



# LA4601

## Audio Power Amplifier for Radio Cassette Recorders

### Overview

This is a different-package version of the power amplifier LA4600 with ultralow peripheral component count. Basic power supply spec is  $V_{cc} = 15V$ , but a 9V spec for operation without heatsink is also possible. BS capacitor, NF capacitor, and oscillation-stopping CR components are incorporated into the IC circuitry.

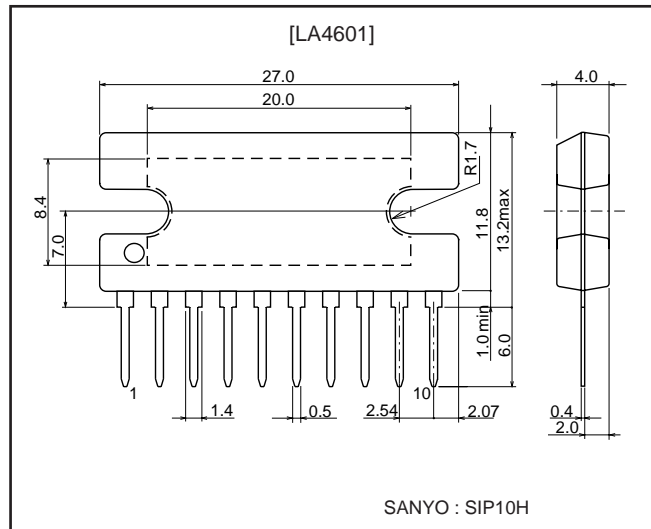
### Functions

- Pin compatible with the LA4600
- Heatsink not required for 9V version
- Output power  $V_{cc} = 15V/3\Omega \dots 7.0W \times 2$
- Built-in standby switching
- Built-in overheat protection (TSD)

### Package Dimensions

unit: mm

#### 3024-SIP10H



### Specifications

#### Maximum Ratings at $T_a = 25^\circ C$

Parameter	Symbol	Conditions	Ratings	Unit
Maximum supply voltage	$V_{cc \max}$	$R_g=0$ (No signal)	24	V
Allowable power dissipation	$P_d \max$	With an arbitrary large heatsink	25.0	W
Thermal resistance	$\theta_{j-c}$		3.0	$^\circ C/W$
Operating temperature	$T_{opr}$		- 20 to +75	$^\circ C$
Storage temperature	$T_{stg}$		- 40 to +150	$^\circ C$

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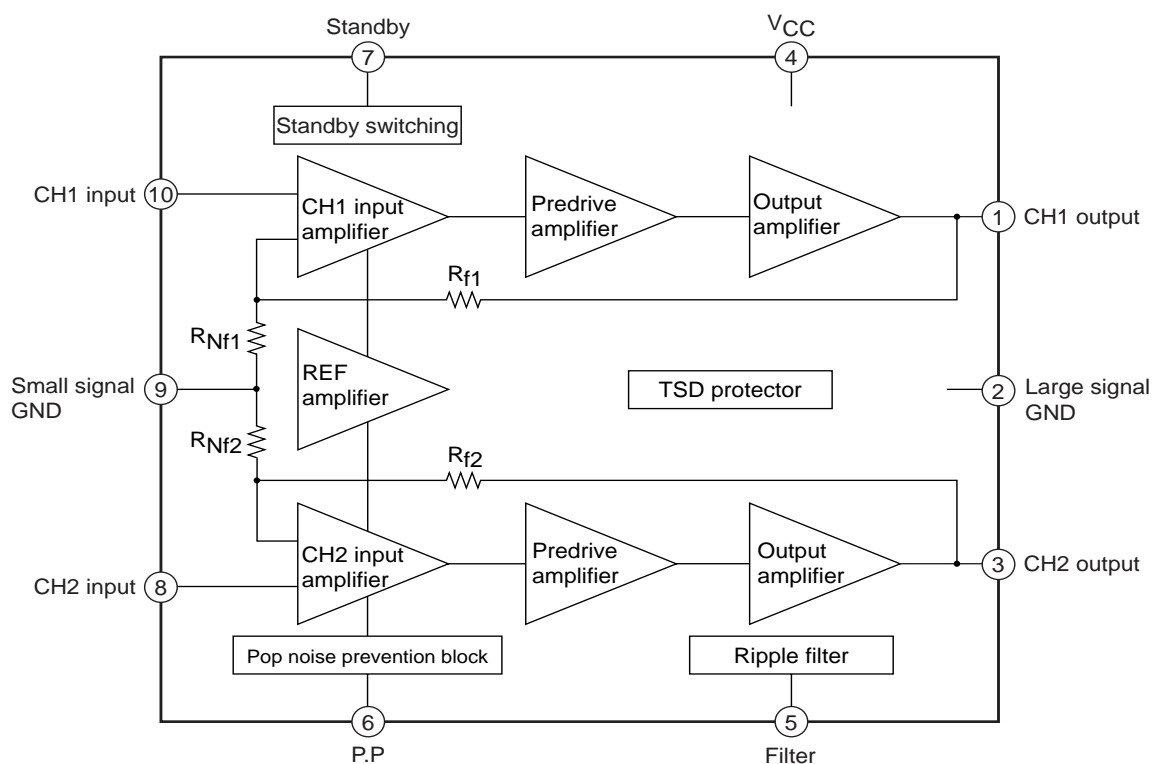
## Operating Conditions at $T_a = 25^\circ\text{C}$

