

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}).

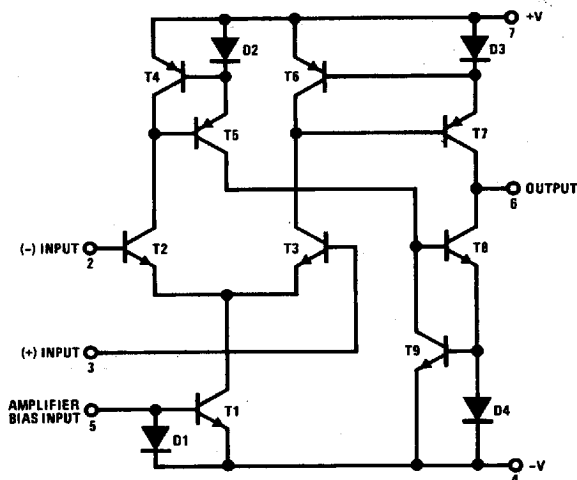
High slew rate together with programmable gain make the LM3080 an ideal choice for variable gain applications such as sample and hold, multiplexing, filtering, and multiplying.

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

Features

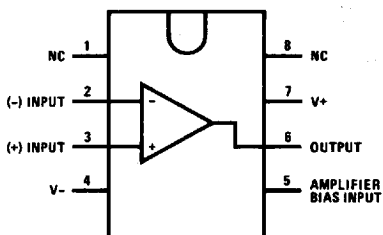
- Slow rate (unity gain compensated): 50 V/ μ s
- Fully adjustable gain: 0 to $g_m \cdot R_L$ limit
- Extended g_m linearity: 3 decades
- Flexible supply voltage range: $\pm 2V$ to $\pm 18V$
- Adjustable power consumption

Schematic and Connection Diagrams



TL/H/7148-1

Dual-In-Line Package



TL/H/7148-2

Top View

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

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

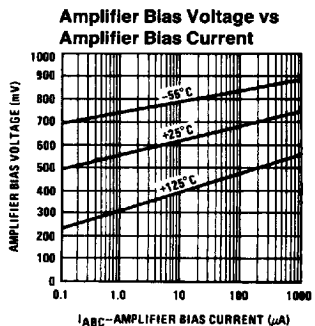
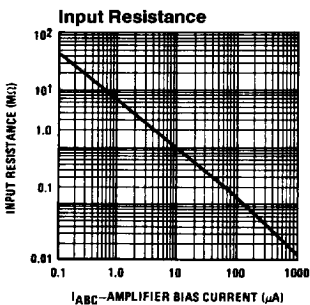
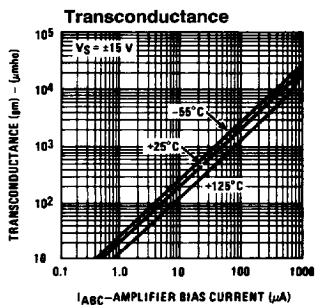
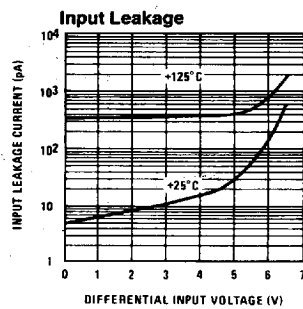
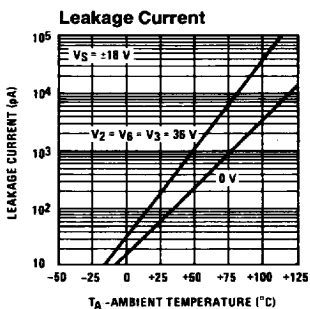
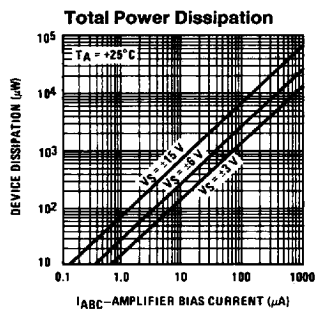
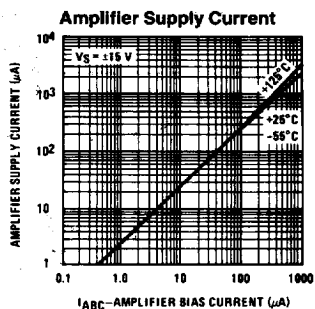
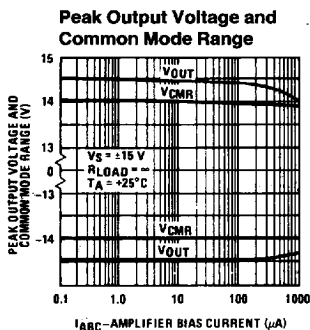
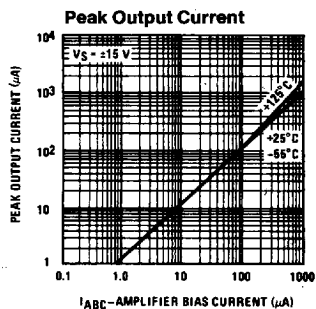
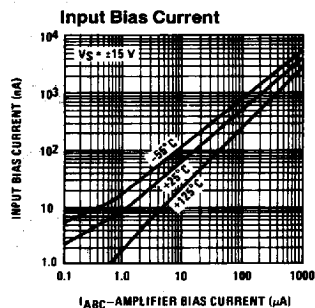
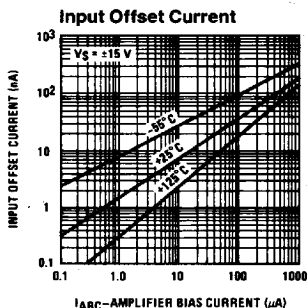
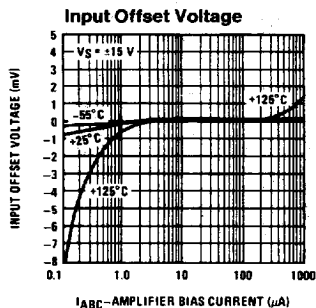
Electrical Characteristics (Note 1)

