

NE612

Double-Balanced Mixer and Oscillator

Product Specification

DESCRIPTION

The NE612 is a low-power VHF monolithic double-balanced mixer with on-board oscillator and voltage regulator. It is intended for low cost, low power communication systems with signal frequencies to 500MHz and local oscillator frequencies as high as 200MHz. The mixer is a "Gilbert cell" multiplier configuration which provides gain of 14dB or more at 49MHz.

The oscillator can be configured for a crystal, a tuned tank operation, or as a buffer for an external L.O. Noise figure at 49MHz is typically below 6dB and makes the device well suited for high performance cordless telephone. The low power consumption makes the NE612 excellent for battery operated equipment. Networking and other communications products can benefit from very low radiated energy levels within systems. The NE612 is available in an 8-lead dual in-line plastic package and an 8-lead SO (surface mounted miniature package).

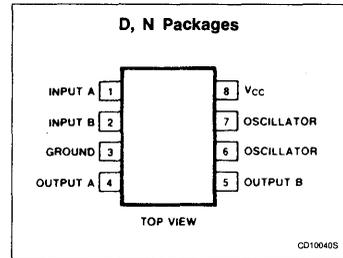
FEATURES

- Low current consumption
- Low cost
- Operation to 500MHz
- Low radiated energy
- Low external parts count; suitable for crystal/ceramic filter
- Excellent sensitivity, gain, and noise figure

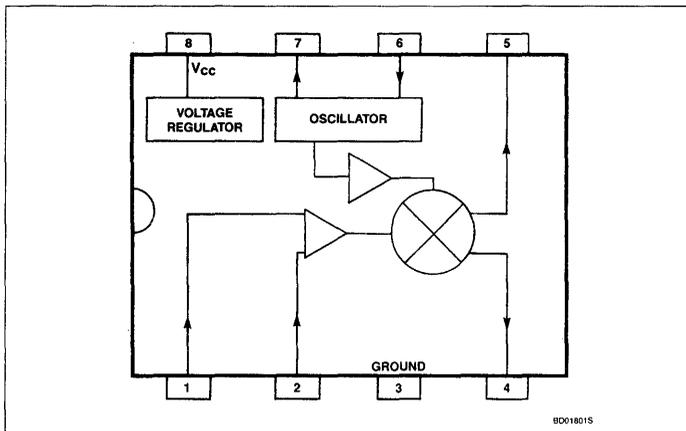
APPLICATIONS

- Cordless telephone
- Portable radio
- VHF transceivers
- RF data links
- Sonabuys
- Communications receivers
- Broadband LANs
- HF and VHF frequency conversion

PIN CONFIGURATION



BLOCK DIAGRAM



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Besides excellent low power performance well into VHF, the NE612 is designed to be flexible. The input, output, and oscillator ports can support a variety of configurations provided the designer understands certain constraints, which will be explained here.

The RF inputs (Pins 1 and 2) are biased internally. They are symmetrical. The equivalent AC input impedance is approximately $1.5k \parallel 3pF$ through 50MHz. Pins 1 and 2 can be used interchangeably, but they should not be DC biased externally. Figure 3 shows three typical input configurations.

The mixer outputs (Pins 4 and 5) are also internally biased. Each output is connected to the internal positive supply by a $1.5k\Omega$ resistor. This permits direct output termination yet allows for balanced output as well. Figure 4 shows three single-ended output configurations and a balanced output.

The oscillator is capable of sustaining oscillation beyond 200MHz in crystal or tuned tank configurations. The upper limit of operation is determined by tank "Q" and required drive levels. The higher the Q of the tank or the smaller the required drive, the higher the

permissible oscillation frequency. If the required L.O. is beyond oscillation limits, or the system calls for an external L.O., the external signal can be injected at Pin 6 through a DC blocking capacitor. External L.O. should be $200mV_{p-p}$ minimum to $300mV_{p-p}$ maximum.

