

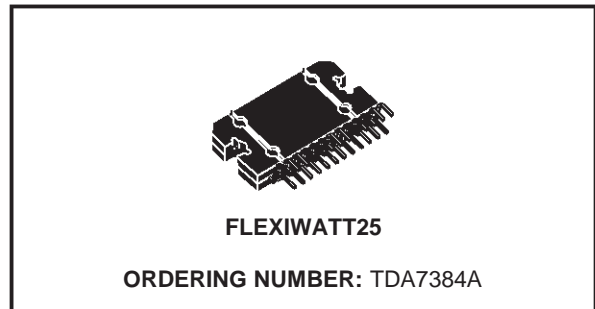


## 4 x 35W QUAD BRIDGE CAR RADIO AMPLIFIER

- HIGH OUTPUT POWER CAPABILITY:
  - 4 x 40W/4Ω MAX.
  - 4 x 35W/4Ω EIAJ
  - 4 x 25W/4Ω @ 14.4V, 1KHz, 10%
  - 4 x 22W/4Ω @ 13.2V, 1KHz, 10%
- LOW DISTORTION
- LOW OUTPUT NOISE
- ST-BY FUNCTION
- MUTE FUNCTION
- AUTOMUTE AT MIN. SUPPLY VOLTAGE DETECTION
- LOW EXTERNAL COMPONENT COUNT:
  - INTERNALLY FIXED GAIN (26dB)
  - NO EXTERNAL COMPENSATION
  - NO BOOTSTRAP CAPACITORS

### PROTECTIONS:

- OUTPUT SHORT CIRCUIT TO GND, TO  $V_S$ , ACROSS THE LOAD
- VERY INDUCTIVE LOADS
- OVERRATING CHIP TEMPERATURE WITH SOFT THERMAL LIMITER
- LOAD DUMP VOLTAGE



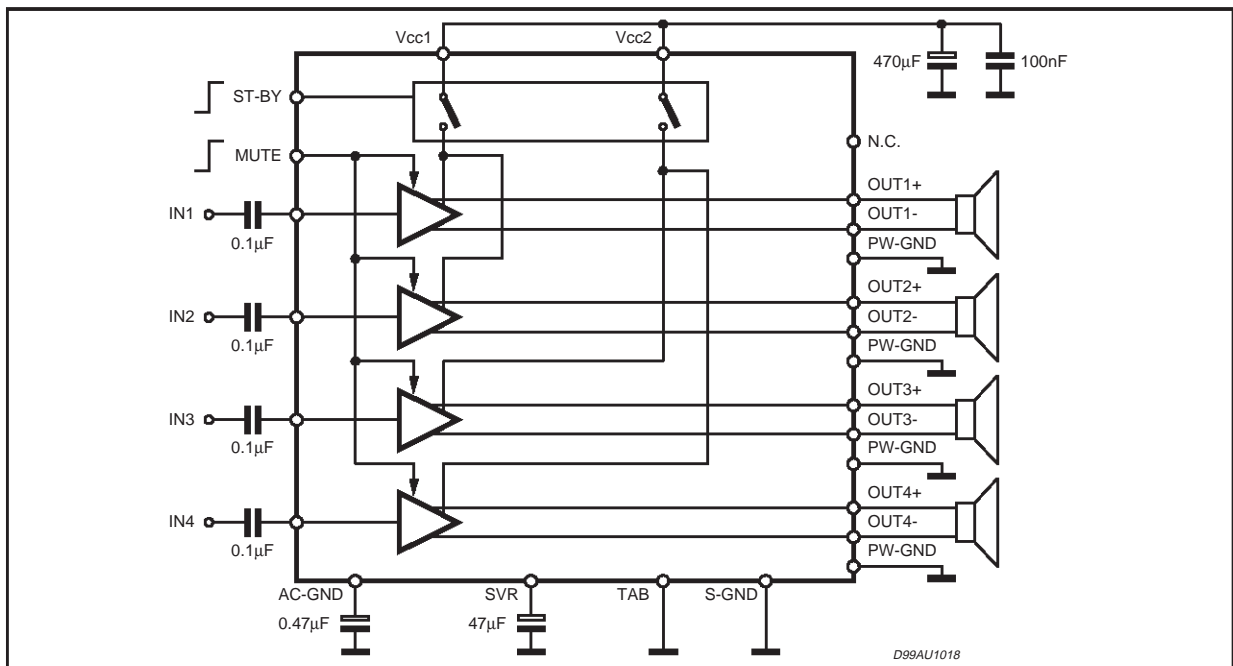
- FORTUITOUS OPEN GND
- REVERSED BATTERY
- ESD

### DESCRIPTION

The TDA7384A is a new technology class AB Audio Power Amplifier in Flexiwatt 25 package designed for high end car radio applications.

