# UMW® TL082

## General J- FET input dual operational amplifier

## Summary

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 $0°C$-$70°C$.

TL082 is available in SOP8 packages.

## Pin diagram



(TOP VIEW)

| | | |
|---|---|---|
| 1OUT | 1 | 8 VCC+ |
| 1IN− | 2 | 7 2OUT |
| 1IN+ | 3 | 6 2IN− |
| VCC− | 4 | 5 2IN+ |
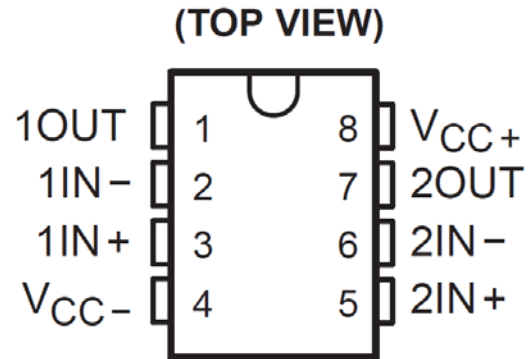
## Main feature

- 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

## Symbol (each operational amplifier)
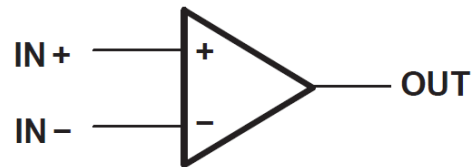
## Internal block diagram (each operational amplifier)
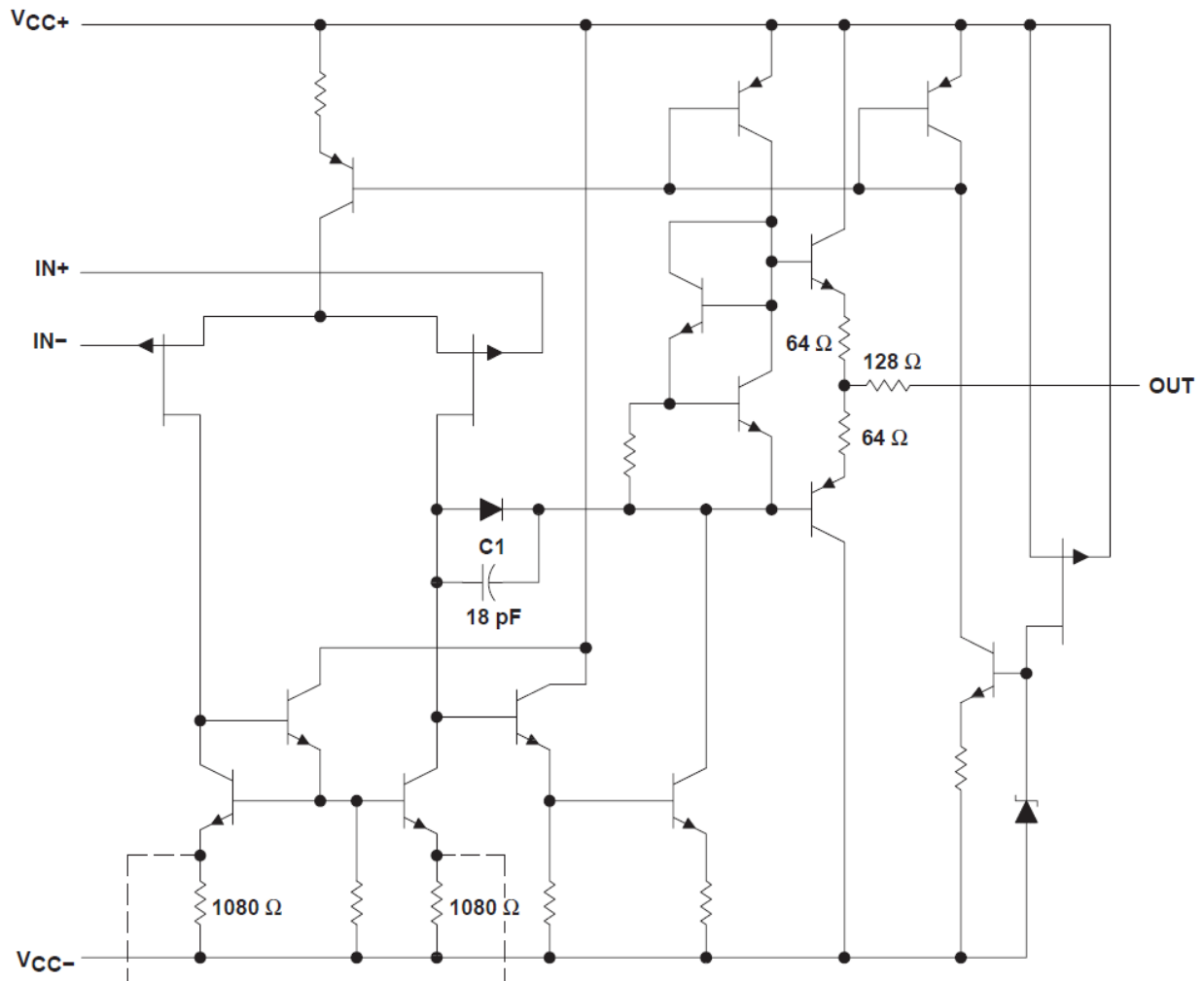


