User's Manual

Simple ISP

User's Manual: Software

RZ/V2L

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General Precautions in the Handling of Microprocessing Unit and Microcontroller Unit Products

The following usage notes are applicable to all Microprocessing unit and Microcontroller unit products from Renesas. For detailed usage notes on the products covered by this document, refer to the relevant sections of the document as well as any technical updates that have been issued for the products.

1. Precaution against Electrostatic Discharge (ESD)
   A strong electrical field, when exposed to a CMOS device, can cause destruction of the gate oxide and ultimately degrade the device operation. Steps must be taken to stop the generation of static electricity as much as possible, and quickly dissipate it when it occurs. Environmental control must be adequate. When it is dry, a humidifier should be used. This is recommended to avoid using insulators that can easily build up static electricity. Semiconductor devices must be stored and transported in an anti-static container, static shielding bag or conductive material. All test and measurement tools including work benches and floors must be grounded. The operator must also be grounded using a wrist strap. Semiconductor devices must not be touched with bare hands. Similar precautions must be taken for printed circuit boards with mounted semiconductor devices.
2. Processing at power-on
   The state of the product is undefined at the time when power is supplied. The states of internal circuits in the LSI are indeterminate and the states of register settings and pins are undefined at the time when power is supplied. In a finished product where the reset signal is applied to the external reset pin, the states of pins are not guaranteed from the time when power is supplied until the reset process is completed. In a similar way, the states of pins in a product that is reset by an on-chip power-on reset function are not guaranteed from the time when power is supplied until the power reaches the level at which resetting is specified.
3. Input of signal during power-off state
   Do not input signals or an I/O pull-up power supply while the device is powered off. The current injection that results from input of such a signal or I/O pull-up power supply may cause malfunction and the abnormal current that passes in the device at this time may cause degradation of internal elements. Follow the guideline for input signal during power-off state as described in your product documentation.
4. Handling of unused pins
   Handle unused pins in accordance with the directions given under handling of unused pins in the manual. The input pins of CMOS products are generally in the high-impedance state. In operation with an unused pin in the open-circuit state, extra electromagnetic noise is induced in the vicinity of the LSI, an associated shoot-through current flows internally, and malfunctions occur due to the false recognition of the pin state as an input signal become possible.
5. Clock signals
   After applying a reset, only release the reset line after the operating clock signal becomes stable. When switching the clock signal during program execution, wait until the target clock signal is stabilized. When the clock signal is generated with an external resonator or from an external oscillator during a reset, ensure that the reset line is only released after full stabilization of the clock signal. Additionally, when switching to a clock signal produced with an external resonator or by an external oscillator while program execution is in progress, wait until the target clock signal is stable.
6. Voltage application waveform at input pin
   Waveform distortion due to input noise or a reflected wave may cause malfunction. If the input of the CMOS device stays in the area between V_{IL} (Max.) and V_{IH} (Min.) due to noise, for example, the device may malfunction. Take care to prevent chattering noise from entering the device when the input level is fixed, and also in the transition period when the input level passes through the area between V_{IL} (Max.) and V_{IH} (Min.).
7. Prohibition of access to reserved addresses
   Access to reserved addresses is prohibited. The reserved addresses are provided for possible future expansion of functions. Do not access these addresses as the correct operation of the LSI is not guaranteed.
8. Differences between products
   Before changing from one product to another, for example to a product with a different part number, confirm that the change will not lead to problems. The characteristics of a microprocessing unit or microcontroller unit products in the same group but having a different part number might differ in terms of internal memory capacity, layout pattern, and other factors, which can affect the ranges of electrical characteristics, such as characteristic values, operating margins, immunity to noise, and amount of radiated noise. When changing to a product with a different part number, implement a system-evaluation test for the given product.

How to Use This Manual

1. Purpose and Target Readers

This manual is designed to provide the user with an understanding of the hardware functions and electrical characteristics of the MCU. It is intended for users designing application systems incorporating the MCU. A basic knowledge of electric circuits, logical circuits, and MCUs is necessary in order to use this manual.

The manual comprises an overview of the product; descriptions of the CPU, system control functions, peripheral functions, and electrical characteristics; and usage notes.

