

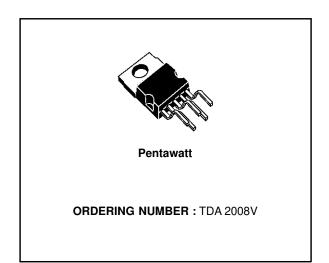
# 12W AUDIO AMPLIFIER ( $V_S = 22V$ , $R_L = 4\Omega$ )

#### **DESCRIPTION**

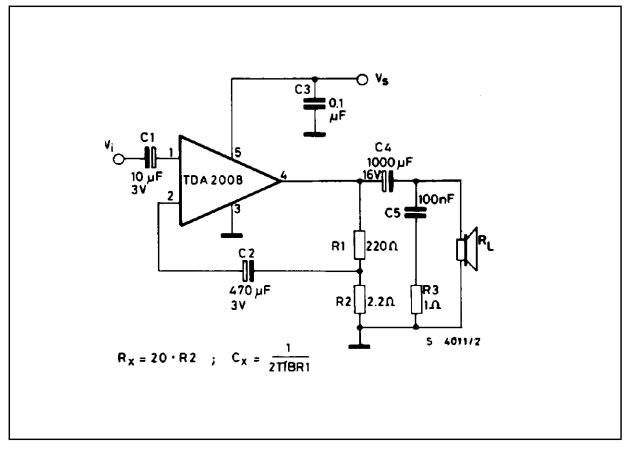
The TDA2008 is a mololithic class B audio power amplifier in Pentawatt<sup>®</sup> package designed for driving low impedence loads (down to  $3.2\Omega$ ). The divice provides a high output current capability (up to 3A), very low harmonic and crossover distortion.

In addition, the device offers the following features:

- very low number of external components;
- assembly ease, due to Pentawatt<sup>®</sup> power package with no electrical insulations requirements;
- space and cost saving;
- high reliability;
- flexibility in use;
- thermal protection.

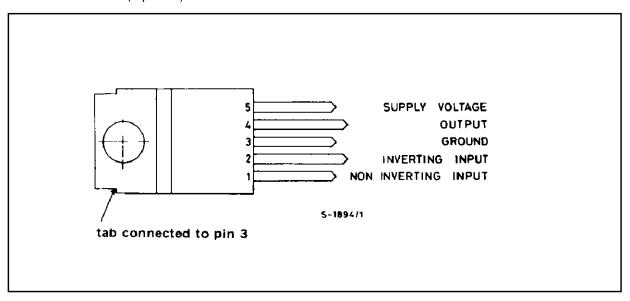


### TYPICAL APPLICATION CIRCUIT



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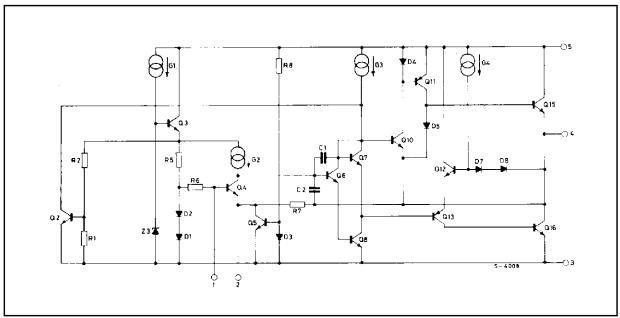
### PIN CONNECTION (top view)



