

# Tune-Up Procedure

Tune-Up Procedure .....	1
1 Purpose .....	2
2 General descriptions .....	2
2.1 Characteristics of the transmit burst.....	2
2.2 GPRS Data Transfer .....	3
3 Parameters .....	3
3.1 Parameters used to shape the burst .....	3
3.2 Parameters used to define the temporal position of the burst .....	4
4 Operating mode.....	4
4.1 How to transmit a Tch burst (Random data), in PCS1900 mode, at power control level max:.....	4
4.2 How to stop Tx measurements: .....	5
4.3 How to transmit a burst after modifying parameters .....	5
5 Purposes .....	5
6 Automatic frequency controls.....	5
7 Static frequency error and range.....	7
8 Output Power .....	8
8.1 BAND GSM850.....	8
8.2 BAND PCS1900.....	8
8.3 GPRS Output Power .....	9
9 Tune-Up WCDMA.....	10
9.1 UMTS band 1900 Tx and 850 Tx .....	10
9.2 WCDMA OUTPOWER.....	10

# 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 to be able to align the mobile in production.

This Tx\_commands user guide is describing:

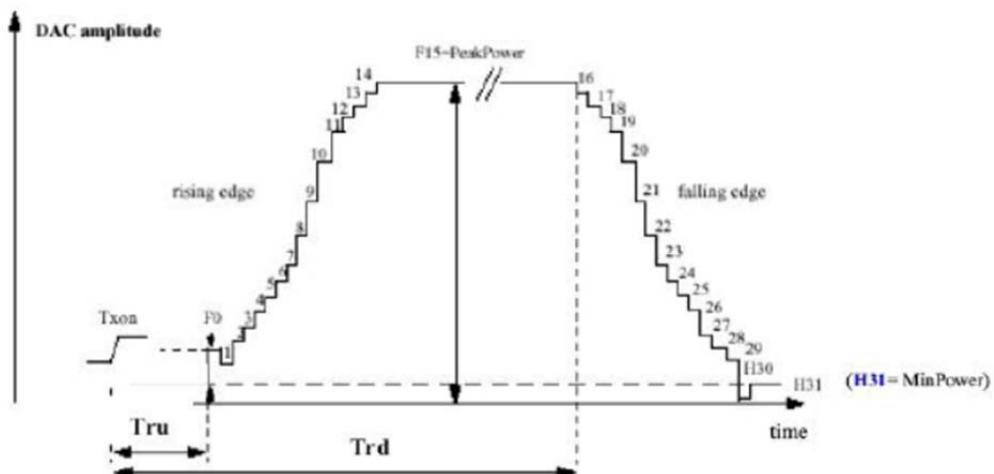
- The characteristics of the transmit burst,
- All the parameters used in the transmit mode,
- The operating mode to make the mobile transmitting

## 2 General descriptions

### 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 ACPW. The burst is generated by a 10-bit DAC from the ACPW as shown below:

The ramping shape is referenced with the rising edge of Tx-ON (from the Baseband). There are two types of parameters define the transmit burst: the first one define the shapes of the burst, and the second one define 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  $n = 0 \dots 31$ .



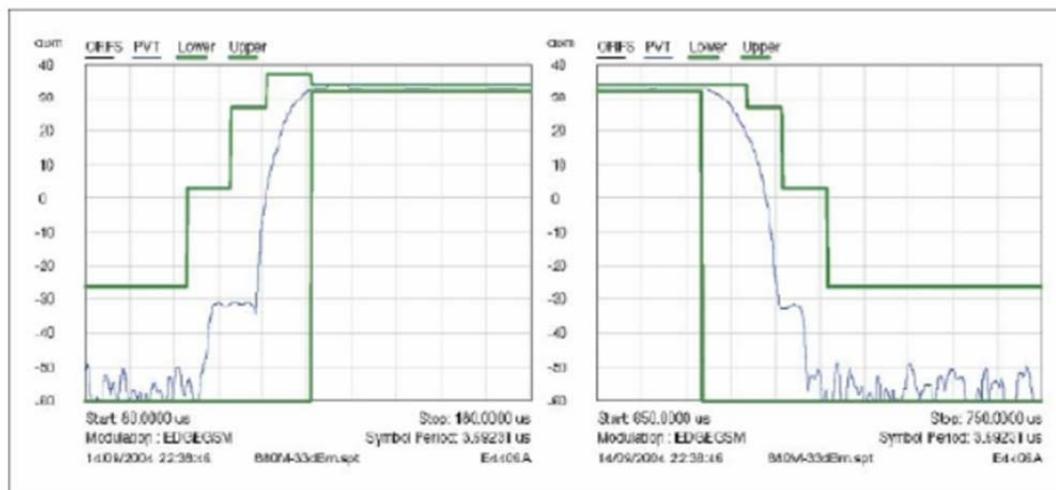
$$Tru = TxTRUDefault + \Delta TRU_P + \Delta TRU_T$$

$\text{Trd} = \text{TxTRD\_NBDefault} + \Delta \text{TRD\_P}$  (for a normal burst).

