

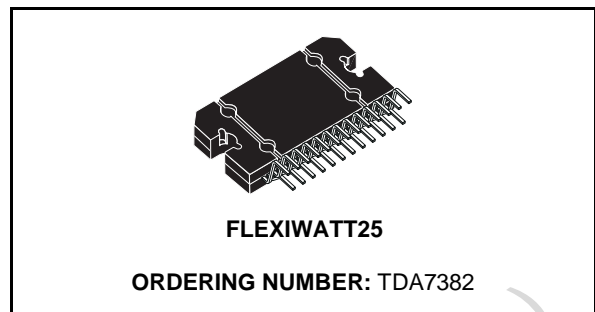


## 4 x 22W FOUR BRIDGE CHANNELS CAR RADIO AMPLIFIER

- HIGH OUTPUT POWER CAPABILITY:
  - 4 x 30W max./4Ω EIAJ
  - 4 x 22W/4Ω @ 14.4V, 1KHz, 10%
  - 4 x 18.5W/4Ω @ 13.2V, 1KHz, 10%
- CLIPPING DETECTOR (THD = 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

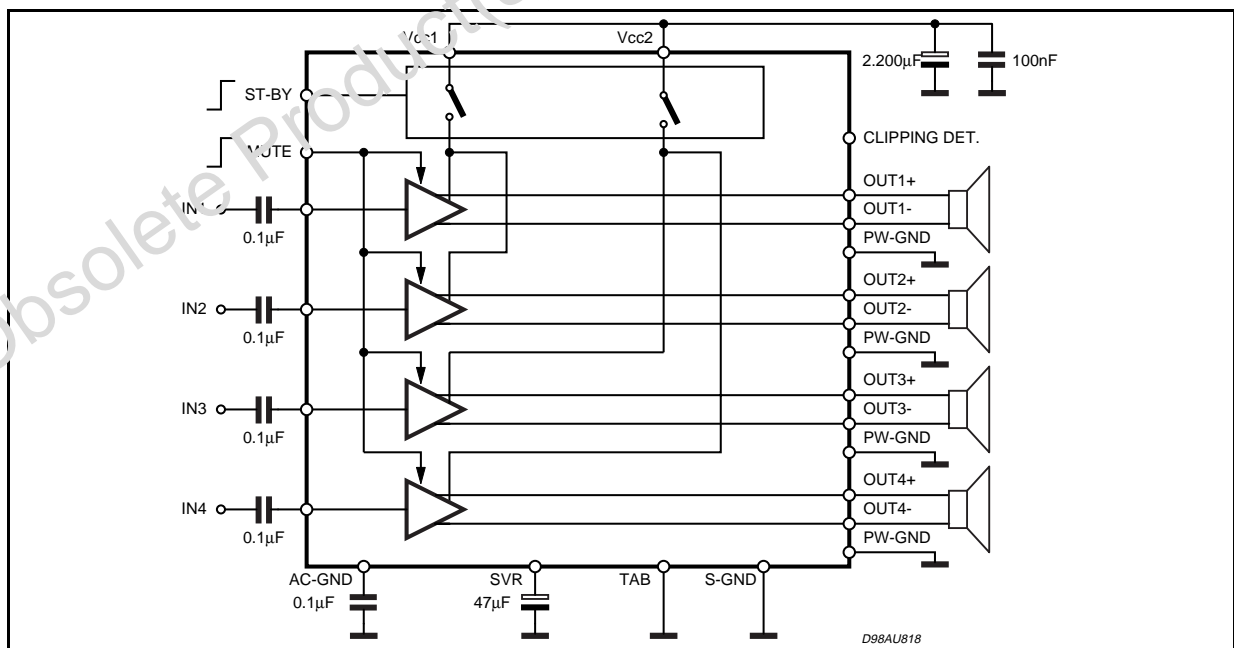


- REVERSED BATTERY
- ESD PROTECTION

### DESCRIPTION

The TDA7382 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 TDA7382 allows a rail to rail output voltage swing with no need of bootstrap capacitors. The extremely reduced components count allows very compact sets. The on-board clipping detector simplifies gain compression operations.

