

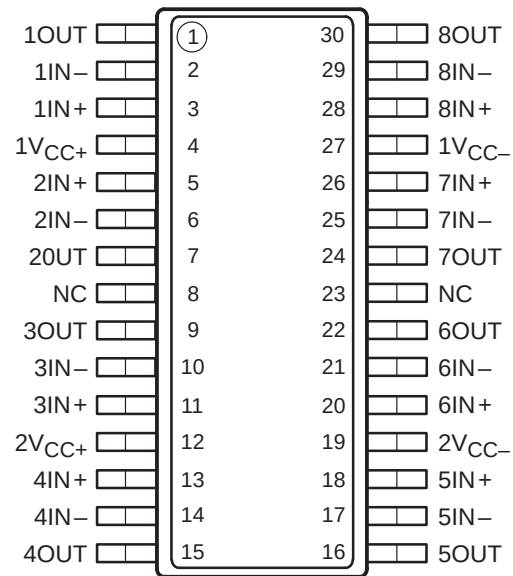
- Low Power Consumption
- Wide Common-Mode and Differential Voltage Ranges
- Low Input Bias and Offset Currents
- Output Short-Circuit Protection
- Low Total Harmonic Distortion . . . 0.003% Typ
- High Input Impedance . . . JFET-Input Stage
- Latch-Up-Free Operation
- High Slew Rate . . . 13 V/ μ s Typ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

description

The TL084x2 JFET-input operational amplifier incorporates well-matched, high-voltage JFET and bipolar transistors in a monolithic integrated circuit. The device features high slew rates, low input bias and offset currents, and low offset voltage temperature coefficient.

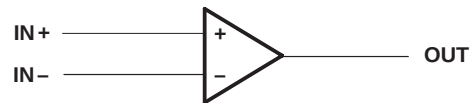
The TL084x2 is characterized for operation from 0°C to 70°C.

DB PACKAGE
(TOP VIEW)



NC – No internal connection

symbol (each amplifier)

