

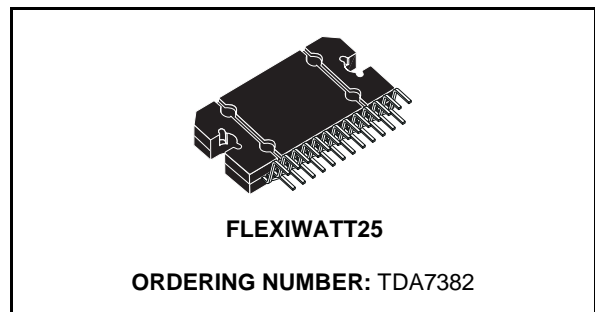


## 4 x 22W FOUR BRIDGE CHANNELS CAR RADIO AMPLIFIER

- 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

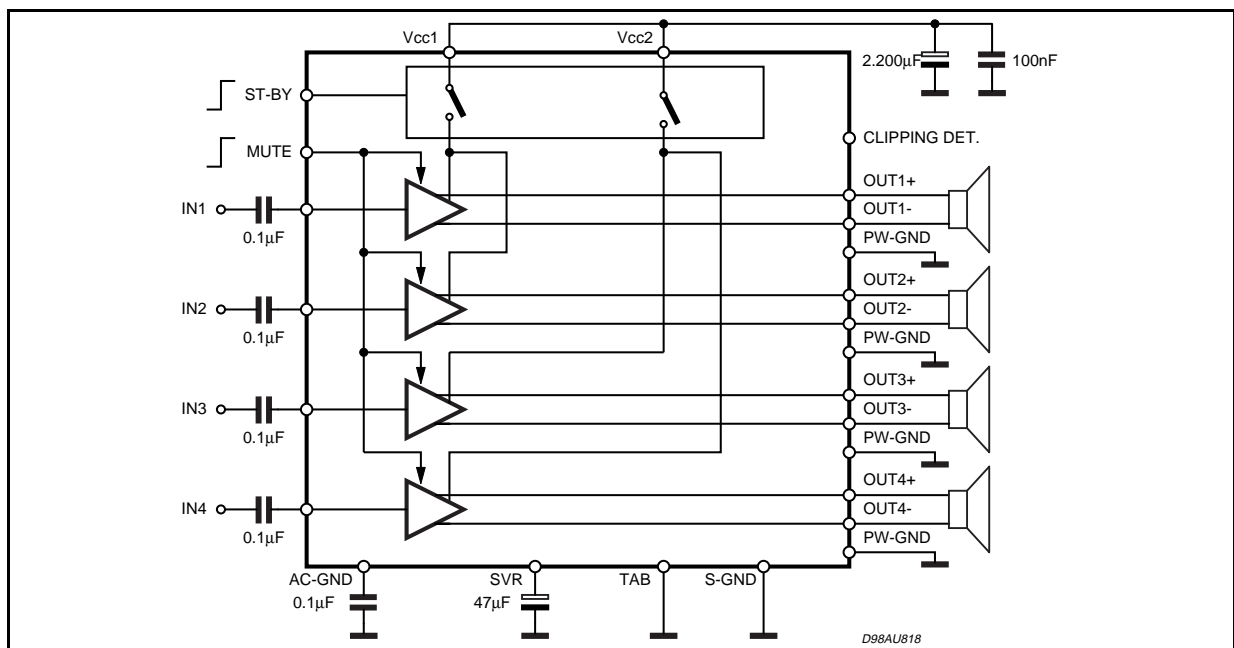


