

THSCP101

V4L2 Command Manual

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1. Purpose

This document describes how to use the camera command of THSCP101 with Pumpkin i350 EVK powered by MediaTek Genio 350.

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 ! queue max-size-time=0 ! waylandsink sync=false fullscreen=true
```

[Optional]

13M pixel @ 20fps : <width> = 4160, <height> = 3120, <frame rate> = 20

4K2K @ 30fps : <width> = 3840, <height> = 2160, <frame rate> = 30

3M pixel @ 30fps : <width> = 2048, <height> = 1536, <frame rate> = 30

1080p @ 30fps : <width> = 1920, <height> = 1080, <frame rate> = 30

1080p @ 60fps : <width> = 1920, <height> = 1080, <frame rate> = 60

[Condition]

Use this function with the following functions.

```
media-ctl -d /dev/media0 -r
```

```
media-ctl -d /dev/media0 -l "'thp7312 3-0061':0" -> "'15040000.seninf':1 [1]'"
```

```
media-ctl -d /dev/media0 -v "'thp7312 3-0061':0 [fmt:YUYV8_1X16/<width>x<height>@1/<frame rate> field:none]"
```

```
media-ctl -d /dev/media0 -v "'15040000.seninf':4 [fmt:YUYV8_1X16/<width>x<height> field:none]"
```

[Example 1] Stream 13M @ 20fps images.

```
media-ctl -d /dev/media0 -r
```

```
media-ctl -d /dev/media0 -l "'thp7312 3-0061':0" -> "'15040000.seninf':1 [1]'"
```

```
media-ctl -d /dev/media0 -v "'thp7312 3-0061':0 [fmt:YUYV8_1X16/4160x3120@1/20 field:none]"
```

```
media-ctl -d /dev/media0 -v "'15040000.seninf':4 [fmt:YUYV8_1X16/4160x3120 field:none]"
```

```
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 ! waylandsink sync=false fullscreen=true
```

[Example 2] Stream 4K2K @ 30fps images.

```
media-ctl -d /dev/media0 -r
```

```
media-ctl -d /dev/media0 -l "'thp7312 3-0061':0" -> "'15040000.seninf':1 [1]'"
```

```
media-ctl -d /dev/media0 -v "'thp7312 3-0061':0 [fmt:YUYV8_1X16/3840x2160@1/30 field:none]"
```

```
media-ctl -d /dev/media0 -v "'15040000.seninf':4 [fmt:YUYV8_1X16/3840x2160 field:none]"
```

```
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 ! waylandsink sync=false fullscreen=true
```

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

```
media-ctl -d /dev/media0 -r
media-ctl -d /dev/media0 -l "'thp7312 3-0061':0" -> "'15040000.seninf':1 [1]'"
media-ctl -d /dev/media0 -V "'thp7312 3-0061':0 [fmt:YUYV8_1X16/2048x1536@1/30 field:none]"
media-ctl -d /dev/media0 -V "'15040000.seninf':4 [fmt:YUYV8_1X16/2048x1536 field:none]"
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 ! waylandsink sync=false fullscreen=true
```

[Example 4] Stream 1080p @ 30fps images.

```
media-ctl -d /dev/media0 -r
media-ctl -d /dev/media0 -l "'thp7312 3-0061':0" -> "'15040000.seninf':1 [1]'"
media-ctl -d /dev/media0 -V "'thp7312 3-0061':0 [fmt:YUYV8_1X16/1920x1080@1/30 field:none]"
media-ctl -d /dev/media0 -V "'15040000.seninf':4 [fmt:YUYV8_1X16/1920x1080 field:none]"
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 ! waylandsink sync=false fullscreen=true
```

[Example 5] Stream 1080p @ 60fps images.

