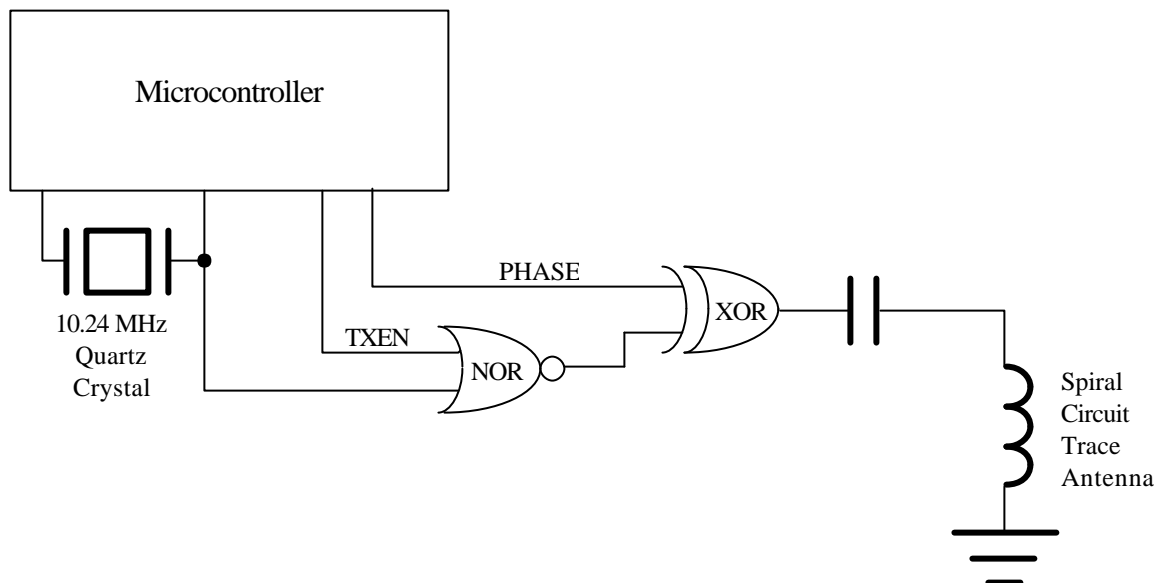


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## Operational Description: TX3-9V



**Figure 1: Generation 3 9V BPSK Transmitter simplified block diagram.**

### Transmit Path:

The carrier frequency is generated by a crystal tuned oscillator circuit, which is embedded within the microcontroller. A NOR gate is used to switch on and off the carrier frequency. Data is modulated onto the carrier through the XOR gate at 1.024 Mbits/s. When the PHASE input is high, the XOR gate inverts the input from the NOR gate, effectively shifting the output carrier phase 180 degrees. Likewise, when the PHASE input is low, the XOR gate buffers the input from the NOR gate resulting in 0 phase shift.

The output of the XOR gate drives an RC tank circuit. The C (20 pF) is chosen to ac couple the output of the XOR gate, and to tune the circuit to 10.24 MHz resonance. The L is the fixed inductance of the spiral circuit trace.

### Antenna Types:

As the antenna is part of the circuit card, no external antennas can be used with this transmitter (thus complying with FCC Section 15.203 requirements).

### Theory of Operation:

The transmitter signal uses Differential Binary Phase Shift Keying (BPSK) modulation. A phase shift of 90 degrees or more is interrupted as a logic 1, while a phase shift of less than 90 degrees is interrupted as a logic 0.

Data is sent in packets of 75 bits or less, in frames of 1 ms in duration. Only one data packet may be sent per frame. Data is transmitted at a fixed rate of 1,024,000 bits per second. So this results in a maximum transmit duty cycle of 7.5%, or a maximum data throughput of 75,000 bits per second.

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## **Mode of Operation During Testing**

Only one mode of operation exists for the Westhold TX3-9V transmitter. The following describes the test mode:

During testing the transmitter used a Differential Binary Phase Shift Keying (BPSK) modulation. A phase shift of 90 degrees or more is interrupted as a logic 1, while a phase shift of less than 90 degrees is interrupted as a logic 0.

Data was sent in packets of 75 bits or less, in frames of 1 ms in duration. Only one data packet was sent per frame. Data was transmitted at a fixed rate of 1,024,000 bits per second. This resulted in a maximum transmit duty cycle of 7.5%, or a maximum data throughput of 75,000 bits per second.