- REVERSED BATTERY
- ESD PROTECTION

### 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.

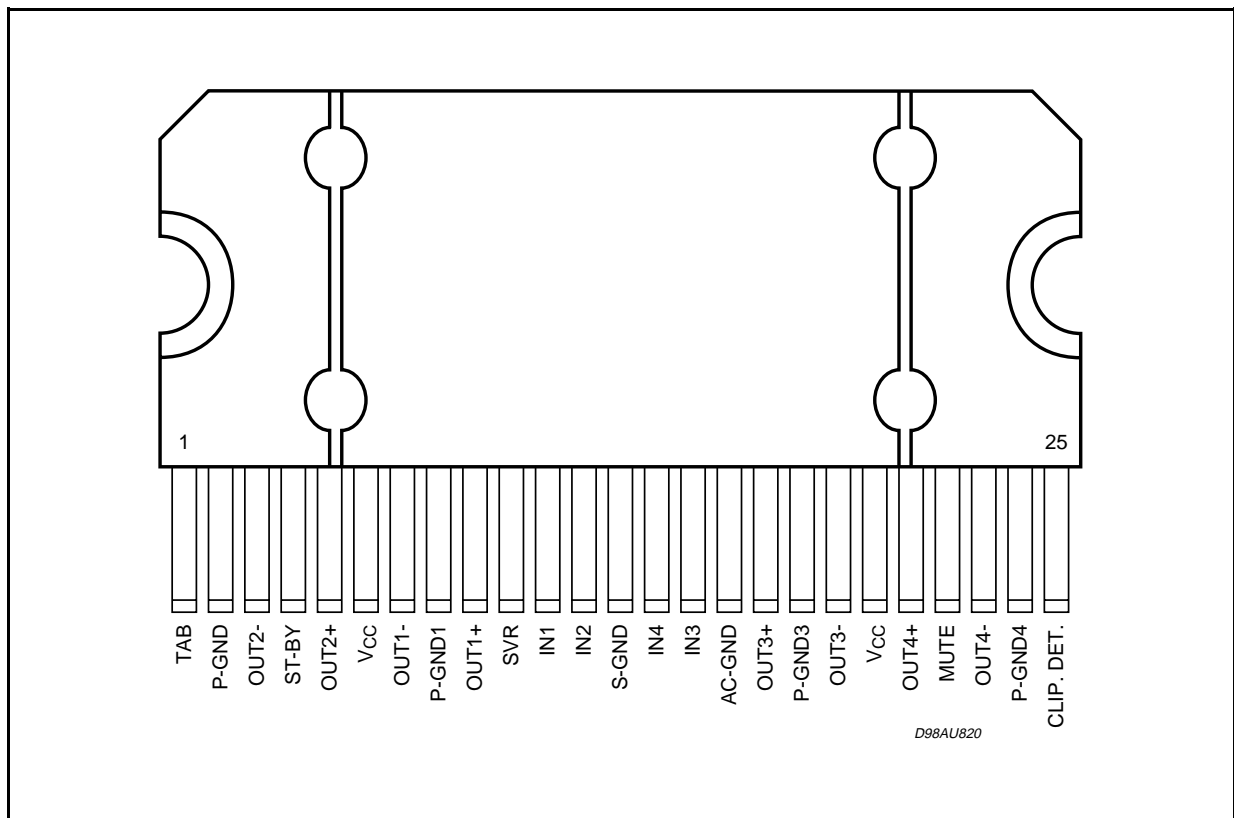
### BLOCK AND APPLICATION DIAGRAM



