Tune-Up Procedure

1 Purpose

- 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 as shown below:

The ramping shapeis referenced with the rising 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 of the transmit burst are determined by a set of 32 DAC

code values n = 0 … 31.
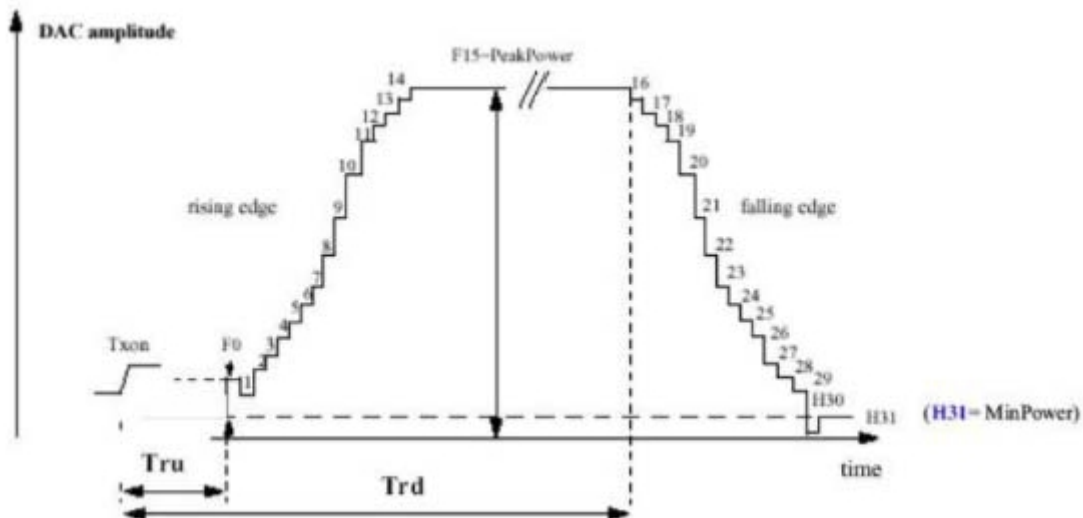
The burst is generated by a 10-bit DAC from the SC7731E as shown below:
theSC7731E. The burst is generated by a 10-bit DAC from the


$Tru = TxTRUDefault + TRU\_P + TRU\_T$

$Trd = TxTRD\_NBDefault + TRD\_P$ (for a normal burst). $Trd = TxTRD\_ABDefault + TRD\_P$ (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 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.
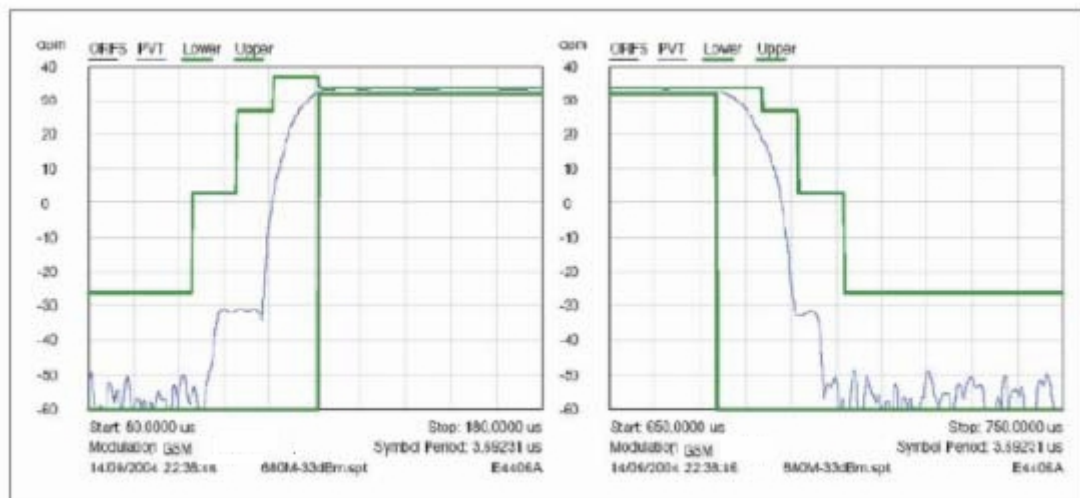
3 Parameters

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

- 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 RTM7289 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 optimized for each power control level.

 (Note that _P means that the parameter is a power compensation parameter).

