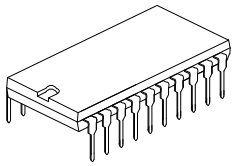
PA6021 **CMOS IC**

2-W STEREO AUDIO POWER AMPLIFIER WITH ADVANCED DC VOLUME CONTROL



DIP-20

Lead-free: PA6021L
Halogen-free: PA6021G

■ DESCRIPTION

The **PA6021** is a stereo audio power amplifier that drives 2 W/channel of continuous RMS power into a 4-Ω load when utilizing a heat sink. Advanced dc volume control minimizes external components and allows BTL (speaker) volume control and SE (headphone) volume control.

The 20-pin DIP package allows for the use of a heatsink which provides higher output power.

To ensure a smooth transition between active and shutdown modes, a fade mode ramps the volume up and down.

■ FEATURES

* 2 W Into 4-W speakers with external heatsink
* DC volume control with 2-dB
  Steps from -40 dB ~ 20 dB
  – Fade Mode
  – -85-dB Mute Mode
* Differential Inputs
* 1-μA Shutdown Current (Typical)
* Headphone Mode

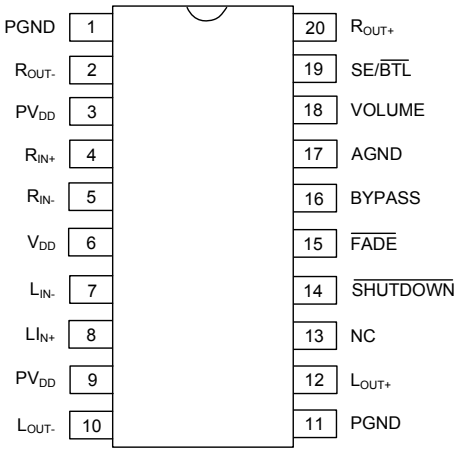
■ ORDERING INFORMATION

Ordering Number			Package	Packing
Normal	Lead Free Plating	Halogen Free		
PA6021-D20-T	PA6021L-D20-T	PA6021G-D20-T	DIP-20	Tube

PA6021L-D20-T
(1)Packing Type
(2)Package Type
(3)Lead Plating

(1) T: Tube
(2) D20: DIP-20
(3) G: Halogen Free, L: Lead Free, Blank: Pb/Sn

■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN #	PIN NAME	I/O	DESCRIPTION
16	BYPASS	I	Tap to voltage divider for internal midsupply bias generator used for analog reference
15	$\overline{FADE}$	I	Places the amplifier in fade mode if a logic low is placed on this terminal; normal operation if logic high is placed on this terminal.
17	AGND		Analog power supply ground
7	L_{IN-}	I	Left channel negative input for fully differential input.
8	L_{IN+}	I	Left channel positive input for fully differential input.
10	L_{OUT-}	O	Left channel negative audio output
12	L_{OUT+}	O	Left channel positive audio output.
13	NC		No connection
1,11	PGND		Power ground
3,9	PV_{DD}		Supply voltage terminal for power stage
5	R_{IN-}	I	Right channel negative input for fully differential input.
4	R_{IN+}	I	Right channel positive input for fully differential input.
2	R_{OUT-}	O	Right channel negative audio output
20	R_{OUT+}	O	Right channel positive audio output
19	SE/$\overline{BTL}$	I	Output control. When this terminal is high, SE outputs are selected. When this terminal is low, BTL outputs are selected.
14	$\overline{SHUTDOW}$	I	Places the amplifier in shutdown mode if a TTL logic low is placed on this terminal
6	V_{DD}		Supply voltage terminal
18	VOLUME	I	Terminal for dc volume control. DC voltage range is 0 to V_{DD}.

