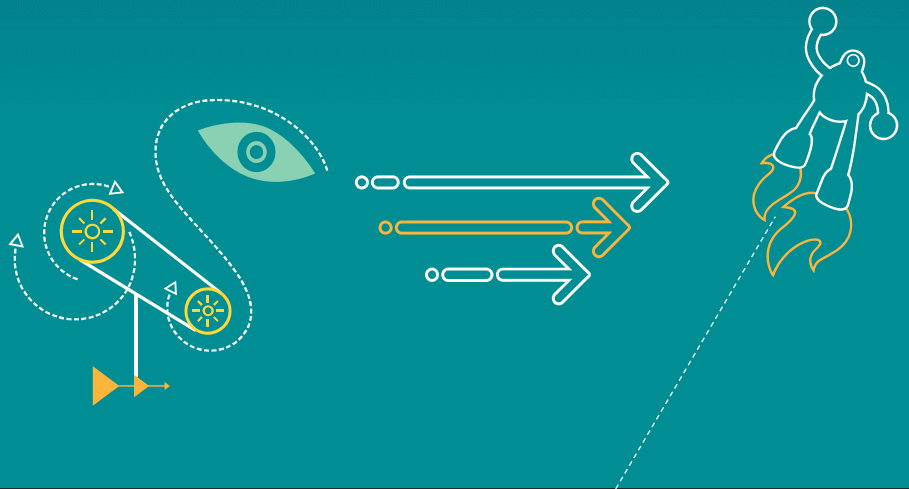
高通8976功耗温升优化技术期刊-20160315

Qualcomm Technologies, Inc.



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Revision History

Revision	Date	Description
A	Jan 7, 2016	Initial version
B	Feb 5, 2016	Add more CRs
C	March 15, 2016	Add more CRs

Checklist

- Generic Power Debug Document
- Generic Power Measurement Checklist
- Generic Power Debug Tips
- MSM8976 Power Document
- MSM8976 CR/Patches Checklist
- MSM8976 Tips

Generic Power Debug Document

Document # (文档编号)	Document Description (文档描述)
80-P0955-1SC (中文版) 80-P0955-1 (英文版)	Power Debug Guide with Simplified Chinese 很详细的功耗debug中文手册，里面有各种case debug的步骤，以及如何来抓取各种log。功耗优化的必读宝典
80-NA157-246	LA Power Optimization 很详细的调试功耗如何抓log，用工具的文档。有各种场景如何抓log的介绍
80-NT616-1	Multimedia Power Debugging Case 有各种多媒体case的功耗调试手段介绍
80-NP961-1	Camera Power Debug Guide Camera功耗调试手册
80-NT384-1	PerfLock API Overview PerfLock接口的介绍
80-P1818-1EC	QUALCOMM ONDEVICE POWER DASHBOARD TEST GUIDE 客户机功耗测试指导手册
80-NT614-1	Android_Power_Basics_Power_Feature_Overview
80-P0956-1	Android_Power_Overview
80-P0958-1	Master_Reference_Document_Power

Generic Power Measurement Checklist

- 在测试功耗之前，请检查下面的这些基本项
- Use perf_defconfig instead defconfig
  - Remove “Debug” features
  - Double check if “CORESIGHT” config is removed
  - Double check if “CONFIG_MSM_DEBUG_LAR_UNLOCK” config is removed
- Disable UART console
  - Especially for smart panel
- Remove unnecessary debug log with high frequency
- Remove on-device logging tools

Generic Power Debug Tips --- How To Check RBSC Power

- Use IR camera to scan board's hot spot if RBSC current is high ;

  当RBSC高的时候可以使用IR Camera看看热点在哪里，这样可以确定是哪个硬件模块没有进入休眠。这个对某个大模块没有进入休眠很有帮助。比如Audio Codec

- Check if some clocks prevent system from going to VDD_MIN from AP side

  运行下面的命令，然后从kernel的dmesg中能看到AP休眠的时候，还有那些clock是enabled的。例如最常见NFC配置错误的时候，bb_clk2_pin在suspend之前没有被disable，导致系统进入不了VDD_MIN

  adb shell "echo 1 > /sys/kernel/debug/clk/debug_suspend

- Hardware break down

  硬件break down对于调试RBSC非常有用。通过焊掉不同器件能够知道到底是哪个器件有漏电。比如拔屏，焊掉NFC模块，Audio Codec模块，各种sensors等等。

- Compare HW difference between OEM device and Qualcomm reference board

  比如LCD, Touch Screen, Finger Print, NFC, Audio Codec, Sensors。最经常有问题的比如NFC, Finger Print.