Thanks to the fully complementary PNP/NPN output configuration the TDA7384A allows a rail to rail output voltage swing with no need of bootstrap capacitors. The extremely reduced components count allows very compact sets.

### BLOCK AND APPLICATION DIAGRAM

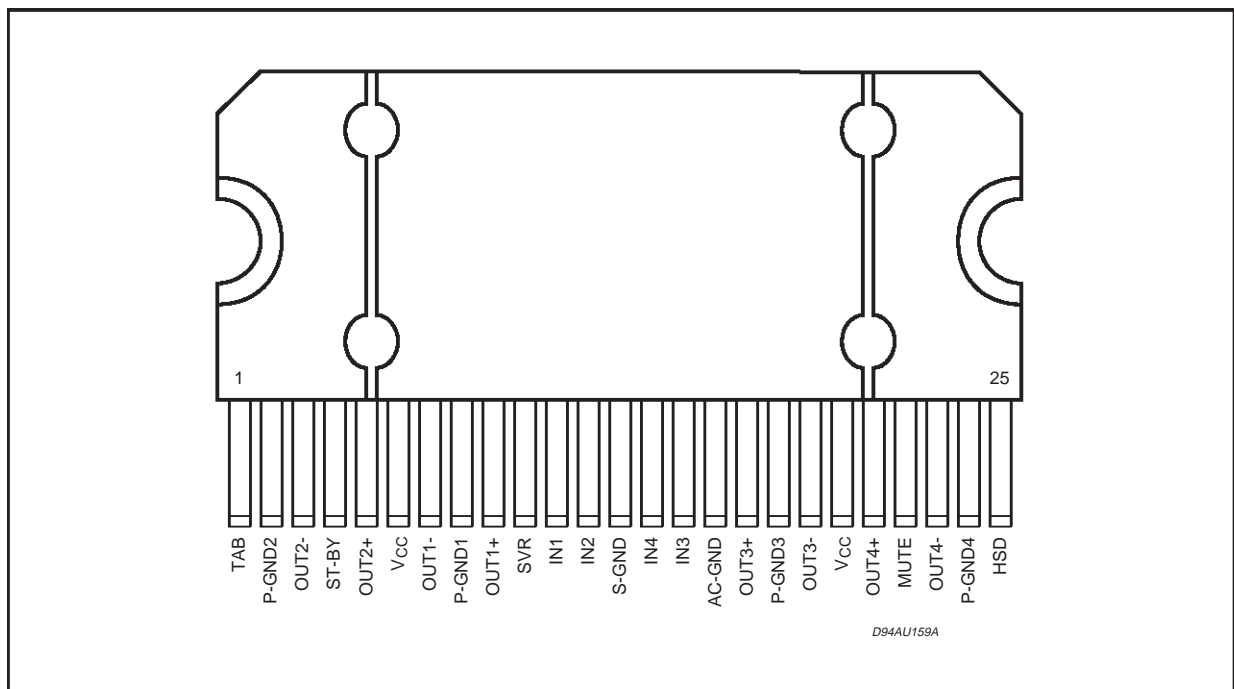


# TDA7384A

## ABSOLUTE MAXIMUM RATINGS

| Symbol       | Parameter   | Value       | Unit |
|--------------|---|-------------|------|
| $V_{CC}$     | Operating Supply Voltage  | 18          | V    |
| $V_{CC(DC)}$ | DC Supply Voltage   | 28          | V    |
| $V_{CC(pk)}$ | Peak Supply Voltage (t = 50ms)                                  | 50          | V    |
| $I_o$        | Output Peak Current:<br>Repetitive (Duty Cycle 10% at f = 10Hz) | 4.5         | A    |
|              | Non Repetitive (t = 100 $\mu$ s)                                | 5.5         | A    |
| $P_{tot}$    | Power dissipation, (T <sub>case</sub> = 70°C)                   | 80          | W    |
| $T_j$        | Junction Temperature  | 150         | °C   |
| $T_{stg}$    | Storage Temperature   | - 55 to 150 | °C   |

## PIN CONNECTION (Top view)



## THERMAL DATA

| Symbol          | Parameter                           | Value  | Unit |
|-----------------|-------------------------------------|--------|------|
| $R_{th j-case}$ | Thermal Resistance Junction to Case | Max. 1 | °C/W |

**ELECTRICAL CHARACTERISTICS** ( $V_S = 14.4V$ ;  $f = 1KHz$ ;  $R_g = 600\Omega$ ;  $R_L = 4\Omega$ ;  $T_{amb} = 25^\circ C$ ;  
Refer to the test and application diagram, unless otherwise specified.)

