



LM4880

CMOS IC

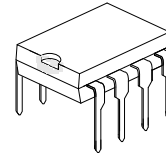
DUAL 250mW AUDIO POWER AMPLIFIER WITH SHUTDOWN MODE

DESCRIPTION

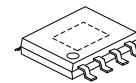
The UTC LM4880 is a dual audio power amplifier capable of delivering typically 250mW per channel of continuous average power to an 8Ω load with 0.1% THD+N using a 5V power supply.

The UTC LM4880 features an externally controlled, low-power consumption shutdown mode, as well as an internal thermal shutdown protection mechanism.

The unity-gain stable UTC LM4880 can be configured by external gain-setting resistors.



DIP-8



HSOP-8

FEATURES

- * No bootstrap capacitors or snubber circuits are necessary
- * Unity-gain stable
- * External gain configuration capability

APPLICATIONS

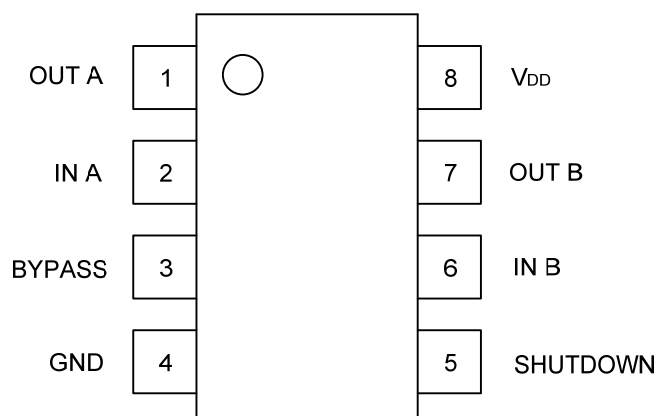
- * Personal Computers
- * CD-ROM Players
- * Headphone Amplifier

ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
LM4880L-D08-T	LM4880G-D08-T	DIP-8	Tube
LM4880L-SH2-R	LM4880G-SH2-R	HSOP-8	Tape Reel
LM4880L-SH2-T	LM4880G-SH2-T	HSOP-8	Tube

LM4880L-D08-T (1)Packing Type (2)Package Type (3)Lead Free	(1) R: Tape Reel, T: Tube (2) D08: DIP-8, SH2: HSOP-8 (3) G: Halogen Free, L: Lead Free
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■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO	PIN NAME	I/O	DESCRIPTION
1	OUT A	O	Channel A output
2	IN A	I	Channel A audio input
3	BYPASS	I	Connect to internal voltage divider for middle supply bias
4	GND		Ground
5	SHUTDOWN	I	Shutdown mode control input, high active, place LM4880 into shutdown mode, when held high
6	IN B	I	Channel B audio input
7	OUT B	O	Channel B output
8	V _{DD}		Supply voltage

■ ABSOLUTE MAXIMUM RATINGS (Note 2)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{DD}	6.0	V
Input Voltage	V_{IN}	$-0.3 \sim V_{DD}+0.3$	V
ESD Susceptibility (Note 3)	ESD	3500	V
ESD Susceptibility (Note 4)		250	V
Power Dissipation (Note 5)	P_D	Internally limited	
Junction Temperature	T_J	150	°C
Operating Temperature	T_{OPR}	-40 ~ +85	°C
Storage Temperature	T_{STG}	-65 ~ +150	°C

Notes: 1. Absolute maximum ratings are those values beyond which the device could be permanently damaged.

Absolute maximum ratings are stress ratings only and functional device operation is not implied.

2. Absolute Maximum Ratings indicate limits beyond which damage may occur. Operating ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits. Electrical Characteristics state DC and AC electrical specifications under particular test conditions which guarantee specific performance limits. This assumes that the device is within the operating ratings. Specifications are not guaranteed for parameters where no limit is given, however, the typical value is a good indication of device performance.

3. Human body model, 100 pF discharged through a 1.5 kΩ resistor.

4. Machine model, 220 pF ~ 240 pF discharged through all pins.

5. The maximum power dissipation must be derated at elevated temperatures and is dictated by T_{JMAX} , θ_{JA} , and the ambient temperature T_A . The maximum allowable power dissipation is $P_{DMAX} = (T_{JMAX} - T_A) / \theta_{JA}$ or the number given in the Absolute Maximum Ratings, whichever is lower. For the UTC LM4880, $T_{JMAX} = 150^\circ\text{C}$, and the typical junction-to-ambient thermal resistance is 170°C/W for SOP-8 package and 107°C/W for DIP-8 package.

