UMW TL082

General J - FET input dual operational amplifier

1.Description

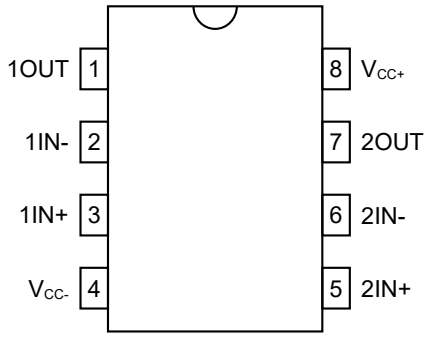
UMW TL082 is a dual operational amplifier with high-speed J-FET input, which consists of high voltage J-FET and bipolar transistor. It has high conversion rate, low input bias current and offset current, and low temperature coefficient of offset voltage. The working range is 0°C-70°C.

UMW TL082 is available in SOP8 packages.

2.Features

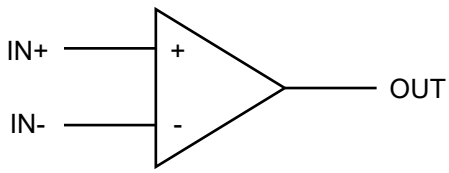
- Lower power consumption
- Wide common- mode and differential - mode input voltage range
- Low input bias current and offset current Output short - circuit current protection
- High input impedance
- High conversion rate
- High gain bandwidth product,up to 4MHz

3.Pinning Information

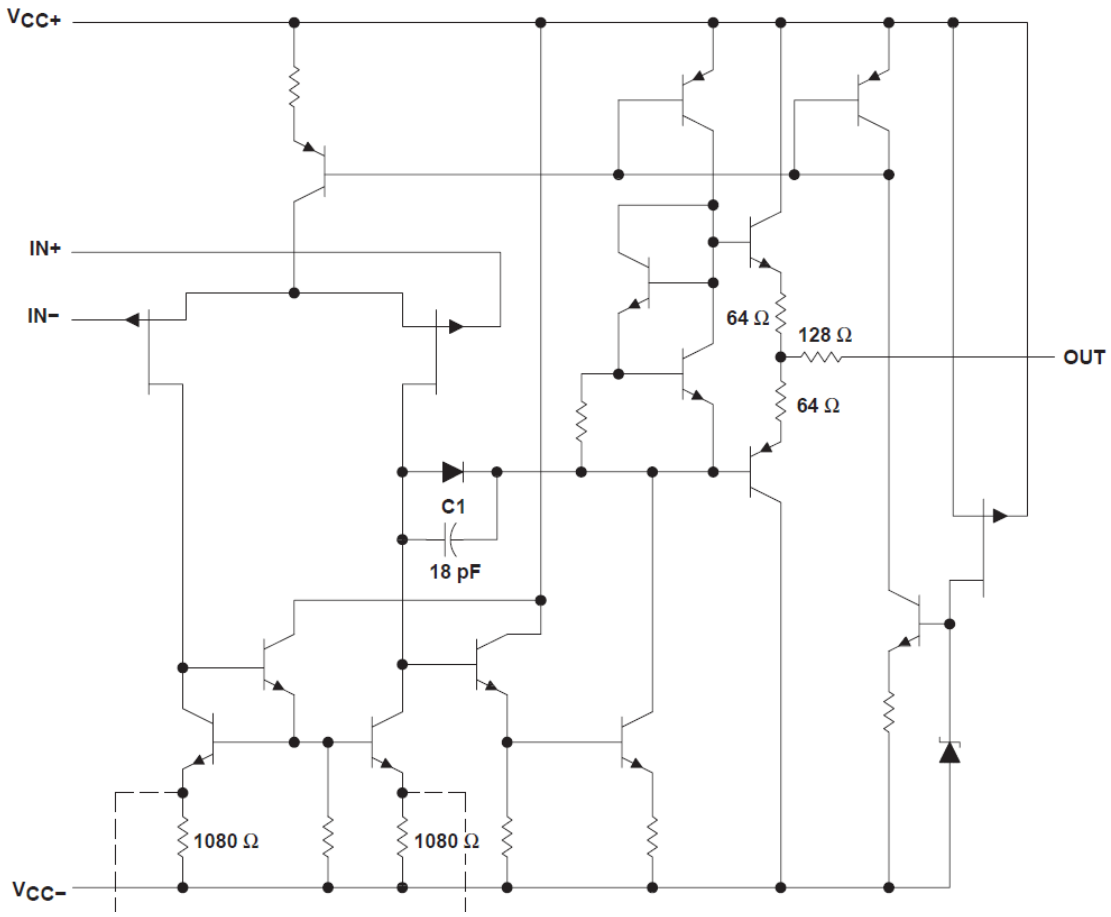


SOP-8

4.Symbol (each operational amplifier)



5.Internal Block Diagram (Each Operational Amplifier)



6.Limit Parameter

Parameter		Value	Value	Units
Power Supply Voltage		V_{CC}	±18	V
Input Voltage		V_I	±15	V
Differential Mode Input Power		V_{ID}	±30	V
Working Temperature	UMW TL082I	T_{OPER}	-40 to 105	°C
	UMW TL082C		0 to 70	°C
Storage Temperature		T_{STG}	-65 to 150	°C

7.Electrical Characteristics

V_{CC}=±15, Tamp=25°C shall be specified separately.

