高通多媒体技术期刊　20151104

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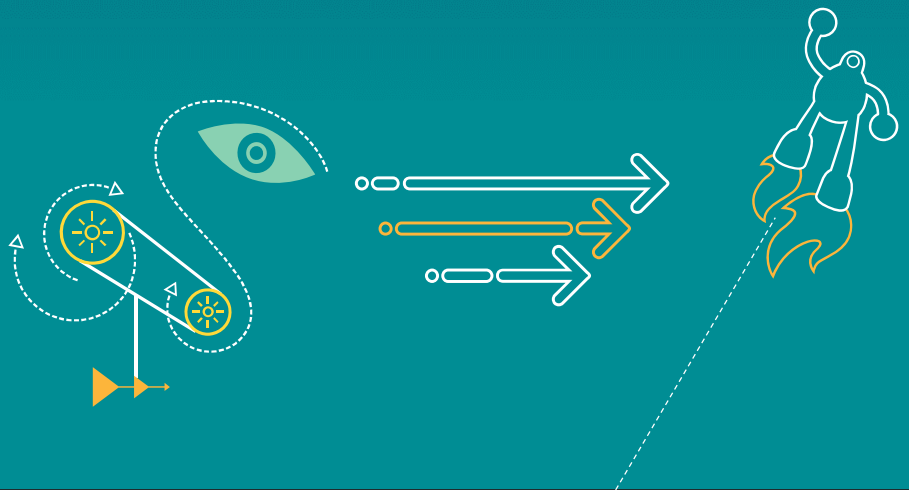

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Revision History

Revision	Date	Description
A	Nov 2015	Initial release

Note: There is no Rev. I, O, Q, S, X, or Z per Mil. standards.

内容

- Display
  - 8996 LCD panel bring-up tips
- Camera
  - PDAF3 Verification

Display

8996 LCD panel bring-up tips

- **80-NU323-31_B_MSM8996_Display_Bringup_Guide**
  kernel\Documentation\devicetree\bindings\fb\mdss-dsi-panel
  kernel\arch\arm\boot\dts\qcom\msm8996-mtp.dtsi
  kernel\arch\arm\boot\dts\qcom\msm8996-cdp.dtsi

  建议在进行LCD panel bring-up之前，认真阅读80-NU323-31文档。如果无法下载该文档，请联系高通技术接口人(TAM)。此文档是高通display技术支持团队对8996 LCD panel bring-up常见问题的最新总结，包含panel bring-up的step-by-step和how to的各种详细介绍。

  建议在拿到高通的SW release baseline的每一次升级之后，认真阅读**kernel\Documentation\devicetree\bindings\fb**目录下的全部txt文档。由于此目录与代码完全同步，可以了解最新的display driver的变化。其中mdss-dsi-panel包含了全部panel setting的介绍—每一个panel dtsi entry item的含义和使用方法。

  建议认真阅读高通参考设计的board dtsi file。MTP和CDP是高通的两种参考电路板，一般OEM较多使用MTP做为参考。MTP上如何load LCD panel是最可靠的参考案例。

8996 LCD panel bring-up tips

Kernel\arch\arm\boot\dts\qcom\msm8996-mtp.dtsi

kernel\arch\arm\boot\dts\qcom\msm8996-cdp.dtsi

从代码中可以看出，以上两个参考device都是在使用 双dsi的 2K video mode Sharp panel。除了默认的panel之外，高通的display SW 团队，还验证了其它类型 的 LCD panel。这些LCD panel dtsi file也可以做为 bring-up 参考。

```
&mdss_dsi0 {
        qcom,dsi-pref-prim-pan = <&dsi_dual_sharp_video>;
        pinctrl-names = "mdss_default", "mdss_sleep";
        pinctrl-0 = <&mdss_dsi_active &mdss_te_active>;
        pinctrl-1 = <&mdss_dsi_suspend &mdss_te_suspend>;
        qcom,platform-te-gpio = <&tlmm 10 0>;
        qcom,platform-reset-gpio = <&tlmm 8 0>;
        qcom,platform-bklight-en-gpio = <&pm8994_gpios 14 0>;
};
&mdss_dsi1 {
        qcom,dsi-pref-prim-pan = <&dsi_dual_sharp_video>;
        pinctrl-names = "mdss_default", "mdss_sleep";
        pinctrl-0 = <&mdss_dsi_active &mdss_te_active>;
        pinctrl-1 = <&mdss_dsi_suspend &mdss_te_suspend>;
        qcom,platform-te-gpio = <&tlmm 10 0>;
        qcom,platform-reset-gpio = <&tlmm 8 0>;
        qcom,platform-bklight-en-gpio = <&pm8994_gpios 14 0>;
};
```

