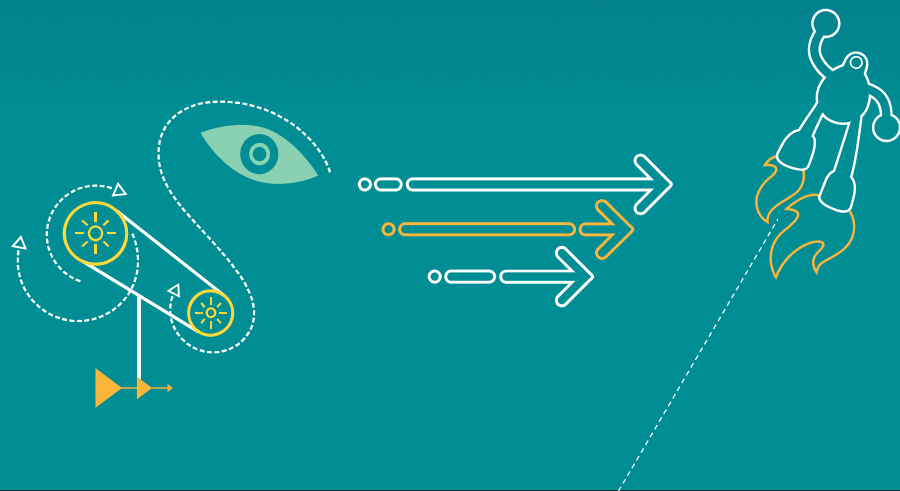

高通RF技术期刊2016-01-29



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Revision History

| Revision | Date | Description |
|----------|----------|-----------------|
| A | Jan 2016 | Initial release |

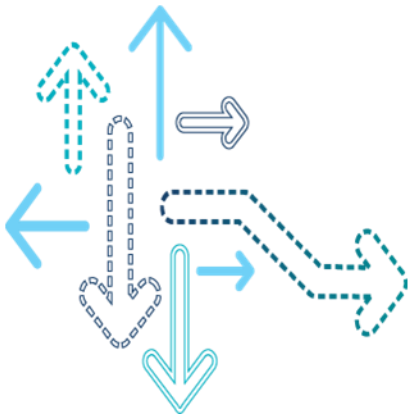
Note: There is no Rev. I, O, Q, S, X, or Z per Mil. standards.

Contents

- RF HW
- RF SW

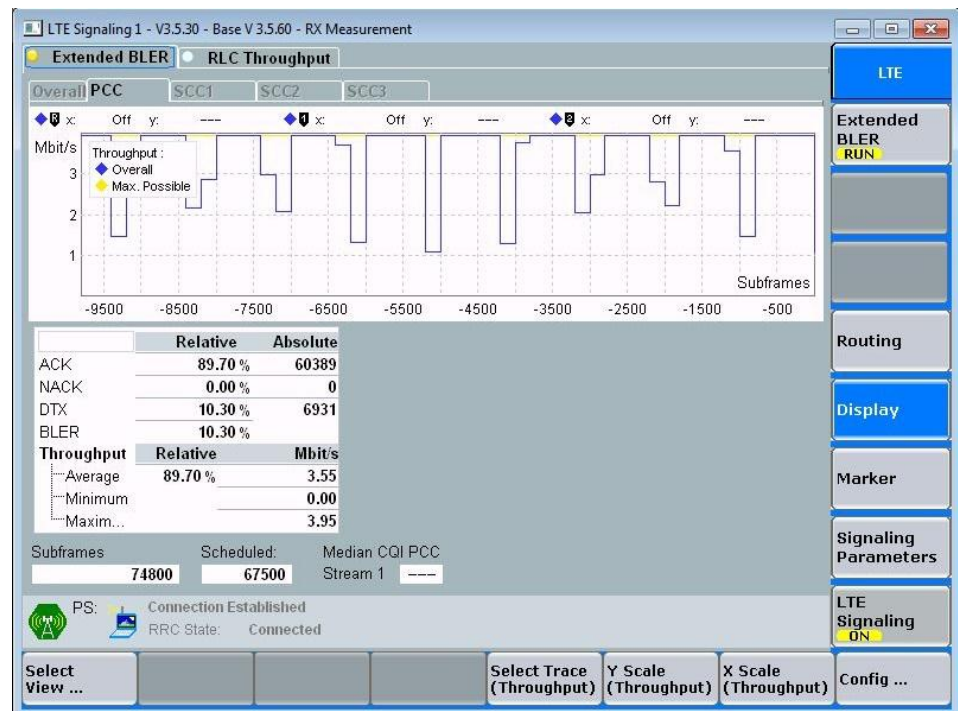
1. LTE_sensitivity_degrade_by_DSDS
2. MSM8996 Current leakage Issue
3. GSM DRX sensitivity test method
4. WTR2965 FAQ summary
5. WTR5975 FAQ summary

RF HW



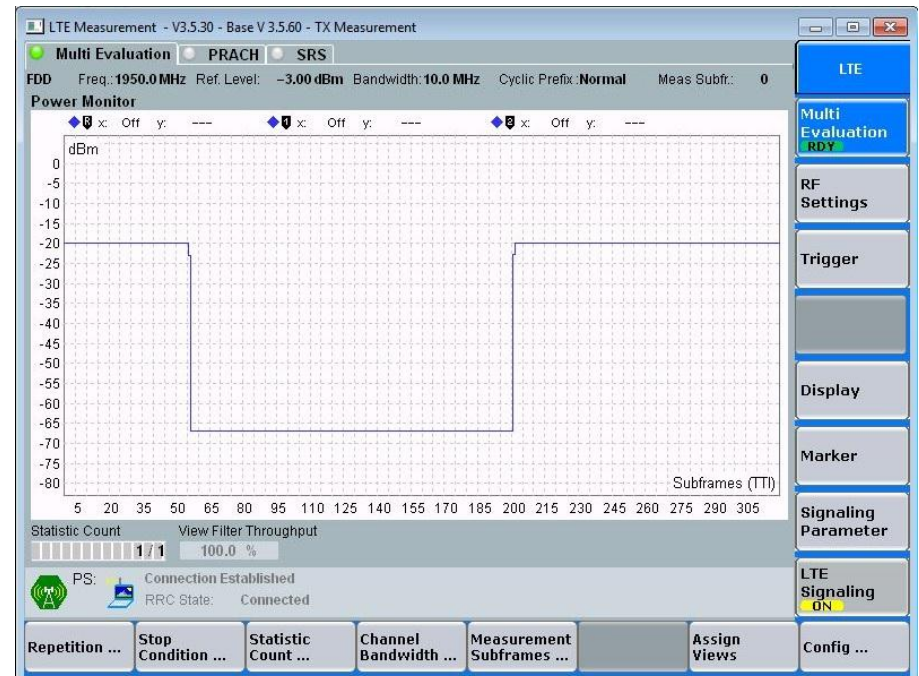
LTE_sensitivity_degrade_by_DS

- **Platform:** MSM8952/56/76
- **适用平台：** MSM8952/56/76
- **Symptom:** In LTE sensitivity testing with CMW500, high BLER is observed even with high downlink cell power. The NS testing is fine without problem.
- **问题描述：**用CMW500进行LTE灵敏度测试时，BLER很高，即使下行功率设置很高也是一样。非信令测试正常。



LTE_sensitivity_degrade_by_DSDDS

- **Analysis:** According the test screen above, the BLER is caused by DTX. By default setting ($BLER = (\#NACK + \#DTX) / (\#ACK + \#NACK + \#DTX)$), the DTX (missing answers) is seen as error. From TX measurement, LTE TX power blanking happened sometimes that cause DTX.
- **Root Cause:** Customer insert two SIM cards in the testing, the phone is in DSDDS mode. When the second sub (SIM) search network or monitor network paging, the LTE Tx/Rx will be stopped for a while (tune away). It will cause DTX and the DTX is calculated as BLER by the callbox.



