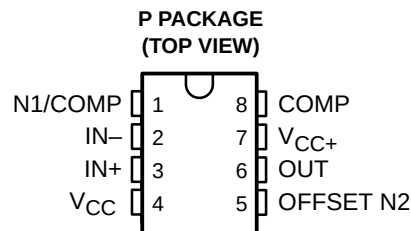


- Low Power Consumption
- Wide Common-Mode and Differential Voltage Ranges
- Low Input Bias and Offset Currents
- Output Short-Circuit Protection
- Low Total Harmonic Distortion . . . 0.003% Typ
- High Input Impedance . . . JFET Input Stage
- External Frequency Compensation
- Common-Mode Input Voltage Range Includes V_{CC+}
- Latch-Up-Free Operation
- High Slew Rate . . . 13 V/ μ s Typ



description

The TL080 JFET-input operational amplifier incorporates well-matched, high-voltage JFET and bipolar transistors in an integrated circuit. This device features high slew rates, low input bias and offset currents, and a low offset-voltage temperature coefficient. Offset adjustment and external-compensation options are available.

The TL080C is characterized for operation from 0°C to 70°C.

AVAILABLE OPTIONS

T_A	V_{IOmax} AT 25°C	PACKAGE
		PLASTIC DIP (P)
0°C to 70°C	10 mV	TL080CP



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PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS
INSTRUMENTS**

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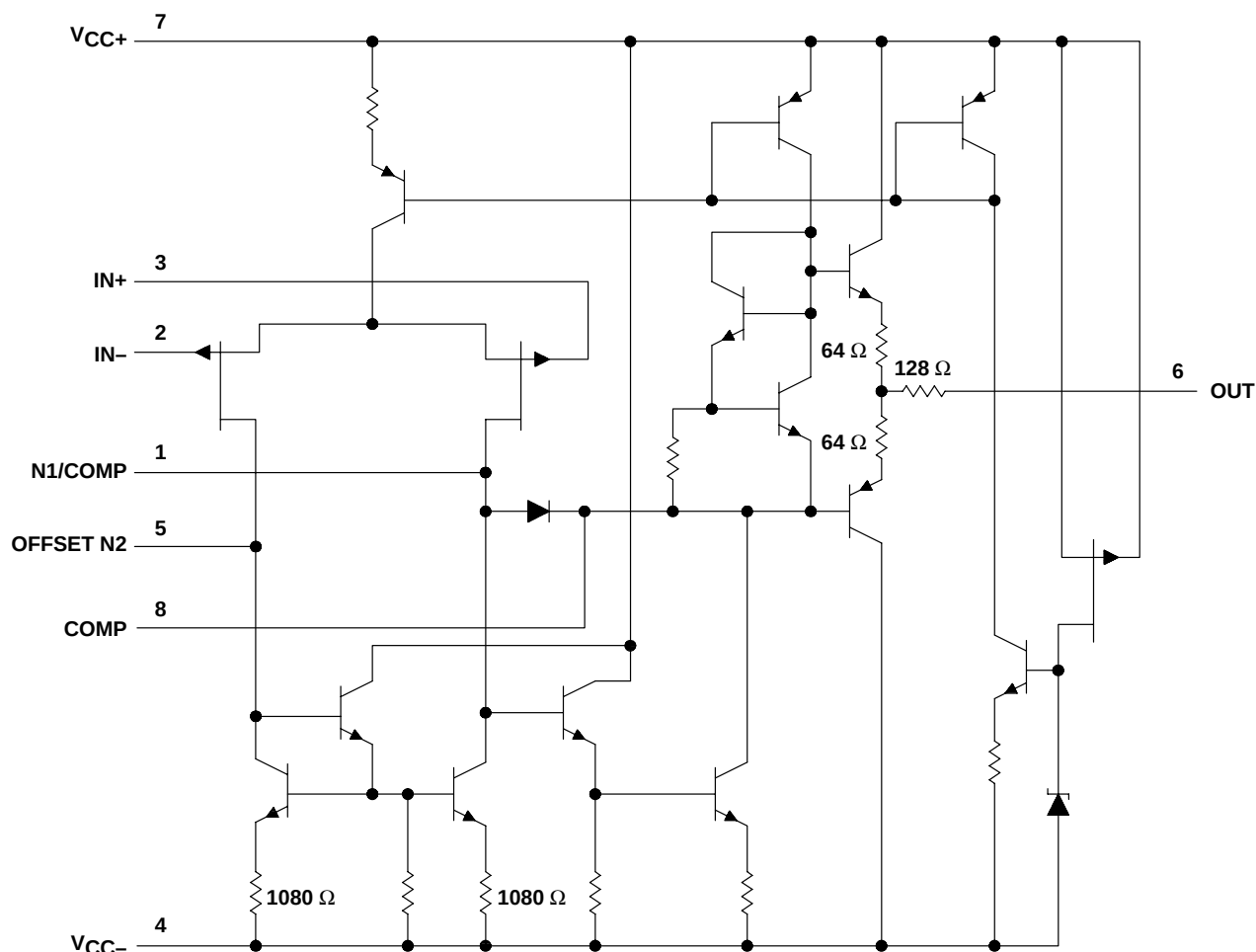
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TL080

