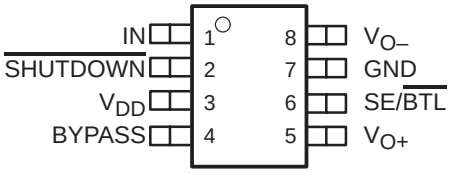
- **Ideal for Wireless Communicators, Notebook PCs, PDAs, and Other Small Portable Audio Devices**
- **2 W Into 4-Ω From 5-V Supply**
- **0.6 W Into 4-Ω From 3-V Supply**
- **Wide Power Supply Compatibility 3 V to 5 V**
- **Low Supply Current**
  - **4 mA Typical at 5 V**
  - **4 mA Typical at 3 V**
- **Shutdown Control . . . 1 μA Typical**
- **Shutdown Pin is TTL Compatible**
- **–40°C to 85°C Operating Temperature Range**
- **Space-Saving, Thermally-Enhanced MSOP Packaging**

DGN PACKAGE
(TOP VIEW)

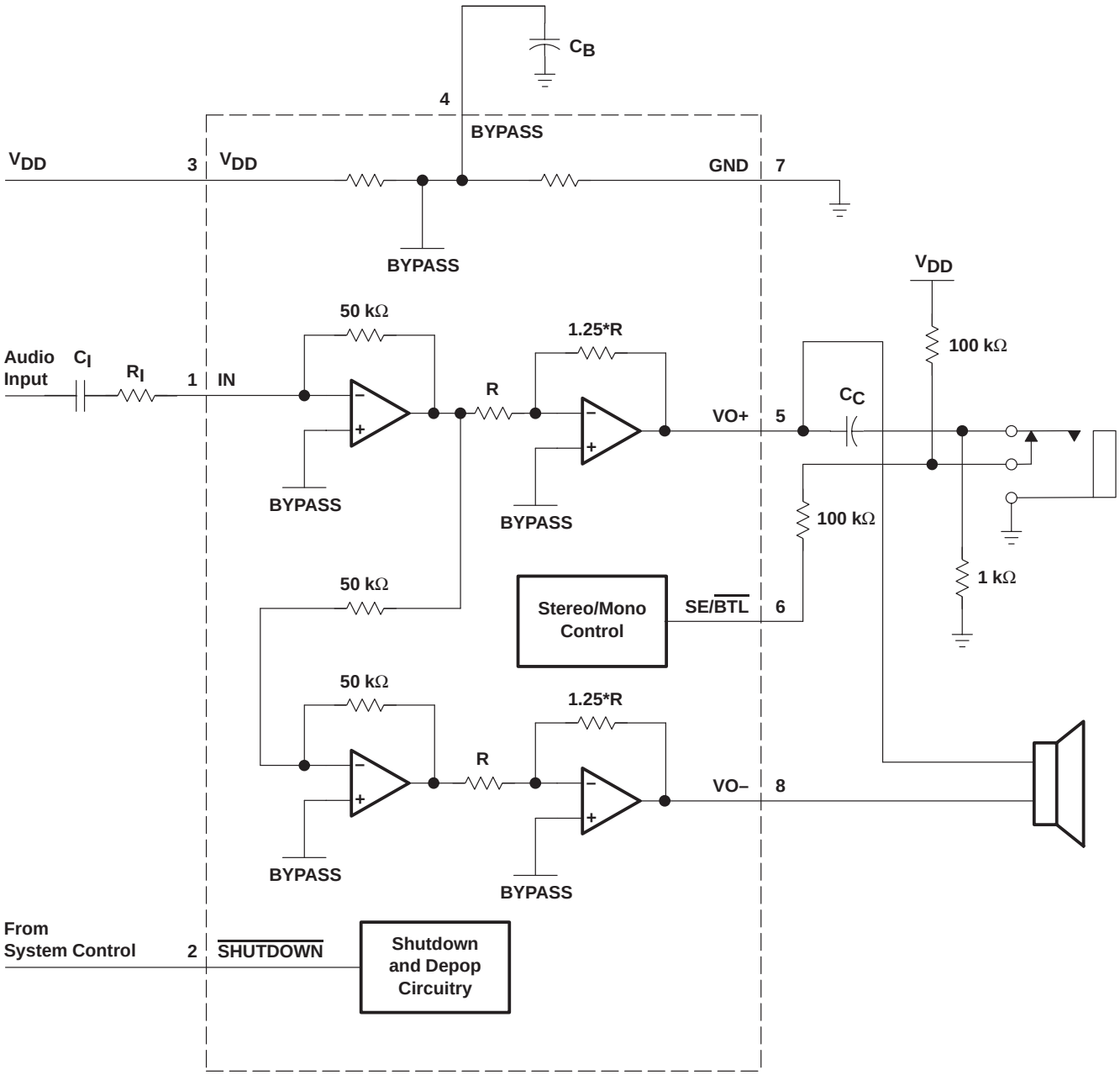


description

The TPA0211 is a 2-W mono bridge-tied-load (BTL) amplifier designed to drive speakers with as low as 4-Ω impedance. The device is ideal for use in small wireless communicators, notebook PCs, PDAs, anyplace a mono speaker and stereo head phones are required. From a 5-V supply, the TPA0211 can delivery 2-W of power into a 4-Ω speaker.

