

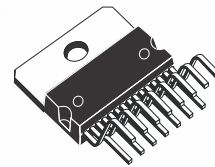


**TDA7494**

**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

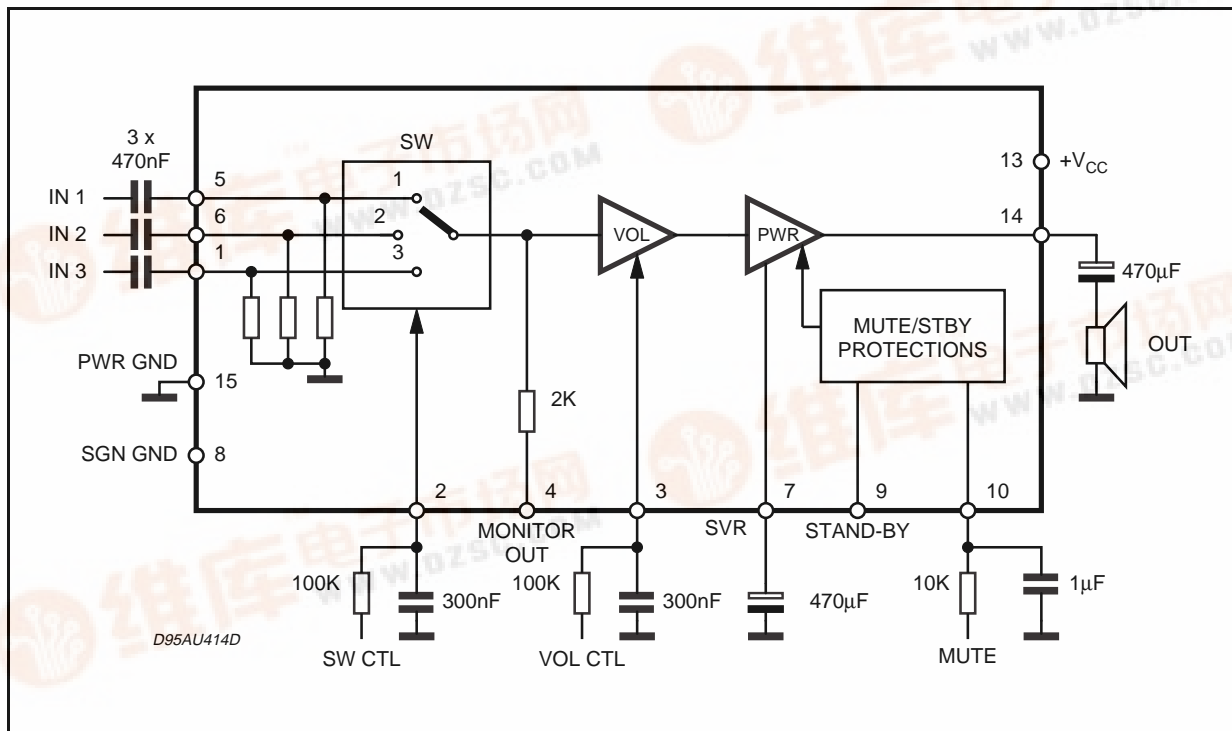
ORDERING NUMBER: TDA7494

**DESCRIPTION**

The TDA7494 10W is 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**



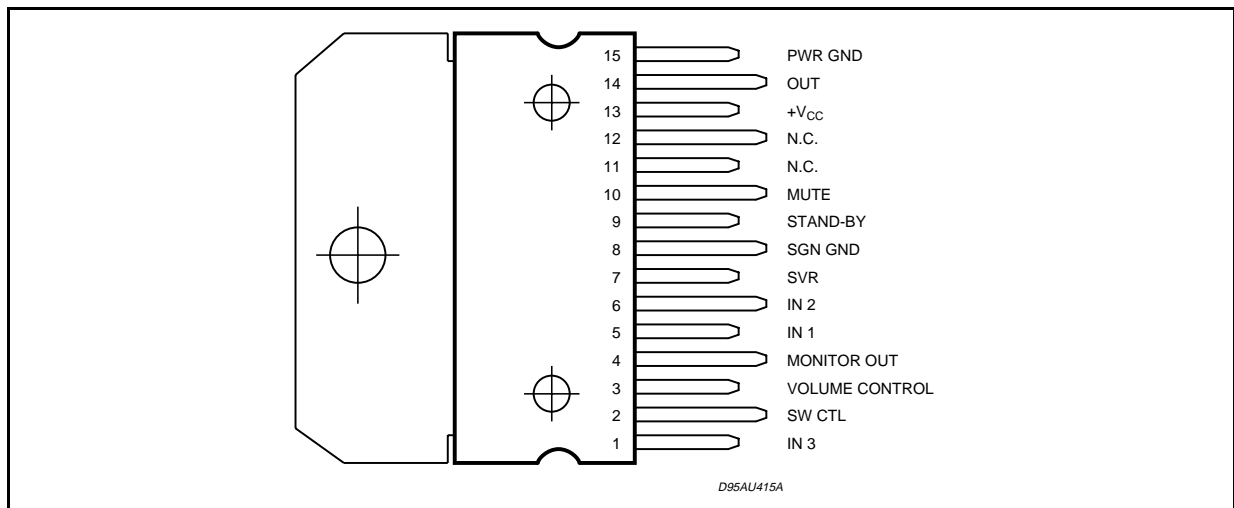
## TDA7494

### ABSOLUTE MAXIMUM RATINGS

| Symbol         | Parameter  | Value      | Unit             |
|----------------|--|------------|------------------|
| $V_S$          | DC Supply Voltage  | 35         | 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                                   | 7          | V                |

