



LA4600

Audio Power Amplifier for Radio Cassette Recorders

Overview

The LA4600 is an audio power amplifier which requires minimum count of external parts by incorporating BS capacitor, NF capacitor; and oscillation prevention CR components into the IC circuitry.

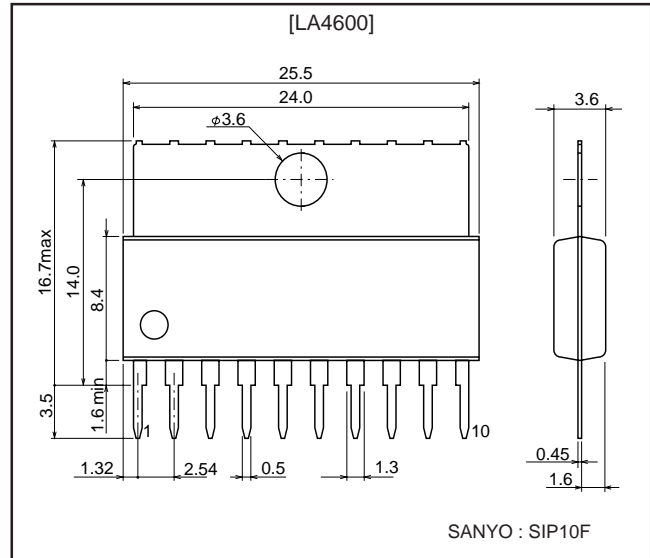
Functions

- Output power : $V_{CC} = 12V/4\Omega$ 4.0W X 2
 $V_{CC} = 9V/4\Omega$ 2.0W X 2
- Built-in standby switch
- Built-in overheat protection (TSD)

Package Dimensions

unit: mm

3046B-SIP10F



Specifications

Maximum Ratings at $T_a = 25^\circ\text{C}$

| Parameter | Symbol | Conditions | Ratings | Unit |
|-----------------------------|---------------------|-------------------------|--------------|--------------------|
| Maximum supply voltage | $V_{CC\text{ max}}$ | $R_g=0$ (No signal) | 24 | V |
| Allowable power dissipation | $P_d\text{ max}$ | With an arbitrary large | 12.5 | W |
| Thermal resistance | θ_{j-c} | | 10.0 | $^\circ\text{C/W}$ |
| Operating temperature | T_{opr} | | - 20 to +75 | $^\circ\text{C}$ |
| Storage temperature | T_{stg} | | - 40 to +150 | $^\circ\text{C}$ |

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

| Parameter | Symbol | Conditions | Ratings | Unit |
|---------------------------------|--------------------|------------------------|-----------|----------|
| Recommended supply voltage | V_{CC} | | 12 | V |
| Recommended load resistance | R_L | | 4 | 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 |

