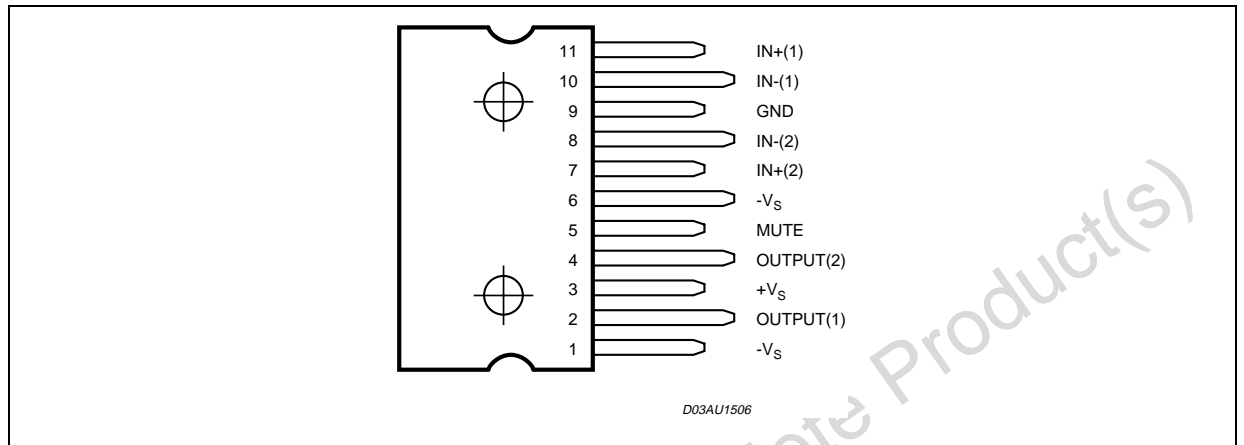


**Table 2. Absolute Maximum Ratings**

Symbol	Parameter	Value	Unit
$V_S$	DC Supply Voltage	$\pm 22$	V
$I_O$	Output Power Current (internally limited)	3	A
$P_{tot}$	Total Power Dissipation ( $T_{amb} = 70^\circ\text{C}$ )	20	W
$T_{amb}$	Ambient Operating Temperature (1)	0 to 70	$^\circ\text{C}$
$T_{stg}, T_j$	Storage and Junction Temperature	-40 to 150	$^\circ\text{C}$

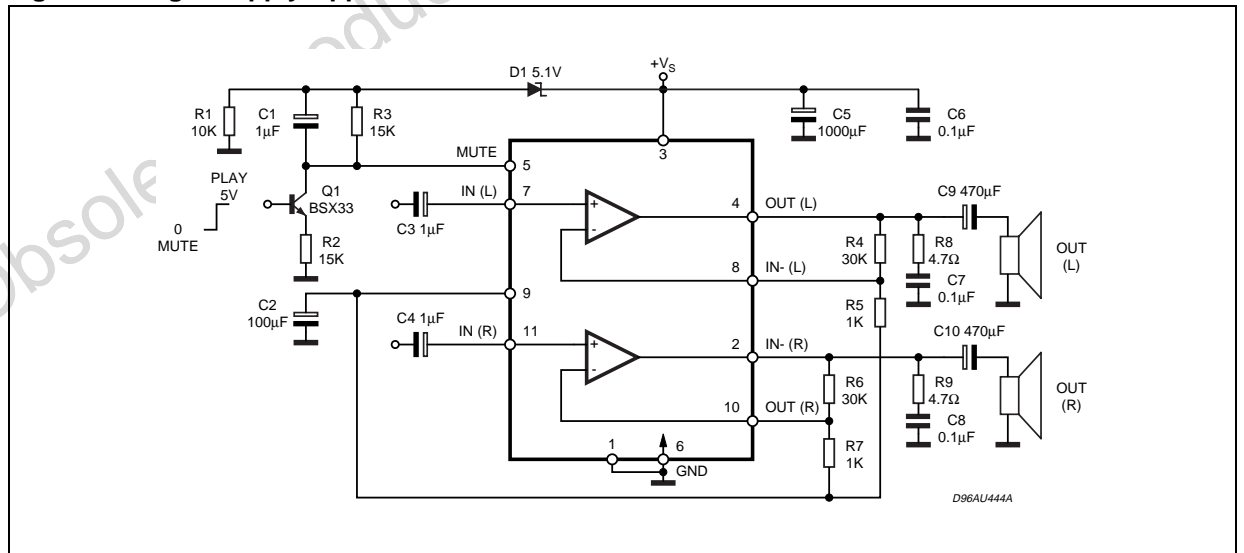
**Figure 3. Pin Connection (Top view)**



**Table 3. Thermal Data**

Symbol	Parameter	Value	Unit
$R_{th\ j-case}$	Thermal Resistance Junction-case Max.	3.9	$^\circ\text{C/W}$
$R_{th\ j-amb}$	Thermal Resistance Junction-ambient	48	$^\circ\text{C/W}$

