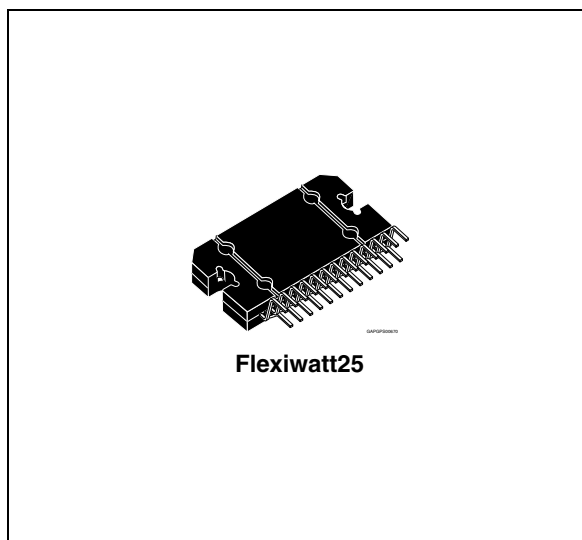


## 4 x 46 W quad bridge car radio amplifier

Datasheet — production data

### Features

- High output power capability:
  - 4 x 46 W / 4  $\Omega$  max.
  - 4 x 27 W / 4  $\Omega$  @ 14.4 V, 1 kHz, 10 %
- Low distortion
- Low output noise
- Standby function
- Mute function
- Automute at min. supply voltage detection
- Low external component count:
  - Internally fixed gain (26 dB)
  - 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 an AB class audio power amplifier, packaged in Flexiwatt 25 and designed for high end car radio applications.

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

**Table 1. Device summary**

Order code	Package	Packing
TDA7384A	Flexiwatt25	Tube

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# 1 Block and pin connection diagrams

Figure 1. Block diagram

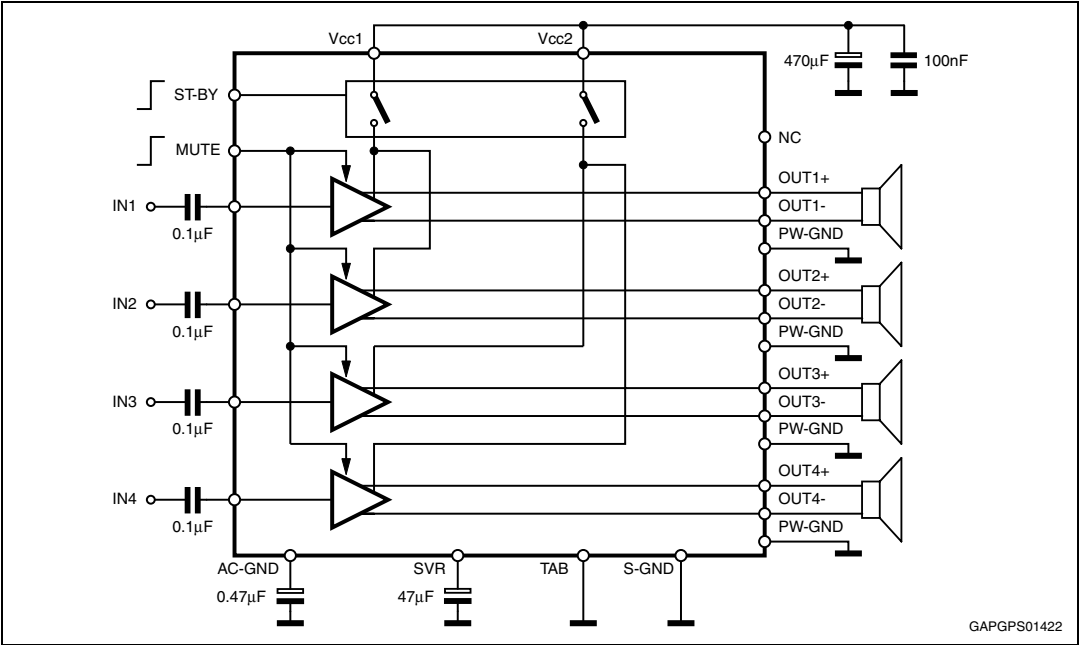
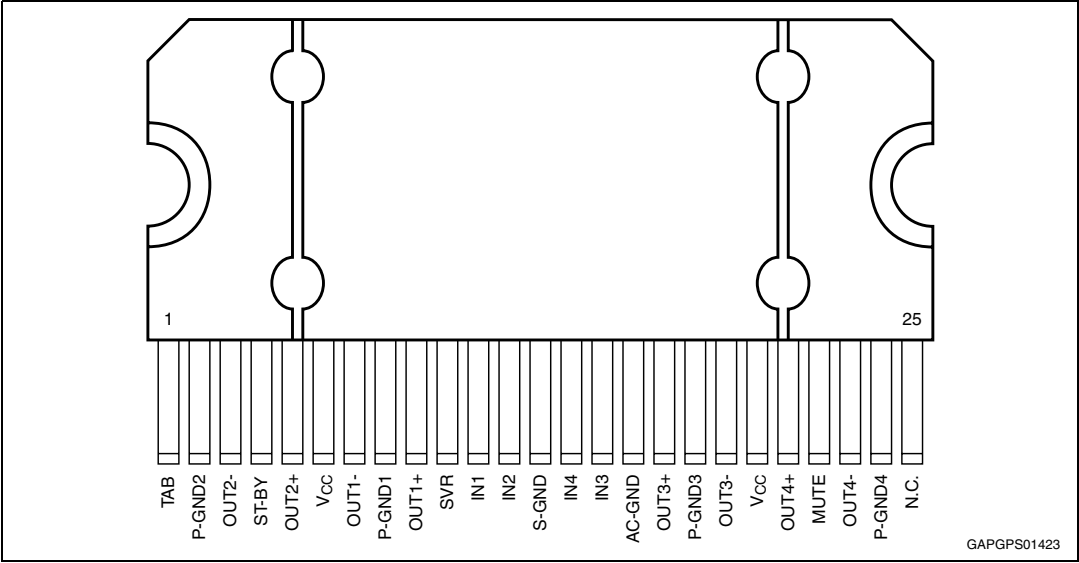


