



LA4613

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 $V_{CC} = 15V$. BS capacitor, NF capacitor, and oscillation prevention CR components are incorporated into the IC circuitry.

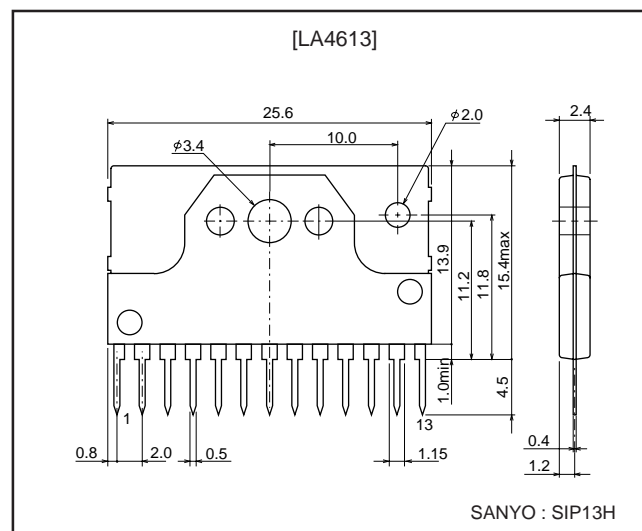
Functions

- Output power : $V_{CC}=15V/3\Omega \dots 7.0W \times 2$
- Built-in standby switch
- Built-in overheat protection (TSD)

Package Dimensions

unit: mm

3107-SIP13H



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 | 15.0 | W |
| Thermal resistance | θ_{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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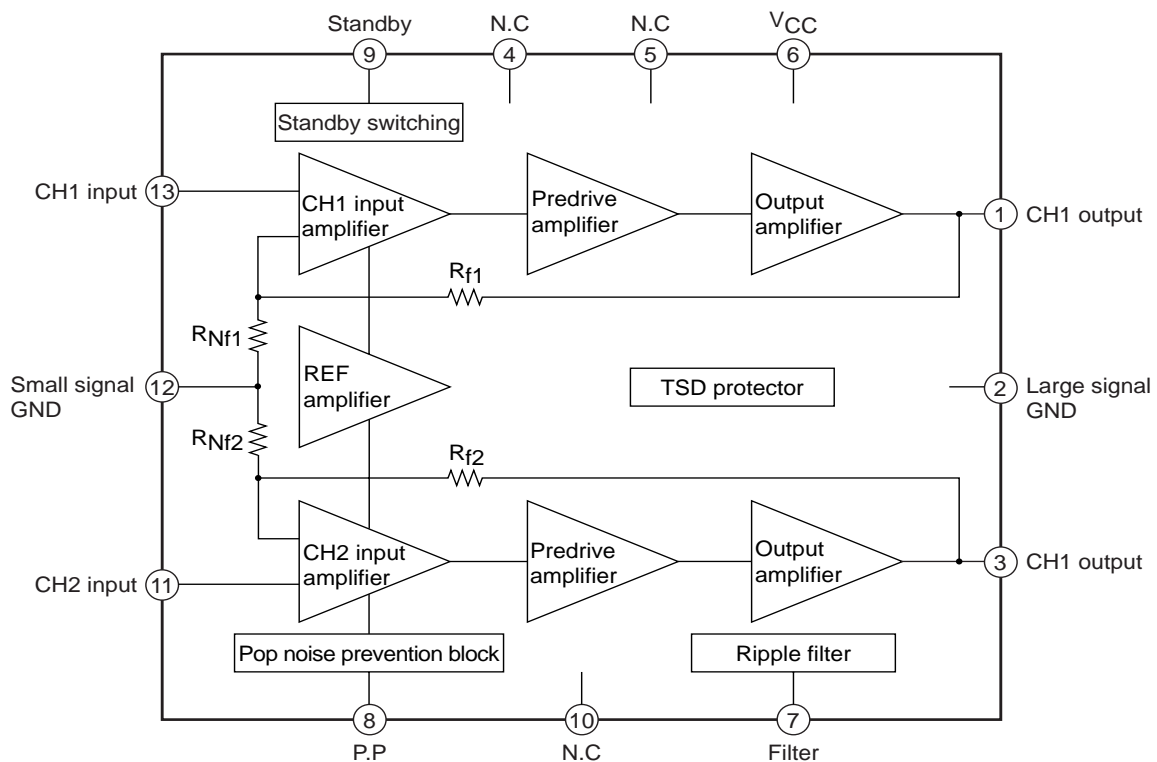
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Recommended Operating Conditions at $T_a = 25^{\circ}\text{C}$

