

## 4 x 45 W quad bridge car radio amplifier

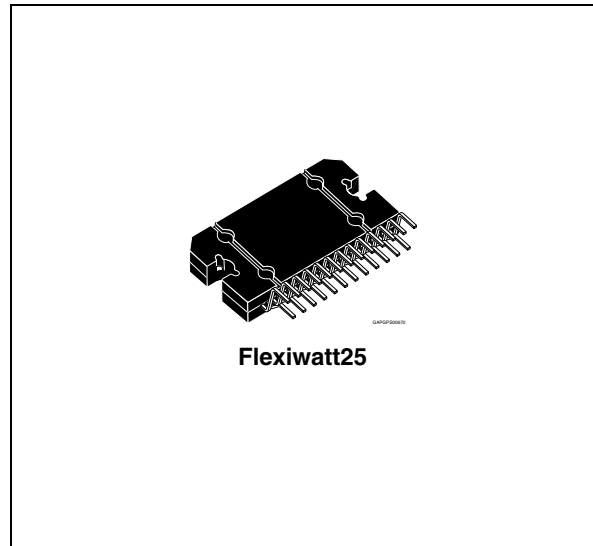
Datasheet – production data

### Features

- High output power capability:
  - 4 x 45 W / 4 Ω max.
  - 4 x 26 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 TDA7388 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 TDA7388 allows a rail to rail output voltage swing with no need of bootstrap capacitors. The extremely reduced boundary components count allows very compact sets.

**Table 1. Device summary**

Order code	Package	Packing
TDA7388	Flexiwatt25	Tube

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# 1 Pin connection and test/application diagrams

Figure 1. Pin connection (top view)

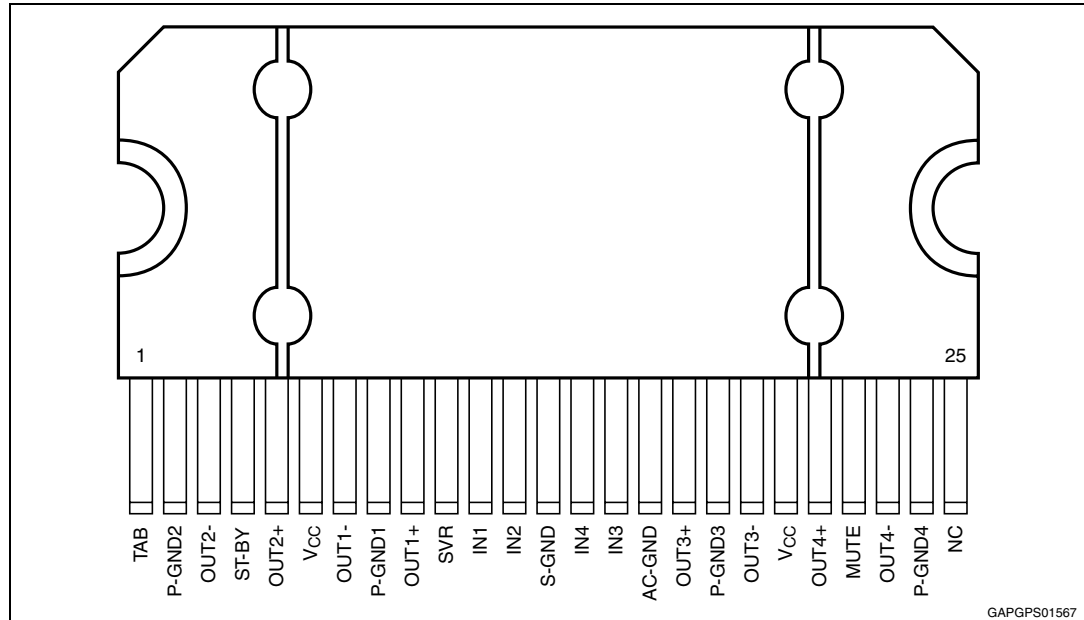
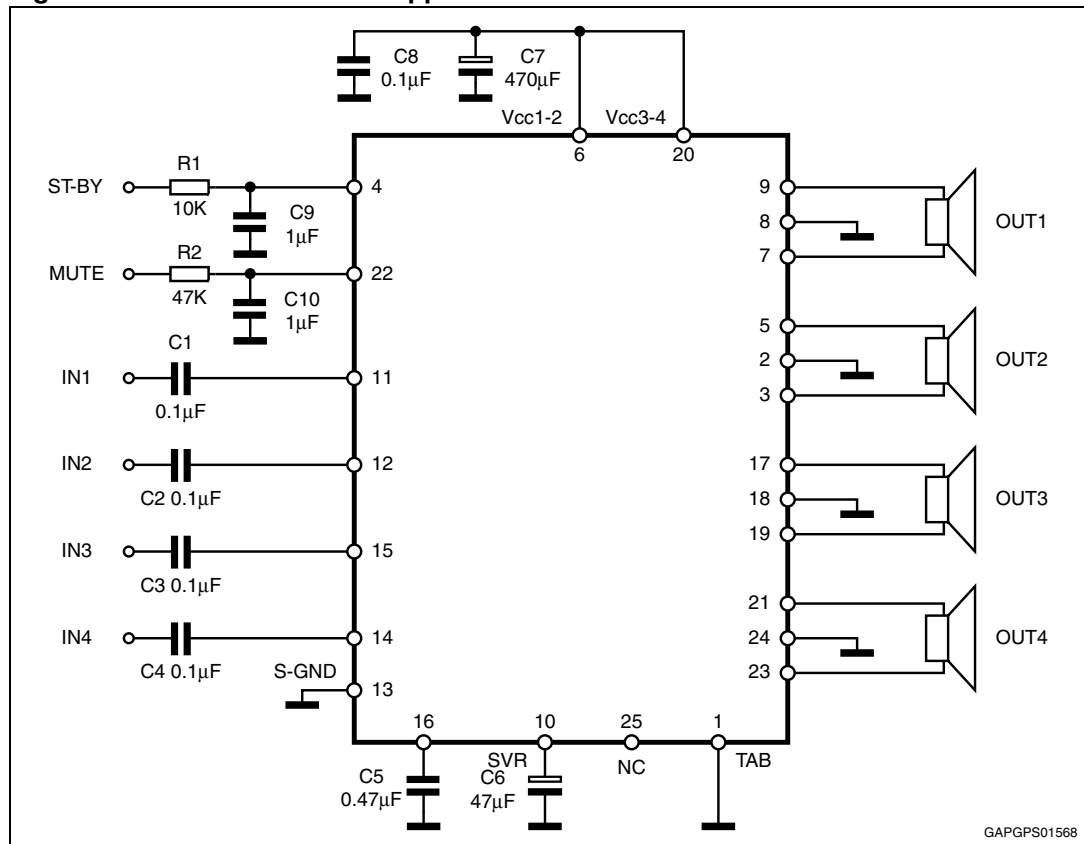