3.3.3 Tune-Up procedure of WCDMA Tx Power

   RPM6569-12serial PA is developed for Wide band Code Division Multiple Access (WCDMA) applications. There are different power gain corresponds to the different power mode. The power mode can be controlled by SC7731E. In order to support open/closed loop power control in WCDMA, the output power of PA must be detected quickly by the transceiver, then it can adjust the output power finely to meet the standard requirements.

For SC7731E platform, there are six parameters defined in the calibration stage in production and stored in the NAND flash. The six parameters are PA gain in low power mode, PA gain in medium power mode, PA gain in high power mode, Power detector gain in low power mode, Power detector gain in medium power mode and Power detector gain in high power mode. The calibration step is shown in the following diagram.

3 . 4 Tune-Up procedure of Frequency

One general DAC are used to control power ramping and gain in SC7731E, which name as GSM APC。It is a 10 bits D/A converters with a programmable-gain output driver. Special offset cancellation is applied in the DAC..

The auxiliary ADC is a 10-bit successive approximation A/D converter. The ADC has 9 input channels, three are from internal analog circuit used to monitor battery voltage, charging current and voltage and the others are for external usage. Two are specially used for touch panel. Special offset cancellation is applied in the ADC.

A part of the AFC is a 12-bit D/A converter and a programmable gain output driver. Special offset cancellation is applied in the AFC DAC.

(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/PCS1900 mode, at power control level max: GSM850/PCS 1900:

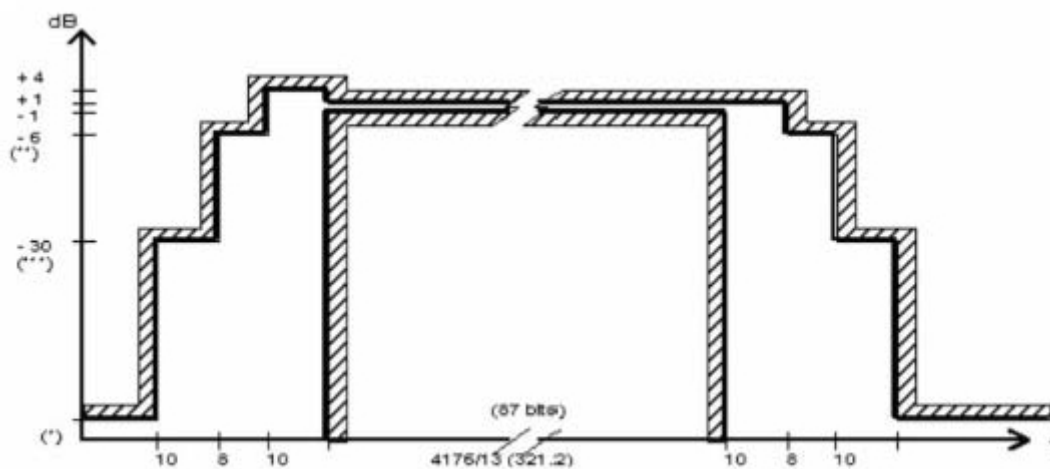Connect the mobile with special software, Configuration of the common parameters: - Band: GSM850/PCS1900,

- Channel: 190/661, - RF level: 5/0,

- 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.

The request of the Power vs. Time.

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 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.
process as below:

The
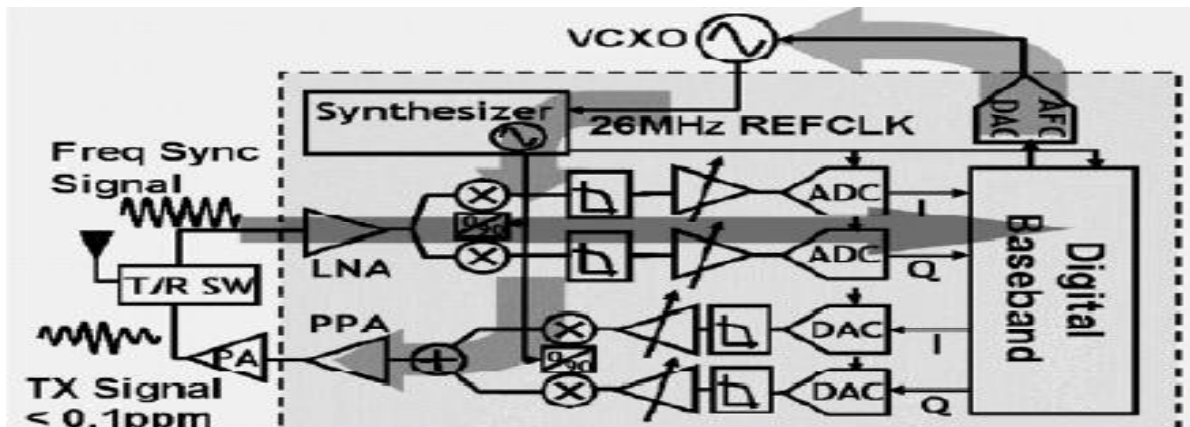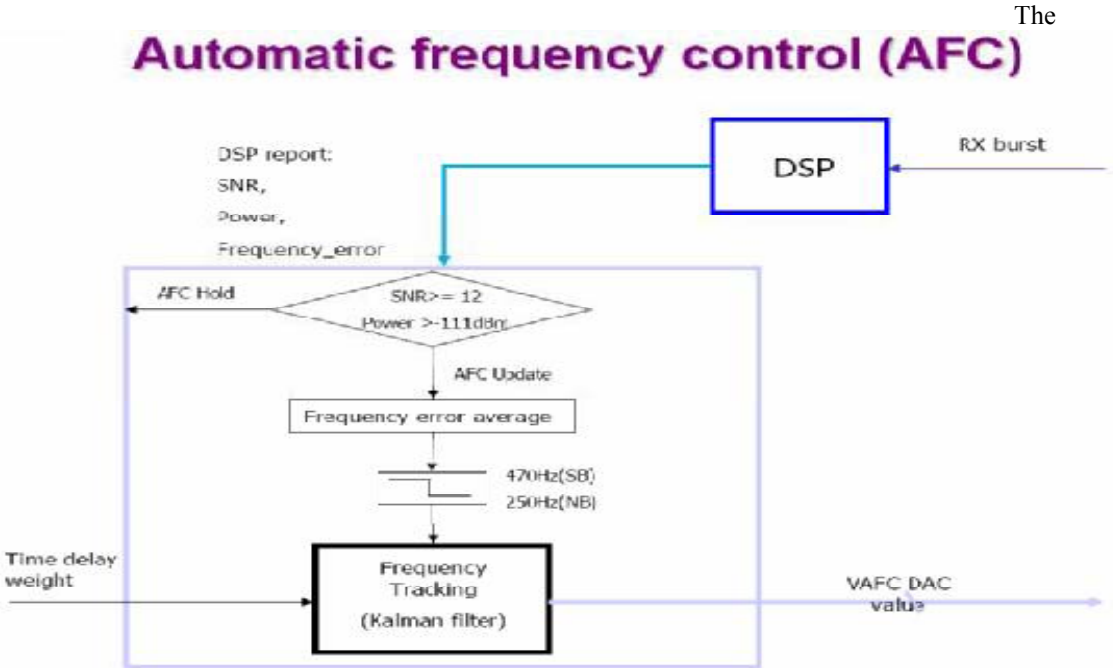
In SC7731E, it uses an control.

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 to195) 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
In SC7731E, it uses an AFC signal from baseband (DAC) to finish automatic frequency
AFC signal from baseband (DAC) to finish automatic frequency to mid-scale (4200) 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 SC7731E each time the TMS is initialized.

Maximum Target Output Power

Mode/Band	Max Target Power(dBm)		
	Channel		
	Low	Middle	High
GSM 850	33.0	33.0	33.0
GPRS 1 TX Slot	33.0	33.0	33.0
GPRS 2 TX Slot	31.0	31.0	31.0
GPRS 3 TX Slot	29.0	29.0	29.0
GPRS 4 TX Slot	28.0	28.0	28.0
PCS 1900	29.0	29.0	29.0
GPRS 1 TX Slot	29.0	29.0	29.0
GPRS 2 TX Slot	27.0	27.0	27.0
GPRS 3 TX Slot	26.0	26.0	26.0
GPRS 4 TX Slot	25.0	25.0	25.0
WCDMA Band 2	23.0	23.0	23.0
HSDPA	23.0	23.0	23.0
HSUPA	23.0	23.0	23.0
HSPA+	23.0	23.0	23.0
WCDMA Band 5	23.0	23.0	23.0
HSDPA	23.0	23.0	23.0
HSUPA	23.0	23.0	23.0
HSPA+	23.0	23.0	23.0
WLAN 2.4G	9.0	9.0	9.0
Bluetooth BDR/EDR	5.0	5.0	3.0
Bluetooth BLE	-1.0	-1.0	-3.0