**INTEGRATED CIRCUITS**

# DATA SHEET

# TDA2611A

## 5 W audio power amplifier

Product specification
File under Integrated Circuits, IC01

November 1982

**Philips**
**Semiconductors**

The TDA2611A is a monolithic integrated circuit in a 9-lead single in-line (SIL) plastic package with a high supply voltage audio amplifier. Special features are:

- **possibility for increasing the input impedance**
- single in-line (SIL) construction for easy mounting
- very suitable for application in mains-fed apparatus
- extremely low number of external components
- thermal protection
- well defined open loop gain circuitry with simple quiescent current setting and fixed integrated closed loop gain.

## QUICK REFERENCE DATA

| | | | | |
|---|---|---|---|---|
| Supply voltage range | $V_P$ | | 6 to 35 | V |
| Repetitive peak output current | $I_{ORM}$ | < | 1,5 | A |
| Output power at $d_{tot} = 10\%$ | | | | |
| $V_P = 18$ V; $R_L = 8\ \Omega$ | $P_o$ | typ. | 4,5 | W |
| $V_P = 25$ V; $R_L = 15\ \Omega$ | $P_o$ | typ. | 5 | W |
| Total harmonic distortion at $P_o < 2$ W; $R_L = 8\ \Omega$ | $d_{tot}$ | typ. | 0,3 | % |
| Input impedance | $\lvert Z_i \rvert$ | typ. | 45 | kΩ |
| Total quiescent current at $V_P = 18$ V | $I_{tot}$ | typ. | 25 | mA |
| Sensitivity for $P_o = 2{,}5$ W; $R_L = 8\ \Omega$ | $V_i$ | typ. | 55 | mV |
| Operating ambient temperature | $T_{amb}$ | | –25 to + 150 | °C |
| Storage temperature | $T_{stg}$ | | –55 to + 150 | °C |

## PACKAGE OUTLINE

9-lead SIL; plastic (SOT110B); SOT110-1; 1996 July 23.

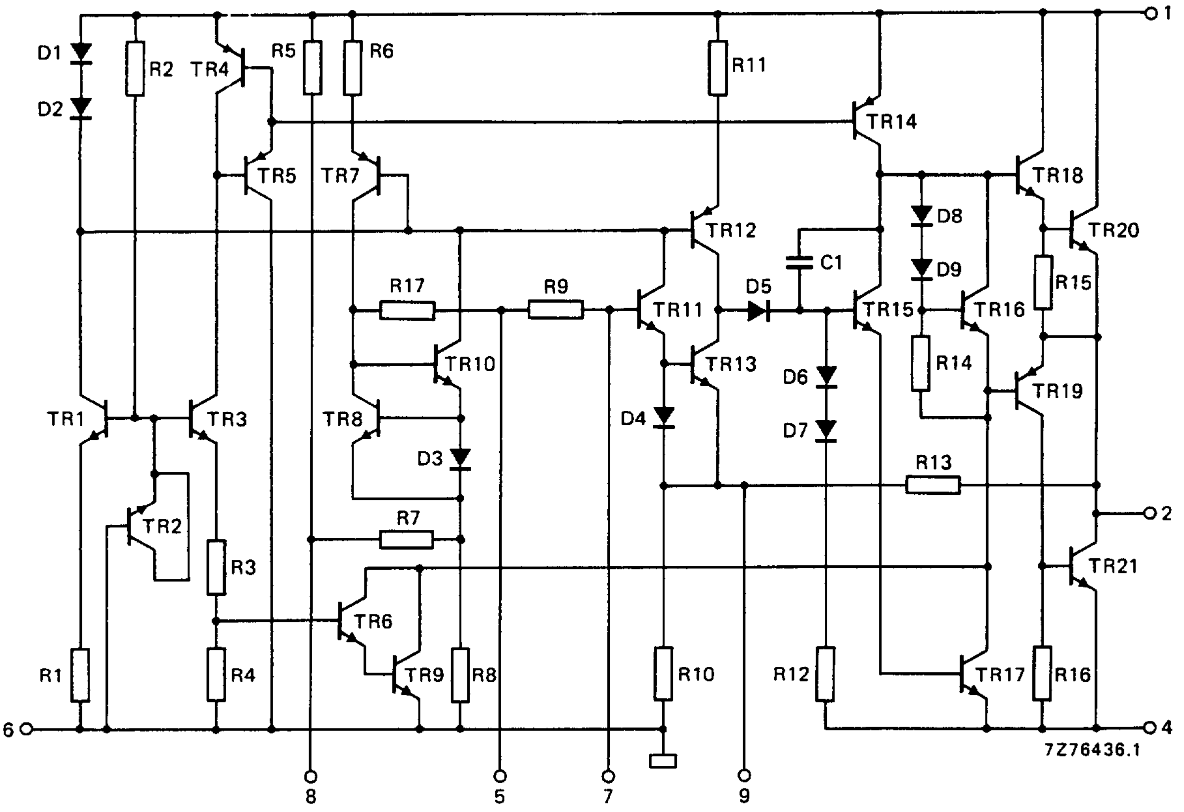


Fig.1 Circuit diagram; pin 3 not connected.

## RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

| | | | |
|---|---|---|---|
| Supply voltage | $V_P$ | max. | 35 V |
| Non-repetitive peak output current | $I_{OSM}$ | max. | 3 A |
| Repetitive peak output current | $I_{ORM}$ | max. | 1,5 A |
| Total power dissipation | see derating curves Fig. 2 | | |
| Storage temperature | $T_{stg}$ | | –55 to + 150 °C |
| Operating ambient temperature | $T_{amb}$ | | –25 to + 150 °C |

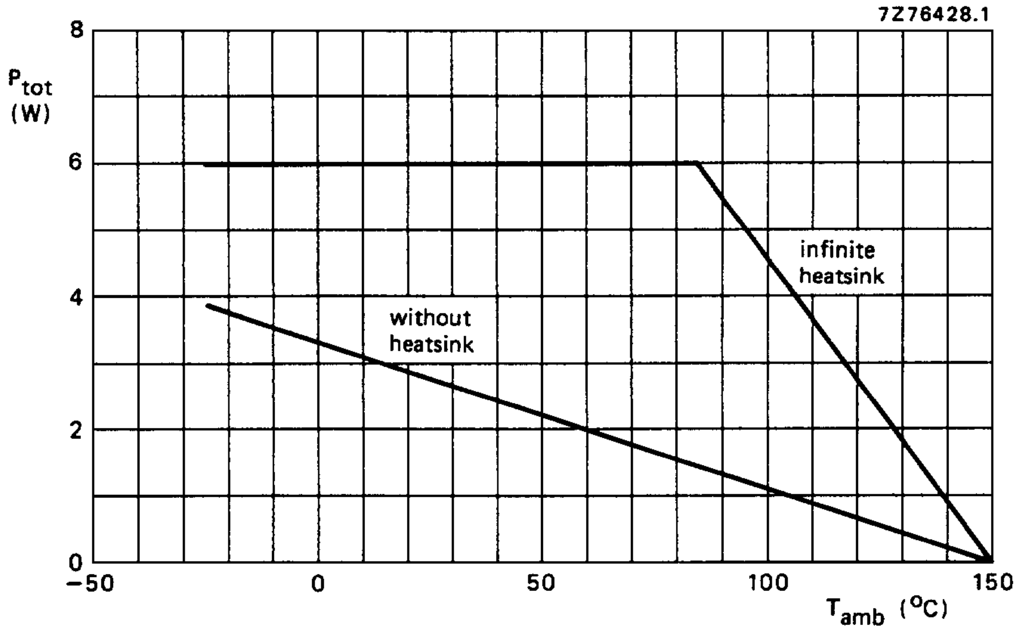


Fig.2 Power derating curves.

## HEATSINK EXAMPLE

Assume $V_P = 18$ V; $R_L = 8\ \Omega$; $T_{amb} = 60$ °C maximum; $T_j = 150$ °C (max. for a 4 W application into an 8 Ω load, the maximum dissipation is about 2,2 W).

The thermal resistance from junction to ambient can be expressed as:

$$R_{th\ j\text{-}a} = R_{th\ j\text{-}tab} + R_{th\ tab\text{-}h} + R_{th\ h\text{-}a} = \frac{150-60}{2,2} = 41\ \text{K/W}.$$

Since $R_{th\ j\text{-}tab} = 11$ K/W and $R_{th\ tab\text{-}h} = 1$ K/W, $R_{th\ h\text{-}a} = 41 - (11 + 1) = 29$ K/W.

## D.C. CHARACTERISTICS

| | | | | |
|---|---|---|---|---|
| Supply voltage range | $V_P$ | | 6 to 35 | V |
| Repetitive peak output current | $I_{ORM}$ | < | 1,5 | A |
| Total quiescent current at $V_P = 18$ V | $I_{tot}$ | typ. | 25 | mA |

## A.C. CHARACTERISTICS

$T_{amb} = 25$ °C; $V_P = 18$ V; $R_L = 8\ \Omega$; f = 1 kHz unless otherwise specified; see also Fig. 3

| | | | | |
|---|---|---|---|---|
| A.F. output power at $d_{tot} = 10\%$ | | | | |
| $V_P = 18$ V; $R_L = 8\ \Omega$ | $P_o$ | > | 4 | W |
| | | typ. | 4,5 | W |
| $V_P = 12$ V; $R_L = 8\ \Omega$ | $P_o$ | typ. | 1,7 | W |
| $V_P = 8,3$ V; $R_L = 8\ \Omega$ | $P_o$ | typ. | 0,65 | W |
| $V_P = 20$ V; $R_L = 8\ \Omega$ | $P_o$ | typ. | 6 | W |
| $V_P = 25$ V; $R_L = 15\ \Omega$ | $P_o$ | typ. | 5 | W |
| Total harmonic distortion at $P_o = 2$ W | $d_{tot}$ | typ. | 0,3 | % |
| | | < | 1 | % |
| Frequency response | | > | 15 | kHz |
| Input impedance | $\lvert Z_i \rvert$ | typ. | 45 | kΩ(1) |
| Noise output voltage at $R_S = 5$ kΩ; B = 60 Hz to 15 kHz | $V_n$ | typ. | 0,2 | mV |
| | | < | 0,5 | mV |
| Sensitivity for $P_o = 2,5$ W | $V_i$ | typ. | 55 | mV |
| | | | 44 to 66 | mV |

