



MEDIATEK

CONFIDENTIAL B

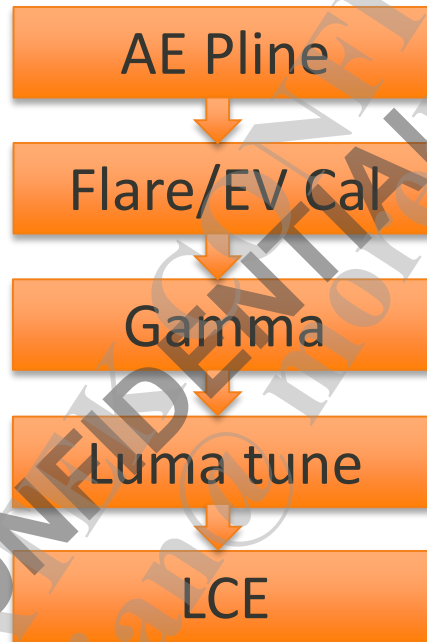
AE - Pline table generation

AE - Pline table greeneration

- AE Pline
 - Device Profile
 - Table Mapping
 - Generate code
 - Debug
- Pline align target phone

Read Before Reading

- Before AE calibration, make sure **OB** and **Shading** calibration done first.
- AE calibration must follow the blow steps:



Device Profile

➤ Device Profile Introduction (MTK provide)

CDVT Sensor Test | CDVT Sensor Calibration | Sensor Register | **Device Profile** | Shading

Control: Import | NVRAM Control: Apply | Save

Lens Profile

String	Value
LensPartNum	AD5823AF
u4LensFno	20

Sensor Profile

String	Value
SensorPartNum	S5K3M2MIPI
u4OBLevel	64
u4MinGain	1160
u4MaxGain	10240
u4MinISOGain	108
u4GainStepUnitInTotalRange	128
u4PreviewExposureLineUnit	10437
u4PreviewMaxFrameRate	30
u4VideoExposureLineUnit	10437
u4VideoMaxFrameRate	30
u4VideoToPreviewSensitivityRatio	1024
u4CaptureExposureLineUnit	10437
u4CaptureMaxFrameRate	30
u4CaptureToPreviewSensitivityRatio	1024
u4Video1ExposureLineUnit	10437
u4Video1MaxFrameRate	120
u4Video1ToPreviewSensitivityRatio	1024
u4Video2ExposureLineUnit	10437

Device Profile

➤ Device Profile Introduction (MTK provide)

- u4OBLevel : OB value (useless)
- u4MinGain : Minimum saturation gain
- u4MaxGain : Sensor support maximum gain
- u4MiniISOGain : ISO value when sensor gain is 1024
- u4GainStepUnitInTotalRange : Sensor gain step based on 1024 (if sensor gain step is 8, $x=1024/8=128$)
- u4PreviewExposureLineUnit : Preview line unit in us
- u4PreviewMaxFrameRate : Preview max frame rate
- u4VideoExposureLineUnit : Video line unit in us
- u4VideoMaxFrameRate : Video max frame rate
- u4VideoToPreviewSensitivityRatio : Video / Preview sensitivity ratio
- u4CaptureExposureLineUnit : Capture line unit in us
- u4CaptureMaxFrameRate : Capture max frame rate
- u4CaptureToPreviewSensitivityRatio : Capture / Preview sensitivity ratio
- Fno : F number*10, ex: f2.2, u2LensFno=22
- Gain Step : Minimum step unit of sensor gain
- FixSensorGain : If the sensor gain is nonlinear, use fix sensor gain table.

Table Mapping

➤ AE Pline Table main page

- a) Mode Menu : List of all sensor and selected for tuning.
- b) AE Table : Current AE scene mapping table.
- c) AE Scene : List of all AE scene with selected sensor mode.
- d) Table Detail : For each table detail tuning.
- e) Import from P-line Info : Import Pline table from csv file.
- f) Export to P-line Info : Export current Pline table to csv file.

NVRAM Control

Read Apply Save

Mapping Table **Table Detail** d

Tuning Control

☐ Skip preview flicker

☐ Skip common multiple flicker

☐ Skip odd exp line

Import **Export** e f

AE Mapping Table a

Mode : Preview

AE Scene c	AE Table
AE_SCENE_AUTO	AETABLE_PREVIEW_AUTO b
AE_SCENE_NIGHT	AETABLE_PREVIEW_AUTO
AE_SCENE_ACTION	AETABLE_PREVIEW_AUTO
AE_SCENE_BEACH	AETABLE_PREVIEW_AUTO
AE_SCENE_CANDLELIGHT	AETABLE_PREVIEW_AUTO
AE_SCENE_FIREWORKS	AETABLE_PREVIEW_AUTO

Table Mapping

Update Scene mapping

- Select sensor mode you want to update.
- Click combo box which is mapping to a scene you want to change. Then select the table name.