**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

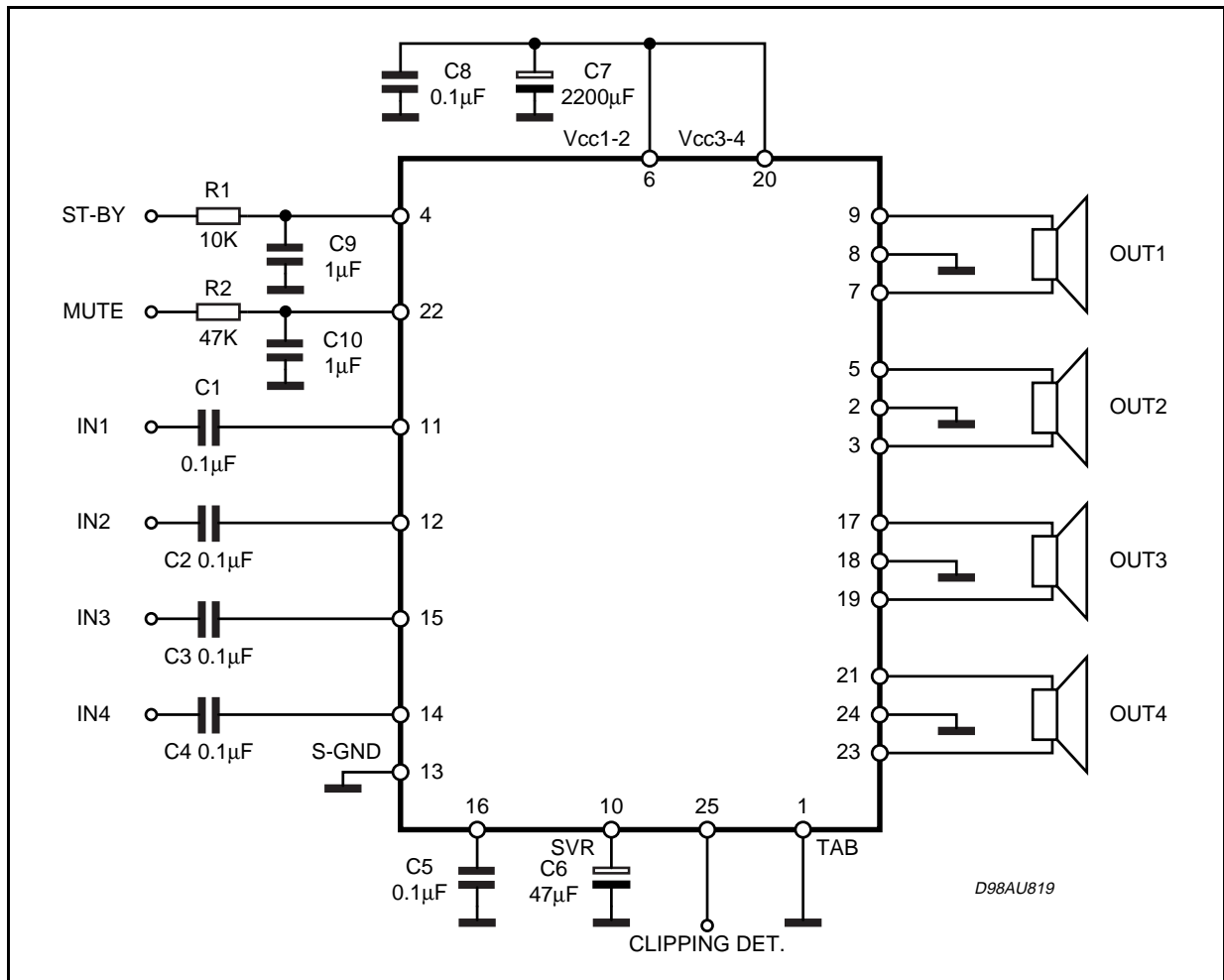
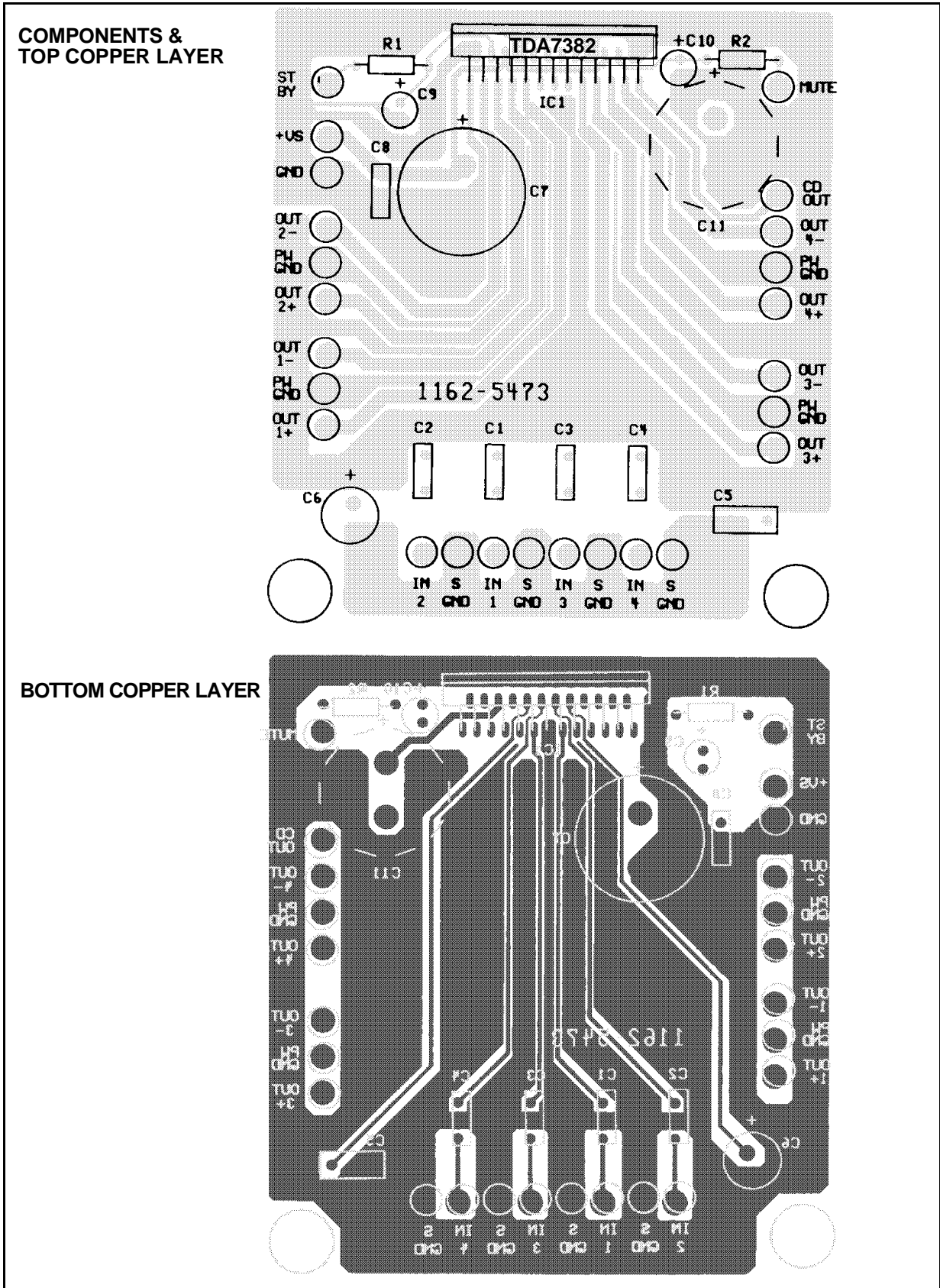
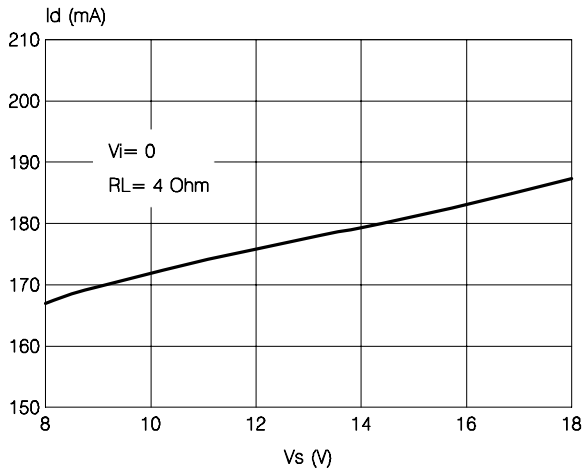