**Figure 4. Single Supply Application**



**Table 4. ELECTRICAL CHARACTERISTICS**

(Refer to the test circuit  $V_S = \pm 14V$ ;  $R_L = 8\Omega$ ;  $R_S = 50\Omega$ ;  $G_V = 30dB$ ,  $f = 1KHz$ ;  $T_{amb} = 25^\circ C$ , unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_S$	Supply Voltage Range	$R_L = 8\Omega$ ; $R_L = 4\Omega$ ;	$\pm 5$ $\pm 5$		$\pm 20$ $\pm 15$	V V
$I_q$	Total Quiescent Current			60	100	mA
$V_{OS}$	Input Offset Voltage		-25		25	mV
$I_b$	Non Inverting Input Bias Current			500		nA
$P_O$	Output Power	THD = 10%; $R_L = 8\Omega$ ; $V_S = \pm 12.5V$ ; $R_L = 4\Omega$ ;	8 7.5	10 10		W W
		THD = 1%; $R_L = 8\Omega$ ; $V_S = \pm 12.5V$ ; $R_L = 4\Omega$ ;		7.5 7.5		W W
THD	Total Harmonic Distortion	$R_L = 8\Omega$ ; $P_O = 1W$ ; $f = 1KHz$ ;		0.03		%
		$R_L = 8\Omega$ ; $P_O = 0.1$ to $5W$ ; $f = 100Hz$ to $15KHz$ ;			0.7	%
		$R_L = 4\Omega$ ; $P_O = 1W$ ; $f = 1KHz$ ;		0.02		%
		$R_L = 4\Omega$ ; $V_S = \pm 10V$ ; $P_O = 0.1$ to $5W$ ; $f = 100Hz$ to $15KHz$ ;			1	%
$C_T$	Cross Talk	$f = 1KHz$ ;	50	70		dB
		$f = 10KHz$ ;		60		
SR	Slew Rate		6.5	10		V/ $\mu s$
$G_{OL}$	Open Loop Voltage Gain			80		dB
$e_N$	Total Output Noise	A Curve $f = 20Hz$ to $22KHz$		3 4	8	$\mu V$ $\mu V$
$R_i$	Input Resistance		15	20		K $\Omega$
SVR	Supply Voltage Rejection (each channel)	$f = 100Hz$ ; $V_R = 0.5V$		60		dB
$T_j$	Thermal Shut-down Junction Temperature			145		$^\circ C$
<b>MUTE FUNCTION [ref +<math>V_S</math>] (*)</b>						
$V_{MUTE}$	Mute /Play threshold		-7	-6	-5	V
$A_{MUTE}$	Mute Attenuation		60	70		dB
<b>STAND-BY FUNCTIONS [ref: +<math>V_S</math>] (only for Split Supply)</b>						
$V_{ST-BY}$	Stand-by Mute threshold		-3.5	-2.5	-1.5	V
$A_{ST-BY}$	Stand-by Attenuation			110		dB
$I_{qST-BY}$	Quiescent Current @ Stand-by			3	6	mA

(\*) In mute condition the current drawn from Pin 5 must be  $\leq 650\mu A$

### 3 MUTE STAND-BY FUNCTION

The pin 5 (MUTE/STAND-BY) controls the amplifier status by two different thresholds, referred to  $+V_S$ .

- 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 current 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 5.