## Limit parameter

| symbol | describe | limit value | unit |
|---|---|---|---|
| Vcc | Power supply voltage | ±18 | V |
| Vi | input voltage | ±14 | V |
| Vid | Differential mode input power | ±28 | V |
| Toper | Working temperature | 0 —70 | ℃ |
| Tstg | Storage temperature | -65 —150 | ℃ |

# General J- FET input dual operational amplifier

## Electrical characteristics (VCC = ±15, Tamp = 25°C shall be specified separately)

| symbol | Parameter name | test condition | test value | | | unit |
|---|---|---|---|---|---|---|
| | | | Min | Typ | Max | |
| Vio | offset voltage | Vo=0V | | 3 | 6 | mV |
| Iio | Input offset current | Vo=0V | | | 1.5 | nA |
| Iib | Output bias current | Vo=0V | | | 2.5 | nA |
| Vicr | Input common mode voltage | | - 12 | ±11 | 15 | V |
| Vom | Peak output voltage | RL = 10 kΩ | ±12 | ±13.5 | | V |
| | | RL ≥ 2 kΩ | ±10 | ±12.5 | | |
| AVD | Large signal voltage gain | RL ≥ 2 kΩ    VO = ±10 V | 80 | 95 | | dB |
| B1 | Gain bandwidth product | | | 3 | | MHz |
| CMRR | common mode rejection ratio | | 70 | 85 | | dB |
| kSVR | Power supply rejection ratio | VCC= ±15 V to    ± 9 V  Vo=0V | 70 | 86 | | dB |
| ICC | Static current- per channel | | | 1.4 | 2.8 | mA |
| SR | conversion rate | VI = 10 V, | 8 | 13 | | V/us |
| tr | risetime | | | 0.05 | | us |

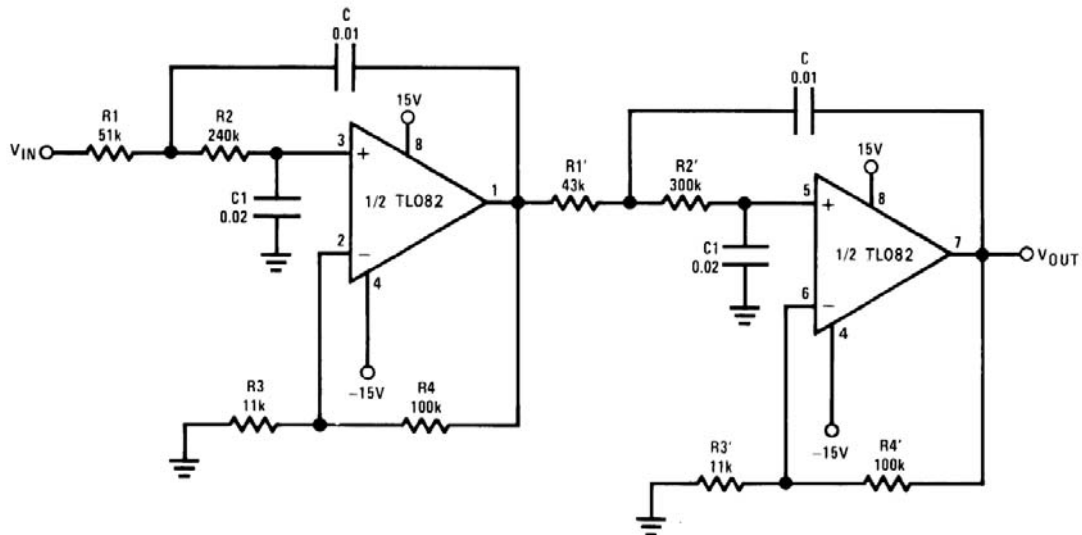## Typical application circuit diagram (including one operational amplifier)