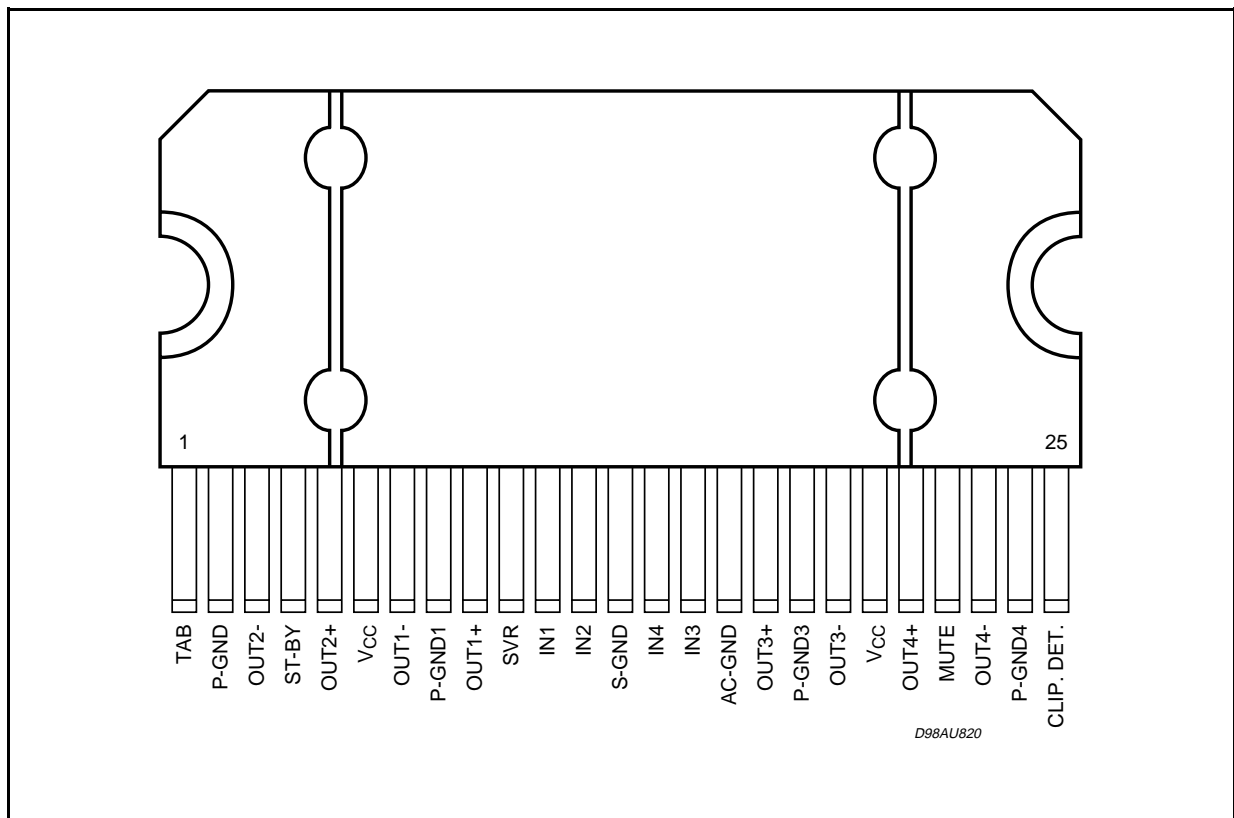
### BLOCK AND APPLICATION DIAGRAM



**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: Repetitive (Duty Cycle 10% at f = 10Hz) Non Repetitive (t = 100μs)	4.5	A
		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 circuit (fig.1), unless otherwise specified.)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$I_{q1}$	Quiescent Current		85	180	300	mA
$V_{OS}$	Output Offset Voltage				100	mV
$G_v$	Voltage Gain		25	26	27	dB
$P_o$	Output Power	THD = 10%	20	22		W
		THD = 1%	16.5	18		W
		THD = 10%; $V_S = 13.5V$	17	20		W
		THD = 10%; $V_S = 14V$	19	21		W
		THD = 5%; $V_S = 14V$	17	19		W
		THD = 1%; $V_S = 14V$	16	17		W
$P_o$ max	Max. Output Power	THD = 10%; $V_S = 13.2V$	17	18.5		W
		THD = 1%; $V_S = 13.2V$	14	15		W
$P_{o\ max}$	Max. Output Power	EIAJ RULES	27.5	30		W
THD	Distortion	$P_o = 4W$		0.04	0.3	%
$e_{No}$	Output Noise	"A" Weighted Bw = 20Hz to 20KHz		50 65	120 150	$\mu V$ $\mu V$
SVR	Supply Voltage Rejection	$f = 100Hz$	50	65		dB
$f_{cl}$	Low Cut-Off Frequency			20		Hz
$f_{ch}$	High Cut-Off Frequency		75			KHz
$R_i$	Input Impedance		60	100	130	$K\Omega$
$C_T$	Cross Talk	$f = 1KHz$	50	70		dB
$I_{SB}$	St-By Current Consumption	St-By = LOW		20	50	$\mu A$
$V_{SB\ out}$	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	$V_O = 1V_{rms}$	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
$I_m(L)$	Muting Pin Current	$V_{MUTE} = 1.5V$ (Source Current)	5	13	16	$\mu A$
CDL	Clipping Detection THD Level		5	10	15	%

