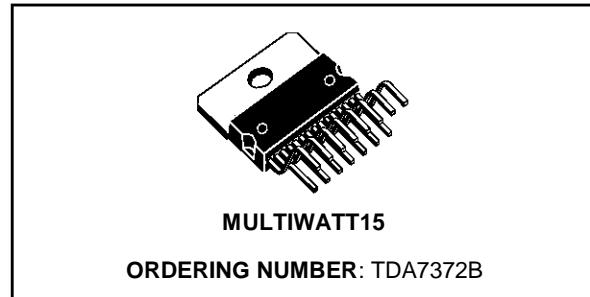


4 x 6W POWER AMPLIFIER FOR CAR RADIO

ADVANCE DATA

- HIGH POWER CAPABILITY:
 - 4x6W min/4Ω @ 14.4V, 1KHz, 10%
 - 4x10W typ/2Ω @ 14.4V, 1KHz, 10%
- MINIMUM EXTERNAL COMPONENT COUNT
 - INTERNALLY FIXED GAIN (40dB)
 - NO BOOTSTRAP CAPACITORS
 - NO EXTERNAL COMPENSATION
- ST-BY FUNCTION (CMOS COMPATIBLE)
- MUTE FUNCTION (CMOS COMPATIBLE)
- NO AUDIBLE POP DURING MUTE/ST-BY OPERATIONS
- LOW SUPPLY SELF MUTING
- PROGRAMMABLE TURN ON DELAY



- FORTUITOUS OPEN GND
- REVERSE BATTERY
- ESD PROTECTION

PROTECTIONS:

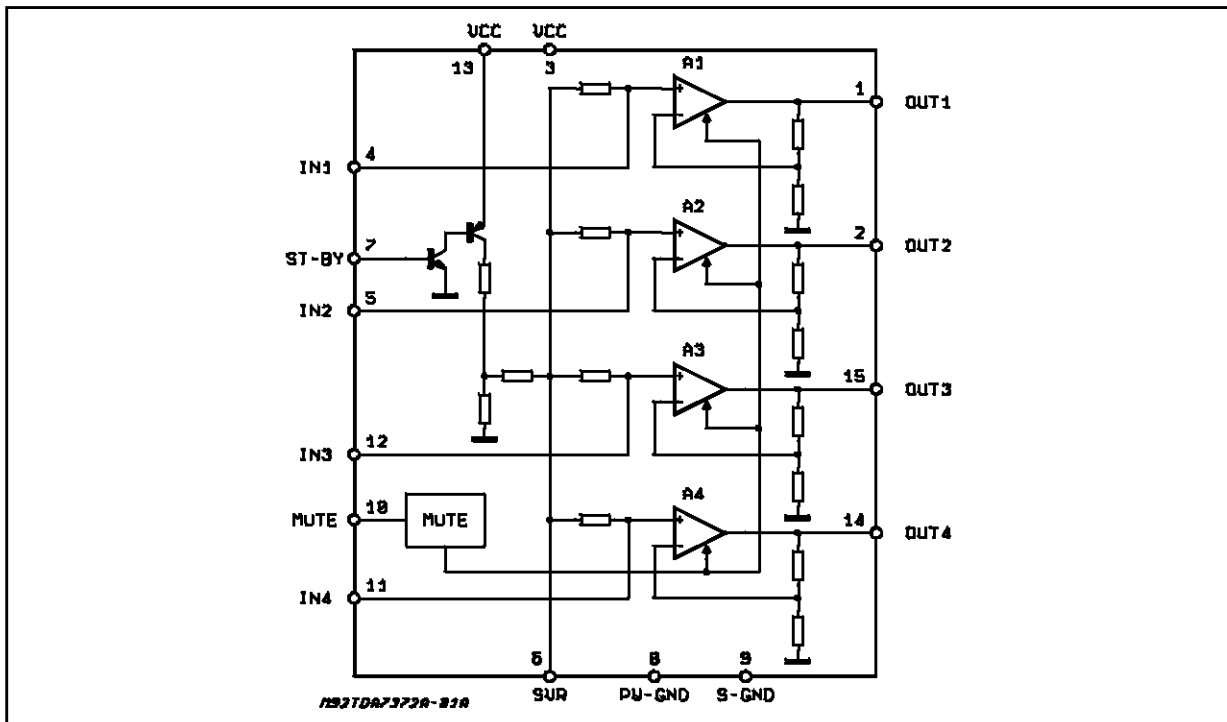
- AC OUTPUT SHORT CIRCUIT TO GND
- DC OUTPUT SHORT CIRCUIT TO GND AND TO V_S AT POWER ON
- SOFT THERMAL LIMITER
- OVERRATING CHIP TEMPERATURE
- LOAD DUMP VOLTAGE

DESCRIPTION

The TDA7372B is a new technology class AB quad channels Audio Power Amplifier in Multiwatt15 package designed for car radio applications.

