6 + 6W STEREO AMPLIFIER WITH MUTING

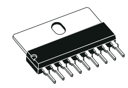
1 FEATURES

- WIDE SUPPLY VOLTAGE RANGE
- HIGH OUTPUT POWER 6+6W @ V_S=20V, R_L = 8Ω, THD=10%
- MUTE FACILITY (POP FREE) WITH LOW CONSUMPTION
- AC SHORT CIRCUIT PROTECTION
- THERMAL OVERLOAD PROTECTION

2 DESCRIPTION

The TDA7263L is class AB dual audio power amplifier assembled in Single IN Line 10 pins package, specially designed for high quality sound application as HI-FI music centers and stereo TV sets.

Figure 1. Package



SIP10

Table 1. Order Codes

Part Number	Package
TDA7263L	SIP10

Figure 2. Block Diagram

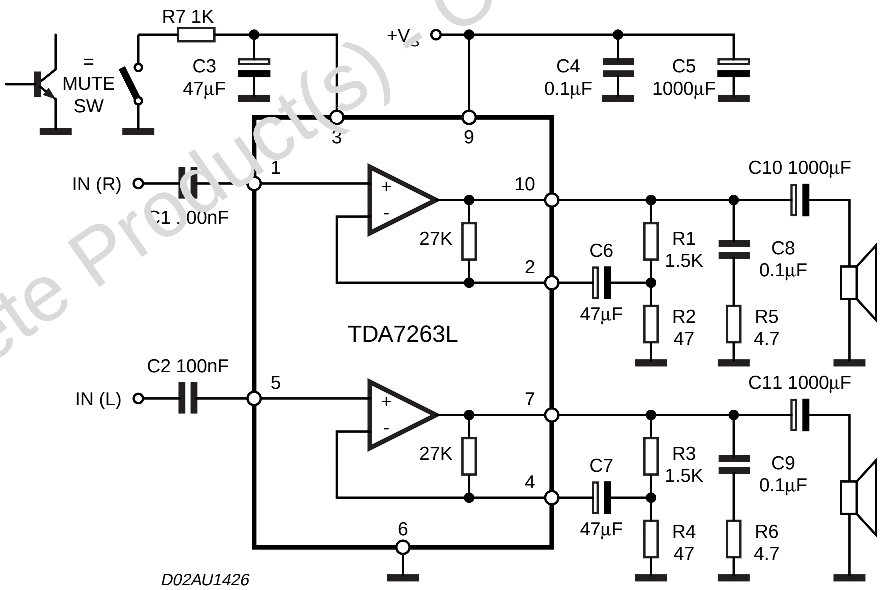


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Table 2. Absolute Maximum Ratings

Symbol	Parameter	Value	Unit
V_S	Supply Voltage without Load	30	V
I_O	Output Peak Current (repetitive f >20Hz)	1.7	A
I_O	Output Peak Current (non repetitive, t = 100µs)	2	A
P_{tot}	Total Power Dissipation (T_{case} = 70°C)	8	W
T_{op}	Operating Temperature Range	0 to 70	°C
T_{stg}, T_j	Storage & Junction Temperature	-40 to 150	°C

Figure 3. Pin Connection (Top view)

