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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



Steps for Calibration

For low light condition

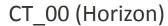
- 1. Dimming the light condition to the target value by using ND filter (ND16, ND32...) or controlling by lighting devices
- 2. Collect processed raw in lab scene for different CT
- 3. Set preferred saturation target (lower than normal)
- 4. Calibrate CCM and fill in NVRAM data





Calibration

Normal LV in the lab environment is around 80~



CT_02 (TL84)







CT_03 (CWF)



CT_04 (D65)

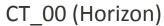


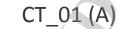




Calibration

Reduced LV in the lab environment is around 20~





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, 0x000000356
  \{.set=\{//CT\ 04\}\}
   0x1E950364, 0x00000007, 0x02701FE7, 0x000001FA9, 0x1DFE0061, 0x000003A1
  }},
  {.set={//CT 05
   {.set={//CT 06
   }},
  {.set={//CT 07
   {.set={//CT 08
   }},
  {.set={//CT 09
```

```
{//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
```

.AWBGain =

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LV partition setting

Ex: Tuning file: camera_ISP_param_xxxmipiraw.h.cpp

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



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Debug info

adb shell setprop debug.smooth_ccm.enable 1

Information parsing from CCM NVRAM

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 CTO/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 CTO/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) // 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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