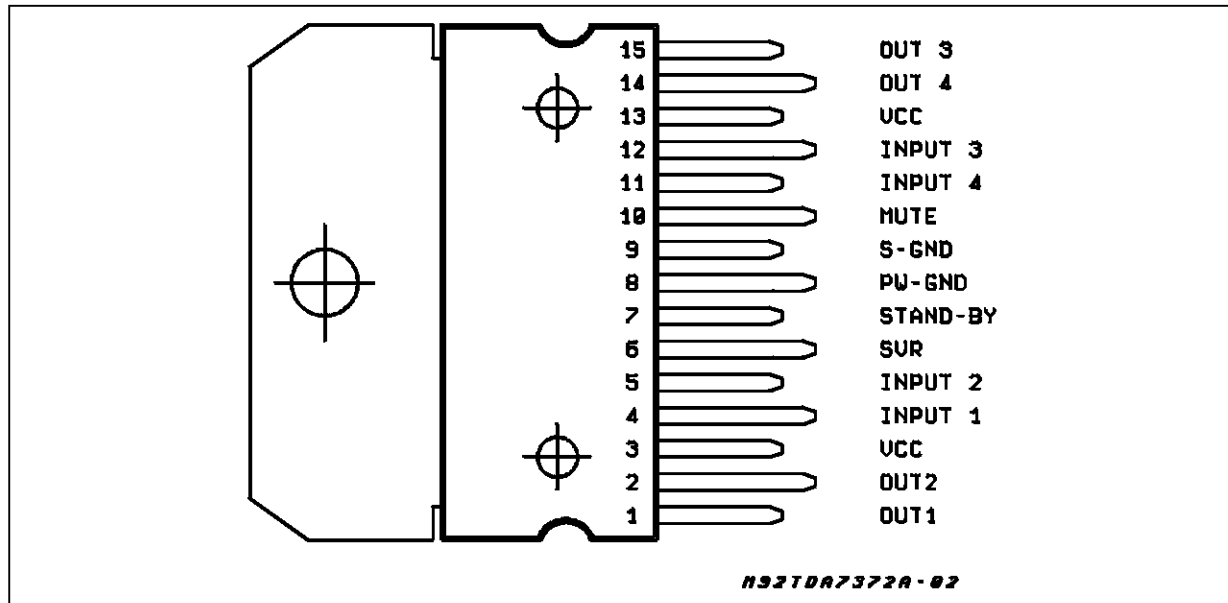
Thanks to the fully complementary PNP/NPN output configuration the TDA7372B delivers a rail to rail voltage swing with no need of bootstrap capacitors.

BLOCK DIAGRAM



TDA7372B

PIN CONNECTION (Top view)



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|----------------|--|------------|------------------|
| V_S | DC Supply Voltage | 28 | V |
| V_{OP} | Operating Supply Voltage | 18 | V |
| V_{PEAK} | Peak Supply Voltage ($t = 50\text{ms}$) | 50 | V |
| I_O | Output Peak Current (not rep. $t = 100\mu\text{s}$) | 4 | A |
| I_O | Output Peak Current (rep. $f > 10\text{Hz}$) | 3 | A |
| P_{tot} | Power Dissipation ($T_{case} = 85^\circ\text{C}$) | 32 | W |
| T_{stg}, T_j | Storage and Junction Temperature | -40 to 150 | $^\circ\text{C}$ |

THERMAL DATA

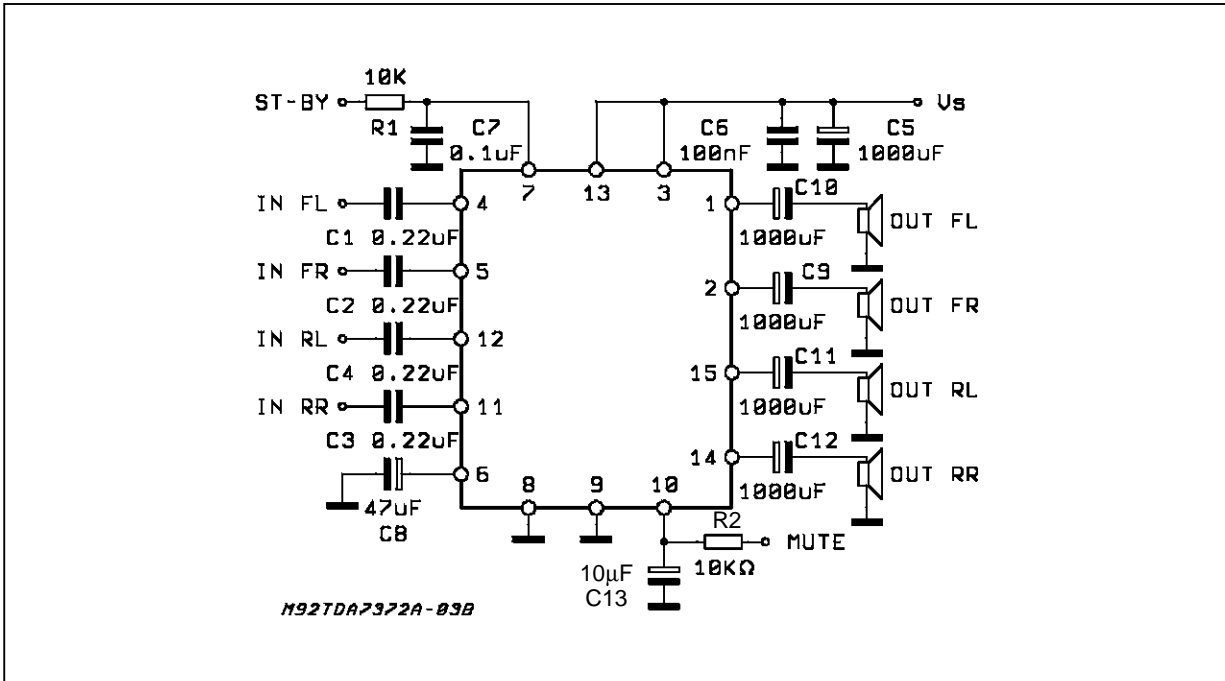
| Symbol | Description | Value | Unit |
|------------------|----------------------------------|-------|--------------------|
| $R_{th\ j-case}$ | Thermal Resistance Junction-case | Max 2 | $^\circ\text{C/W}$ |

