ALC/AGC	1AH.5-7	AGC Speed Parameter(Divisor)
58	0	D)Other1	1EH.0-2	CDS Gain
59	0	D)Other1	1EH.4-5	CDS Monitor Pin Output Signal
60	0	D)Blank	1EH.6-7	BLANK_1E_6_7
61	0	D)Other1	1FH.0-6	CDS Fixed OB Clamp Level
62	0	D)Other1	1FH.7	CDS Automatic OB Clamp Level Adjustment ON/OFF
63	0	D)Ape/Chr	20H	Color Separation R
64	0	D)Ape/Chr	21H	Color Separation B
65	0	D)Ape/Chr	22H	Carrier Balance R
66	0	D)Ape/Chr	23H	Carrier Balance B
67	0	D)Ape/Chr	24H.0	Manner Of RB Signal Production
68	0	D)Ape/Chr	24H.1-2	Manner Of YL Signal Production
70	0	D)Blank	24H.6-7	BLANK_24_6_7
71	0	D)Other1	25H.0	Attribute Of Color Separation HG
72	0	D)Other1	25H.1	Attribute Of SP1 And AP2
73	0	D)Other2	25H.2	Order Of UV Digital Output
74	0	D)Other2	25H.3	Swap R And B After Color Separation
75	0	D)Other2	25H.4	Swap R-Y And B-Y In Output
76	0	D)Other2	25H.5	YL Selection for Color Difference Signal

WARNING: Changing the following register contents strictly prohibited. Any changes to these registers may cause permanent camera malfunction.

D. Prohibited DSP Register Mapping List (Continued)

NO	Only Reading	Page	Address	Name
77	0	D)LineCrawl	25H.6	RB Line Crawl
78	0	D)AWB1	25H.7	AWB Color Phase Sign
83	0	D)AWB2	2AH.0-1	AWB IQ Signal LPF
84	0	D)AWB2	2AH.2	AWB Color Area Selection
85	0	D)AWB2	2AH.3	AWB High Speed OFF/ON
86	0	D)AWB2	2AH.4	AWB Status at Passing Origin
87	0	D)Blank	2AH.5-7	BLANK_2A_5_7
88	0	D)AWB2	2BH	AWB High Speed R Multiplier
89	0	D)AWB2	2CH	AWB High Speed B Multiplier
90	0	D)AWB2	2DH	AWB Control Frequency
91	0	D)AWB2	2EH	AWB Data High Luminance Limiter
92	0	D)AWB2	2FH	AWB Data Low Luminance Limiter
93	0	D)AWB2	30H	AWB Data Luminance Limiter Reference
94	0	D)AWB2	31H	AWB Data Luminance Limiter Peak Weight
95	0	D)AWB2	32H	AWB Data Luminance Limiter Variation Multiplier
96	0	D)AWB2	33H.0-6	AWB Weight Of Center Area
97	0	D)AWB2	33H.7	AWB Color Signal Selection
98	0	D)AWB2	34H.0-3	AWB Size Of Center Area
99	0	D)AWB2	34H.4-5	AWB Vertical Position Of Center Area
100	0	D)AWB2	34H.6-7	AWB Horizontal Position Of Center Area
101	0	D)AWB2	35H	AWB Area Reset Luminance Error
102	0	D)AWB2	36H	AWB Area I-Plus(High Speed)
103	0	D)AWB2	37H	AWB Area I-Minus(High Speed)
104	0	D)AWB2	38H	AWB Area Q-Plus(High Speed)
105	0	D)AWB2	39H	AWB Area Q-Minus(High Speed)
106	0	D)AWB2	3AH	AWB Area I-Plus(Normal)
107	0	D)AWB2	3BH	AWB Area I-Minus(Normal)
108	0	D)AWB2	3CH	AWB Area Q-Plus(Normal)
109	0	D)AWB2	3DH	AWB Area Q-Minus(Normal)
110	0	D)AWB2	3EH.0-6	AWB I Direction Threshold
111	0	D)Blank	3EH.7	BLANK_3E_7
112	0	D)AWB2	3FH.0-6	AWB Q Direction Threshold
113	0	D)Blank	3FH.7	BLANK_3F_7
114	0	D)AWB2	40H.0-3	AWB I Direction Tolerance
115	0	D)AWB2	40H.4-7	AWB Q Direction Tolerance
124	0	D)AWB1	48H	REF_GA_R1M
125	0	D)AWB1	49H	REF_GA_B1M
126	0	D)AWB1	4AH	REF_GA_R1P
127	0	D)AWB1	4BH	REF_GA_B1P
128	0	D)AWB1	4CH	REF_GA_R2M
129	0	D)AWB1	4DH	REF_GA_B2M
130	0	D)AWB1	4EH	REF_GA_R2P
131	0	D)AWB1	4FH	REF_GA_B2P
132	0	D)AWB1	50H	REF_GA_R3M
133	0	D)AWB1	51H	REF_GA_B3M

