SGS-THOMSON MICROELECTRONICS

TDA7384A

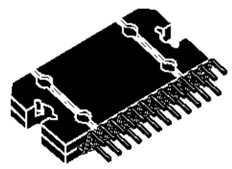
4 x 25W FOUR BRIDGE CHANNELS CAR RADIO AMPLIFIER

ADVANCE DATA

- HIGH OUTPUT POWER CAPABILITY:
  4 x 35W max./4Ω EIAJ
  4 x 25W/4Ω @ 14.4V, 1KHz, 10%
  4 x 21W/4Ω @ 13.2V, 1KHz, 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



FLEXIWATT25

ORDERING NUMBER: TDA7384A

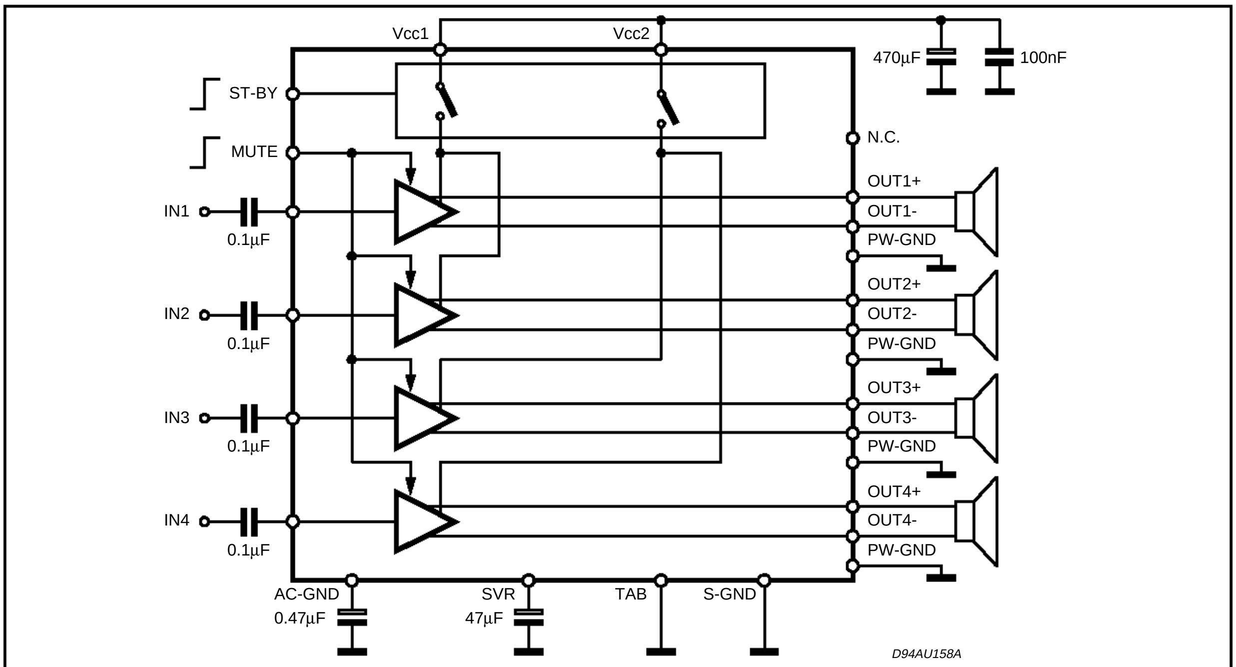
- REVERSED BATTERY
- ESD

DESCRIPTION

The TDA7384A 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 TDA7384A allows a rail to rail output voltage swing with no need of bootstrap capacitors. The extremely reduced components count allows very compact sets.