Figure 2. Standard test and application circuit



## 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	
$P_{tot}$	Power dissipation, ( $T_{case} = 70\text{ }^\circ\text{C}$ )	80	W
$T_j$	Junction temperature	150	$^\circ\text{C}$
$T_{stg}$	Storage temperature	- 55 to 150	$^\circ\text{C}$

### 2.2 Thermal data

Table 3. Thermal data

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

### 2.3 Electrical characteristics

$V_S = 14.4\text{ V}$ ; f = 1 kHz;  $R_g = 600\ \Omega$ ;  $R_L = 4\ \Omega$ ;  $T_{amb} = 25\text{ }^\circ\text{C}$ ; Refer to the test and application diagram ([Figure 2](#)), 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
$P_o$	Output power	THD = 10 %; $V_S = 14.4\text{ V}$	22	26	-	W
$P_{o\ max}$	Max.output power <sup>(1)</sup>	$V_S = 14.4\text{ V}$	37	41	-	W
		$V_S = 15.2\text{ V}$	-	45	-	
THD	Distortion	$P_o = 4\text{ W}$	-	0.04	0.15	%

Table 4. Electrical characteristics (continued)

Symbol	Parameter	Test condition	Min.	Typ.	Max.	Unit
$e_{No}$	Output noise	"A" Weighted	-	50	70	$\mu\text{V}$
		Bw = 20 Hz to 20 kHz	-	70	100	$\mu\text{V}$
SVR	Supply voltage rejection	f = 100 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	-	$\text{K}\Omega$
$C_T$	Cross talk	f = 1 kHz; $P_o = 4 \text{ W}$	60	70	-	dB
		f = 10 kHz; $P_o = 4 \text{ W}$	-	60	-	dB
$I_{SB}$	Standby current consumption	$V_{St-by} = 0\text{V}$	-	-	20	$\mu\text{A}$
$V_{SB out}$	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. $\geq 80 \text{ dB}$ ; $P_{Oref} = 4 \text{ W}$ (Amp: play); Att. $< 0.1 \text{ dB}$ ; $P_o = 0.5 \text{ W}$	-	7.6	6.5 8.5	V
$I_{pin22}$	Muting pin current	$V_{MUTE} = 1.2 \text{ V}$ (Source current)	5	11	20	$\mu\text{A}$

1. Saturated square wave output.

## 3 Application hints

Ref. to the circuit of [Figure 2](#).