Parameter	Symbol	Conditions		Min	Typ	Max	Units
Offset Voltage	V_{IO}	V_O=0V			3	10	mV
Input Offset Current	I_{IO}	V_O=0V			5	100	nA
Output Bias Current	I_{IB}	V_O=0V			20	400	PA
Input Common Mode	V_{ICM}			±11	±15		V
Voltage Range					-12		V
Output voltage swing	±V_{opp}	T_{amb}=+25°C	R_L=2kΩ	10	12		V
			R_L=10kΩ	12	13.5		V
Large Signal Voltage Gain	A_{vd}	R_L=2kΩ, V_O=±10V	T_{amb}=+25°C	50	200		V/mV
			T_{min}≤T_{amb}≤T_{max}	25			V/mV
Common Mode Rejection Ratio	CMRR	V_{CC}=±15V to ±9V, V_O=0V		70	86		dB
Power Supply Rejection Ratio	SVR			70	86		dB
Static Current-per Channel	I_{CC}	V_I=10V			1.4	2.8	mA
Conversion Rate	SR			8	13		V/μs
Risetime	t_r				0.05		μs

Parameter	Symbol	Conditions	Min	Typ	Max	Units
Rise time	t_r	V_{in}=20mV, R_L=2kΩ, C_L=100pF, unity gain		0.1		μs
Overshoot	K_{OV}	V_{in}=20mV, R_L=2kΩ, C_L=100pF, unity gain		10		%
Gain bandwidth product	GBP	V_{in}=10mV, R_L=2kΩ, C_L=100pF, F=100kHz	2.5	4		MHz
Input resistance	R_i			10^{12}		Ω
Total harmonic distortion	THD	F=1kHz, R_L=2kΩ, C_L=100pF A_V=20dB, V_O=2V_{pp}		0.01		%
Equivalent input noise voltage	e_n	R_S=100Ω, F=1KHz		15		nV/√Hz
Phase margin	Ø m			45		degrees
Channel separation	V_{O1}/V_{O2}	A_V=100		120		dB

1. The input bias currents are junction leakage currents which approximately double for every 10°C increase in the junction temperature.

