

**MEDIATEK**

CONFIDENTIAL B

# P40 CCM New Flexibility & Usage



# Outline

- New Feature
- NVRAM Setting
- Debug info

# New Features of P40 SCCM

- LV interpolation (6 LV partitions)
- Increased light sources support (10 CT partitions)

# Steps for Calibration

## For normal light condition

1. Collect processed raw in lab scene for different CT
2. Calibrate GAMMA
3. Set **normal saturation target\*** for lab pass criterion
4. Calibrate CCM and fill in NVRAM data

\* Saturation target: (High CT) D65/CWF/TL84 = 100~110  
(Low CT) A/Hor = 90~100

# Steps for Calibration

## For low light condition

1. Dimming the light condition to the target value by using ND filter (ND16, ND32...) or controlling by lighting devices
2. Collect processed raw in lab scene for different CT
3. **Set preferred saturation target** (lower than normal)
4. Calibrate CCM and fill in NVRAM data

# Calibration

Normal LV in the lab environment is around **80~**

CT\_00 (Horizon)



CT\_01 (A)



CT\_02 (TL84)



CT\_03 (CWF)



CT\_04 (D65)





# Calibration

Reduced LV in the lab environment is around **20~**

CT\_00 (Horizon)



CT\_01 (A)



CT\_02 (TL84)



CT\_03 (CWF)



CT\_04 (D65)



# ISP NVRAM COLOR TABLE STRUCTURE

Ex: Tuning file : xxx\_Scene\_Capture\_CCM.cpp

Number of calibrated light sources

.CCM\_CT\_valid\_NUM = 5,

Weights for temporal frames

.CCM\_Coef = {1, 2, 2}, //{ present frame, previous 1 frame, previous 2 frame }



# ISP NVRAM CCM STRUCTURE

- Support 10 light sources or environment

.CCM\_Reg =

```
{
    { .set = { //CT_00
        0x1FA8024E, 0x0000000A, 0x028D1F56, 0x0000001D, 0x1E4A0000, 0x000003B6
    } },
    { .set = { //CT_01
        0x1FA8024E, 0x0000000A, 0x028D1F56, 0x0000001D, 0x1E4A0000, 0x000003B6
    } },
    { .set = { //CT_02
        0x1EE20343, 0x00001FDB, 0x02BF1F95, 0x00001FAC, 0x1EAF002D, 0x00000324
    } },
    { .set = { //CT_03
        0x1E3F03A2, 0x0000001F, 0x02801F78, 0x00000008, 0x1E750035, 0x00000356
    } },
    { .set = { //CT_04
        0x1E950364, 0x00000007, 0x02701FE7, 0x00001FA9, 0x1DFE0061, 0x000003A1
    } },
    { .set = { //CT_05
        0x00000000, 0x00000000, 0x00000000, 0x00000000, 0x00000000, 0x00000000
    } },
    { .set = { //CT_06
        0x00000000, 0x00000000, 0x00000000, 0x00000000, 0x00000000, 0x00000000
    } },
    { .set = { //CT_07
        0x00000000, 0x00000000, 0x00000000, 0x00000000, 0x00000000, 0x00000000
    } },
    { .set = { //CT_08
        0x00000000, 0x00000000, 0x00000000, 0x00000000, 0x00000000, 0x00000000
    } },
    { .set = { //CT_09
        0x00000000, 0x00000000, 0x00000000, 0x00000000, 0x00000000, 0x00000000
    } }
}
```

.AWBGain =

```
{
    { //CT_00
        521, // i4R
        512, // i4G
        1930 // i4B
    },
    { //CT_01
        673, // i4R
        512, // i4G
        1493 // i4B
    },
    .
    .
    .
    .
    .
    .
    { //CT_08
        512, // i4R
        512, // i4G
        512 // i4B
    },
    { //CT_09
        512, // i4R
        512, // i4G
        512 // i4B
    }
}
```

