National Semiconductor

February 1995

LM3080
Operational Transconductance Amplifier

General Description

The LM3080 is a programmable transconductance block intended to fulfill a wide variety of variable gain applications. The LM3080 has differential inputs and high impedance push-pull outputs. The device has high input impedance and its transconductance (g_m) is directly proportional to the amplifier bias current (I_{ABC}).

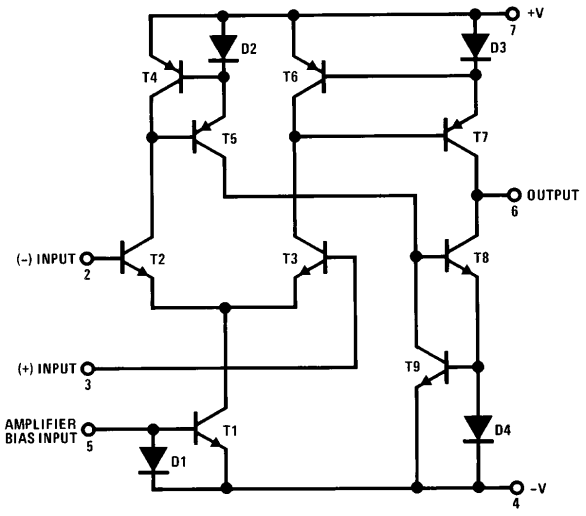
High slew rate together with programmable gain make the LM3080 an ideal choice for variable gain applications such as sample and hold, multiplexing, filtering, and multiplying.

The LM3080N and LM3080AN are guaranteed from 0°C to +70°C.

Features

- Slew rate (unity gain compensated): 50 V/μs
- Fully adjustable gain: 0 to $g_m \bullet R_L$ limit
- Extended g_m linearity: 3 decades
- Flexible supply voltage range: ±2V to ±18V
- Adjustable power consumption

Schematic and Connection Diagrams



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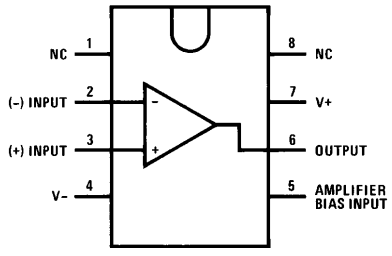
Dual-In-Line Package



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Top View

Order Number LM3080AN, LM3080M or LM3080N
See NS Package Number M08A or N08E

RRD-B30M115/Printed in U. S. A.

Absolute Maximum Ratings

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage (Note 2)	
LM3080	±18V
LM3080A	±22V
Power Dissipation	250 mW
Differential Input Voltage	±5V
Amplifier Bias Current (I_{ABC})	2 mA
DC Input Voltage	$+V_S$ to $-V_S$
Output Short Circuit Duration	Indefinite
Operating Temperature Range	
LM3080N or LM3080AN	0°C to +70°C
Storage Temperature Range	−65°C to +150°C
Lead Temperature (Soldering, 10 sec.)	260°C

Electrical Characteristics (Note 1)

