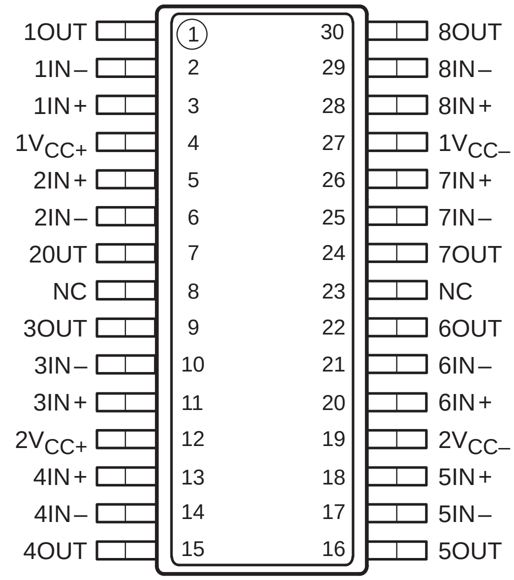
- **Low Power Consumption**
- **Wide Common-Mode and Differential Voltage Ranges**
- **Low Input Bias and Offset Currents**
- **Output Short-Circuit Protection**
- **Low Total Harmonic Distortion 0.003% Typ**
- **Low Noise V_n = 18 nV/$\sqrt{Hz}$ Typ at f = 1 kHz**
- **High Input Impedance . . . JFET Input Stage**
- **Internal Frequency Compensation**
- **Latch-Up-Free Operation**
- **High Slew Rate . . . 13 V/µs Typ**
- **Common-Mode Input Voltage Range Includes V_{CC+}**

DB PACKAGE
(TOP VIEW)



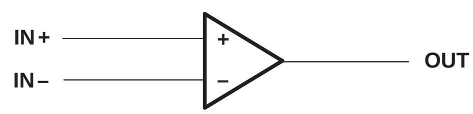
NC – No internal connection

description

The TL074x2 JFET-input operational amplifier is designed as a lower-noise version of the TL084x2 amplifier with low input bias and offset currents and fast slew rate. The low harmonic distortion and low noise make the TL074x2 ideally suited for high-fidelity and audio-preamplifier applications. Each amplifier features JFET inputs (for high input impedance) coupled with bipolar output stages integrated on a single monolithic chip.

The TL074x2 is characterized for operation from 0°C to 70°C.

symbol (each amplifier)