Figure 2. Pin connection



## 2 Electrical specifications

### 2.1 Absolute maximum ratings

**Table 2. Absolute maximum ratings**

Symbol	Parameter	Value	Unit
$V_S$	Operating supply voltage	18	V
$V_{S(DC)}$	DC supply voltage	28	V
$V_{S(pk)}$	Peak supply voltage ( $t = 50$ ms)	50	V
$I_O$	Output peak current: Repetitive (duty cycle 10 % at $f = 10$ Hz)	4.5	A
	Non repetitive ( $t = 100$ $\mu$ s)	5.5	A
$P_{tot}$	Power dissipation, ( $T_{case} = 70$ °C)	80	W
$T_j$	Junction temperature	150	°C
$T_{stg}$	Storage temperature	– 55 to 150	°C

### 2.2 Thermal data

**Table 3. Thermal data**

Symbol	Parameter	Value	Unit
$R_{th\ j-case}$	Thermal resistance junction-to-case max.	1	°C/W

### 2.3 Electrical characteristics

$V_S = 14.4$  V;  $f = 1$  kHz;  $R_g = 600$   $\Omega$ ;  $R_L = 4$   $\Omega$ ;  $T_{amb} = 25$  °C; Refer to the test and application diagram ([Figure 3](#)), unless otherwise specified.