8.1 Typical Characterisitics

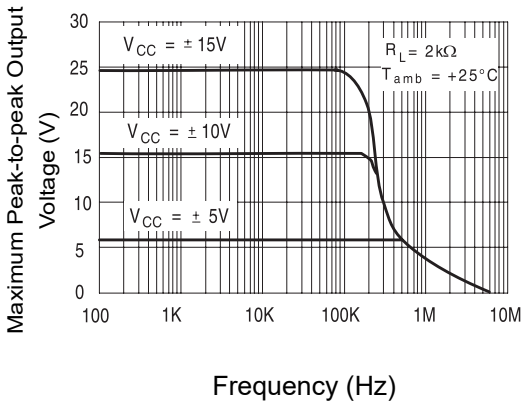


Figure 1: Maximum peak-to-peak output voltage versus frequency

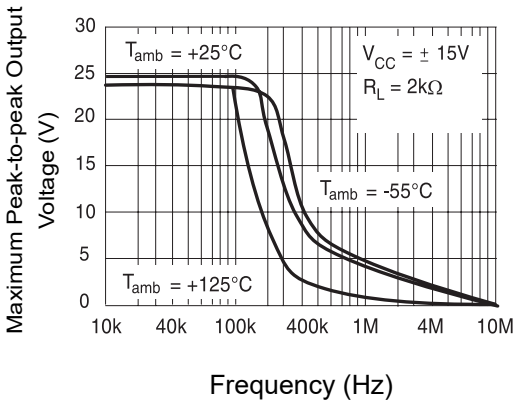


Figure 2: Maximum peak-to-peak output voltage versus frequency

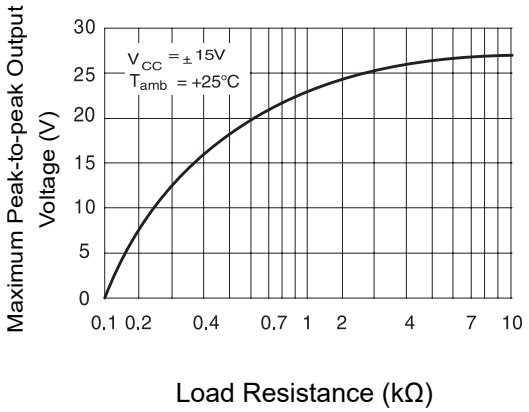


Figure 3: Maximum peak-to-peak output voltage versus load resistance

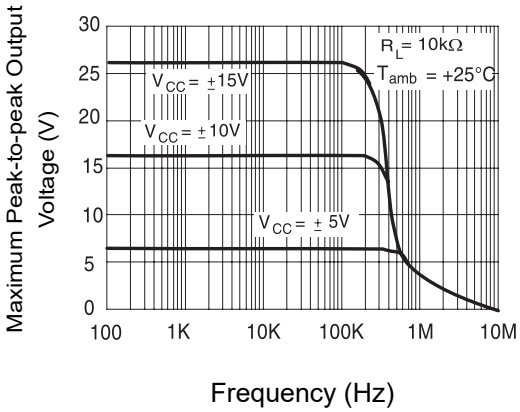


Figure 4: Maximum peak-to-peak output voltage versus frequency

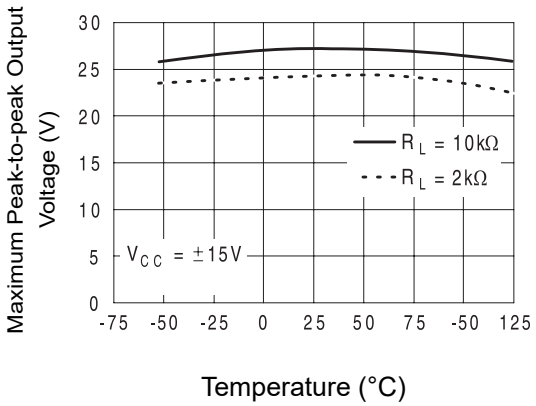


Figure 5: Maximum peak-to-peak output voltage versus free air temperature

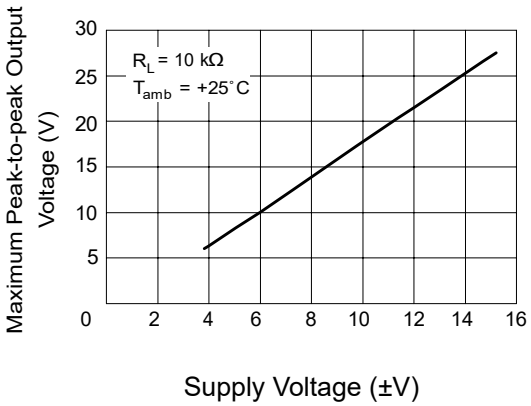


Figure 6: Maximum peak-to-peak output voltage versus supply voltage

8.2 Typical Characterisitics

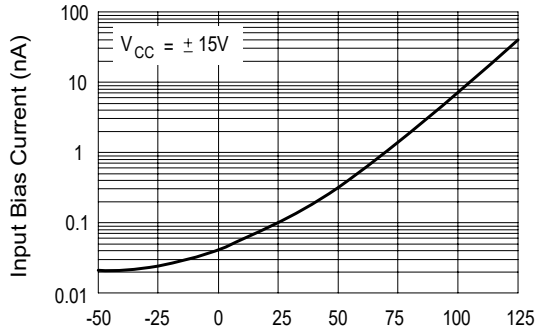


Figure 7: Input bias current versus free air temperature

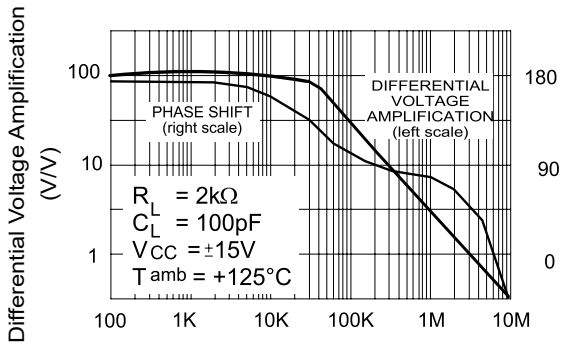


Figure 8: Large signal differential voltage amplification and phase shift versus frequency

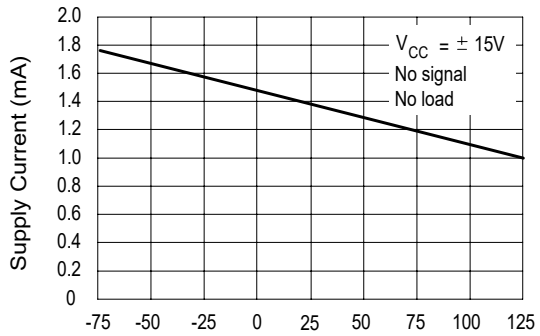


Figure 9: Supply current per amplifier versus free air temperature

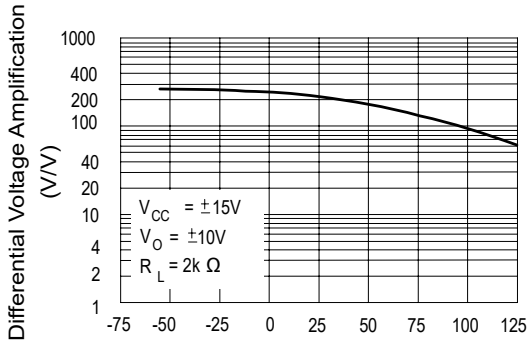


Figure 10: Large signal differential voltage amplification versus free air temp.

