3-Walts Mono Filter-free Audio Power Amplifier

General Description

The LPA8003S is an audio power amplifier designed for portable communication device applications such as mobile phone applications. The LPA8003S is capable of delivering 3W of continuous average power to an 4Ω BTL and with less than 10% distortion (THD+N) from a 5.0V power supply. The LPA8003S provides high quality audio while requiring few external components and minimal power consumption. It features a low-power shutdown mode, which is achieved by driving the SHUTDOWN pin with logic low.

The LPA8003S contains circuitry to prevent from “pop and click” noise that would otherwise occur during turn-on and turn-off transitions. For maximum flexibility, the LPA8003S provides an externally controlled gain (with resistors), as well as an externally controlled turn-on and turn-off times (with the bypass capacitor).

The LPA8003S is available in SOP8 package.

Order Information

LPA8003S □ □ □

- F: Pb-Free
- Package Type
  - SO: SOP-8

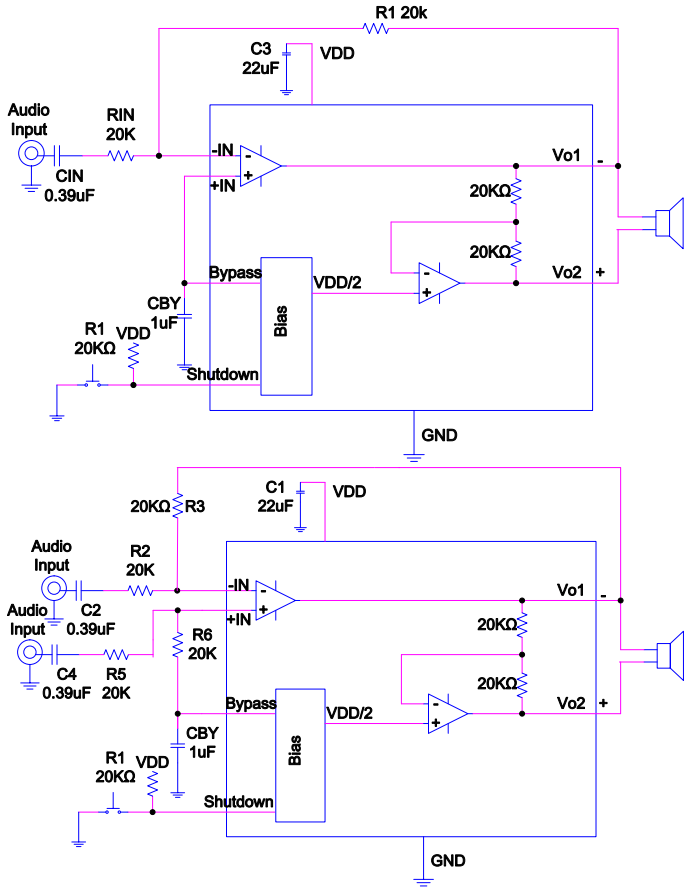
Applications

- ✧ PMP,PSP,Game,Data-Bank
- ✧ Cellular and Smart mobile phone

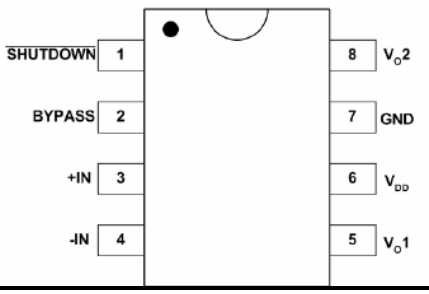
Features

- ◆ 2.5-5.5V operation
- ◆ 65dB PSRR at 217Hz, VDD=5V
- ◆ 0.1μA ultra low current shutdown mode
- ◆ Improved pop & click circuitry
- ◆ Unique Modulation Scheme Reduces EMI Emissions
- ◆ No output coupling capacitors, snubber networks or bootstrap capacitors required
- ◆ External gain configuration capability
- ◆ Shutdown Pin has 1.8V Compatible Thresholds
- ◆ BTL output can drive capacitive loads
- ◆ RoHS compliant and 100% lead(Pb)-free

Typical Application Circuit



Functional Pin Description

Package Type	Pin Configurations
SOP-8	

Pin Description

Pin No.	Pin Name	DESCRIPTION
1	SHUTDOWN	The device enters in shutdown mode when a high level is applied on this pin.
2	BYPASS	Bypass capacitor pin which provides the common mode voltage.
3	+IN	Positive input of the first amplifier, receives the common mode voltage.
4	-IN	Negative input of the first amplifier, receives the audio input signal. Connected to the feedback resistor Rf and to the input resistor Rin.
5	V_{O1}	Negative output of the LPA8003S. Connected to the load and to the feedback resistor Rf.
6	V_{DD}	Analog VDD input supply.
7	GND	Ground connection for circuitry.
8	V_{O2}	Positive output of the LPA8003S.