ELECTRICAL CHARACTERISTICS (Refer to the test circuit; $V_S = 14.4V$; $R_L = 4\Omega$, $T_{amb} = 25^\circ C$, $f = 1kHz$, unless otherwise specified)

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|--------------|-------------------------------|---|------|------|------|-----------|
| V_S | Supply Range | | 8 | | 18 | V |
| I_d | Total Quiescent Drain Current | | | | 150 | mA |
| P_O | Output Power | $R_L = 4\Omega$; THD = 10% each channel | 6 | 6.5 | | W |
| | | $R_L = 2\Omega$; THD = 10% each channel | | 10 | | W |
| d | Distortion | $R_L = 4\Omega$; $P_O = 0.1$ to $3W$ | | 0.08 | 0.5 | % |
| CT | Cross Talk | $f = 1kHz$; $R_g = 0$ | 45 | 50 | | dB |
| | | $f = 10kHz$; $R_g = 0$ | | 40 | | dB |
| R_{IN} | Input Impedance | | 35 | | | $K\Omega$ |
| G_V | Voltage Gain | | | 40 | | dB |
| G_V | Voltage Gain Match. | | | | 1 | dB |
| BW | Bandwidth | @ -3dB | 75 | | | KHz |
| E_{NO} | Output Noise Voltage (*) | $R_g = 0$ | | | 300 | μV |
| SVR | Supply Voltage Rejection | $R_g = 0$; $f = 100Hz$ | 45 | | | dB |
| ASB | Stand-by Attenuation | | 80 | | | dB |
| I_{SB} | ST-BY Current Consumption | $V_{pin7} = 1.5V$ | | | 100 | μA |
| I_{PIN7} | ST-BY Pin Current | Play mode; $V_{pin7} = 5V$ | | | 50 | μA |
| | | Output Under Short (Max driving current under fault) | | | 5 | mA |
| $V_{SB IN}$ | ST-BY IN Threshold Voltage | | | | 1.5 | V |
| $V_{SB OUT}$ | ST-BY OUT Threshold Voltage | | 3.5 | | | V |
| A_M | MUTE Attenuation | | | 80 | | dB |
| $V_{M IN}$ | MUTE IN Threshold Voltage | | | | 1.5 | V |
| $V_{M OUT}$ | MUTE OUT Threshold Voltage | | 3.5 | | | V |

(*) 22Hz to 22KHz

TEST AND APPLICATION CIRCUIT



If high source resistance is present (e.g. passive audio controls) it might be necessary to add $C = 470\text{pF}$ from each input pin to S-GND to prevent instability phenomena.

Figure 1: P.C. Board and components layout of the Test and Application Circuit (1:1 scale)

