
高通8937功耗温升优化技术期刊- 20160427



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Revision History

| Revision | Date | Description |
|----------|----------------|-----------------|
| A | April 27, 2016 | Initial version |

Checklist

- Generic Power Debug Document
- Generic Power Measurement Checklist
- Generic Power Debug Tips
- MSM8937 Power Document
- MSM8937 CR/Patches Checklist
- MSM8937 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
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
- 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

MSM8937 Power Document

| Document # (文档编号) | Document Description (文档描述) |
|--------------------|--|
| 80-P2468-7 | MSM8937_LA_Current_Consumption_Data 包括各种应用场景下的功耗breakdown数据 |
| 80-P2485-4 | MSM8937_System_Power_Overview |
| 80-NU154-10 | MSM8956_MSM8976_MSM8937_RPM_Overview_and_Debug |
| 80-P2468-1 | MSM8937 DEVICE SPECIFICATION |
| 80-P2067-1 | MSM8937/17 MSM8953 Technical Conference |

Checklist --- CR/Patches (NEW)

N means No Impact

- means Side Effect

+ means Good Impact

| CR | Fix | Patch | Perf | Power | Stability | Comment |
|--------|---|---|------|-------|-----------|--|
| 992103 | Power regression of MP3/MP4 on CS load. | | N | + | N | The CR fixes the corner case in PM_QOS code. |
| 980223 | Disable the ktime backtrace in kernel PM suspend flow. | | N | N | N | Impact of CR#936509(optimize the suspend/idle latency). |
| no | MP3 playback current changes from 64mA to 131mA with different BT headsets. | https://android.googlesource.com/platform/system/bt/+d0aa6cc53abaf122a2426c20691ccfa025ca7369%5E%21/#F0 | N | + | N | Maintain the new framework of blacklist devices for absolute volume. |
| 924291 | With some camera operation, RBSC becomes ~12mA afterwards. | | N | + | N | Specific G sensor(LSM6DS3) driver blocks ADSP sleep, even sensor is actually disabled. |

Checklist --- CR/Patches (NEW)

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

| CR | Fix | Patch | Perf | Power | Stability | Comment |
|---------|---|-------|------|-------|-----------|--|
| 986194 | Current Consumption in RF5425 is higher than expected, need init PA to OFF after UE bootup. | | N | + | N | Abnormal case, PA consumes 70~80mA. Without RF5425, this CR would be not included. |
| 1004039 | With some camera operation, system standby would become ~40mA | | N | + | N | Timestamp between gyro sensor and camera is not expected. Camera exit function blocked by Cam_MctBus deadlock. |
| | | | | | | |
| | | | | | | |

Android Power profile

问题：

about measuring power values(/frameworks/base/core/res/res/xml/power_profile.xml), QC doesn't have any power for each cpu frequency, even others like WIFI scan/active power...

建议：

不支持, 需自行测试得到. 无法衡量其准确度.

Google官网：

- <https://source.android.com/devices/tech/power/index.html>
- <https://source.android.com/devices/tech/power/values.html>

Config for HW without NXP NFC (important)

问题：

HW without NXP NFC, there may be a chance that static image display see ~6mA power increase. Actually other CPU active scenarios will show the similar symptom.

解决:

请关闭**TARGET_USES_NQ_NFC**和 **CONFIG_NFC_NQ** , Smartcard service可根据需要自行决定开关.

- **TARGET_USES_NQ_NFC := false**
- **#in device/qcom/msm8937_64/msm8937_64.mk <32bit or 64bit to choose>**
- **\kernel\arch\arm64\configs\<device config file>**
- **To disable: (by default switched ON in 8937)**
- Comment or delete this flag.
- **#CONFIG_NFC_NQ=y**
- **TARGET_ENABLE_PROPRIETARY_SMARTCARD_SERVICE := true**
- **#in vendor/qcom/proprietary/common/msm89XX/BoardConfigVendor.mk.**

MSM8937 Tips