JFET-INPUT OPERATIONAL AMPLIFIER

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schematic



All component values shown are nominal.

absolute maximum ratings over operating free-air temperature range (unless otherwise noted)[†]

Supply voltage (see Note 1): V_{CC+}	18 V
V_{CC-}	–18 V
Differential input voltage, V_{ID} (see Note 2)	±30 V
Input voltage, V_I (see Notes 1 and 3)	±15 V
Duration of short-circuit current (see Note 4)	Unlimited
Package thermal impedance, θ_{JA} (see Notes 5 and 6)	85°C/W
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°C
Storage temperature range, T_{stg}	–65°C to 150°C

[†] Stresses beyond those listed under “absolute maximum ratings” may cause permanent damage to the device. These are stress ratings only, and functional operation of the device at these or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

- NOTES:
1. All voltage values, except differential voltages, are with respect to the midpoint between V_{CC+} and V_{CC-} .
 2. Differential voltages are at $IN+$ with respect to $IN-$.
 3. The magnitude of the input voltage must never exceed the magnitude of the supply voltage or 15 V, whichever is less.
 4. The output can be shorted to ground or to either supply. Temperature and/or supply voltages must be limited to ensure that the dissipation rating is not exceeded.
 5. Maximum power dissipation is a function of $T_J(max)$, θ_{JA} , and T_A . The maximum allowable power dissipation at any allowable ambient temperature is $P_D = (T_J(max) - T_A)/\theta_{JA}$. Operating at the absolute maximum T_J of 150°C can impact reliability.
 6. The package thermal impedance is calculated in accordance with JESD 51-7.

electrical characteristics, $V_{CC\pm} = \pm 15$ V (unless otherwise noted)

PARAMETER		TEST CONDITIONS	$T_A^{\dagger}$	MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage	$V_O = 0, R_S = 50 \Omega$	25°C		3	15	mV
			Full range			20	
$\alpha_{V_{IO}}$	Temperature coefficient of input offset voltage	$V_O = 0, R_S = 50 \Omega$	Full range		18		µV/°C
I_{IO}	Input offset current [‡]	$V_O = 0$	25°C		5	200	pA
			Full range			2	nA
I_{IB}	Input bias current [‡]	$V_O = 0$	25°C		30	400	pA
			Full range			10	nA
V_{ICR}	Common-mode input voltage range		25°C	±11	–12 to 15		V
V_{OM}	Maximum peak output voltage swing	$R_L = 10 k\Omega$	25°C	±12	±13.5		V
		$R_L \geq 10 k\Omega$	Full range	±12			
		$R_L \geq 2 k\Omega$		±10	±12		
A_{VD}	Large-signal differential voltage amplification	$V_O = \pm 10$ V, $R_L \geq 2 k\Omega$	25°C		25	200	V/mV
			Full range		15		
B_1	Unity-gain bandwidth		25°C		3		MHz
r_i	Input resistance		25°C		10^{12}		Ω
CMRR	Common-mode rejection ratio	$V_{IC} = V_{ICRmin}, V_O = 0, R_S = 50 \Omega$	25°C	70	86		dB
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{CC\pm}/\Delta V_{IO}$)	$V_{CC} = \pm 15$ V to ± 9 V, $V_O = 0, R_S = 50 \Omega$	25°C	70	86		dB
I_{CC}	Supply current	$V_O = 0$, No load	25°C		1.4	2.8	mA
V_{O1}/V_{O2}	Crosstalk attenuation	$A_{VD} = 100$	25°C		120		dB

[†] All characteristics are measured under open-loop conditions with zero common-mode voltage unless otherwise specified. Full range for T_A is –40°C to 85°C.

[‡] Input bias currents of a FET-input operational amplifier are normal junction reverse currents, which are temperature sensitive, as shown in Figure 5. Pulse techniques must be used that will maintain the junction temperature as close to the ambient temperature as possible.

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operating characteristics, $V_{CC\pm} = \pm 15\text{ V}$, $T_A = 25^{\circ}\text{C}$

PARAMETER	TEST CONDITIONS			MIN	TYP	MAX	UNIT
SR Slew rate at unity gain	$V_I = 10\text{ V}$,	$R_L = 2\text{ k}\Omega$,	$C_L = 100\text{ pF}$, See Figure 1	8	13		$\text{V}/\mu\text{s}$
t_r Rise-time overshoot factor	$V_I = 20\text{ mV}$,	$R_L = 2\text{ k}\Omega$,	$C_L = 100\text{ pF}$, See Figure 1		0.05		μs
V_n Equivalent input noise voltage	$R_S = 100\text{ }\Omega$	$f = 1\text{ kHz}$			18		$\text{nV}/\sqrt{\text{Hz}}$
		$f = 10\text{ Hz to }10\text{ kHz}$			4		μV
I_n Equivalent input noise current	$R_S = 100\text{ }\Omega$,	$f = 1\text{ kHz}$			0.01		$\text{pA}/\sqrt{\text{Hz}}$
THD Total harmonic distortion	$V_{O(\text{rms})} = 10\text{ V}$,	$R_S \leq 1\text{ k}\Omega$, $R_L \geq 2\text{ k}\Omega$, $f = 1\text{ kHz}$			0.003%		

