*Part A : Tx Tune-up*

**Content**



**1. Purpose**

This panel gives the possibility to manage the mobile in the transmit mode.
This window includes both:
- all the parameters (frequency band, RF channel, RF level to get the desire antenna output power⋯) the user needs to make the mobile transmitting,
- all the parameters needed to define a transmit burst,
- all the compensation table, temperature alignment parameters ⋯ to be able to align the mobile in production.

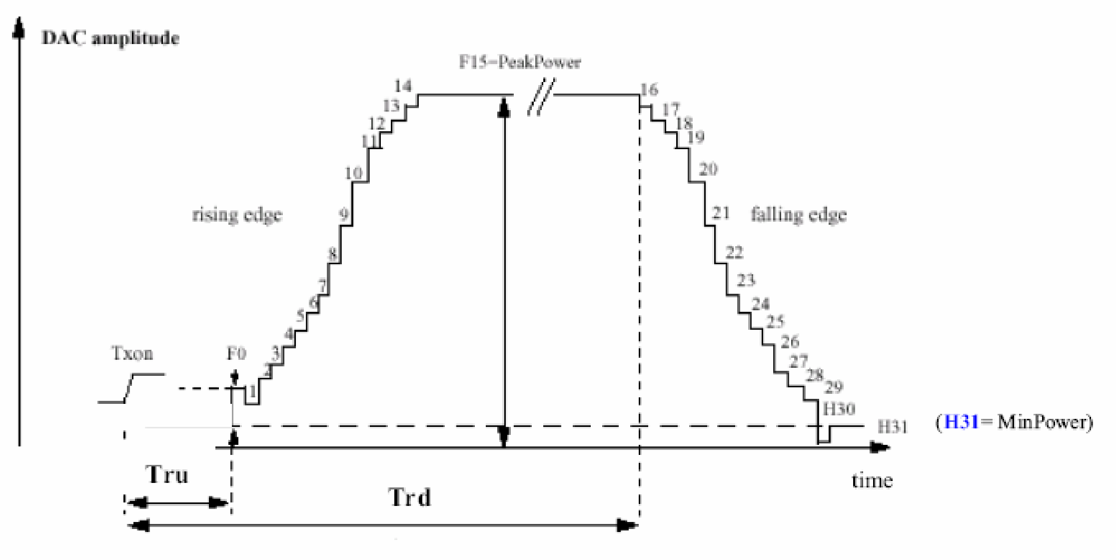
This Tx_commands user guide is describing:
- the characteristics of the transmit burst,
- all the parameters used in the transmit mode,
- the operating mode to make the mobile transmitting

**2. General description**

**2.1. Characteristics of the transmit burst**

The power levels and the shape of a transmit burst are controlled by the power amplifier controller integrated in the MT6235. The commands of the burst itself is generated by a 10 bits DAC from the BPI of MT6235 as shown below:
The ramping shape is referenced with the rising edge of Tx-ON (from the BPI).
The transmit 2 types of parameters define the transmit burst: the first shapes the gabarit of the burst, and the
second one the temporal position of the burst.
The rising and the falling edge of the transmit burst are determined by a set of 32 DAC

code values n = 0 ⋯ 31.




**Tru** = **TxTRUDefault** + △TRU_P + △TRU_T

**Trd** = **TxTRD_NBDefault** + △TRD_P (for a normal burst).

**Trd** = **TxTRD_ABDefault** + △TRD_P (for an access burst).

## 3. Parameters

F(n) are values coming from the DAC to shape the transmit burst. Some F(n) values have a corresponding
parameter used in the TAT to align the mobiles.

