

EVX-5300/5400 (VHF) 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 D5014, D5016 (both JDP2S12CR), and the 1st RF attenuator Q5037 (SKY12338), and then removed undesired frequencies by the varactor tuned band-pass filter D5022, D5023, D5026, D5027 (all 1SV323).

The filtered RF signal is amplified by Q5045 (2SC3356) and then passes through the Band-pass filter and the 2nd RF attenuator Q5050 (SKY12338), and then applied to the 1st mixer Q5053 (AK1220).

1-2. First Mixer

The RF signal is mixed with the 1st local signal between 186.85 MHz and 224.85 MHz in the 1st mixer Q5053(AK1220), to produce 50.85 MHz 1st IF signal.

The 1st local signal is generated by the VCO, which consists of Q5055 (2SK508), varactor diodes D1029, D1032, D1036, and D1037 (all 1SV282). The 1st local signal is supplied to the 1st mixer Q5053(AK1220) through the buffer amplifier Q5064(2SC5006) and Q5066 (2SC5226).

1-3. IF Amplifier & Demodulator

The 1st IF signal is applied to the monolithic crystal filter XF5001 to strip away all but the desired signal, and then supplied to the custom IC Q5070 (RFIC) through the IF amplifier Q5068 (2SC5226). The custom IC Q5070 (RFIC) converts the 1st IF signal into the Base Band signal.

The Base Band signal from the custom IC Q5070 (RFIC) is applied to another custom IC Q5001 (OMAP), which is demodulated by the Digital Signal Processor.

1-4. Audio amplifier

The demodulated signal from the custom IC Q5001 (OMAP) is applied to another custom IC Q5044 (PMAIC), which convert to analog signal. The custom IC Q5044 (PMAIC) convert to analog signal.

The output signal from the custom IC Q5044 (PMAIC) is applied to the AF amplifier which is constructed Q5015(NJM12902) and Q5027(TDA1519CTH).

The output of Q5027(TDA1519CTH) is applied to the front panel audio speaker or external speaker.

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), and then applied to the custom IC Q5044 (PMAIC), which is amplified the speech signal.

The amplified speech signal from the custom IC Q5044 (PMAIC) is supplied to another custom IC Q5001 (OMAP), which process the speech signal by the Digital Signal Processor.

The processed speech signal from the custom IC Q5001 (OMAP) is supplied to the modulator section of the custom IC Q5070 (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 Q5070 (RFIC) is buffered by Q5061 (2SK3077) and amplified by Q5052 (RD01MUS1).

The Low-level signal is then applied to Power Module Q1046 (RA30H3847M1A) for final amplification up to 25 watts output power.

The transmit signal then passes through the antenna switch D5018, D5019 (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 forward power of the Power Module Q5046 (RA30H1317M1A) is detected by D5020 (HSM88AS) and then applied to the comparator Q5074 (ADM8566ARM),

The comparator Q5074 (ADM8566ARM) compares detected voltage of forward power and power control voltage from custom IC Q5070 (RFIC), makes output power stable by controlling the bias voltage RF amplifier Q5052 (RD01MUS1).

Additionally, output voltage of operational amp Q5043 (ADM8566ARM) is supplied to Power Module. The output level is controlled by Q5070 (RFIC) to three level (50 watt model) or two level (25 watt model).

The Reflection power from the antenna is detected by D5021 (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 (X5002), and the custom IC Q5070 (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 Q5055 (2SK508) generates a programmed frequency between 186.85 and 224.85 MHz as 1st local signal.

While the radio is transmitting, the TX oscillator Q5054 (2SK508) generates a frequency between 136 and 174 MHz .

The output from oscillator is amplified by buffer amplifier Q5064 (2SC5006) and then is divided, one is fed back to the PLL Circuit in the custom IC Q5070 (RFIC). The other one is supplied to the 1st mixer Q5053 (AK1220) in case of the reception. In the transmission, the output is modulated to the FM (or digital) in the custom IC Q5070 (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 (D5029, D5032, D5036, D5037 (all 1SV282) for receiving, and D5028, D5031, D5034, D5035 (all 1SV282) for transmitting) from the custom IC Q5070 (RFIC).

3-3. PLL

The main constitution product of the PLL is equipped all with in the custom IC Q5070 (RFIC), so that all processing regarding the frequency control is performed in the custom IC Q5070 (RFIC).