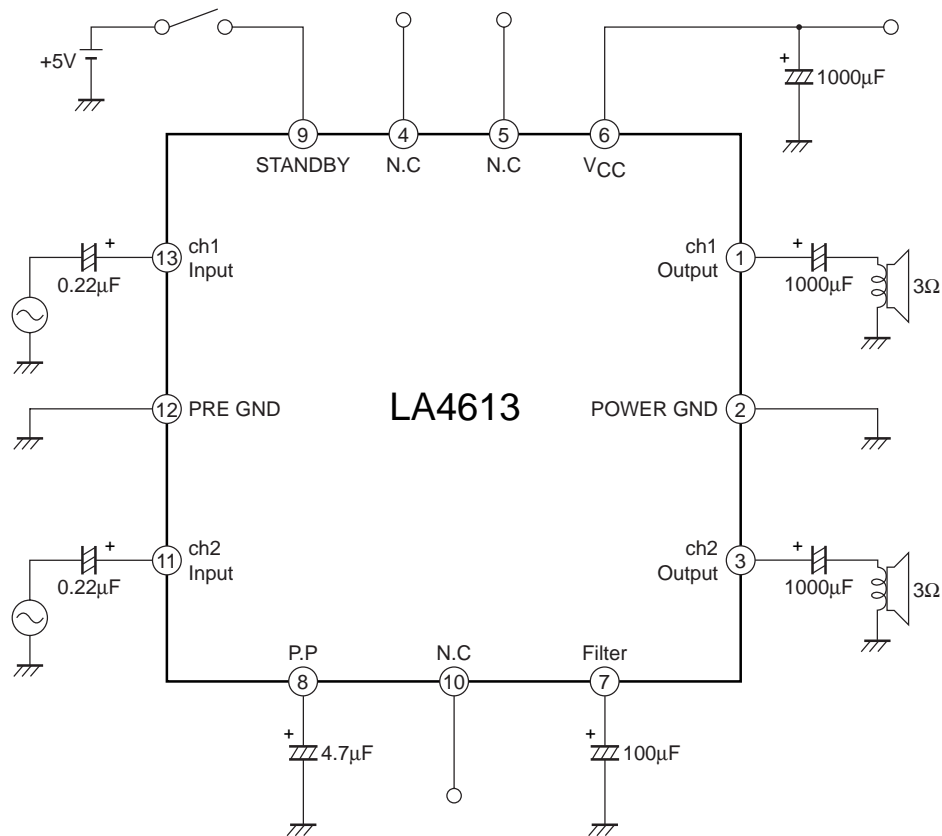
| Parameter | Symbol | Conditions | Ratings | Unit |
|---------------------------------|--------------------|------------------------|-----------|----------|
| Recommended supply voltage | V_{CC} | | 15 | V |
| Recommended load resistance | R_L | | 3 | Ω |
| Operating supply voltage range | $V_{CC\text{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