$\text{Trd} = \text{TxTRD\_ABDefault} + \Delta \text{TRD\_P}$  (for an access burst).

## 2.2 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 up to four uplink slot. 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.



## 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 APCW.

- [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 AP6684 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  $\Delta\text{TRU}_P$ ) 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  $\Delta\text{TRD}_P$ ) on the panel, in the Optimal Burst. This is the burst length compensation, which is optimized for each power control level. (Note that  $_P$  means that the parameter is a power compensation parameter).

## 4 Operating mode

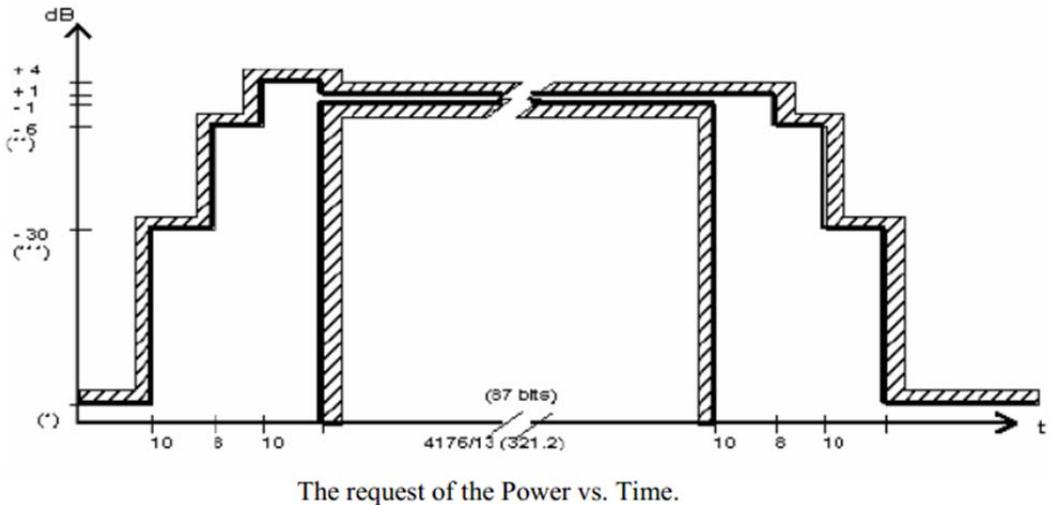
### 4.1 How to transmit a Tch burst (Random data), in PCS1900 mode, at power control level max:

PCS 1900:

Connect the mobile with special software, Configuration of the common parameters:

- Band: PCS1900,
- Channel: 661,
- RF level: 0,
- Burst select: Mode Tch Random

Press STAR command to start continuous TX, you can check the burst with CMU200 orAgilent 8960; it must fit the curve below.



## 4.2 How to stop Tx measurements:

Press STOP command to stop the TX.

## 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) 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.

## 5 Purposes

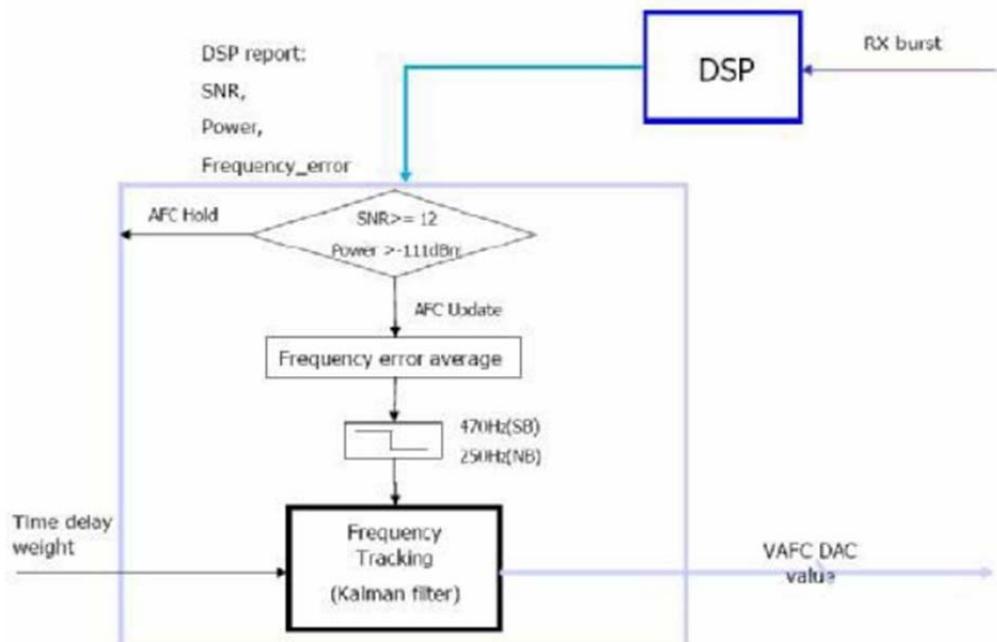
This panel gives the description of the Frequency plan. This window includes both:

