



PA7468

Preliminary

CMOS IC

STEREO 2.6W AUDIO POWER AMPLIFIER WITH DC VOLUME CONTROL

DESCRIPTION

As an audio power amplifier with DC volume control, UTC **PA7468** is a stereo bridged audio power amplifier. In normal operation it can produce 2.6W (1.8W) into 4Ω with less than 10% (1.0%) THD+N.

In UTC **PA7468**, the attenuator range of the volume control is from 20dB (@DC_V_{OL}=0V) to -80dB (@DC_V_{OL}=3.54V) with 32 steps. Besides, the UTC **PA7468** includes the depop circuitry and the thermal shutdown protection circuitry (to reduce pops and clicks noise during power up or shutdown mode operation).

The **UTC PA7468** has a BTL mode for speaker drive and a SE mode for headphone drive. These two modes can be quickly chosen by the SE/BTL input control pin signal.

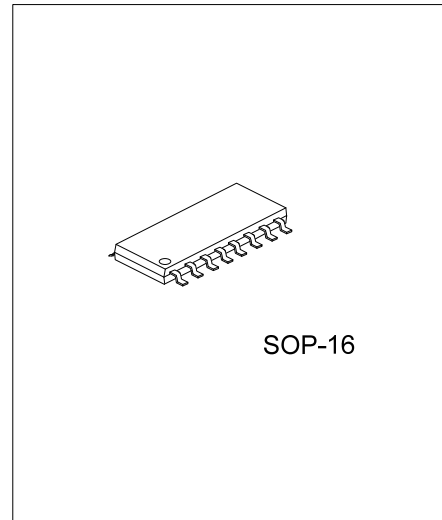
FEATURES

- * Low Operating Current: 9mA
- * Two Output Modes Allowable with BTL and SE Modes(chosen by SE/BTL pin)
- * Low Current Consumption :1mA(in Shutdown Mode)
- * With Short Circuit Protection
- * With Thermal Shutdown Protection
- * With Over Current Protection Circuitry
- * Eliminating Turn-on and Turn-off Transients in Outputs by Improved Depop Circuitry to.
- * Very High PSRR
- * 32 Steps Volume Adjustable
- * BTL Mode :2.6W per Channel Output Power into 4Ω Load at 5V

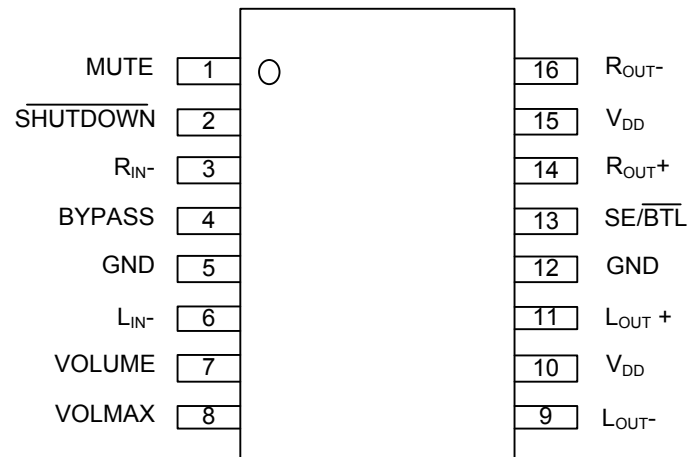
ORDERING INFORMATION

Ordering Number		Package	Packing
Lead Free	Halogen Free		
PA7468L-S16-R	PA7468G-S16-R	SOP-16	Tape Reel
PA7468L-S16-T	PA7468G-S16-T	SOP-16	Tube

