



# PA2616

## LINEAR INTEGRATED CIRCUIT

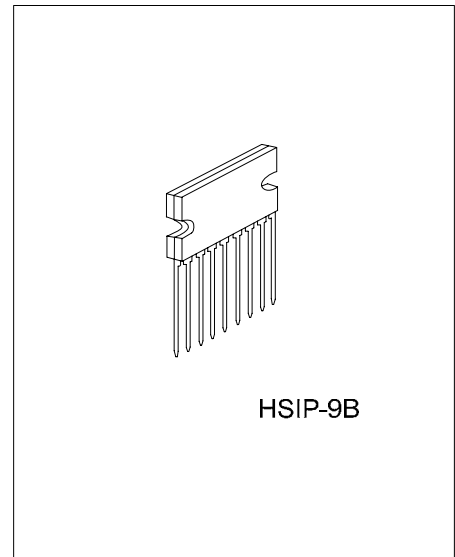
### 2 X 12 W HI-FI AUDIO POWER AMPLIFIERS WITH MUTE

■ DESCRIPTION

The **UTC PA2616** is dual power amplifiers which the supplied in a 9-lead plastic power package (HSIP-9B). This is especially suited for such as stereo radio and stereo TV applications.

■ FEATURES

- \* Needs few external components
- \* No switch-on/switch-off clicks
- \* During switch-on and switch-off input mute
- \* Low offset voltage between output and ground
- \* Both amplifiers has an excellent gain balance
- \* Hi-Fi in accordance with IEC 268 and DIN 45500
- \* Thermal protected and short-circuit proof and
- \* Mute available.



HSIP-9B

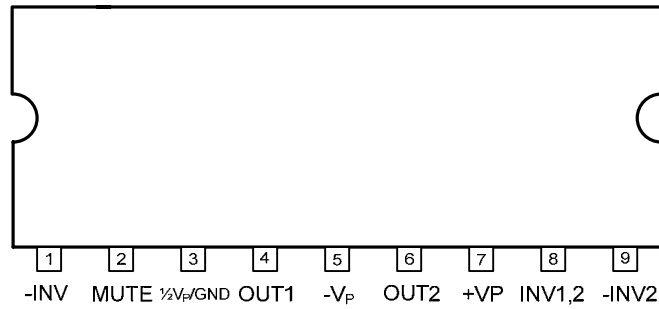
\*Pb-free plating product number: PA2616L

■ ORDERING INFORMATION

Ordering Number		Package	Packing
Normal	Lead Free Plating		
PA2616-H09-B-T	PA2616L-H09-B-T	HSIP-9B	Tube

