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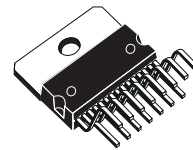
Address: A1208, Overseas Decoration Building, #122 Zhenhua RD., Futian, Shenzhen, China



## 10W AMPLIFIER WITH DC VOLUME CONTROL

- 10W OUTPUT POWER  $R_L = 8\Omega$ ,  
@ THD = 10%  $V_{CC} = 28V$
- ST-BY AND MUTE FUNCTIONS
- LINEAR VOLUME CONTROL DC COUPLED  
WITH POWER OP AMPLIFIER
- NO BOUCHEROT CELL
- NO ST-BY RC INPUT NETWORK
- SIGNAL LINE OUTPUT BEFORE VOLUME  
CONTROLLING AND MUTING
- 3 SWITCHABLE VOLTAGE CONTROLLED  
INPUT PINS
- SINGLE SUPPLY RANGING UP TO 35V
- SHORT CIRCUIT PROTECTION
- THERMAL OVERLOAD PROTECTION
- INTERNALLY FIXED GAIN
- SOFT CLIPPING
- LOW TURN-ON TURN-OFF POP NOISE
- MULTIWATT 15 PACKAGE

### MULTIPOWER BI50II TECHNOLOGY



**Multiwatt15**

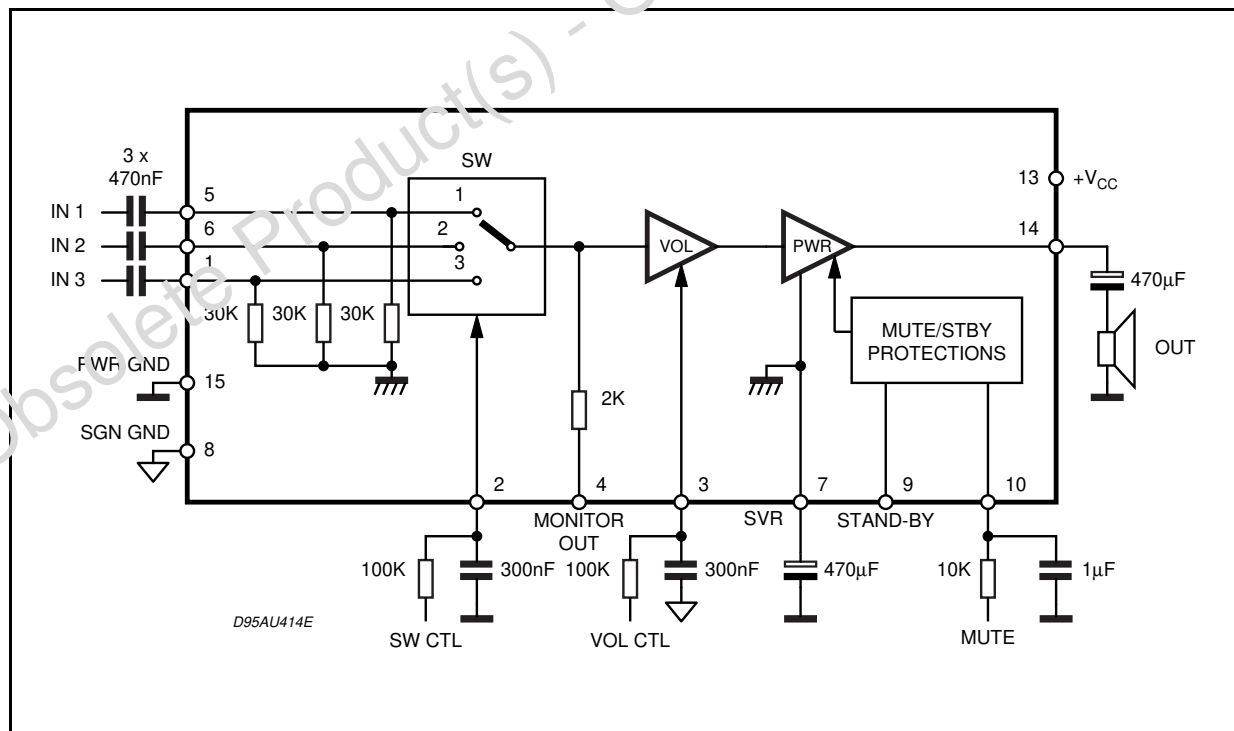
**ORDERING NUMBER:** TDA7494

### DESCRIPTION

The TDA7494 10W class AB power amplifier assembled in the Multiwatt 15 package, specially designed for high quality sound, TV applications.

Features of the TDA7494 include volume control, 3 switchable inputs, Stand-by and mute functions.

### BLOCK AND APPLICATION DIAGRAM



# TDA7494

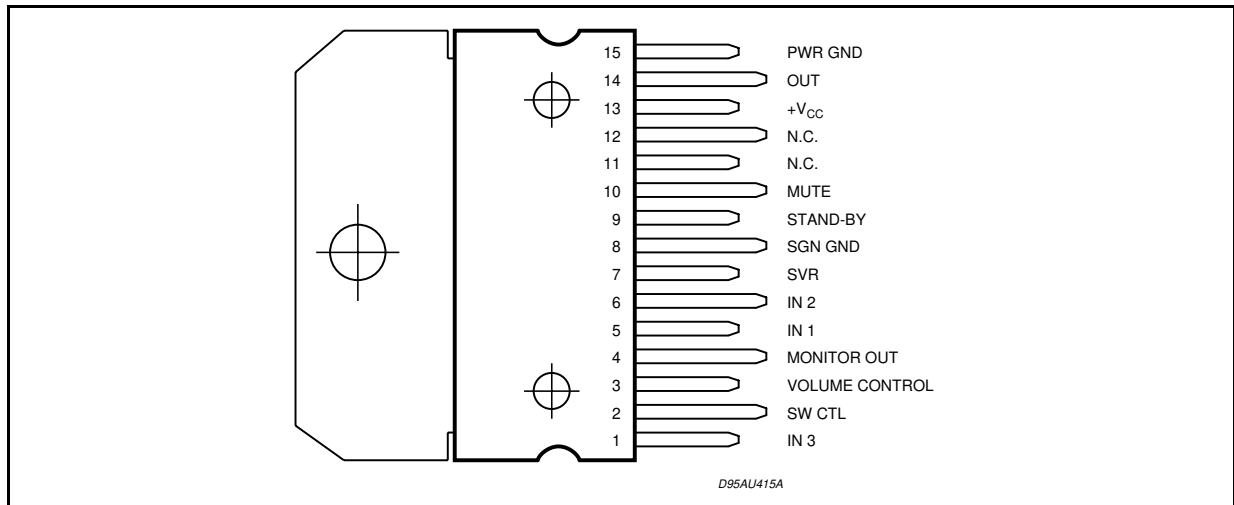
## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
$V_S$	DC Supply Voltage	40	V
$V_{IN}$	Maximum Input Voltage	8	V <sub>pp</sub>
$P_{tot}$	Total Power Dissipation ( $T_{amb} = 70^\circ\text{C}$ )	16	W
$T_{amb}$	Ambient Operating Temperature Range (1)	-20 to +85	$^\circ\text{C}$
$T_{stg}, T_j$	Storage and Junction Temperature	-40 to 150	$^\circ\text{C}$
$V_2, V_3$	Volume CTRL DC voltage (2)	7	V

(1) Operation between -20 to 85  $^\circ\text{C}$  guaranteed by correlation with 0 to 70 $^\circ\text{C}$ .

