

TEK CITY ELECTRONICS LTD.

(FRS-UHF Transceiver)

(Model No. : 1-80000)

Technical Description

This is a UHF FRS transceiver which provide half duplex communications. The Crystal oscillator with temperature compensation and detection circuit are applied to provide accurate and stable operation.

There are three major electrical units to support this transceiver function properly which are listed below:

1. Power Management circuit
2. Receiver
3. Transmitter

Power Management Circuit

The transceiver operates with 4×AAA batteries and it will be turned On/OFF by pressing the power ON/OFF button, K101.

The voltage from the battery will be regulated by a voltage regulator circuits U101, Q101, Q102 and it will supply the power to the digital circuit, analog circuit and RF circuit.

The voltage regulator circuit output is 3.0V and the minimum operation voltage from the battery is 4.6V.

Receiver

The RF signal is received from the antenna which is followed by the band pass filter consisting of C42-C51, A1-3, L10, L11 and antenna switches D2, D3. The RF signal pass is then fed to LNA for amplification and this signal will be down converted into 1st intermediate frequency 21.7MHz by using a mixer Q1. The 1st IF at the mixer output is passed through a crystal filter FL1 and amplified by Q2. The local oscillator is made by using a PLL consisting of U1, Q305 and Q306. The reference frequency used in the PLL is 21.25MHz. An accurate and stable reference signal is provided by the crystal oscillator X1 and it is temperature compensated by C7, C8.

The 1st IF is fed into a single conversion IF IC U2, which includes the 2nd local oscillator, 2nd mixer, IF amplifier, discriminator, squelch and mute control. The 2nd LO frequency is provided by X1 which is shared with the reference signal of the PLL circuit by using the internal buffer amplifier of PLL IC namely U1.

The audio signal after the discriminator is fed into the CTCSS IC U105 which includes FM de-emphasis circuit audio filter, sub tone frequency filter and CTCSS detector. The audio signal output from the CTCSS IC will be fed into the audio amplifier U106. The CTCSS IC will acknowledge the MCU U103 to take appropriate logic decision if the sub tone signal is detected.

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Transmitter

The voice signal is picked up by a microphone MIC101 and amplified by amplifier U102B. The amplified voice signal is fed into a limiter circuit D102, U102D to limit the maximum frequency deviation to be less than 2.5kHz.

The limited voice signal will be passed into the CTCSS IC U105 which includes the band pass filter and the sub tone signal generator. The sub tone signal and the voice signal will be frequency modulated by the VCO circuit Q305, Q306, D304 and D302 which is frequency synthesized by PLL circuit U1.

The frequency modulated signal will be amplified by a two stage amplifier Q3, Q4 to provide enough signal power to drive the final stage power amplifier Q5. The RF power signal followed by band pass filter C42-C51, A1-3, L10, L11 and antenna switch D2, D3. Then the filtered power signal was fed into the antenna for transmission.