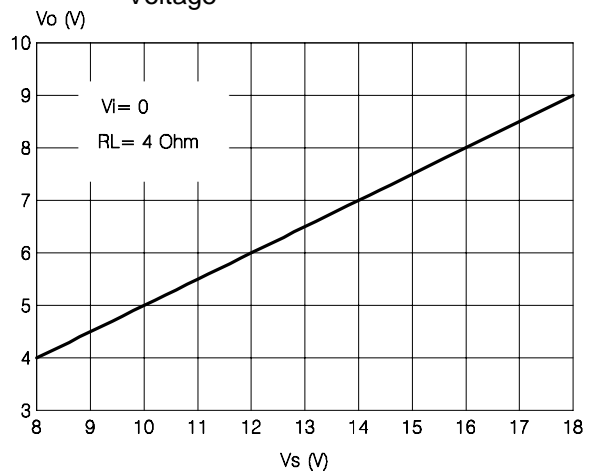
Figure 2: P.C.B. and component layout of the figure 1 (1:1 scale)



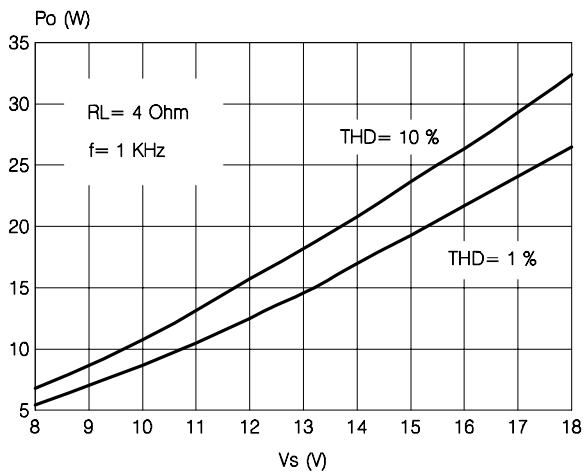
**Figure 3: Quiescent Current vs. Supply Voltage**