**Table 4. Electrical characteristics**

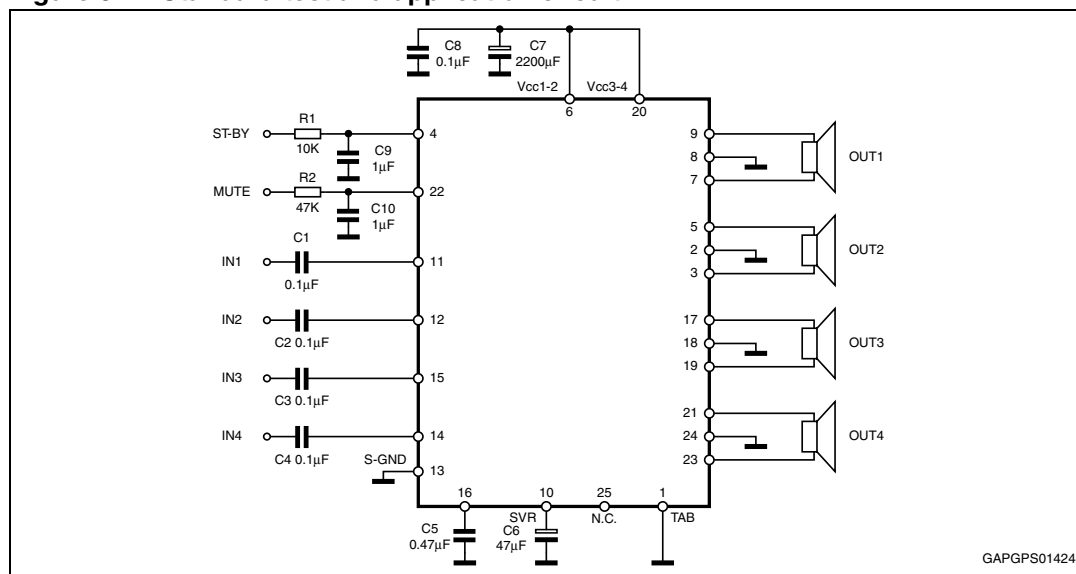
Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
$I_{q1}$	Quiescent current	$R_L = \infty$	120	190	350	mA
$V_{OS}$	Output offset voltage	Play mode	-	-	$\pm 100$	mV
$dV_{OS}$	During mute ON/OFF output offset voltage	ITU R-ARM weighted	-80	-	+80	mV
$G_v$	Voltage gain	-	25	26	27	dB
$\Delta G_v$	Channel gain unbalance	-	-	-	$\pm 1$	dB
$P_o$	Output power	THD = 10%; $V_S = 14.4$ V	24	27	-	W
		THD = 10%; $V_S = 13.2$ V	20	22	-	W
$P_{o\ max}$	Max. output power <sup>(1)</sup>	$V_S = 14.4$ V	38	42	-	W
		$V_S = 15.2$ V	-	46	-	W

**Table 4. Electrical characteristics (continued)**

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
THD	Distortion	$P_O = 4W$	-	0.04	0.15	%
$e_{No}$	Output noise	"A" Weighted	-	50	70	$\mu V$
		Bw = 20 Hz to 20 kHz	-	70	100	$\mu V$
SVR	Supply voltage rejection	$f = 100 \text{ Hz}; V_r = 1 \text{ Vrms}$	50	65	-	dB
$f_{ch}$	High cut-off frequency	$P_O = 0.5 \text{ W}$	100	200	-	KHz
$R_i$	Input Impedance		70	100	-	K $\Omega$
$C_T$	Cross talk	$f = 1 \text{ kHz}; P_O = 4 \text{ W}$	60	70	-	dB
		$f = 10 \text{ kHz}; P_O = 4 \text{ W}$	50	60	-	dB
$I_{SB}$	Standby current consumption	$V_{St-by} = 0 \text{ V}$	-	-	20	$\mu A$
$I_{pin4}$	Standby pin current	$V_{St-by} = 1.2 \text{ to } 2.6 \text{ V}$	-	-	$\pm 1$	$\mu A$
$V_{SB out}$	Standby out threshold voltage	(Amp: ON)	3.5	-	-	V
$V_{SB IN}$	Standby in threshold voltage	(Amp: OFF)	-	-	1.5	V
$A_M$	Mute attenuation	$P_{Oref} = 4 \text{ W}$	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); Att $\geq 80 \text{ dB}$ ; $P_{Oref} = 4 \text{ W}$	-		6.5	V
		(Amp: Play); Att $< 0.1 \text{ dB}$ ; $P_O = 0.5 \text{ W}$		7.6	8.5	
$I_{pin22}$	Muting pin current	$V_{MUTE} = 1.2 \text{ V}$ (Source current)	5	11	20	$\mu A$

1. Saturated square wave output.

Figure 3. Standard test and application circuit



GAPGPS01424

## 2.4 PCB and component layout

Referred to [Figure 3: Standard test and application circuit](#).