(2) Pin 3 is ESD sensitive (max. voltage  $\pm 1.5\text{kV}$ )

## PIN CONNECTION



## THERMAL DATA

Symbol	Parameter	Value	Unit
$R_{th\ j-case}$	Thermal Resistance Junction-case	Typ = 3.8    Max = 4.8	$^\circ\text{C}/\text{W}$
$R_{th\ j-amb}$	Thermal Resistance Junction-ambient	max 35	$^\circ\text{C}/\text{W}$

**ELECTRICAL CHARACTERISTICS** (Refer to the test circuit,  $V_S = 21\text{V}$ ,  $R_L = 8\Omega$ ;  $R_g = 50\Omega$ ;  $T_{amb} = 25^\circ\text{C}$ ; unless otherwise specified.)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
$V_S$	Supply Voltage Range		11		35	V
$I_q$	Total Quiescent Current			22	50	mA
DCVos	Output DC Offset Referred to SVR Potential	No Input Signal	-550		550	mV
$V_o$	Quiescent Output Voltage	$V_S = 18\text{V}$	7.8	9	10.2	V
$P_o$	Output Power	THD = 10%; $V_{CC} = 28\text{V}$ , $R_L = 8\Omega$ THD = 1%; $V_{CC} = 28\text{V}$	8 6	10 8		W
		THD = 10%; $V_{CC} = 21\text{V}$ , THD = 1%; $V_{CC} = 21\text{V}$ ,	5 3.5	5.5 4		W
		THD = 10%; $V_{CC} = 21\text{V}$ , $R_L = 4\Omega$ THD = 1%; $V_{CC} = 21\text{V}$ ,	5 3.9	7.5 5.5		W
		THD = 10%; $V_{CC} = 18\text{V}$ , THD = 1%; $V_{CC} = 18\text{V}$	4.5 3.5	6 4.5		W
		THD = 10%; $V_{CC} = 18\text{V}$ , $R_L = 8\Omega$ THD = 1%; $V_{CC} = 18\text{V}$	3.5 2.2	3.75 2.85		W

## ELECTRICAL CHARACTERISTICS (continued)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
THD	Total Harmonic Distortion	$P_O = 1W$ ; $f = 1KHz$ ; $G_v = 26dB$			0.4	%
$I_{peak}$	Output Peak Current	(internally limited)	1.4	1.9		A
$T_{op}$	Operating Temperature		0		70	°C
$V_{in}$	Input Signal				2.8	V <sub>rms</sub>
$G_v$	Closed Loop Gain	Vol Ctrl > 4.5V	24.5	26	27.5	dB
$G_{vLine}$	Monitor Out Gain	$R_{LOAD Mon} = \infty$	-3	-1.5	0	dB
$A_{MinVol}$	Attenuation at Min Volume	Vol Ctrl < 0.5V	80			dB
BW				0.6		MHz
$e_n$	Total Output Noise	$f = 20Hz$ to 22KHz Play, max volume		350	700	$\mu V$
		$f = 20Hz$ to 22KHz Play, max attenuation		60	100	$\mu V$
		$f = 20Hz$ to 22KHz Mute		30	50	$\mu V$
SR	Slew Rate		5	8		V/ $\mu s$
$R_i$	Input Resistance		22.5	30		K $\Omega$
$R_{Mon}$	Monitor Output Resistance		1.4	2	3	K $\Omega$
$R_{load Mon}$	Monitor Output Load		30			K $\Omega$
SVR	Supply Voltage Rejection	$f = 1kHz$ ; max volume $C_{SVR} = 470\mu A$ ; $V_{RIP} = 1V_{RMS}$	36	43		dB
		$f = 1kHz$ ; max attenuation $C_{SVR} = 470\mu A$ ; $V_{RIP} = 1V_{RMS}$	60	73		dB
$T_M$	Thermal Muting			150		°C
$T_s$	Thermal Shut-down			160		°C
$V_{ST-BY}$	Stand-by threshold		2.3	2.5	2.7	V
$V_{MUTE}$	Mute Threshold		2.3	2.5	2.7	V
Sel #1	Control Voltage	Input #1 selected	0		1	V
Sel #2	Control Voltage	Input #2 selected	2.3		2.7	V
Sel #3	Control Voltage	Input #3 selected	4		5	V
$I_{qST-BY}$	Quiescent Current @ Stand-by			0.6	1	mA
$A_{MUTE}$	Mute Attenuation		60	75		dB
$I_{stbyBIAS}$	Stand-by bias current	Stand by on; $V_{ST-BY} = 5V$ ; $V_{MUTE} = 5V$ ;		80	150	$\mu A$
		Play or Mute		2	20	$\mu A$
$I_{muteBIAS}$	Mute bias current	Mute		1.5	10	$\mu A$
		Play		0.5	5	$\mu A$
$I_{switchBIAS}$	Switch bias current	Input #1 selected		-0.5	5	$\mu A$
		Input #2 selected		1	10	$\mu A$
		Input #3 selected		1.5	20	$\mu A$



# TDA7494

Figure 1: Test and Application Circuit.