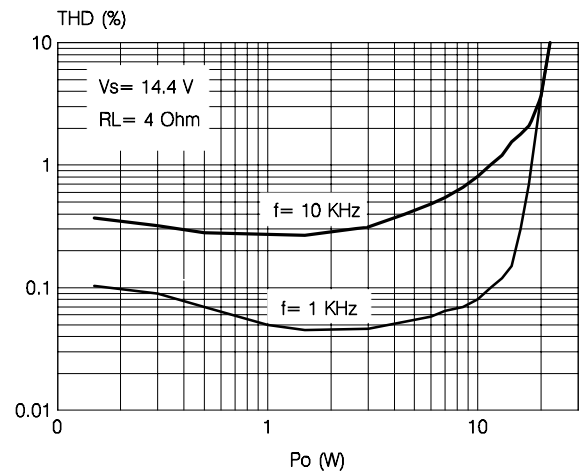
**Figure 4: Quiescent Output Voltage vs. Supply Voltage**



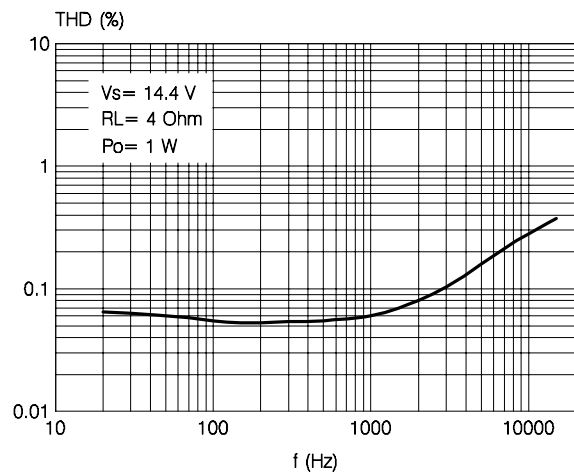
**Figure 5: Output Power vs. Supply Voltage**



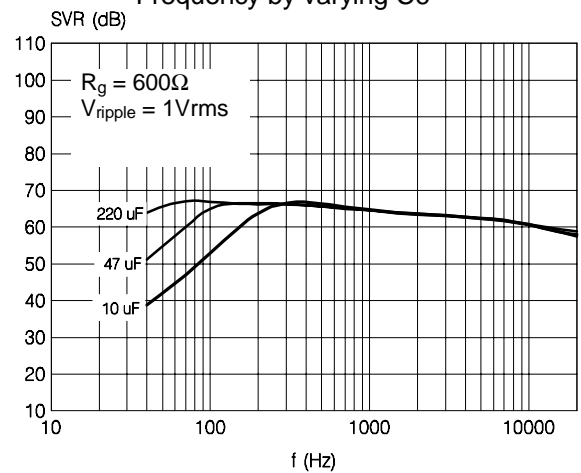
**Figure 6: Distortion vs. Output Power**