■ THERMAL DATA

PARAMETER		SYMBOL	RATINGS	UNIT
Junction to Ambient	DIP-8	θ_{JA}	107	°C/W
	HSOP-8		42.3	
Junction to Case	DIP-8	θ_{JC}	37	°C/W
	HSOP-8		12	

■ OPERATING RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{DD}	2.7 ~ 5.5	V
Temperature Range ($T_{MIN} \leq T_A \leq T_{MAX}$)	T_A	-40 ~ +85	°C

■ ELECTRICAL CHARACTERISTICS (Note 1,2)

($T_A=25^{\circ}\text{C}$, the following specifications apply for $V_{DD}=5\text{V}$, $f=1\text{kHz}$ unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Supply Voltage	V_{DD}		2.7		5.5	V
Quiescent Power Supply Current	I_{DD}	$V_{IN}=0\text{V}$, $I_{OUT}=0\text{A}$		3.6	6.0	mA
Shutdown Current	I_{SHDN}	$V_{PIN5}=V_{DD}$		0.7	5	μA
Output Offset Voltage	$V_{O(OFF)}$	$V_{IN}=0\text{V}$		5	50	mV
Output Power	P_{OUT}	THD=0.1%(MAX), $f=1\text{kHz}$	$R_L=8\Omega$	200	250	mW
			$R_L=32\Omega$		85	mW
		THD+N=10%, $f=1\text{kHz}$	$R_L=8\Omega$		325	mW
			$R_L=32\Omega$		110	mW
Total Harmonic Distortion + Noise	THD+N	$R_L=8\Omega$, $P_{OUT}=200\text{mW}$, $f=1\text{kHz}$		0.03		%
		$R_L=32\Omega$, $P_{OUT}=75\text{mW}$, $f=1\text{kHz}$		0.02		%
Power Supply Rejection Ratio	PSRR	$C_B=1.0\mu\text{F}$, $V_{RIPPLE}=200\text{mV}_{RMS}$, $f=100\text{Hz}$		50		dB

Notes: 1. All voltages are measured with respect to the ground pin, unless otherwise specified.

2. Absolute Maximum Ratings indicate limits beyond which damage may occur. Operating ratings indicate conditions for which the device is functional, but do not guarantee specific performance limits. Electrical Characteristics state DC and AC electrical specifications under particular test conditions which guarantee specific performance limits. This assumes that the device is within the operating ratings. Specifications are not guaranteed for parameters where no limit is given, however, the typical value is a good indication of device performance.

■ TYPICAL APPLICATION

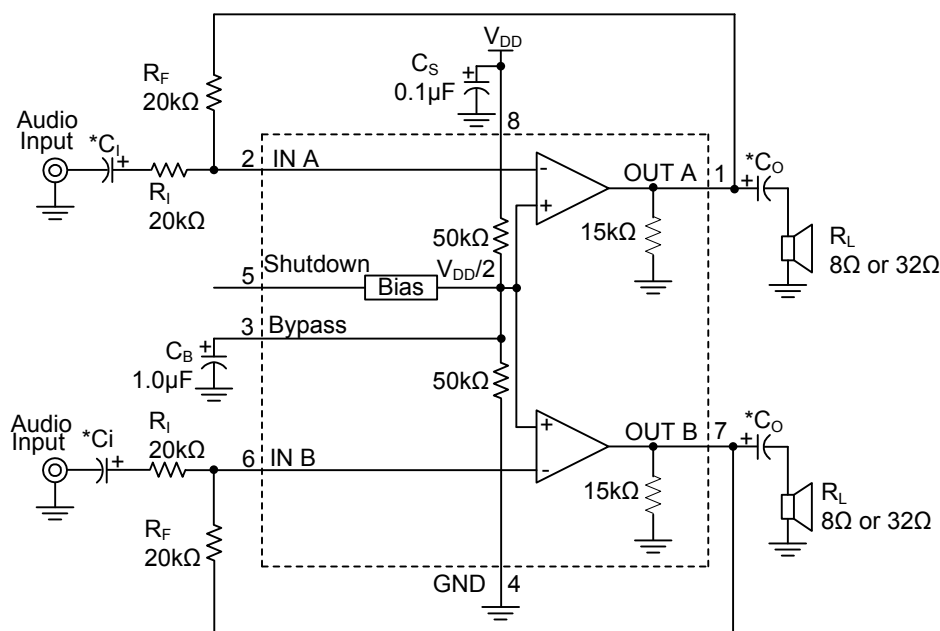


Fig. 1 Typical Audio Amplifier Application Circuit

■ EXTERNAL COMPONENTS DESCRIPTION (Fig. 1)

COMPONENTS	FUNCTIONAL DESCRIPTION
1. R_I	Inverting input resistance which sets the closed-loop gain in conjunction with R_F . This resistor also forms a high pass filter with C_I at $f_C = 1/(2\pi R_I C_I)$.
2. C_I	Input coupling capacitor which blocks the DC voltage at the amplifier's input terminals. Also creates a high pass filter with R_I at $f_C = 1/(2\pi R_I C_I)$.
3. R_F	Feedback resistance which sets closed-loop gain in conjunction with R_I .
4. C_S	Supply bypass capacitor which provides power supply filtering.
5. C_B	Bypass pin capacitor which provides half-supply filtering.
6. C_O	Output coupling capacitor which blocks the DC voltage at the amplifier's output. Forms a high pass filter with R_L at $f_O = 1/(2\pi R_L C_O)$.