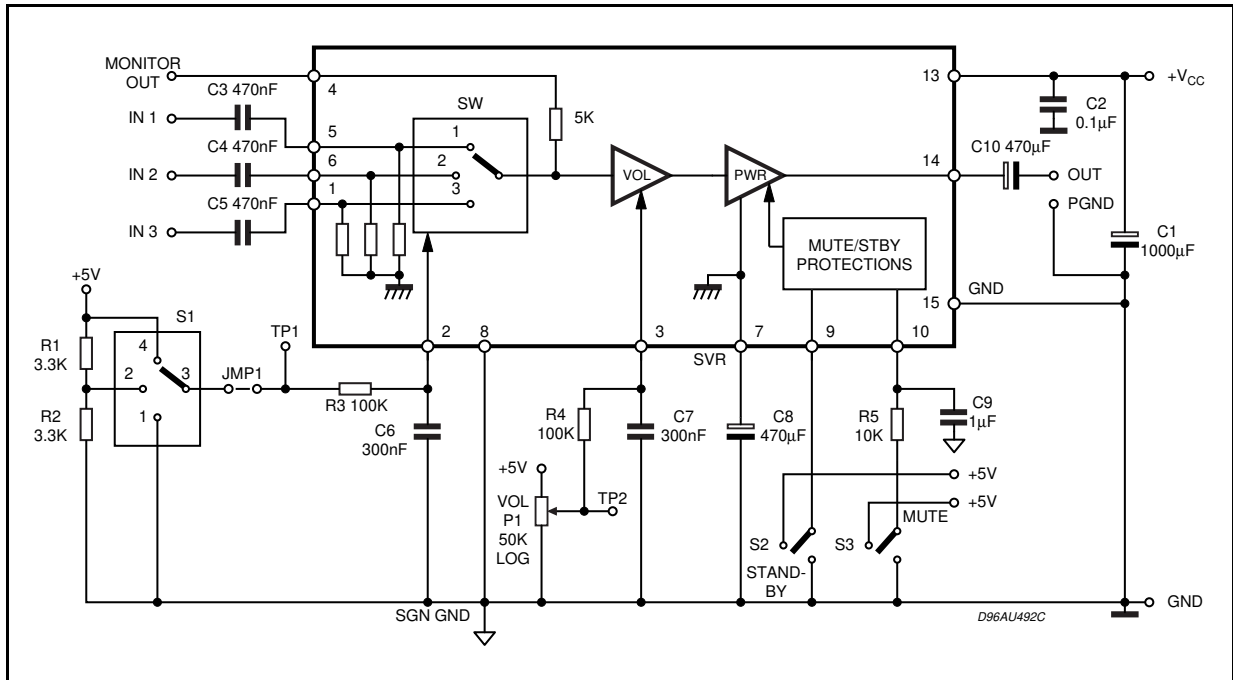
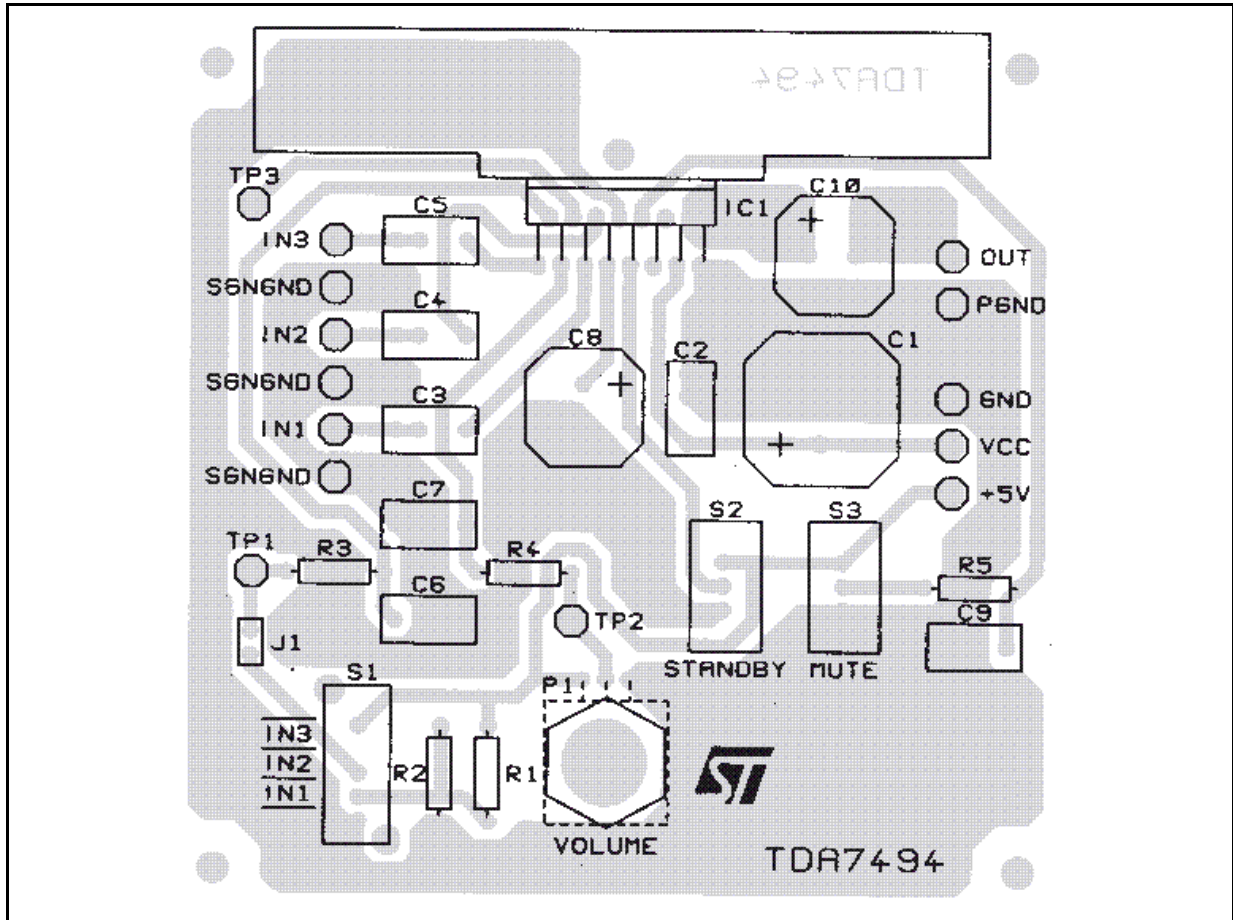


Figure 2: P.C.B. and component layout.



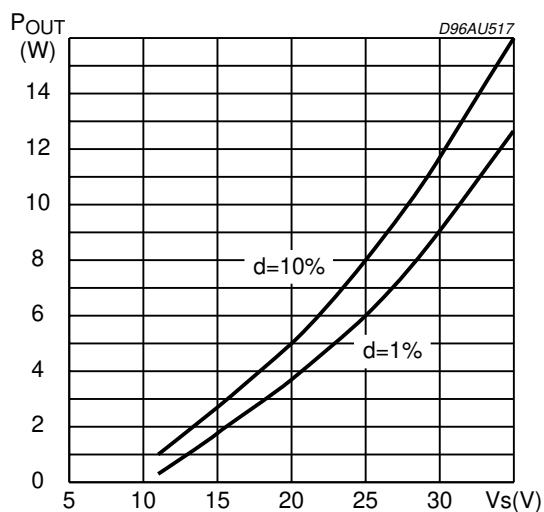
## APPLICATION SUGGESTIONS

The recommended values of the external components are those shown on the application circuit of figure 1. Different values can be used; the following table can help the designer.

