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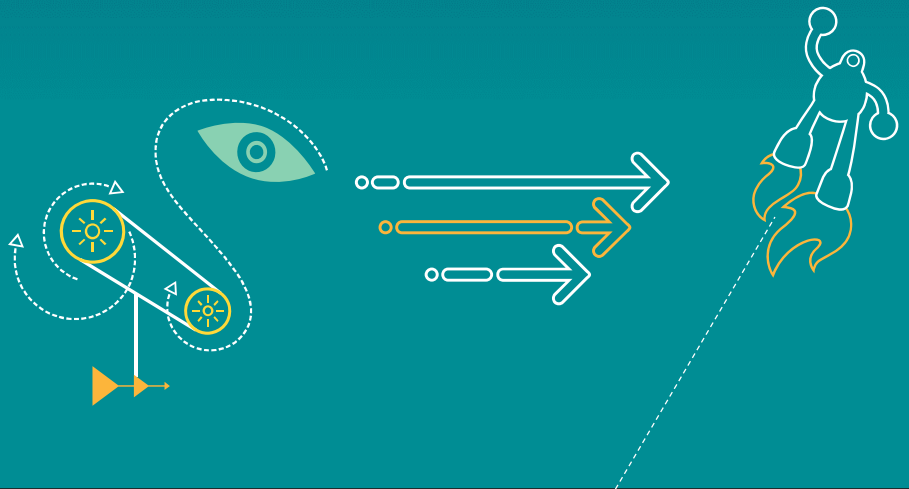
Qualcomm Technologies, Inc.



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Revision History

Revision	Date	Description
A	Dec 2015	Initial release

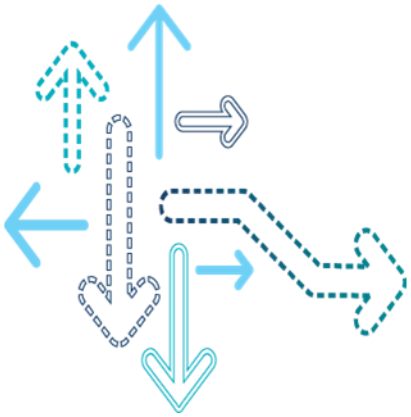
Note: There is no Rev. I, O, Q, S, X, or Z per Mil. standards.

Contents

- RF HW
- RF SW

1. GSM ORFS modulation issue
2. LTE B13 spurious emission issue for VZW supplementary testing
3. Baseband modem power supply for CA/non-CA design

RF HW



GSM ORFS modulation issue

- **Platform**: MSM8952/MSM8956/MSM8976+WTR2955/WTR2965
- **适用平台**: MSM8952/MSM8956/MSM8976+WTR2955/WTR2965

- **Description**: GSM ORFS modulation failed @ special frequency offset and fail points vary across all channels .

- **问题描述**：

GSM 调制谱在某些点失败，并且失败点和测试信道有关，测试信道改变，失败点随之变化。如下表所示的测试结果，在DCS 595信道，测试结果在±1.2M超标，而在DCS 596 信道，测试结果在±1.0M失败。以此类推。

CH	-100KHz	+100KHZ	-200KHz	+200KHZ	-400KHz	+400KHZ	-600KHz	+600KHZ	-800KHz	+800KHZ	-1000KHz	+1000KHZ	-1200KHz	+1200KHZ
595	-8.06	-8.18	-36.34	-36.19	-67.8	-66.1	-75	-75.3	-77.5	-76.87	-77.95	-77.8	-78.7	**-72.2**
596	-8.96	-8.87	-36.28	-36.39	-66.31	-66.67	-74.7	-74.7	-77.5	-76.5	-76	**-68.1**	-77.3	-78.6
597	-9.69	-9.98	-37.1	-36.6	-67.5	-67.5	-74.2	-75.8	-73.6	**-64.9**	-79.3	-79.1	-79.9	-80.5
598	-9.57	-8.34	-36.75	-36.64	-66.46	-67.37	-66.66	**-56.85**	-77.3	-76.7	-77.9	-79.2	-79.2	-79.7
599	-8.78	-8.64	-36.7	-36.6	-66.2	**-62.9**	-76	-75.4	-77.8	-76.7	-78.7	-78.5	-79.3	-79.3
600	-8.64	-9.1	-35.1	**-33**	-64.4	-65	-74.3	-75.2	-77.1	-75.9	-77.8	-78	-77.8	-79.1
601	-9.26	-9.27	-36.5	-37.3	-66.4	-66.5	-74.5	-76.1	-76.5	-76	-78.5	-78.8	-79.8	-79.6

GSM ORFS modulation issue

- **Solution**: Customer have followed our suggestion as 80-NP237-56 GSM ORFS issue section and already added SPDT on FBRX path. Cut down the FBRX path will make issue disappear. Check the GRFC logic of SPDT with Oscilloscope, it is square wave rather than keep low as designer expected. Checked customer RFC and found GRFC_12 which used for this SPDT is also used as PA_IND as default, remove the RFC_WTR2965_V2_CHILE_CA_4320_PA_IND config in the files,and then the GRFC_12 works ok.

- **解决办法**：客户已经按照80-NP237-56的指导在FBRX 路径加了SPDT， 移除 SPDT或者其他FBRX路径上的串联器件，问题消失。使用示波器检查该SPDT的控制逻辑，发现在GSM工作的时候，GRFC_12并没有像预期一样保持长低或者长高的状态，而是出现周期性的方波。检查RFC，发现GRFC_12的默认属性是PA_IND，在代码中删除PA_IND的配置后，问题解决。因此，客户在使用GRFC控制的小开关时，一定要确认该GRFC没有缺省定义为PA_IND属性。或者说不同类别的射频前端不要进行GRFC的复用。

LTE B13 spurious emission issue for VZW supplementary testing

- **Platform**: All
- **适用平台**：全部

- **Background**: For LTE B13 spurious testing, VZW has its own supplementary testing cases besides 3GPP spec 6.6.3.2, which are 2.4 SPURIOUS EMISSION BAND UE CO-EXISTENCE and 2.9 SPURIOUS EMISSIONS WITH TX GATING. When LTE B13 is transmitting at conducted mode, the spurious emission @GPS 1559-1610MHz should be no more than the limit shows in below table.
- **问题背景**：针对LTE B13 的杂散测试，VZW在3GPP 6.6.3.2规范基础上有自己的补充测试项2.4 SPURIOUS EMISSION BAND UE CO-EXISTENCE 和2.9 SPURIOUS EMISSIONS WITH TX GATING，即在线缆模式测试，LTE B13发射时，落在GPS 1559-1610MHz频段范围内的杂散不能超过下表的门限。

Frequency	Emission Limit
1559.00-1574.42 MHz	<= -60 dBm/MHz
1574.42 MHz – 1576.42 MHz	<= -80 dBm/MHz
1576.42 MHz – 1610.00 MHz	<= -60 dBm/MHz

LTE B13 spurious emission issue for VZW supplementary testing

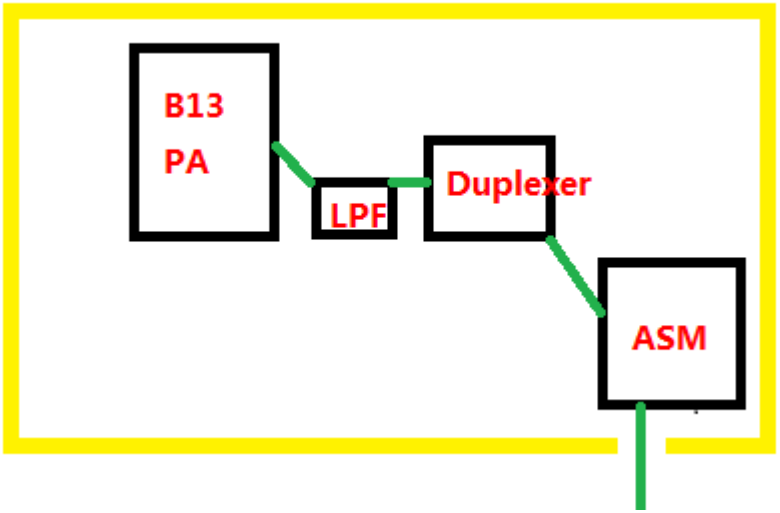
- **Symptom**: At maximum output power, the worst case value is -55.6dBm at 1572.5MHz, larger than -60dBm@1559-1574MHz.
- **问题描述**：最大发射功率下，最大杂散点1572.5MHz，幅度-55.6dBm，超过-60dBm@1559-1574MHz的规范门限。

Center Frequency	Measured Power	Upper Limit	Result	Observations
[1.55950000 GHz; 1.57392000 GHz]	[-90.9 dBm; -55.6 dBm]	-60.0 dBm	Outside	Worst case value: -55.6 dBm at 1.57250000 GHz; 1 samples outside

- **Analysis**：1. For schematic, B13 LPF is required on post PA for 2nd harmonic suppression. On the other hand, the PN of B13 duplexer should meet QCT requirement. It's confirmed that there are no problem for sch and components PN. 2. For layout, PA/LP/Duplexer/ASM are located in same shielding can, B13 2nd harmonic can be improved by13dB after removing the shielding can. 3. cutting different shape holes can improve 2nd harmonic, different shape has different testing result. Larger size, better improvement. 4. The 2nd harmonic is coupled into front end circuits through cavity resonating. The cavity resonating and coupling will be much clear after covering the shielding can.

LTE B13 spurious emission issue for VZW supplementary testing

- **问题分析**：1. Schematic上，对于B13，需要在PA后面增加一个LPF，以抑制B13的二次谐波，另外duplexer也要符合高通的推荐规格型号。确认在硬件上原理图和器件选型完全符合高通要求。2. layout上， PA、LPF、Duplexer和ASM在同一个屏蔽罩里， 当去掉此屏蔽罩，B13的二次谐波可以改善13dB。3. 在屏蔽罩上开尺寸、形状不同的孔，改善的幅度不同，孔越大，改善越明显。4. PA 的二次谐波通过屏蔽罩的腔体谐振，耦合到前端电路。当屏蔽罩盖上，谐振就越强，耦合就越明显。



LTE B13 spurious emission issue for VZW supplementary testing

- **Solution**: 1. cutting a dedicated hole on PA shielding can, but must make sure there is no radiation emission for other bands. 2. split into two separated shielding can for PA and front end circuit, that can cut off cavity coupling, and improve 2nd harmonic of B13.
- **解决方案**：1. 在屏蔽罩上开孔，但可能带来其他频段的辐射杂散的问题。 2. layout的时候建议 B13 PA和前端电路分成两个独立屏蔽罩，这样可以有效切断腔体耦合，改善B13的二次谐波。

Baseband modem power supply for CA/non-CA design

- **Platform**: MSM8952/56/76/17/37/40 + WTR29x5
- **适用平台**： MSM8952/56/76/17/37/40 + WTR29x5

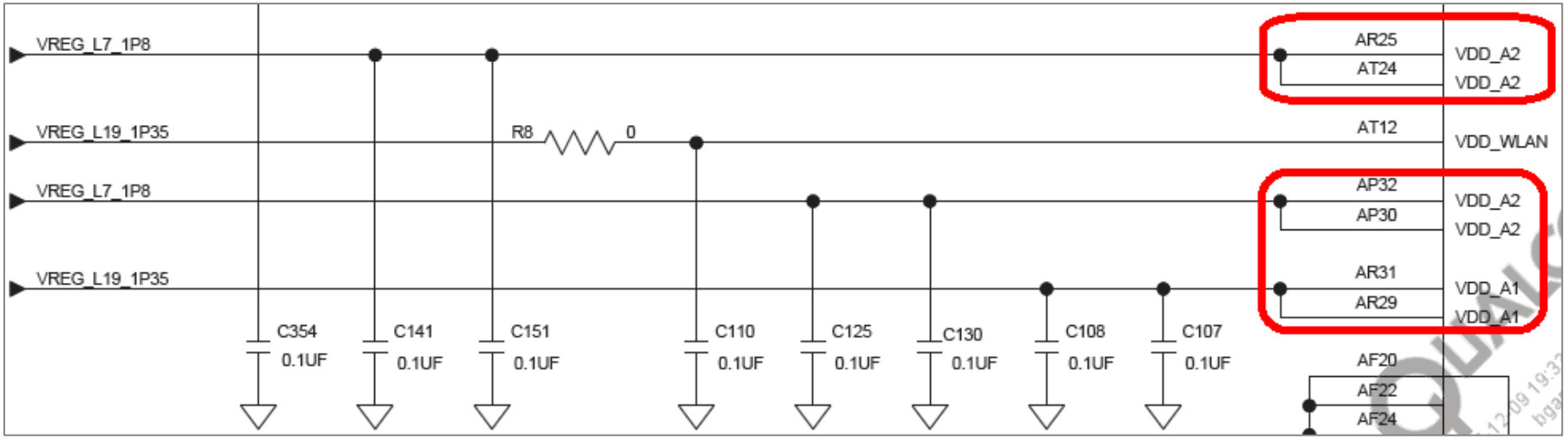
- **Symptom:** In schematic review stage, we found several customers use wrong power supply connection for modem part at MSM side.
- **问题描述：** 在原理图review阶段，我们发现一些客户基带侧Modem的供电部分存在错误。