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



Three-Band Active Tone Control
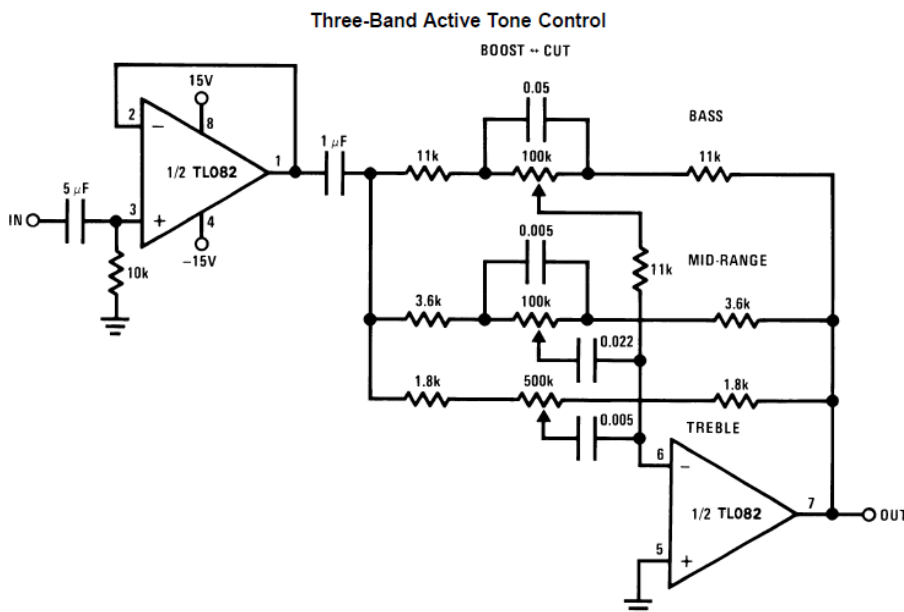
## Fourth- order low- pass filtering

### Fourth Order Low Pass Butterworth Filter



- Corner frequency $(f_c) = \sqrt{\dfrac{1}{R1R2CC1}} \cdot \dfrac{1}{2\pi} = \sqrt{\dfrac{1}{R1'R2'CC1}} \cdot \dfrac{1}{2\pi}$

- 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

## Fourth- order high- pass    filtering

### Fourth Order High Pass Butterworth Filter
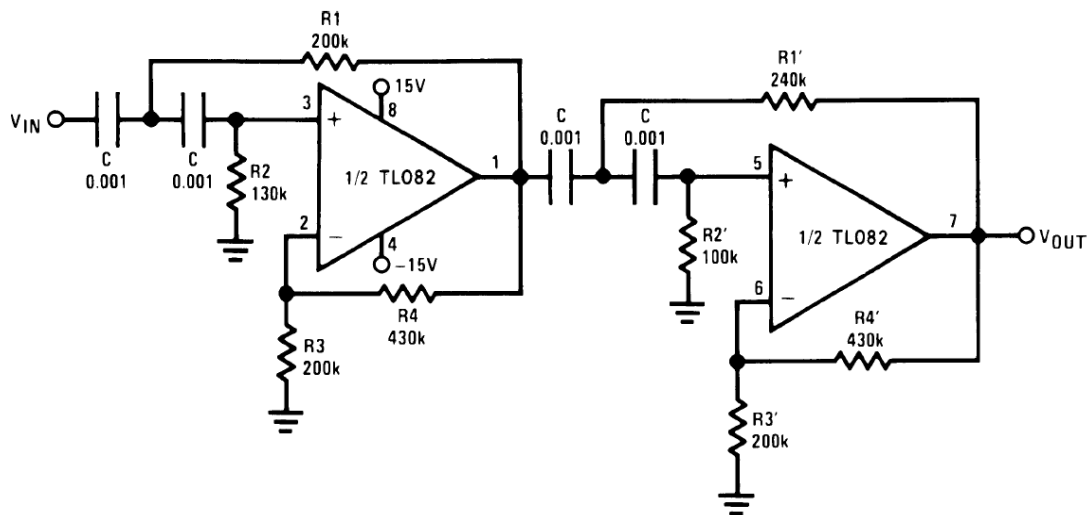


- Corner frequency $(f_c) = \sqrt{\dfrac{1}{R1R2C^2}} \cdot \dfrac{1}{2\pi} = \sqrt{\dfrac{1}{R1'R2'C^2}} \cdot \dfrac{1}{2\pi}$

