

## **TDA7499SA**

## 6W+6W STEREO AMPLIFIER WITH MUTE & ST-BY

PRODUCT PREVIEW

- WIDE SUPPLY VOLTAGE RANGE UP TO +18V
- 6+6W @THD = 10%,  $R_L$ = 8 $\Omega$ ,  $V_S$  = ±10V
- NO POP AT TURN-ON/OFF
- MUTE (POP FREE)
- STANDARD BY FEATURE (LOW Iq)
- SHORT CIRCUIT PROTECTION TO GND
- THERMAL OVERLOAD PROTECTION
- CLIPWATT 11 PACKAGE



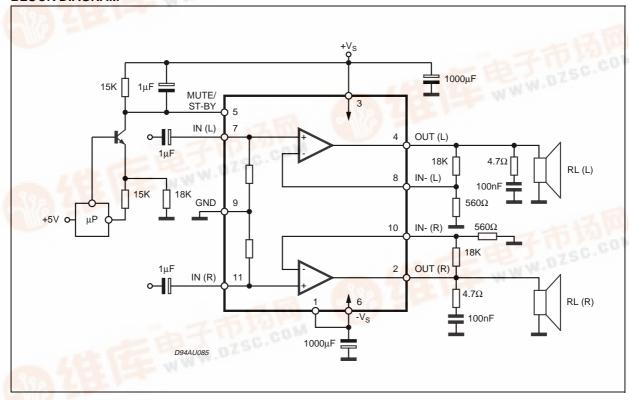
#### **DESCRIPTION**

The TDA7499SA is class AB power amplifier assembled in the @ Clipwatt 11 package, specially designed for high quality sound application as Hi-Fi

music centers and stereo TV sets.

The TDA7499SA is pin to pin compatible with TDA7269, TDA7269A, TDA7269SA, TDA7269ASA, TDA7265, TDA7499.

#### **BLOCK DIAGRAM**



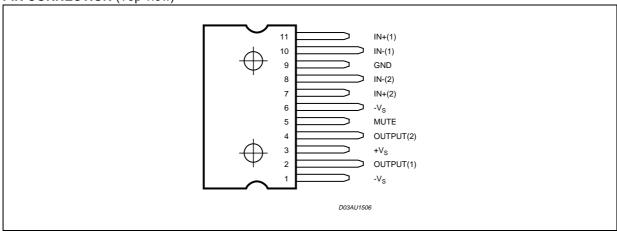


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#### **ABSOLUTE MAXIMUM RATINGS**

Symbol	Parameter	Value	Unit	
Vs	DC Supply Voltage	±20	V	
Io	Output Power Current (internally limited)	2.5	Α	
P <sub>tot</sub>	Total Power Dissipation (Tamb = 70°C)	20	W	
T <sub>amb</sub>	Ambient Operating Temperature (1)	0 to 70	°C	
T <sub>stg</sub> , T <sub>j</sub>	Storage and Junction Temperature	-40 to 150	°C	

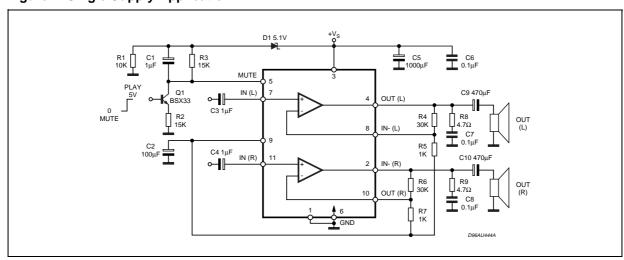
## PIN CONNECTION (Top view)



### THERMAL DATA

Symbol	Parameter	Value	Unit
R <sub>th j-case</sub>	Thermal Resistance Junction-case	max = 3.9	°C/W
R <sub>th j-amb</sub>	Thermal Resistance Junction-ambient	max = 48	°C/W

Figure 1. Single Supply Application



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**ELECTRICAL CHARACTERISTCS** (Refer to the test circuit  $V_S = \pm 10V$ ;  $R_S = 50\Omega$ ;  $G_V = 30 dB$ , f = 1 KHz;  $T_{amb} = 25$ °C, unless otherwise specified)