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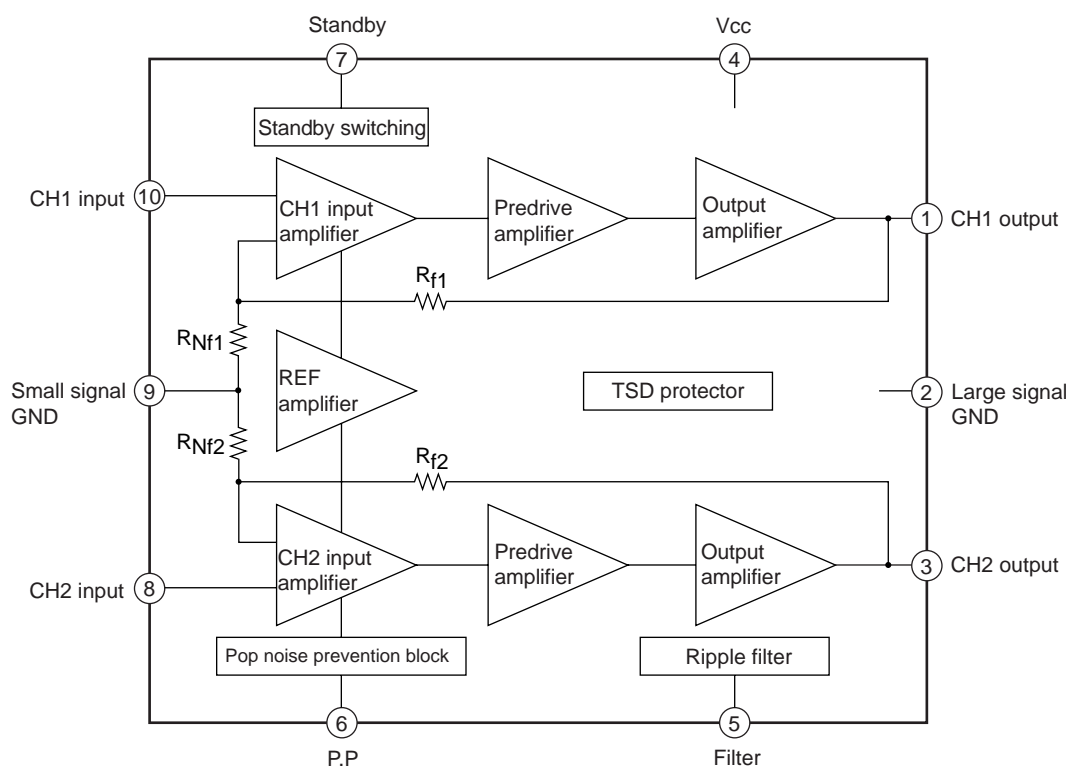
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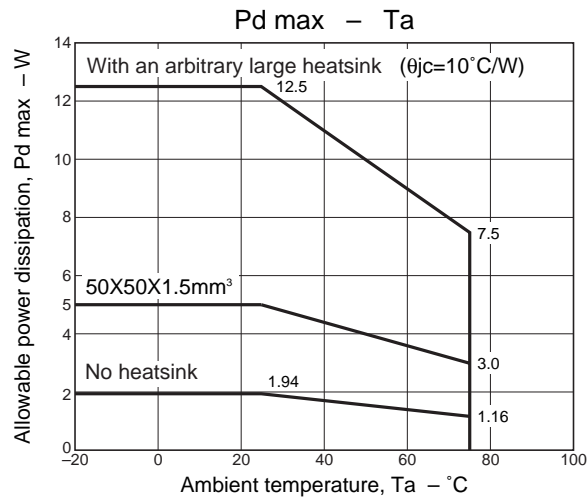
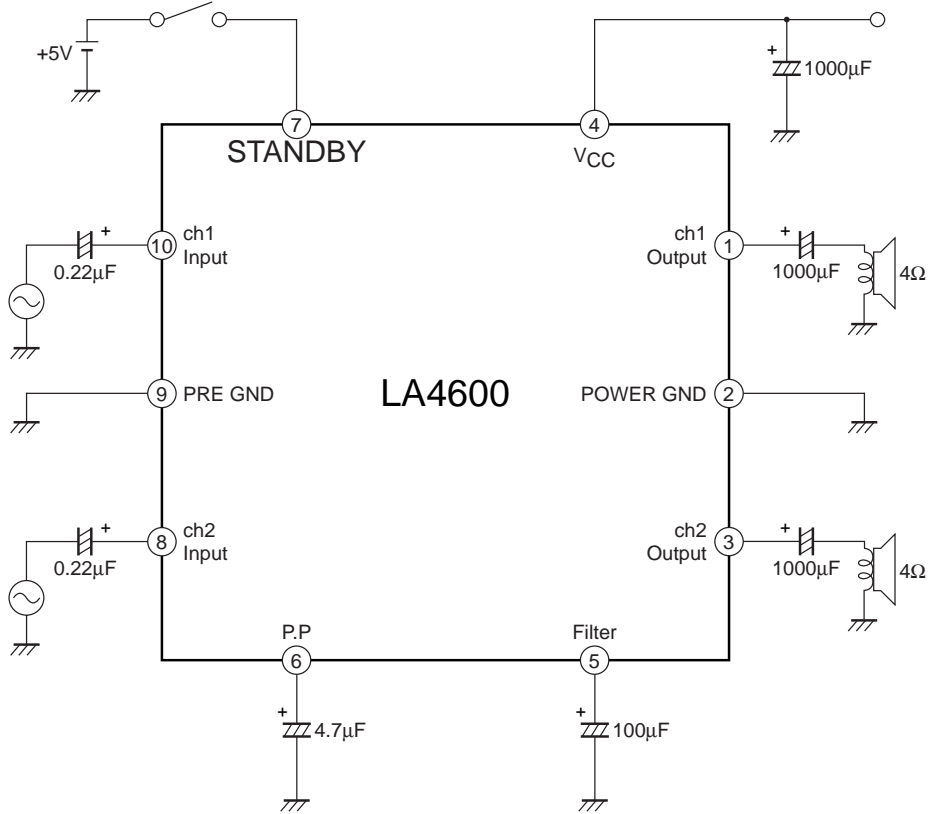
Electrical Characteristics at $T_a = 25^\circ\text{C}$, $V_{cc}=12\text{V}$, $R_L=4\Omega$, $f=1\text{ kHz}$