- 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
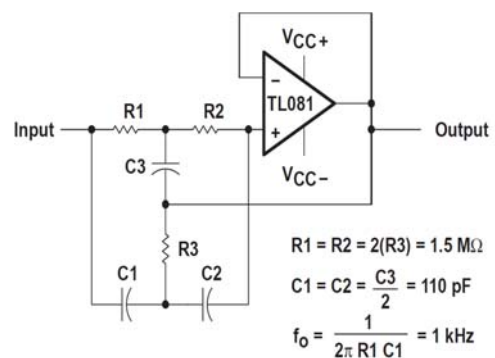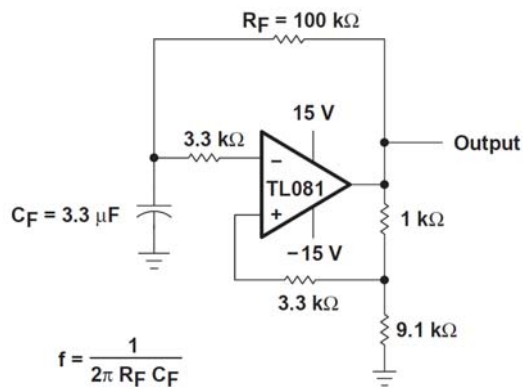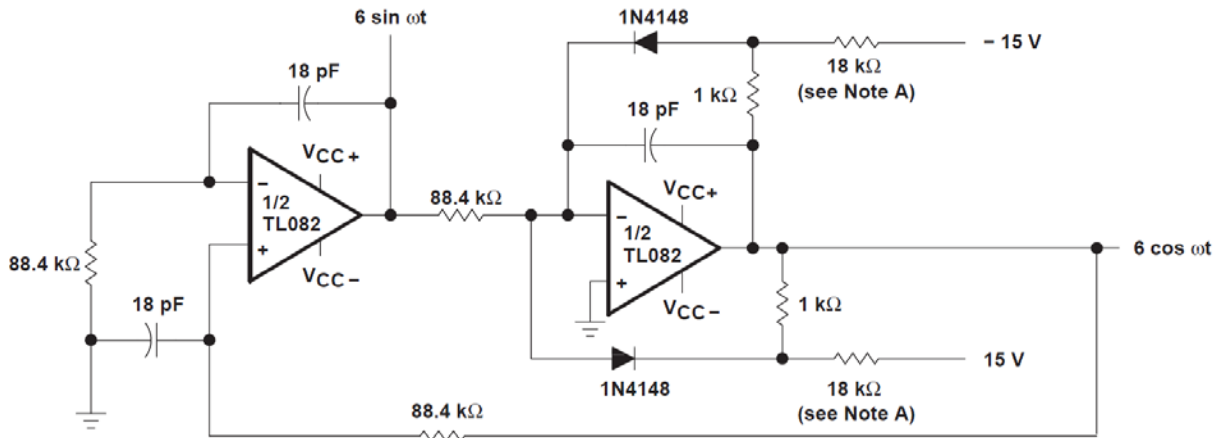
## Resistancevoltage conversion

