Operational Amplifiers

LM307 operational amplifier

general description

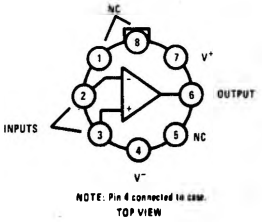
The LM307 is a complete, general purpose operational amplifier, with the necessary frequency compensation built into the chip. Advanced processing techniques make the input currents a factor of ten lower than industry standards like the 709C. Yet, it is a direct, plug-in replacement for the 709C, LM201, MC1439 and 741 in most applications.

In addition to reduced input current, the offset voltage and offset current are guaranteed over the entire common mode range and maximum drift specifications are given. The amplifier also 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, as well as freedom from oscillations.

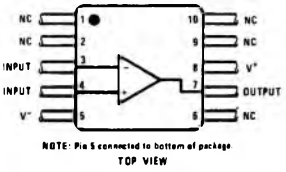
The LM307 provides better accuracy and lower noise than its predecessors in high impedance circuitry. The low input currents also make it particularly well suited for long interval integrators or timers, sample and hold circuits and low frequency waveform generators. Further, replacing circuits where matched transistor pairs buffer the inputs of conventional IC op amps, it can give lower offset voltage and drift at reduced cost.

connection diagrams

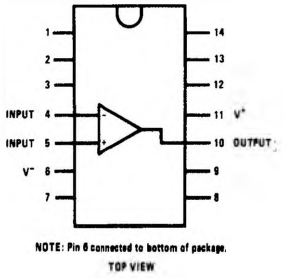
Metal Can



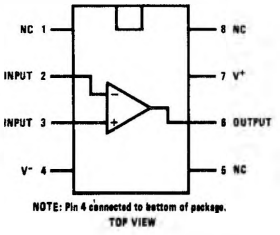
Flat Package



Cavity Dual-In-Line Package

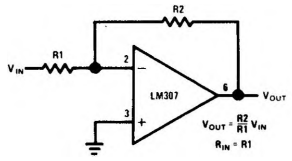


Molded Dual-In-Line Package

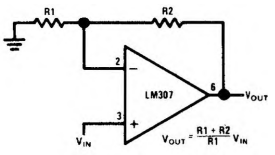


typical applications

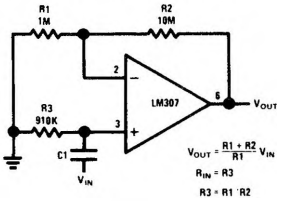
Inverting Amplifier



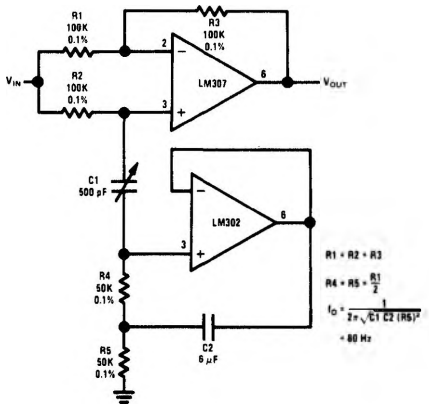
Non-Inverting Amplifier



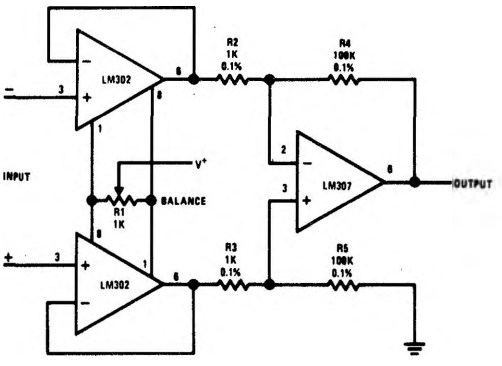
Non-Inverting AC Amplifier



Tunable Notch Filter



Differential Input Instrumentation Amplifier



absolute maximum ratings

Supply Voltage	±18V
Power Dissipation (Note 1)	500 mW
Differential Input Voltage	±30V
Input Voltage (Note 2)	±15V
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

electrical characteristics (Note 4)