Figure 5 shows several proven oscillator circuits. Figure 5a is appropriate for cordless telephones. In this circuit a third overtone parallel-mode crystal with approximately 5pF load capacitance should be specified. Capacitor C3 and inductor L1 act as a fundamental trap. In fundamental mode oscillation the trap is omitted.

Figure 6 shows a Colpitts varacter tuned tank oscillator suitable for synthesizer-controlled applications. It is important to buffer the output of this circuit to assure that switching spikes from the first counter or prescaler do not end up in the oscillator spectrum. The dual-gate MOSFET provides optimum isolation with low current. The FET offers good isolation, simplicity, and low current, while the bipolar circuits provide the simple solution for non-critical applications. The resistive divider in the emitter-follower circuit should be chosen to provide the minimum input signal which will assure correct system operation.

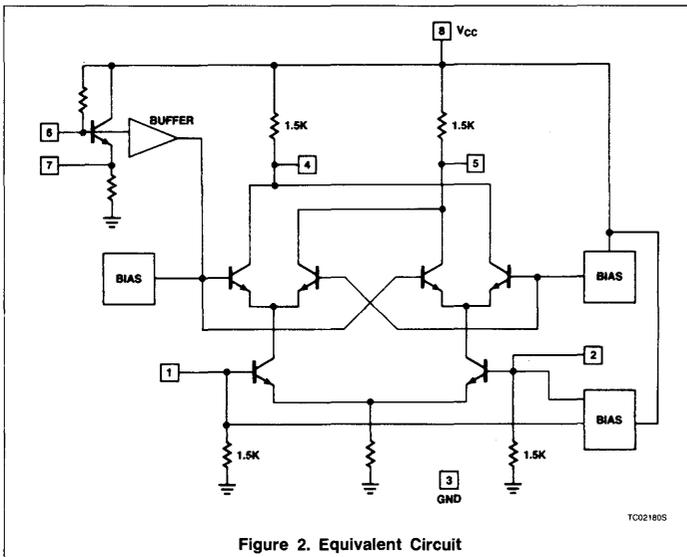


Figure 2. Equivalent Circuit

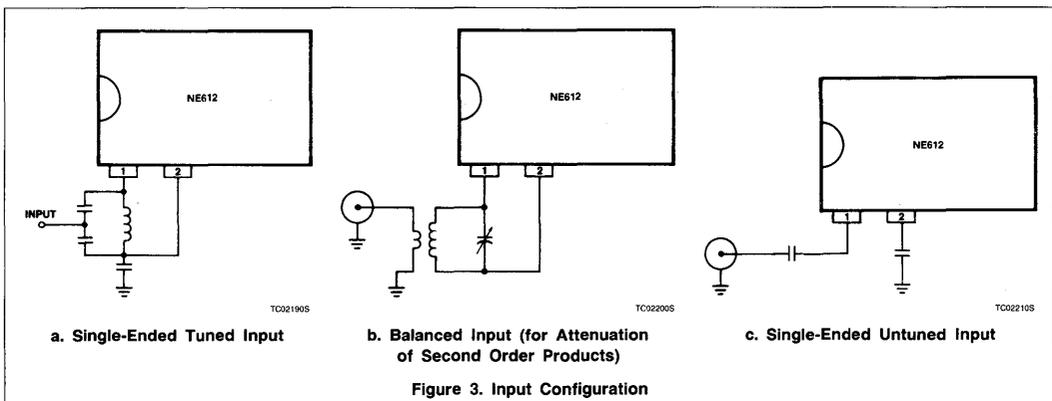
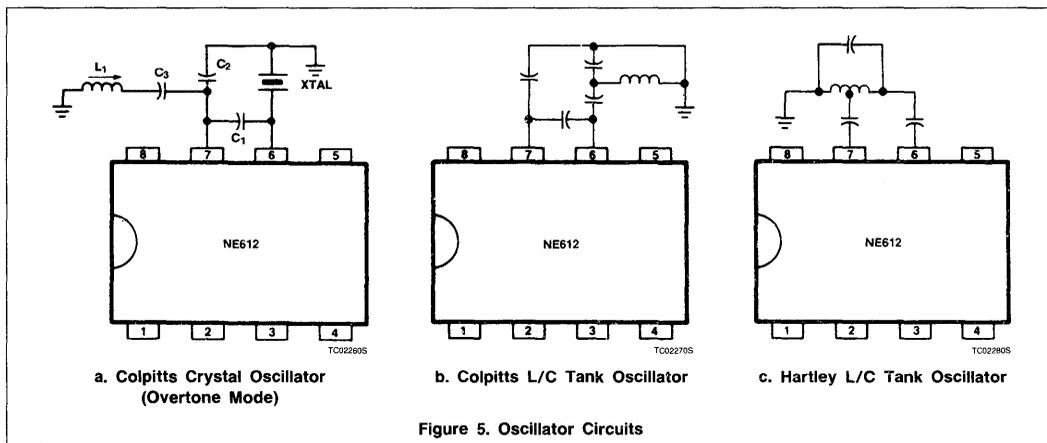
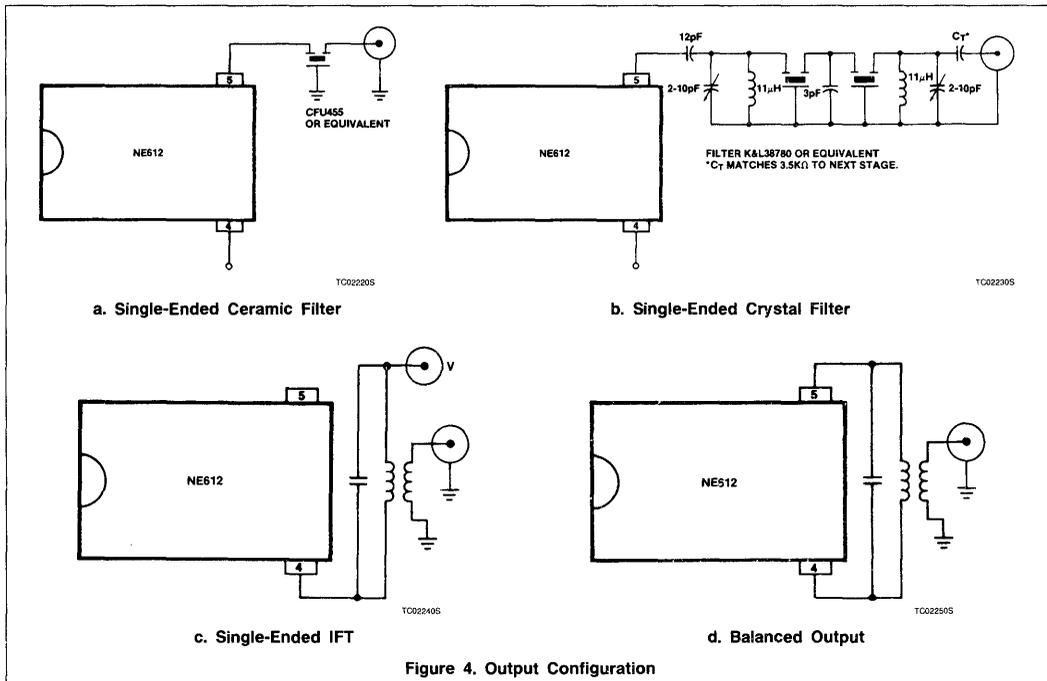


