D271 Theory of Operation

Description of Circuit Operation

(1) Base Unit:

The differential I and Q signals from RF109 transceiver chip are fed to the baseband IC, U39. The signals are either audio data or control data. The DSP and CODEC process the 32 KBIT ADPCM audio data in this baseband IC. The converted differential analog audio, SPKO+ and SPKO- at pin 46 & 47 of U39 is filtered by the bandpass filter formed by OPAMP, U20 and other passive components before transmit to Tel-Line, Tip & Ring via hybrid circuit, OPAMP, U35 and Transformer, T3. The digital control data is input to the microprocessor 65C02 in the baseband IC; U39 after it is processed by the DSP.

The received analog audio signal from the Tel-Line is input the Low Pass filter formed by OPAMP, U35 and other passive components. One path of the receive audio, SPK_IN is routed to the Speakerphone IC, U12 for speakerphone function. The other filtered audio path, LINE_IN is fed into audio portion of the FS1035, U8 for muting and routing function before it is input to OPAMP, U20 and baseband IC, U39. The processed audio or control data is input to RF109 transceiver IC to sent it to Handset via 2.4 GHz Radio Frequency carrier.

The relay K1 and Q1 via LINE_CTR at pin 3 of U8 control the "ONHOOK" and "OFFHOOK" of the Tel-Line.

Ring signal is monitored by U8 at R101 and R103. After receive a valid ring signal from the Tel-Line, the base will sent control data to handset for ringing.

DTMF signal is generated by U8 at pin 92 and the signal is output to the Tel-Line through the hybrid circuit, T3 and U35.

When the handset is in the charging cradle, the charge detect signal, PARK at U8 and U39 will activate the base to send security codes to the charging handset through the center charge contact.

The unregulated power supply from the AC adapter is input to two 5V regulators, 7805. One of the regulators is dedicated to RF circuit and the other is supply to audio and digital circuit.

The "LINE IN USE" LED is controlled by pin 63 of U8.

Caller ID data pass through C576 and C577 from Tel-Line. It is process by U8 via pin 127-130.

CAS data and dial tone are input through U8 at pin 96 to U11 at pin 13 and 14. The detected CAS or Dial tone is signal back to the microprocessor, Z80 in U8.

Extension phone is use is detected by U8 at pin 120-122.

Hold release signal is detected by U8 at pin 123-125.

(2) Handset unit:

The receive differential Q and I signals from RF109 transceiver chip are fed to the baseband IC, U7. The signals are either audio data or control data. The DSP and CODEC process the 32 KBIT ADPCM audio data in this baseband IC. The converted differential analog audio, SPKO+ and SPKO- at pin 46 & 47 of U39 are input to the earpiece through Stereo-Phone-Jack, J13. The digital control data is input to the microprocessor 65C02 in the baseband IC; U7 after it is processed by the DSP.

The voice signal from the Microphone at JP8 & 10 is differentially ac coupled to U7. The analog signal is digitized by the CODEC before it passes to the DSP to create the 32 Kbit ADPCM audio date. The processed audio or control data is input to RF109 transceiver IC to sent it to Base via 2.4 GHz Radio Frequency carrier.

The handset keys are detected at pin8-10, pin 53-60 of U7.

The Buzzer BZ1 generates key beep and ringing tones through the control of Q3 and pin 44 of U7.

(3) RF Circuits

Both base and Handset RF circuits and PCB layout are identical.

The RF109 transceiver IC, U2 and RF110 Class AB Power Amplifier, U1 are designed to work with the same baseband chip used in both Base and Handset unit. Together with T/R switch, receive preselect filter, low pass filter, loop filter, bandpass filter and VCO, a 2.4 GHz DSS cordless telephone' complete transmit, receive and frequency function is formed (See attached figure).

The RF109/RF110 interface requires a minimum of 18 signals from the baseband chip.