- **Analysis:** We have a baseband document -5B which contains the information of how to handle unused pins. We can refer to it to connect Modem power supply correctly.
- **问题分析：**基带文档中有一篇对于如何处理不适用的pin脚有详细定义，我们可以参考这篇文档来正确连接Modem相关pin的供电。

Baseband modem power supply for CA/non-CA design

- **MSM8952**
  - Ref Doc:80-NT665-5B
  - 参考文档:80-NT665-5B

- Modem power pins:
  - AR25(Tx_DAC0),AT24(Tx_DAC1),AR31/AP32(Rx_CH0/1),AR29/AP30(Rx_CH2/3)
- Modem供电pin脚:
  - AR25(Tx_DAC0),AT24(Tx_DAC1),AR31/AP32(Rx_CH0/1),AR29/AP30(Rx_CH2/3)



Baseband modem power supply for CA/non-CA design

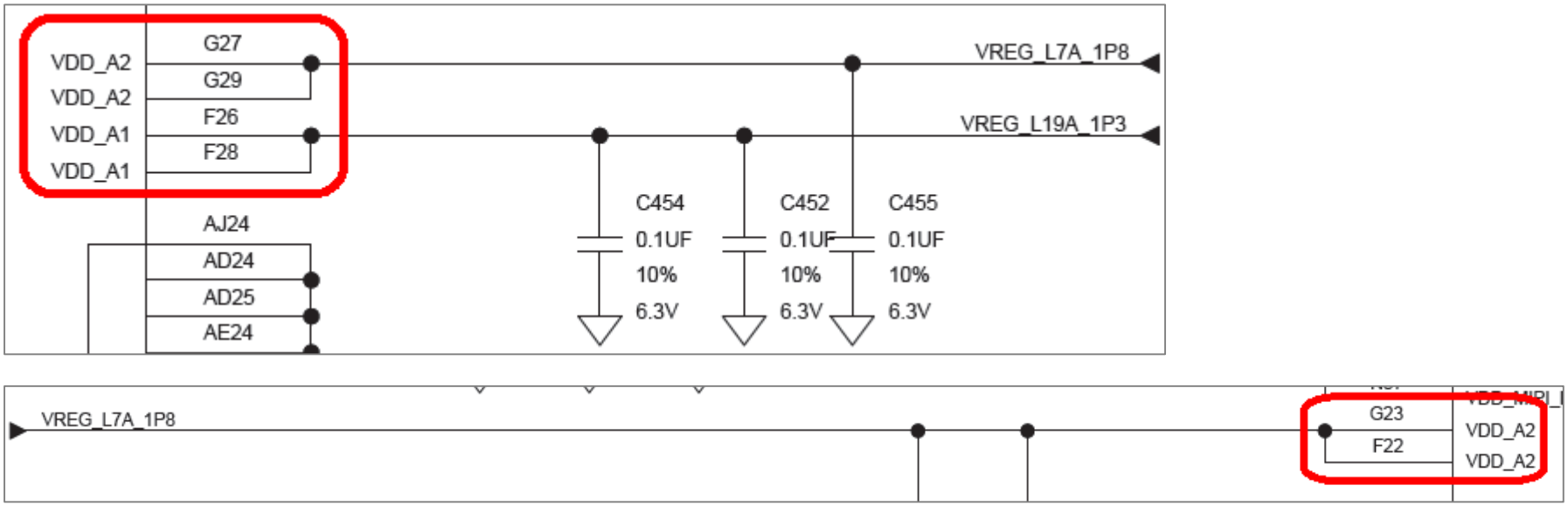
- **MSM8952**

I/F	Signal	Unused pin state	Comments
TX_DAC0	TX_DAC0_IM TX_DAC0_IP TX_DAC0_QM TX_DAC0_QP	GND	
	TX_DAC0_VREF	GND	
	VDD_A2 (AR25)	GND	
TX_DAC1	TX_DAC1_IM TX_DAC1_IP TX_DAC1_QM TX_DAC1_QP	GND	
	TX_DAC1_VREF	GND	
	VDD_A2 (AT24)	GND	
BBRX_CH0/1	BBRX_CH0_I, BBRX_CH0_Q	GND	
	BBRX_CH1_I, BBRX_CH1_Q	GND	
	VDD_A2 (AP32)	Connect to VREG_L7 if CH0 and/or CH1 is used. Connect to GND if both CH0 and CH1 are not used.	
	VDD_A1 (AR31)	Connect to VREG_L19 if CH0 and/or CH1 is used. Connect to GND if both CH0 and CH1 are not used.	
BBRX_CH2/3	BBRX_CH2_I, BBRX_CH2_Q	GND	
	BBRX_CH3_I, BBRX_CH3_Q	GND	
	VDD_A2 (AP30)	Connect to VREG_L7 if CH2 and/or CH3 is used. Connect to GND if both CH2 and CH3 are not used.	
	VDD_A1 (AR29)	Connect to VREG_L19 if CH2 and/or CH3 is used. Connect to GND if both CH2 and CH3 are not used.	

Baseband modem power supply for CA/non-CA design

- **MSM8956/76**
  - Ref Doc:80-NT667-5B
  - 参考文档:80-NT667-5B

- Modem power pins:
  - G23(Tx_DAC0),F22(Tx_DAC1),G27/F26(Rx_CH0/1),G29/F28(Rx_CH2/3)
- Modem供电pin脚:
  - G23(Tx_DAC0),F22(Tx_DAC1),G27/F26(Rx_CH0/1),G29/F28(Rx_CH2/3)



Baseband modem power supply for CA/non-CA design

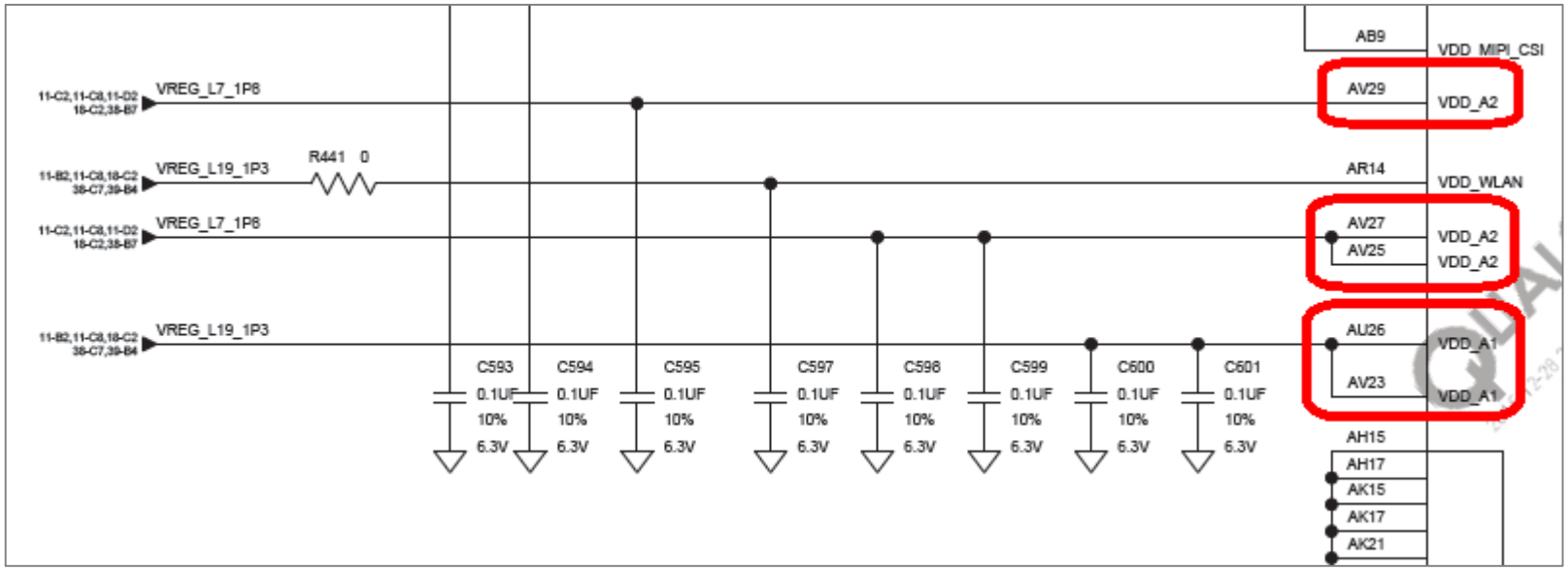
- **MSM8956/76**

I/F	Signal	Unused Pin State	Comments
TX_DAC0	TX_DAC0_IM TX_DAC0_IP TX_DAC0_QM TX_DAC0_QP	GND	
	TX_DAC0_VREF	GND	
	VDD_A2 (G23)	GND	
TX_DAC1	TX_DAC1_IM TX_DAC1_IP TX_DAC1_QM TX_DAC1_QP	GND	
	TX_DAC1_VREF	GND	
	VDD_A2 (F22)	GND	
BBRX_CH0/1	BBRX_CH0_I, BBRX_CH0_Q	Float	
	BBRX_CH1_I, BBRX_CH1_Q	Float	
	VDD_A2 (G27)	Connect to VREG_L7 if CH0 and/or CH1 is used. Connect to GND if both CH0 and CH1 are not used.	
	VDD_A1 (F26)	Connect to VREG_L19 if CH0 and/or CH1 is used. Connect to GND if both CH0 and CH1 are not used.	
BBRX_CH2/3	BBRX_CH2_I, BBRX_CH2_Q	Float	
	BBRX_CH3_I, BBRX_CH3_Q	Float	
	VDD_A2 (G29)	Connect to VREG_L7 if CH2 and/or CH3 is used. Connect to GND if both CH2 and CH3 are not used.	
	VDD_A1 (F28)	Connect to VREG_L19 if CH2 and/or CH3 is used. Connect to GND if both CH2 and CH3 are not used.	

Baseband modem power supply for CA/non-CA design

- **MSM8917/37/40**
  - Ref Doc:80-P2468-5B
  - 参考文档:80-P2468-5B

- Modem power pins: AV29(Tx_DAC0),AU26/AV27(Rx_CH0/1),AV23/AV25(Rx_CH2/3)
- Modem供电pin脚: AV29(Tx_DAC0),AU26/AV27(Rx_CH0/1),AV23/AV25(Rx_CH2/3)



Baseband modem power supply for CA/non-CA design

- **MSM8917/37/40**

Interface	Pin	Unused state	Comments
TXDAC0	TXDAC0_IP	GND	
	TXDAC0_IM	GND	
	TXDAC0_QP	GND	
	TXDAC0_QM	GND	
	TXDAC0_VREF	GND	
	VDDA_TXDAC0 (pin AV29)	GND	
	VDDMX_DAC (pin AU30)	GND	
BBRX_CH0	BBRX_IP_CH0	GND	
	BBRX_QP_CH0	GND	
	VDD_A2 (AV27)	VREG_L7A or GND	Connect to power if either channel 0 or 1 is used. Connect to GND if both are not used.
	VDD_A1 (AU26)	VREG_L19A or GND	Connect to power if either channel 0 or 1 is used. Connect to GND if both are not used.
BBRX_CH1	BBRX_IP_CH1	GND	
	BBRX_QP_CH1	GND	
BBRX_CH2	BBRX_IP_CH2	GND	
	BBRX_QP_CH2	GND	
	VDD_A2 (AV25)	VREG_L7A or GND	Connect to power if either channel2 or 3 is used. Connect to GND if both are not used.
	VDD_A1 (AV23)	VREG_L19A or GND	Connect to power if either channel2 or 3 is used. Connect to GND if both are not used.
BBRX_CH3	BBRX_I_IP_CH3	GND	
	BBRX_I_QP_CH3	GND	

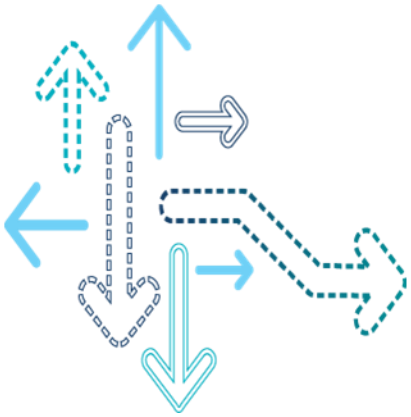
Baseband modem power supply for CA/non-CA design

- **Solution:** Please refer to BB document when design UL CA/DL CA/non-CA schematic for correct mode power supply pins connection. Otherwise it will lead to no Tx power or no Rx function.

