



Operational Amplifiers

LH201 operational amplifier general description

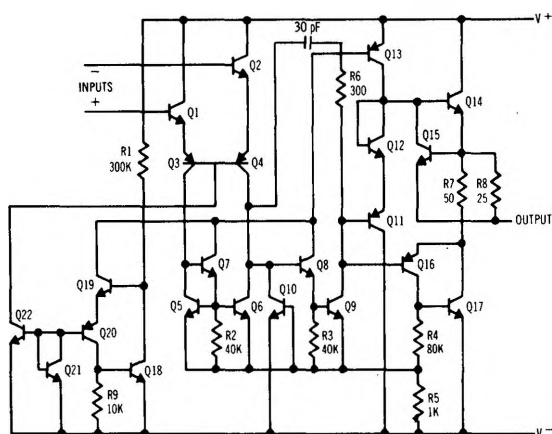
The LH201 is a general-purpose operational amplifier which is internally compensated for unity-gain feedback. The device combines a LM201 operational amplifier and the 30 pF compensation capacitor in a single package. As such, it is a direct, plug-in replacement for both the LM201 and the LM709C in the majority of applications. It is identical to the LH101 except that operation is specified over a 0 to 70°C temperature range. Features of the amplifier include:

- Operation guaranteed for supply voltages from $\pm 5\text{V}$ to $\pm 20\text{V}$

- Low current drain — even with the output saturated
- No latch-up when common-mode range is exceeded
- Continuous short-circuit protection
- Input transistors protected from excessive input voltage.

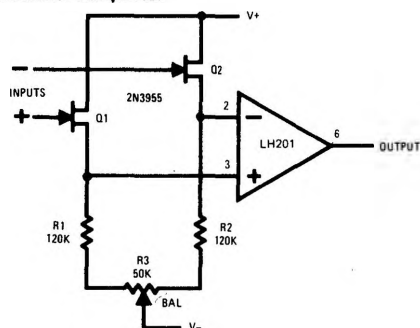
The LH201 is available in either an 8-lead, low-profile TO-5 header or a $1/4'' \times 1/4''$ metal flat package.