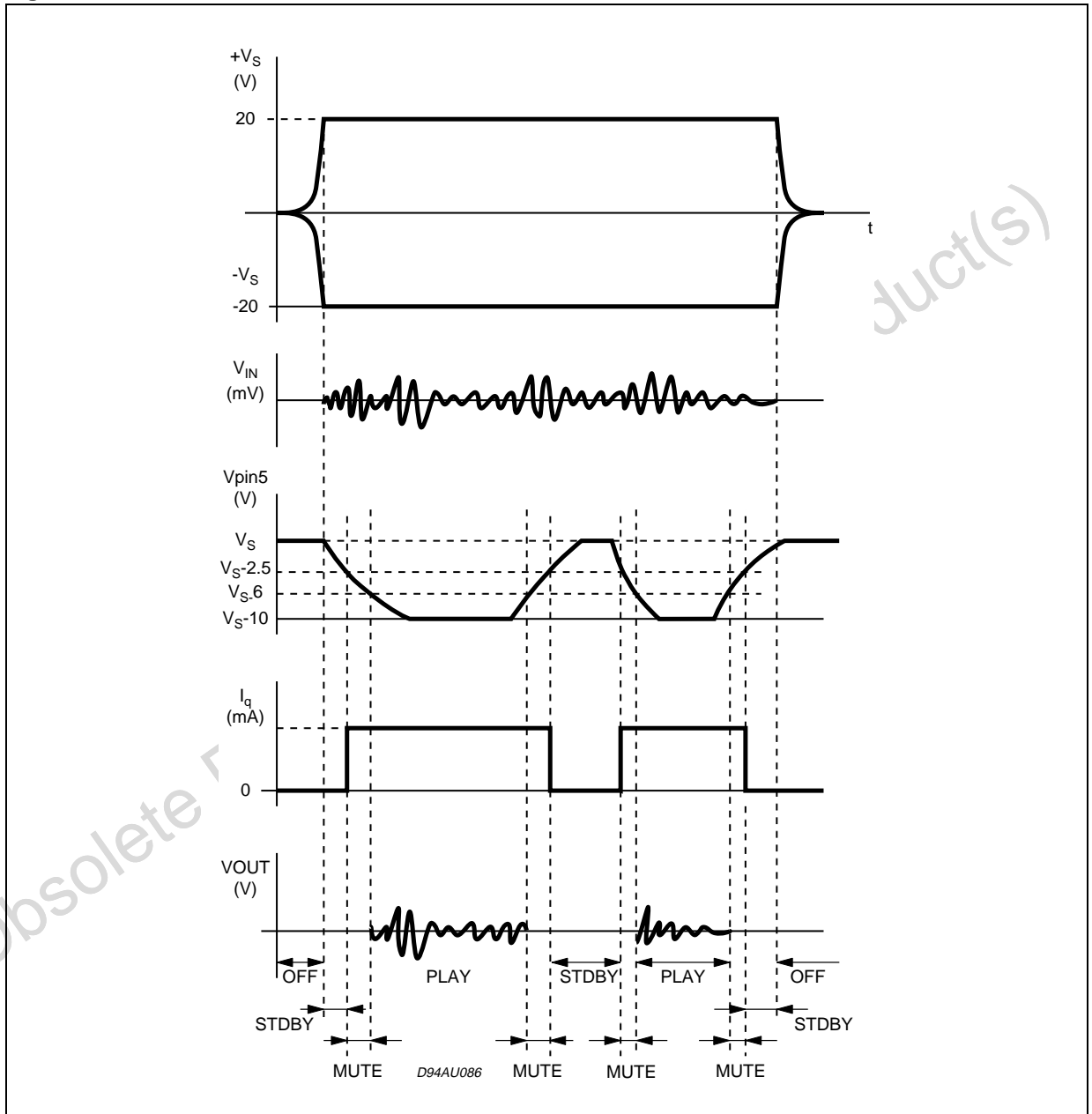
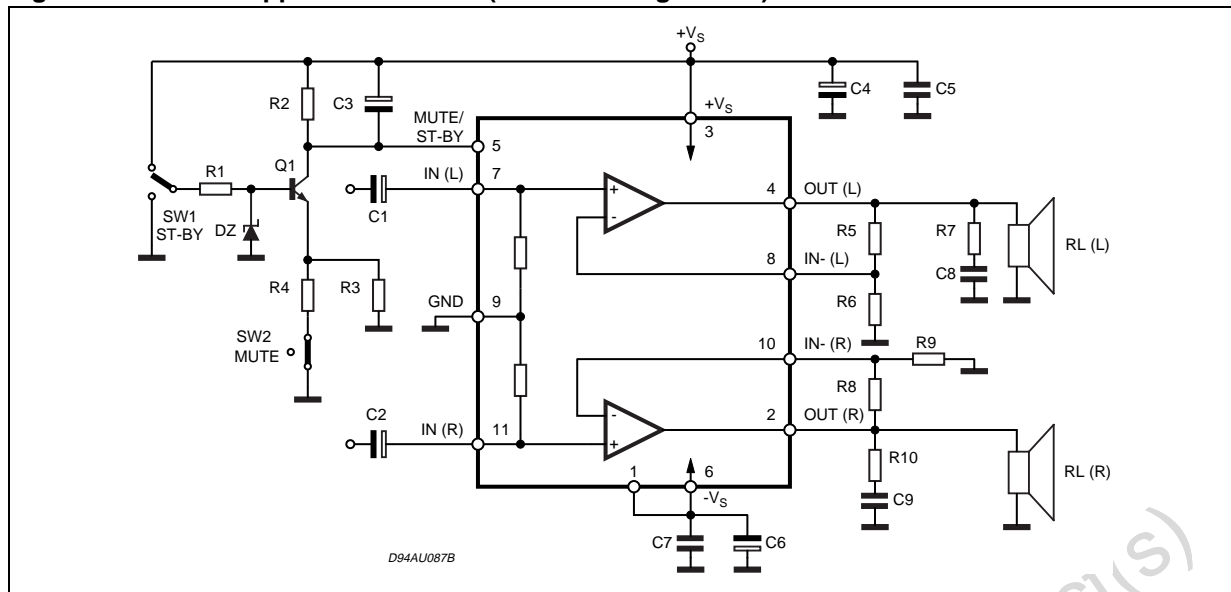