WARNING: Changing the following register contents strictly prohibited. Any changes to these registers may cause permanent camera malfunction.

D. Prohibited DSP Register Mapping List (Continued)

NO	Only Reading	Page	Address	Name
134	0	D)AWB1	52H	REF_GA_R3P
135	0	D)AWB1	53H	REF_GA_B3P
136	0	D)AWB1	54H.0-6	K_GA_R1M
137	0	D)Blank	54H.7	BLANK_54_7
138	0	D)AWB1	55H.0-6	K_GA_B1M
139	0	D)Blank	55H.7	BLANK_55_7
140	0	D)AWB1	56H.0-6	K_GA_R1P
141	0	D)Blank	56H.7	BLANK_56_7
142	0	D)AWB1	57H.0-6	K_GA_B1P
143	0	D)Blank	57H.7	BLANK_57_7
144	0	D)AWB1	58H.0-6	K_GA_R2M
145	0	D)Blank	58H.7	BLANK_58_7
146	0	D)AWB1	59H.0-6	K_GA_B2M
147	0	D)Blank	59H.7	BLANK_59_7
148	0	D)AWB1	5AH.0-6	K_GA_R2P
149	0	D)Blank	5AH.7	BLANK_5A_7
150	0	D)AWB1	5BH.0-6	K_GA_B2P
151	0	D)Blank	5BH.7	BLANK_5B_7
152	0	D)AWB1	5CH.0-5	REF_MAT_R1M
153	0	D)Blank	5CH.6-7	BLANK_5C_6_7
154	0	D)AWB1	5DH.0-5	REF_MAT_B1M
155	0	D)Blank	5DH.6-7	BLANK_5D_6_7
156	0	D)AWB1	5EH.0-5	REF_MAT_R1P
157	0	D)Blank	5EH.6-7	BLANK_5E_6_7
158	0	D)AWB1	5FH.0-5	REF_MAT_B1P
159	0	D)Blank	5FH.6-7	BLANK_5F_6_7
160	0	D)AWB1	60H.0-5	REF_MAT_R2M
161	0	D)Blank	60H.6-7	BLANK_60_6_7
162	0	D)AWB1	61H.0-5	REF_MAT_B2M
163	0	D)Blank	61H.6-7	BLANK_61_6_7
164	0	D)AWB1	62H.0-5	REF_MAT_R2P
165	0	D)Blank	62H.6-7	BLANK_62_6_7
166	0	D)AWB1	63H.0-5	REF_MAT_B2P
167	0	D)Blank	63H.6-7	BLANK_63_6_7
168	0	D)AWB1	64H.0-5	REF_MAT_R3M
169	0	D)Blank	64H.6-7	BLANK_64_6_7
170	0	D)AWB1	65H.0-5	REF_MAT_B3M
171	0	D)Blank	65H.6-7	BLANK_65_6_7
172	0	D)AWB1	66H.0-5	REF_MAT_R3P
173	0	D)Blank	66H.6-7	BLANK_66_6_7
174	0	D)AWB1	67H.0-5	REF_MAT_B3P
175	0	D)Blank	67H.6-7	BLANK_67_6_7
176	0	D)AWB1	68H	K_MAT_R1M
177	0	D)AWB1	69H	K_MAT_B1M
178	0	D)AWB1	6AH	K_MAT_R1P

WARNING: Changing the following register contents strictly prohibited. Any changes to these registers may cause permanent camera malfunction.

