DBL 567

<table>
<tr><td>TONE DECODER</td><td>8 DIP</td><td>Unit: mm</td></tr>
</table>

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
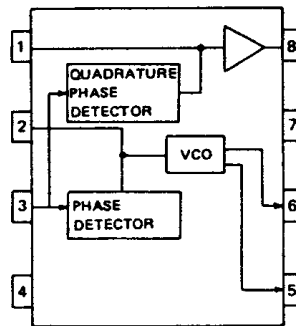- ○ Carrier current remote controls
- ○ Communications paging decoders

☐ 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.
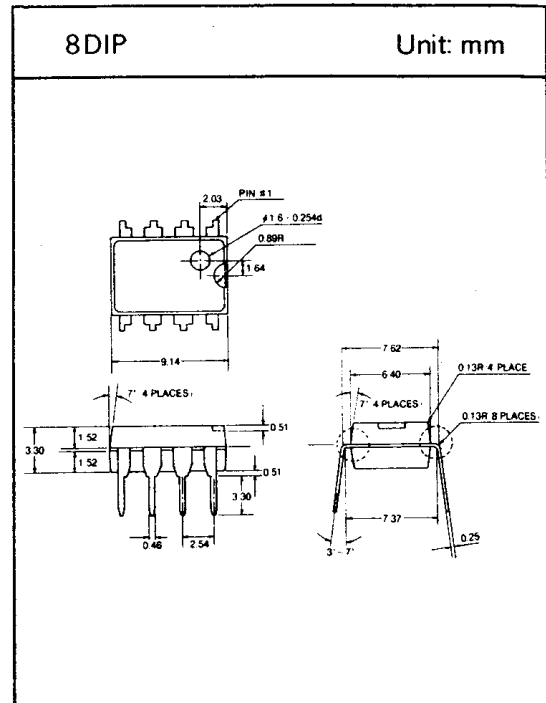
DBL 567

☐ BLOCK DIAGRAM

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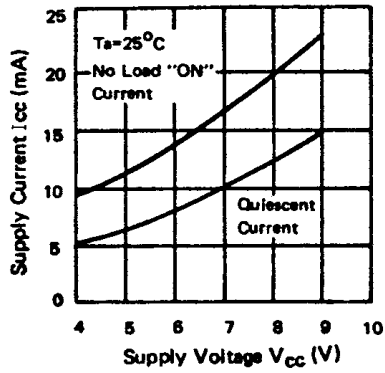5. TIMING RESISTOR
6. TIMING CAPACITOR
7. GND
8. OUTPUT

☐ ELECTRICAL CHARACTERISTICS (AC Test Circuit, Ta = 25°C, V$_{CC}$ = 5V)

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$_L$ = 20K Ω	—	6	8	mA
Power Supply Current Activated	I$_{CC}$	R$_L$ = 20K Ω	—	11	13	mA
Input Resistance	R$_{IN}$	—	15	20	25	K Ω
Smallest Detectable Input Voltage	V$_{IN-1}$	I$_L$ = 100mA, f = fo	—	20	25	mV$_{rms}$
Largest No Output Input Voltage	V$_{IN-2}$	I$_C$ = 100mA, f = fo	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$_n$ = 140KHz	—	-6	—	dB
Largest Detection Bandwidth	B.W	—	10	14	18	%of fo
Largest Detection Bandwidth Skew	B.W$_S$	—	—	2	3	%of fo
Largest Detection Bandwidth Variation with Temperature	B.W$_T$	—	—	±0.1	0.25	%1°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°C < Ta < 70°C	—	35±60	—	ppm/°C
		−55°C < Ta < + 125°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$_{ON-OFF}$	—	—	fo/20	—	—
Output Leakage Current	I$_{LEAK}$	V$_8$ = 15V	—	0.01	25	μA
Output Saturation Voltage	V$_{SAT}$	V$_{IN}$ = 25mV$_{rms}$, I$_8$ = 30mA	—	0.2	0.4	V
		V$_{IN}$ = 25mV$_{rms}$, I$_8$ = 100mA	—	0.6	1	V
Output Fall Time	t$_F$	—	—	30	—	nS
Output Rise Time	t$_R$	—	—	150	—	nS

■DBL 567■

□ TYPICAL PERFORMANCE CHARACTERISTICS

Icc – Vcc

Ta=25°C
No Load "ON" Current

Quiescent Current

Supply Current Icc (mA)

Supply Voltage V_{CC} (V)

BW – f_O

Bandwidth (% of f_O)

Ta=25°C
V_{CC}=5V

Center Frequency f_O (Hz)

BW (C_2, C_3 Function)

$f_O C_1$ – (Hz μF)
$f_O C_3$ – (Hz μF)

Ta=25°C
V_{CC}=5V

C_3
C_2

Bandwidth BW (% of f_O)

V_{IN} – BW

Input Voltage V_{IN} (mVrms)

Bandwidth (% of f_O)