Figure 6. Test and Application Circuit (Stereo Configuration)



## 4 APPLICATION SUGGESTIONS

### 4.1 (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

Table 5. .

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

(\*) Closed loop gain has to be  $\geq 25$ dB

4.2 PC Board

Figure 7. LC

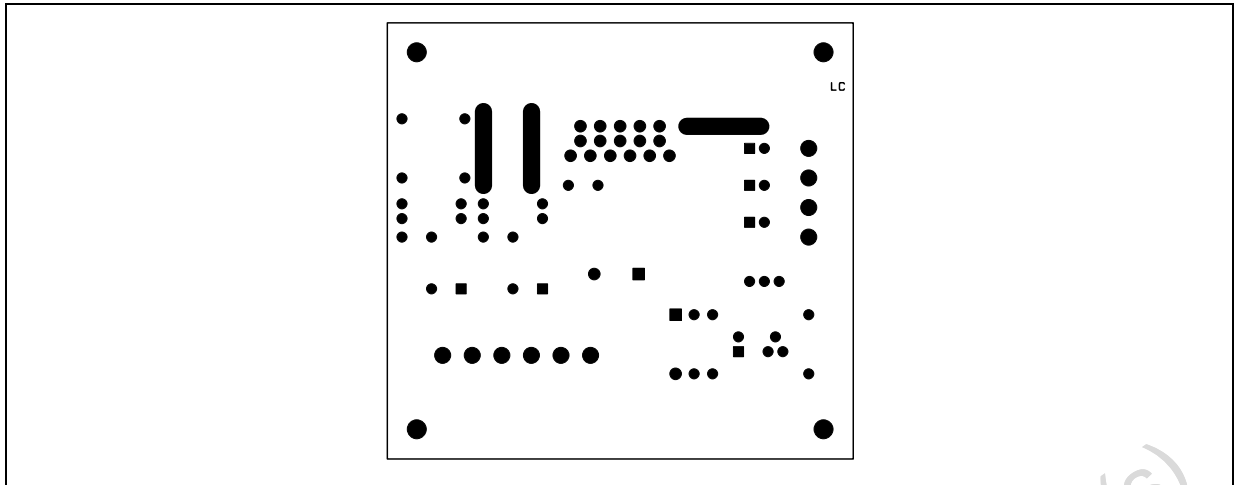


Figure 8. LS

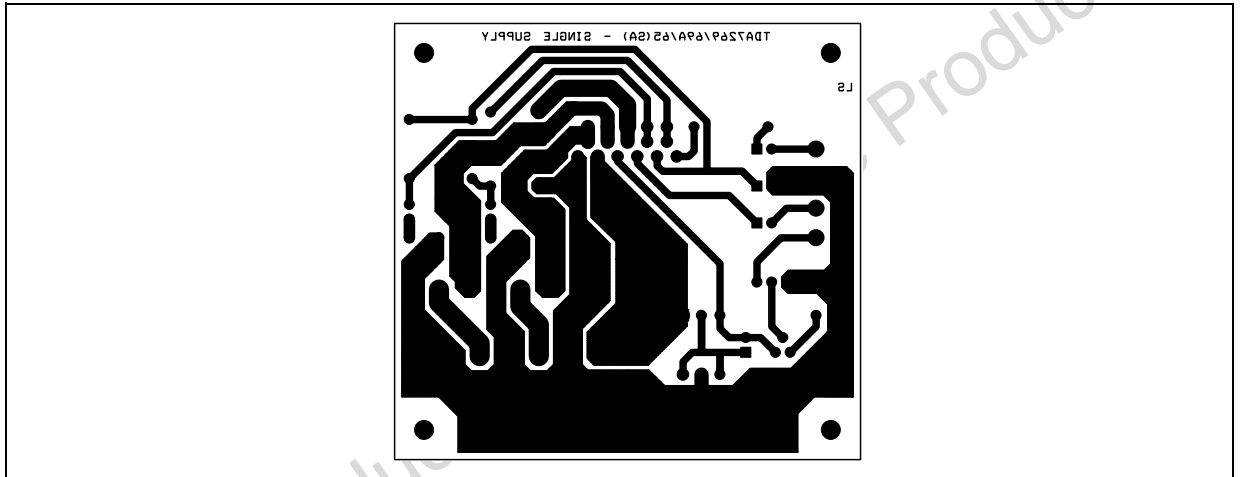
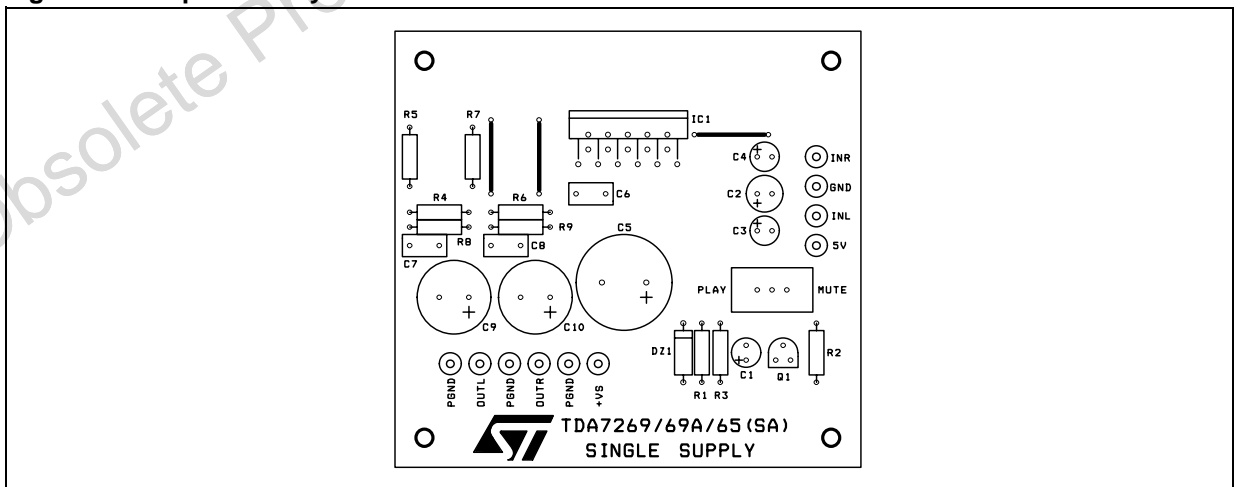


Figure 9. Component Layout



## 5 HEAT SINK DIMENSIONING:

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

The parameters that influence the dimensioning are:

- Maximum dissipated power for the device ( $P_{dmax}$ )
- Max thermal resistance Junction to case ( $R_{Th\ j-c}$ )
- Max. ambient temperature  $T_{amb\ max}$
- Quiescent current  $I_q$  (mA)

### 5.1 Example:

$V_{CC} = \pm 14\text{V}$ ,  $R_{load} = 80\text{ohm}$ ,  $R_{Th\ j-c} = 3.9\ ^\circ\text{C}/\text{W}$ ,  $T_{amb\ max} = 50^\circ\text{C}$