Figure 4. Components and top copper layer

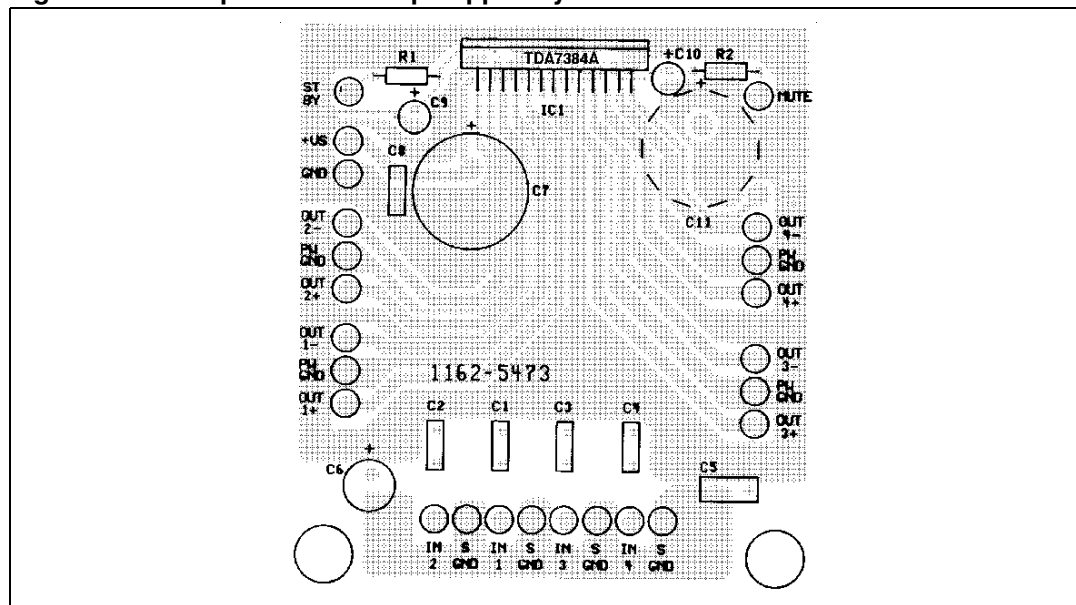
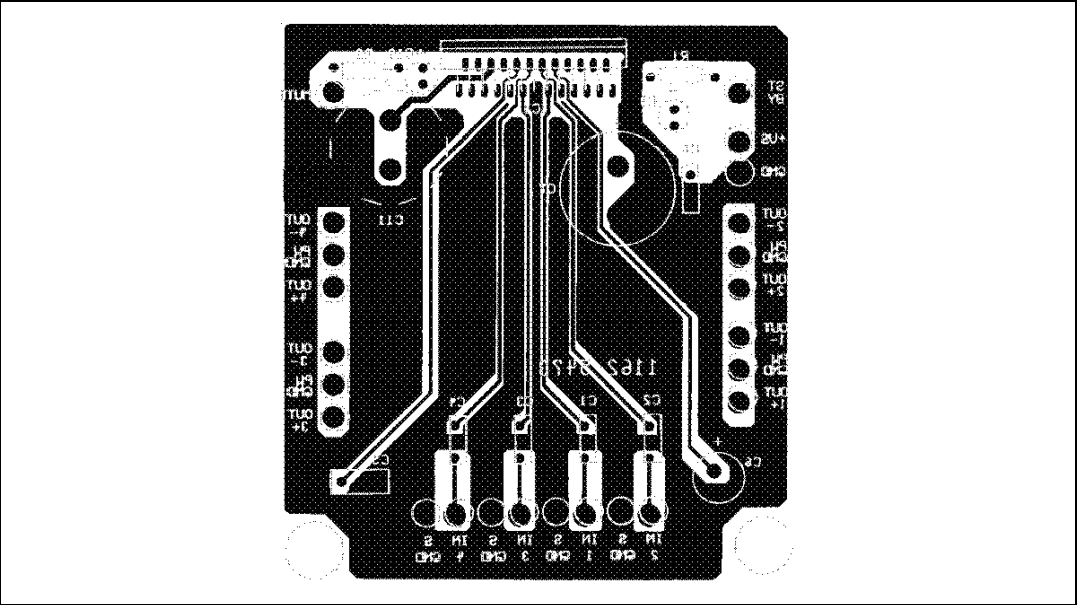




