

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 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, D1026, and D1027 (all 1SV323).

The filtered RF signal is amplified by Q1045 (2SC3356) and then passes through the band-pass filter and the 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 186.85 and 224.85 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 (all 1SV282). The 1st local signal is supplied to the 1st mixer Q1053 (AK1220) through the buffer amplifier Q1064 (2SC5006) and amplifier 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), which convert to analog signal. The output signal from the custom IC Q1044 (PMAIC) is applied to the AF amplifier Q1015 (NJM12902) and Q1025 (TDA1519CTH). The output signal from Q1025 (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 the external microphone which connected to the J2001 (EVX-5300) or J3001 (EVX-5400) is supplied to the AF amplifier Q2005 (NJM2125: EVX-5300) or Q3010 (NJM2125: EVX-5400), and then applied to 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 (RD-01MUS1), and then is applied to the Power Module Q1046 (RA60H1317M1B), which is amplified up to 50 watts output power.

The transmit signal then passes through the antenna switch D1018 and 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 forward power of the Power Module Q1046 (RA60H1317M1B) is detected by D1020 (HSM88AS), and then applied to the 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 4 levels of output power (Hi, Low3, Low2, and Low1) it is controlled by the Q1070 (RFIC).

The Reflection power from the antenna 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 $+140$ °F (-30 °C to $+60$ °C).

3-1. VCO (VOLTAGE CONTROLLED OSCILLATOR)

While the radio is receiving, the RX oscillator Q1055 (2SK508) generates a programmed frequency between 186.85 and 224.85 MHz as 1st local signal.

While the radio is transmitting, the TX oscillator Q1055 (2SK508) generates a frequency between 136.00 and 174.00 MHz.

The output from oscillator is amplified by buffer amplifier Q1064 (2SC5006) and then is divided, one is fed 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 (all 1SV282) for receiving, and D1028, D1031, D1034, & D1035 (all 1SV282) for transmitting) 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).