D. Prohibited DSP Register Mapping List (Continued)

NO	Only Reading	Page	Address	Name
179	0	D)AWB1	6BH	K_MAT_B1P
180	0	D)AWB1	6CH	K_MAT_R2M
181	0	D)AWB1	6DH	K_MAT_B2M
182	0	D)AWB1	6EH	K_MAT_R2P
183	0	D)AWB1	6FH	K_MAT_B2P
186	0	D)Blank	70H.7	BLANK_70_7
189	0	D)Blank	72H.6-7	BLANK_72_6_7
194	0	D)Ape/Chr	76H.0-2	Low Luminance Chroma Suppress Timing Adjustment
195	0	D)Ape/Chr	76H.3-5	High Luminance Chroma Suppress Timing Adjustment
196	0	D)Blank	76H.6-7	BLANK_76_6_7
205	0	D)ALC/AGC	7BH.2	ALC/AGC Line Count of Luminance Signal
206	0	D)ALC/AGC	7BH.3	ALC/AGC Luminance Signal LPF Specification
208	0	D)LineCrawl	7BH.7	YL Line Crawl
210	0	D)Ape/Chr	7CH.5-6	Horizontal Aperture Timing
211	0	D)LineCrawl	7CH.7	Line Crawl Edge Emphasis OFF/ON
213	0	D)Ape/Chr	7DH.6	H Aperture Coring OFF/ON
214	0	D)Blank	7DH.7	BLANK_7D_7
216	0	D)Blank	7EH.5-7	BLANK_7E_5_7
218	0	D)Ape/Chr	7FH.6	V Aperture Coring OFF/ON
219	0	D)Blank	7FH.7	BLANK_7F_7
222	0	D)Blank	81H.6-7	BLANK_81_6_7
224	0	D)Blank	82H.6-7	BLANK_82_6_7
226	0	D)Other2	84H.0-2	Clear Vertical Edge Timing
227	0	D)Other2	84H.3-5	Clear Horizontal Edge Timing
228	0	D)Other2	84H.6	Edge Signal Gain Selection
229	0	D)Blank	84H.7	BLANK_84_7
230	0	D)LineCrawl	85H	Line Crawl Check1(0H-2H)
231	0	D)LineCrawl	86H	Line Crawl Check2(1H-0H,2H)
232	0	D)LineCrawl	87H	Line Crawl Check3(Maximum)
233	0	D)Other1	88H.0-5	Setup Level Adjustment
234	0	D)Other1	88H.6	CBLK Level Switching
235	0	D)Blank	88H.7	BLANK_88_7
236	0	D)Ape/Chr	89H	R-Y Burst Level
237	0	D)Ape/Chr	8AH	B-Y Burst Level
238	0	D)Other2	8BH.0-4	Analog Output Gain
239	0	D)Other2	8BH.5	Analog SYNC Signal ON/OFF
241	0	D)Blank	8BH.7	BLANK_8B_7
242	0	D)Other1	8CH	SYNC Level Adjustment
243	0	D)Other3	8DH.0-6	Power On Mute Time
244	0	D)Other3	8DH.7	Power On Mute OFF/ON
245	0	D)Other1	8EH.0-2	FS Phase Adjustment
246	0	D)Other1	8EH.3-5	ADCK Phase Adjustment
247	0	D)Other1	8EH.6	Attribute Of FR
248	0	D)Other1	8EH.7	Attribute Of FH
249	0	D)Other1	8FH.0-2	RS Phase Adjustment

WARNING: Changing the following register contents strictly prohibited. Any changes to these registers may cause permanent camera malfunction.