Figure 5. Bottom copper layer



2.5 Electrical characteristic curves

Figure 6. Quiescent current vs. supply voltage

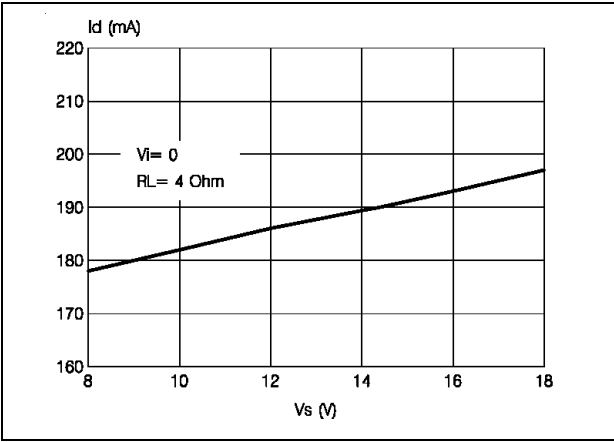


Figure 7. Quiescent current vs. supply current

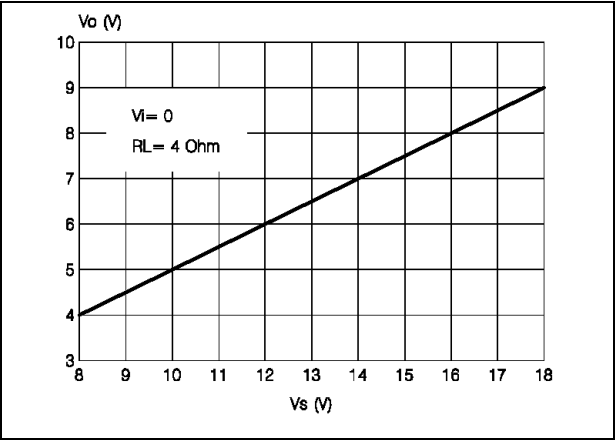


Figure 8. Output power vs. supply voltage (4 Ω)