**Parameter used in TAT** = [F(n)].

### 3.1. Parameters used to shape the burst

- **H0** = [F(1)] controls the rate at which energy is given to the control loop at the beginning of the ramp. This energy is needed to bring the PA system control in a closed loop. This is the second code coming from the MT6235 DAC.
- **PeakPow** = [F(15)] corresponds to the peak power of the transmit burst.
- **H30** = [F(30)] corresponds to the last ramping coefficients used to shape the ramp.
- **MinPow** = [F(31)] is a fixed parameter and corresponds to the Code Start of the MT6235 specification. It ensures a fast discharge of accumulated energy during the open loop mode in the summing node.

### 3.2. Parameters used to define the temporal position of the burst

#### 3.2.1. Optimum position of the burst

This parameter is **TRU** (or **△TRU_P**) on the panel, in the Optimal Burst. This is the burst starting time correction, which is optimised for each power control level.
(Note that **_P** means that the parameter is a power compensation parameter).

### 3.2.2. Optimum length of the burst

This parameter is **TRD** (or △**TRD_P**) on the panel, in the Optimal Burst. This is the burst length compensation, which is optimised for each power control level.
(Note that **_P** means that the parameter is a power compensation parameter).

### 3.3. Parameters used for temperature compensation

In order to take into account the variation in temperature of each element constituting the power control loop (detector, power amplifier, and power controller), a **temperature compensation table** is defined as below:
- 2 boundaries in temperature **T1** and **T2** (same boundaries for Rx and Tx mode, EGSM, GSM, GSM850, PCS and DCS), **T1** and **T2** are 8 bits ADC values and corresponding degree values are displayed.
- 3 values limits of the power level (threshold values) for which the correction is applied (3 for EGSM, 3 for GSM, 3 for GSM850, 3 for PCS and 3 for DCS):

**Limit△PeakPow** (for Power Control Level equal or less than limit PeakPow, the correction is applied); for example in DCS mode, if the threshold is "5", so the correction of Peak-Power is applied for PCL0, 1, 2, 3, 4 and 5.

**Limit△H0** (for PCL equal or higher than limit H0, the correction is applied).

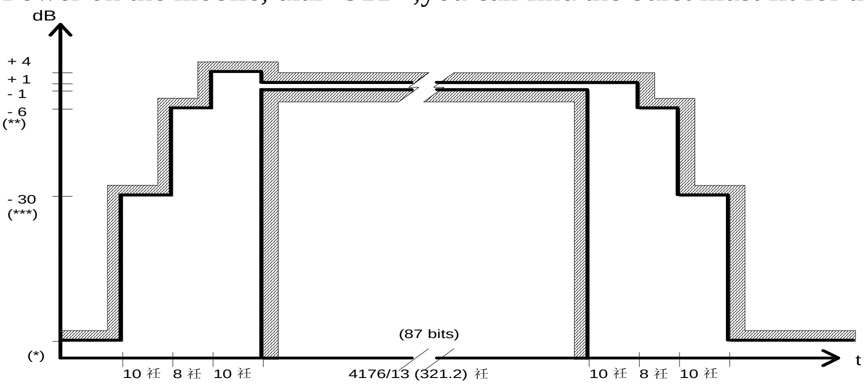
**Limit△TRU** (PCL equal or higher than limit TRU, the correction is applied).

- 3 values of correction of the emitted power level: △**PeakPow_T**, △**H0_T**, △**TRU_T** (repeated for the 3 temperature ranges (low, ambient and high), EGSM, GSM850, GSM, PCS and DCS); Note that **_T** means that the parameter is a temperature compensation parameter.

### 4.1. How to transmit a Tch burst (Random data), in GSM850 mode, channel 199, at power control level max:

**Configuration of the common parameters:**
**- band: "GSM850"**
**- channel:199**
**- RF level: 5,**
**- Burst select: Mode Tch Random**

Power on the mobile, dial "911" ,you can find the burst must fit for the curve below.



The request of the Power vs Time.

**4.2. How to stop Tx measurements:**

On hook the mobile ,the test will be stop.