| Symbol        | Parameter                                | Test Condition  | Min.           | Typ.           | Max.      | Unit               |
|---------------|--|---|----------------|----------------|-----------|--------------------|
| $I_{q1}$      | Quiescent Current                        | $R_L = \infty$  | 120            | 190            | 350       | mA                 |
| $V_{OS}$      | Output Offset Voltage                    | Play Mode   |                |                | $\pm 80$  | mV                 |
| $dV_{OS}$     | During mute ON/OFF output offset voltage |   |                |                | $\pm 80$  | mV                 |
| $G_v$         | Voltage Gain                             |   | 25             | 26             | 27        | dB                 |
| $dG_v$        | Channel Gain Unbalance                   |   |                |                | $\pm 1$   | dB                 |
| $P_o$         | Output Power                             | $V_S = 13.2V$ ; THD = 10%<br>$V_S = 13.2V$ ; THD = 0.8%<br>$V_S = 14.4V$ ; THD = 10%            | 20<br>15<br>24 | 22<br>17<br>26 |           | W<br>W<br>W        |
| $P_o$ EIAJ    | EIAJ Output Power (*)                    | $V_S = 13.7V$   | 32             | 35             |           | W                  |
| $P_o$ max.    | Output Power (*)                         | $V_S = 14.4V$   | 38             | 40             |           | W                  |
| THD           | Distortion                               | $P_o = 4W$  |                | 0.04           | 0.15      | %                  |
| $e_{No}$      | Output Noise                             | "A Weighted"<br>Bw = 20Hz to 20KHz  |                | 50<br>70       | 70<br>100 | $\mu V$<br>$\mu V$ |
| SVR           | Supply Voltage Rejection                 | $f = 100Hz$ ; $V_r = 1V_{rms}$  | 50             | 65             |           | dB                 |
| $f_{ch}$      | High Cut-Off Frequency                   | $P_o = 0.5W$  | 100            | 200            |           | KHz                |
| $R_i$         | Input Impedance                          |   | 70             | 100            |           | K $\Omega$         |
| $C_T$         | Cross Talk                               | $f = 1KHz$ $P_o = 4W$<br>$f = 10KHz$ $P_o = 4W$   | 60<br>50       | 70<br>60       | -<br>-    | dB<br>dB           |
| $I_{SB}$      | St-By Current Consumption                | $V_{St-By} = 1.5V$  |                |                | 100       | $\mu A$            |
| $I_{pin4}$    | St-by pin Current                        | $V_{St-By} = 1.5V$ to $3.5V$  |                |                | $\pm 10$  | $\mu A$            |
| $V_{SB\ out}$ | St-By Out Threshold Voltage              | (Amp: ON)   | 3.5            |                |           | V                  |
| $V_{SB\ in}$  | St-By in Threshold Voltage               | (Amp: OFF)  |                |                | 1.5       | V                  |
| $A_M$         | Mute Attenuation                         | $P_{Oref} = 4W$   | 80             | 90             |           | dB                 |
| $V_{M\ out}$  | Mute Out Threshold Voltage               | (Amp: Play)   | 3.5            |                |           | V                  |
| $V_{M\ in}$   | Mute In Threshold Voltage                | (Amp: Mute)   |                |                | 1.5       | V                  |
| $V_{AM\ in}$  | $V_S$ Automute Threshold                 | (Amp: Mute)<br>Att $\geq 80dB$ ; $P_{Oref} = 4W$<br>(Amp: Play)<br>Att $< 0.1dB$ ; $P_o = 0.5W$ |                |                | 6.5       | V                  |
| $I_{pin22}$   | Muting Pin Current                       | $V_{MUTE} = 1.5V$<br>(Sourced Current)  | 5              | 11             | 20        | $\mu A$            |

(\*) Saturated square wave output.