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

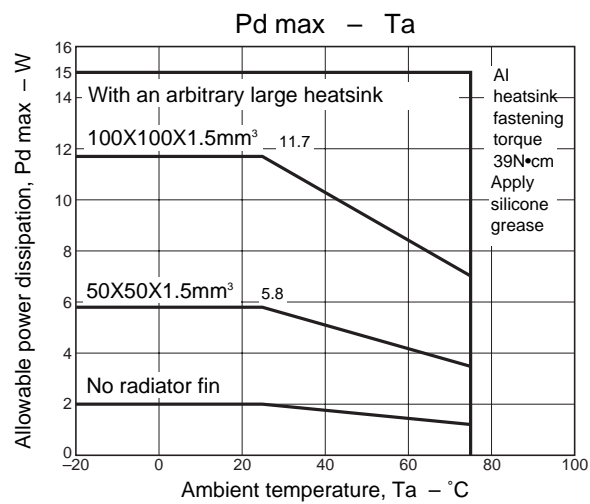
| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---------------------------|-----------|--|---------|------|------|------------------|
| | | | min | typ | max | |
| Standby current | I_{st} | Standby pin \rightarrow GND | — | 1.0 | 10 | μA |
| Quiescent current | I_{cco} | $R_g=0$ | 20 | 35 | 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 rejection ratio | SVRR | $V_r=0\text{ dBm}$, $R_g=0$, $f_r=100\text{ Hz}$ DIN AUDIO | 45 | 55 | — | dB |
| Stanby ON voltage | V_{st} | | 1.5 | 5.0 | — | V |
| Input resistance | R_i | | 20 | 30 | 40 | $\text{k}\Omega$ |

Block Diagram

Sample Application



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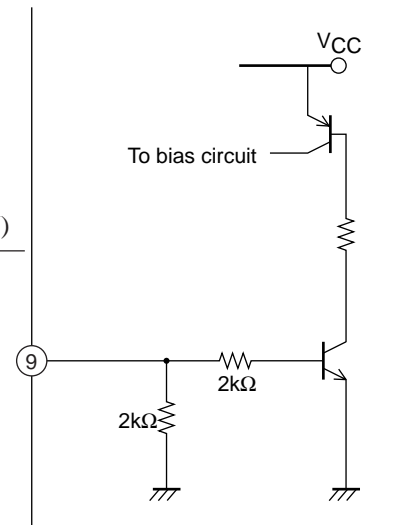
Pin Descriptions

1. Standby switching function (9)

Power is switched ON and OFF by controlling the High and Low states at pin 9, respectively (standby). To switch power ON, apply 1.5V or more, or 800 μ A to pin 9.

$$\text{Current supplied to pin 9} \doteq \frac{\text{Applied voltage}}{2 \text{ k}\Omega} + \frac{\text{Applied voltage} - V_{\text{BE}} (\text{approx. } 0.7\text{V})}{2 \text{ k}\Omega}$$

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



2. Input pins (11,13)

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

Input impedance is approx. 30 k Ω .

- The recommended value for the input capacitor is 0.22 μ 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.)

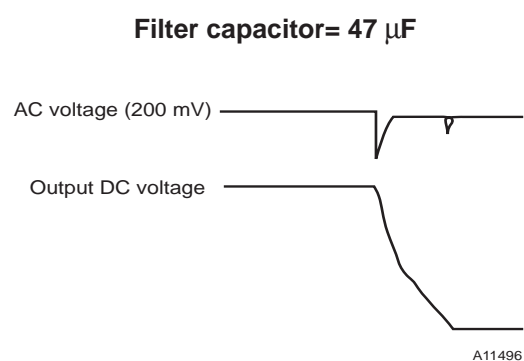
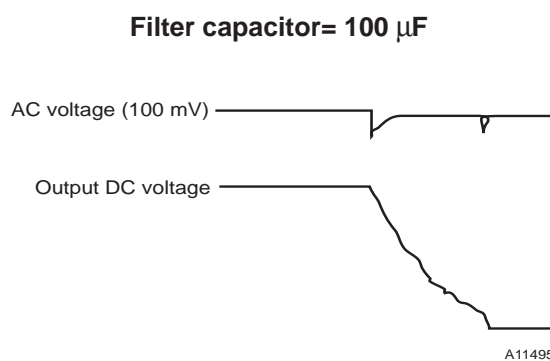
| Input capacitor | 1.0 μ F | 2.2 μ F | 3.3 μ F | 4.7 μ F | 10 μ F |
|---------------------|-------------|-------------|-------------|-------------|------------|
| Starting time t_s | 0.2s | 0.3s | 0.5s | 0.65s | 1.5s |

3. Filter (decoupling) pin (7)

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

The recommended value for the filter capacitor is 100 μ F.