**Note**

1. Input impedance can be increased by applying C and R between pins 5 and 9 (see also Figures 6 and 7).

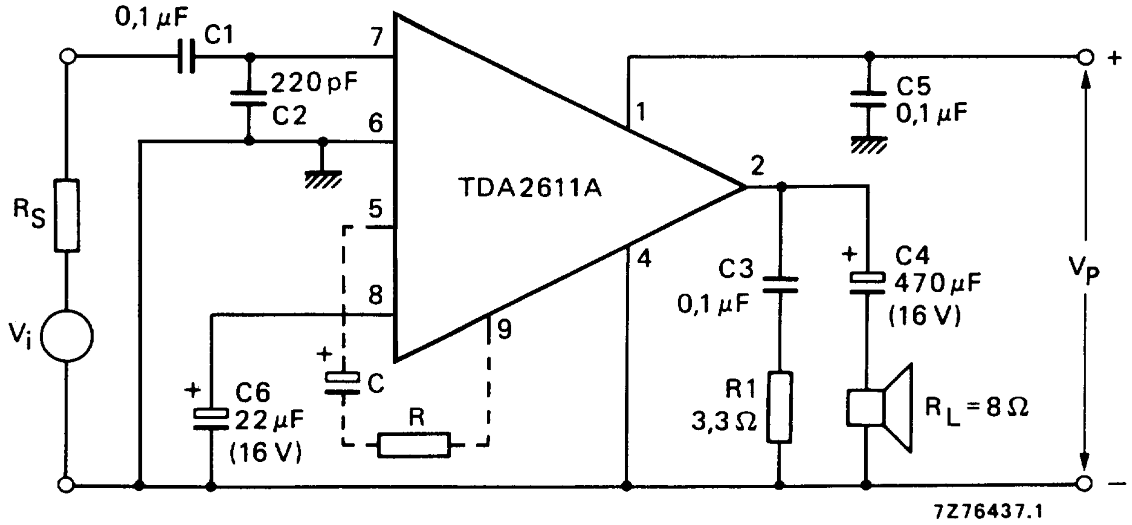


Fig.3 Test circuit; pin 3 not connected.

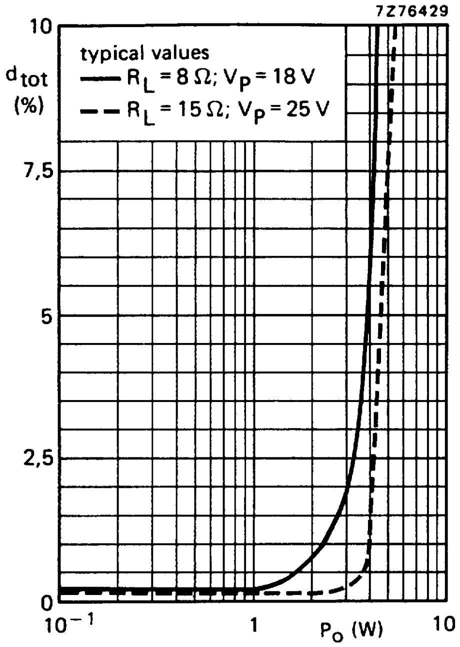


Fig.4 Total harmonic distortion as a function of output power.

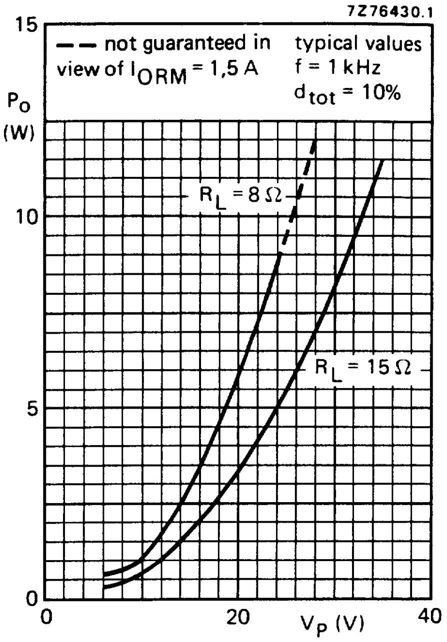


Fig.5 Output power as a function of supply voltage.