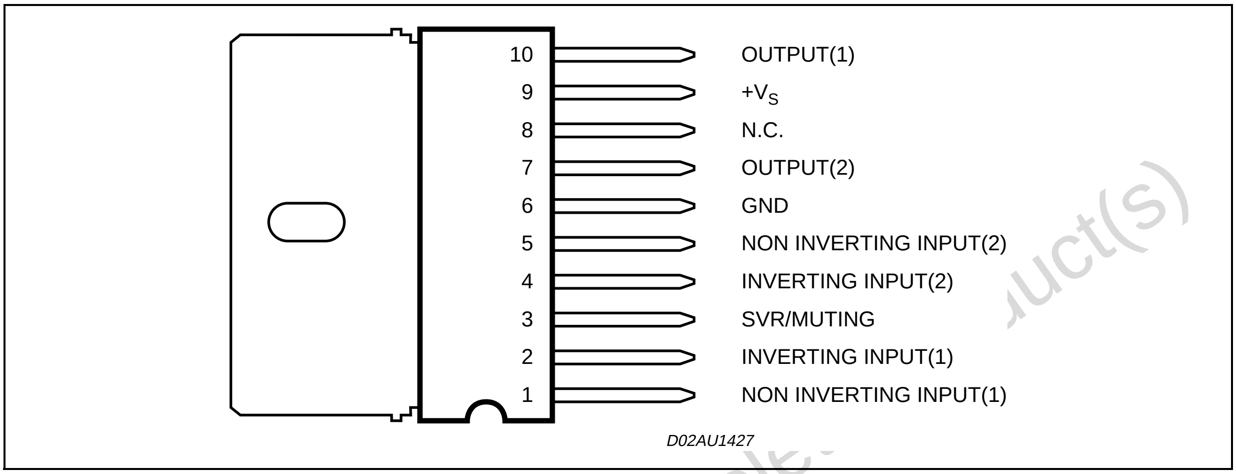

Figure 4. Block Diagram

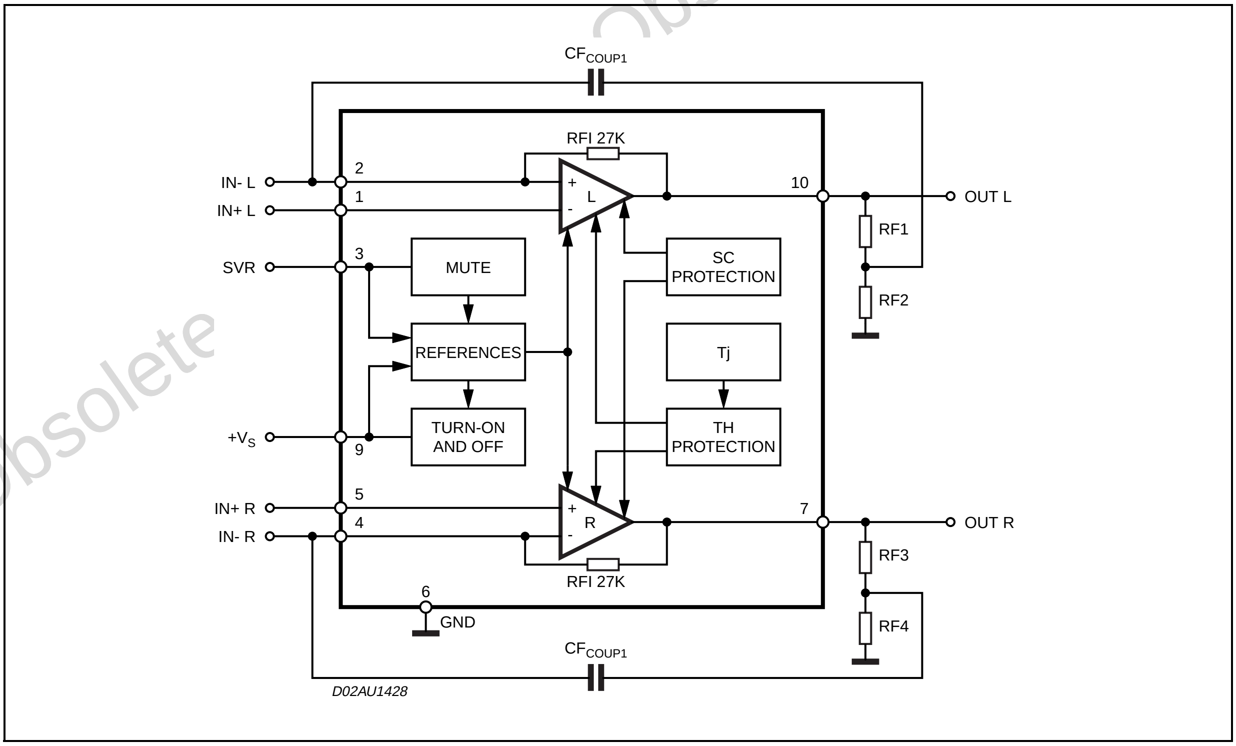

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Table 3. Thermal Data

Symbol	Parameter		Value	Unit
$R_{th\ j-case}$	Thermal resistance junction to case	Max	9	°C/W