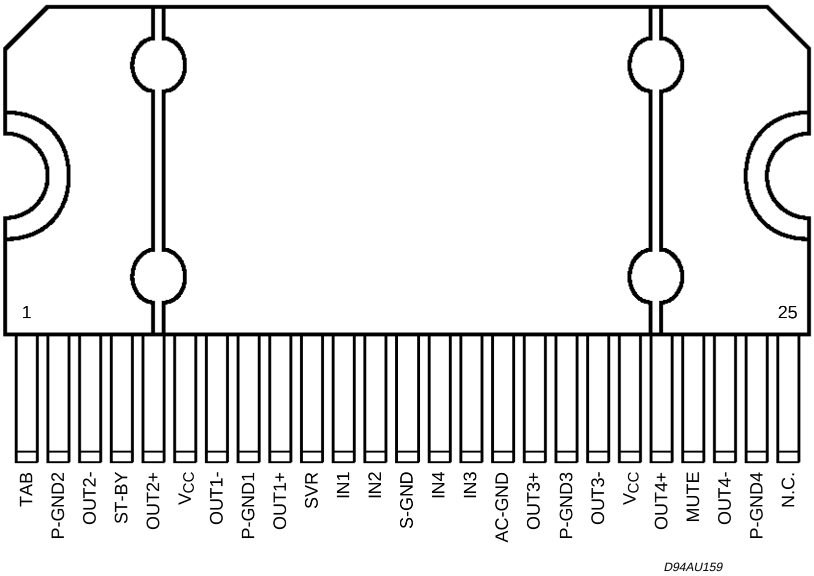
BLOCK AND APPLICATION DIAGRAM



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 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

PIN CONNECTION (Top view)



THERMAL DATA

Symbol	Parameter	Value	Unit
$R_{th\ j\text{-}case}$	Thermal Resistance Junction to Case Max.	1	°C/W

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

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
I_{q1}	Quiescent Current	$R_L = \infty$	120	190	270	mA
V_{OS}	Output Offset Voltage	Play Mode			±80	mV
dV_{OS}	During mute ON/OFF output offset voltage				±80	mV
G_v	Voltage Gain		25	26	27	dB
dG_v	Channel Gain Unbalance				±1	dB
P_o	Output Power	V_S = 13.2V; THD = 10% V_S = 13.2V; THD = 0.8% V_S = 14,4V; THD = 10%	19 14	21 17 26		W W W
$P_{O\ max}$	Max. Output Power	EIAJ RULES V_S = 13.7V V_i = 5Vrms	32	35	-	W
THD	Distortion	P_o = 4W		0.04	0.15	%
e_{No}	Output Noise	"A Weighted" Bw = 20Hz to 20KHz		50 70	70 100	µV µV
SVR	Supply Voltage Rejection	f = 100Hz; V_r = 1Vrms	50	65		dB
f_{ch}	High Cut-Off Frequency	P_O = 0.5W	100	200		KHz
R_i	Input Impedance		70	100		KΩ
C_T	Cross Talk	f = 1KHz P_O = 4W f = 10KHz P_O = 4W	60	70 60	– –	dB dB
I_{SB}	St-By Current Consumption	$V_{St\text{-}By}$ = 1.5V			100	µA
I_{pin4}	St-by pin Current	VSt-By = 1.5V to 3.5V			±10	µA
$V_{SB\ out}$	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	P_{Oref} = 4W	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 ≥ 80dB; P_{Oref} = 4W (Amp: Play) Att < 0.1dB; P_O = 0.5W		 7.6	 6.5 8.5	 V V
I_{pin22}	Muting Pin Current	V_{MUTE} = 1.5V to 3.5W (Sourced Current)	5	11	20	µA