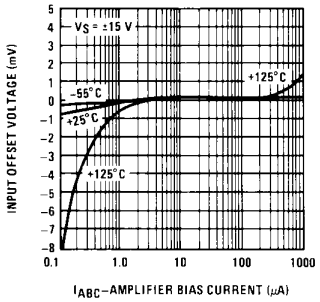
Parameter	Conditions	LM3080			LM3080A			Units
		Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage			0.4	5		0.4	2	mV
	Over Specified Temperature Range			6			5	mV
	I_{ABC} = 5 µA		0.3			0.3	2	mV
Input Offset Voltage Change	5 µA ≤ I_{ABC} ≤ 500 µA		0.1			0.1	3	mV
Input Offset Current			0.1	0.6		0.1	0.6	µA
Input Bias Current			0.4	5		0.4	5	µA
	Over Specified Temperature Range		1	7		1	8	µA
Forward Transconductance (g_m)		6700	9600	13000	7700	9600	12000	µmho
	Over Specified Temperature Range	5400			4000			µmho
Peak Output Current	R_L = 0, I_{ABC} = 5 µA		5		3	5	7	µA
	R_L = 0	350	500	650	350	500	650	µA
	R_L = 0							
	Over Specified Temperature Range	300			300			µA
Peak Output Voltage								
Positive	R_L = ∞, 5 µA ≤ I_{ABC} ≤ 500 µA	+12	+14.2		+12	+14.2		V
Negative	R_L = ∞, 5 µA ≤ I_{ABC} ≤ 500 µA	−12	−14.4		−12	−14.4		V
Amplifier Supply Current			1.1			1.1		mA
Input Offset Voltage Sensitivity								
Positive	$\Delta V_{OFFSET}/\Delta V+$		20	150		20	150	µV/V
Negative	$\Delta V_{OFFSET}/\Delta V-$		20	150		20	150	µV/V
Common Mode Rejection Ratio		80	110		80	110		dB
Common Mode Range		±12	±14		±12	±14		V
Input Resistance		10	26		10	26		kΩ
Magnitude of Leakage Current	I_{ABC} = 0		0.2	100		0.2	5	nA
Differential Input Current	I_{ABC} = 0, Input = ±4V		0.02	100		0.02	5	nA
Open Loop Bandwidth			2			2		MHz
Slew Rate	Unity Gain Compensated		50			50		V/µs

Note 1: These specifications apply for V_S = ±15V and T_A = 25°C, amplifier bias current (I_{ABC}) = 500 µA, unless otherwise specified.

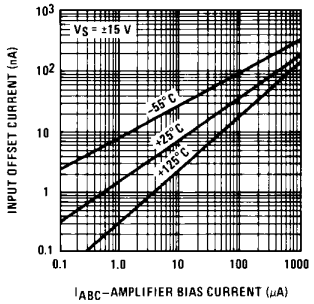
Note 2: Selection to supply voltage above ±22V, contact the factory.

Typical Performance Characteristics

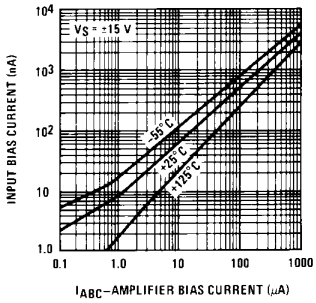
Input Offset Voltage



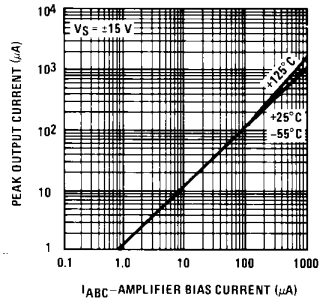
Input Offset Current



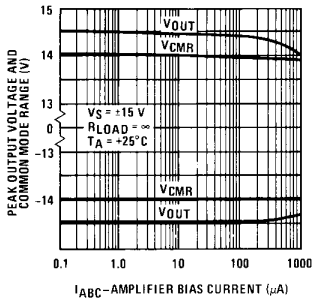
Input Bias Current



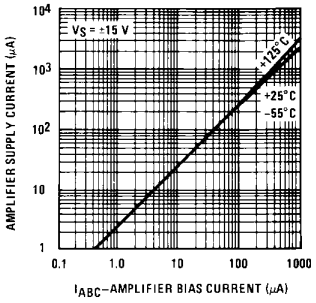
Peak Output Current



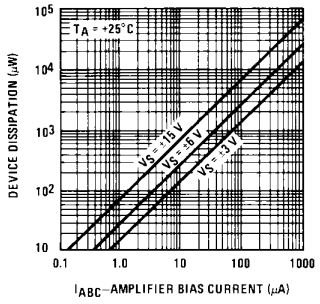
Peak Output Voltage and Common Mode Range