APPLICATION INFORMATION

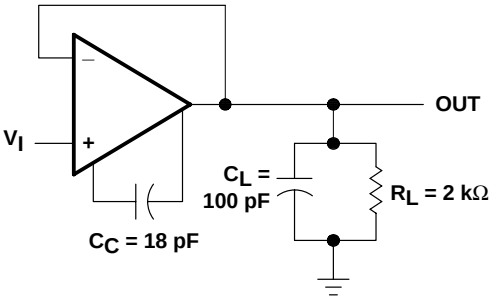


Figure 1. Unity-Gain Amplifier

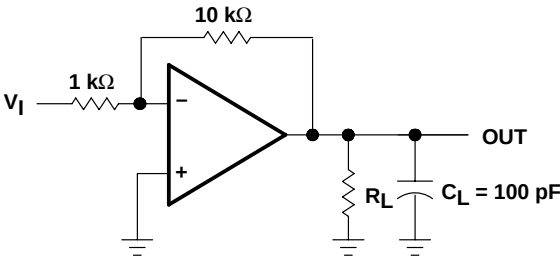


Figure 2. Gain-of-10 Inverting Amplifier

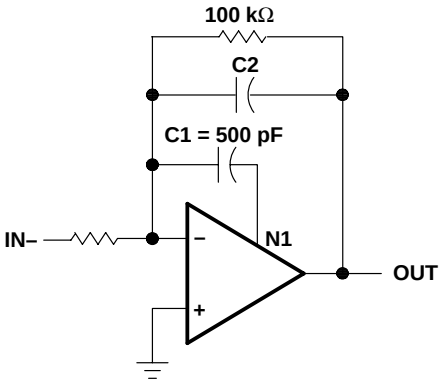


Figure 3. Feed-Forward Compensation

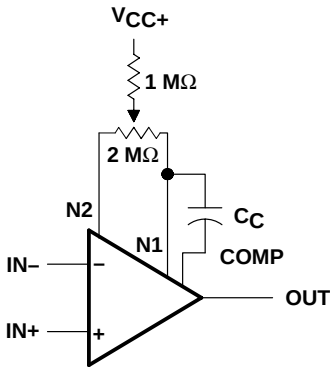


Figure 4. Input Offset Voltage Null Circuit

TYPICAL CHARACTERISTICS

Table of Graphs

			FIGURE
V_{OM}	Maximum peak output voltage	vs Frequency	5, 6, 7
		vs Free-air temperature	8
		vs Load resistance	9
		vs Supply voltage	10
A_{VD}	Large-signal differential voltage amplification	vs Free-air temperature	11
		vs Frequency	12
	Differential voltage amplification	vs Frequency	13
P_D	Total power dissipation	vs Free-air temperature	14
I_{CC}	Supply current	vs Free-air temperature	14
		vs Supply voltage	15
I_{IB}	Input bias current	vs Free-air temperature	16
	Large-signal pulse response	vs Time	17
V_O	Output voltage	vs Elapsed time	18
CMRR	Common-mode rejection ratio	vs Free-air temperature	19
V_n	Equivalent input noise voltage	vs Frequency	20
THD	Total harmonic distortion	vs Frequency	21

