

TECHNICAL DESCRIPTION

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

[CDMA mode]

The rated maximum power output for CDMA is 0.236 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 824.700 MHz to 848.310 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 ± 300 Hz.

The transmitter is equipped with a voice processor and a Code. The Code (IC211) samples a voice signal and a Voice processor, which is included in MSM (Mobile Subscriber Modem) (IC211), codes 8K (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 D/A Converters, which are included in IC 211, 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 TX PLL (Phase Locked Loop) circuit and a local PLL circuit. TX PLL circuit consists of a VCO (CM4), a frequency synthesizer IC (IC141), a loop filter, and a reference frequency oscillator (TCXO). The TX UP mixer is incorporated in the TX Control IC (IC132). The local PLL circuit consists of a VCO included in IC123, the frequency synthesizer IC (IC141), the

loop filter, and the reference frequency oscillator. The TX up mixer is in the TX control IC (IC132). For the TCXO system, see TCXO section.

Each Frequency Synthesizer IC (IC141, IC123) has a programmable divider, a reference divider, a phase comparator, and a charge pump. The programmable divider of XF141, which is controlled by MSM (IC211) included CPU, provides a signal to the phase comparator by dividing an output of the VCO (X1402). The programmable divider of IC123 is a fixed divider and it provides a signal to the phase comparator by dividing the VCO frequency 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 (X1402) for RF-PLL and the VCO (in IC123) for IF PLL, and the TCXO system stability are controlled by MSM3100. The baseband signal is generated by mixing with the TX_IF-PLL output on the TX control (IC132), and provided to the Buffer Amp. (IC142) through a bandpass filter.

The power amplifier circuit, which consists of a Power Amp. (IC131), the bandpass filter, a Duplexer (XF132, XF111), and the power control circuit, amplifies the output from the Driver Amp. of IC132 and provides at least (MAX) 25.8 dB output. The output of the power amplifier (IC131) is connected to a duplexer, an isolator and a separator. The SW is connected to an antenna terminal and an external connector RF terminal. The signal (ANT_EXT) from MSM3100 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 the TX control IC (IC132), an AD converter included in IC211, and a TX control circuit included in MSM3100. The Power Amp output level, which is detected by HDET is converted into the digital data by the AD converter included in

IC15, and is loaded into MSM3100. The TX power level is confirmed according to the RX power level and a command from the base station. The MSM3100 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 IC132. 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.

IC211 (MSM3100) 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 MSM3100. The TX control IC (IC132), the frequency synthesizer IC (IC141, IC123) and Power Amp is enabled.

The TCXO system

The TCXO system contains of TCXO module (X1401) and Auto Frequency Control block.

The frequency of the TCXO module is 19.68 MHz with stability less than ± 2 ppm 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 (IC401) includes, so that the receiving frequency agrees with the base station transmit frequency. The frequency stability of TCXO system is maintained within ± 300 Hz over the temperature range of -30 to $+60$ degrees Centigrade.