# LV partition setting

Ex: Tuning file : camera\_ISP\_param\_xxxmipiraw.h.cpp

```
.Lv_Env = { .u2Length = 6,  
            .IDX_Partition = {-30, -10, 10, 50, 100, 120}
```

u2Length is fixed, but the points of LV partition are programmable

# Debug info

**ADB command :**

For Smooth ccm debug info. :

```
adb shell setprop debug.smooth_ccm.enable 1
```

# Debug info

```
adb shell setprop debug.smooth_ccm.enable 1
```

## Information parsing from CCM NVRAM

```
01-01 00:08:46.528 D/ispfeature( 3163): Real LV = 22
01-01 00:08:46.528 D/ispfeature( 3163): Upper LV = 50
01-01 00:08:46.528 D/ispfeature( 3163): Lower LV = 10
01-01 00:08:46.528 D/ispfeature( 3163): Number of Upper CT = 5
01-01 00:08:46.528 D/ispfeature( 3163): Number of Lower CT = 5
01-01 00:08:46.528 D/ispfeature( 3163): Coef1, Coef2, Coef3 = 1, 2, 2
01-01 00:08:46.528 D/ispfeature( 3163): LV_[50]_CT0_rCCM_Nvram = (590, -88, 10, -170, 653, 29, 0, -438, 950)
01-01 00:08:46.528 D/ispfeature( 3163): LV_[50]_CT1_rCCM_Nvram = (590, -88, 10, -170, 653, 29, 0, -438, 950)
01-01 00:08:46.528 D/ispfeature( 3163): LV_[50]_CT2_rCCM_Nvram = (835, -286, -37, -107, 703, -84, 45, -337, 804)
.....
.....

01-01 00:08:46.528 D/ispfeature( 3163): LV_[10]_CT0_rCCM_Nvram = (590, -88, 10, -170, 653, 29, 0, -438, 950)
01-01 00:08:46.528 D/ispfeature( 3163): LV_[10]_CT1_rCCM_Nvram = (590, -88, 10, -170, 653, 29, 0, -438, 950)
01-01 00:08:46.528 D/ispfeature( 3163): LV_[10]_CT2_rCCM_Nvram = (835, -286, -37, -107, 703, -84, 45, -337, 804)
.....
.....
.....
```

# Debug info

```
adb shell setprop debug.smooth_ccm.enable 1
```

## Intermediate results

01-01 00:08:35.005 D/ispfeature( 589): Initial Blending Ratio between CT0/CT2 = (0.578000)  
01-01 00:08:35.005 D/ispfeature( 589): Advanced Blending Ratio with estimated CT1 = (0.035804)  
01-01 00:08:35.005 D/ispfeature( 589): CCM interpolation results for set 0 (0:upper, 1:lower) = (688, -168, -8, -143, 671, -16, 17, -396, 891) // UpperLV set CCM result  
01-01 00:08:35.005 D/ispfeature( 589): Initial Blending Ratio between CT0/CT2 = (0.578000)  
01-01 00:08:35.005 D/ispfeature( 589): Advanced Blending Ratio with estimated CT1 = (0.035804)  
01-01 00:08:35.005 D/ispfeature( 589): CCM interpolation results for set 1 (0:upper, 1:lower) = (512, 0, 0, 0, 512, 0, 0, 0, 512) // LowerLV set CCM result  
01-01 00:08:35.005 D/ispfeature( 589): LowerLV CCM blending ratio = (0.707317)  
01-01 00:08:35.005 D/ispfeature( 589): Temporal CCM 0 = (581, -67, -2, -58, 573, -3, 4, -166, 674)  
01-01 00:08:35.005 D/ispfeature( 589): Temporal CCM 1 = (584, -70, -2, -61, 576, -3, 5, -173, 680)  
01-01 00:08:35.005 D/ispfeature( 589): Final CCM\_Output = (578, -64, -2, -55, 570, -3, 4, -158, 666) //Final CCM blending result

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*everyday genius*