MAXIMUM PEAK OUTPUT VOLTAGE
vs
FREQUENCY

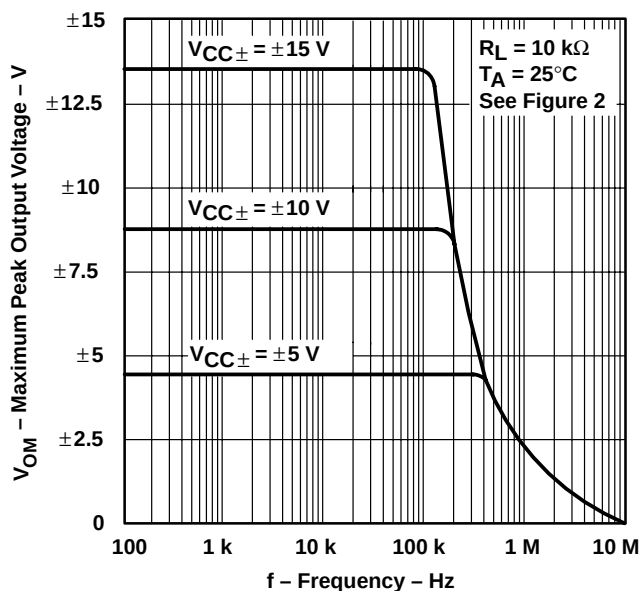


Figure 5

MAXIMUM PEAK OUTPUT VOLTAGE
vs
FREQUENCY

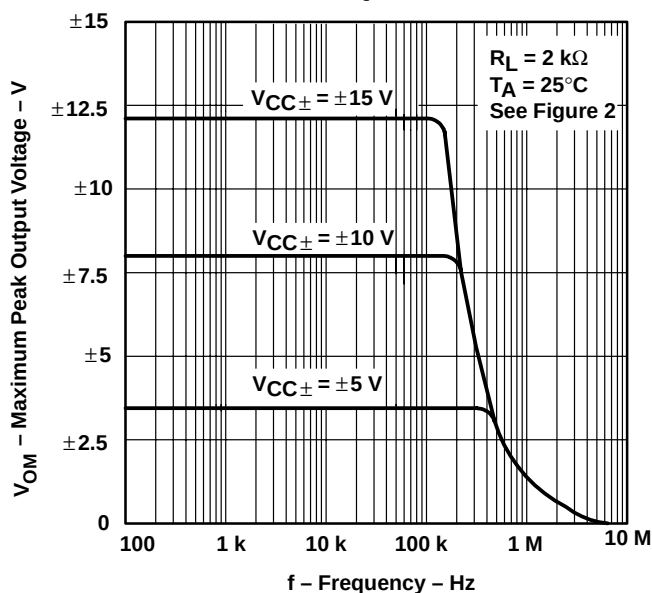


Figure 6

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TYPICAL CHARACTERISTICS