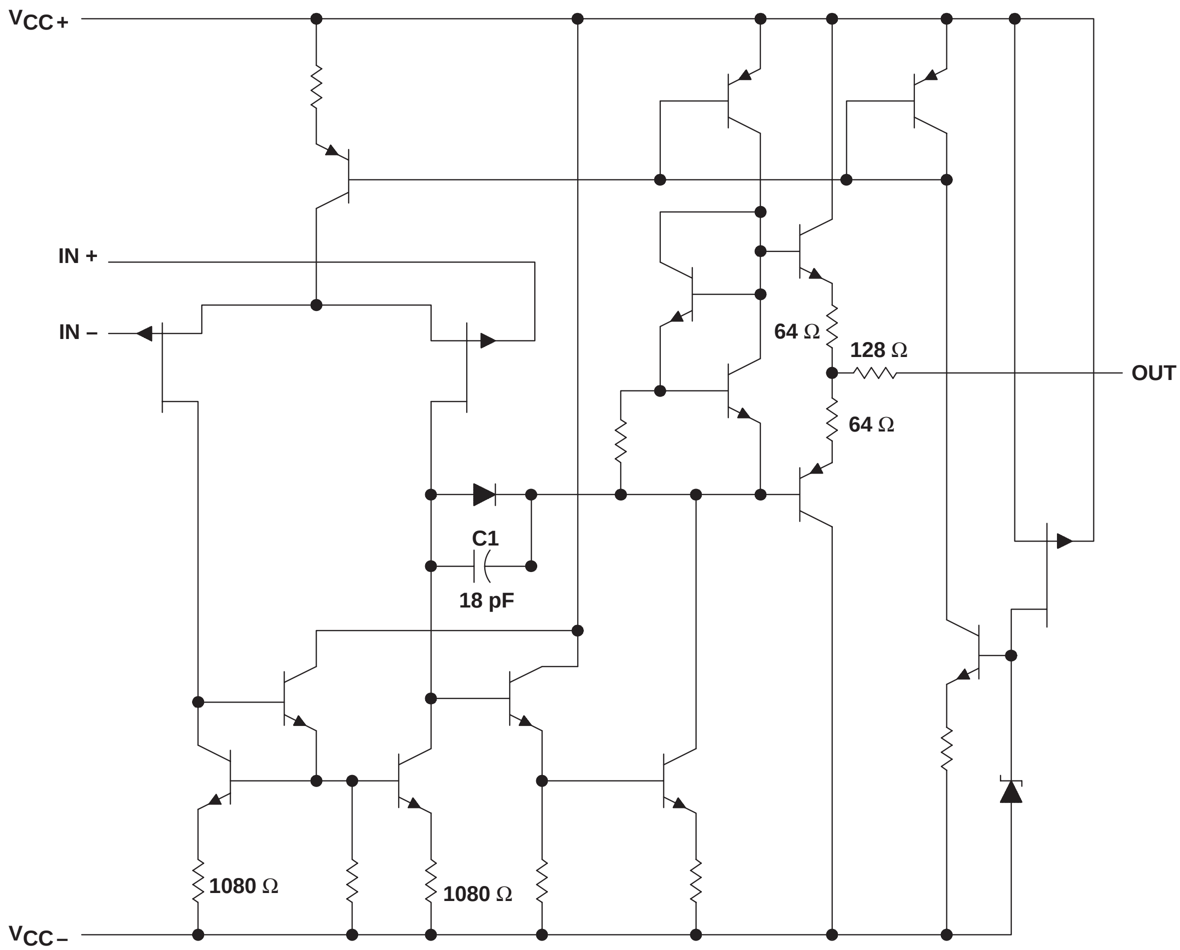


AVAILABLE OPTION

T_A	V_{IO}max AT 25°C	PACKAGE SMALL OUTLINE (DB)†
0°C to 70°C	10 mV	TL074x2DBLE

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

schematic (each amplifier)



All component values shown are nominal.

COMPONENT COUNT†	
Resistors	88
Transistors	112
JFET	20
Diodes	12
Capacitors	8

† Includes bias and trim circuitry

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 range, V_I (see Notes 1 and 3) . . . . ±15 V
Duration of output short circuit (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, 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	$T_A \le 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING
DB	1024 mW	8.2 mW/°C	655 mW

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

PARAMETER		TEST CONDITIONS†		T_A‡	MIN	TYP	MAX	UNIT
V_{IO}	Input offset voltage	V_O = Ω,	R_S = 50 Ω	25°C		3	10	mV
				Full range			13	
α_{VIO}	Temperature coefficient of input offset voltage	V_O = 0,	R_S = 50 Ω	Full range		18		µV/°C
I_{IO}	Input offset current	V_O = 0		25°C		5	100	pA
				Full range			10	nA
I_{IB}	Input bias current§	V_O = 0		25°C		65	200	pA
				Full range			7	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 kΩ		25°C	±12	±13.5		V
		R_L ≥ 10 kΩ		Full range	±12			
		R_L ≥ 2 kΩ			±10			
A_{VD}	Large-signal differential voltage amplification	V_O = ±10 V,	R_L ≥ 2 kΩ	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	$V_{IC} = V_{ICR}$min, R_S = 50 Ω	V_O = 0,	25°C	70	100		dB
k_{SVR}	Supply-voltage rejection ratio ($\Delta V_{CC\pm}/\Delta V_{IO}$)	V_{CC} = ±9 V to ±15 V, R_S = 50 Ω	V_O = 0,	25°C	70	100		dB
I_{CC}	Supply current (each amplifier)	V_O = 0,	No load	25°C		1.4	2.5	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 T_A = 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 2. Pulse techniques must be used that will maintain the junction temperature as close to the ambient temperature as possible.

operating characteristics, $V_{CC\pm}$ = ±15 V, T_A = 25°C

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
SR	Slew rate at unity gain	V_I = 10 V, C_L = 100 pF,	R_L = 2 kΩ, See Figure 1	8	13		V/µs
t_r	Overshoot factor rise time	V_I = 20 mV, C_L = 100 pF,	R_L = 2 kΩ, See Figure 1		0.1		µs
					20%		
V_n	Equivalent input noise voltage	R_S = 20 Ω	f = 1 kHz		18		nV/$\sqrt{Hz}$
			f = 10 Hz to 10 kHz		4		µV
I_n	Equivalent input noise current	R_S = 20 Ω,	f = 1 kHz		0.01		pA/$\sqrt{Hz}$
THD	Total harmonic distortion	$V_O$rms = 10 V, R_L ≥ 2 kΩ,	R_S ≤ 1 kΩ, f = 1 kHz		0.003%		