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

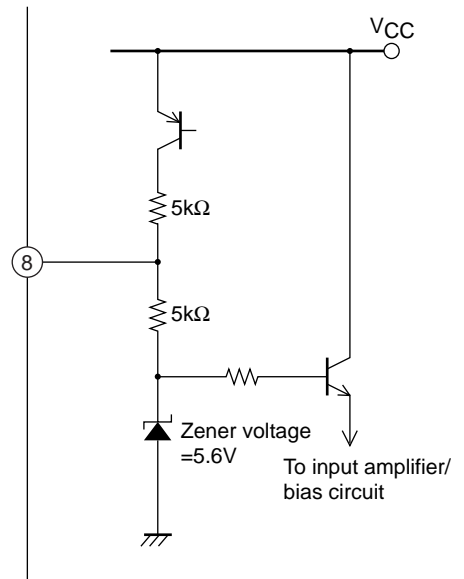


4. P.P (pop noise) pin (8)

$$\text{Voltage at pin 8} \approx \frac{V_{CC} - V_{CE} (\text{approx. } 0.3V) - 5.6V}{2} + 5.6V$$

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

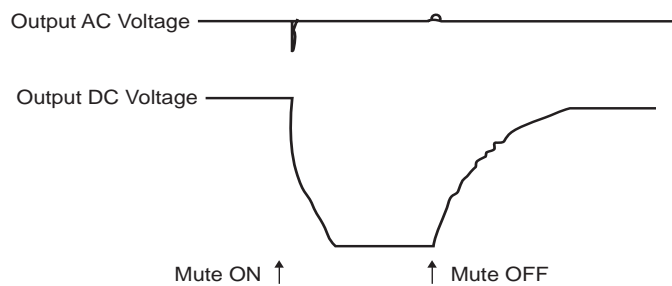
When capacitance is higher than 10 μF , the sound will not be cut off when setting the standby pin to Low (power OFF).



