

THSCJ101

V4L2 Command Manual

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1. Purpose

This document describes how to use the camera command of THSCJ101 with Jetson Orin NX.

2. Camera Command

2.1 Image Streaming

Image streaming	Options
Image streaming	1080p : 1920x1080@29.6fps, YUV422 1080p : 1920x1080@59.6fps, YUV422 3M pixel : 2048x1536@29.6fps, YUV422 4K2K : 3840x2160@29.5fps, YUV422 13M pixel : 4160x3120@19.8fps, YUV422

2.1.1 Image Streaming

[Function]

Stream various combinations of image size and frame rate.

[Command]

```
gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-raw,format=YUY2, width=<width>,height=<height>,framerate=<frame rate>/1 ! xvimagesink
```

[Optional]

<mode> 0: 1080p @ 30fps : <width> = 1920, <height> = 1080, <frame rate> = 30
 <mode> 1: 1080p @ 60fps : <width> = 1920, <height> = 1080, <frame rate> = 60
 <mode> 2: 3M pixel @ 30fps : <width> = 2048, <height> = 1536, <frame rate> = 30
 <mode> 3: 4K2K @ 30fps : <width> = 3840, <height> = 2160, <frame rate> = 30
 <mode> 4: 13M pixel @ 20fps : <width> = 4160, <height> = 3120, <frame rate> = 20

[Condition]

Use this function with the following functions.

```
v4l2-ctl -d /dev/video0 --set-ctrl sensor_mode=<mode>
```

[Example 1] Stream 1080p @ 30fps images.

```
v4l2-ctl -d /dev/video0 --set-ctrl sensor_mode=0
gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-raw,format=YUY2,
width=1920,height=1080,framerate=30/1 ! xvimagesink
```

[Example 2] Stream 1080p @ 60fps images.

```
v4l2-ctl -d /dev/video0 --set-ctrl sensor_mode=1
gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-raw,format=YUY2,
width=1920,height=1080,framerate=60/1 ! xvimagesink
```

[Example 3] Stream 3M pixel @ 30fps images.

```
v4l2-ctl -d /dev/video0 --set-ctrl sensor_mode=2
gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-raw,format=YUY2,
width=2048,height=1536,framerate=30/1 ! xvimagesink
```

[Example 4] Stream 4K2K @ 30fps images.

```
v4l2-ctl -d /dev/video0 --set-ctrl sensor_mode=3
gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-raw,format=YUY2,
width=3840,height=2160,framerate=30/1 ! xvimagesink
```

[Example 5] Stream 13M @ 20fps images.

```
v4l2-ctl -d /dev/video0 --set-ctrl sensor_mode=4
gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-raw,format=YUY2,
width=4160,height=3120,framerate=20/1 ! xvimagesink
```

2.1.2 Image Capture

[Function]

Capture an image from one of various streaming image sizes.

[Command]

```
gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-raw,format=YUY2, width=<width>,height=<height>,framerate=<frame rate>/1 ! queue max-size-time=0 ! jpegenc snapshot=true quality=95 ! filesink location=<file name>
```

[Optional]

```
<mode> 0: 1080p @ 30fps : <width> = 1920, <height> = 1080, <frame rate> = 30
<mode> 1: 1080p @ 60fps : <width> = 1920, <height> = 1080, <frame rate> = 60
<mode> 2: 3M pixel @ 30fps : <width> = 2048, <height> = 1536, <frame rate> = 30
<mode> 3: 4K2K @ 30fps : <width> = 3840, <height> = 2160, <frame rate> = 30
<mode> 4: 13M pixel @ 20fps : <width> = 4160, <height> = 3120, <frame rate> = 20
```

[Condition]

Use this function with the following function.

```
v4l2-ctl -d /dev/video0 --set-ctrl sensor_mode=<mode>
```

[Example 1] Capture 1080p image from 1080p@30fps streaming.

```
v4l2-ctl -d /dev/video0 --set-ctrl sensor_mode=0
gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-raw,format=YUY2,
width=1920,height=1080,framerate=30/1 ! queue max-size-time=0 ! jpegenc
snapshot=true quality=95 ! filesink location=1080p30.jpeg
```

