

LM4876 Boomer® Audio Power Amplifier Series

1.1W Audio Power Amplifier with Logic Low Shutdown

General Description

The LM4876 is a single 5V supply bridge-connected audio power amplifier capable of delivering 1.1W (typ) of continuous average power to an 8Ω load with 0.5% THD+N.

Like other audio amplifiers in the Boomer series, the LM4876 is designed specifically to provide high quality output power with a minimal amount of external components. The LM4876 does not require output coupling capacitors, bootstrap capacitors, or snubber networks. It is perfectly suited for low-power portable systems.

The LM4876 features an active low externally controlled, micro-power shutdown mode. Additionally, the LM4876 features an internal thermal shutdown protection mechanism. For PCB space efficiency, the LM4876 is available in MSOP and SO surface mount packages.

The unity-gain stable LM4876's closed loop gain is set using external resistors.

Key Specifications

■ THD+N at 1kHz for 1W continuous average output power into 8Ω	0.5% (max)
■ Output power at 1kHz into 8Ω with 10% THD+N	1.5W (typ)
■ Shutdown current	0.01μA (typ)
■ Supply voltage range	2.0V to 5.5V

Features

- Does not require output coupling capacitors, bootstrap capacitors, or snubber circuits
- 10-pin MSOP and 8-pin SO packages
- Unity-gain stable
- External gain set

Applications

- Mobile Phones
- Portable Computers
- Desktop Computers
- Low-Voltage Audio Systems

Typical Application

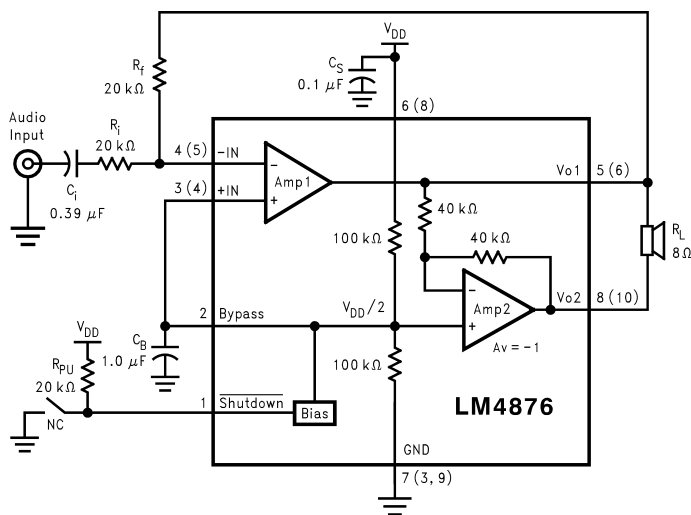
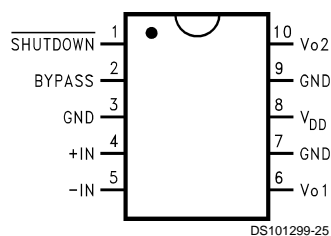


FIGURE 1. Typical LM4876 Audio Amplifier Application Circuit. Numbers in () are specific to the 10-pin MSOP package

Connection Diagram

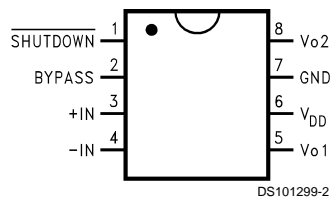
Mini Small Outline MSOP Package



Top View

Order Number LM4876MM
See NS Package Number MUB10A

Small Outline SO Package



Top View

Order Number LM4876M
See NS Package Number M08A

Absolute Maximum Ratings (Note 2)

If Military/Aerospace specified devices are required, please contact the National Semiconductor Sales Office/Distributors for availability and specifications.

Supply Voltage	6.0V
Storage Temperature	–65°C to +150°C
Input Voltage	–0.3V to $V_{DD} + 0.3V$
Power Dissipation (Note 3)	Internally Limited
ESD Susceptibility (Note 4)	2500V
ESD Susceptibility (Note 5)	250V
Junction Temperature	150°C
Soldering Information	
Small Outline Package	
Vapor Phase (60 sec.)	215°C

Infrared (15 sec.)

220°C

See AN-450 "Surface Mounting and their Effects on Product Reliability" for other methods of soldering surface mount devices.

θ_{JC} (typ)—MUB10A	56°C/W
θ_{JA} (typ)—MUB10A	210°C/W
θ_{JC} (typ)—M08A	35°C/W
θ_{JA} (typ)—M08A	140°C/W

Operating Ratings

Temperature Range

$$T_{MIN} \leq T_A \leq T_{MAX}$$

$$-40^\circ\text{C} \leq T_A \leq 85^\circ\text{C}$$

Supply Voltage

$$2.0V \leq V_{DD} \leq 5.5V$$

Electrical Characteristics (Notes 1, 2)

The following specifications apply for $V_{DD} = 5V$ unless otherwise specified. Limits apply for $T_A = 25^\circ\text{C}$.

Symbol	Parameter	Conditions	LM4876		Units (Limits)
			Typical	Limit	
			(Note 6)	(Note 7)	
V_{DD}	Supply Voltage			2.0 5.5	V (min) V (max)
I_{DD}	Quiescent Power Supply Current	$V_{IN} = 0V$, $I_O = 0A$	6.5	10.0	mA (max)
I_{SD}	Shutdown Current	$V_{PIN1} = 0V$	0.01	2	μA (max)
V_{OS}	Output Offset Voltage	$V_{IN} = 0V$	5	50	mV (max)
P_O	Output Power	THD = 0.5% (max); $f = 1\text{ kHz}$; $R_L = 8\Omega$ THD+N = 10%; $f = 1\text{ kHz}$; $R_L = 8\Omega$	1.10 1.5	1.0	W (min) W
THD+N	Total Harmonic Distortion+Noise	$P_O = 1\text{ Wrms}$; $A_{VD} = 2$; $20\text{ Hz} \leq f \leq 20\text{ kHz}$; $R_L = 8\Omega$	0.25		%
PSRR	Power Supply Rejection Ratio	$V_{DD} = 4.9V$ to $5.1V$	65		dB

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

Note 2: *Absolute Maximum Ratings* indicate limits beyond which damage to the device 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 that guarantee specific performance limits. This assumes that the device operates within the Operating Ratings. Specifications are not guaranteed for parameters where no limit is given. The typical value, however, is a good indication of device performance.

Note 3: 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 Absolute Maximum Ratings, whichever is lower. For the LM4876, $T_{JMAX} = 150^\circ\text{C}$. The typical junction-to-ambient thermal resistance is 140°C/W for the M08A package and 210°C/W for the MUB10A package.

Note 4: Human body model, 100 pF discharged through a 1.5 k Ω resistor.

Note 5: Machine Model, 220 pF–240 pF discharged through all pins.

Note 6: Typicals are measured at 25°C and represent the parametric norm.

Note 7: Limits are guaranteed to National's AOQL (Average Outgoing Quality Level).

Electrical Characteristics $V_{DD} = 5/3.3/2.6V$

Symbol	Parameter	Conditions	LM4876		Units (Limits)
			Typical	Limit	
			(Note 6)	(Note 7)	
V_{IH}	Shutdown Input Voltage High			1.2	V(min)
V_{IL}	Shutdown Input Voltage Low			0.4	V(max)