Table 4. ELECTRICAL CHARACTERISTCS

(Refer to the stereo test and application circuit, V_S = 20V; R_L = 8Ω; G_v = 30dB; f = 1KHz; T_{amb} = 25°C unless otherwise specified.)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_S	Supply Voltage		10		24	V
V_O	Quiescent Output Voltage			9.5		V
I_q	Total Quiescent Current			70	95	mA
P_O	Output Power (RMS)	d = 10%; T_{amb} = 85°C	5	6		W
		d = 1%	4	5		W
d	Total Harmonic Distortion	P_O = 1W, f = 1kHz		0.03	0.3	%
		f = 100Hz to 10KHz; P_O = 0.1 to 3W			0.5	
C_T	Cross Talk	R_S = 10K&; f = 1KHz		70		dB
		R_S = 10K&; f = 10KHz		60		dB
R_I	Input Resistance		100	200		KΩ
f_L	Low Frequency Roll-off (-3dB)			40		Hz
f_H	High Frequency Roll-off (-3dB)			80		KHz
e_N	Total Input Noise Voltage	A Curve; R_S = 10KΩ		1.5		mV
		f = 22Hz to 22KHz; R_S = 10KΩ		3	10	V
SVR	Supply Voltage Rejection (each channel)	R_S = 10KΩ; f = 100Hz; V_r = 0.5V	45	60		dB
T_j	Thermal Shutdown Junction Temperature			145		°C
MUTE FUNCTION						
VT_{MUTE}	Mute Threshold		1	1.6		V
VT_{PLAY}	Play Threshold			4.5		V
ATT_{AM}	Mute Attenuation		70	100		dB
I_{qMUTE}	Quiescent Current @ Mute			7	10	mA

3 TYPICAL CHARACTERISTICS

(referred to the typical Application Circuit, V_S = 20V, R_L = 8Ω, unless otherwise specified)

Figure 5. Output Power vs. Supply Voltage

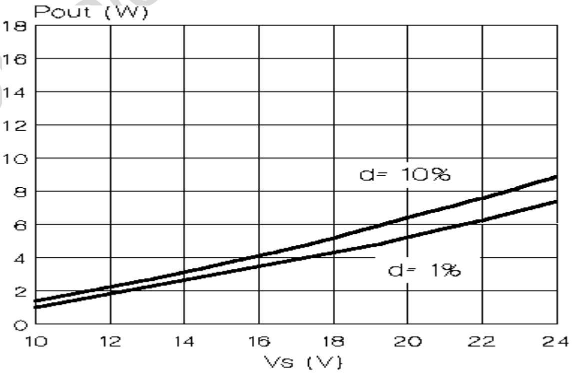

Figure 6. Distortion vs. Output Power

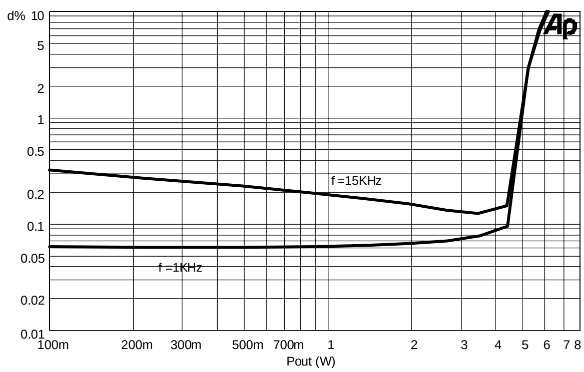

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Figure 7. Quiescent Current vs. Supply Voltage

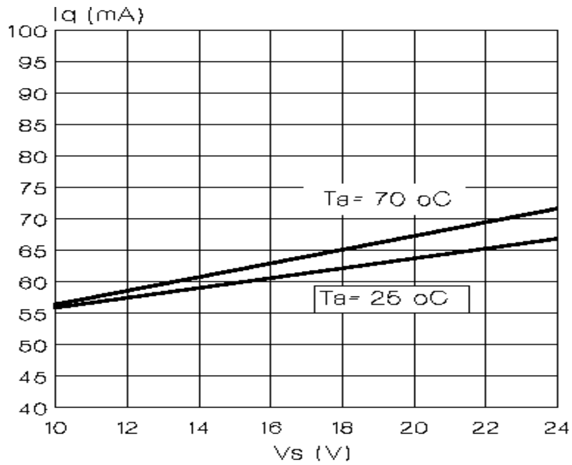


Figure 8. Supply Voltage Rejection vs. Freq.