[Example 1] Capture 1080p image from 1080p@60fps streaming.

```
v4l2-ctl -d /dev/video0 --set-ctrl sensor_mode=1
gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-raw,format=YUY2,
width=1920,height=1080,framerate=60/1 ! queue max-size-time=0 ! jpegenc
snapshot=true quality=95 ! filesink location=1080p60.jpeg
```

[Example 2] Capture 3M image from 3M@30fps streaming.

```
v4l2-ctl -d /dev/video0 --set-ctrl sensor_mode=2
gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-raw,format=YUY2,
width=2048,height=1536,framerate=30/1 ! queue max-size-time=0 ! jpegenc
snapshot=true quality=95 ! filesink location=3M30.jpeg
```

[Example 3] Capture 4K2K image from 4K@30fps streaming.

```
v4l2-ctl -d /dev/video0 --set-ctrl sensor_mode=3
gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-raw,format=YUY2,
width=3840,height=2160,framerate=30/1 ! queue max-size-time=0 ! jpegenc
snapshot=true quality=95 ! filesink location=4k30.jpeg
```

[Example 4] Capture 13M image from 13M@20fps streaming.

```
v4l2-ctl -d /dev/video0 --set-ctrl sensor_mode=4
gst-launch-1.0 v4l2src device=/dev/video0 ! video/x-raw,format=YUY2,
width=4160,height=3120,framerate=20/1 ! queue max-size-time=0 ! jpegenc
snapshot=true quality=95 ! filesink location=13M20.jpeg
```

2.2 Camera Function and Image Quality Control

Camera Function and image quality control	Options
Focus Mode Selection	Auto or Manual
Auto Focus Method Selection	Contrast or PDAF Hybrid
Focus Position Selection	Inf. to Macro (80mm)
Brightness Control	21 steps
Contrast Control	21 steps
Saturation Control	32 steps
Sharpness Control	32 steps
Noise Reduction Mode Selection	Auto or Manual
Noise Reduction Level Control	11 steps
Auto Exposure Compensation	13 steps -6/3EV to +6/3EV
Power Line Frequency (Flicker Cancel Mode) Selection	Disable, 50Hz or 60Hz
White Balance Mode Selection	Auto or Manual
White Balance Manual Control	x1 to x7.97 for red and blue
Rotation Selection	0 or 180 degree
Frame Rate Control for Low Light	Longer exposure or fixed frame rate selectable
Program THP7312-P Firmware	Program THP7312-P firmware into the flash ROM of THSCG101

