



TL082

LINEAR INTEGRATED CIRCUIT

GENERAL PURPOSE DUAL J-FET OPERATIONAL AMPLIFIER

DESCRIPTION

The UTC **TL082** is a high speed J-FET input dual operational amplifier. It incorporates well matched, high voltage J-FET and bipolar transistors in a monolithic integrated circuit.

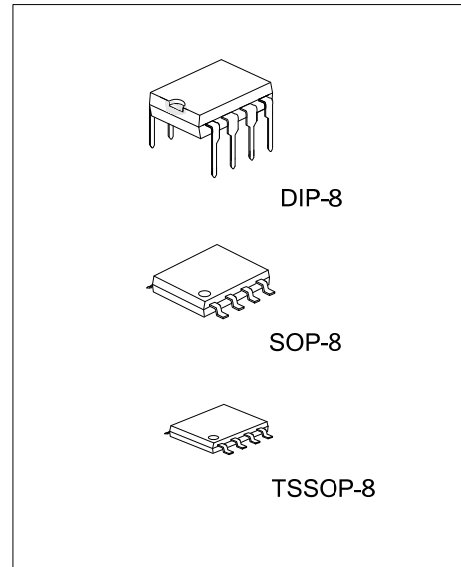
The device features high slew rates, low input bias and offset current, and low offset voltage temperature coefficient.

FEATURES

- * Low input bias and offset current
- * Wide common-mode (up to V_{CC}^+) and differential voltage range
- * Output short-circuit protection
- * High input impedance J-FET input stage
- * Internal frequency compensation
- * Latch up free operation
- * High slewrate: 16V/ μ s(typ.)

ORDERING INFORMATION

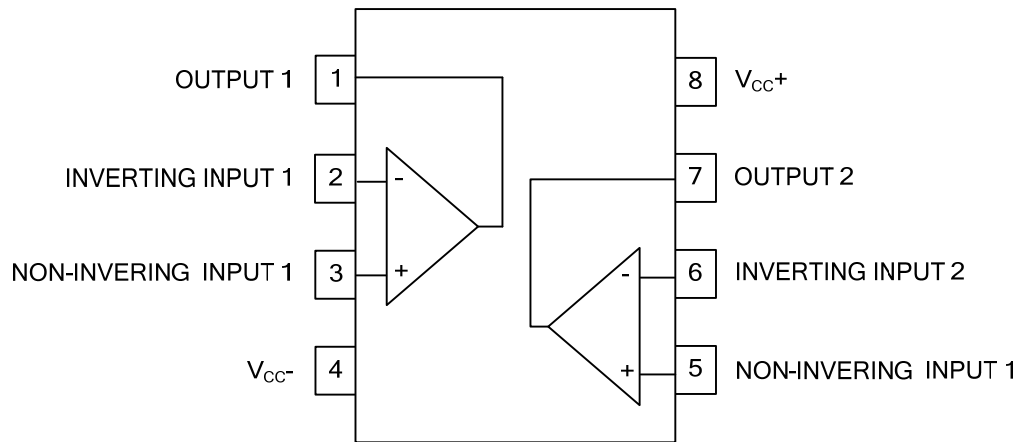
| Ordering Number | | | Package | Packing |
|-----------------|-------------------|--------------|---------|-----------|
| Normal | Lead Free Plating | Halogen Free | | |
| TL082-D08-T | TL082L-D08-T | TL082G-D08-T | DIP-8 | Tube |
| TL082-P08-R | TL082L-P08-R | TL082G-P08-R | TSSOP-8 | Tape Reel |
| TL082-S08-R | TL082L-S08-R | TL082G-S08-R | SOP-8 | Tape Reel |