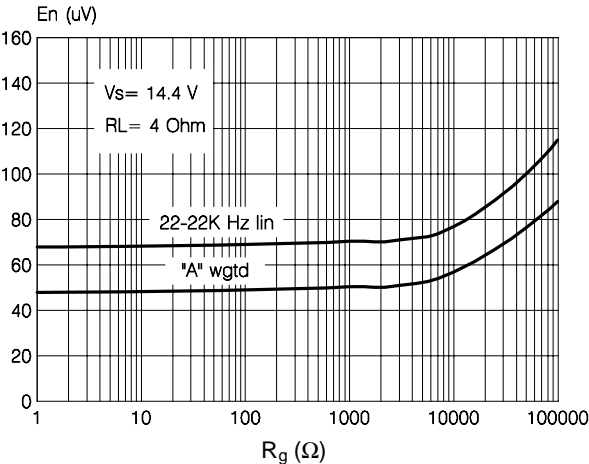
**Figure 7: Distortion vs. Frequency.**



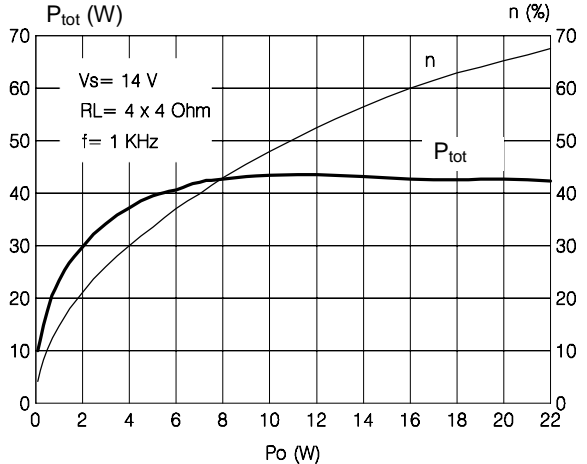
**Figure 8: Supply Voltage Rejection vs. Frequency by varying C6**



**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**

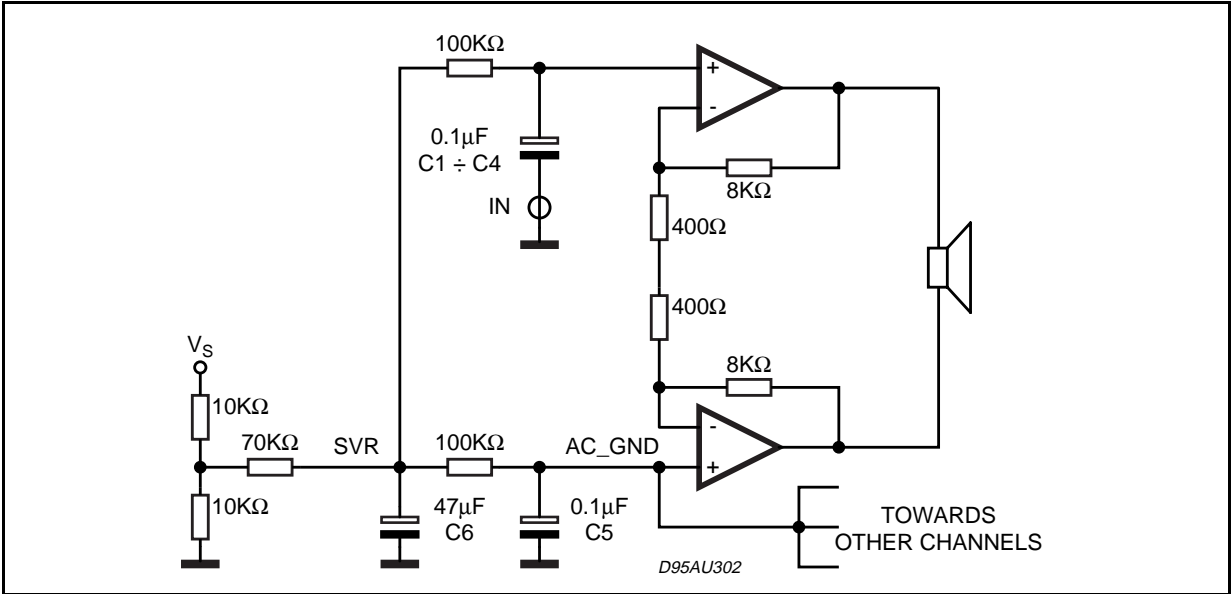
STAND-BY and MUTING facilities are both CMOS-COMPATIBLE. If unused, a straight connection to  $V_s$  of their respective pins would be admissible. Conventional low-power transistors can be employed to drive muting and stand-by pins in

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.

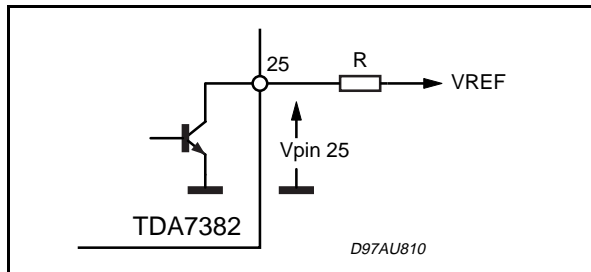
The maximum load that pin 25 can sustain is

1KΩ.

