Overview
This is a different-package version of the power amplifier LA4600 with ultralow peripheral component count. Basic power supply spec is Vcc = 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 $V_{cc} = 15V/3 \Omega \ldots 7.0W \times 2$
• Built-in standby switching
• Built-in overheat protection (TSD)

Specifications

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

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Ratings</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Maximum supply voltage</td>
<td>$V_{cc, \text{max}}$</td>
<td>$R_g=0$ (No signal)</td>
<td>24</td>
<td>V</td>
</tr>
<tr>
<td>Allowable power dissipation</td>
<td>$P_{d, \text{max}}$</td>
<td>With an arbitrary large heatsink</td>
<td>25.0</td>
<td>W</td>
</tr>
<tr>
<td>Thermal resistance</td>
<td>$\theta_{j-c}$</td>
<td></td>
<td>3.0</td>
<td>°C/W</td>
</tr>
<tr>
<td>Operating temperature</td>
<td>$T_{opr}$</td>
<td></td>
<td>-20 to +75</td>
<td>°C</td>
</tr>
<tr>
<td>Storage temperature</td>
<td>$T_{s\text{tg}}$</td>
<td></td>
<td>-40 to +150</td>
<td>°C</td>
</tr>
</tbody>
</table>

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**Operating Conditions at Ta = 25°C**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Ratings</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Recommended supply voltage</td>
<td>$V_{cc}$</td>
<td></td>
<td>15</td>
<td>V</td>
</tr>
<tr>
<td>Recommended load resistance</td>
<td>$R_L$</td>
<td></td>
<td>3</td>
<td>Ω</td>
</tr>
<tr>
<td>Operating supply voltage range</td>
<td>$V_{cc, op}$</td>
<td>Within maximum ratings</td>
<td>5.0 to 22</td>
<td>V</td>
</tr>
<tr>
<td>Operating load resistance range</td>
<td></td>
<td></td>
<td>2.7 to 8</td>
<td>Ω</td>
</tr>
</tbody>
</table>

**Electrical Characteristics at Ta = 25°C, $V_{cc} = 15V$, $R_L = 3\Omega$, $f = 1$ kHz**

<table>
<thead>
<tr>
<th>Parameter</th>
<th>Symbol</th>
<th>Conditions</th>
<th>Ratings</th>
<th>Unit</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standby current</td>
<td>$I_{st}$</td>
<td>Standby pin -&gt; GND</td>
<td>1.0</td>
<td>10 μA</td>
</tr>
<tr>
<td>Quiescent current</td>
<td>$I_{cco}$</td>
<td>$R_g=0$</td>
<td>20</td>
<td>35  mA</td>
</tr>
<tr>
<td>Voltage gain</td>
<td>$V_G$</td>
<td>$V_o=0$ dBm</td>
<td>43.0</td>
<td>45.0 47.0 dB</td>
</tr>
<tr>
<td>Total harmonic distortion</td>
<td>$THD$</td>
<td>$P_o=1w$</td>
<td>0.2</td>
<td>0.8 %</td>
</tr>
<tr>
<td>Output noise voltage</td>
<td>$V_{no}$</td>
<td>$R_g=0$, DIN AUDIO</td>
<td>0.15</td>
<td>0.5 mV</td>
</tr>
<tr>
<td>Output voltage</td>
<td>$P_0$</td>
<td>$V_{cc}$=9V, $R_L=4\Omega$, $THD=10%$</td>
<td>6.0</td>
<td>7.0 W</td>
</tr>
<tr>
<td>Output voltage</td>
<td>$P_0$</td>
<td>$R_{g}=9V$, $R_L=4\Omega$, $THD=10%$</td>
<td>1.5</td>
<td>2.0 W</td>
</tr>
<tr>
<td>Channel separation</td>
<td>$Ch_{sep}$</td>
<td>$V_o=0$ dBm, $R_g=0$, DIN AUDIO</td>
<td>50</td>
<td>60 dB</td>
</tr>
<tr>
<td>Ripple suppression</td>
<td>$SVRR$</td>
<td>$V_r=0$ dBm, $f_r=100$ Hz, DIN AUDIO</td>
<td>45</td>
<td>55 dB</td>
</tr>
<tr>
<td>Standby ON voltage</td>
<td>$V_{st}$</td>
<td></td>
<td>1.5</td>
<td>5.0 V</td>
</tr>
<tr>
<td>Input resistance</td>
<td>$R_i$</td>
<td></td>
<td>20</td>
<td>30  40 kΩ</td>
</tr>
</tbody>
</table>

**Block Diagram**
Sample Application

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**LA4601**

![Circuit Diagram]

**Pd max – Ta**

- **With an arbitrary large heatsink**
  - 100X100X1.5mm³
  - 50X50X1.5mm³

- **With recommended substrate**
  - IC only

**Allowable power dissipation, Pd max – W**

- 4.7µF
- 100µF

**Properties**

- **+5V**
- **1000µF**
- **4Ω**
- **0.22µF**
- **4.7µF**
- **1000µF**
- **1000µF**
- **4Ω**

**Table**

- **Ambient temperature, Ta – °C**
- **Allowable power dissipation, Pd max – W**
- **3.6**
- **7.0**
- **12.5**
- **15.5**
- **19.5**
- **25.0**
- **28.0**

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**Notes**

- Apply silicone grease
- Fastening torque 39N•cm
- For Al heatsink

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No. 6013-3/7
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 μA to pin 7.

\[
\text{Current supplied to pin 7} = \frac{\text{Applied voltage}}{2 \, \text{kΩ}} + \frac{\text{Applied voltage} - V_{BE} \text{ (approx. 0.7V)}}{2 \, \text{kΩ}}
\]

- 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 VBE (1.4V).
Input impedance is approx. 30 kΩ.
- The recommended value for the input capacitor is 0.22 μF, but this can be varied in order to adjust the starting time (tS). (The starting time is the time required from applying voltage to the standby pin until sound output is obtained.)

<table>
<thead>
<tr>
<th>Input capacitor</th>
<th>1.0 μF</th>
<th>2.2 μF</th>
<th>3.3 μF</th>
<th>4.7 μF</th>
<th>10 μF</th>
</tr>
</thead>
<tbody>
<tr>
<td>Starting time (tS)</td>
<td>0.2s</td>
<td>0.3s</td>
<td>0.5s</td>
<td>0.65s</td>
<td>1.5s</td>
</tr>
</tbody>
</table>

3. Filter (decoupling) pin (5)

Pin voltage is approx. 1/2 VCC.
The recommended value for the filter capacitor is 100 μF.
When capacitance is lower, pop noise when setting the standby pin to Low (power OFF) will increase.
4. **P.P (pop noise) pin (6)**

Voltage at pin 6 is given by:
\[
\text{Voltage} = \frac{V_{cc} - V_{ce} \text{ (approx. 0.3V)}}{2 \, \text{k}\Omega} + 5.6V
\]

- 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).

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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