8996 LCD panel bring-up tips

```
&dsi_dual_nt35597_video {
		qcom,mdss-dsi-bl-pmic-control-type = "bl_ctrl_wled";
		qcom,mdss-dsi-bl-min-level = <1>;
		qcom,mdss-dsi-bl-max-level = <4095>;
		qcom,cont-splash-enabled;
		qcom,panel-supply-entries = <&dsi_panel_pwr_supply>;
};

&dsi_dual_nt35597_cmd {
		qcom,mdss-dsi-bl-pmic-control-type = "bl_ctrl_wled";
		qcom,mdss-dsi-bl-min-level = <1>;
		qcom,mdss-dsi-bl-max-level = <4095>;
		qcom,cont-splash-enabled;
		qcom,panel-supply-entries = <&dsi_panel_pwr_supply>;
		qcom,partial-update-enabled;
		qcom,panel-roi-alignment = <720 128 720 64 720 64>;
};
```

8996 LCD panel bring-up tips

```
&dsi_nt35597_dsc_video {
        qcom,mdss-dsi-bl-pmic-control-type = "bl_ctrl_wled";
        qcom,mdss-dsi-bl-min-level = <1>;
        qcom,mdss-dsi-bl-max-level = <4095>;
        qcom,cont-splash-enabled;
        qcom,panel-supply-entries = <&dsi_panel_pwr_supply>;
};

&dsi_nt35597_dsc_cmd {
        qcom,mdss-dsi-bl-pmic-control-type = "bl_ctrl_wled";
        qcom,mdss-dsi-bl-min-level = <1>;
        qcom,mdss-dsi-bl-max-level = <4095>;
        qcom,cont-splash-enabled;
        qcom,panel-supply-entries = <&dsi_panel_pwr_supply>;
};
```

8996 LCD panel bring-up tips

```
&dsi_dual_jdi_video {
                pwms = <&pmi8994_pwm_4 0 0>;
                pwm-names = "backlight";
                qcom,mdss-dsi-bl-pmic-control-type = "bl_ctrl_pwm";
                qcom,mdss-dsi-bl-pwm-pmi;
                qcom,mdss-dsi-bl-pmic-pwm-frequency = <100>;
                qcom,mdss-dsi-bl-min-level = <1>;
                qcom,mdss-dsi-bl-max-level = <4095>;
                qcom,5v-boost-gpio = <&pmi8994_gpios 8 0>;
                qcom,cont-splash-enabled;
                qcom,panel-supply-entries = <&dsi_panel_pwr_supply>;
};
&dsi_dual_jdi_cmd {
                pwms = <&pmi8994_pwm_4 0 0>;
                pwm-names = "backlight";
                qcom,mdss-dsi-bl-pmic-control-type = "bl_ctrl_pwm";
                qcom,mdss-dsi-bl-pwm-pmi;
                qcom,mdss-dsi-bl-pmic-pwm-frequency = <100>;
                qcom,mdss-dsi-bl-min-level = <1>;
                qcom,mdss-dsi-bl-max-level = <4095>;
                qcom,5v-boost-gpio = <&pmi8994_gpios 8 0>;
                qcom,cont-splash-enabled;
                qcom,panel-supply-entries = <&dsi_panel_pwr_supply>;
                qcom,partial-update-enabled;
                qcom,panel-roi-alignment = <4 4 2 2 20 20>;
```