AE Mapping Table

1.

a

Mode : Capture

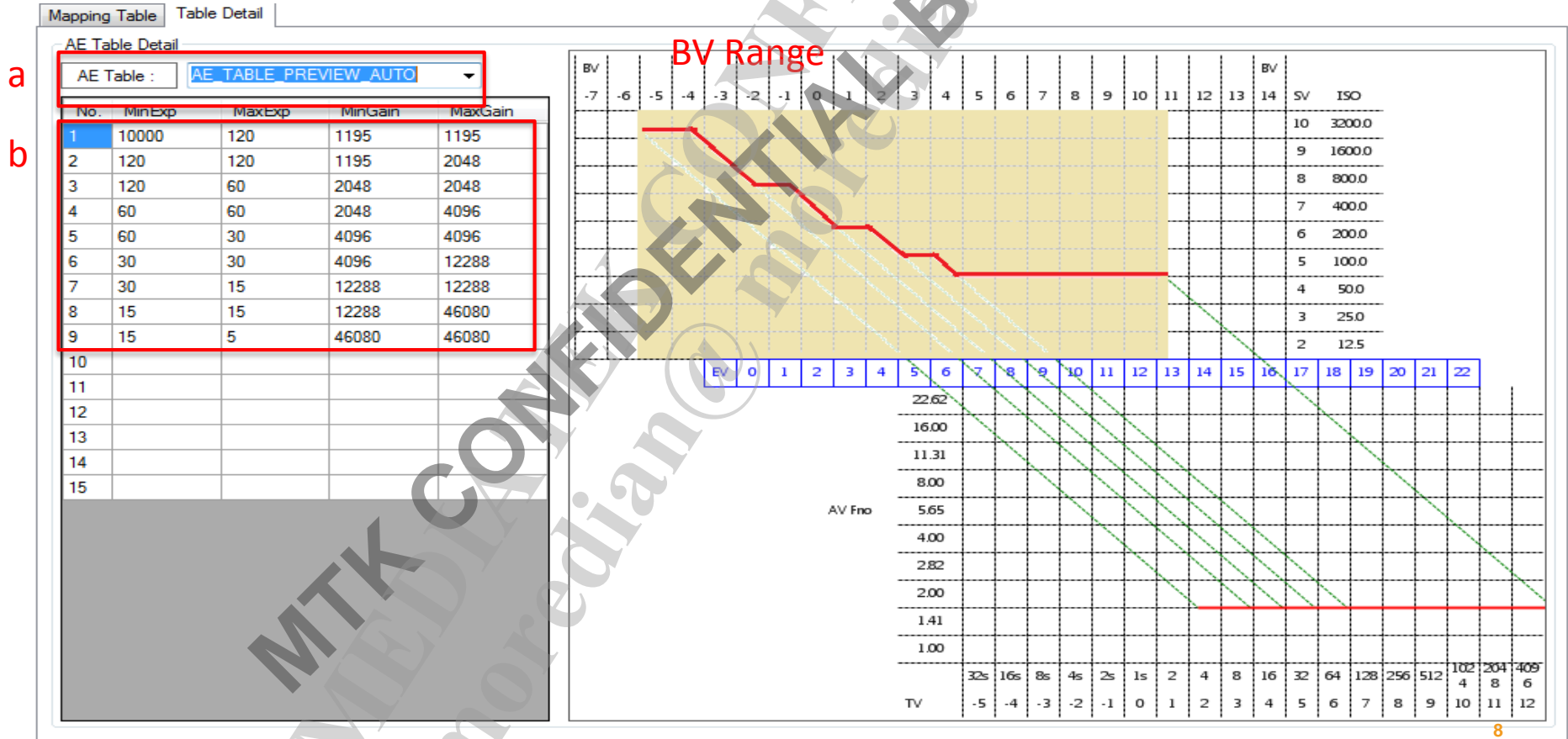
b

AE Scene	AE Table
AE_SCENE_AUTO	AE_TABLE_CAPTURE_AUTO
AE_SCENE_NIGHT	AE_TABLE_CAPTURE_AUTO
AE_SCENE_ACTION	AE_TABLE_VIDEO_AUTO
AE_SCENE_BEACH	AE_TABLE_VIDEO1_AUTO
AE_SCENE_CANDLELIGHT	AE_TABLE_VIDEO2_AUTO
AE_SCENE_FIREWORKS	AE_TABLE_CUSTOM1_AUTO
AE_SCENE_LANDSCAPE	AE_TABLE_CUSTOM2_AUTO
AE_SCENE_PORTRAIT	AE_TABLE_CUSTOM3_AUTO
AE_SCENE_NIGHT_PORTRAIT	AE_TABLE_CUSTOM4_AUTO
AE_SCENE_PARTY	AE_TABLE_CUSTOM5_AUTO
AE_SCENE_SNOW	AE_TABLE_VIDEO_NIGHT
AE_SCENE_SPORTS	AE_TABLE_CAPTURE_ISO50
AE_SCENE_STEADYPHOTO	AE_TABLE_CAPTURE_ISO100
AE_SCENE_SUNSET	AE_TABLE_CAPTURE_ISO200
AE_SCENE_THEATRE	AE_TABLE_CAPTURE_ISO400
AE_SCENE_ISO_ANTI_SHAKE	AE_TABLE_CAPTURE_ISO800
AE_SCENE_ISO100	AE_TABLE_CAPTURE_ISO1600
AE_SCENE_ISO200	AE_TABLE_CAPTURE_ISO3200
AE_SCENE_ISO400	AE_TABLE_STROBE
	AE_TABLE_SCENE_INDEX1
	AE_TABLE_SCENE_INDEX2
	AE_TABLE_SCENE_INDEX3
	AE_TABLE_SCENE_INDEX4
	AE_TABLE_SCENE_INDEX5
	AE_TABLE_SCENE_INDEX6
	AE_TABLE_SCENE_INDEX7
	AE_TABLE_SCENE_INDEX8
	AE_TABLE_SCENE_INDEX9
	AE_TABLE_SCENE_INDEX10
	AE_TABLE_SCENE_INDEX11
	AE_TABLE_SCENE_INDEX12

2.

Table Mapping

- Update Table detail
 - a) Select a table from AE Table. Then right side will show the Pline chart automatically.
 - b) Modify the table exposure information and Pline chart also updated after change value.



Generate Code

➤ Save nvram and generate Pline

- Apply and save.
- Select Action/Generate Code.
- Load save path
- Select Pline, Generate

NVRAM Control

Read Apply Save

Action Page Window

Connect
Disconnect
Generate Code
Dump NVRAM
Refresh NVRAM
Exit

Sensor Calibration Sensor Register

Save

Mail

Preview AUTO

No.	MinExp	MaxExp	MinGain	MaxGain
1	10000	30	1195	1195
2	30	30	1195	12288
3	30	24	12288	12288
4	24	24	12288	46080
5	24	15	46080	46080