■ ABSOLUTE MAXIMUM RATING

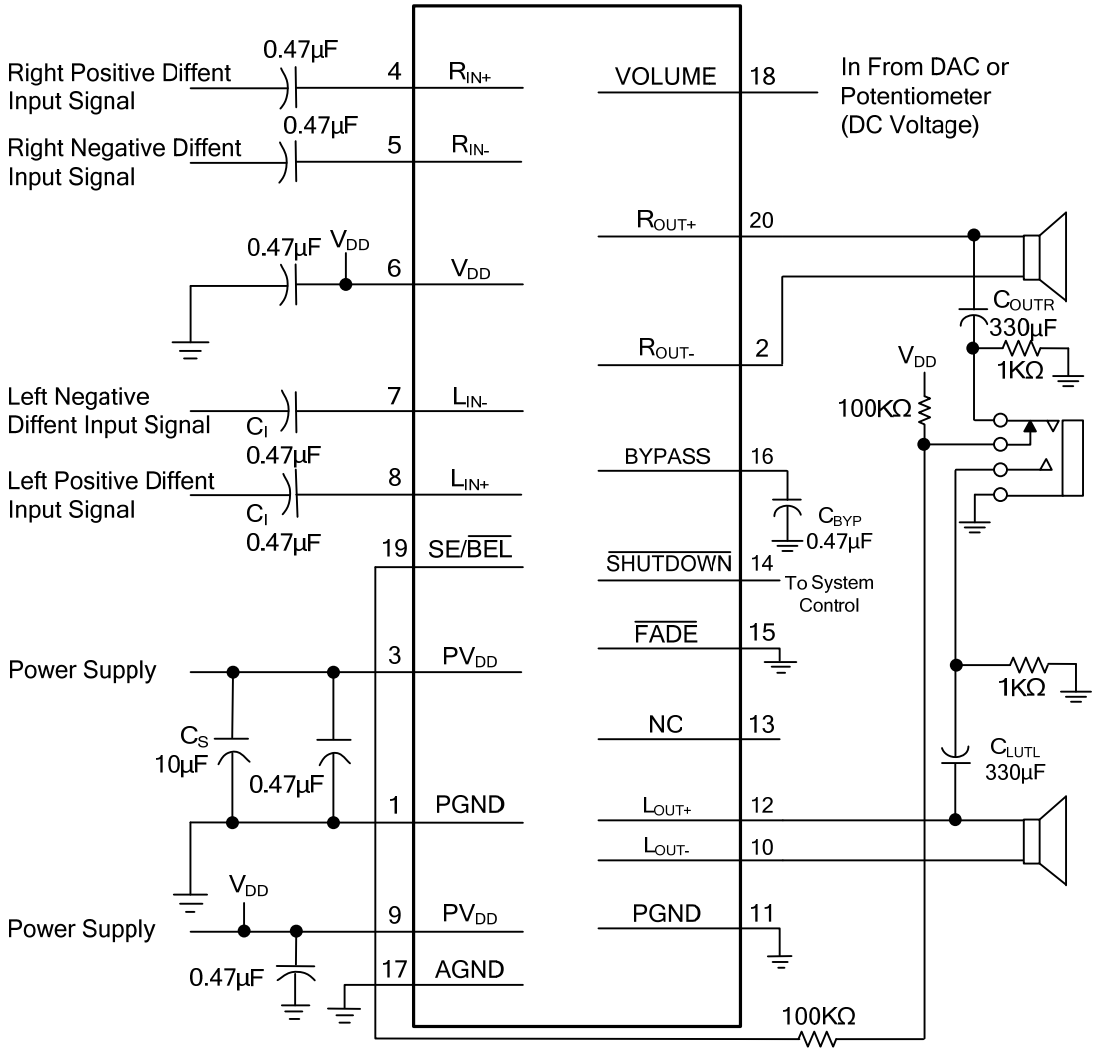
PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage, V_{DD}, PV_{DD}	V_{SS}	-0.3V ~ 6V	V
Input Voltage, R_{IN+}, R_{IN-}, L_{IN+},L_{IN-}	V_{IN}	-0.3V ~ V_{DD}+0.3V	V
Junction Temperature	T_J	-40°C ~ 150°C	℃
Operating Temperature	T_{OPR}	-40°C ~ 85°C	℃
Storage Temperature Range	T_{STG}	-65°C ~ 85°C	℃

Note: Absolute maximum ratings are those values beyond which the device could be permanently damaged. Absolute maximum ratings are stress ratings only and functional device operation is not implied.