COMPONENT	SUGGESTION VALUE	PURPOSE	LARGER THAN SUGGESTION	SMALLER THAN SUGGESTION
R1	3.3K $\Omega$	Input switch circuit	Vpin #2 shifted downward	Vpin #2 shifted upward
R2	3.3K $\Omega$	Input switch circuit	Vpin #2 shifted upward	Vpin #2 shifted downward
R3	100K $\Omega$	Input switch time constant	Larger Input Switch Time	Smaller input switch time
R4	100K $\Omega$	Volume control time constant	Larger Volume Regulation Time	Smaller volume regulation time
R5	10K $\Omega$	Mute time constant	Larger mute on/off time	Smaller mute on/off time
P1	50K $\Omega$	Volume control circuit		
C1	1000 $\mu$ F	Supply voltage bypass		Danger of oscillation
C2	100nF	Supply voltage bypass		Danger of oscillation
C3	470nF	Input DC decoupling	Lower low frequency cutoff	Higher low frequency cutoff
C4	470nF	Input DC decoupling	Lower low frequency cutoff	Higher low frequency cutoff
C5	470nF	Input DC decoupling	Lower low frequency cutoff	Higher low frequency cutoff
C6	300nF	Input- switch time constant	Larger-Input- switch time	Smaller input- switch time
C7	300nF	Volume control time constant	Larger volume regulation time	Smaller volume regulation time
C8	470 $\mu$ F	Ripple Rejection	Better SVR	Worse SVR
C9	1 $\mu$ F	Mute time constant	Larger mute on/off time	Smaller mute on/off time
C10	470 $\mu$ F	Output DC decoupling	Lower low frequency cutoff	Higher low frequency cutoff

**TYPICAL CHARACTERISTICS:** Refer to the Application Circuit of Fig.1  $V_S = 21V$ ;  $R_L = 8\Omega$ ;  $f = 1KHz$ ;  $R_s = 8\Omega$ ;  $T_{amb} = 25^\circ C$ ;  $R_s = 50\Omega$ ; unless otherwise specified