List up the v4l2-ctl controls supported by THSCJ101.

```
v4l2-ctl -d /dev/video0 --list-ctrls
```

```
Camera Controls
group_hold 0x009a2003 (bool) : default=0 value=0 flags=execute-on-write
sensor_mode 0x009a2008 (int64) : min=0 max=5 step=1 default=0 value=0 flags=slider
gain 0x009a2009 (int64) : min=16 max=356 step=1 default=16 value=16 flags=slider
exposure 0x009a200a (int64) : min=13 max=683709 step=1 default=2495 value=13 flags=slider
frame_rate 0x009a200b (int64) : min=2000000 max=29600000 step=1 default=29600000 value=2000000 flags=slider
flip_mirror_control 0x009a200e (intmenu): min=0 max=1 default=0 value=0
brightness 0x009a200f (intmenu): min=0 max=20 default=10 value=10
saturation 0x009a2010 (int64) : min=0 max=31 step=1 default=10 value=10 flags=slider
contrast 0x009a2011 (int64) : min=0 max=20 step=1 default=10 value=10 flags=slider
sharpness 0x009a2012 (int64) : min=0 max=31 step=1 default=8 value=8 flags=slider
low_light_compensation 0x009a2013 (intmenu): min=0 max=1 default=1 value=1
noise_reduction_mode 0x009a2014 (intmenu): min=0 max=1 default=1 value=1
noise_reduction_level 0x009a2015 (int64) : min=0 max=10 step=1 default=0 value=0 flags=slider
autofocus_mode 0x009a2016 (intmenu): min=0 max=1 default=1 value=1
focus_position 0x009a2017 (int64) : min=0 max=18 step=1 default=0 value=0 flags=slider, execute-on-write
autofocus_start 0x009a2018 (intmenu): min=0 max=1 default=0 value=0 flags=execute-on-write
autofocus_method 0x009a2019 (int64) : min=0 max=2 step=1 default=2 value=2 flags=slider
autoexposure_bias 0x009a201a (intmenu): min=0 max=12 default=6 value=6
power_line_frequency 0x009a201b (intmenu): min=0 max=2 default=1 value=1
auto_white_balance_mode 0x009a201c (intmenu): min=0 max=1 default=1 value=1
manual_white_balance_red_gain 0x009a201d (int64) : min=32 max=255 step=1 default=64 value=64 flags=slider
manual_white_balance_blue_gain 0x009a201e (int64) : min=32 max=255 step=1 default=50 value=50 flags=slider
isp_firmware_update 0x009a201f (bool) : default=0 value=0 flags=execute-on-write
sensor_configuration 0x009a2032 (u32) : min=0 max=4294967295 step=1 default=0 [22] flags=read-only, volatile, has-payload
sensor_mode_i2c_packet 0x009a2033 (u32) : min=0 max=4294967295 step=1 default=0 [1026] flags=read-only, volatile, has-payload
sensor_control_i2c_packet 0x009a2034 (u32) : min=0 max=4294967295 step=1 default=0 [1026] flags=read-only, volatile, has-payload
bypass_mode 0x009a2064 (intmenu): min=0 max=1 default=0 value=0
override_enable 0x009a2065 (intmenu): min=0 max=1 default=0 value=0
height_align 0x009a2066 (int) : min=1 max=16 step=1 default=1 value=1
size_align 0x009a2067 (intmenu): min=0 max=2 default=0 value=0
write_isp_format 0x009a2068 (int) : min=1 max=1 step=1 default=1 value=1
sensor_signal_properties 0x009a2069 (u32) : min=0 max=4294967295 step=1 default=0 [30][18] flags=read-only, has-payload
sensor_image_properties 0x009a206a (u32) : min=0 max=4294967295 step=1 default=0 [30][16] flags=read-only, has-payload
sensor_control_properties 0x009a206b (u32) : min=0 max=4294967295 step=1 default=0 [30][36] flags=read-only, has-payload
sensor_dv_timings 0x009a206c (u32) : min=0 max=4294967295 step=1 default=0 [30][16] flags=read-only, has-payload
low_latency_mode 0x009a206d (bool) : default=0 value=0
preferred_stride 0x009a206e (int) : min=0 max=65535 step=1 default=0 value=0
sensor_modes 0x009a2082 (int) : min=0 max=30 step=1 default=30 value=5 flags=read-only
```

The following v4l2 controls are not needed for THSCJ101 because THSCJ101 has the stand alone ISP chip.

- group_hold
- gain
- exposure
- frame_rate
- sensor_configuration
- sensor_mode_i2c_packet
- sensor_control_i2c_packet
- bypass_mode
- override_enable
- height_align
- size_align
- write_isp_format
- sensor_signal_properties
- sensor_image_properties
- sensor_control_properties
- sensor_dv_timings
- low_latency_mode
- preferred_stride

2.2.1. Focus Mode Selection

[Function]

Select focus mode.

[Command]

```
v4l2-ctl -d /dev/video0 --set-ctrl=autofocus_mode=<focus mode>
```

[Option]

<focus mode>

0 : Manual focus or one shot AF

1 : Continuous AF

[Condition]

None

[Example 1] Manual Focus or One Shot AF

```
v4l2-ctl -d /dev/video0 --set-ctrl=autofocus_mode=0
```

[Example 2] Continuous AF

```
v4l2-ctl -d /dev/video0 --set-ctrl=autofocus_mode=1
```


2.2.2. Auto Focus Method Selection

[Function]

Select the auto focus method, contrast or PDAF hybrid.