<p>PA7468L-S16-R</p> <p>(1) Packing Type (2) Package Type (3) Lead Free</p>	<p>(1) R: Tape Reel (2) S16: SOP-16 (3) G: Halogen Free, L: Lead Free</p>
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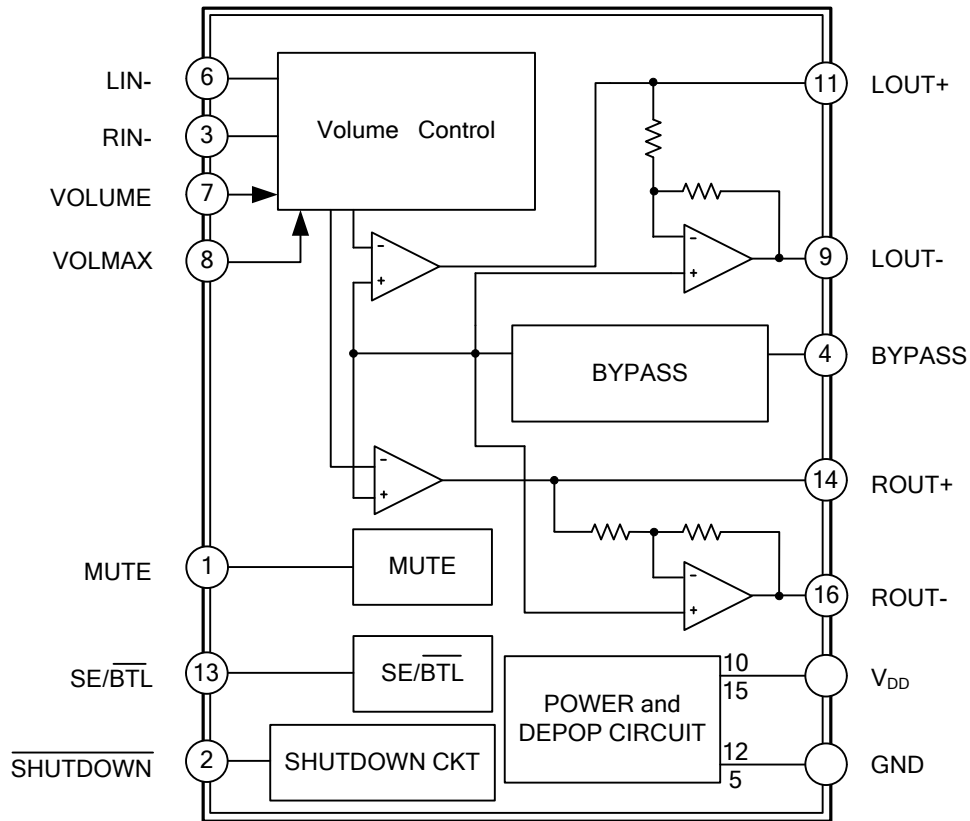
■ PIN CONFIGURATION



■ PIN DESCRIPTION

PIN NO.	PIN NAME	DESCRIPTION
1	MUTE	Input pin for mute controlling: low for normal operation; high to mute.
2	SHUTDOWN	When this pin is pulled low the chip will be into shutdown mode. $I_{SD} = 1\mu A$
3	R _{IN-}	Right channel input pin
4	BYPASS	Pin for bias voltage generator
5,12	GND	Ground
6	L _{IN-}	Left channel input pin
7	VOLUME	Volume gain setting input signal.
8	VOLMAX	Pin for setting the maximum output swing. Inputting V_C to this pin, the output voltage swing will be clamped between $V_{OH} - V_C$ & $V_{OL} + V_C$. Connecting GND to this pin will disable the function. For this pin, the max input voltage must be $\leq 1/2 V_{DD}$.
9	L _{OUT-}	Left channel's negative output in BTL mode; high impedance in SE mode.
10, 15	V _{DD}	Supply voltage
11	L _{OUT+}	Left channel's positive output in BTL mode and SE mode
13	SE/BTL	Output mode control input, high :SE output mode ,low :for BTL mode.
14	R _{OUT+}	Right channel's positive output in BTL mode and SE mode
16	R _{OUT-}	Right channel's negative output in BTL mode ;high impedance in SE mode.

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING (unless otherwise specified)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{DD}	-0.3 ~ +6.0	V
Input Voltage (SE/BTL, SHUTDOWN, MUTE)	V_{IN}	-0.3 ~ $V_{DD}+0.3$	V
Power Dissipation	P_D	Internal Limited	W
Junction Temperature	T_J	150	°C
Storage Temperature	T_{STG}	-65 ~ +150	°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.

