

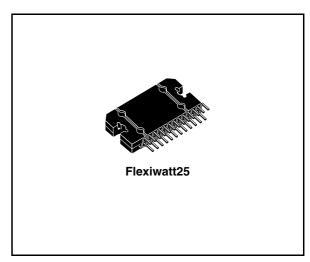
4 x 42W quad bridge car radio amplifier

Features

- High output power capability:
 - 4 x 42 W / 4 Ω max.
 - 4 x 27 W / 4 Ω @ 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

Contents TDA7384A

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1 Block and pin connection diagrams

Figure 1. Block diagram

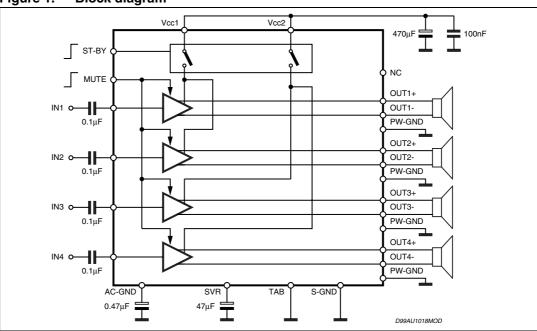
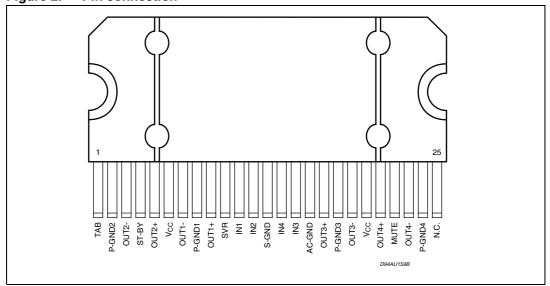


Figure 2. Pin connection



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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) Non repetitive (t = 100 μ s)	4.5 5.5	A 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

Table 4. Electrical characteristics

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

Symbol	Parameter	Test condition	Min.	Тур.	Max.	Unit
I _{q1}	Quiescent current	$R_L = \infty$	120	190	350	mA
V _{OS}	Output offset voltage	Play mode			±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
ΔG_v	Channel gain unbalance				±1	dB
В	Output nower	THD = 10%; V _S = 14.4V	24	27		W
P _o	Output power	THD = 10%; V _S = 13.2V	20	22		W
P _{o max}	Max. output power ⁽¹⁾	V _S = 14.4V	38	42		W
THD	Distortion	$P_0 = 4W$		0.04	0.15	%

Table 4. Electrical characteristics (continued)

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

Symbol	Parameter	Test condition	Min.	Тур.	Max.	Unit
0	Output noise	"A" Weighted		50	70	μV
e_{No}	Output Hoise	Bw = 20 Hz to 20 kHz		70	100	μV
SVR	Supply voltage rejection	f = 100 Hz; V _r = 1 Vrms	50	65		dB
f _{ch}	High cut-off frequency	$P_0 = 0.5 \text{ W}$	100	200		KHz
R _i	Input Impedance		70	100		ΚΩ
	0 0	f = 1 kHz; P _o = 4 W	60	70		dB
C _T	Cross talk	f = 10 kHz; P _o = 4 W	50	60		dB
I _{SB}	Standby current consumption	V _{St-by} = 0 V			20	μΑ
I _{pin4}	Standby pin current	V _{St-by} = 1.2 to 2.6 V			±1	μΑ
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 W	80	90		dB
V _{M out}	Mute out threshold voltage	(Amp: Play)	3.5			٧
$V_{M in}$	Mute in threshold voltage	(Amp: Mute)			1.5	V
V _{AM in}	V _S automute threshold	(Amp: Mute); Att \geq 80 dB; $P_{Oref} = 4 \text{ W}$ (Amp: Play); Att < 0.1 dB; $P_{O} = 0.5 \text{ W}$		7.0	6.5	V
				7.6	8.5	
I _{pin22}	Muting pin current	V _{MUTE} = 1.2 V (Source current)	5	11	20	μΑ

^{1.} Saturated square wave output.

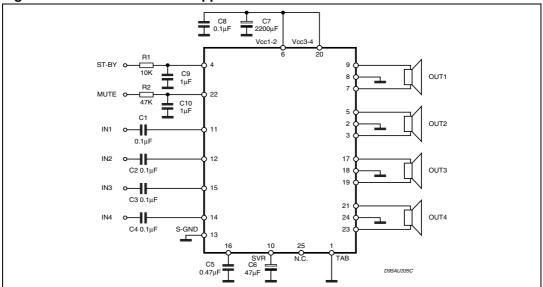
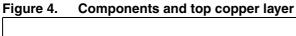


Figure 3. Standard test and application circuit

2.4 PCB and component layout

Referred to Figure 3: Standard test and application circuit.