LTE_sensitivity_degrade_by_DS

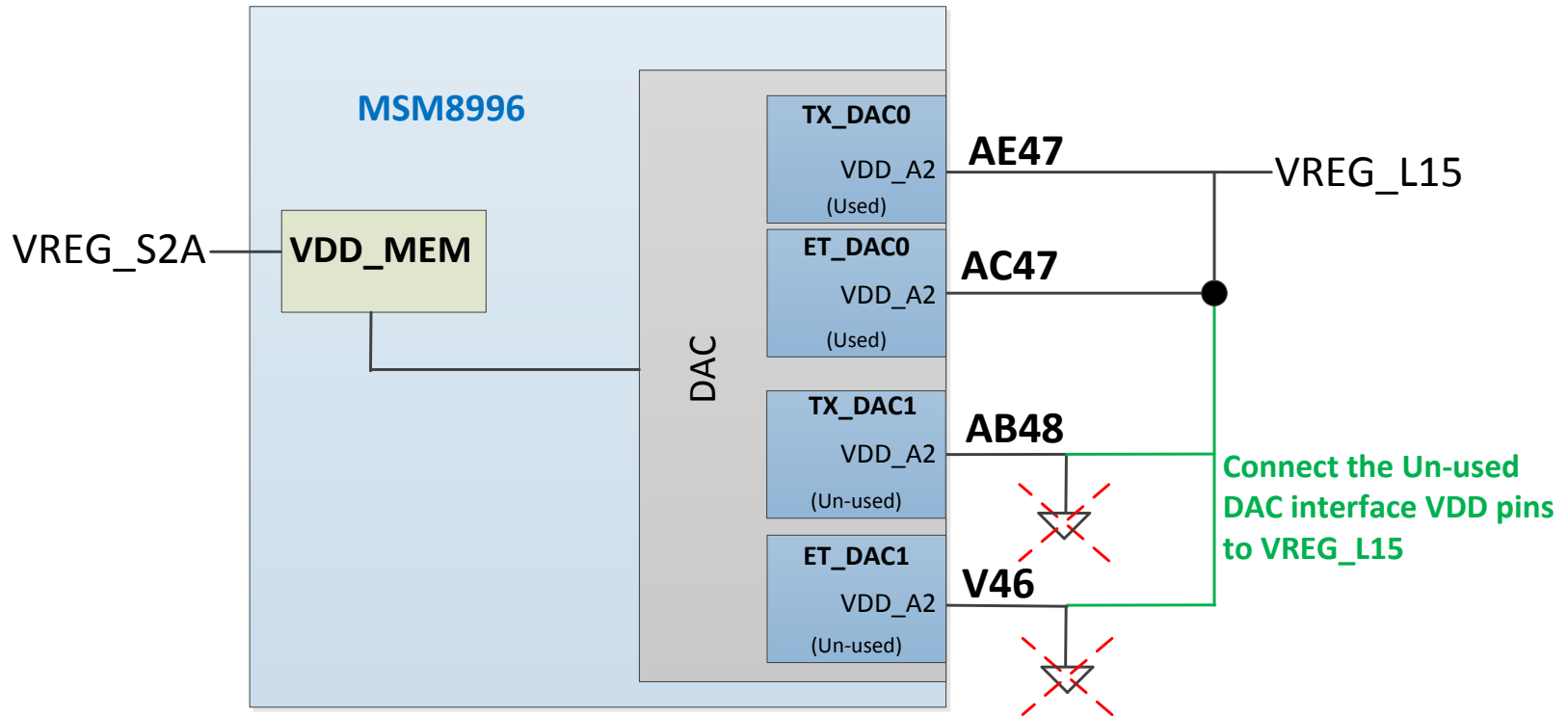
- **问题分析：**根据仪表的显示，BLER是由于有DTX。根据仪表的默认配置 ($BLER = (\#NACK + \#DTX) / (\#ACK + \#NACK + \#DTX)$) DTX会计入BLER. 从发射测量能看到，发射功率有时会关闭。
- **根本原因：**客户在测试中插入了两张SIM卡，手机进入了DS模式。当第二个SIM卡搜索网络或监听网络paging消息时，LTE的收发会被关闭(tune away)。这样就会造成DTX，而这个会被计算为BLER。
- **Solution:** use single SIM to test LTE performance.
- **解决办法：**用单卡进行测试。

MSM8996 Current leakage Issue

- **Platform:** MSM8996
- **适用平台：**MSM8996
- **Symptom:** MSM8996 reference design needs to be corrected where unused TX/ET DACs must be connected to LDO15 rather than to GND. If these unused DAC vdd_A supplies are routed to ground – customers may see unexpected current leakage.
- **问题描述：**MSM8996参考原理图需要更新, 不使用的Tx/ET DAC的VDD_A2供电pin脚需要接到LDO15上而不是接地。如果不使用的Tx/ET DAC的VDD_A2供电pin脚接地了, 那客户项目上可能会看到一些漏电流的现象。
- **Solution:** Connect unused TX/ET DAC VDDA pins to LDO15.
- **解决办法：**将不使用的TX/ET DAC的VDD_A2 pin脚接到LDO15上。

MSM8996 Current leakage Issue

- **Affected Pins:**

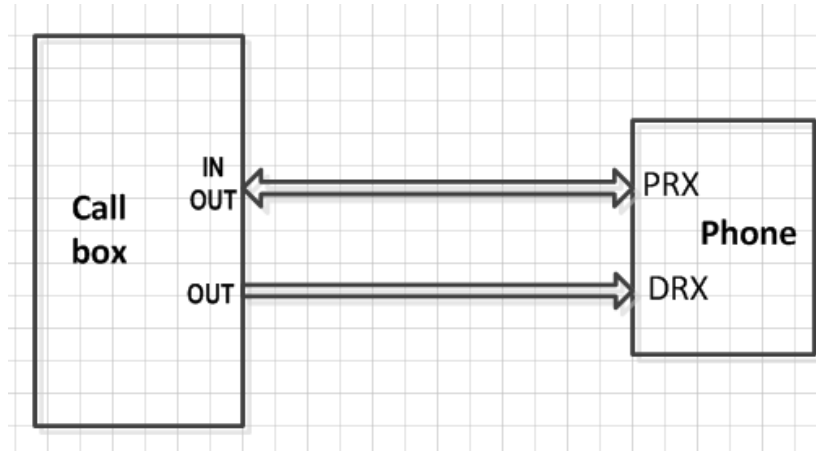


80-NT204-41 **MSM8996 Baseband** Reference Schematic and
80-NT204-5B Design Guidelines will be updated as above.