> Particular attention should be paid to the precautionary notes when using the manual. These notes occur within the body of the text, at the end of each section, and in the Usage Notes section.

> The revision history summarizes the locations of revisions and additions. It does not list all revisions. Refer to the text of the manual for details.

The following documents apply to the RZ/V2L Group. Make sure to refer to the latest versions of these documents. The newest versions of the documents listed may be obtained from the Renesas Electronics Web site.2.3

Document Type	Description	Document Title	Document No.
User’s manual for Hardware	This document is RZ/V2L Group User's Manual.	RZ/V2L Group User's Manual: Hardware	R01UH0936EJ0130

Table of Contents

1. Overview

1.1 Features

This manual describes the functions and usage of the Software for Simple ISP function via V4L2 software, which controls DRP-AI of RZ/V2L Group microprocessors. V4L2 is customized to use the Simple ISP.

1.2 Supported specification

Simple ISP executes using the V4L2 API.

Table 1-1 Supported specification

Categories		Supported specifications
Camera image input	Image format	Bayer format(RGGB)
	Data format	RAW8, RAW10, RAW12(*1)
	Resolution	MIN(16*4), MAX(2592*1944) integer multiple of 2
	Stride	16 to 65535(byte)
	Frame rate	30fps @HD
Camera image output	Image format	YUYV, UYVY, RGB888, ARGB8888
Basic Function	Demosaicing	ACPI Method conversion
Image Quality Enhancement	Bias Correction	Bias adjustment for R,G,B component in Bayer array
	Digital Gain	Gain adjustment for R,G,B component after demosaicing
	Color matrix correction	Color correction by 3x3 transformation matrix operation
	2D Noise reduction	Noise reduction using Median filter
	3D Noise reduction	Noise reduction by analyzing previous image
	Sharpening	Sharpening using Unsharp masking
	Gamma correction	Gamma correction by User specified LUT
	Color component accumulate	Extract Accumulate value to control exposure
	White Balance Control	Manual or auto
Sensor Control	Exposure Control	Manual or auto

Note 1: For detailed information, please refer the Table 35.13 Image Output Formats of RZ/V2L Group User's Manual: Hardware(R01UH0936EJ0130). Also, this software has not been evaluated in case of RAW12.

1.3 About Simple ISP

Simple ISP is that specializes in outputting an image having high color-reproducibility through the color-matrix correction and 3D noise reduction. This can be used to obtain image having high color-reproducibility which is suitable for AI processing, and images having a more natural color representation to the naked eye. This function performs bias correction, color component accumulation, demosaicing, gain correction, color-matrix correction, noise reduction, sharpening, Gamma correction, and 3D noise reduction on captured data (Bayer array) stored in the memory and outputs an image with YCbCr422 format. These functions are performed with pipeline processing. AE (automatic exposure control) can be realized by adjusting the gain of the CMOS sensor and the shutter speed on the CPU side by using the color component accumulation value obtained from this function.