| Parameter | Symbol | Conditions | Ratings | | | Unit |
|---------------------------|-----------|---|---------|------|------|------------------|
| | | | min | typ | max | |
| Standby current | I_{st} | Standby pin \rightarrow GND | — | 1.0 | 10 | μA |
| Quiescent current | I_{cco} | $R_g=0$ | 18 | 32 | 64 | 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% | 3.0 | 4.0 | — | W |
| | P_{o2} | $V_{cc}=9\text{V}$, 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 |
| Standby ON voltage | V_{st} | | 1.5 | 5.0 | — | V |
| Input resistance | R_i | | 20 | 30 | 40 | $\text{K}\Omega$ |

Block Diagram



Sample Application



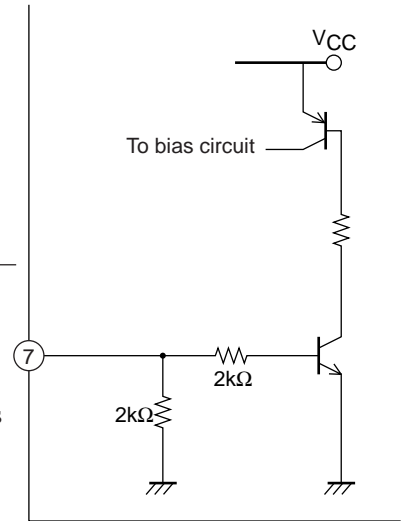
Pin Descriptions

1. Standby switching function (7)

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 μ A to pin 7.

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

- When directly connecting a microcontroller with this pin, 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 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.)

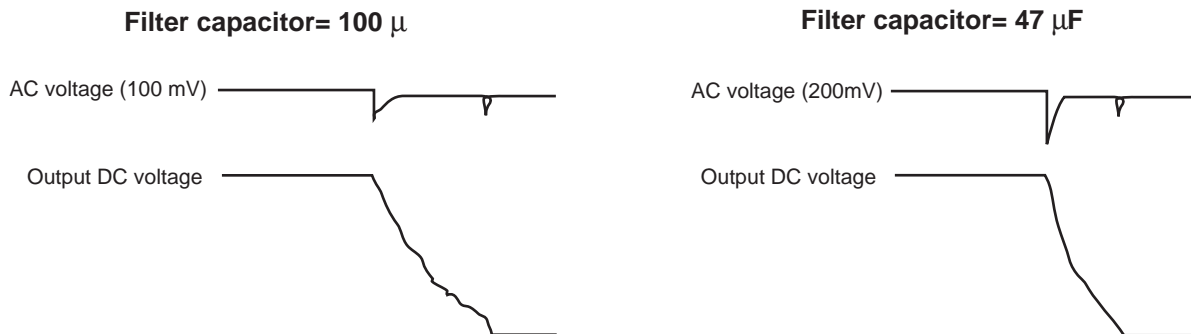
| | | | | | |
|-------------------------|-------------|-------------|-------------|-------------|------------|
| Input capacitor | 1.0 μ F | 2.0 μ F | 3.3 μ F | 4.7 μ F | 10 μ F |
| Starting time (t_s) | 0.2s | 0.3s | 0.5s | 0.65s | 1.5s |