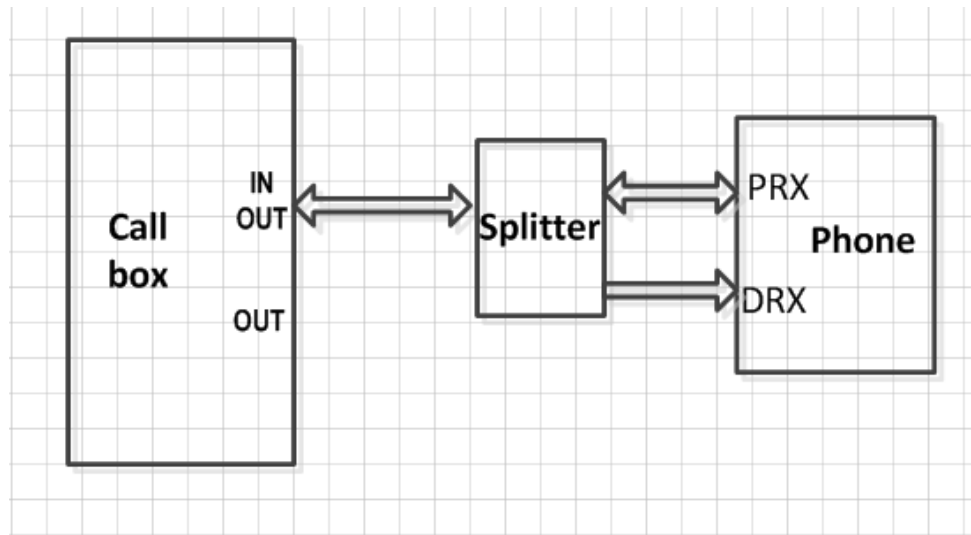
GSM DRX sensitivity test method

- **Platform:** All
- **适用平台：**全部
- **Symptom:** Test GSM sensitivity, PRX is fine, sensitivity is -109dBm. However, GSM DRX sensitivity is just only -103dBm. GSM and 3G/4G are cobanding, no issue for 3G/4G DRX.
- **问题现象：**测试GSM的灵敏度，PRX可以达到-109dBm，而GSM DRX的灵敏度只有-103dBm。GSM和3G/4G共用射频通路，3G/4G DRX灵敏度正常，没有发现有desense。
- **Analysis:** (1)check cal log, RxGainOffset on GSM PRX and DRX is 2230 and 2237, no big difference, that means RF loss is close for PRX and DRX. (2)check testing method, found it's not standard.(3)as below picture, PRX+TX port of phone connects to IN/OUT port of call box, DRX port connects to OUT port of call box.(4)when testing, firstly open IN/OUT port on call box, after call, close out function of IN/OUT port, and open OUT port on call box, make sure not disconnecting during testing.
- **问题分析:** (1)检查cal log, GSM PRX和DRX的RxGainOffset分别是2230和2237，说明主分集RF loss接近，应该和匹配无关。(2)确认测试方法，客户采用的测试方法并不规范。(3)如下图所示，手机和call box的连接方法是，手机的PRX+TX连接Call box的IN/OUT端口，手机的DRX连接Call box的OUT端口。(4)测试的时候，首先打开Call box的IN/OUT端口，待Call上后，在Call box上关闭IN/OUT端口的OUT，打开OUT端口，保证手机连接不中断。

GSM DRX sensitivity test method



■ (1) wrong connection for GSM DRX testing



■ (2) correct connection for GSM DRX testing

GSM DRX sensitivity test method

- **Solution:** (1)use correct connection during GSM DRX sensitivity, as picture2 on previous slide. Use a splitter, the common port connects to IN/OUT port on call box, differential ports connects to GSM PRX and DRX ports of phone. (2)set NV71588=5 or 3, reboot device, and then test GSM PRX and DRX sensitivity.(3)setting NV71588 is just for debug, reset a default value after debugging.
- **解决方案:** (1)测试GSM DRX采用正确的连接方法，如上页图2所示。采用功分器，功分器的公共端接call box的IN/OUT端，差分端接手机GSM PRX和DRX端口；(2)设置NV71588=5或3，重启手机，然后分别测试GSM的主分集灵敏度。(3)NV71588的设置仅用于调试，测试完成后需要重置到原始状态。

| GSMRxDivCtlFlag | Function |
|---|--|
| 15 [MPSS.BO.2.5 (Bolt 2.5) and later] | GSM RxD feature is enabled in both Idle and Connected modes, both PRx and DRx paths are On |
| 7 | GSM RxD feature in Connected mode is enabled, both PRx and DRx paths are On |
| 5 | Only PRx path is enabled (for debug only) |
| 3 | Only DRx path is enabled (for debug only) |
| 0 | GSM RxD feature is disabled, default value |

WTR2965 的常见问题及回复

- **适用平台**：WTR2965 related platform

- **背景**：客户提出的WTR2965相关问题及回复统一汇总如下，供大家参考。并且这些问题也在solution中做了汇总，大家可以搜索solution 00031367找到。

- **Q/A**：

- 01.

Q: Is the FBRx needed for EDGE?

A: No. For EDGE, the TX_FBRX path should also be routed to GND just like 80-NP237-56 section 1 indicated.

- 02.

Q: For the De-Pop design, is it necessary to add LC for all RX_IQ lines as indicated in RF journal?

A: No. The root cause is ADC clock harmonics coupled into LNA. If the LNA is not used, the LC is not needed for that WTR's RX_IQ lines.

- 03.

Q: Is the direct via from shunt C to main GND necessary for the added LC?

A: It's highly recommended to do so to make sure the LC filter effective.

- 04.

Q: Do we need to consider FBRx coupler issue described in 80-NP237-56 section 8 for one antenna design?

A: No need, for there would be no such undesired signal path. But the antenna design would be a big challenge.

- 05.

Q: Is there any mini-spec for the distance between IQ line and PMIC?

A: No such data right now. Suggest customer to avoid this issue in the very beginning of placement.

- 06.

Q: Is there any plan for WTR2k used with MSM8909?

A: 8909W(for loE) can be used with WTR2K.

WTR2965 的常见问题及回复

▪ 07.

Q: About the 4fmod issue, 80-NP237-5_E P120 is conflict with 80-NP237-56_E section 11.

A: 80-NP237-5_E P120 information is wrong. Will be updated in future. Please refer to 80-NP237-56_E section 11.

08.

Q: Does WTR2965 support eLNA on PRx ports?

A: Doesn't support. There is no plan to add/verify eLNA on MTP.

09.

Q: How to achieve max power limitation change is conductive mode and radiative mode? We need 24dBm output power at radiative mode, but 23.5dBm a factory conductive mode testing.

A: The idea is to follow 80-VP146-8 to use SAR backoff NV. To set the factory conductive mode as an SAR backoff scenario. Customer need to implement state indicator/sw change and verify on their own board.

10.

Q: Are Tx SAW needed for B12/B17?

A: No. B12/17 is SAWless mode. Refer to 80-NP237-5 and 80-NP237-49

11.

Q: Will the RF temperature compensation use the external thermistor of PA area?

A: No. RF temp comp will use WTR internal thermistor. The external one should be used for phone thermal management.

12.

Q: How to hand unused GNSS_IN pin?

A: It should be GND. Please follow 80-NP237-5 page97 for unused WTR pin recommendation.

13.

Q: Can B38 co-banding with B41 (100MHz BW)?

A: Yes, 80-NP237-47 does it.

WTR2965 的常见问题及回复

■ 14.

Q: Is WTR ports assigned by freq range?

A: It is not follow freq range simply. But we assign it per band. A port will test some bands in factory. If it is tested, we will support it. If any port need changed on your side, please inform us for non-POR review. Recommend refer to 80-NP237-121.

15.

Q: Do you have any suggestion for B3+B7 CA combination? We use two antenna, for B3+B7, have to add additional diplexer that add IL for B7 Tx path.

A: MTP use 4 antenna design, HB and MB are separated. So no this issue.

16.

Q: Do we need to put 5G LPF on the TRX path and FBRx path?

A: Please look at 80-NP237-56 for detail. Generally speaking, if don't have 5G WiFi, both filters are not needed. If have 5G WiFi, FBRx filter is mandatory. TRx filter is based on PA emission noise in WiFi band.

17.

Q: We need B39C/B40C/B41C UL CA. Can WTR2965 support it?

A: Yes. See 80-NP237-48

18.

Q: The SPDT of FBRx path is needed or not?

A: It is needed. It used to bypass GSM coupling power in GSM mode.

19.

Q: Do we need to put LC filter on WTR Rx_IQ bus?

A: Yes, it is recommended for Rx_IQ if TDD LTE bands are supported.

20.

Q: How about B28 filter spec to meet NS_18?

A: Please follow 80-VP447-12 for mini-spec.

WTR2965 的常见问题及回复

■ 21.

Q: Why there is 0ohm and DNI 4.7uF cap on QFE2101 pin5/6?