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

### 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   | -400       |              | 400  | mV   |
| $V_o$  | Quiescent Output Voltage                   | $V_S = 28\text{V}$  |            | 14           |      | V    |
| $P_o$  | Output Power                               | THD = 10%; $V_{CC} = 28\text{V}$ , $R_L = 8\Omega$<br>THD = 1%; $V_{CC} = 28\text{V}$   | 8<br>6     | 10<br>8      |      | W    |
|        |  | THD = 10%; $V_{CC} = 21\text{V}$ ,<br>THD = 1%; $V_{CC} = 21\text{V}$ ,                 | 5<br>3.5   | 5.5<br>4     |      | W    |
|        |  | THD = 10%; $V_{CC} = 21\text{V}$ , $R_L = 4\Omega$<br>THD = 1%; $V_{CC} = 21\text{V}$ , | 5<br>3.9   | 7.5<br>5.5   |      | W    |
|        |  | THD = 10%; $V_{CC} = 18\text{V}$ ,<br>THD = 1%; $V_{CC} = 18\text{V}$                   | 4.5<br>3.5 | 6<br>4.5     |      | W    |
|        |  | THD = 10%; $V_{CC} = 18\text{V}$ , $R_L = 8\Omega$<br>THD = 1%; $V_{CC} = 18\text{V}$   | 3.5<br>2.5 | 3.75<br>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  | $V_{rms}$ |
| $G_v$            | Closed Loop Gain             | $V_{ol} Ctrl > 4.5V$  | 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    | $V_{ol} Ctrl < 0.5V$  | 80   |      |      | dB        |
| BW               |                              |   |      | 0.6  |      | MHz       |
| $e_n$            | Total Output Noise           | $f = 20Hz$ to $22KHz$<br>Play, max volume                                   |      | 350  | 700  | $\mu V$   |
|                  |                              | $f = 20Hz$ to $22KHz$<br>Play, max attenuation                              |      | 60   | 100  | $\mu V$   |
|                  |                              | $f = 20Hz$ to $22KHz$<br>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<br>$C_{SVR} = 470\mu A$ ; $V_{RIP} = 1V_{RMS}$      | 36   | 43   |      | dB        |
|                  |                              | $f = 1kHz$ ; max attenuation<br>$C_{SVR} = 470\mu A$ ; $V_{RIP} = 1V_{RMS}$ | 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; $V_{ST-BY} = 5V$ ;<br>$V_{MUTE} = 5V$ ;                        |      | 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.

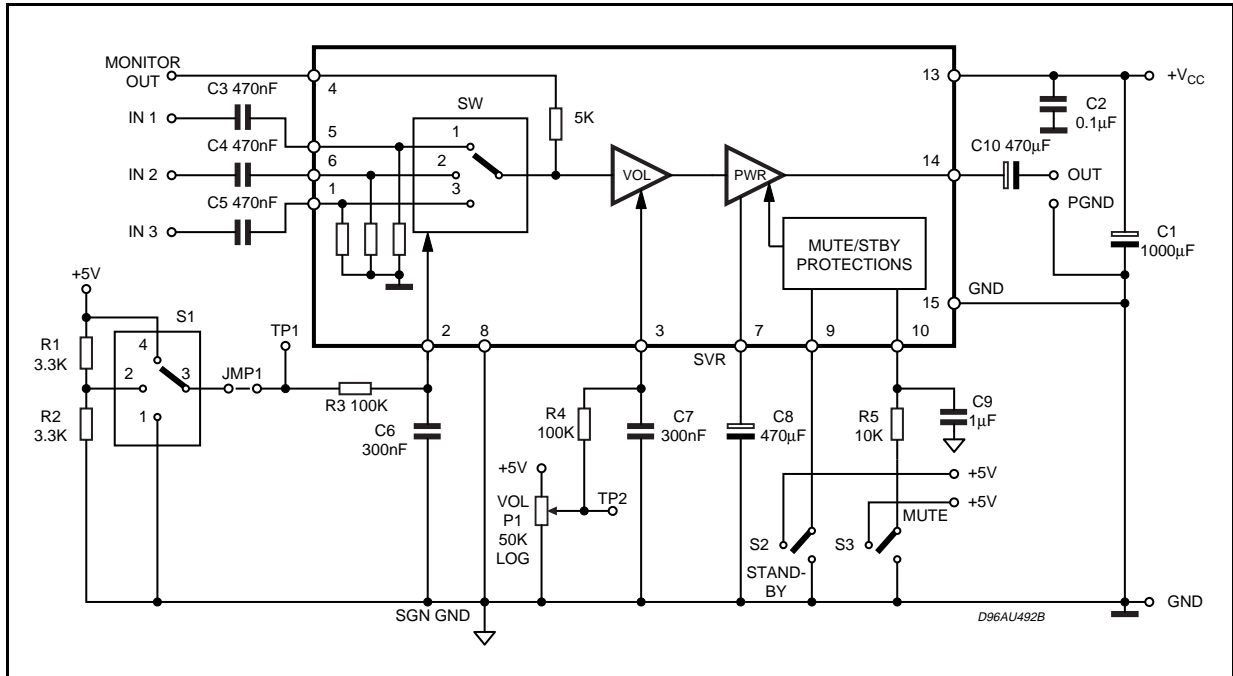
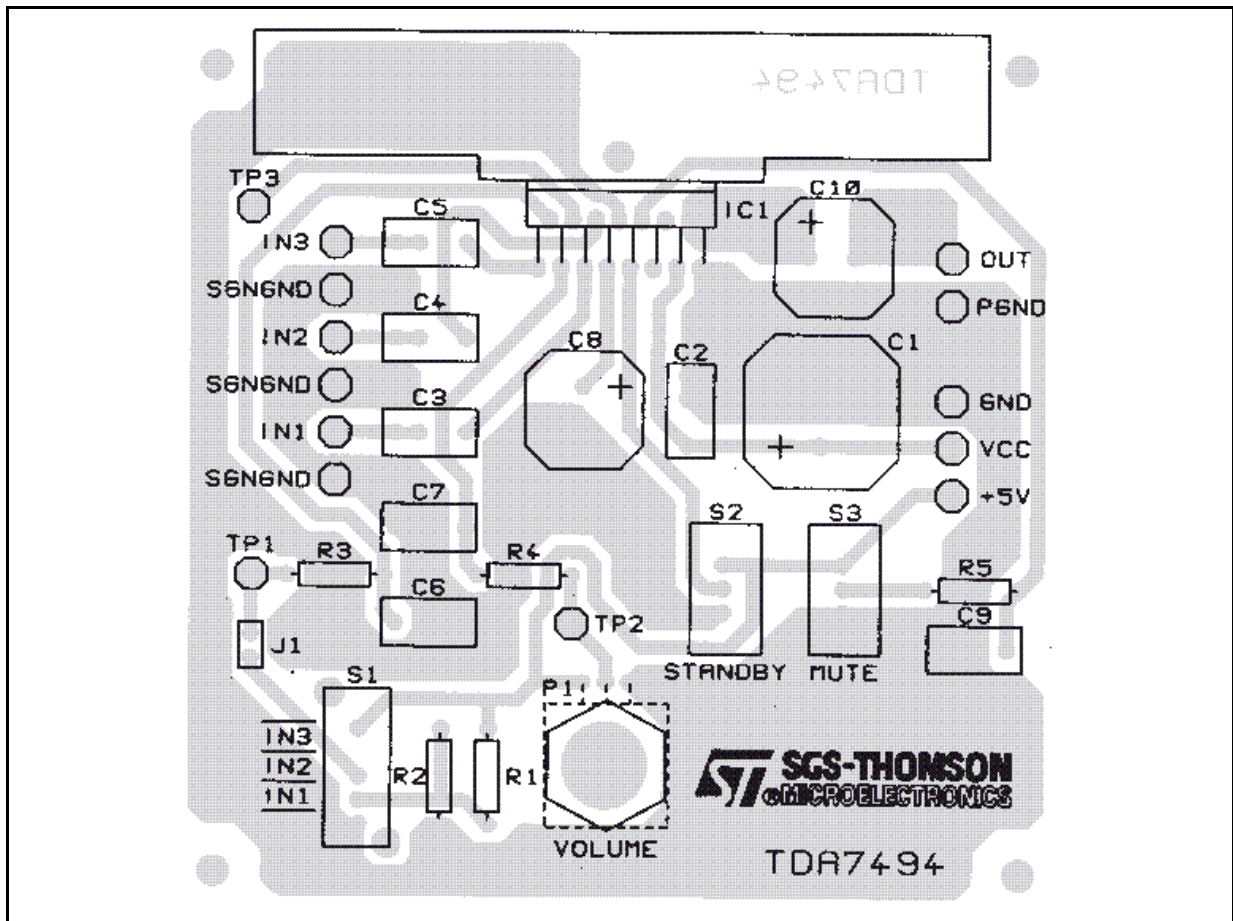