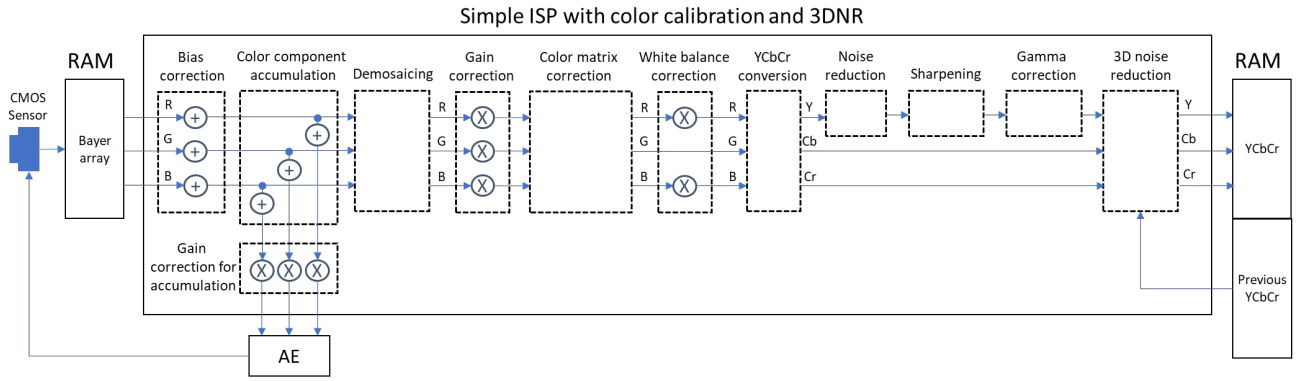


Figure 1-1 Block diagram of Simple ISP with color calibration and 3DNR

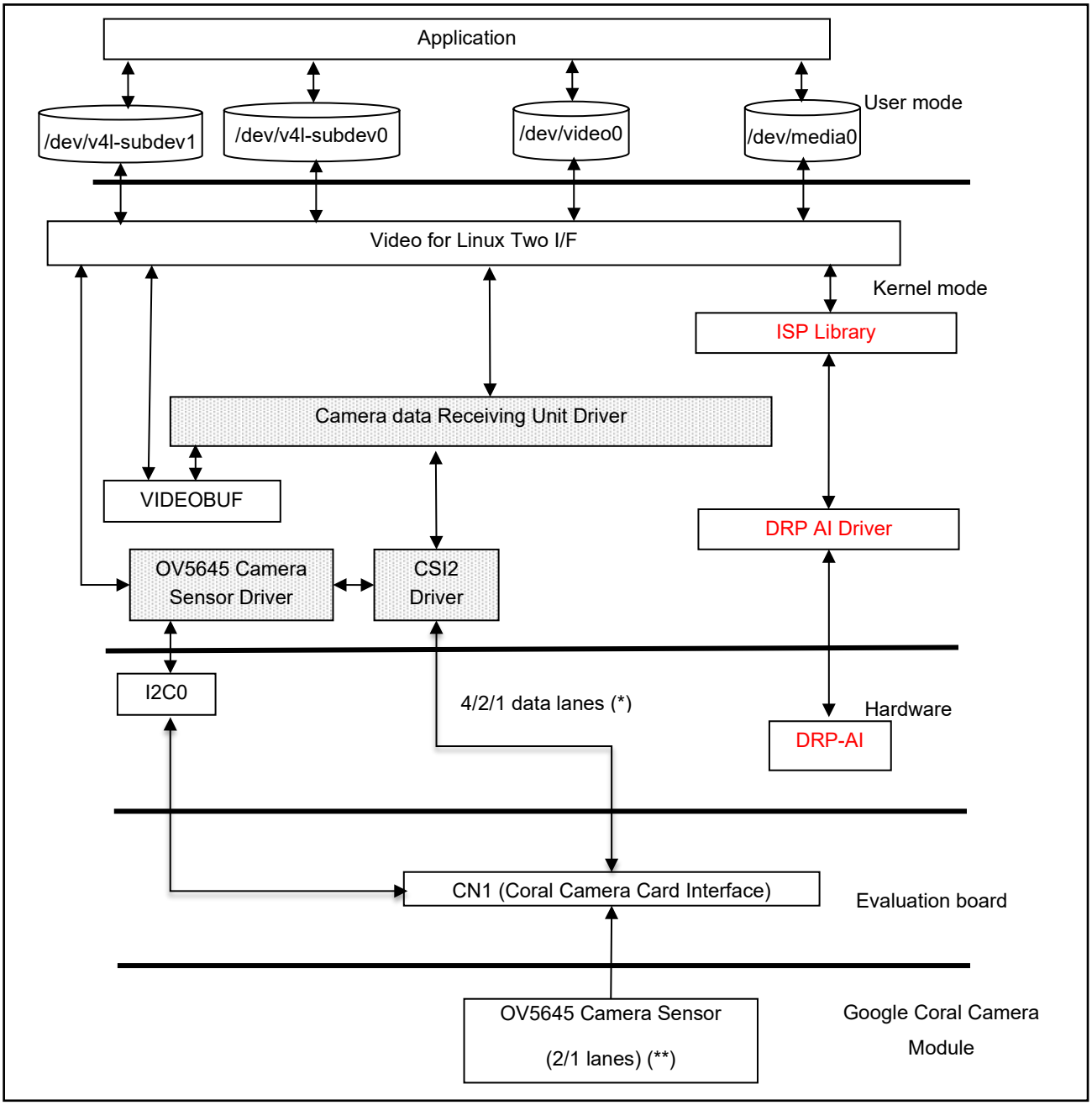
Bias correction	: Correction by addition for each RGB component in the Bayer array
Color component accumulation	: Accumulated value for each RGB component in the Bayer array
Gain correction for accumulated value	: Correction by multiplication for the accumulated values of each RGB component in the Bayer array
Demosaicing	: Interpolation from Bayer array to RGB component
Gain correction	: Correction by multiplication for each RGB component after demosaicing
Color matrix correction	: Color correction for RGB component by 3 × 3 transformation matrix
White balance correction	: Correction by multiplication for each RGB component after color matrix correction
YCbCr conversion	: Conversion processing of RGB component into YCbCr component
Noise reduction	: Noise reduction for Y component (Median filter)
Sharpening	: Sharpening for Y component (Unsharp masking)
Gamma correction	: Gamma correction for Y component
3D noise reduction	: Noise reduction processing for YCbCr component using the previous YCbCr image