D. Prohibited DSP Register Mapping List (Continued)

NO	Only Reading	Page	Address	Name
250	0	D)Other1	8FH.3-5	FCDS Phase Adjustment
251	0	D)Other1	8FH.6-7	FH2 Phase Adjustment
252	0	D)Other3	90H.0-5	Standby Time
253	0	D)Other3	90H.6	Standby Setting
254	0	D)Blank	90H.7	BLANK_90_7
255	0	D)Other1	91H.0	Vertical Reset Signal Timing
256	0	D)Other1	91H.1	Vertical Reset Signal Normal/Invert
257	0	D)Other1	91H.2	Horizontal Reset Signal Normal/Invert
258	0	D)Other3	91H.3	KEI Pulse ON/OFF
259	0	D)Other3	91H.4	Status Of Updating Setting
260	0	D)Other1	91H.5	DCK1 Normal/Invert
261	0	D)Other1	91H.6	DCK2 Normal/Invert
262	0	D)Other2	91H.7	Knee
263	0	D)Other3	92H	Output KEI Pulse AGC Gain
264	0	D)Other1	93H.0-1	Variation Color Signal Addition Timing
265	0	D)Other2	93H.2	Encoder Circuit Input Signal Latch OFF/ON
266	0	D)Other2	93H.3	Encoder Circuit Input Signal Latch Normal/Invert
267	0	D)Blank	93H.4-7	BLANK_92_4_7
268	0	D)Other1	94H.0-3	Luminance Signal Processing Timing
269	0	D)Other1	94H.4-6	Variation Color Signal Timing
270	0	D)Blank	94H.7	BLANK_94_7
271	0	D)Other2	95H.0	Swap YL Line Selection For Each R And B
272	0	D)Other2	95H.1	Swap U And V Of Digital Output
273	0	D)Other2	95H.2	Swap R And B Of Matrix Input
274	0	D)Other2	95H.3	Swap R And B Of White Balance
275	0	D)Other2	95H.4	Swap R And B Of Color Killer
276	0	D)Other2	95H.5	DA Convertor Standby Status
277	0	D)Test	95H.6	TEST
278	0	D)Other3	95H.7	DCK1 Pin Output Signal Timing
279	0	D)Blemish	96H	White Point Recognition A
280	0	D)Blemish	97H	White Point Recognition B
281	0	D)Blemish	98H	White Point Recognition C
282	0	D)Blemish	99H	White Point Recognition D
283	0	D)Blemish	9AH	Black Point Recognition A
284	0	D)Blemish	9BH	Black Point Recognition B
285	0	D)Blemish	9CH	Black Point Recognition C
286	0	D)Blemish	9DH	Black Point Recognition D
287	0	D)Blemish	9EH.0-5	Black And White Point Correction ON/OFF
288	0	D)Blank	9EH.6-7	BLANK_9E_6_7
290	0	D)Blemish	A0H,A2H.0-1	White Blemish Point 1H
291	0	D)Blemish	A1H,A2H.2-3	White Blemish Point 1V
292	0	D)Blank	A2H.4-7	BLANK_A2_4_7
293	0	D)Blemish	A3H,A5H.0-1	White Blemish Point 2H
294	0	D)Blemish	A4H,A5H.2-3	White Blemish Point 2V
295	0	D)Blank	A5H.4-7	BLANK_A5_4_7

WARNING: Changing the following register contents strictly prohibited. Any changes to these registers may cause permanent camera malfunction.