Figure 2: P.C.B. and component layout.



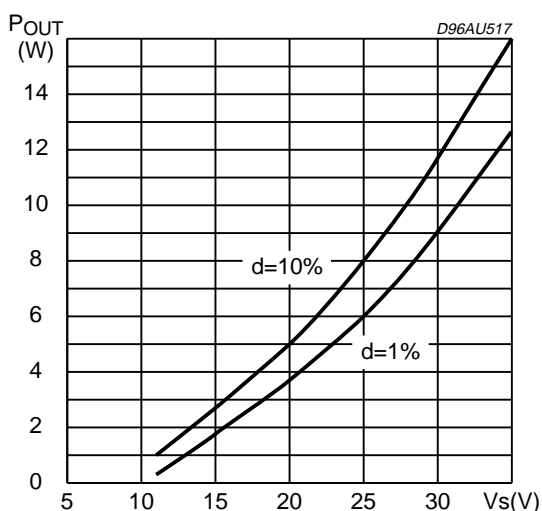
**APPLICATION SUGGESTIONS**

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        | 3.3KΩ            | Input switch circuit         | Vpin #2 shifted downward      | Vpin #2 shifted upward         |
| R2        | 3.3KΩ            | Input switch circuit         | Vpin #2 shifted upward        | Vpin #2 shifted downward       |
| R3        | 100KΩ            | Input switch time constant   | Larger Input Switch Time      | Smaller input switch time      |
| R4        | 100KΩ            | Volume control time constant | Larger Volume Regulation Time | Smaller volume regulation time |
| R5        | 10KΩ             | Mute time constant           | Larger mute on/off time       | Smaller mute on/off time       |
| P1        | 50KΩ             | Volume control circuit       |                               |                                |
| C1        | 1000μF           | 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        | 470μF            | Ripple Rejection             | Better SVR                    | Worse SVR                      |
| C9        | 1μF              | Mute time constant           | Larger mute on/off time       | Smaller mute on/off time       |
| C10       | 470μF            | 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