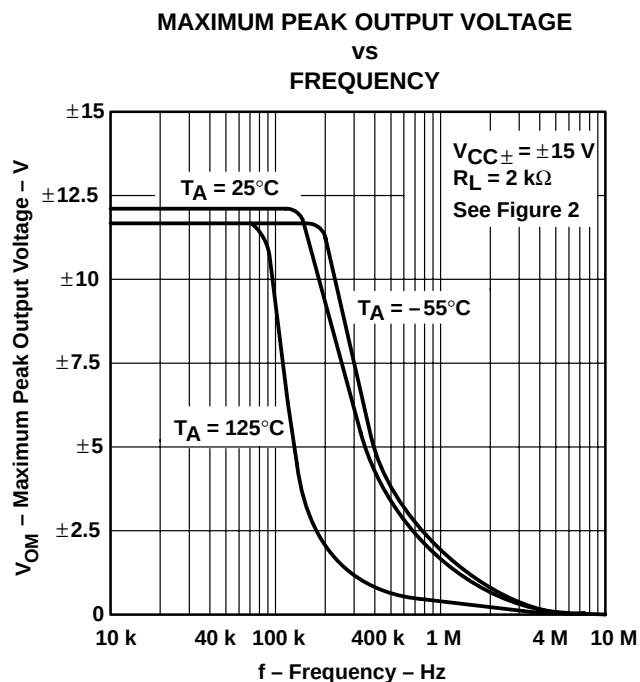


Figure 7

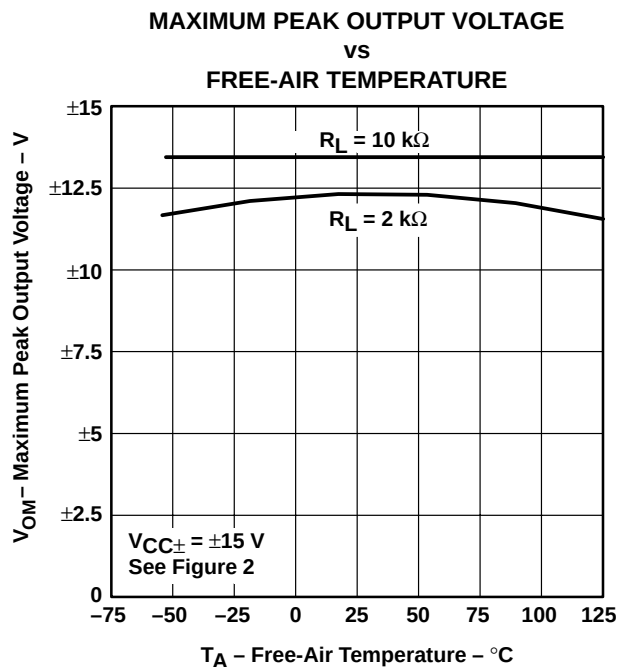


Figure 8

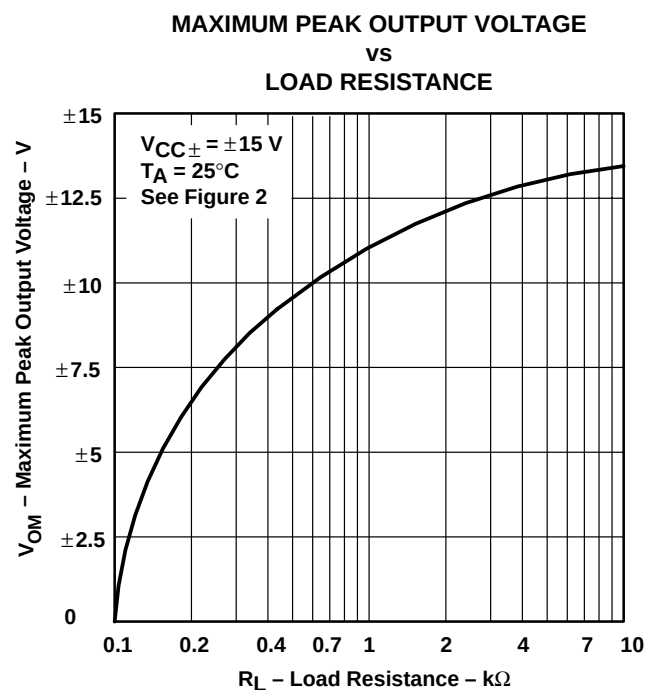


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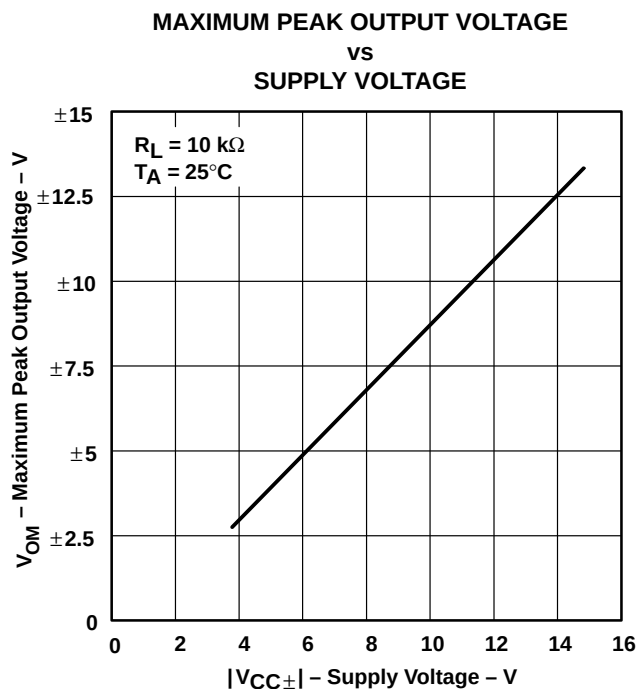