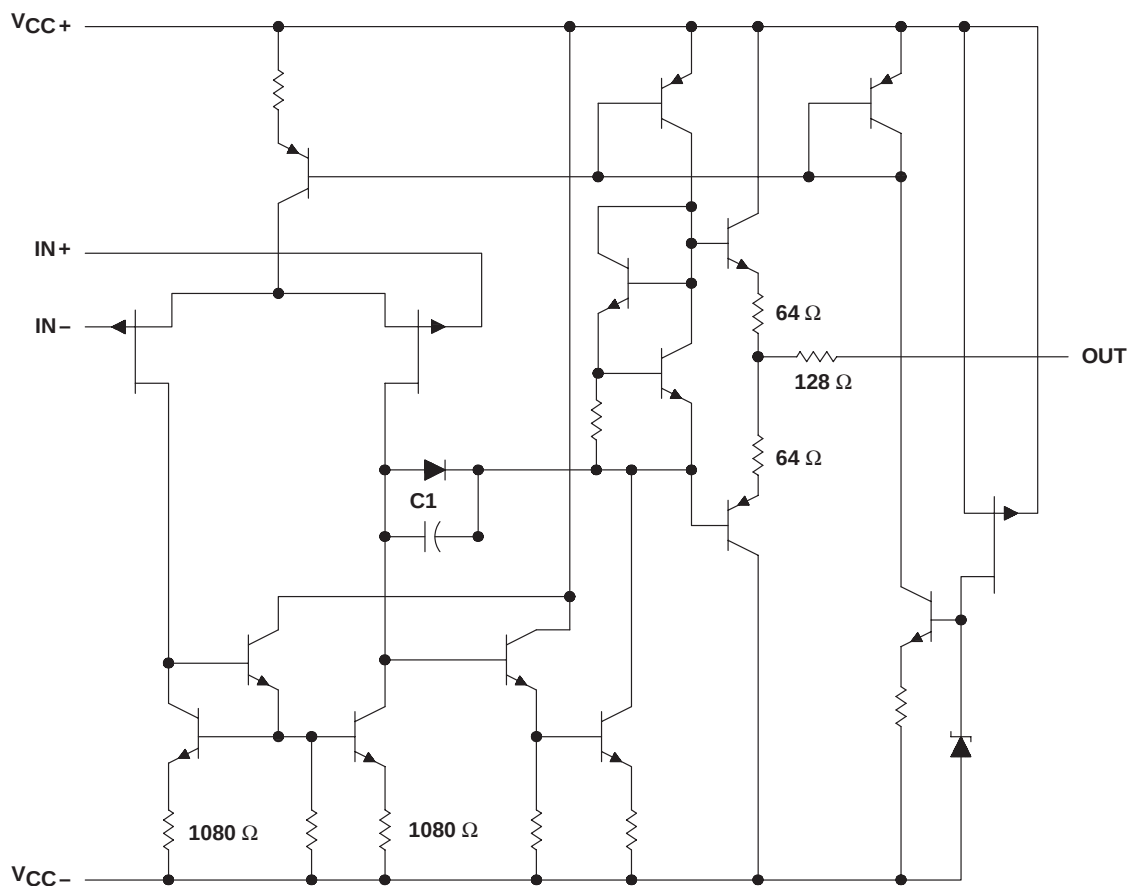


AVAILABLE OPTION

T_A	V_{IOmax} AT 25°C	PACKAGE
		SMALL OUTLINE (DB) [†]
0°C to 70°C	15 mV	TL084x2DBLE

[†] The DB package is only available left-end taped and reeled.

schematic (each amplifier)



All component values shown are nominal.

COMPONENT COUNT	
Resistors	76
Transistors	120
JFET	20
Diodes	12
Capacitors	8

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

Supply voltage, V_{CC+} (see Note 1)	18 V
Supply voltage, V_{CC-} (see Note 1)	–18 V
Differential input voltage, V_{ID} (see Note 2)	± 30 V
Input voltage, V_I (any input) (see Notes 1 and 3)	± 15 V
Duration of output short circuit to ground (see Note 4)	unlimited
Continuous total dissipation	See Dissipation Rating Table
Operating free-air temperature range, T_A	0°C to 70°C
Storage temperature range	–65°C to 150°C
Lead temperature 1,6 mm (1/16 inch) from case for 10 seconds	260°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 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 and V_{CC} specified for the measurement of I_{OS} , 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.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25^\circ\text{C}$	$T_A = 70^\circ\text{C}$ POWER RATING
DB	1024 mW	8.2 mW/°C	655 mW

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

PARAMETER		TEST CONDITIONS [†]	T_A [‡]	MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage	$V_O = 0$, $R_S = 50\ \Omega$	25°C		5	15	mV
			Full range			20	
α_{VIO}	Temperature coefficient of input offset voltage	$V_O = 0$, $R_S = 50\ \Omega$	Full range		10		$\mu V/^\circ C$
I_{IO}	Input offset current	$V_O = 0$	25°C		5	200	pA
			Full range			5	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	± 10	± 11		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
		$V_O = \pm 10\ V$, $R_L \geq 2\ k\Omega$	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	$V_{IC} = V_{ICRmin}$, $R_S = 50\ \Omega$, $V_O = 0$	25°C	70	76		dB
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{CC\pm} / \Delta V_{IO}$)	$V_{CC} = \pm 15\ V$ to $\pm 9\ V$, $R_S = 50\ \Omega$, $V_O = 0$	25°C	70	76		dB
I_{CC}	Supply current (per amplifier)	$V_O = 0$, 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 is 0°C to 70°C.

[§] Input bias currents of a FET-input operational amplifier are normal junction reverse currents, which are temperature sensitive as shown in Figure 14. Pulse techniques must be used that will maintain the junction temperature as close to the ambient temperature as possible.

operating characteristics, $V_{CC\pm} = \pm 15$ V, $T_A = 25^\circ C$ (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
SR	Slew rate at unity gain	$V_I = 10\ V$, $R_L = 2\ k\Omega$, $C_L = 100\ pF$, See Figure 1		13		V/ μs
t_r	Rise time	$V_I = 20\ mV$, $R_L = 2\ k\Omega$, $C_L = 100\ pF$, See Figure 1		0.05		μs
	Overshoot factor			20%		
V_n	Equivalent input noise voltage	$R_S = 20\ \Omega$, $f = 1\ kHz$		18		nV/ $\sqrt{Hz}$