```
media-ctl -d /dev/media0 -r
media-ctl -d /dev/media0 -l "'thp7312 3-0061':0" -> "'15040000.seninf':1 [1]'"
media-ctl -d /dev/media0 -V "'thp7312 3-0061':0 [fmt:YUYV8_1X16/1920x1080@1/60 field:none]"
media-ctl -d /dev/media0 -V "'15040000.seninf':4 [fmt:YUYV8_1X16/1920x1080 field:none]"
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 ! waylandsink sync=false fullscreen=true
```

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]

13M pixel @ 20fps : <width> = 4160, <height> = 3120, <frame rate> = 20, <file name>= Arbitrary file name

4K2K @ 30fps : <width> = 3840, <height> = 2160, <frame rate> = 30, <file name>= Arbitrary file name

3M pixel @ 30fps : <width> = 2048, <height> = 1536, <frame rate> = 30, <file name>= Arbitrary file name

1080p @ 30fps : <width> = 1920, <height> = 1080, <frame rate> = 30, <file name>= Arbitrary file name

1080p @ 60fps : <width> = 1920, <height> = 1080, <frame rate> = 60, <file name>=Arbitrary file name

[Condition]

Use this function with the following function.

```
media-ctl -d /dev/media0 -r
```

```
media-ctl -d /dev/media0 -l "'thp7312 3-0061':0" -> "'15040000.seninf':1 [1]'"
```

```
media-ctl -d /dev/media0 -v "'thp7312 3-0061':0 [fmt:YUYV8_1X16/<width>x<height>@1/<frame rate> field:none]"
```

```
media-ctl -d /dev/media0 -v "'15040000.seninf':4 [fmt:YUYV8_1X16/<width>x<height> field:none]"
```

[Example 1] Capture 13M image from 13M@20fps streaming.

```
media-ctl -d /dev/media0 -r
```

```
media-ctl -d /dev/media0 -l "'thp7312 3-0061':0" -> "'15040000.seninf':1 [1]'"
```

```
media-ctl -d /dev/media0 -v "'thp7312 3-0061':0 [fmt:YUYV8_1X16/4160x3120@1/20 field:none]"
```

```
media-ctl -d /dev/media0 -v "'15040000.seninf':4 [fmt:YUYV8_1X16/4160x3120 field:none]"
```

```
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=13M.jpeg
```

[Example 1] Capture 4K2K image from 4K@30fps streaming.

```
media-ctl -d /dev/media0 -r
```

```
media-ctl -d /dev/media0 -l "'thp7312 3-0061':0" -> "'15040000.seninf':1 [1]'"
```

```
media-ctl -d /dev/media0 -v "'thp7312 3-0061':0 [fmt:YUYV8_1X16/3840x2160@1/30 field:none]"
```

```
media-ctl -d /dev/media0 -v "'15040000.seninf':4 [fmt:YUYV8_1X16/3840x2160 field:none]"
```

```
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=4K.jpeg
```

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

```
media-ctl -d /dev/media0 -r
media-ctl -d /dev/media0 -l "'thp7312 3-0061':0" -> "'15040000.seninf':1 [1]'"
media-ctl -d /dev/media0 -V "'thp7312 3-0061':0 [fmt:YUYV8_1X16/2048x1536@1/30
field:none]"
media-ctl -d /dev/media0 -V "'15040000.seninf':4 [fmt:YUYV8_1X16/2048x1536
field:none]"
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=3M.jpeg
```

[Example 3] Capture 1080p image from 1080p@30fps streaming.

```
media-ctl -d /dev/media0 -r
media-ctl -d /dev/media0 -l "'thp7312 3-0061':0" -> "'15040000.seninf':1 [1]'"
media-ctl -d /dev/media0 -V "'thp7312 3-0061':0 [fmt:YUYV8_1X16/1920x1080@1/30
field:none]"
media-ctl -d /dev/media0 -V "'15040000.seninf':4 [fmt:YUYV8_1X16/1920x1080
field:none]"
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 4] Capture 1080p image from 1080p@60fps streaming.

```
media-ctl -d /dev/media0 -r
media-ctl -d /dev/media0 -l "'thp7312 3-0061':0" -> "'15040000.seninf':1 [1]'"
media-ctl -d /dev/media0 -V "'thp7312 3-0061':0 [fmt:YUYV8_1X16/1920x1080@1/60
field:none]"
media-ctl -d /dev/media0 -V "'15040000.seninf':4 [fmt:YUYV8_1X16/1920x1080
field:none]"
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
```

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
Read/Write THP7312-P Register	Write and read THP7312-P registers

List up the v4l2-ctl controls supported by THSCG101.