Figure 10

TYPICAL CHARACTERISTICS

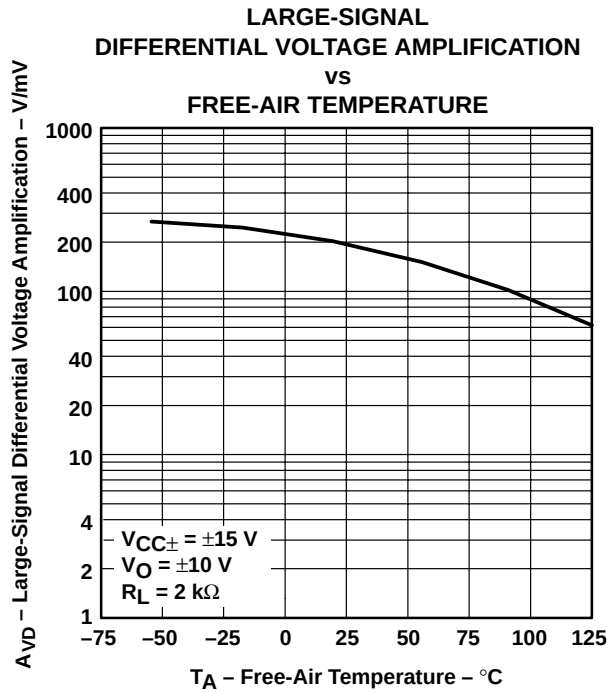


Figure 11

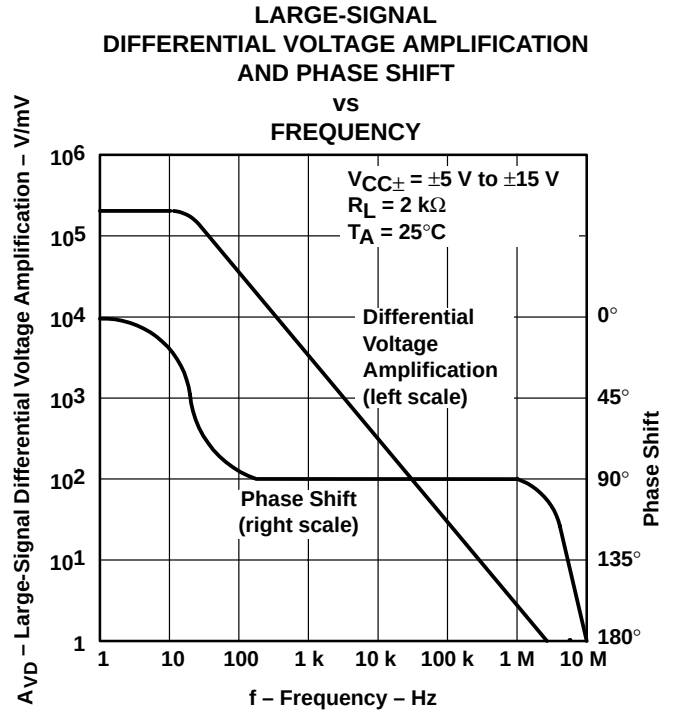


Figure 12

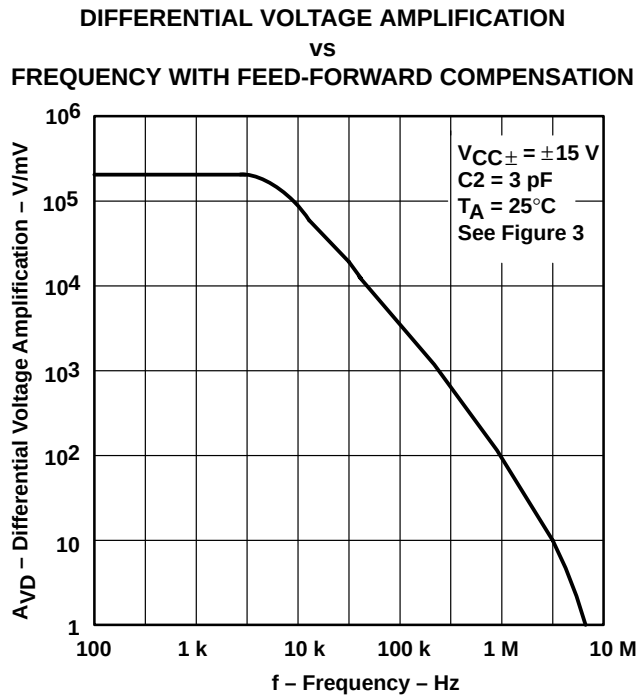


Figure 13

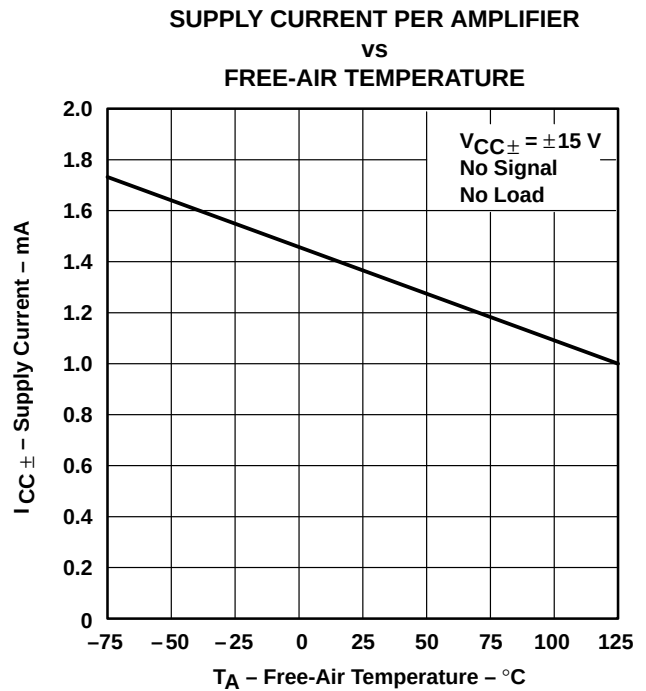


Figure 14