2. V4L2 API for ISP

2.1 Module Configuration

The following figure shows the configuration of this module. This document describes the example using Google Coral Camera (OV5645) MIPI-CSI.

Figure 2-1 Module Configuration RZ/V2L



Note:

(*) MIPI CSI2 module can support 4/2/1 data lanes.

(**) OV5645 camera sensor can support 2/1 data lanes.

2.2 List of API

The following table shows V4L2 APIs that are checked the operation in the RZ/V2L Linux Package. This document focuses on the ISP feature.

Table 2-1 System calls using V4L2

System call	Summary
open	Open a V4L2 device file.
close	Close a V4L2 device file.
ioctl	Issue V4L2 API for the opened device file.
select	Check if DQBUF can be executed.
mmap	Map a buffer in user space.
munmap	Unmap a buffer in user space.
ioctl(VIDIOC_S_FMT)	Specify the data format.
ioctl(VIDIOC_REQBUFS)	Request a buffer area.
ioctl(VIDIOC_QUERYBUF)	Query the status of a buffer.
ioctl(VIDIOC_QBUF)	Register a buffer.
ioctl(VIDIOC_DQBUF)	Release a buffer.
ioctl(VIDIOC_STREAMON)	Start streaming.
ioctl(VIDIOC_STREAMOFF)	Stop streaming.
ioctl(VIDIOC_S_EXT_CTRLS)	Setting value of extended control

Note: The string in parentheses after system call “ioctl” is the constant name to specify as the second argument when “ioctl” is issued.

2.3 Specifications

This chapter shows V4L2 API specification of setting value for extended control (VIDIOC_S_EXT_CTRLS). The following list shows kind of the extension control to support this package. There are two types of settings and two types of gettings. One is the setting of each parameter, and the other is the setting of parameters for all function. To use function of Simple ISP, please **do not include** "v4l2-controls.h", include "renesas-v4l2-controls.h". These source code files are enclosed SDK environment of "sysroots/aarch64-poky-linux/usr/include/linux".

2.3.1 Setting of parameters for individual function

The following Table 2-2 and Table 2-3 show specifications for setting of parameters for individual function.

Table 2-2 Description of setting parameters for individual function (1/2)

