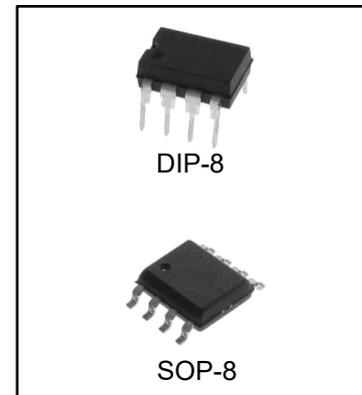


## LM567/LM567C Tone Decoder

### 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



### ORDERING INFORMATION

DEVICE	Package Type	MARKING	Packing	Packing Qty
LM567N	DIP-8	LM567	TUBE	2000pcs/Box
LM567CN	DIP-8	LM567C	TUBE	2000pcs/Box
LM567M/TR	SOP-8	LM567	REEL	2500pcs/Reel
LM567CM/TR	SOP-8	LM567C	REEL	2500pcs/Reel

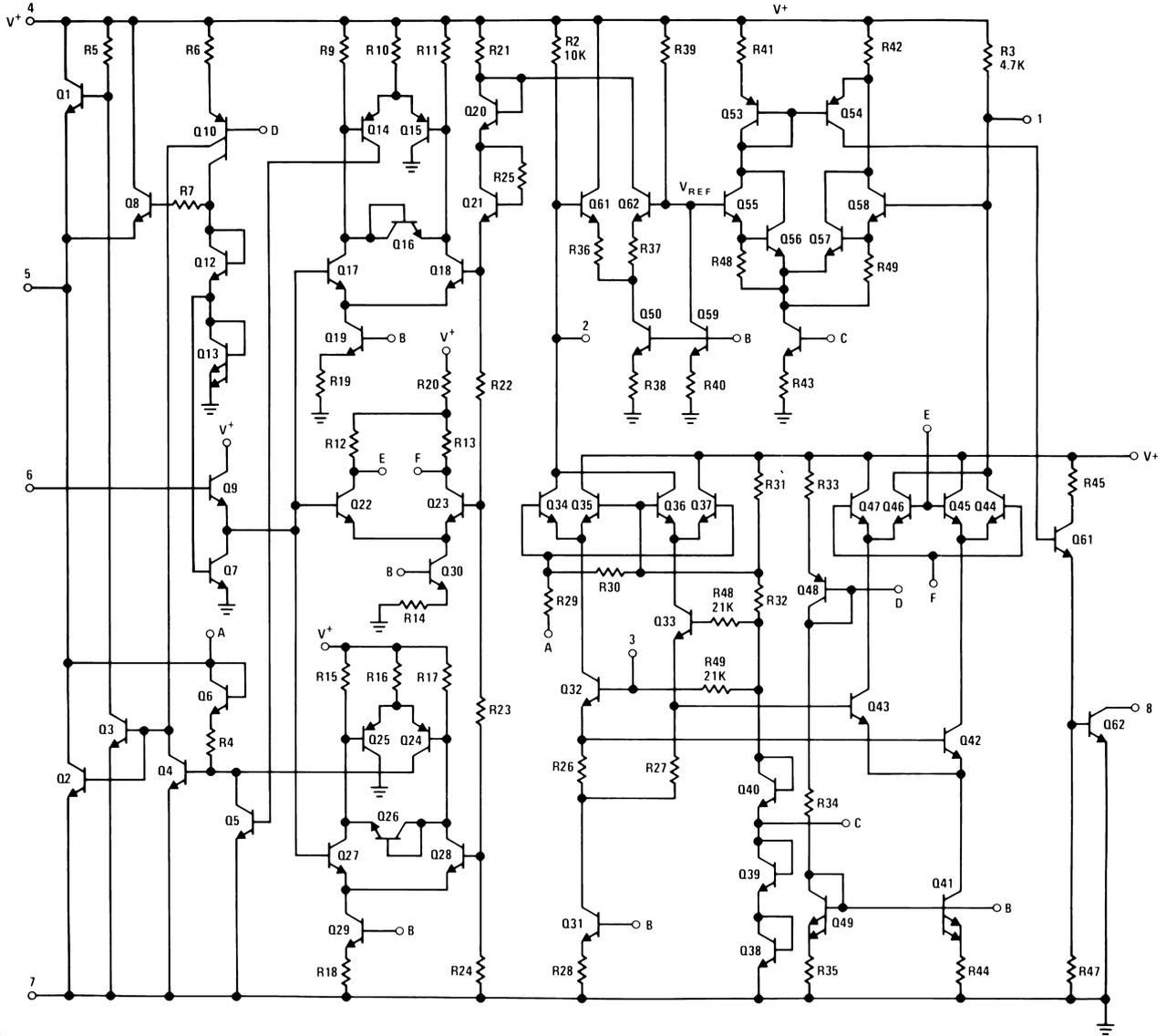


**ELECTRICAL CHARACTERISTICS**

 AC Test Circuit,  $T_A = 25^\circ\text{C}$ ,  $V_+ = 5\text{V}$ 

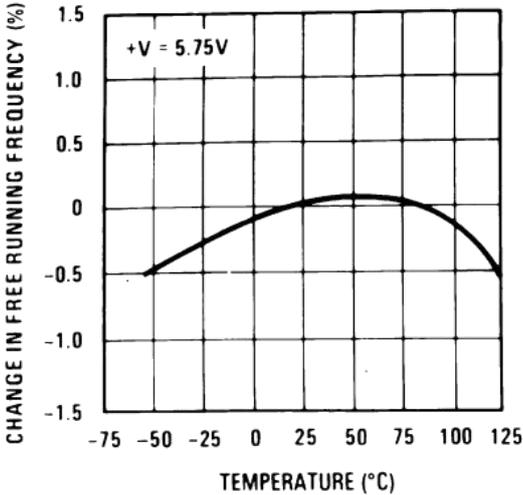
Parameters	Conditions	LM567			LM567C			Units
		Min	Typ	Max	Min	Typ	Max	
Power Supply Voltage Range		4.75	5.0	9.0	4.75	5.0	9.0	V
Power Supply Current Quiescent	$R_L = 20\text{k}$		6	8		7	10	mA
Power Supply Current Activated	$R_L = 20\text{k}$		11	13		12	15	mA
Input Resistance		18	20		15	20		k $\Omega$
Smallest Detectable Input Voltage	$I_L = 100\text{ mA}, f_i = f_o$		20	25		20	25	mVrms
Largest No Output Input Voltage	$I_C = 100\text{ mA}, f_i = f_o$	10	15		10	15		mVrms
Largest Simultaneous Outband Signal to Inband Signal Ratio			6			6		dB