PARAMETER MEASUREMENT INFORMATION

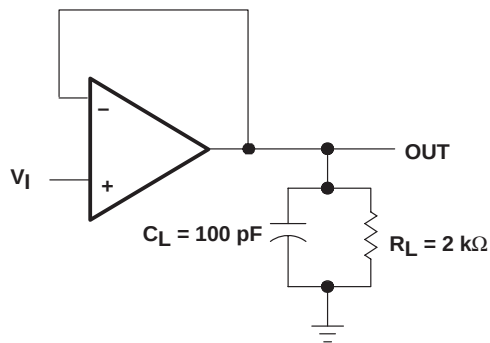


Figure 1. Unity-Gain Amplifier

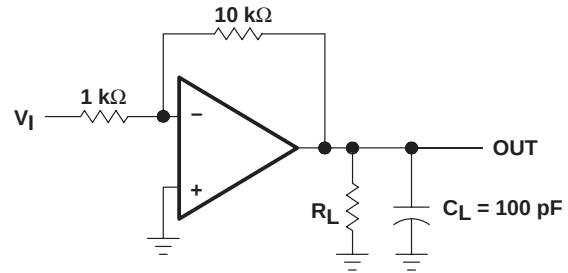


Figure 2. Gain-of-10 Inverting Amplifier

TYPICAL CHARACTERISTICS

Table of Graphs

			FIGURE
V_{OM}	Maximum peak output voltage	vs Frequency	3, 4, 5
		vs Free-air temperature	6
		vs Load resistance	7
		vs Supply voltage	8
A_{VD}	Large-signal differential voltage amplification	vs Free-air temperature	9
		vs Frequency	10
P_D	Total power dissipation	vs Free-air temperature	11
I_{CC}	Supply current	vs Free-air temperature	12
		vs Supply voltage	13
I_{IB}	Input bias current	vs Free-air temperature	14
	Pulse response	Large signal	15
V_O	Output voltage	vs Elapsed time	16
CMRR	Common-mode rejection ratio	vs Free-air temperature	17
V_n	Equivalent input noise voltage	vs Frequency	18
THD	Total harmonic distortion	vs Frequency	19
	Phase shift	vs Free-air temperature	10