No.	Specification	Range of values	Parameter of function argument	
			Control ID	Control class
0	Setting of detail parameters	-	V4L2_CID_RZ_ISP_DETAIL	See. Table 2-4 through Table 2-9
1	Adjustment value of black level	0 through 127 Default:0	V4L2_CID_RZ_ISP_BL	0 through 127 Default:0
2	Adjustment value of white balance	0: Day light 1: Neutral light 2: Interior light 3: Lamp light Default:1	V4L2_CID_RZ_ISP_WB	V4L2_RZ_ISP_WB_DAYLIGHT V4L2_RZ_ISP_WB_HORIZON V4L2_RZ_ISP_WB_WHITE V4L2_RZ_ISP_WB_STUDIO_LAMP
3	Setting of gamma value	1 through 9999 Default:100(mean 1.00)	V4L2_CID_RZ_ISP_GAMMA	1 through 9999
4	Setting of color matrix	0: Original 1: Standard correction 2: Vivid correction 3: Sepia correction Default:1	V4L2_CID_RZ_ISP_CMX	V4L2_RZ_ISP_CMX_NONE V4L2_RZ_ISP_CMX_NORMAL V4L2_RZ_ISP_CMX_VIVID V4L2_RZ_ISP_CMX_SEPIA
5	2D noise reduction	0 through 100 Default:100	V4L2_CID_RZ_ISP_2DNR	0 through 100
6	3D noise reduction	0: OFF 1: ON Default:1	V4L2_CID_RZ_ISP_3DNR	0 or 1
7	Unsharp Mask	0: OFF 1: WEAK 2: NORMAL 3: STRONG Default:0	V4L2_CID_RZ_ISP_EMP	V4L2_RZ_ISP_EMP_NONE V4L2_RZ_ISP_EMP_WEAK V4L2_RZ_ISP_EMP_NORMAL V4L2_RZ_ISP_EMP_STRONG
8	AE ON/OFF(*)	0: OFF 1: ON Default:1	V4L2_CID_RZ_ISP_AE	0 or 1

Note: Execute between "Querybuf of ioctl function" and "Stream on setting of ioctl function".

Table 2-3 Description of setting parameters for individual function (2/2)

No.	Specification	Range of values	Parameter of function argument	
			Control ID	Control class
9	Expose level (*1)(*2)	-400 through 400(x0.1dB) Default: 100(x0.1dB)	V4L2_CID_RZ_ISP_EXPOSE_LV	-400 through 400
10	Target brightness (8-bit range)(*2)	1 through 254 Default: 106	V4L2_CID_RZ_ISP_T_BL	1 through 254
11	Brightness threshold(*2)	1 through 64 Default: 10	V4L2_CID_RZ_ISP_THRESHOLD	1 through 64
12	AWB ON/OFF	0: OFF (Manual) 1: ON (Auto) Default:0	V4L2_CID_RZ_ISP_AWB	0 or 1

Note1: The Expose level function controls the shutter time of the camera and the analog gain to correct the brightness.

Note2: Execute between "AE ON/OFF" and "Stream on setting of ioctl function".

2.3.2 Setting of detail parameters

The following **Table 2-4** through **Table 2-9** show specifications for setting of detail parameters (V4L2_CID_RZ_ISP_DETAIL). "Bit field" is used "Data to be updated".

Table 2-4 Description of setting parameters for detail functions (1/7)

Start Address	Bit Feild	Size (byte)	Setting information	Setting Values
0000h	-	2	Total byte number	0x01AD
0002h	-	2	(Management Area) Data to be updated	Use the value "Bit field "**Table 2-4** through **Table 2-9**. In this case, the Color Matrix preset table (bit2) and the Color Matrix selection preset number (bit4) is a value of 1 (0b0000 0000 0001 0100 =0x0014).
0004h	-	20	Reserved	0x00
0018h	-	8	(Management Area) Signature	Case: Version 1.1 or later 0x52, 0x5A, 0x56, 0x5F, 0x49, 0x53, 0x50, 0x31 Case: Version 1.0 or before 0x52, 0x5A, 0x56, 0x5F, 0x49, 0x53, 0x50, 0x30
0020h	0	1	Output format	Case: Types of YUV 0x00: YUYV 0x01: UYVY Case: Types of RGB 0x10: RGB888 0x11: ARGB8888
0021h	1	9	Brightness integration value	[0] whether luminance accumulation is enabled or disabled 0: Do not acquire color component accumulation 1: Acquire color component accumulation [1]-[8] The upper left position (X,Y) [1]-[2] area_offset_x x coordinate of the start position of the area for color component accumulation [3]-[4] area_offset_y y coordinate of the start position of the area for color component accumulation [5]-[6] area_width Width of the area for color component accumulation [7]- [8] area_height Height of the area for color component accumulation

Table 2-5 Description of setting parameters for detail functions (2/7)