PARAMETER MEASUREMENT INFORMATION

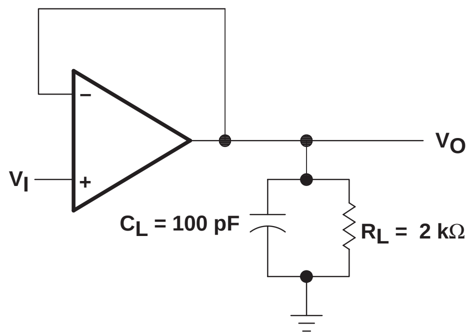


Figure 1. Unity-Gain Amplifier

TYPICAL CHARACTERISTICS

Table of Graphs

			FIGURE
I_{IB}	Input bias current	vs Free-air temperature	2
V_{OM}	Maximum peak output voltage	vs Frequency vs Free-air temperature vs Load resistance vs Supply voltage	3, 4, 5 6 7 8
A_{VD}	Large-signal differential voltage amplification	vs Free-air temperature vs Frequency	9 10
	Normalized unity-gain bandwidth	vs Free-air temperature	11
CMRR	Common-mode rejection ratio	vs Free-air temperature	12
I_{CC}	Supply current	vs Supply voltage vs Free-air temperature	13 14
P_D	Total power dissipation	vs Free-air temperature	15
	Normalized slew rate	vs Free-air temperature	16
V_n	Equivalent input noise voltage	vs Frequency	17
THD	Total harmonic distortion	vs Frequency	18
	Pulse response	Large signal	19
V_O	Output voltage	vs Time	20
	Normalized phase shift	vs Free-air temperature	11

