Michelle RF Circuit Description

Limiting Power

Each mobile is individually calibrated at the factory to ensure max power of +23dBm and min power of –50dBm by employing proper frequency and temperature compensation schemes for both the TX and RX automatic gain control(AGC) amplifier.

Suppression of Spurious Radiation

Spurious and harmonic suppression is achieved by proper design with various filters and sufficient use of metallic shields. Rigorous testing at the factory ensures continuous compliance.

Frequency stabilization

A voltage controlled temperature compensated crystal oscillator(VCTCXO) is utilized as a frequency reference for all of the transceiver local oscillators. This crystal oscillator is specified to a frequency stability of +/-2.5ppm. The synthesizer lock status is constantly monitored by the microprocessor and transmission is disabled whenever an out of lock condition is detected. The mobile is locked to the base station during operation. The mobile receiver constantly monitors the received signal form the base station and makes necessary frequency adjustment on the VCTCXO to correct any frequency errors between the mobile and the base station.

Limiting Modulation

The audio input is sampled, digitally limited, and then filtered to amplitude and frequency limit the signal applied to the modulator. The device supports the IS-95A for CDMA operation. The device has an operating temperature range of –30 to +60℃. The functions include Compandor, PLL lock detector, filtering of received data, audio signal filtering for signals

MSM Part

MSM3000 is the core element of CDMA system terminal that include ARM7TDMI core. It is made up of a CPU, encoder, interleaver, deinterleaver, viterbi decoder, MOD/DEM, and vocoder. 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 scope 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 de-interleaved 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 ouput digital voice data.

The MSM3000 supports Enhanced Variable Rate Coder(EVRC) operation in addition to the standard 8k and 13k vocoding rate.

Keypad/LCD and Receptacle Part

Once the keypad is pressed, the key signals are checked by MSM3000 for processing. In addition, when the key is pressed, the keypad/LCD lights up through the use of 15 LEDs. The terminal status and operation are displayed on the screen for the user with the characters and icons on the LCD. It exchanges audio signals and data with external sources through the receptacle, and then receives power from the battery or external batteries.

Audio Processing Part

MIC signals are inputted into the audio codec which is ST5092, and converted into digital signals. Then, they are inputted into MSM3000. In addition, digital audio signals outputted from MSM3000 are converted into analog signals after going through the audio codec. These signals are transferred to the earpiece. Then, the signals of ringer activate the ringer by activating Q703 by using signals generated in the timer in MSM3000.

Memory Part

8 Mbit Flash Memory ,2 Mbit Static RAM, and 128 Kbit EEPROM are used. The programs can be changed through down loading after the assembling of terminals. On the SRAM which is U708, data generated during the terminal operation are stored temporarily. On EEPROM which is U709, non-volatile data such as unique numbers(ESN) of terminals are stored.

Power Supply Part

When the battery voltage(+3.6V~+4.2V) is fed and the PWR/END key of keypad is pressed, MSM3000 is activated by the V_PWR, PS_ON, and DC/DC converter(U711) generates +4.2V which is supplied to PA stage. MSM3000 output PS_HOLD, and Two regulators generate +3.0V which are used for audio codec and other LOGIC parts.

Logic Part

The logic part consists of internal CPU of MSM, RAM, ROM and EEPROM. The major components are as follows:

CPU: ARM7TDMI core

FLASH MEMORY and SRAM: U707, U708

FLASH ROM: 8Mbits(28F800C3B)

SRAM: 2Mbits(KM68U2000)

EEPROM: U709(M24128, 128Kbit) LCD Module

LCD module contains a controller which will display the information onto the LCD by 8-bit data from the MSM3000. It also consists a DC/DC converter to supply +3.0V for fine view angle and LCD reflect to improve the display efficiency. Four LEDs are used to display LCD backlight.