Parameter	Symbol	Conditions	Ratings	Unit
Recommended supply voltage	$V_{CC}$		15	V
Recommended load resistance	$R_L$		3	$\Omega$
Operating supply voltage range	$V_{CC\ op}$	Within maximum ratings	5.0 to 22	V
Operating load resistance range			2.7 to 8	$\Omega$

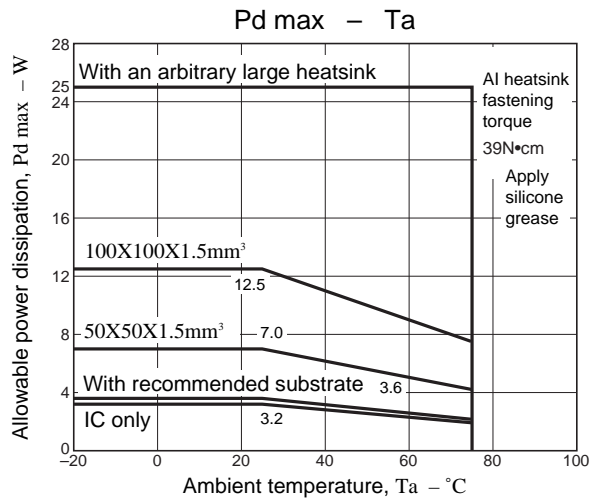
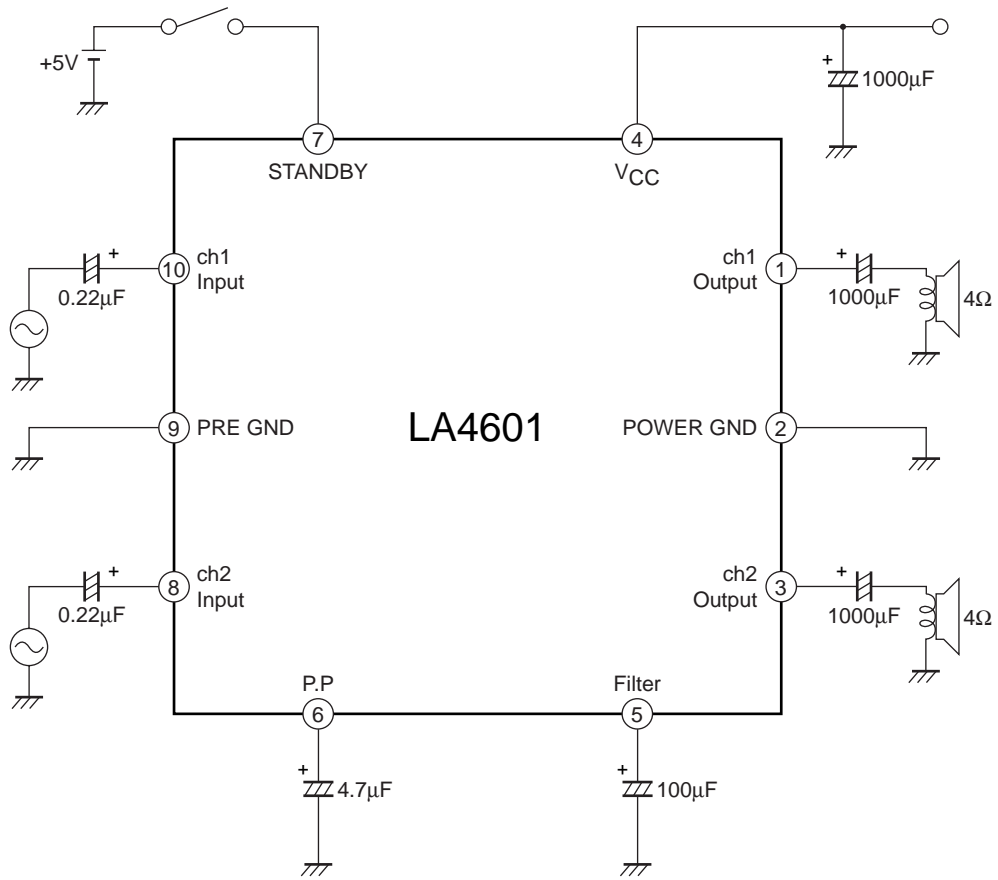
## Electrical Characteristics at $T_a = 25^\circ\text{C}$ , $V_{CC} = 15\text{V}$ , $R_L = 3\Omega$ , $f = 1\text{kHz}$