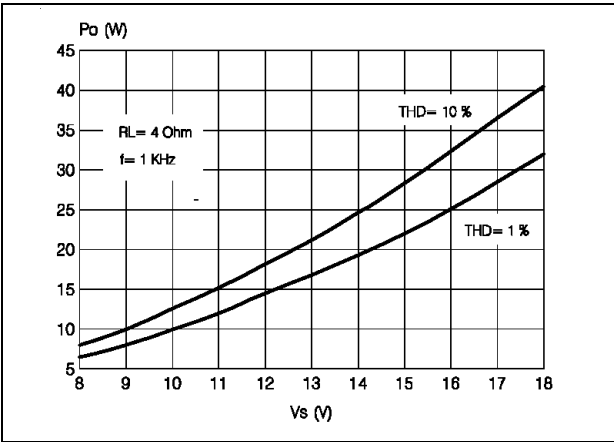


Figure 9. Distortion vs. output power

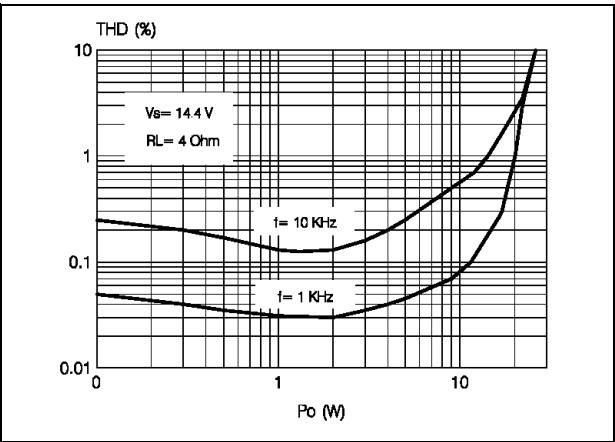


Figure 10. Distortion vs. frequency

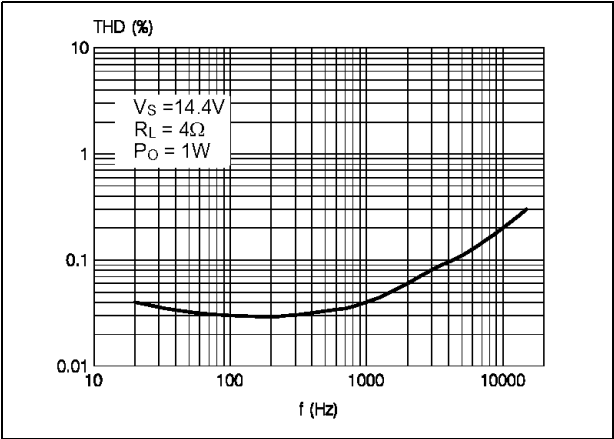


Figure 11. Supply voltage rejection vs. frequency

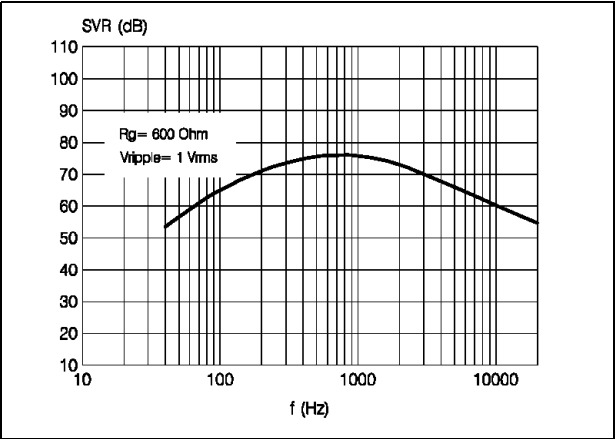


Figure 12. Output noise vs. source resistance

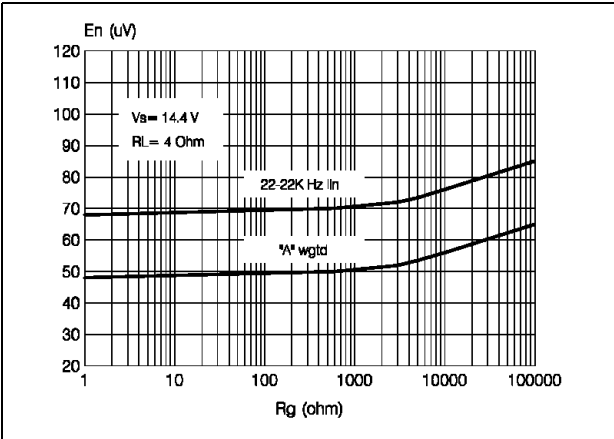
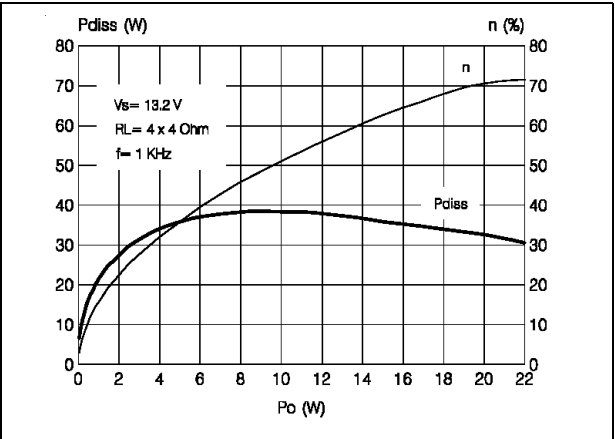


Figure 13. Power dissipation and efficiency vs. output power



## 3 Application hints

Referred to the circuit of [Figure 3](#).