[Command]

```
v4l2-ctl -d /dev/video0 --set-ctrl=autofocus_method=<auto focus method>
v4l2-ctl -d /dev/video0 --set-ctrl=autofocus_start=1
```

[Option]

<auto focus method>

0 : Contrast

1 : PDAF hybrid

[Condition]

None

[Example 1] Continuous PDAF Hybrid

```
v4l2-ctl -d /dev/video0 --set-ctrl=autofocus_mode=1
v4l2-ctl -d /dev/video0 --set-ctrl=autofocus_method=1
```

[Example 2] Continuous Contrast AF

```
v4l2-ctl -d /dev/video0 --set-ctrl=autofocus_mode=1
v4l2-ctl -d /dev/video0 --set-ctrl=autofocus_method=0
```

[Example 3] One Shot PDAF Hybrid

```
v4l2-ctl -d /dev/video0 --set-ctrl=autofocus_mode=0
v4l2-ctl -d /dev/video0 --set-ctrl=autofocus_method=1
v4l2-ctl -d /dev/video0 --set-ctrl=autofocus_start=1
```

[Example 4] One Shot Contrast AF

```
v4l2-ctl -d /dev/video0 --set-ctrl=autofocus_mode=0
v4l2-ctl -d /dev/video0 --set-ctrl=autofocus_method=0
v4l2-ctl -d /dev/video0 --set-ctrl=autofocus_start=1
```

2.2.3. Focus Position Selection

[Function]

Move the lens to the specified position and stop.

[Command]

```
v4l2-ctl -d /dev/video0 --set-ctrl=focus_position=<lens position>
```

[Option]

<lens position>

0 : The Inf. position which can cover all the temperature and direction conditions.

18 : The Macro position which can cover all the temperature and direction conditions.

[Condition]

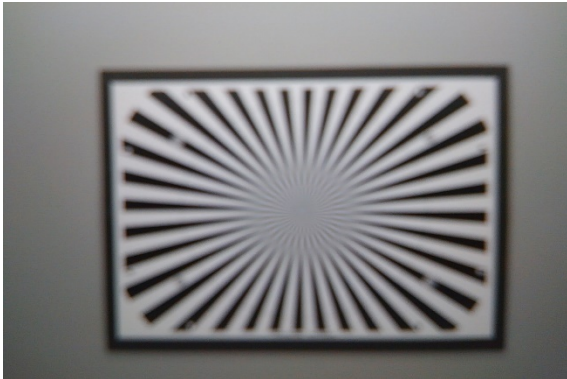
Use this function with the following function.

```
v4l2-ctl -d /dev/video0 --set-ctrl=autofocus_method=0
```

[Example 1] Move the lens to the position 18 (Unfocus).

```
v4l2-ctl -d /dev/video0 --set-ctrl=autofocus_method=0
```

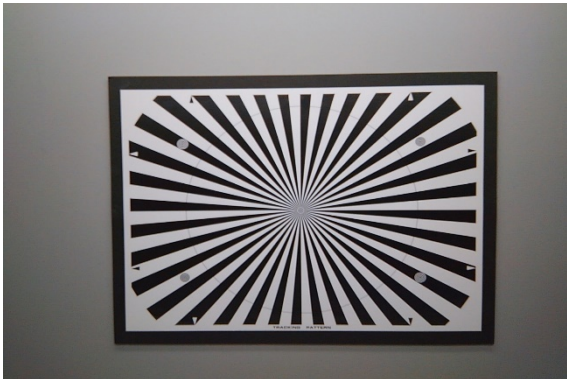
```
v4l2-ctl -d /dev/video0 --set-ctrl=focus_position=18
```



Unfocused image

[Example 2] Move the lens to the position 8 (Infocus).

```
v4l2-ctl -d /dev/video0 --set-ctrl=focus_position=8
```



Focused image

2.2.4. Brightness Control

[Function]

Change image brightness.

[Command]

```
v4l2-ctl -d /dev/video0 --set-ctrl=brightness=<brightness>
```

[Option]

<brightness>

0 to 20 : 0 is darkest, 20 is brightest.

[Condition]

None

[Example 1] Set brightness to 17.

```
v4l2-ctl -d /dev/video0 --set-ctrl=brightness=17
```



[Example 2] Set brightness to 10.

```
v4l2-ctl -d /dev/video0 --set-ctrl=brightness=10
```



2.2.5. Contrast Control

[Function]

Change the contrast.