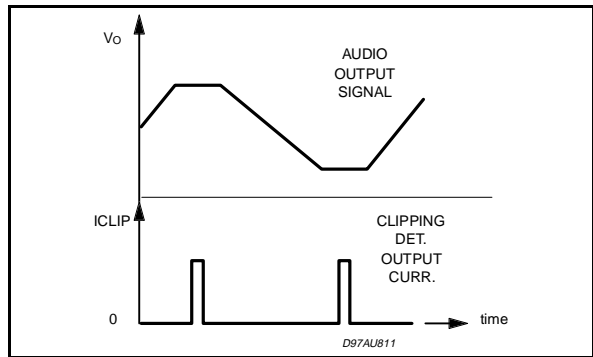
Due to its operating principles, the clipping detector has to be viewed mainly as a power-dependent feature rather than frequency-dependent. This means that clipping state causing THD = 10% typ. will be immediately signaled out whenever a fixed power level is reached, regardless of the audio frequency.

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.

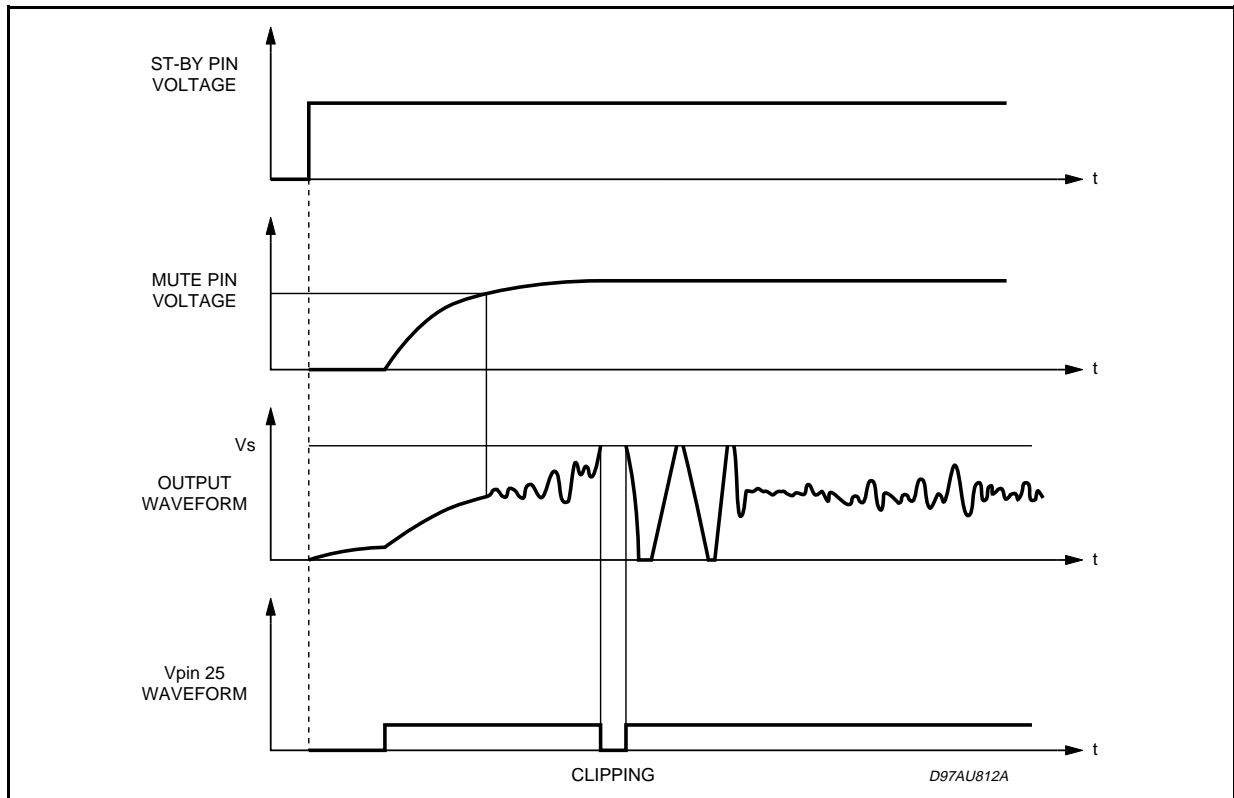
**Figure 12:** Diagnostics circuit.