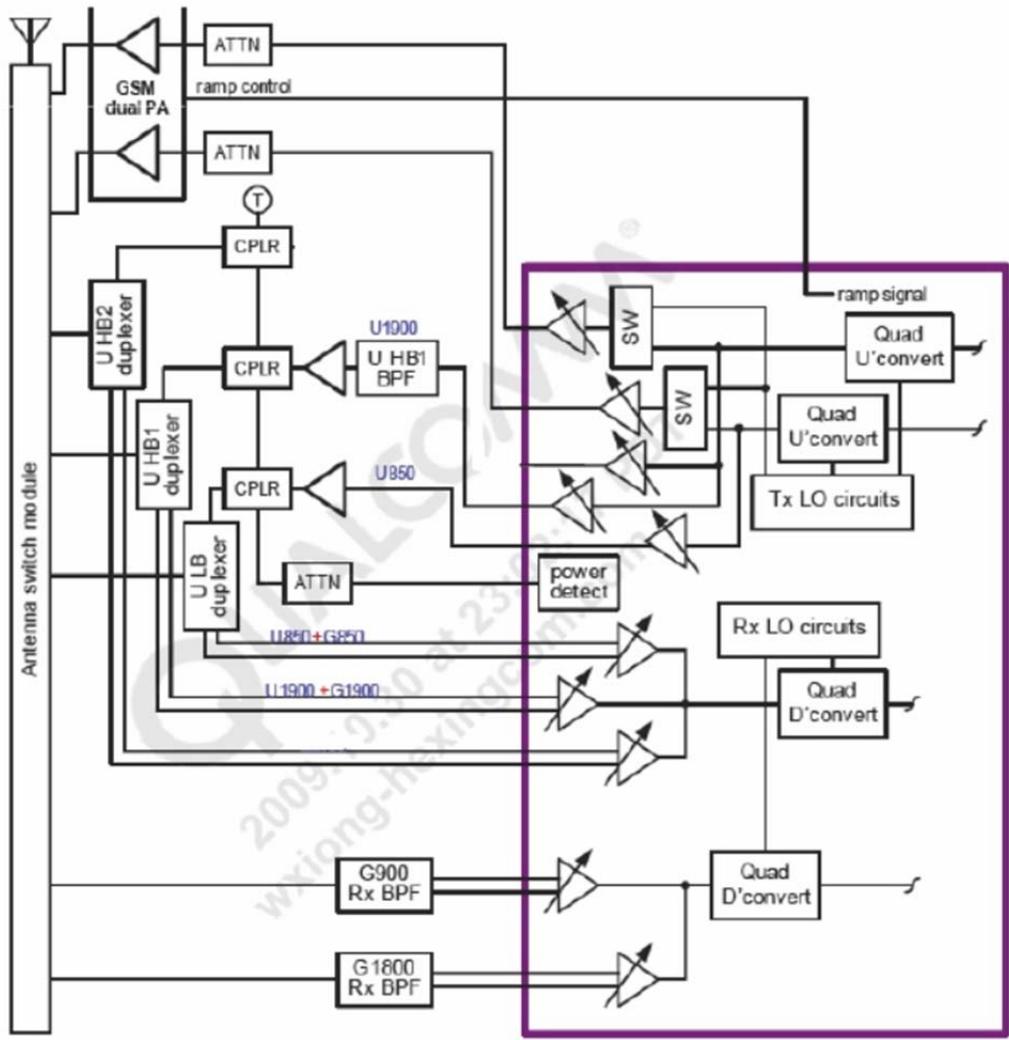
- Automatic frequency control (AFC),
- Static frequency error and range,
- Dynamic frequency error and range

## 6 Automatic frequency controls

Before a handset is allowed to transmit any signals, it needs to first receive the FSB signal from the base station, demodulate and decode it using its own local oscillator, map it to the constellation plane, calculate the frequency offset, and adjust the local oscillator accordingly, until 0.1ppm of frequency accuracy is achieved. This frequency correction loop is called the automatic frequency control (AFC) loop in GSM standard. The process as below:

## Automatic frequency control (AFC)





In MT8389, it uses an AFC signal from baseband (DAC) to finish automatic frequency control.

