TECHNICAL DESCRIPTION

The transmitter has been specially designed for the Domestic Public Cellular Radiotelephone Communications Service. The rated maximum power output is 3 watts with the capability of reducing the maximum power in seven steps of 4dB each on command from a Base 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 +15/-15 % 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 closest Base Station in the system and the 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.

The transmitter carrier frequency is generated by a Phase Locked Loop (PLL) circuit. The PLL circuit consists of a TX Voltage Controlled Oscillator (TX VCO, MX301), a PLL integrated circuit (IC301), a loop filter and a reference frequency oscillator (TCXO system, see Pages 4 to 6 of Exhibit 3).

The frequency of the TCXO system is 14.4 MHz with stability better than ±2.5ppm over the temperature range of -30 to +60 degrees Centigrade. The frequency of TCXO system can be controlled by AFC (Automatic Frequency Control) circuit so that the receiving frequency agrees with the Base Station transmit frequency. In this mode, the frequency stability of TCXO system is maintained within ±1.0ppm over the temperature range of -30 to +60 degrees Centigrade. The reference divider provides a reference signal to the phase comparator by dividing an output of the TCXO system.

The programmable divider, which is controlled by digital circuitry, provides a signal to the phase comparator by dividing an output of the TX VCO (MX301).

The phase comparator controls a frequency of the TX VCO through the charge pump and the loop filter so that the phase of the signal from the programmable divider agrees with the phase of the reference signal. Therefore, the frequency of the TX VCO is controlled by the digital circuitry with the stability of the TCXO system. The TX PLL synthesizer provides a RF signal to TX driver AMP(Q203).

TECHNICAL DESCRIPTION (Continued)

The TX PLL circuit also acts as a frequency modulator which provides the peak frequency deviation within ±12 KHz and the constant deviation and low distortion within the operating bandwidth. The frequency modulator is preceded by a Signal Audio Processing LSI (IC403) which contains a band pass filter, compressor, pre-emphasis, limiter, post-limiter filter, and a mute switch, to provide appropriate voice band processing. Supervisory Audio Tone (SAT), Signaling Tone (ST), and Wide Band Data (WBD) are generated within the Signal Audio Processing LSI (IC403) which is controlled by Microprocessor (IC601), and transmitted to the frequency modulator through the filter included in the Signal Audio Processing LSI (IC403).

The power amplifier circuit, which consists of a RF power amplifier module (IC201), a band pass filter (F202), the driver (Q203), and a power control circuit, amplifiers the 0.3 milliwatt from the TX PLL synthesizer circuit and provides at least 5 watts output. The output of the power amplifier is connected to an antenna terminal through a directional coupler (F203) and a Band Pass Filter (F101). The output of the power amplifier provides adequate margin to compensate for losses in the directional coupler and bandpass filter.

The Power Control circuit (APC) consists of a power level detector (D201), comparator (IC202), and a DA converter incorporated in IC601. The power detector provides the comparator with a DC voltage which indicates the power level. The D/A converter, which is controlled by the digital circuitry provides the reference DC voltage to the comparator. The comparator controls the RF power amplifier module so that the voltage detected by the power level detector is equal to the reference voltage. The D/A converter converts the binary data from the digital circuitry into the analog reference voltage. Binary data, which corresponding to the eight different power levels, is stored in the EEPROM of the digital circuitry and controls the power level adjustment. The transmitter has the capability of reducing the maximum output power level in 7 steps of 4 dB each.

The digital circuitry continuously monitors the power output at the output of the power detector. If the power output is detected and the CARRIER ON command is not enabled by the digital circuitry, the transmitter ill be deactivated through independent action of controlling TX Enable Switch (Q301) to turn off the power of TX VCO (MX301) and through action of controlling Power Supply Switch (Q201) with signal (TXTS) to turn off the power of RF Power Amp. Module (IC201), TX Driver Amp (Q203) and Automatic Power Control (IC202).