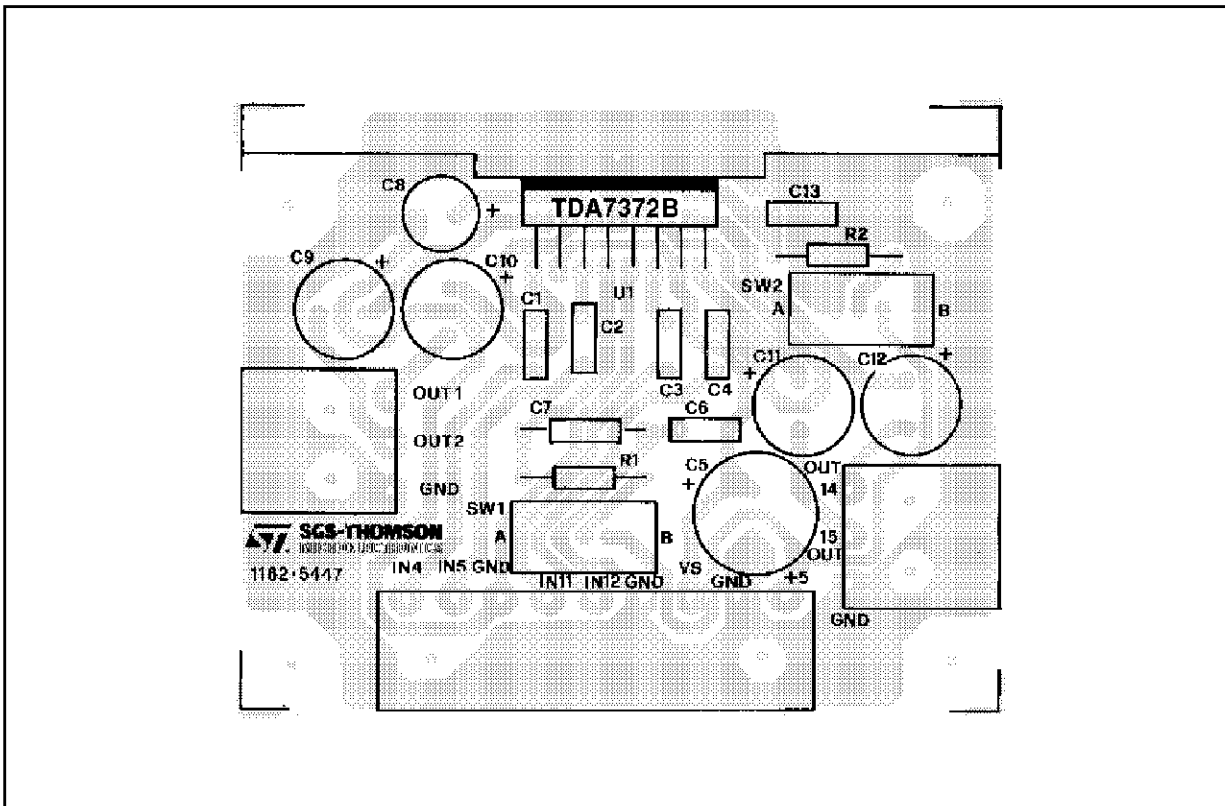


Figure 2: Quiescent Drain Current vs. Supply Voltage

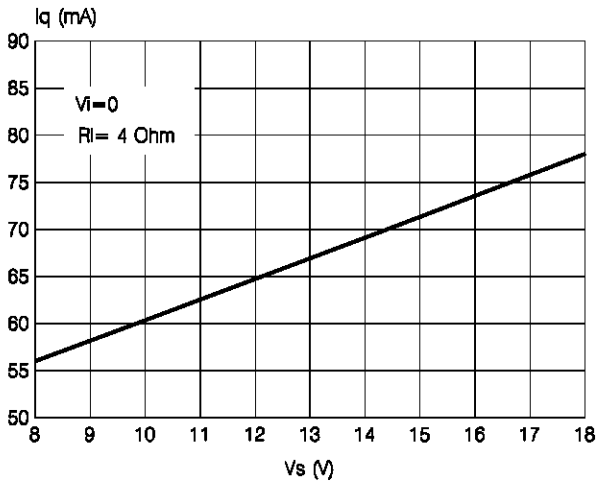


Figure 4: Output Power vs Supply Voltage

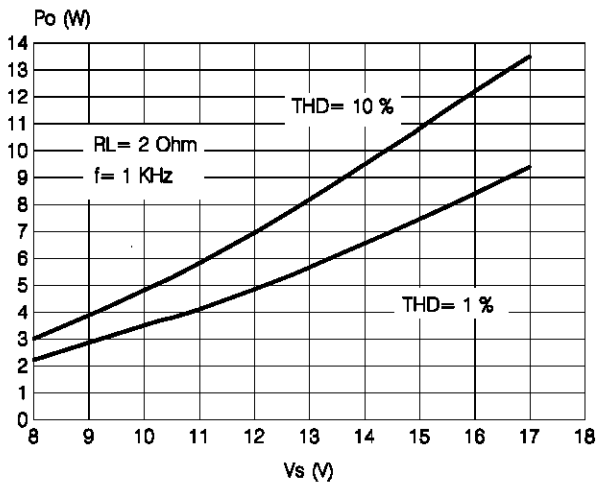


Figure 6: Distortion vs. Output Power

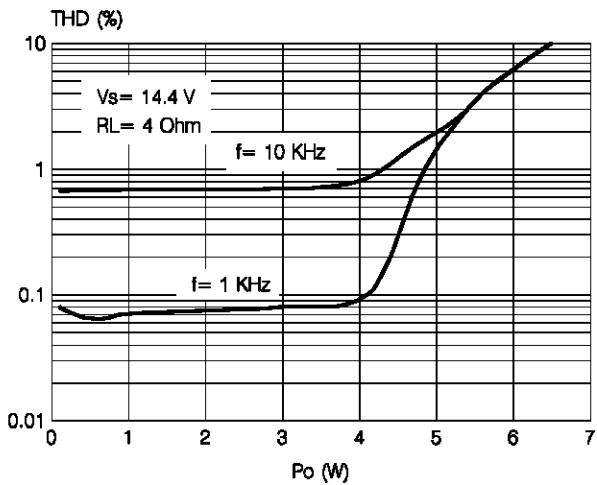