Absolute Maximum Ratings

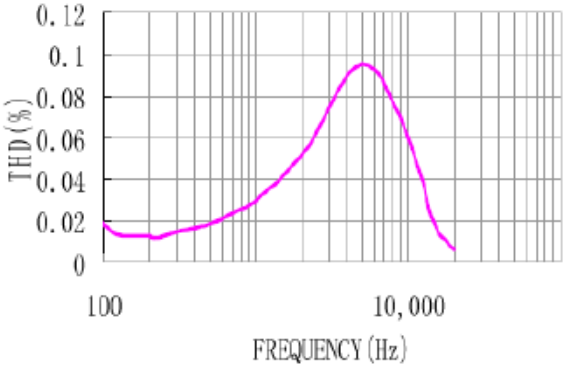
- ✧ Input Voltage to GND (V_{INA}, V_{INB}) ---------- 6V
- ✧ Adapter Voltage to GND (V_{ADP}) ---------- -0.3V to 6V
- ✧ Supply Voltage, V_{DD} ---------- -0.3 V to 6V
- ✧ Voltage at Any Input Pin ---------- -0.3 V to V_{DD} +0.3
- ✧ Junction Temperature, TJMAX ---------- 150°C
- ✧ Storage Temperature Rang, T_{stg} ---------- -65°C to 150°C
- ✧ ESD Susceptibility ---------- 2 kV
- ✧ Lead temperature from case for 10 seconds ---------- 260°C
- ✧ Thermal Resistance ---------- 57°C/W

Electrical Characteristics

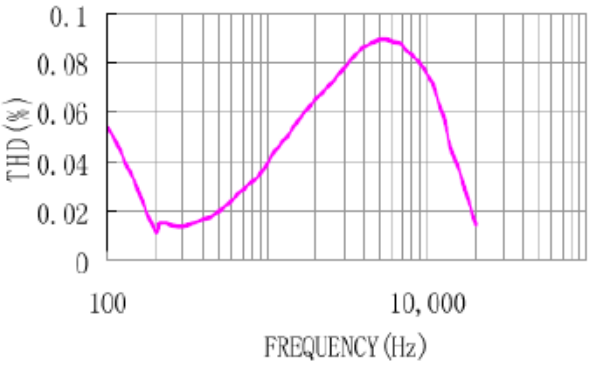
Symbol	Parameter	Conditions		LPA8003S			Unit
				Min.	Typ.	Max.	
V_{OS}	Output offset voltage (measured differentially)	Vi=0V,Av=2V/V,V_{DD}=2.5V to 5.5V			5	25	mV
I_Q	Quiescent current	V_{DD}=5.5V, no load			5		mA
		V_{DD}=3.6V, no load			4		
		V_{DD}=2.5V, no load			3		
I_{SHDN}	Shutdown Current	V_{SHDN}=0.35V, V_{DD}=2.5V to 5.5V		0.1	2.0		μA
P_O	Output Power	V_{DD}=5V，THD=1%,F=1KHz,R_L=4Ω			2.4		W
		V_{DD}=5V，THD=1%,F=1KHz,R_L=8Ω			1.8		
		V_{DD}=5V，THD=10%,F=1KHz,R_L=4Ω			3.0		
		V_{DD}=5V，THD=10%,F=1KHz,R_L=8Ω			2.1		
I_{LIM}	P-Channel Current Limit			1.2			A
$R_{DS(ON)}$	Static drain-source on-state resistance	V_{DD}=5.5V, no load			400		mΩ
		V_{DD}=3.6V, no load			500		
		V_{DD}=2.5V, no load			700		
THD+N	Total harmonic distortion plus noise	V_{DD}=5V,Po=1W,R_L=8Ω,f=1KHz		0.123			%
		V_{DD}=3.6V,Po=0.5W,R_L=8Ω,f=1KHz		0.130			
		V_{DD}=2.5V,Po=0.2W,R_L=8Ω,f=1KHz		0.163			
PSRR	Supply ripple rejection ratio	V_{DD}=5V,Inputs ac-grounded with Ci=2uF	F=217Hz, Vripple=200mVpp		-68		dB
CMRR	Common mode rejection ratio	V_{DD}=3.6V, Vic=1Vpp	F=217Hz		-58		dB
Zt	Start-up time from shutdown	V_{DD}=3.6V			45		mS