Figure 1: Standard Test and Application Circuit

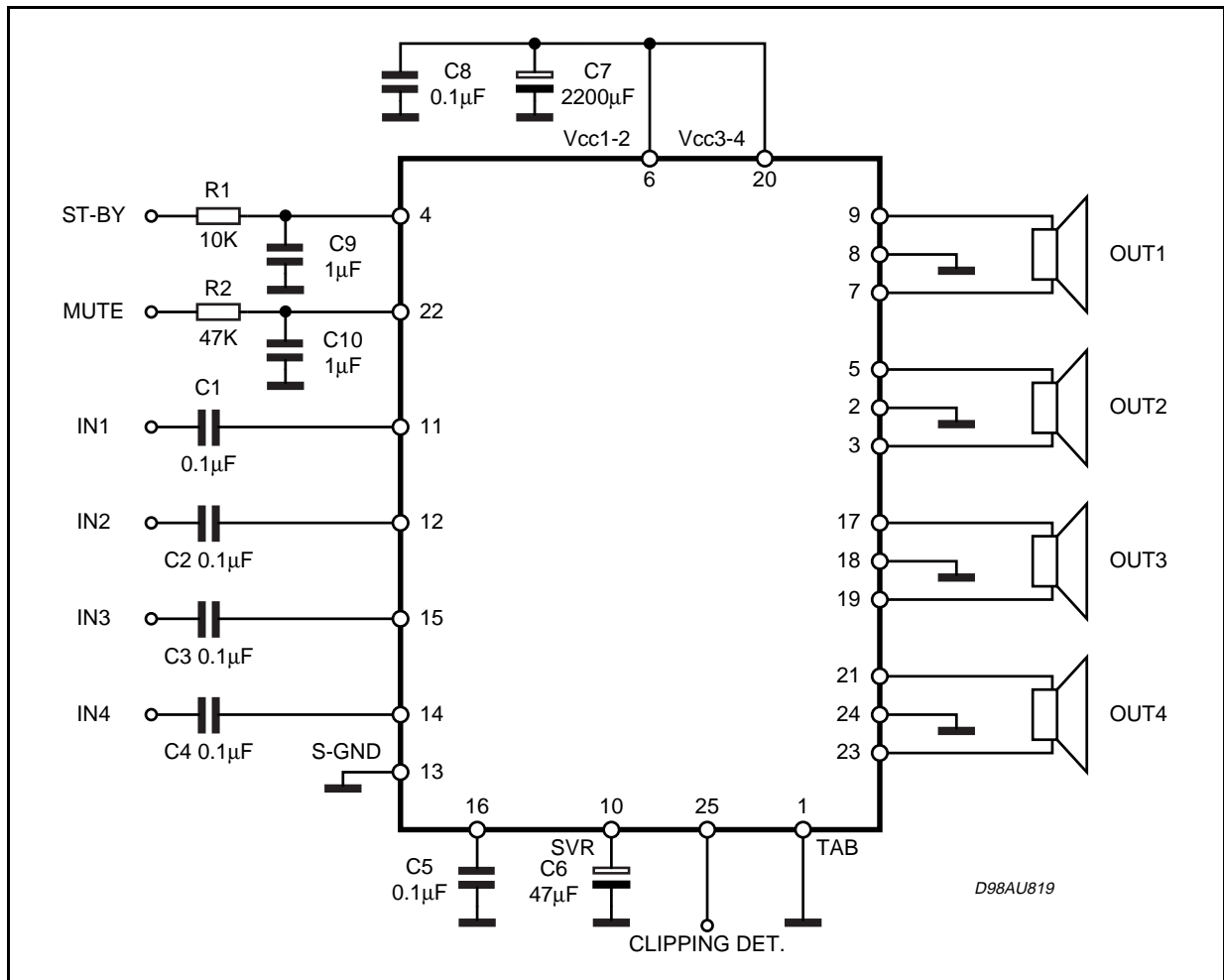