Figure 3: Output Power vs. Supply Voltage

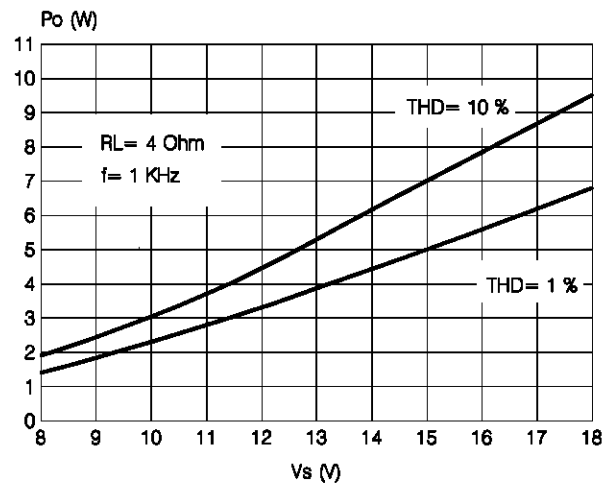


Figure 5: Output power vs. Frequency vs. C_{out} Value

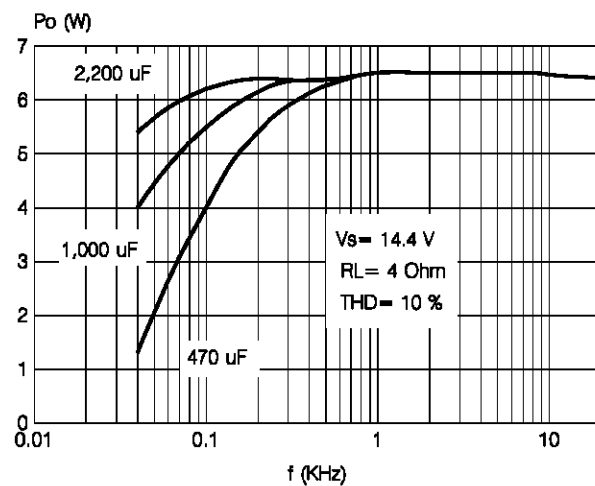


Figure 7: Distortion vs. Output Power

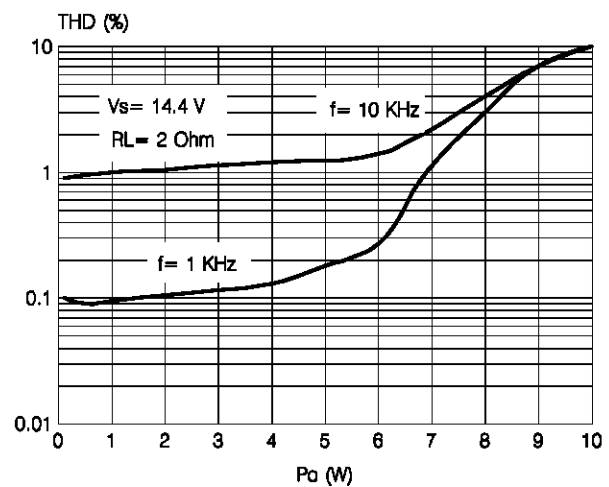


Figure 8: Distortion vs. Frequency