<p>PA2616L-H09-B-T</p> <p>(1)Packing Type (2)Package Type (3)Lead Plating</p>	<p>(1) T: Tube (2) H09-B: HSIP-9B (3) L: Lead Free Plating, Blank: Pb/Sn</p>
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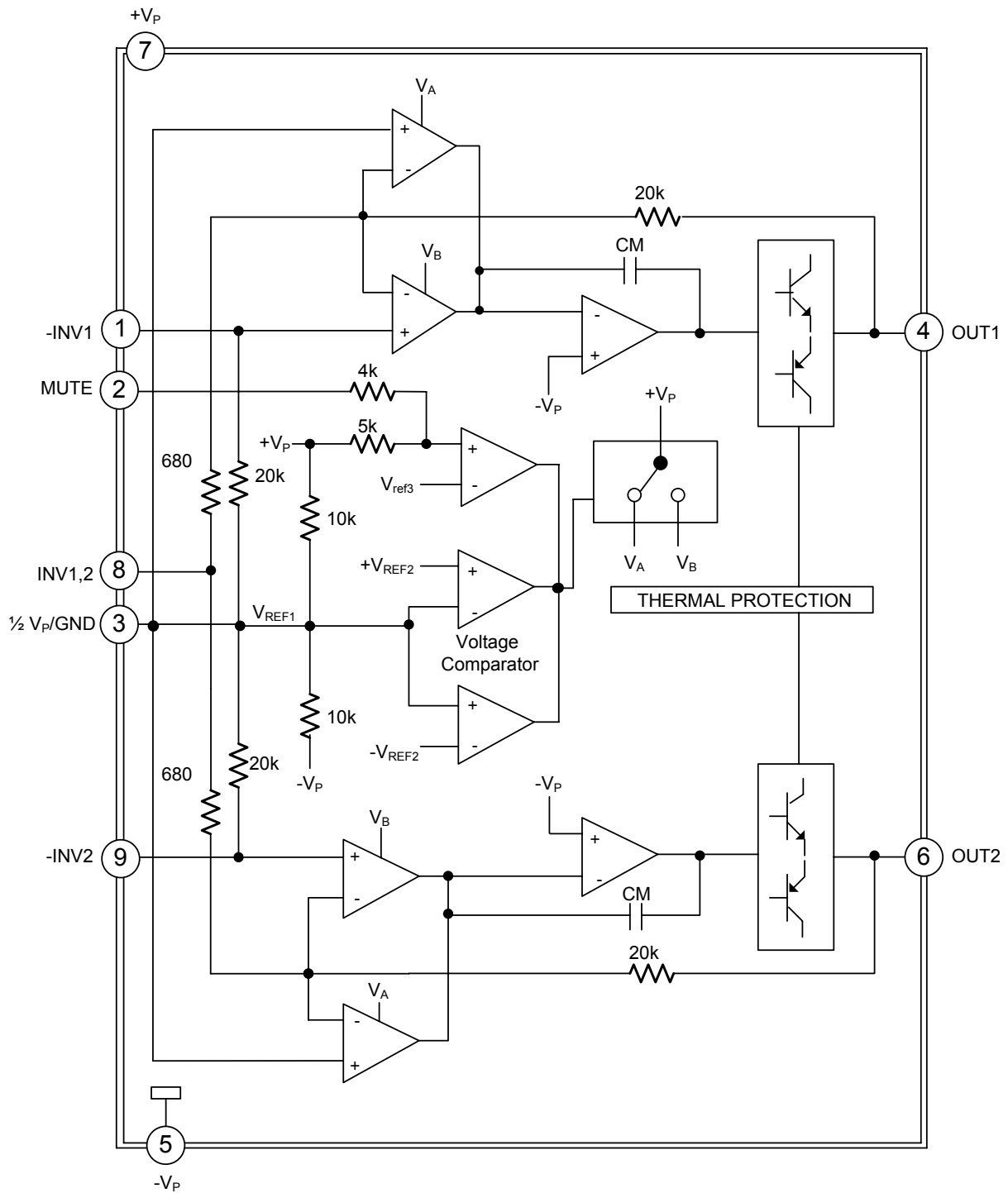
### ■ PIN CONFIGURATION



### ■ PIN DESCRIPTIONS

PIN NO.	PIN NAME	I/O	PIN FUNCTION
1	-INV1	I	Non-inverting input 1
2	MUTE	I	Mute input
3	$\frac{1}{2}V_p/GND$		$\frac{1}{2}$ supply voltage or ground
4	OUT1	O	Output 1
5	$-V_p$		Negative supply voltage
6	OUT2	O	Output 2
7	$+V_p$		Positive supply voltage
8	INV1, 2	I	Inverting inputs 1 and 2
9	-INV2	I	Non-inverting input 2

■ BLOCK DIAGRAM



### ■ ABSOLUTE MAXIMUM RATINGS

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	$\pm V_P$	21	V
Non-Repetitive Peak Output Current	$I_{PEAK}$	4	A
Power Dissipation	$P_D$	25	W
Short Circuit Time	Note 1	$t_{SC}$	1
Junction Temperature	$T_J$	+150	°C
Operating Temperature	$T_{OPR}$	-25 ~ +150	°C
Storage Temperature	$T_{STG}$	-50 ~ +150	°C

Note: 1. For asymmetrical power supplies (with the load short-circuited), the maximum unloaded supply voltage is limited to  $V_P = 28$  V and the maximum unloaded supply voltage is limited to 32 V (with the load short-circuited) with an internal supply resistance of  $R_S = 4 \Omega$ . The circuit is short-circuit-proof up to  $V_P = \pm 21$  V for symmetrical power supplies.

2. 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	TEST CONDITIONS	MIN	TYP	MAX	UNIT
Junction-to-Ambient	$\theta_{JA}$				2.5	°C/W