**Figure 3:** Output Power vs Supply Voltage



**Figure 4:** Distortion vs Output Power

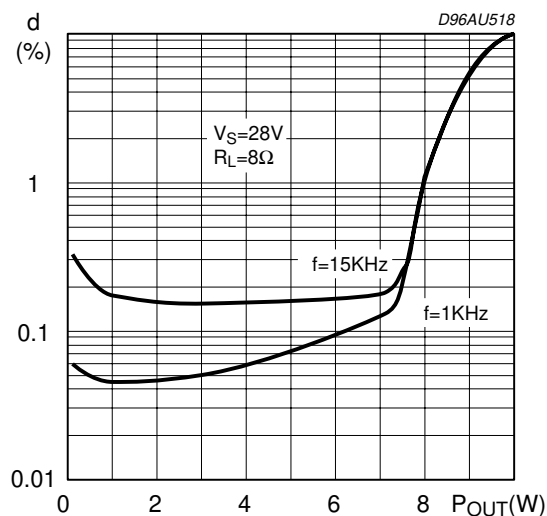


Figure 5: Output Power vs Supply Voltage

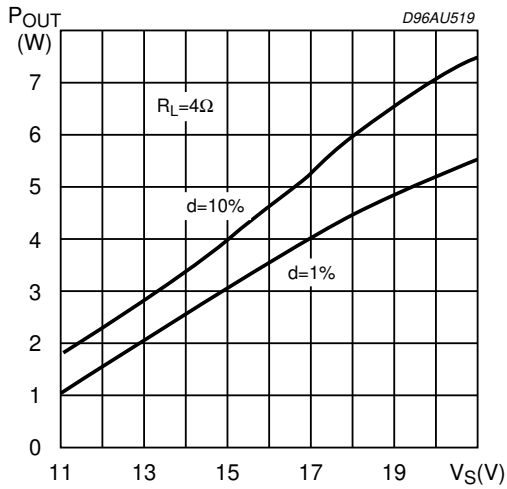


Figure 6: Distortion vs Output Power

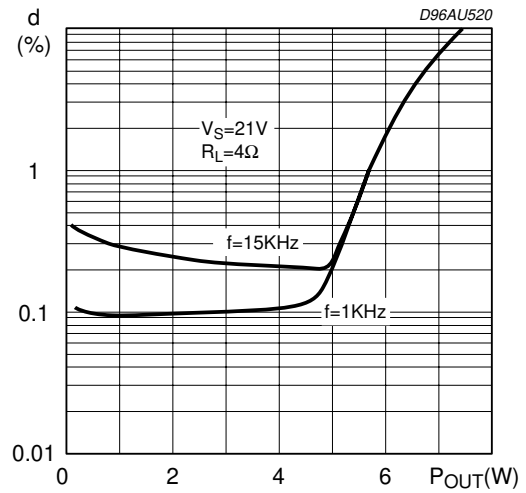


Figure 7: Distortion vs Frequency

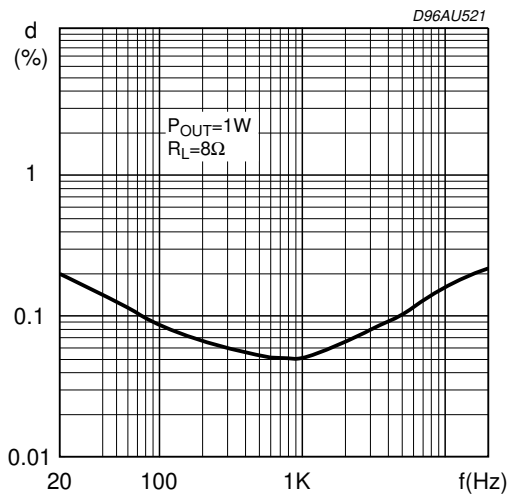


Figure 8: Distortion vs Frequency

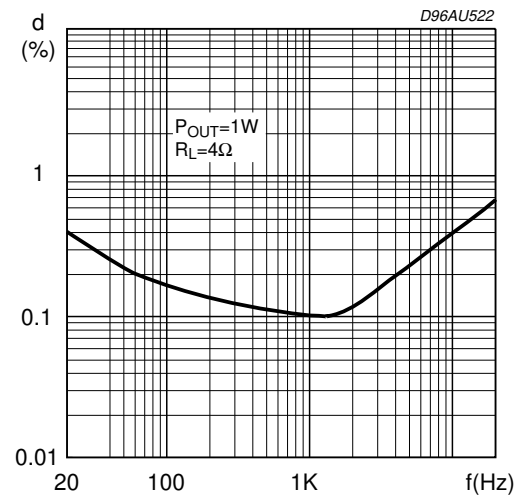


Figure 9: Quiescent Current vs Supply Voltage

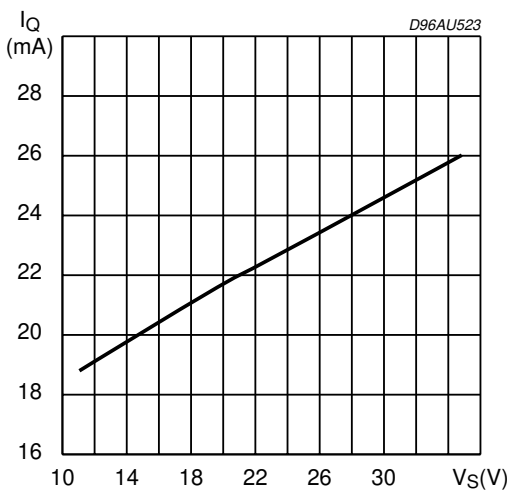
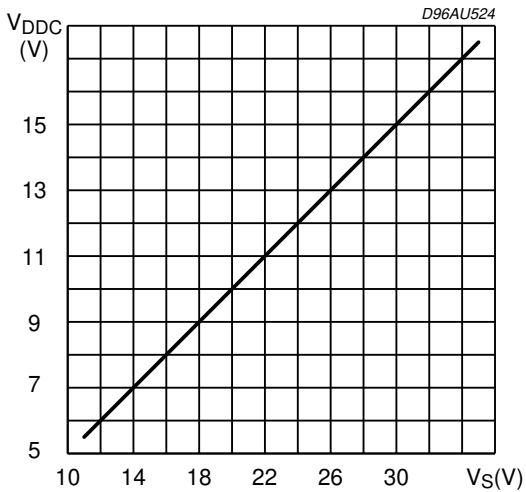
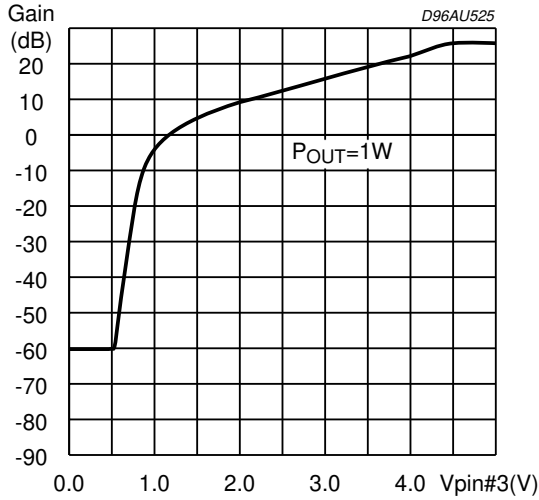


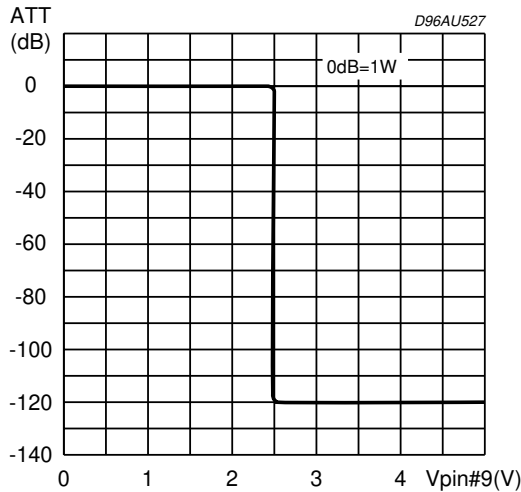
Figure 10: Quiescent Output Voltage vs Supply Voltage



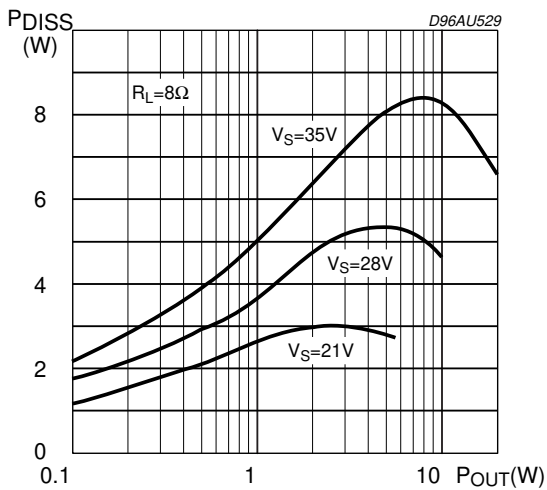
**Figure 11: Gain vs Volume Control (pin #3)**



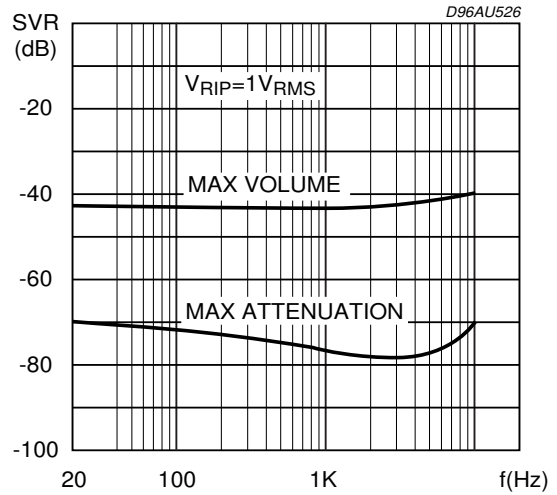
**Figure 13: Stand-by Attenuation vs Vpin # 9**



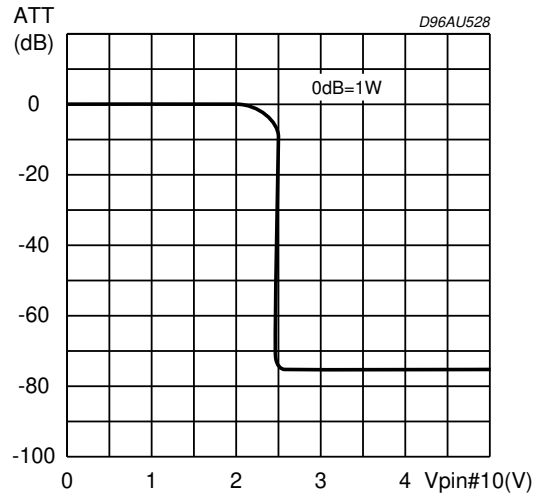
**Figure 15: Power Dissipation vs Output Power**



