

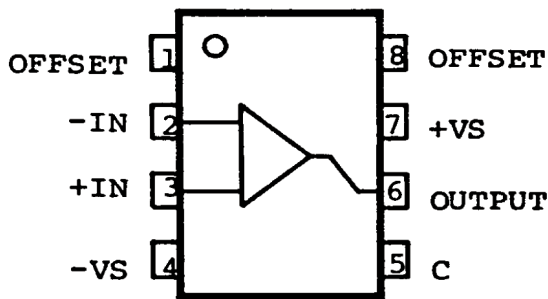
FEATURES

3.5nV//Hz INPUT NOISE VOLTAGE
 ± 20 V/ μ S SLEW RATE
 50 MHz GAIN-BANDWIDTH PRODUCT
 600 μ V UNTRIMMED OFFSET VOLTAGE
 ± 40 mA OUTPUT LOAD CURRENT

APPLICATIONS

AUDIO AMPLIFIERS
 DATA ACQUISITION AMPLIFIERS
 ACTIVE FILTERS
 PRECISION LINE DRIVER

FUNCTIONAL DIAGRAM



Order Part Number MA-322-CP
 Epoxy Molded 8-pin mini-DIP

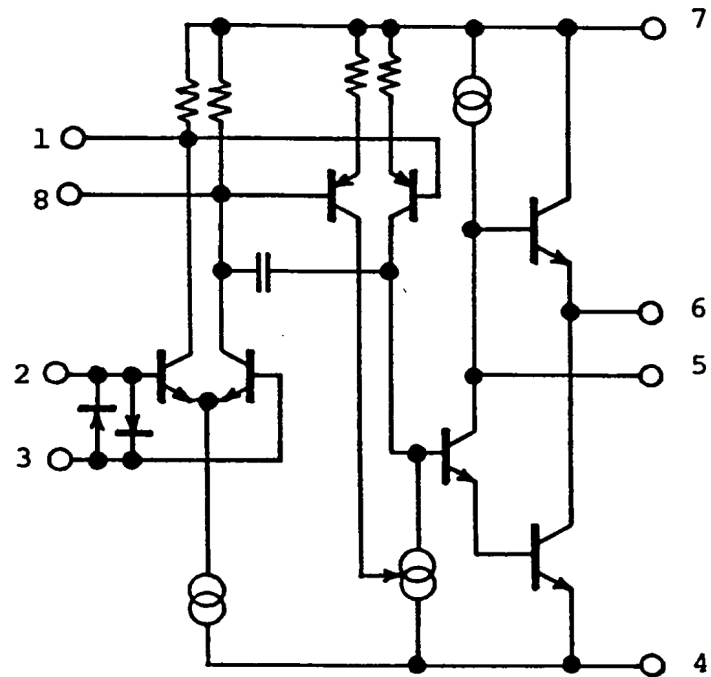
GENERAL DESCRIPTION

MA-322 is a differential bipolar input operational amplifier with a low noise input stage. Other unique areas include wide bandwidth with unity gain stability and moderately high output drive capability.

Input anti-parallel diodes are used to protect the input stage devices and prevent reverse breakdown of the base junction - an occurrence which would cause the low noise input characteristics to deteriorate.

Pin 5 is brought out to allow over-compensation for lowest noise possible under capacitive load, capacitive source or integrator applications. A 33pF capacitor is connected from pin 5 to pin 8 for these applications.

SIMPLIFIED SCHEMATIC



ELECTRICAL CHARACTERISTICS

ABSOLUTE MAXIMUM RATINGS

Supply Voltage (Between +VS and -VS terminals)	40 Volts
Differential Input Voltage	0.5 Volt
Common Mode Input Voltage	$\pm V$ Supply
Power Dissipation	500 Milliwatts
Operating Temperature Range	-55°C to +75°C
Storage Temperature Range	-65°C to +150°C
Lead Temperature (Soldering, 10 seconds)	+300°C

SPECIFICATIONS, $\pm V_S = 15V$, +25°C

INPUT

Noise Voltage ¹	Typical	3.5nV/ \sqrt{Hz}
	Maximum	5.0nV/ \sqrt{Hz}
Noise Current ¹	Typical	0.5pA/ \sqrt{Hz}
	Maximum	1.0pA/ \sqrt{Hz}
Offset Voltage	Maximum	2.0 millivolts
Offset Voltage Drift	Maximum	15uV/°C
Bias Current	Maximum	750nA
Offset Current	Maximum	150nA
Common Mode Voltage	Minimum	± 12 Volts
Common Mode Rejection	Minimum	90dB

OPEN LOOP GAIN at DC

Minimum 94dB

DYNAMIC RESPONSE

Slew Rate	Minimum	$\pm 15V/\mu s$
Gain-Bandwidth Product ²	Minimum	40MHz

OUTPUT

Voltage Swing - no load	Minimum	± 12 Volts
Load Current - ± 10 Volt	Minimum	$\pm 30mA$
Full Power Bandwidth	Minimum	240kHz