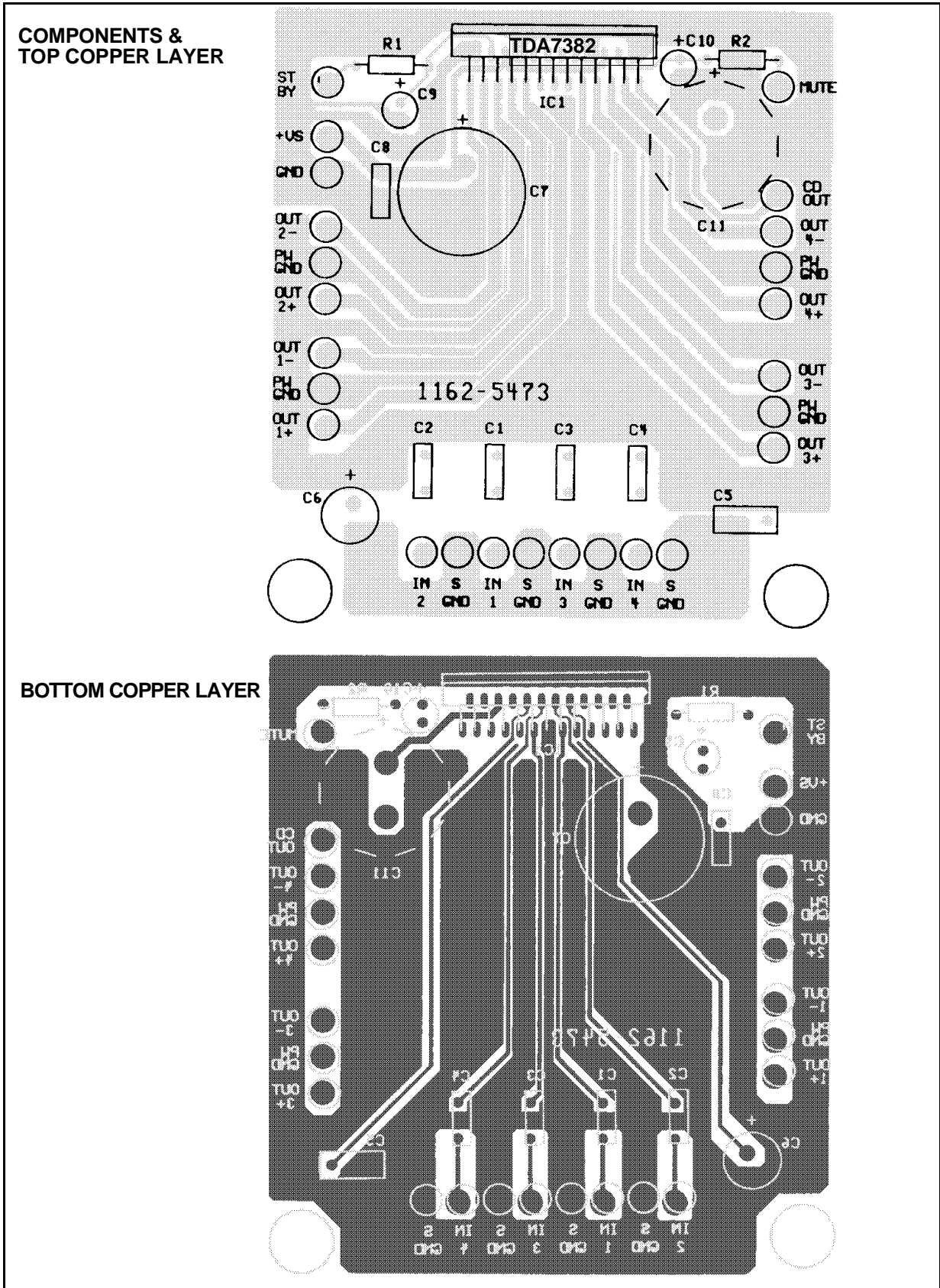
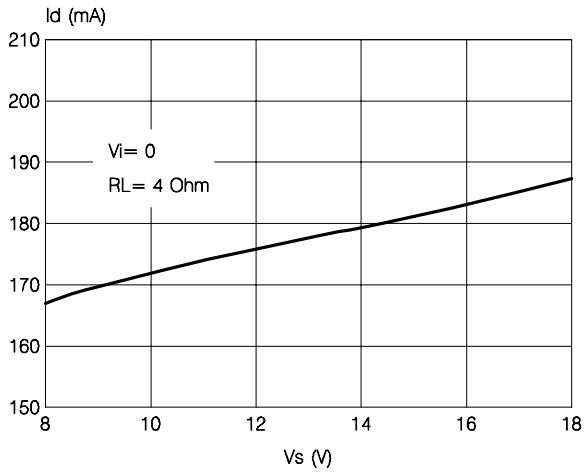


