

Tune-Up Procedure

Tune-Up TX

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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 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 MT6515. The burst is generated by a 10-bit DAC from the MT6515 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 $n = 0 \cdots 31$.

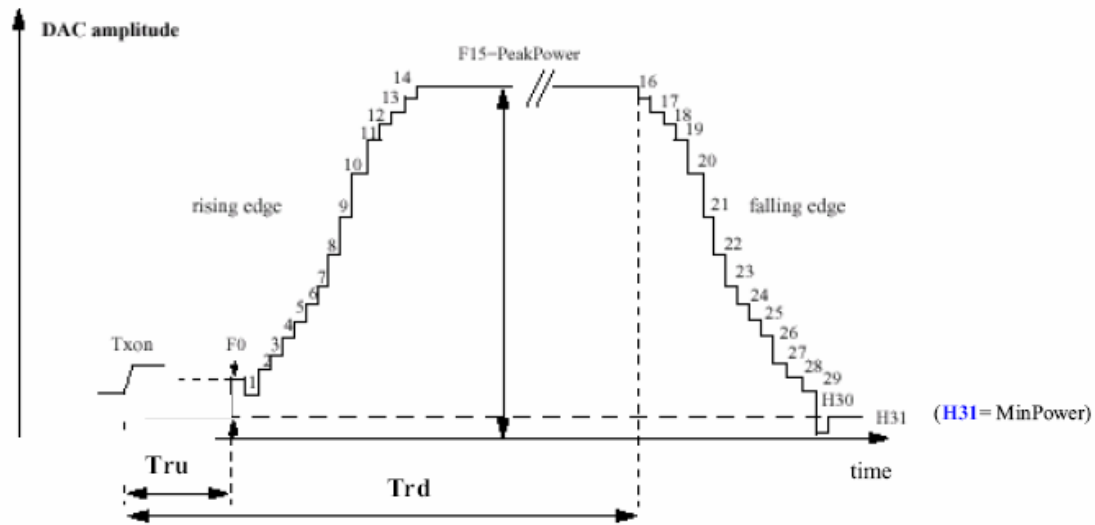


Figure 1

$$\text{Tru} = \text{TxTRUDefault} + \Delta \text{TRU_P} + \Delta \text{TRU_T}$$

$$\text{Trd} = \text{TxTRD_NBDefault} + \Delta \text{TRD_P} \text{ (for a normal burst).}$$

$$\text{Trd} = \text{TxTRD_ABDefault} + \Delta \text{TRD_P} \text{ (for an access burst).}$$

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 MT6225 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 RF7182 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 Δ **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 Δ **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 GSM850 & GSM900 & DCS1800 & PCS1900 mode, at power control level max:

GMS 850 & GSM900:

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

- Band: GSM850,
- Channel: 190,
- RF level: 5,
- Band: GSM900
- Channel: 62,
- RF level: 5,
- Burst select: Mode Tch Random

DCS1800 & PCS1900:

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

- Band: PCS1900,
- Channel: 661,
- RF level: 0,
- Band: DCS1800,
- Channel: 698,
- RF level: 0,
- Burst select: Mode Tch Random

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

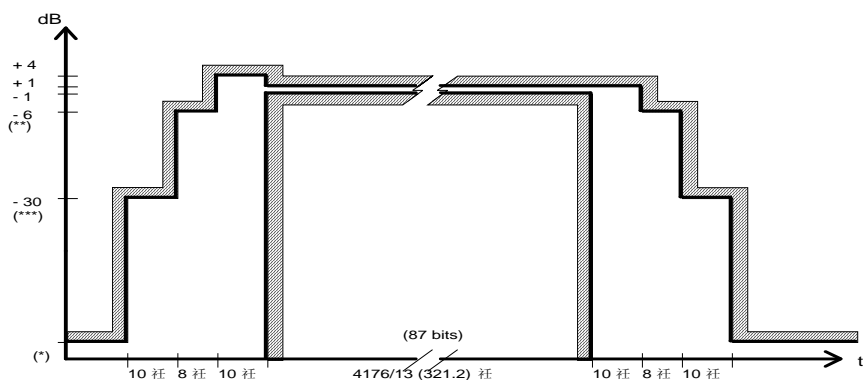
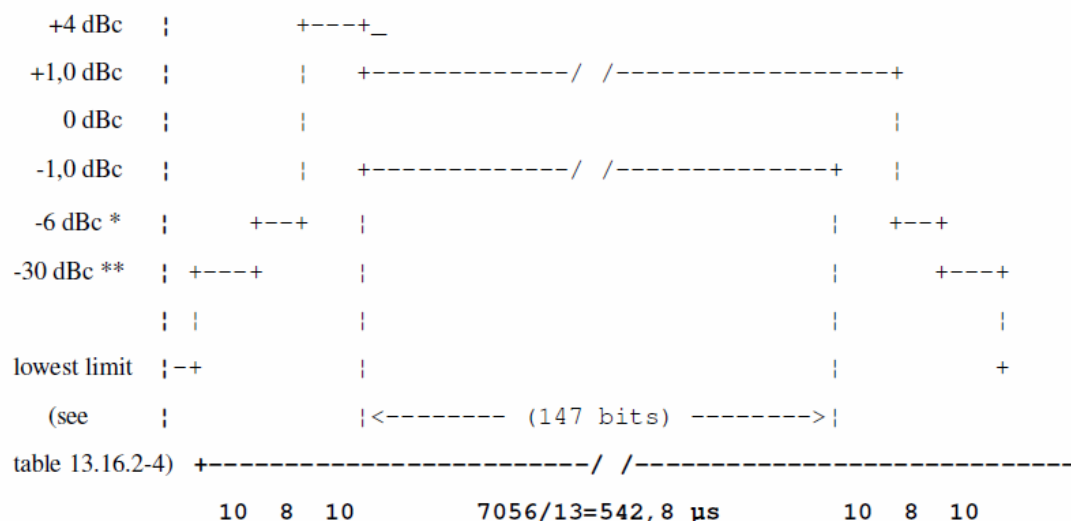