### 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  $\mu\text{F}$** .

### 3.2 Input stage

The TDA7388'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  $\mu\text{F}$ ) is adopted, the low frequency cut-off amounts 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 standby 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  $\mu\text{A}$  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  $\mu\text{F}$ ).

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

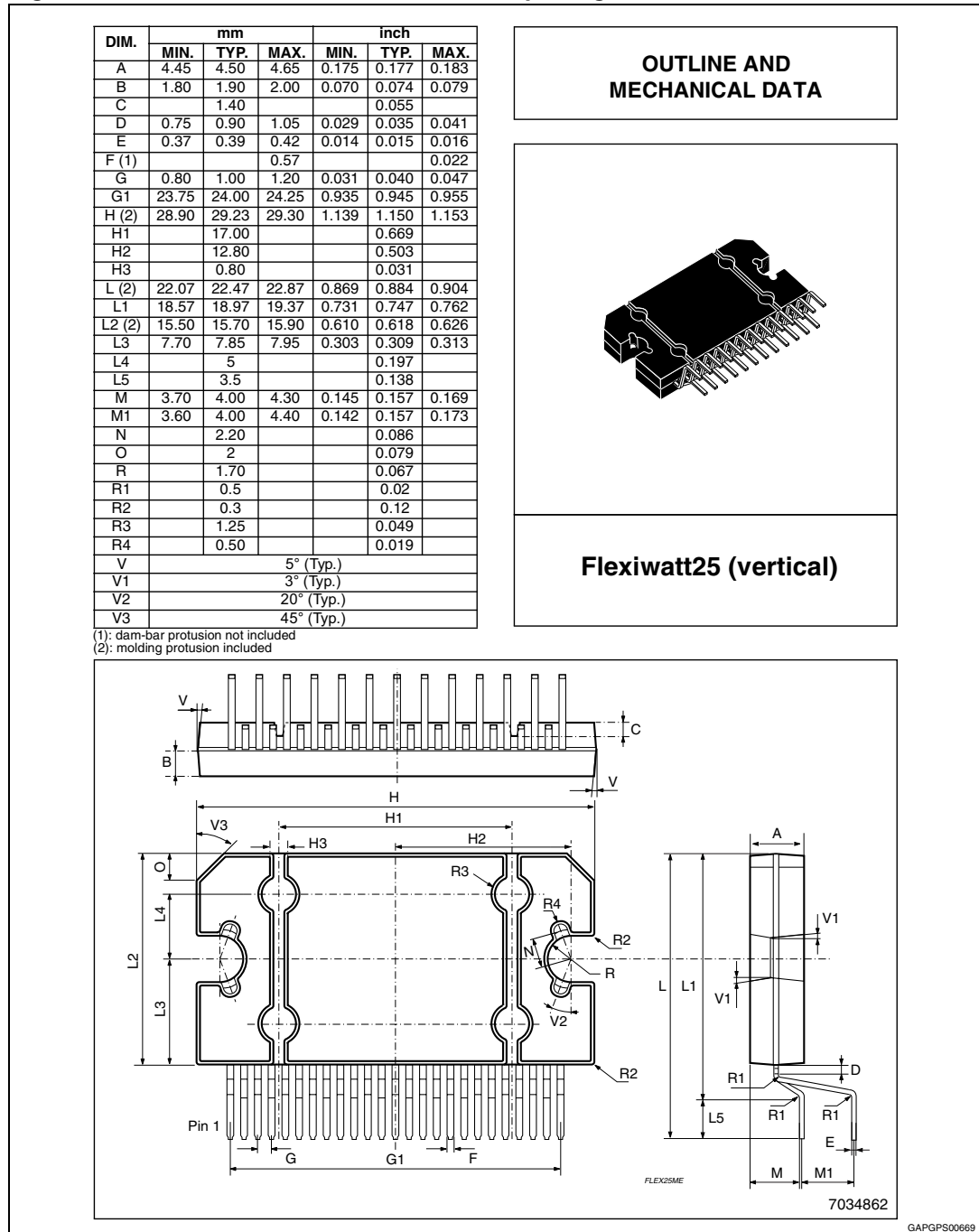
About the stand-by, the time constant to be assigned in order to obtain a virtually pop-free transition has to be slower than 2.5 V/ms.

# 4 Package information

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

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**Figure 3. Flexiwatt25 mechanical data and package dimensions**



## 5 Revision history

**Table 5. Document revision history**

Date	Revision	Changes
06-Dec-2007	1	Initial release.
12-Jul-2010	2	Document status promoted from preliminary data to datasheet.
26-Apr-2012	3	Modified <i>Features on page 1</i> . Updated <i>Table 4: Electrical characteristics on page 6</i> .
20_Jun-2012	4	Updated <i>Section 3.3: Standby and muting</i> .

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