

DBL 567

TONE DECODER

The DBL567 is general purpose tone decoders designed to provide a saturated transistor switch to ground when an input signal is present within the passband.

FEATURES

- Logic compatible output with 100mA current sinking capability
- 20 to 1 frequency range with an external resistor
- 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 0.01Hz to 500KHz

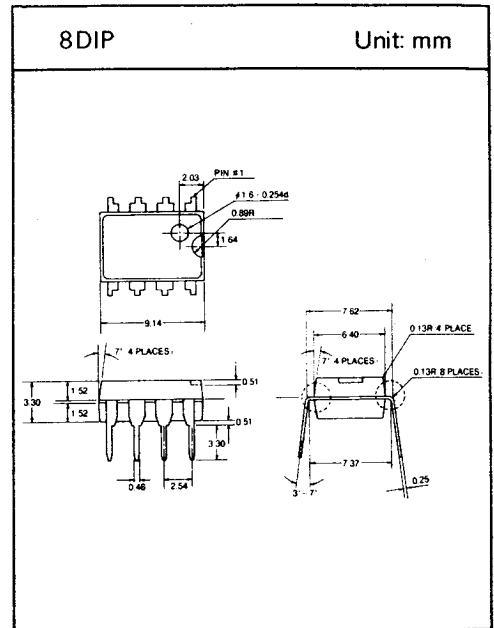
APPLICATIONS

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

MAXIMUM RATINGS

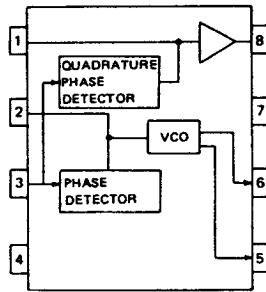
Characteristic	Rating	Unit
Supply Voltage	10	V
Power Dissipation*	300	mW
V_8	15	V
V_3	-10	V
V_3	$V_8 + 0.5$	V
Storage Temperature	-55 ~ +150	°C

* The maximum junction temperature is 150°C. The device must be derated based on a thermal resistance of 187°C/W, junction to ambient.



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□ BLOCK DIAGRAM



1. OUTPUT FILTER
2. LOOP FILTER
3. INPUT
4. V_{CC}
5. TIMING RESISTOR
6. TIMING CAPACITOR
7. GND
8. OUTPUT

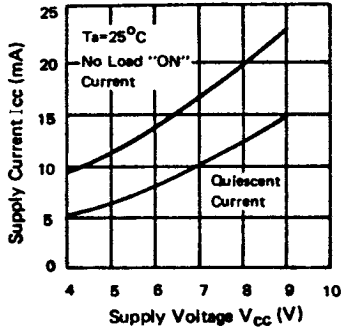
□ ELECTRICAL CHARACTERISTICS (AC Test Circuit, $T_a = 25^\circ\text{C}$, $V_{CC} = 5\text{V}$)

Characteristic	Symbol	Condition	Min.	Typ.	Max.	Unit
Power Supply Voltage Range	V_{CC}	—	4.75	5	9	V
Power Supply Current Quiescent	I_{CCQ}	$R_L = 20\text{K}\Omega$	—	6	8	mA
Power Supply Current Activated	I_{CC}	$R_L = 20\text{K}\Omega$	—	11	13	mA
Input Resistance	R_{IN}	—	15	20	25	$\text{K}\Omega$
Smallest Detectable Input Voltage	V_{IN-1}	$I_L = 100\text{mA}$, $f = f_0$	—	20	25	mV_{rms}
Largest No Output Input Voltage	V_{IN-2}	$I_C = 100\text{mA}$, $f = f_0$	10	15	—	mV_{rms}
Largest Simultaneous Outband Signal to Inband Signal Ratio	S_i/S_o	—	—	6	—	dB
Minimum Input Signal to Wideband Noise Ratio	S/N	$B_n = 140\text{KHz}$	—	-6	—	dB
Largest Detection Bandwidth	B.W	—	10	14	18	% of f_0
Largest Detection Bandwidth Skew	$B.W_s$	—	—	2	3	% of f_0
Largest Detection Bandwidth Variation with Temperature	$B.W_T$	—	—	± 0.1	0.25	%/°C
Largest Detection Bandwidth Variation with Supply voltage	$B.W_V$	4.75V ~ 6.75V	—	± 1	± 2	%/V
Highest Center Frequency	f_{O-H}	—	100	500	—	KHz
Center Frequency Stability	f_{O-S}	$0^\circ\text{C} < T_a < 70^\circ\text{C}$	—	35 ± 60	—	ppm/°C
		$-55^\circ\text{C} < T_a < +125^\circ\text{C}$	—	35 ± 140	—	ppm/°C
Center Frequency shift with supply voltage	f_{O-V}	4.75V ~ 6.75V	—	0.5	2	%/V
Fastest ON-OFF Cycling Rate	CR_{ON-OFF}	—	—	$f_0/20$	—	—
Output Leakage Current	I_{LEAK}	$V_B = 15\text{V}$	—	0.01	25	μA
Output Saturation Voltage	V_{SAT}	$V_{IN} = 25\text{mV}_{\text{rms}}$, $I_B = 30\text{mA}$	—	0.2	0.4	V
		$V_{IN} = 25\text{mV}_{\text{rms}}$, $I_B = 100\text{mA}$	—	0.6	1	V
Output Fall Time	t_F	—	—	30	—	nS
Output Rise Time	t_R	—	—	150	—	nS