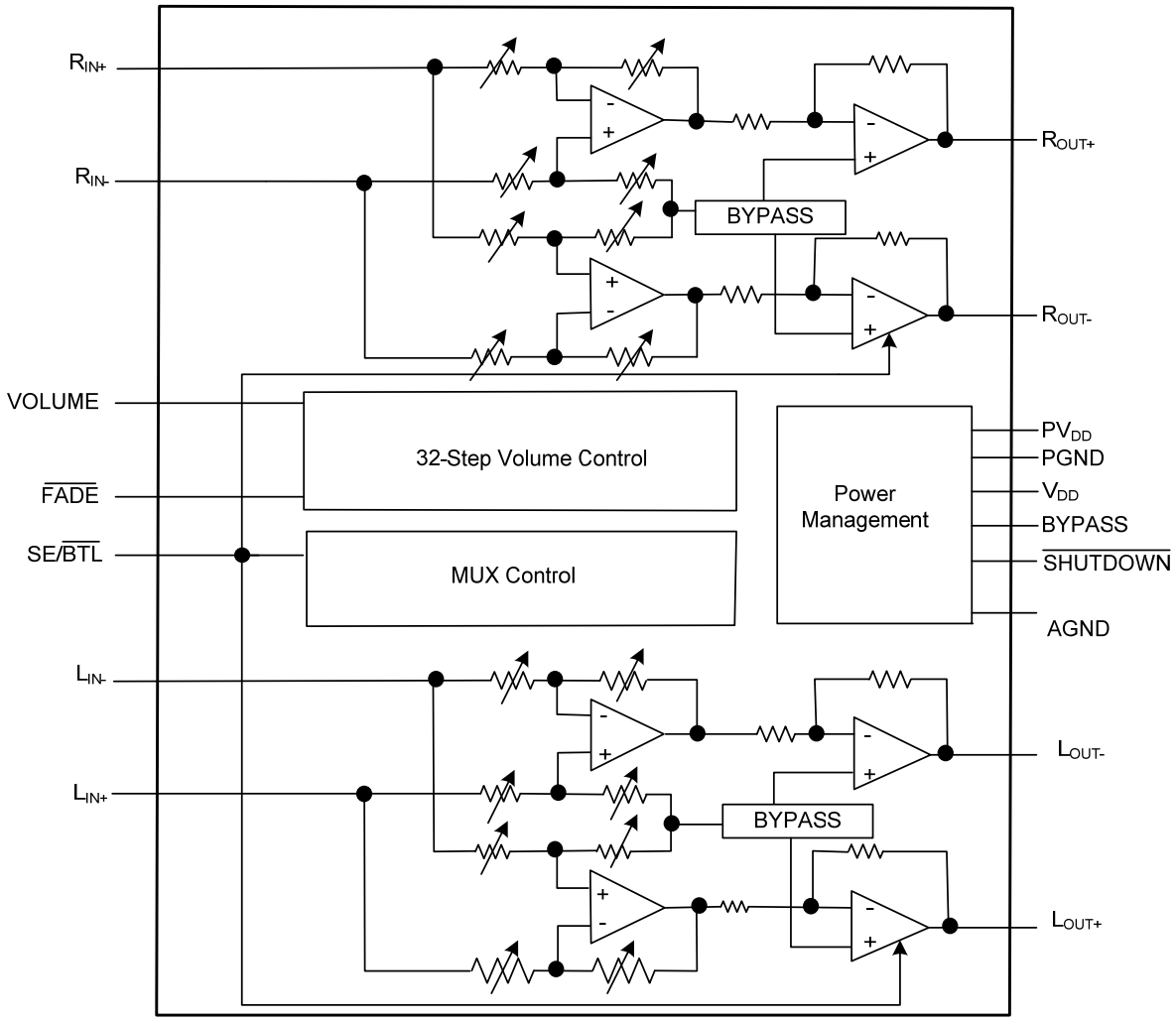
■ ELECTRICAL CHARACTERISTICS (T_a=25°C, unless otherwise specified)