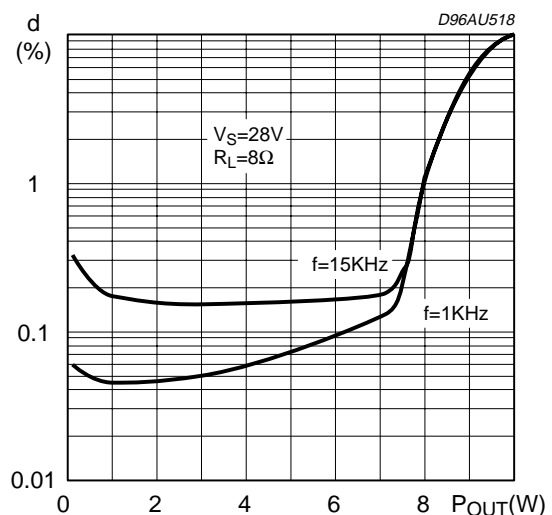


Figure 5: Output Power vs Supply Voltage

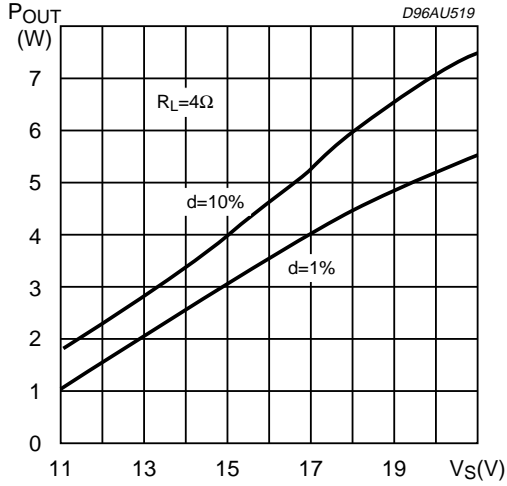


Figure 6: Distortion vs Output Power

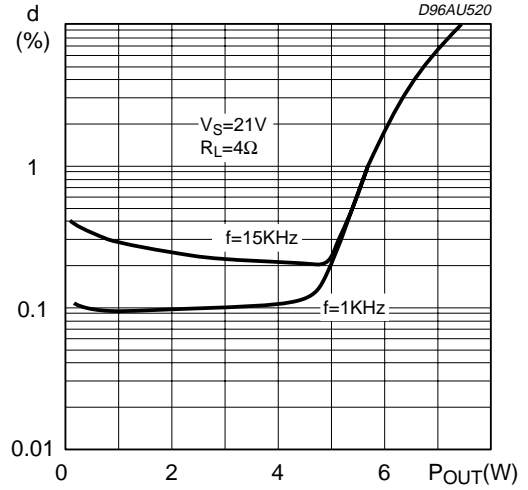


Figure 7: Distortion vs Frequency

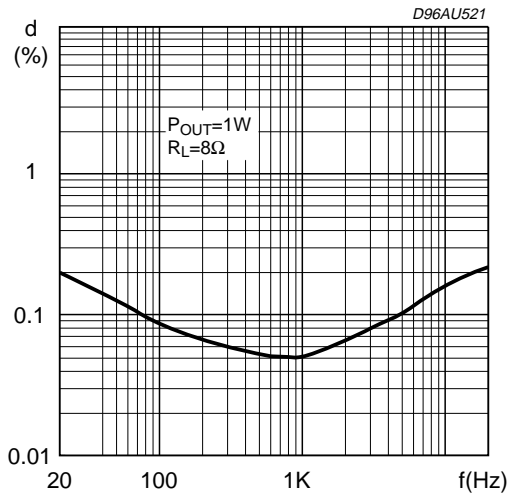


Figure 8: Distortion vs Frequency

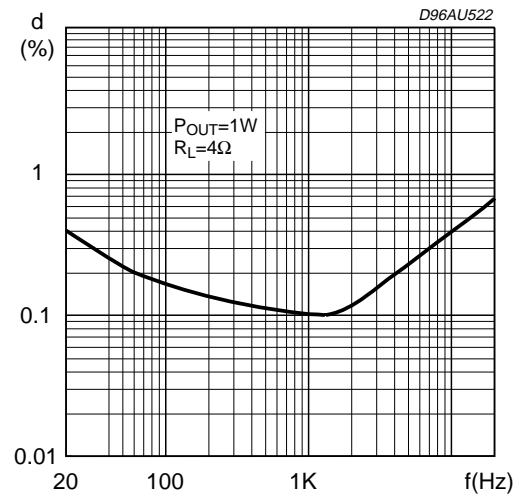


Figure 9: Quiescent Current vs Supply Voltage

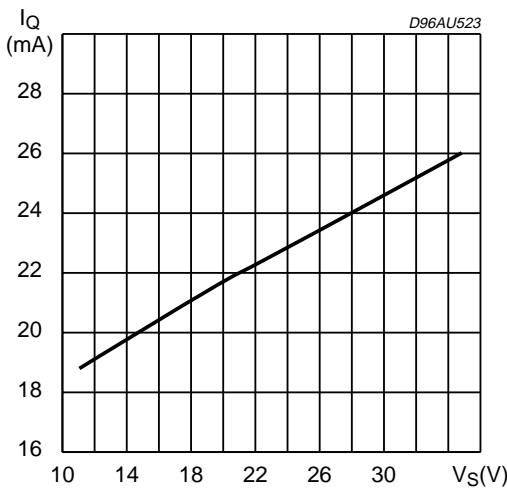


Figure 10: Quiescent Output Voltage vs Supply Voltage

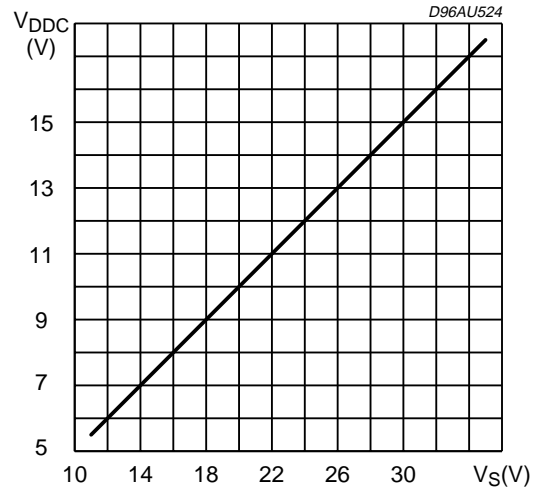


Figure 11: Gain vs Volume Control (pin #3)