Parameter	Symbol	Conditions	Ratings			Unit
			min	typ	max	
Standby current	$I_{st}$	Standby pin $\rightarrow$ GND	—	1.0	10	$\mu\text{A}$
Quiescent current	$I_{cco}$	$R_g=0$	20	35	70	mA
Voltage gain	VG	$V_o=0\text{ dBm}$	43.0	45.0	47.0	dB
Total harmonic distortion	THD	$P_o=1\text{w}$	—	0.2	0.8	%
Output noise voltage	$V_{no}$	$R_g=0$ , DIN AUDIO	—	0.15	0.5	mV
Output voltage	$P_{o1}$	THD=10%	6.0	7.0	—	W
	$P_{o2}$	$V_{CC}=9\text{V}$ , $R_L=4\Omega$ , THD=10%	1.5	2.0	—	W
Channel separation	Chsep	$V_o=0\text{ dBm}$ , $R_g=0$ , DIN AUDIO	50	60	—	dB
Ripple suppression	SVRR	$V_r=0\text{ dBm}$ , $R_g=0$ , $f_r=100\text{ Hz}$ DIN AUDIO	45	55	—	dB
Standby ON voltage	$V_{st}$		1.5	5.0	—	V
Input resistance	$R_i$		20	30	40	$\text{k}\Omega$

## Block Diagram



Sample Application



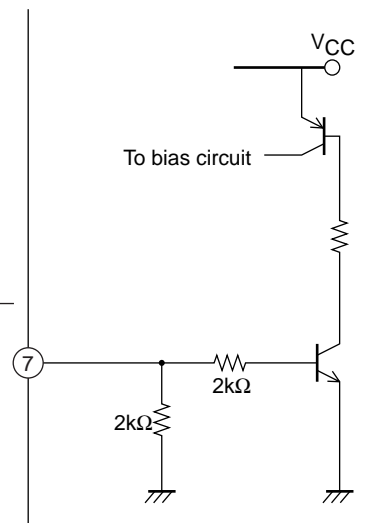
## Pin Descriptions

### 1. Standby switching function

Power is switched ON and OFF by controlling the High and Low states at pin 7, respectively (standby). To switch power ON, apply 1.5V or more, or 800  $\mu$ A to pin 7.

$$\text{Current supplied to pin 7} \cong \frac{\text{Applied voltage}}{2 \text{ k}\Omega} + \frac{\text{Applied voltage} - V_{BE} \text{ (approx. 0.7V)}}{2 \text{ k}\Omega}$$

- When directly connecting the microcontroller, add a resistor in series to optimize the current for the microcontroller.



### 2. Input pins (8,10)

Voltage at the input pins is approx.  $2 V_{BE}$  (1.4V).

Input impedance is approx. 30 k $\Omega$ .

- The recommended value for the input capacitor is 0.22  $\mu$ F, but this can be varied in order to adjust the starting time ( $t_s$ ). (The starting time is the time required from applying voltage to the standby pin until sound output is obtained.)