Figure2

The request of the Power vs. Time.

For GPRS, the power/time relationship of the measured samples for normal bursts shall be within the limits of the power time template of figure 3 at each frequency, under every combination of normal and extreme test conditions and at each power control level measured.



Power / time template for normal bursts

Figure 3

- * For GSM 850 and GSM 900 MS:
 - 4 dBc for power control level 16;
 - 2 dBc for power control level 17;
 - 1 dBc for power control levels 18 and 19-31.
- For DCS 1 800 and PCS 1 900 MS:
 - 4 dBc for power control level 11;
 - 2 dBc for power control level 12;
 - 1 dBc for power control levels 13, 14 and 15-28.
- ** For GSM 850 and GSM 900 MS:
 - 30 dBc or -17 dBm, whichever is the higher.

For DCS 1 800 and PCS 1 900MS:
-30 dBc or -20 dBm, whichever is the higher.

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.

Tune-Up Frequency

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5 Purpose

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

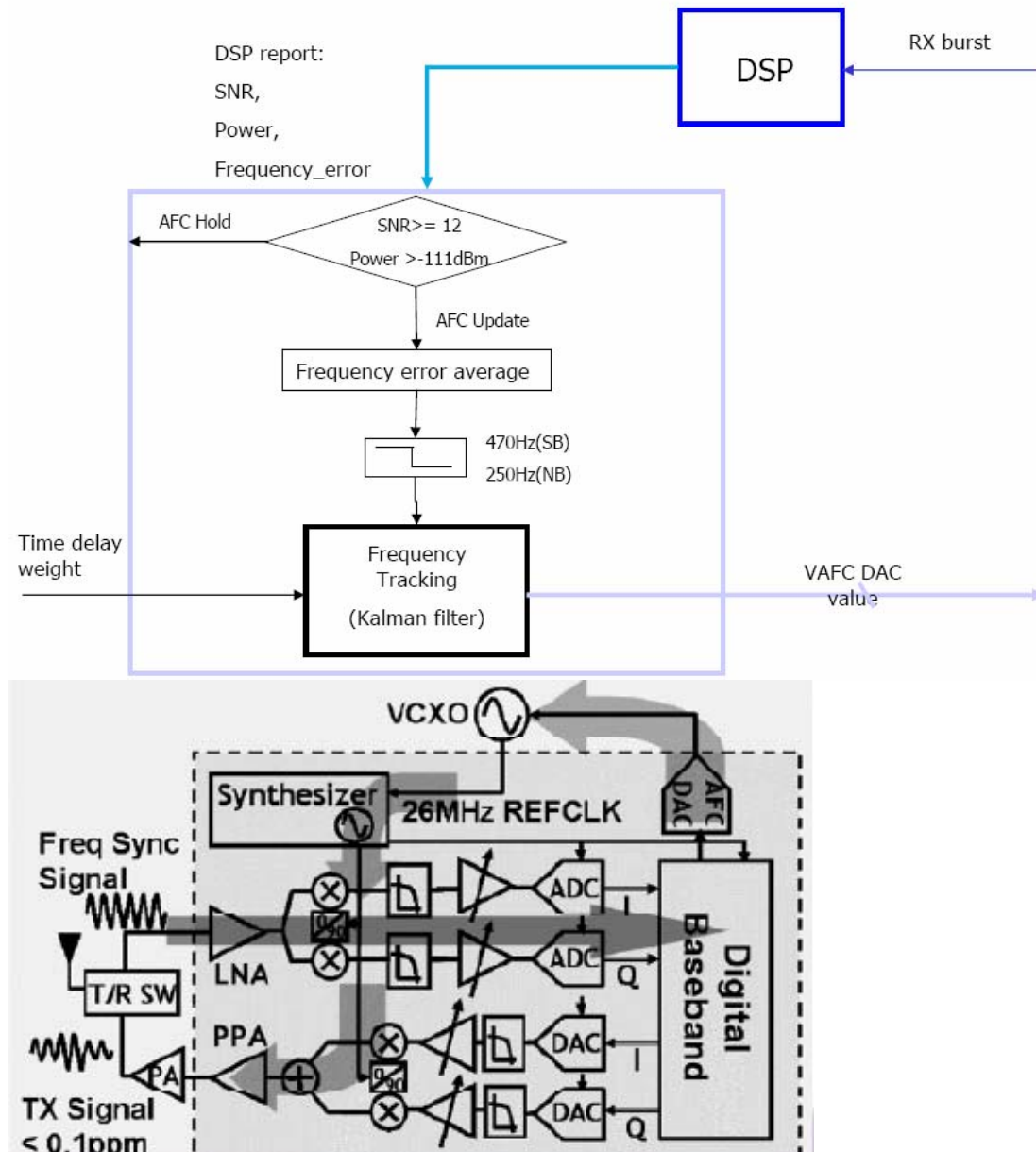
6 Automatic frequency control

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 MT6140, 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 to63) must larger than 43ppm(± 21.5 ppm).
- 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(4044) 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 MT6140 each time the VCXO is initialized.

Output Power

For GSM

1. BAND DCS1800/PCS1900

Power Level Target Unit Tolerance

2. BAND GSM850/GSM900

Power Level Target Unit Tolerance

1. BAND DCS1800/PCS1900

Power Level Target Unit Tolerance

Power level	Power Peak value	limit
	dBm	normal
0	30	+/-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/GSM900

Power Level Target Unit Tolerance

Power level	Power Peak value	limit
	dBm	normal
5	33	+/-2 dB)
6	31	+/-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

For GPRS

1. BAND GSM850/GSM900

Power Level Target Unit Tolerance