TYPICAL CHARACTERISTICS

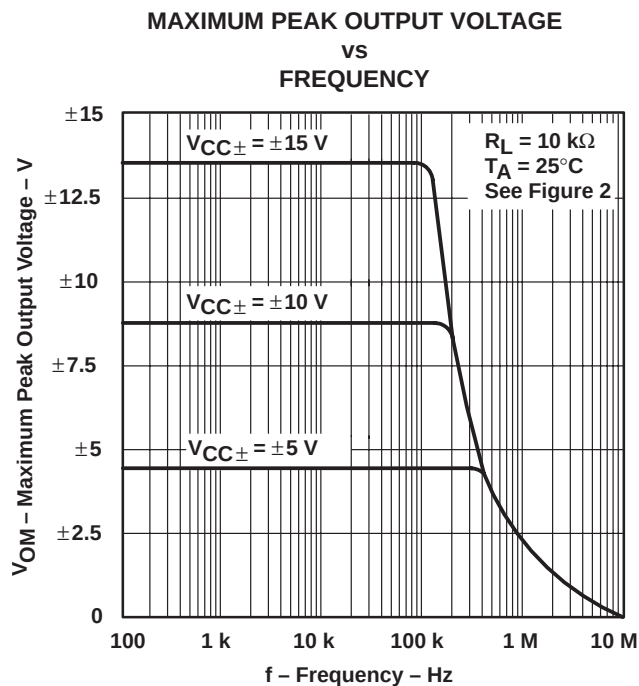


Figure 3

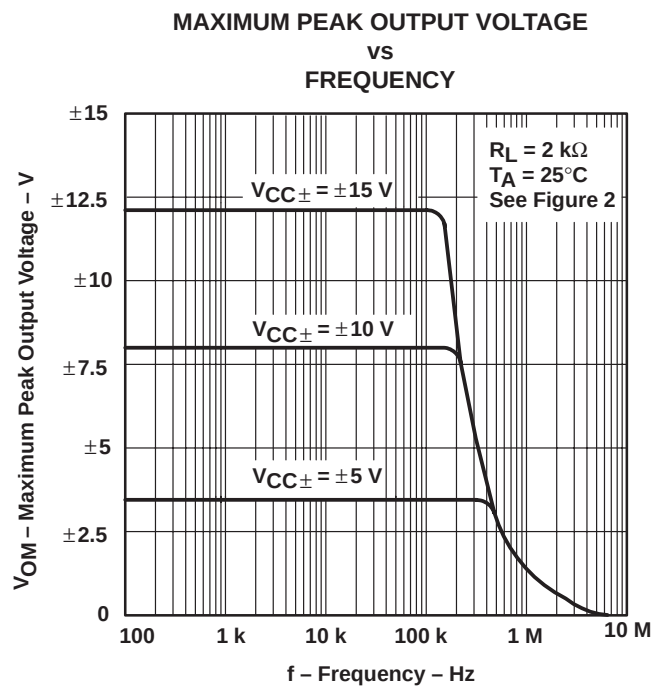


Figure 4

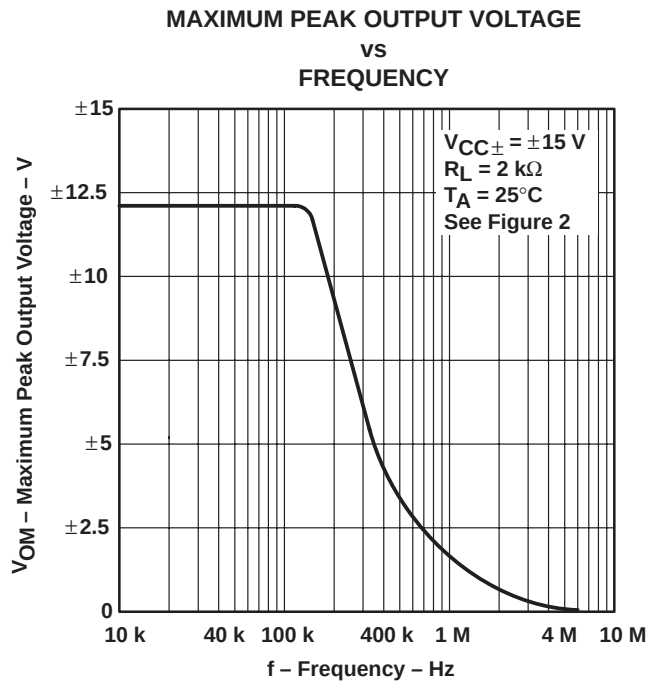


Figure 5

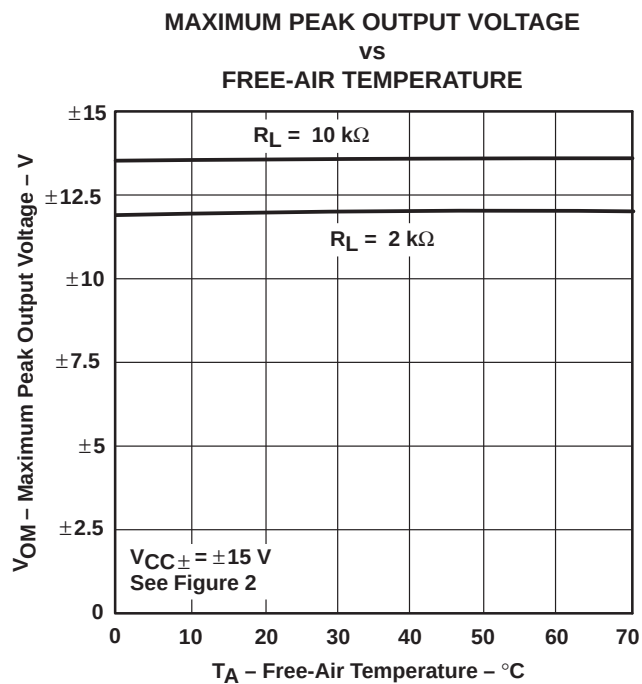


Figure 6

TYPICAL CHARACTERISTICS