Minimum Input Signal to Wideband Noise Ratio	$B_n = 140\text{ kHz}$		-6			-6		dB
Largest Detection Bandwidth		12	14	16	10	14	18	% of $f_o$
Largest Detection Bandwidth Skew			1	2		2	3	% of $f_o$
Largest Detection Bandwidth Variation with Temperature			$\pm 0.1$			$\pm 0.1$		%/ $^\circ\text{C}$
Largest Detection Bandwidth Variation with Supply Voltage	4.75–6.75V		$\pm 1$	$\pm 2$		$\pm 1$	$\pm 5$	%V
Highest Center Frequency		100	500		100	500		kHz
Center Frequency Stability (4.75–5.75V)	$0 < T_A < 70$ $-55 < T_A < +125$		$35 \pm 60$ $35 \pm 140$			$35 \pm 60$ $35 \pm 140$		ppm/ $^\circ\text{C}$ ppm/ $^\circ\text{C}$
Center Frequency Shift with Supply Voltage	4.75V–6.75V 4.75V–9V		0.5	1.0 2.0		0.4	2.0 2.0	%/V %/V
Fastest ON-OFF Cycling Rate			$f_o/20$			$f_o/20$		
Output Leakage Current	$V_B = 15\text{V}$		0.01	25		0.01	25	$\mu\text{A}$
Output Saturation Voltage	$e_i = 25\text{ mV}, I_B = 30\text{ mA}$ $e_i = 25\text{ mV}, I_B = 100\text{ mA}$		0.2 0.6	0.4 1.0		0.2 0.6	0.4 1.0	V
Output Fall Time			30			30		ns
Output Rise Time			150			150		ns