- 对于有Finger Print的设备，如果Finger Print驱动request了CXO,那么系统就不能进入VDD_MIN. 这样RBSC就会高些

- Dump only clock via JTAG

  如果不希望通过JTAG传递太多数据，可以只dump clock，这样可以看出哪个clock阻止系统进入休眠。

- For more details, pls refer to doc 80-P0955-1SC, chapter 3.1.

  更多细节，请参考文档80-P0955-1SC的"3.1 底电流"

Generic Power Debug Tips --- How To Check MP3 Power

- Identify the MP3 playback mode

  Compress offload /Tunnel mode: Decoding on ADSP，下面是命令

  adb shell setprop audio.offload.disable 0

  Non-Offload/Nontunnel mode: Decoding on CPU，下面是命令

  adb shell setprop audio.offload.disable 1

- Check if there is 3rd party sound effect lib such as Dolby

  如果有第三方的音效处理算法，系统功耗肯定会比高通参考数据高。为了方便比较，可以先disable第三方算法，然后和参考平台进行比较

- Check is there any Hi-Fi function enabled

  可以重点关注Hi-Fi PA的功耗情况。同时看看有没有Hi-Fi bypass mode用来方便做对比测试

- For more details, pls refer to doc 80-P0955-1SC, chapter 3.4.

  更多细节，请参考文档80-P0955-1SC的“3.4 MP3播放 ”

Generic Power Debug Tips --- How To Check Static Display Power

- Check Static Display with Android Native UI

  这样可以排除由于产品本身的UI引起的功耗增加。Native UI case功耗正常以后再切换到产品定制UI上来。很多时候我们可以根据波形来进行对比。比如看看定制化UI的功耗波形是否有周期性的peak之类。

- Check if Touch Screen consumes more power

  当Touch Screen产生了更多中断的时候，Static Display这种case会有更好的功耗。Touch Screen本身firmware是否有优化空间也是考虑之一。需要和Touch Screen厂家沟通以确认。

- Check if auto backlight adjustment feature is enabled

  为了能更好对比功耗数据，做测试的时候需要disable自动背光调整功能

- For more details, pls refer to doc 80-P0955-1SC, chapter 3.3.

  更多细节，请参考文档80-P0955-1SC的“3.3 静态显示 ”

Generic Power Debug Tips --- How To Check Camera Power

- Disable all unnecessary logs

  Camera应用场景的时候因为log过多会导致系统功耗上升很多。要减少不必要log输出，或者直接disable LogD。

- Balance Performance and Power

  比如对于fps,可以低于30fps以取得更低功耗。需要找Camera Vendor提供更低帧率的设置

  对于sensor output，可以采用最低的sensor output resolution来满足实际场景需要，比如1080P video record的时候sensor就不用输出Full Size，而是最接近1080P的sensor output.

- Balance Performance and Power

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- Get basic power data with all features disabled, such as OIS, ASD

  第一步先disable各种feature来得到一个最低功耗。因为各种feature功耗多少是可以采用叠加方式的。把最简单的case调好了后面就好调了。调试简单case的时候最好避免其他因素的干扰。

- For more details, pls refer to doc 80-P0955-1SC, chapter 4.17, 4.18 and 4.19.

  更多细节，请参考文档80-P0955-1SC的4.17 摄像头预览调试, 4.18 摄像头功率优化技术 4.19 视频录制功率　优化技术 ”

Generic Power Debug Tips --- How To Check Trex Power

- Disable thermal engine before power data collection

- Optimize Display Porch Values

  这样可以优化功耗

- Get ftrace log for analysis

  可以重点focus在DDR和CPU的频率和利用率上

Generic Power Debug Tips --- DoU (Days of Usage)

- Brightness should be adjust to a reasonable value when do apple to apple comparing with the target HW;
  不同硬件的同一亮度实际的背光功耗也可能有区别，这部分在做DoU比较的时候要弄清楚