- **解决方法：**请参考各平台基带文档，对于UL CA/DL CA/non-CA设计，在原理图阶段要把modem供电pin脚连接正确，否则会导致没有Tx功率或者某些Rx通路不通的问题。

1. TA.2.0 ICI-CA RFC Customization
2. CDMA 1x RC1 TX gating failure due to wrong MIPI PA_ON register address setting
3. How to debug WCDMA RSCP variation issues via RF AGC logs
4. Common Issues About GSM Tx Timing

RF SW



TA.2.0 ICI-CA RFC Customization

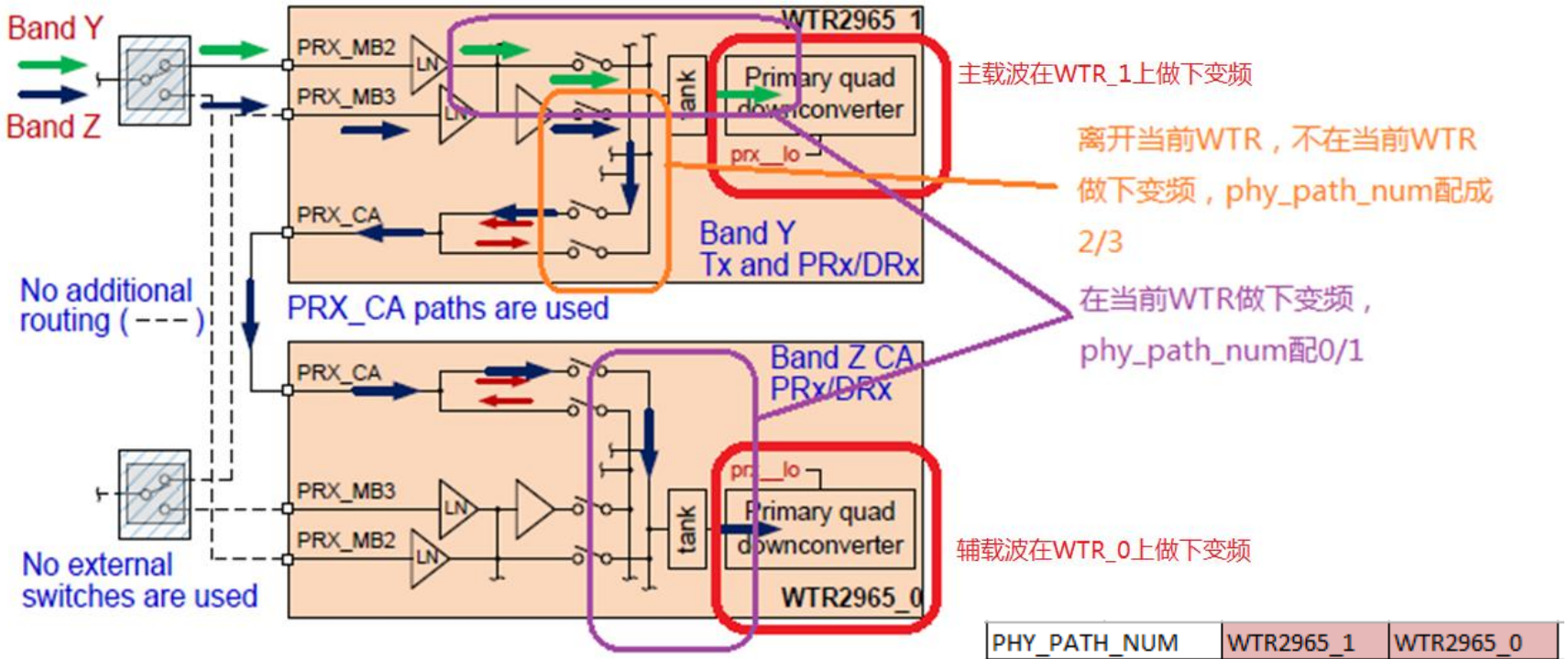
- **Platform**: TA.2.0
- **适用平台**：TA.2.0

- **Symptom**: WTR2955/WTR2965 have ICI-CA, which make design more flexible. Meanwhile, the SW feature RxTx Split is introduecd. Then, most customers have difficult in RFC customization.
- **问题描述**：WTR2955/WTR2965有用于CA的ICI端口，使得CA设计更加灵活。同时，TA.2.0的软件中引入了新的软件特性RxTx Split。这些较大的改动，使得客户修改RFC产生了一定的困难。

- **Analysis**: WTR2955 supports intra band non-contiguous DL-CA .WTR2965 supports intra band non-contiguous and inter band DL-CA (for specific CA combos) using ICI pins. In TA.2.0, preferred_bands_supported and alt_path will be used to do ICI-CA RFC customization.
- **问题分析**：WTR2955通过ICI只支持带内不连续的CA; WTR2965通过ICI可以支持带内不连续和特定组合的带间CA。TA.2.0中需要通过preferred_bands_supported和alt_path等，共同完成ICI-CA的配置。这里介绍了如何修改ICI-CA的RFC。

TA.2.0 ICI-CA RFC Customization

- SCC goes through ICI port, then 2 WTR should be configured in RFC. For the WTR where down-convert happens, PHY_PATH_NUM should be 0/1. For the WTR where only LNA is unsed, PHY_PATH_NUM should be 2/3.
- 辅载波经过ICI端口而通过两个WTR，因此需要配置两个WTR。其中，只经过LNA，不做下频段的WTR，PHY_PATH_NUM配成2/3。需要做下变频的WTR，PHY_PATH_NUM配成0/1.



PHY_PATH_NUM		WTR2965_1	WTR2965_0
Band Y	PCC	0/1	NA
Band Z	SCC	2/3	0/1

TA.2.0 ICI-CA RFC Customization

- FW check preferred_band_supported and bands_supported, then decide the device number for PCC and SCC. PCC must be on preferred_bands_supported list just as standalone mode. For example, B3+B1. If B3 is PCC and B1 is SCC, then B3 will be on device 2/3, while B1 is on device 0/1.
- 底层通过查找preferred_band_supported和bands_supported来选择主/辅载波所用的device。和单载波模式一样，主小区必须在preferred_bands_supported的频段列表上。假设B3+B1，其中B3是主载波，B1是辅载波，那么B3将在device 2/3上，B1将在device 0/1上。

```
{ /* Logical Device 2 */
  /* bands_supported */
  {                                   所能够支持的所有频段列表
    {
      /* Bit mask element 0 */
      ( ( (uint64)1 << (SYS_BAND_GSM_850 - 0) ) | ( (uint64)1 << (SYS_BAND_GSM_EGSM_900 - 0) ) | ( (uint64)1 << (SYS_BAND_GSM_DCS_1800 - 0) ) | ( (uint64)1 << (SYS_BA
      /* Bit mask element 1 */
      ( ( (uint64)1 << (SYS_BAND_LTE_EUTRAN_BAND1 - 64) ) | ( (uint64)1 << (SYS_BAND_LTE_EUTRAN_BAND2 - 64) ) | ( (uint64)1 << (SYS_BAND_LTE_EUTRAN_BAND3 - 64) ) | (
      /* Bit mask element 2 */
      ( ( (uint64)1 << (SYS_BAND_LTE_EUTRAN_BAND32 - 128) ) | ( (uint64)1 << (SYS_BAND_LTE_EUTRAN_BAND38 - 128) ) | ( (uint64)1 << (SYS_BAND_LTE_EUTRAN_BAND39 - 128)
    },
  },
  /* preferred_bands_supported */      单载波和PCC时，优先选择device2的频段列表
  {
    {
      /* Bit mask element 0 */
      ( ( (uint64)1 << (SYS_BAND_GSM_850 - 0) ) | ( (uint64)1 << (SYS_BAND_GSM_EGSM_900 - 0) ) | ( (uint64)1 << (SYS_BAND_GSM_DCS_1800 - 0) ) | ( (uint64)1 << (SYS_BA
      /* Bit mask element 1 */
      ( ( (uint64)1 << (SYS_BAND_LTE_EUTRAN_BAND1 - 64) ) | ( (uint64)1 << (SYS_BAND_LTE_EUTRAN_BAND2 - 64) ) | ( (uint64)1 << (SYS_BAND_LTE_EUTRAN_BAND3 - 64) ) | (
      /* Bit mask element 2 */
      ( ( (uint64)1 << (SYS_BAND_LTE_EUTRAN_BAND32 - 128) ) | ( (uint64)1 << (SYS_BAND_LTE_EUTRAN_BAND38 - 128) ) | ( (uint64)1 << (SYS_BAND_LTE_EUTRAN_BAND39 - 128)
    },
  },
  /* ho_rxd_bands_supported */
  {
    {
      /* Bit mask element 0 */
      (0),
      /* Bit mask element 1 */
      (0),
      /* Bit mask element 2 */
      (0),
    }
```

TA.2.0 ICI-CA RFC Customization

- SW will decide the alt_path number of each carrier, referring to alt_path_selection_tbl. In TA.2.0, PCC will be on al_path 0, while SCC of intra NC CA will be on alt path 1 and SCC of inter CA will be on alt path 2 as default. Then B3 will be on device 2/3 as PCC, B1 will be on device 0/1 with alth_path 2 as SCC.
- 底层会根据alt_path_selection_tbl来确定主/辅载波在哪个alt_path上。TA.2.0中，主载波默认在alt_path 0上，带内不连续CA的辅载波在alt_path 1上，带间CA的辅载波在alt path 2上。根据上一页，B3+B1，B3做PCC时在device2/3上，B1做SCC在device0/1上，使用alt_path 2.

```
rfc_alt_path_sel_type rfc_wtr2965_v2_chile_ca_4320_alt_path_selection_tbl[7][RFM_MAX_WAN_DEVICES] =
{
  {  /* Index 0 */
    {RFM_LTE_MODE, RFC_LTE_LTE_B3_BANDMASK,  1/*alt_path*/,  RFC_PRX_PATH     },  /* RFM_DEVICE_0 */
    {RFM_LTE_MODE, RFC_LTE_LTE_B3_BANDMASK,  1/*alt_path*/,  RFC_DRX_PATH     },  /* RFM_DEVICE_1 */
    {RFM_LTE_MODE, RFC_LTE_LTE_B3_BANDMASK,  0/*alt_path*/,  RFC_PRX_PATH     },  /* RFM_DEVICE_2 */
    {RFM_LTE_MODE, RFC_LTE_LTE_B3_BANDMASK,  0/*alt_path*/,  RFC_DRX_PATH     },  /* RFM_DEVICE_3 */
    {RFM_INVALID_MODE , 0xFF/*invalid_band*/, 0/*alt_path*/, RFC_INVALID_PATH   },  /* RFM_DEVICE_4 */
    {RFM_INVALID_MODE , 0xFF/*invalid_band*/, 0/*alt_path*/, RFC_INVALID_PATH   },  /* RFM_DEVICE_5 */
    {RFM_INVALID_MODE , 0xFF/*invalid_band*/, 0/*alt_path*/, RFC_INVALID_PATH   },  /* RFM_DEVICE_6 */
    {RFM_INVALID_MODE , 0xFF/*invalid_band*/, 0/*alt_path*/, RFC_INVALID_PATH   },  /* RFM_DEVICE_7 */
    {RFM_INVALID_MODE , 0xFF/*invalid_band*/, 0/*alt_path*/, RFC_INVALID_PATH   },  /* RFM_DEVICE_8 */
    {RFM_INVALID_MODE , 0xFF/*invalid_band*/, 0/*alt_path*/, RFC_INVALID_PATH   },  /* RFM_DEVICE_9 */
  .

                                                  辅载波用alt_path2
  {  /* Index 3 */
    {RFM_LTE_MODE, RFC_LTE_LTE_B1_B7_B40_BANDMASK,  2/*alt_path*/,  RFC_PRX_PATH     },  /* RFM_DEVICE_0 */
    {RFM_LTE_MODE, RFC_LTE_LTE_B1_B7_B40_BANDMASK,  2/*alt_path*/,  RFC_DRX_PATH     },  /* RFM_DEVICE_1 */
    {RFM_LTE_MODE, RFC_LTE_LTE_B3_BANDMASK,  0/*alt_path*/,  RFC_PRX_PATH     },  /* RFM_DEVICE_2 */
    {RFM_LTE_MODE, RFC_LTE_LTE_B3_BANDMASK,  0/*alt_path*/,  RFC_DRX_PATH     },  /* RFM_DEVICE_3 */   主载波
    {RFM_INVALID_MODE , 0xFF/*invalid_band*/, 0/*alt_path*/, RFC_INVALID_PATH   },  /* RFM_DEVICE_4 */
    {RFM_INVALID_MODE , 0xFF/*invalid_band*/, 0/*alt_path*/, RFC_INVALID_PATH   },  /* RFM_DEVICE_5 */
    {RFM_INVALID_MODE , 0xFF/*invalid_band*/, 0/*alt_path*/, RFC_INVALID_PATH   },  /* RFM_DEVICE_6 */
    {RFM_INVALID_MODE , 0xFF/*invalid_band*/, 0/*alt_path*/, RFC_INVALID_PATH   },  /* RFM_DEVICE_7 */
    {RFM_INVALID_MODE , 0xFF/*invalid_band*/, 0/*alt_path*/, RFC_INVALID_PATH   },  /* RFM_DEVICE_8 */
    {RFM_INVALID_MODE , 0xFF/*invalid_band*/, 0/*alt_path*/, RFC_INVALID_PATH   },  /* RFM_DEVICE_9 */
  },
```