Parameter	Conditions	LM3080			LM3080A			Units
		Min	Typ	Max	Min	Typ	Max	
Input Offset Voltage	Over Specified Temperature Range $I_{ABC} = 5 \mu A$		0.4	5		0.4	2	mV
				6			5	mV
			0.3			0.3	2	mV
Input Offset Voltage Change	$5 \mu A \leq I_{ABC} \leq 500 \mu A$		0.1			0.1	3	mV
Input Offset Current			0.1	0.6		0.1	0.6	μA
Input Bias Current	Over Specified Temperature Range		0.4	5		0.4	5	μA
			1	7		1	8	μA
Forward Transconductance (g_m)	Over Specified Temperature Range	6700	9600	13000	7700	9600	12000	μmho
		5400			4000			μmho
Peak Output Current	$R_L = 0, I_{ABC} = 5 \mu A$		5		3	5	7	μA
	$R_L = 0$	350	500	650	350	500	650	μA
	Over Specified Temperature Range	300			300			μA
Peak Output Voltage	$R_L = \infty, 5 \mu A \leq I_{ABC} \leq 500 \mu A$	+12	+14.2		+12	+14.2		V
	$R_L = \infty, 5 \mu A \leq I_{ABC} \leq 500 \mu A$	-12	-14.4		-12	-14.4		V
Amplifier Supply Current			1.1			1.1		mA
Input Offset Voltage Sensitivity	$\Delta V_{OFFSET}/\Delta V +$ $\Delta V_{OFFSET}/\Delta V -$		20	150		20	150	$\mu V/V$
			20	150		20	150	$\mu V/V$
Common Mode Rejection Ratio		80	110		80	110		dB
Common Mode Range		±12	±14		±12	±14		V
Input Resistance		10	26		10	26		k Ω
Magnitude of Leakage Current	$I_{ABC} = 0$		0.2	100		0.2	5	nA
Differential Input Current	$I_{ABC} = 0, \text{Input} = \pm 4V$		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 $V_S = \pm 15V$ and $T_A = 25^\circ C$, amplifier bias current (I_{ABC}) = 500 μA , unless otherwise specified.

Note 2: Selection to supply voltage above $\pm 22V$, contact the factory.

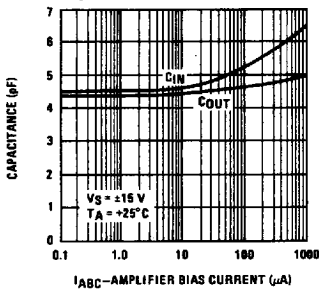
Typical Performance Characteristics



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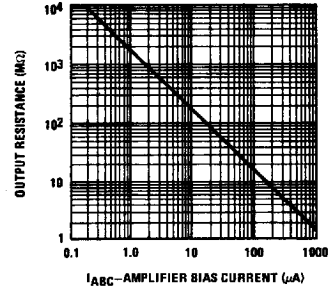
Typical Performance Characteristics (Continued)

Input and Output Capacitance



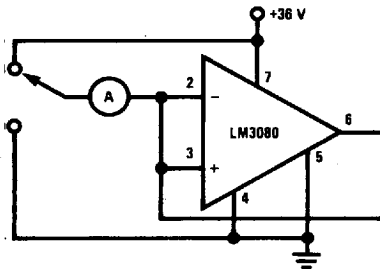
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Output Resistance



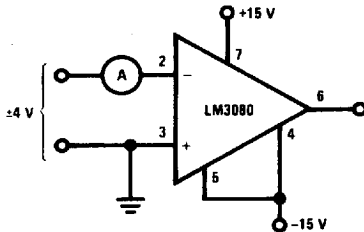
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Leakage Current Test Circuit



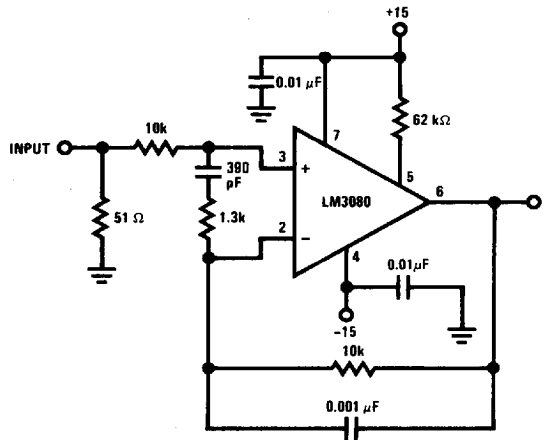
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Differential Input Current Test Circuit



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Unity Gain Follower



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