

THEORY OF OPERATION

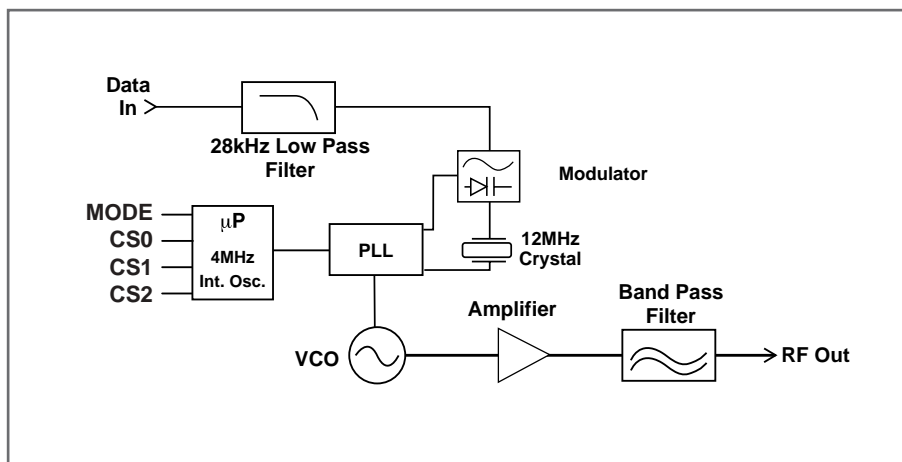


Figure 14: HP-3 Series Transmitter Block Diagram

The TXM-HP3 is a high-performance, multi-channel RF transmitter capable of transmitting both analog (FM) and digital (FSK) information. FM/FSK modulation offers significant advantages over AM or OOK modulation methods including increased noise immunity and the receiver's ability to "capture" in the presence of multiple signals. This is especially helpful in crowded bands like those in which the HP-3 operates.

Let's take a brief look at each transmitter section. A precision 12.00MHz Voltage-Controlled Crystal Oscillator (VCXO) serves as the frequency reference for the transmitter. Incoming signals are filtered to limit their bandwidth and then used to directly modulate this reference. Direct reference modulation inside the loop bandwidth allows a fast startup while allowing a wide modulation bandwidth and near DC modulation capability. This results in accurate reproduction of analog and digital content and eliminates the need for code balancing.

The modulated 12.00MHz reference frequency is applied to the Phase-Locked Loop (PLL). The PLL, combined with a 902-928MHz VCO, forms a stable frequency synthesizer that can be programmed to oscillate at the desired transmit frequency. An on-board micro-controller manages the PLL programming functions and greatly simplifies user interface. The micro-controller reads the channel-selection lines and programs the on-board synthesizer. This frees the designer from complex programming requirements and allows for manual or software channel selection. The micro-controller also monitors the status of the PLL and indicates when the transmitter is stable and ready to transmit data by raising the CTS line high.

The PLL locked carrier is amplified and buffered to isolate the VCO from the antenna and to increase the output power of the transmitter. The output of the buffer amplifier is connected to a filter network which suppresses harmonic emissions. Finally, the signal reaches the single-ended antenna port, which is matched to 50 ohms to support commonly available antennas, such as those manufactured by Linx.