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TYPICAL CHARACTERISTICS

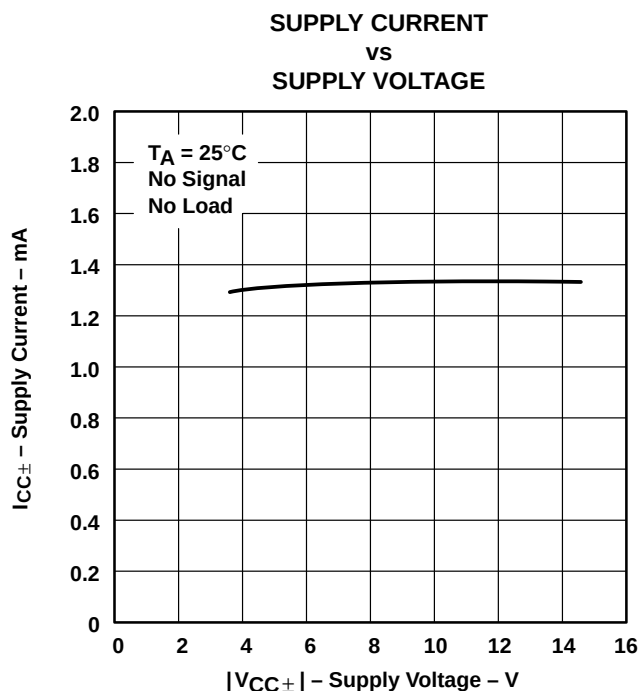


Figure 15

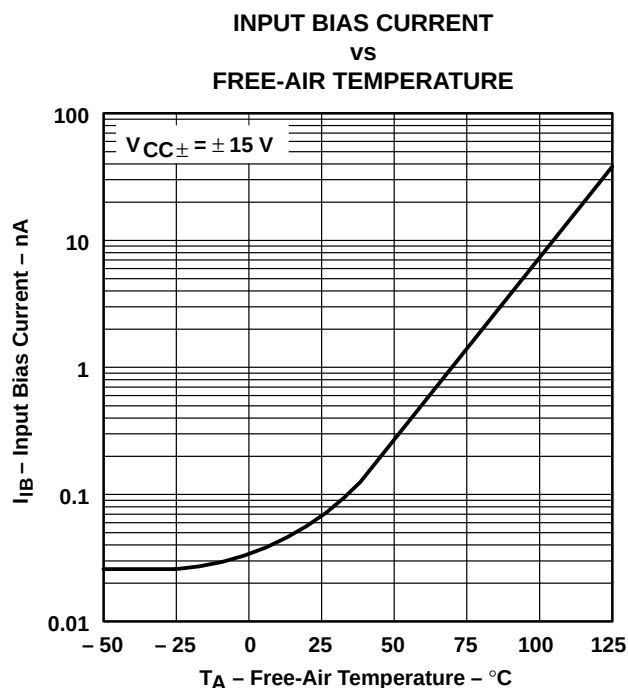


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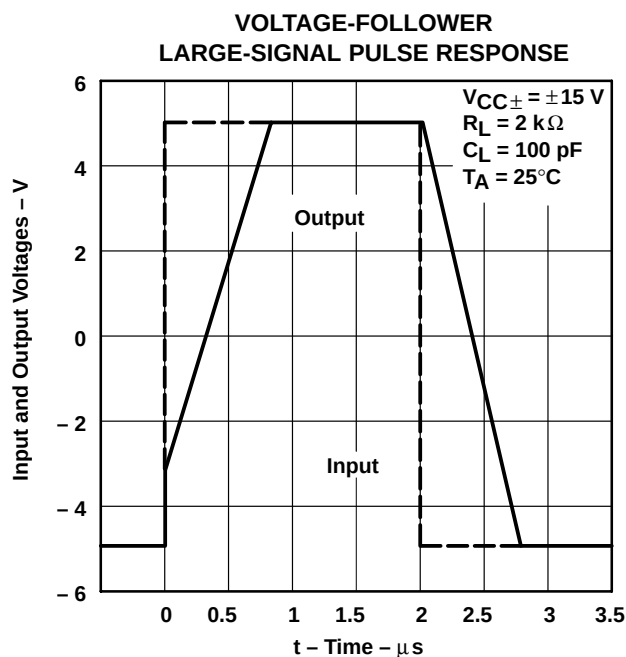