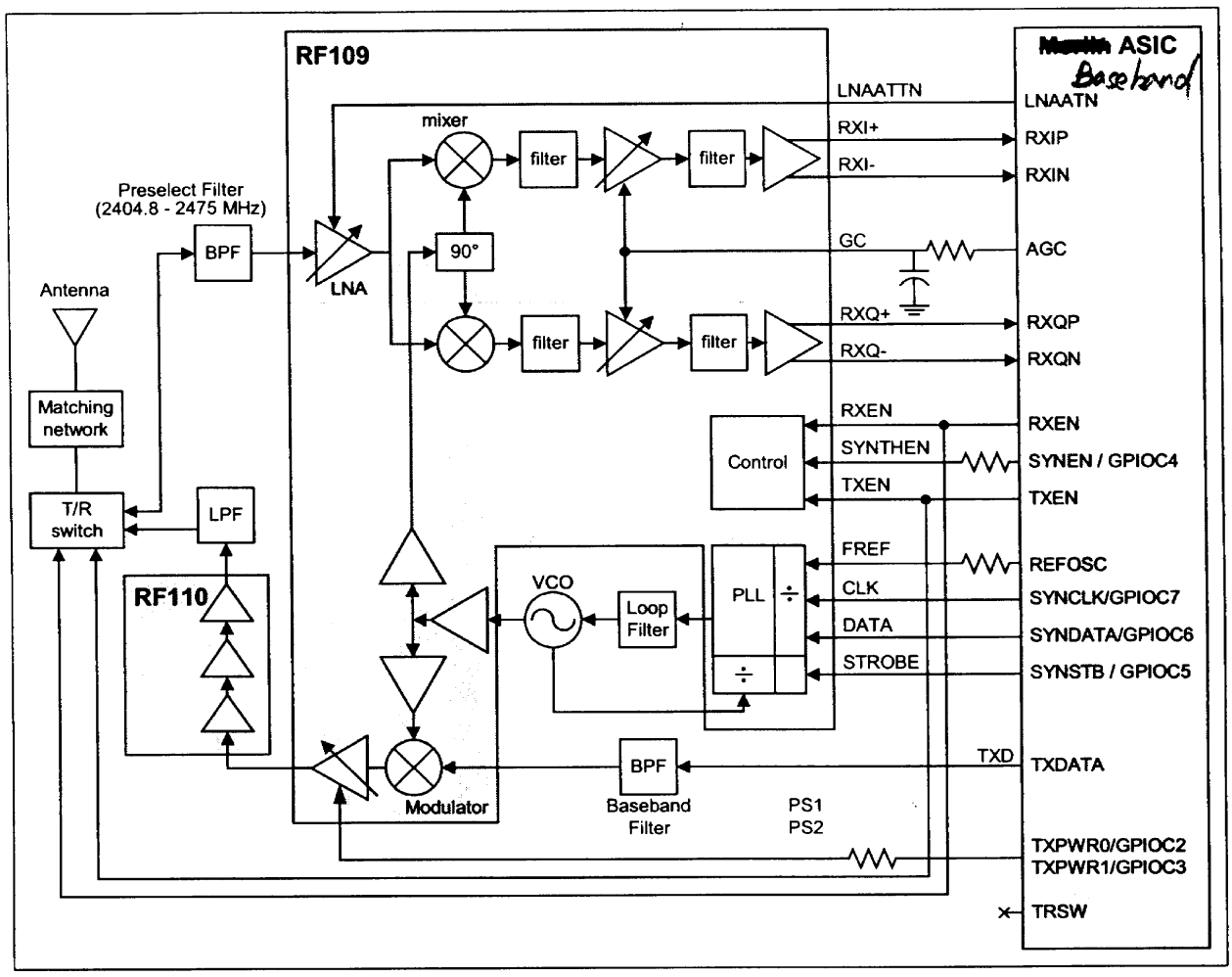


Figure 6-4. Block Diagram for The RF109/RF110 2.4 GHz RF Chipset

Transmit Path:

The baseband digital input signal is shaped by external filter. The shaping of the baseband data determines the spectral shape of the transmitted RF signal. For the 2.4 GHz telephone system, the typical 3-dB highpass filter cutoff frequency is about 22 KHz and the lowpass filter is 820 KHz. The transmit baseband input level at the TXD input of the RF109 is typically 100 mVp-p.

The RF110 PA inputs and outputs are differential RF signals. The differential outputs are converted to 50 Ohm using printed balun circuit, MS1-6. It is then filtered by the 5 poles low pass filter formed by C62, MS7, C18, MS8, C19 ad C20 before sent it out to the air via build in antenna and antenna switch, U3.

The phone is designed to provide automatically selectable High, Medium and low output power modes. Depending on the distance between base and handset unit, the system automatically set the desired power mode.

Receive Path:

The 2.4 GHz signal is received at the antenna and passes through the antenna switch, T/R switch, U3 and RF Bandpass Filter (BPF), FL1. The BPF is used to minimize overloading of the front end of the radio. The filter has a 3-dB passband range from 2400 to 2480 MHz.

The output of the BPF is AC-coupled through C16 to the Low Noise Amplifier (LNA) in RF109. The RF109 downconverts the RF signals into I/Q baseband signal. The differential I/Q baseband signals are DC-coupled to the baseband IC at RXIP, RXIN, RXQP and RXQN inputs.

Antenna Switch or Transmit/Receive (T/R) Switch:

The T/R functions of the radio are enabled by TXEN and RXEN control signals form the baseband IC.