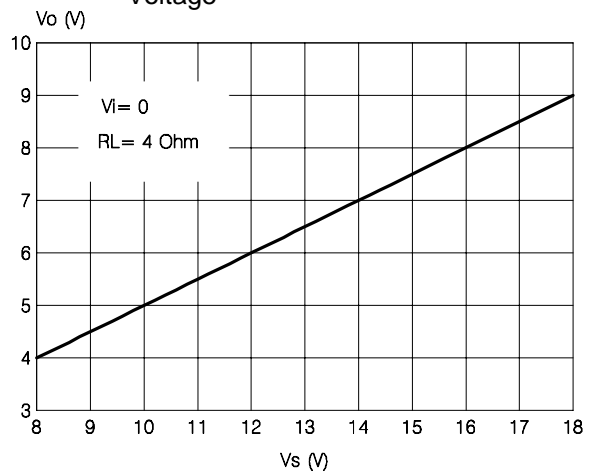
Figure 2: P.C.B. and component layout of the figure 1 (1:1 scale)



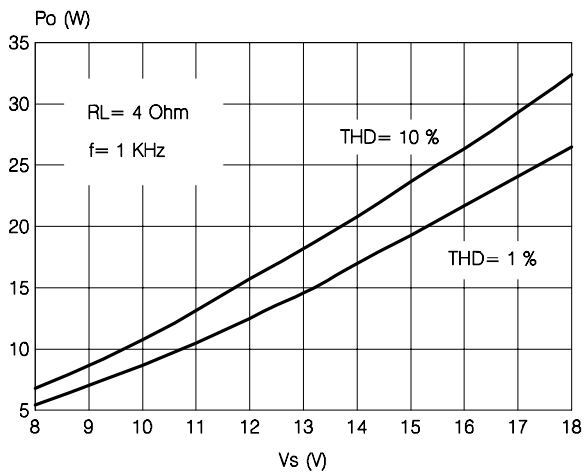
**Figure 3: Quiescent Current vs. Supply Voltage**



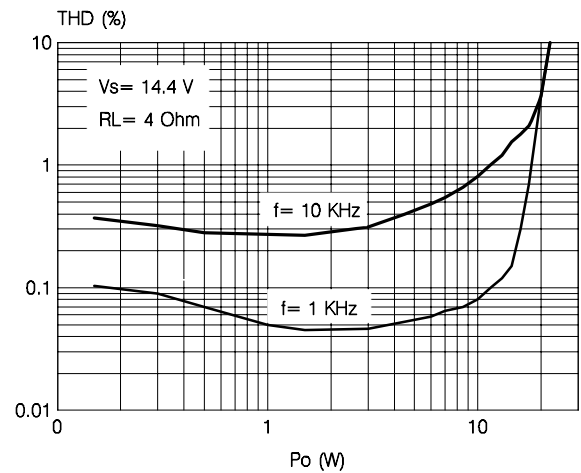
**Figure 4: Quiescent Output Voltage vs. Supply Voltage**



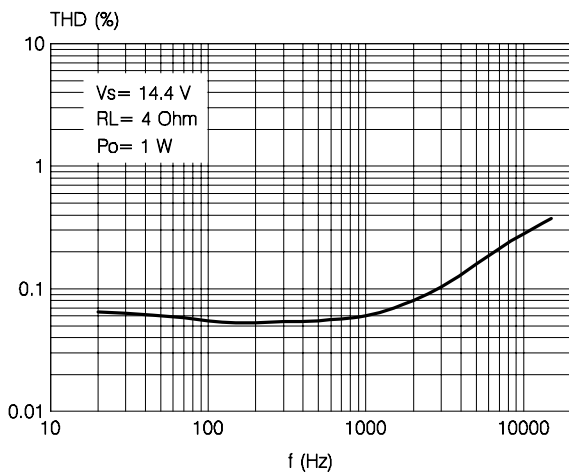
**Figure 5: Output Power vs. Supply Voltage**



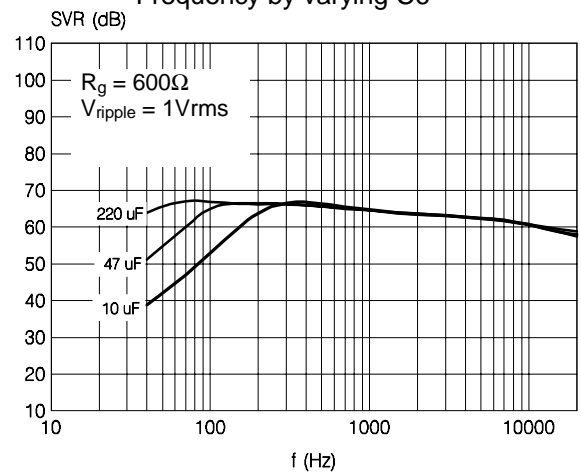
**Figure 6: Distortion vs. Output Power**