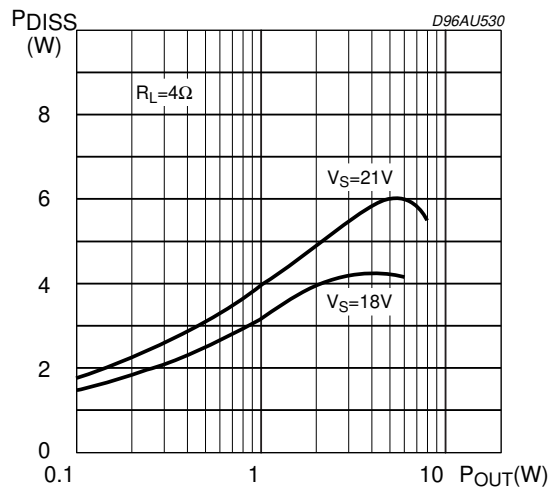
**Figure 12: Supply Voltage Rejection vs Frequency**



**Figure 14: Mute Attenuation vs Vpin # 10**



**Figure 16: Power Dissipation vs Output Power**



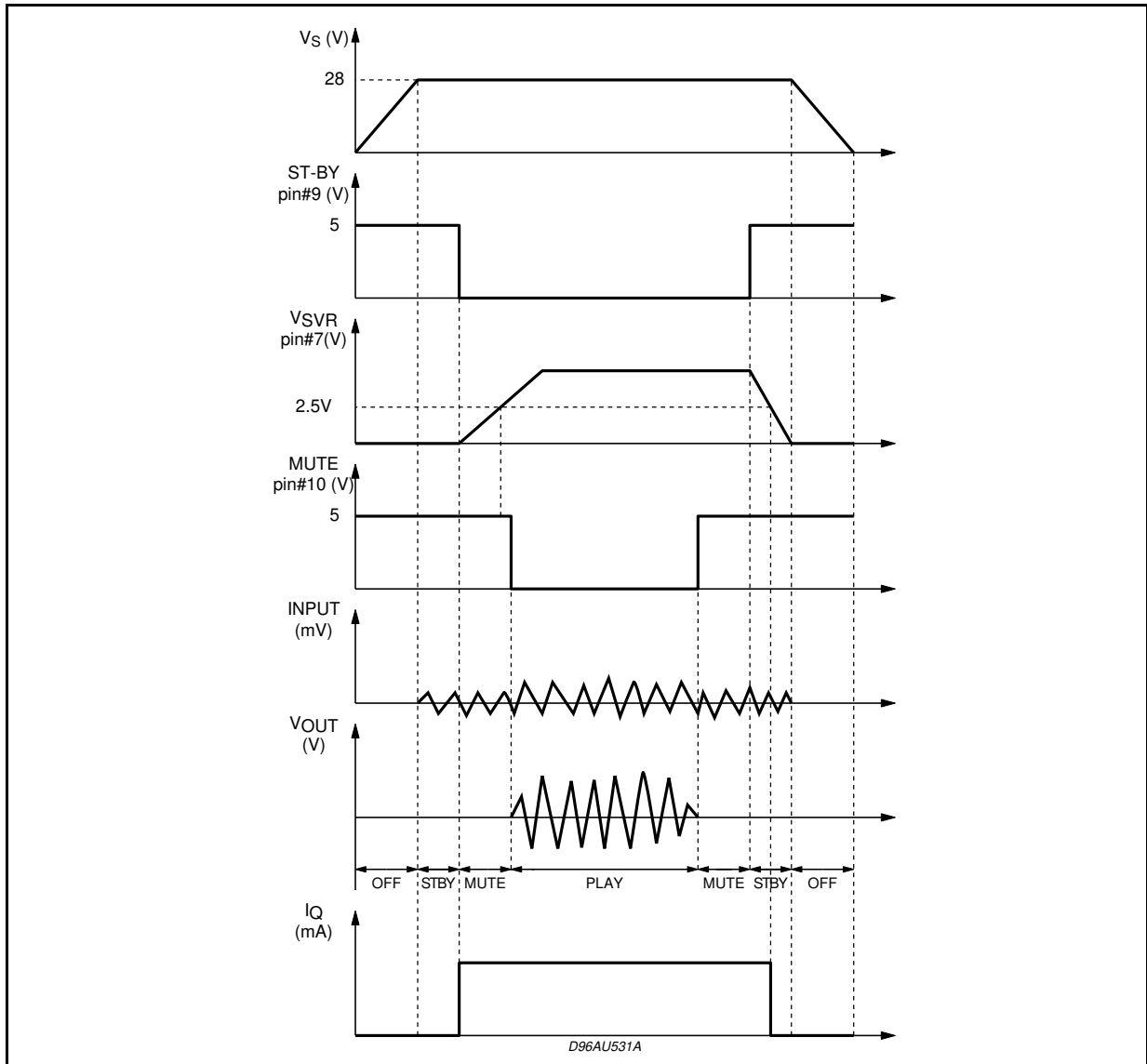


**MUTE STAND-BY TRUTH TABLE**

MUTE	ST-BY	OPERATING CONDITION
H	H	STANDBY
L	H	STANDBY
H	L	MUTE
L	L	PLAY

**Turn ON/OFF Sequences (for optimising the POP performances)**

**A) USING MUTE AND STAND-BY FUNCTIONS**



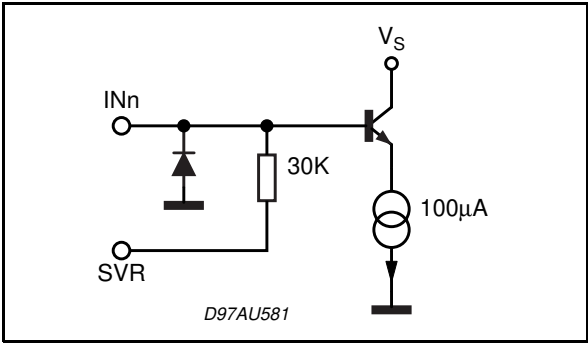
**B) USING ONLY THE MUTE FUNCTION**

To simplify the application, the stand-by pin can be connected directly to Ground.

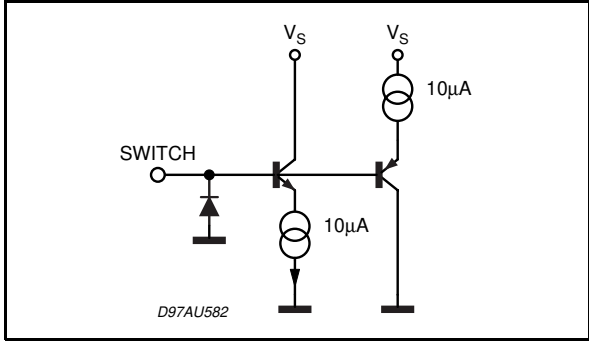
During the ON/OFF transitions we recommend to respect the following conditions:

- At the turn-on the transition mute to play must be made when the SVR pin is higher than 2.5V
- At the turn-off the TDA7494 must be brought to mute from the play condition when the SVR pin is higher than 2.5V.