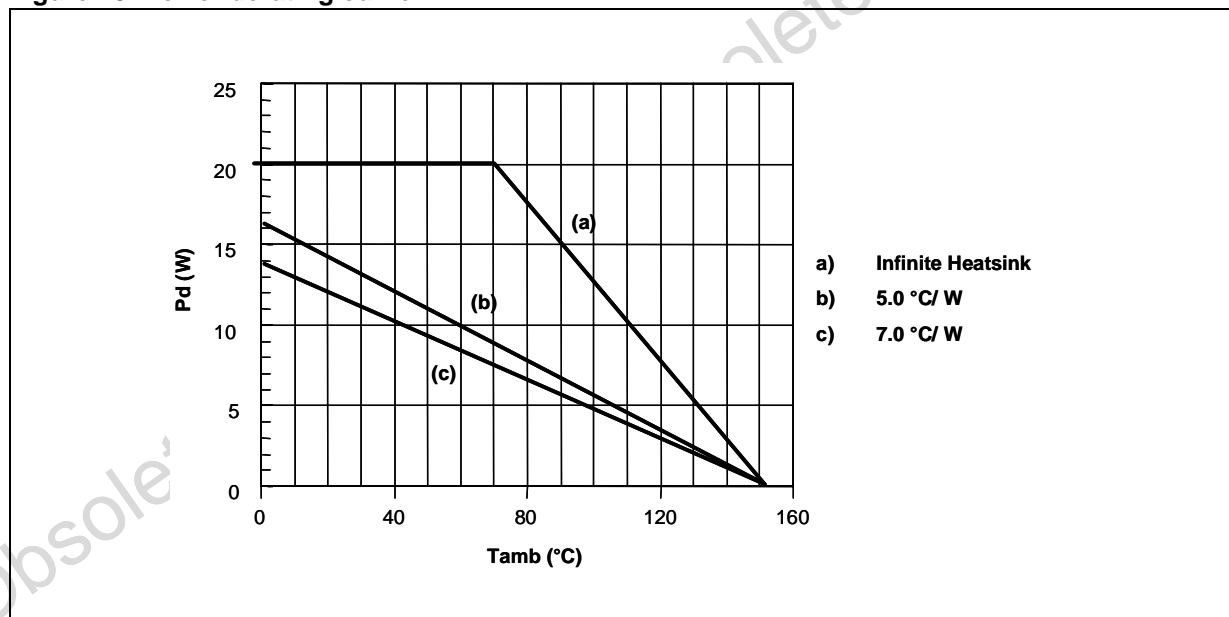
$$P_{dmax} = (N^\circ \text{ channels}) \cdot \frac{2V_{cc}^2}{\Pi^2 \cdot R_{load}} + I_q \cdot V_{cc}$$

$$P_{dmax} = 2 \cdot (4.96) + 0.84 = 10.7\ \text{W}$$

$$(\text{Heat Sinker}) R_{Th\ c-a} = \frac{150 - T_{amb\ max}}{P_{d\ max}} - R_{Th\ j-c} = \frac{150 - 50}{10.7} - 3.9 = 5.4\ ^\circ\text{C}/\text{W}$$

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

**Figure 10. Power derating curve**



## 6 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 11.

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/mm<sup>2</sup> 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 1mm<sup>2</sup> at least.