PARAMETER	CONDITIONS	MIN	TYP	MAX	UNITS
Input Offset Voltage	$T_A = 25°C$, $R_S \leq 50\ k\Omega$		2.0	7.5	mV
Input Offset Current	$T_A = 25°C$		3	50	nA
Input Bias Current	$T_A = 25°C$		70	250	nA
Input Resistance	$T_A = 25°C$	0.5	2		MΩ
Supply Current	$T_A = 25°C$, $V_S = \pm 15V$		1.8	3.0	mA
Large Signal Voltage Gain	$T_A = 25°C$, $V_S = \pm 15V$ $V_{OUT} = \pm 10V$, $R_L \geq 2\ k\Omega$	25	160		V/mV
Input Offset Voltage	$R_S \leq 50\ k\Omega$			10	mV
Average Temperature Coefficient of Input Offset Voltage			6.0	30	μV/°C
Input Offset Current				70	nA
Average Temperature Coefficient of Input Offset Current	$25°C \leq T_A \leq 70°C$ $0°C \leq T_A \leq 25°C$		0.01 0.02	0.3 0.6	nA/°C nA/°C
Input Bias Current				300	nA
Large Signal Voltage Gain	$V_S = \pm 15V$, $V_{OUT} = \pm 10V$ $R_L \geq 2\ k\Omega$	15			V/mV
Output Voltage Swing	$V_S = \pm 15V$, $R_L = 10\ k\Omega$ $R_L = 2\ k\Omega$	±12 ±10	±14 ±13		V V
Input Voltage Range	$V_S = \pm 15V$	±12			V
Common Mode Rejection Ratio	$R_S \leq 50\ k\Omega$	70	90		dB
Supply Voltage Rejection Ratio	$R_S \leq 50\ k\Omega$	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°C/W junction to ambient or 45°C/W junction to case.

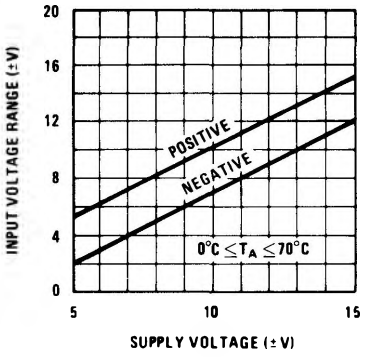
Note 2: For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

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

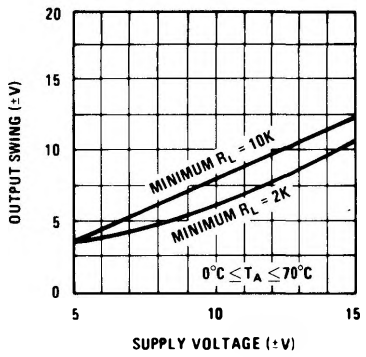
Note 4: The specifications apply for $0°C \leq T_A \leq 70°C$ and $\pm 5V \leq V_S \leq \pm 15V$, unless otherwise specified.