Power class				Power control level	GAMMA_TN (Γ_{CH})	Transmitter output power (note 2,3)	Tolerances	
2	3	4	5			dBm	normal	extreme
.	.	.	.	2	0	39	± 2 dB	$\pm 2,5$ dB
.	.	.	.	3	1	37	± 3 dB (note 1)	± 4 dB (note 1)
.	.	.	.	4	2	35	± 3 dB	± 4 dB
.	.	.	.	5	3	33	± 3 dB (note 1)	± 4 dB (note 1)
.	.	.	.	6	4	31	± 3 dB	± 4 dB
.	.	.	.	7	5	29	± 3 dB (note 1)	± 4 dB (note 1)
.	.	.	.	8	6	27	± 3 dB	± 4 dB
.	.	.	.	9	7	25	± 3 dB	± 4 dB
.	.	.	.	10	8	23	± 3 dB	± 4 dB
.	.	.	.	11	9	21	± 3 dB	± 4 dB
.	.	.	.	12	10	19	± 3 dB	± 4 dB
.	.	.	.	13	11	17	± 3 dB	± 4 dB
.	.	.	.	14	12	15	± 3 dB	± 4 dB
.	.	.	.	15	13	13	± 3 dB	± 4 dB
.	.	.	.	16	14	11	± 5 dB	± 6 dB
.	.	.	.	17	15	9	± 5 dB	± 6 dB
.	.	.	.	18	16	7	± 5 dB	± 6 dB
.	.	.	.	19	17	5	± 5 dB	± 6 dB

GSM 850 and GSM 900 allowed maximum output power reduction in a multislot configuration

Number of timeslots in uplink assignment	Permissible nominal reduction of maximum output power, (dB)
1	0
2	0 to 3,0
3	1,8 to 4,8
4	3,0 to 6,0

1. BAND DCS1800/PCS1900

Power Level Target Unit Tolerance

Power class			Power control level	GAMMA_TN (Γ_{CH})	Transmitter output power (note 2,3)	Tolerances	
1	2	3			dBm	normal	extreme
	.		29	0	36	$\pm 2,0$ dB	$\pm 2,5$ dB
		.	30	1	34	$\pm 3,0$ dB	$\pm 4,0$ dB
	.	.	31	2	32	$\pm 3,0$ dB	$\pm 4,0$ dB
.	.	.	0	3	30	$\pm 3,0$ dB (note_1)	± 4 dB (note_1)
.	.	.	1	4	28	± 3 dB	± 4 dB
.	.	.	2	5	26	± 3 dB	± 4 dB
.	.	.	3	6	24	± 3 dB (note_1)	± 4 dB (note_1)
.	.	.	4	7	22	± 3 dB	± 4 dB
.	.	.	5	8	20	± 3 dB	± 4 dB
.	.	.	6	9	18	± 3 dB	± 4 dB
.	.	.	7	10	16	± 3 dB	± 4 dB
.	.	.	8	11	14	± 3 dB	± 4 dB
.	.	.	9	12	12	± 4 dB	± 5 dB
.	.	.	10	13	10	± 4 dB	± 5 dB
.	.	.	11	14	8	± 4 dB	± 5 dB
.	.	.	12	15	6	± 4 dB	± 5 dB
.	.	.	13	16	4	± 4 dB	± 5 dB
.	.	.	14	17	2	± 5 dB	± 6 dB
.	.	.	15	18	0	± 5 dB	± 6 dB

PCS1900 and DCS1800 allowed maximum output power reduction in a multislot configuration

Number of timeslots in uplink assignment	Permissible nominal reduction of maximum output power, (dB)
1	0
2	0 to 3,0
3	1,8 to 4,8
4	3,0 to 6,0