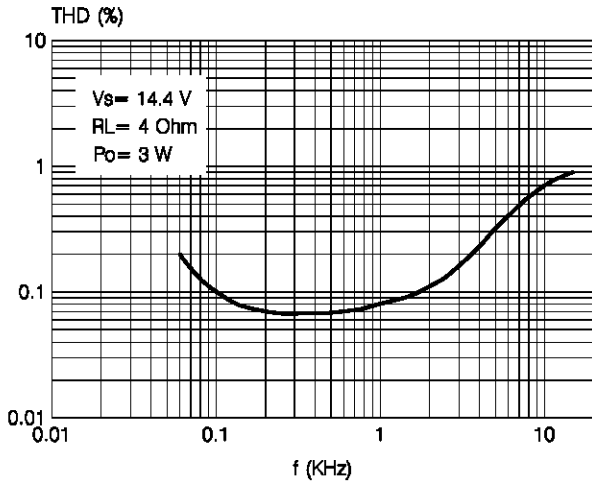


Figure 9: Distortion vs. Frequency

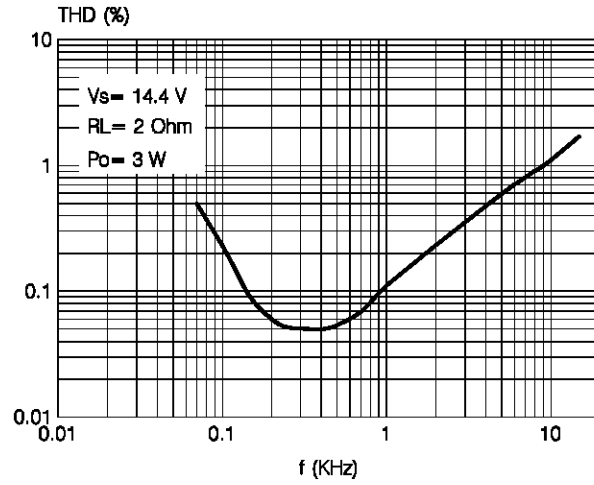


Figure 10: Cross-Talk vs. Frequency

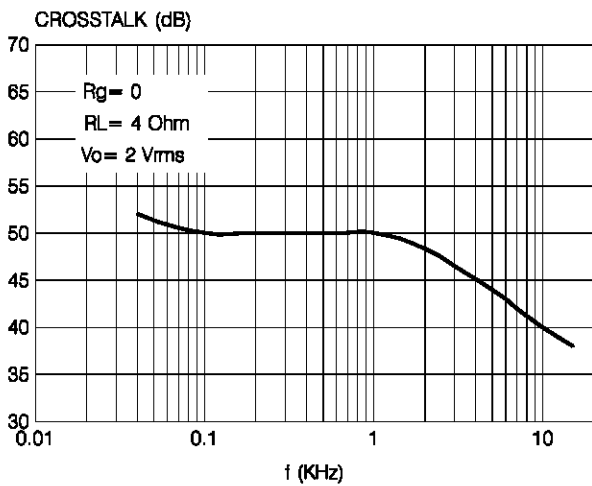


Figure 11: Supply Voltage Rejection vs. Frequency

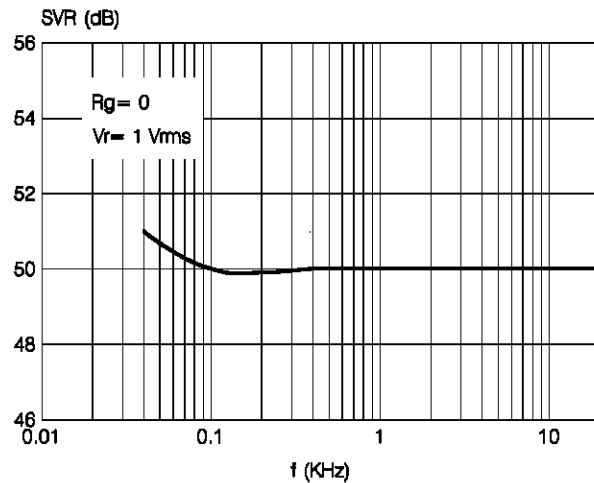


Figure 12: Total Power Dissipation and Efficiency