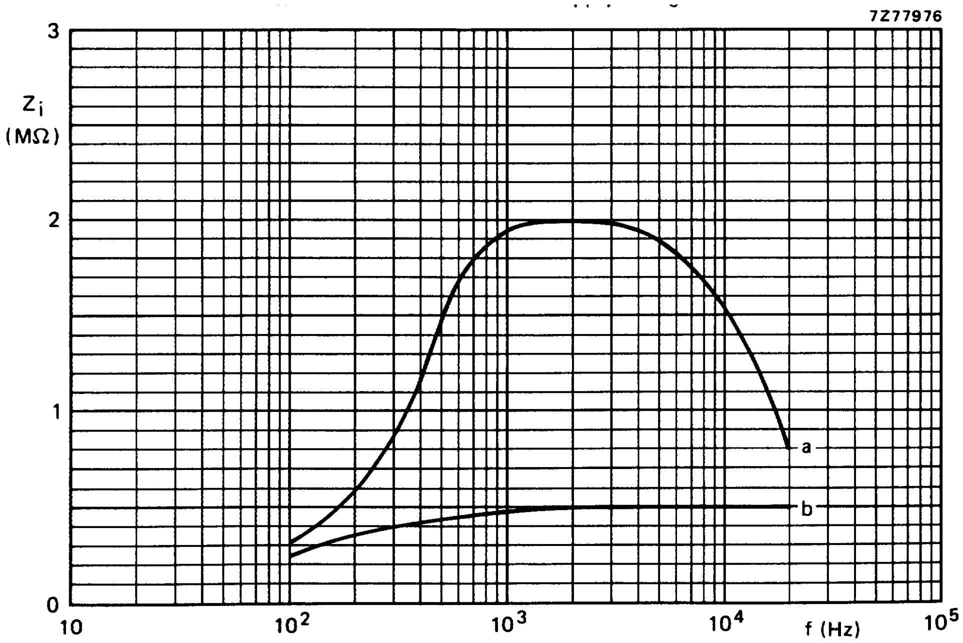


Fig.6 Input impedance as a function of frequency; curve a for C = 1 µF, R = 0 Ω; curve b for C = 1 µF, R = 1 kΩ; circuit of Fig. 3; C2 = 10 pF; typical values.

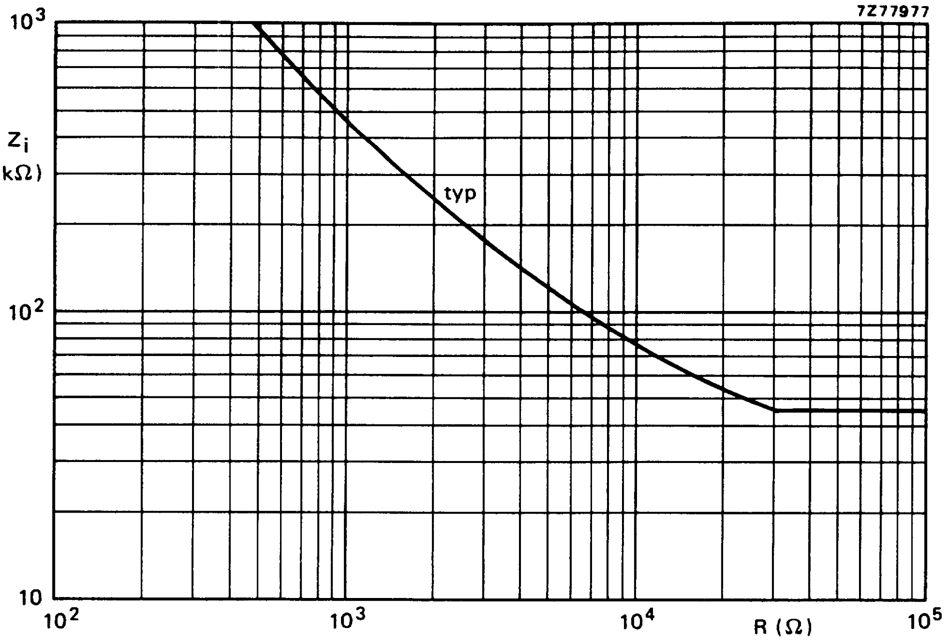


Fig.7 Input impedance as a function of R in circuit of Fig. 3; C = 1 µF; f = 1 kHz.

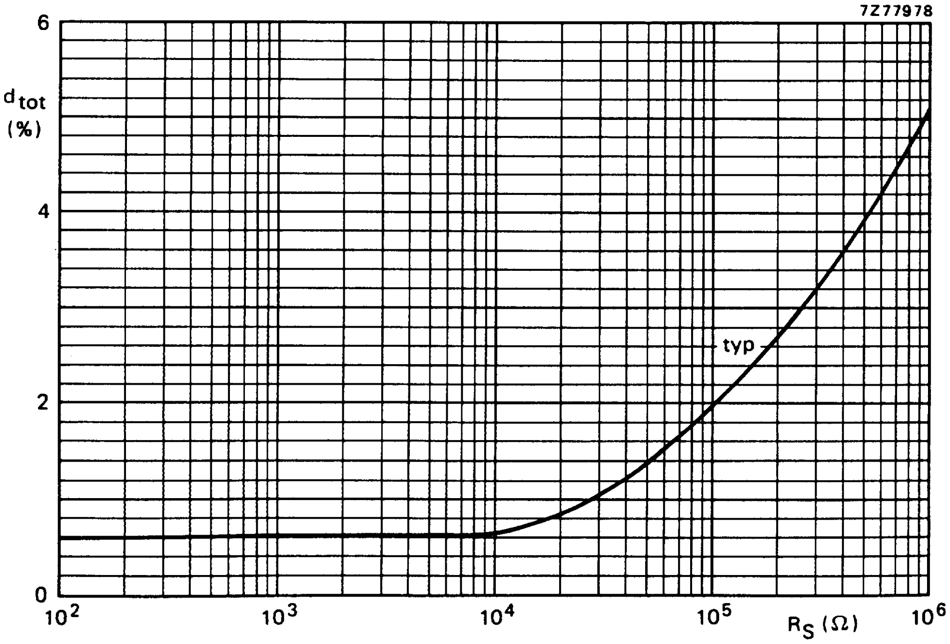


Fig.8 Total harmonic distortion as a function of $R_S$ in the circuit of Fig. 3; $P_o$ = 3,5 W; f = 1 kHz.