TYPICAL CHARACTERISTICS

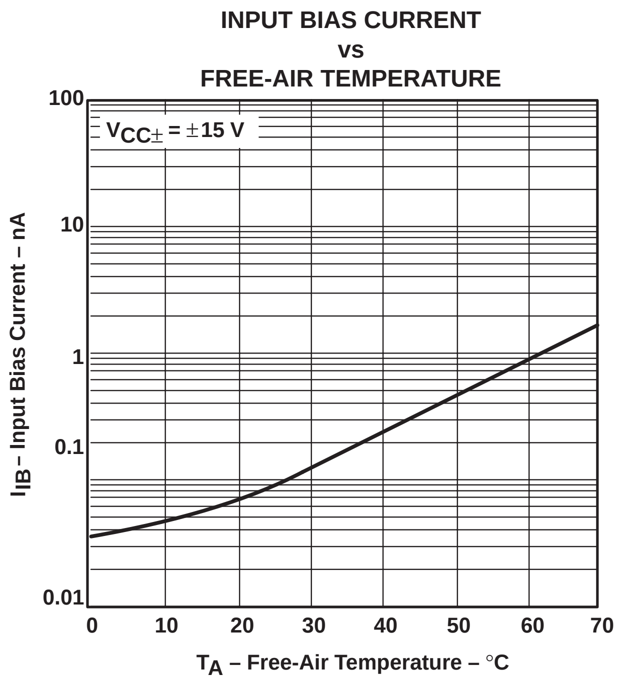


Figure 2

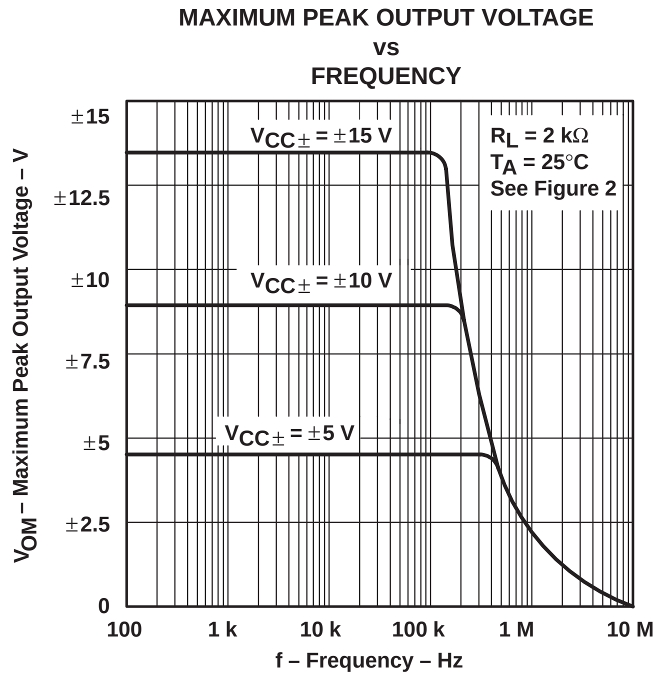


Figure 3

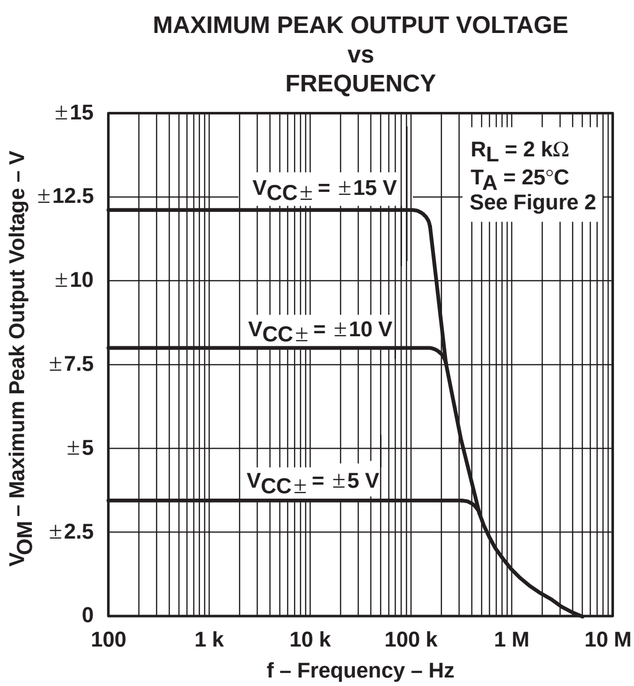


Figure 4

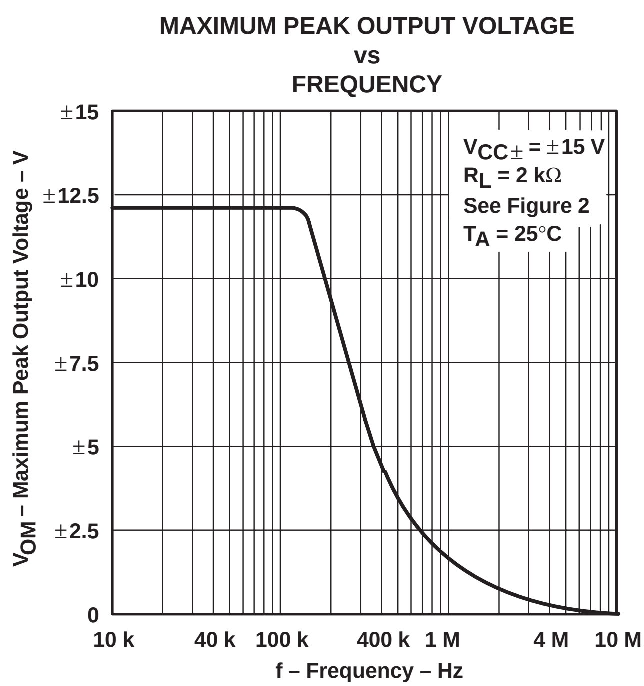


Figure 5

TYPICAL CHARACTERISTICS

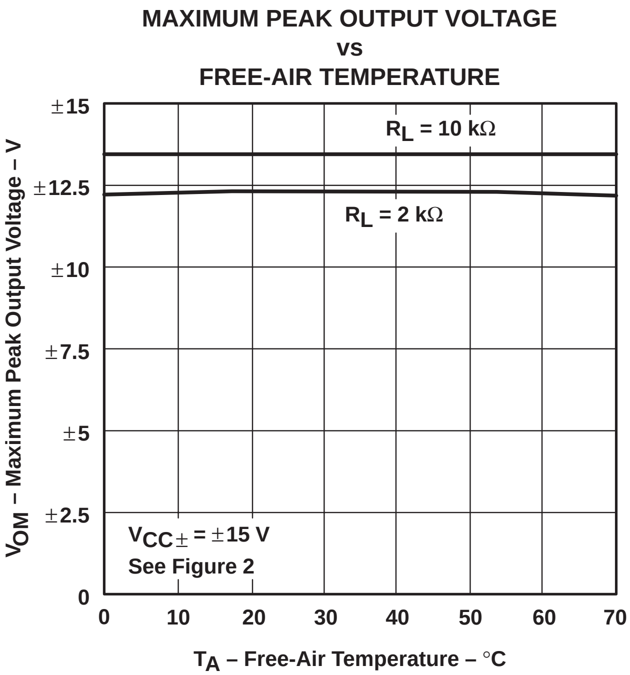