3. Filter (decoupling) pin (5)

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

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.

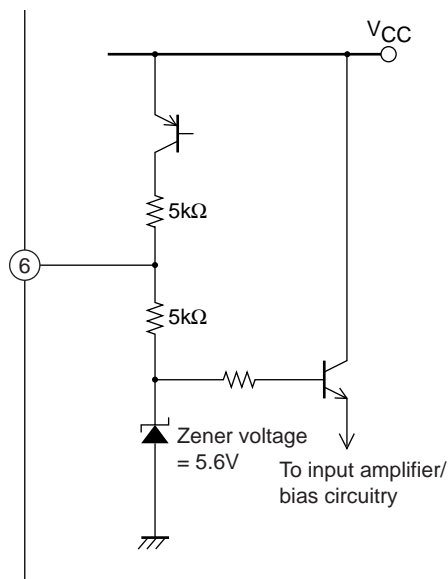


4. P.P (pop noise) pin (6)

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

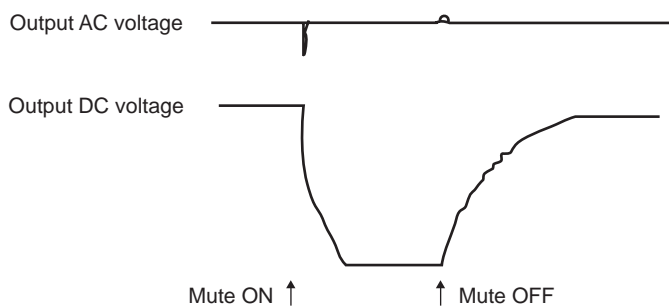
- The recommended value for the P.P capacitor is 4.7 μF .
When capacitance is lower than 2.2 μF , pop noise when setting the standby pin to Low (power OFF) will increase.

