

EVX-5300/5400 (UHF) Circuit Description

1. Receiver System

1-1. Front-end RF amplifier

Incoming RF signal from the antenna passes through the Low-pass filter, antenna switching diode D1014, D1016 (both JDP2S12CR), and the 1st RF attenuator Q1037 (SKY12338), and then removed undesired frequencies by the varactor tuned band-pass filter D1022, D1023 (all 1SV323).

The filtered RF signal is amplified by Q1045 (2SC3356) and then passes through the Band-pass filter D1026, D1027 and D1061 (all 1SV323), 2nd RF attenuator Q1050 (SKY12338) and then applied to the 1st mixer Q1053 (AK1220).

1-2. First Mixer

The RF signal is mixed with the 1st local signal between 352.15 MHz and 419.15 MHz in the 1st mixer Q1053(AK1220), to produce 50.85 MHz 1st IF signal.

The 1st local signal is generated by the VCO, which consists of Q1055 (2SK508), varactor diodes D1029, D1032, D1036, and D1037 (1SV279,1SV280). The 1st local signal is supplied to the 1st mixer Q1053(AK1220) through the buffer amplifier Q1064(2SC5006) and Q1066 (2SC5226).

1-3. IF Amplifier & Demodulator

The 1st IF signal is applied to the monolithic crystal filter XF1001 to strip away all but the desired signal, and then supplied to the custom IC Q1070 (RFIC) through the IF amplifier Q1068 (2SC5226). The custom IC Q1070 (RFIC) converts the 1st IF signal into the Base Band signal.

The Base Band signal from the custom IC Q1070 (RFIC) is applied to another custom IC Q1001 (OMAP), which is demodulated by the Digital Signal Processor.

1-4. Audio amplifier

The demodulated signal from the custom IC Q1001 (OMAP) is applied to another custom IC Q1044 (PMAIC). The custom IC Q1044 (PMAIC) convert to analog signal. The output signal from the custom IC Q1044 (PMAIC) is applied to the AF amplifier which is constructed Q1015(NJM12902) and Q1027(TDA1519CTH).

The output of Q1027(TDA1519CTH) drive a front panel speaker or external speaker that is connected microphone jack J1004.

2. Transmitter System

2-1. MIC Amplifier and modulator

The speech signal from external microphone which connected J2001 (EVX-5300) or J3001 (EVX-5400) is supplied to AF amplifier Q2005 (NJM2125 / EVX-5300) or Q3010 (NJM2125 / EVX-5400). The output signal is supplied the custom IC Q1044 (PMAIC), which is amplified the speech signal.

The amplified speech signal from the custom IC Q1044 (PMAIC) is supplied to another custom IC Q1001 (OMAP), which process the speech signal by the Digital Signal Processor.

The processed speech signal from the custom IC Q1001 (OMAP) is supplied to the modulator section of the custom IC Q1070 (RFIC), which modulates the speech signal into the FM or digital signal.

2-2. Drive and Final Amplifier Stages

The modulated signal from the custom IC Q1070 (RFIC) is buffered by Q1061 (2SK3077) and amplified by Q1052 (RD01MUS1).

The Low-level signal is then applied to Power Module Q1046 (RA60H3847M1A) for final amplification up to 45 watts output power.

The transmit signal then passes through the antenna switch D1018, D1019 (both MA4P959) and is low pass filtered to suppress away harmonic spurious radiation before delivery to the antenna.

2-3. Automatic Transmit Power Control

The output power of Power Module is detected by CM coupler, forward power is detected by D1020 (HSM88AS) and is input to comparator Q1074 (ADM8566ARM),

The comparator Q1074 (ADM8566ARM) compares detected voltage of forward power and power control voltage from custom IC Q1070 (RFIC), makes output power stable by controlling the bias voltage RF amplifier Q1052 (RD01MUS1).

Additionally, output voltage of operational amp Q1043 (ADM8566ARM) is supplied to Power Module .There are 4levels of output power (Hi, Lo3, Lo2 and Lo1) it is controlled by the Q1070 (RFIC).

Reflection power is detected by D1021 (HSM88AS), Automatic transmission power control circuit protect equipment. For example, when the antenna is not connected.

3. PLL Frequency Synthesizer

The frequency synthesizer consists of VCO, TCXO (X1002), and the custom IC Q1070 (RFIC).

The output frequency from TCXO is 19.2 MHz and the tolerance is ± 1.5 ppm in the temperature range -22°F to $+140^{\circ}\text{F}$ (-30°C to $+60^{\circ}\text{C}$).

3-1. VCO (Voltage Controlled Oscillator)

While the radio is receiving, the RX oscillator Q1055 (2SK508) generates a programmed frequency between 352.15 and 419.15 MHz as 1st local signal.

While the radio is transmitting, the TX oscillator Q1054 (2SK508) generates a frequency between 403 and 470 MHz .

The output from oscillator is amplified by buffer amplifier Q1064 (2SC5006) and then is divided, one is feed back to the PLL Circuit in the custom IC Q1070 (RFIC). The other one is supplied to the 1st mixer Q1053 (AK1220) in case of the reception. In the transmission, the output is modulated to the FM (or digital) in the custom IC Q1070 (RFIC), and then supplied to the transmitter section described previously.

3-2. VCV (Varactor Control Voltage) Control

The tuning voltage (VCV) of the VCO establishes the lock range of VCO by controlling the cathode of varactor diode (D1029, D1032, D1036, D1037 for receiving, and D1028, D1031, D1034, D1035 for transmitting: 1SV279 and 1SV280) from the custom IC Q1070 (RFIC).

3-3. PLL

The main constitution product of the PLL is equipped all with in the custom IC Q1070 (RFIC), so that all processing regarding the frequency control is performed in the custom IC Q1070 (RFIC).