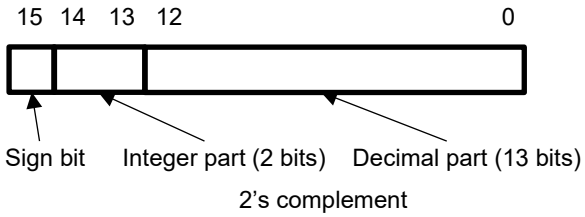
Start Address	Bit P	Size (byte)	Setting information	Setting Values
002Ah	2	72	Color Matrix preset table data	The conversion matrix formula is follows: $\begin{pmatrix} R_{out} \\ G_{out} \\ B_{out} \end{pmatrix} = \begin{pmatrix} Matrix\ c11 & Matrix\ c12 & Matrix\ c13 \\ Matrix\ c21 & Matrix\ c22 & Matrix\ c23 \\ Matrix\ c31 & Matrix\ c32 & Matrix\ c33 \end{pmatrix} \begin{pmatrix} R_{in} \\ G_{in} \\ B_{in} \end{pmatrix}$ [0]-[17] Preset 1 [0]-[1] Matrix c11 Value of the element at row 1 column 1 of the color matrix correction transformation matrix converted to fixed-point format The specification of fixed-point format is shown in the figure below.  0x3b8b is the recommended value. [2]-[3] Matrix c12 Value of element at row 1 column 2 of the color matrix correction transformation matrix converted to fixed-point format The fixed-point format is the same as that of matrix_c11. 0xeaf1 is the recommended value.

Table 2-6 Description of setting parameters for detail functions (3/7)

				[4]-[5] Matrix c13 Value of element at row 1 column 3 of the color matrix correction transformation matrix converted to fixed-point format The fixed-point format is the same as that of matrix_c11. 0xf405 is the recommended value. [6]-[7] Matrix c21 Value of element at row 2 column 1 of the color matrix correction transformation matrix converted to fixed-point format The fixed-point format is the same as that of matrix_c11. 0xf726 is the recommended value. [8]-[9] Matrix c22 Value of element at row 2 column 2 of the color matrix correction transformation matrix converted to fixed-point format The fixed-point format is the same as that of matrix_c11. 0x2fdf is the recommended value. [10]-[11] Matrix c23 Value of element at row 2 column 3 of the color matrix correction transformation matrix converted to fixed-point format The fixed-point format is the same as that of matrix_c11. 0xf84d is the recommended value. [12]-[13] Matrix c31 Value of element at row 3 column 1 of the color matrix correction transformation matrix converted to fixed-point format The fixed-point format is the same as that of matrix_c11. 0x0182 is the recommended value. [14]-[15] Matrix c32 Value of element at row 3 column 2 of the color matrix correction transformation matrix converted to fixed-point format The fixed-point format is the same as that of matrix_c11. 0xc9c5 is the recommended value. [16]-[17] Matrix c33 Value of element at row 3 column 3 of the color matrix correction transformation matrix converted to fixed-point format The fixed-point format is the same as that of matrix_c11. 0x5c3a is the recommended value. [18]-[35] Preset 2 [36]-[53] Preset 3 [54]-[71] Preset 4 Please see Preset1. * Set the "ColorMatrix selection preset number" at the same time.

Table 2-7 Description of setting parameters for detail functions (4/7)

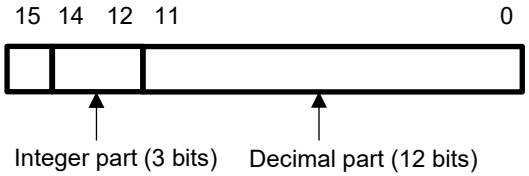
Start Address	Bit field	Size (byte)	Setting information	Setting Values
0072h	3	24	White Balance preset table data	[0]-[5]Preset 1 [0][1]Gain R A value of the gain correction value of image (R component) converted to fixed-point format. The specification of fixed-point format is shown in the figure below.  0x2315 is the recommended value. [2][3]Gain G A value of the gain correction value of image (G component) converted to fixed-point format. The fixed-point format is the same as that of Gain R. 0x1800 is the recommended value. [4][5]Gain B A value of the gain correction value of image (G component) converted to fixed-point format. The fixed-point format is the same as that of Gain R. 0x1800 is the recommended value. [6]-[11]Preset 2 [12]-[17]Preset 3 [18]-[23]Preset 4 Please see the Preset 1. * Set the "WhiteBalance Selection Preset Number" at the same time.
008Ah	4	1	Color Matrix selection preset number	[0]Initial setting color Matrix preset number 0 through 3
008Bh	5	1	White Balance selection preset number	[0]Initial setting white Balance preset number preset number 0 through 3
008Ch	6	6	Image size information	[0]-[1] Width (16 to 2592, integer multiple of 2) [2]-[3] Height (4 to 1944, integer multiple of 2) [4]-[5] Stride