D. Prohibited DSP Register Mapping List (Continued)

NO	Only Reading	Page	Address	Name
296	0	D)Blemish	A6H,A8H.0-1	White Blemish Point 3H
297	0	D)Blemish	A7H,A8H.2-3	White Blemish Point 3V
298	0	D)Blank	A8H.4-7	BLANK_A8_4_7
299	0	D)Blemish	A9H,ABH.0-1	White Blemish Point 4H
300	0	D)Blemish	AAH,ABH.2-3	White Blemish Point 4V
301	0	D)Blank	ABH.4-7	BLANK_AB_4_7
302	0	D)Blemish	ACH,AEH.0-1	White Blemish Point 5H
303	0	D)Blemish	ADH,AEH.2-3	White Blemish Point 5V
304	0	D)Blank	AEH.4-7	BLANK_AE_4_7
305	0	D)Blemish	AFH,B1H.0-1	White Blemish Point 6H
306	0	D)Blemish	B0H,B1H.2-3	White Blemish Point 6V
307	0	D)Blank	B1H.4-7	BLANK_B1_4_7
308	0	D)Blemish	B2H,B4H.0-1	White Blemish Point 7H
309	0	D)Blemish	B3H,B4H.2-3	White Blemish Point 7V
310	0	D)Blank	B4H.4-7	BLANK_B4_4_7
311	0	D)Blemish	B5H,B7H.0-1	White Blemish Point 8H
312	0	D)Blemish	B6H,B7H.2-3	White Blemish Point 8V
313	0	D)Blank	B7H.4-7	BLANK_B7_4_7
314	0	D)Blank	B8H	BLANK_B8_0_7
315	0	D)Blank	B9H	BLANK_B9_0_7
316	0	D)Blank	BAH	BLANK_BA_0_7
317	0	D)Blank	BBH	BLANK_BB_0_7
318	0	D)Blank	BCH	BLANK_BC_0_7
319	0	D)Blank	BDH	BLANK_BD_0_7
320	0	D)Blank	BEH	BLANK_BE_0_7
321	0	D)Blank	BFH	BLANK_BF_0_7
322	0	D)Test	C0H	TEST_SEL31
323	0	D)Test	C1H	TEST_SEL32
324	0	D)Test	C2H.0	TEST_SEL33
325	0	D)Blank	C2H.1-7	BLANK_C2_1_7
326	0	D)Test	C3H	TEST_SEL1A
327	0	D)Test	C4H	TEST_SEL1B
328	0	D)Test	C5H	TEST_SEL1C
329	0	D)Test	C6H.0-1	TEST_SEL1D
330	0	D)Blank	C6H.2-7	BLANK_C6_2_7
331	0	D)Test	C7H	TEST_SEL1V1
332	0	D)Test	C8H	TEST_SEL1V2
333	0	D)Test	C9H	TEST_SEL1V3
334	0	D)Test	CAH	TEST_SEL1V4
335	0	D)Test	CBH.0-6	TEST_C2_OB3
336	0	D)Blank	CBH.7	BLANK_CB_7
337	0	D)Test	CCH.0-6	TEST_C2_OB4
338	0	D)Blank	CCH.7	BLANK_CC_7
339	0	D)Test	CDH	TEST_C2_DL1
340	0	D)Test	CEH	TEST_C2_DL2

WARNING: Changing the following register contents strictly prohibited. Any changes to these registers may cause permanent camera malfunction.