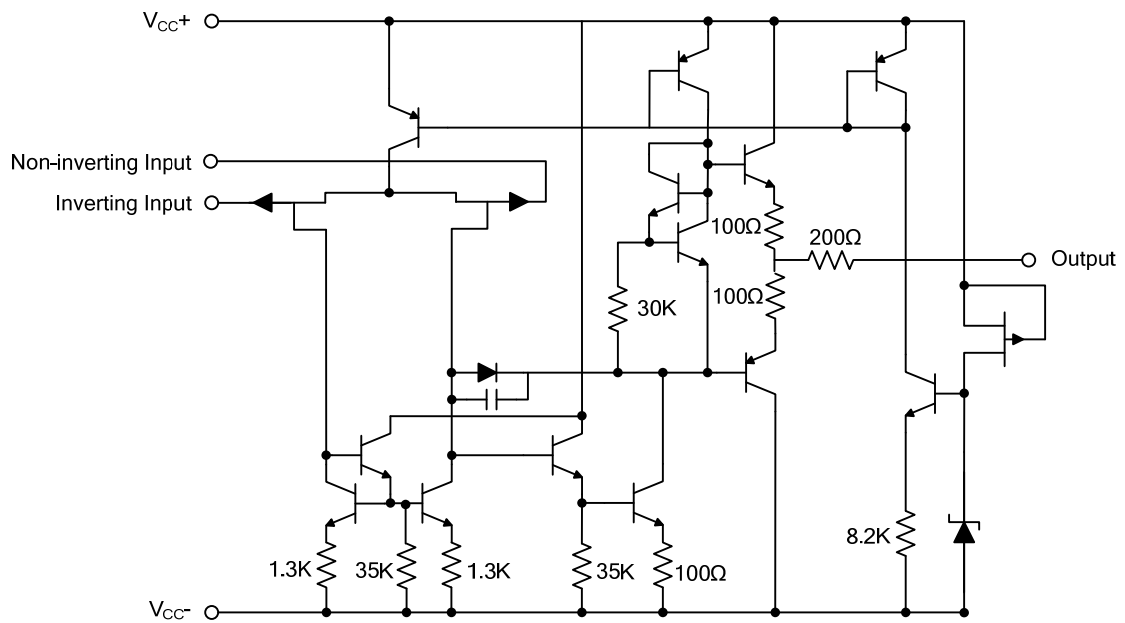
Lead-free: TL082L
Halogen-free: TL082G

| | |
|---|---|
| <p>TL082L-D08-T</p> <p>(1) Packing Type (2) Package Type (3) Lead Plating</p> | <p>(1) T: Tube, R: Tape Reel (2) D08: DIP-8, P08: TSSOP-8, S08: SOP-8 (3) G: Halogen Free, L: Lead Free, Blank: Pb/Sn</p> |
|---|---|

■ PIN CONFIGURATION



■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING (Ta=25°C)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|--|------------------|------------|------|
| Supply Voltage (Note 2) | V _{CC} | ±18 | V |
| Input Voltage (Note 3) | V _{IN} | ±15 | V |
| Differential Input Voltage (Note 4) | V _{ID} | ±30 | V |
| Power Dissipation | P _D | 680 | mW |
| Output Short-Circuit Duration (Note 5) | | Infinite | |
| Operating Temperature | T _{OPR} | -20 ~ +85 | °C |
| Storage Temperature Range | T _{STG} | -65 ~ +150 | °C |

Note: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

- All voltage values, except differential voltage, are with respect to the zero reference level (ground) of the supply voltages where the zero reference level is the midpoint between V_{CC-} and V_{CC+}.
- The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 volts, whichever is less.
- Differential voltages are at the non-inverting input terminal with respect to the inverting input terminal.
- The output may be shorted to ground or to either supply. Temperature and/or supply voltages must be limited to ensure that the dissipation rating is not exceeded.

■ THERMAL DATA

| PARAMETER | SYMBOL | RATINGS | UNIT |
|---------------------|---------|---------|------|
| Junction to Ambient | SOP-8 | 125 | °C/W |
| | DIP-8 | 85 | °C/W |
| | TSSOP-8 | 120 | °C/W |
| Junction to Case | SOP-8 | 40 | °C/W |
| | DIP-8 | 41 | °C/W |
| | TSSOP-8 | 37 | °C/W |