Figure 6

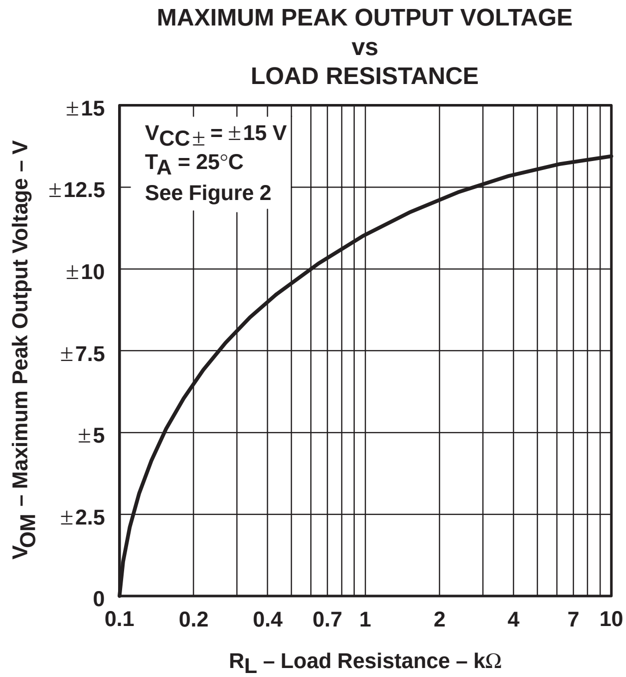


Figure 7

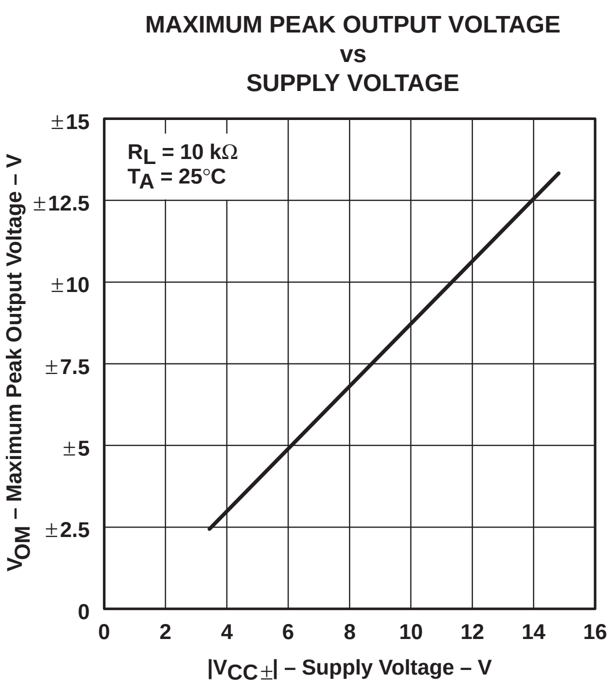


Figure 8

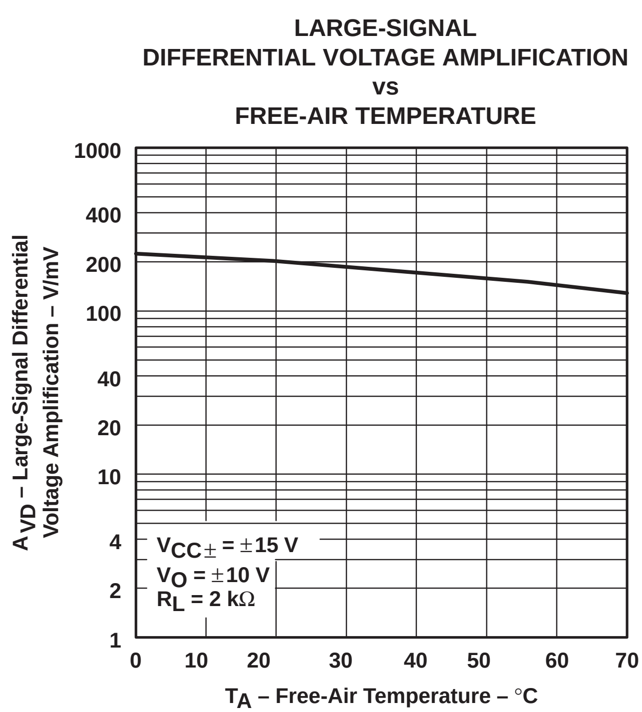


Figure 9

TYPICAL CHARACTERISTICS

LARGE-SIGNAL DIFFERENTIAL VOLTAGE AMPLIFICATION AND PHASE SHIFT vs FREQUENCY

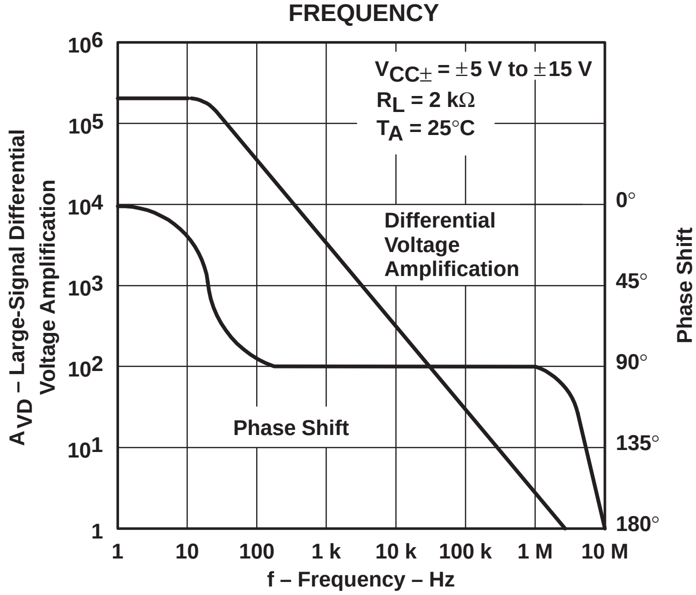