6				

NVRAM generate code

File Info

Lens : DW9800AF Sensor : S5K2P7MIPI

Path : C:\

Load

Code Info

☐ Shading ☐ Lens ☒ Pline ☐ 3A ☐ ISP ☐ Flash

Generate Close

Generate Code

➤ Parameter file

- /vendor/mediatek/proprietary/custom/[Platform]/hal/imgsensor/ver1/xxx_mipi_raw/camera_AE_PLineTable_xxxmipiraw.h

```
#ifndef _CAMERA_AE_PLINETALE_IMX386MIPIRAW_H
#define _CAMERA_AE_PLINETALE_IMX386MIPIRAW_H

#include <custom/aaa/AEPlinetable.h>

static strEvPLine sPreviewPLineTable_60Hz =
{
    {93,1088,1032, 0, 0, 0}, //TV = 13.39(5 lines) AV=2.00 SV=5.10 BV=10.29
    {93,1152,1032, 0, 0, 0}, //TV = 13.39(5 lines) AV=2.00 SV=5.18 BV=10.21
    {111,1056,1024, 0, 0, 0}, //TV = 13.14(6 lines) AV=2.00 SV=5.04 BV=10.09
    {111,1120,1032, 0, 0, 0}, //TV = 13.14(6 lines) AV=2.00 SV=5.14 BV=10.00
    {129,1024,1040, 0, 0, 0}, //TV = 12.92(7 lines) AV=2.00 SV=5.02 BV=9.90
    {129,1120,1032, 0, 0, 0}, //TV = 12.92(7 lines) AV=2.00 SV=5.14 BV=9.78
    {148,1056,1024, 0, 0, 0}, //TV = 12.72(8 lines) AV=2.00 SV=5.04 BV=9.68
    {166,1024,1024, 0, 0, 0}, //TV = 12.56(9 lines) AV=2.00 SV=5.00 BV=9.56
    {166,1056,1024, 0, 0, 0}, //TV = 12.56(9 lines) AV=2.00 SV=5.04 BV=9.51
    {185,1024,1032, 0, 0, 0}, //TV = 12.40(10 lines) AV=2.00 SV=5.01 BV=9.39
    {185,1088,1032, 0, 0, 0}, //TV = 12.40(10 lines) AV=2.00 SV=5.10 BV=9.30
    {203,1056,1032, 0, 0, 0}, //TV = 12.27(11 lines) AV=2.00 SV=5.06 BV=9.21
    {221,1040,1032, 0, 0, 0}, //TV = 12.14(12 lines) AV=2.00 SV=5.03 BV=9.11
    {240,1024,1040, 0, 0, 0}, //TV = 12.02(13 lines) AV=2.00 SV=5.02 BV=9.00
    {258,1024,1032, 0, 0, 0}, //TV = 11.92(14 lines) AV=2.00 SV=5.01 BV=8.91
    {277,1024,1032, 0, 0, 0}, //TV = 11.82(15 lines) AV=2.00 SV=5.01 BV=8.81
    {295,1024,1040, 0, 0, 0}, //TV = 11.73(16 lines) AV=2.00 SV=5.02 BV=8.70
}
```