A: The 0ohm is used to provide another bypass path for GSM in bypass mode. If install 4.7uF, the cap will be used in APT mode that improve GSM ORFS/RxN performance. The different BOM need software to config it.

22.

Q: Some reference schematic didn't list the supported CA combination.

A: Please refer to 80-NP237-48/49/50 that are WTR2965 ref sch. All of them have CA combination list.

23.

Q: In 80-NP237-56, the 5G filter is not needed if WWAN noise in 5G WiFi band is -96dBm, can you let me know the measure bandwidth of the -96dBm?

A: For WiFi sens (-90dBm) at worst case BW we are saying -96dBm of cellular power. This would be below noise floor during WiFi sens measurement.

24.

Q: Did FBRx path need matching?

A: Yes, it is RF signal.

25.

Q: Could WTR2K support SAWless on part of GSM bands?

A: No. The SAWless rule is same as WTR4905, all or none.

26.

Q: Can we active GSM DRx for a part of GSM bands?

A: Yes. But all GSM bands need to be configured in RFC.

WTR2965 的常见问题及回复

▪ 27.

Q: In SKY7791x Tx spur issue described in RF journal, what's the difference between enable signals (PA_EN, ASM_EN) and GSM timing NV?

A: Enable signal is MIPI signal. The function is controlling how to close/open PA/ASM. GSM timing NV is controlling when PA/ASM open/close.

28.

Q: How should we get the DLL file?

A: The best way is get the DLL file from code release.

29.

Q: In a B3+B8 DL CA design, can we use a MMPA? We see B8 is using a dedicated satellite PA in Qualcomm REF design.

A: Please use a dedicated satellite B8 PA in a B3+8 DL CA design, otherwise B8 2nd harmonic leakage in MMPA will desense B3 RX.

30.

Q: In WTR2965 ref design, we can see a 5G LPF on main TRX path to suppress WAN harmonics to avoid WIFI 5G desense. But we know 2G/3G/4G LB TX 3rd harmonics will fall into WIFI 2.4G, do we need a 2.4G LPF?

A: Yes, Qualcomm requires a 5G LPF on main TRX path if you support 5G WIFI, but no 2.4G LPF, maybe LB duplexer can provide efficient attenuation in WIFI 2.4G band. The Tx freq of G900/LTE 900 is 880~915M, the 3rd harmonics will fall into 2640~2745M which is outside of 2.4G wifi band. In China we don't have GSM850 band. If we use 3rd harmonics typical value -39dBm, that will be $-39-48-1-12\text{dB(antenna isolation)}=-100\text{dBm}$, if it's 10M BW it will be -170dBm/Hz (5M BW it will be -167dBm/Hz), so impact will be minimal. But if use max value (-14dBm), it will be much higher. In a design with QPA QFE3320, we can see an integrated LPF which can provide extra 3rd harmonic suppression. But no such integrated LPF inside 3rd party ASM such as SKYWORKS SKY13552-669LF.

WTR2965 的常见问题及回复

▪ 31.

Q: How to deal with QFE2101 Pin5/6? If we connect VPA_APT to VCC_GSM to power GSM PA, can we NC Pin5/6?

A: You should follow Qualcomm ref design such as 80-NL713-4x for WTR4905 and 80-NP237-4x for WTR2965. You can see an example current leakage issue in <高通硬件技术期刊 2014-9-1 >. If you connect VPA_APT to VCC_GSM to power GSM PA, you should keep a series 0ohm placeholder and a shunt 4.7uF placeholder because GSM PA requires higher transient/peak current than 3G/LTE. If GSM PA is powered by VBAT, then you can NC QFE2101 pin5/6.

32.

Q: Can MSM8937 support CA?

A: Yes, 8937 supports LTE up to CAT4, including 2 × 10 MHz Carrier Aggregation (CA), UL CA is not supported.

33.

Q: How to do GSM temperature compensation? The GSM Temp comp NV seems very large and complicated, we don't know how to do it. Does Qcom have an auto tool to do RF temp compensation? We need it to speed up RF performance tuning.

A: For GSM Temp comp, please refer to Qcom doc 80-N5420-13. Qcom don't have an auto tool to do RF temp compensation.

34.

Q: What's the rational LNA gain offset value in RF calibration?

A: You can ref to Qcom MTP cal data, your LNA gain offset should be close to MTP, if far from MTP value, it may indicates you will have RX desense issue.

35.

Q: How to set GSM PA switching point?

A: Please refer to Qcom NV definition doc, you study the definition of all of the items in the NV. Pls take care of the EDGE predist swpt, suggest 2250 for GSM LB, and 2150 for GSM HB, if the predist swpt is set improperly, you will meet EDGE ORFS and modulation issue.

WTR2965 的常见问题及回复

▪ 36.

Q: What's difference between WTR2955 and WTR2965? Do we need to study WTR2955?

A: You can see the ICI is supported in WTR2965 only, for more details, pls refer to 80-NP237-5 3.2.4. And some new features will be only developed on 2965 only, e.g. SAWLESS, new band supporting... You can study WTR2965 only because you don't have any WTR2955 projects.

37.

Q: Is the FBRX working in GSM mode?

A: No, FBRX/HDET only works in 3G/4G mode, and doesn't work in GSM mode. You need to SPDT on FBRX for WTR2965 to mitigate GSM ORFS issue.

38.

Q: Is GPIO GSM PA timing different with MIPI PA? We found the default timing provided by Qcom is not suitable on our GPIO PA.

A: Yes, the timing value provide by Qcom is based on MIPI-controlled QPA, it may be not suitable for 3rd party GPIO PA. Customer need adjust timing for different 3rd party PA. You can refer to doc 80-NF238-16. Per my experience, mostly the main difference is "pa_en_start_offset_adj", QPA has one large value while 3rd party PA has it near to 0.

39.

Q: For WTR4905, Qcom provide 80-NL713-13_C(WTR4905 S-PARAMETERS AND NF CIRCLE), and we can tune the RF matching to the NF circle to achieve good sensitivity. The doc says the Data was de-embedded to the pin of the IC for the S-parameter. But is the provide NF circle is de-embedded to the pin of the IC for the S-parameter? Seems not. And seems the NF circle center is not symmetric to S-parameter, why?

A: Normally, S-parameter impedance is different from Gamma optimum point. (NF circle). Impedance matching is for maximize the Gain and NF matching is for minimize the NF. NF circle is from source-pull and this is simulation data. NF circle data in 80-NP237-13_C. The provided WTR4905 NF circle is de-embedded to the pin of the RFIC.

WTR5975 的常见问题及回复

- **适用平台**：WTR5975 related platform

- **背景**：客户提出的WTR5975相关问题及回复统一汇总如下，供大家参考。并且这些问题也在solution中做了汇总，大家可以搜索solution 00031366找到。

- **Q/A**：

- **1.**

Q: When can we get 9x50 MTP test result? And WTR5975 Max current on Pwr supply pins like WTR1605, 2DL/3DL/UL CA detail guide like WTR3925?

A: No MTP data package yet, WTR5975 design guide released just one week without CA guide. Will be updated in Rev B, we will document the max current rating on each power rail.

- **2.**

Q: WTR5975 use Qualcomm external QLNA, how much sensitivity improvement compared with old platform? How about Rx NV,LNA Cal difference?

A: We should have preliminary data by end of this month, expecting 0.3dB to 0.5dB of sensitivity improvement but could be tough comparing with Thor because of different front end.

- **3.**

Q: WTR5975 has WTR1.0 and 2.0 version for WMSS_RESET,which controlled by PMIC or MDM9x50 via resistors jumper; please let us know other effect between 1.0/2.0 in advance.

A: This is explained clearly in Design guidelines and schematics, WMSS_RESET functionality will be enabled only on 2.0, we are enabling customers to have hook in place so that board spin could be avoided between WTR1.0 and WTR2.0.