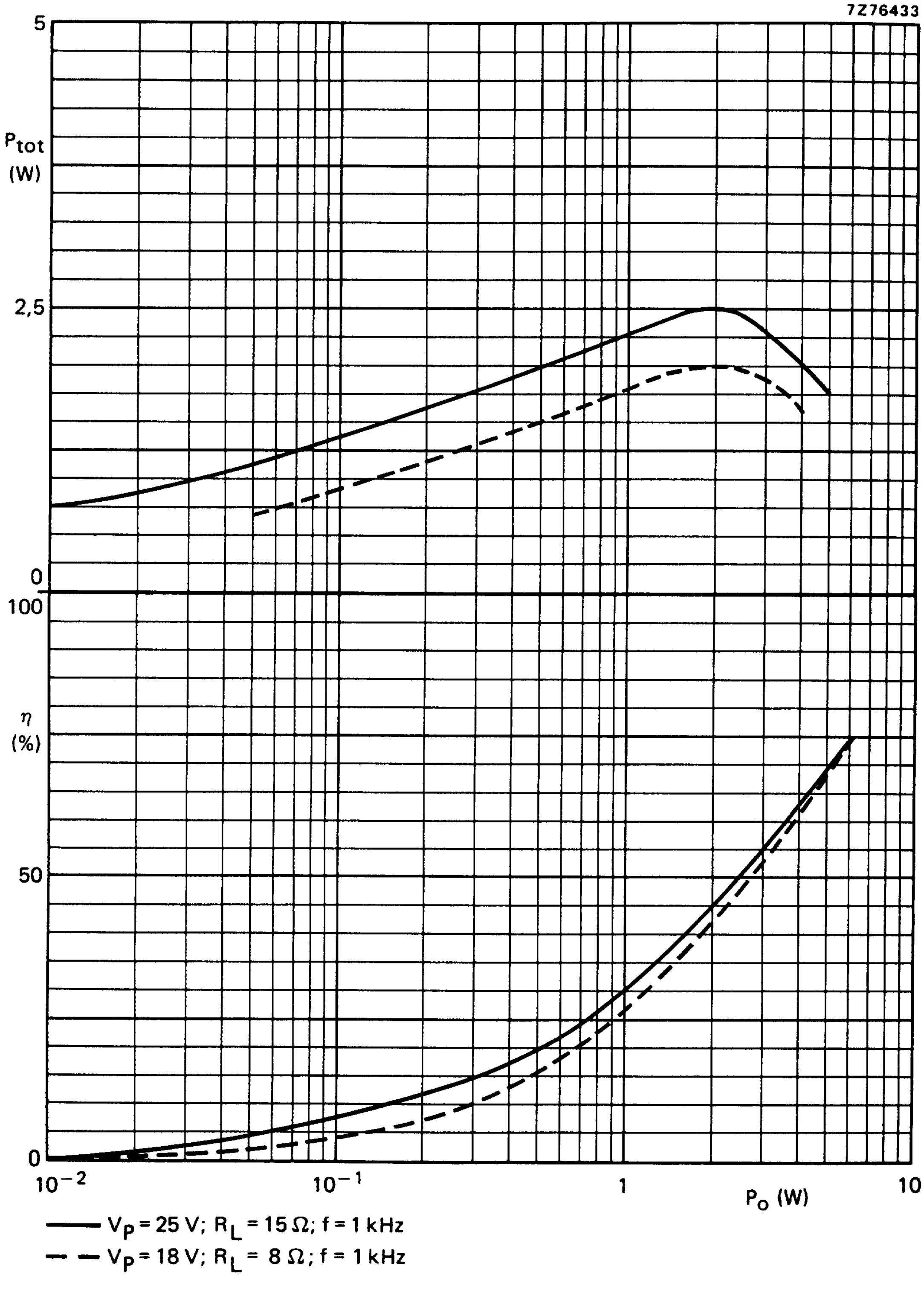


Fig.9 Total power dissipation and efficiency as a function of output power.