The diagram shows a single-channel audio amplifier circuit. The input is labeled "AUDIO INPUT" and is connected to the non-inverting input (pin 3) of the LM4880. The input signal passes through a 0.33μF capacitor and a 20kΩ resistor. The non-inverting input is also connected to ground through a 1μF capacitor. The inverting input (pin 2) is connected to the output (pin 1) through a 20kΩ resistor. The output is connected to a 100μF capacitor, which is then connected to a 1kΩ resistor (labeled R_O) and a 100kΩ resistor (labeled R_{SD}). The 100kΩ resistor is connected to ground through a 1MΩ resistor (labeled R_P). The output is also connected to a "HEADPHONE JACK" and a "TO CHANNEL B OUTPUT (PIN 7) VIA COUPLING CAPACITOR". The LM4880 is powered by V_{DD} and has a 0.1μF capacitor connected to its pin 8.

■ AUTOMATIC SWITCHING CIRCUIT

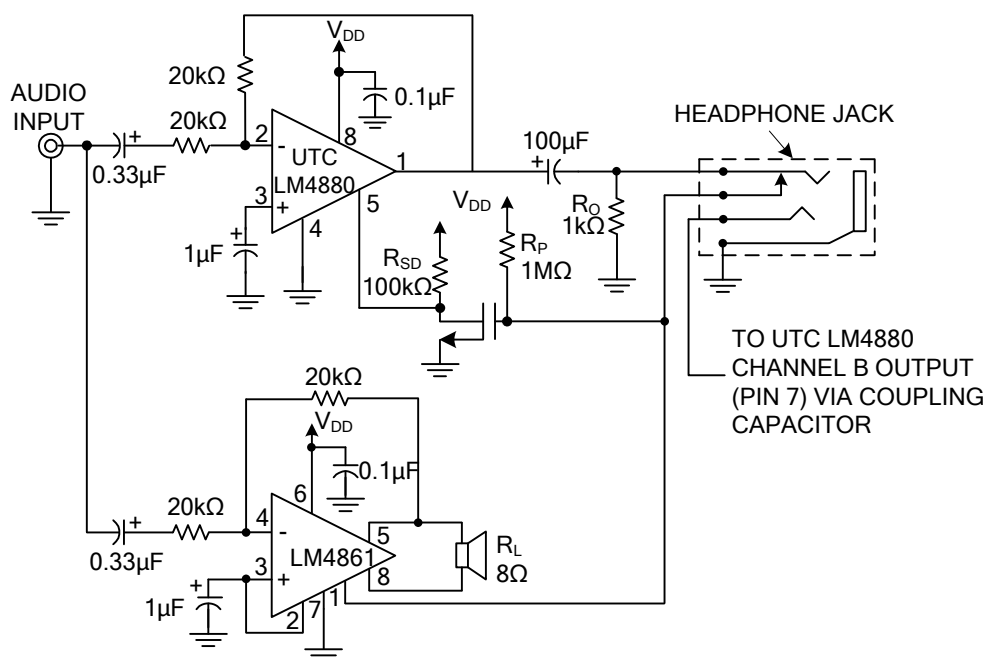
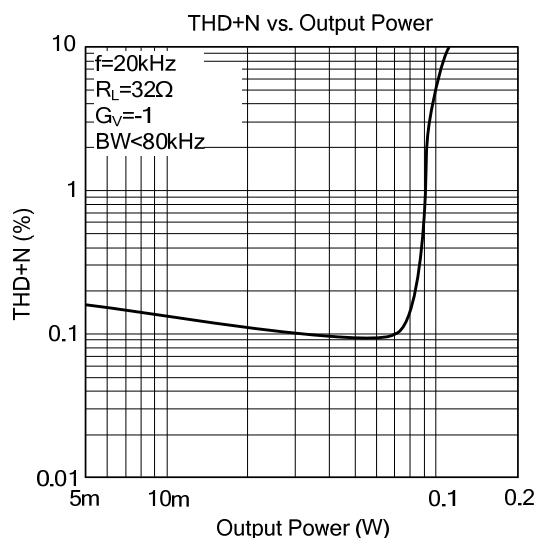
