

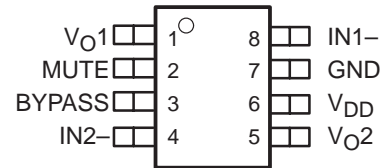
TPA152

75-mW STEREO AUDIO POWER AMPLIFIER

SLOS210A – JUNE 1998 – REVISED MARCH 2000

- High-Fidelity Line-Out/HP Driver
- 75-mW Stereo Output
- PC Power Supply Compatible
- Pop Reduction Circuitry
- Internal Mid-Rail Generation
- Thermal and Short-Circuit Protection
- Surface-Mount Packaging
- Pin Compatible With TPA302

D PACKAGE
(TOP VIEW)



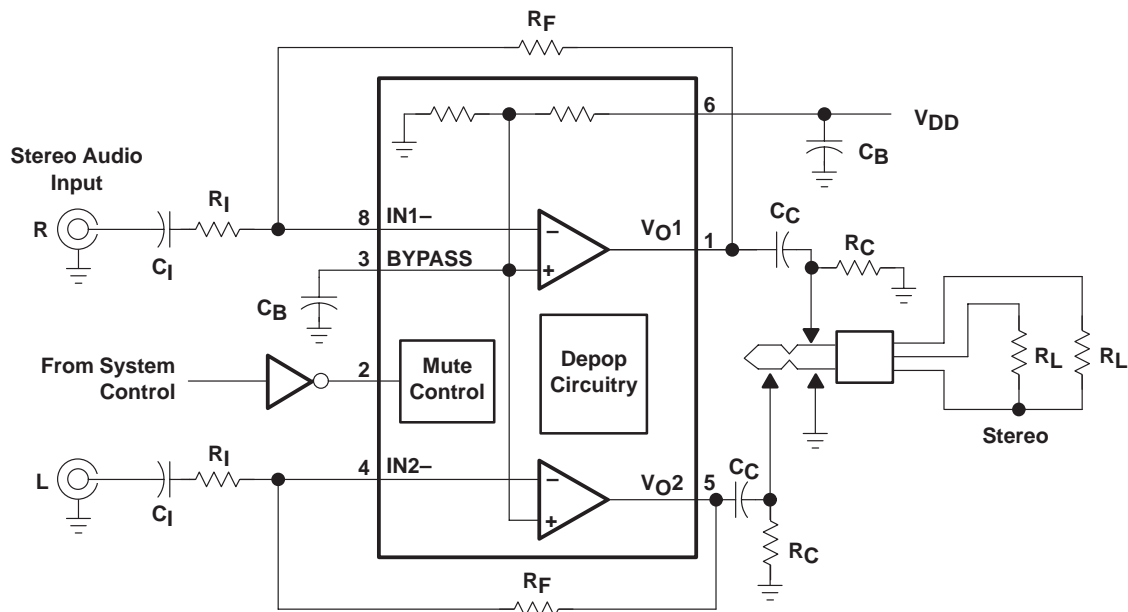
description

The TPA152 is a stereo audio power amplifier capable of less than 0.1% THD+N at 1 kHz when delivering 75 mW per channel into a 32-Ω load. THD+N is less than 0.2% across the audio band of 20 to 20 kHz. For 10 kΩ loads, the THD+N performance is better than 0.005% at 1 kHz, and less than 0.01% across the audio band of 20 to 20 kHz.

The TPA152 is ideal for use as an output buffer for the audio CODEC in PC systems. It is also excellent for use where a high-performance head phone/line-out amplifier is needed. Depop circuitry is integrated to reduce transients during power up, power down, and mute mode.

Amplifier gain is externally configured by means of two resistors per input channel and does not require external compensation for settings of 1 to 10. The TPA152 is packaged in the 8-pin SOIC (D) package that reduces board space and facilitates automated assembly.

typical application circuit



PRODUCTION DATA information is current as of publication date. Products conform to specifications per the terms of Texas Instruments standard warranty. Production processing does not necessarily include testing of all parameters.

**TEXAS
INSTRUMENTS**

POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

Copyright © 2000, Texas Instruments Incorporated

TPA152

75-mW STEREO AUDIO POWER AMPLIFIER

SLOS210A – JUNE 1998 – REVISED MARCH 2000

AVAILABLE OPTIONS

T _A	PACKAGED DEVICE
	SMALL OUTLINE
–40°C to 85°C	TPA152D†

† The D packages are available taped and reeled. To order a taped and reeled part, add the suffix R (e.g., TPA152DR)

Terminal Functions

TERMINAL NAME	NO.	I/O	DESCRIPTION
BYPASS	3		BYPASS is the tap to the voltage divider for internal mid-supply bias. This terminal should be connected to a 0.1-μF to 1-μF capacitor.
GND	7		GND is the ground connection.
IN1–	8	I	IN1– is the inverting input for channel 1.
IN2–	4	I	IN2– is the inverting input for channel 2.
MUTE	2	I	A logic high puts the device into MUTE mode.
V _{DD}	6	I	V _{DD} is the supply voltage terminal.
V _{O1}	1	O	V _{O1} is the audio output for channel 1.
V _{O2}	5	O	V _{O2} is the audio output for channel 1.