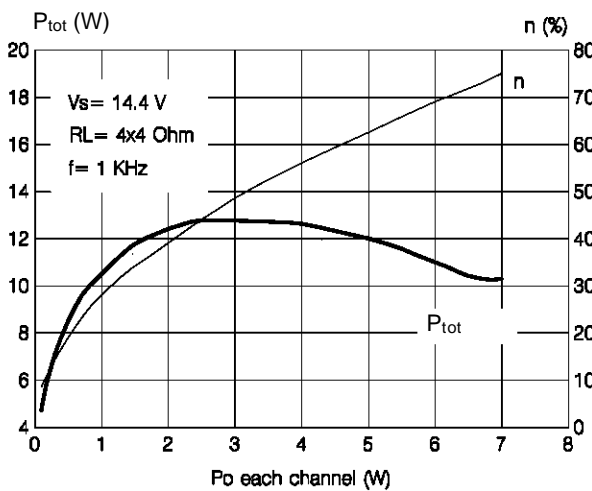


Figure 13: Total Power Dissipation and Efficiency vs. Output Power

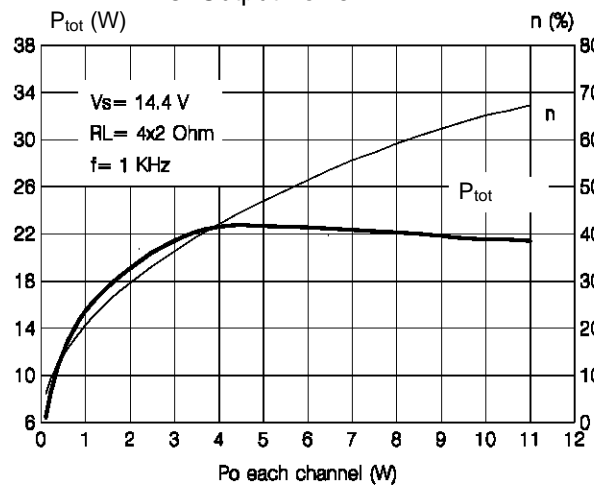
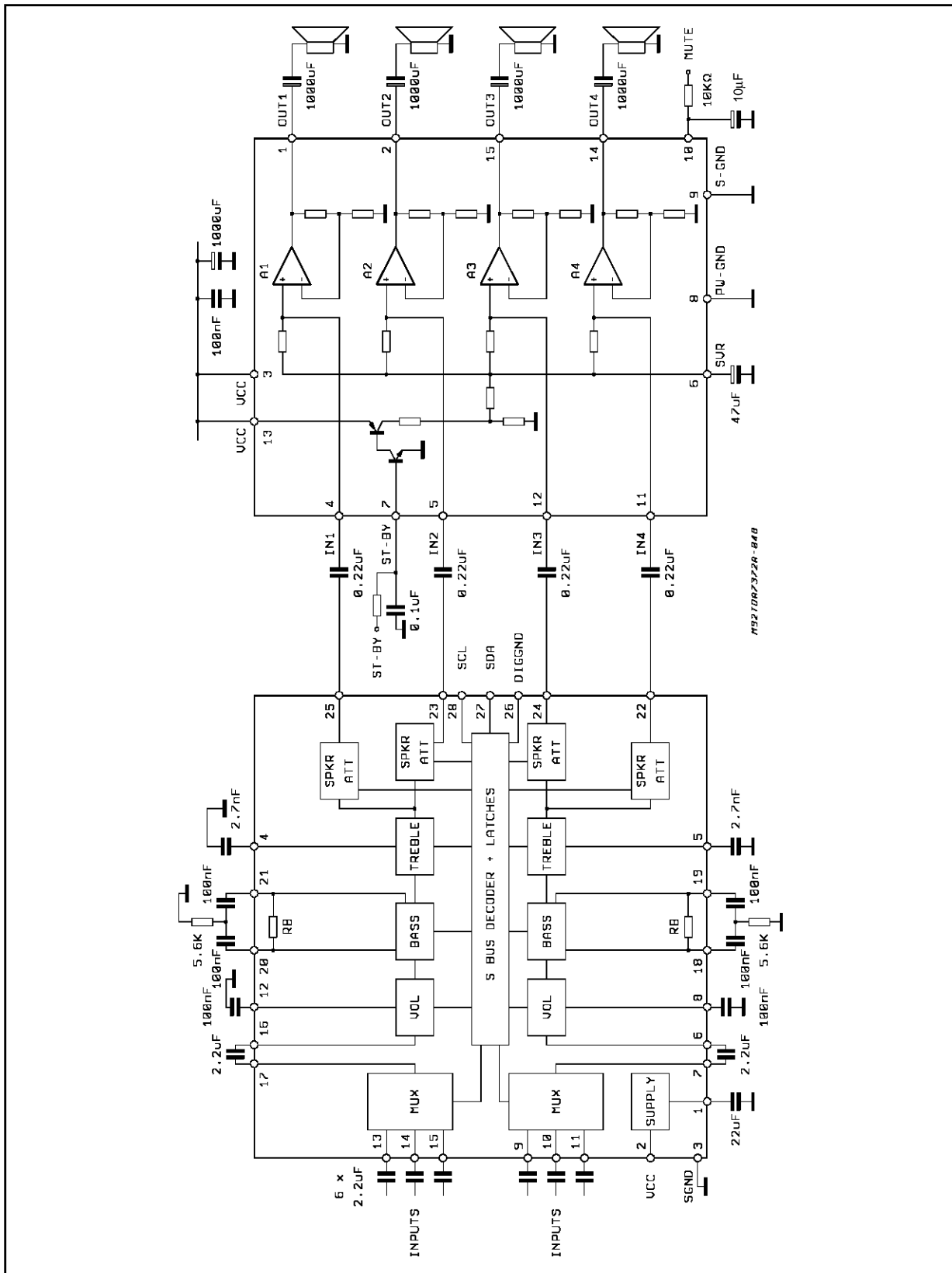


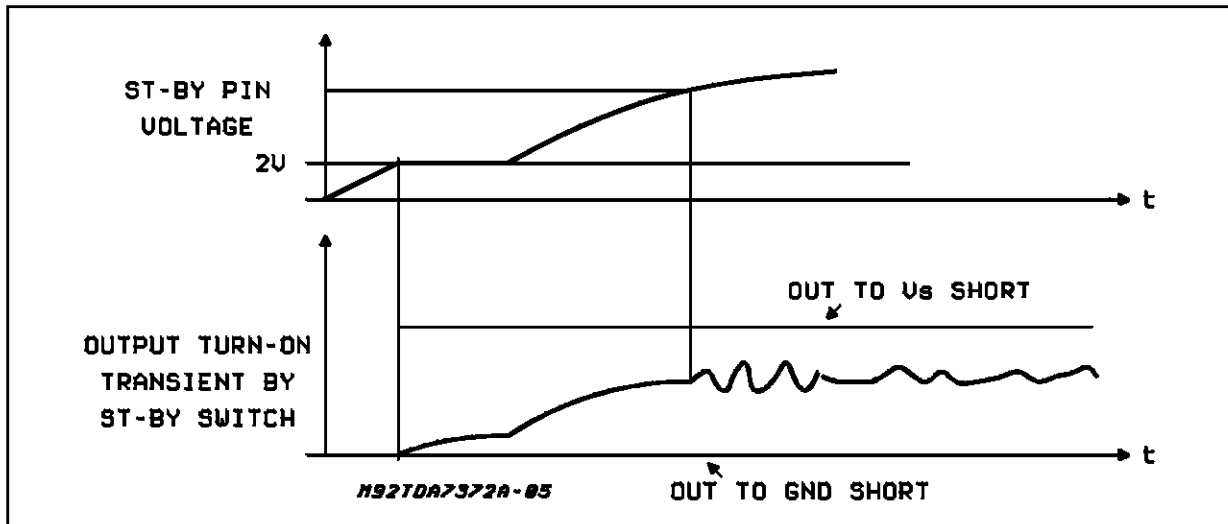
Figure 14: TDA7317 + 7372 Application Circuit.