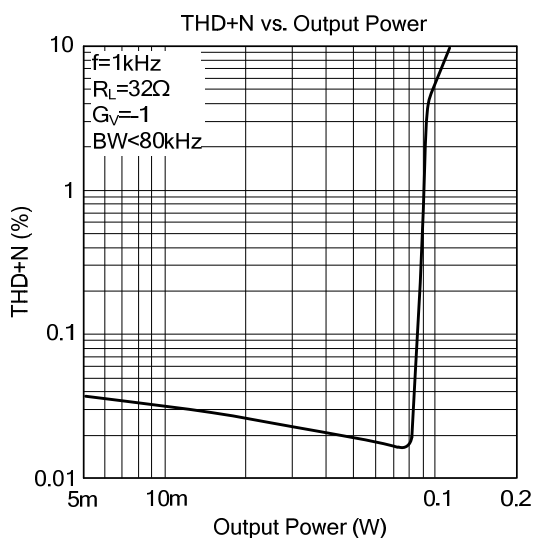
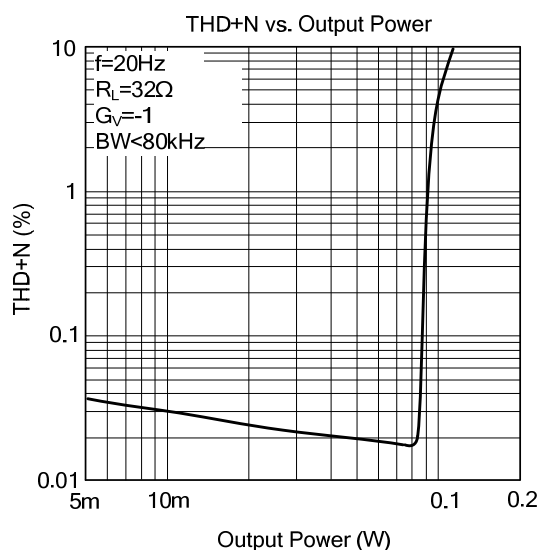
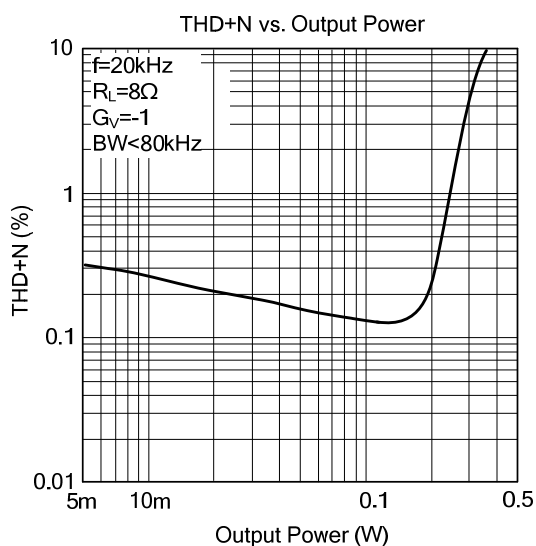
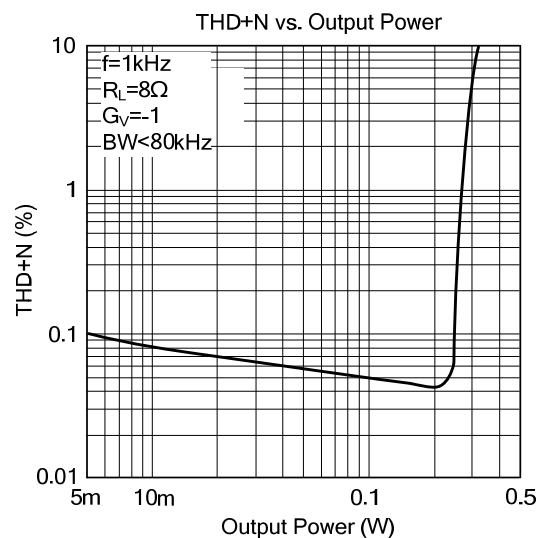
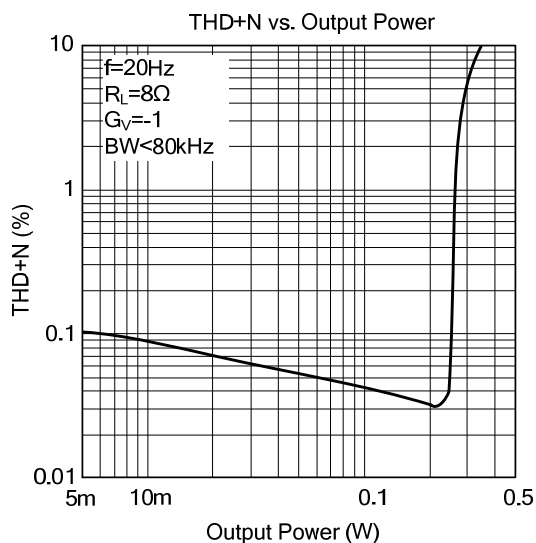
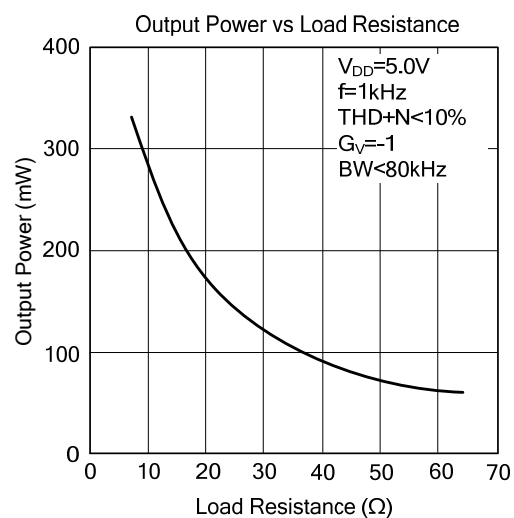
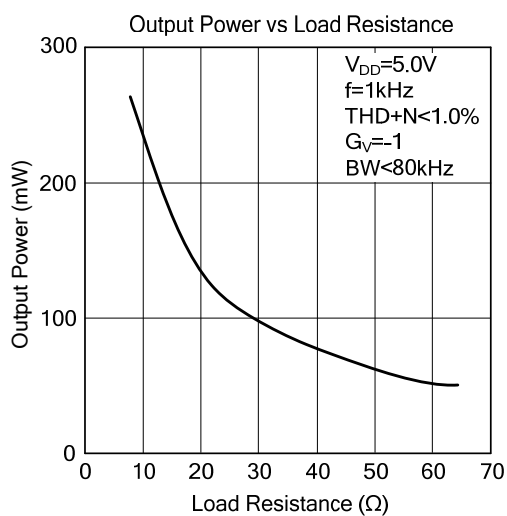
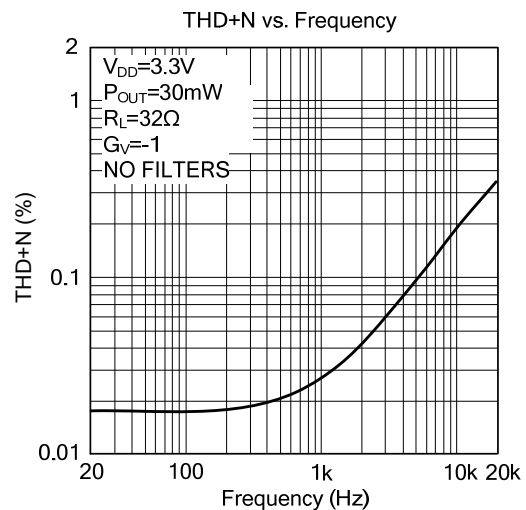
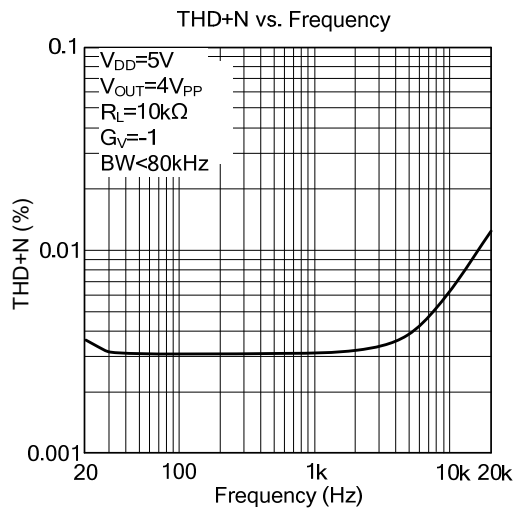
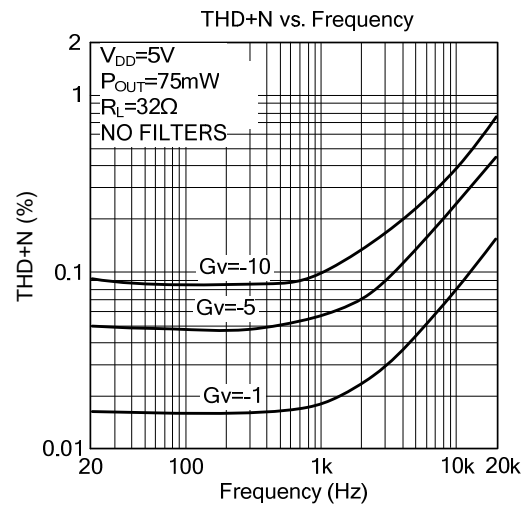
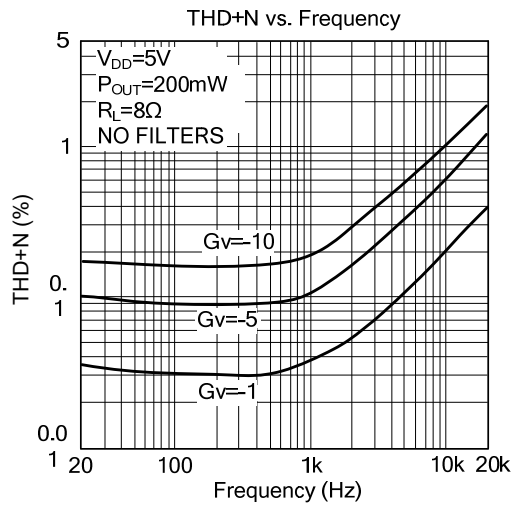


