

## LM567/LM567C Tone Decoder

### General Description

The LM567 and LM567C are general purpose tone decoders designed to provide a saturated transistor switch to ground when an input signal is present within the passband. The circuit consists of an I and Q detector driven by a voltage controlled oscillator which determines the center frequency of the decoder. External components are used to independently set center frequency, bandwidth and output delay.

### Features

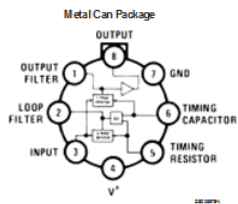
- 20 to 1 frequency range with an external resistor
- Logic compatible output with 100 mA current sinking capability
- Bandwidth adjustable from 0 to 14%

- High rejection of out of band signals and noise
- Immunity to false signals
- Highly stable center frequency
- Center frequency adjustable from 0.01 Hz to 500 kHz

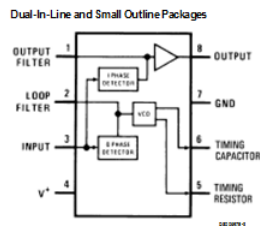
### Applications

- Touch tone decoding
- Precision oscillator
- Frequency monitoring and control
- Wide band FSK demodulation
- Ultrasonic controls
- Carrier current remote controls
- Communications paging decoders

### Connection Diagrams

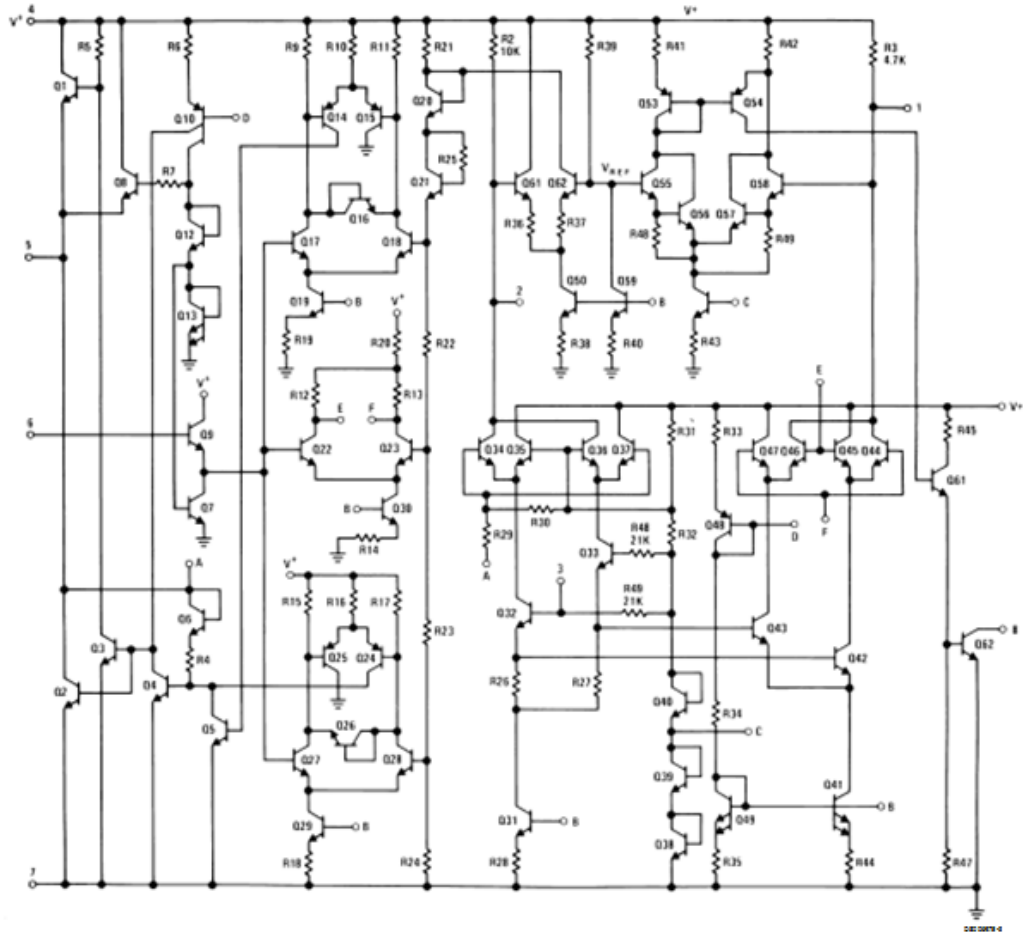


Top View  
Order Number LM567H or LM567CH  
See NS Package Number H08C



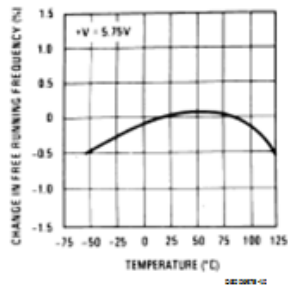
Top View  
Order Number LM567CM  
See NS Package Number M08A  
Order Number LM567CN  
See NS Package Number N08E

