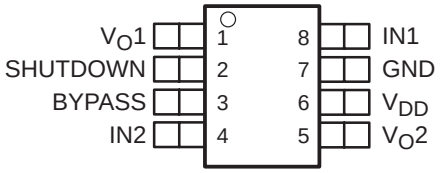
- **300-mW Stereo Output**
- **PC Power Supply Compatibility 5-V and 3.3-V Specified Operation**
- **Shutdown Control**
- **Internal Mid-Rail Generation**
- **Thermal and Short-Circuit Protection**
- **Surface-Mount Packaging**
- **Functional Equivalent of the LM4880**

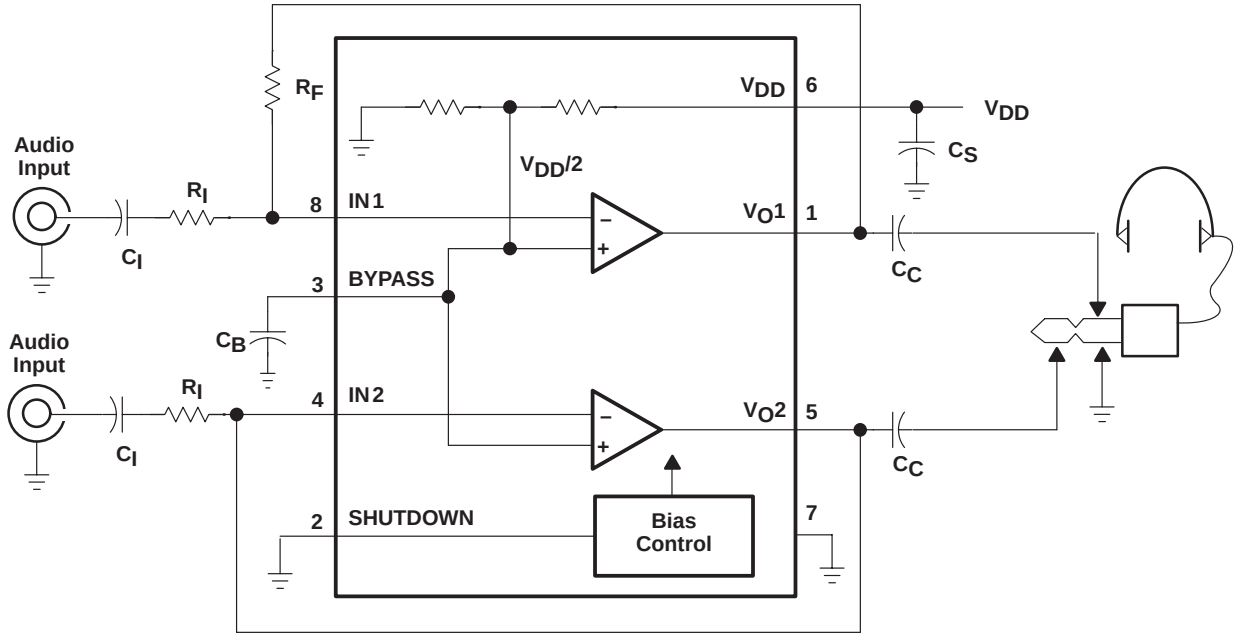
D PACKAGE
(TOP VIEW)



description

The TPA302 is a stereo audio power amplifier capable of delivering 250 mW of continuous average power into an 8-Ω load at less than 0.06% THD+N from a 5-V power supply or up to 300 mW at 1% THD+N. The TPA302 has high current outputs for driving small unpowered speakers at 8 Ω or headphones at 32 Ω. For headphone applications driving 32-Ω loads, the TPA302 delivers 60 mW of continuous average power at less than 0.06% THD+N. The amplifier features a shutdown function for power-sensitive applications as well as internal thermal and short-circuit protection. The amplifier is available in an 8-pin SOIC (D) package that reduces board space and facilitates automated assembly.

typical application circuit



Please be aware that an important notice concerning availability, standard warranty, and use in critical applications of Texas Instruments semiconductor products and disclaimers thereto appears at the end of this data sheet.