**4.3. How to transmit a burst after modifying parameters.**

Please note that each time a parameter (such as parameter used to shape the burst, or temperature compensation parameter), is changed, then the user have to: **download to flash** to validate the parameter modification. If the command is not performed, the old parameters are taken into account.

# Part B : Rx Tune-up

**Content**



## 5. Purpose

This panel gives the possibility to manage the mobile in the receive mode.

This window includes both:

- all the parameters (frequency band, RF channel, input power⋯) the user needs to make the mobile receive,
- all the gain compensation table, temperature alignment parameters ⋯ to be able to align the mobile in production.

This Rx_commands user guide is describing:

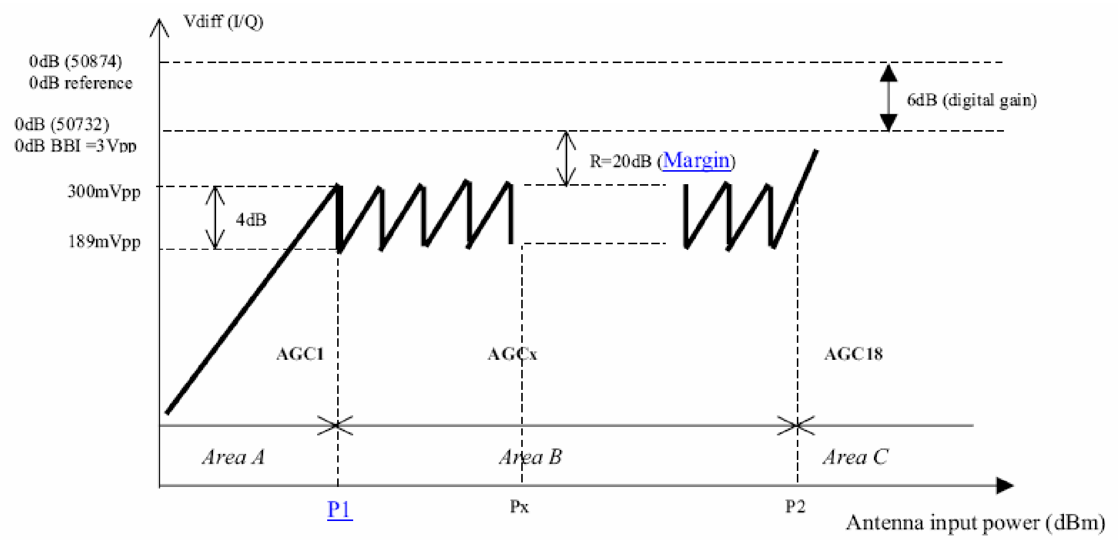
- the basis of the AD6548 radio chip functionality in receive mode,
- all the parameters used in the receive mode,
- the operating mode to make the mobile receiving.

## 6. General descriptio

The AD6548  receiver IC is a zero IF architecture.
The receiver consists in two distinct parts, the RF receiver front-end and the ADC section.
The RF receiver front-end:

- amplifies theGSM850, PCS aerial signal,
- converts the chosen channel down to a low IF at 100kHz,
- provides in addition more than 35 dB image suppression rejection.

Some selectivity is provided at this stage by an on-chip low-pass filter, and channel selectivity is provided by means of a high performance integrated band-pass filter.
The receiver operates as shown in the graphic below. The I/Q differential amplitude is represented versus the RF input power at the antenna.