8996 LCD panel bring-up tips

```
&dsi_dual_jdi_4k_nofbc_video {
                pwms = <&pmi8994_pwm_4 0 0>;
                pwm-names = "backlight";
                qcom,mdss-dsi-bl-pmic-control-type = "bl_ctrl_pwm";
                qcom,mdss-dsi-bl-pwm-pmi;
                qcom,mdss-dsi-bl-pmic-pwm-frequency = <100>;
                qcom,mdss-dsi-bl-min-level = <1>;
                qcom,mdss-dsi-bl-max-level = <4095>;
                qcom,cont-splash-enabled;
                qcom,panel-supply-entries = <&dsi_panel_pwr_supply>;
};
```

8996 LCD panel bring-up tips

- **debugfs介绍**

  在最新的MDSS驱动中，我们增加了下面的目录，用于LCD panel相关的debug/bring-up。下面的目录和entry直接对应了MDSS驱动和LCD panel dtsi中对应的设置。如果对具体的entry有疑问，可以具体参考MDSS驱动中的具体函数和变量 。

  root@msm8996:/d/mdss_panel_fb0/intf0 # ls

  bl_max
  bl_min
  brightness_max
  clk_rate
  dcs_cmd_by_left
  dsi_ctrl_pdata
  dsi_phy_ctrl
  dynamic_fps
  esd_check_enabled
  fbc
  lcdc
  max_refresh_rate
  min_refresh_rate
  mipi
  panel_ack_disabled

8996 LCD panel bring-up tips

- **debugfs介绍**

  比如其中的 clk_rate，实际上是mipi的bit clock。其中TE目录包括各种TE相关的设置。

  partial_update_enabled

  partial_update_roi_merge

  physical_height

  physical_width

  te

  ulps_feature_enabled

  ulps_suspend_enabled

  xres

  yres

  root@msm8996:/d/mdss_panel_fb0/intf0/te # ls

  te_rd_ptr_irq

  te_refx100

  te_start_pos

  te_sync_cfg_height

  te_sync_threshold_continue

  te_sync_threshold_start

  te_tear_check_en

  te_vsync_init_val

8996 LCD panel bring-up tips

- **TE , GPIO和LCD panel 管脚的连接**

  一般不建议修改参考电路中的管脚连接，LCD panel和8996管脚连接最好使用MTP或者CDP的默认设计。

  如果需要更改HW设计，在LCD panel bring-up之前，需要仔细对比电路图的改动。

  a) TE/Vsync管脚，不能随意指定GPIO，不是任意一个GPIO都可以configure为TE/Vsync。具体的管脚选择，请参考对应的datasheet，或者联系高通硬件支持团队。

  如果TE管脚有所改动

  ----------参考之前的文档，进行对应的TE pin SW 配置。

  ----------仔细检查此TE/vsync管脚在MTP或者CDP中的用途，其它子系统是否使用此管脚。

  可能需要修改其它子系统的SW。

  ---------参考之前的文档，去检查TE是否为成为有效输入。

- **LCD panel dtsi 模板的选择**

  LCD panel dtsi 模板的选择。 不要直接使用之前平台（比如8994,8939) 验证过的LCD panel dtsi file。虽然其中panel specific 的setting可以继续使用，但是对应的LCD panel dtsi一定要参考8996中提供的panel dtsi 文件。因为SW是随时变化的，之前平台的一些setting，可能在当前8996 baseline中已经发生变化。

8996 LCD panel bring-up tips

- **8996 MTP和 panel dtsi 文件中的新的setting。**

```
&mdss_dsi {
        hw-config = "split_dsi";
 };
```

8996如果是双DSI的LCD panel，建议保持 “split_dsi”，如果是 1080p的单DSI，建议改为”single_dsi”。

在LK中，对应的设置是.

bootable\bootloader\lk\target\msm8996\oem_panel.c

panelstruct->paneldata->panel_operating_mode = 11;

Camera

PDAF3 Verification

- PDAF3 calibration data verification
- PDAF3 special notes(need consult with QC CE)
  - Can’t be supported in sensor’s mirror and flip mode(please double confirm with QC CE)
  - Use default preview size in mct_pipeline.c
- PDAF3 performance checking
  - Confirm PDAF enabled in sensor driver
  - Confirm PDAF/HAF enabled in tuning file
  - Confirm HAF worked by checking the log
  - Confirm the defocus variation when lens get focused