v4l2-ctl -d /dev/v4l-subdev1 --list-ctrls

```

User Controls
  brightness 0x00980900 (int) : min=-10 max=10 step=1 default=0 value=0 flags=slider
  contrast 0x00980901 (int) : min=0 max=20 step=1 default=10 value=10 flags=slider
  saturation 0x00980902 (int) : min=0 max=31 step=1 default=10 value=10 flags=slider
  white_balance_automatic 0x0098090c (bool) : default=1 value=1
  red_balance 0x0098090e (int) : min=32 max=255 step=1 default=64 value=64 flags=slider
  blue_balance 0x0098090f (int) : min=32 max=255 step=1 default=50 value=50 flags=slider
  power_line_frequency 0x00980918 (menu) : min=0 max=2 default=1 value=1 (50 Hz)
  sharpness 0x0098091b (int) : min=0 max=31 step=1 default=8 value=8 flags=slider
  rotate 0x00980922 (int) : min=0 max=180 step=180 default=0 value=0 flags=modify-layout
  low_light_compensation 0x00981a01 (bool) : default=1 value=1
  auto_focus_method 0x00981a02 (int) : min=0 max=2 step=1 default=2 value=2
  noise_reduction_auto 0x00981a03 (bool) : default=1 value=1
  noise_reduction_level 0x00981a04 (int) : min=0 max=10 step=1 default=0 value=0
  thp7312_firmware_version 0x00981a05 (str) : min=0 max=50 step=1 value="THSCG101:THP7312 firmware version = 90.02" flags=read-only, volatile, has-payload
  thp7312_firmware_update 0x00981a06 (bool) : default=0 value=0 flags=volatile, execute-on-write
  thp7312_register_rw_address 0x00981a07 (int) : min=0 max=65535 step=1 default=61440 value=61440 flags=volatile, execute-on-write
  execute_thp7312_register_rw 0x00981a08 (int) : min=0 max=255 step=1 default=0 value=90 flags=volatile, execute-on-write

Camera Controls
  focus_absolute 0x009a090a (int) : min=0 max=18 step=1 default=0 value=0 flags=execute-on-write
  focus_automatic_continuous 0x009a090c (bool) : default=1 value=1
  auto_exposure_bias 0x009a0913 (intmenu) : min=0 max=12 default=6 value=6 (0 0x0)
  auto_focus_start 0x009a091c (button) : value=0 flags=write-only, execute-on-write
    
```


2.2.1. Focus Mode Selection

[Function]

Select focus mode.

[Command]

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=focus_automatic_continuous=<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/v4l-subdev1 --set-ctrl=focus_automatic_continuous=0
```

[Example 2] Continuous AF

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=focus_automatic_continuous=1
```

2.2.2. Auto Focus Method Selection

[Function]

Select the auto focus method, contrast or PDAF hybrid.

[Command]

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=auto_focus_method=<auto
focus method>
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=auto_focus_start=1
```

[Option]

<auto focus method>

0 : Contrast

1 : PDAF hybrid

[Condition]

None

[Example 1] Continuous PDAF Hybrid

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=focus_automatic_continuous=1
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=auto_focus_method=1
```

[Example 2] Continuous Contrast AF

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=focus_automatic_continuous=1
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=auto_focus_method=0
```

[Example 3] One Shot PDAF Hybrid

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=focus_automatic_continuous=0
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=auto_focus_method=1
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=auto_focus_start=1
```

[Example 4] One Shot Contrast AF

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=focus_automatic_continuous=0
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=auto_focus_method=0
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=auto_focus_start=1
```

2.2.3. Focus Position Selection

[Function]

Move the lens to the specified position and stop.

[Command]

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=focus_absolute=<lens position>
```

[Option]

<lens position>

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

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

[Condition]

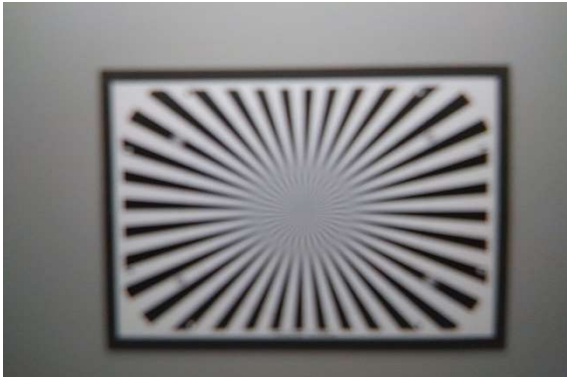
Use this function with the following function.