### ■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>SUPPLY</b>						
Supply Voltage	$\pm V_P$			16	21	V
Repetitive Peak Output Current	$I_{O(PEAK)}$			2.2		A
<b>OPERATING POSITION, Note 1</b>						
Supply Voltage	$\pm V_P$		7.5	16	21	V
Total Quiescent Current	$I_Q$	$R_L = \infty$	18	40	70	mA
Output Power	$P_{OUT}$	THD = 0.5%	10	12		W
		THD = 10%	12	15		
Total Harmonic Distortion	THD	$P_{OUT} = 6$ W		0.15	0.2	%
Power Bandwidth	$B_W$	THD = 0.5%; Note 2		20~20K		Hz
Voltage Gain	$G_V$		29	30	31	dB
Gain Unbalance	$ G_V $			0.2	1	dB
Noise Output Voltage	eN	Note 3		70	140	$\mu$ V
Input Impedance	$R_{IN}$		14	20	26	k $\Omega$
Supply Voltage Ripple Rejection	SVRR	Note 4	40	60		dB
Channel Separation	$\alpha$	$R_S = 0$	46	70		dB
Input Bias Current	$I_{I(BIAS)}$			0.3		$\mu$ A
DC Output Offset Voltage	$ \Delta V_{GND} $			30	200	mV
DC Output Offset Voltage	$ \Delta V_{4-6} $	between two channels		4	150	mV
<b>MUTE POSITION (AT <math>I_{MUTE} \geq 300 \mu A</math>)</b>						
Output Voltage	$V_{OUT}$	$V_{IN} = 600$ mV		0.3	1.0	mV
Mute Input Impedance	$Z_{2-7}$	Note 7	6.7	9	11.3	k $\Omega$
Total Quiescent Current	$I_Q$	$R_L = \infty$	18	40	70	mA
Noise Output Voltage	eN	Note 3		70	140	$\mu$ V
Supply Voltage Ripple Rejection	SVRR	Note 4	40	55		dB
DC Output Offset Voltage	$ \Delta V_{GND} $			40	200	mV
Offset Voltage With Respect To Operating Position	$ \Delta V_{off} $			4	150	mV
Current If Pin 2 Is Connected To Pin 5	$I_2$				8.2	mA

### ■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	TEST CONDITIONS	MIN	TYP	MAX	UNIT
<b>MUTE POSITION, Note 5</b>						
Supply Voltage	$\pm V_P$		2		5.8	V
Total Quiescent Current	$I_Q$	$R_L = \infty$	9	30	40	mA
Output Voltage	$V_{OUT}$	$V_{IN} = 600$ mV		0.3	1.0	mV
Noise Output Voltage	eN	Note 3		70	140	$\mu$ V
Supply Voltage Ripple Rejection	SVRR	Note 4	40	55		dB
<b>OPERATING POSITION, Note 6</b>						
Total Quiescent Current	$I_Q$		18	40	70	mA
Output Power	$P_{OUT}$	THD = 0.5%	5	6		W
		THD = 10%	6.5	8		
		THD = 0.5%; $R_L = 4\Omega$		10		
		THD = 10%; $R_L = 4\Omega$		14		
Total Harmonic Distortion	THD	$P_{OUT} = 4$ W		0.13	0.2	%
Power Bandwidth	B	THD = 0.5%; note 2		40~20K		Hz
Voltage Gain	$G_V$		29	30	31	dB
Gain Unbalance	$ G_V $			0.2	1	dB
Noise Output Voltage	eN	Note 3		70	140	$\mu$ V
Input Impedance	$R_{IN}$		14	20	26	k $\Omega$
Supply Voltage Ripple Rejection	SVRR		35	44		dB
Channel Separation	$\alpha$			45		dB
<b>MUTE POSITION (<math>I_{MUTE} \geq 300 \mu A</math>)</b>						
Output Voltage	$V_{OUT}$	$V_{IN} = 600$ mV		0.3	1.0	mV
Mute Input Impedance	$Z_{2-7}$	Note 7	6.7	9	11.3	k $\Omega$
Total Quiescent Current	$I_Q$		18	40	70	mA
Noise Output Voltage	eN	Note 3		70	140	$\mu$ V
Supply Voltage Ripple Rejection	SVRR	Note 4	35	44		dB
Offset Voltage With Respect To Operating Position	$ \Delta V_{off} $			4	150	mV
Current If Pin 2 Is Connected To Pin 5	$I_2$				8.2	mA

Note: 1.  $V_P = \pm 16$  V;  $R_L = 8 \Omega$ ;  $T_a = 25 \text{ }^\circ\text{C}$ ;  $f = 1$  kHz; symmetrical power supply  $I_{MUTE} < 30 \mu A$ . See Fig. 1

2. The power bandwidth is measured at  $P_{O(MAX)}$  3 dB output power

3. The noise output voltage (RMS value) is measured at  $R_S = 2$  k $\Omega$ , unweighted (20 Hz to 20 kHz)

4. The ripple rejection is measured at  $R_S = 0$  and  $f = 100$  Hz to 20 kHz. The ripple voltage (200 mV) is applied in phase to the positive and the negative supply rails. With asymmetrical power supplies, the ripple rejection is measured at  $f = 1$  kHz