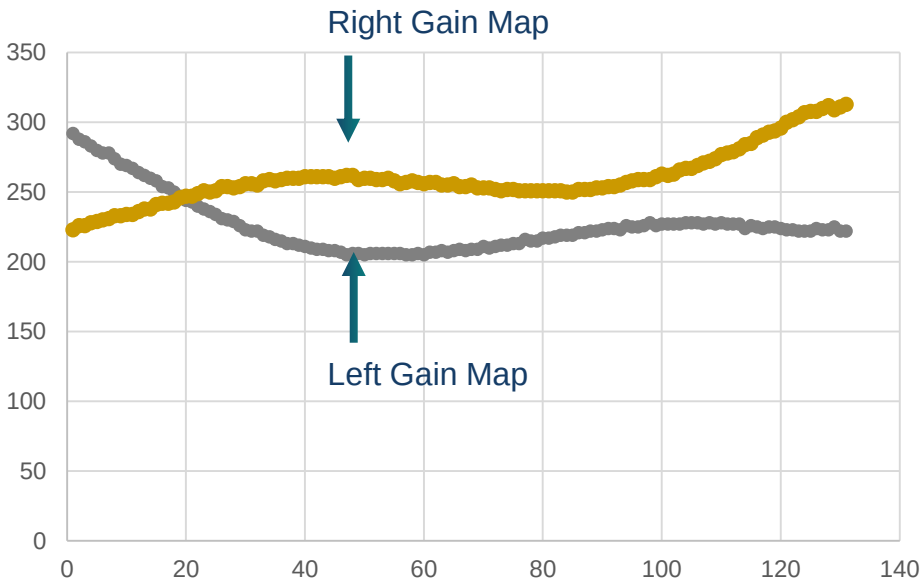
PDAF3 calibration data verification

- Typical AF OTP data
  - Note: All the PDAF verification guide is base on 3M2 1D gain map

	Range	Note
K Value	Around 20000	Conversion Coefficient between PD and defocus. (DAC/pixel)
Gain Map value (131 left, 131 right)	Around 200 ~ 350	Gain map is like a rolloff table, and it should be continuous.

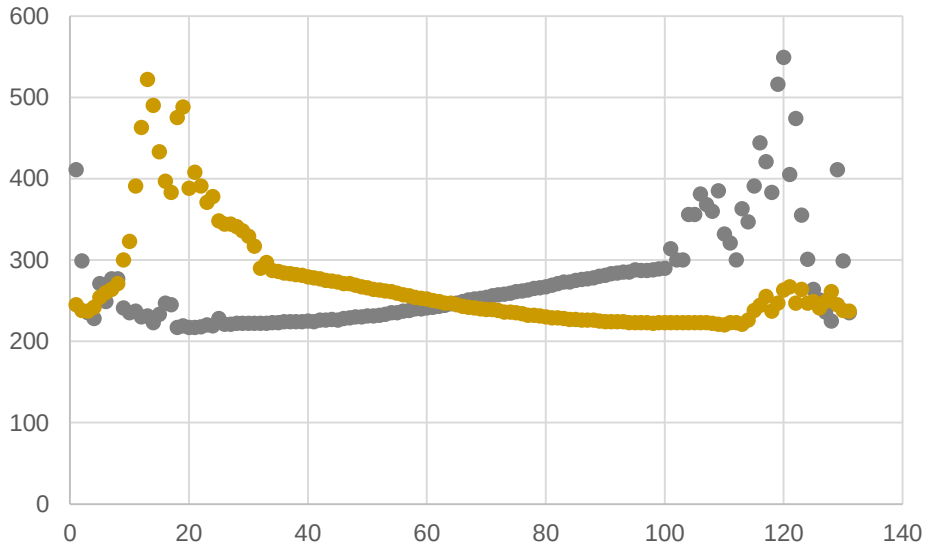
PDAF3 calibration data verification

- Typical Gain Map
  - Check the Gain map trend gave by module vendor
    - Correct gain map, gain map should be continuous.