□ TEST CIRCUIT

+5V
R_L
R_1 2.4K
C_1* 0.0033μF

8   7   6   5

DBL 567

1   2   3   4

0.02μF   0.005μF   0.01μF   1μF

Signal Input   +5V

f_{IN} = 100KHz + 5V
* Adjust for f_O = 100KHz
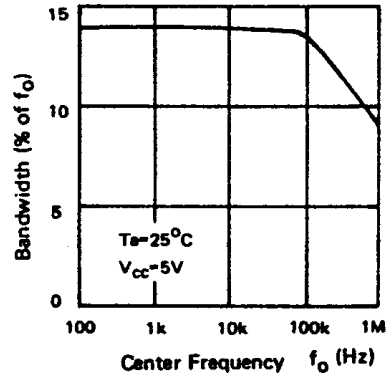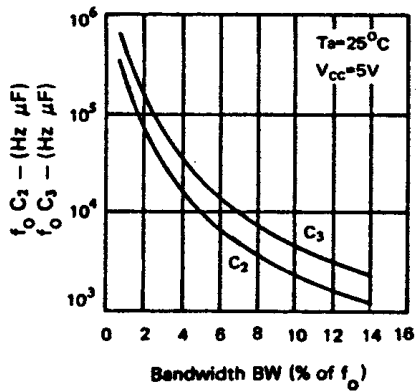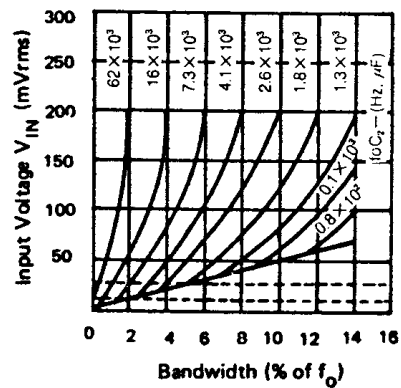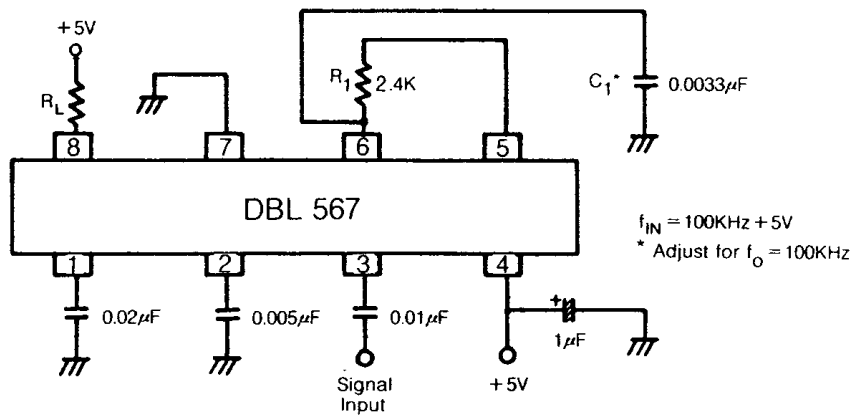
☐ APPLICATIONS

1. Oscillator with Quadrature Output

DBL 567

Connect pin 3
to 2.8V to
invert output

R_L

90°

$R1$ $R_L > 1K$

C1
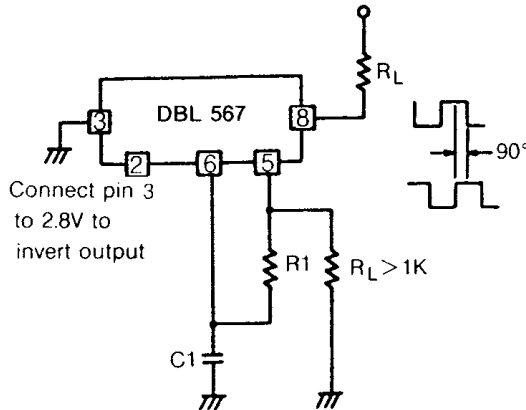
2. Oscillator with Double Frequency Output

DBL 567

R_L

2fo

fo

$R1$

C2   C1
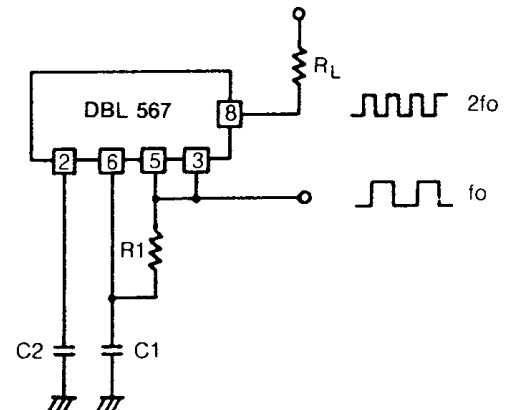
3. Precision Oscillator to switch 100mA Loads

DBL 567

R_L

VCO
Terminal
(±6%)

R1

C2   C1
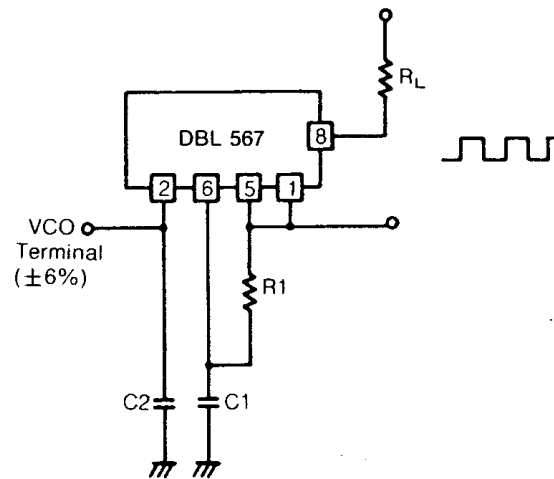
* The center frequency of the tone decoder is equal to the free running frequency of the VCO. This is given by

$$fo \simeq \frac{1}{1.1 R_1 C_1}$$

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)