**Area A:** The total gain of the receiver is maximum and constant for all RF input power below P1; the I/Q amplitude increases linearly versus the RF input power until it reaches 300mVpp. The AGC is set to maximum gain AGC1.
**Area B:** The total gain of the receiver is controlled by the AGC to maintain the I/Q amplitude between 189 mVpp and 300 mVpp. This range corresponds to a gain step of 4 dB in the AGC.
**Area C:** The total gain of the receiver is minimum and constant for all RF input level above P2 = P1 + 17*4 Db (18 AGC steps of 4 dB each). The RF stage (LNA) is then saturated for strong RF input levels; the I/Q amplitude increases and reaches maximum amplitude. The AGC is set to a minimum gain AGC18.
**Note:** In area B, the IQ amplitude is set 20 dB below the saturation level of the DACs in the MT6235 (according to the margin of the system). The saturation level of the BBI corresponds to a 0 dB reference (i.e. 3Vpp differential or 1.5Vpp single ended).
Then the upper and the lower limits in differential before a gain transition in the AGC correspond respectively to 300 mVpp and 190 mVpp (i.e. 150 mVpp and 95 mVpp single ended).

**7. Parameters**
**7.1. Parameters in EEPROM**

### 7.1.1. Parameters in Rx mode for GSM850, PCS (default radio parameters)

* **P1GSM850** : minimum input power where AGC is active in EGSM.
coded over the range -128 dBm ($-2^7$dBm) to +127 dBm ($+2^7$-1 dBm) with 1dB per step.
* **P1PCS** : minimum input power where >AGC is active in DCS.
coded over the range -128 dBm ($-2^7$ dBm) to +127 dBm ($+2^7$-1 dBm) with 1dB per step.
*** Gain compensation tables** (one for GSM850, one for PCS):
- 4 frequency limits (named **F1_SGR**, **F2_SGR**, **F3_SGR** and **F4_SGR**) to divide the receive band into 5 ranges; the number of the ARCFN is coded.
- 5 values of gain correction (named **SGR_F1**, **SGR_F2**, **SGR_F3** and **SGR_F4**) in 5 frequency ranges to compensate the gain within each frequency range. These values are coded over the range - 16 dB ($-2^7/8$ dB) to 15.875 dB ($(+2^7-1)/8$ dB) with 1/8 dB per step.
The 5 values are repeated for the 3 temperature ranges.

### 7.1.2. Generic Parameters in Rx mode (same for GSM850, PCS)

* Marging of the system for GSM850, PCS (refereed as **Margin** in the TAT interface) and coded over the range 0 dB to 127.5 dB with 0.5 dB per step.
***T1** and **T2**: temperature boundaries for compensation (same boundaries for Rx and Tx).
**T1** and **T2** are 8 bits ADC values.

## 7.2. Parameters in Flash memory

All parameters are stored in flash memory as default parameters.

# 8. Operating mode

We have the possibility to select 2 different receive modes:

Continuous receive (Rx continuous); this mode sets the mobile in a "no stop receive mode" (without any notion of bursts: continuous reception).

Bursted receive mode (Rx configuration), where the mobile is set in a bursted received mode.

- Burst Rx: one Rx slot per frame
- Burst (Rx+Moni): one Rx slot and one monitoring slot per frame
- Stop mode: no receive activation

For these 2 modes, common parameters can be configured:

- the band (GSM850, PCS)
- the Rx channel
- the Monitoring channel (if used)
- the temperature (in case of temperature compensation)
- antenna level (code): input antenna power (in dBm), so the receive path is forced to the corresponding AGC gain.

## 8.1. Continuous Rx mode

Please note that in both continuous and bursted Rx mode, the offset compensation is done, based on DSP algorithm.

