

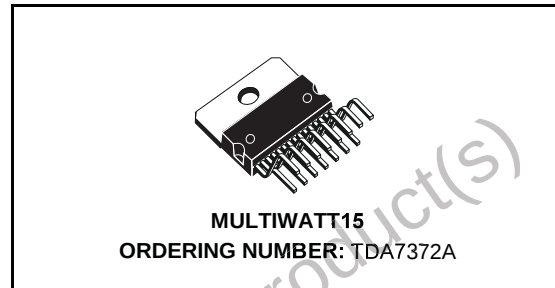
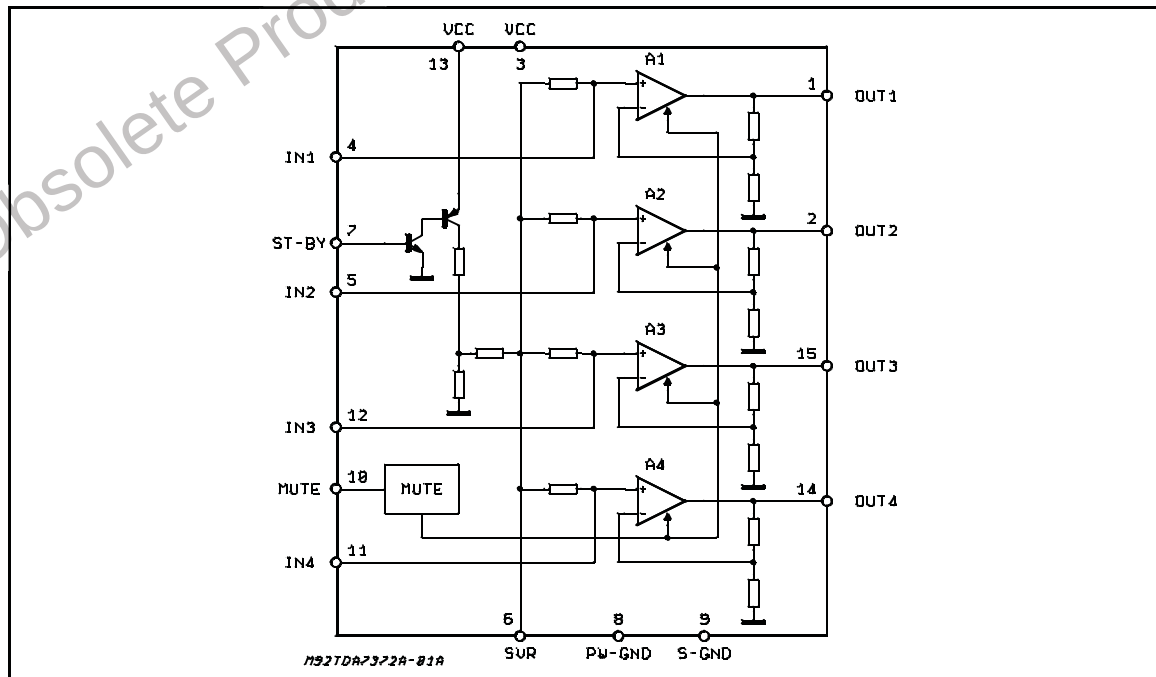
## 4 x 6W POWER AMPLIFIER FOR CAR RADIO

- HIGH POWER CAPABILITY:  
4x6W min/4Ω @14.4V, 1KHz, 10%  
4x10W typ/2Ω @14.4V, 1KHz, 10%
- MINIMUM EXTERNAL COMPONENT COUNT
  - INTERNALLY FIXED GAIN (20dB)
  - 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

### PROTECTIONS:

- AC OUTPUT SHORT CIRCUIT TO GND
- DC OUTPUT SHORT CIRCUIT TO GND AND TO V<sub>S</sub> AT POWER ON
- SOFT THERMAL LIMITER
- OVERRATING CHIP TEMPERATURE
- LOAD DUMP VOLTAGE