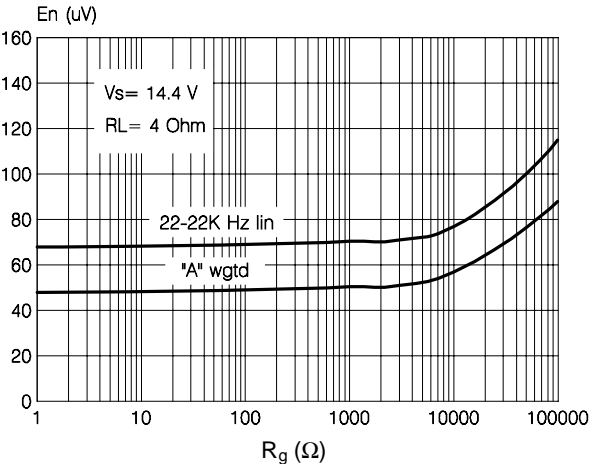
**Figure 7: Distortion vs. Frequency.**



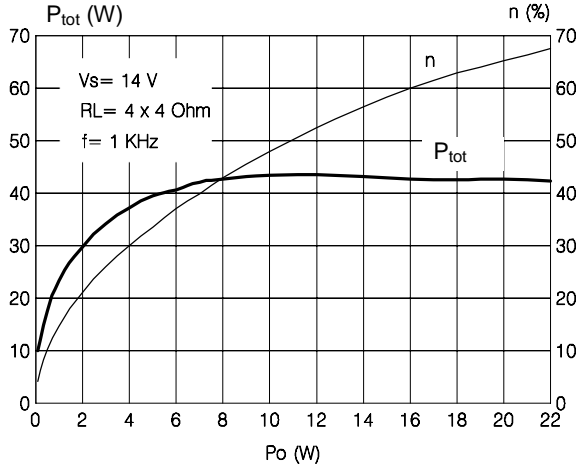
**Figure 8: Supply Voltage Rejection vs. Frequency by varying C6**



**Figure 9:** Output Noise vs. Source Resistance



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



**INPUT STAGE**

The TDA7382'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 ( $0.1\mu F$ ) is adopted, the low frequency cut-off will amount to 16 Hz.

**STAND-BY AND MUTING**

STAND-BY and MUTING facilities are both 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

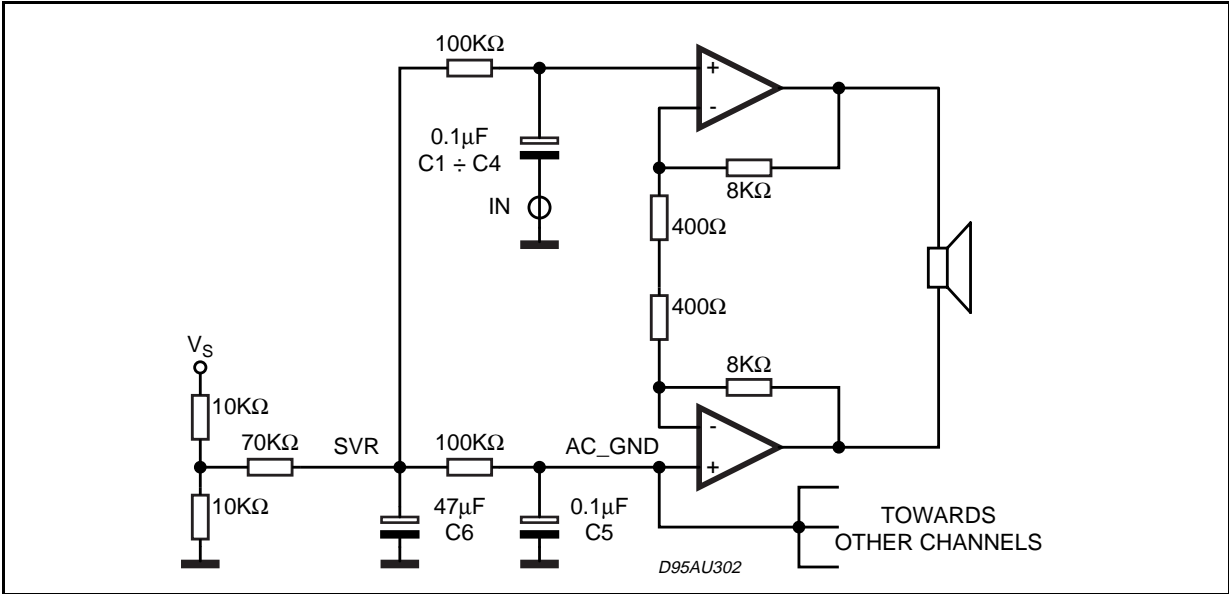
absence of true CMOS ports or microprocessors. R-C cells have always to be used in order to smooth down the transitions for preventing any audible transient noises.

Since a DC current of about 10 uA normally flows out of pin 22, the maximum allowable muting-series resistance ( $R_2$ ) is  $70K\Omega$ , 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 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 as-

**Figure 11:** Input/Output Biasing.



signed in order to obtain a virtually pop-free transition has to be slower than 2.5V/ms.

**CLIPPING DETECTOR**

The **CLIPPING DETECTOR** acts in a way to output a signal as soon as one or more outputs reach or trespass a typical THD level of 10%.

As a result, the clipping-related signal at pin 25 takes the form of pulses, which are synchronized with each single clipping event in the music program. Applications making use of this facility usually operate a filtering/integration of the pulses train through passive R-C networks and realize a volume (or tone bass) stepping down in association with microprocessor-driven audioprocessors.

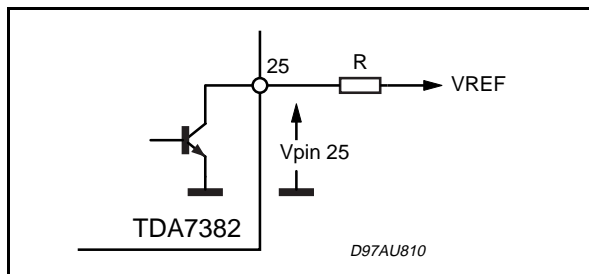
The maximum load that pin 25 can sustain is

1KΩ.