Figure 1: Standard Test and Application Circuit

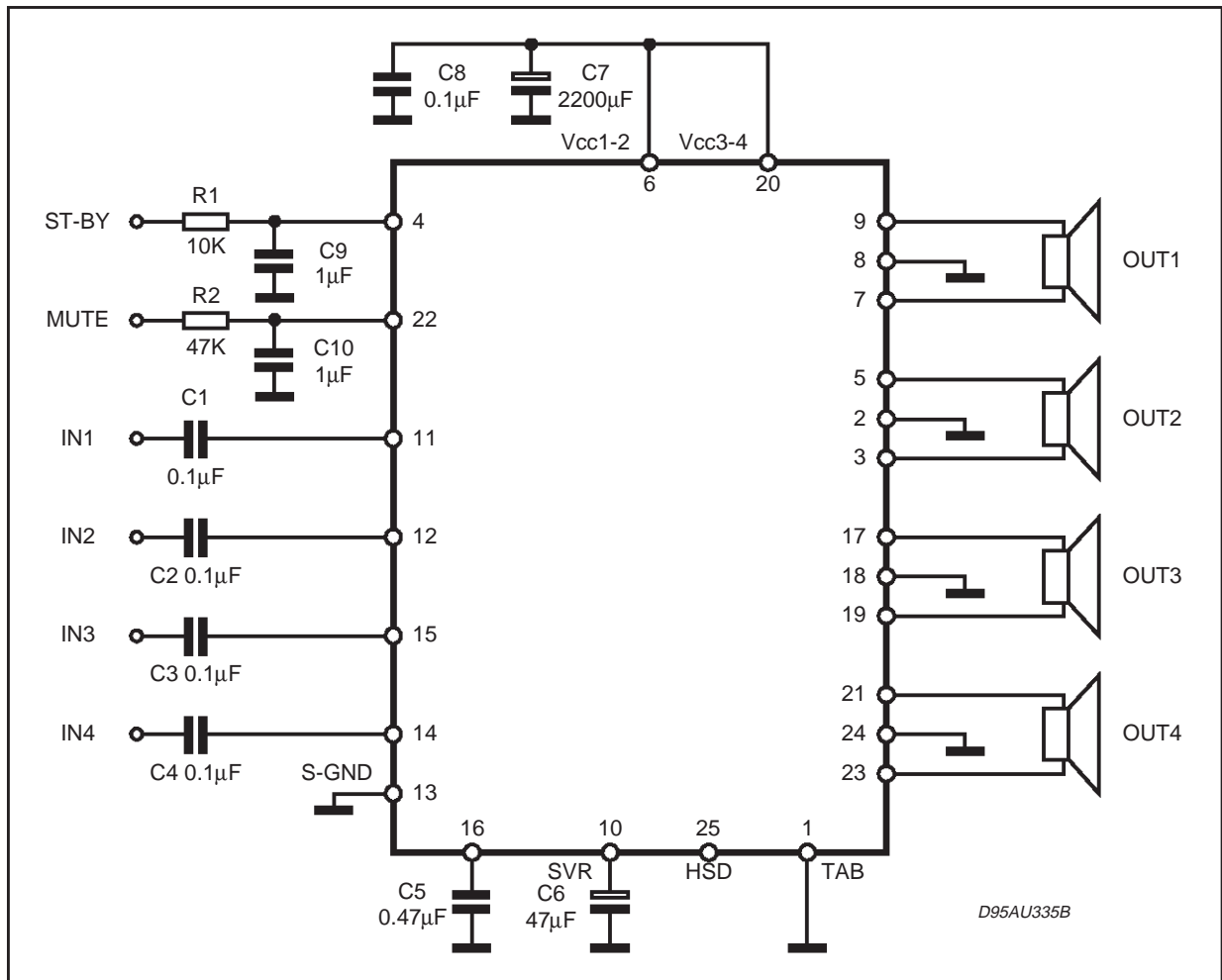


Figure 2: P.C.B. and component layout of the figure 1 (1:1 scale)