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

TPA152

75-mW STEREO AUDIO POWER AMPLIFIER

SLOS210A – JUNE 1998 – REVISED MARCH 2000

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

Supply voltage, V_{DD}	6 V
Input voltage, V_I	–0.3 V to $V_{DD} + 0.3$ V
Continuous total power dissipation	internally limited (See Dissipation Rating Table)
Operating junction temperature range, T_J	–40°C to 150°C
Operating case temperature range, T_C	–40°C to 125°C
Storage temperature range, T_{stg}	–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 or any other conditions beyond those indicated under “recommended operating conditions” is not implied. Exposure to absolute-maximum-rated conditions for extended periods may affect device reliability.

DISSIPATION RATING TABLE

PACKAGE	$T_A \leq 25^\circ\text{C}$	DERATING FACTOR	$T_A = 70^\circ\text{C}$	$T_A = 85^\circ\text{C}$
D	724 mW	5.8 mW/°C	464 mW	376 mW

recommended operating conditions

	MIN	MAX	UNIT
Supply voltage, V_{DD}	4.5	5.5	V
Operating free-air temperature, T_A	–40	85	°C

dc electrical characteristics at $T_A = 25^\circ\text{C}$, $V_{DD} = 5$ V

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
V_{OO} Output offset voltage				10	mV
Supply ripple rejection ratio	$V_{DD} = 4.9$ V to 5.1 V		81		dB
I_{DD} Supply current	See Figure 13		5.5	14	mA
$I_{DD}(\text{MUTE})$ Supply current in MUTE			5.5	14	mA
Z_I Input impedance			>1		M Ω

ac operating characteristics $V_{DD} = 5$ V, $T_A = 25^\circ\text{C}$, $R_L = 32 \Omega$ (unless otherwise noted)

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
P_O Output power (each channel)	THD $\leq 0.03\%$, Gain = 1, See Figure 1		75†		mW
THD+N Total harmonic distortion plus noise	$P_O = 75$ mW, 20 Hz–20 kHz, Gain = 1, See Figure 2		0.2%		
B_{OM} Maximum output power bandwidth	$A_V = 5$, THD $< 0.6\%$, See Figure 2		>20		kHz
Phase margin	Open loop, See Figure 16		80°		
Supply ripple rejection ratio	1 kHz, $C_B = 1 \mu\text{F}$, See Figure 12		65		dB
Mute attenuation	See Figure 15		110		dB
Ch/Ch output separation	See Figure 13		102		dB
Signal-to-Noise ratio	$V_O = 1$ V(rms), Gain = 1 See Figure 11		104		dB
V_N Noise output voltage	See Figure 10		6		$\mu\text{V}(\text{rms})$

† Measured at 1 kHz.

- NOTES: 1. The dc output voltage is approximately $V_{DD}/2$.
2. Output power is measured at the output pins of the IC at 1 kHz.



TPA152

75-mW STEREO AUDIO POWER AMPLIFIER

SLOS210A – JUNE 1998 – REVISED MARCH 2000

ac operating characteristics $V_{DD} = 5\text{ V}$, $T_A = 25^\circ\text{C}$, $R_L = 10\text{ k}\Omega$

PARAMETER	TEST CONDITIONS	MIN	TYP	MAX	UNIT
THD+N Total harmonic distortion plus noise	$V_I = 1\text{ V}_{(rms)}$, 20 Hz–20 kHz, Gain = 1, See Figure 6		0.005%		
	$V_O(PP) = 4\text{ V}$, 20 Hz–20 kHz, Gain = 1, See Figure 8		0.005%		
BOM Maximum output power bandwidth	G = 5, THD <0.02%, See Figure 6		>20		kHz
Phase margin	Open loop, See Figure 16		80°		
k_{SVR} Supply voltage rejection ratio	1 kHz, $C_B = 1\text{ }\mu\text{F}$, See Figure 12		65		dB
Mute attenuation	See Figure 15		110		dB
Ch/Ch output separation	See Figure 13		102		dB
Signal-to-Noise ratio	$V_O = 1\text{ V}_{(rms)}$, Gain = 1, See Figure 11		104		dB
V_n Noise output voltage	See Figure 10		6		$\mu\text{V}_{(rms)}$

† Measured at 1 kHz.