[Command]

```
v4l2-ctl -d /dev/video0 --set-ctrl=contrast=<contrast>
```

[Option]

<contrast>

0-20 : 0 is the lowest, 20 is the highest contrast.

[Condition]

None

[Example 1] Set contrast to 6.

```
v4l2-ctl -d /dev/video0 --set-ctrl=contrast=6
```



[Example 2] Set contrast to 12.

```
v4l2-ctl -d /dev/video0 --set-ctrl=contrast=12
```



2.2.6. Saturation Control

[Function]

Change the saturation.

[Command]

```
v4l2-ctl -d /dev/video0 --set-ctrl=saturation=<saturation>
```

[Option]

<saturation>

0-31 : 0 is the lowest, 31 is the highest saturation.

[Condition]

None

[Example 1] Set saturation to 6.

```
v4l2-ctl -d /dev/video0 --set-ctrl=saturation=6
```



[Example 2] Set saturation to 23.

```
v4l2-ctl -d /dev/video0 --set-ctrl=saturation=23
```



2.2.7. Sharpness Control

[Function]

Change the image sharpness

[Command]

```
v4l2-ctl -d /dev/video0 --set-ctrl=sharpness=<sharpness>
```

[Option]

<sharpness>

0-31 : 0 is the weakest, 31 is the strongest sharpness.

[Condition]

None

[Example 1] Set sharpness to 0.

```
v4l2-ctl -d /dev/video0 --set-ctrl=sharpness=0
```



[Example 2] Set sharpness to 31.

```
v4l2-ctl -d /dev/video0 --set-ctrl=sharpness=31
```



2.2.8. Noise Reduction Mode Selection

[Function]

Select the noise reduction (NR) mode, manual or auto.

[Command]

```
v4l2-ctl -d /dev/video0 --set-ctrl=noise_reduction_mode=<NR mode>
```

[Option]

<NR mode>

0 : Manual mode

1 : Auto mode

[Condition]

None

[Example 1] Set the noise reduction mode to manual

```
v4l2-ctl -d /dev/video0 --set-ctrl=noise_reduction_mode=0
```

2.2.9. Noise Reduction Level Control

[Function]

Change the noise reduction (NR) level.

[Command]

```
v4l2-ctl -d /dev/video0 --set-ctrl=noise_reduction_level=<NR level>
```

[Option]

<NR level>

0-10 : 0 is the weakest, 10 is the strongest noise reduction level.

[Condition]

Use this function with the following function.

```
v4l2-ctl -d /dev/video0 --set-ctrl=noise_reduction_mode=0
```

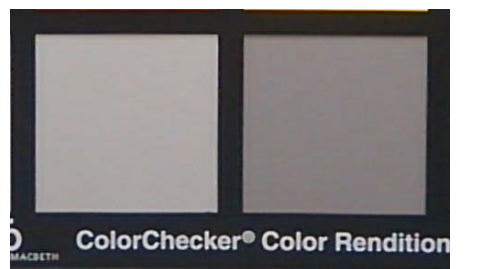

[Example 1] Set noise reduction level to 0.

```
v4l2-ctl -d /dev/video0 --set-ctrl=noise_reduction_mode=0  
v4l2-ctl -d /dev/video0 --set-ctrl=noise_reduction_level=0
```



[Example 2] Set noise reduction level to 10.

```
v4l2-ctl -d /dev/video0 --set-ctrl=noise_reduction_mode=0  
v4l2-ctl -d /dev/video0 --set-ctrl=noise_reduction_level=10
```



2.2.10. Auto Exposure Compensation

[Function]

Compensate the exposure value.