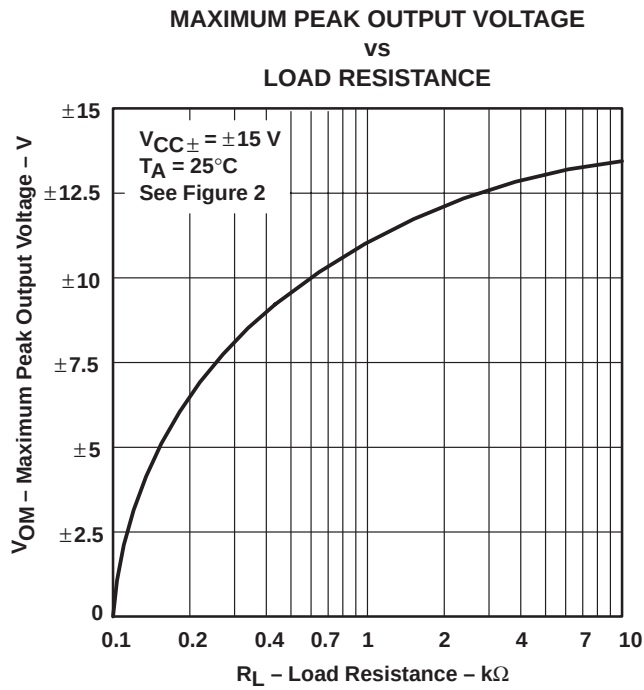


Figure 7

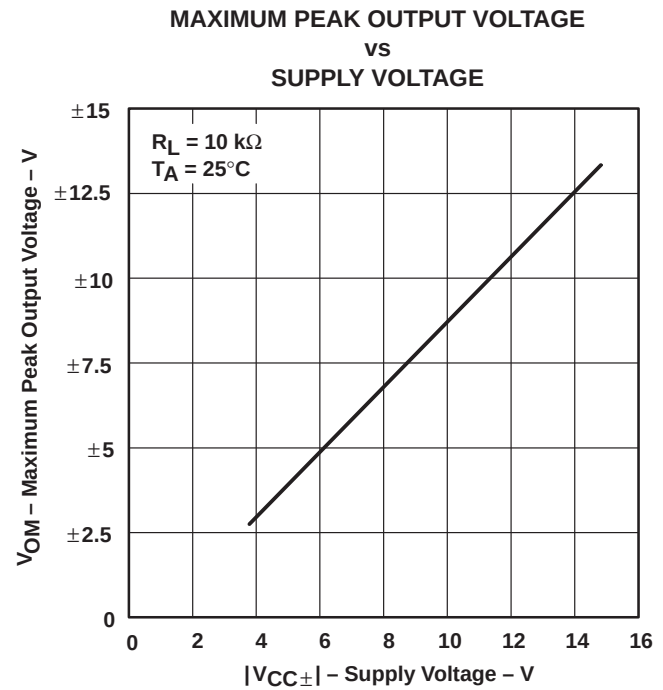


Figure 8

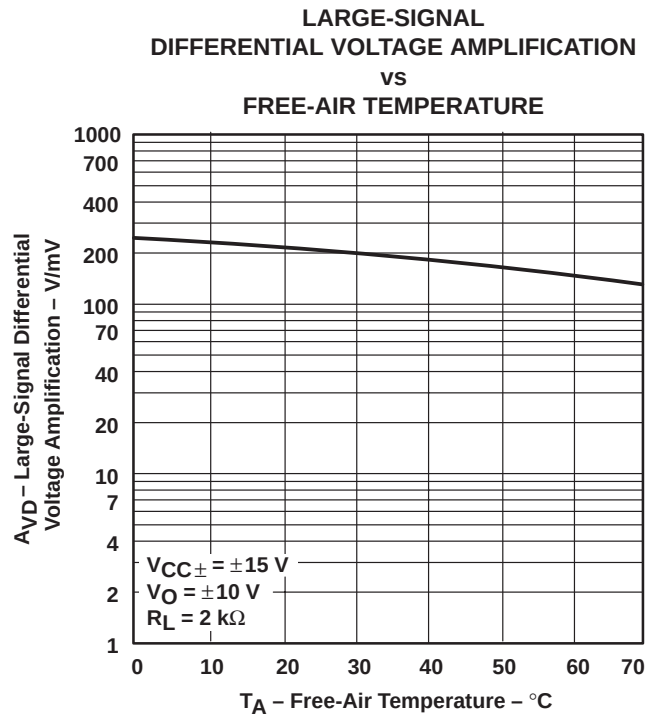


Figure 9

TYPICAL CHARACTERISTICS

LARGE-SIGNAL
DIFFERENTIAL VOLTAGE AMPLIFICATION
VS