### 8.1.1. To perform continuous Rx mode:

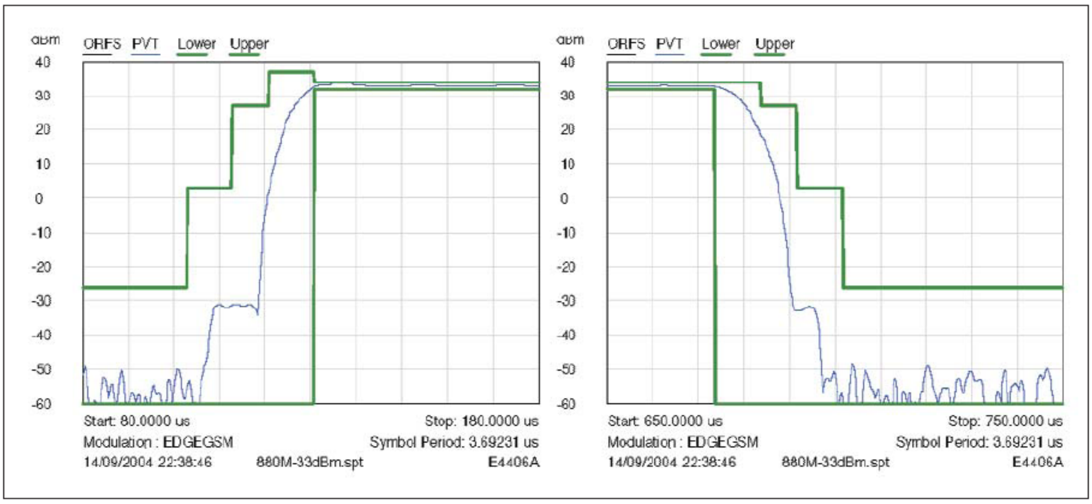
**Configuration of the common parameters (band, channel,…)**

Power on the mobile, dial SOS(“911”, etc.) .

**8.1.2. To stop continuous Rx mode:**
On hook the mobile, the test will be stop.

***Part C : GPRS Tune-up***

**9. GPRS Data Transfer**
GSM mobile phones use a Time Division Multiple Access (TDMA) scheme to transmit data. The TDMA format contains eight time slots. The handset power amplifier typically transmits in one or two or three or four of these up time slots. To prevent interference between cell phones, the time mask profile as specified is very restricted. To meet the GSM time mask, the output power of the PA needs to ramp up and down very quickly while staying within the time mask and not generating extraneous frequency bursts due to too abrupt ramp profiles. As described before, the Vramp input value sets the RF output power. By applying a certain ramp profile to the Vramp pin, the power level (Pout) of the PA is set to obtain the required time mask. A time mask of the PA's output power is displayed. The time mask meets the limits (displayed by green lines) over a wide range of temperature, voltage and load variations.




# Part D: Output Power

## 1. BAND PCS1900
**Power Level Target Unit Tolerance**

| Power level | Power Peak value | limit |
|---|---|---|
| | dBm | normal |
| 0 | 29 | +/-2 dB*) |
| 1 | 28 | +/-3 dB |
| 2 | 26 | +/-3 dB |
| 3 | 24 | +/-3 dB*) |
| 4 | 22 | +/-3 dB |
| 5 | 20 | +/-3 dB |
| 6 | 18 | +/-3 dB |
| 7 | 16 | +/-3 dB |
| 8 | 14 | +/-3 dB |
| 9 | 12 | +/-4 dB |
| 10 | 10 | +/-4 dB |
| 11 | 8 | +/-4 dB |
| 12 | 6 | +/-4 dB |
| 13 | 4 | +/-4 dB |
| 14 | 2 | +/-5 dB |
| 15 | 0 | +/-5 dB |

## 2. BAND GSM850

**Power Level Target Unit Tolerance**

| Power level | Power Peak value | limit |
|---|---|---|
| | dBm | normal |
| 5 | 32 | +/-2 dB*) |
| 6 | 30.5 | +/-3 dB |
| 7 | 29 | +/-3 dB) |
| 8 | 27 | +/-3 dB |
| 9 | 25 | +/-3 dB |
| 10 | 23 | +/-3 dB |
| 11 | 21 | +/-3 dB |
| 12 | 19 | +/-3 dB |
| 13 | 17 | +/-3 dB |
| 14 | 15 | +/-3 dB |
| 15 | 13 | +/-3 dB |
| 16 | 11 | +/-5 dB |
| 17 | 9 | +/-5 dB |
| 18 | 7 | +/-5 dB |
| 19 | 5 | +/-5 dB |