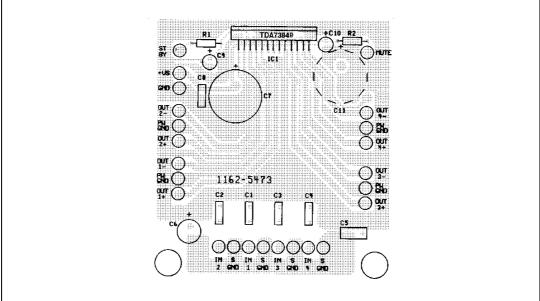
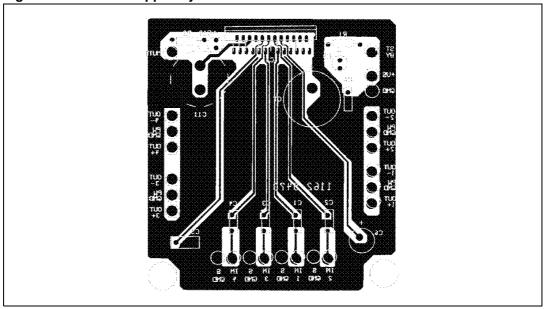


Figure 5. Bottom copper layer



2.5 Electrical characteristic curves

Figure 6. Quiescent current vs. supply voltage

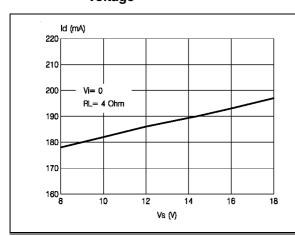


Figure 7. Quiescent current vs. supply current

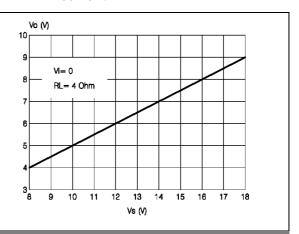
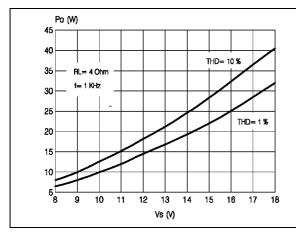


Figure 8. Output power vs. supply voltage (4Ω)

Figure 9. Distortion vs. output power



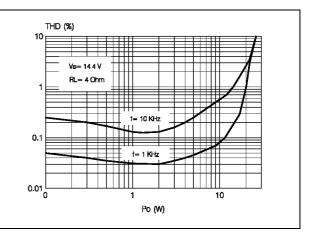
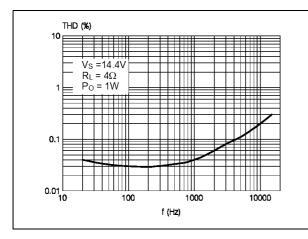


Figure 10. Distortion vs. frequency

Figure 11. Supply voltage rejection vs. frequency



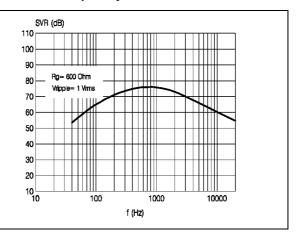
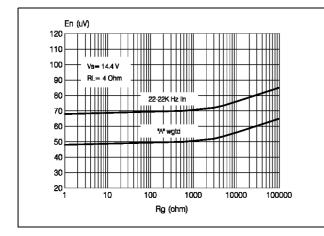
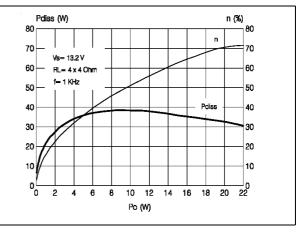


Figure 12. Output noise vs. source resistance Figure 13. Power dissipation and efficiency vs. output power





TDA7384A Application hints

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 10µf.

3.2 Input stage

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

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

3.3 Standby and muting

Standby and muting facilities are both 3.3 V CMOS-compatible. If unused, a straight connection to $V_{\rm s}$ 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 μ A normally flows out of pin 22, the maximum allowable muting-series resistance (R₂) is 70 k Ω , which is sufficiently high to permit a muting capacitor reasonably small (about 1 μ 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.

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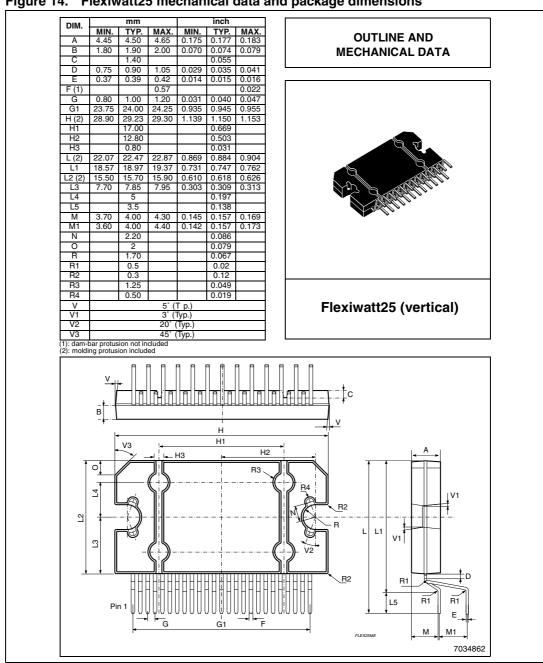
Package information TDA7384A

4 Package information

In order to meet environmental requirements, ST (also) offers these devices in ECOPACK[®] packages. ECOPACK[®] packages are lead-free. The category of second Level Interconnect is marked on the package and on the inner box label, in compliance with JEDEC Standard JESD97. The maximum ratings related to soldering conditions are also marked on the inner box label.

ECOPACK is an ST trademark. ECOPACK specifications are available at: www.st.com.

Figure 14. Flexiwatt25 mechanical data and package dimensions



TDA7384A Revision history

5 Revision history

Table 5. Document revision history

Date	Revision	Changes
05-Dec-2001	1	Initial release.
11-Dec-2007	2	Updated in the <i>Table 4</i> the values of the parameters P_0 and $P_{0 \text{ max}}$.
10-Oct-2008	3	Updated Table 3: Thermal data on page 6.

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