**Ohms to Volts Converter**
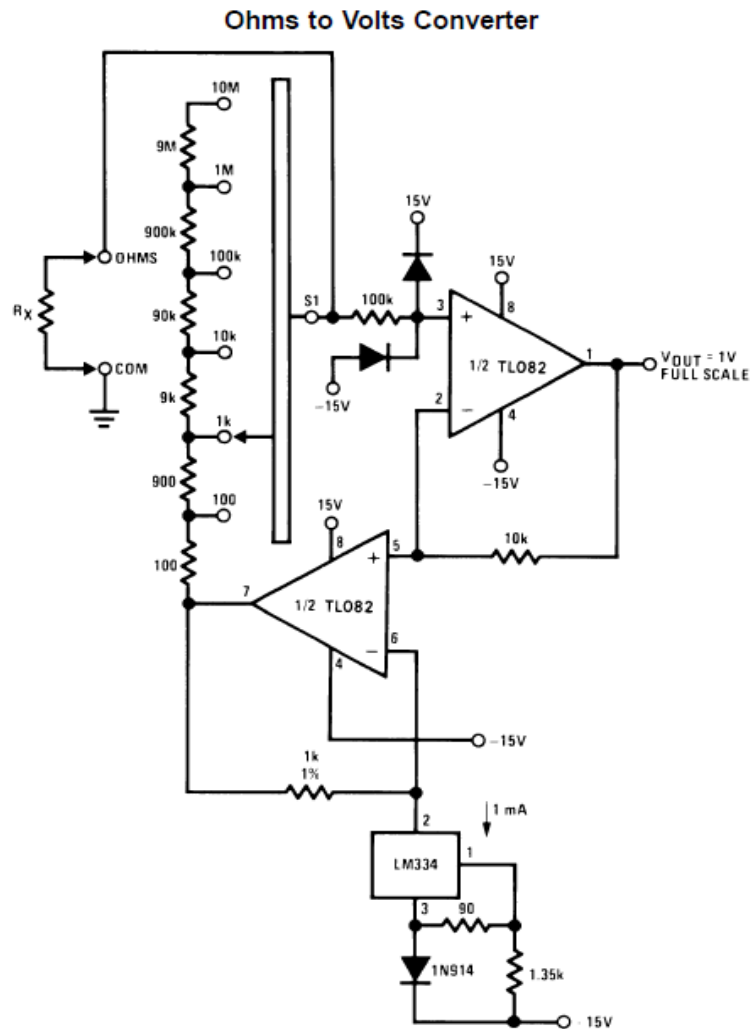


$$V_O = \frac{1V}{R_{LADDER}} \times R_X$$

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

## Typical lines



$$f = \frac{1}{2\pi R_F C_F}$$

$$R1 = R2 = 2(R3) = 1.5\,M\Omega$$

$$C1 = C2 = \frac{C3}{2} = 110\,pF$$
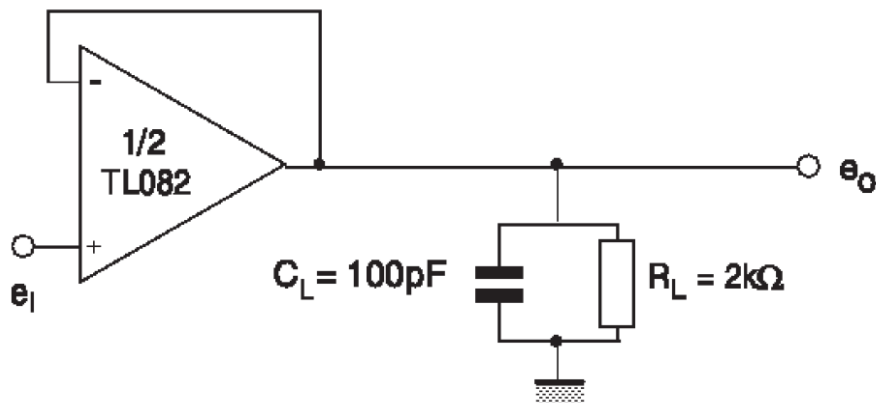
$$f_o = \frac{1}{2\pi R1\,C1} = 1\,kHz$$

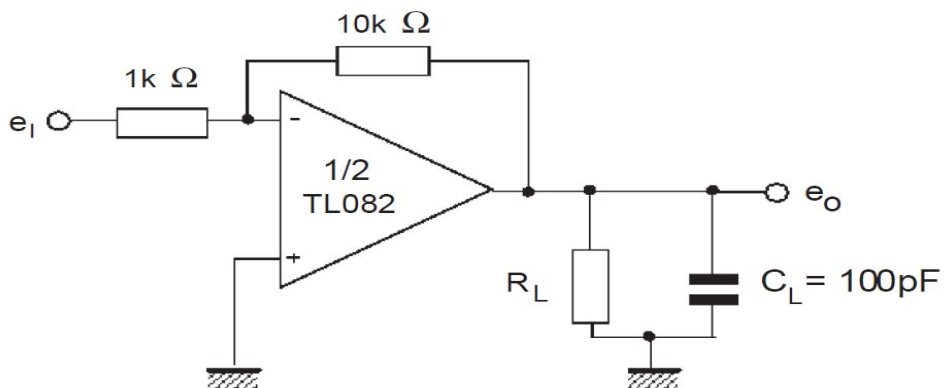## 100 kHz quadrature oscillator 100-KHz Quadrature Oscillator