■ THERMAL DATA

PARAMETER	SYMBOL	RATINGS	UNIT
Junction to Ambient	θ_{JA}	90	°C/W

■ RECOMMENDED OPERATING CONDITIONS

PARAMETER	SYMBOL	RATINGS	UNIT		
Supply Voltage	V_{DD}	4.5 ~ 5.5	V		
Threshold Voltage	High	SHUTDOWN, MUTE	V_{IH}	2.0	V
		SE/BTL		4.0	V
	Low	SHUTDOWN, MUTE	V_{IL}	1.0	V
		SE/BTL		1.0	V
Common Mode Input Voltage	V_{ICM}	$V_{DD}-1.0$	V		
Ambient Temperature	T_A	-40 ~ 85	°C		

■ ELECTRICAL CHARACTERISTICS ($T_A=25^\circ\text{C}$, unless otherwise specified)

$V_{DD} = 5V$

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Output Differential Voltage	V_{OS}			5		mV
Supply Current	I_{DD}	SE/BTL = 0V		9	20	mA
		SE/BTL = 5V		4	10	mA
Supply Current in Shutdown Mode	I_{SD}	SE/BTL = 0V, SHUTDOWN = 0V		1		μA
High Input Current	I_{IH}			900		nA
Low Input Current	I_{IL}			900		nA

Operating Characteristics, BTL mode ($V_{DD} = 5V$, $R_L = 4\Omega$, Gain = 2V/V)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Maximum Output Power	P_{OUT}	THD+N=10%, $f_{IN}=1\text{kHz}$	$R_L=3\Omega$		2.9	W
			$R_L=4\Omega$		2.6	W
			$R_L=8\Omega$		1.6	W
		THD+N=1%, $f_{IN}=1\text{kHz}$	$R_L=3\Omega$		2.4	W
			$R_L=4\Omega$		1.8	W
			$R_L=8\Omega$	1	1.3	W
Total Harmonic Distortion Plus Noise	THD+N	$P_{OUT}=1.2W$, $R_L=4\Omega$, $f_{IN}=1\text{kHz}$		0.07		%
		$P_{OUT}=0.9W$, $R_L=8\Omega$, $f_{IN}=1\text{kHz}$		0.08		%
Power Ripple Rejection Ratio	PSRR	$V_{RR}=0.1V_{rms}$, $R_L=8\Omega$, $C_B=1\mu\text{F}$, $f_{IN}=120\text{Hz}$		60		dB
Channel Separation	Crosstalk	$C_B=1\mu\text{F}$, $R_L=8\Omega$, $f_{IN}=1\text{kHz}$		90		dB
Signal to Noise Ratio	S/N	$P_{OUT}=1.1W$, $R_L=8\Omega$, A Weighting		95		dB

■ ELECTRICAL CHARACTERISTICS(Cont.)

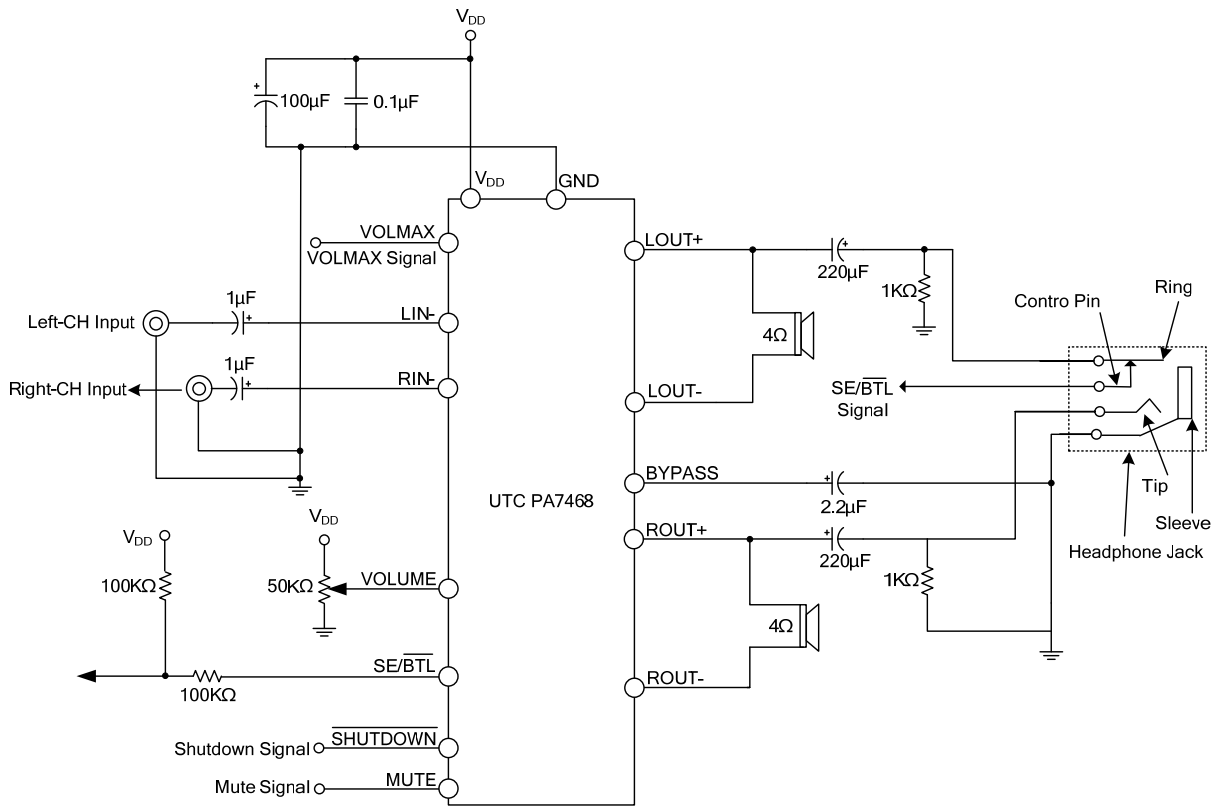
Operating Characteristics, SE mode ($V_{DD} = 5V$, Gain = 1V/V)