guaranteed performance

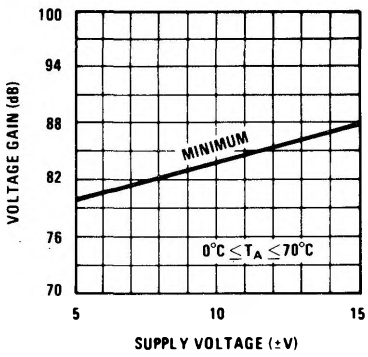
Input Voltage Range



Output Swing

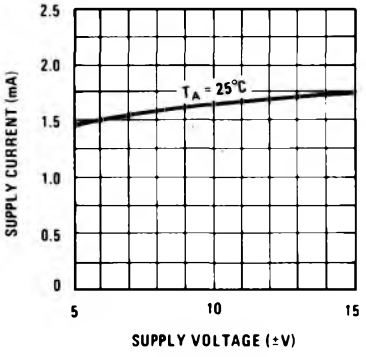


Voltage Gain

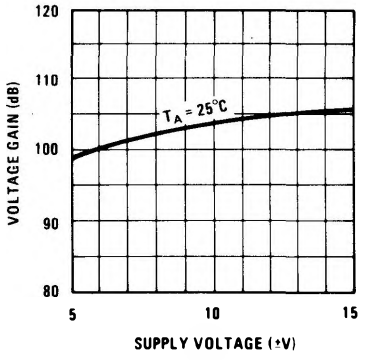


typical performance

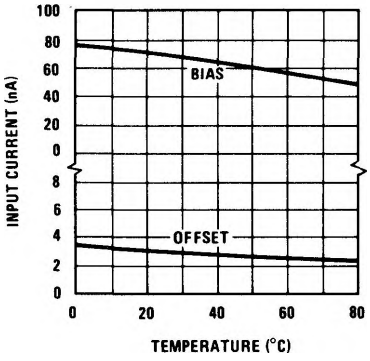
Supply Current



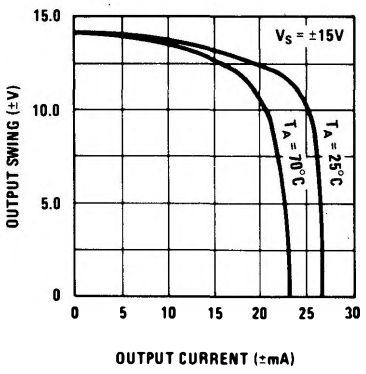
Voltage Gain



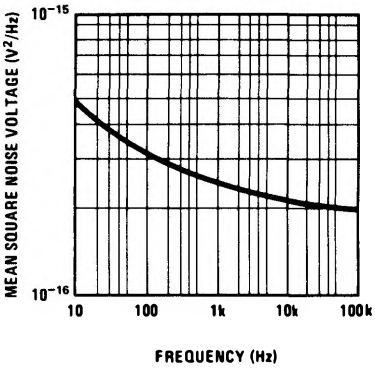
Input Current



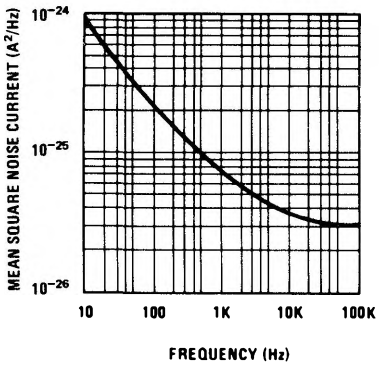
Current Limiting



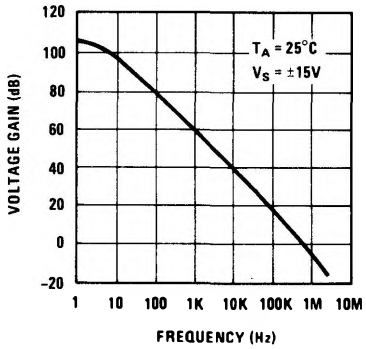
Input Noise Voltage



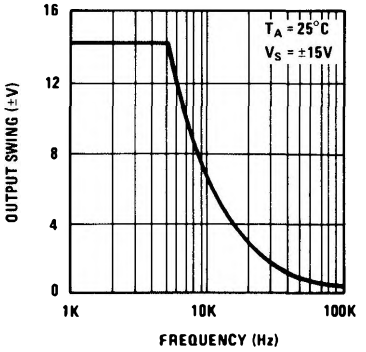
Input Noise Current



Open Loop
Frequency Response



Large Signal
Frequency Response



Voltage Follower
Pulse Response