NOTE A: These resistor values may be adjusted for a symmetrical output.
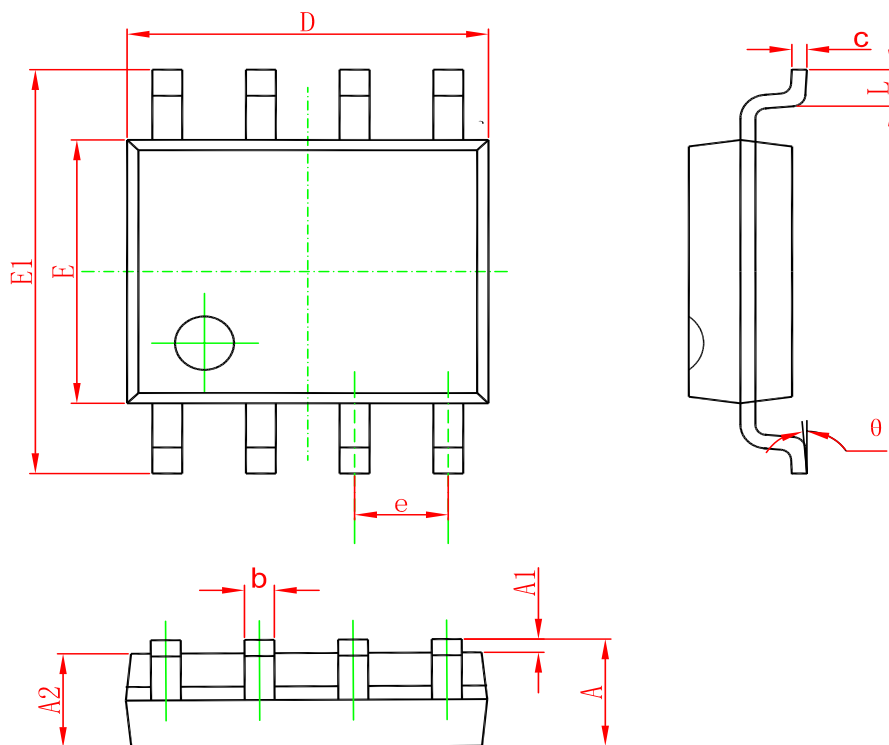
## Voltage Follower voltage follower



## Gain-of-10 Inverting Amplifier with gain of 10

**PACKAGE OUTLINE DIMENSIONS**

**SOP-8**



| Symbol | Dimensions In Millimeters | | Dimensions In Inches | |
|--------|------|------|------|------|
| | Min | Max | Min | Max |
| A | 1.350 | 1.750 | 0.053 | 0.069 |
| A1 | 0.100 | 0.250 | 0.004 | 0.010 |
| A2 | 1.350 | 1.550 | 0.053 | 0.061 |
| b | 0.330 | 0.510 | 0.013 | 0.020 |
| c | 0.170 | 0.250 | 0.006 | 0.010 |
| D | 4.700 | 5.100 | 0.185 | 0.200 |
| E | 3.800 | 4.000 | 0.150 | 0.157 |
| E1 | 5.800 | 6.200 | 0.228 | 0.244 |
| e | 1.270(BSC) | | 0.050(BSC) | |
| L | 0.400 | 1.270 | 0.016 | 0.050 |
| θ | 0° | 8° | 0° | 8° |

## Marking

TL082C
UMW XXXX
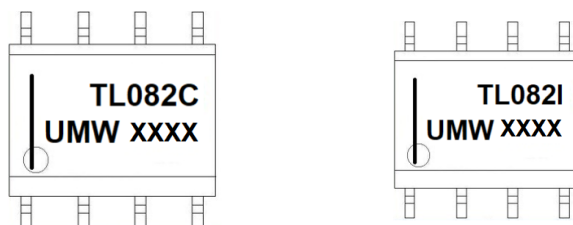
TL082I
UMW XXXX

## Ordering information

| Order code | Package | Baseqty | Deliverymode |
|---|---|---|---|
| UMW TL082CDR | SOP-8 | 2500 | Tape and reel |
| UMW TL082IDR | SOP-8 | 2500 | Tape and reel |