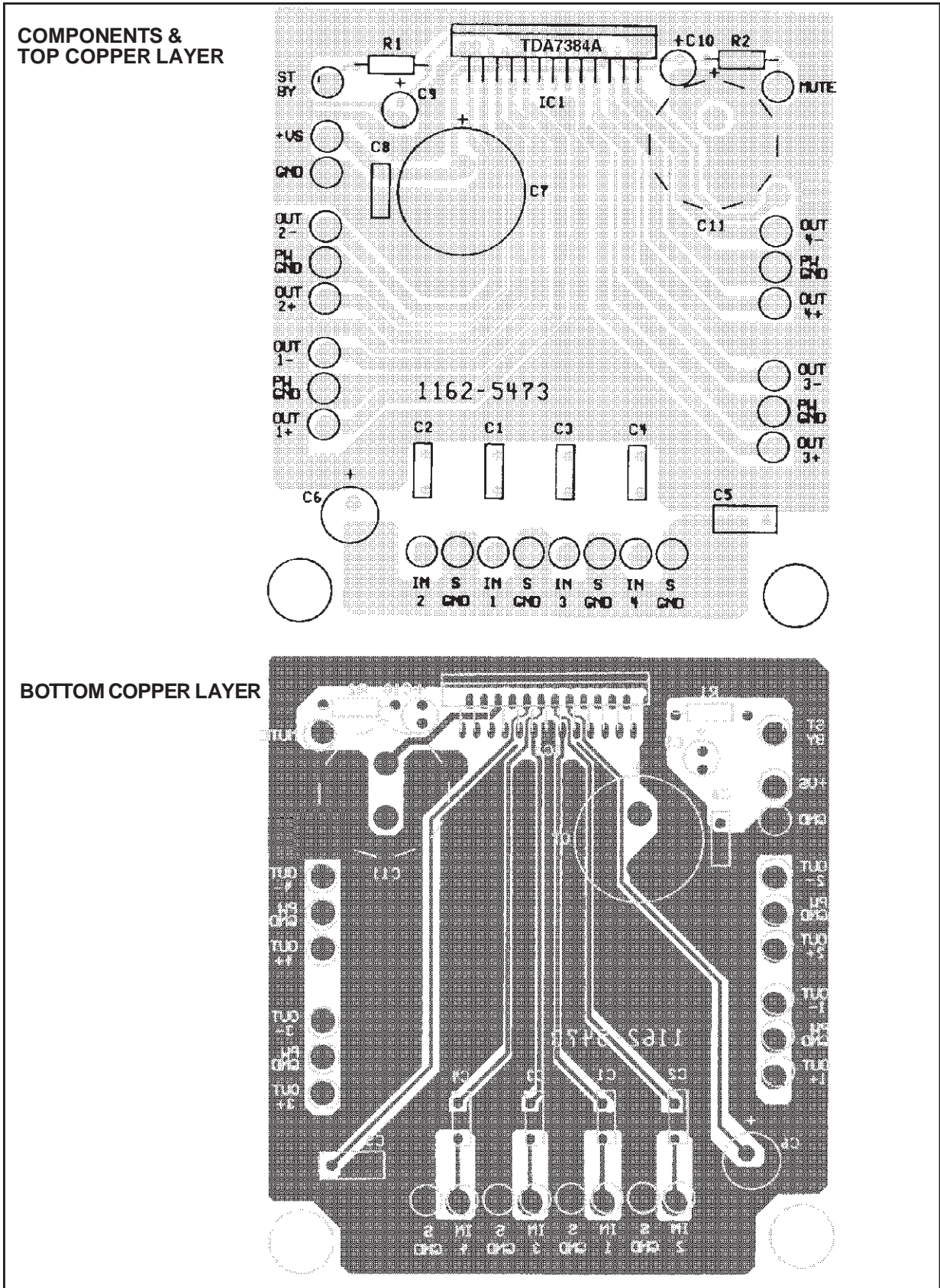


Figure 3: Quiescent Current vs. Supply Voltage

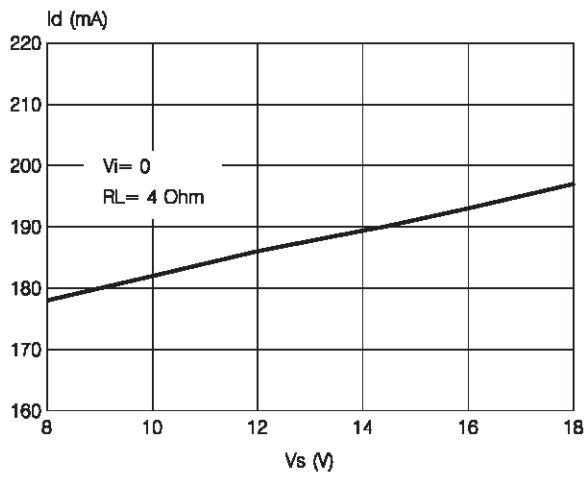


Figure 4: Quiescent Output Voltage vs. Supply Voltage

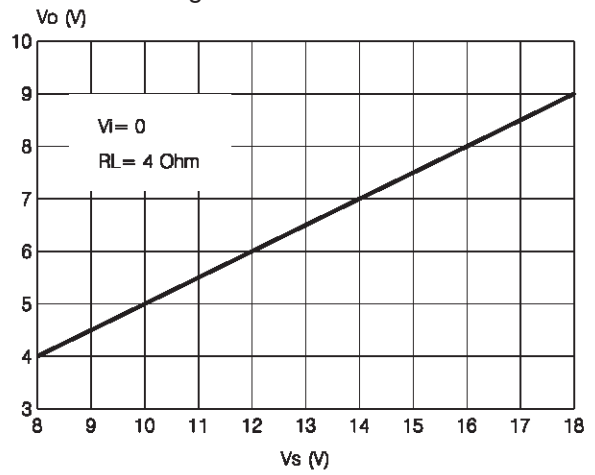


Figure 5: Output Power vs. Supply Voltage

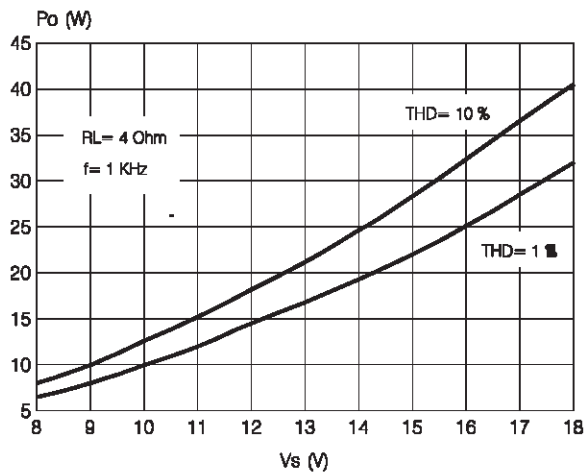