## Schematic Diagram

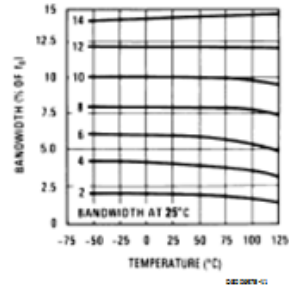


## Typical Performance Characteristics

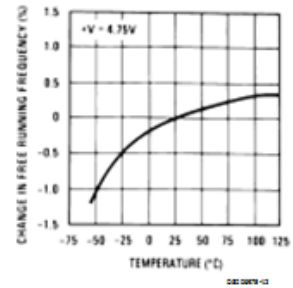
Typical Frequency Drift



Typical Bandwidth Variation

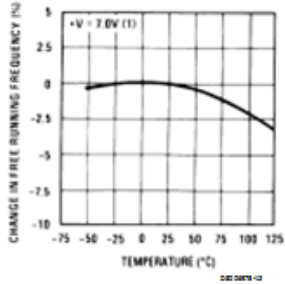


Typical Frequency Drift

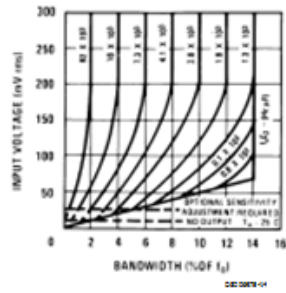


## Typical Performance Characteristics (Continued)

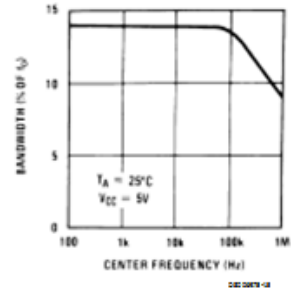
Typical Frequency Drift



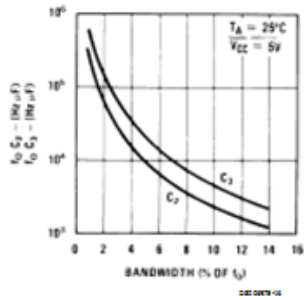
Bandwidth vs Input Signal Amplitude



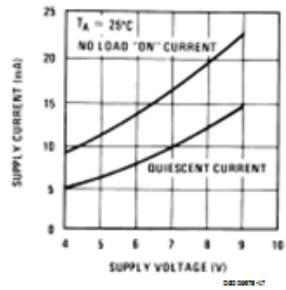
Largest Detection Bandwidth



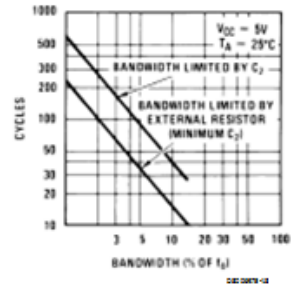
Detection Bandwidth as a Function of  $C_2$  and  $C_3$



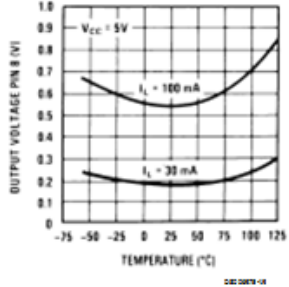
Typical Supply Current vs Supply Voltage



