

Circuit Description

1. Overview

RFT6100(U103) receives modulated digital signals from the MSM6050(U7) of the digital circuit and then, changes them into analog signals by the digital/analog converter (DAC, D/A Converter) in order to create baseband signals. Created baseband signals are changed into RF signals by RFT6100(U103). They are amplified at the Power AMP(U204, U6). Finally, they are sent out to the cell site via the antenna after going through the isolator and duplexer.

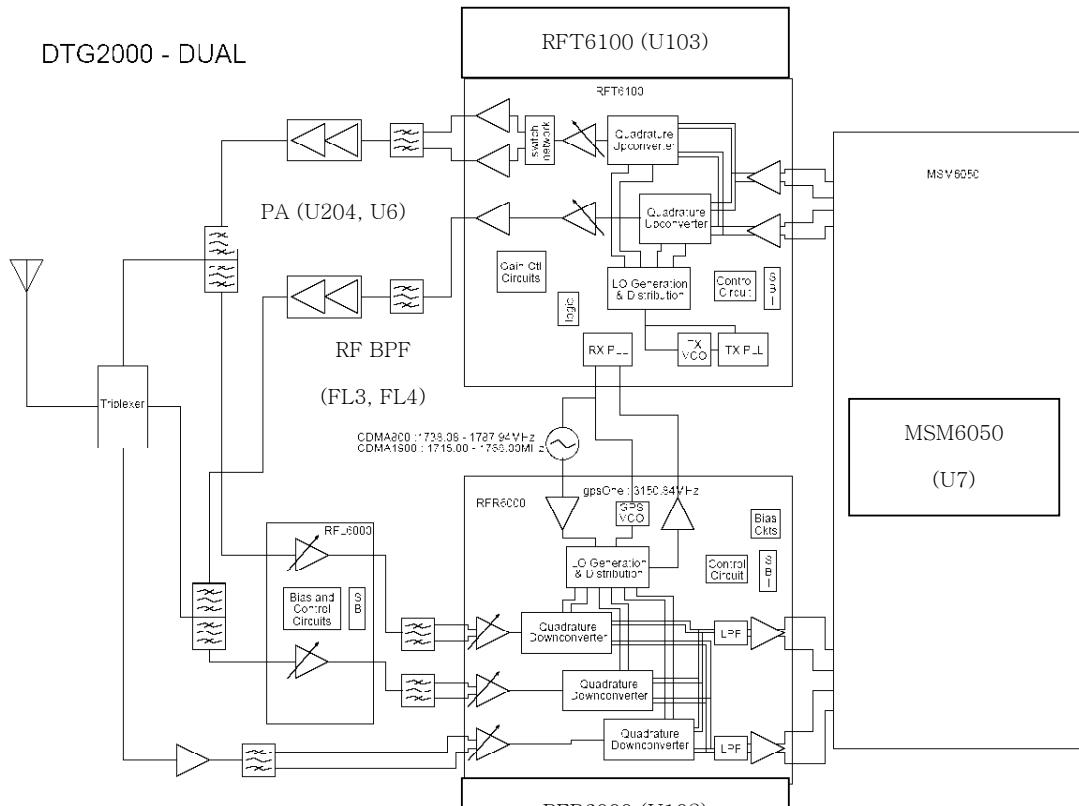


Figure 1. DTG2000-DUAL Block Diagram

2. RF Transmit / Receive Part

2.1. Tx Baseband Processors, RFT6100 (U103)

The RFT6100(U103) includes digital-to-analog converters(DAC) for converting digital baseband to analog baseband, low-pass filters, a mixer for up-converting to RF and an 85 dB dynamic range Tx

AGC amplifier. The RFT6100(U103) includes a fully programmable phase-locked loop(PLL) for generating Rx LO.

2.2. Transmit Bandpass Filter (FL3, FL4)

Transmit signals that have been converted RF signals are inputted into the Power Amp(U6, U204) after passing through RF BPF(FL3, FL4) in order to filter out noise signals amplified during the amplification of RF signals. This is carried out in order to create power level inputted to the Power AMP(U204, U6) via RF BPF (FL3, FL4). IL of two RF BPFs is 4dB as a maximum, whereas the ripple in the passing band is 2dB(maximum). The degree of the suppression of transmit signals on receive band is at least 20dB or greater. The maximum power that can be inputted is about 25dBm.