D. Prohibited DSP Register Mapping List (Continued)

NO	Only Reading	Page	Address	Name
341	0	D)Test	CFH.0-5	TEST_C2_YL
342	0	D)Blank	CFH.6-7	BLANK_CF_6_7
343	0	D)Test	D0H	TEST_C2_GAMMA1
344	0	D)Test	D1H.0-1	TEST_C2_GAMMA2
345	0	D)Test	D1H.2	TEST_SSG_SEL
346	0	D)Blank	D1H.3-7	BLANK_D1_3_7
347	0	D)Test	D2H	TEST_C6_00
348	0	D)Test	D3H	TEST_C6_01
349	0	D)Test	D4H.0-6	TEST_C6_02
350	0	D)Blank	D4H.7	BLANK_D4_7
351	0	D)Test	D5H	TEST_C4_IO0
352	0	D)Test	D6H.0-4	TEST_C4_IO1
353	0	D)Blank	D6H.5-7	BLANK_D6_5_7
354	0	D)Test	D7H	TEST_C4_IO2
355	0	D)Test	D8H	TEST_C4_S0
356	0	D)Test	D9H	TEST_C4_S1
357	0	D)Test	DAH.0	TEST_C4_S2
358	0	D)Blank	DAH.1-7	BLANK_DA_1_7
359	0	D)Test	DBH	TEST_C5_T0
360	0	D)Test	DCH	TEST_C5_T1
361	0	D)Test	DDH.0-5	TEST_C5_T2
362	0	D)Blank	DDH.6-7	BLANK_DD_6_7
363	0	D)Test	DEH	TEST_SEL71
364	0	D)Test	DFH.0-1	TEST_SEL72
365	0	D)Blank	DFH.2-7	BLANK_DF_2_7
366	0	D)Test	E0H	TEST_C8_00
367	0	D)Test	E1H	TEST_C8_01
368	0	D)Test	E2H	TEST_C8_02
369	0	D)Test	E3H	TEST_C8_03
370	0	D)Test	E4H	TEST_C8_04
371	0	D)Test	E5H	TEST_C8_05
372	0	D)Test	E6H	TEST_C8_06
373	0	D)Test	E7H	TEST_C8_07
374	0	D)Test	E8H	TEST_C8_08
375	0	D)Test	E9H.0-6	TEST_C8_09
376	0	D)Blank	E9H.7	BLANK_E9_7
377	0	D)Blank	EAH	BLANK_EA_0_7
378	0	D)Blank	EBH	BLANK_EB_0_7
379	0	D)Blank	ECH	BLANK_EC_0_7
380	0	D)Blank	EDH	BLANK_ED_0_7
381	0	D)Blank	EEH	BLANK_EE_0_7
382	0	D)Blank	EFH	BLANK_EF_0_7
383	0	D)Test	F0H	TEST_REG1
384	0	D)Test	F1H	TEST_REG2
385	0	D)Test	F2H	TEST_REG3

WARNING: Changing the following register contents strictly prohibited. Any changes to these registers may cause permanent camera malfunction.

D. Prohibited DSP Register Mapping List (Continued)

NO	Only Reading	Page	Address	Name
386	0	D)Test	F3H	TEST_REG4
387	0	D)Test	F4H	TEST_REG5
388	0	D)Test	F5H	TEST_REG6
389	0	D)Test	F6H.0-5	TEST_REG7
390	0	D)Blank	F6H.6-7	BLANK_F6_6_7
391	0	D)Test	F7H	TEST_REG8
392	0	D)Test	F8H	TEST_REG9
393	0	D)Test	F9H	TEST_REGA
394	0	D)Test	FAH	TEST_REGB
395	0	D)Test	FBH.0-5	TEST_SEL_REG
396	0	D)Blank	FBH.6-7	BLANK_FB_6_7
397	0	D)Test	FCH	TEST_WT_DAT30
398	0	D)Test	FDH.0-6	TEST_WT_DAT31
399	0	D)Blank	FDH.7	BLANK_FD_7
400	0	D)Test	FEH.0-5	TEST_C5_WT3
401	0	D)Blank	FEH.6-7	BLANK_FE_6_7
402	0	D)Blank	FFH	BLANK_FF_0_7
409	0	D)AF_CPU:Advanced	01H.0	Enable External Pin Manual Focus Control Range
425	0	D)AF_CPU:Advanced	0EH	Model Code
426	0	D)AF_CPU:Advanced	0FH.0-1	RS232C Baud Ratio
427	0	D)AF_CPU:Advanced	0FH.6	RS232C Short Reply For Write
428	0	D)AF_CPU:Advanced	0FH.7	Enable RS232C Check Sum
447	0	D)AF_CPU:Advanced	2CH	External Pin Manual Focus Control Range Extend FAR Ratio
448	0	D)AF_CPU:Advanced	2DH	External Pin Manual Focus Control Range Extend FAR Step
449	0	D)AF_CPU:Advanced	2EH	External Pin Manual Focus Control Range Extend NEAR Ratio
450	0	D)AF_CPU:Advanced	2FH	External Pin Manual Focus Control Range Extend NEAR Step

V. OSCD (On Screen Character Display) Command

The maximum number of characters per line is 28 characters. The maximum number of lines is 12 lines.