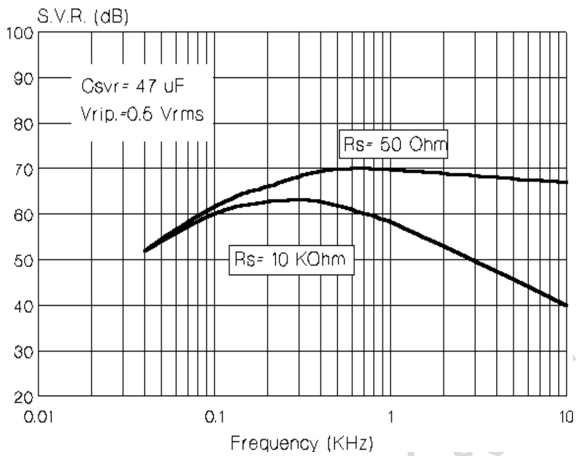


Figure 9. Crosstalk vs. Frequency

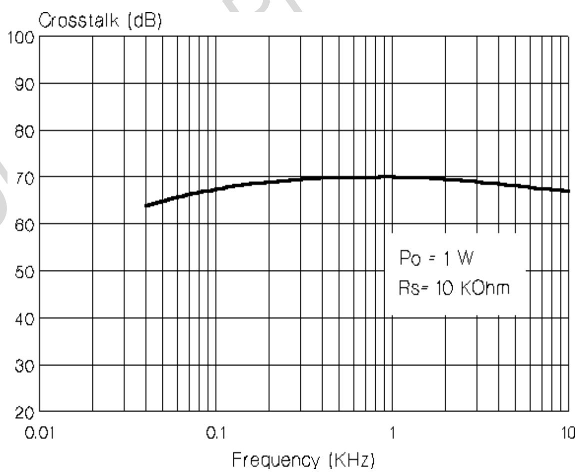


Figure 10. Output Attenuation & Quiescent Current vs. V_{pin3}

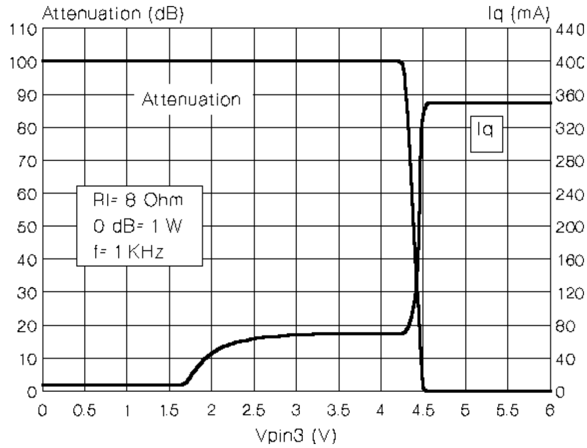


Figure 11. Total Power Dissipation vs. Output Power

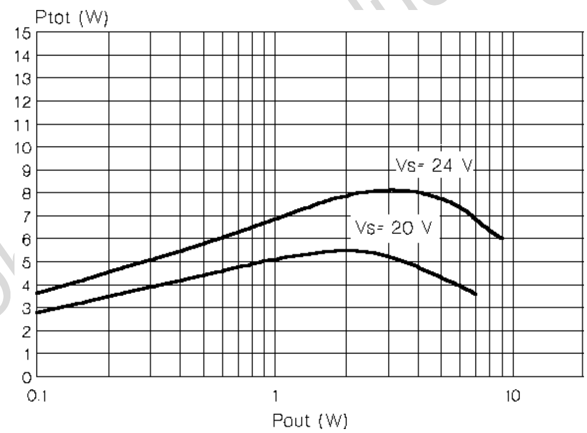


Figure 12. PC Board Component Layout

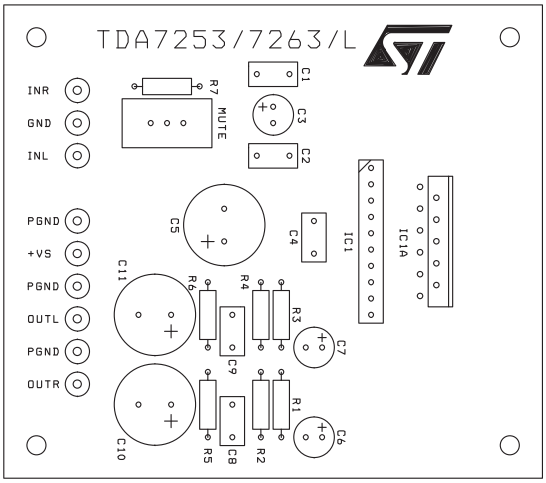


Figure 13. Evaluation Board Top Layer Layout

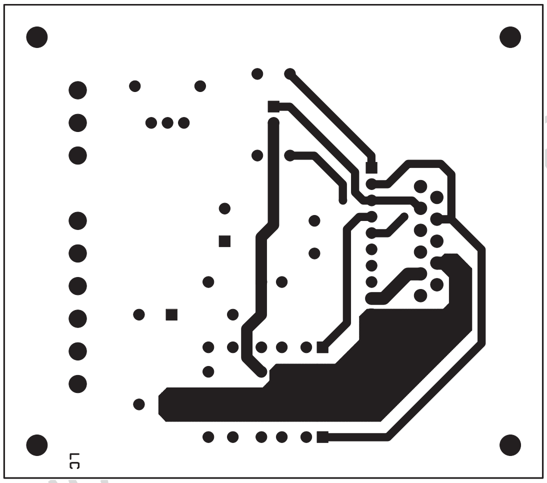
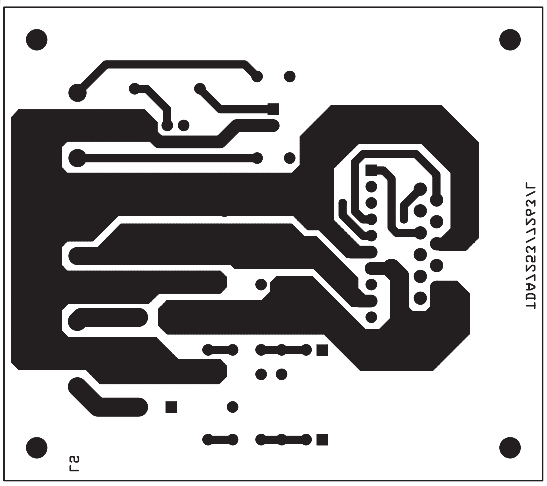


Figure 14. Evaluation Board Bottom Layer Layout



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4 APPLICATION SUGGESTION

The recommended values of the components are those shown on the typical application circuit. Different values can be used; the following table can help the designer.

Component	Recomm. Value	Purpose	Larger Than	Smaller Than
R1 and R3	1.5KΩ	Close loop gain setting (*)	Increase of gain	Decrease of gain
R2 and R4	47Ω	Close loop gain setting (*)	Decrease of gain	Increase of gain
R5 and R6	4.7Ω	Frequency stability	Danger of oscillations	
C1 and C2	100nF	Input DC decoupling	Higher SVR	Higher low frequency cutoff
C3	47µF	- Ripple Rejection - Mute time constant	Increase of the Switch-on time	- Degradation of SVR - Worse turn-off pop by muting
C4	100nF	Supply Voltage Bypass		Danger of oscillations
C5	1000µF	Supply Voltage Bypass		
C6 and C7	47µF	Feedback input DC decoupling	Increase of the Switch-on time	Danger of Switch-on time
C8 and C9	0.1µF	Frequency stability		Danger of oscillations