[Command]

```
v4l2-ctl -d /dev/video0 --set-ctrl=autoexposure_bias=<EV>
```

[Option]

<EV>

EV	0	1	2	3	4	5	6
EV compensation	-6/3EV	-5/3EV	-4/3EV	-3/3EV	-2/3EV	-1/3EV	0EV

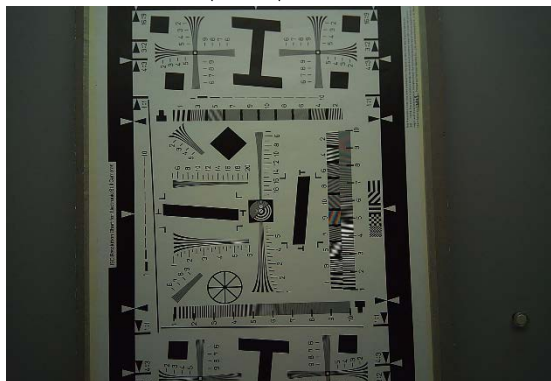
EV	7	8	9	10	11	12
EV compensation	1/3EV	2/3EV	3/3EV	4/3EV	5/3EV	6/3EV

[Condition]

None

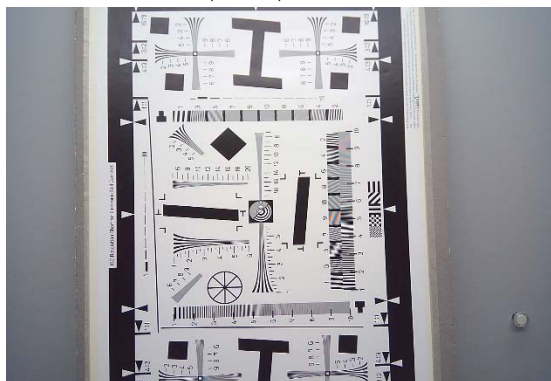
[Example 1] Set EV to -3/3EV.

```
v4l2-ctl -d /dev/video0 --set-ctrl=autoexposure_bias=3
```



[Example 1] Set EV to 3/3EV

```
v4l2-ctl -d /dev/video0 --set-ctrl=autoexposure_bias=9
```



2.2.11. Power Line Frequency (Flicker Cancel Mode) Selection

[Function]

Change the power line frequency for flicker cancel.

[Command]

```
v4l2-ctl -d /dev/video0 --set-ctrl=power_line_frequency=<Flicker cancel>
```

[Option]

<Flicker cancel>

0 : Disable

1 : 50Hz

2 : 60Hz

[Condition]

None

[Example 1] Disable flicker cancel

```
v4l2-ctl -d /dev/video0 --set-ctrl=power_line_frequency=0
```

[Example 2] Cancel 50Hz flicker

```
v4l2-ctl -d /dev/video0 --set-ctrl=power_line_frequency=1
```

[Example 3] Cancel 60Hz flicker

```
v4l2-ctl -d /dev/video0 --set-ctrl=power_line_frequency=2
```

2.2.12. White Balance Mode Selection

[Function]

Change the white balance mode, manual or auto.

[Command]

```
v4l2-ctl -d /dev/video0 --set-ctrl=auto_white_balance_mode=<manual or auto >
```

[Option]

<manual or auto>

0 : Manual White Balance

1 : Auto White Balance

[Condition]

None

[Example 1] Set white balance to manual mode.

```
v4l2-ctl -d /dev/video0 --set-ctrl=auto_white_balance_mode=0
```

[Example 2] Set white balance to auto mode.

```
v4l2-ctl -d /dev/video0 --set-ctrl=auto_white_balance_mode=1
```

2.2.13. White Balance Manual Control

[Function]

Set R and B gain manually.

[Command]

```
v4l2-ctl -d /dev/video0 --set-ctrl=manual_white_balance_red_gain=<red gain>
v4l2-ctl -d /dev/video0 --set-ctrl=manual_white_balance_blue_gain=<blue gain>
```

[Option]

<red gain>, <blue gain>

32-255 : 32 is corresponding to 1.00, 255 is corresponding to 7.96.