## APPLICATION INFORMATION

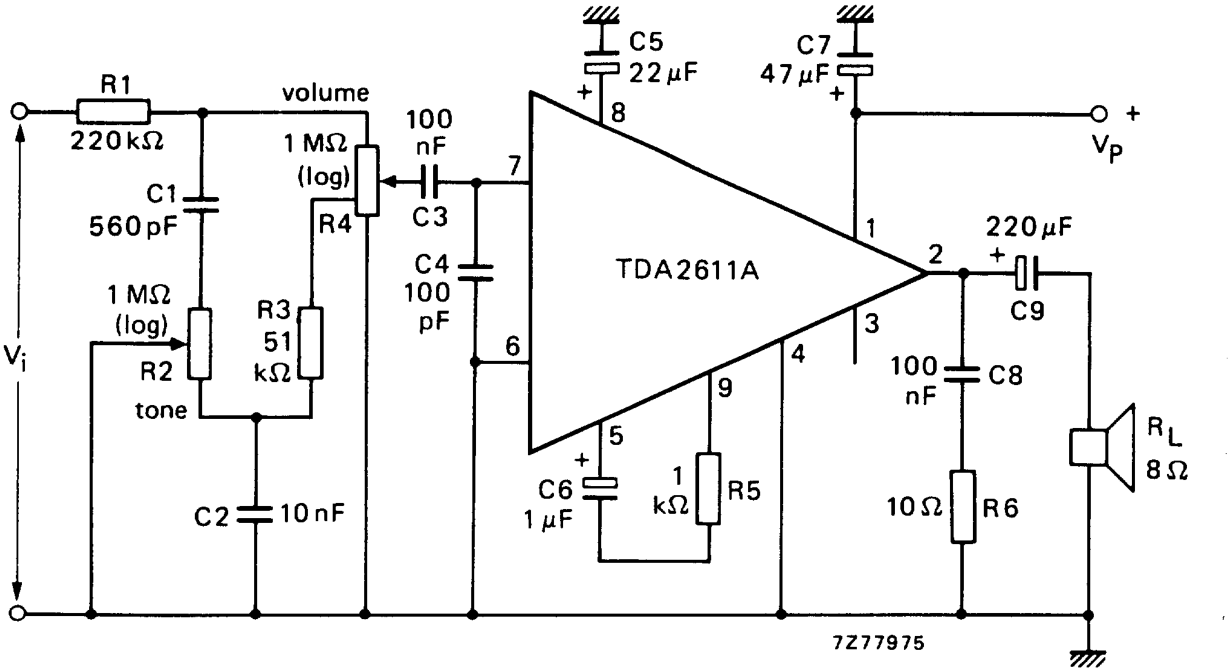


Fig.10 Ceramic pickup amplifier circuit.

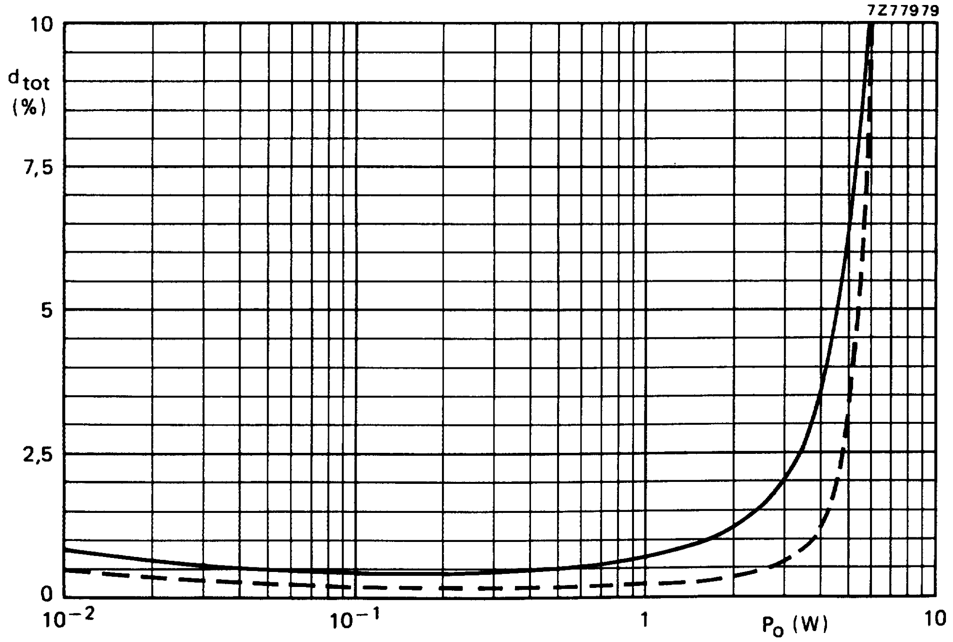


Fig.11 Total harmonic distortion as a function of output power; ——— with tone control; – – – without tone control; in circuit of Fig. 10; typical values.