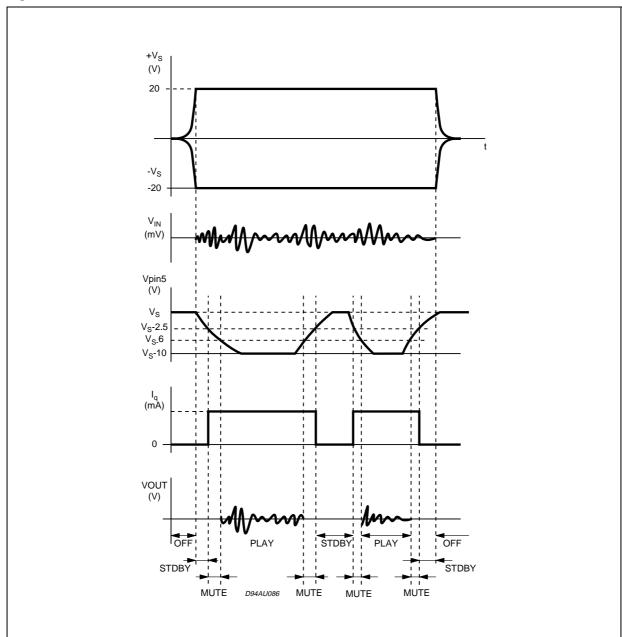
Vos   Input Offset Voltage   .25   .25   mV	Symbol	Parameter	Test Condition	Min.	Тур.	Max.	Unit		
Total Quiescent Current   50   90   mA	Vs	Supply Voltage Range	$R_L = 8\Omega$	±5		±18	V		
Nos   Input Offset Voltage   Vos   Input Offset Voltage   Vos   Input Offset Voltage   Vos   Input Power   THD = 10%; RL = 8Ω; Vs = ±8.5V; RL = 4Ω;			$R_L = 4\Omega;$	±5		±12	V		
Bo   Output Bias Current   So0   NA	Iq	Total Quiescent Current			50	90	mA		
$\begin{array}{c} P_O \\ P_O \\$	Vos	Input Offset Voltage		-25		25	mV		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$	Ib	Output Bias Current			500		nA		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	P <sub>O</sub>	Output Power	$R_L = 8\Omega$ ;				W W		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			$R_L = 8\Omega$ ;				W W		
$ \begin{array}{c ccccccccccccccccccccccccccccccccccc$	THD	Total Harmonic Distortion	$R_L = 8\Omega$ ; $P_O = 1W$ ; $f = 1KHz$ ;		0.03		%		
$\begin{array}{c ccccccccccccccccccccccccccccccccccc$			$P_0 = 0.1 \text{ to } 5\text{W};$		0.2	0.5	%		
PO = 0.1 to 2W;   f = 100Hz to 15KHz;			$R_L = 4\Omega$ ; $P_O = 1W$ ; $f = 1KHz$ ;		0.02		%		
F = 10KHz;   50   60   dB			$P_0 = 0.1 \text{ to } 2W;$		0.2	1	%		
GOL   Open Loop Voltage Gain   80   dB	СТ	Cross Talk		50			dB dB		
eN       Total Output Noise       A Curve $f = 20Hz$ to $22KHz$ 3 4 8 μV         Ri       Input Resistance       15 20 ΚΩ         SVR       Supply Voltage Rejection (each channel) $f = 100Hz$ ; $V_R = 0.5V$ 60 dB         Tj       Thermal Shut-down Junction Temperature       145 °C         MUTE & INPUT SELECTION FUNCTIONS         V <sub>MUTE</sub> Mute /Play threshold       -7 -6 -5 V         A <sub>MUTE</sub> Mute Attenuation       60 70 dB         STAND-BY FUNCTIONS [ref: +V <sub>S</sub> ] (only for Split Supply)         V <sub>ST-BY</sub> Stand-by Mute threshold       -3.5 -2.5 -0.5 V         A <sub>ST-BY</sub> Stand-by Attenuation       110 dB	SR	Slew Rate		6.5	10		V/μs		
F = 20Hz to 22KHz	G <sub>OL</sub>	Open Loop Voltage Gain			80		dB		
SVR         Supply Voltage Rejection (each channel)         f = 100Hz; V <sub>R</sub> = 0.5V         60         dB           Tj         Thermal Shut-down Junction Temperature         145         °C           MUTE & INPUT SELECTION FUNCTIONS         -7         -6         -5         V           A <sub>MUTE</sub> Mute /Play threshold         -7         -6         -5         V           A <sub>MUTE</sub> Mute Attenuation         60         70         dB           STAND-BY FUNCTIONS [ref: +V <sub>S</sub> ] (only for Split Supply)         -3.5         -2.5         -0.5         V           A <sub>ST-BY</sub> Stand-by Attenuation         110         dB	e <sub>N</sub>	Total Output Noise				8	μV μV		
(each channel)         145         °C           Tj         Thermal Shut-down Junction Temperature         145         °C           MUTE & INPUT SELECTION FUNCTIONS         ***  VMUTE Mute /Play threshold         -7         -6         -5         V           AMUTE Mute Attenuation         60         70         dB           STAND-BY FUNCTIONS [ref: +Vs] (only for Split Supply)         ***  VST-BY Stand-by Mute threshold         -3.5         -2.5         -0.5         V           AST-BY Stand-by Attenuation         110         dB	R <sub>i</sub>	Input Resistance		15	20		ΚΩ		
MUTE & INPUT SELECTION FUNCTIONS           V <sub>MUTE</sub> Mute /Play threshold         -7         -6         -5         V           A <sub>MUTE</sub> Mute Attenuation         60         70         dB           STAND-BY FUNCTIONS [ref: +V <sub>S</sub> ] (only for Split Supply)         V         -3.5         -2.5         -0.5         V           A <sub>ST-BY</sub> Stand-by Attenuation         110         dB	SVR		f = 100Hz; V <sub>R</sub> = 0.5V		60		dB		
V <sub>MUTE</sub> Mute /Play threshold         -7         -6         -5         V           A <sub>MUTE</sub> Mute Attenuation         60         70         dB           STAND-BY FUNCTIONS [ref: +V <sub>S</sub> ] (only for Split Supply)         V         Stand-by Mute threshold         -3.5         -2.5         -0.5         V           A <sub>ST-BY</sub> Stand-by Attenuation         110         dB	Tj				145		ç		
A <sub>MUTE</sub> Mute Attenuation         60         70         dB           STAND-BY FUNCTIONS [ref: +V <sub>S</sub> ] (only for Split Supply)           V <sub>ST-BY</sub> Stand-by Mute threshold         -3.5         -2.5         -0.5         V           A <sub>ST-BY</sub> Stand-by Attenuation         110         dB	MUTE & I	NPUT SELECTION FUNCTIONS							
STAND-BY FUNCTIONS [ref: +V <sub>S</sub> ] (only for Split Supply)           V <sub>ST-BY</sub> Stand-by Mute threshold         -3.5         -2.5         -0.5         V           A <sub>ST-BY</sub> Stand-by Attenuation         110         dB	$V_{MUTE}$	Mute /Play threshold		-7	-6	-5	٧		
V <sub>ST-BY</sub> Stand-by Mute threshold -3.5 -2.5 -0.5 V A <sub>ST-BY</sub> Stand-by Attenuation 110 dB	A <sub>MUTE</sub>	Mute Attenuation		60	70		dB		
A <sub>ST-BY</sub> Stand-by Attenuation 110 dB	STAND-BY FUNCTIONS [ref: +V <sub>S</sub> ] (only for Split Supply)								
	V <sub>ST-BY</sub>	Stand-by Mute threshold		-3.5	-2.5	-0.5	V		
I <sub>dST-RY</sub> Quiescent Current @ Stand-by 3 6 mA	A <sub>ST-BY</sub>	Stand-by Attenuation			110		dB		
40.5.   1	I <sub>qST-BY</sub>	Quiescent Current @ Stand-by			3	6	mA		