Table 2-8 Description of setting parameters for detail functions (5/7)

Start Address	Bit field	Size (byte)	Setting information	Setting Values
0092h	7	16	3DNR Parameters	[0] Coefficient Y Coefficient (0 to 64) that indicates the ratio of Y signal differences when calculating Y-motion information Recommended value:64 [1] Coefficient C Coefficient (0 to 64) that indicates the ratio of Y signal difference when calculating C-motion information Recommended value:32 [2] Alpha max Y Maximum value of Y-correlation coefficient (0 to 255) Recommended value:128 [3]-[4] Threshold a Y Threshold value (0 to 511) of Y-motion information in which Y-correlation coefficient becomes maximum value Recommended value:8 [5]-[6] Threshold b Y Threshold value (0 to 511) of Y-motion information in which Y-correlation coefficient becomes 0 Recommended value:16 [7]-[8] Slope Y Constant of proportionality (0 to 4095) used for calculating Y-correlation coefficient Recommended value:512 [9] Alpha Max C Maximum value of C-correlation coefficient (0 to 255) Recommended value:128 [10]-[11] Threshold a C Threshold value (0 to 511) of C-motion information in which C-correlation coefficient becomes maximum value Recommended value:8

Table 2-9 Description of setting parameters for detail functions (6/7)

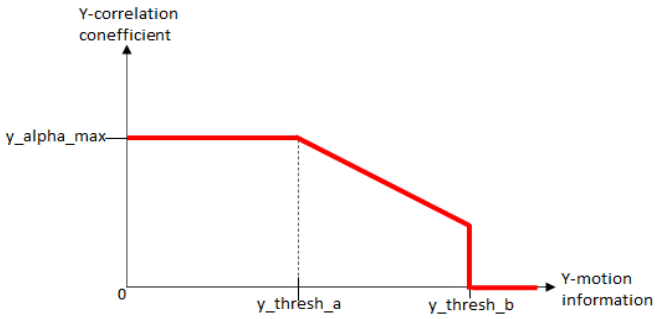
				[12]-[13] Threshold b C Threshold value (0 to 511) of C-motion information in which C-correlation coefficient becomes 0 Recommended value: 16 [14]-[15] Slope C Constant of proportionality (0 to 4095) used for calculating C-correlation coefficient Recommended value: 512 
00A2h	8	6	RGB bias data	[0]-[1] Bias R Bias correction value of image (R component) (-128 to 127) Recommended value: 0 [2]-[3] Bias G Bias correction value of image (G component) (-128 to 127) Recommended value: 0 [4]-[5] Bias B Bias correction value of image (B component) (-128 to 127) Recommended value: 0
00A8h	9	2	2DNR (Median) blend ratio	[0]-[1] 0 through 256
00AAh	10	2	Contour enhancement	[0] Correction strength [1] Coring value
Version1.1 or later				
00ACh	11	5	Auto Exposure	[0] AE ON/OFF 0:AE OFF, 1:AE ON [1] Target [2]-[3] Expose Level [4] Threshold
00B1h	12	5	Auto white balance	[0] AWB ON (Auto) / OFF (Manual) 0: AWB OFF (Manual), 1: AWB ON (Auto) [1]-[2] AWB Gain R [3]-[4] AWB Gain B
00B6h	-	73	Reserved	-

Table 2-10 Description of setting parameters for detail functions (7/7)

Start Address	Bit field	Size (byte)	Setting information	Setting Values
00FFh	15	257	gamma	[0] Gamma correction status 0: No correction 1: Correction [1]-[256] Gamma correction table
Version1.0 or before				
00ACh	11	257	gamma	[0] Gamma correction status 0: No correction 1: Correction [1]-[256] Gamma correction table

2.3.3 Getting of parameters

The following Table 2-11 shows specifications for getting of parameters.