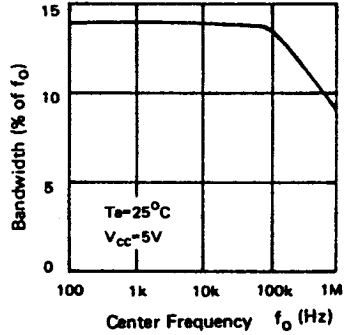
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TYPICAL PERFORMANCE CHARACTERISTICS

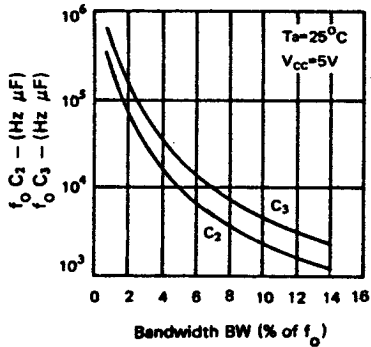
$I_{CC} - V_{CC}$



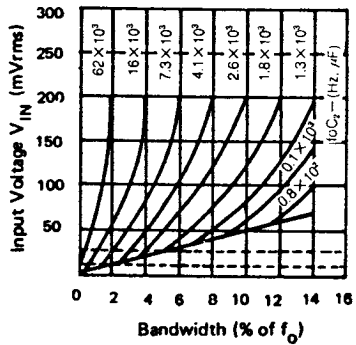
$BW - f_o$



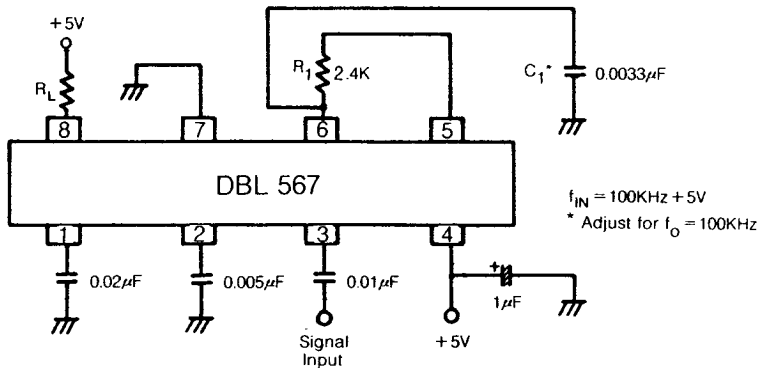
$BW (C_2, C_3 \text{ Function})$



$V_{IN} - BW$



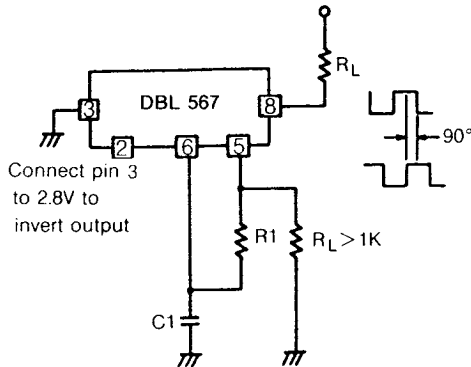
TEST CIRCUIT



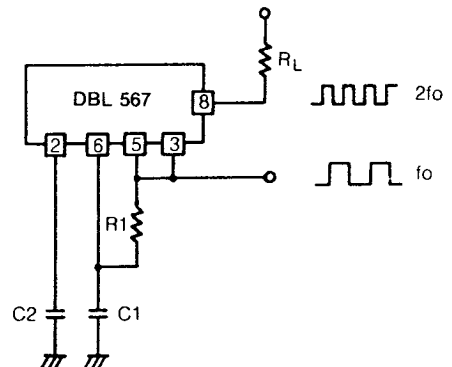
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APPLICATIONS

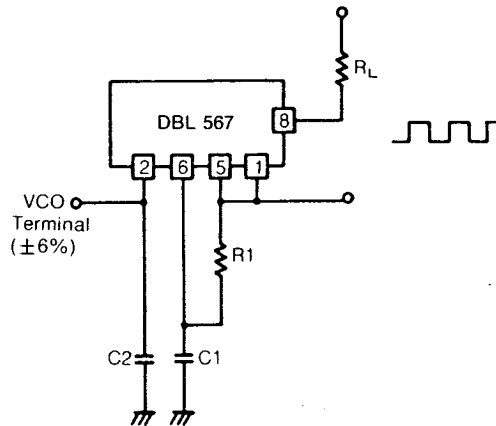
1. Oscillator with Quadrature Output



2. Oscillator with Double Frequency Output



3. Precision Oscillator to switch 100mA Loads



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

$$f_o \approx \frac{1}{1.1R_1C_1}$$

The bandwidth of the filter may be found from the approximation

$$B.W = 1070 \sqrt{\frac{V_{IN}}{f_o C_2}} \text{ in \% of } f_o$$

where

V_{IN} = Input voltage (volts rms), $V_{IN} \leq 200mV_{rms}$

C_2 = Capacitance at Pin 2 (μF)