**Figure 11. Example of right placement of the clip**

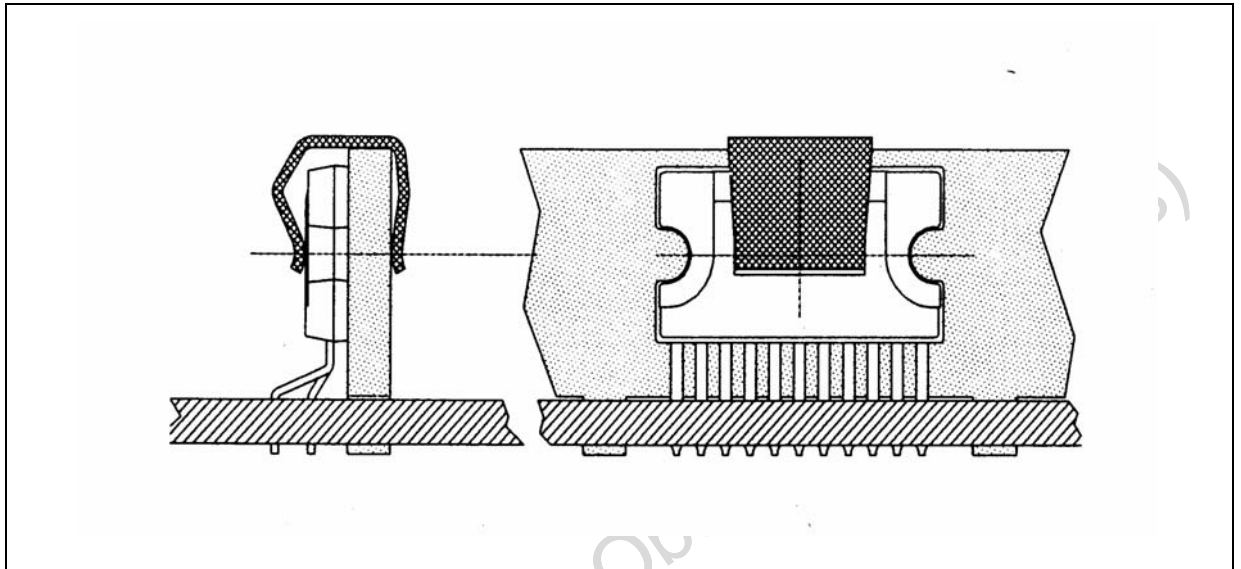
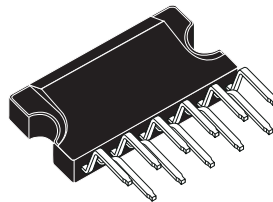


Figure 12. Clipwatt11 Mechanical Data &amp; Package Dimensions

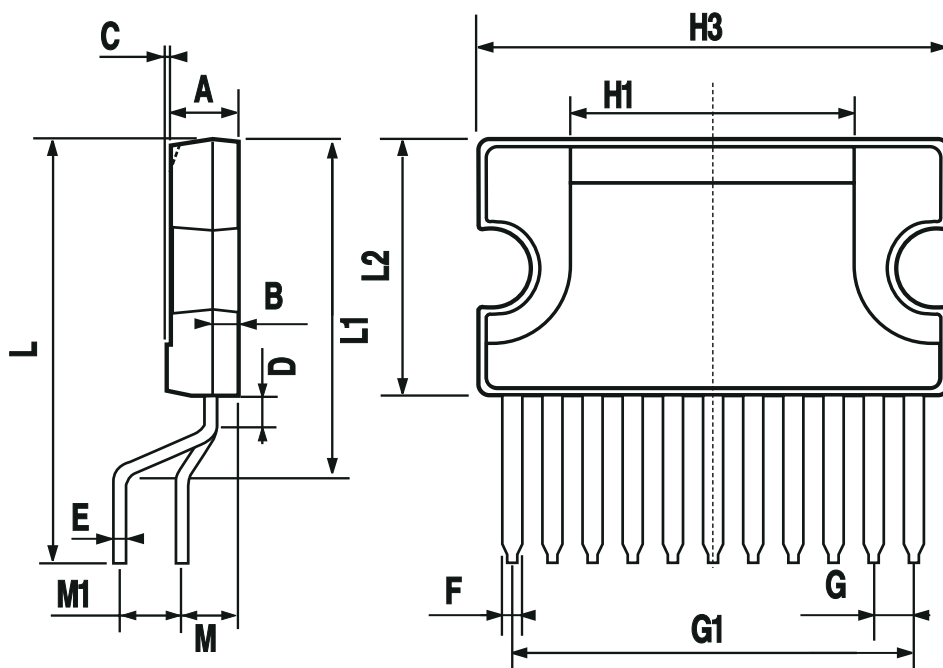
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			3.2			0.126
B			1.05			0.041
C		0.15			0.006	
D		1.5			0.059	
E	0.49		0.55	0.019		0.002
F	0.77	0.8	0.88	0.030	0.031	0.035
F1			0.15			0.006
G	1.57	1.7	1.83	0.062	0.067	0.072
G1	16.87	17	17.13	0.664	0.669	0.674
H1		12			0.480	
H2		18.6			0.732	
H3	19.85			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	
M		2.54			0.100	
M1		2.54			0.100	

### OUTLINE AND MECHANICAL DATA

Weight: 1.80gr



**Clipwatt11**



0044448 G



**Table 6. Revision History**

Date	Revision	Description of Changes
May 2003	1	First Issue
Septembe 2004	2	Changed Status and the graphic aspect in compliant to the new rules "Corporate Technical Pubblicaions Design Guide"

Obsolete Product(s) - Obsolete Product(s)

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