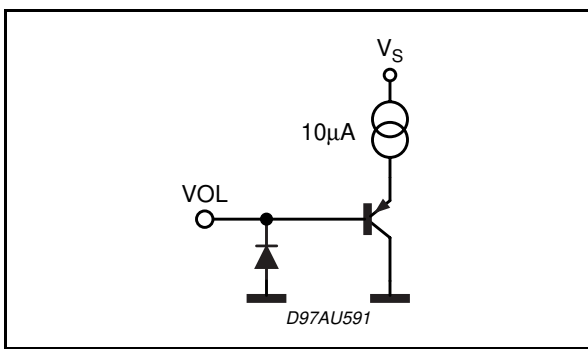
**PINS:** IN3, IN1, IN2



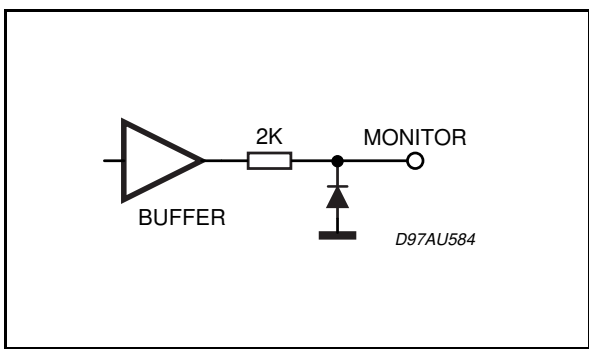
**PIN:** SWITCH



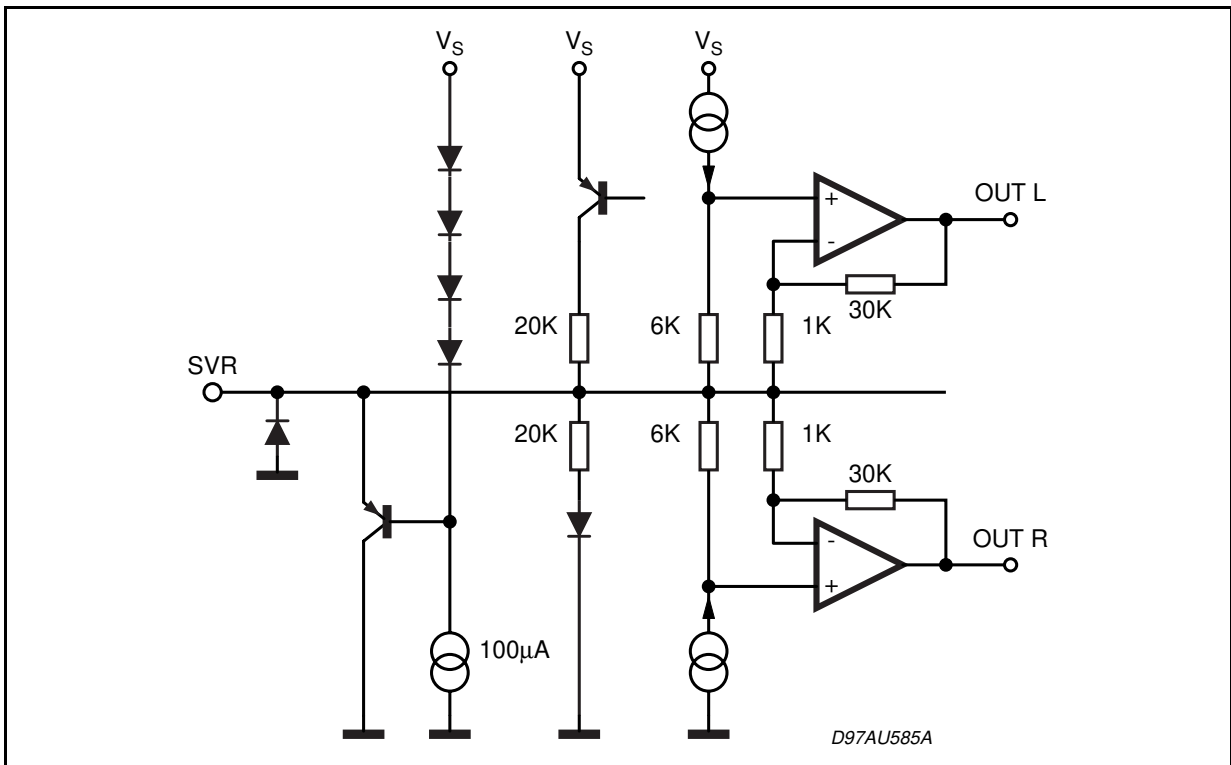
**PIN:** VOLUME



**PIN:** MONITOR

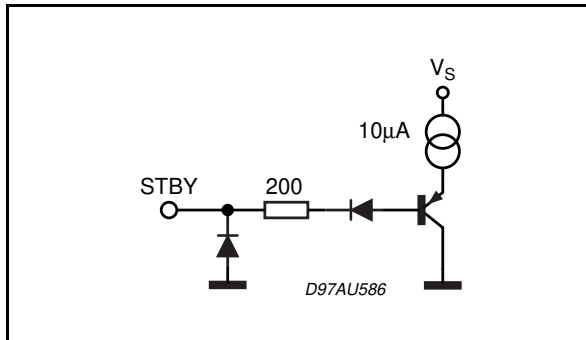


**PIN:** SVR

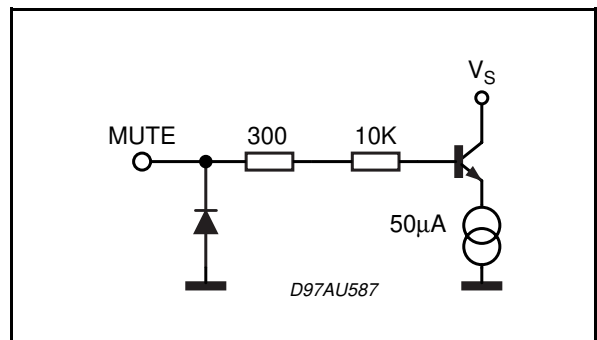


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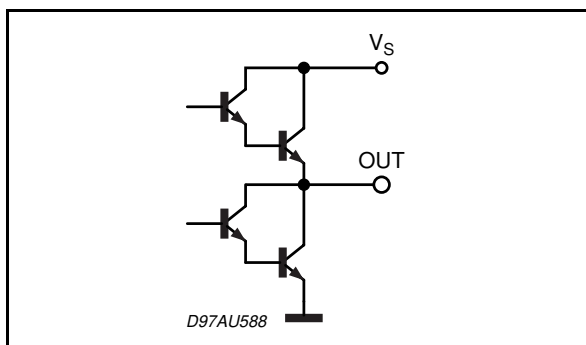
**PIN: ST-BY**