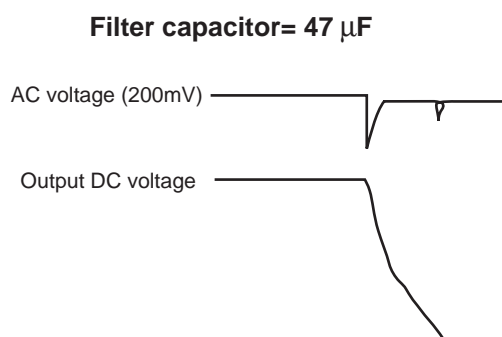
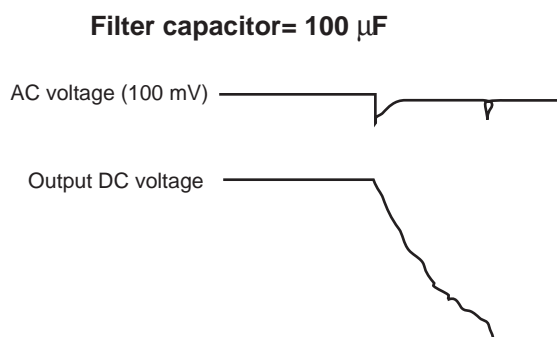
Input capacitor	1.0 $\mu$ F	2.2 $\mu$ F	3.3 $\mu$ F	4.7 $\mu$ F	10 $\mu$ F
Starting time ( $t_s$ )	0.2s	0.3s	0.5s	0.65s	1.5s

### 3. Filter (decoupling) pin (5)

Pin voltage is approx.  $1/2 V_{CC}$ .

The recommended value for the filter capacitor is 100  $\mu$ F.

When capacitance is lower, pop noise when setting the standby pin to Low (power OFF) will increase.

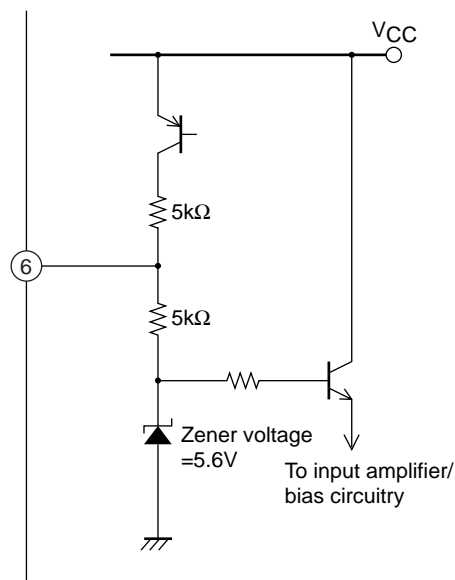


#### 4. P.P (pop noise) pin (6)

$$\text{Voltage at pin 6} \cong \frac{V_{CC} - V_{CE} (\text{approx. } 0.3V) - 5.6V}{2 \text{ k}\Omega} + 5.6V$$

- The recommended value for the P.P capacitor is 4.7  $\mu$ F. When capacitance is lower than 2.2  $\mu$ F, pop noise when setting the standby pin to Low (power OFF) will increase.

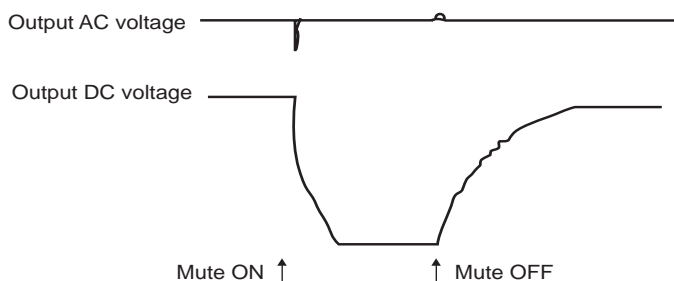
When capacitance is higher than 10  $\mu$ F, the sound will not be cut off when setting the standby pin to Low (power OFF).