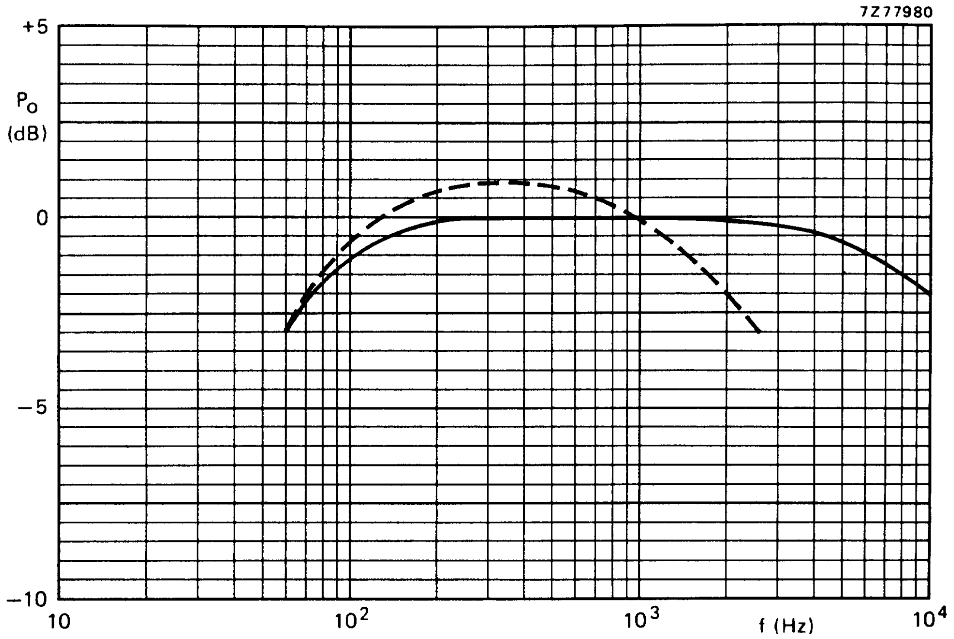


Fig.12 Frequency characteristics of the circuit of Fig. 10; ———— tone control max. high; – – – tone control min. high; $P_o$ relative to 0 dB = 3 W; typical values.

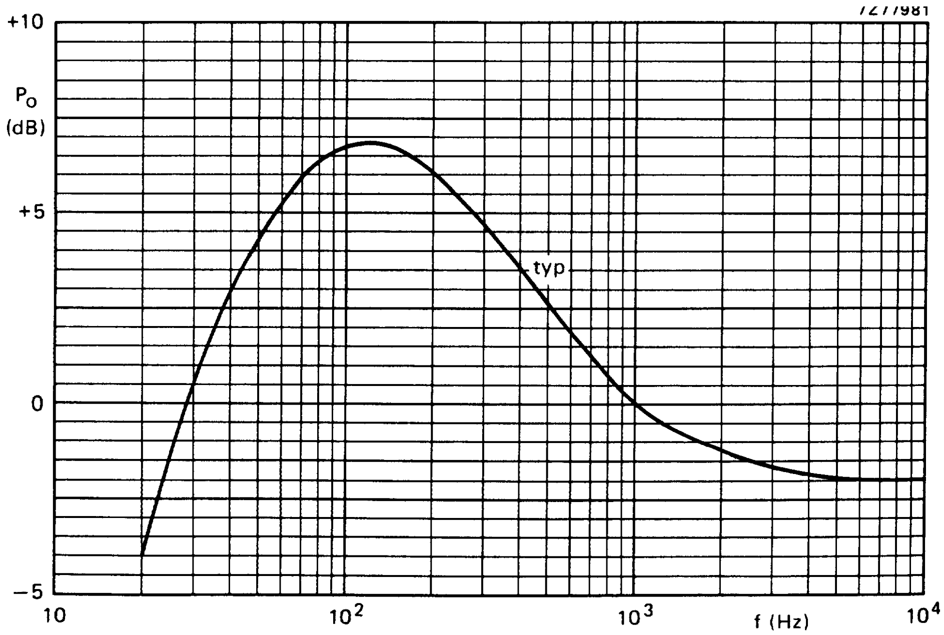
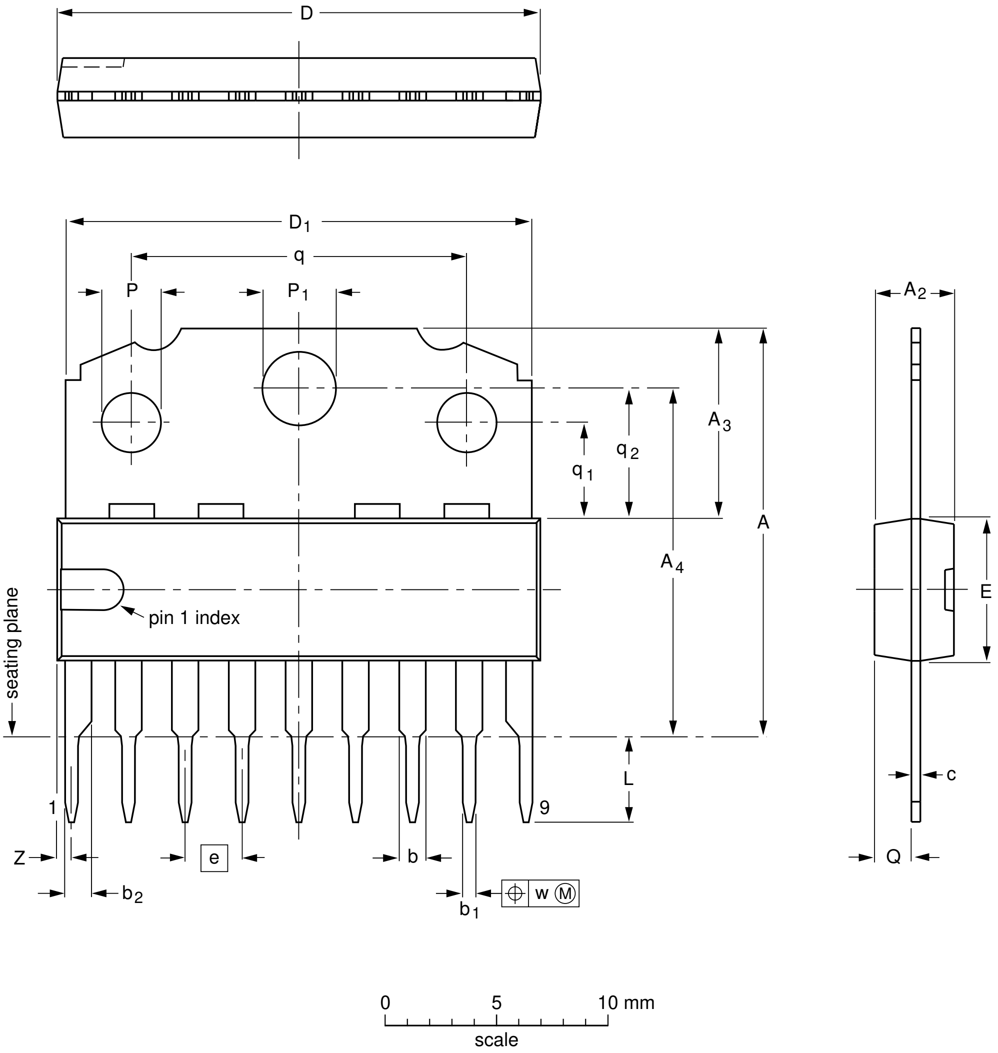