- **4.**

Q: HORXD,CA and MIMO on one design in 80-NR113-42,how to switch between them by software?

A: To check with RFSW team.

WTR5975 的常见问题及回复

▪ 5.

Q: WTR5975 has one QLINK_UL, not like WTR3925+WTR4905 have two TX_IQ separated, are there any conflict during 2UL CA?

A: It will be no conflict.

6.

Q: Can we connect groups of WTR5975 GND pins on surface layer like WTR1605? no such info in 5975 guide..

A: No need to group GND pins, no such restrictions. As we get more knowledgeable on platform, we will update Design guidelines as needed.

7.

Q: Multiple Tx share FBRX by switch, if 2UL CA wok, how to do the Pwr det simultaneously?

A: It's doing time sharing for CH0 and CH1.

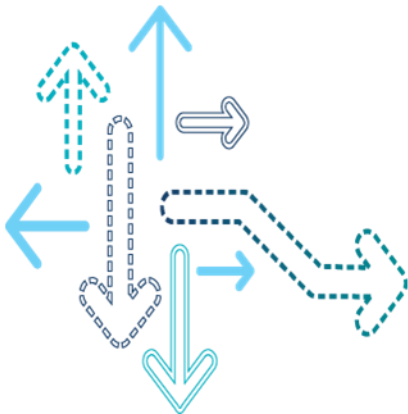
8.

Q:There is no FBRX_IQ, so how FBRX convey to MDM, through QLINK_UL?

A: Yes, Digital processing is integrated in WTR, communicate with MDM through QLIK_DL/UL.

1. WTR Configuration Of Disabling GSM DRx
2. TDSCDMA RF diversity issue and solution
3. Rx RSB Calibration
4. LTE Power Class 2
5. Antenna Number Setting

RF SW



WTR Configuration Of Disabling GSM DRx

- **Platform:** TA.2.0
- **适用平台：**TA.2.0
- **Symptom:** Generally, we won't care about the DRx configuration in RFC if diversity is not needed. We only disable them by Band-configure NV. However, in TA.2.0, GSM will crash or fail if there is improper configuration in DRx.
- **问题描述：**通常情况下，如果不需要分集，我们不用去关心RFC中DRx的配置，只是通过NV来使能或禁止所需的频段。但是在TA.2.0里面，GSM DRx如果配置错误，会引起死机和射频通路不通等问题。
- **Analysis:** In TA.2.0, even GSM DRx is disabled by NV, the configuration of WTR in GSM DRx will be applied. We'll discuss 2 issues led by DRx WTR configuration, when NV4548 = 0. However, other devices configured in DRx will not be applied.
- **问题分析：**在TA.2.0里，即使GSM分集被NV禁用，GSM分集代码中WTR的配置也会生效。此处介绍两种由于分集中WTR的配置错误导致GSM失败的问题。需要注意的是，此时NV4548=0，分集并没有使能。GSM DRx配置中，除WTR以外的其他器件配置不会生效。

WTR Configuration Of Disabling GSM DRx

- 1, DRx and PRx should be on the same WTR2965. FW will check if DRx and PRx are on the same VCO, although DRx is not enabled. If they are not on the same VCO, **phone will crash**.
- GSM的分集和主集必须在同一个WTR上**。FW会判断主/分集是否在同一个VCO上，如果不在，会死机。

```
rfc_device_info_type rf_card_wtr2955_v2_chile_ca_rx_on_rfm_device_0_gsm_g850_device_info =
{
    RFC_ENCODED_REVISION,
    RFC_RX_MODEM_CHAIN_0, /* Modem Chain */
    2, /* NV Container */
    0, /* Antenna */
    3, /* NUM_DEVICES_TO_CONFIGURE */
    {
        {
            RFDEVICE_TRANSCEIVER,
            WTR2955 /* NAME */
            0, /* DEVICE_MODULE_TYPE_INSTANCE */
            0, /* PHY_PATH_NUM */
            {
                0 /*Warning: Not specified*/, /* INTF_REV */
                (int)WTR2955_GSM_PXLYG1_BAND850_PLB1, /* PORT */
                ( RFDEVICE_RX_GAIN_STATE_MAPPING_INVALID ), /* RF_ASIC_BAND_AGC_LUT_MAPPING */
                FALSE, /* TXAGC_LUT */
                WTR2955_FBRX_ATTEN_DEFAULT, /* FBRX_ATTEN_STATE */
                0, /* Array Filler */
            }
        }
    }
};
```

```
rfc_device_info_type rf_card_wtr2955_v2_chile_ca_rx_on_rfm_device_1_gsm_g850_device_info =
{
    RFC_ENCODED_REVISION,
    RFC_RX_MODEM_CHAIN_1, /* Modem Chain */
    3, /* NV Container */
    1, /* Antenna */
    3, /* NUM_DEVICES_TO_CONFIGURE */
    {
        {
            RFDEVICE_TRANSCEIVER,
            WTR2955 /* NAME */
            1, /* DEVICE_MODULE_TYPE_INSTANCE */
            1, /* PHY_PATH_NUM */
            {
                0 /*Warning: Not specified*/, /* INTF_REV */
                (int)WTR2955_GSM_DRXLYG1_BAND850_DLB1, /* PORT */
                ( RFDEVICE_RX_GAIN_STATE_MAPPING_INVALID ), /* RF_ASIC_BAND_AGC_LUT_MAPPING */
                FALSE, /* TXAGC_LUT */
                WTR2955_FBRX_ATTEN_DEFAULT, /* FBRX_ATTEN_STATE */
                0, /* Array Filler */
            }
        }
    }
};
```

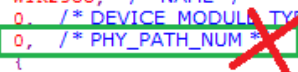
should be the same as PRx,
it should be 0 here

WTR Configuration Of Disabling GSM DRx

- 2, DRx and PRx should be configured on different PHY_PATH_NUM. Although DRx is not enabled, DRx will snatch RF resource, and PRx will fail.
- 分集和主集的PHY_PATH_NUM不能相同。** 若配成相同，分集在主集配置完成后配置，PHY_PATH_NUM对应的射频资源会再次分配给分集，导致主接收不通。

```
rfc_device_info_type rf_card_wtr2955_v2_chile_ca_rx_on_rfm_device_0_gsm_g850_device_info =
{
    RFC_ENCODED_REVISION,
    RFC_RX_MODEM_CHAIN_0, /* Modem Chain */
    2, /* NV Container */
    0, /* Antenna */
    3, /* NUM_DEVICES_TO_CONFIGURE */
    {
        {
            RFDEVICE_TRANSCEIVER,
            WTR2955, /* NAME */
            0, /* DEVICE_MODULE_TYPE_INSTANCE */
            0, /* PHY_PATH_NUM */
            {
                0 /*Warning: Not specified*/, /* INTF_REV */
                (int)WTR2955_GSM_PRLGY1_BAND850_PLB1, /* PORT */
                ( RFDEVICE_RX_GAIN_STATE_MAPPING_INVALID ), /* RF_ASIC_BAND_AGC_LUT_MAPPING */
                FALSE, /* TXAGC_LUT */
                WTR2955_FBRX_ATTEN_DEFAULT, /* FBRX_ATTEN_STATE */
                0, /* Array Filler */
            }
        }
    }
};

rfc_device_info_type rf_card_wtr2955_v2_chile_ca_rx_on_rfm_device_1_gsm_g850_device_info =
{
    RFC_ENCODED_REVISION,
    RFC_RX_MODEM_CHAIN_1, /* Modem Chain */
    3, /* NV Container */
    1, /* Antenna */
    3, /* NUM_DEVICES_TO_CONFIGURE */
    {
        {
            RFDEVICE_TRANSCEIVER,
            WTR2955, /* NAME */
            0, /* DEVICE_MODULE_TYPE_INSTANCE */
            0, /* PHY_PATH_NUM */
            {
                0 /*Warning: Not specified*/, /* INTF_REV */
                (int)WTR2955_GSM_DRXLGY1_BAND850_DLB1, /* PORT */
                ( RFDEVICE_RX_GAIN_STATE_MAPPING_INVALID ), /* RF_ASIC_BAND_AGC_LUT_MAPPING */
                FALSE, /* TXAGC_LUT */
                WTR2955_FBRX_ATTEN_DEFAULT, /* FBRX_ATTEN_STATE */
                0, /* Array Filler */
            }
        }
    }
};
```

