

RF Amplifier

The LNA is constructed with two stages of amplifiers (Q1 and Q2) and filters (FIL1 and FIL2) for high rejection ratio of alternate channel and spurious. They are matching with the LC networks. The signal received from the antenna is fed to the LNA. Then, the LNA amplifies and filters out the desired signal and delivers it to the mixer.

Local Oscillator

The first local oscillation frequency is derived from a single 4MHz crystal by means of a phase locked loop. The transmitter frequency is from 910MHz (channel A) to 921.5MHz (channel H). The first IF is at 71MHz with the first LO operates from 839MHz to 850.5MHz.

The second local oscillator is formed with a 60.3MHz crystal and a transistor Q5.

Mixer

The first mixer is constructed with a dual gate MOSFET (Q3). After the received signal has amplified from the LNA, it is injected in the G1 of the FET. And the local oscillation frequency from the first local oscillator is fed to the G2 of the FET. And the received signal and local oscillation frequency are heterodyned at Q3 to produce a 71MHz intermediate frequency (IF) signal.

The second mixer is built in the integrate circuit U1. The first IF is amplified by Q4 and inject to pin 16 of U1 and the second local oscillation frequency is fed to the U1 at pin 2. They are heterodyned to produce the second IF 10.7MHz.

IF Filter/Limiter and Detector

The 10.7MHz IF signal from the second mixer is filtered by FIL4 and amplified by U1 internally. U1 performs the IF Limiter and FM quadrature detector as well. The detector's center frequency is determined by adjusting L18. The audio is recovered from pin 14 and RF signal level out (RSSI) is at pin 10.

Audio Amplifier and Expander

The recovered audio from U1 is amplified by an op-amp (1/4 IC100) and expanded by IC101 and IC100C to improve the Signal-to-Noise ratio. C110 and R117 form the de-emphasis network. The expander can be trimmed to a minimum distortion by means of adjusting VR102.

Bass and Treble Control

IC102A and rotary potentiometer (VR200 and VR201) are used to form an active tone control circuitry for the bass and treble sound. The expended audio is coupled to the control circuitry. When the potentiometers are rotated at a different position from center, the circuitry can provide up to 12dB gain or 12-dB attenuation for the bass and treble sound respectively.

Balance and Unbalance Output

The audio from Bass and Treble control is divided into two. One is amplified as balance output by IC200 with output transformer T300. Another is amplified by Q320 as the unbalance mode output.

Squelch and Mute Circuit

The recovered audio from U1 is also fed to a squelch network, which is constructed with IC100A, IC100B, IC102B and Q400. The noise is detected and amplified by IC100A, IC100B and Q400. And then D400 and D401 rectify it. The noise level is proportional to the DC level at TP5. If the DC level presented at TP5 is higher then the preset level at pin 6 of IC102B, Q200 will be turned off and mute the audio.

RF Level Meter

The MCU (IC400) detects the DC level from the RSSI pin 10 of U1 and classifies it into three different strength level. The LED for LOW, MID and HIGH of the level meter will be turned on through the output port pin15 to pin 17 from the MCU according to the RF signal strength received.