Figure 1: Standard Test and Application Circuit

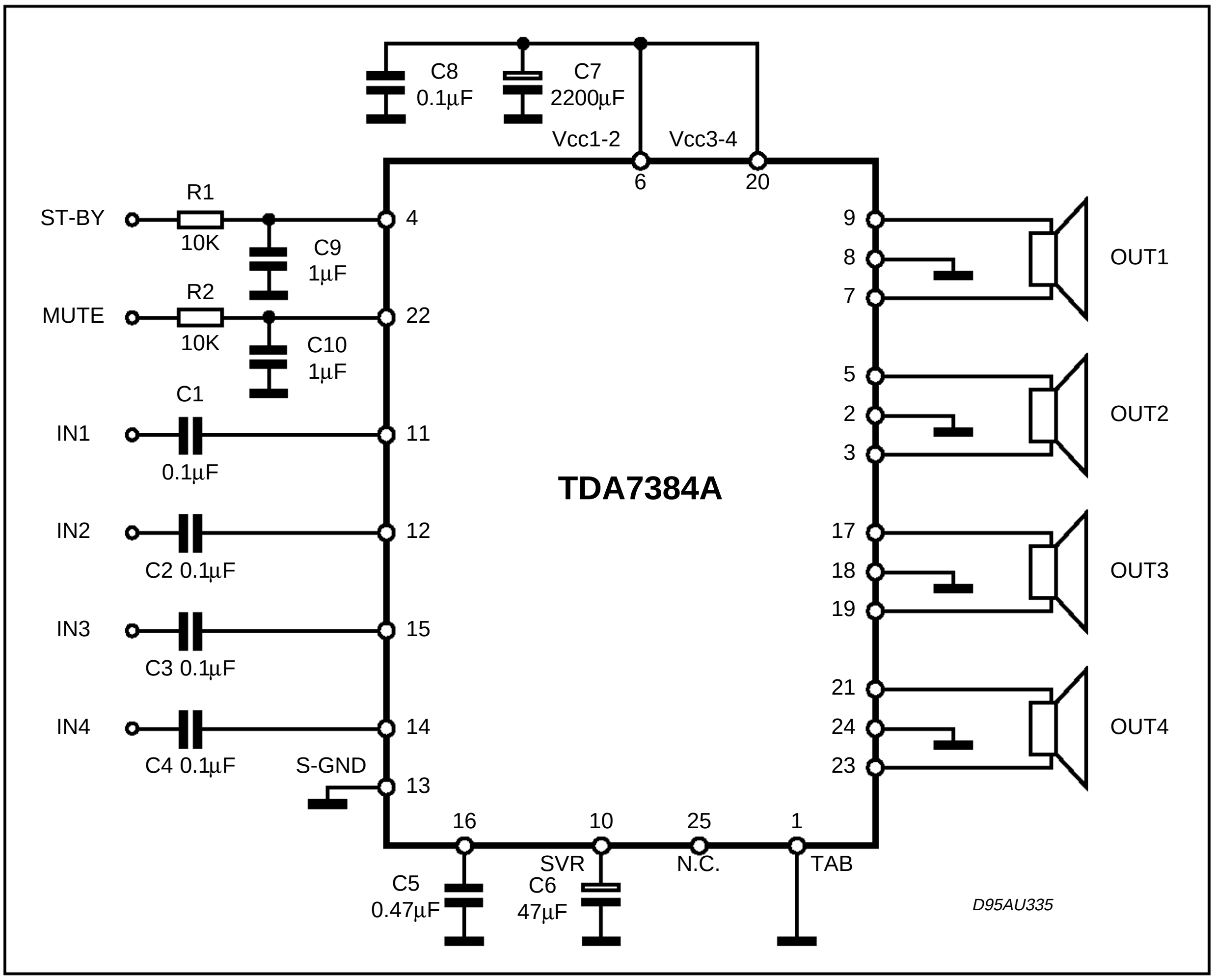
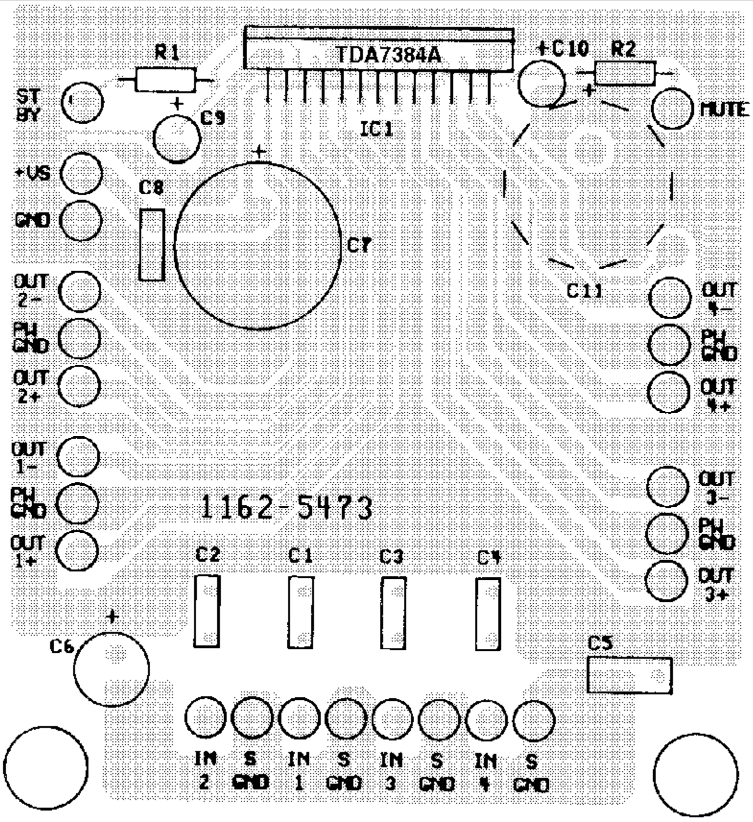