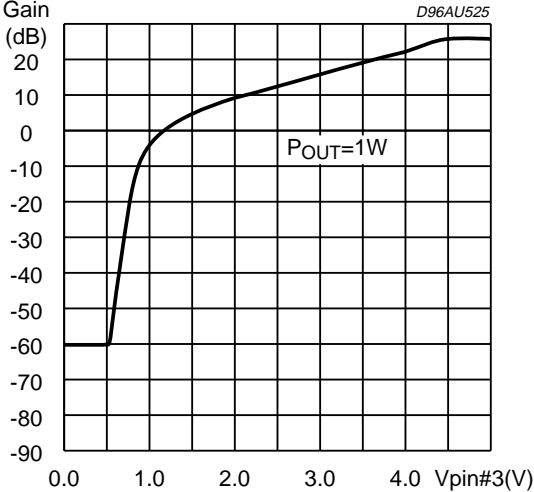


Figure 12: Supply Voltage Rejection vs Frequency

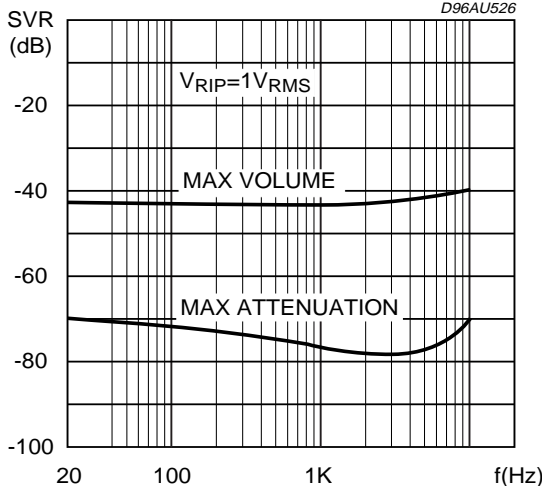


Figure 13: Stand-by Attenuation vs Vpin # 9

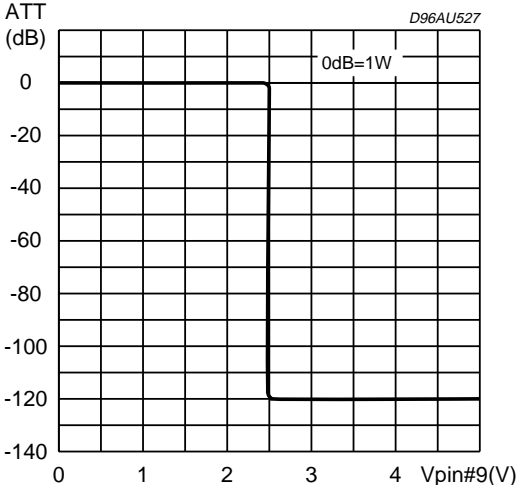


Figure 14: Mute Attenuation vs Vpin # 10

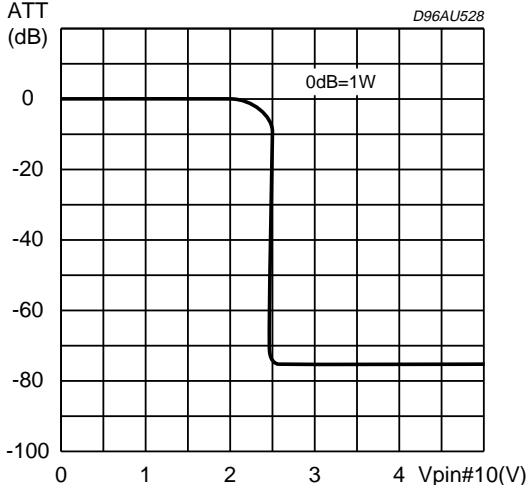


Figure 15: Power Dissipation vs Output Power

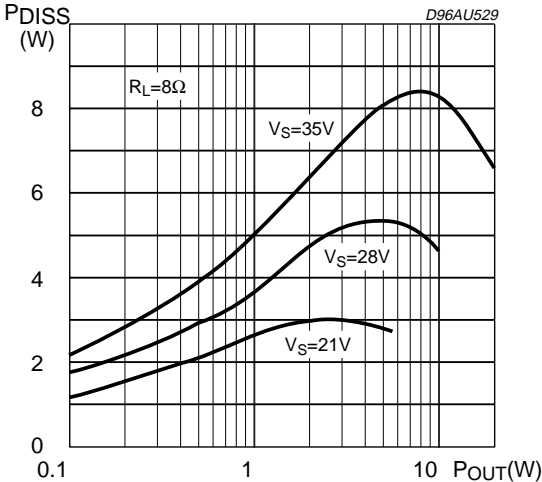
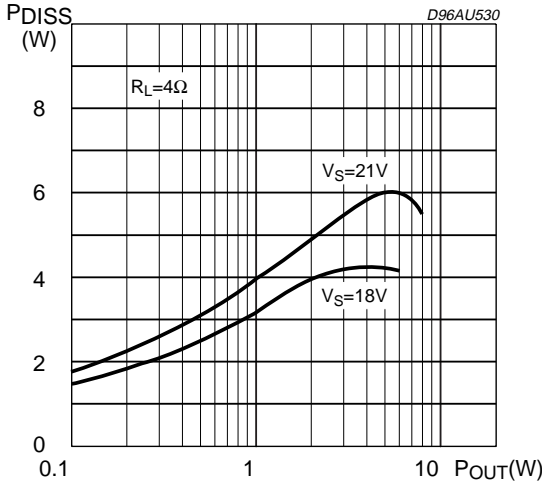