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=focus_automatic_continuous=0
```

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

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=focus_automatic_continuous=0
```

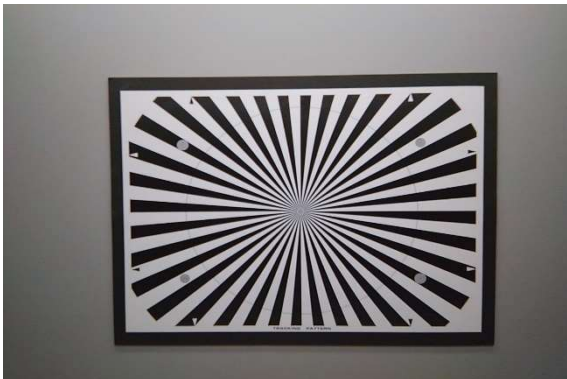
```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=focus_absolute=18
```



Unfocused image

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

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=focus_absolute=8
```



Focused image

2.2.4. Brightness Control

[Function]

Change image brightness.

[Command]

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=brightness=<brightness>
```

[Option]

<brightness>

-10 to 10 : -10 is darkest, 10 is brightest.

[Condition]

None

[Example 1] Set brightness to 7.

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=brightness=7
```



[Example 2] Set brightness to 0.

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=brightness=0
```



2.2.5. Contrast Control

[Function]

Change the contrast.

[Command]

```
v4l2-ctl -d /dev/v4l-subdev1 --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/v4l-subdev1 --set-ctrl=contrast=6
```



[Example 2] Set contrast to 12.

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=contrast=12
```



2.2.6. Saturation Control

[Function]

Change the saturation.

[Command]

```
v4l2-ctl -d /dev/v4l-subdev1 --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/v4l-subdev1 --set-ctrl=saturation=6
```



[Example 2] Set saturation to 23.

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=saturation=23
```



2.2.7. Sharpness Control

[Function]

Change the image sharpness

[Command]

```
v4l2-ctl -d /dev/v4l-subdev1 --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/v4l-subdev1 --set-ctrl=sharpness=0
```



[Example 2] Set sharpness to 31.

```
v4l2-ctl -d /dev/v4l-subdev1 --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/v4l-subdev1 --set-ctrl=noise_reduction_auto=<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/v4l-subdev1 --set-ctrl=noise_reduction_auto=0
```


2.2.9. Noise Reduction Level Control

[Function]

Change the noise reduction (NR) level.

[Command]

```
v4l2-ctl -d /dev/v4l-subdev1 --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/v4l-subdev1 --set-ctrl=noise_reduction_auto=0
```

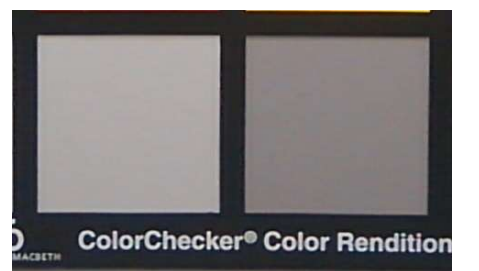
[Example 1] Set noise reduction level to 0.

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=noise_reduction_auto=0  
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=noise_reduction_level=0
```



[Example 2] Set noise reduction level to 10.

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=noise_reduction_auto=0  
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=noise_reduction_level=10
```



2.2.10. Auto Exposure Compensation

[Function]

Compensate the exposure value.

[Command]

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=auto_exposure_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

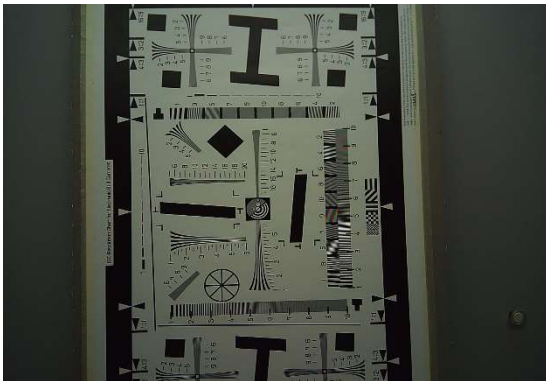
EV	7	8	9	10	11	12
EV compensation	1/3EV	2/3EV	3/3EV	4/3EV	5/3EV	6/3EV