C10 and C11	1000µF	Output DC decoupling		Higher low-frequency cut-off

(*) Closed loop gain must be higher than 26dB

5 BUILT-IN PROTECTION SYSTEMS

5.1 Thermal Shut-down

The presence of a thermal limiting circuit offers the following advantages:

1 an overload on the output (even if it is permanent), or an excessive ambient temperature can be easily withstood.

2 the heatsink can have a smaller factor of safety compared with that of a conventional circuit. There is no device damage in the case of excessive junction temperature; if for any reason the junction temperature increases up to 145°C. the thermal shutdown simply reduces the output power and therefore the power dissipation.

The maximum allowable power dissipation depends upon the thermal resistance junction-ambient. Figure 15 shows the dissipable power as a function of ambient temperature for different heatsink thermal resistance.

5.2 Short Circuit (AC Conditions)

The TDA7263L can withstand accidental short circuits across the speaker made by a wrong connection during normal play operation.

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6 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)

6.1 Example:

V_{CC} = 20V, R_{load} = 8ohm, $R_{Th\ j\text{-}c}$ = 9 °C/W , $T_{amb\ max}$ = 50°C

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

P_{dmax} = 2 · (2.5) + 0.5 = 5.5W

$$(\text{Heat Sinker})\ R_{Th\ c\text{-}a} = \frac{150 - T_{amb\ max}}{P_{d\ max}} - R_{Th\ j\text{-}c} = \frac{150-50}{5.5} - 9 = 9.0°C/W$$

In figure 11 is shown the Power derating curve for the device.