The gain of the input stage is set by the user-selected input resistor and a 50-kΩ internal feedback resistor ($A_V = – R_F / R_I$). The power stage is internally configured with a gain of –1.25 V/V in SE mode, and –2.5 V/V in BTL mode. Thus, the overall gain of the amplifier is 62.5 kΩ/ R_I in SE mode and 125 kΩ/ R_I in BTL mode. The input terminals are high-impedance CMOS inputs, and can be used as summing nodes.

The TPA0211 is available in the 8-pin thermally-enhanced MSOP package (DGN) and operates over an ambient temperature range of –40°C to 85°C.



AVAILABLE OPTIONS

T_A	PACKAGED DEVICES	MSOP SYMBOLIZATION
	MSOP† (DGN)	
–40°C to 85°C	TPA0211DGN	AEG

† The DGN package are available taped and reeled. To order a taped and reeled part, add the suffix R to the part number (e.g., TPA0211DGNR).

Terminal Functions

TERMINAL NAME	TERMINAL NO.	I/O	DESCRIPTION
BYPASS	4	I	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.
IN	1	I	IN is the audio input terminal.
SE/$\overline{\text{BTL}}$	6	I	When SE/$\overline{\text{BTL}}$ is held low, the TPA0211 is in BTL mode. When SE/$\overline{\text{BTL}}$ is held high, the TPA0211 is in SE mode.
$\overline{\text{SHUTDOWN}}$	2	I	$\overline{\text{SHUTDOWN}}$ places the entire device in shutdown mode when held low. TTL compatible input.
V_{DD}	3		V_{DD} is the supply voltage terminal.
V_O+	5	O	V_O+ is the positive output for BTL and SE modes.
V_O-	8	O	V_O- is the negative output in BTL mode and a high-impedance output in SE mode.

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 free-air temperature range, T_A (see Table 3) . . . . . –40°C to 85°C
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	$T_A \le 25°C$	DERATING FACTOR	$T_A = 70°C$	$T_A = 85°C$
DGN	2.14 W¶	17.1 mW/°C	1.37 W	1.11 W

¶ Please see the Texas Instruments document, *PowerPAD Thermally Enhanced Package Application Report* (literature number SLMA002), for more information on the PowerPAD package. The thermal data was measured on a PCB layout based on the information in the section entitled *Texas Instruments Recommended Board for PowerPAD* on page 33 of the before mentioned document.

recommended operating conditions

			MIN	MAX	UNIT
Supply voltage, V_{DD}			2.5	5.5	V
High-level input voltage, V_{IH}	ST/$\overline{\text{MN}}$	V_{DD} = 3 V	2.7		V
		V_{DD} = 5 V	4.5		
	$\overline{\text{SHUTDOWN}}$		2		
Low-level input voltage, V_{IL}	ST/$\overline{\text{MN}}$	V_{DD} = 3 V		1.65	V
		V_{DD} = 5 V		2.75	
	$\overline{\text{SHUTDOWN}}$			0.8	
Operating free-air temperature, T_A			–40	85	°C

electrical characteristics at specified free-air temperature, V_{DD} = 3 V, T_A = 25°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$\|V_{OO}\|$	Output offset voltage (measured differentially)				30	mV
I_{DD}	Supply current			4	6	mA
$I_{DD(SD)}$	Supply current, shutdown mode			1	10	μA

operating characteristics, V_{DD} = 3 V, T_A = 25°C, R_L = 4 Ω

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
P_O	Output power, see Note 1	THD = 1%, BTL mode			660		mW
		THD = 0.1%, SE mode,	R_L = 32 Ω		33		
THD + N	Total harmonic distortion plus noise	P_O = 500 mW, f = 20 Hz to 20 kHz			0.3%		
B_{OM}	Maximum output power bandwidth	Gain = 2, THD = 2%			20		kHz

NOTE 1: Output power is measured at the output terminals of the device at f = 1 kHz.

electrical characteristics at specified free-air temperature, V_{DD} = 5 V, T_A = 25°C (unless otherwise noted)

PARAMETER		TEST CONDITIONS	MIN	TYP	MAX	UNIT
$\|V_{OO}\|$	Output offset voltage (measured differentially)				30	mV
I_{DD}	Supply current			4	6	mA
$I_{DD(SD)}$	Supply current, shutdown mode			1	10	μA