—  should be 1

WTR Configuration Of Disabling GSM DRx

- **For GSM DRx, some RFC suggestion**
 - 1, if disable GSM DRx, only disable them by NV, don't remove them from RFC;
 - 2, if enable any GSM DRx band, make sure all GSM bands have DRx configuration in RFC;
 - 3, always make sure DRx WTR have a proper configuration although it is not enabled.
- **处理GSM分集RFC的建议**
 - 1, 如果不需要GSM的分集接收, 只需通过NV禁用掉分集的频段;
 - 2, 如果需要使能某个GSM的分集, 需要确保所有的GSM频段在RFC里都有分集配置;
 - 3, 不管是否使能GSM的分集, 分集中WTR的配置中不能有错误。

TDSCDMA RF diversity issue and solution

- **Platform:** MSM8916/36/94/96/52/76
- **适用平台：** MSM8916/36/94/96/52/76

- **Symptom:** Crash issues in TDSCDMA diversity test and online call
- **问题描述：** TDSCDMA分集测试和现网下死机的问题

- **Issue list:**
 - case1: HW doesn't support TDSCDMA DIV for B34 and B39, but set wrong value for RxD and RxD_RDDS in NV69745
 - case2: HW supports B39 DIV only, but doesn't support B34 DIV, set wrong value for RxD and RxD_RDDS in NV69745
 - case3: HW supports B34 DIV and B39 DIV, but DIV sensitivity test fail
 - case4: Cannot set NV69745

TDSCDMA RF diversity issue and solution

问题列表

- 问题1：硬件不支持分集,但是在NV69745中错误的设置RxD, RxD_RDDS成1
- 问题2：硬件仅支持B39的分集，不支持B34的分集，但是在NV69745中错误设置RxD, RxD_RDDS成1
- 问题3：硬件支持B34和B39的分集，但是工厂和现网模式下测试B34和B39的分集灵敏度没有数据
- 问题4：NV69745无法设置

Solution:

- Case1: Customers should know if HW support DIV and set correspond right value for below item in NV69745.

If support DIV, set RxD and RxD_RDDS to 1, otherwise set 0

| 69745 TDS L1 RXD Parameters /nv/item_files/modem/tdscd... TDSCDMA | | | | |
|---|-------|---------------------|------|--------|
| Fields | | | | |
| Input | Value | Name (Partial) | Size | Type |
| 3 | 3 | Version | 8 | UINT8 |
| 1 | 1 | RxD_Enable | 8 | BOOL |
| 1 | 1 | RxD_RDDS_Enable | 8 | BOOL |
| 2458 | 2458 | bler_high_threshold | 32 | UINT32 |

TDSCDMA RF diversity issue and solution

QXDM log has key words output for the setting

tdsrxdiv.c 00616 TDS_RXD: feature setting rxd 1, rdds 1, fach 1, idle 1, rxdpm 1, bch 1, acq 1, ard 1

- case2: QCT doesn't support B34 or B39 DIV separately, that means if B34 doesn't support DIV, but only B39 supports DIV, we should set RxD and RxD_RDDS to 0
- case3: Set RxD to 1, and set RxD_RDDS to 0, because in lab test, either FTM or online mode, SNR is very good, so if we enable RxD_RDDS to 1, DIV will be closed automatically.

| RXD | RXD_RDDS | description |
|-----|----------|--|
| 0 | 0 | DIV close |
| 1 | 0 | DIV enable but dynamic algorithm disable, that means DIV always on |
| 1 | 1 | DIV enable and dynamic algorithm enable, that means DIV sometimes on sometimes off |

- case4: Should set NV69745 version to 3 to make it correct for setting items.

TDSCDMA RF diversity issue and solution

问题解决：

- 问题1：客户需要根据硬件是否支持分集来正确设置NV69745中的RxD和RxD_RDDS，设置后可以在QXDM log中搜索关键字来确认设置是否正确。
- 问题2：QCT不支持B34和B39单独的分集设置，也就是说只要有一个频段不支持分集就要将RxD和RxD_RDDS设置成0。
- 问题3：需要将RxD设置成1，RxD_RDDS设置成0，因为在工厂和实验室现网模式下，信噪比很高，所以如果将RxD_RDDS设置成1，分集可能会被自动关掉，导致分集灵敏度测不出来

| RXD | RXD_RDDS | description |
|-----|----------|-----------------------------|
| 0 | 0 | 分集功能关闭 |
| 1 | 0 | 分集打开，但是动态控制算法关闭，因此分集常开 |
| 1 | 1 | 分集打开，动态控制算法打开，分集打开关闭受动态算法控制 |

- 问题4：如果出现NV69745没有激活或设置无效的情况，需要首先将第一项的版本号设置成3，然后就可以设置下面的分集选项

Rx RSB Calibration

- **Platform:** MSM8994/8996+ WTR3925/4905
- **适用平台：** MSM8994/8996+ WTR3925/4905
- **Content:** Rx RSB RF calibration explanation.
- **内容：** Rx RSB 校准介绍。
- **RF cal purpose :** WTR3925 is developed in a 28 nm processor that inherently has more mismatches, which makes it more sensitive for RSB. Nominal parts may look good, but in mass production, many parts fail specifications if they are not calibrated.
- **校准目的：** WTR3925 采用的制程导致器件的RSB比较敏感，因此需要在工厂进行校准。仅LTE、WCDMA需要Rx RSB校准，其他制式不需要。
- **Impact:** Throughput degradation is expected if RSB specification is not met
- **影响：** 如果Rx RSB未校正，可能导致TP受到影响

Rx RSB Calibration

- Rfcal NV:

`<RxRsb_Type>0</RxRsb_Type>`
`<DevicePathPair_To_NVcontainer>0,0,0,1,0,1;2,0,2;3,0,3</DevicePathPair_To_NVcontainer>`
`<RxRsb_Waveform_Offset_in_kHz>500</RxRsb_Waveform_Offset_in_kHz>`

| Band Width | Waveform Offset_in_Hz | Device_Id | Gain_State | sin_theta_before_cal | cos_theta_before_cal | gain_inv_before_cal | Rsb_before_cal |
|------------|-----------------------|-----------|------------|----------------------|----------------------|---------------------|----------------|
| 3 | 500 | 0 | 0 | 1027 | 16133 | 16605 | 43 |
| 3 | 500 | 0 | 1 | 5 | 16383 | 16276 | 49 |
| 3 | 500 | 0 | 2 | -47 | 16383 | 16414 | 55 |
| 3 | 500 | 0 | 3 | -35 | 16383 | 16426 | 55 |
| 3 | 500 | 0 | 4 | -60 | 16383 | 16413 | 53 |
| 3 | 500 | 0 | 5 | -43 | 16383 | 16405 | 56 |