Figure 6: Distortion vs. Output Power

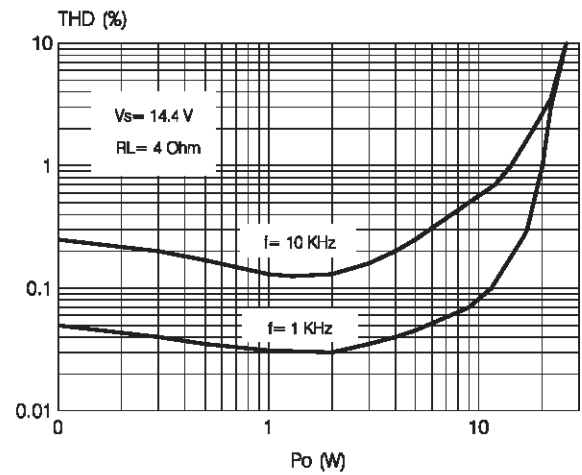


Figure 7: Distortion vs. Frequency

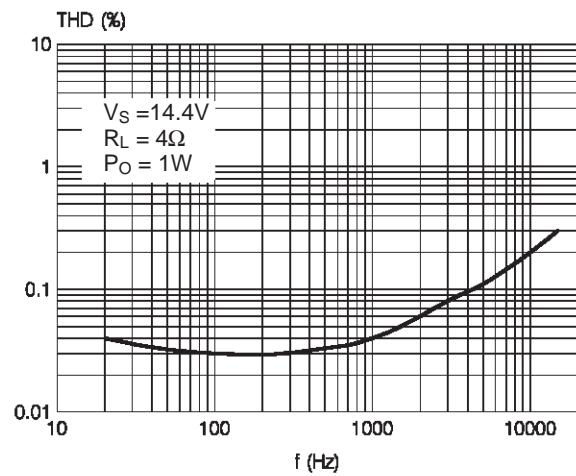
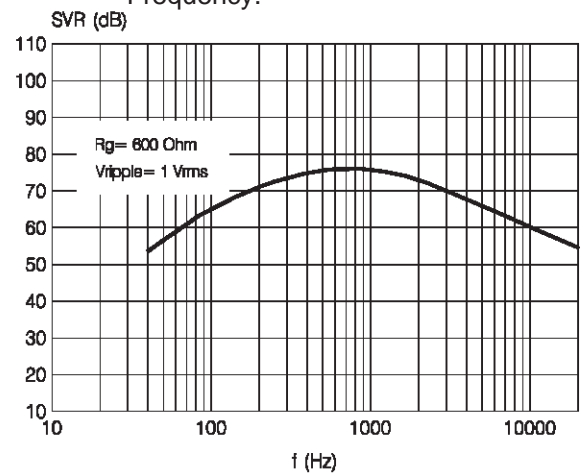
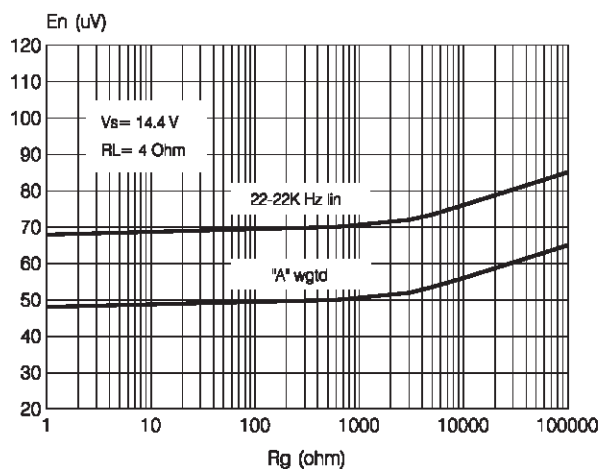


Figure 8: Supply Voltage Rejection vs. Frequency.



