

LM 101A, 201A, 301A, General Purpose Operational Amplifiers

GENERAL DESCRIPTION

The 101A and 301A are General Purpose monolithic Operational Amplifiers constructed using the Fairchild Planar epitaxial process. These integrated circuits are intended for applications requiring low input offset voltage or low input offset current. The accuracy of long interval integrators, timers and sample and hold circuits is improved due to the low drift and low bias currents of the 101A and 301A. Frequency response may be matched to the individual circuit need with one external capacitor. The absence of "latch-up" coupled with internal short circuit protection make the 101A, 201A and 301A virtually foolproof. The 101A, 301A are pin compatible with the popular μ A709, μ A741, μ A748 and μ A777.

FEATURES

- Low offset current and voltage.
- Low offset current drift.
- Low bias current.
- Short circuit protected.
- Low power consumption.

ABSOLUTE MAXIMUM RATINGS

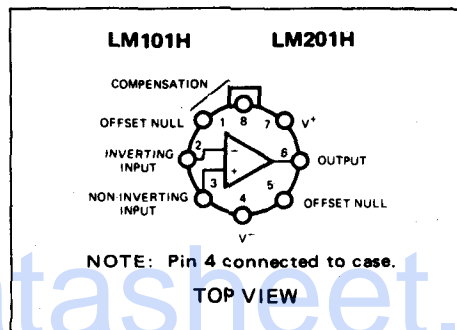
| | |
|-------------------------------|-----------------|
| Supply Voltage | |
| Military (101A) | $\pm 22V$ |
| Commercial (301A) | $\pm 18V$ |
| Internal Power Dissipation | |
| Metal Can | 500 mW |
| DIP | 670 mW |
| Mini DIP | 310 mW |
| Differential Input Voltage | $\pm 30V$ |
| Input Voltage | $\pm 15V$ |
| Storage Temperature Range | |
| Metal Can, DIP | -65°C to +150°C |
| Mini DIP | -55°C to +125°C |
| Operating Temperature Range | |
| Military (101A) | -55°C to +125°C |
| Commercial (301A) | 0°C to +70°C |
| Lead Temperature (Soldering) | |
| Metal Can, DIP (60 seconds) | 300°C |
| Mini DIP (10 seconds) | 260°C |
| Output Short Circuit Duration | Indefinite |

REFERENCE TABLE

| Code | Stock No. |
|---------|-----------|
| LM101AD | 35800B |
| LM101AH | 35801X |
| LM301AH | 35802R |
| LM301AN | 35803G |

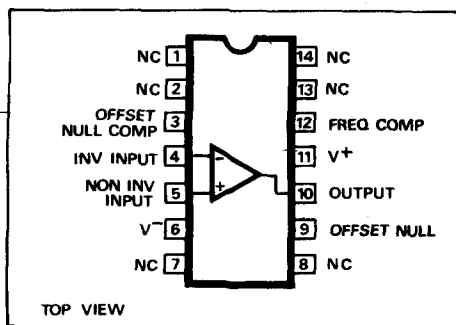
CONNECTION DIAGRAM

See outline drawing No 97 for dimensions.



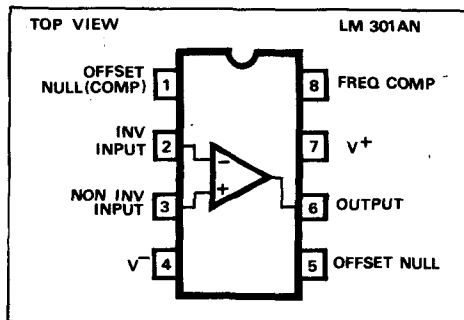
CONNECTION DIAGRAM

See outline drawing No 131 for dimensions.



CONNECTION DIAGRAM

See outline drawing No 132 for dimensions.



LM301A Series Operational Amplifiers

REFERENCE TABLE

| Code | Stock No. |
|---------|-----------|
| LM301AH | 19661C |
| LM301AN | 19752H |

GENERAL DESCRIPTION

The LM301A is a general-purpose operational amplifier which features improved performance over the 709C and other popular amplifiers. Advanced processing techniques make possible an order of magnitude reduction in input currents, and a redesign of the biasing circuitry reduces the temperature drift of input current.