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT	
Maximum Output Power	P_{OUT}	THD+N=10%, f_{IN} =1kHz	$R_L = 16\Omega$		220		mW
			$R_L = 32\Omega$		120		mW
		THD+N=1%, f_{IN} =1kHz	$R_L = 16\Omega$		160		mW
			$R_L = 32\Omega$		95		mW
Total Harmonic Distortion Plus Noise	THD+N	$P_{OUT}=125mW, R_L = 16\Omega, f_{IN}=1kHz$		0.09		%	
		$P_{OUT}=65mW, R_L = 32\Omega, f_{IN}=1kHz$		0.09		%	
Power Ripple Rejection Ratio	PSRR	$V_{IN}=0.1V_{rms}, R_L=8\Omega, C_B=1\mu F, f_{IN}=120Hz$		60		dB	
Channel Separation	Crosstalk	$C_B=1\mu F, R_L=32\Omega, f_{IN}=1kHz$		60		dB	
Signal to Noise Ratio	S/N	$P_{OUT}=75mW, SE, R_L=32\Omega, A$ Weighting		100		dB	

■ VOLUME CONTROL TABLE_BTL MODE (Supply Voltage $V_{DD}=5V$)

GAIN(DB)	HIGH(V)	LOW(V)	HYSTERESIS(MV)	RECOMMENDED VOLTAGE(V)
20	0.12	0.00		0
18	0.23	0.17	52	0.20
16	0.34	0.28	51	0.31
14	0.46	0.39	50	0.43
12	0.57	0.51	49	0.54
10	0.69	0.62	47	0.65
8	0.80	0.73	46	0.77
6	0.91	0.84	45	0.88
4	1.03	0.96	44	0.99
2	1.14	1.07	43	1.10
0	1.25	1.18	41	1.22
-2	1.37	1.29	40	1.33
-4	1.48	1.41	39	1.44
-6	1.59	1.52	38	1.56
-8	1.71	1.63	37	1.67
-10	1.82	1.74	35	1.78
-12	1.93	1.85	34	1.89
-14	2.05	1.97	33	2.01
-16	2.16	2.08	32	2.12
-18	2.28	2.19	30	2.23
-20	2.39	2.30	29	2.35
-22	2.50	2.42	28	2.46
-24	2.62	2.53	27	2.57
-26	2.73	2.64	26	2.69
-28	2.84	2.75	24	2.80
-30	2.96	2.87	23	2.91
-32	3.07	2.98	22	3.02
-34	3.18	3.09	21	3.14
-36	3.30	3.20	20	3.25
-38	3.41	3.32	18	3.36
-40	3.52	3.43	17	3.48
-80	5.00	3.54	16	5

■ TYPICAL APPLICATION CIRCUIT



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