Debug

Test Setup:

Low light scene.

Test Procedure:

Step1.

Open AE log: adb shell setprop debug.ae.enable 9

Enter preview mode.

Step2.

Switch to video preview or recording, capture.

Step3.

Confirm max shutter and gain fulfill demand.

Step4.

If the shutter/gain not satisfy requirement, please send mtklog for MTK.

How to align pline with target phone ?

❖ target phone is MTK platform phone

Ask customer provide pline or NVRAM, then sync with target phone

Eg : get target phone pline setting such as:

```
AETABLE_SCENE_INDEX20  
0,0  
1,10000,30,1136,1136  
2,30,30,1136,4096  
3,30,25,4096,4096  
4,25,25,4096,12288  
5,25,20,12288,12288  
6,20,20,12288,16384  
7,20,17,16384,16384  
8,17,17,16384,32768  
9,17,10,32768,32768  
AETABLE_END
```

Fine tune pline by CCT, then merge in NVRAM

❖ target phone is other platform phone(ex:QC)

- If Customer can provide pline segments of target phone,
Sync pline directly
- If not , Do step by step as below shows

Pline sync

- **Goal**

- Sync exposure setting as Target phone

- **Scene**

- Gray wall with High or Mid color temperature light source
- 24 color checker put in the center
- 1 lux to 1000 lux

1, 3, 5, 7, 10, 15, 20, 30, 40, 50, 60, 70, 80, 90, 100, 150, 200, 250, 300, 350, 400, 450, 500, 600, 700, 800, 900, 1000



AE_TuningAsistance

- **How to get target phone pline segments**

- Take images under each luminance and then make a list of exposure setting and Y mean.
- Plan exposure setting of each luminance to sync Pline
- Discuss with customer and verify
 - Pline might be not all the same as target phone due to different sensitivity, Fn, ISO...

Pline sync

- How to fine tune in detail
- Sync exposure setting
 - List exposure
 - Analysis shutter/ISO
 - Classify into exposure/ISO segments
 - Plan Pline segments to fit target phone exposure/ISO segments

- Discuss with customer and verify
 - It might not fit 100% as target phone due to different sensitivity, Fn, ISO...
 - Re-take images of tuning phone to verify

Note :
If ISO is real , we can get shutter & iso segments directly

If iso refined, we should sync pline by ratio relations of refine iso, such as excel shows

Target phone	A7		
Fn	2		
Lux	Shutter	ISO	Y mean
1	1/15	800	5.62
3	1/15	800	15.3
5	1/15	800	31.16
7	1/15	800	45.09
10	1/15	800	60.35
15	1/15	800	78.57
20	1/15	800	97.69
30	1/15	800	121.66
40	1/15	640	125.94
50	1/15	500	125.27
60	1/15	400	124.37
70	1/15	400	127.29
80	1/15	320	127.74
90	1/15	320	128.74
100	1/15	250	129.46
150	1/15	200	135.46
200	1/15	160	136.97
250	1/20	160	137.52
300	1/24	160	138.66
350	1/24	160	139.06
400	1/30	160	139.16
450	1/30	125	137.7
500	1/30	125	138.15
600	1/30	100	138.3
700	1/40	125	138.8
800	1/40	100	139.71
900	1/40	100	137.51
1000	1/40	80	137.99

Max BV range

Turning point 3

Turning point 2

Turning point 1

THANKS