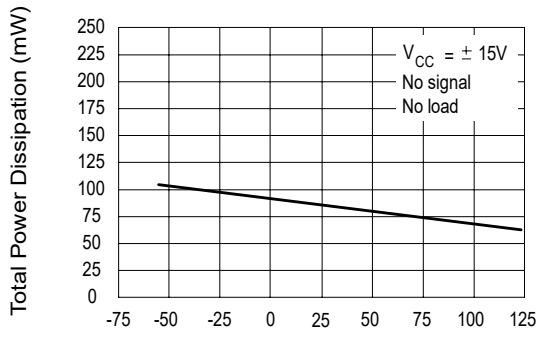


Figure 11: Total power dissipation versus free air temperature

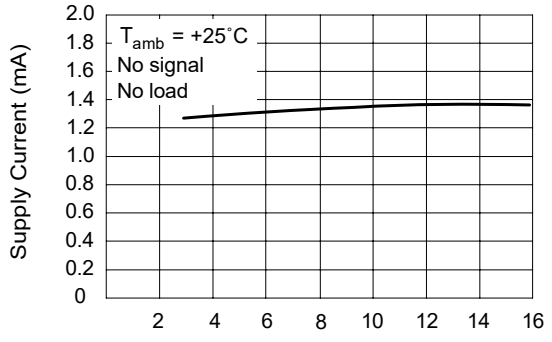


Figure 12: Supply current per amplifier versus supply voltage

8.3 Typical Characterisitics

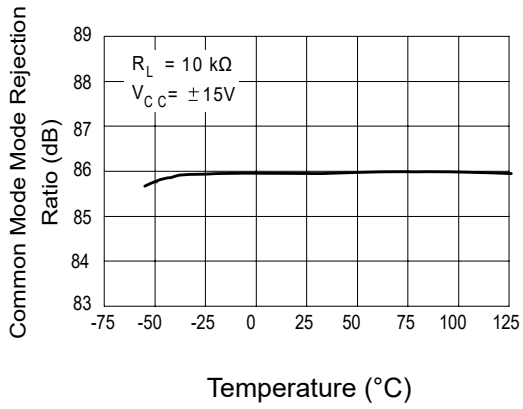


Figure 13: Common mode rejection ratio versus free air temperature

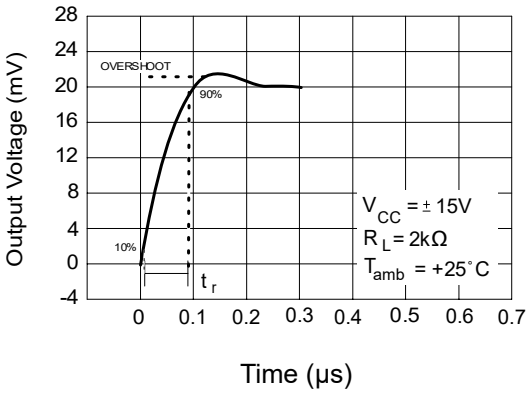


Figure 14: Output voltage versus elapsed time

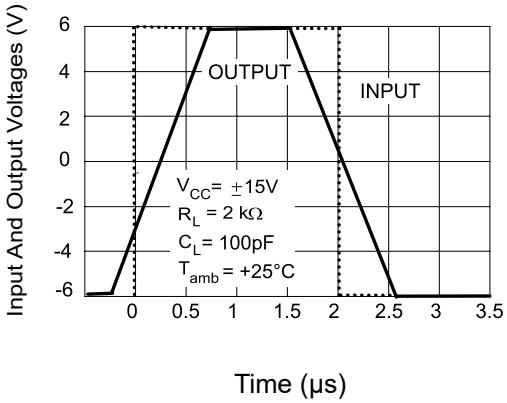