#### **MUTE STAND-BY FUNCTION**

The pin 5 (MUTE/STAND-BY) controls the amplifier status by two different thresholds, referred to +V<sub>S</sub>.

- When  $V_{pin5}$  higher than = + $V_S$  -2.5V the amplifier is in Stand-by mode and the final stage generators are off.
- When  $V_{pin5}$  between = + $V_S$  -2.5V and  $V_S$  -6V the final stage generators are switched on and the amplifier is in mute mode.
- When  $V_{pin5}$  lower than = + $V_S$  -6V the amplifier is play mode.

Figure 2.



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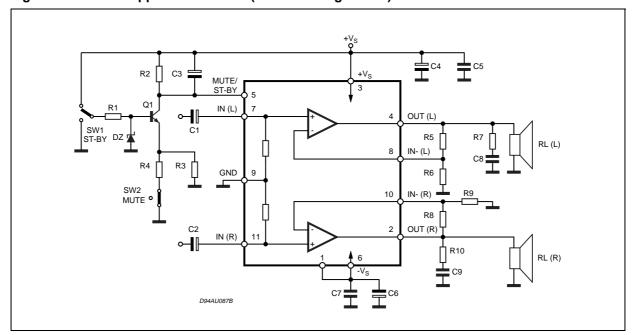


Figure 3. Test and Application Circuit (Stereo Configuration)

#### **APPLICATION SUGGESTIONS** (Demo Board Schematic)

The recommended values of the external components are those shown the demoboard schematic different values can be used, the following table can help the designer.