AVAILABLE OPTIONS

T_A	PACKAGED DEVICES
	SMALL OUTLINE† (D)
–40°C to 85°C	TPA302D

† The D packages are available taped and reeled. To order a taped and reeled part, add the suffix R (e.g., TPA302DR)

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
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	$T_A \le 25°C$ POWER RATING	DERATING FACTOR ABOVE $T_A = 25°C$	$T_A = 70°C$ POWER RATING	$T_A = 85°C$ POWER RATING
D	731 mW	5.8 mW/°C	460 mW	380 mW

recommended operating conditions

	MIN	MAX	UNIT
Supply voltage, V_{DD}	2.7	5.5	V
Operating free-air temperature, T_A	–40	85	°C

dc electrical characteristics at specified free-air temperature, V_{DD} = 3.3 V (unless otherwise noted)

PARAMETER		TEST CONDITION	MIN	TYP	MAX	UNIT
I_{DD}	Supply current			2.25	5	mA
V_{IO}	Input offset voltage			5	20	mV
PSRR	Power supply rejection ratio	V_{DD} = 3.2 V to 3.4 V		55		dB
$I_{DD(SD)}$	Quiescent current in shutdown			0.6	20	µA

ac operating characteristics, V_{DD} = 3.3 V, T_A = 25°C, R_L = 8 Ω (unless otherwise noted)

PARAMETER		TEST CONDITION		MIN	TYP	MAX	UNIT
P_O	Output power	Gain = –1, f = 1 kHz	THD < 0.08%		100		mW
			THD < 1%		125		
			THD < 0.08%, R_L = 32 Ω		25		
			THD < 1%, R_L = 32 Ω		35		
B_{OM}	Maximum output power bandwidth	Gain = 10, 1% THD			20		kHz
B_1	Unity gain bandwidth	Open loop			1.5		MHz
	Channel separation	f = 1 kHz			75		dB
	Supply ripple rejection ratio	f = 1 kHz			45		dB
V_n	Noise output voltage	Gain = –1			10		µVrms

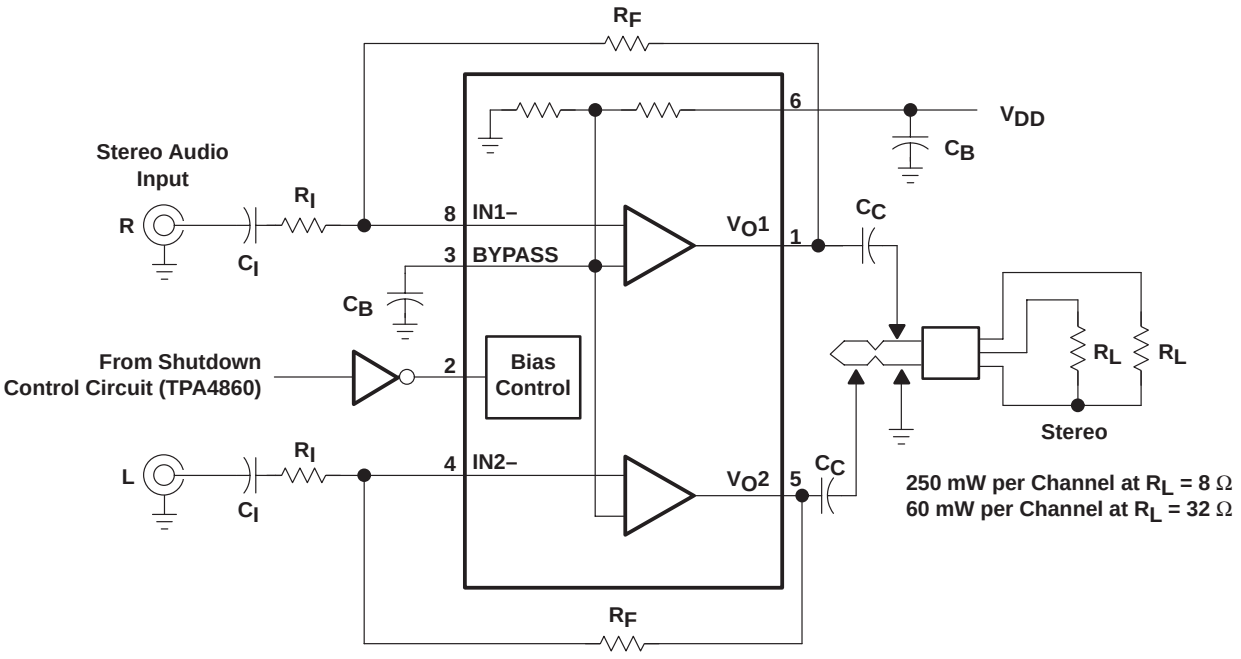
dc electrical characteristics at specified free-air temperature, V_{DD} = 5 V (unless otherwise noted)