Fig.13 Frequency characteristic of the circuit of Fig. 10; volume control at the top; tone control max. high.

## PACKAGE OUTLINE

### SIL9MPF: plastic single in-line medium power package with fin; 9 leads SOT110-1



**DIMENSIONS (mm are the original dimensions)**

| UNIT | A | $A_2$ max. | $A_3$ | $A_4$ | b | $b_1$ | $b_2$ | c | $D^{(1)}$ | $D_1$ | $E^{(1)}$ | e | L | P | $P_1$ | Q | q | $q_1$ | $q_2$ | w | $Z^{(1)}$ max. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| mm | 18.5<br>17.8 | 3.7 | 8.7<br>8.0 | 15.8<br>15.4 | 1.40<br>1.14 | 0.67<br>0.50 | 1.40<br>1.14 | 0.48<br>0.38 | 21.8<br>21.4 | 21.4<br>20.7 | 6.48<br>6.20 | 2.54 | 3.9<br>3.4 | 2.75<br>2.50 | 3.4<br>3.2 | 1.75<br>1.55 | 15.1<br>14.9 | 4.4<br>4.2 | 5.9<br>5.7 | 0.25 | 1.0 |

**Note**

1. Plastic or metal protrusions of 0.25 mm maximum per side are not included.

| OUTLINE VERSION | REFERENCES | | | | EUROPEAN PROJECTION | ISSUE DATE |
|---|---|---|---|---|---|---|
| | IEC | JEDEC | EIAJ | | | |
| SOT110-1 | | | | | | ~~92-11-17~~<br>95-02-25 |

## SOLDERING

### Introduction

There is no soldering method that is ideal for all IC packages. Wave soldering is often preferred when through-hole and surface mounted components are mixed on one printed-circuit board. However, wave soldering is not always suitable for surface mounted ICs, or for printed-circuits with high population densities. In these situations reflow soldering is often used.

This text gives a very brief insight to a complex technology. A more in-depth account of soldering ICs can be found in our *“IC Package Databook”* (order code 9398 652 90011).

### Soldering by dipping or by wave

The maximum permissible temperature of the solder is 260 °C; solder at this temperature must not be in contact with the joint for more than 5 seconds. The total contact time of successive solder waves must not exceed 5 seconds.

The device may be mounted up to the seating plane, but the temperature of the plastic body must not exceed the specified maximum storage temperature ($T_{stg\ max}$). If the printed-circuit board has been pre-heated, forced cooling may be necessary immediately after soldering to keep the temperature within the permissible limit.

### Repairing soldered joints

Apply a low voltage soldering iron (less than 24 V) to the lead(s) of the package, below the seating plane or not more than 2 mm above it. If the temperature of the soldering iron bit is less than 300 °C it may remain in contact for up to 10 seconds. If the bit temperature is between 300 and 400 °C, contact may be up to 5 seconds.

## DEFINITIONS

| **Data sheet status** | |
|---|---|
| Objective specification | This data sheet contains target or goal specifications for product development. |
| Preliminary specification | This data sheet contains preliminary data; supplementary data may be published later. |
| Product specification | This data sheet contains final product specifications. |
| **Limiting values** | |
| Limiting values given are in accordance with the Absolute Maximum Rating System (IEC 134). Stress above one or more of the limiting values may cause permanent damage to the device. These are stress ratings only and operation of the device at these or at any other conditions above those given in the Characteristics sections of the specification is not implied. Exposure to limiting values for extended periods may affect device reliability. | |
| **Application information** | |
| Where application information is given, it is advisory and does not form part of the specification. | |

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