■ ELECTRICAL CHARACTERISTICS

(V_{CC}=±15V, Ta=25°C, T_{MIN}=0°C, T_{MAX}=70°C, unless otherwise specified)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|-------------------|---|-----|------------------|-----|-------|
| Input Offset Voltage (R _S =50Ω) | V _{IO} | T _a =25°C | | 3 | 10 | mV |
| | | T _{MIN} ≤ T _a ≤ T _{MAX} | | | 13 | |
| Input Offset Voltage Drift | D _{VIO} | | | 10 | | μV/°C |
| Input Offset Current (Note) | I _{IO} | T _a =25°C | | 5 | 100 | pA |
| | | T _{MIN} ≤ T _a ≤ T _{MAX} | | | 10 | nA |
| Input Bias Current (Note) | I _{IB} | T _a =25°C | | 20 | 400 | pA |
| | | T _{MIN} ≤ T _a ≤ T _{MAX} | | | 20 | nA |
| Input Common Mode Voltage Range | V _{ICM} | | ±11 | -12~+15 | | V |
| Output Voltage Swing | ±V _{OPP} | T _a =25°C, R _L =2kΩ, | 10 | 12 | | V |
| | | T _a =25°C, R _L =10kΩ | 12 | 13.5 | | V |
| | | T _{MIN} ≤ T _a ≤ T _{MAX} , R _L =2kΩ | 10 | | | V |
| | | T _{MIN} ≤ T _a ≤ T _{MAX} , R _L =10kΩ | 12 | | | V |
| Large Signal Voltage Gain (R _L =2kΩ, V _{OUT} =±10V) | A _{vd} | T _a =25°C | 25 | 200 | | V/mV |
| | | T _{MIN} ≤ T _a ≤ T _{MAX} | 15 | | | |
| Gain Bandwidth Product (Ta=25°C) | GBP | V _{IN} =10mV, R _L =2kΩ, C _L =100pF, f=100kHz | 2.5 | 4 | | MHz |
| Input Resistance | R _i | | | 10 ¹² | | Ω |
| Common Mode Rejection Ratio (R _S =50Ω) | CMR | T _a =25°C | 70 | 86 | | dB |
| | | T _{MIN} ≤ T _a ≤ T _{MAX} | 70 | | | |
| Supply Voltage Rejection Ratio (R _S =50Ω) | SVR | T _a =25°C | 70 | 86 | | dB |
| | | T _{MIN} ≤ T _a ≤ T _{MAX} | 70 | | | |

■ ELECTRICAL CHARACTERISTICS (Cont.)

| PARAMETER | SYMBOL | TEST CONDITIONS | MIN | TYP | MAX | UNIT |
|---|-----------------|---|-----|------|-----|--------------------------------------|
| Supply Current, No Load | I_{CC} | $T_a=25^\circ\text{C}$ | | 3.6 | 5.6 | mA |
| Channel Separation ($A_v=100$, $T_a=25^\circ\text{C}$) | V_{01}/V_{02} | | | 120 | | dB |
| Output Short-Circuit Current | I_{OS} | $T_a=25^\circ\text{C}$ | 10 | 40 | 60 | mA |
| | | $T_{MIN} \leq T_a \leq T_{MAX}$ | 10 | | 60 | mA |
| Slew Rate ($T_a=25^\circ\text{C}$) | SR | $V_{IN}=10\text{V}$, $R_L=2\text{k}\Omega$ $C_L=100\text{pF}$, unity gain | 8 | 16 | | V/ μs |
| Rise Time ($T_a=25^\circ\text{C}$) | t_R | $V_{IN}=20\text{mV}$, $R_L=2\text{k}\Omega$ $C_L=100\text{pF}$, unity gain | | 0.1 | | μs |
| Overshoot ($T_a=25^\circ\text{C}$) | K_{OV} | $V_{IN}=20\text{mV}$, $R_L=2\text{k}\Omega$ $C_L=100\text{pF}$, unity gain | | 10 | | % |
| Total Harmonic Distortion ($T_a=25^\circ\text{C}$) | THD | $A_v=20\text{dB}$, $f=1\text{kHz}$, $R_L=2\text{k}\Omega$, $C_L=100\text{pF}$, $V_{OUT}=2\text{Vpp}$) | | 0.01 | | % |
| Phase Margin | Φ_m | | | 45 | | Degrees |
| Equivalent Input Noise Voltage ($R_S=100\Omega$, $f=1\text{KHz}$) | eN | | | 15 | | $\frac{\text{nV}}{\sqrt{\text{Hz}}}$ |

Note: The Input bias currents are junction leakage currents, which approximately double for every 10°C increase in the junction temperature.