Fig. 3 Automatic Switching Circuit

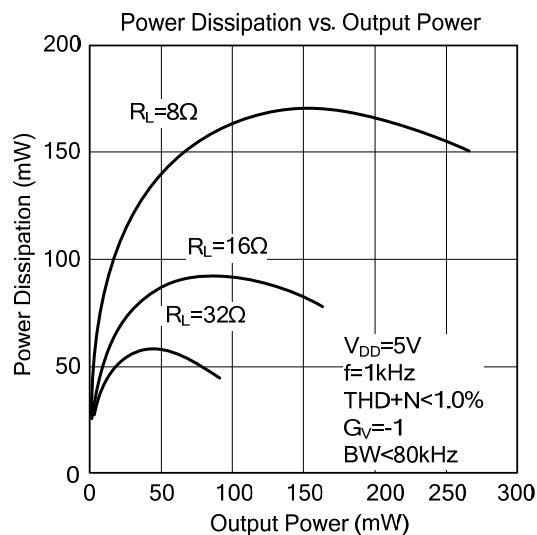
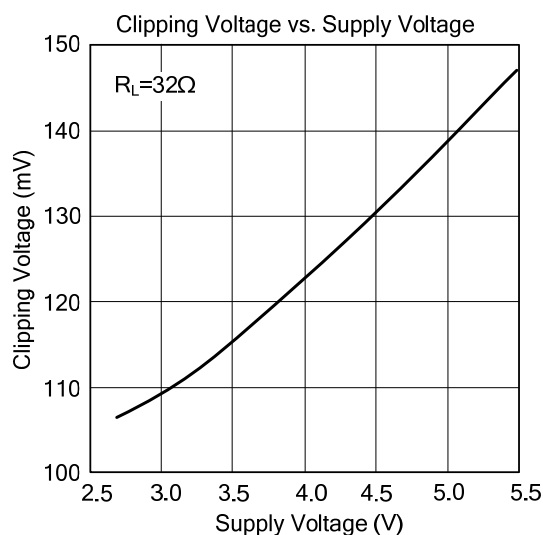
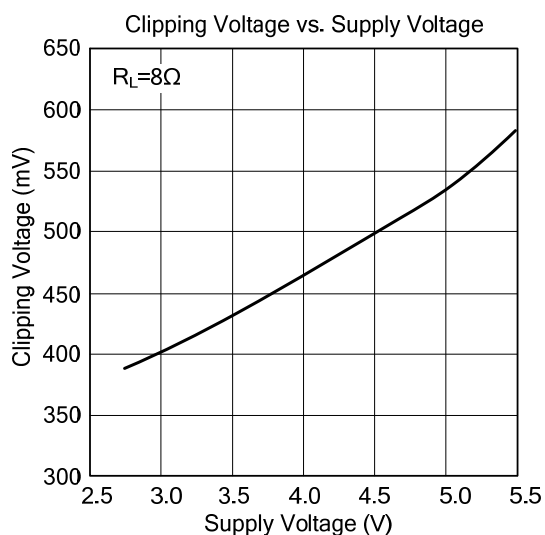
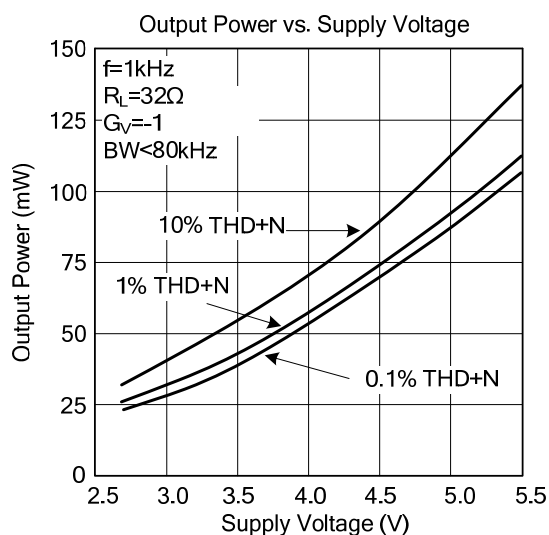
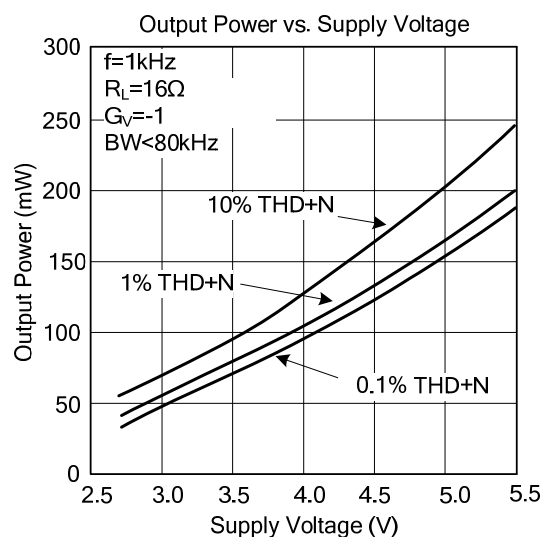
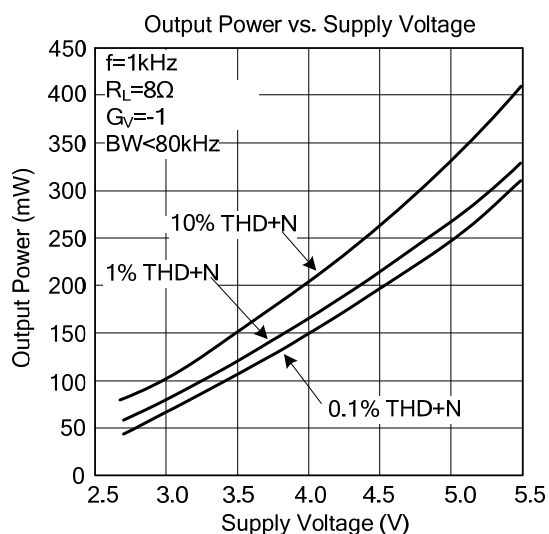
TYPICAL CHARACTERISTICS