COMPONENT	SUGGESTION VALUE	PURPOSE	LARGER THAN RECOMMENDED VALUE	SMALLER THAN RECOMMENDED VALUE
R1	10ΚΩ	Mute Circuit	Increase of Dz Biasing Current	
R2	15ΚΩ	Mute Circuit	V <sub>pin</sub> #5 Shifted Downward	V <sub>pin</sub> #5 Shifted Upward
R3	18ΚΩ	Mute Circuit	V <sub>pin</sub> #5 Shifted Upward	V <sub>pin</sub> #5 Shifted Downward
R4	15ΚΩ	Mute Circuit	V <sub>pin</sub> #5 Shifted Upward	V <sub>pin</sub> #5 Shifted Downward
R5, R8	18ΚΩ	Closed Loop Gain	Increase of Gain	
R6, R9	560KΩ	Setting (*)	Decrease of Gain	
R7, R10	4.7ΚΩ	Frequency Stability	Danger of Oscillations	Danger of Oscillations
C1, C2	1μF	Input DC Decoupling		Higher low frequency cutoff
C3	1μF	St-By/Mute Time Constant	Larger On/Off Time	Smaller On/Off Time
C4, C6	1000μF	Supply Voltage Bypass		Danger of Oscillations
C5, C7	0.1μF	Supply Voltage Bypass		Danger of Oscillations
C8, C9	0.1μF	Frequency Stability		
Dz	5.1V	Mute Circuit		

<sup>(\*)</sup> Closed loop gain has to be ≥25dB

### **PC Board**

Figure 4. Evaluation Board Top Layer Layout

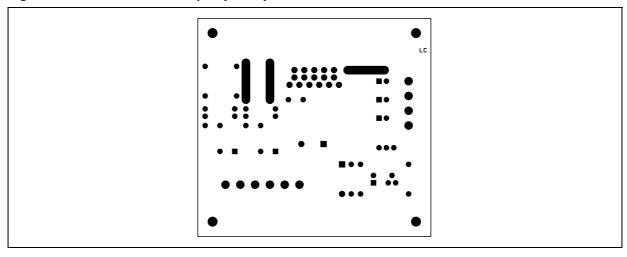


Figure 5. Evaluation Board Bottom Layer Layout

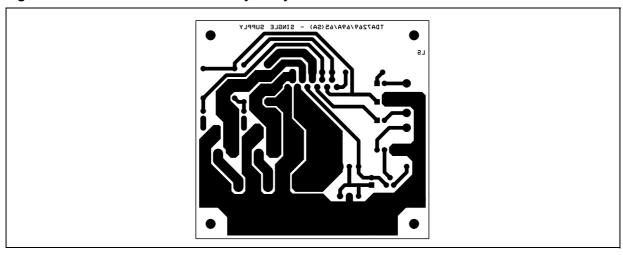
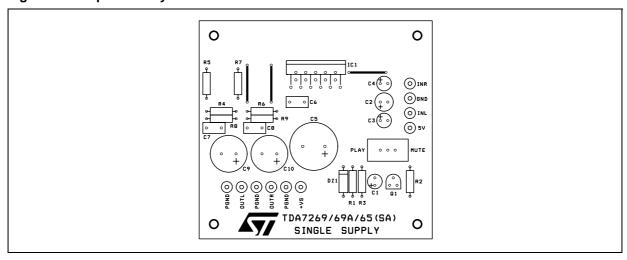


Figure 6. Component Layout



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#### **HEAT SINK DIMENSIONING:**

In order to avoid the thermal protection intervention, that is placed approximatively at  $T_j = 150$ °C, it is important the dimensioning of the Heat Sinker  $R_{Th}$  (°C/W).