TA.2.0 ICI-CA RFC Customization

- SCC configuration is as following. LGY1 is used for standalone mode and intra CA, while LGY2 is be used for inter-CA. PS. the inter-CA combination should be confirmed with us.
- 辅载波的RFC配置如下。LGY1用作单载波以及带内CA，LGY2用作带间CA。需要注意的是带间CA的组合和port mapping需跟高通确认。

	LGY	alt-path
Intra-CA	1	1
inter-CA	2	2

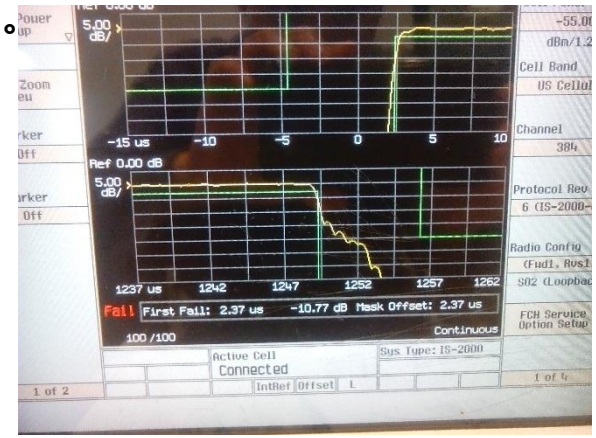
CDMA 1x RC1 TX gating failure due to wrong MIPI PA_ON register address setting

- **Platform**: MSM8916/39+WTR4905 (DPM 2.0), MSM8909 + WTR4905 (Jolokia 1.0)
- **适用平台**： MSM8916/39+WTR4905 (DPM 2.0), MSM8909 + WTR4905 (Jolokia 1.0)

- **Symptom:** CDMA 1x RC1 TX gating test fails due to mask is violated, **meanwhile**, tuning these timing macro definitions in modem_proc\rftech_cdma\common\rf\inc\rf_cdma_constants.h does NOT improve. Failure test screen shot on Agilent 8960 test box is shown as below.

- **问题描述：** CDMA 1x RC1门控发射测试因为测试到的功率曲线失败碰触了模板门限而失败。**并且**，调节modem_proc\rftech_cdma\common\rf\inc\rf_cdma_constants.h中以下几个CDMA时序参数宏定义的值，测试结果没有任何改善。失败现象如图。

  - RF_CDMA_TX_WARM_UP_US
  - RF_CDMA_PA_WARM_UP_US
  - RF_CDMA_TX_TURN_OFF_DELAY_US
  - RF_CDMA_PA_TURN_OFF_DELAY_US



CDMA 1x RC1 TX gating failure due to wrong MIPI PA_ON register address setting

- **Analysis:** This problem is due to the MIPI PA applied on CDMA bands' doesn't have an exclusive PA_ON register, but customer defines PA_ON register address in MIPI PA driver as 0x00, which is expected to be RFFE_INVALID_REG_ADDR. In this category of MIPI PA, generally PA_ON is a bit in PA_Range register, whose address is 0x00. Then while enabling TX, MIPI PA driver will write wrong value RF_REG_INVALID (0xff) to MIPI PA register 0x00.
- **问题分析：**这个问题是由于CDMA频段使用的MIPI PA没有单独的PA_ON寄存器，但却将PA驱动中的PA_ON寄存器地址设置成了0x00造成的（应该设置为RFFE_INVALID_REG_ADDR）。这类的MIPI PA，PA_ON往往是PA_Range寄存器中的一个位，而PA_Range寄存器的地址是0x00。打开TX时，如果PA_ON寄存器的地址也是0x00，那么会导致射频驱动往0x00对应的PA_RANGE寄存器里写入无效值RF_REG_INVALID（0xFF），导致测波形异常。

```
static uint8 rfdevice_pa_rfmd_7459a_pa_on_regs[RFDEVICE_PA_RFMD_7459a_PA_ON_NUM_REGS] = {0x00 /*Warning: Not Specified*/, };
static int16 rfdevice_pa_rfmd_7459a_pa_on_data[RFDEVICE_PA_RFMD_7459a_NUM_PORTS][RFDEVICE_PA_RFMD_7459a_PA_ON_NUM_REGS] =
{
 { /* PORT NUM: 0 */
   RF_REG_INVALID,
 },
 { /* PORT NUM: 1 */
   RF_REG_INVALID,
 },
 { /* PORT NUM: 2 */
   RF_REG_INVALID,
 },
 { /* PORT NUM: 3 */
   RF_REG_INVALID,
 },
 { /* PORT NUM: 4 */
```

if MIPI PA doesn't have exclusive PA_ON register, this value should be RFFE_INVALID_REG_ADDR, NOT 0x00.

CDMA 1x RC1 TX gating failure due to wrong MIPI PA_ON register address setting

- **Solution:** replace PA_ON register address in MIPI PA driver from 0x00 to RFFE_INVALID_REG_ADDR if MIPI doesn't have exclusive PA_ON register.

- **解决方法：**如果MIPI PA没有单独的PA_ON寄存器，那么请在PA_ON寄存器的地址处使用RFFE_INVALID_REG_ADDR，而非0x00。

How to debug WCDMA RSCP variation issues via RF AGC logs

- **Platform**: ALL
- **适用平台**：所有平台
- **Symptoms**:
- Recently we have customers reporting 2dB CPICH RSCP variation(lower) observed right after the specific testing step – WCDMA RX sensitivity testing, and the variation is not recoverable unless re-booting the DUT. The symptoms can be summarized as below:
  - 2dB CPICH RSCP variation(lower) observed.
  - Only replicable right after the specific testing step- WCDMA RX sensitivity testing.
  - Not recoverable unless re-booting the DUT.
- In this topic we will see how to narrow down the culprit via the RF AGC log analysis and also we have some extended rules summarized on how to customize the rf card to align with the WCDMA RX+TX AGC behavior.
- **问题描述**：
- 最近我们有客户向我们报告2dB CPICH RSCP 差异变化（变低）的故障， 这个故障发生在特定测试步骤-WCDMA接收灵敏度测试之后并且是不可恢复的，除非重启测试手机。故障现象总结如下：
  - 观察到2dB CPICH RSCP差异变化（变低）。
  - 仅在特定的测试步骤- WCDMA接收灵敏度测试之后复现。
  - 不可恢复，除非重启测试手机。
- 在这个主题，我们将看到如何通过RF AGC log分析来定位问题， 并且由此延伸总结关于如何配置rf card规则使其符合WCDMA RX+TX AGC动作。

How to debug WCDMA RSCP variation issues via RF AGC logs

- **Analysis:**

1. To start analyzing RSCP variation issue, we need to find out if the variation comes out of Ec/Io or RXAGC or both. **Figure 1** is used to check where the variation coming out of.
   - From the plotting, Ec/Io is maintained stable while there is 2dB dip in RX0AGC after RX sensitivity testing done which matches with the symptoms reported.
   - The conclusion of Figure 1 is that the RSCP variation comes out of RXAGC while Ec/Io is ruled out.
2. To further narrow down RX0AGC dip, **Figure 2** WCDMA AGC plotting is generated which includes TXAGC, RX0AGC & RX1AGC(here RX0AGC represents Primary RXAGC, RX1AGC represents Diversity RXAGC).
   - Following the RX0AGC clue, it is found not only 2dB dip in RX0AGC but also 2dB higher in TXAGC at the same time.
   - While observing TXAGC & RX0AGC variation RX1AGC is turned off which is a very important clue.
   - To summarize Figure 2, 2dB higher in TXAGC and 2dB dip in RX0AGC are both observed which looks to be additionally 2dB “insertion loss” suddenly added into the RTX chain, diversity chain is turned off right at the point which implies Div chain off might impact the primary RTX chain.
3. Following the clues seen in AGC plot, the next experiment is to test with DRx chain disabled by NV3851=0, it is feedback that the 2dB variation issue is gone after DRx chain disabled. The root cause is narrowed down to be DRx chain ON/OFF operation.

How to debug WCDMA RSCP variation issues via RF AGC logs

- **Analysis(cont):**

4. The left is to review the DRx chain configurations in which band the testing is ongoing.
   - It is not surprised to find that in RX1 sig_cfg there is a duplicated GRFC sig as in RX0 sig_cfg which is significant conflict because whatever it controls, it brings the signal into the unexpected state (pulled low in this case) for RX0_ON when RX1 turned off. See **Figure 3**.
   - In this case, the wrong signal state lead 2dB dip in RX0AGC and 2dB higher in TXAGC.

- **问题分析：**

1. 对于分析RSCP变化问题，我们首先要搞清楚差异来自于Ec/Io或者RXAGC或者两者都有，图一正是用来检查这个变化的出处。
   - 从图1发现完成灵敏度测试之后Ec/Io维持的很稳定而RX0AGC出现了2dB下降。这与报告的症状很吻合。
   - 从图1我们得到的结论是RSCP变化来自于RXAGC而Ec/Io在这个案例中被排除了。
2. 接下来为进一步缩小RX0AGC 2dB变化的原因，我们来查看这个过程的WCDMA AGC plotting 如图2，其中包括TXAGC,RX0AGC,RX1AGC（在这里RX0AGC表示主集RXAGC,RX1AGC表示分集RXAGC）。
   - 沿着RX0AGC的线索，我们发现在RX0AGC 2dB下降的时间点，TXAGC 也同时上升了2dB。
   - 而在观察到RX0AGC和TXAGC变化的时间点正是RX1AGC被关闭的时候。这是一个非常重要的线索。
   - 总结下图2，同时观察到TXAGC上升2dB和RX0AGC下降2dB，这个现象看起来就像是在前端RTX通路上突然额外多了2dB插损，同时RX0AGC在相同时间点关闭了,这指示分集通道关可能会影响主集RTX通道。

How to debug WCDMA RSCP variation issues via RF AGC logs

- **问题分析：**

4. 沿着在AGC plot的线索，接下的实验是在关闭分集情况下复测（NV修改NV3851=0）。结果反馈关闭分集后2dB变化的现象消失了，问题原因已经明确跟DRX 开/关有关。
5. 最后让我们来重新评审当前测试频段的分集接收配置。
   - 不出意外，在RX1的sig_cfg中存在一个与RX0 相同重复的GRFC信号配置。这是一个明显的配置冲突，因为不管它用来控制任何前端器件，当RX1关闭的时候这个信号会被置成对于RX0 ON非期望的状态（在当前案例被拉低），见图3。
   - 在当前案例中，这个错误的信号配置导致RX1关闭时RX0AGC降低2dB以及TXAGC升高2dB。

- **Solution**:
- In the solution section, let us summarize one thumb of rule on the rfc sig cfg for WCDMA(FDD) system: once you see the duplicated sig configuration across RX0 & RX1 & TX in the same band, you must be very careful and considering if it is the right signal configuration as expected.
- As seen in the analysis above, the wrong duplicated sig configuration in RX1 would impact WCDMA RX0 & TX AGC and further the other measurements like RSCP etc. the fix is removing the signal configuration in RX1, and leave it only in RX0 which would align with WCDMA RX0 & RX1 & TX AGC behavior in signaling mode.
- **解决方案：**
- 在解决方案部分，我们来总结一个WCDMA(FDD)系统专用的rfc 信号配置经验法则：一旦你发现在统一频段RX0,RX1和TX有重复的信号配置， 那么你必须特别小心了， 并且想一想 这是不是期望的正确配置。
- 如以上分析在RX1中错误的重复配置信号导致RX0和TX AGC抖动，进而影响其它测量指标如RSCP等。修复方法是在RX1 去除重复的信号仅在RX0保留，这样的配置就对齐信令模式下WCDMA RX0，RX1,TXAGC动作了。

