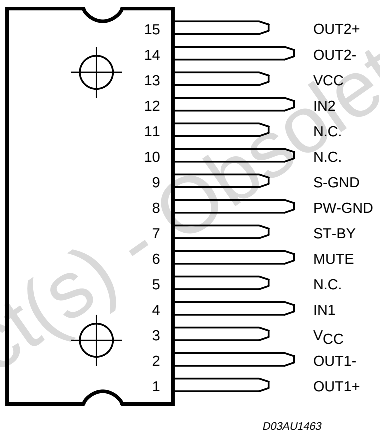
ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
V_S	Supply Voltage	20	V
I_O	Output Peak Current (internally limited)	2	A
P_{tot}	Total Power Dissipation (T_{amb} = 70°C)	20	W
T_{op}	Operating Temperature	0 to 70	°C
T_{stg}, T_j	Storage and Junction Temperature	-40 to 150	°C

THERMAL DATA

Symbol	Parameter	Value	Unit
$R_{th\ j\text{-}case}$	Thermal Resistance Junction-case	Typ = 1.8; Max. = 2.5	°C/W
$R_{th\ j\text{-}amb}$	Thermal Resistance Junction-ambient	48	°C/W

PIN CONNECTION (Top view)



ELECTRICAL CHARACTERISTCS

(V_{CC} = 11V, R_L = 8Ω, f = 1KHz, T_{amb} = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_{CC}	Supply Range		3	11	18	V
I_q	Total Quiescent Current			50	65	mA
V_{OS}	Output Offset Voltage				120	mV
P_O	Output Power	THD 10%	6.3	7		W
THD	Total Harmonic Distortion	P_O = 1W		0.05	0.2	%
		P_O = 0.1W to 2W f = 100Hz to 15KHz			1	%
SVR	Supply Voltage Rejection	f = 100Hz, VR =0.5V	40	56		dB
CT	Crosstalk		46	60		dB
A_{MUTE}	Mute Attenuation		60	80		dB
T_w	Thermal Threshold			150		°C
G_V	Closed Loop Voltage Gain		25	26	27	dB
ΔG_V	Voltage Gain Matching				0.5	dB

ELECTRICAL CHARACTERISTCS (continued)
(V_{CC} = 11V, R_L = 8Ω, f = 1KHz, T_{amb} = 25°C unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
R_i	Input Resistance		25	30		KΩ
VT_{MUTE}	Mute Threshold	for V_{CC} > 6.4V; Vo = -30dB	2.3	2.9	4.1	V
		for V_{CC} < 6.4V; Vo = -30dB	V_{CC}/2 -1	V_{CC}/2 -075	V_{CC}/2 -0.5	V
VT_{ST-BY}	St-by Threshold		0.8	1.3	1.8	V
I_{ST-BY}	St-by Current V6 = GND				100	µA
e_N	Total Output Voltage	A Curve; f = 20Hzto 20KHz		150		µV

APPLICATION SUGGESTION

STAND-BY AND MUTE FUNCTIONS

(A) Microprocessor Application

In order to avoid annoying "Pop-Noise" during Turn-On/Off transients, it is necessary to guarantee the right St-by and mute signals sequence. It is quite simple to obtain this function using a microprocessor (Fig. 1 and 2).
At first St-by signal (from µP) goes high and the voltage across the St-by terminal (Pin 7) starts to increase exponentially. The external RC network is intended to turn-on slowly the biasing circuits of the amplifier, this to avoid "POP" and "CLICK" on the outputs.
When this voltage reaches the St-by threshold level, the amplifier is switched-on and the external capacitors in series to the input terminals (C3, C53) start to charge.
It's necessary to mantain the mute signal low until the capacitors are fully charged, this to avoid that the device goes in play mode causing a loud "Pop Noise" on the speakers.
A delay of 100-200ms between St-by and mute signals is suitable for a proper operation.