**Figure 13:** Clipping Detection Waveforms.



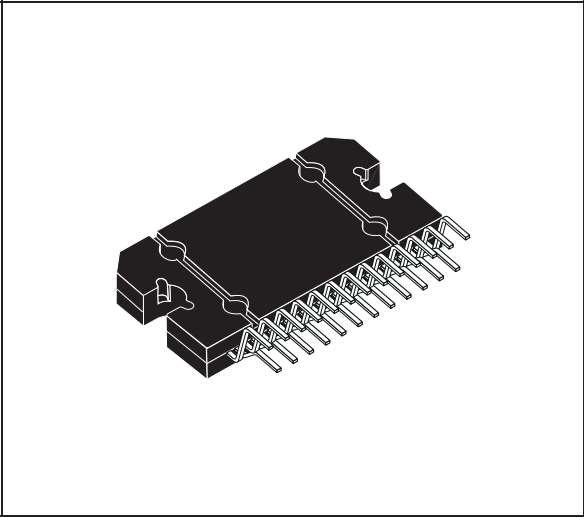
**Figure 14:** Diagnostics Waveforms.





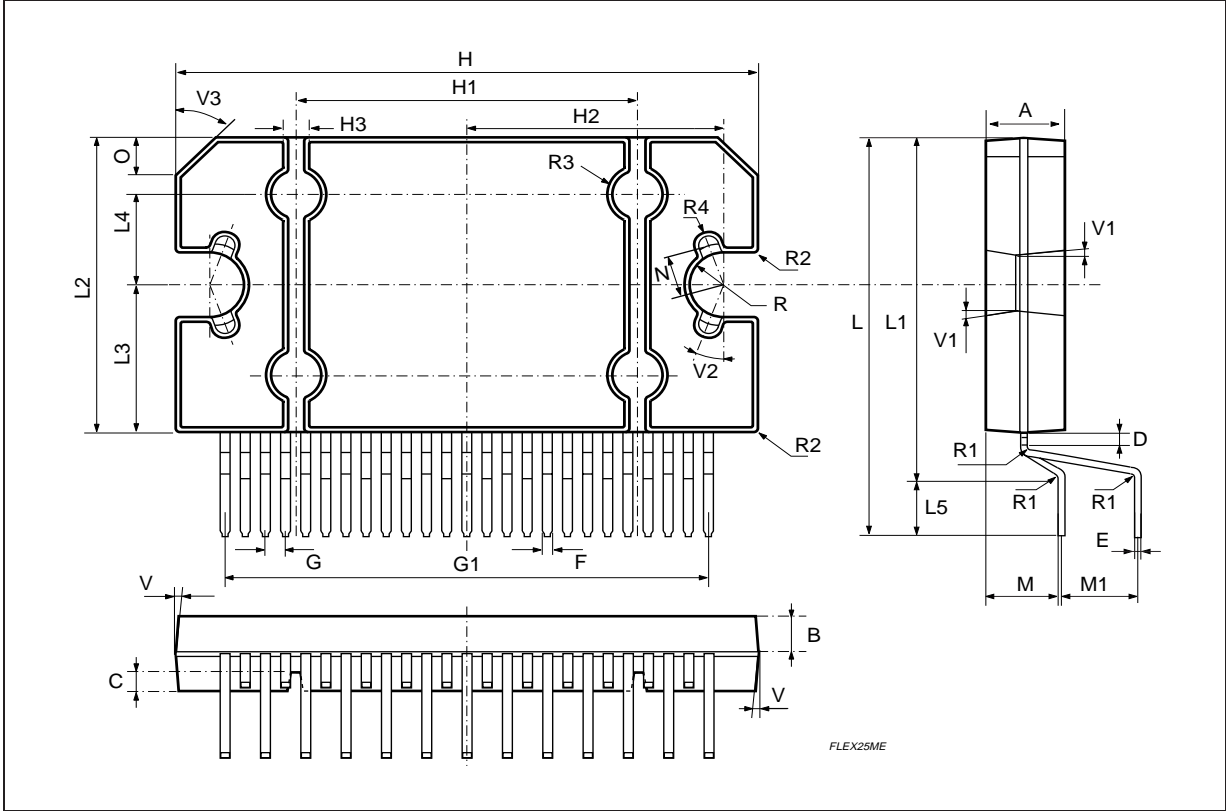
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.45	4.50	4.65	0.175	0.177	0.183
B	1.80	1.90	2.00	0.070	0.074	0.079
C		1.40			0.055	
D	0.75	0.90	1.05	0.029	0.035	0.041
E	0.37	0.39	0.42	0.014	0.015	0.016
F (1)			0.57			0.022
G	0.80	1.00	1.20	0.031	0.040	0.047
G1	23.75	24.00	24.25	0.935	0.945	0.955
H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



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