This amplifier offers many features which make its application nearly foolproof: overload protection on the input and output, no latch-up when the common mode range is exceeded, freedom from oscillations and compensation with a single 30pF capacitor. It has advantages over internally compensated amplifiers in that the compensation can be tailored to the particular application. For example, as a summing amplifier, slew rates of 10 V/ μ s and bandwidths of 10 MHz can be realised. In addition, the circuit can be used as a comparator with differential inputs up to ± 30 V; and the output can be clamped at any desired level

to make it compatible with logic circuits.

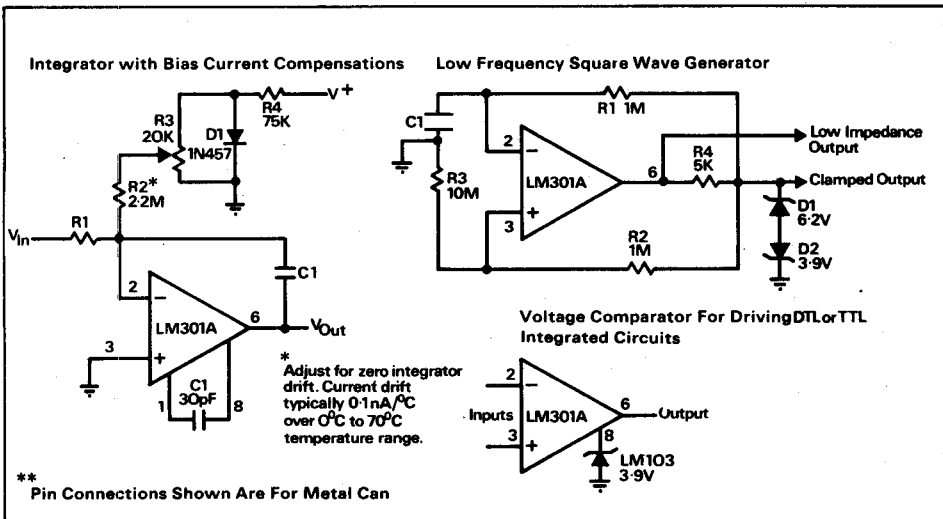
The LM301A provides better accuracy and lower noise than its predecessors in high impedance circuitry. The low input currents also make it particularly well suited for long interval integrators or timers, sample and hold circuits and low frequency waveform generators. Further, replacing circuits where matched transistor pairs buffer the inputs of conventional IC op amps, it can give lower offset voltage and drift at reduced cost.

ABSOLUTE MAXIMUM RATINGS

| | |
|--|----------------|
| Supply Voltage | ± 18 V |
| Power Dissipation (Note 1) | 500mW |
| Differential Input Voltage | ± 30 V |
| Input Voltage (Note 2) | ± 15 V |
| Output Short-Circuit Duration (Note 3) | Indefinite |
| Operating Temperature Range | 0°C to 70°C |
| Storage Temperature Range | -65°C to 150°C |
| Lead Temperature (Soldering, 60 sec) | 300°C |

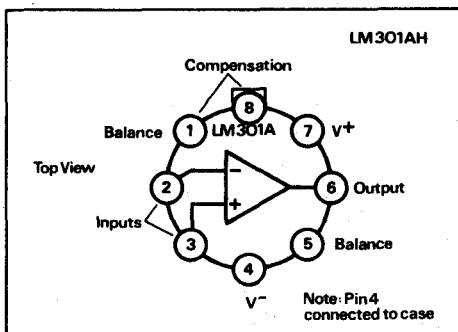
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TYPICAL APPLICATIONS* *