**SCHEMATIC DIAGRAM**

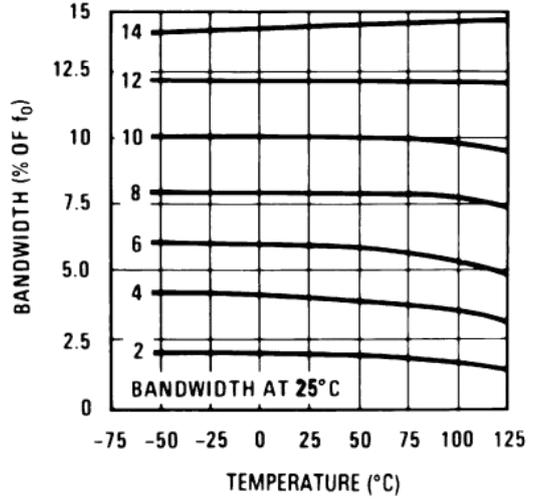


**TYPICAL PERFORMANCE CHARACTERISTICS**

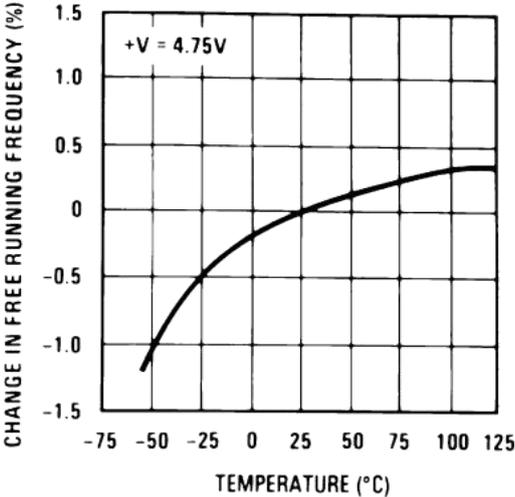
Typical Frequency Drift



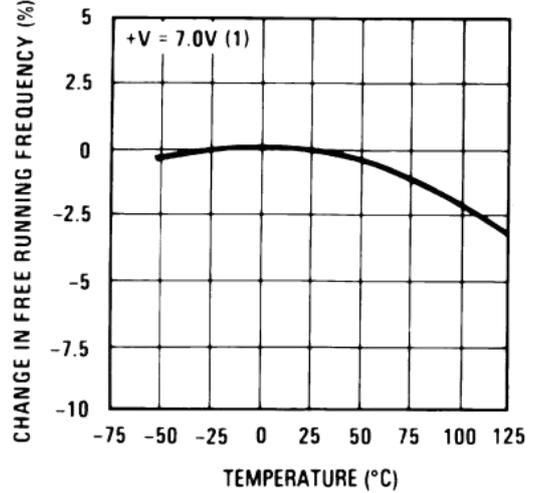
Typical Bandwidth Variation



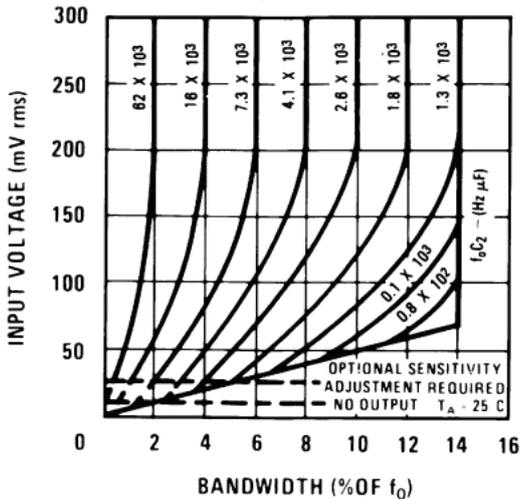