Figure 15: Voltage follower large signal pulse response

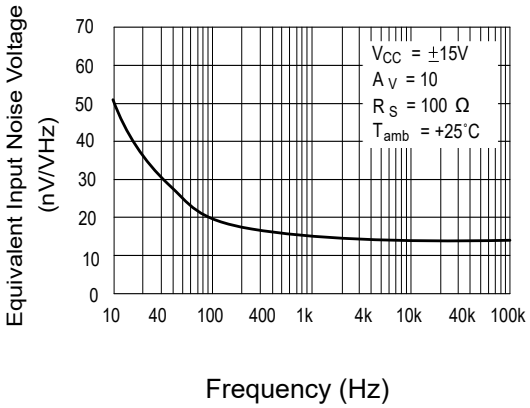


Figure 16: Equivalent input noise voltage versus frequency

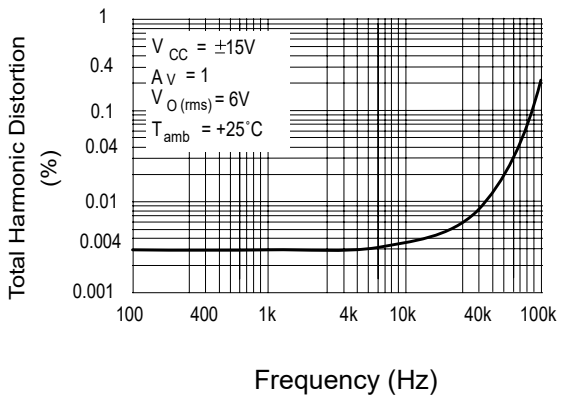
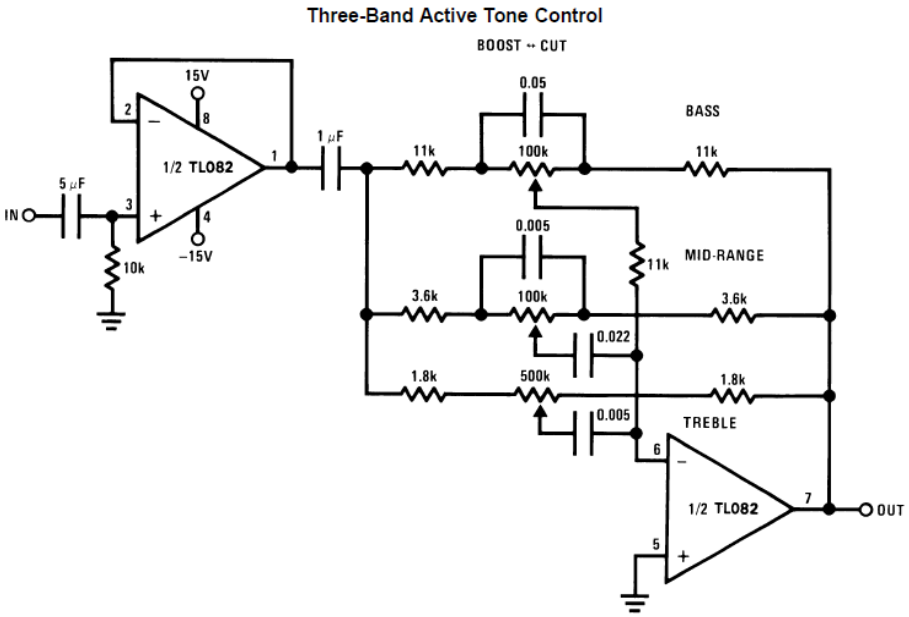


Figure 17: Total harmonic distortion versus frequency

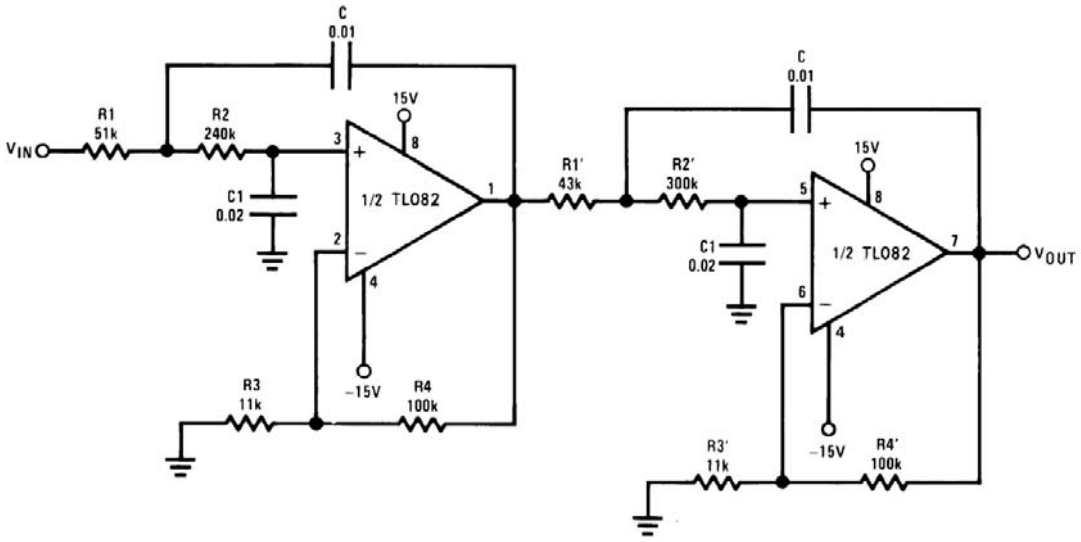
9.Typical Application Circuit Diagram (Including One Operational Amplifier)



Three - Band Active Tone Control for three- segment tone control.

