TECHNICAL DESCRIPTION

This transmitter has been specially designed for the Domestic Personal Communication Service(CDMA) and the Domestic Cellular Radiotelephone Communication Service (AMPS).

[**PCS mode**]

The rated maximum power output for PCS is 0.2 watts with the capability of reducing the maximum power in a step of 1 dB on command from the base station. The transmitter output is confirmed correspond to the received power level of the mobile station. Each power level is maintained within +2 /-4 dB of its nominal level over the temperature range from –30 to +60 degrees centigrade and +14 –14% change of the supply voltage. This transmitter operates in the frequency range of 1851.250 MHz to 1908.250 MHz. The frequencies are generated by Phase Locked Loop Frequency Synthesizers, which are controlled by the closest base station in the system. The handset causes the frequency stability of carrier according to the frequency from the base station to become less than ± 150 Hz.

The transmitter is equipped with a voice processor and a Codec that are included in IC210 MSM5105. The Codec (that is included in IC210 MSM5105) samples a voice signal and a Voice processor codes EVRC or 13K voice data packet. And MSM formats the modulated signals with a voice data packet. The modulation is the Quadrature modulation. The I and Q signals are shaped by the filters whose function is included in MSM. The signals are transformed to BBA (Base Band Analog processor) (IC20). The D/A Converters, that are included in IC210 MSM5105, generate analog I and Q signals. The low pass filters shape the analog I and Q signals to limit Band width 1.25MHz.

The carrier frequency of transmitter is generated by a RF PLL (Phase Locked Loop) circuit and a local PLL circuit. RF PLL circuit consists of a VCO (X1401), a frequency synthesizer IC (IC141), a loop filter, and a reference frequency oscillator (TCXO) X1400. The TX UP mixer is incorporated in the TX Control IC (IC130). The local PLL circuit consists of a VCO and a frequency synthesizer included in IC130, the loop filter, and the reference frequency oscillator. The TX up mixer is in the TX control IC (IC131). For the TCXO system, see EXHIBIT XX.

Each Frequency Synthesizer Circuit (IC141, IC130) has a programmable divider, a reference divider, a phase comparator, and a change pump. The programmable divider of IC141, which is controlled by MSM (IC210) installed CPU, provides a signal to the phase comparator by dividing an output of the VCO (X1401). The programmable divider of IC130 is a fixed divider and it provides a signal to the phase comparator by dividing the VCO frequency by the fixed number. The reference divider provides a reference signal to the phase comparator by dividing an output of the TCXO system.

The phase comparator controls a frequency of the VCO through the charge pump and Loop filter so that the phase of the signal from the programmable divider corresponds to the phase of the reference signal. The frequency of the VCO (X1401) for RF-PLL and the VCO (that is included in IC123) for IF PLL, and the TCXO system stability are controlled by IC210 MSM5105. In PCS mode, after mixing and the TX_IF-PLL output on the TX control (IC130), RF output is provided to a bandpass filter, IC131 SAW Filter. In AMPS mode, after mixing and the TX_IF-PLL output on the TX control (IC130), RF output is provided to a bandpass filter, XF135 SAW Filter.

The power amplifier circuit, which consists of a PCS Power Amp. (IC133), the Coupler (XF131), and Isolator (XF132), amplifies the

output from the SAW Filter (IC131) and provides at least (MAX) 25.0 dB output. The output of the PCS power amplifier is connected to the antenna through tow staggered duplexer. The SW (XF110) is connected to an antenna terminal and an external connector RF terminal. The signal (ANT_EXT) from MSM5101 decides which path is appropriate to be output. The output of the power amplifier provides adequate margin to compensate for losses in the duplexer, the isolator, the separator and the SW.

The Power Control circuit consists the HDET, an AGC (Auto Gain Control) circuit included in IC130, an AD converter included in IC210. The PCS Power Amp. output level, which is detected by HDET is converted into the digital data by the AD converter included in IC210, and is loaded into MSM5105. The TX power level is confirmed according to the RX power level and a command from the base station. The MSM5105 detects the RX power level in IC and generates an AGC signal corresponding to the TX power level, and adjusts the signal according to a command from the base station and a read value of HDET, and then provides it into the AGC circuit in IC20. The TX power level of the transmitter is controlled by changing the Amplitude of the output power level in AGC circuit according to the AGC control voltage value.

IC210 (MSM5105) continuously monitors the power output at the output of HDET. The above is used to adjust the maximum TX power. An AGC value is modified by a monitor value, and it doesn’t exceed a set TX LIMIT value. The transmitter is controlled by a signal from the MSM5105. The TX control IC (IC130), the frequency synthesizer IC (IC141) and PCS Power Amp is enabled.

[**AMPS mode**]

The rated maximum power output is 0.175 watts with the capability of reducing the maximum power in five steps of 4dB each on command from

a Base Station. Each power level is maintained within +2/-4dB of its nominal level per the temperature range from –30 to +60 degrees Centigrade and +14 –14% change of the supply voltage, accumulative. This transmitter operates in the frequency range of 824.04 to 848.97 MHz. The frequencies are generated by Phase Locked Loop Frequency Synthesizers which are controlled by the closets Base Station in the system and frequency stability of carrier is better than ± 2.5 ppm. The transmitter is equipped with an audio compressor having 2:1 syllabic compandor, a pre-emphasis audio circuit having a 6dB/octave response, an instantaneous deviation limiter to limit deviation to ± 12KHz and a post deviation limiter filter having a –48dB/octave response above 3000 Hz.

A Local PLL (Phase Locked Loop) circuit and a TX PLL circuit generate the transmitter carrier frequency. Each PLL circuit consists of a VCO (Voltage Controlled Oscillator)(X1401 or one which is included in IC130), a programmable divider, a reference divider, a phase comparator, a charge pump, a loop filter, and a reference frequency oscillator. The up Mixer is incorporated in IC130.

The TCXO system is same as PCS mode.

The phase comparator controls a frequency of the VCO through the charge pump and the loop filter so that the phase of the signal from programmable divider agrees with the phase of the reference signal. Because of it, the frequency of VCO is controlled by the digital circuitry with the stability of the TCXO system . The RF signal with transmit frequency, which is derived by mixing TX PLL output with Local PLL output in IC130, is provided to driver (in IC141) through the Buffer Amp (in IC122).

The digital circuitry continuously monitors the output at the

output of the power detector (HDET). If the power output is detected and the Carrier ON command is not enable by the digital circuitry, the transmitter will be deactivated through independent action of controlling TX Enable

The TCXO system

The TCXO system contains of TCXO module and Auto Frequency Control block.

The frequency of the TCXO module is 19.2 MHz with stability less than ±2ppm over the temperature range of –30 to +80 degrees Centigrade.

The frequency of TCXO module can be controlled by AFC (Auto Frequency Control) circuit block which Mobile station Modem (IC210) includes, so that the receiving frequency agrees with the base station transmit frequency. The frequency stability of TCXO system is maintained within ± 150 Hz over the temperature range of –30 to +60 degrees Centigrade.