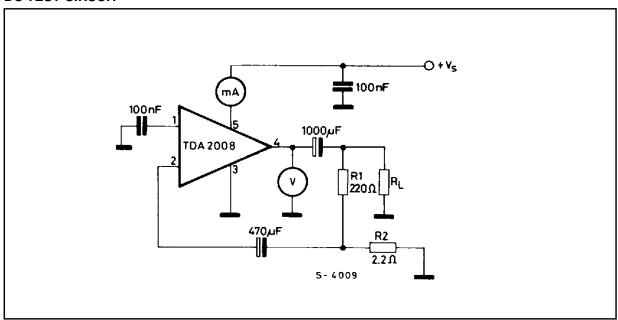
### **ABSOLUTE MAXIMUM RATINGS**

| Symbol                            | Parameter                                     | Value       | Unit |
|-----------------------------------|---|-------------|------|
| Vs                                | DC supply voltage                             | 28          | ٧    |
| Io                                | Output peak current (repetitive)              | 3           | Α    |
| Io                                | Output peak current ( non repetitive)         | 4           | Α    |
| P <sub>tot</sub>                  | Power dissipation at T <sub>case</sub> = 90°C | 20          | W    |
| T <sub>stg</sub> , T <sub>j</sub> | Storage and junction temperature              | - 40 to 150 | °C   |

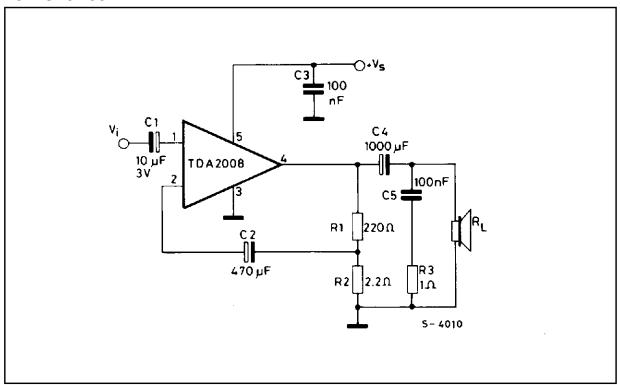
### **SCHEMATIC DIAGRAM**



### **DC TEST CIRCUIT**



## **AC TEST CIRCUIT**



### THERMAL DATA

| Symbol                 | Parameter                            | Value | Unit |
|------------------------|--------------------------------------|-------|------|
| R <sub>th-j-case</sub> | Thermal resistance junction-case max | 3     | °C/W |

# **ELECTRICAL CHARACTERISTICS** ( Refer to the test circuit, $V_s$ = 18V, $T_{amb}$ = 25 °C unless otherwise specified)

| Symbol               | Parameter                        | Test co  | nditions  | Min. | Тур.                 | Max. | Unit           |
|----------------------|----------------------------------|--|---|------|----------------------|------|----------------|
| Vs                   | Supply voltage                   |  |   | 10   |                      | 28   | V              |
| Vo                   | Quiescent output voltage (pin 4) |  |   |      | 10.5                 |      | ٧              |
| l <sub>d</sub>       | Quiescent drain current (pin 5)  |  |   |      | 65                   | 115  | mA             |
| Po                   | Output power                     | d = 10%  | $R_L = 8\Omega$   |      | 8                    |      | W              |
|                      |                                  | f = 1 KHz  | $R_L = 4\Omega$   | 10   | 12                   |      | W              |
| V <sub>i</sub> (RMS) | Input saturation voltage         |  |   | 300  |                      |      | mV             |
| Vi                   | Input sensitivity                | $f = 1 \text{ KHz} \\ P_0 = 0.5W \\ P_0 = 8W \\ P_0 = 0.5W \\ P_0 = 12W$ | $R_L = 8\Omega$ $R_L = 8\Omega$ $R_L = 4\Omega$ $R_L = 4\Omega$ |      | 20<br>80<br>14<br>70 |      | mV<br>mV<br>mV |
| В                    | Frequency response<br>(-3 dB)    | $P_0 = 1W$<br>$R_L = 4\Omega$  |   | 40   | 40 to 15,000         |      | Hz             |
| d                    | Distortion                       | f = 1 KHz<br>P <sub>o</sub> = 0.05 to 4W<br>P <sub>o</sub> = 0.05 to 6W  | $R_L = 8\Omega$<br>$R_L = 4\Omega$                              |      | 0.12<br>0.12         | 1    | %<br>%         |
| Ri                   | Input resistance (pin 1)         | f = 1 KHz  |   | 70   | 150                  |      | ΚΩ             |
| Gv                   | Voltage gain (open loop)         | f = 1 KHz  | $R_L = 8\Omega$   |      | 80                   |      | dB             |
| Gv                   | Voltage gain (closed loop)       |  | 11[ - 022   | 39.5 | 40                   | 40.5 | dB             |
| e <sub>N</sub>       | Input noise voltage              | BW = 22Hz to 22  | · KHz   |      | 1                    | 5    | μV             |
| i <sub>N</sub>       | Input noise current              |  | . IXI IZ  |      | 60                   | 200  | pА             |
| SVR                  | Supply voltage rejection         | $V_{ripple} = 0.5$ $R_g = 10 K \Omega$ $R_L = 4 \Omega$                  | f = 100 Hz  | 30   | 36                   |      | dB             |