**Figure 9:** Output Noise vs. Source Resistance**APPLICATION HINTS** (ref. to the circuit of fig. 1)**SVR**

Besides its contribution to the ripple rejection, the SVR capacitor governs the turn ON/OFF time sequence and, consequently, plays an essential role in the pop optimization during ON/OFF transients. To conveniently serve both needs, **ITS MINIMUM RECOMMENDED VALUE IS 10µF.**

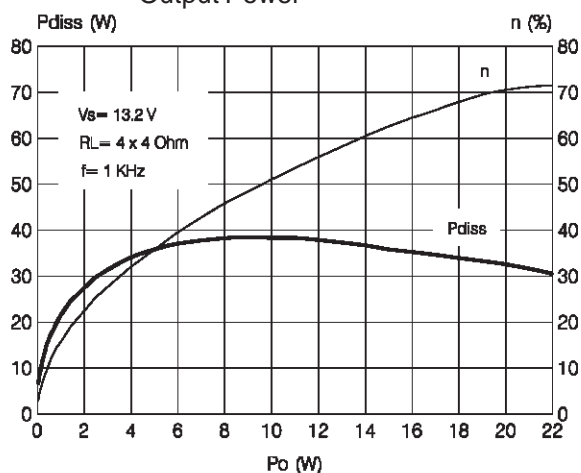
**INPUT STAGE**

The TDA7384A'S inputs are ground-compatible and can stand very high input signals ( $\pm 8V_{pk}$ ) without any performances degradation.

If the standard value for the input capacitors (0.1µF) is adopted, the low frequency cut-off will amount to 16 Hz.

**STAND-BY AND MUTING**

STAND-BY and MUTING facilities are both

**Figure 10:** Power Dissipation & Efficiency vs. Output Power

CMOS-COMPATIBLE. If unused, a straight connection to  $V_S$  of their respective pins would be admissible. Conventional/low-power transistors can be employed to drive muting and stand-by pins in absence of true CMOS ports or microprocessors.

R-C cells have always to be used in order to smooth down the transitions for preventing any audible transient noises.

Since a DC current of about 10 uA normally flows out of pin 22, the maximum allowable muting-series resistance ( $R_2$ ) is 70KΩ, which is sufficiently high to permit a muting capacitor reasonably small (about 1µF).

If  $R_2$  is higher than recommended, the involved risk will be that the voltage at pin 22 may rise to above the 1.5 V threshold voltage and the device will consequently fail to turn OFF when the mute line is brought down.

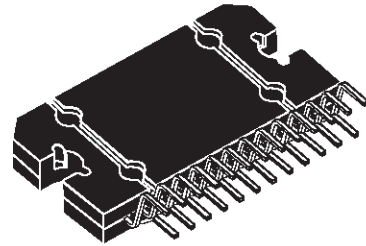
About the stand-by, the time constant to be assigned in order to obtain a virtually pop-free transition has to be slower than 2.5V/ms.