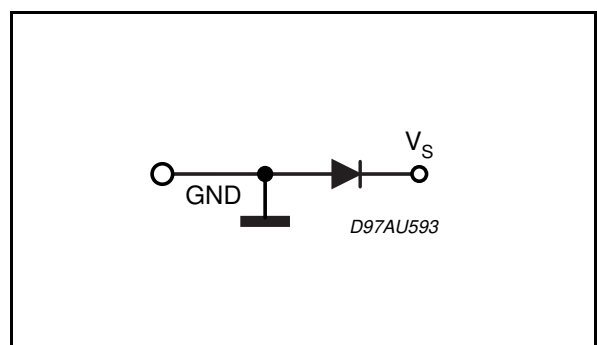
**PIN: MUTE**



**PIN: OUT**

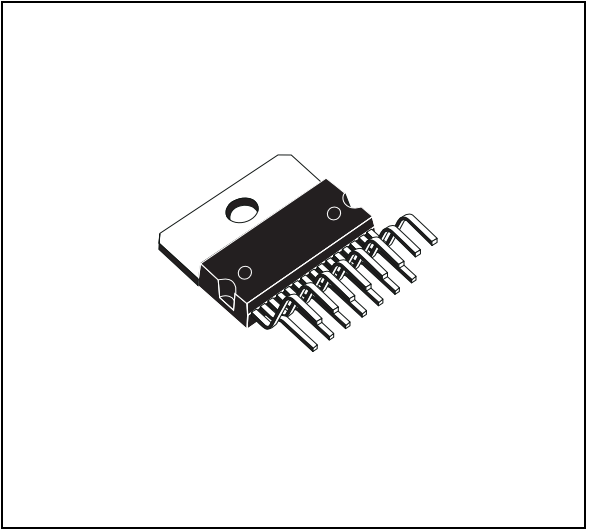


**PINS: PW-GND, S-GND**

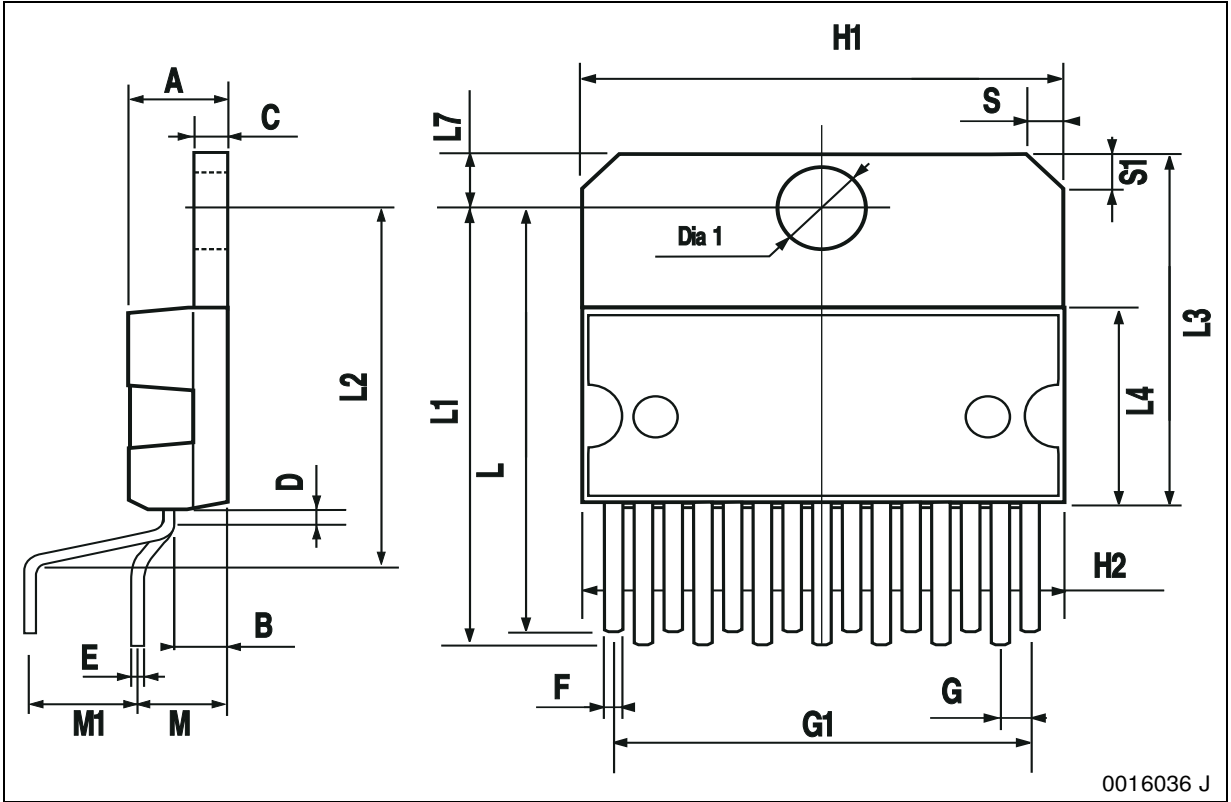


DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A5						0.197
B			2.65			0.104
C			1.6			0.063
D		1			0.039	
E	0.49		0.55	0.019		0.022
F	0.66		0.75	0.026		0.030
G	1.02	1.27	1.52	0.040	0.050	0.060
G1	17.53	17.78	18.03	0.690	0.700	0.710
H1	19.6			0.772		
H2			20.2			0.795
L	21.9	22.2	22.5	0.862	0.874	0.886
L1	21.7	22.1	22.5	0.854	0.87	0.886
L2	17.65		18.1	0.695		0.713
L3	17.25	17.5	17.75	0.679	0.689	0.699
L4	10.3	10.7	10.9	0.406	0.421	0.429
L7	2.65		2.9	0.104		0.114
M	4.25	4.55	4.85	0.167	0.179	0.191
M1	4.73	5.08	5.43	0.186	0.200	0.214
S	1.9		2.6	0.075		0.102
S1	1.9		2.6	0.075		0.102
Dia1	3.65		3.85	0.144		0.152

**OUTLINE AND MECHANICAL DATA**



**Multiwatt15 (Vertical)**



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