How to debug WCDMA RSCP variation issues via RF AGC logs

Figure 1 RX0AGC vs Inst_Ec/Io

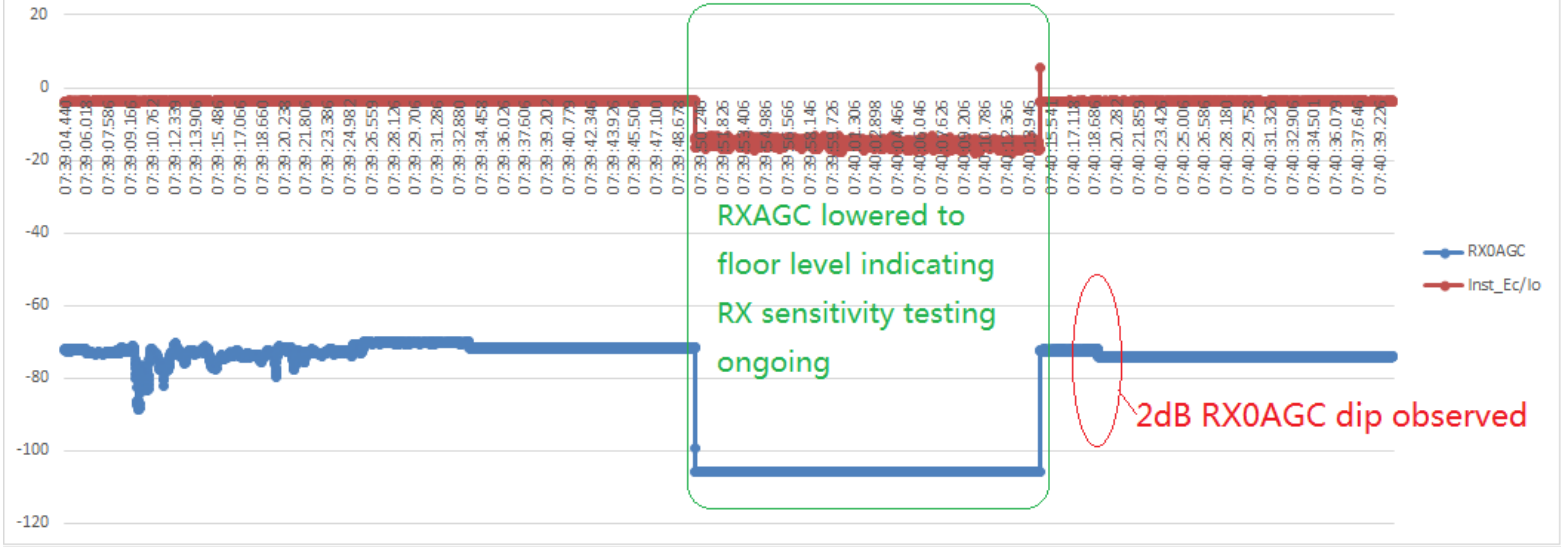
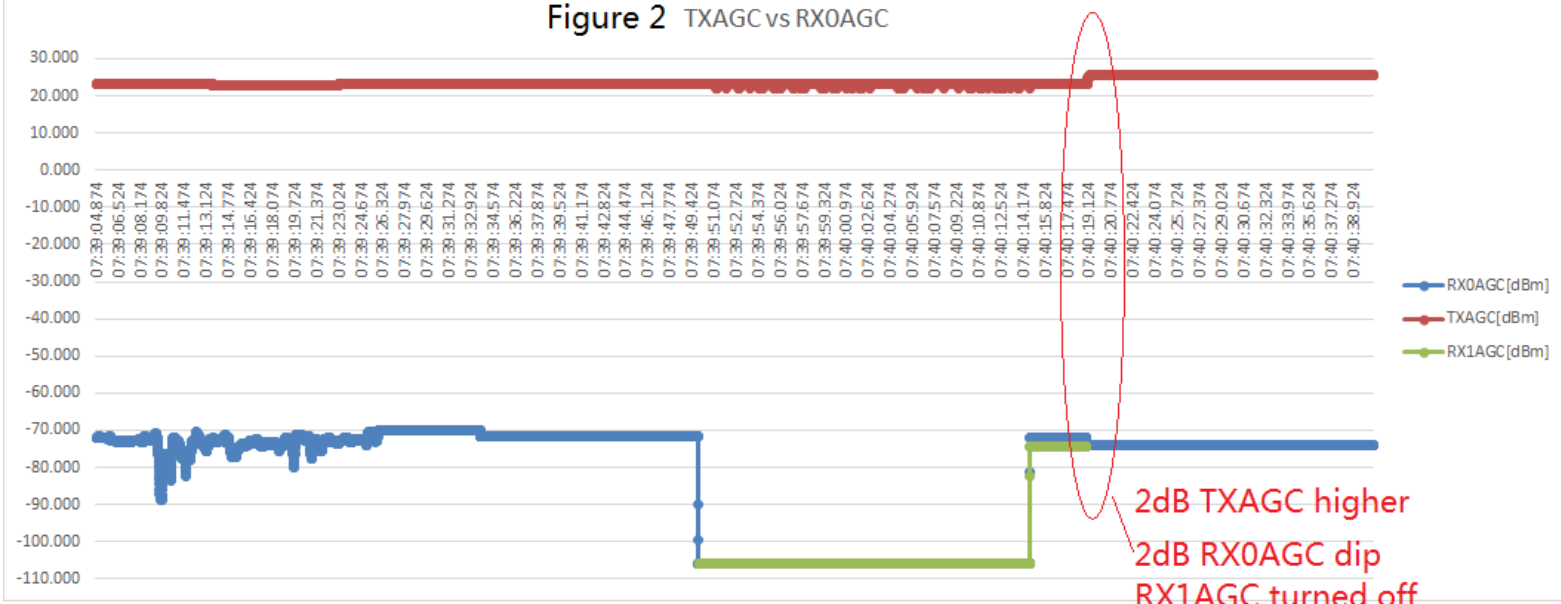


Figure 2 TXAGC vs RX0AGC



How to debug WCDMA RSCP variation issues via RF AGC logs

```
rfc_sig_info_type rf_card_wtr4905_china_v2_rx1_wcdma_b1_sig_cfg =
{
  0x04200394,   /* Revision: v4.32.916 */
  {
    { (int)RFC_WTR4905_CHINA_V2_RF_PATH_SEL_13,   { RFC_HIGH, 0 }, {RFC_LOW, 0 }  },

    { (int)RFC_SIG_LIST_END,   { RFC_LOW, 0 }, {RFC_LOW, 0 } }
  },
};
```

```
rfc_sig_info_type rf_card_wtr4905_china_v2_rx0_wcdma_b1_sig_cfg =
{
  0x04200394,   /* Revision: v4.32.916 */
  {
    { (int)RFC_WTR4905_CHINA_V2_RF_PATH_SEL_13,   { RFC_HIGH, 0 }, {RFC_LOW, 0 }  },

    { (int)RFC_SIG_LIST_END,   { RFC_LOW, 0 }, {RFC_LOW, 0 } }
  },
};
```

Duplicated signal is conflicting - when RX1 OFF, the signal is in the wrong state for RX0 ON

Figure 3

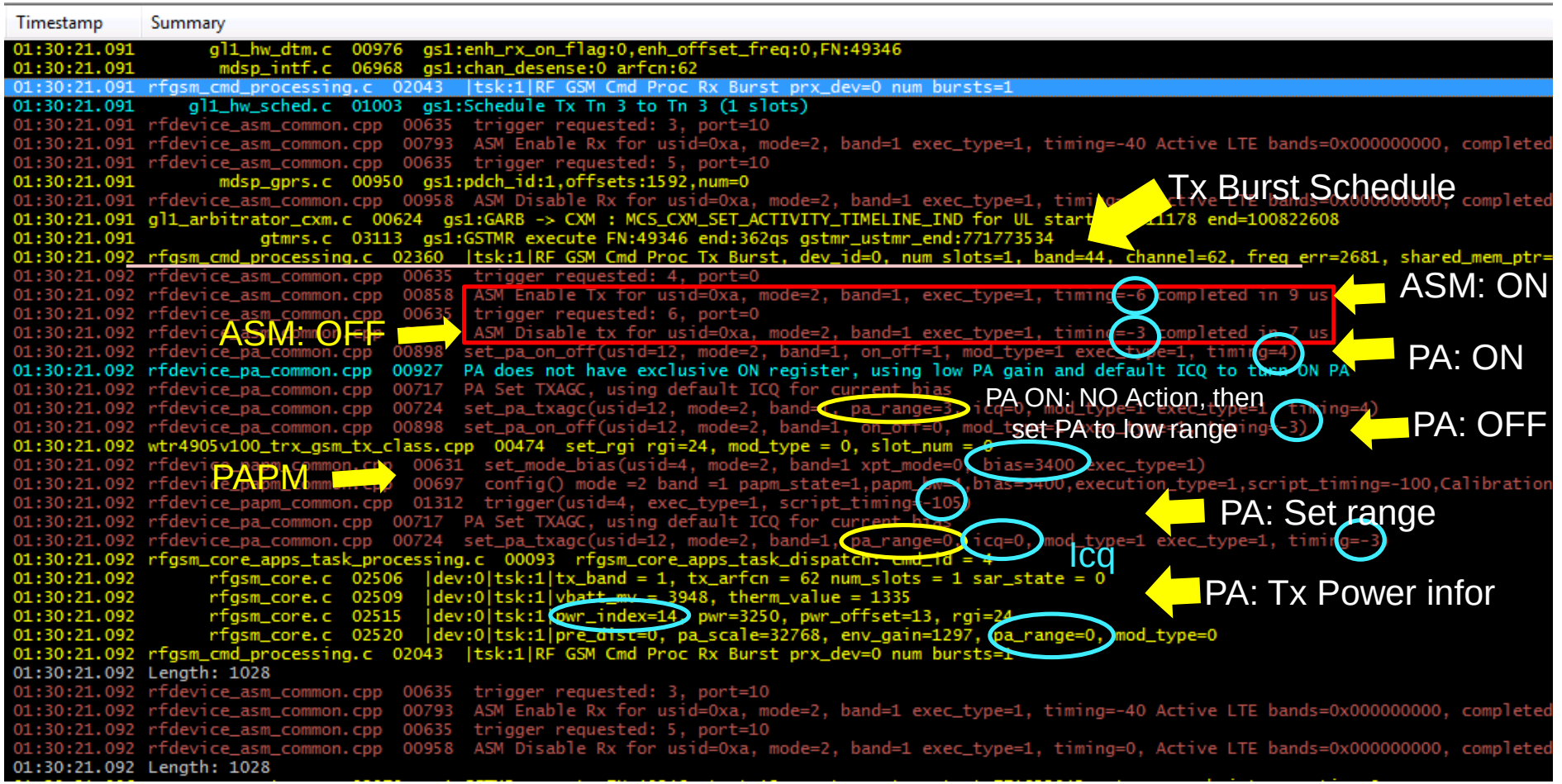
Common Issues About GSM Tx Timing

- **Platform**: MSM8x16/36/39/8909/8952/8956/8976/8994/8996
- **适用平台**：MSM8x16/36/39/8909/8952/8956/8976/8994/8996

- **Symptom**: We will summary some common RF issues caused by invalid settings of GSM Tx Timing in this topic.
  - a) QXDM log and warning msg related GSM timing
  - b) FTM/Calibration issue related with GSM timing
  - c) Call setup issue caused by GSM timing
  - For more detailed information about GSM Tx Timing, please refer to 80-NF238-16
- **问题描述**：利用本次GSM时序配置话题的机会，我们来讨论一些有关GSM时序的日志，校准，以及电话建立过程中（语音或数据业务）相关的问题：
  - a) 有关GSM时序的QXDM日志和警告信息
  - b)有关GSM时序的校准问题，测试问题
  - c)有关GSM时序的语音或数据业务建立失败问题
- 更多有关GSM时序的信息，请参考80-NF238-16

QXDM log and warning msg related GSM timing

- We can check most of GSM Timing infor from following QXDM log
- 我们可以从如下的QXDM log中查看到大部分GSM实际应用的时序信息