■ PARAMETER MEASUREMENT INFORMATION

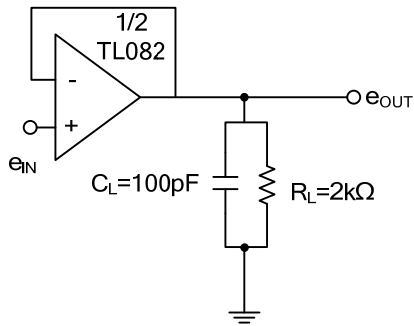


Figure 1. Voltage Follower

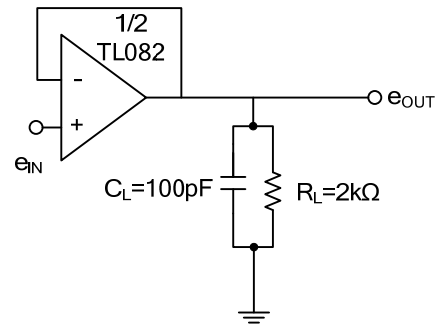
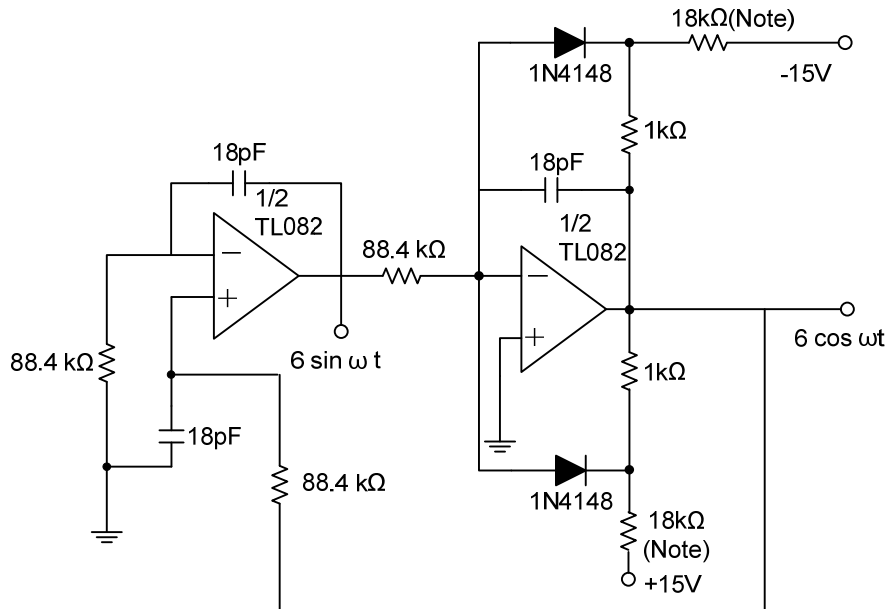