Figure 16: Power Dissipation vs Output Power

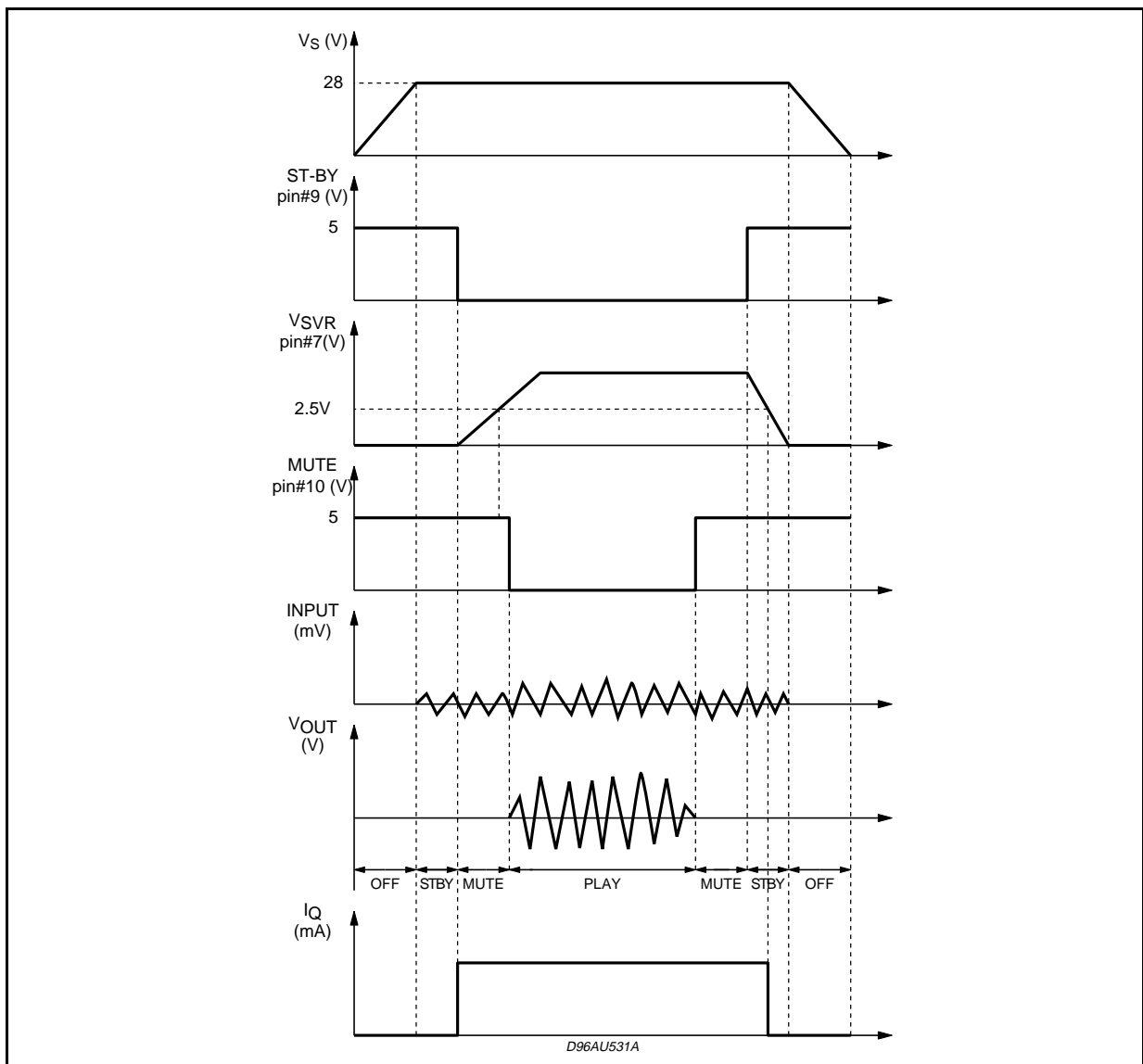


**MUTE STAND-BY TRUTH TABLE**

| 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**

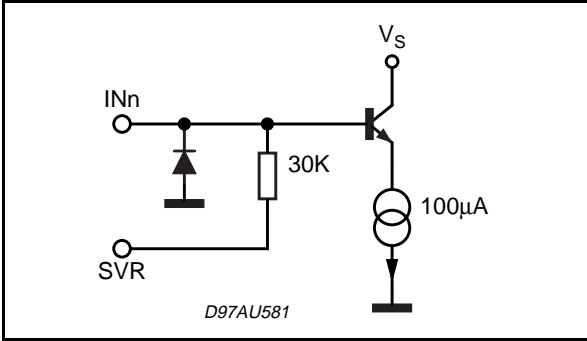
To simplify the application, the stand-by pin can be connected directly to Ground.

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

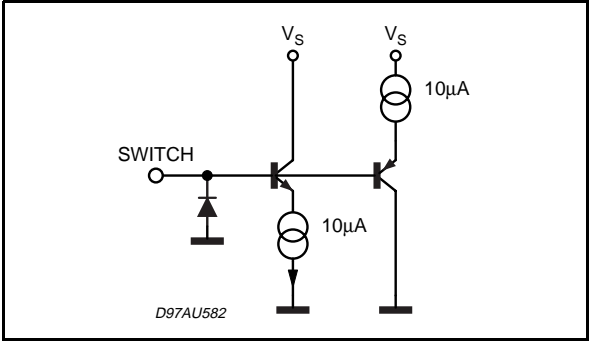
- At the turn-on the transition mute to play must be made when the SVR pin is higher than 2.5V
- At the turn-off the TDA7494 must be brought to mute from the play condition when the SVR pin is higher than 2.5V.