Figure 1. Microprocessor Application

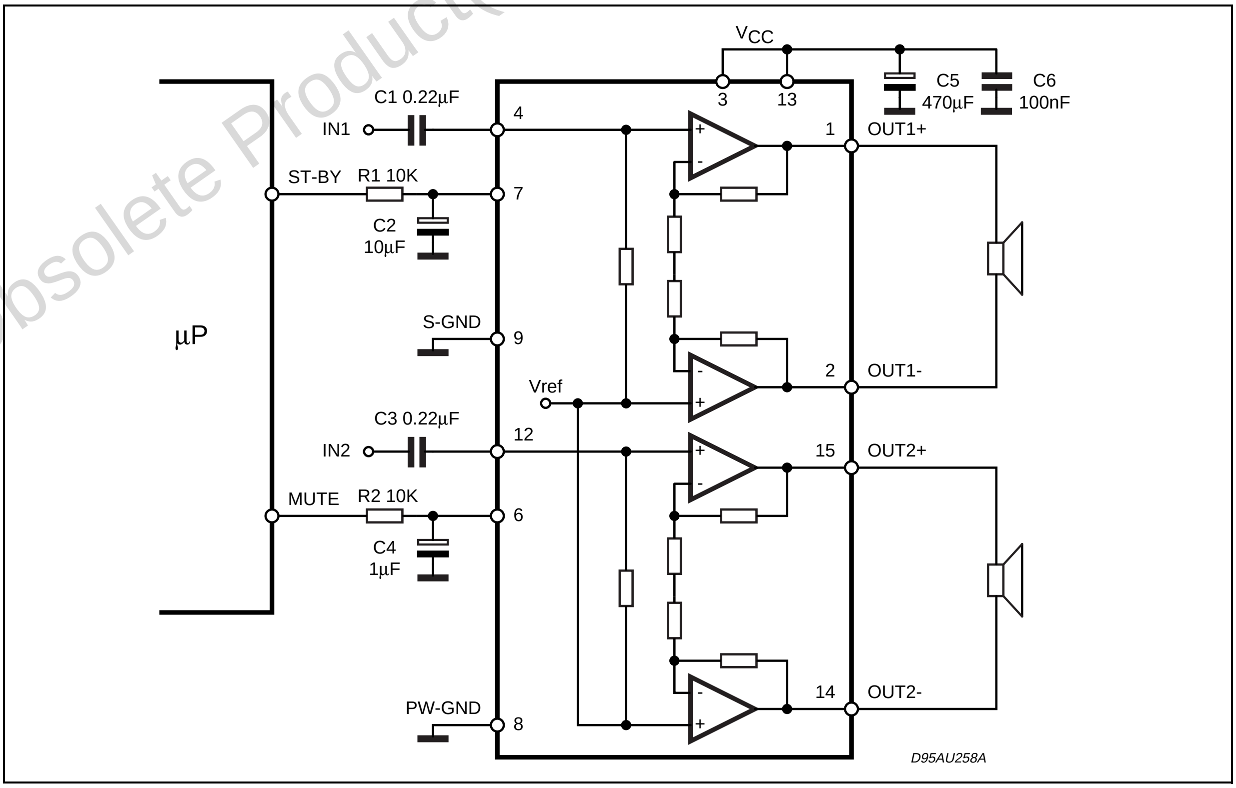