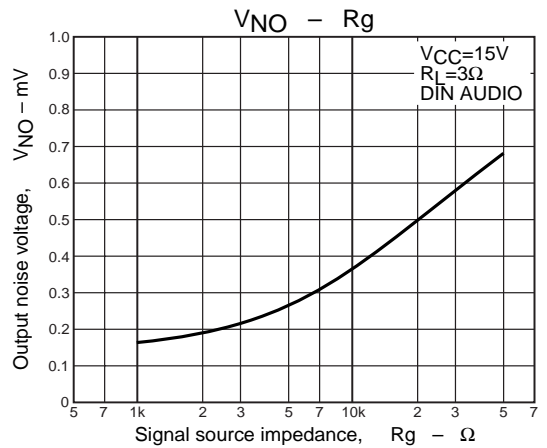
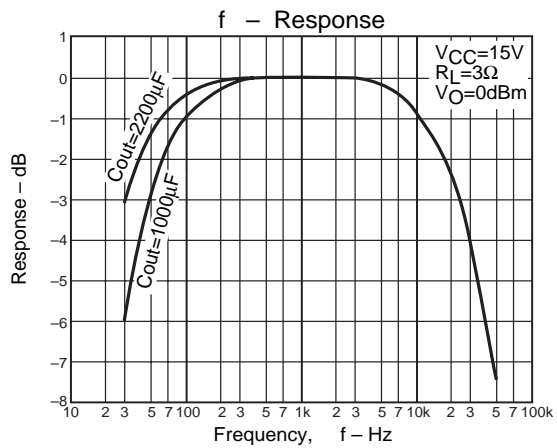
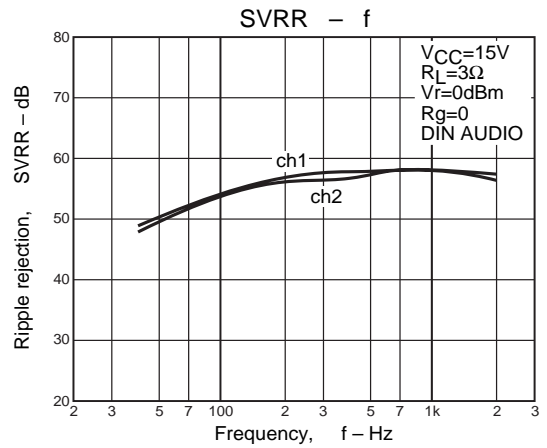
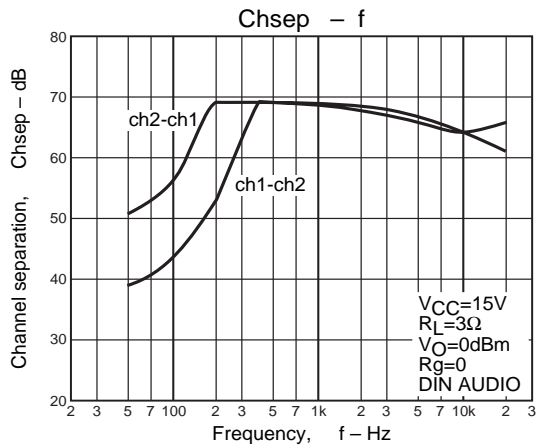
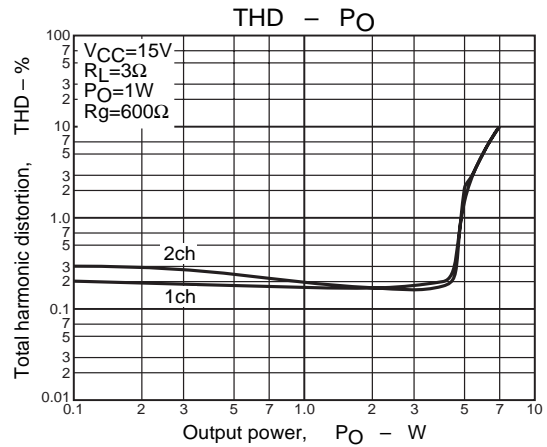
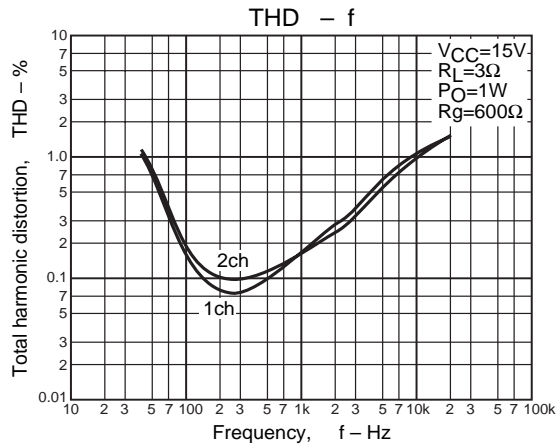
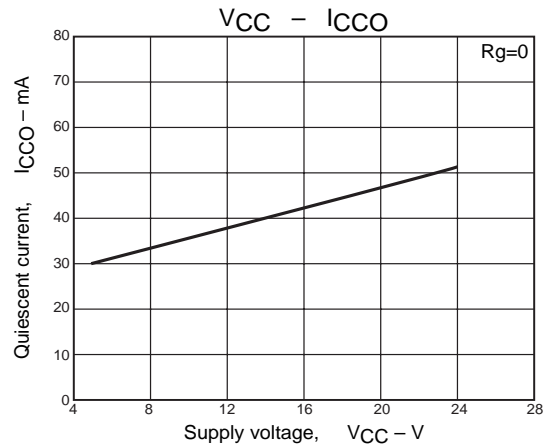
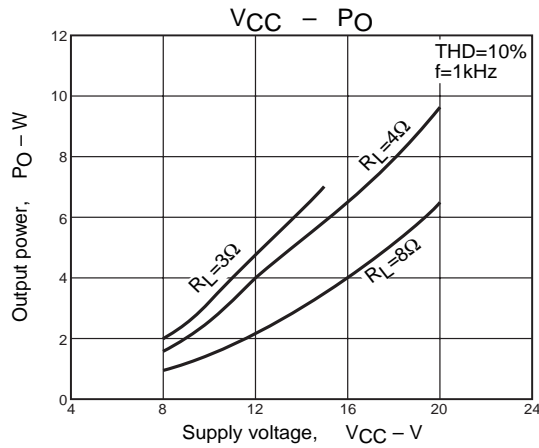
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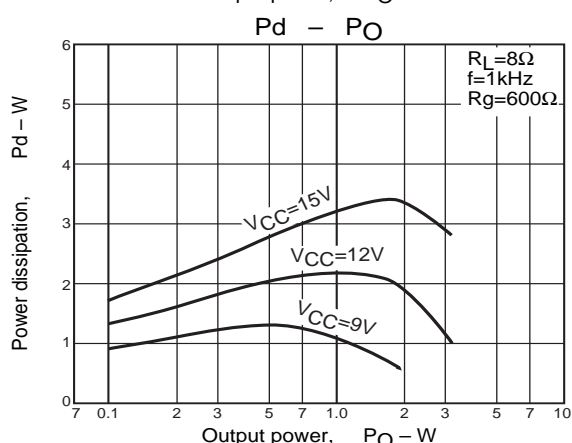
