

## **Micropower Tone Decoder**

#### **GENERAL DESCRIPTION**

The XR-L567 is a micropower phase-locked loop (PLL) circuit designed for general purpose tone and frequency decoding. In applications requiring very low power dissipation, the XR-L567 can replace the popular 567- type decoder with only minor component value changes. The XR-L567 offers approximately 1/10th the power dissipation of the conventional 567-type tone decoder, without sacrificing its key features such as the oscillator stability, frequency selectivity, and detection threshold. Typical quiescent power dissipation is less than 4 mW at 5 volts. It operates over a wide frequency band of 0.01 Hz to 60 kHz and contains a logic compatible output which can sink up to 10 milliamps of load current. The bandwidth, center frequency, and output delay are independently determined by the selection of four external components.

#### **FEATURES**

Very Low Power Dissipation (≈ 4 mW at 5V). Bandwidth Adjustable from 0 to 14%. Logic Compatible Output with 10 mA Current Sinking Capability
Highly Stable Center Frequency.

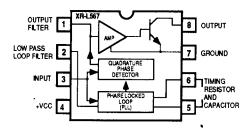
Highly Stable Center Frequency.
Center Frequency Adjustable from 0.01 Hz to 60 kHz.

Inherent Immunity to False Signals.
High Rejection of Out-of-Band Signals and Noise.
Frequency Range Adjustable Over 20:1 Range by External Resistor.

#### **APPLICATIONS**

Battery-Operated Tone Detection Touch-Tone® Decoding Sequential Tone Decoding Communications Paging Ultrasonic Remote-Control Telemetry Decoding

### **FUNCTIONAL BLOCK DIAGRAM**



## **ABSOLUTE MAXIMUM RATINGS**

Power Supply 10 volts
Power Dissipation (package limitation)
Ceramic Package 385 mW
Storage Temperature -65°C to + 150°C
Rev-A

## SYSTEM DESCRIPTION

The XR-L567 monolithic circuit consists of a phase detector low pass filter, and current controlled oscillator which comprise the basic phase-locked loop, plus an additional low pass filter and quadrature detector enabling detection of in-band signals. The device has a normally high open collector output.

The input signal is applied to Pin 3 (100 k $\Omega$  nominal input resistance). Free running frequency is controlled by an RC network at Pins 5 and 6. A capacitor on Pin 1 serves as the output filter and eliminates out-of-band triggering. PLL filtering is accomplished with a capacitor on Pin 2; band-width and skew are also dependant upon the circuitry here. Pin 4 is + VCC (4.75 to 8V nominal, 10V maximum); Pin 7 is ground; and Pin 8 is the open collector output, pulling low when an in-band signal triggers the device.

The XR-L567 is pin-for-pin compatible with the standard XR-567-type decoder. Internal resistors have been scaled up by a factor of ten, thereby reducing power dissipation and allowing use of smaller capacitors for the same applications compared to the standard part. This scaling also lowers maximum device center frequency and load current sinking capabilities.