# TDA7384A

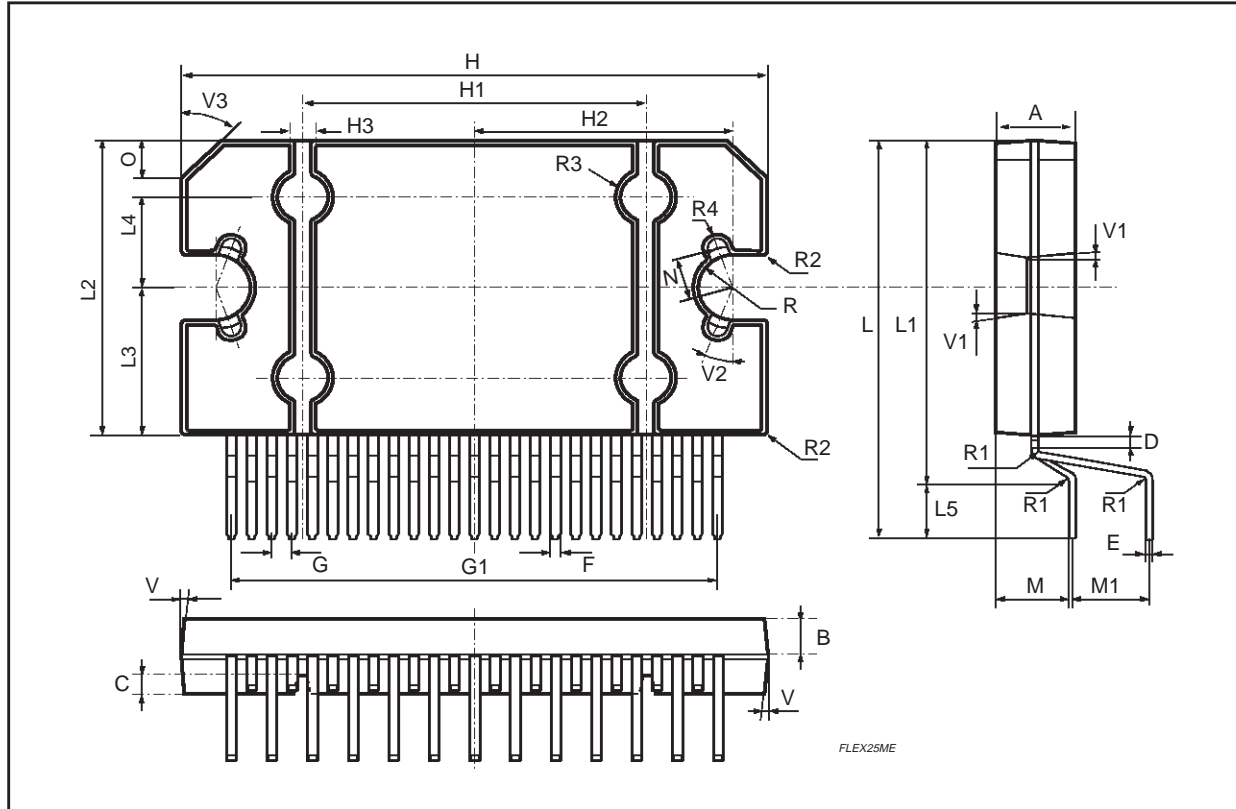
| DIM.   | mm    |       |            | inch  |       |       |
|--------|-------|-------|------------|-------|-------|-------|
|        | MIN.  | TYP.  | MAX.       | MIN.  | TYP.  | MAX.  |
| A      | 4.45  | 4.50  | 4.65       | 0.175 | 0.177 | 0.183 |
| B      | 1.80  | 1.90  | 2.00       | 0.070 | 0.074 | 0.079 |
| C      |       | 1.40  |            |       | 0.055 |       |
| D      | 0.75  | 0.90  | 1.05       | 0.029 | 0.035 | 0.041 |
| E      | 0.37  | 0.39  | 0.42       | 0.014 | 0.015 | 0.016 |
| F (1)  |       |       | 0.57       |       |       | 0.022 |
| G      | 0.80  | 1.00  | 1.20       | 0.031 | 0.040 | 0.047 |
| G1     | 23.75 | 24.00 | 24.25      | 0.935 | 0.945 | 0.955 |
| H (2)  | 28.90 | 29.23 | 29.30      | 1.138 | 1.150 | 1.153 |
| H1     |       | 17.00 |            |       | 0.669 |       |
| H2     |       | 12.80 |            |       | 0.503 |       |
| H3     |       | 0.80  |            |       | 0.031 |       |
| L (2)  | 22.07 | 22.47 | 22.87      | 0.869 | 0.884 | 0.904 |
| L1     | 18.57 | 18.97 | 19.37      | 0.731 | 0.747 | 0.762 |
| L2 (2) | 15.50 | 15.70 | 15.90      | 0.610 | 0.618 | 0.626 |
| L3     | 7.70  | 7.85  | 7.95       | 0.303 | 0.309 | 0.313 |
| L4     |       | 5     |            |       | 0.197 |       |
| L5     |       | 3.5   |            |       | 0.138 |       |
| M      | 3.70  | 4.00  | 4.30       | 0.145 | 0.157 | 0.169 |
| M1     | 3.60  | 4.00  | 4.40       | 0.142 | 0.157 | 0.173 |
| N      |       | 2.20  |            |       | 0.086 |       |
| O      |       | 2     |            |       | 0.079 |       |
| R      |       | 1.70  |            |       | 0.067 |       |
| R1     |       | 0.5   |            |       | 0.02  |       |
| R2     |       | 0.3   |            |       | 0.12  |       |
| R3     |       | 1.25  |            |       | 0.049 |       |
| R4     |       | 0.50  |            |       | 0.019 |       |
| V      |       |       | 5° (Typ.)  |       |       |       |
| V1     |       |       | 3° (Typ.)  |       |       |       |
| V2     |       |       | 20° (Typ.) |       |       |       |
| V3     |       |       | 45° (Typ.) |       |       |       |

(1): dam-bar protusion not included  
 (2): molding protusion included

## OUTLINE AND MECHANICAL DATA



## Flexiwatt25





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