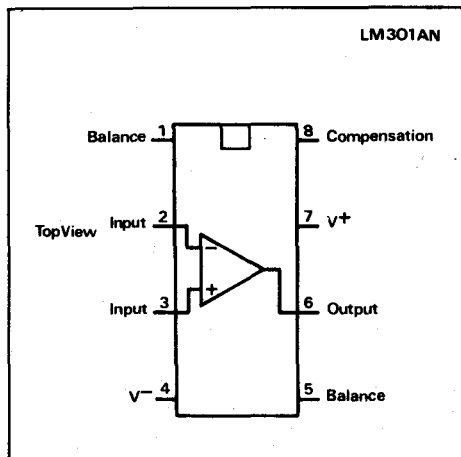


PLEASE QUOTE STOCK NO. AND MANUFACTURER'S CODE WHEN ORDERING

CONNECTION DIAGRAMS



See outline drawing No. 97 for dimensions.



See outline drawing No. 103 for dimensions.

ELECTRICAL CHARACTERISTICS (Note 4)

| Parameter | Conditions | Min. | Typ. | Max. | Units |
|---|---|----------------------|----------------------|------------|--|
| Input Offset Voltage | $T_A = 25^\circ\text{C}$, $R_S \leq 50\text{ k}\Omega$ | | 2.0 | 7.5 | mV |
| Input Offset Current | $T_A = 25^\circ\text{C}$ | | 3 | 50 | nA |
| Input Bias Current | $T_A = 25^\circ\text{C}$ | | 70 | 250 | nA |
| Input Resistance | $T_A = 25^\circ\text{C}$ | | 2 | | M Ω |
| Supply Current | $T_A = 25^\circ\text{C}$, $V_S = \pm 15\text{V}$ | 0.5 | 1.8 | 3.0 | mA |
| Large Signal Voltage Gain | $T_A = 25^\circ\text{C}$, $V_S = \pm 15\text{V}$ $V_{OUT} = \pm 10\text{V}$, $R_L \geq 2\text{ k}\Omega$ | 25 | 160 | | V/mV |
| Input Offset Voltage | $R_S \leq 50\text{ k}\Omega$ | | | 10 | mV |
| Average Temperature Coefficient of Input Offset Voltage | | | 6.0 | 30 | $\mu\text{V}/^\circ\text{C}$ |
| Input Offset Current | | | | 70 | nA |
| Average Temperature Coefficient of Input Offset Current | $25^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$ $0^\circ\text{C} \leq T_A \leq 25^\circ\text{C}$ | | 0.01 0.02 | 0.3 0.6 | nA/ $^\circ\text{C}$ nA/ $^\circ\text{C}$ |
| Input Bias Current | | | | 300 | nA |
| Large Signal Voltage Gain | $V_S = \pm 15\text{V}$, $V_{OUT} = \pm 10\text{V}$ $R_L \geq 2\text{ k}\Omega$ | 15 | | | V/mV |
| Output Voltage Swing | $V_S = \pm 15\text{V}$, $R_L = 10\text{ k}\Omega$ $R_L = 2\text{ k}\Omega$ | ± 12 ± 10 | ± 14 ± 13 | | V V |
| Input Voltage Range | $V_S = \pm 15\text{V}$ | ± 12 | | | V |
| Common Mode Rejection Ratio | $R_S \leq 50\text{ k}\Omega$ | 70 | 90 | | dB |
| Supply Voltage Rejection Ratio | $R_S \leq 50\text{ k}\Omega$ | 70 | 96 | | dB |

Note 1: For operating at elevated temperatures, the device must be derated based on a 100°C maximum junction temperature and a thermal resistance of $150^\circ\text{C}/\text{W}$ junction to ambient or $45^\circ\text{C}/\text{W}$ junction to case.

Note 2: For supply voltages less than $\pm 15\text{V}$, the absolute maximum input voltage is equal to the supply voltage.

Note 3: Continuous short circuit is allowed for case temperatures to 70°C and ambient temperatures to 55°C .

Note 4: These specifications apply for $0^\circ\text{C} \leq T_A \leq 70^\circ\text{C}$, $\pm 5\text{V} \leq V_S \leq \pm 15\text{V}$ and C_1 30pF unless otherwise specified.

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