Table 2-11 Description of getting parameters

No.	Specification	Range of values	Parameter of function argument	
			Control ID	Address of information data
0	Setting of detail parameters	**Refer to** Table 2-4 through Table 2-9	V4L2_CID_RZ_ISP_DETAIL	Need to prepare 512bytes
1	Adjustment value of black level	0 through +127 Default:0	V4L2_CID_RZ_ISP_BL	Need to prepare 4bytes
2	Adjustment value of white level	0: Day light 1: Neutral light 2: Interior light 3: Lamp light Default:1	V4L2_CID_RZ_ISP_WB	
3	Setting of gamma value	1 through 9999 Default:100(mean 1.00)	V4L2_CID_RZ_ISP_GAMMA	
4	Setting of color matrix	0: Original 1: Standard correction 2: Vivid correction 3: Sepia correction Default:1	V4L2_CID_RZ_ISP_CMX	
5	2D noise reduction	0 through 100 Default:100	V4L2_CID_RZ_ISP_2DNR	
6	3D noise reduction	0: OFF 1: ON Default:1	V4L2_CID_RZ_ISP_3DNR	
7	Unsharp Mask	0: OFF 1: WEAK 2: NORMAL 3: STRONG Default:0	V4L2_CID_RZ_ISP_EMP	
8	Auto White Balance	0: OFF 1: ON Default:0	V4L2_CID_RZ_ISP_AWB	

2.4 Sample code

This section describes sample code for using the video codec extension.

2.4.1 Example code of Setting Auto Exposure

```
/* Example code of Setting Auto Exposure */

int set_ae(int onoff)
{
  int ret;
  struct v4l2_ext_controls extCtls;
  struct v4l2_ext_control extCtl;
  memset(&extCtls, 0, sizeof(extCtls));
  memset(&extCtl, 0, sizeof(extCtl));
  extCtl.id = V4L2_CID_RZ_ISP_AE;
  extCtl.value = onoff;
  extCtls.controls = &extCtl;
  extCtls.count = 1;
  extCtls.ctrl_class = V4L2_CTRL_CLASS_CAMERA;
  ret = xioctl(m_fd, VIDIOC_S_EXT_CTRLS, &extCtls);

  return ret;
}
```

2.4.2 Example code of detail Setting

```
/* Example code of Setting detail */

int set_all(unsigned char *senddata)
{
struct v4l2_ext_controls extCtls;
struct v4l2_ext_control extCtl;

memset(&extCtls, 0, sizeof(extCtls));
memset(&extCtl, 0, sizeof(extCtl));
extCtl.id = V4L2_CID_RZ_ISP_DETAIL;
extCtl.value = 1;
extCtl.ptr = senddata;
extCtl.size = 512;
extCtls.controls = &extCtl;
extCtls.count = 1;
extCtls.ctrl_class = V4L2_CTRL_CLASS_CAMERA;
ret = xioctl(m_fd, VIDIOC_S_EXT_CTRLS, &extCtls);
return ret;
}
```

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Rev.	Date	Description	
		Page	Summary
1.00	24. Dec.21	—	First Edition issued
1.10	28.April. 22	6	Modified table of Table 1-1 to delete unnecessary information
		10-17	Modified table name of Table 2-2 through Table 2-9
		11	Modified value of default
		17	Modified table of Table 2-9 to add version 1.1 format
		18	Added function of getting parameters
		20	Modified sample code for supporting v1.1
1.20	29. July. 22	6, 11,17,19	Added AWB function of setting parameters
		17	Added figure of 3d noise reduction detail
1.21	31. Jan. 23	6	Modified number of reference documents
1.30	31. July 23	6	Modified number of reference documents
		10	Modified default value of AE to 1(=ON)

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