Greatest Number of Cycles Before Output

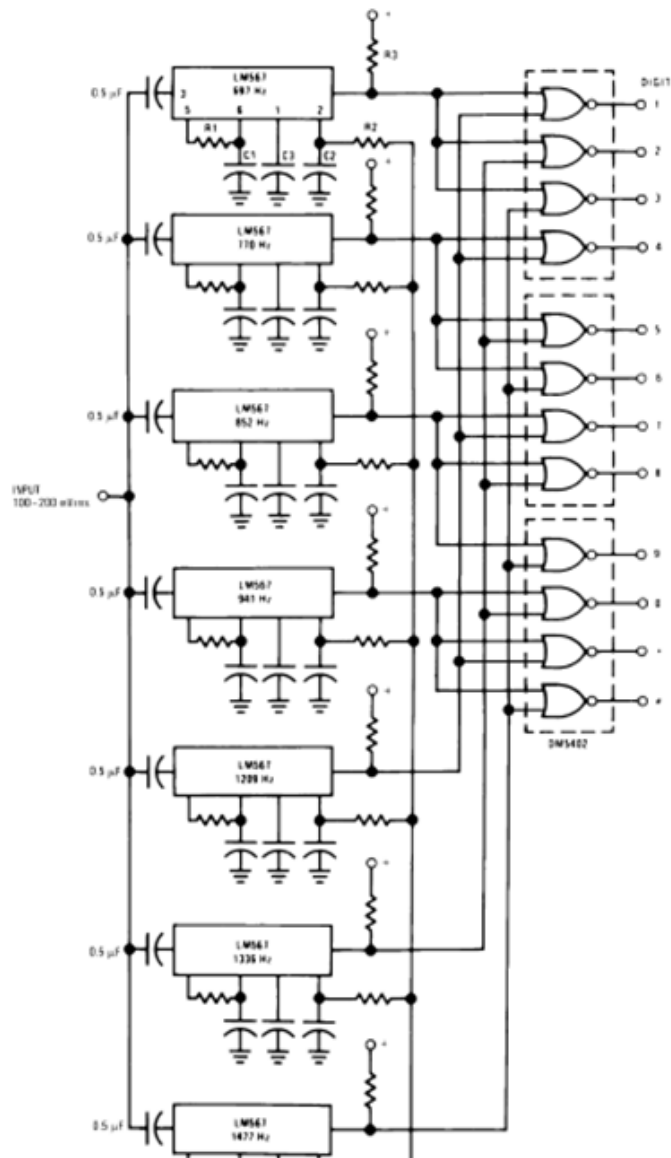


Typical Output Voltage vs Temperature



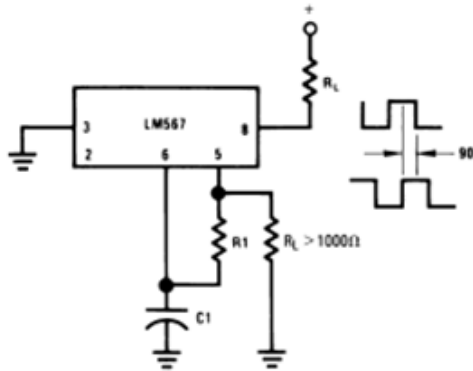
## Typical Applications

Touch-Tone Decoder



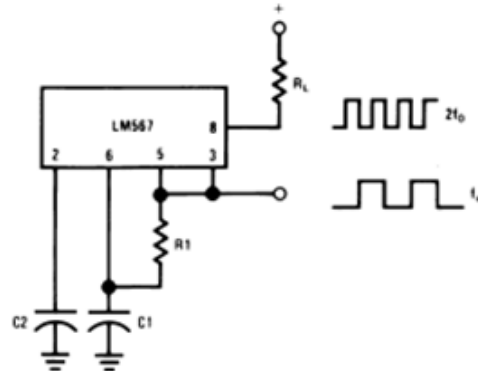
## Typical Applications (Continued)

Oscillator with Quadrature Output

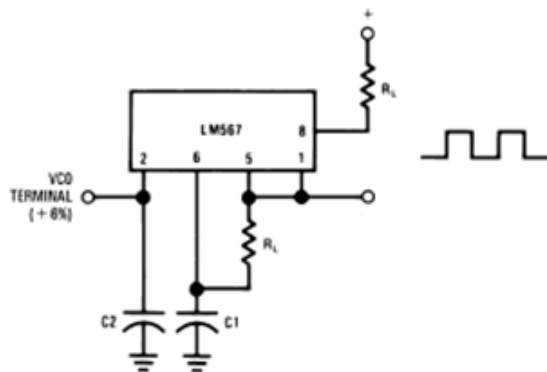


Connect Pin 3 to 2.8V to Invert Output

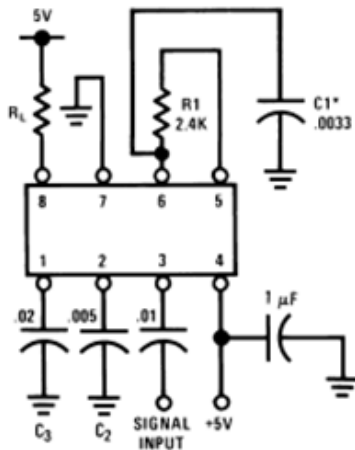
Oscillator with Double Frequency Output



Precision Oscillator Drive 100 mA Loads



## AC Test Circuit



## Applications Information

The center frequency of the tone decoder is equal to the free running frequency of the VCO. This is given by,

$$f_o \cong \frac{1}{1.1 R_1 C_1}$$

The bandwidth of the filter may be found from the approximation

$$BW = 1070 \sqrt{\frac{V_i}{f_o C_2}} \text{ in } \% \text{ of } f_o$$

Where

$V_i$  = Input voltage (volts rms),  $V_i = 200 \text{ mV}$

$C_2$  = Capacitance at Pin 2 ( $\mu\text{F}$ )