Figure 10

NORMALIZED UNITY-GAIN BANDWIDTH AND PHASE SHIFT vs FREE-AIR TEMPERATURE

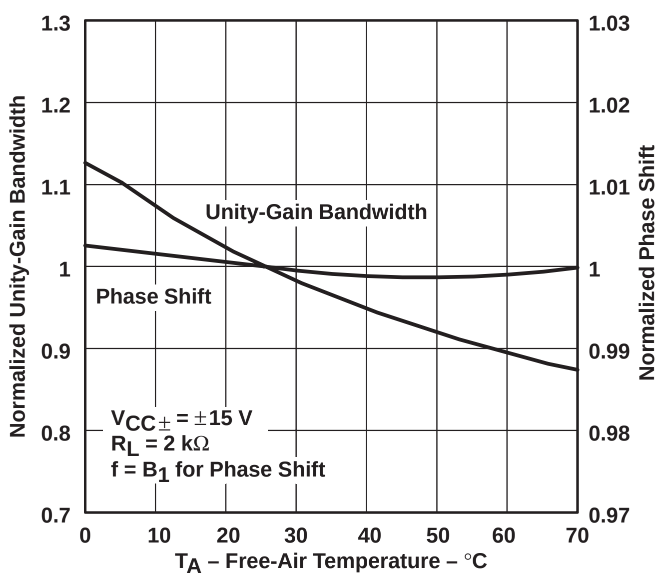


Figure 11

TYPICAL CHARACTERISTICS

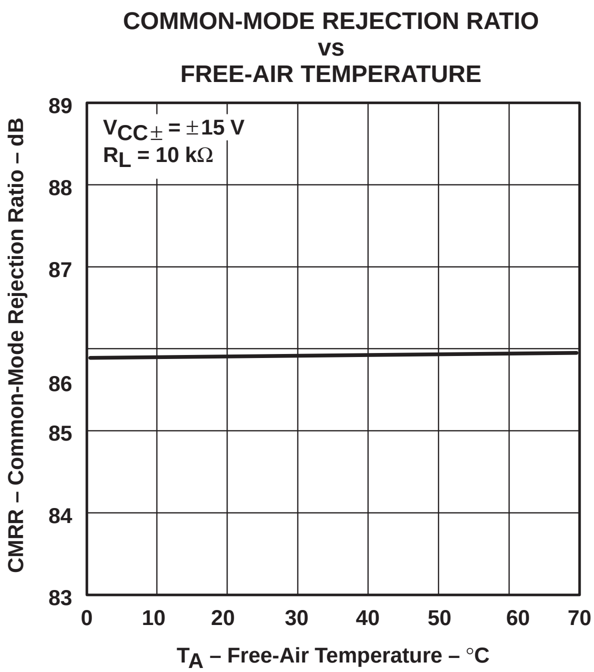


Figure 12

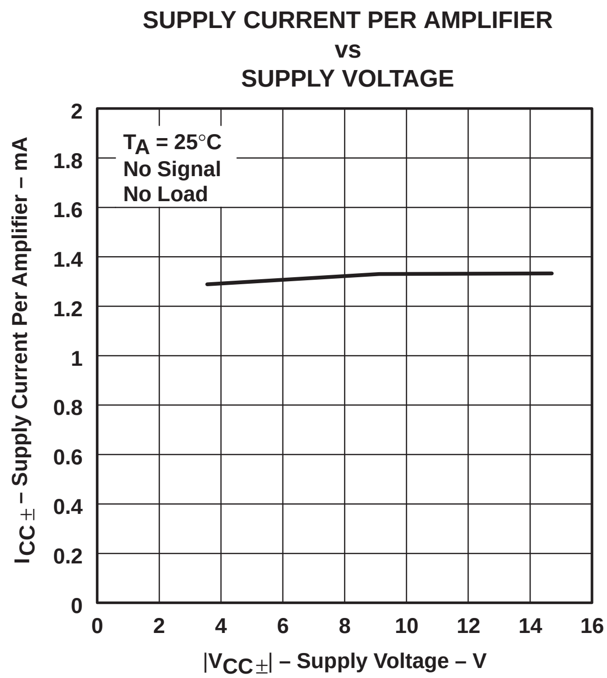


Figure 13

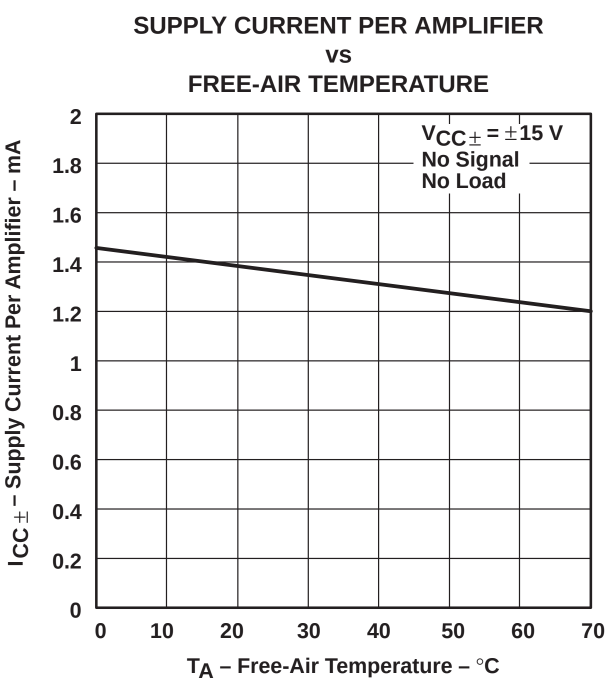