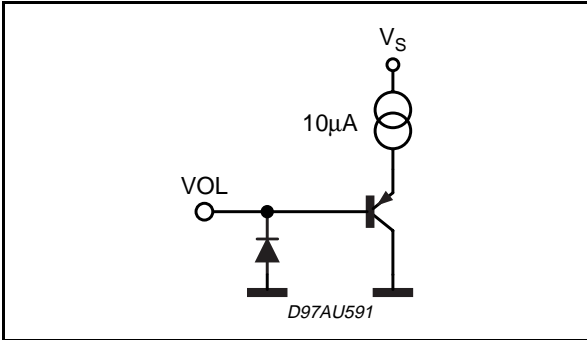
**PINS:** IN3, IN1, IN2



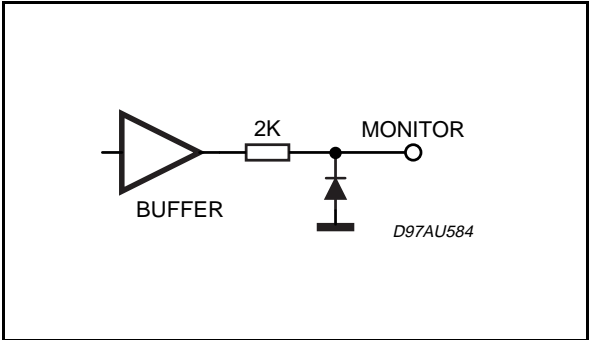
**PIN:** SWITCH



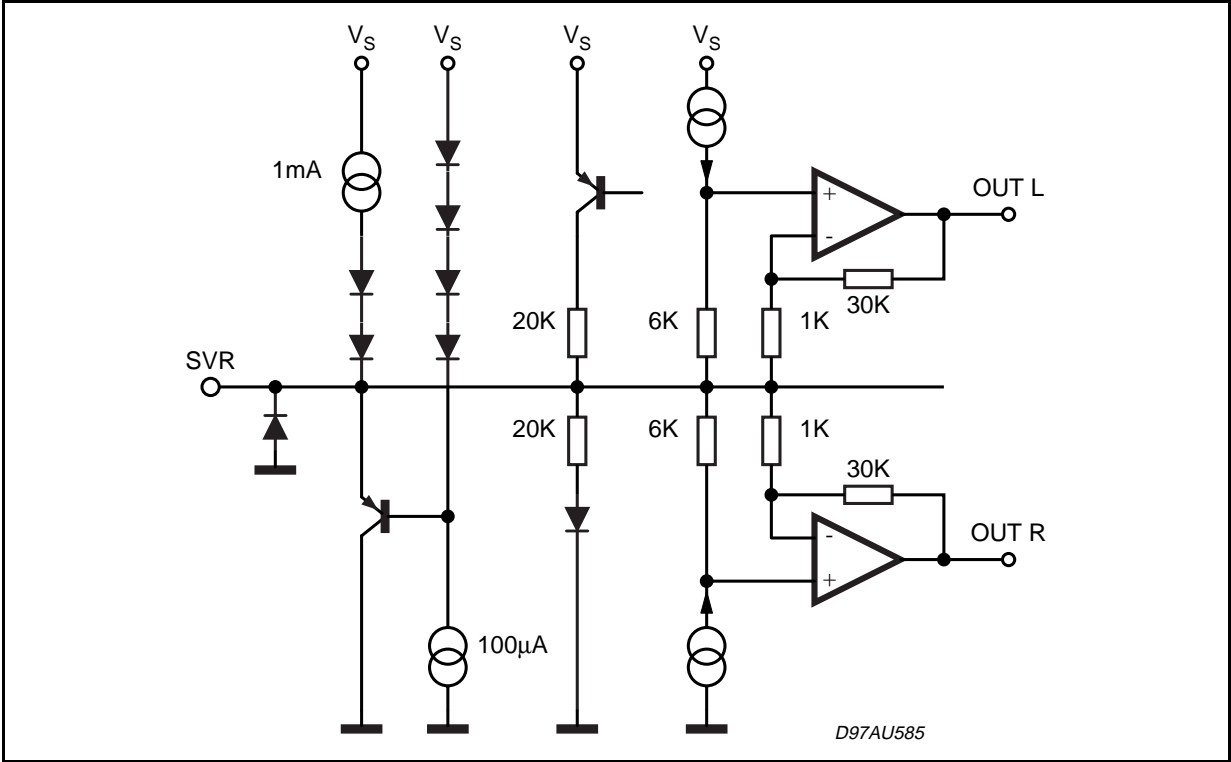
**PIN:** VOLUME



**PIN:** MONITOR

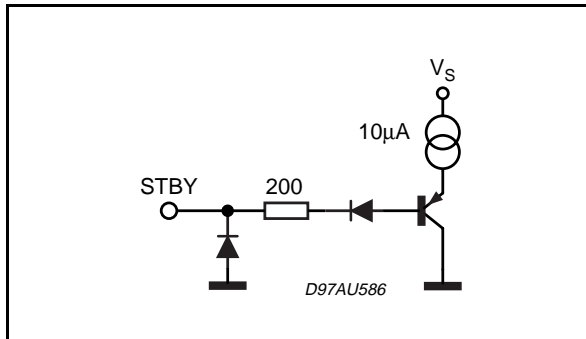


**PIN:** SVR

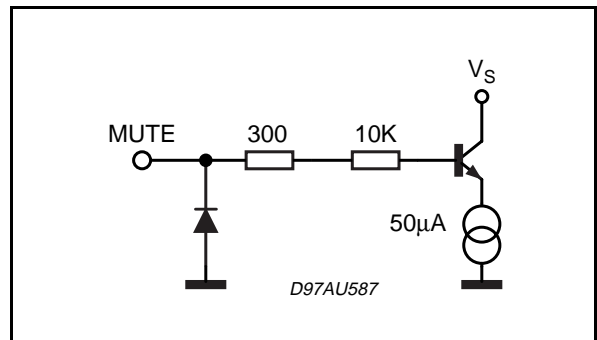


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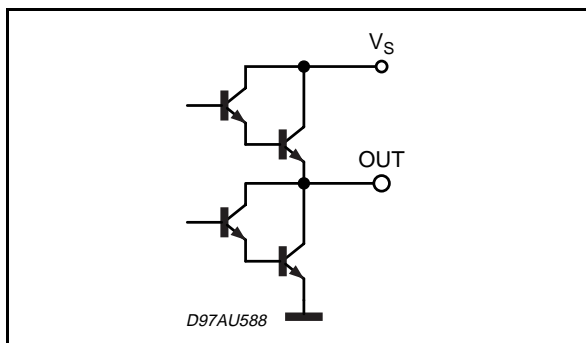
**PIN: ST-BY**



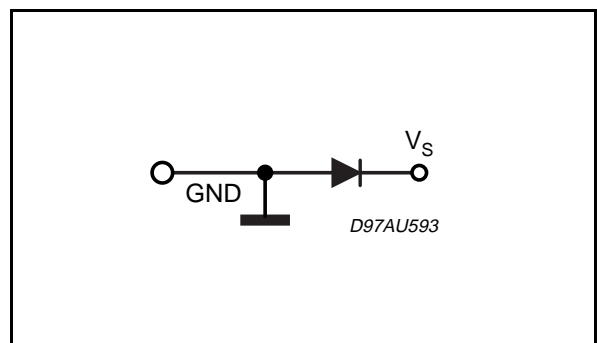
**PIN: MUTE**



**PIN: OUT**

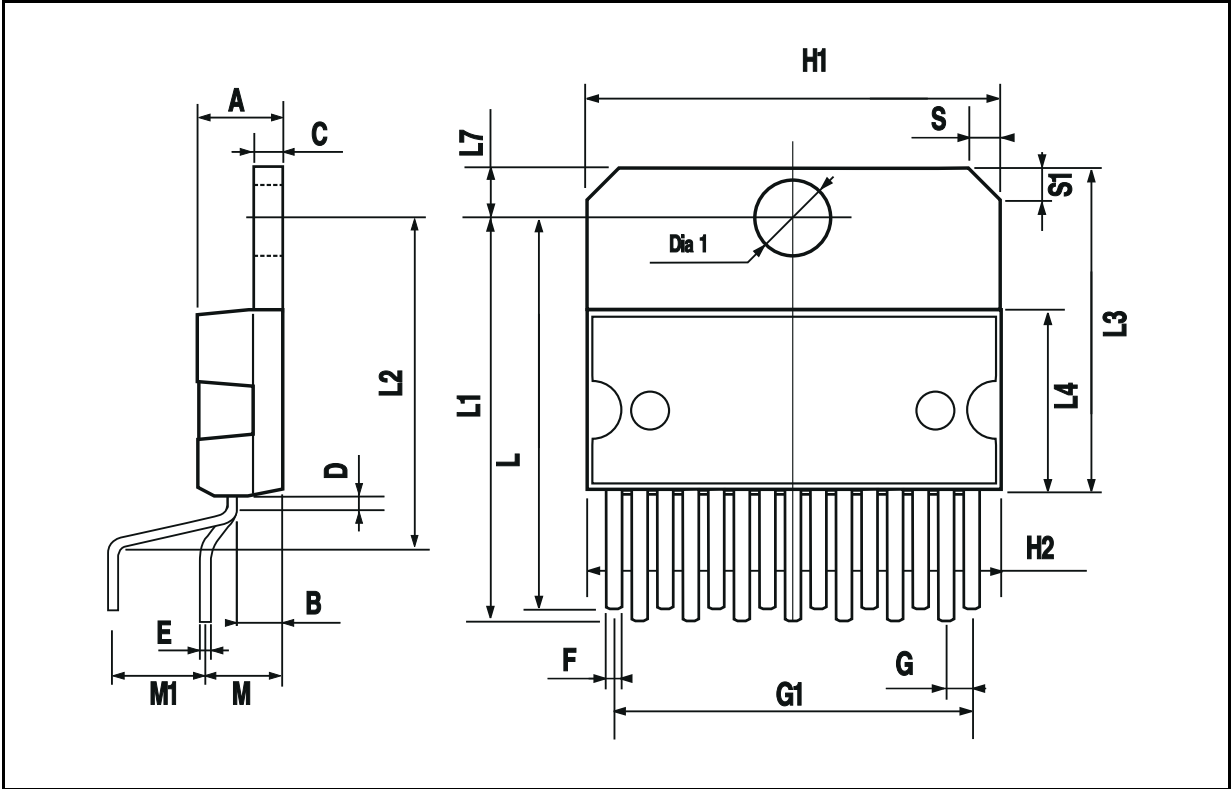


**PINS: PW-GND, S-GND**



MULTIWATT15 PACKAGE MECHANICAL DATA

| DIM. | mm    |       |       | inch  |       |       |
|------|-------|-------|-------|-------|-------|-------|
|      | MIN.  | TYP.  | MAX.  | MIN.  | TYP.  | MAX.  |
| A    |       |       | 5     |       |       | 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 | 0.870 | 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   | 4.63  | 5.08  | 5.53  | 0.182 | 0.200 | 0.218 |
| 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 |



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