PDAF3 calibration data verification

- Typical Gain Map
  - Check the Gain map trend gave by module vendor
    - Incorrect gain map.



Special Note

- PDAF3 can’t be supported in sensor’s mirror and flip mode
  - Please double confirm with QC CE about the supporting after sensor’s mirror and flip.
- Use default preview size in mct_pipeline.c
  - PDAF3 can’t work correctly when you set your customized preview size(like 1440x1080) on some branch.
    - MSM8952.LA.1.0

```
static cam_dimension_t default_preview_sizes[] = {
  { 2048, 1536}, // QXGA
  { 2048, 1080}, // 4k/2
  { 1920, 1080}, //1080p
  { 1280, 960},
  { 1280, 720},  // 720P, reserved
  { 864, 480}, //FWVGA
  { 800, 480},   //  WVGA
  { 768, 432},
  { 720, 480},
  { 640, 640},
  { 640, 480},   // VGA
  { 640, 360},
  { 576, 432},
  { 480, 320},   // HVGA
  { 384, 288},
  { 352, 288},   // CIF
  { 320, 240},   // QVGA
  { 240, 160},   // SQVGA
  { 176, 144},   // QCIF
  { 160, 120}
};
```

Performance checking

- Confirm PDAF enabled in sensor driver
  - Check below configuration in the sensor driver(S5k3m2xm_lib.c)

```
static struct sensor_lib_out_info_t sensor_out_info[] = {
 {/* 30 fps full size settings */
   .x_output = 4208,
   .y_output = 3120,
   .line_length_pclk = 4592,
   .frame_length_lines = 3188,
   .vt_pixel_clk = 440000000,
   .op_pixel_clk = 432000000,
   .binning_factor = 1,
   .max_fps = 30.056,
   .min_fps = 7.5,
   .mode = SENSOR_DEFAULT_MODE,
   .is_pdaf_supported = 1,
 },
```

  - Check HAF enabled and PDAF3 enabled(af_haf_tuning_data_camera.h)

HAF

```
.enable = 1,

.algo_enable = {0,1,0,0},
```

PDAF

```
  .defocus_threshold       = 36.0f, //0.6f,  //35
  .depth_stable_threshold  = 40.0f, //0.8f,
},
/*reserve[200] */
.reserve = {
     3,  /* Type */
     SINGLE_HYP_F_IDX, //SINGLE_30CM_IDX}, /* init pos */
   /*PDAF_CAF_DECISION_BY_MAJORITY*/
   /* This parameter is for deciding AF trigger type by PDAF/C
```

Type 3

Performance checking

- Confirm HAF worked
  - Enable AF and HAF log
    - adb shell setprop persist.camera.stats.debug.mask 36(8916/29/39)
    - adb shell setprop persist.camera.stats.debug 196656(8952)
    - adb shell setprop persist.camera.stats.debug 48(8952)
- Check the key words in AF/HAF log

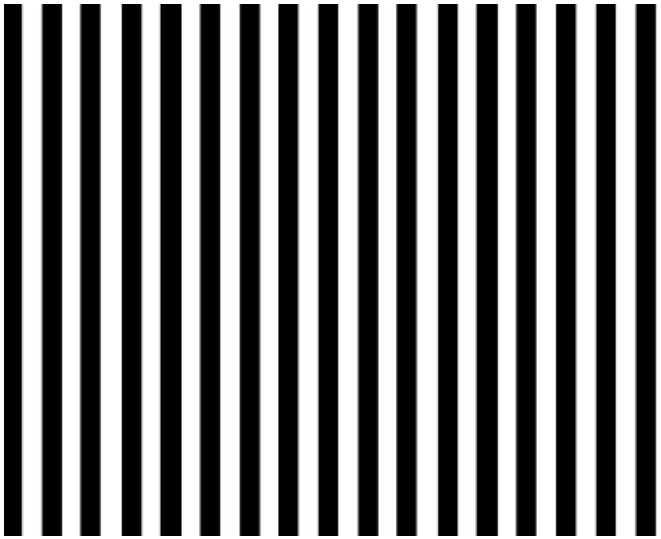
HAF enabled

```
af_process: Update HAF
af_pdaf3_proc_pd:grid[0]: pd=-0.08, defocus=-26, conf=928, weight=1.00
af_pdaf3_proc_pd: history: ( -28 -33 -28 ) ==> average -29, prev -27, avg =-29.67 ,defocus_std -0.17, combine=7
af_pdaf3_proc_pd: roi[0]: pos452 index=32, pd=-0.08, defocus=-28, conf roi=928, is_conf=1
```