5.  $\pm V_P = 4$  V;  $R_L = 8 \Omega$ ;  $T_a = 25 \text{ }^\circ\text{C}$ ;  $f = 1$  kHz; symmetrical power supply. See Fig.1

6.  $V_P = 24$  V;  $R_L = 8 \Omega$ ;  $T_a = 25 \text{ }^\circ\text{C}$ ;  $f = 1$  kHz; asymmetrical power supply  $I_{MUTE} < 30 \mu A$ . See Fig.2

7. At pin 2 it is a resistor divider of typical 4k $\Omega$  and 5k $\Omega$  to the positive supply rail. And at the connection of the 4k $\Omega$  and 5k $\Omega$  resistor a zener diode of typical 6.6 V is also connected to the positive supply rail. The zener's spread voltage is 6.1 to 7.1 V.

### ■ TYPICAL APPLICATION CIRCUIT

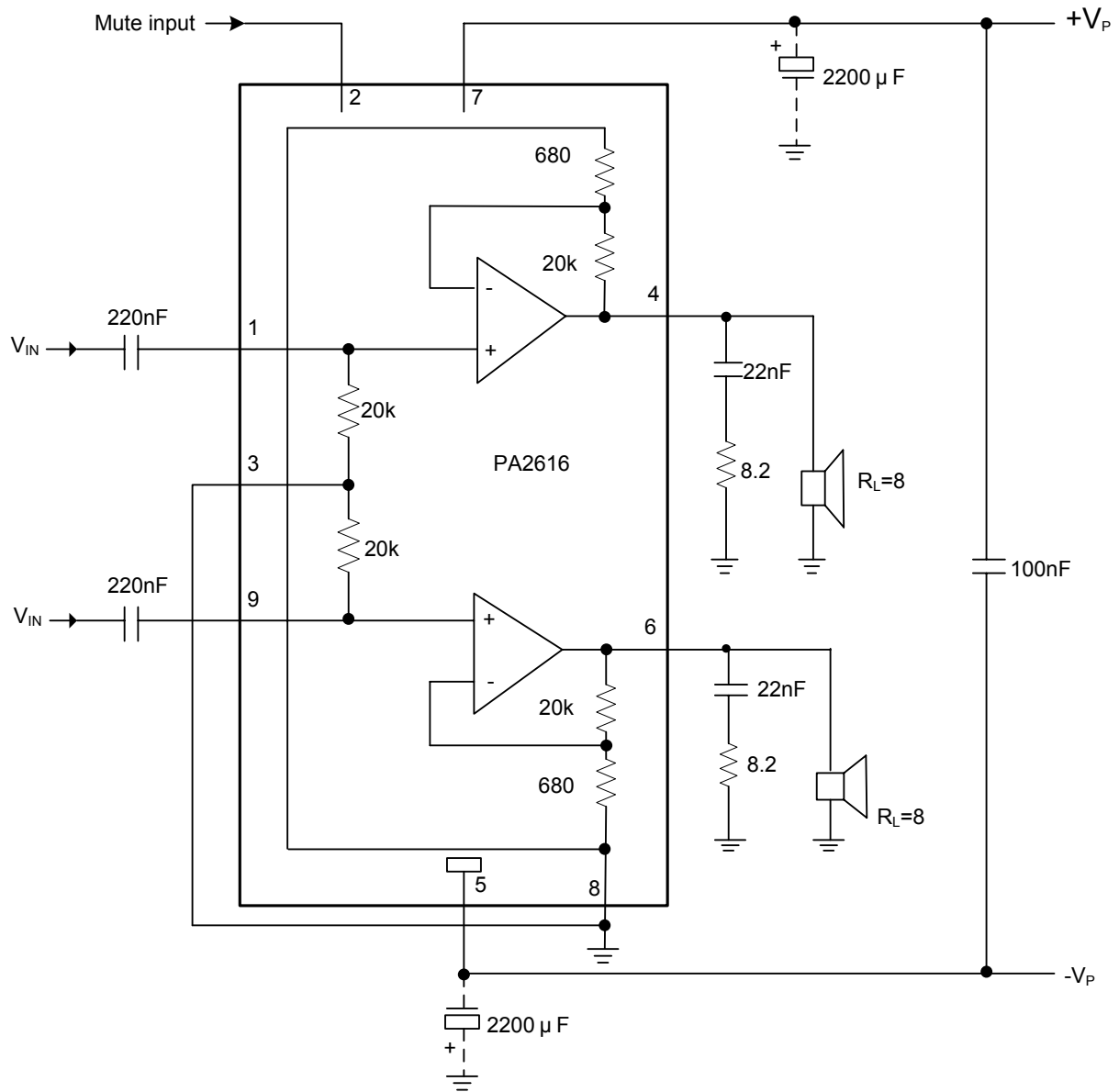


Fig. 1 Test and Application Circuit with Symmetrical Power Supply

■ TYPICAL APPLICATION CIRCUIT (Cont.)