# XR-L567

**ELECTRICAL PERFORMANCE CHARACTERISTICS - XR-L567** 

| ELECTRICAL                          | - FEM ON  | MANCE CHARACTER                | 10.100   | LIMITS |          |             | GROUP A  |
|-------------------------------------|-----------|--------------------------------|--|--------|----------|-------------|----------|
| TEST                                | SYMBOL    | CONDITIONS                     | TEMPERATURE  | MIN    | MAX      | UNIT        | SUBGROUP |
| 1631                                | O T MIDOL | 001101110110                   |  |        |          |             |          |
| Supply Current                      | Icc       | Vcc = +5V                      | TA = +25°C   |        | 1000     | μΑ          | 1        |
| Quiescent                           |           |                                | -55°C≤TA≤+125°C  |        | 1000     | μΑ          | 2,3      |
| adicoo                              | ļ         |                                |  |        |          |             |          |
| Supply Current                      | lcc       | Vcc = +8V                      | Ta = +25°C   | l<br>l | 2000     | μА          | 1        |
| Quiescent                           |           |                                |  |        |          |             |          |
| 44.0000                             |           |                                |  |        |          |             | _        |
| Supply Current                      | 1cc       | Vcc = +5V                      | TA = +25°C   | İ      | 1400     | μΑ          | 1        |
| Activated                           |           |                                | -55°C≤TA≤+125°C  |        | 2000     | μA          | 2,3      |
|                                     | . 1       |                                |  |        |          |             | _        |
| Highest Center                      | Fc        |                                | TA = +25°C   | 10     |          | KHz         | 9        |
| Frequency                           |           |                                | -55°C≤TA≤+125°C  | 10     |          | KHz         | 10,11    |
|                                     |           |                                |  |        |          |             | _        |
| Center Frequency                    | DRFT      | 4.75V <u>≤</u> Vcc <u>≤</u> 8V | TA = +25°C   |        | 2.0      | %/V         | 9        |
| Drift with Supply                   |           |                                | -55°C≤TA≤+125°C  | 1      | 3.0      | %/V         | 10,11    |
|                                     | İ         |                                |  |        |          |             |          |
| Output Saturation                   | VSAT      | lc = 2 mA                      | TA = +25°C   |        | 0.4      | V           | 1        |
| Voltage                             |           | Vin = 25 mVrms                 | -55°C≤TA≤+125°C  |        | 0.4      | V           | 2,3      |
|                                     |           | Vcc = +5V                      |  |        |          | Ì           |          |
|                                     |           |                                |  | 1      |          | .,          |          |
| Output Saturation                   | VSAT      | Ic = 10 mA                     | Ta = +25°C   | 1      | 0.6      | V           | 2.3      |
| Voltage                             | 1 1       | Vin = 25 mVrms                 | -55°C≤TA≤+125°C  | İ      | 0.6      | V           | 2,3      |
|                                     |           | Vcc = +5V                      |  | 1      | ļ        | 1           |          |
|                                     |           |                                |  |        | 0.5      | μА          | 1        |
| Output Leakage                      | IOL       | Vin = 7.5 mVrms                | TA = +25°C   |        | 25<br>25 | μA          | 2,3      |
| Current                             |           | Vcc = 15V                      | -55°C≤TA≤+125°C  |        | 25       | μА          | 2,3      |
|                                     |           |                                | 7. 0500  | 10     | ŀ        | mVrms       | 4        |
| Largest No Output                   | VIL       | Vcc = +5V                      | TA = +25°C   | 10     |          | mVrms       | 5,6      |
| Input Voltage                       |           |                                | -55°C <u>≤</u> TA≤+125°C   | 10     |          | 111 411113  | 3,5      |
|                                     |           |                                | TA = +25°C   |        | 25       | mVrms       | 4        |
| Smallest Detectable                 | Vis       |                                | -55°C <ta<+125°c< td=""><td>1</td><td>25</td><td>mVrms</td><td>5.6</td></ta<+125°c<> | 1      | 25       | mVrms       | 5.6      |
| Input Voltage                       |           | l .                            | -55"CZ 14Z+125"C   | İ      | 23       | 111 4 11113 | 0,0      |
|                                     | LDDW      |                                | TA = +25°C   | 10     | 18       | %           | 4        |
| Largest Detection                   | LDBW      |                                | -55°C≤TA≤+125°C  | 10     | 20       | %           | 5.6      |
| Bandwidth                           |           |                                | -55 051454125 0  | '      | -        |             | -,-      |
| Louiset Datastics                   | SKEW      |                                | TA = +25°C   | 1      | 3.0      | %           | 4        |
| Largest Detection<br>Bandwidth Skew | SVEAA     |                                | -55°C≤TA≤+125°C  | 1      | 3.0      | %           | 5,6      |
| Bandwidin Skew                      | 1         |                                | 00 02 175T 120 0   |        |          | 1           |          |