The parameters that influence the dimensioning are:

- Maximum dissipated power for the device (P<sub>dmax</sub>)
- Max thermal resistance Junction to case (R<sub>Th i-c</sub>)
- Max. ambient temperature Tamb max
- Quiescent current Iq (mA)

#### Example:

$$V_{CC} = \pm 10V$$
,  $R_{load} = 8$ ohm,  $R_{Th j-c} = 3.9$  °C/W,  $T_{amb max} = 50$ °C

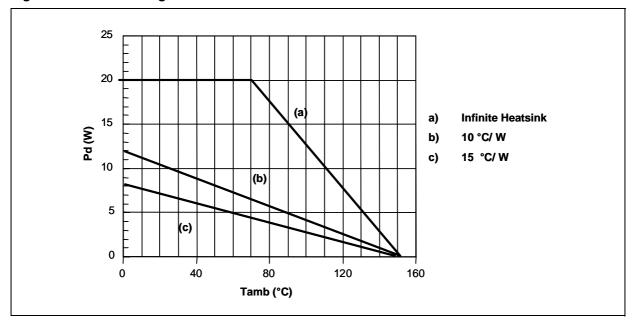
$$P_{dmax} = (N^{\circ} \text{ channels}) \cdot \frac{2V_{cc}^{2}}{\Pi^{2} \cdot R_{load}} + I_{q} \cdot V_{cc}$$

$$P_{dmax} = 2 \cdot (2.5) + 0.8 = 6W$$

(Heat Sinker) 
$$R_{Th\ c-a} = \frac{150 - T_{amb\ max}}{P_{d\ max}} - R_{Th\ j-c} = \frac{150 - 50}{6} - 3.9 = 12.7^{\circ}C/W$$

In figure 7 is shown the Power derating curve for the device.

Figure 7. Power derating curve



#### **Clipwatt Assembling Suggestions**

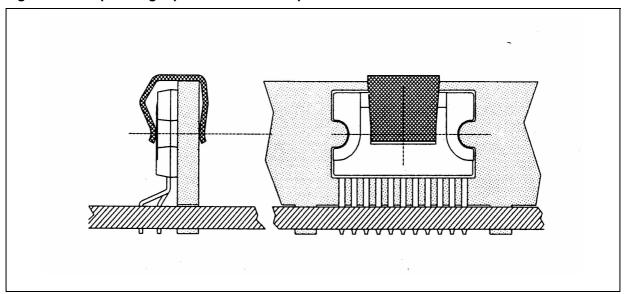
The suggested mounting method of Clipwatt on external heat sink, requires the use of a clip placed as much as possible in the plastic body center, as indicated in the example of figure 8.

A thermal grease can be used in order to reduce the additional thermal resistance of the contact between package and heatsink.

A pressing force of 7 - 10 Kg gives a good contact and the clip must be designed in order to avoid a maximum contact pressure of 15 Kg/mm2 between it and the plastic body case.

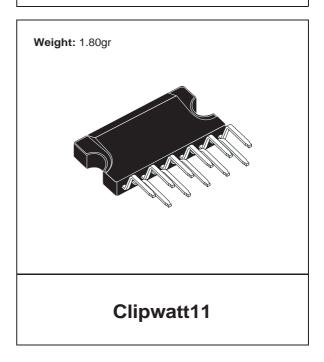
As example , if a 15Kg force is applied by the clip on the package , the clip must have a contact area of 1mm2 at least.

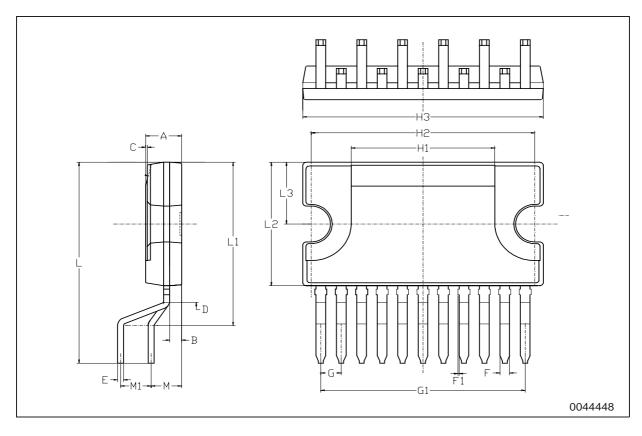
Figure 8. Example of right placement of the clip



DIM.	mm			inch			
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Α			3.2			0.126	
В			1.05			0.041	
С		0.15			0.006		
D		1.5			0.059		
Е	0.49		0.55	0.019		0.002	
F	0.77	8.0	0.88	0.030	0.031	0.035	
F1			0.15			0.006	
G	1.57	1.7	1.83	0.062	0.067	0.072	
G1	16.87	17	17.13	0.664	0.669	0.674	
H1		12			0.480		
H2		18.6			0.732		
НЗ	19.85			0.781			
L		17.9			0.700		
L1		14.55			0.580		
L2	10.7	11	11.2	0.421	0.433	0.441	
L3		5.5			0.217		
М		2.54			0.100		
M1		2.54			0.100		

# OUTLINE AND MECHANICAL DATA





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