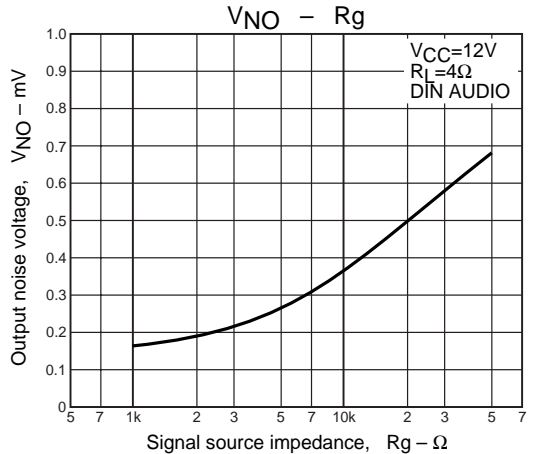
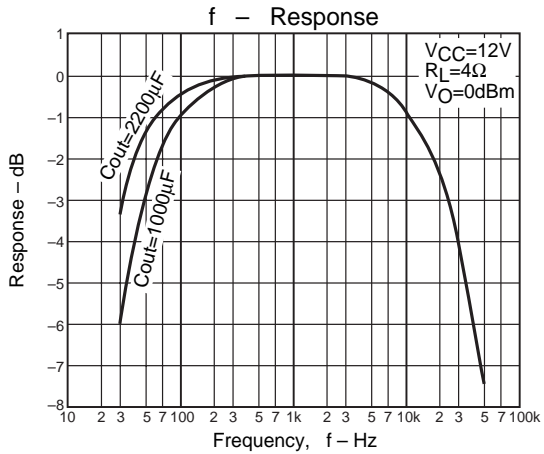
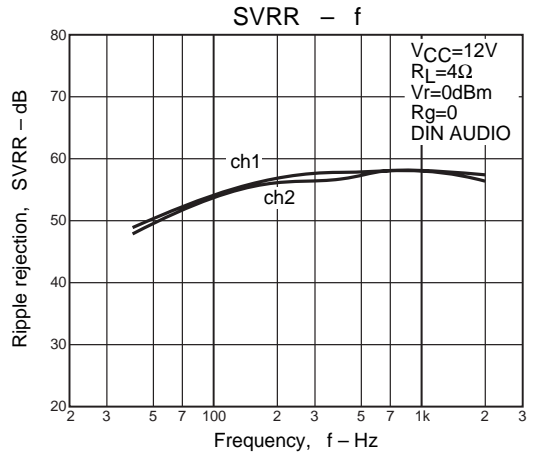
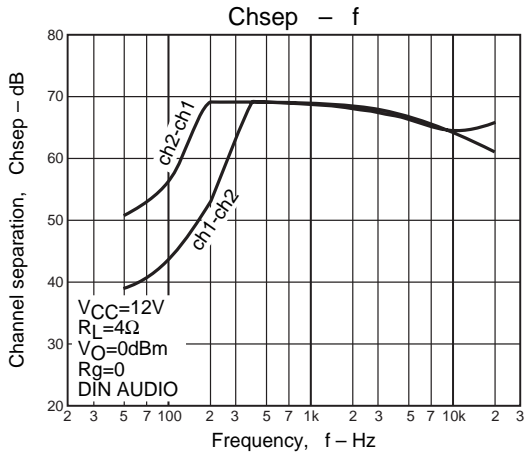
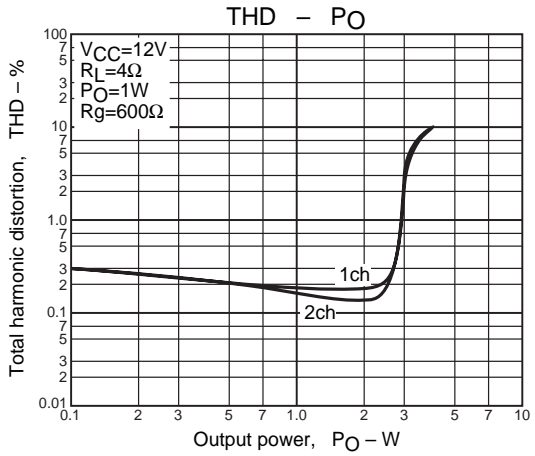
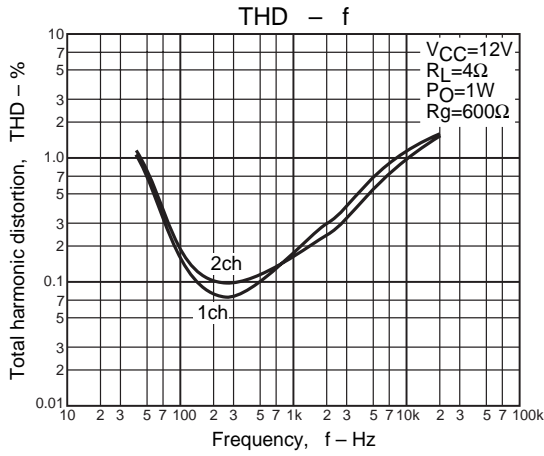
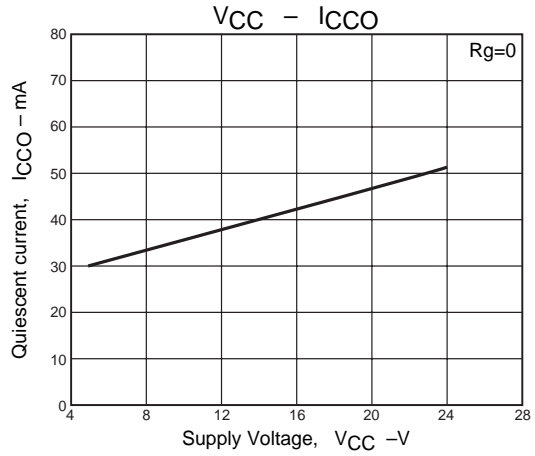
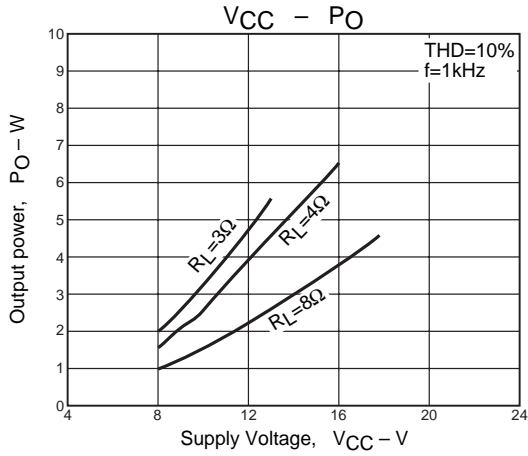
When capacitance is higher than 10 μF , the sound will not be cut off when setting the standby pin to Low (power OFF).