Figure 14

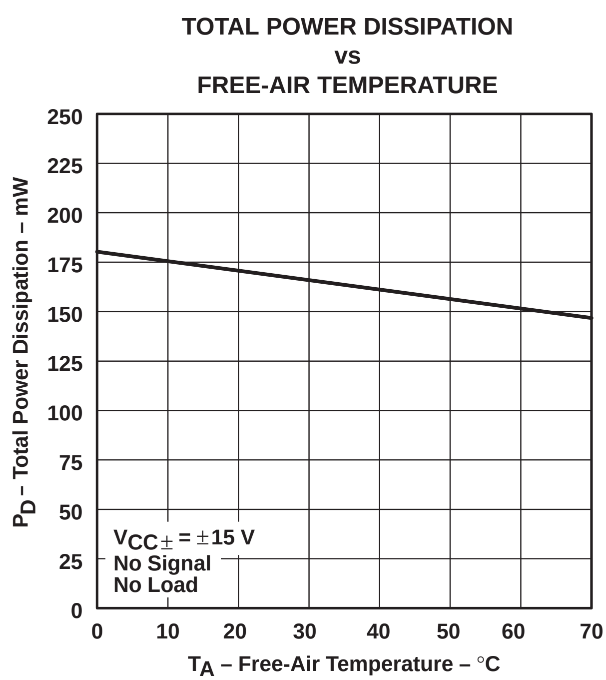


Figure 15

TYPICAL CHARACTERISTICS

NORMALIZED SLEW RATE vs FREE-AIR TEMPERATURE

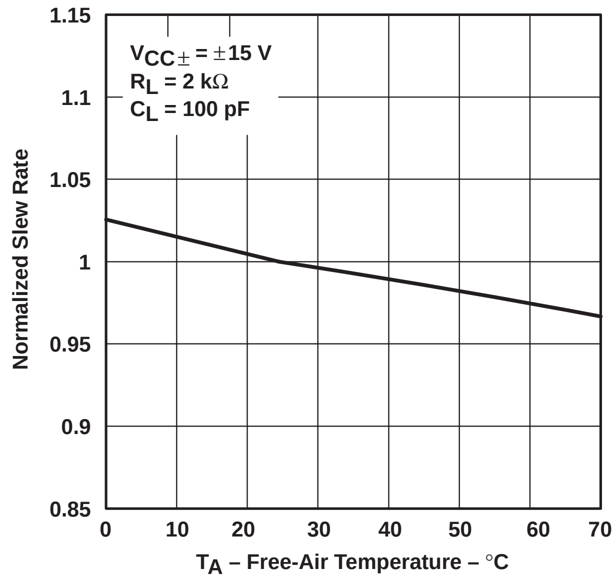


Figure 16

EQUIVALENT INPUT NOISE VOLTAGE vs FREQUENCY

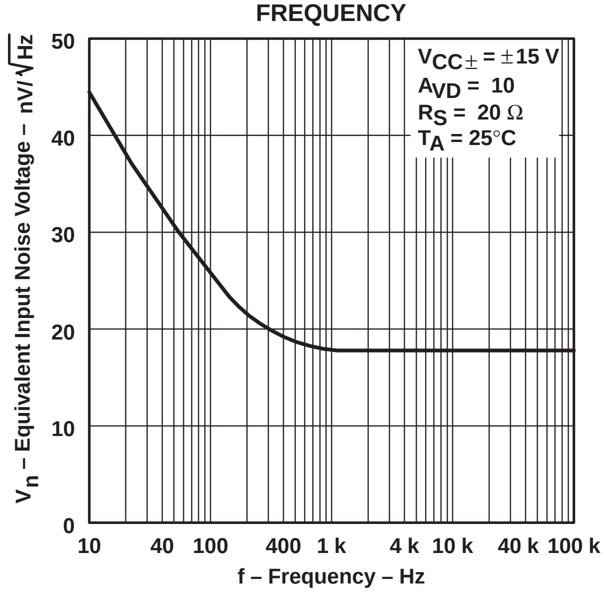


Figure 17