Typical Frequency Drift



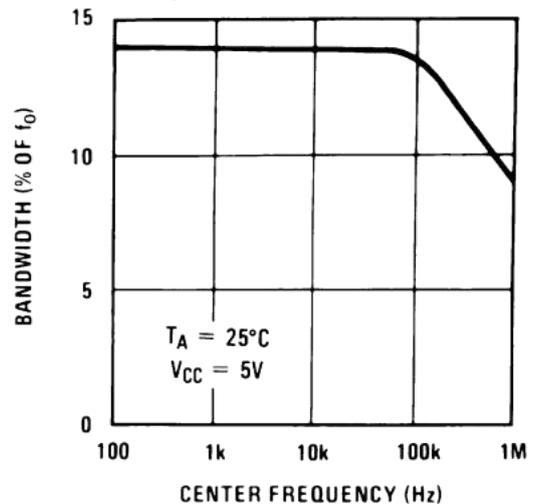
Typical Frequency Drift



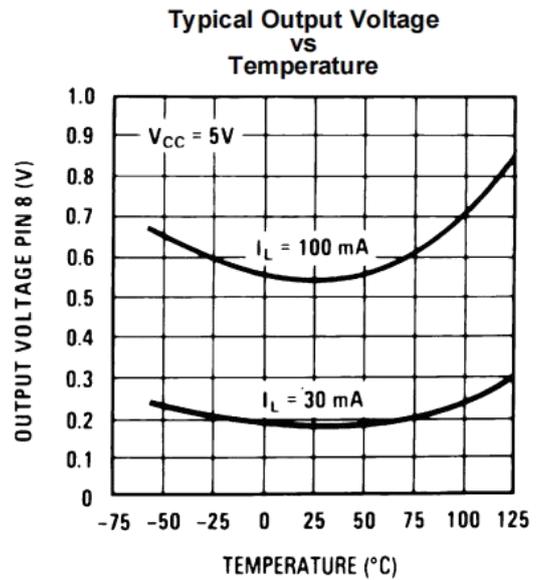
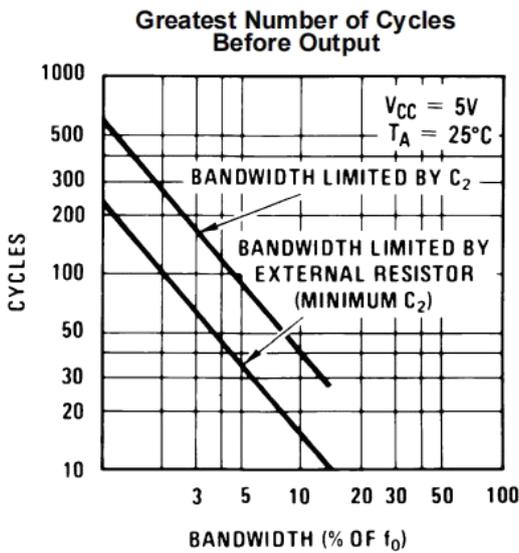
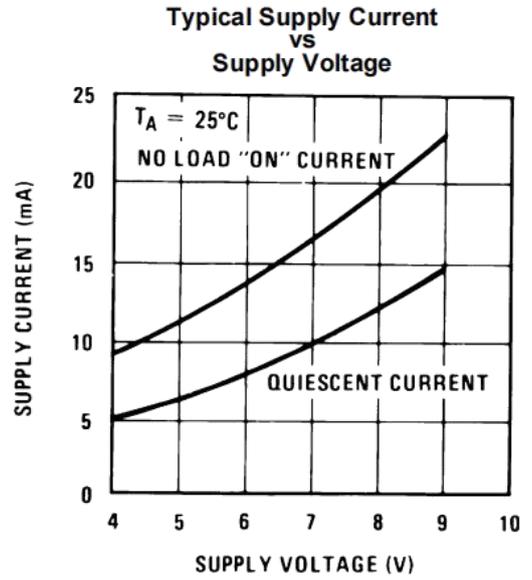
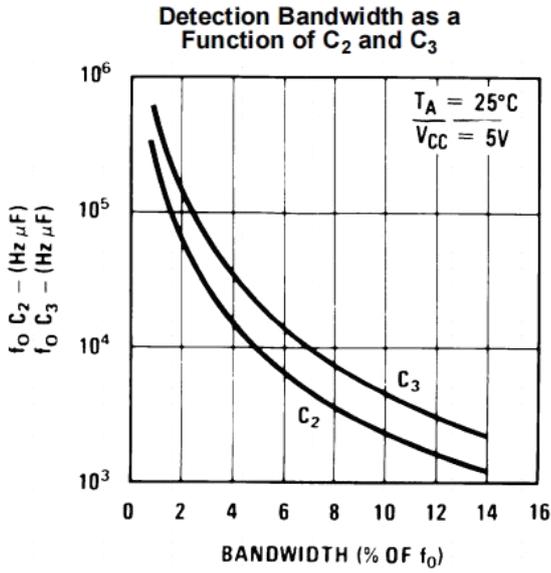
Bandwidth vs Input Signal Amplitude