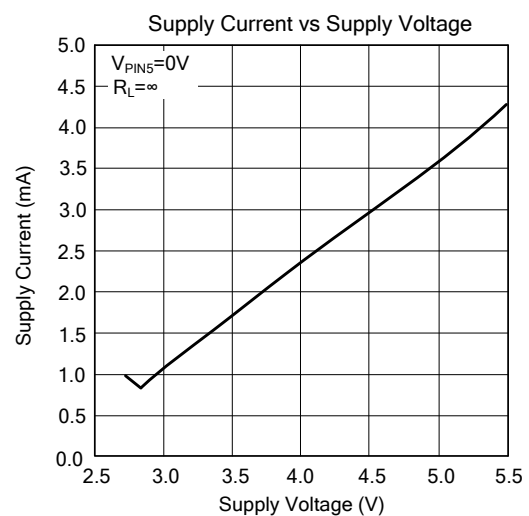
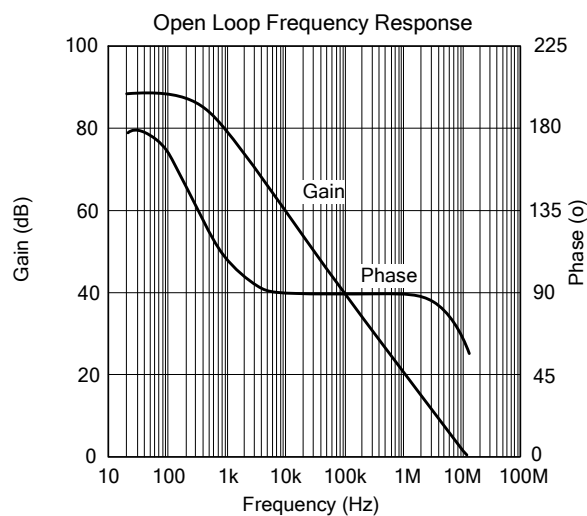
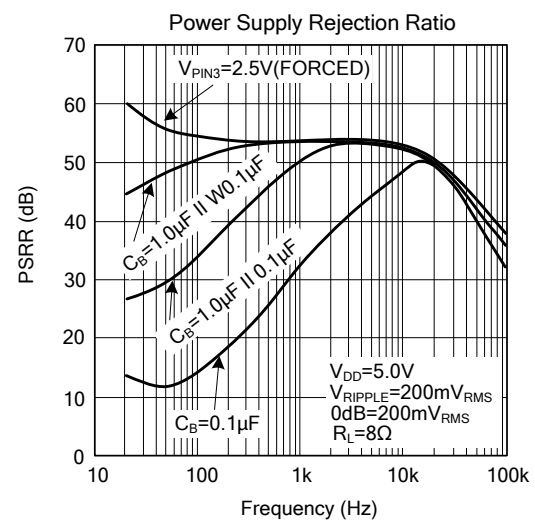
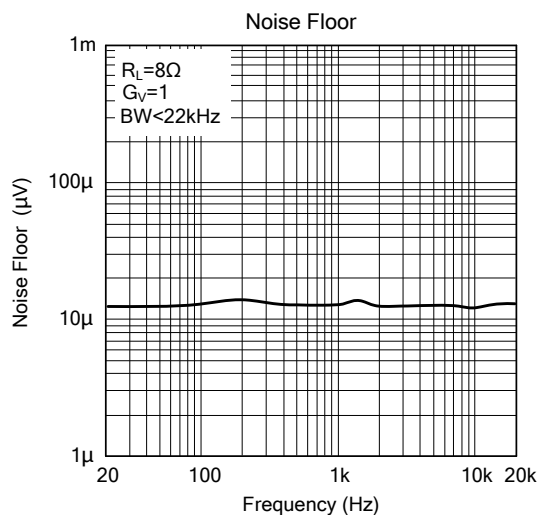
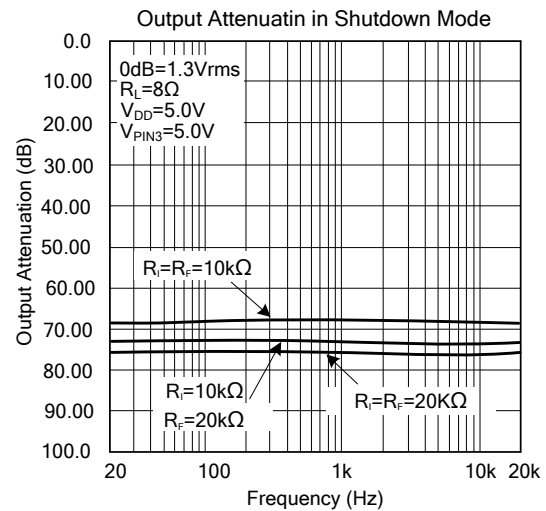
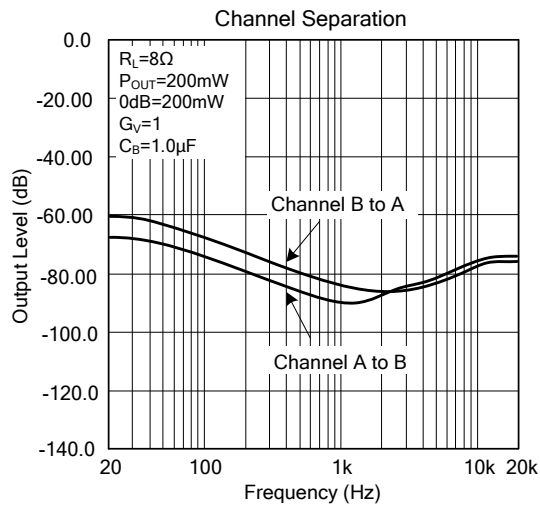
■ TYPICAL CHARACTERISTICS(Cont.)