POWER SUPPLY

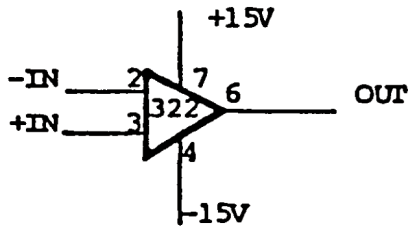
Current	Maximum	$\pm 7mA$
Minimum Voltage		$\pm 2.5V$

- NOTES: 1. Noise Voltage and Current are measured with a bandwidth of 300Hz to 10kHz.
2. Gain-Bandwidth Product is measured at closed loop gain of 100X (40dB).

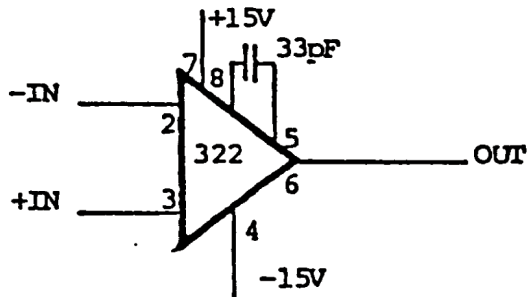
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TYPICAL CIRCUITS AND APPLICATIONS

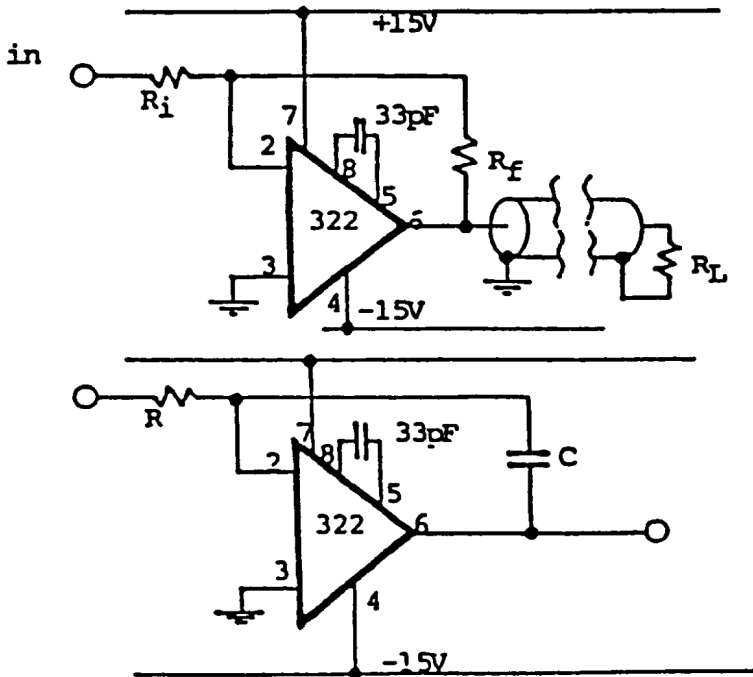
Although the MA-322 is internally compensated, there is an optional external capacitor used for over-compensation under certain conditions. The basic connections:



The optional capacitor is connected between pins 5 and 8. A typical value is 33pF.

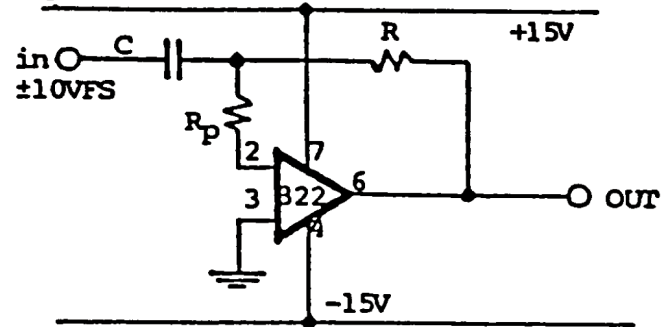


Over-compensation is suggested when MA-322 drives a capacitive load, such as a long cable, or when it is used as an integrator. Two such examples are shown below:



When used with active filters, over-compensation is recommended.

Input current should be limited when overdrive is a possibility. Because protection diodes are used between the differential inputs, excess currents can flow in differentiator and comparator applications. Protection can simply be a resistor in series with one or both inputs.



In the above circuit, R_p is 2k, which limits input current to 5mA, but has no significant effect on circuit operation.

DC offset voltage is nulled with an external potentiometer, as shown. Leads to pins 1 and 8 should be short, because they serve as actual connections to the collectors of the first stage. The use of a resistive trimmer, located within one inch of the MA-322, and away from digital or other switching signal lines is suggested.