PARAMETER		TEST CONDITION	MIN	TYP	MAX	UNIT
I_{DD}	Supply current			4	10	mA
V_{OO}	Output offset voltage	See Note 1		5	20	mV
PSRR	Power supply rejection ratio	V_{DD} = 4.9 V to 5.1 V		65		dB
$I_{DD(SD)}$	Quiescent current in shutdown			0.6		μA

ac operating characteristics, V_{DD} = 5 V, T_A = 25°C, R_L = 8 Ω (unless otherwise noted)

PARAMETER		TEST CONDITION		MIN	TYP	MAX	UNIT
P_O	Output power	Gain = –1, f = 1 kHz	THD < 0.06%		250		mW
			THD < 1%		300		
			THD < 0.06%, R_L = 32 Ω		60		
			THD < 1%, R_L = 32 Ω		80		
B_{OM}	Maximum output power bandwidth	Gain = 10, 1% THD			20		kHz
B_1	Unity gain bandwidth	Open loop			1.5		MHz
	Channel separation	f = 1 kHz			75		dB
	Supply ripple rejection ratio	f = 1 kHz			45		dB
V_n	Noise output voltage	Gain = –1			10		μVrms

typical application



TYPICAL CHARACTERISTICS

Table of Graphs

			FIGURE
THD + N	Total harmonic distortion plus noise	vs Frequency	1–3, 7–9, 13–15, 19–21
		vs Output power	4–6, 10–12 16–18, 22–24
I_{DD}	Supply current	vs Supply voltage vs Free-air temperature	25 26
V_n	Output noise voltage	vs Frequency	27, 28
	Maximum package power dissipation	vs Free-air temperature	29
	Power dissipation	vs Output power	30, 31
P_{Omax}	Maximum output power	vs Free-air temperature	32, 33
P_O	Output power	vs Load resistance vs Supply voltage	34 35
	Open loop response		36
	Closed loop response		37
	Crosstalk	vs Frequency	38, 39
	Supply ripple rejection ratio	vs Frequency	40, 41