Figure 2: P.C.B. and component layout of the figure 1 (1:1 scale)

COMPONENTS & TOP COPPER LAYER



BOTTOM COPPER LAYER

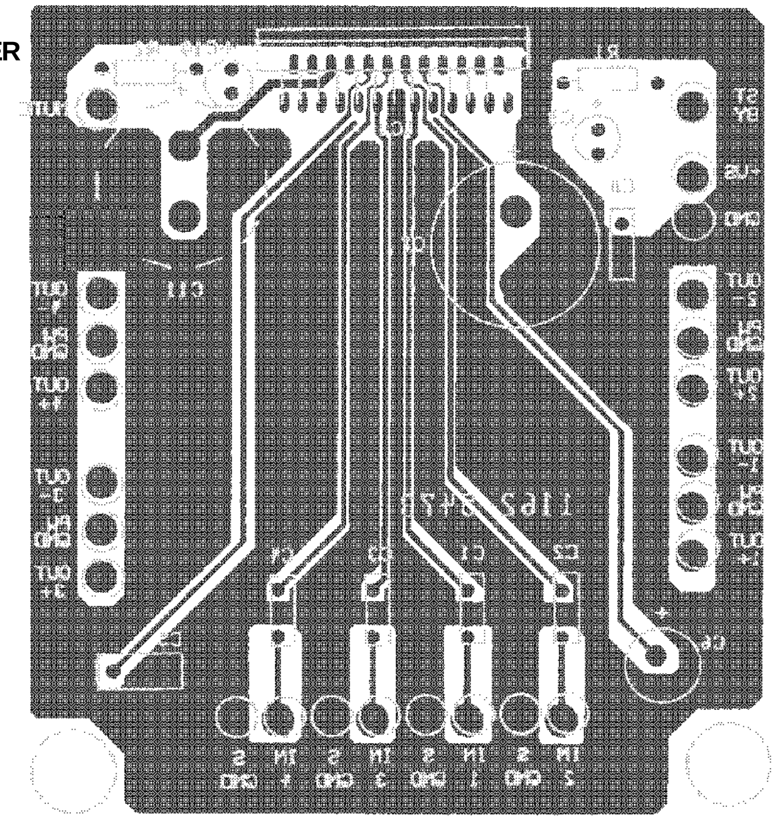


Figure 3: Quiescent Current vs. Supply Voltage

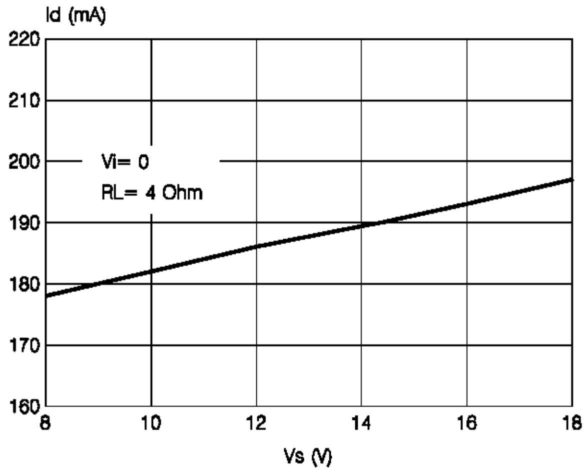


Figure 4: Quiescent Output Voltage vs. Supply Voltage