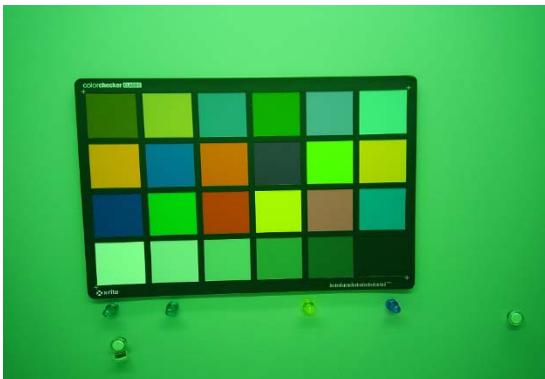
[Condition]

Use this function with the following function.

```
v4l2-ctl -d /dev/video0 --set-ctrl=auto_white_balance_mode=0
```

[Example 1] Set red gain and blue gain to 1.00.

```
v4l2-ctl -d /dev/video0 --set-ctrl=auto_white_balance_mode=0
v4l2-ctl -d /dev/video0 --set-ctrl=manual_white_balance_red_gain=32
v4l2-ctl -d /dev/video0 --set-ctrl=manual_white_balance_blue_gain=32
```



2.2.14. Rotation Selection

[Function]

Rotate the image with 0 degree or 180 degree.

[Command]

```
v4l2-ctl -d /dev/video0 --set-ctrl=flip_mirror_control=<normal  
or rotate 180 degree>
```

[Option]

<0 or 180 degree>

0 : 0 degree (No rotation)

1 : Rotate 180 degree

[Condition]

None

[Example 1] Rotate the image 180 degree.

```
v4l2-ctl -d /dev/video0 --set-ctrl=flip_mirror_control=1
```



2.2.15. Frame Rate Control for Low Light

[Function]

Enable the frame rate control for low light compensation.

[Command]

```
v4l2-ctl -d /dev/video0 --set-ctrl=low_light_compensation=<Enable or Disable>
```

[Option]

<Enable or Disable>

0 : Disable

1 : Enable

[Condition]

None

[Example 1] Disable the frame rate control for low light compensation.

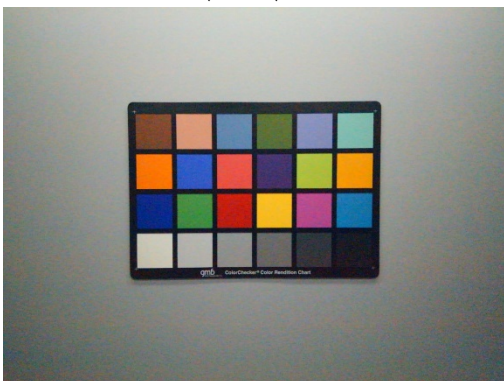
```
v4l2-ctl -d /dev/video0 --set-ctrl=low_light_compensation=0
```



No Low Light Compensation with Fixed Frame Rate

[Example 2] Enable the frame rate control for low light exposure. (※)

```
v4l2-ctl -d /dev/video0 --set-ctrl=low_light_compensation=1
```



Low Light Compensation by Reducing the Frame Rate

※ The light condition is identical to Example 1.

2.2.16. Program THP7312-P Firmware

[Function]

Program the flash ROM with the THP7312-P firmware embedded in the Linux Binary.

[Command]

```
v4l2-ctl -d /dev/video0 --set-ctrl=isp_firmware_update=1
```

[Option]

None

[Condition]

None

[Example 1] Program the flash ROM with the THP7312-P firmware embedded in the Linux Binary.

[Step 1] Copy the latest THP7312-P firmware binary, thscg101_thp7312.bin to the directory, /lib/firmware/thine. Make the directory first if it is the first time to program the firmware binary.

```
sudo mkdir /lib/firmware/thine
```

```
sudo cp ./thscg101_thp7312.bin /lib/firmware/thine/thscg101_thp7312.bin
```

[Step 2] Shutdown and power off the carrier board of Jetson Orin NX.

[Step 3] Change the DIP switch (S1) of THSCJ101 as follows.



[Step 4] Power on the carrier board of Jetson Orin NX and log in.