Figure 17

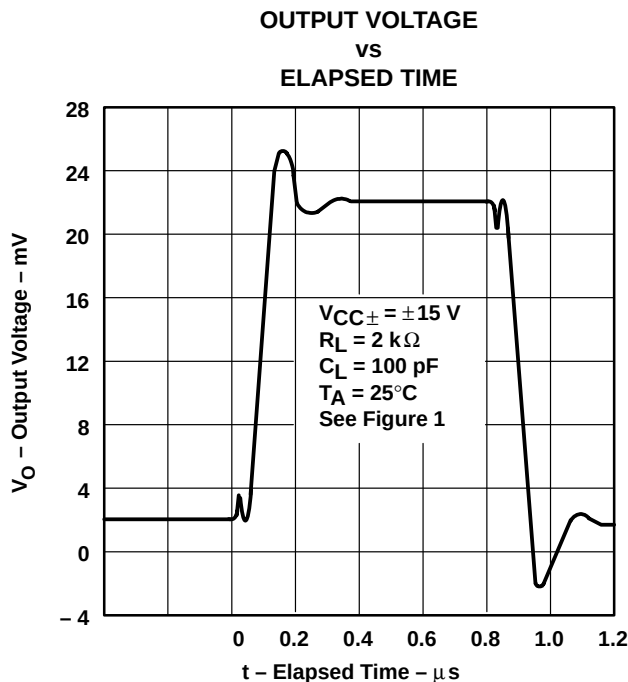


Figure 18

TYPICAL CHARACTERISTICS

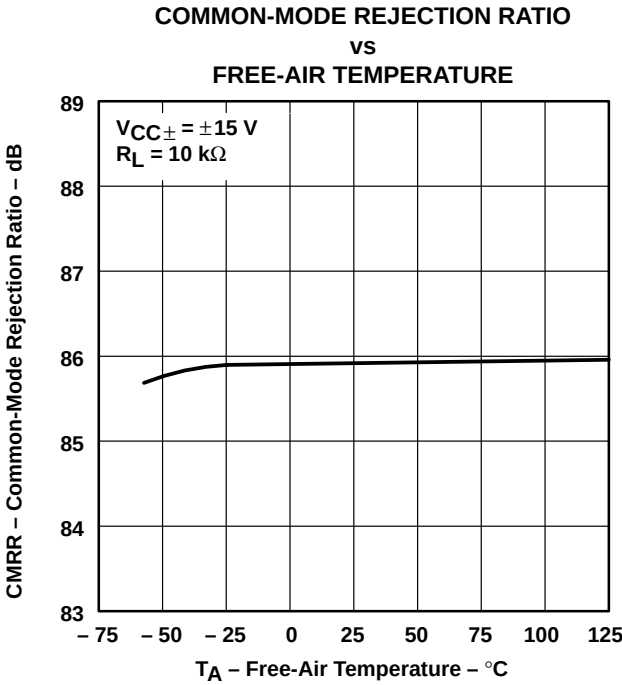


Figure 19

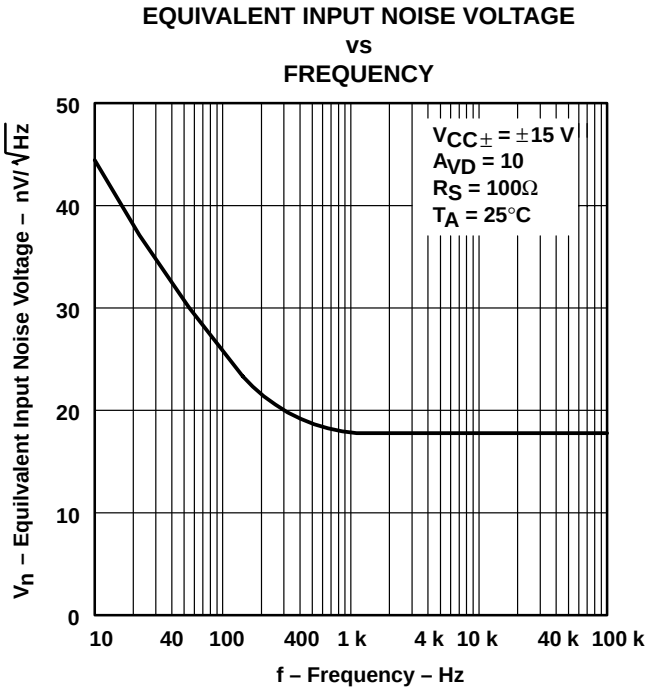


Figure 20

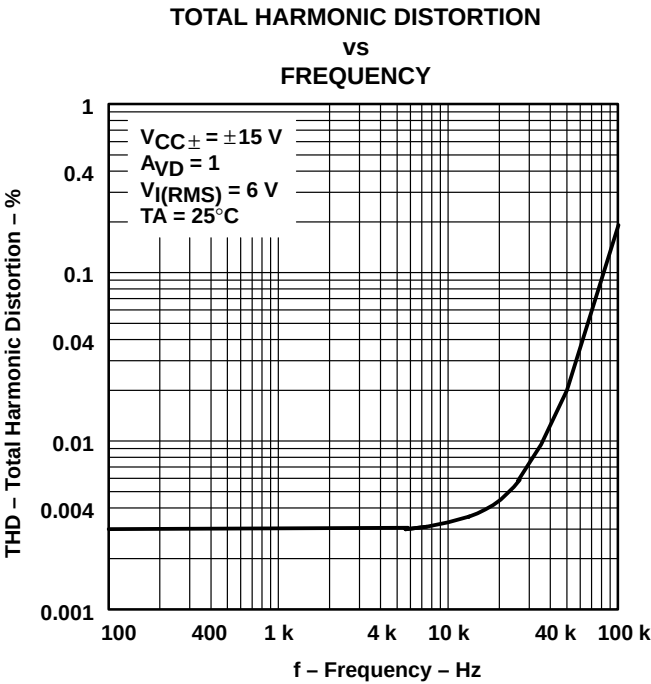


Figure 21

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APPLICATION INFORMATION

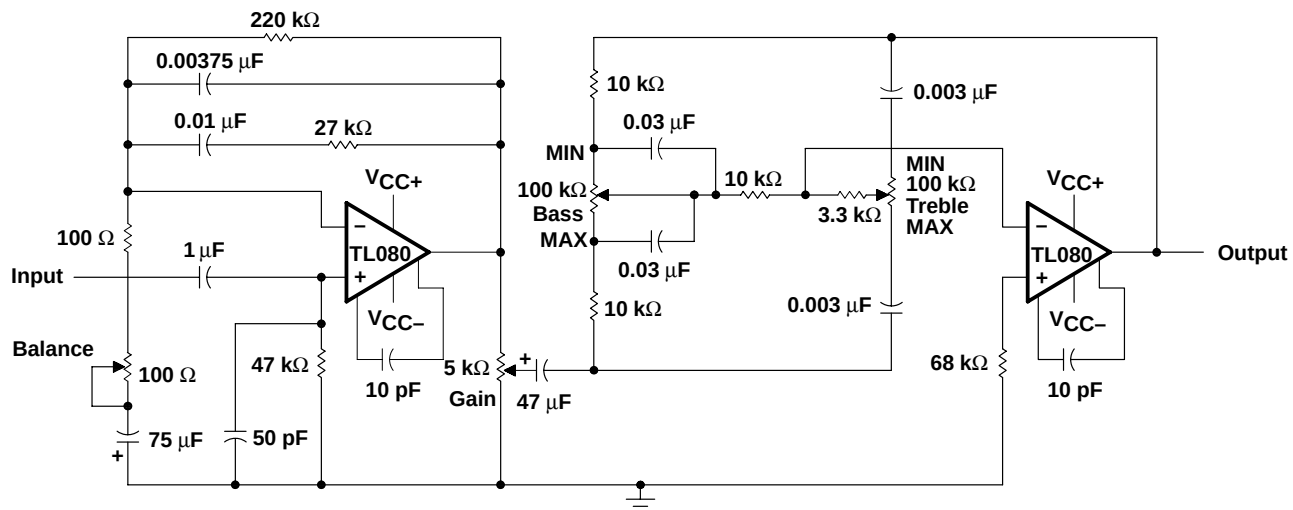


Figure 22. IC Preamplifier

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Mailing Address:

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