`<RxRsb_DL_Bandwidth>3</RxRsb_DL_Bandwidth>`

`long CBandHelper::CalculatedDLChan_RxCalNV(BAND_CLASS_ENUM band, Long u1Chan)`

RFNV_DATA_TYPE_RXRSB_CAL

| Field | Value | Type |
|--------------------|-------|---------------|
| nv_container_idx | 0 | uint16 |
| rsb_type | 0 | uint8 |
| dl_channel | 150 | uint16 |
| freq_offset_in_kHz | 500 | int32 |
| bandwidth | 3 | uint8 |
| rsb_data_lna[0] | | rsb_data_list |
| nv_active | 1 | uint8 |
| sin_theta | 31 | int16 |
| cos_theta | 16383 | int16 |
| gain_inv | 16395 | int16 |
| rsb_data_lna[1] | | rsb_data_list |
| nv_active | 1 | uint8 |
| sin_theta | 38 | int16 |
| cos_theta | 16383 | int16 |
| gain_inv | 16244 | int16 |
| rsb_data_lna[2] | | rsb_data_list |
| nv_active | 1 | uint8 |
| sin_theta | 53 | int16 |
| cos_theta | 16383 | int16 |
| gain_inv | 16258 | int16 |
| rsb_data_lna[3] | | rsb_data_list |

Rx RSB Calibration

- Rfcal Paramters
- 校准参数

```
<Sweep_Params>
  <Sweep_Type>112</Sweep_Type>
  <Pre_Sweep_Computation>0</Pre_Sweep_Computation>
  <Compute_From_Sweep>0</Compute_From_Sweep>
  <Device_Selection>
    <Master_Device_ID>2</Master_Device_ID>
    <Slave_Device_ID>3</Slave_Device_ID>
    <NV_Device_To_Chain_Map>2,0</NV_Device_To_Chain_Map>
    <Tx_Device_To_Calibrate>2</Tx_Device_To_Calibrate>
    <Rx_Device_To_Calibrate>2,3</Rx_Device_To_Calibrate>
    <Master_Device_ID_List>2;2,0</Master_Device_ID_List>
    <Slave_Device_ID_List>3;3,1</Slave_Device_ID_List>
    <DevicePathPair_To_NVcontainer>2,0,0;3,0,1;0,0,2;1,0,3</DevicePathPair_To_NVcontainer>
  </Device_Selection>
  <Waveform>
    <Waveform_Type>3</Waveform_Type>
    <Start_RB>22</Start_RB>
    <Number_Of_RBs>6</Number_Of_RBs>
    <Tx_BW>3</Tx_BW>
    <Rx_BW>3</Rx_BW>
    <EUL_Waveform_Type>0</EUL_Waveform_Type>
  </Waveform>
  <Enable_Sweep_Mode>1</Enable_Sweep_Mode>
  <Measure_CA>0</Measure_CA>
  <Meas_Tx>0</Meas_Tx>
  <Ref_Channel>38425</Ref_Channel>
  <Tx_Channel_List>38425</Tx_Channel_List>
  <Rx_Channel_List>38425</Rx_Channel_List>
  <PA_State_List>2</PA_State_List>
  <RGI_List>50</RGI_List>
  <Bias_List>3500</Bias_List>
  <PA_Quiescent_Current>127</PA_Quiescent_Current>
  <IQ_Gain>622</IQ_Gain>
  <Env_Scale>820</Env_Scale>
  <Segment_Length>6000</Segment_Length>
  <Config_Segment_Length>35000</Config_Segment_Length>
  <Tuning_Segment_Length>15000</Tuning_Segment_Length>
```

112 will do Rx RSB cal

<Master_Device_ID_List>
Standalone_Master_Device;
CA_Pcell_Master_Device, CA_Scell_Master_Device
</Master_Device_ID_List>

1 -- sweep cal mode
0 -- serial cal mode

1- will enable scell Rx RSB cal

not use in this sweep

Rx RSB Calibration

■ 校准参数



Rx RSB Calibration

- Aux port for Drx Rx RSB Cal(1)
- 采用仪器副头进行Drx的Rx RSB 校准 (1)
 - 使用 高通内部工具进行转换

RF Software Customer Engineering Debug Tool - [Xml Tool]

Click To Connect DUT... XML Tool NV Tool BringUp Tips Admin About

1. drop one xml input file here, (支持拖拽文件至下面对话框)

Source xml: C:\Work\ModifyCalV4TreeAutoMaticly\RFSoftwareCustomerEngineeringDebugTool_V1.6\WTR3925_SSKU_3100_ESC_Params.xml

Target xml: C:\Work\ModifyCalV4TreeAutoMaticly\RFSoftwareCustomerEngineeringDebugTool_V1.6\WTR3925_SSKU_3100_ESC_Params_changed.xml

2. Chose one change Type: (改成何种tree) ☒ Do Nothing

☐ XPT->APT ☐ XPT->FULLBIAS ☐ XPT->ET ☐ FULLBIAS->APT ☐ APT->FULLBIAS ☐ Auto-Check/Modify自动检查修正 ☐ Normal->Internal Cal

3. Choose additional change you want (请选择添加下面额外修改)

☒ AUX Port Support (不用功分器校准分集)

☐ change Sweep114 back to Sweep14 (MultiBand Intra-band CA校准 sweep114不用做char)

☐ delete LTEB41 Split Band (LTEB41不使用split band)

☐ Add comment for parameters (给参数添加注释)

☐ APT 3Pastate Change To 2PAstate (APT 3级增益改为2级)

☐ modify tree to FBRx DC Cal only for FBRx char on TA2.0/TH2.0 (校准tree改为只进行FBRx DC Cal 给tabasco/thor2.0 fbrx char之前使用)

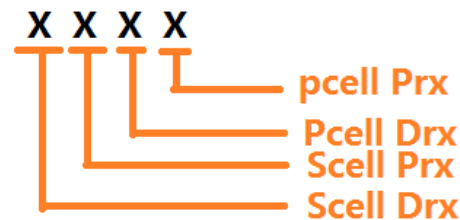
☐ cal rx with serial method (require rfcal 1854dll)

5. log打印

4. Modify (修改)

Rx RSB Calibration

- Aux port for Drx Rx RSB Cal(2)
- 采用仪器副头进行Drx的Rx RSB 校准 (2)
 - 手动修改xml
- 拷贝sweep 112
- 在第一个 112 sweep
 - `<RxRsb_Device_Mask>1</RxRsb_Device_Mask>` -- 没有 CA 的Prx 校准
 - `<RxRsb_Device_Mask>5</RxRsb_Device_Mask>` -- Pcell + Scell Prx 校准
- 在第二个112 sweep
 - `<RxRsb_Device_Mask>2</RxRsb_Device_Mask>` -- 没有CA Drx 校准
 - `<RxRsb_Device_Mask>10</RxRsb_Device_Mask>` -- Pcell + Scell Drx 校准
 - 添加`<Enable_Downlink_Aux_Port>TRUE</Enable_Downlink_Aux_Port>`
- `<RxRsb_Device_Mask>` : 用来管控Rx RSB校准的通道。Bit 0: pcell, Prx ; Bit 1: pcell, Drx, Bit 2: scell, Prx, Bit 3: scell Drx



LTE Power Class 2

- **Platform:** All
- **适用平台：**所有
- **Content:** Recently some customers are querying about LTE Power Class 2 (26dBm) status and platform support condition.
- **内容：**最近一些客户正在询问关于LTE功率等级2 (26dBm) 状态和平台支持情况。
- **Standard Status:** At present, 3GPP spec about LTE Power Class 2 detailed definition hasn't still been finalized, it not only contains RF requirements for Class 2 UEs (Peak Power/MPR/A-MPR etc.) requirement, but only have protocol part and base station requirement. So it is an overall design standpoint based on 3GPP standard.
- **标准状态：**目前关于LTE功率等级2的3GPP详细规范还没有最终定稿, 它不仅包含诸如最大功率、最大功率回退, 额外最大功率回退等射频要求, 而且还协议部分和基站协调工作的要求。所以它是一个基于标准的综合设计和考量。

LTE Power Class 2

- **QTI Status:** We are currently assessing feasibility of support for a future product once the RF requirements in the spec get defined.
- **QTI 状态：** 我们正在评估支持未来产品的可行性。
- **Action:** Please re-direct Sprint to Qualcomm SD team. Qualcomm SD LTE team is working closely with Sprint on the power class 2 feasibility, spec definition and implementation. So far, there are too much uncertainty. Sprint knows all the details and Sprint has good communication with Qualcomm SD LTE team, they needn't ask phone vendor to talk with Qualcomm
- **处理：**基本上这种需求都是运营商提出来的，如果是Sprint, 请让他直接联系高通SD team，如果其他运营商，请让其直接洽谈高通市场相关team.