Figure 3. Input Configuration

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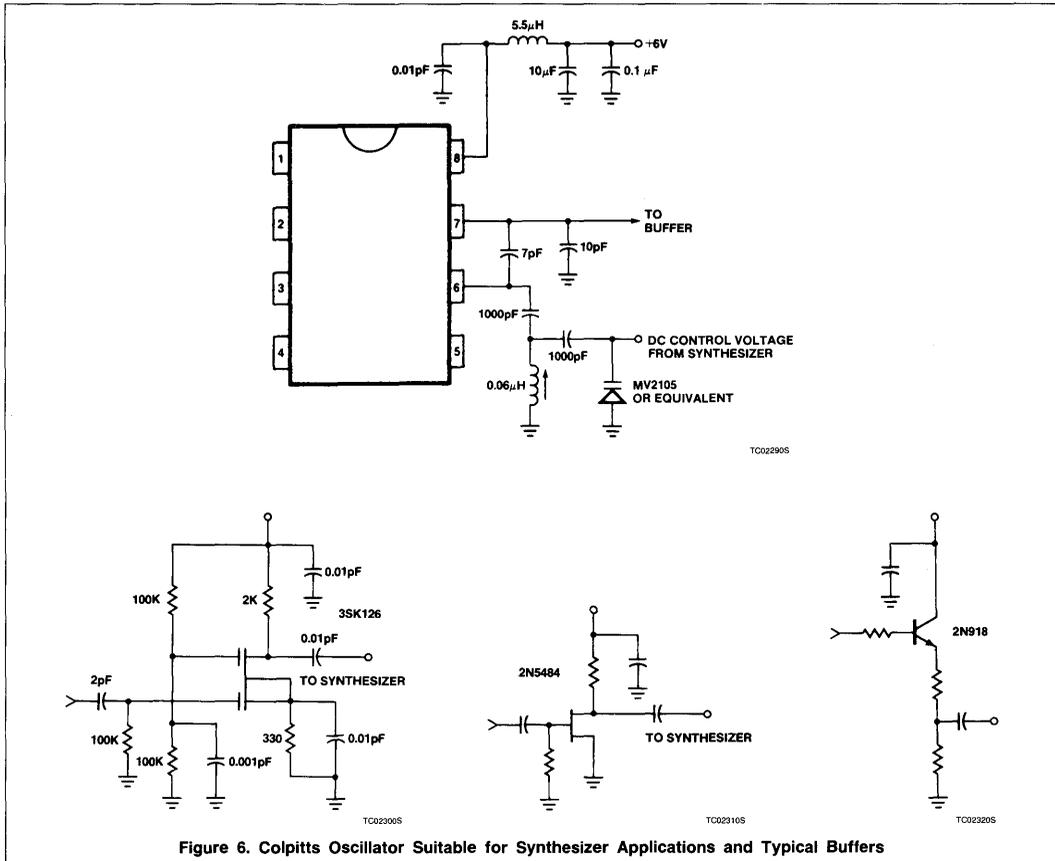


Figure 6. Colpitts Oscillator Suitable for Synthesizer Applications and Typical Buffers

TEST CONFIGURATION

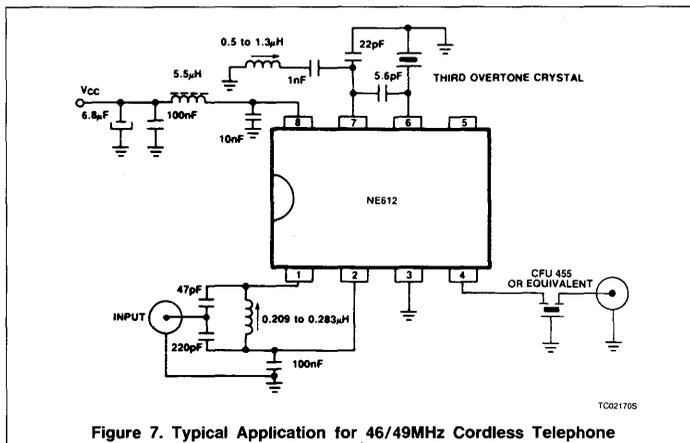


Figure 7. Typical Application for 46/49MHz Cordless Telephone

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