Figure 2. Gain-of-10 Inverting Amplifier

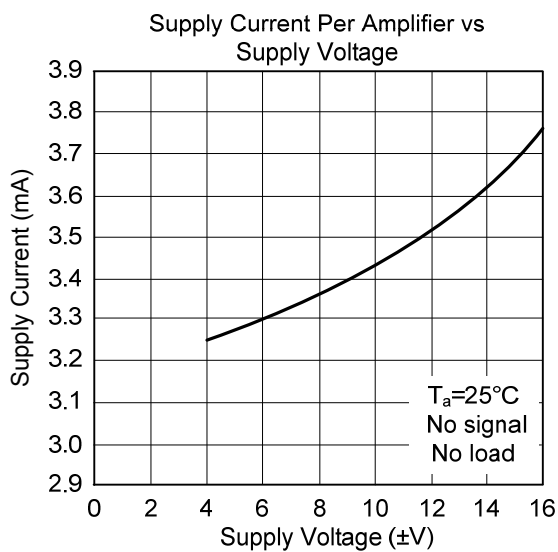
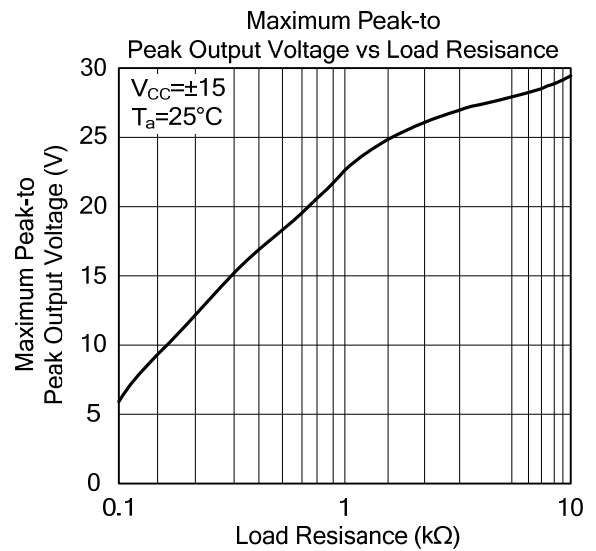
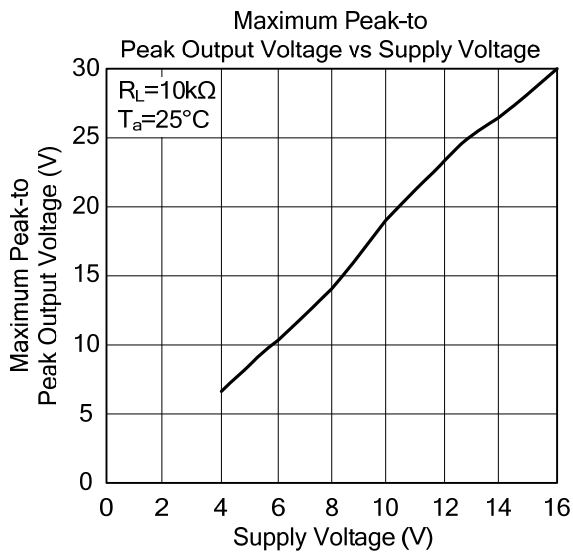
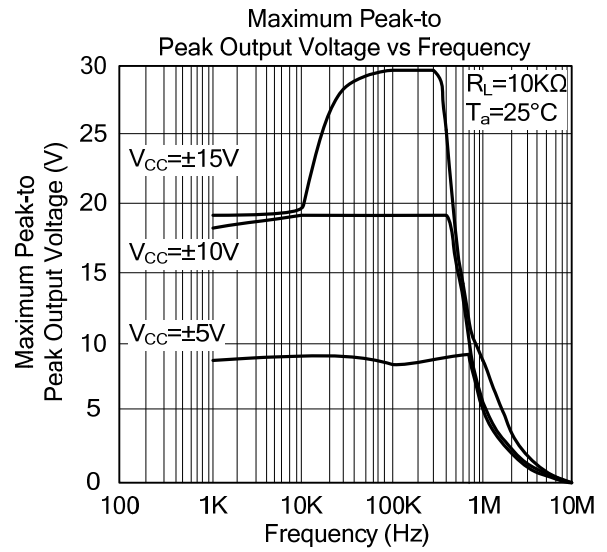
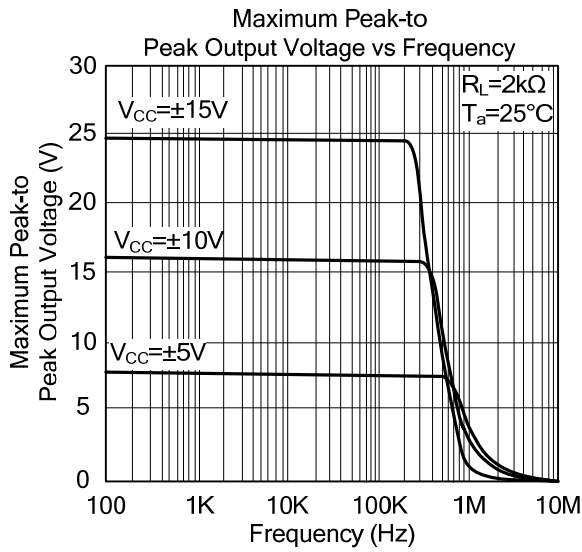
■ TYPICAL APPLICATION CIRCUIT

100 KHz Quadruple Oscillators



Note: These resistors values may be adjusted for a symmetrical output

■ TYPICAL CHARACTERISTICS



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