Antenna Number Setting

- **Platform:** TA.2.0/TH.2.0 and derived PLs (MSM8952/8956/8976/8953/8996, MDM9x40)
- **适用平台：** TA.2.0/TH.2.0及衍生版本 (MSM8952/8956/8976/8953/8996, MDM9x40)
- **Symptom:** On previous platforms, the “Antenna” parameter in RFC only takes effect with a design which has both QTuner (e.g. QFE2550) and ASDiv feature at the same time. But on latest platforms mentioned above, the “Antenna” parameter need to be set correctly no matter whether QTuner is used or not, ASDiv is adopted or not. Otherwise, it will cause various complex issues without common symptoms like crash, set up failure, call drop, handover failure...
- **问题描述：** 在之前的老平台上，RFC中的“Antenna”参数仅仅在既使用了QTuner（例如 QFE2550）又使能了ASDiv功能的设计中才起作用。而在上面提到的最新的平台上，“Antenna”参数必须要正确地设置，无论是否使用了QTuner，无论是否使能了ASDiv功能。否则，会引起一系列表现并不一致的复杂问题例如: 死机，接入失败，掉话，切换失败。。。
- **Solution:** The “Antenna” parameter in RFC is used to capture which antenna is used in a particular RF path then to allocation RF resource correctly for each scenario.
- **解决方案：** RFC “Antenna”参数决定了在一条指定的射频链路上哪个天线会被用到，据此才能给各种场景指派正确的射频资源。

Antenna Number Setting

- In QTI reference design usually 4 antennas are used with below number allocation. And customers can find relative value setting in RFC.
- 在高通的参考设计中一般会采用4天线的设计，并且按照下面的规则分配天线的标识值。客户从RFC中也可以看到这些相关的值的设置。
 - Antenna 0 – MB/LB Primary Antenna
 - Antenna 1 – MB/LB Diversity Antenna
 - Antenna 2 – HB Primary Antenna
 - Antenna 3 – HB Diversity Antenna

```
rfc_device_info_type rf_card_wtr3925_ssku_3100_rx_on_rfm_device_0_lte_b1_device_info =
{
    RFC_ENCODED_REVISION,
    RFC_RX_MODEM_CHAIN_0, /* Modem Chain */
    0, /* NV Container */
    0, /* Antenna */ MB Primary Antenna
    2, /* NUM_DEVICES_TO_CONFIGURE */

rfc_device_info_type rf_card_wtr3925_ssku_3100_rx_on_rfm_device_1_lte_b1_device_info =
{
    RFC_ENCODED_REVISION,
    RFC_RX_MODEM_CHAIN_1, /* Modem Chain */
    1, /* NV Container */
    1, /* Antenna */ MB Diversity Antenna
    2, /* NUM_DEVICES_TO_CONFIGURE */

rfc_device_info_type rf_card_wtr3925_ssku_3100_rx_on_rfm_device_0_lte_b7_device_info =
{
    RFC_ENCODED_REVISION,
    RFC_RX_MODEM_CHAIN_0, /* Modem Chain */
    0, /* NV Container */
    2, /* Antenna */ HB Primary Antenna
    2, /* NUM_DEVICES_TO_CONFIGURE */

rfc_device_info_type rf_card_wtr3925_ssku_3100_rx_on_rfm_device_1_lte_b7_device_info =
{
    RFC_ENCODED_REVISION,
    RFC_RX_MODEM_CHAIN_1, /* Modem Chain */
    1, /* NV Container */
    3, /* Antenna */ HB Diversity Antenna
    2, /* NUM_DEVICES_TO_CONFIGURE */
```

Antenna Number Setting

- In customers designs, especially China customers will usually use 3 or 2 antennas. This request corresponding RFC change to fit it. Antenna numbering change not only applies to band configurations, but also applies to APIs which need antenna info like ASDiv APIs. The mapping between the antenna value and actual antenna is flexible. 0 can be any antenna, as long as one unified mapping is used within one RF card. Please take below example change 4 antenna design to 2 antenna design as a reference.
- 在客户的设计中，尤其是中国客户通常会选择3天线或者2天线的设计。这就要求在RFC中进行相应的修改来适应这样的设计。天线标识数的修改不仅适用于band中的配置，同时也适用于任何需要天线标识数的接口函数，例如ASDiv的接口函数。天线标识数和实际天线个数之间的映射是灵活的。比如0号天线可以是任何一个天线，只要保证在同一个RF card中所有天线到其标识数的映射是统一的就行。请参考以下将4天线设计改为2天线设计的例子。

Antenna Number Setting

- Example: Change from 4 antennas design to 2 antennas design. HB/MB/LB share one Primary Antenna and one Diversity Antenna.
- 示例：4天线设计改为2天线设计。高频/中频/低频 共享一个主集天线和一个分集天线。

Band Configuration APIs Change

```
rfc_device_info_type rf_card_wtr3925_ssku_3100_rx_on_rfm_device_0_lte_b1_device_info =
{
    RFC_ENCODED_REVISION,
    RFC_RX_MODEM_CHAIN_0, /* Modem Chain */
    0, /* NV Container */
    0, /* Antenna */ MB Primary Antenna
    2, /* NUM_DEVICES_TO_CONFIGURE */

rfc_device_info_type rf_card_wtr3925_ssku_3100_rx_on_rfm_device_1_lte_b1_device_info =
{
    RFC_ENCODED_REVISION,
    RFC_RX_MODEM_CHAIN_1, /* Modem Chain */
    1, /* NV Container */
    1, /* Antenna */ MB Diversity Antenna
    2, /* NUM_DEVICES_TO_CONFIGURE */

rfc_device_info_type rf_card_wtr3925_ssku_3100_rx_on_rfm_device_0_lte_b7_device_info =
{
    RFC_ENCODED_REVISION,
    RFC_RX_MODEM_CHAIN_0, /* Modem Chain */
    0, /* NV Container */
    2, /* Antenna */ Need change to 0 for HB Primary Antenna
    2, /* NUM_DEVICES_TO_CONFIGURE */

rfc_device_info_type rf_card_wtr3925_ssku_3100_rx_on_rfm_device_1_lte_b7_device_info =
{
    RFC_ENCODED_REVISION,
    RFC_RX_MODEM_CHAIN_1, /* Modem Chain */
    1, /* NV Container */
    3, /* Antenna */ Need change to 1 for HB Diversity Antenna
    2, /* NUM_DEVICES_TO_CONFIGURE */
```

Antenna Number Setting

ASDiv APIs Change

```
rfc_device_info_type rf_card_wtr3925_ssku_3100_lte_disable_ant_swap_1_hb_device_info =
{
    RFC_ENCODED_REVISION,
    0 /* Warning: Not Specified */, /* Modem Chain */
    0 /* Warning: Not Specified */, /* NV Container */
    2, /* Antenna */ Need change to 0 for HB ASDiv API
    3, /* NUM_DEVICES_TO_CONFIGURE */
}

rfc_device_info_type rf_card_wtr3925_ssku_3100_lte_enable_ant_swap_1_hb_device_info =
{
    RFC_ENCODED_REVISION,
    0 /* Warning: Not Specified */, /* Modem Chain */
    0 /* Warning: Not Specified */, /* NV Container */
    3, /* Antenna */ Need change to 1 for HB ASDiv API
    3, /* NUM_DEVICES_TO_CONFIGURE */
}
```

Questions?

<https://support.cdmatech.com>

