

LMX3150

Modulation Synthesizer for RF Personal Communications

General Description

The LMX3150 Modulation Synthesizer is an integrated circuit intended for RF transmitter applications that use constant envelope modulation schemes such as FSK, MSK and GMSK. The LMX3150 combines a low frequency quadrature modulator, a phase detector, two frequency dividers, and a high frequency mixer. Along with an external loop filter and two VCOs, this device takes the I (in-phase) and Q (quadrature) inputs and modulates inside of a phase locked loop (see Block Diagram/System Diagram).

While the LMX3150 can be used in various wireless applications, it is ideal for addressing GSM (Global System for Mobile Communications), DCS1800 (PCN) the European standards for digital wireless telephony, and the U.S. GSM derivative PCS-1900. The LMX3150 meets the stringent requirements of these standards on wide band noise, eliminating the need for a bandpass filter on the output of the transmitter.

The LMX3150 operates between 2.7V and 5.5V and draws 25 mA. Serial data is transferred into the the LMX3150 via a MICROWIRE™ interface (Data, LE, CLOCK). It is fabricated using National's ABiC V silicon BiCMOS process. The LMX3150 is available in a 28-pin TSSOP surface mount plastic package.

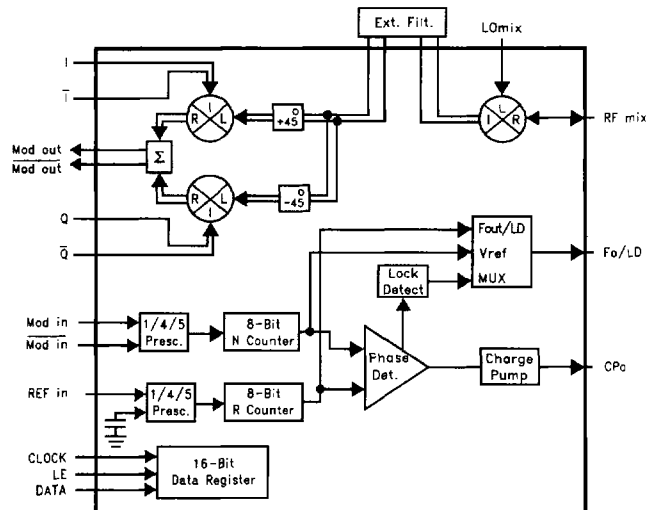
Features

- 2.7V to 5.5V operation
- Low current consumption: $I_{CC} = 25 \text{ mA}$ (typ)
- IF frequency: 50 MHz–350 MHz
- Transmit frequencies up to 2 GHz (RF mixer input frequencies)
- On board LO Quadrature
- Selectable powerdown mode: $I_{CC} < 50 \mu\text{A}$

Applications

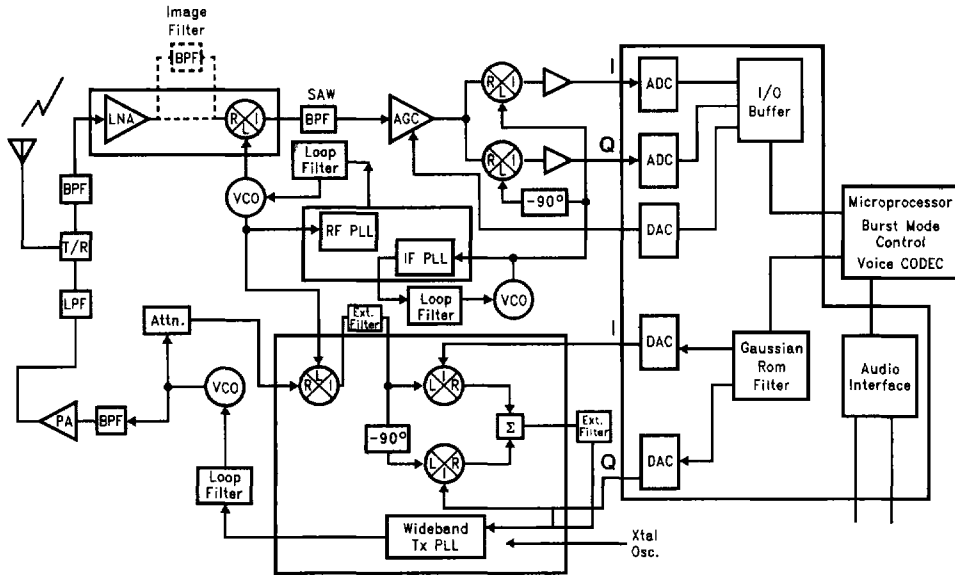
- GSM (Global System for Mobile Communications)
- DCS1800 (PCN)
- U.S. PCS-1900
- Other constant envelope modulation wireless communication systems

Block Diagram



TL/W/12847-1

Typical System Application



TL/W/12847-6

Notes: A reference frequency is chosen so that it is much larger than the span of the modulated signal. This reference signal is compared at the phase detector with a modulated signal centered at the reference frequency.

The modulated signal is generated in the loop by down converting the signal from the transmit VCO with a mixer and second VCO (or Rx VCO). This downconverted signal is then sent through a quadrature modulator where the phase of modulating signals I and Q are added inside the loop.

The loop filter has a wide bandwidth to avoid distorting the modulated signal. When the mixer is used in the Tx loop, the Rx VCO can provide channel selectivity. The Tx VCO supplies the constant envelope signal directly to the power amplifier.

Programmable gain and phase shift adjustments are available for systems with widely varying IF frequencies.