GSM Timing in QXDM Log: Potential Fake Error Msg

- The following error message is not recognized as a Tx timing issue. The PA range is expected to be earlier than PA ON for GRFC PA, but for MIPI PA device, PA is enabled together with PA range settings.
- For MIPI PA device, PA ON signal is expected earlier than the PA range signal, since PA ON script sets PA to the lowest gain state and overrides the settings in the PA range script; and effect UE max Tx power and EDGE pre-distortion calibration
- 以下有关PA_ON和PA_R时序的错误信息并不是表示手机真的存在时序问题。对于GRFC PA，PA_RANGE（PA增益）的期望时序应该比PA_ON（PA打开）的早；而对于MIPI PA， PA_ON和PA_RANGE是一起配置的。
- 对于MIPI PA， PA_RANGE的时序应该比PA_ON的时序晚，因为PA_ON的时序配置序列会把PA配置到最低增益模式，从而影响PA的最大发射功率和EDGE的预失真校准。

Name	Timestamp	Summary
GSM L1/High	00:04:19.736	l1_tch.c 02418 gs2:FN:507566,TSC:0,sacch_minus_one_frame:11
GSM L1/Medium	00:04:19.736	gl1_msg.c 00862 gs2:FT handler add 0xc0bb44bc num_ft_handlers 5
GSM L1/Medium	00:04:19.736	l1_tch.c 02771 gs2:Homing seq transmitted fn=46
GSM L1/High	00:04:19.736	mdsp_intf.c 06985 gs2:chan_desense:2 arfcn:62
GSM L1/High	00:04:19.736	mdsp_intf.c 06985 gs2:chan_desense:2 arfcn:62
GSM L1/High	00:04:19.736	mdsp_dtm.c 00970 gs2:CXM : GMDSP RX slot=0 coex_priority=0, coex_desense_id=4294967280
GSM L1/Error	00:04:19.736	mdsp_dtm.c 01014 gs2:Invalid mdsp pointer
Radio Freque...	00:04:19.736	rfgsm_cmd_processing.c 01621 |tsk:2|RF GSM Cmd Proc Rx Burst prx_dev=0 num bursts=1
GSM L1/High	00:04:19.736	gl1_hw.c 10231 gs2:GL1 band change request: new band=44; prev band=44 cmd issued 1
GSM L1/High	00:04:19.736	mdsp_dtm.c 02192 gs2:CXM : GMDSP TX slot=0 coex_priority=0, coex_desense_id=4294967280
GSM L1/Medium	00:04:19.736	gl1_hw_sched.c 00995 gs2:Schedule Tx Tn 3 to Tn 3 (1 slots)
GSM L1/High	00:04:19.736	mdsp_intf.c 06985 gs2:chan_desense:0 arfcn:1
GSM L1/High	00:04:19.736	gl1_hw_gsm.c 02350 gs2: dynamic_tx_div_enable_disable = 0
GSM L1/High	00:04:19.736	mdsp_gprs.c 00707 gs2:CXM : GMDSP monitor=0 coex_priority=0, coex_desense_id=4294967280
GSM L1/High	00:04:19.737	gl1_hw.c 11094 gs2:get_gfw_app_mode 0
GSM L1/Medium	00:04:19.737	mdsp_intf_async.c 00370 gs2:Sleep cmd 1
GSM L1/High	00:04:19.737	gtmrs.c 02400 gs2:GSTMR execute FN:507566 end qs:449 qstmr ustmr_end:902269879
Radio Freque...	00:04:19.737	rfgsm_cmd_processing.c 01925 |tsk:2|RF GSM Cmd Proc Tx Burst, dev_id=0, num_slots=1, band=44, channel=62
Radio Freque...	00:04:19.737	wtr1605_gsm_tx.c 00984 wtr1605_gsm_set_rgi(rgi=20)
Radio Freque...	00:04:19.737	rfc_gsm.cpp 02027 TX-ON PA-device set_gain_range() is late and with wrong pa_range=1,mode_type=0
Radio Freque...	00:04:19.737	rfgsm_core_apps_task_processing.c 00094 rfgsm_core_apps_task_dispatch: cmd_id = 4
Radio Freque...	00:04:19.737	rfgsm_core.c 02199 |dev:0|tsk:2|tx_band = 1, tx_arfcn = 62 num_slots = 1 sar_state = 0
Radio Freque...	00:04:19.737	rfgsm_core.c 02202 |dev:0|tsk:2|vbatt_mv = 3874, therm_value = 1036
Radio Freque...	00:04:19.737	rfgsm_core.c 02206 |dev:0|tsk:2|Power after simultaneous SAR limit = 2650
Radio Freque...	00:04:19.737	rfgsm_core.c 02212 |dev:0|tsk:2|pwr_index=11, pwr=2650, pwr_offset=43, rgi=20
Radio Freque...	00:04:19.737	rfgsm_core.c 02217 |dev:0|tsk:2|pre_dist=0, pa_scale=32768, env_gain=1297, pa_range=1, mod_type=0

FTM/Calibration issue related with GSM timing

- **Symptom**:The max Tx power under high PA gain mode for GSM, is only ~20dBm
- **问题描述**：GSM在PA高增益下的最大发射功率只有20dBm左右

- **Analysis**:
  - Check the reg_0 status of MIPI PA: it always stays at low power mode, reg_0[1:0]=11
  - Set PA gain to highest gain mode, DUT Tx power is over 33dBm(for low bands)
  - While there is no issue for RFC, PA driver and FTM operation issue as checked
  - Check GSM Tx timing NV form qcn, review Tx timing from RFC:
    - <NvItem id="24980" name="RFNV_GSM_C0_GSM850_TX_TIMING_I" mapping="direct" encoding="dec">
    - **-66,9,0,2,-1,-30,0**</NvItem>

```
rfc_sig_info_type rf_card_wtr4905_chile_srlte_v2_tx0_gsm_g850_sig_cfg =
{
  RFC_ENCODED_REVISION,
  {
    { (int)RFC_WTR4905_CHILE_SRLTE_V2_TIMING_PA_CTL,    { RFC_CONFIG_ONLY  /*Warning: Not specified*/ , -10 }, {RFC_LOW, 0 }  },
    { (int)RFC_WTR4905_CHILE_SRLTE_V2_TIMING_PA_RANGE,    { RFC_CONFIG_ONLY  /*Warning: Not specified*/ , -3 }, {RFC_LOW, 0 }  },
    { (int)RFC_WTR4905_CHILE_SRLTE_V2_TIMING_ASM_CTL,    { RFC_CONFIG_ONLY  /*Warning: Not specified*/ , -10 }, {RFC_LOW, 0 }  },
    { (int)RFC_WTR4905_CHILE_SRLTE_V2_TIMING_TUNER_CTL,    { RFC_CONFIG_ONLY  /*Warning: Not specified*/ , -150 }, {RFC_LOW, 0 }  },
    { (int)RFC_WTR4905_CHILE_SRLTE_V2_TIMING_PAPM_CTL,    { RFC_CONFIG_ONLY  /*Warning: Not specified*/ , -100 }, {RFC_LOW, 0 }  },
    { (int)RFC_WTR4905_CHILE_SRLTE_V2_TIMING_PAPM_MULTISLOT_CTL,    { RFC_CONFIG_ONLY  /*Warning: Not specified*/ , -6 }, {RFC_LOW, 0 }  },
    { (int)RFC_WTR4905_CHILE_SRLTE_V2_GPDATA0_0,    { RFC_CONFIG_ONLY, 0 }, {RFC_CONFIG_ONLY, 0 }  },
    { (int)RFC_WTR4905_CHILE_SRLTE_V2_INTERNAL_GNSS_BLANK_CONCURRENCY,    { RFC_HIGH, -10 }, {RFC_LOW, 0 }  },
    { (int)RFC_WTR4905_CHILE_SRLTE_V2_TX_GTR_TH,    { RFC_CONFIG_ONLY, -10 }, {RFC_LOW, 66 }  },
    { (int)RFC_SIG_LIST_END,    { RFC_LOW, 0 }, {RFC_LOW, 0 } }
  },
};
```

- **问题分析:**
  - 检查MIPI PA reg_0 寄存器状态，该寄存器总是处于最低增益模式，即reg_0[1:0]=11
  - 使用MIPI控制接口手动配置PA增益到最高增益，发射功率可以达到33dBm以上(低频段)
  - 检查RFC，PA驱动，以及FTM操作方式，都没有问题(如上)

FTM/Calibration issue related with GSM timing

- According Tx timing set in NV and RFC, we can get the following final timing applied to GSM: PA_ON timing is later than PA_RANGE timing, and PA is gated to lowest gain state always.
- 根据NV和RFC中时序的配置，我们得出如下最终应用于GSM系统的时序。PA_ON比PA_RANGE的时序晚，所以PA的增益被限制在了最低增益状态。

Tx Timing Item	RFC name	RFC Value	NV Value	Final Value	Note
tx_burst_offset_adj			-66	-66	Timing in NV
pa_en_start_offset_adj	**PA_CTL (PA_ON)**	-10	9	1	=pa_start_offset_adj + pa_en_start_offset_adj + PA_CTL start timing in RFC =2+9+(-10)
pa_en_stop_offset_adj	**PA_CTL (PA_OFF)**	-10	0	-1	=pa_stop_offset_adj + pa_en_stop_offset_adj + PA_CTL stop timing in RFC =(-1)+0+0
pa_start_offset_adj	**(Ramp up)**		2	2	Timing in NV
pa_stop_offset_adj	**(Ramp down)**		-1	-1	Timing in NV
ant_timing_start_offset_adj	**ASM_CTL (ASM ON)**	-10	-30	-29	=pa_start_offset_adj + pa_en_start_offset_adj + ant_timing_start_offset_adj + ASM_CTL start timing in RFC =2+9+(-30) +(-10)
ant_timing_stop_offset_adj	**ASM_CTL (ASM OFF)**	-10	0	-1	=pa_stop_offset_adj + pa_en_stop_offset_adj + ant_timing_stop_offset_adj + ASM_CTL stop timing in RFC =(-1)+0+0+0
	PA_RANGE	-3	-3	-3	Timing **ONLY** in RFC

FTM/Calibration issue related with GSM timing

- So max tx power is gated to ~20dBm
- Solution: change PA_ON timing from 9 to 5 or earlier(e.g. 4) as below.

- PS: for more detailed information about GSM Tx Timing, please refer to 80-NF238-16

- 所以最大发射功率被限制在~20dBm左右了
- 解决方法：把PA_ON的时序从9提前到5或更早（如4），如下所示:

- 后记：更多有关GSM时序的信息，请参考80-NF238-16

Tx Timing Item	RFC name	RFC Value	NV Value	Final Value	Note
pa_en_start_offset_adj	PA_CTL (PA_ON)	-10	4	-4	=pa_start_offset_adj + pa_en_start_offset_adj + PA_CTL start timing in RFC =2+4+(-10)
	PA_RANGE	-3	-3	-3	Timing ONLY in RFC

FTM/Calibration issue related with GSM timing(Contd.)

- **Symptom**: EDGE pre-distortion calibration failure due to max AMAM power is low
- **问题描述**：EDGE预失真较真因AMAM的最大扫描功率过低而失败

NV_GSM_Tx_Cx_CAL - Header

Chain	Number of Channels	Channel - 1	Channel - 2	Channel - 3	Predistortion RGI	Variant Version	Number of Variant Elements	NV ID	AMAM Max Pwr	AMAM Max Pwr Min
0	3	128	190	251	21	0	22	24972	2678	2700

- **Analysis**:
  - For pre-distortion calibration failure, review the following check list:
  - a) EDGE port configuration in RFC: for most 3rd part PA, EDGE use different port with GSMK(GSM voice)

```
{
  RFDEVICE_PA,
  GEN_PA,  /* NAME */
  0,  /* DEVICE_MODULE_TYPE_INSTANCE */
  0 /*Warning: Not specified*/,  /* PHY_PATH_NUM */
  {
    0  /* Orig setting: */,  /* INTF_REV */
    (0x1A5 << 22)/*mfg_id*/ | (0x96 << 14)/*prd_id*/ | (4 << 7)/*sec_port_num*/ | (0)/*port_num*/,  /* PORT_NUM */
    0,  /* Array Filler */
    0,  /* Array Filler */
    0,  /* Array Filler */
    0,  /* Array Filler */
  },
},
```

EDGE port

GMSK port

- **问题分析**
  - 对于预失真校准失败，请检查如下常见问题
  - a) 对于第三方PA，检查RFC中EDGE的端口配置是否正确

FTM/Calibration issue related with GSM timing(Contd.)