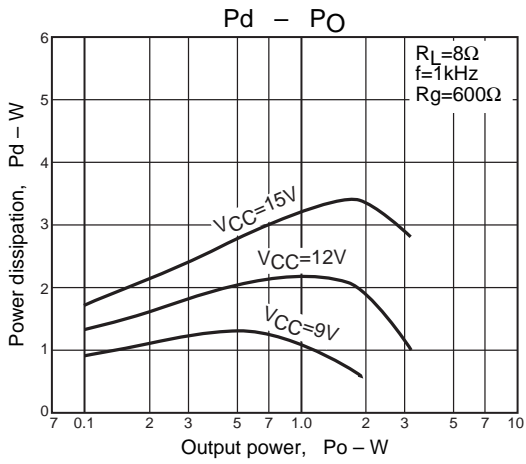
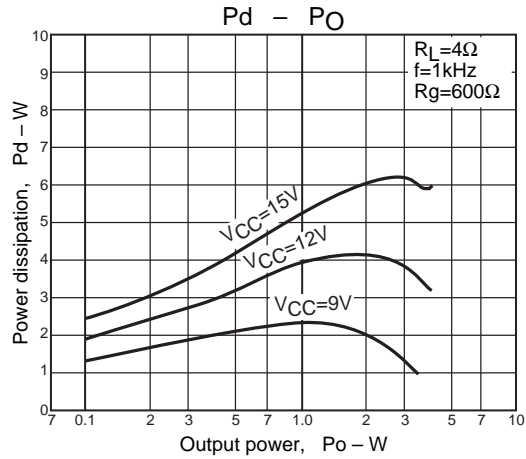
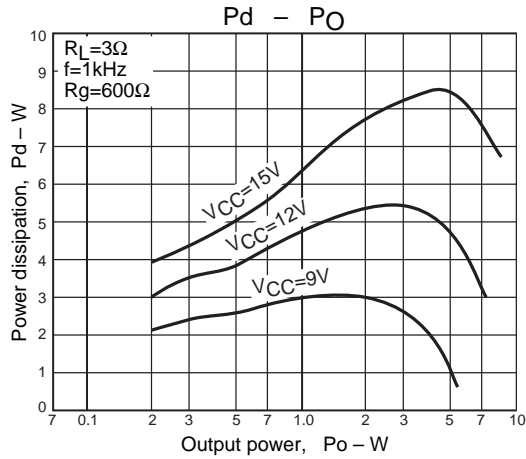


5. Muting

The output signal can be controlled by connecting pin 5 (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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