LOCAL Oscillator (LO) Generation:

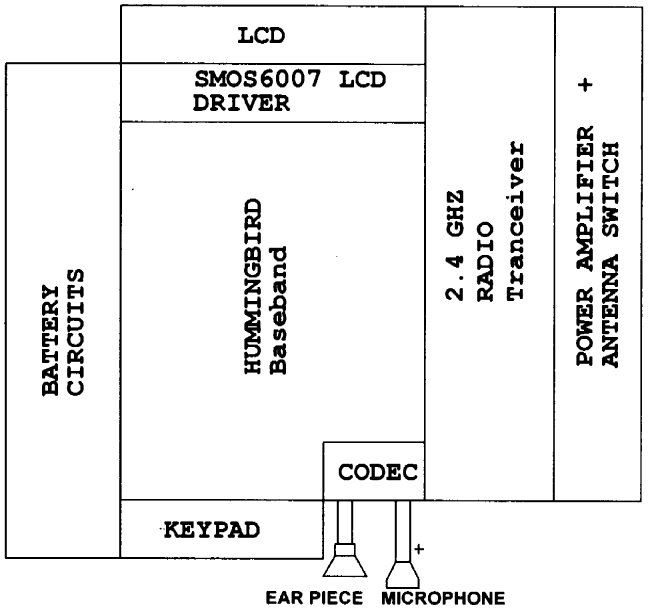
The LO signal is generated by a programmable PLL frequency synthesizer in the RF109 and an external 2.4 GHz VCO, U5. The RF109 synthesizer requires differential input signals, from the external VCO, to generate the LO frequency. The 'pi" network (R13, 15 and 16) provides 10 dB power attenuation in the VCO output signals. A balun transformer, U6, is used to generate differential signals from the single-ended VCO output.

Shielding:

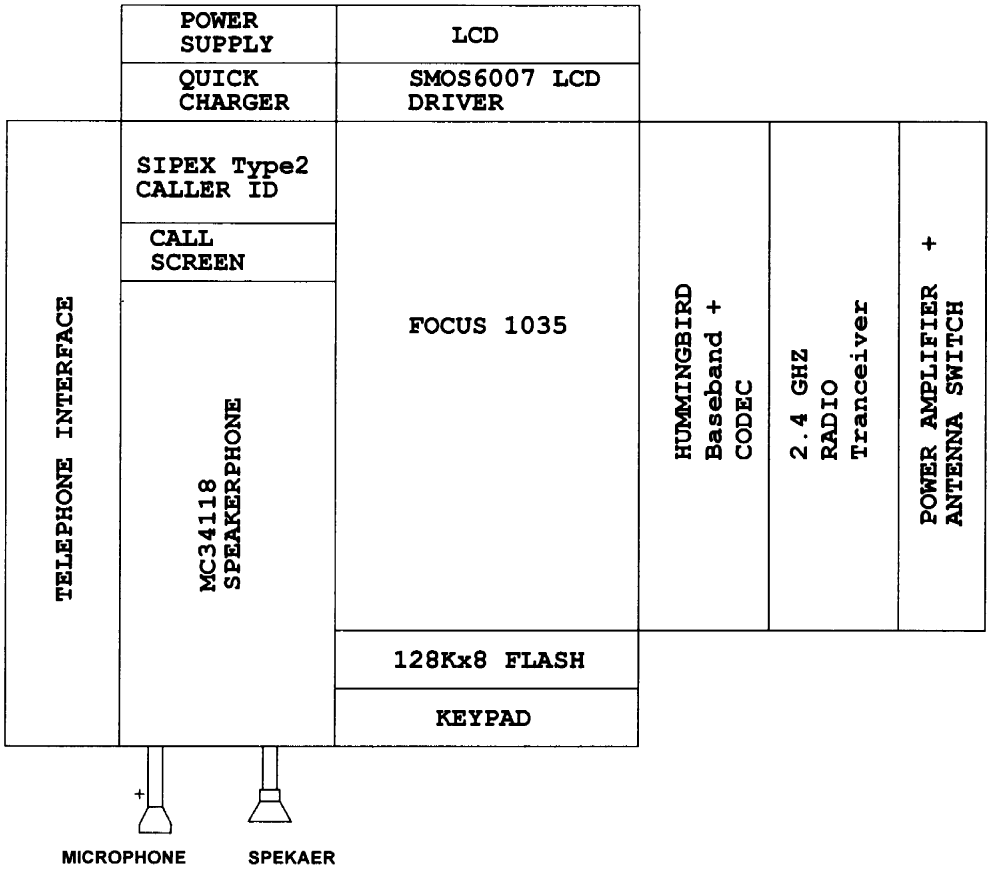
Radio shield is used to minimize the VCO pulling effects, noise interference, and to comply with FCC part 15 radiated emission limits.

D271 BLOCK DIAGRAM

HANDSET BLOCK DIAGRAM



BASE BLOCK DIAGRAM



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