TOTAL HARMONIC DISTORTION PLUS NOISE vs FREQUENCY

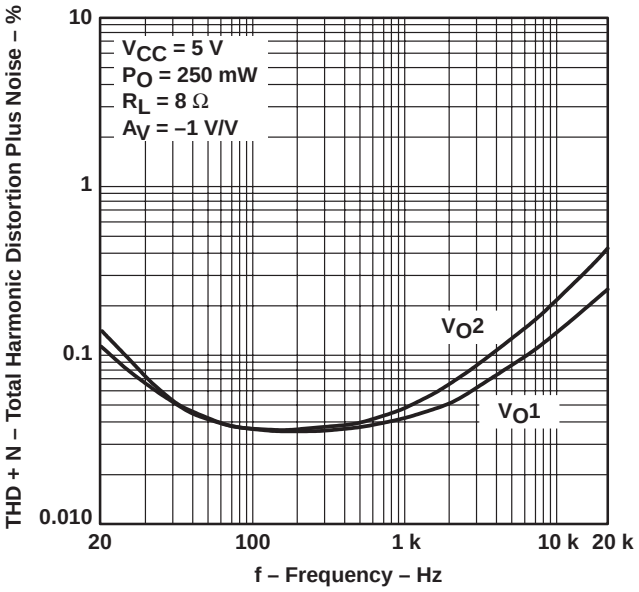


Figure 1

TOTAL HARMONIC DISTORTION PLUS NOISE vs FREQUENCY

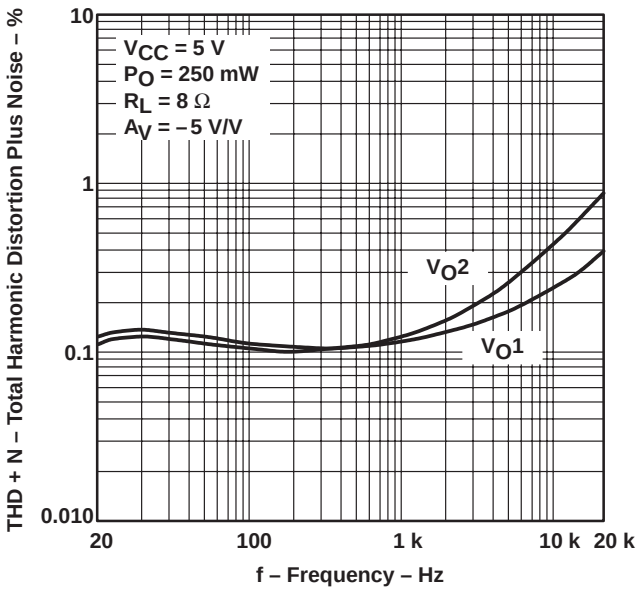
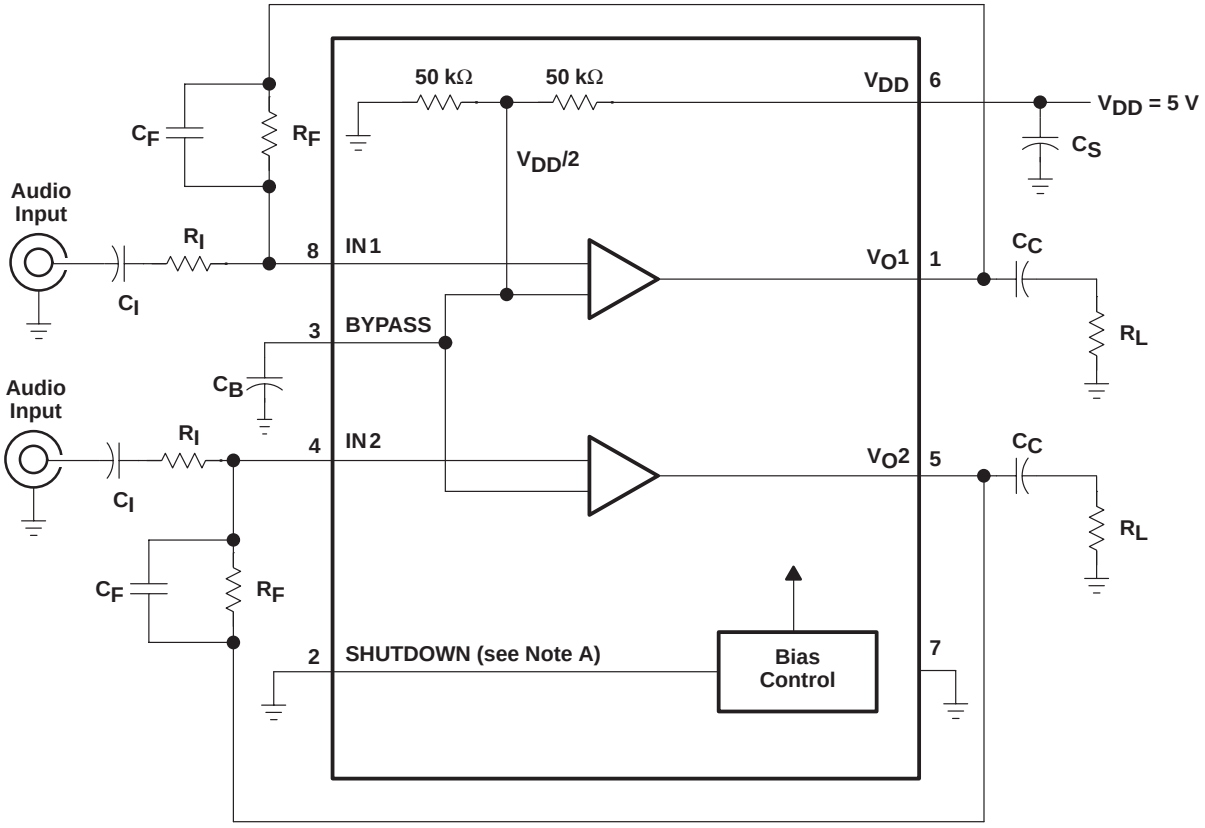


Figure 2

APPLICATION INFORMATION

selection of components

Figure 42 is a schematic diagram of a typical application circuit.



NOTE A: SHUTDOWN must be held low for normal operation and asserted high for shutdown mode.

Figure 42. TPA302 Typical Notebook Computer Application Circuit