FUNCTIONAL DESCRIPTION

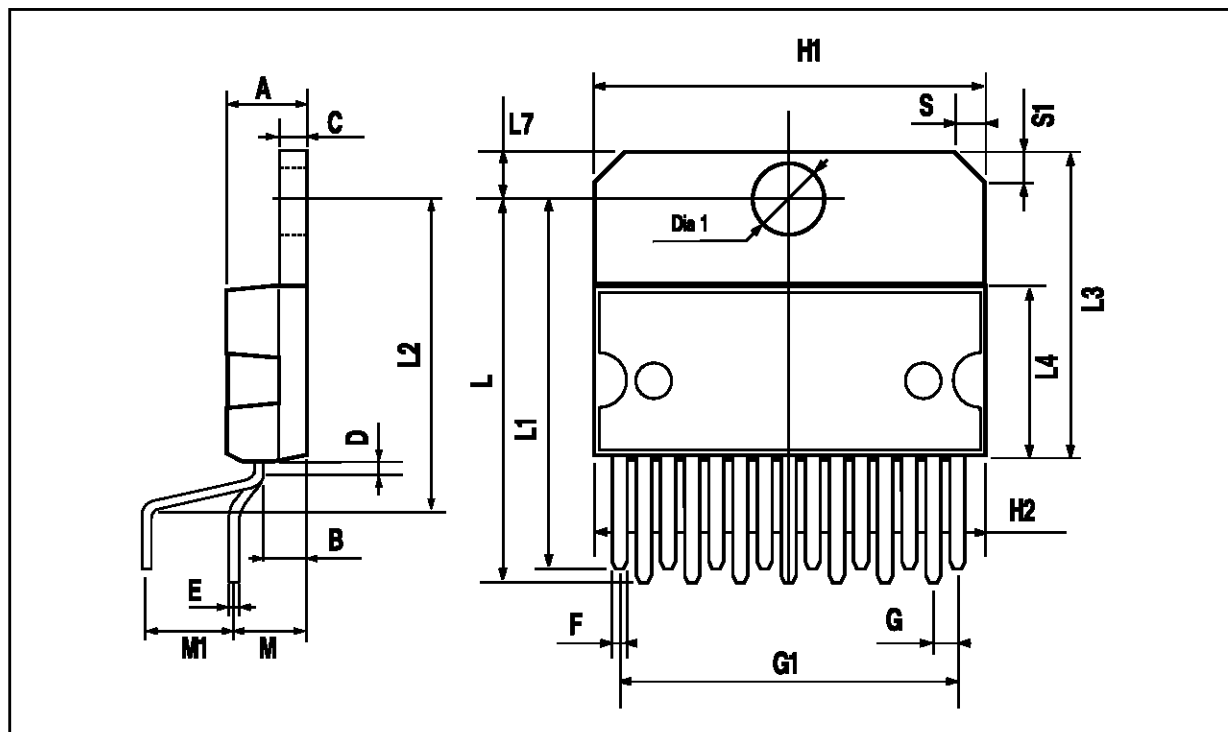
| Function | Description |
|-----------------------------------|--|
| GENERAL | The TDA7372B is a quad channel single package audio power amplifier intended to reduce the mismatch in the electrical characteristics among the four different channels and to consistently drop the external component count. It contains four non inverting stages whose gain is internally fixed to 40dB. |
| OUTPUT STAGE | The output stage is a single ended type suitable to drive 4Ω loads. It consists of a class AB fully complementary PNP/NPN stages short circuit protected. A rail to rail output swing is achieved without need of bootstrap capacitors. Moreover, the external compensation is not necessary. |
| ST-BY | The device features a St-BY function which shuts down the internal bias supplies when the ST-BY input is low. In ST-BY mode the amplifier sinks a small current (in the range of few μAs). When the St-BY pin is high the IC becomes fully operational. |
| MUTE | A mute function is also provided. This reduces the gain of the input stage to a level effectively eliminating any audio input influence on the output stage when the mute line is low. When the mute line is high the normal input path is restored. The device goes automatically is mute status when the supply voltage goes below the minimum allowed value. This prevents pop noises whenever the battery voltage drops below a fixed threshold. When the supply voltage rises to its nominal value the device recovers the play condition with a delay fixed by the C _{SVR} capacitor. |
| THERMAL PROTECTION | The Thermal protection principle involves two different steps a) Soft thermal limitation b) Shutdown Until the junction temperature remains below a preset threshold, the I.C. will deliver the full power. Once the threshold has been reached, the device automatically goes, into mute status. The play to mute transition is internally controlled so producing a soft muting without unpleasant effect. Supposing the junction temperature does not reduce to safe levels a complete shutdown will occur. |
| BUILT-IN SHORT CIRCUIT PROTECTION | Reliable and safe operation in presence of: - AC short circuit to GND - DC short circuit to GND and to V _S during power-on phase is assured by a built-in protection circuitry. the DC short protector acts in such a way to avoid the device is turned on (by ST-BY) when a DC short is present between out to GND or out to V _S . Due to this reason it is necessary to introduce a proper delay on the st-by pin (especially when it is driven by V _S). More over, as the involved circuitry is normally disabled when a current higher than 5mA is flowing into the st-by pin, it is important, in order not to disable it, to have the external current source driving the pin it self limited to 5mA. (figure 1 is showing relevant waveforms). |

Figure 15: Fault (DC short) waveforms



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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