Typical Operating Characteristics

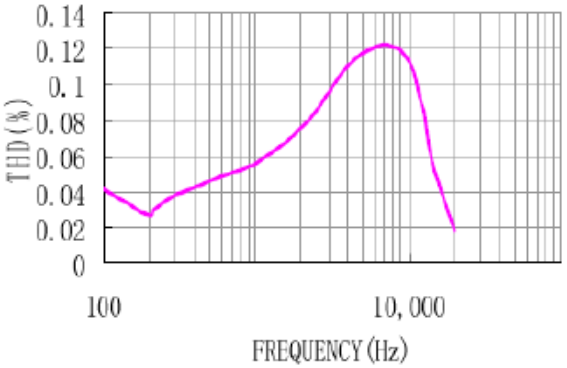
THD vs Frequency
T=25℃, Vdd=5V, RL=8Ω, and Po=500mW



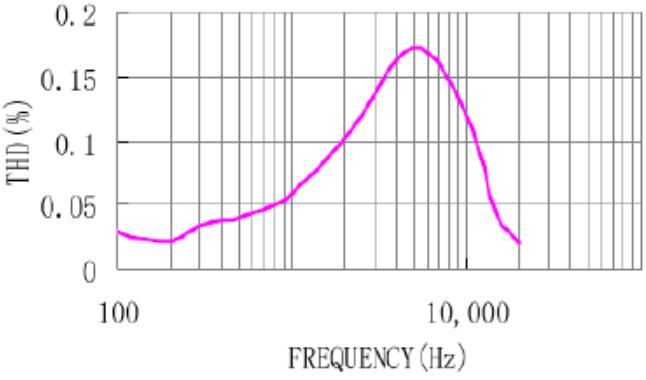
THD vs Frequency
T=25℃, Vdd=3.3V, RL=8Ω, and Po=425mW



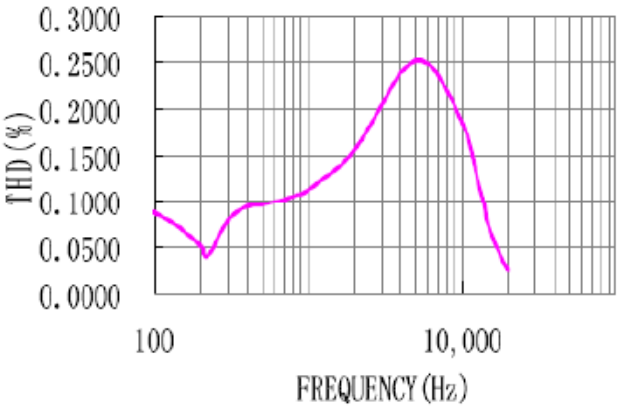
THD vs Frequency
T=25℃, Vdd=2.5V, RL=8Ω, and Po=150mW



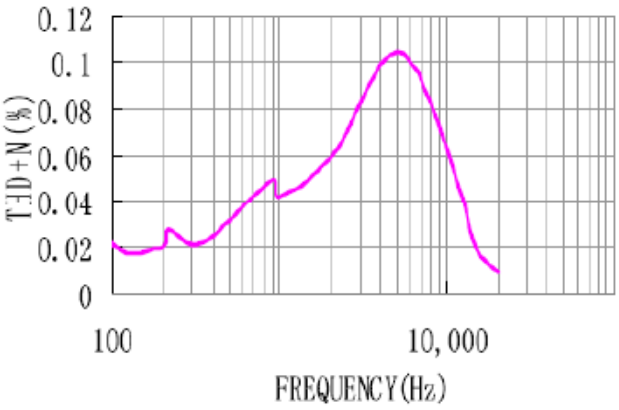
THD vs Frequency
T=25℃, Vdd=3.3V, RL=4Ω, and Po=425mW