FREQUENCY

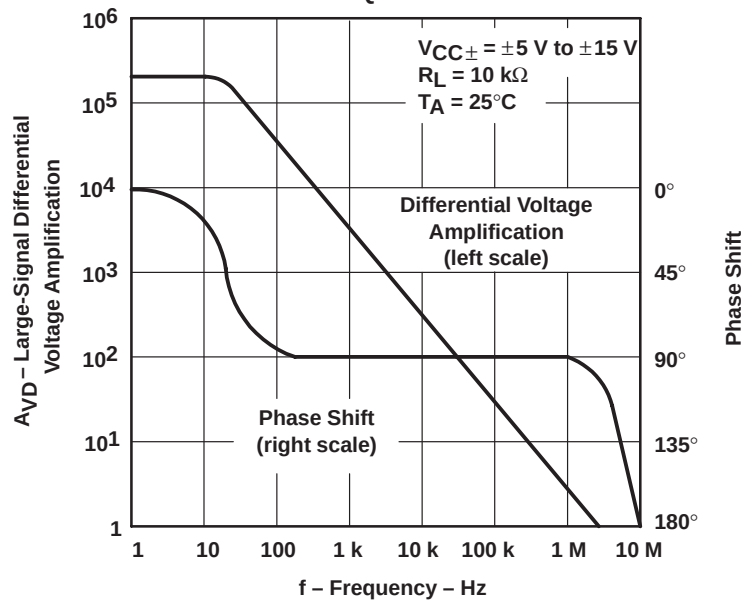


Figure 10

TOTAL POWER DISSIPATION
VS
FREE-AIR TEMPERATURE

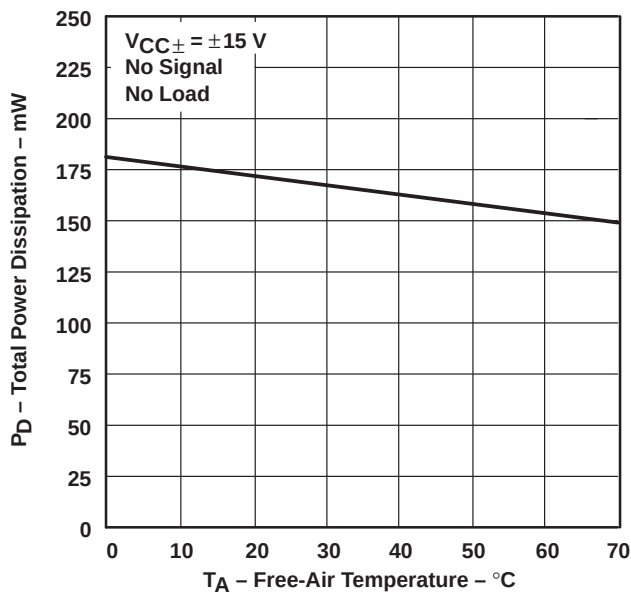


Figure 11

SUPPLY CURRENT (PER AMPLIFIER)
VS
FREE-AIR TEMPERATURE

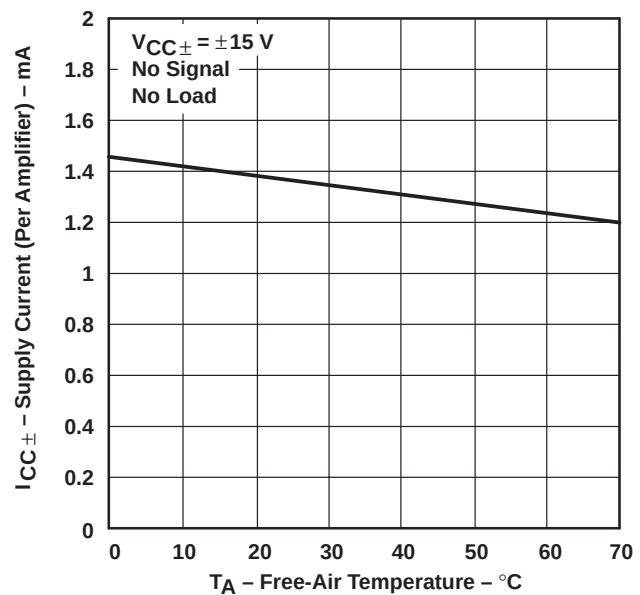