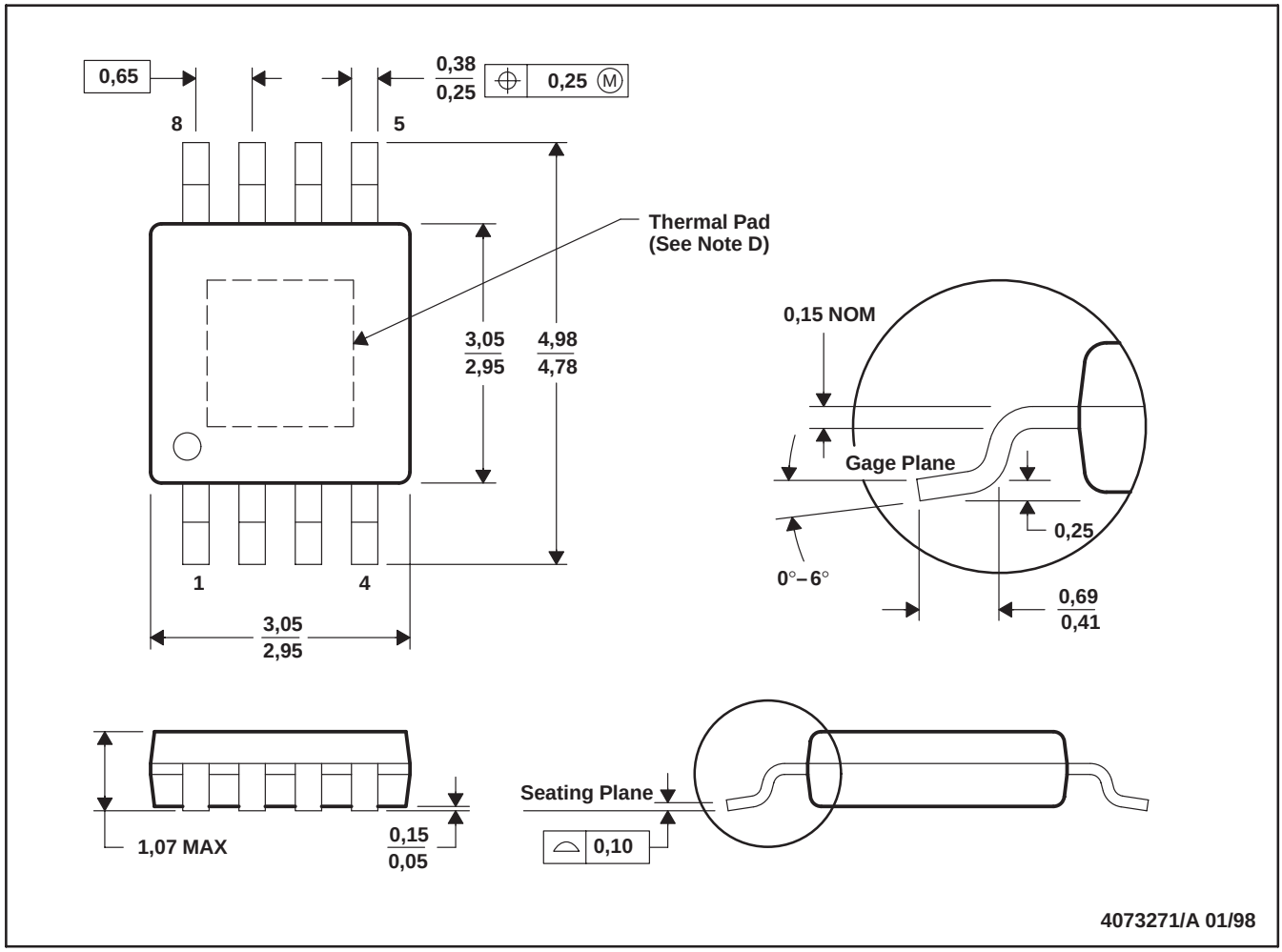
operating characteristics, V_{DD} = 5 V, T_A = 25°C, R_L = 4 Ω

PARAMETER		TEST CONDITIONS		MIN	TYP	MAX	UNIT
P_O	Output power, see Note 1	THD = 1%, BTL mode			2		W
		THD = 0.1%, SE mode,	R_L = 32 Ω		92		mW
THD + N	Total harmonic distortion plus noise	P_O = 1.5 W, f = 20 Hz to 20 kHz			0.2%		
B_{OM}	Maximum output power bandwidth	Gain = 2.5, THD = 2%			20		kHz

NOTE 1: Output power is measured at the output terminals of the device at f = 1 kHz.

MECHANICAL DATA

DGN (S-PDSO-G8) **PowerPAD™ PLASTIC SMALL-OUTLINE PACKAGE**



NOTES: A. All linear dimensions are in millimeters.
B. This drawing is subject to change without notice.
C. Body dimensions include mold flash or protrusions.
D. The package thermal performance may be enhanced by attaching an external heat sink to the thermal pad. This pad is electrically and thermally connected to the backside of the die and possibly selected leads. The dimension of the thermal pad is 1.40 mm (height as illustrated) × 1.80 (width as illustrated) mm (maximum). The pad is centered on the bottom of the package.
E. Falls within JEDEC MO-187

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