10. Fourth- Order Low- Pass Filtering

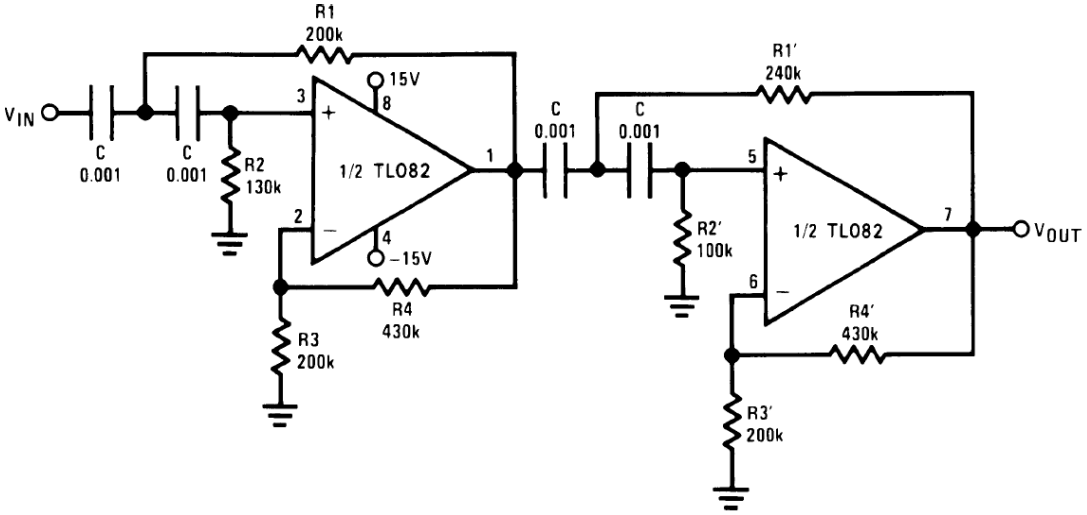
Fourth Order Low Pass Butterworth Filter



- Corner frequency (f_c) = $\sqrt{\frac{1}{R1R2CC1}} \cdot \frac{1}{2\pi} = \sqrt{\frac{1}{R1'R2'CC1}} \cdot \frac{1}{2\pi}$
- Passband gain (H_O) = (1 + R4/R3) (1 + R4'/R3')
- First stage Q = 1.31
- Second stage Q = 0.541
- Circuit shown uses nearest 5% tolerance resistor values for a filter with a corner frequency of 100 Hz and a passband gain of 100
- Offset nulling necessary for accurate DC performance

11.Fourth-order High-pass Filtering

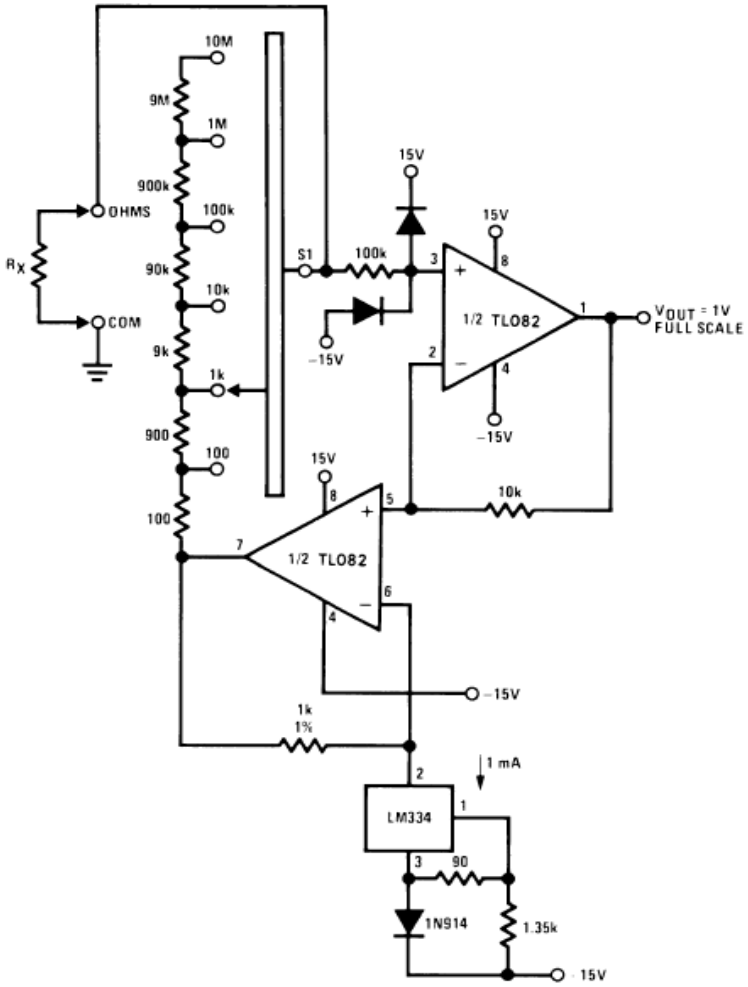
Fourth Order High Pass Butterworth Filter



- Corner frequency (f_c) = $\sqrt{\frac{1}{R1R2C^2}} \cdot \frac{1}{2\pi} = \sqrt{\frac{1}{R1'R2'C^2}} \cdot \frac{1}{2\pi}$
- Passband gain (H_O) = (1 + R4/R3) (1 + R4'/R3')
- First stage Q = 1.31
- Second stage Q = 0.541
- Circuit shown uses closest 5% tolerance resistor values for a filter with a corner frequency of 1 kHz and a passband gain of 10