Figure 12

TYPICAL CHARACTERISTICS

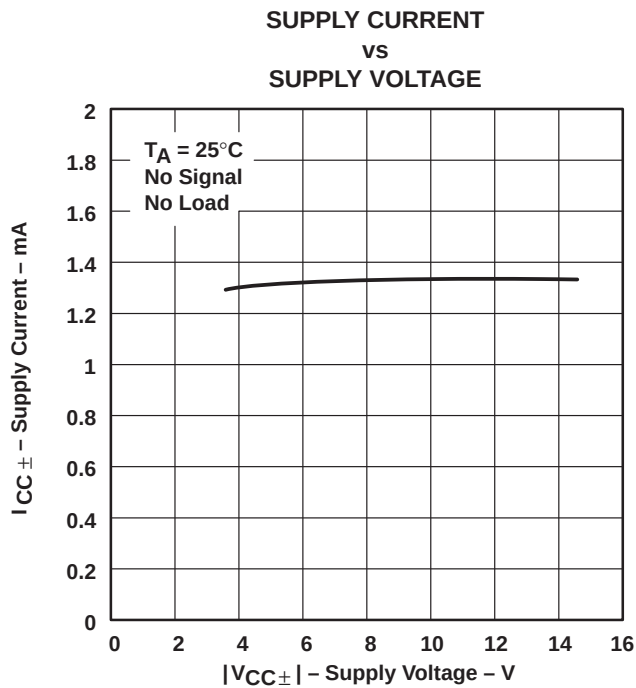


Figure 13

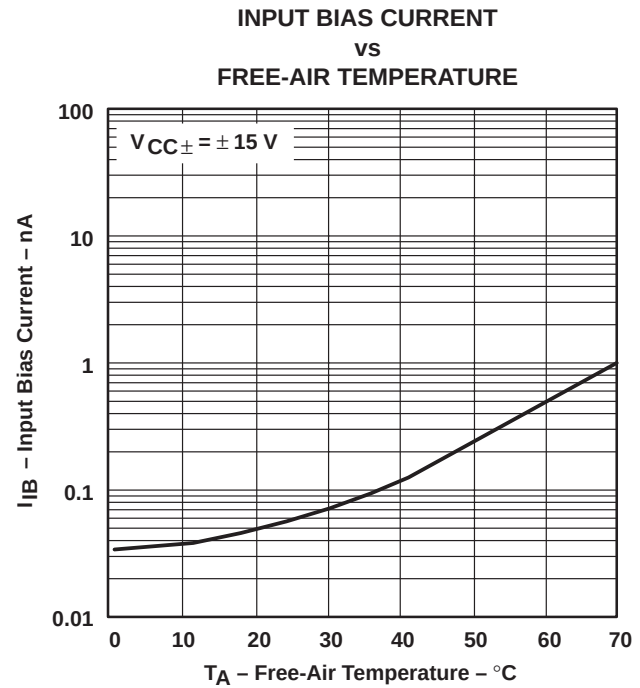


Figure 14

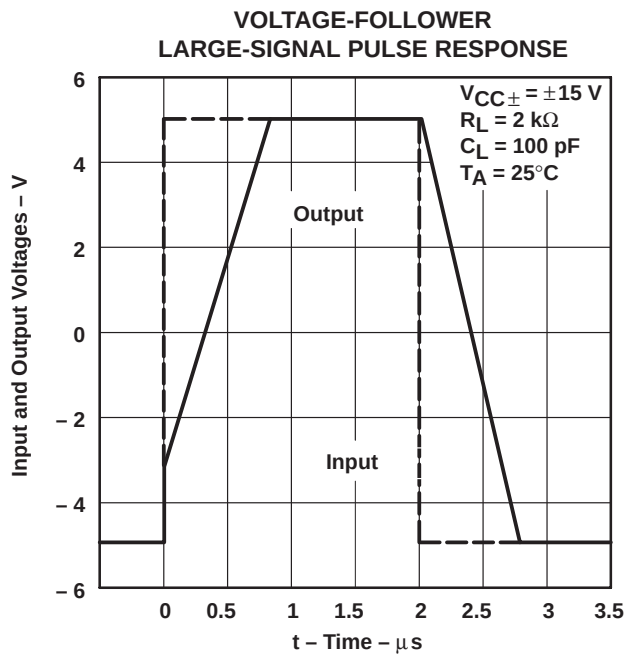


Figure 15

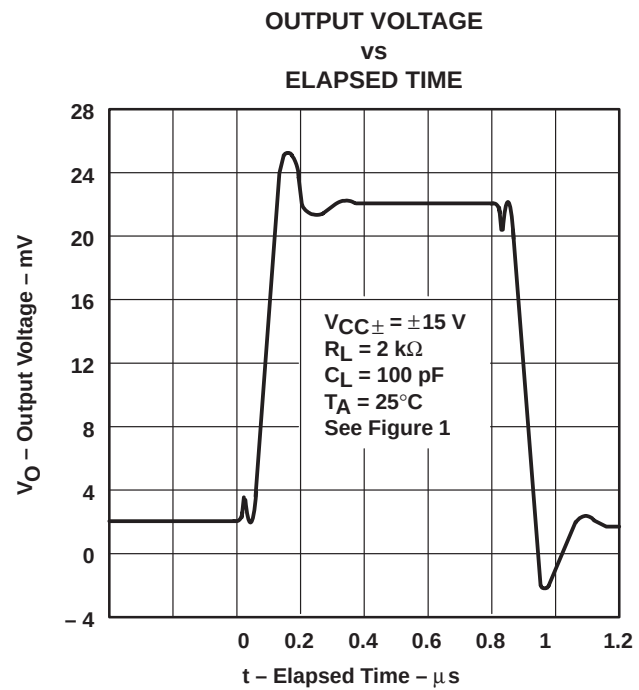