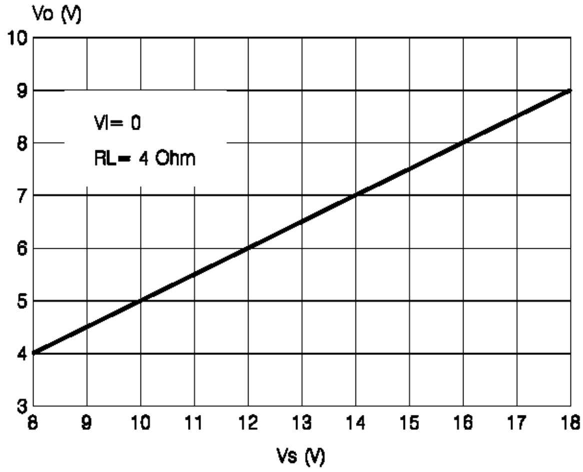


Figure 5: Output Power vs. Supply Voltage

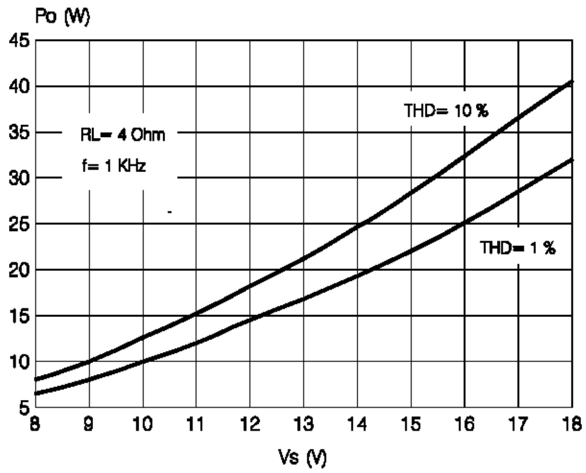


Figure 6: Distortion vs. Output Power

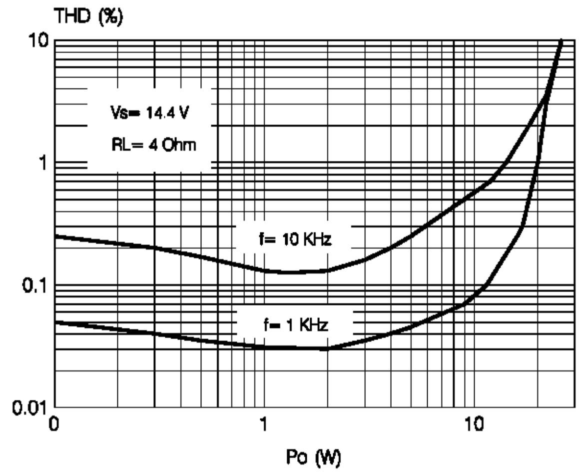


Figure 7: Distortion vs. Frequency

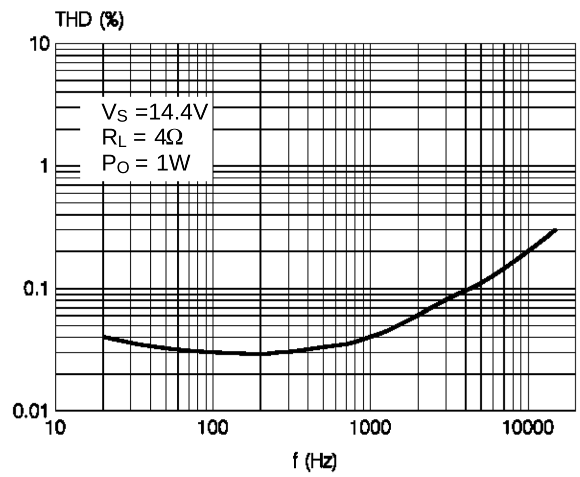


Figure 8: Supply Voltage Rejection vs. Frequency.