TYPICAL CHARACTERISTICS

Table of Graphs

		FIGURE
THD+N Total harmonic distortion plus noise	vs Output power	1, 4
THD+N Total harmonic distortion plus noise	vs Frequency	2, 3, 6, 8, 9
THD+N Total harmonic distortion plus noise	vs Output voltage	5, 7
V_n Output noise voltage	vs Frequency	10
SNR Signal-to-noise ratio	vs Gain	11
Supply ripple rejection ratio	vs Frequency	12
Crosstalk	vs Frequency	13, 14
Mute Attenuation	vs Frequency	15
Open-loop gain and phase	vs Frequency	16, 17
Closed-loop gain and phase	vs Frequency	18
I_{DD} Supply current	vs Supply voltage	19
P_O Output power	vs Load resistance	20
P_D Power dissipation	vs Output power	21



POST OFFICE BOX 655303 • DALLAS, TEXAS 75265

TYPICAL CHARACTERISTICS

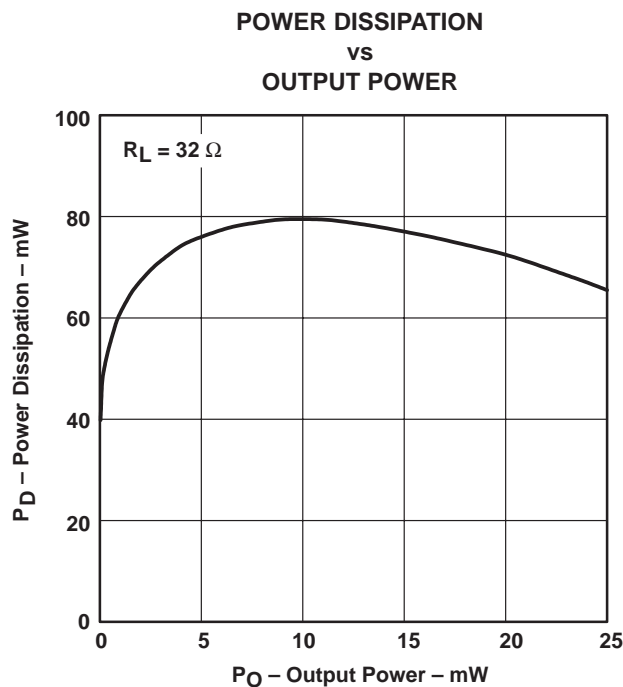
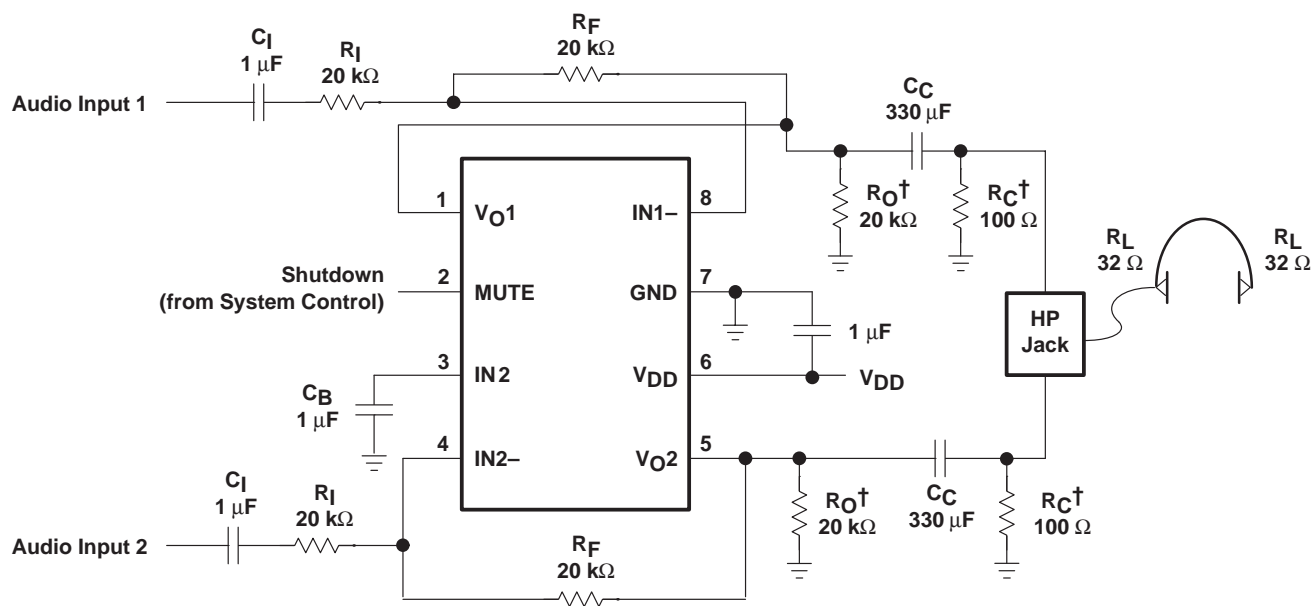


Figure 21

APPLICATION INFORMATION

selection of components

Figure 22 is a schematic diagram of a typical application circuit.



† These resistors are optional. Adding these resistors improves the depop performance of the TPA152.

Figure 22. TPA152 Typical Application Circuit