[Step 5] Execute the following command;

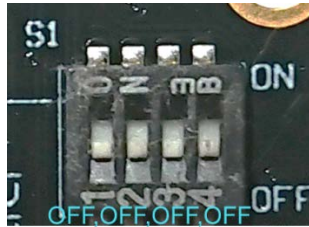
```
v4l2-ctl -d /dev/video0 --set-ctrl=isp_firmware_update=1
```

[Step 6] Wait 35 seconds and enter “dmesg” to check “Flash Memory: THP7312 Firmware update is completed” is shown. The THP7312-P programming succeeded if “THP7312 Firmware update is completed” is displayed in the log. The following log is the example.


```
[ 192.622845] thp7312 10-0061: thp7312_firmware_update is called
[ 192.623535] thp7312 10-0061: thp7312_request_firmware_cb is called
[ 192.623574] thp7312 10-0061: Flash Memory:THP7312 firmware size is 132268
[ 192.624948] thp7312 10-0061: Flash Memory: Manufacturer ID =0xc2 Device ID (ID7-ID0)=0x32
[ 192.625959] thp7312 10-0061: Flash Memory: JEDEC ID =0xc2 0x25 0x32
[ 192.626110] thp7312 10-0061: Flash Memory: Erase Block Start
[ 192.730699] thp7312 10-0061: Flash Memory: Waiting Erase
[ 192.833933] thp7312 10-0061: Flash Memory: Waiting Erase
[ 192.937155] thp7312 10-0061: Flash Memory: Waiting Erase
[ 193.039137] thp7312 10-0061: Flash Memory: Waiting Erase
[ 193.141317] thp7312 10-0061: Flash Memory: Erase Block 0 Complete
[ 193.245945] thp7312 10-0061: Flash Memory: Waiting Erase
[ 193.347931] thp7312 10-0061: Flash Memory: Waiting Erase
[ 193.451143] thp7312 10-0061: Flash Memory: Waiting Erase
[ 193.553321] thp7312 10-0061: Flash Memory: Waiting Erase
[ 193.656225] thp7312 10-0061: Flash Memory: Erase Block 1 Complete
[ 193.761748] thp7312 10-0061: Flash Memory: Waiting Erase
[ 193.864882] thp7312 10-0061: Flash Memory: Waiting Erase
[ 193.967888] thp7312 10-0061: Flash Memory: Waiting Erase
[ 194.071215] thp7312 10-0061: Flash Memory: Waiting Erase
[ 194.173225] thp7312 10-0061: Flash Memory: Erase Block 2 Complete
[ 194.174221] thp7312 10-0061: Flash Memory:Flash Memory is erased.
[ 194.174227] thp7312 10-0061: Flash Memory: firmware download 131072 bytes start
[ 195.258826] thp7312 10-0061: Flash Memory: firmware data downloading
[ 196.343238] thp7312 10-0061: Flash Memory: firmware data downloading
[ 197.428798] thp7312 10-0061: Flash Memory: firmware data downloading
[ 198.514821] thp7312 10-0061: Flash Memory: firmware data downloading
[ 198.514832] thp7312 10-0061: Flash Memory: firmware download 131072 bytes complete
[ 206.590599] thp7312 10-0061: Flash Memory: Program 131072 bytes is completed.
[ 206.590610] thp7312 10-0061: Flash Memory: firmware download 1196 bytes start
[ 206.630956] thp7312 10-0061: Flash Memory: firmware download 1196 bytes complete
[ 214.732347] thp7312 10-0061: Flash Memory: Program 1196 bytes is completed.
[ 216.833422] thp7312 10-0061: Flash Memory: CRC of firmware in Source File = 0x8696e79c(*1)
[ 216.833433] thp7312 10-0061: Flash Memory: CRC of firmware in Flash Memory = 0x8696e79c(*1)
[ 216.833438] thp7312 10-0061: Flash Memory: THP7312 Firmware update is completed
```

(*1) CRC value is varied according to the THP7312-P firmware binary code.

[Step 7] Change the DIP switch (S1) of THSCJ101 as follows.



[Step 8] Reboot the Jetson Orin NX with the following command.

```
sudo reboot
```

[Step 9] Confirm the THP7312-P firmware version from the log.

```
sudo dmesg | grep Firmware
```

```
[ 13.717310] thp7312 10-0061: thp7312_board_setup: Firmware version NN(*2)  
[ 13.735659] thp7312 10-0061: thp7312_board_setup: Firmware subversion NN(*2)
```

(*2) NN is the THP7312-P firmware version which is running in THP7312-P. README.txt file has the version number and subversion number of THP7312-P firmware binary.