THD vs Frequency
T=25℃, Vdd=2.5V, RL=4Ω, and Po=150mW



THD+N vs Frequency
T=25℃, Vdd=5V, RL=8Ω, and Po=500mW



Layout Considerations

As output power increases, interconnect resistance (PCB traces and wires) between the amplifier, load and power supply create a voltage drop. The voltage loss on the traces between the LPA8003S and the load results is lower output power and decreased efficiency. Higher trace resistance between the supply and the LPA8003S has the same effect as a poorly regulated supply, increase ripple on the supply line also reducing the peak output power. The effects of residual trace resistance increases as output current increases due to higher output power, decreased load impedance or both. To maintain the highest output voltage swing and corresponding peak output power, the PCB traces that connect the output pins to the load and the supply pins to the power supply should be as wide as possible to minimize trace resistance.

The use of power and ground planes will give the best THD+N performance. While reducing trace resistance, the use of power planes also creates parasite capacitors that help to filter the power supply line.

The inductive nature of the transducer load can also result in overshoot on one or both edges, clamped by the parasitic diodes to GND and V_{DD} in each case. From an EMI stand- point, this is an aggressive waveform that can radiate or conduct to other components in the system and cause interference. It is essential to keep the power and output traces short and well shielded if possible. Use of ground planes, beads, and micro-strip layout techniques are all useful in preventing unwanted interference.

As the distance from the LPA8003S and the speaker increase, the amount of EMI radiation will increase since the output wires or traces acting as antenna become more efficient with length. What is acceptable EMI is highly application specific.

Ferrite chip inductors placed close to the LPA8003S may be needed to reduce EMI radiation. The value of the ferrite chip is very application specific.

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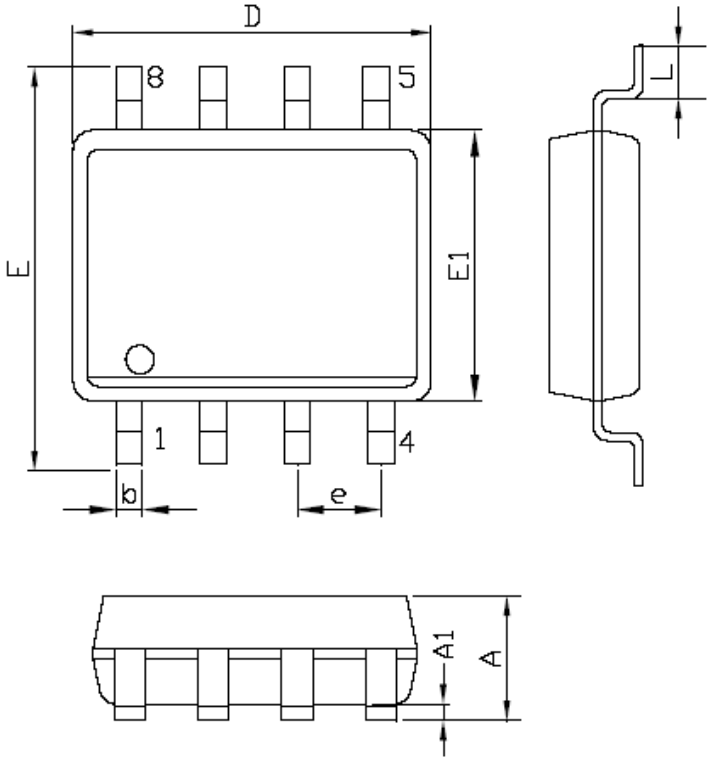
Packaging Information



SYMBOLS	MILLIMETERS		INCHES	
	MIN.	MAX.	MIN.	MAX.
A	1.35	1.75	0.053	0.069
A1	0.10	0.25	0.004	0.010
D	4.90		0.193	
E	5.80	6.20	0.228	0.244
E1	3.90		0.153	
L	0.40	1.27	0.016	0.050
b	0.31	0.51	0.012	0.020
e	1.27		0.050	

单击下面可查看定价，库存，交付和生命周期等信息

>>LOW POWER(微源半导体)