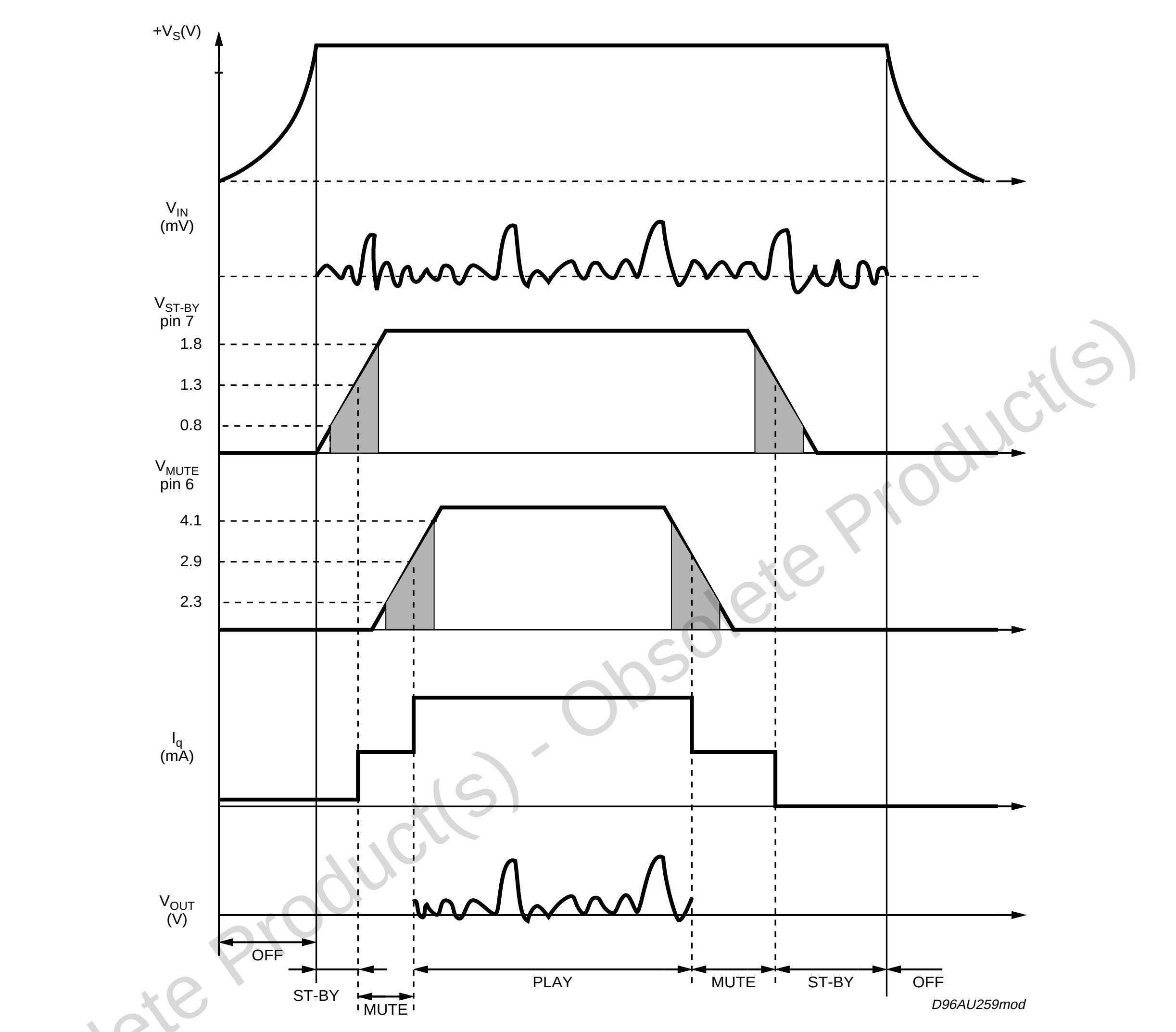