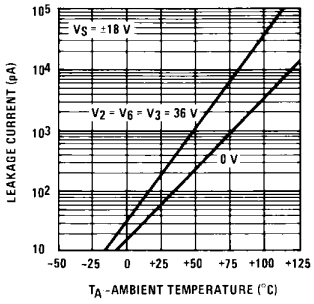
Amplifier Supply Current



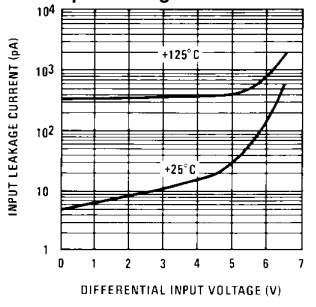
Total Power Dissipation



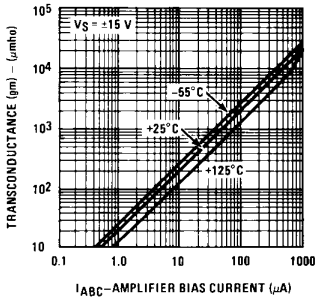
Leakage Current



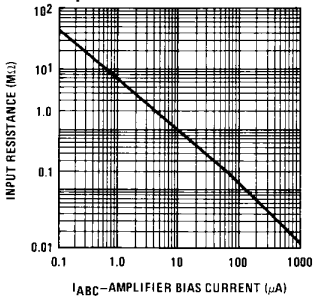
Input Leakage



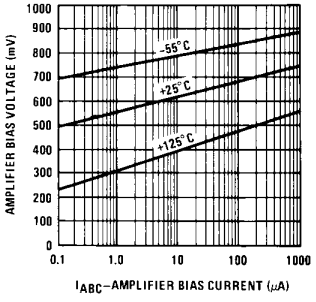
Transconductance



Input Resistance



Amplifier Bias Voltage vs Amplifier Bias Current



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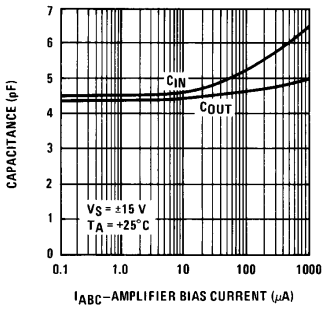
Typical Performance Characteristics (Continued)

Input and Output Capacitance



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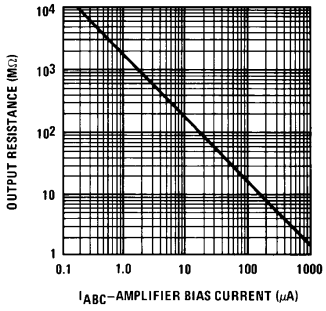
Output Resistance



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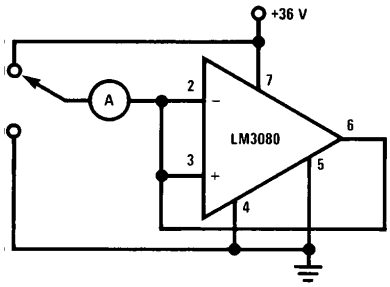
Leakage Current Test Circuit



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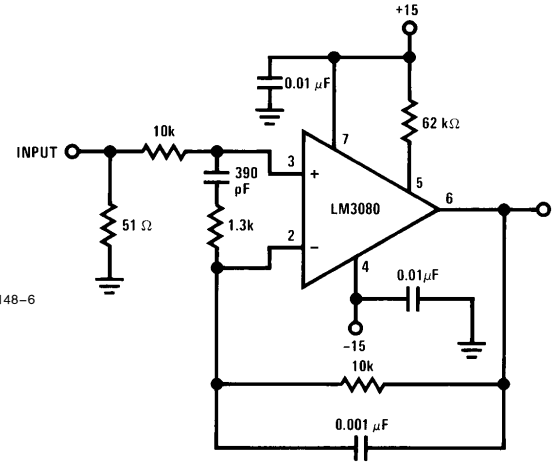
Unity Gain Follower



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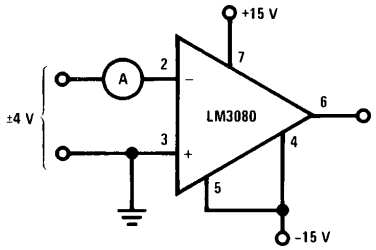
Differential Input Current Test Circuit