PDAF3 enabled

Performance checking

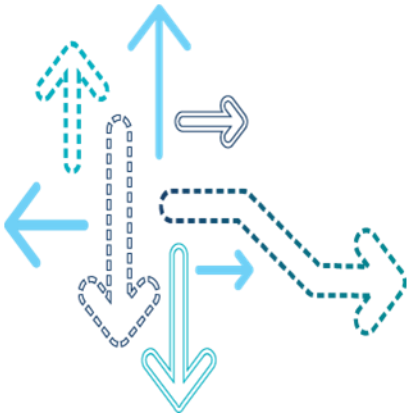
- Confirm PDAF performance
  - Enable AF and HAF log
    - adb shell setprop persist.camera.stats.debug.mask 36(8916/29/39)
    - adb shell setprop persist.camera.stats.debug 196656(8952)
    - adb shell setprop persist.camera.stats.debug 48(8952)
  - Get AF focused on a scene like vertical stripe under 500lux+ at 20cm, 50cm, 100cm, 500cm
  - Check the defocus value, it should with in -30 ~ +30



Performance checking

- Check the defocus value, variation of abs(defocus) should less than 30 for a good performance.
- Bad performance if the variation of abs(defocus) > 50.

```
af_pdaf3_proc_pd: roi[0]: pos451 index=26, pd=-0.07, defocus=-25, conf roi=903, is_conf=1
af_pdaf3_proc_pd: roi[0]: pos451 index=27, pd=-0.07, defocus=-24, conf roi=901, is_conf=1
af_pdaf3_proc_pd: roi[0]: pos451 index=28, pd=-0.08, defocus=-28, conf roi=891, is_conf=1
af_pdaf3_proc_pd: roi[0]: pos451 index=29, pd=-0.07, defocus=-24, conf roi=893, is_conf=1
af_pdaf3_proc_pd: roi[0]: pos451 index=30, pd=-0.08, defocus=-27, conf roi=899, is_conf=1
af_pdaf3_proc_pd: roi[0]: pos451 index=31, pd=-0.06, defocus=-22, conf roi=898, is_conf=1
af_pdaf3_proc_pd: roi[0]: pos451 index=32, pd=-0.07, defocus=-25, conf roi=888, is_conf=1
af_pdaf3_proc_pd: roi[0]: pos451 index=33, pd=-0.07, defocus=-22, conf roi=898, is_conf=1
af_pdaf3_proc_pd: roi[0]: pos451 index=34, pd=-0.09, defocus=-31, conf roi=895, is_conf=1
af_pdaf3_proc_pd: roi[0]: pos451 index=35, pd=-0.07, defocus=-24, conf roi=889, is_conf=1
af_pdaf3_proc_pd: roi[0]: pos451 index=36, pd=-0.07, defocus=-22, conf roi=892, is_conf=1
af_pdaf3_proc_pd: roi[0]: pos451 index=37, pd=-0.09, defocus=-31, conf roi=896, is_conf=1
af_pdaf3_proc_pd: roi[0]: pos451 index=38, pd=-0.08, defocus=-27, conf roi=895, is_conf=1
af_pdaf3_proc_pd: roi[0]: pos451 index=39, pd=-0.07, defocus=-26, conf roi=893, is_conf=1
af_pdaf3_proc_pd: roi[0]: pos451 index=40, pd=-0.08, defocus=-27, conf roi=899, is_conf=1
```



Questions?

https://support.cdmatech.com