- Thermal facts should be taken into account
  不同的thermal config会对DoU结果有影响

MSM8976 Power Document

Document # (文档编号)	Document Description (文档描述)
80-NT667-7	MSM8976_LA_Current_Consumption_Data 包括各种应用场景下的功耗breakdown数据
80-P1718-8	Power Data for MSM8976.LA.1.0-00350-STD.PROD
80-P2778-4	Power Data for MSM8976.LA.1.0.1_00060_STD

MSM8976 Checklist --- CR/Patches

N means No Impact ***- means Side Effect*** ***+ means Good Impact***

CR	Fix	Patches	Perf	Power	Stability	Comment
924779	Can not sleep for LTE standby		N	+	N	
949222	Add 550Mhz power level, this helps in both performance and power.		+	+	N	

MSM8976 Checklist --- CR/Patches (improve Performance/Power)

N means No Impact ***- means Side Effect*** ***+ means Good Impact***

CR	Fix	Patch	Perf	Power	Stability	Comment
881194	Scheduler : Load balancing improvement.		+	-	N	
914674 943813	8976 QOS patches – GPU and Wireless		+	-	N	
928243 931349	Riptide Whitelist patches		+	-	N	
942601 944709	GPU DCVS changes		+	-	N	
943361	Ramp Governor and Scheduler aggressively Increase Launch boost 1.5GHz - > 1.8GHz Set min DDR Floor (BIMC Clk) to 192MHz		+	-	N	

MSM8976 Checklist --- CR/Patches

N means No Impact ***- means Side Effect*** ***+ means Good Impact***

CR	Fix	Patch	Perf	Power	Stability	Comment
933762	GPU DCVS tuning on MSM8976		+	+	N	
960111	Fix perf core bootup failure issue，which can lead some of stability issues and standy power issues.		N	+	+	
969112	Fix Tsen interrupts issue in low temperature to avoid high standby power issue		N	+	N	
957221	avoid uart reconfig enable clk that block device not sleep when using virtual sim		N	+	N	
916022	wakelock is not acquired when polling state is set and allow system to go to suspend.		N	+	N	
959992	Fix the error “Thermal-Client-Lib: Pipe error” when enter camera.		N	N	N	Thermal engine

Checklist --- CR/Patches (NEW)

N means No Impact ***- means Side Effect*** ***+ means Good Impact***

CR	Fix	Patch	Perf	Power	Stability	Comment
971588	Fix core_ctl initialization failure issue when the battery SOC is less then 10%		+	+	N	
961055	CX running @ NOM instead of SVS+ in LTE CA CAT6		+	+	N	Cat6 Power optimization CR
967605	8976_CAT6 : Reduce Q6 frequency from 614MHz to 576MHz and Boost API change for Q6		N	+	N	
967621	8976_CAT6 : LTE FW optimization for reduced Q6 clocks		N	+	N	
977178	LFW: Free up some space in static TCM		N	+	N	

Checklist --- CR/Patches (NEW)

N means No Impact ***- means Side Effect*** ***+ means Good Impact***

CR	Fix	Patch	Perf	Power	Stability	Comment
972118	Do not resume the eMMC device as part of the system resume. Only resume it when there's a request to be processed.		+	+	N	Fix Vdd min sleep issue when enable EMMC deferred resume function
961377	IPA_WS wakelock will be hold for a long time and lead standby power issue		N	+	N	Need to merge after CR 916022 integration
984992	clk: qcom: clock-gcc: Update the frequency precision for clocks		N	+	N	Fix high power issue during usb charging
987462	msm_otg suspend failed with DCP Charger Connect/Disconnect use case.		N	+	N	After the removal of USB cable, the issue here is USB acquired wakelock is still held.

MSM8976 Tips

问题：

低温环境中（低于15C）待机，电池消耗较快。

分析：

在运行该命令后，重现问题，收集问题机器中的dmesg。分析log发现，“tsens_interrupt”多次唤醒系统。

```
echo 1 > /sys/module/msm_show_resume_irq/parameters/debug_mask
```

原因：

MSM8976上增加了VDD Mx voltage restriction的功能，设置低温15C触发，17C移除。因为监控所有的on-die sensors，导致中断触发频繁唤醒系统，影响待机耗电。

解决：

CR 969112