Figure 2. Microprocessor Driving Signals



B) Low Cost Application

In low cost applications where the µP is not present, the suggested circuit is shown in fig.3.

The St-by and mute terminals are tied together and they are connected to the supply line via an external voltage divider.

The device is switched-on/off from the supply line and the external capacitor C4 is intended to delay the St-by and mute threshold exceeding, avoiding "Popping" problems.

Figure 3. Stand-alone low-cost Application

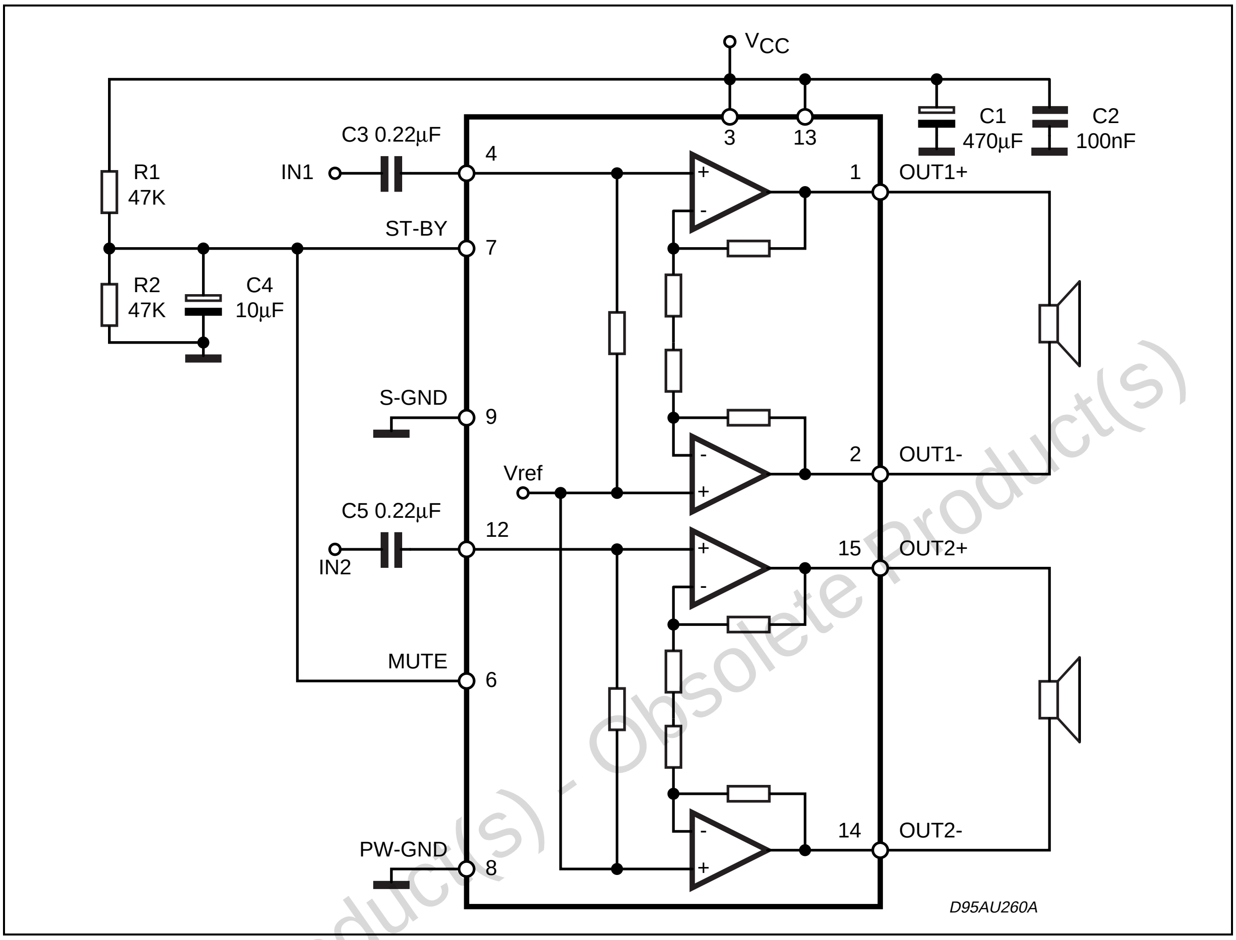


Figure 4. Distortion vs Frequency

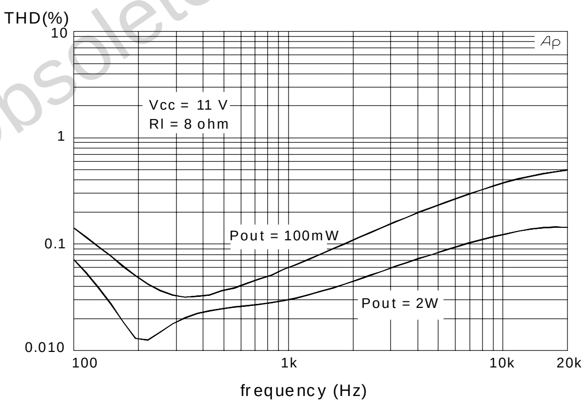


Figure 5. Gain vs Frequency

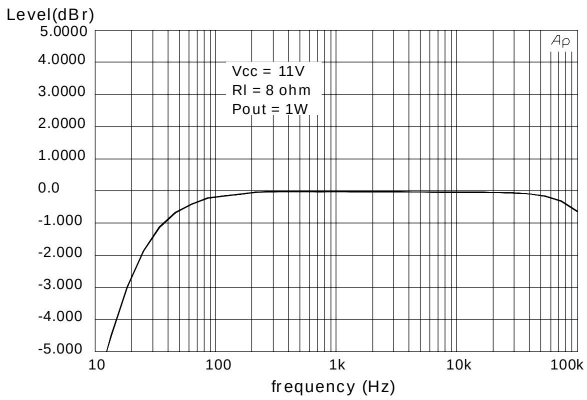


Figure 6. Mute Attenuation vs Vpin.8

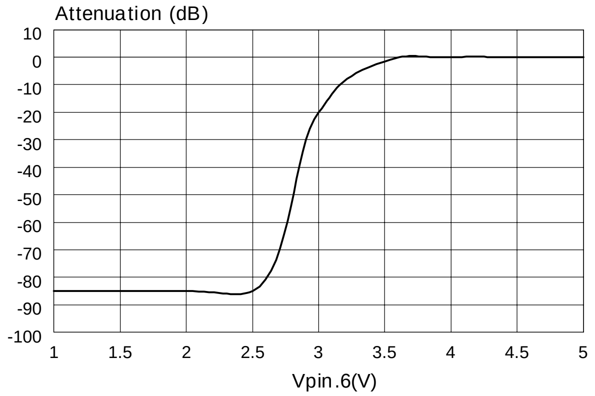


Figure 8. Quiescent Current vs Supply Voltage

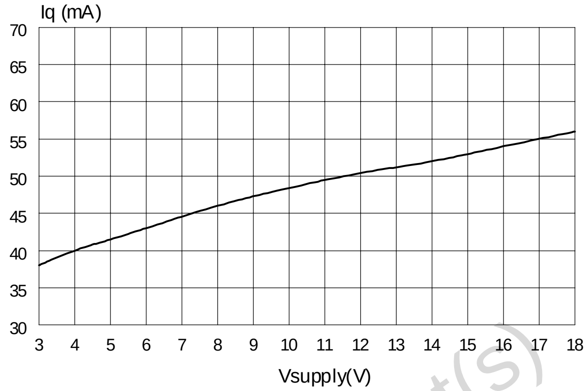


Figure 7. Stand-By attenuation vs Vpin 9

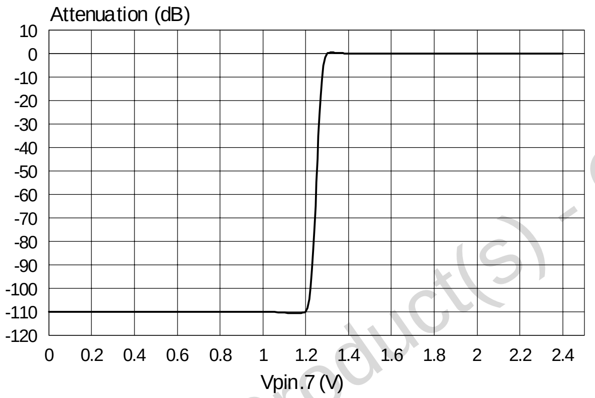


Figure 9. PC Board Component Layout