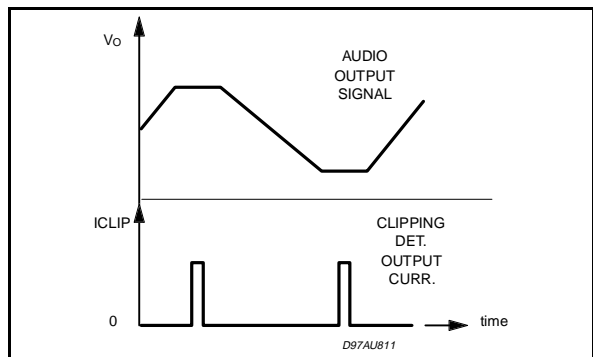
Due to its operating principles, the clipping detector has to be viewed mainly as a power-dependent feature rather than frequency-dependent. This means that clipping state causing THD = 10% typ. will be immediately signaled out whenever a fixed power level is reached, regardless of the audio frequency.

In other words, this feature offers the means to counteract the extremely sound-damaging effects of heavy clipping, caused by a sudden increase of odd order harmonics and appearance of serious intermodulation phenomena.

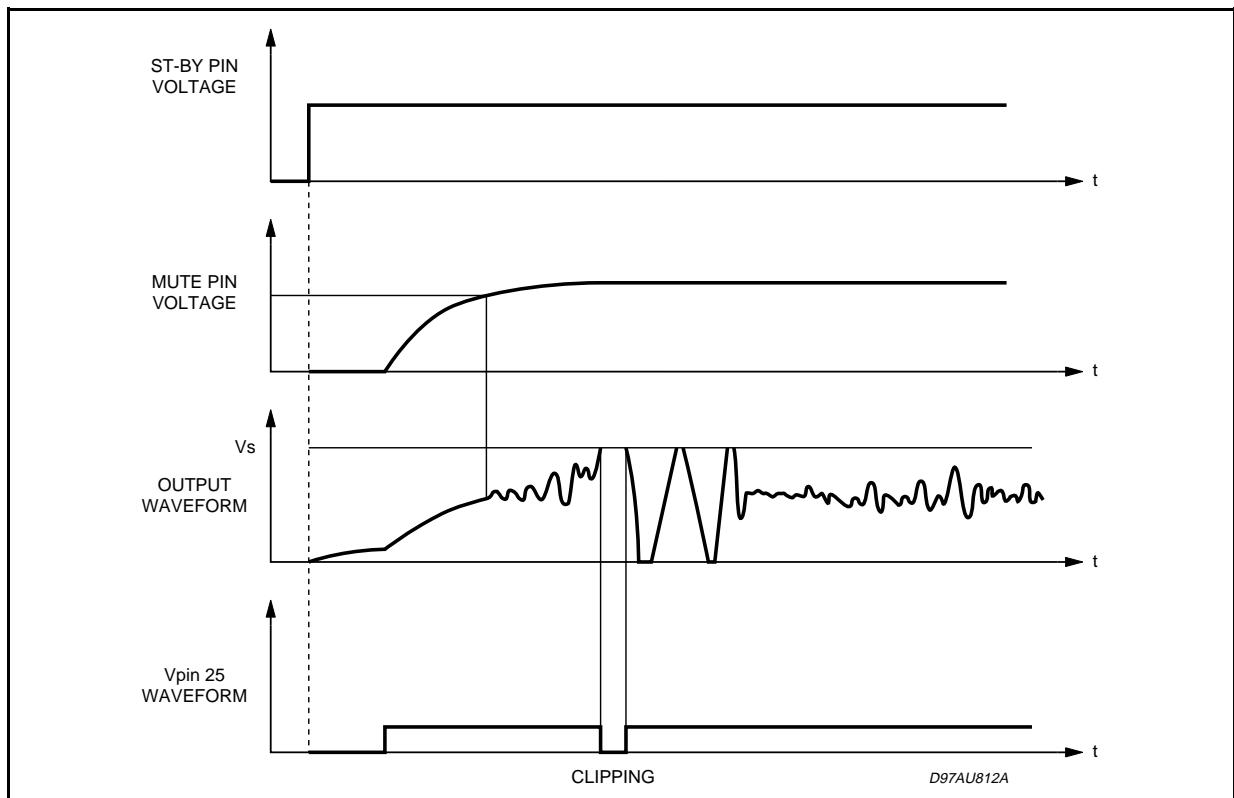
**Figure 12:** Diagnostics circuit.