### 3.1 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 10 $\mu$ f**.

### 3.2 Input stage

The TDA7384A's inputs are ground-compatible and can stand very high input signals ( $\pm 8$  Vpk) without any performances degradation.

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

### 3.3 Standby and muting

If standby and muting are not used, 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  $\mu$ A normally flows out of pin 22, the maximum allowable muting-series resistance ( $R_2$ ) is 70 k $\Omega$ , which is sufficiently high to permit a muting capacitor reasonably small (about 1 $\mu$ F).

If  $R_2$  is higher than recommended, the involved risk will be that the voltage at pin 23 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 2.5 V/ms.

## 4 Package information

In order to meet environmental requirements, ST offers these devices in different grades of ECOPACK<sup>®</sup> packages, depending on their level of environmental compliance. ECOPACK<sup>®</sup> specifications, grade definitions and product status are available at: [www.st.com](http://www.st.com).

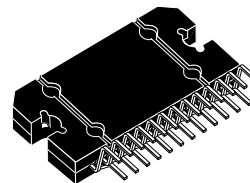
ECOPACK<sup>®</sup> is an ST trademark.

**Figure 14. Flexiwatt25 mechanical data and package dimensions**

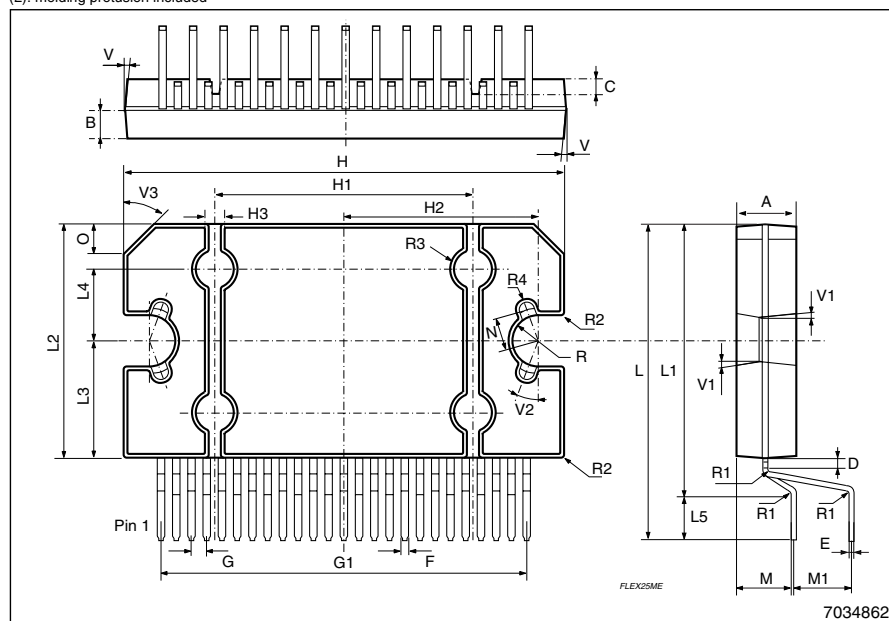
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.45	4.50	4.65	0.175	0.177	0.183
B	1.80	1.90	2.00	0.070	0.074	0.079
C		1.40			0.055	
D	0.75	0.90	1.05	0.029	0.035	0.041
E	0.37	0.39	0.42	0.014	0.015	0.016
F (1)			0.57		0.022	
G	0.80	1.00	1.20	0.031	0.040	0.047
G1	23.75	24.00	24.25	0.935	0.945	0.955
H (2)	28.90	29.23	29.30	1.139	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 (vertical)



GAPGPS00669

## 5 Revision history

**Table 5. Document revision history**

Date	Revision	Changes
05-Dec-2001	1	Initial release.
11-Dec-2007	2	Updated in the <a href="#">Table 4</a> the values of the parameters $P_o$ and $P_{o\ max}$ .
10-Oct-2008	3	Updated <a href="#">Table 3: Thermal data on page 6</a> .
07-Jun-2012	4	Updated <a href="#">Features on page 1</a> ; Updated <a href="#">Electrical characteristics on page 6</a> .
20-Jun-2012	5	Updated <a href="#">Section 3.3: Standby and muting</a> .

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