Figure 15. Power Derating Curve

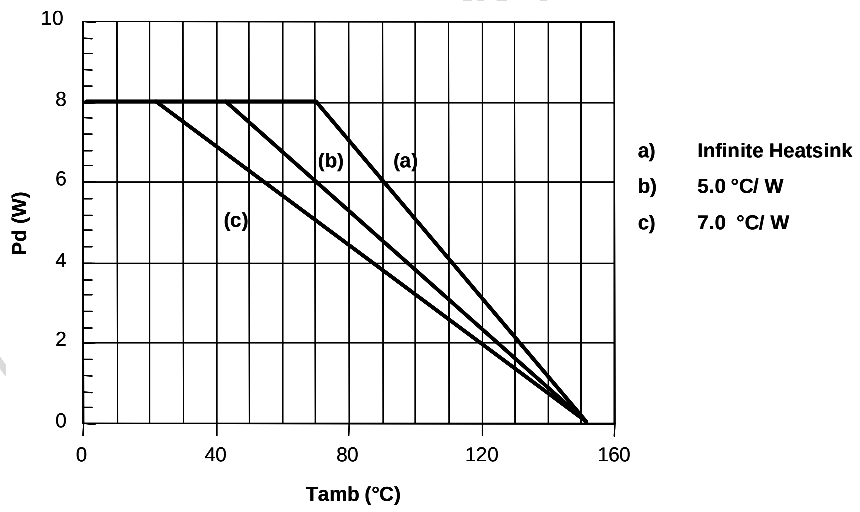

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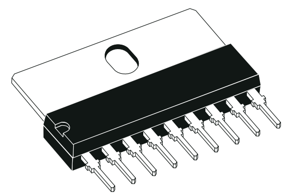
Figure 16. SIP10 Mechanical Data & Package Dimensions

DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			7.1			0.280
a1	2.7		3	0.106		0.118
B			24.8			0.976
b1		0.5			0.020	
b3	0.85		1.6	0.033		0.063
C		3.3			0.130	
c1		0.43			0.017	
c2		1.32			0.052	
D			23.7			0.933
d1		14.5			0.571	
e		2.54			0.100	
e3		22.86			0.900	
L	3.1			0.122		
L1		3			0.118	
L2		17.6			0.693	
L3			0.25			0.010
L4			0.254			0.010
M		3.2			0.126	
N		1			0.039	
P			0.15			0.006

OUTLINE AND MECHANICAL DATA

Weight: 2.02gr



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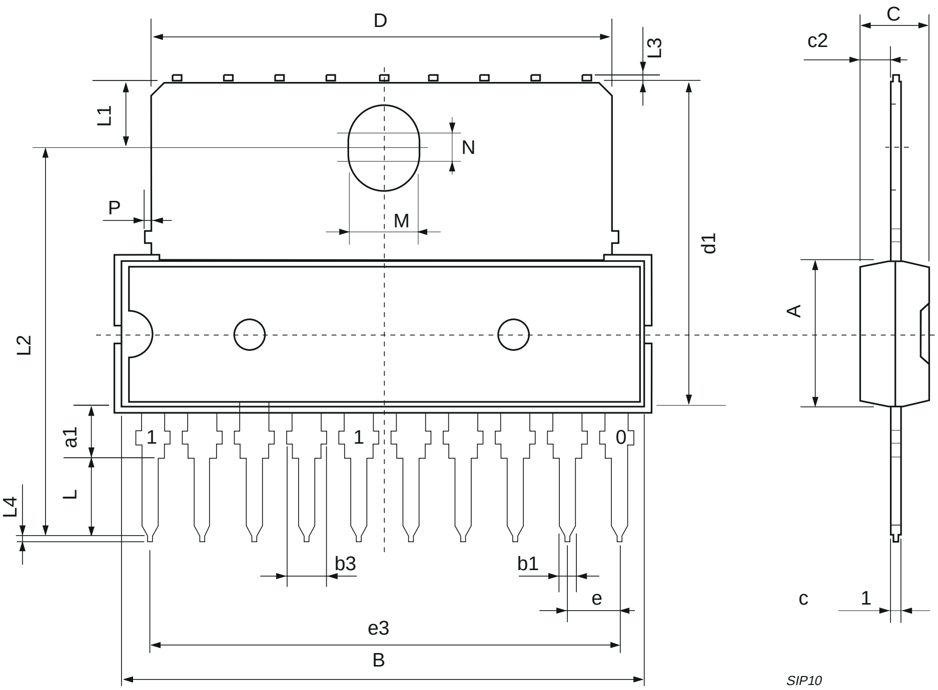

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Table 5. Revision History

Date	Revision	Description of Changes
June 2003	1	First Issue
September 2004	2	Changed Status and the graphic aspect in compliant to the new rules “Corporate Technical Pubblications Design Guide”

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