Figure 16

TYPICAL CHARACTERISTICS

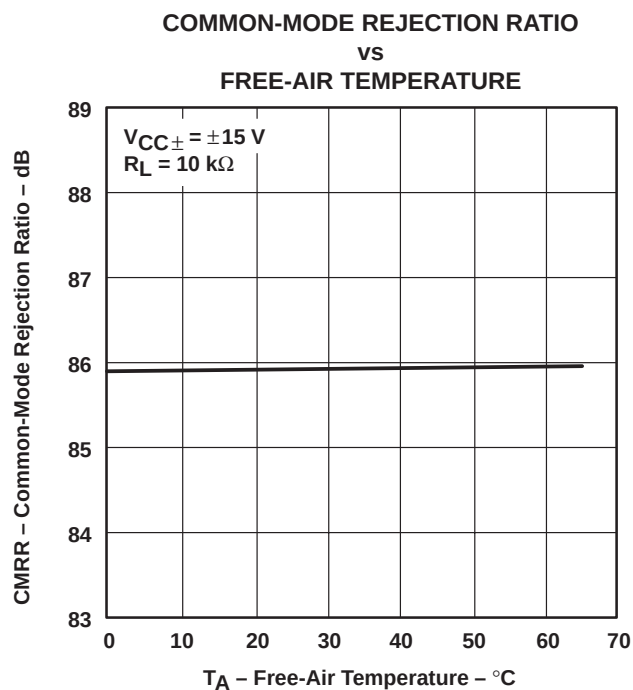


Figure 17

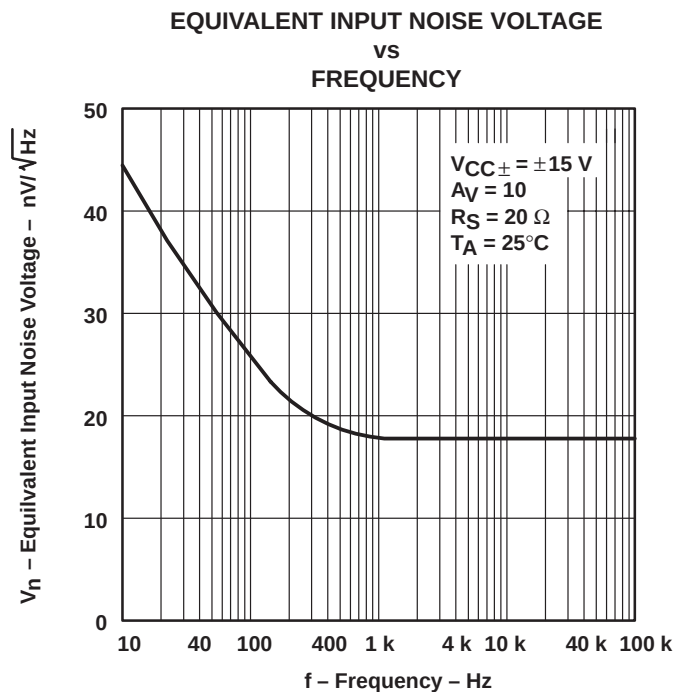


Figure 18

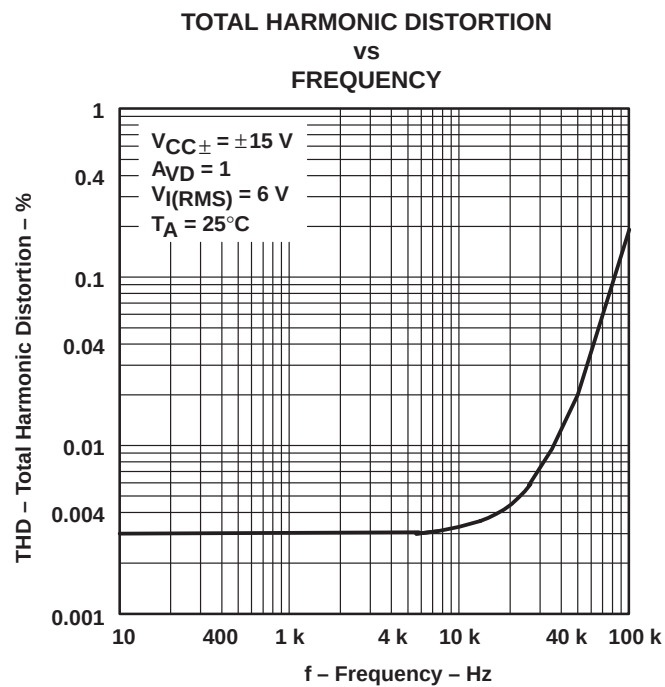


Figure 19

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