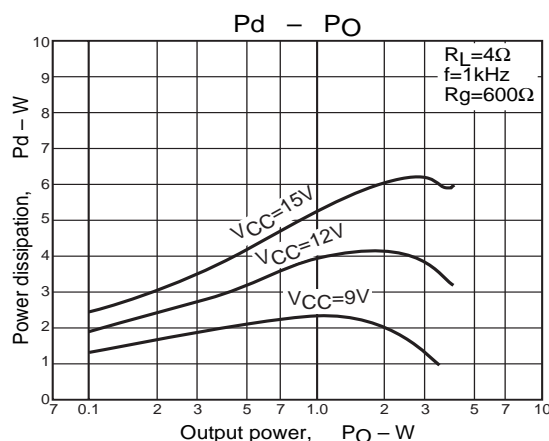
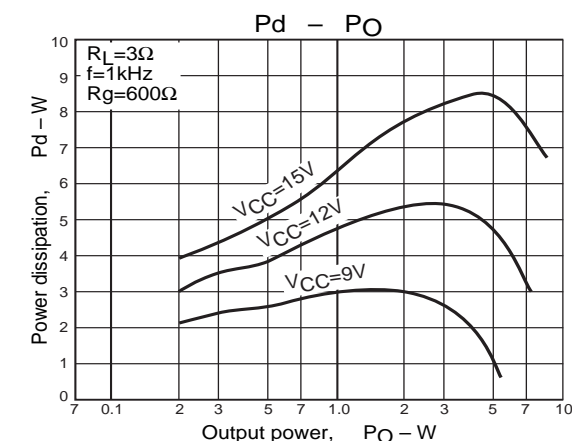
5. Muting

The output signal can be controlled by connecting pin 7 (Filter) to ground via a resistance of 300 to 500 Ω . If resistance is higher than 750 Ω , the suppression ratio will decrease.



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