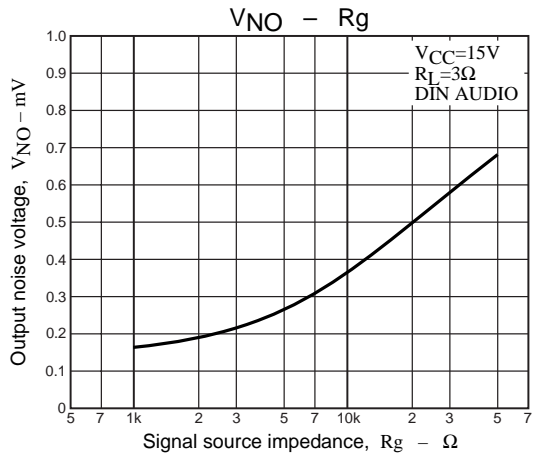
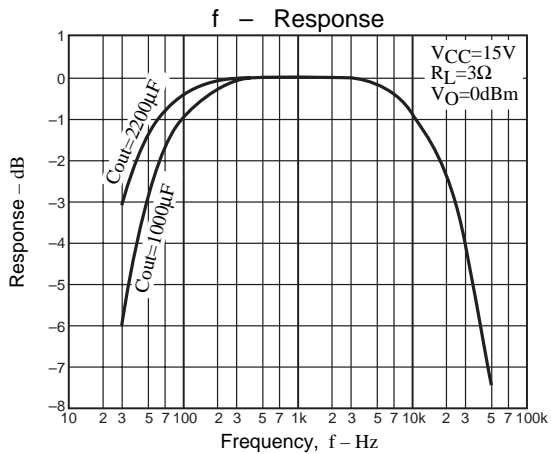
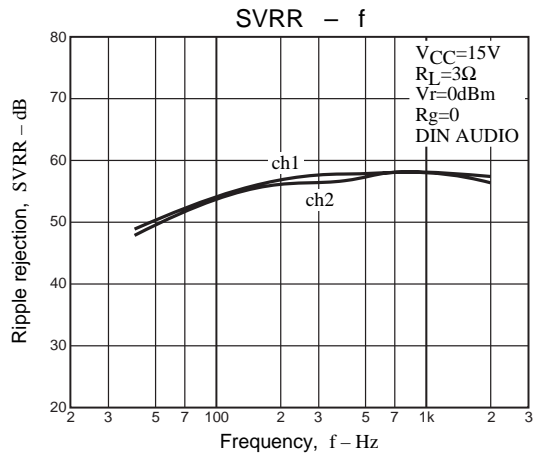
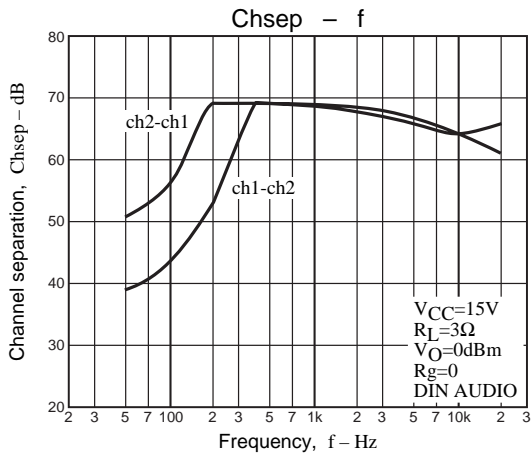
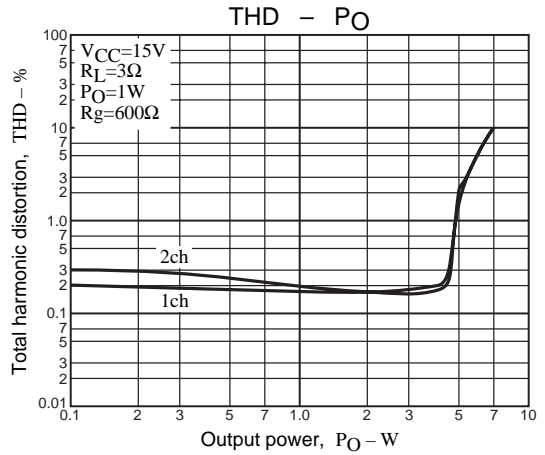
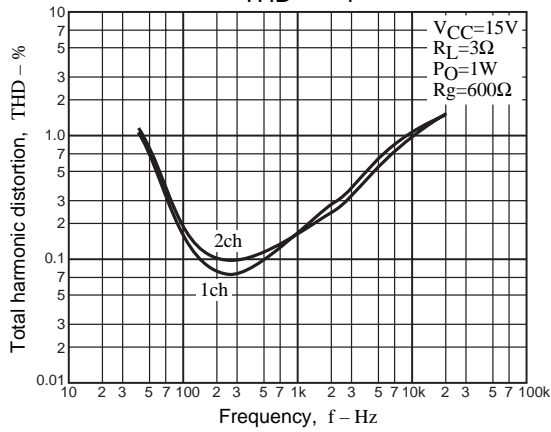
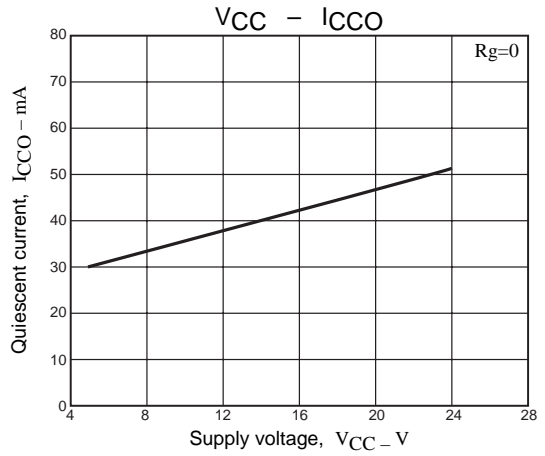
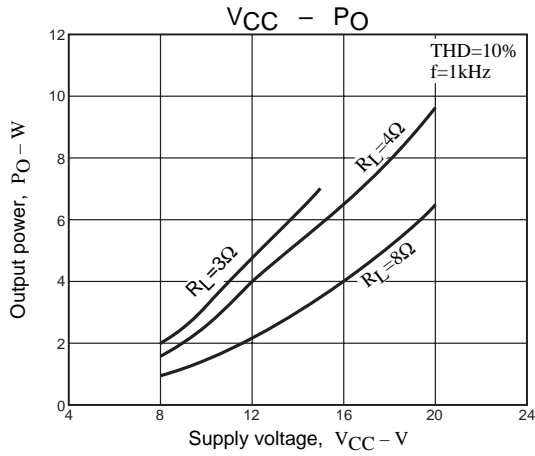
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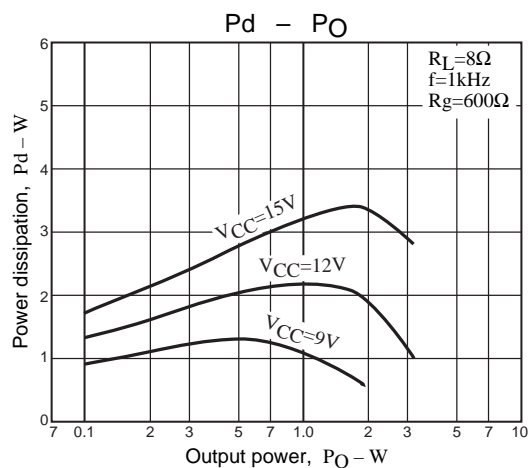
