Precision Tone Decoder

GENERAL DESCRIPTION

The XR-567A provides all the necessary circuitry for constructing a variety of tone detectors and frequency decoders. Phase-locked loop circuit techniques are used to provide operation from 0.01 Hz tp 500 kHz. The circuit also features an input preamp, a high-current logic output, and programmable output delay.

The XR-567A, available in an 8-Pin DIL package, is designed to offer improved frequency accuracy and drift characteristics over the standard industry 567. These changes offer improved overall circuit performance, while reducing initial circuit adjustments.

FEATURES

Programmable Detection Bandwidth	0% to 14%
Logic Output	100 mA
Wide Center Frequency Range	0.01 Hz to 500 kHz
High Rejection of Out-of-Band Signals and Noise	
Direct Replacement for standard 567	
Inherent immunity to out-of-band signals & noise	

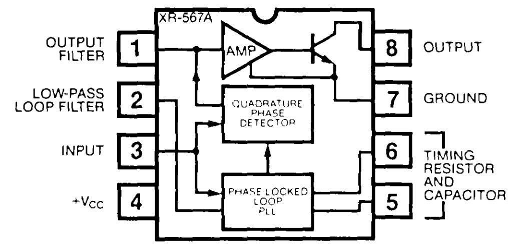
APPLICATIONS

Tone Detection
Touch-Tone® Decoding
Communications Paging
Ultrasonic Remote Control
Precision Oscillator
Wireless Intercom
Carrier-Tone Transceiver
FSK Demodulation
Dual Time Constant Tone Detector

ABSOLUTE MAXIMUM RATINGS

Power Supply	10 volts
Power Dissipation	
Ceramic Package	385 mW
Plastic Package	300 mW
Derate above 25°C	2.5 mW/°C
Operating Temperature Range	
XR-567AM	−55°C to +125°C
XR-567ACN/ACP	0°C to +70°C
Storage Temperature Range	−65°C to +150°C

FUNCTIONAL BLOCK DIAGRAM



ORDERING INFORMATION

Part Number	Package	Operating Temperature
XR-567AM	Ceramic	−55°C to +125°C
XR-567ACN	Ceramic	0°C to +70°C
XR-567ACP	Plastic	0°C to +70°C

SYSTEM DESCRIPTION

The XR-567A is an improved version of the popular 567 tone decoder. Center frequency accuracy is guaranteed by design modifications and testing to 5%, and is typically better than 2%. Temperature drift of the center frequency is also improved. Thus, in most applications, no trimming is required.

The XR-567A monolithic tone decoder 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 capable of sinking 100 mA.

The input signal is applied to Pin 3 (20 kΩ nominal input resistance). Free running frequency is controlled by an RC network at Pins 5 and 6 and can typically reach 500 kHz. 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; bandwidth and skew are also dependant upon the circuitry here. Bandwidth is adjustable from 0% to 14% of the center frequency. Pin 4 is $+V_{CC}$ (4.75 to 9V nominal, 10V maximum); Pin 7 is ground; and Pin 8 is open collector output, pulling low when an in band signal triggers the device.

ELECTRICAL CHARACTERISTICS

Test Conditions: V_{CC} = +5V. T_A = 25° C, unless otherwise specified.

PARAMETERS	LIMITS MIN	TYP	MAX	UNITS	CONDITIONS
GENERAL					
Supply Voltage Range	4.75		9.0	Vdc	
Supply Current					
Quiescent XR-567AM		6	8	mA	R_L = 20 kΩ
Quiescent XR-567AC		7	10	mA	R_L = 20 kΩ
Activated XR-567AM		11	13	mA	R_L = 20 kΩ
Activated XR-567AC		12	15	mA	R_L = 20 kΩ
Output Voltage			15	V	
Negative Voltage at Input			−10	V	
Positive Voltage at Input			V_{CC} +0.5	V	
CENTER FREQUENCY					
Highest Center Frequency	100	500		kHz	
Center Frequency Stability					
Temperature T_A = 25°C		35		ppm/°C	
0 < T_A < 70°C		±60		ppm/°C	
−55 < T_A < +125°C		±120		ppm/°C	
Supply Voltage					
XR-567AM		0.5	1.0	%/V	f_o = 100 kHz
XR-567AC		0.7	2.0	%/V	f_o = 100 kHz
Initial Accuracy		±2.0	±5.0	%	f_o = 80 kHz
Center Frequency		1.06			f = 1/RC
DETECTION BANDWIDTH					
Largest Detection Bandwidth					
XR-567AM	12	14	16	% of f_o	f_o = 100 kHz
XR-567AC	10	14	18	% of f_o	f_o = 100 kHz
Largest Detection Bandwidth Skew					
XR-567AM		1	2	% of f_o	
XR-567AC		2	3	% of f_o	
Largest Detection Bandwidth Variation					
Temperature		±0.1		%/°C	V_{in} = 300 mV rms
Supply Voltage		±1	±2	%/V	V_{in} = 300 mV rms
INPUT					
Input Resistance		20		kΩ	
Smallest Detectable Input Voltage		20	25	mV rms	I_L = 100 mA, f_i = f_o
Largest No-Output Input Voltage	10	15		mV rms	I_L = 100 mA, f_i = f_o
Greatest Simultaneous Outband Signal to Inband Signal Ratio		+6		dB	
Minimum Input Signal to Wideband Noise Ratio		−6		dB	B_n = 140 kHz
OUTPUT					
Output Saturation Voltage		0.2	0.4	V	I_L = 30 mA, V_{in} = 25 mV rms
		0.6	1.0	V	I_L = 100 mA, V_{in} = 25 mV rms
Output Leakage Current		0.01	25	μA	
Fastest ON/OFF Cycling Rate		f_o/20			
Output Rise Time		150		ns	R_L = 50Ω
Output Fall Time		30		ns	R_L = 50Ω

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