PARAMETER	SYMBOL	CONDITIONS		MIN	TYP	MAX	UNIT
DC CHARACTERISTICS (V_{DD}=PV_{DD}=5.5V)							
Supply Voltage, V_{DD}, PV_{DD}	V_{DD}			4		5.5	V
DC Differential Output Voltage	$V_{OUT(DIFF)}$	Gain=0dB, SE/$\overline{BTL}$=0V				30	mV
		Gain=20dB, SE/$\overline{BTL}$=0V				50	
High-level Input Voltage	V_{IH}	SE/$\overline{BTL}$, $\overline{FADE}$		0.8xV_{DD}			V
		$\overline{SHUTDOWN}$		2			V
Low-level Input Voltage	V_{IL}	SE/$\overline{BTL}$, $\overline{FADE}$				0.6xV_{DD}	V
		$\overline{SHUTDOWN}$				0.8	V
High-level Input Current (SE/$\overline{BTL}$, $\overline{FADE}$, $\overline{SHUTDOWN}$, VOLUME	$\lvert I_{IH} \rvert$	V_{IN}=V_{DD}=PV_{DD}				1	μA
Low-level Input Current (SE/$\overline{BTL}$, $\overline{FADE}$, $\overline{SHUTDOWN}$, VOLUME	$\lvert I_{IL} \rvert$	V_{IN}=0V				1	μA
Supply Current, No Load	I_{DD}	SE/$\overline{BTL}$=0V, $\overline{SHUTDOWN}$=2V		6.0	7.5	9.0	mA
		SE/$\overline{BTL}$=5.5V, $\overline{SHUTDOWN}$=2V		3.0	5	6	
Supply Current, Shutdown Mode	$I_{DD(SD)}$	$\overline{SHUTDOWN}$=0V			1	20	μA
AC CHARACTERISTICS(V_{DD}=PV_{DD}=5V, R_L=4Ω, Gain=20dB)							
Bypass Voltage (Nominally V_{DD}/2)	$V_{(Bypass)}$	Measured at pin 16, No load, V_{DD}=5.5V		2.65	2.75	2.85	V
High-Level Output Voltage	V_{OH}	R_L=8Ω, Measured between output and V_{DD}=5.5V				700	mV
Low-Level Output Voltage	V_{OL}	R_L=8Ω, Measured between output and GND, V_{DD}=5.5V				400	mV
Output Power	P_{OUT}	THD=1%, f=1kHz			1.5		W
		THD=10%, f=1kHz			2		
Total Harmonic Distortion + Noise	THD+N	P_{OUT}=1W, R_L=8Ω, f=20Hz~20kHz			<0.8%		
Power Supply Rejection Ratio	PSRR	V_{DD}=PV_{DD}=4V~5.5V		-42	-70		dB
Input Impedance	Z_I	VOLUME=5V			14		kΩ
Supply Ripple Rejection Ratio	RR	f=1kHz, Gain=0dB, $C_{(BYP)}$=0.47μF	BTL		-82		dB
			SE		-57		dB
Noise Output Voltage	eN	f=20Hz~20kHz, Gain=0dB, $C_{(BYP)}$=0.47μF	BTL		36		μV_{RMS}
Supply Current, Max Power Into a 4-Ω Load	I_{DD}	$\overline{SHUTDOWN}$=2V, R_L=4Ω, SE/$\overline{BTL}$=0V, P_{OUT}=2W			1.3		A_{RMS}

■ TYPICAL APPLICATION CIRCUIT

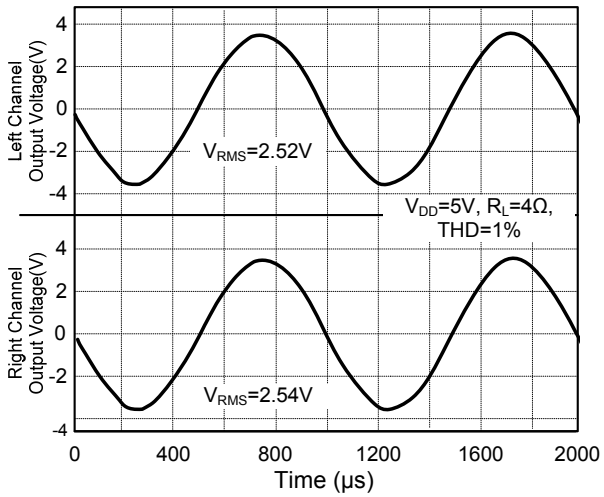


■ BLOCK DIAGRAM

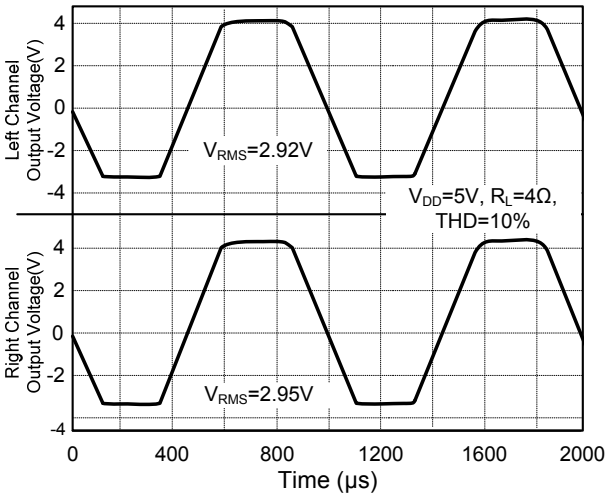


■ TYPICAL CHARACTERISTICS

Output Waveform



Output Waveform



Output Waveform