Warning:

While sending this command to the camera, the auto focus function is going to stop because the camera control and OSCD use the same microprocessor.

A. One Byte Command

Function	D7	D6	D5	D4	D3	D2	D1	D0
Cancel all Video RAM	0	0	0	0	0	0	0	0
Display control	0	0	0	1	D0	1	BL1	BL0
Change Character address bank	0	1	1	1	1	1	1	C8

1. Clearing the Video RAM

Clear all character data (12 rows, 28 columns) from the video RAM bt 0xFE, When using this command, Display control set off and the address of the Video RAM set (0,0).

2. Display Control

D0: Display switch (0: Display off, 1: Display on)

BL1 & 0: Blinking frequency (00: blinking off, 01: blinking 2Hz, 10: 1Hz, 11: 0.5Hz)

3. Change character address bank

C8: Change address bank (0: select low rank bank, 1: select high rank bank)

B. Two Bytes Command

Note: Send in the order of D15-D8 and D7-D0.

Function	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Write Address Control	1	0	0	0	1	0	0	AR3	AR2	AR1	AR0	AC4	AC3	AC2	AC1	AC0
Character Size Control	1	0	0	1	1	0	SV1	SV0	SH1	SH0	0	0	AR3	AR2	AR1	AR0

1. Write Address Control

Assign the address to write characters.

AR3 & 2 & 1: Assign the number of the row (0000 to 1011)

AC4 & 3 & 2 & 1: Assign the number of the column (00000 to 11011)

2. Character Size Control

Assign the character size for each row.

SV1, 0: The height of the character (00: Standard, 01: 2times, 10: 3times, 11: 4times)

SH1, 0: The width of the character (00: Standard, 01: 2times, 10: 3times, 11: 4times)

AR3, 2, 1, 0: The number of the rows (0000 to 1011)

C. Consecutive Two Bytes Command

Notes:

1. Send in the order of D15-D8 and D7-D0
2. These two bytes of data must be bundled together and sent. If the each byte is sent individually, it may not be processed correctly.

Function	D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Display Character Control	1	1	0	1	0	0	BL	0	C7	C6	C5	C4	C3	C2	C1	C0

a. Display Character Control

This command writes characters into the current address of the video RAM. After writing the character, the address will automatically increment of the next location.

After this command, the data being sent will be received as C7-C0 automatically. To finish the Display character control, send the command "0xFF".

BL: Blinking Status (0: blink off, 1: blink on)

C7-C0: The character code (Please check below table)

C7-C0	Character	C7-C0	Character	C7-C0	Character	C7-C0	Character
000	0	010	G	020	W	116	m
001	1	011	H	021	X	117	n
002	2	012	I	022	Y	118	o
003	3	013	J	023	Z	119	p
004	4	014	K	10A	a	11A	q
005	5	015	L	10B	b	11B	r
006	6	016	M	10C	c	11C	s
007	7	017	N	10D	d	11D	t
008	8	018	O	10E	e	11E	u
009	9	019	P	10F	f	11F	v
00A	A	01A	Q	110	g	120	w
00B	B	01B	R	111	h	121	x
00C	C	01C	S	112	i	122	y
00D	D	01D	T	113	j	123	z
00E	E	01E	U	114	k	xFE	No display
00F	F	01F	V	115	l	xFF	2 Byte command finish code

Note: Please refer to the "NED uPD6467" data sheet when requiring additional characters to the ones listed above.

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