

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 D4014, D4016 (both JDP2S12CR), and the 1st RF attenuator Q4037 (SKY12338), and then removed undesired frequencies by the varactor tuned band-pass filter D4022, D4023, D4026, D4027 (all 1SV323).

The filtered RF signal is amplified by Q4045 (2SC3356) and then passes through the Band-pass filter and the 2nd RF attenuator Q4050 (SKY12338), and then applied to the 1st mixer Q4053 (AK1220).

1-2. First Mixer

The RF signal is mixed with the 1st local signal between 399.15 MHz and 461.15 MHz in the 1st mixer Q4053(AK1220), to produce 50.85 MHz 1st IF signal.

The 1st local signal is generated by the VCO, which consists of Q4055 (2SK508), varactor diodes D4029, D4032, D4036, and D4037 (all 1SV282). The 1st local signal is supplied to the 1st mixer Q4053(AK1220) through the buffer amplifier Q4064(2SC5006) and Q4066 (2SC5226).

1-3. IF Amplifier & Demodulator

The 1st IF signal is applied to the monolithic crystal filter XF4001 to strip away all but the desired signal, and then supplied to the custom IC Q4070 (RFIC) through the IF amplifier Q4068 (2SC5226). The custom IC Q4070 (RFIC) converts the 1st IF signal into the Base Band signal.

The Base Band signal from the custom IC Q4070 (RFIC) is applied to another custom IC Q4001 (OMAP), which is demodulated by the Digital Signal Processor.

1-4. Audio amplifier

The demodulated signal from the custom IC Q4001 (OMAP) is applied to another custom IC Q4044 (PMAIC), which convert to analog signal. The custom IC Q4044 (PMAIC) convert to analog signal.

The output signal from the custom IC Q4044 (PMAIC) is applied to the AF amplifier which is constructed Q4015(NJM12902) and Q4027(TDA1519CTH).

The output of Q4027(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 Q4044 (PMAIC), which is amplified the speech signal.

The amplified speech signal from the custom IC Q4044 (PMAIC) is supplied to another custom IC Q4001 (OMAP), which process the speech signal by the Digital Signal Processor.

The processed speech signal from the custom IC Q4001 (OMAP) is supplied to the modulator section of the custom IC Q4070 (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 Q4070 (RFIC) is buffered by Q4061 (2SK3077) and amplified by Q4052 (RD01MUS1).

The Low-level signal is then applied to Power Module Q4046 (RA30H4452M1A) for final amplification up to 25 watts output power.

The transmit signal then passes through the antenna switch D4018, D4019 (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 Q4046 (RA30H4452M1A) is detected by D4020 (HSM88AS) and then applied to the comparator Q4074 (ADM8566ARM),

The comparator Q4074 (ADM8566ARM) compares detected voltage of forward power and power control voltage from custom IC Q4070 (RFIC), makes output power stable by controlling the bias voltage RF amplifier Q4052 (RD01MUS1).

Additionally, output voltage of operational amp Q4043 (ADM8566ARM) is supplied to Power Module. The output level is controlled by Q4070 (RFIC) to three level (50 watt model) or two level (25 watt model).

The Reflection power from the antenna is detected by D4021 (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 (X4002), and the custom IC Q4070 (RFIC).

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

3-1. VCO (Voltage Controlled Oscillator)

While the radio is receiving, the RX oscillator Q4055 (2SK508) generates a programmed frequency between 399.15 and 461.15 MHz as 1st local signal.

While the radio is transmitting, the TX oscillator Q4054 (2SK508) generates a frequency between 450 and 512 MHz .

The output from oscillator is amplified by buffer amplifier Q4064 (2SC5006) and then is divided, one is fed back to the PLL Circuit in the custom IC Q4070 (RFIC). The other one is supplied to the 1st mixer Q4053 (AK1220) in case of the reception. In the transmission, the output is modulated to the FM (or digital) in the custom IC Q4070 (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 (D4029, D4032, D4036, D4037 (all 1SV282) for receiving, and D4028, D4031, D4034, D4035 (all 1SV282) for transmitting) from the custom IC Q4070 (RFIC).

3-3. PLL

The main constitution product of the PLL is equipped all with in the custom IC Q4070 (RFIC), so that all processing regarding the frequency control is performed in the custom IC Q4070 (RFIC).