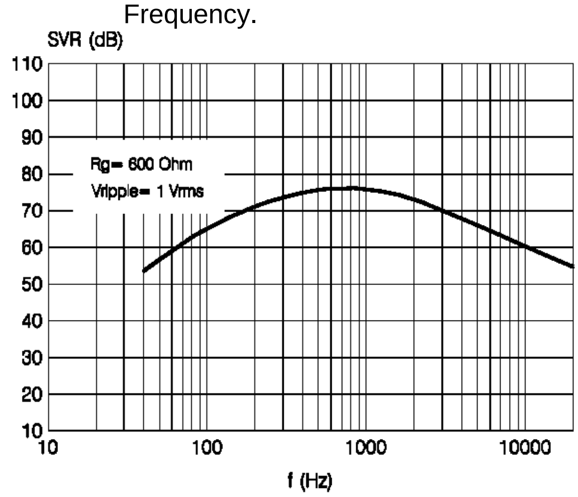


Figure 9: Output Noise vs. Source Resistance

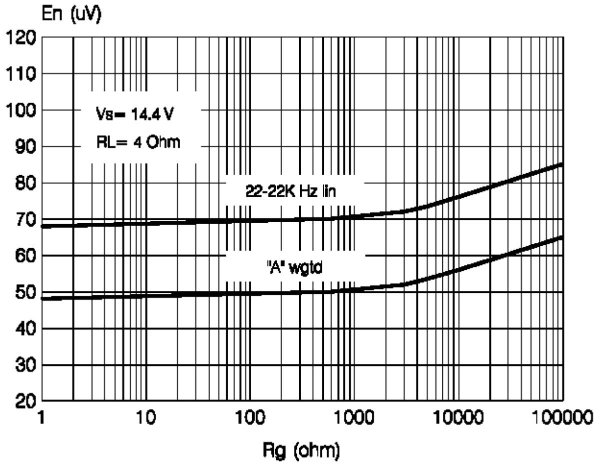
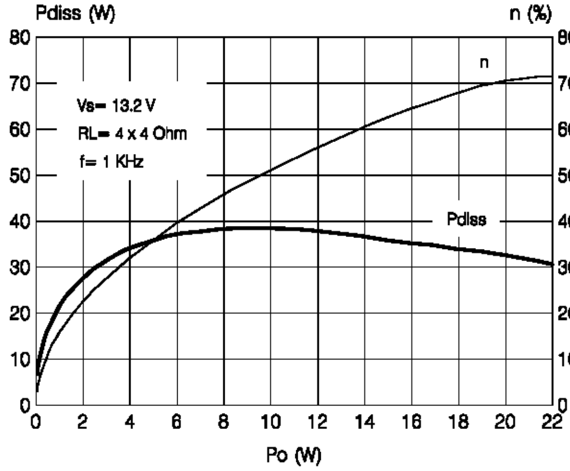


Figure 10: Power Dissipation & Efficiency vs. Output Power



APPLICATION HINTS (ref. to the circuit of fig. 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**.

INPUT STAGE

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

If the standard value for the input capacitors (0.1µF) 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 Vs 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 recommended muting-series resistance (R_2) is in the range 70KΩ to 120KΩ, which is also sufficiently high to allow a muting capacitor reasonably small (about 1µF).

If R_2 values higher than recommended are chosen, 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.

Conversely, in case of R_2 lower than 70KΩ, no negative impact will exist other than the necessity to increase C_{10} if the pop during muting operations grows to unacceptable levels.

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

FLEXIWATT25 PACKAGE MECHANICAL DATA

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	4.45		4.65	0.175		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			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	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	21.57	21.97	22.37	0.849	0.865	0.880
L1	18.57	18.97	19.37	0.731	0.786	0.762
L2	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
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	
R4		0.50			0.019	
V2	20°					
V3	45°