schematic and connection diagrams

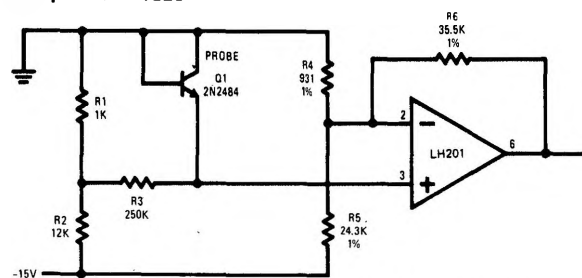


typical applications**

FET Operational Amplifier

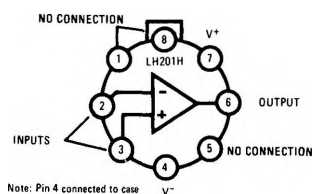


Temperature Probe

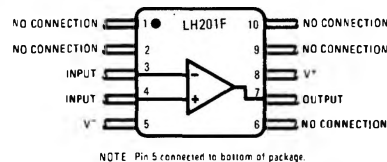


**Pin connections shown are for metal-can package.

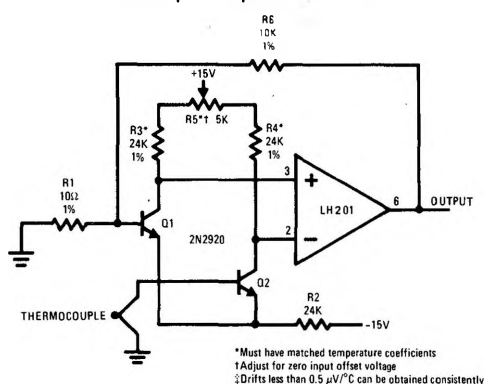
Metal Can



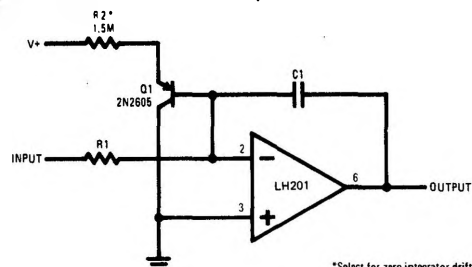
Flat Pack



Low Drift Thermocouple Amplifier†



Integrator with Bias Current Compensation



*Select for zero integrator drift

absolute maximum ratings

Supply Voltage	±22V
Power Dissipation (Note 1)	250 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	$T_A = 25^\circ\text{C}$, $R_S \leq 10\text{k}\Omega$		2.0	7.5	mV
Input Offset Current	$T_A = 25^\circ\text{C}$		100	500	nA
Input Bias Current	$T_A = 25^\circ\text{C}$		0.25	1.5	μA
Input Resistance	$T_A = 25^\circ\text{C}$	150	400		$\text{k}\Omega$
Supply Current	$T_A = 25^\circ\text{C}$, $V_S = \pm 20\text{V}$		1.8	3.0	mA
Large Signal Voltage Gain	$T_A = 25^\circ\text{C}$, $V_S = \pm 15\text{V}$ $V_{\text{OUT}} = \pm 10\text{V}$, $R_L \geq 2\text{k}\Omega$	20	150		V/mV
Input Offset Voltage	$R_S \leq 10\text{k}\Omega$			10	mV
Average Temperature Coefficient of Input Offset Voltage	$R_S \leq 50\Omega$		6		$\mu\text{V}/^\circ\text{C}$
	$R_S \leq 10\text{k}\Omega$		10		$\mu\text{V}/^\circ\text{C}$
Input Offset Current	$T_A = +70^\circ\text{C}$ $T_A = 0^\circ\text{C}$		50 150	400 750	nA nA
Input Bias Current	$T_A = 0^\circ\text{C}$		0.32	2.0	μA
Large Signal Voltage Gain	$V_S = \pm 15\text{V}$, $V_{\text{OUT}} = \pm 10\text{V}$ $R_L \geq 2\text{k}\Omega$	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	$R_S \leq 10\text{k}\Omega$	65	90		dB
Supply Voltage Rejection Ratio	$R_S \leq 10\text{k}\Omega$	70	90		dB

Note 1: For operating at elevated temperatures, the device must be derated based on a 150°C maximum junction temperature and a thermal resistance of 150°C/W junction to ambient or 45°C/W junction to case for the metal-can package. For the flat package, the derating is based on a thermal resistance of 185°C/W when mounted on a 1/16-inch-thick, epoxy-glass board with ten, 0.03-inch-wide, 2-ounce copper conductors (see curve).

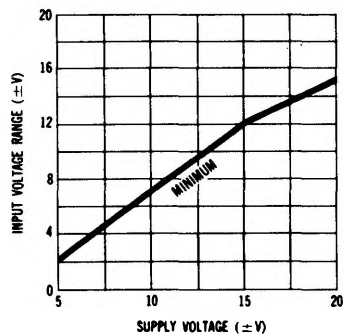
Note 2: For supply voltages less than ±15V, the absolute maximum input voltage is equal to the supply voltage.

Note 3: Continuous short circuit is allowed for case temperatures to +125°C and ambient temperatures to +70°C.