## 7 Static frequency error and range

Factors of static frequency error: manufacturing frequency tolerance in crystal at Room temperature, aging,

- Static frequency error is compensated for using 6bits programming capacitor array (CAP ID).
- The static frequency range of capacitor array ( CAP ID=0 to 63) must larger than 34ppm( +17ppm).
- The static range depends on crystal's TS and CL
- The capacitor array calibration is done in production testing by setting the AFC DAC to mid-scale(4196) and adjusting CAP ID to the setting that give closest to 0 ppm error(finish by test software). This CAP ID value is then stored in Flash memory and rewritten to MT6167 each time the TCXO is initialized.

## 8 Output Power

### 8.1 BAND GSM850

Power Level Target Unit Tolerance

Power level	Conducted power (dBm)	Limit
5	31	+/-2dB
6	29	+/-3dB
7	28	+/-3dB
8	27	+/-3dB
9	25	+/-3dB
10	23	+/-3dB
11	21	+/-3dB
12	19	+/-3dB
13	17	+/-3dB
14	15	+/-4dB
15	13	+/-4dB
16	11	+/-4dB
17	9	+/-4dB
18	7	+/-5dB
19	5	+/-5dB

### 8.2 BAND PCS1900

Power Level Target Unit Tolerance

Power level	Conducted power (dBm)	Limit
0	28.5	+/-2dB
1	26	+/-3dB
2	25	+/-3dB
3	23	+/-3dB
4	21	+/-3dB
5	20	+/-3dB
6	18	+/-3dB
7	16	+/-3dB
8	14	+/-3dB
9	12	+/-4dB
10	10	+/-4dB
11	8	+/-4dB
12	6	+/-4dB
13	4	+/-5dB
14	2	+/-5dB
15	0	+/-5dB

### 8.3 GPRS Output Power

GSM850 &GSM900&DCS1800& PCS1900 allowed maximum output reduction in a multislots Configuration.

GSM850

Multislots	Conducted power (dBm)	Limit
1	31	+/-2dB
2	30.5	+/-2dB
3	28.5	+/-2dB
4	27	+/-2dB

PCS1900

Multislots	Conducted power (dBm)	Limit
1	28.5	+/-2dB
2	28	+/-2dB
3	26.5	+/-2dB
4	25	+/-2dB

## 9 Tune-Up WCDMA

### 9.1 UMTS band 1900 Tx and 850 Tx

1. Inspect the orientation of the U660 and the surrounding components.
2. If the orientation is wrong, record the findings in the FA report and complete the repair steps as appropriate.
3. Using a microscope, inspect the solder quality of the above and the surrounding components.
4. If soldering problems are found, record the findings and repair as appropriate.
5. Install and power up the META into the debug fixture according to the META installation.
6. Set the spectrum analyzer to:  
Frequency 1880 MHz and 835 MHz  
Span 1 MHz  
REF LVL 0 dBm  
RES BW = AUTO
7. Connect the passive RF probe to the spectrum analyzer.
8. Start the UMTS 1900 and 850 Tx with maximum power in META. Match the frequency with the one set in the spectrum analyzer.
9. Check the current drawn from the power supply.
10. Measure the power detector range .

### 9.2 WCDMA OUTPOWER

#### WCDMA band 2 OUTPOWER

RF Test items	Channel		Notes	Specification
	UL	DL		
Minimum output	9262	9662		<-50dBm

Power	9400	9800		<-50dBm
	9538	9938		<-50dBm
Maximum output Power	9262	9662		$21 \pm 2$ dm
	9400	9800		$21 \pm 2$ dm
	9538	9938		$21 \pm 2$ dm

## WCDMA band 5 OUTPOWER

RF Test items	Channel		Notes	Specification
	UL	DL		
Minimum output Power	4132	4357		<-50dBm
	4183	4408		<-50dBm
	4233	4458		<-50dBm
Maximum output Power	4132	4357		$21 \pm 2$ dm
	4183	4408		$21 \pm 2$ dm
	4233	4458		$21 \pm 2$ dm