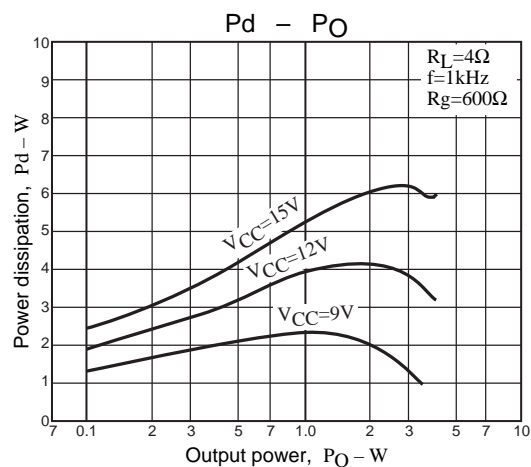
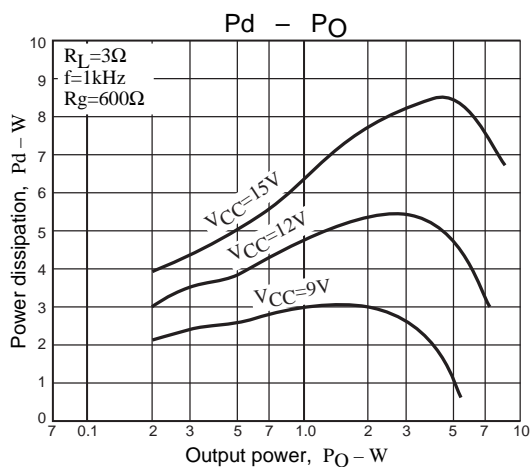
#### 5. Muting

The output signal can be controlled by connecting pin 5 (Filter) to ground via a resistance of 300 to 500 $\Omega$ . If resistance is higher than 750 $\Omega$ , the suppression ratio will decrease.



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