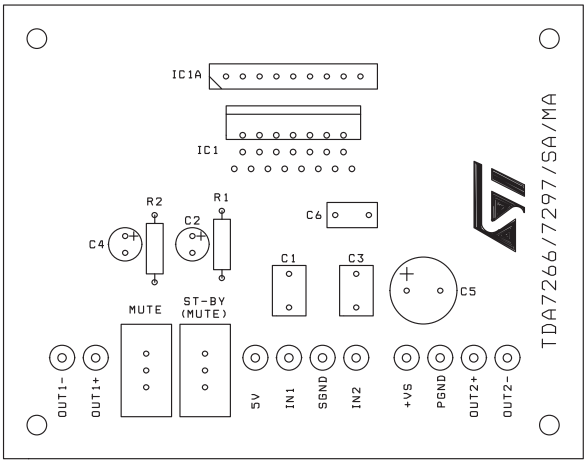


Figure 10. Evaluation Board Top Layer Layout

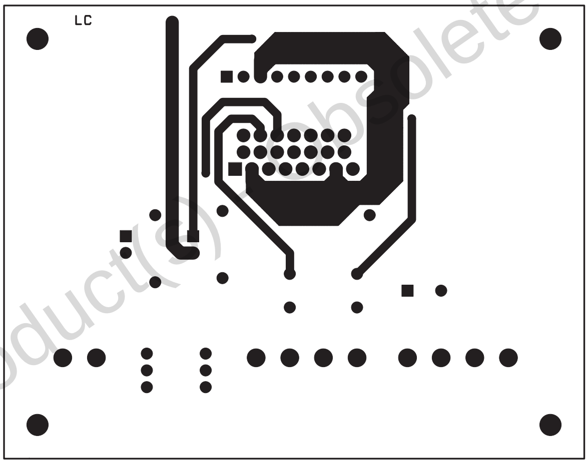
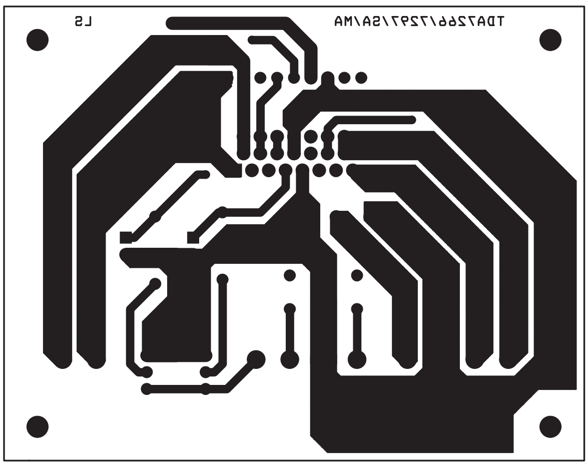


Figure 11. Evaluation Board Bottom Layer Layout



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_{dmax})
– Max thermal resistance Junction to case ($R_{Th\ j\text{-}c}$)
– Max. ambient temperature $T_{amb\ max}$
– Quiescent current I_q (mA)

Example:

V_{CC} = 11V, R_{load} = 8ohm, $R_{Th\ j\text{-}c}$ = 2.5 °C/W , $T_{amb\ max}$ = 50°C