12.Resistance- Voltage Conversion

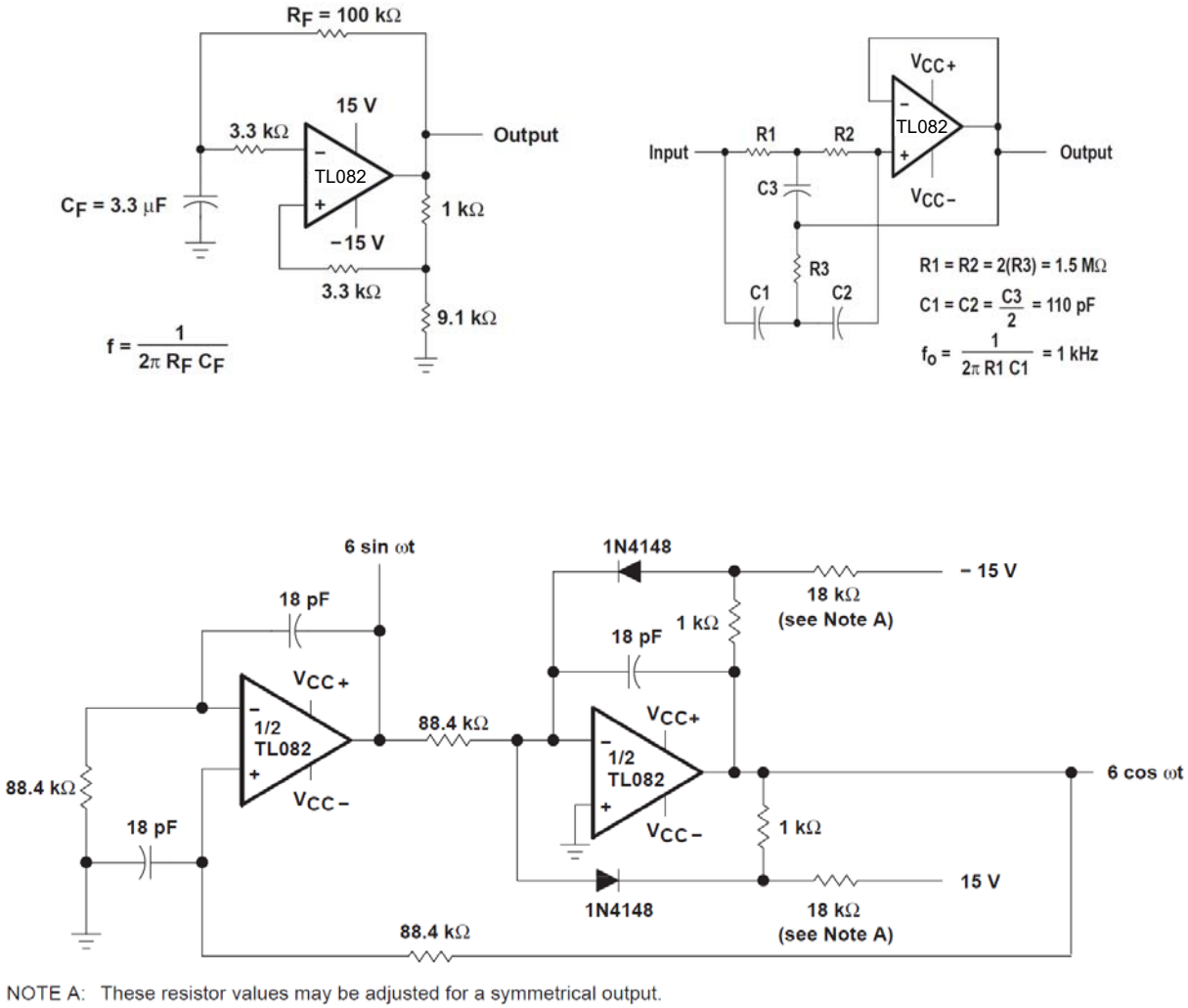
Ohms to Volts Converter



$$V_O = \frac{1V}{R_{LADDER}} \times R_X$$

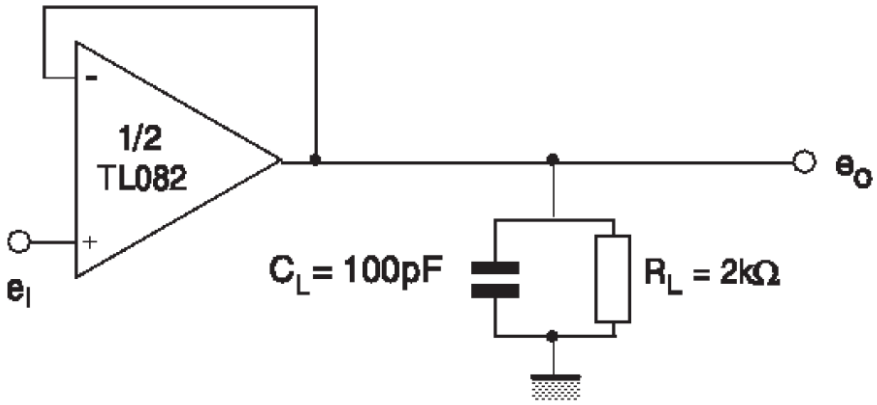
Where R_{LADDER} is the resistance from switch S1 pole to pin 7 of the TL082CP.