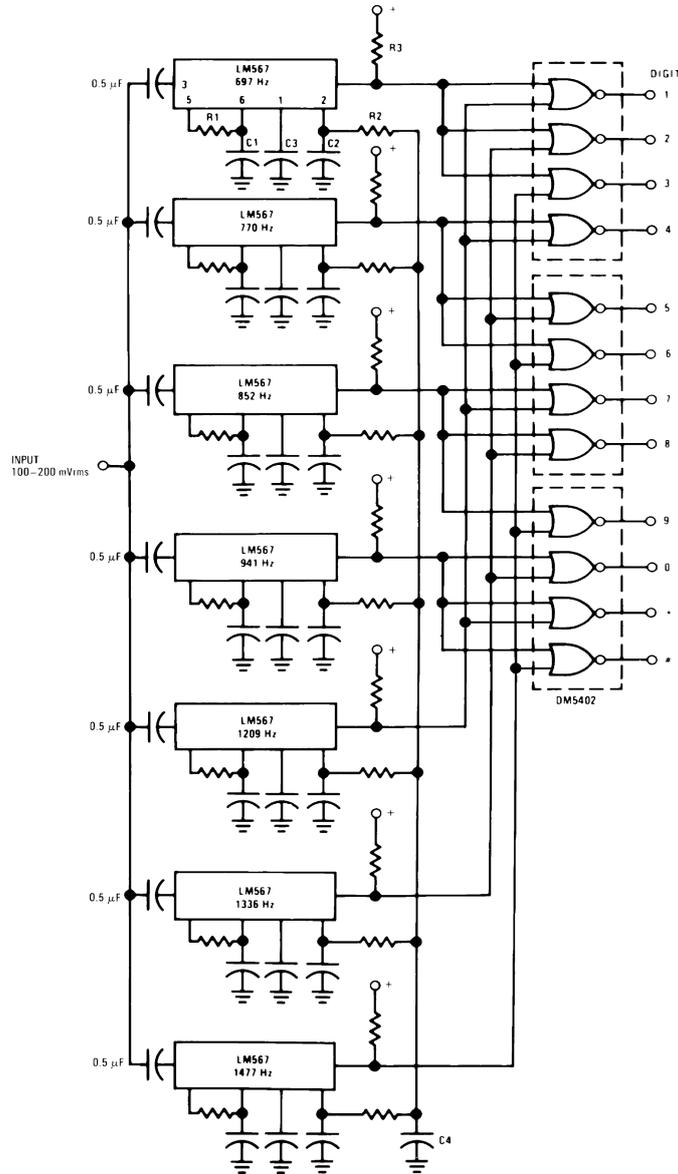
Largest Detection Bandwidth



**TYPICAL PERFORMANCE CHARACTERISTICS (continued)**



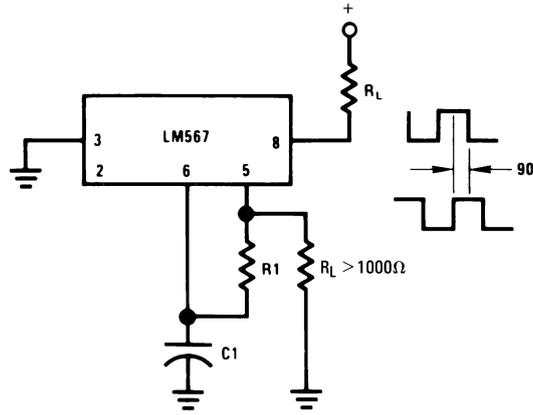
TYPICAL APPLICATIONS



Component values (typ)

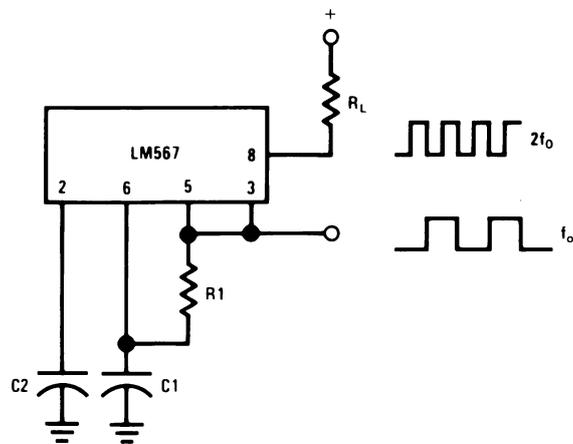
- R1 6.8 to 15k
- R2 4.7k
- R3 20k
- C1 0.10 mfd
- C2 1.0 mfd 6V
- C3 2.2 mfd 6V
- C4 250 mfd 6V

Touch-Tone Decoder