**Figure 13:** Clipping Detection Waveforms.



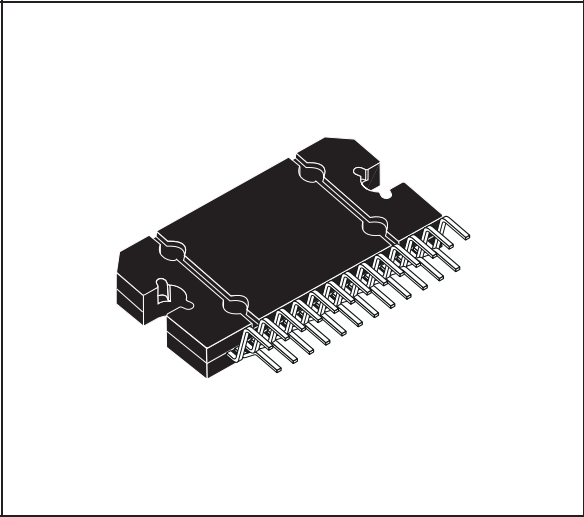
**Figure 14:** Diagnostics Waveforms.





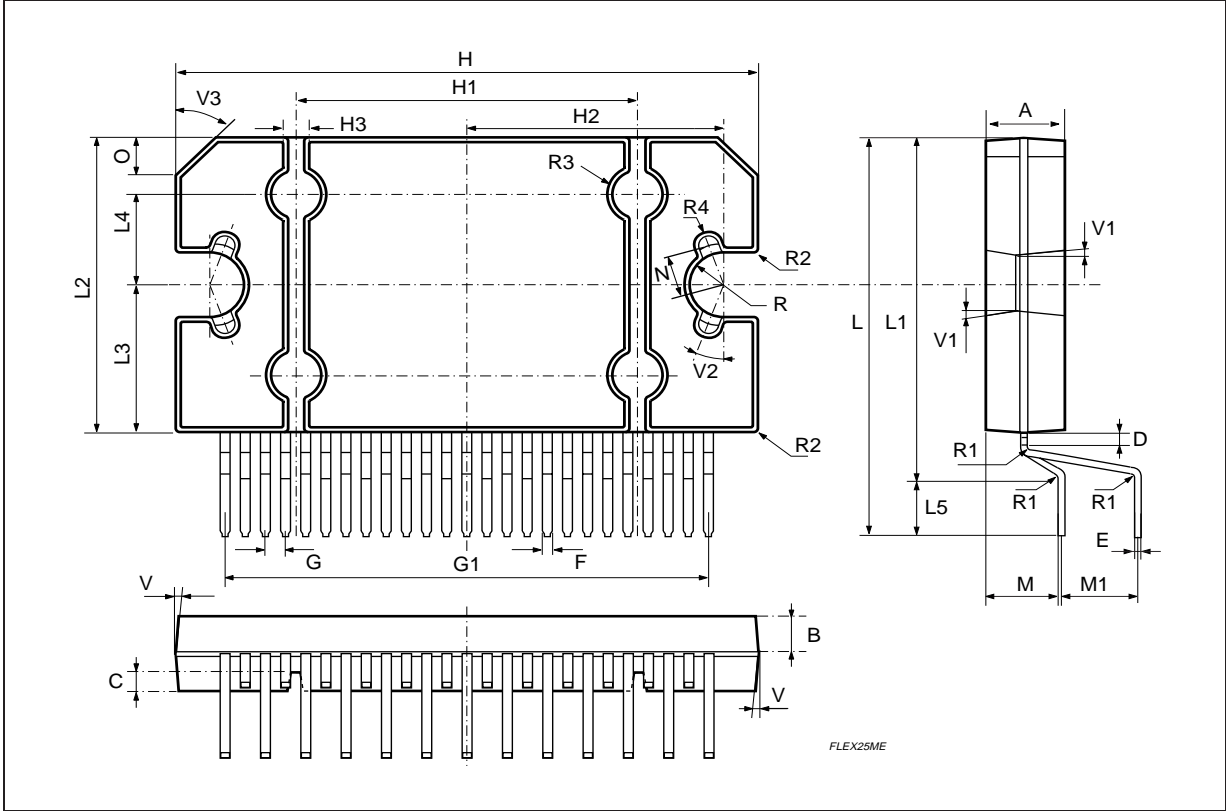
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.45	4.50	4.65	0.175	0.177	0.183
B	1.80	1.90	2.00	0.070	0.074	0.079
C		1.40			0.055	
D	0.75	0.90	1.05	0.029	0.035	0.041
E	0.37	0.39	0.42	0.014	0.015	0.016
F (1)			0.57			0.022
G	0.80	1.00	1.20	0.031	0.040	0.047
G1	23.75	24.00	24.25	0.935	0.945	0.955
H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

**OUTLINE AND MECHANICAL DATA**



**Flexiwatt25**

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



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specification mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics

© 2001 STMicroelectronics – Printed in Italy – All Rights Reserved

STMicroelectronics GROUP OF COMPANIES

Australia - Brazil - Canada - China - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco -  
Singapore - Spain - Sweden - Switzerland - United Kingdom - United States.

<http://www.st.com>