[Condition]

None

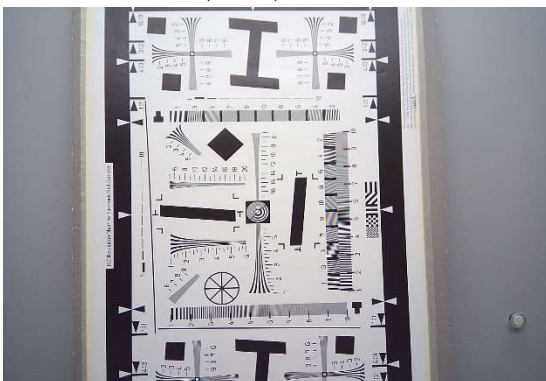
[Example 1] Set EV to -3/3EV.

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=auto_exposure_bias=3
```



[Example 1] Set EV to 3/3EV

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=auto_exposure_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/v4l-subdev1 --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/v4l-subdev1 --set-ctrl=power_line_frequency=0
```

[Example 2] Cancel 50Hz flicker

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=power_line_frequency=1
```

[Example 3] Cancel 60Hz flicker

```
v4l2-ctl -d /dev/v4l-subdev1 --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/v4l-subdev1 --set-ctrl=white_balance_automatic=<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/v4l-subdev1 --set-ctrl=white_balance_automatic=0
```

[Example 2] Set white balance to auto mode.

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=white_balance_automatic=1
```

2.2.13. White Balance Manual Control

[Function]

Set R and B gain manually.

[Command]

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=red_balance=<red gain>
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=blue_balance=<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/v4l-subdev1 --set-ctrl=white_balance_automatic=0
```

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

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=white_balance_automatic=0
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=red_balance=32
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=blue_balance=32
```



2.2.14. Rotation Selection

[Function]

Rotate the image with 0 degree or 180 degree.

[Command]

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=rotate=<0 or 180 degree>
```

[Option]

<0 or 180 degree>

0 : 0 degree (No rotation)

180 : Rotate 180 degree

[Condition]

None

[Example 1] Rotate the image 180 degree.

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=rotate=180
```



2.2.15. Frame Rate Control for Low Light

[Function]

Enable the frame rate control for low light compensation.

[Command]

```
v4l2-ctl -d /dev/v4l-subdev1 --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/v4l-subdev1 --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/v4l-subdev1 --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/v4l-subdev1 --set-ctrl=thp7312_firmware_update=1
```

[Option]

None

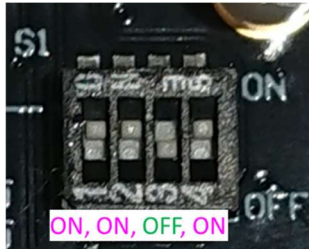
[Condition]

None

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

[Step 1] Shutdown and power off the Pumpkin i350 EVK.

[Step 2] Change the DIP switch (S1) as follows.



[Step 3] Power on Pumpkin i350 EVK and log in as root.

[Step 4] Execute the following command;

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=thp7312_firmware_update=1
```

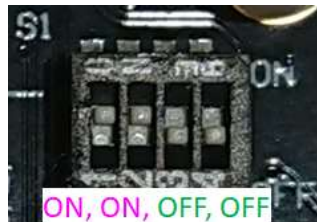
[Step 5] Wait 35 seconds and enter “dmesg” to check “Flash Memory: THP7312 Firmware update is completed” is shown. The THP7312-P programming succeeded if “THP7312 Firmware update is completed” is displayed in the log. The following log is the example.