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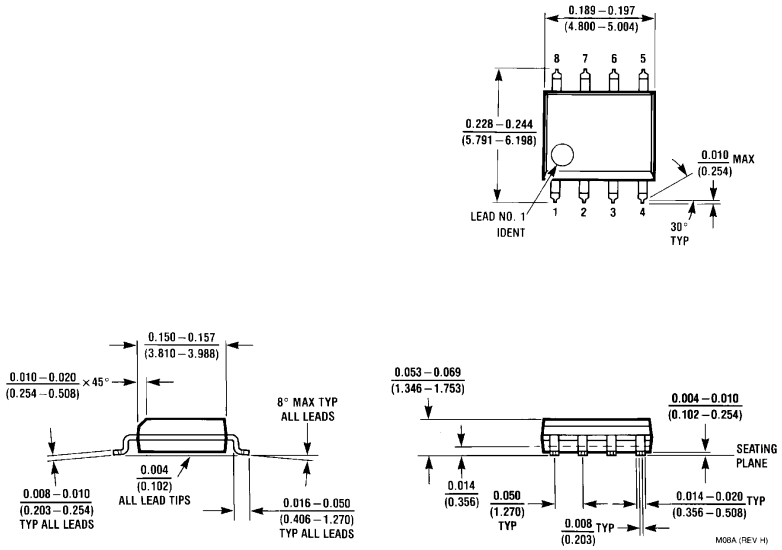
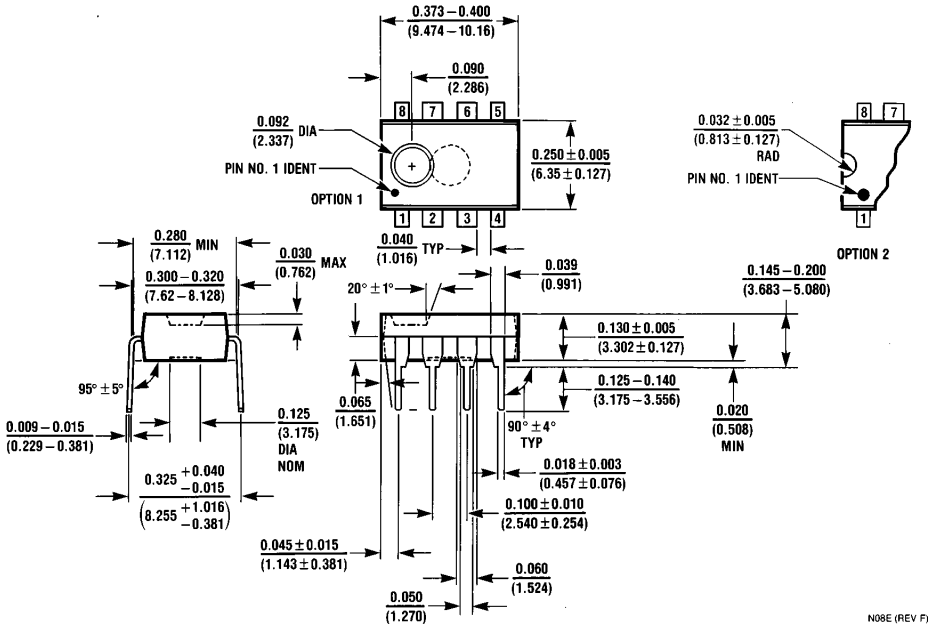
Physical Dimensions inches (millimeters)



Molded Package SO (M)
Order Number LM3080M
NS Package Number M08A

Physical Dimensions inches (millimeters) (Continued)



Molded Dual-In-Line Package (N)
Order Number LM3080AN or LM3080N
NS Package Number N08E

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2. A critical component is any component of a life support device or system whose failure to perform can be reasonably expected to cause the failure of the life support device or system, or to affect its safety or effectiveness.

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