- b) check PA driver configuration

```
{
  RFDEVICE_PA,
  GEN_PA,   /* NAME */
  0,   /* DEVICE_MODULE_TYPE_INSTANCE */
  0 /*Warning: Not specified*/,   /* PHY_PATH_NUM */
  {
    0   /* Orig setting:  */,   /* INTF_REV */
    (0x1A5 << 22)/*mfg_id*/ | (0x96 << 14)/*prd_id*/ | (4 << 7)/*sec_port_num*/ | (0)/*port_num*/,   /* PORT_NUM */
    0,   /* Array Filler */
    0,   /* Array Filler */
    0,   /* Array Filler */
    0,   /* Array Filler */
  },
},
```

EDGE port

GMSK port

TABLE 15. SKY77916-21 MIPI RFFE REGISTER MAP (LINEAR GMSK POWER CONTROL ONLY)

Bit Position	Description	Trigger Support	R/W	Default	Notes
Register 0, Address 0x00 (Mode Control)					
[7]	Register Map & Power Control Selector	Trigger0	R/W	0	(set to 0 to select this Linear GMSK Power Control register map)
[6:3]	PA Bias Mode Control			0000	0000 = Low Band EDGE 0100 = B34/39 TD-SCDMA 0110 = Low Band Switch OUT 0001 = High Band EDGE 0101 = B39 TDD LTE 0110 = High Band Switch OUT 0010 = Low Band GMSK 0011 = High Band GMSK
[2]	PA Enable			0	0 = PA Tx Disabled 1 = PA Tx Enabled
[1:0]	Power Range Mode			00	00 = High Power Mode (HPM) 01 = Mid Power Mode (MPM) 10 = Low Power Mode (LPM) 11 = Ultra-Low Power Mode (ULPM)

```
#define RFDEVICE_PA_SKY77916_21_PA_SET_RANGE_NUM_REGS 1
static uint8 rfdevice_pa_sky77916_21_pa_set_range_regs[RFDEVICE_PA_SKY77916_21_PA_SET_RA
static int16 rfdevice_pa_sky77916_21_pa_set_range_data[RFDEVICE_PA_SKY77916_21_NUM_PORTS
{
  { /* PORT NUM: 0 GMSK GSM850*/
    { 0x14, },   /* PA Range: 0 */
    { 0x15, },   /* PA Range: 1 */
    { 0x16, },   /* PA Range: 2 */
    { 0x17, },   /* PA Range: 3 */
  },
  { /* PORT NUM: 1 GMSK GSM900*/
    { 0x14, },   /* PA Range: 0 */
    { 0x15, },   /* PA Range: 1 */
    { 0x16, },   /* PA Range: 2 */
    { 0x17, },   /* PA Range: 3 */
  },
  { /* PORT NUM: 2 GMSK DCS1800*/
    { 0x1C, },   /* PA Range: 0 */
    { 0x1D, },   /* PA Range: 1 */
    { 0x1E, },   /* PA Range: 2 */
    { 0x1F, },   /* PA Range: 3 */
  },
  { /* PORT NUM: 3 GMSK PCS1900*/
    { 0x1C, },   /* PA Range: 0 */
    { 0x1D, },   /* PA Range: 1 */
    { 0x1E, },   /* PA Range: 2 */
    { 0x1F, },   /* PA Range: 3 */
  },
  { /* PORT NUM: 4 EDGE GSM850*/
    { 0x05, },   /* PA Range: 0 */
    { 0x05, },   /* PA Range: 1 */
    { 0x06, },   /* PA Range: 2 */
    { 0x07, },   /* PA Range: 3 */
  },
  { /* PORT NUM: 5 EDGE GSM900*/
    { 0x05, },   /* PA Range: 0 */
    { 0x05, },   /* PA Range: 1 */
    { 0x06, },   /* PA Range: 2 */
    { 0x07, },   /* PA Range: 3 */
  },
```

for GSMK port

for EDGE port

- c) check 8PSK scan power in DA swap: whether it's engough

- b) 检查PA规格书和PA的驱动，EDGE的端口是否配置正确
- c) 检查8PSK在DA扫描阶段的功率覆盖，是否足够大

FTM/Calibration issue related with GSM timing(Contd.)

- d) check power supply for GSM PA/ASM
  - If any 3rd part PAPM device(e.g. LM3263) applied for GSM PA, bypass it and recalibration GSM

```
{
  RFDEVICE_PAPM,
  LM3263,   /*PAPM LM3263*//* NAME */
  0,   /* DEVICE_TYPE_INSTANCE */
  0 /*Warning: Not specified*/,   /* PHY_PATH_NUM */
  {
    0   /* Orig setting:  */,   /* INTF_REV */
    (PAPM_MAN_ID << 22)/*mfg_id*/ | (PAPM_PROC_ID << 14)/*prd_id*/ | (PAPM_GSM_G900_PORT_ID)/*port_num*/,   /* PORT_NUM */
    0,   /* Array Filler */
    0,   /* Array Filler */
    0,   /* Array Filler */
    0,   /* Array Filler */
  },
},
```

- e) check GSM Tx timing to avoid tx timing violation
  - Whether PA_ON is later than PA_RANGE timing

Tx Timing Item	RFC name	RFC Value	NV Value	Final Value	Note
pa_en_start_offset_adj	PA_CTL (PA_ON)	-10	9	1	=pa_start_offset_adj + pa_en_start_offset_adj + PA_CTL start timing in RFC =2+9+(-10)
	PA_RANGE	-3	-3	-3	Timing ONLY in RFC

- d) 检查GSM 功放/天线开关的供电
  - 是否使用了第三方的开关电源器件(如LM3263)，如有，去掉它并直接使用电池供电，再次测试或校准GSM
- e) 检查GSM 发射时序的NV和RFC中的配置
  - 是否存在PA_ON比PA_RANGE的时序晚的情况(如上表所示)

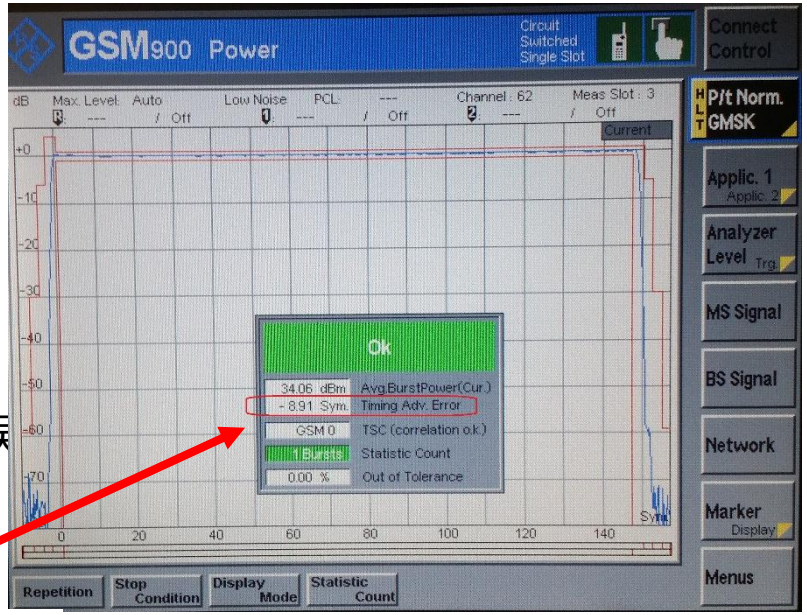
FTM/Calibration issue related with GSM timing(Contd.)

- f) check GPDATA connection in schematic and configuration in RFC
  - GPDATA configuration in RFC should match HW configuration
- g) check whether any components missed on Tx chain, or install wrong part
- h) check PA match NW to confirm it's expected

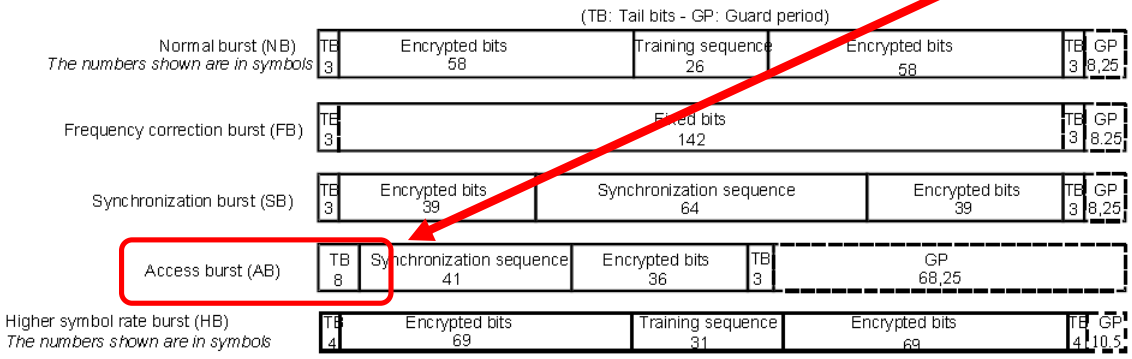
- f) 检查GPDATA管脚在原理图和RFC中的配置
  - GPDATA在RFC中的配置要正确并且与硬件一直
- g) 检查发射通路是否有漏贴，贴错器件
- h) 检查PA匹配是否正常

Call setup issue caused by GSM timing (1)

- **Symptom**: (AB)burst timing error is too large and failed to camp to callbox/NW
- **问题描述**：(AB)突发序列时序误差太大导致手机无法注册上仪器或实网
- **Analysis**: Check burst error of AB(Access Burst, RACH) or NB(Normal Burst) using callbox
  - Check burst error of AB using CMU200
  - There is 8 tail bits for AB, so if its burst error
  - is larger than 8 symbol, decoding error
  - of AB may happen to BTS side and failed to
  - set up call per no IA from network



- **问题分析**：用综测仪检查AB突发和正常突发的时序误
  - 使用CMU200可以方便的观察AB突出的时序误差
  - AB突发有8字节的保护位，如果突发误差大于

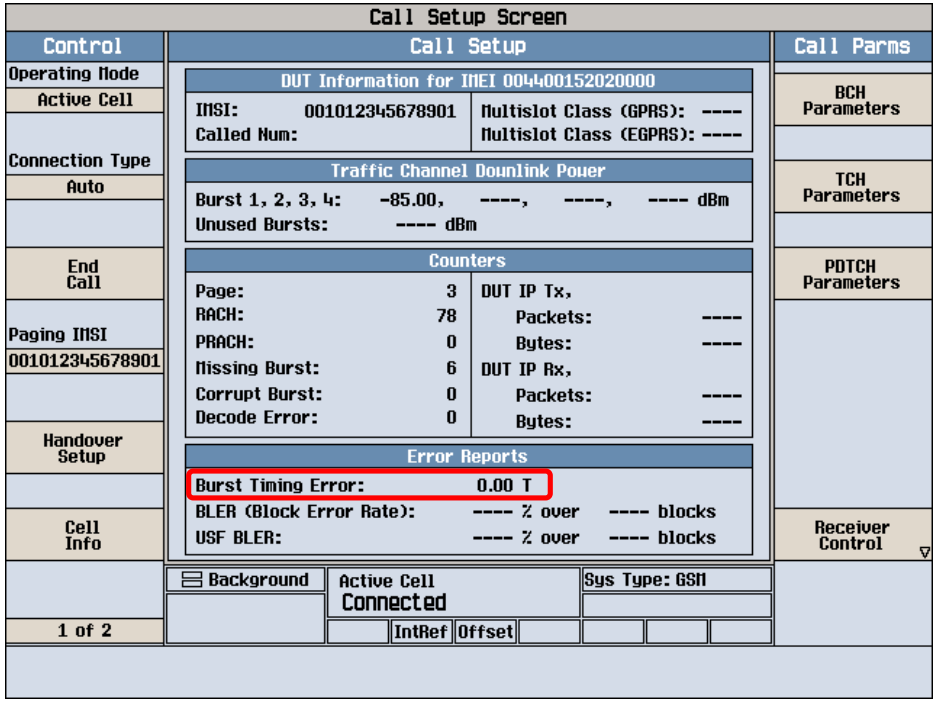


8字节，有可能造成BTS测无法正确

- 解码RACH信道，而导致网络没有
  - 立即分配回应给申请接入的手机

Call setup issue caused by GSM timing (1)