13. Typical Lines

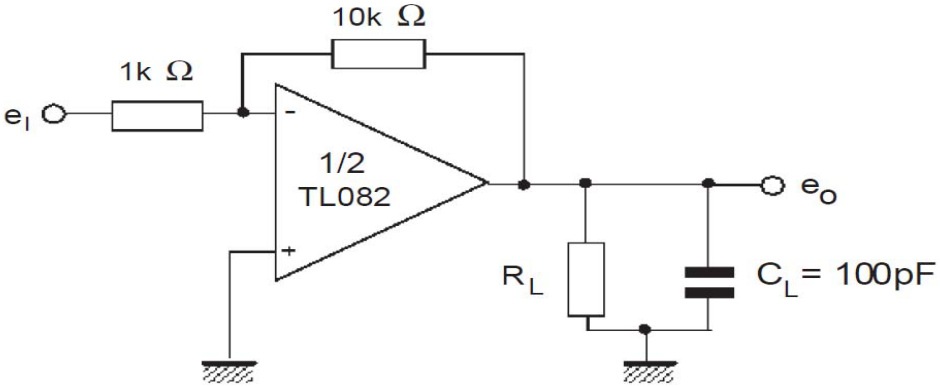


NOTE A: These resistor values may be adjusted for a symmetrical output.

100 kHz quadrature oscillator 100- KHz Quadrature Oscillator

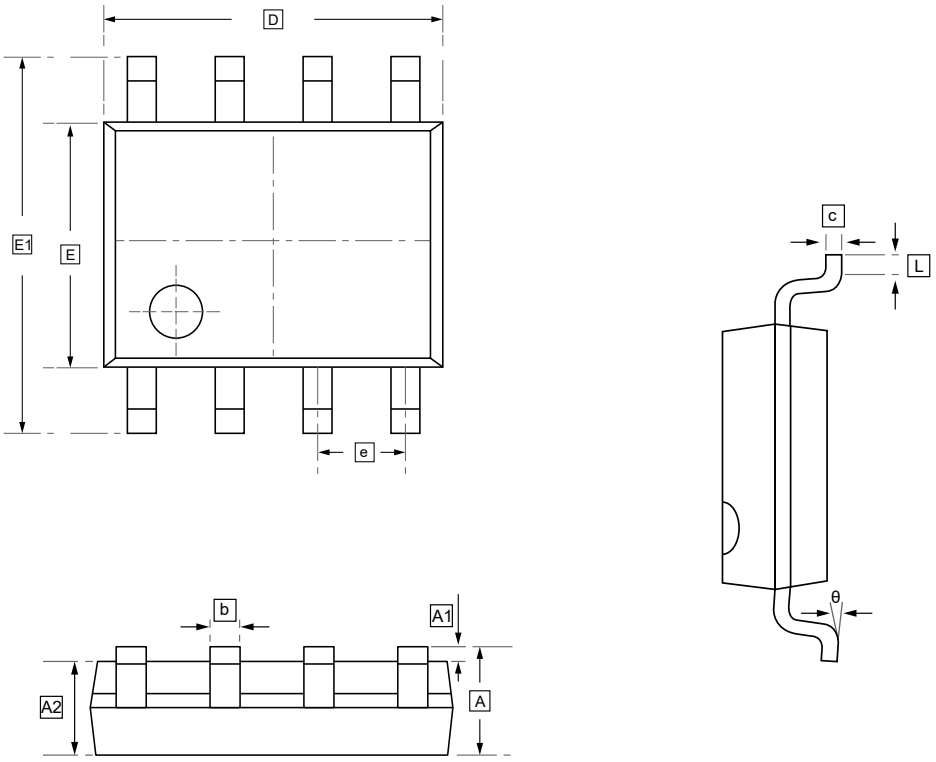


Voltage Follower voltage follower



Gain-of- 10 Inverting Amplifier with gain of 10

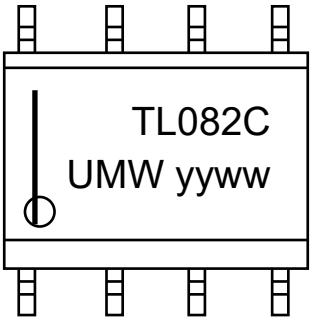
14.SOP-8 Package Outline Dimensions



DIMENSIONS (mm are the original dimensions)

Symbol	A	A1	A2	b	c	D	E	E1	e	L	θ
Min	1.350	0.000	1.350	0.330	0.170	4.700	3.800	5.800	1.270	0.400	0°
Max	1.750	0.100	1.550	0.510	0.250	5.100	4.000	6.200	BSC	1.270	8°

15.Ordering Information



yy: Year Code
ww: Week Code

Order Code	Marking	Package	Base QTY	Delivery Mode
UMW TL082CDR	TL082C	SOP-8	2500	Tape and reel
UMW TL082IDR	TL082I	SOP-8	2500	Tape and reel

16.Disclaimer

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