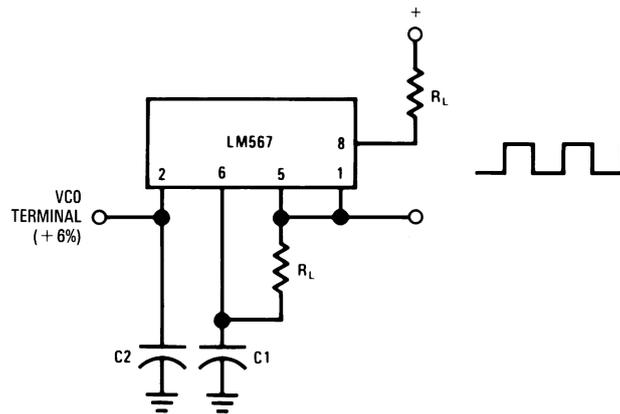


Connect Pin 3 to 2.8V to Invert Output

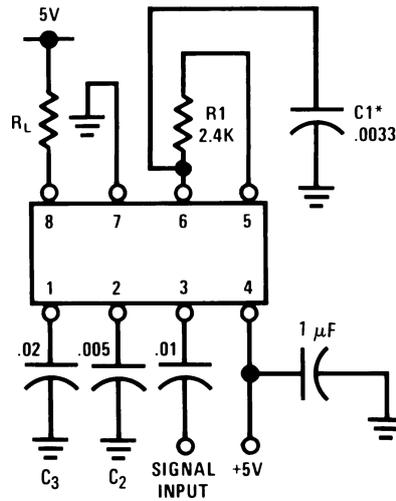
**Oscillator with Quadrature Output**



**Oscillator with Double Frequency Output**



**Precision Oscillator Drive 100 mA Loads**

**AC TEST CIRCUIT**


$f_i = 100 \text{ kHz} + 5V$

\*Note: Adjust for  $f_o = 100 \text{ kHz}$ .