### **APPLICATION INFORMATION**

Figure 1. Typical application circuit

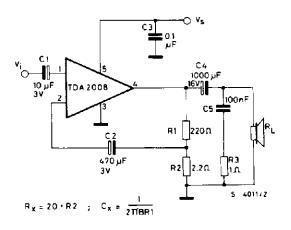
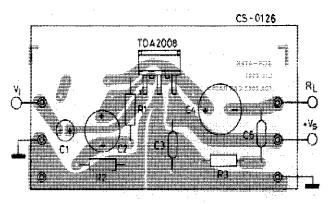


Figure 2. P.C. board and component layout for the circuit of fig. 1 (1:1 scale)



circuit (°)

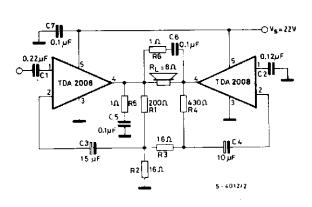
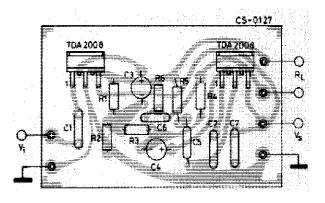


Figure 3. 25W bridge configuration applica-tion Figure 4. P.C. board and component layout for the circuit of fig. 3 (1:1 scale)



(°) The value of the capacitorr C3 and C4 are different to optimize the SVR (Typ. = 40 dB)

Figure 5. Quiescent current vs. supply voltage

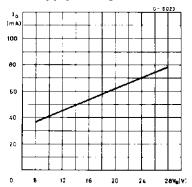


Figure 6. Output voltage vs. supply voltage

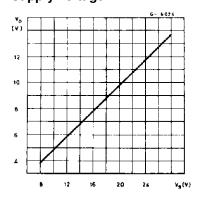


Figure 7. Output power vs. supply voltage

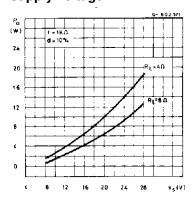


Figure 8. Distortion vs. frequency

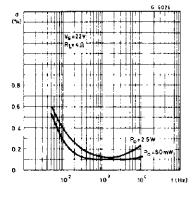


Figure 9. Supply voltage rejection vs. frequency

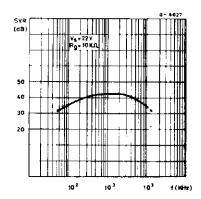
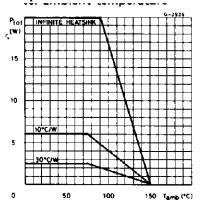


Figure 10. Maximum al- lowable power dissipation vs. ambient temperature



### PRACTICAL CONSIDERATIONS

### Printed circuit board

The layout shown in Fig. 2 is recommended. If different layouts are used, the ground points of input 1 and input 2 must be well decoupled from the ground of the output through which a rather high current flows.

### Assembly suggestion

No electrical insulation is needed between the

package and the heat-sink. Pin length should be as short as possible. The soldering temperature must not exceed 260°C for 12 seconds.