2.3. Power Amplifier (U6, U204)

The power amplifier(U204, U6) that can be used in the CDMA mode has linear amplification capability. For higher efficiency, it is made up of one MMIC (Monolithic Microwave Integrated Circuit) for which RF input terminal and internal interface circuit are integrated onto one IC after going through the AlGaAs/GaAs HBT (heterojunction bipolar transistor) process. The module of power amplifier is made up of an output end interface circuit including this MMIC. The maximum power that can be inputted through the input terminal is +17dBm and conversion gain is about 28dB. RF transmit signals that have been amplified through the power amplifier are sent to the duplexer and then, sent out to the cell site through the antenna in order to prevent any damages on circuits, that may be generated by output signals reflected from the duplexer and re-inputted to the power amplifier output end.

2.4. Description of Frequency Synthesizer Circuit

2.4.1 Voltage Control Temperature Compensation Crystal Oscillator(TCX1)

The temperature range that can be compensated by TCX1 which is the reference frequency generator of mobile terminal is -30 ~ +80 degrees. TCX1 receives frequency tuning signals called TRK_LO_ADJ from MSM as 0.5V~2.5V DC via R and C filters in order to generate the reference frequency of 19.2MHz and input it into the frequency synthesizer of UHF band. Frequency stability depending on temperature is ± 2.0 ppm.

2.4.2 Voltage Control Crystal Oscillator (VCO1)

VCO that generates the LO frequency of mobile terminal receives the output voltage of PLL. The sensitivity on control voltage is 23MHz/v and the output level is 1dBm(maximum). Since LO frequency signal is very important for the sensitivity of mobile terminal, they must have good

spurious characteristics. VCO1 is -70dBc(maximum).

3. Digital/Voice Processing Part

3.1 Overview

The digital/voice processing part processes the user's commands and processes all the digital and voice signal processing in order to operate in the phone. The digital/voice processing part is made up of a receptacle part, voice processing part, mobile station modem part, memory part, and power supply part.

3.1.1 Voice Processing Part

The voice processing part is made up of an audio codec into digital voice signals and digital voice signals into analog voice signals, amplifying part for amplifying the voice signals and sending them to the ear piece, amplifying part that amplifies ringer signals coming out from MSM6050, and amplifying part that amplifies signals coming out from MIC and transferring them to the audio processor.

MIC signals are amplified through the audio codec which is PM6050(U4), and converted into digital signals. Then, they are inputted into MSM6050. In addition, digital audio signals outputted from MSM6050 are converted into analog signals after going through the audio codec to be amplified. and then transferred to the ear piece.

3.1.2 MSM6050 (Mobile Station Modem) Part

MSM6050, which is U7, is the core element of CDMA system terminal that includes ARM7TDMI microprocessor core. It is made up of a CPU, encoder, interleaver, deinterleaver, Viterbi decoder, MOD/DEM, and vocoder. TCXO (19.2MHz) that is received from TCX1. CPU controls the terminal operation. Digital voice data that have been inputted are voice-encoded and variable-rated. Then, they are convolutionally encoded so that error detection and correction are possible. Coded symbols are interleaved in order to cope with multi-path fading. Each data channel is scrambled by the long code PN sequence of the user in order to ensure the confidentiality of calls. Moreover, binary quadrature codes are used based on Walsh functions in order to discern each channel. Data created thus are 4-phase modulated by one pair of Pilot PN code and they are used to create I and Q data. When received, I and Q data are demodulated into symbols by the demodulator and then, deinterleaved in reverse to the case of transmission. Then, the errors of data received from Viterbi decoder are detected and corrected. They are voice decoded at the vocoder in order to output digital voice data

3.1.3 Memory Part

Memory part consists of Flash Memory, SRAM. In the Flash Memory part included SRAM of U1 (64M x 16M bits), there are programs used for terminal operation. The programs can be changed through down loading after the assembling of terminals. On the SRAM(16Mbits), data generated during the terminal operation are stored temporarily.

3.1.4 Power Supply Part (U4)

When the External DC (4.5V) is fed to the five regulators generated +2.7V or +1.8V. The generated voltages are used for MSM6050, RFT6100, RFR6000, audio codec, and other LOGIC parts. PWR