TOTAL HARMONIC DISTORTION vs FREQUENCY

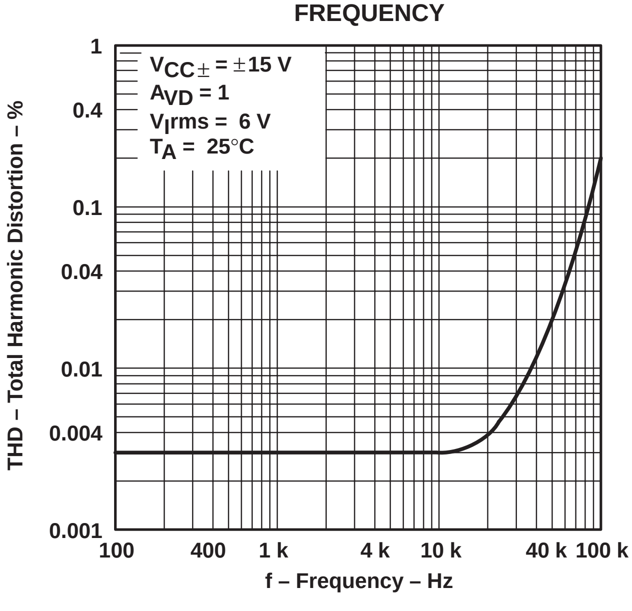


Figure 18

VOLTAGE-FOLLOWER LARGE-SIGNAL PULSE RESPONSE

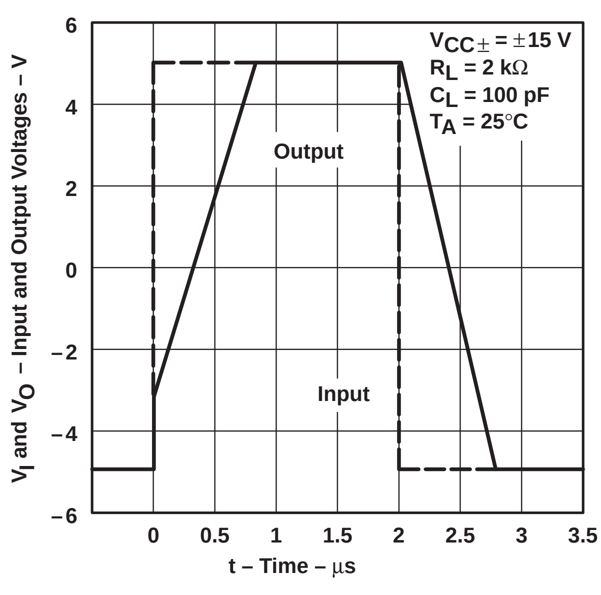


Figure 19

TYPICAL CHARACTERISTICS

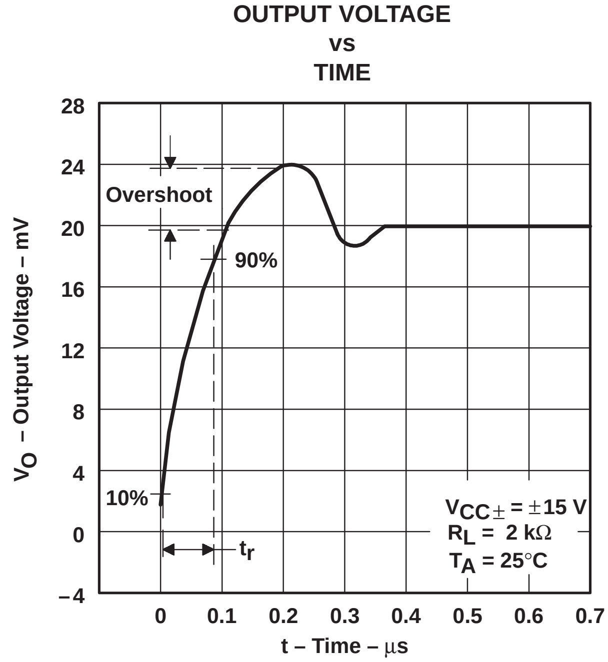


Figure 20

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