**APPLICATIONS INFORMATION**

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

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

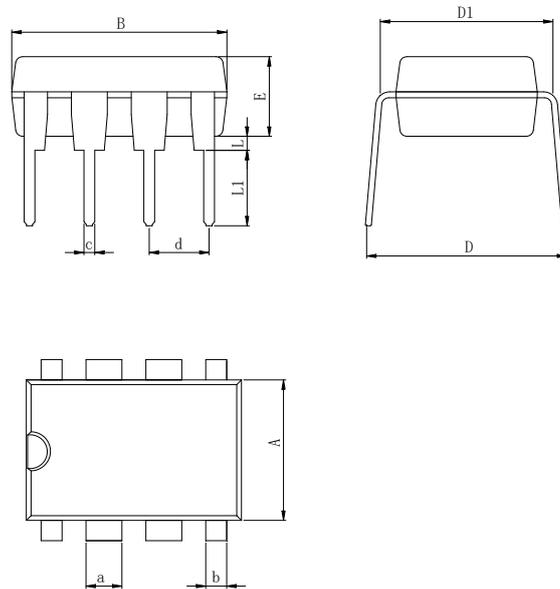
The bandwidth of the filter may be found from the approximation

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

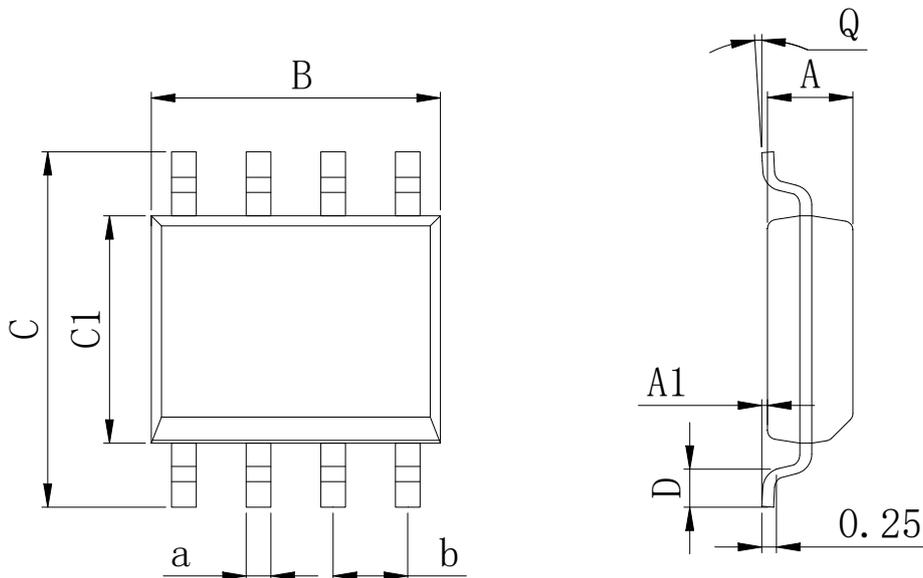
where

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

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

**PHYSICAL DIMENSIONS**
**DIP-8**

**Dimensions In Millimeters(DIP-8)**

Symbol:	A	B	D	D1	E	L	L1	a	b	c	d
Min:	6.10	9.00	8.10	7.42	3.10	0.50	3.00	1.50	0.85	0.40	2.54 BSC
Max:	6.68	9.50	10.9	7.82	3.55	0.70	3.60	1.55	0.90	0.50	

**SOP-8**

**Dimensions In Millimeters(SOP-8)**

Symbol:	A	A1	B	C	C1	D	Q	a	b
Min:	1.35	0.05	4.90	5.80	3.80	0.40	0°	0.35	1.27 BSC
Max:	1.55	0.20	5.10	6.20	4.00	0.80	8°	0.45	

## REVISION HISTORY

DATE	REVISION	PAGE
2018-6-2	New	1-12
2023-8-29	Update encapsulation type、Update Lead Temperature、Updated DIP-8 dimension	1、2、10

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