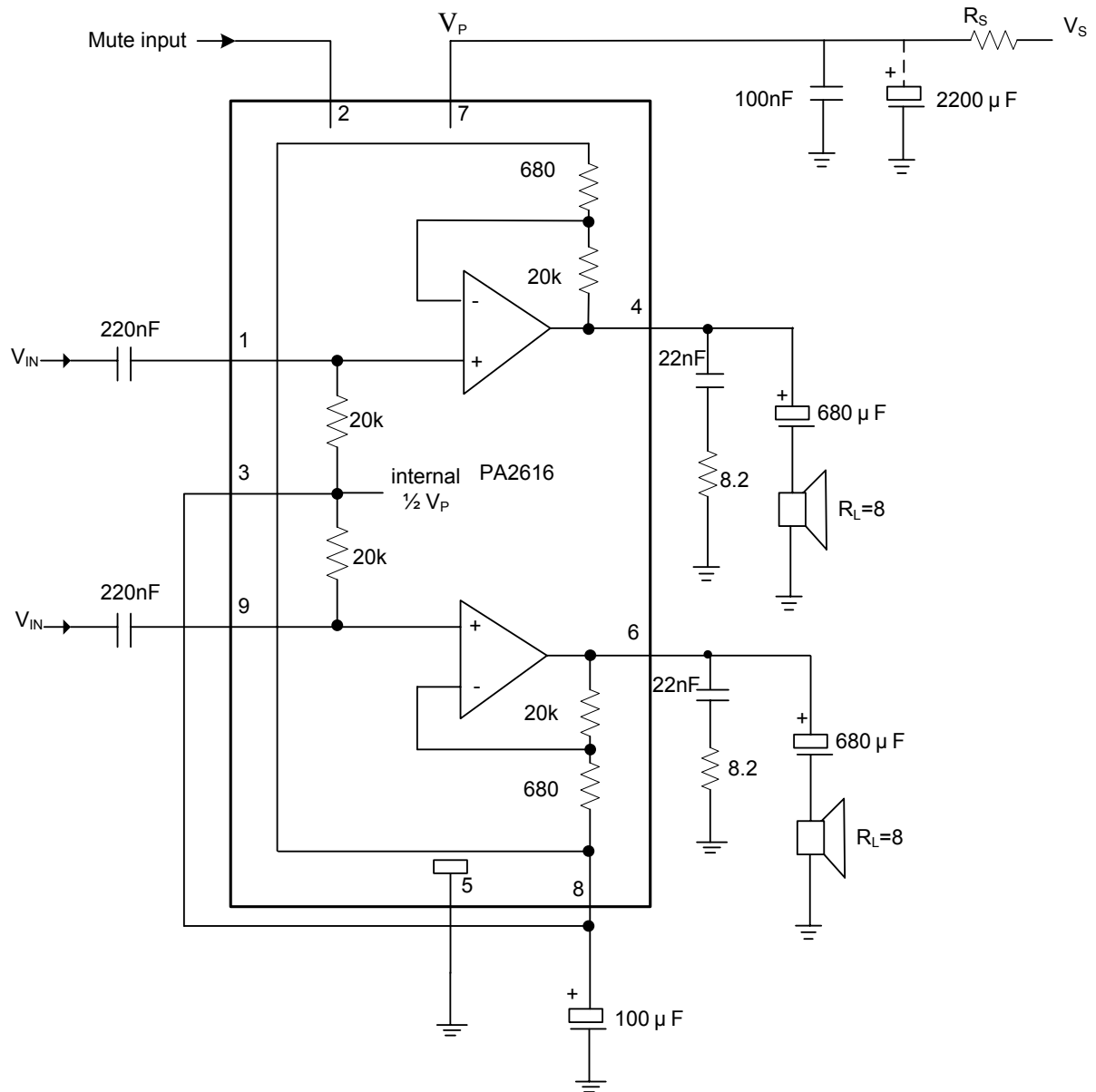


Fig. 2 Test and Application Circuit with Asymmetrical Power Supply

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