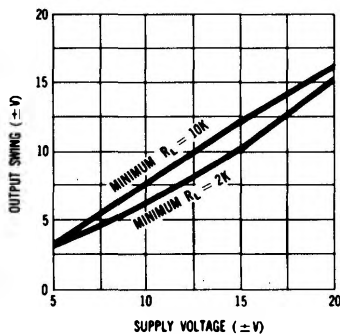
Note 4: These specifications apply for $-55^\circ\text{C} \leq T_A \leq 125^\circ\text{C}$, $\pm 5\text{V} \leq V_S \leq \pm 20\text{V}$ and $C_1 = 30\text{ pF}$ unless otherwise specified.

guaranteed performance

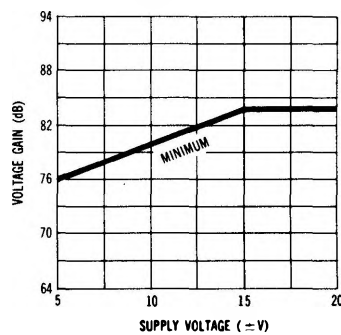
Input Voltage Range



Output Swing

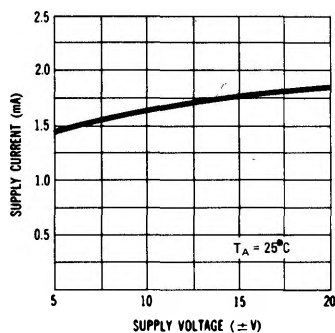


Voltage Gain

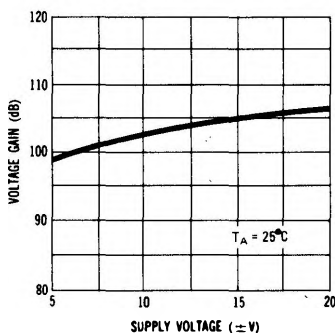


typical performance

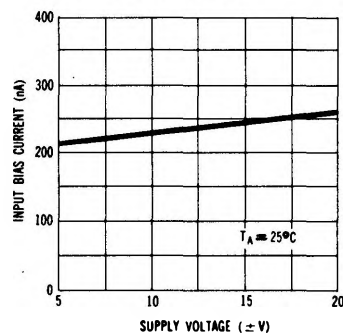
Supply Current



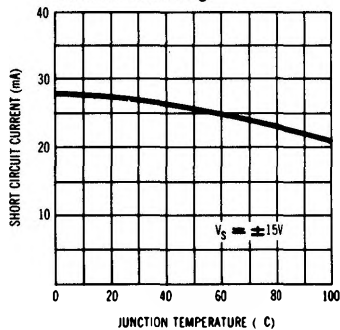
Voltage Gain



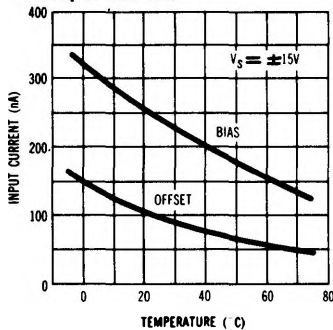
Input Bias Current



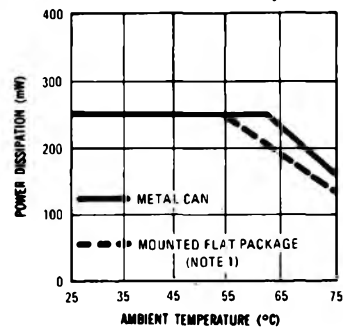
Current Limiting



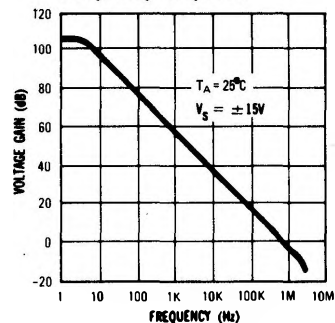
Input Current



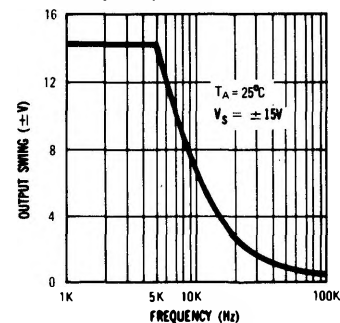
Maximum Power Dissipation



Open Loop Frequency Response



Large Signal Frequency Response



Voltage Follower Pulse Response