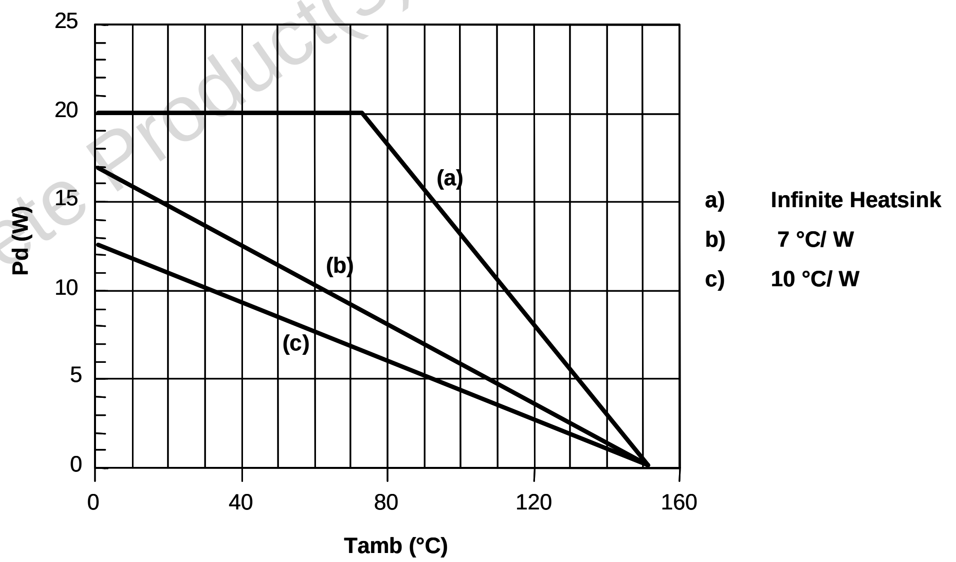
$$P_{dmax} = (\text{N° channels}) \cdot \frac{V_{cc}^{2}}{\Pi^2 \cdot \frac{R_{load}}{2}} + I_q \cdot V_{cc}$$

$$P_{dmax} = 2 \cdot (3.0) + 0.5 = 6.5\ \text{W}$$

$$(\text{Heat Sinker})\ R_{Th\ c\text{-}a} = \frac{150 - T_{amb\ max}}{P_{d\ max}} - R_{Th\ j\text{-}c} = \frac{150 - 50}{6.5} - 2.5 = 12.8°C/W$$

In figure 12 is shown the Power derating curve for the device.

Figure 12. Power derating curve



Clipwatt Assembling Suggestions

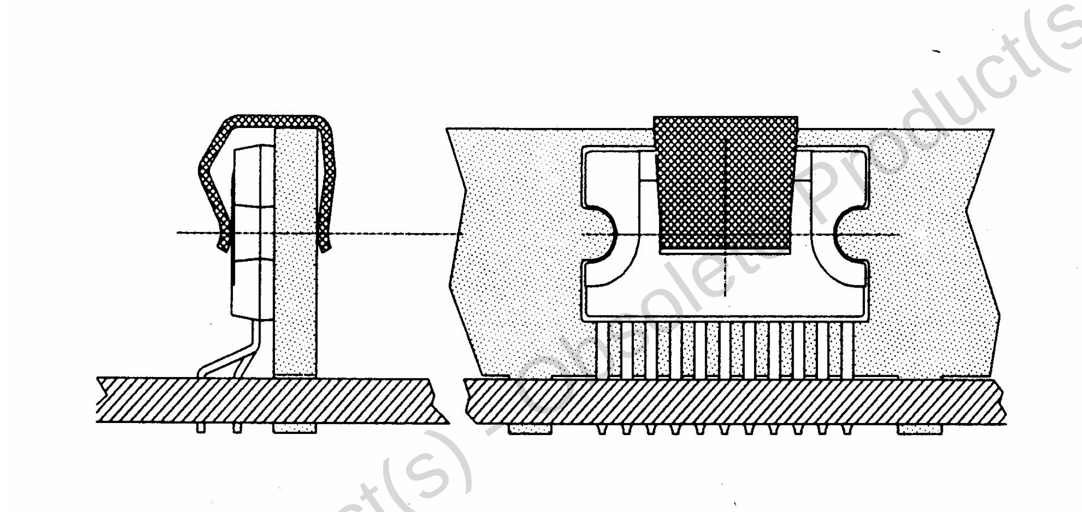
The suggested mounting method of Clipwatt on external heat sink, requires the use of a clip placed as much as possible in the plastic body center, as indicated in the example of figure 13.