### **Application suggestions**

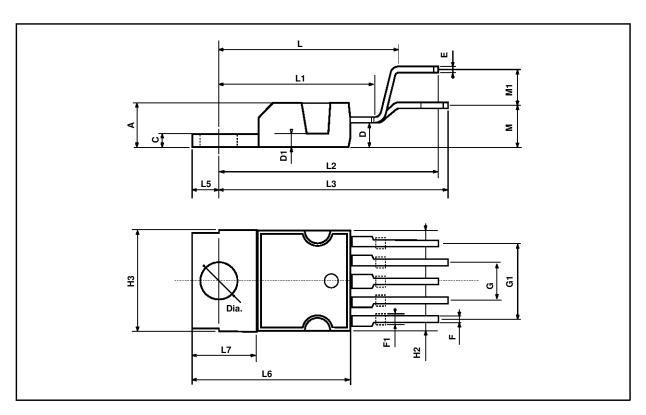
The recommended component values are those shown in the application circuits of Fig. 1. Different values can be used. The following table is intended to aid the car-radio designer.

| Component | Recommended value         | Purpose                  | Larger than recommended value                                   | Smaller than recommended value                                  |
|-----------|---------------------------|--------------------------|---|---|
| C1        | 2.2μF                     | Input DC decoupling      |   | Noise at switch-on, switch-off                                  |
| C2        | 470μF                     | Ripple rejection.        |   | Degradation of SVR.   |
| C3        | 0.1μF                     | Supply by passing.       |   | Danger of oscillation.  |
| C4        | 1000μF                    | Output coupling.         |   | Higher low frequency cutoff.                                    |
| C5        | 0.1μF                     | Frequency stability.     |   | Danger of oscillation at high frequencies with inductive loads. |
| R1        | (G <sub>v</sub> - 1) • R2 | Setting of gain. (*)     |   | Increase of drain current.                                      |
| R2        | 2.2Ω                      | Setting of gain and SVR. | Degradation of SVR.   |   |
| R3        | 1Ω                        | Frequency stability.     | Danger of oscillation at high frequencies with inductive loads. |   |

<sup>(\*)</sup> The closed loop gain must be higher than 26dB.

### PENTAWATT PACKAGE MECHANICAL DATA

| DIM.   | mm    |       |      | inch  |       |       |  |
|--------|-------|-------|------|-------|-------|-------|--|
| DIIVI. | MIN.  | TYP.  | MAX. | MIN.  | TYP.  | MAX.  |  |
| Α      |       |       | 4.8  |       |       | 0.189 |  |
| С      |       |       | 1.37 |       |       | 0.054 |  |
| D      | 2.4   |       | 2.8  | 0.094 |       | 0.110 |  |
| D1     | 1.2   |       | 1.35 | 0.047 |       | 0.053 |  |
| Е      | 0.35  |       | 0.55 | 0.014 |       | 0.022 |  |
| F      | 0.8   |       | 1.05 | 0.031 |       | 0.041 |  |
| F1     | 1     |       | 1.4  | 0.039 |       | 0.055 |  |
| G      |       | 3.4   |      | 0.126 | 0.134 | 0.142 |  |
| G1     |       | 6.8   |      | 0.260 | 0.268 | 0.276 |  |
| H2     |       |       | 10.4 |       |       | 0.409 |  |
| H3     | 10.05 |       | 10.4 | 0.396 |       | 0.409 |  |
| L      |       | 17.85 |      |       | 0.703 |       |  |
| L1     |       | 15.75 |      |       | 0.620 |       |  |
| L2     |       | 21.4  |      |       | 0.843 |       |  |
| L3     |       | 22.5  |      |       | 0.886 |       |  |
| L5     | 2.6   |       | 3    | 0.102 |       | 0.118 |  |
| L6     | 15.1  |       | 15.8 | 0.594 |       | 0.622 |  |
| L7     | 6     |       | 6.6  | 0.236 |       | 0.260 |  |
| М      |       | 4.5   |      |       | 0.177 |       |  |
| M1     |       | 4     |      |       | 0.157 |       |  |
| Dia    | 3.65  |       | 3.85 | 0.144 |       | 0.152 |  |



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