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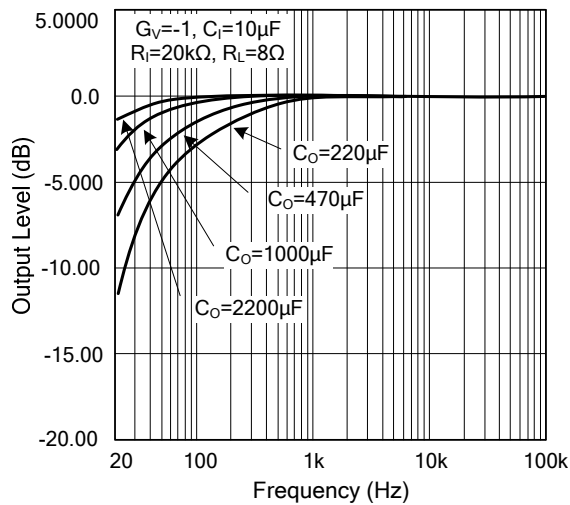


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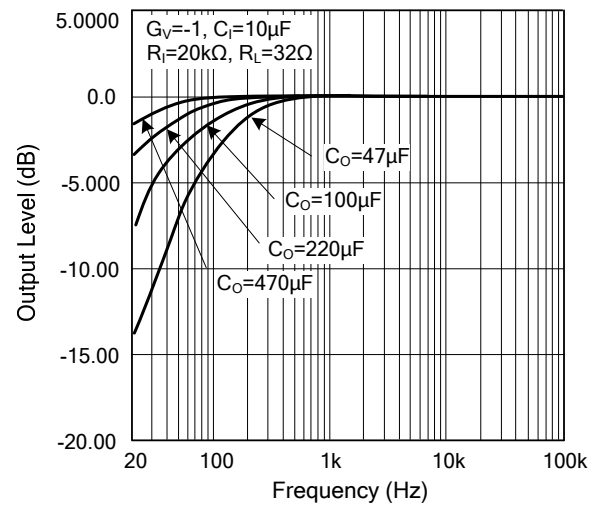


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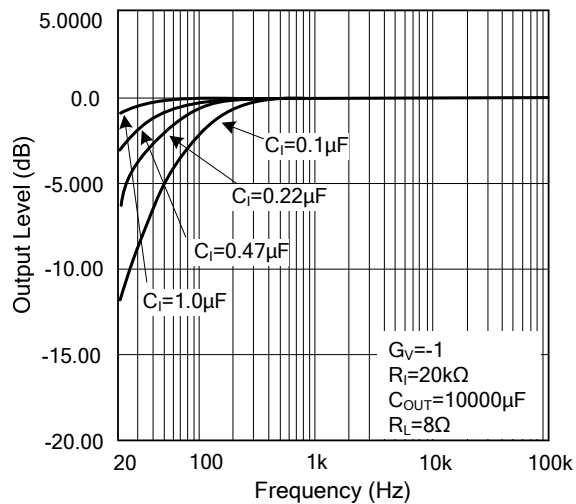
Frequency Response vs. Output Capacitor Size



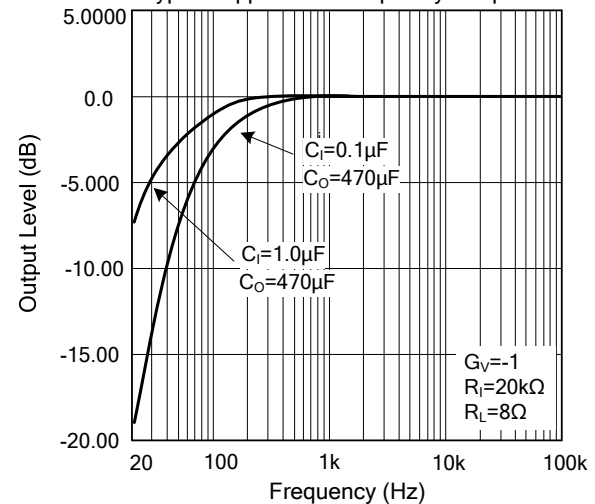
Frequency Response vs. Output Capacitor Size



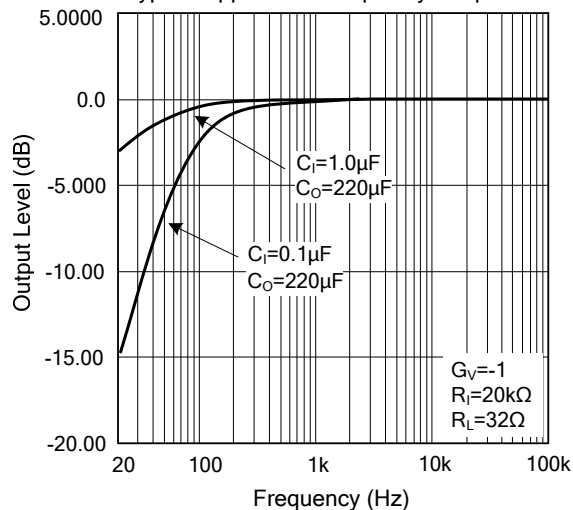
Frequency Response vs Input Capacitor Size



Typical Application Frequency Response



Typical Application Frequency Response



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