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.

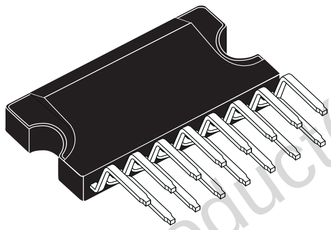
Figure 13. Example of right placement of the clip



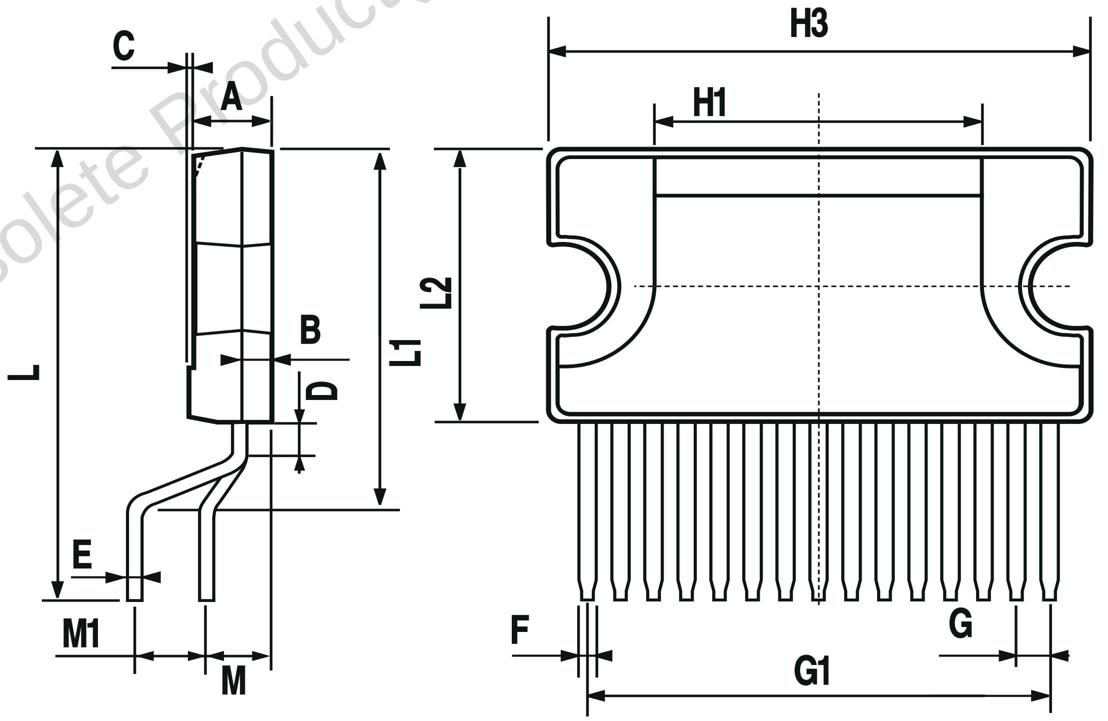
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			3.2			0.126
B			1.05			0.041
C		0.15			0.006	
D		1.55			0.061	
E	0.49		0.55	0.019		0.022
F	0.67		0.73	0.026		0.029
G	1.14	1.27	1.4	0.045	0.050	0.055
G1	17.57	17.78	17.91	0.692	0.700	0.705
H1		12			0.480	
H2		18.6			0.732	
H3	19.85			0.781		
L		17.95			0.707	
L1		14.45			0.569	
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: 1.92gr



Clipwatt15



0044538

STMicroelectronics GROUP OF COMPANIES
Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan - Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States
www.st.com