```
[ 51.791265] thp7312 3-0061: firmware file= thine/thscg101_thp7312.bin
[ 51.793073] thp7312 3-0061: Flash Memory:THP7312 firmware size is 132268
[ 51.797231] thp7312 3-0061: Flash Memory: Manufacturer ID =0xc2 Device ID (ID7-ID0)=0x32
[ 51.800113] thp7312 3-0061: Flash Memory: JEDEC ID =0xc2 0x25 0x32
[ 51.800627] thp7312 3-0061: Flash Memory: Erase Block Start
[ 51.908870] thp7312 3-0061: Flash Memory: Waiting Erase
[ 52.012765] thp7312 3-0061: Flash Memory: Waiting Erase
[ 52.117247] thp7312 3-0061: Flash Memory: Waiting Erase
[ 52.221758] thp7312 3-0061: Flash Memory: Waiting Erase
[ 52.325994] thp7312 3-0061: Flash Memory: Erase Block 0 Complete
[ 52.434397] thp7312 3-0061: Flash Memory: Waiting Erase
[ 52.537637] thp7312 3-0061: Flash Memory: Waiting Erase
[ 52.641562] thp7312 3-0061: Flash Memory: Waiting Erase
[ 52.745963] thp7312 3-0061: Flash Memory: Waiting Erase
[ 52.850043] thp7312 3-0061: Flash Memory: Erase Block 1 Complete
[ 52.958381] thp7312 3-0061: Flash Memory: Waiting Erase
[ 53.062494] thp7312 3-0061: Flash Memory: Waiting Erase
[ 53.166744] thp7312 3-0061: Flash Memory: Waiting Erase
[ 53.270338] thp7312 3-0061: Flash Memory: Waiting Erase
[ 53.374451] thp7312 3-0061: Flash Memory: Waiting Erase
[ 53.478712] thp7312 3-0061: Flash Memory: Erase Block 2 Complete
[ 53.481680] thp7312 3-0061: Flash Memory:Flash Memory is erased.
[ 53.481705] thp7312 3-0061: Flash Memory: firmware download 131072 bytes start
[ 56.512850] thp7312 3-0061: Flash Memory: firmware data downloading
[ 59.544548] thp7312 3-0061: Flash Memory: firmware data downloading
[ 62.576025] thp7312 3-0061: Flash Memory: firmware data downloading
[ 65.607826] thp7312 3-0061: Flash Memory: firmware data downloading
[ 65.607898] thp7312 3-0061: Flash Memory: firmware download 131072 bytes complete
[ 73.710208] thp7312 3-0061: Flash Memory: Program 131072 bytes is completed.
[ 73.710234] thp7312 3-0061: Flash Memory: firmware download 1196 bytes start
[ 73.821927] thp7312 3-0061: Flash Memory: firmware download 1196 bytes complete
[ 81.921979] thp7312 3-0061: Flash Memory: Program 1196 bytes is completed.
[ 84.022320] thp7312 3-0061: Flash Memory: CRC of firmware in Source File = 0x282da762 (*1)
[ 84.022348] thp7312 3-0061: Flash Memory: CRC of firmware in Flash Memory = 0x282da762 (*1)
[ 84.022356] thp7312 3-0061: Flash Memory: THP7312 Firmware update is completed
```

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

[Step 6] Shutdown and power off Pumpkin i350 EVK.

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



[Step 8] Power on Pumpkin i350 EVK.

[Step 9] Confirm the THP7312-P firmware version

```
v4l2-ctl -d /dev/v4l-subdev1 --get-ctrl=thp7312_firmware_version
```

```
thp7312_firmware_version: 'THSCG101:THP7312 firmware version = xx.xx' (*2)
```

(*2) xx.xx is the THP7312-P firmware version which is running in THP7312-P.

2.2.17. Read/Write THP7312-P Register

[Function]

Write a value to specified register address of THP7312-P.

Read a byte from the specified register address of THP7312-P.

[Command]

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=thp7312_register_rw_address=<Address>
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=execute_thp7312_register_rw=<Write value>
v4l2-ctl -d /dev/v4l-subdev1 --get-ctrl=execute_thp7312_register_rw
```

[Option]

<Address>

0-65535 (Decimal)

<Write Value>

0-255 (Decimal)

[Condition]

None

[Example 1] Read the firmware version from two registers, 0xF000 (61440d) and 0xF005 (61445d).

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=thp7312_register_rw_address=61440
v4l2-ctl -d /dev/v4l-subdev1 --get-ctrl=execute_thp7312_register_rw
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=thp7312_register_rw_address=61445
v4l2-ctl -d /dev/v4l-subdev1 --get-ctrl=execute_thp7312_register_rw
```

[Example 2] Write 0 to 0xF008 (61448d) to stop the image streaming.

```
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=thp7312_register_rw_address=61448
v4l2-ctl -d /dev/v4l-subdev1 --set-ctrl=execute_thp7312_register_rw=0
```