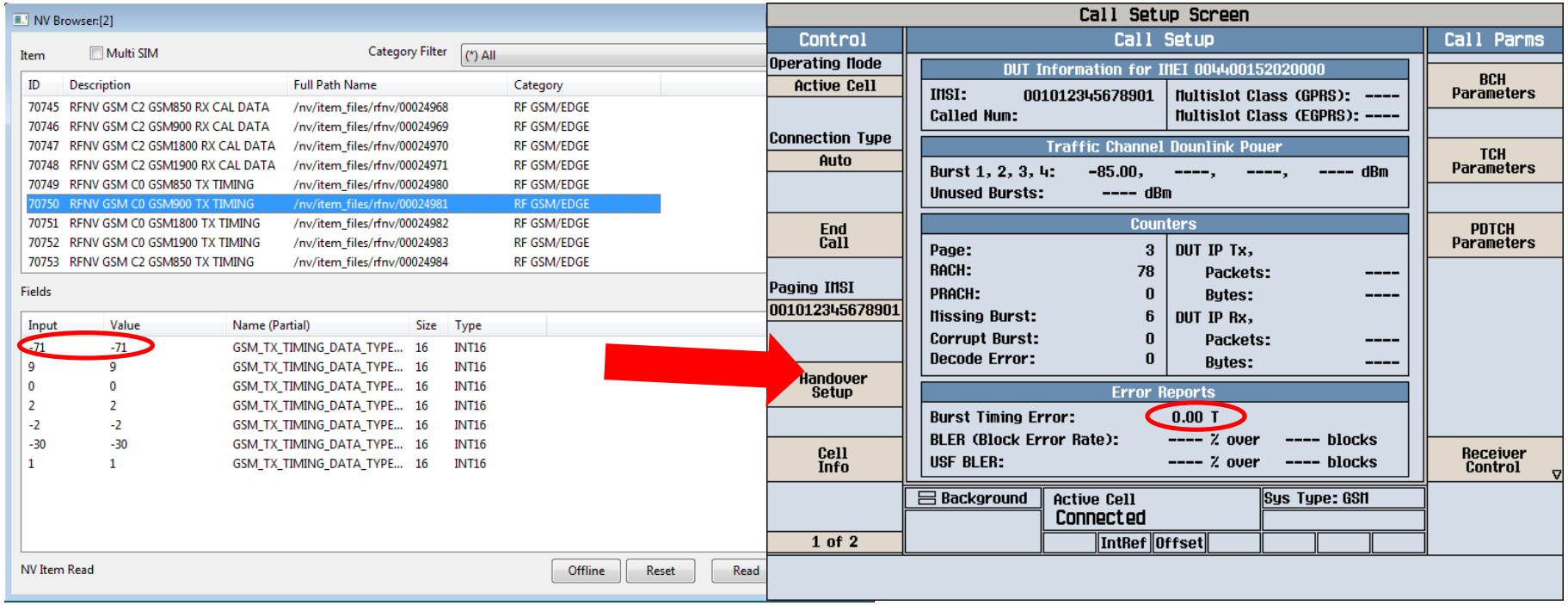
- Check burst error of other burst by CMU200, Aglient8960, or other callbox



- 使用CMU200，安捷伦8960，或其他综测仪来测量常规突发的时序误差

Call setup issue caused by GSM timing (1)

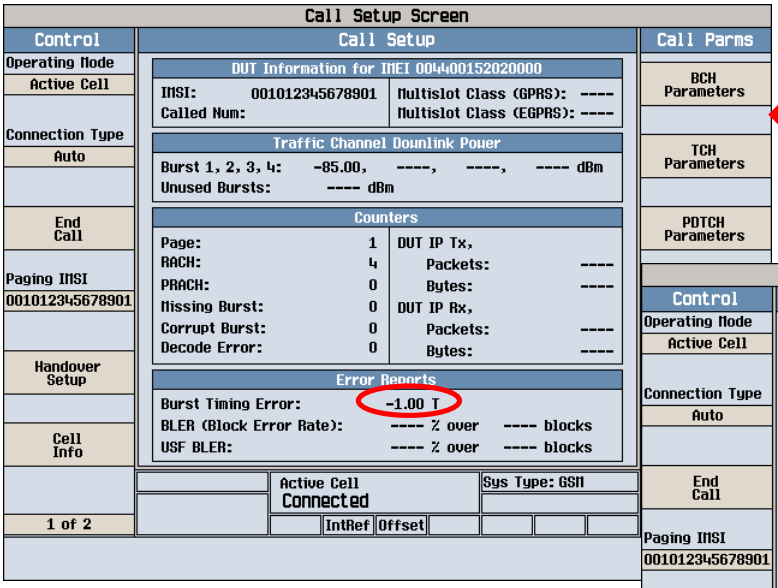
- If burst error of AB burst is too large, adjust GSM Tx NV to adjust it and make sure the error with +/-0.5bit
- For NV detailed information about GSM Tx Timing, please refer to 80-NF238-16



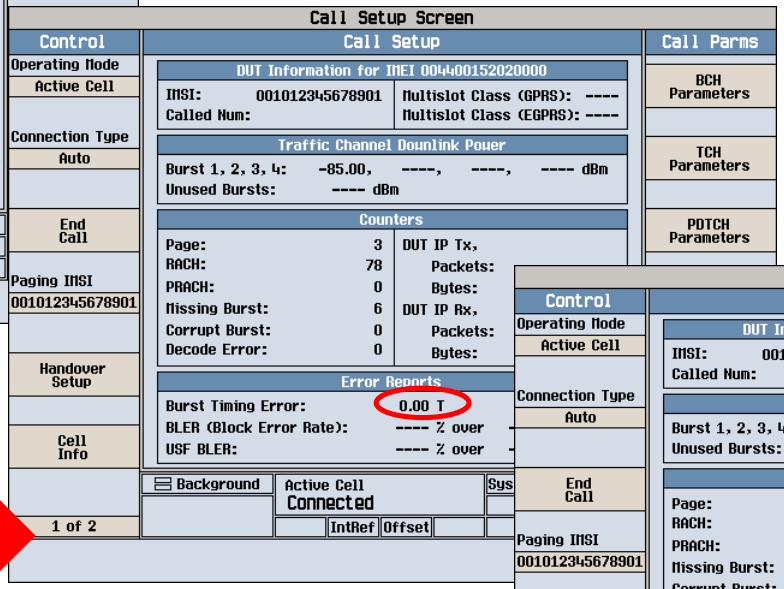
- 如使用仪器测量得到AB突发的误差太大，需要调整GSM发射时序NV，并确保突发误差在0.5bit之内
- 更多有关GSM时序NV的信息，请参考80-NF238-16

Call setup issue caused by GSM timing (1) - Solution

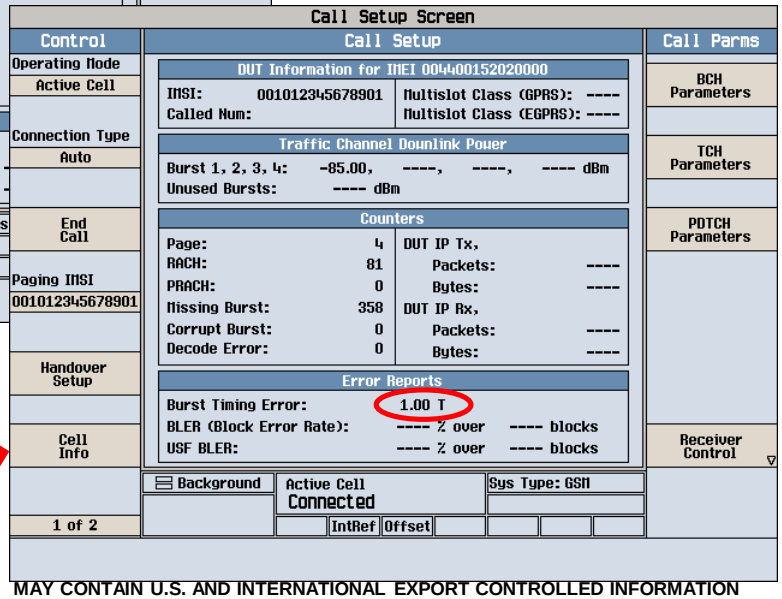
- Adjust tx_burst_offset_adj by 4(QS) roughly then by 1(QS)
  - 首先以4QS粗调，然后再1QS细调



tx_burst_offset_adj=-63
There is 1 symbol error: ahead
存在一个调制码的误差：提前了



tx_burst_offset_adj=-67
It's OK here
刚刚好



存在一个调制码的误差：滞后了
tx_burst_offset_adj=-71
There is 1 symbol error: late

Call setup issue caused by GSM timing (2)

- **Symptom**: UE fails to camp to callbox/NW due to violation b/w PA_ON and PA_RANGE
- **问题描述**：PA_ON和PA_RANGE时序冲突导致的网络注册失败
- **Analysis**: Check the failure log, most of this kind failure is
  - due to RACH failure then T3126 time out at GSM low layer,
  - or GSM L2 connection failure due to T200 timeout (UL failure)

```
LOG        [0x5A88]    GSM DSDS L1 Transmit Burst Metrics06:36:55.160     Length: 0036
LOG        [0x5A88]    GSM DSDS L1 Transmit Burst Metrics06:36:56.180     Length: 0036
LOG        [0x5A88]    GSM DSDS L1 Transmit Burst Metrics06:36:57.218     Length: 0036
LOG        [0x5A88]    GSM DSDS L1 Transmit Burst Metrics06:36:58.238     Length: 0036
MSG        [04009/02] GSM GPRS GRR/High                 06:36:58.238
rr_conn_establish.c  01013  gs2:Starting T3126(4460)
MSG        [04009/02] GSM GPRS GRR/High                 06:37:02.698
rr_gprs_debug.c  03247  gs2:Timer T3126 expired in state RR_CONNECTION_PENDING
MSG        [04009/02] GSM GPRS GRR/High                 06:37:02.699
rr_conn_establish.c  05482  gs2:Timer T3126 Expired
MSG        [04009/02] GSM GPRS GRR/High                 06:37:02.699
rr_conn_establish.c  05484  gs2:Trigger RF dump at T3126 expiry
EVENT      [00451]    EVENT_GSM_TIMER_EXPIRED          06:37:02.698     T3126
```

```
LOG        [0x5A88]          GSM DSDS L1 Transmit Burst Metrics        06:54:51.107
Length: 0036
LOG        [0x5A88]          GSM DSDS L1 Transmit Burst Metrics        06:54:51.255
Length: 0036
LOG        [0x5AC8]          GSM DSDS L2 States                        06:54:51.301
Length: 0004
LOG        [0x5A88]          GSM DSDS L1 Transmit Burst Metrics        06:54:51.342
Length: 0036
LOG        [0x5AC8]          GSM DSDS L2 States                        06:54:51.536
Length: 0004
Subscription ID = 2
SAPI            = 0
L2 State        = Establishment Pending
L2 Event        = T200 Timeout
```

- **问题分析**：
- 检查QXDM失败日志可知，由GSM时序导致的失败的直接原因是
  - 接入信道失败，然后底层的T3126定时器超时
  - 或者层2链接建立失败，然后T200定时器超时

Call setup issue caused by GSM timing (2)

- Check GSM Tx timing NV, we can find the following violation configuration b/w PA_ON and PA_RANGE

Tx Timing Item	RFC name	RFC Value	NV Value	Final Value	Note
pa_en_start_offset_adj	PA_CTL (PA_ON)	-10	9	1	=pa_start_offset_adj + pa_en_start_offset_adj + PA_CTL start timing in RFC =2+9+(-10)
	PA_RANGE	-3	-3	-3	Timing ONLY in RFC

- 检查GSM时序NV，我们大多可以发现如上的配置冲突，即PA_ON的时序晚于PA_RANGE

- **Solution**: Refer to 80-NF238-16, adjust PA_ON timing ahead of PA_RANGE

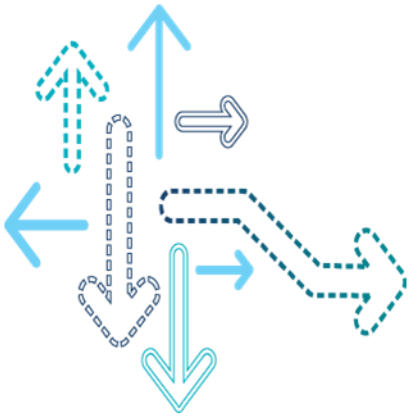
Tx Timing Item	RFC name	RFC Value	NV Value	Final Value	Note
pa_en_start_offset_adj	PA_CTL (PA_ON)	-10	4	-4	=pa_start_offset_adj + pa_en_start_offset_adj + PA_CTL start timing in RFC =2+4+(-10)
	PA_RANGE	-3	-3	-3	Timing ONLY in RFC

- **解决方案**：参考文档80-NF238-1，调整PA_ON的时序，使之早于PA_RANGE

Call setup issue caused by GSM timing (2)

- Please note that GSM Tx timing violation is one of the reason of GSM call setup failure issues, but not the common reason or only reason.
- Thus if no other obvious error check from other POV. Check GSM Tx timing NV to make sure it's configured well

- 特别说明：GSM时序配置冲突只是GSM打电话失败的一个原因，不是常规原因或唯一原因；因此如在其他方面没有发现明显错误，请检查GSM时序NV并确保其配置得当。



Questions?

https://support.cdmatech.com