

THEORY OF OPERATION

The module is a high-performance, eight-channel, FM transmitter capable of transmitting analog or digital data.

Digital information is modulated at the transmitter using FSK (frequency shift keying), the binary form of frequency modulation. FSK offers significant advantages over AM-based modulation methods, i.e., increased noise immunity and the ability of the receiver to “capture” in the presence of multiple signals. These advantages will be particularly appreciated in crowded bands like those in which the transmitter operates. While FSK modulation is not the most bandwidth-efficient manner of modulating digital data, it is an excellent choice for reliable, low-cost, low-power RF products.

To transmit analog information the module reverts to FM modulation. In this mode simple to complex waveforms can be introduced at the transmitter's data pin and recovered with minimal distortion at the receiver's analog output pin.

The user-supplied antenna is connected at pin 2. The transmitter is designed to operate with a 50-ohm load.

An accurate 12.00MHz VCXO (voltage-controlled crystal oscillator) serves as the frequency reference for the transmitter. The modulation input pin is connected to the VCXO through a two-pole low-pass filter. The low-pass filter is used to shape the incoming data and limit the transmission bandwidth to 25kHz.

The reference frequency is directly modulated. This method affords two benefits. First, it eliminates the need for a frequency conversion in the transmitter, reducing size, cost, and current consumption. Second, it allows the modulation to occur within the loop bandwidth of the frequency synthesizer allowing a wide modulation bandwidth of 50Hz to 25kHz.

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 a number of preset frequencies.

An on-board micro-controller reads the channel-selection lines and programs the PLL to the desired channel frequency. The micro-controller also monitors the status of the PLL and indicates when the transmitter is stable and ready to transmit data by asserting the CTS line high.

A buffer amplifier is used 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 LPF, which is used to suppress harmonic emissions. All harmonic specifications are based on a 50-ohm load.