### BLOCK DIAGRAM



- FORTUITOUS OPEN GND
- REVERSED BATTERY
- ESD PROTECTION

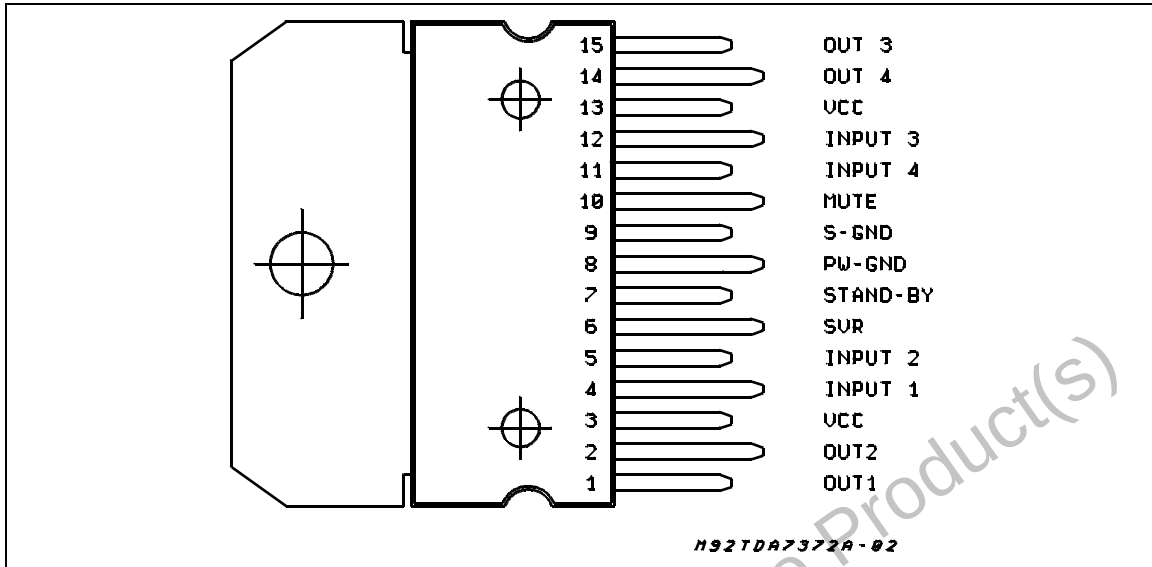
### DESCRIPTION

The TDA7372A 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 TDA7372A delivers a rail to rail voltage swing with no need of bootstrap capacitors.

## TDA7372A

### 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%<br>each channel             | 6    | 6.5      |      | W          |
|              |                               | $R_L = 2\Omega$ ; THD = 10%<br>each channel             |      | 10       |      | W          |
| d            | Distortion                    | $R_L = 4\Omega$ ;<br>$P_O = 0.1$ to $3W$                |      | 0.04     | 0.3  | %          |
| CT           | Cross Talk                    | $f = 1kHz$ ; $R_g = 0$<br>$f = 10kHz$ ; $R_g = 0$       | 54   | 60<br>55 |      | dB<br>dB   |
| $R_{IN}$     | Input Impedance               |                                                         | 35   |          |      | K $\Omega$ |
| $G_V$        | Voltage Gain                  |                                                         | 19   | 20       | 21   | dB         |
| $G_V$        | Voltage Gain Match.           |                                                         |      |          | 1    | dB         |
| BW           | Bandwidth                     | @ -3dB                                                  | 100  |          |      | KHz        |
| $E_{NO}$     | Output Noise Voltage (*)      | $R_g = 0$                                               |      |          | 120  | $\mu V$    |
| SVR          | Supply Voltage Rejection      | $R_g = 0$ ; $f = 100Hz$                                 | 48   |          |      | dB         |
| ASB          | Stand-by Attenuation          |                                                         | 80   |          |      | dB         |
| $I_{SB}$     | ST-BY Current Consumption     | $V_{pin7} = 1.5V$                                       |      |          | 100  | $\mu A$    |
| $I_{PIN 7}$  | ST-BY Pin Current             | Play mode; $V_{pin7} = 5V$                              |      |          | 30   | $\mu A$    |
|              |                               | Output Under Short (Max<br>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

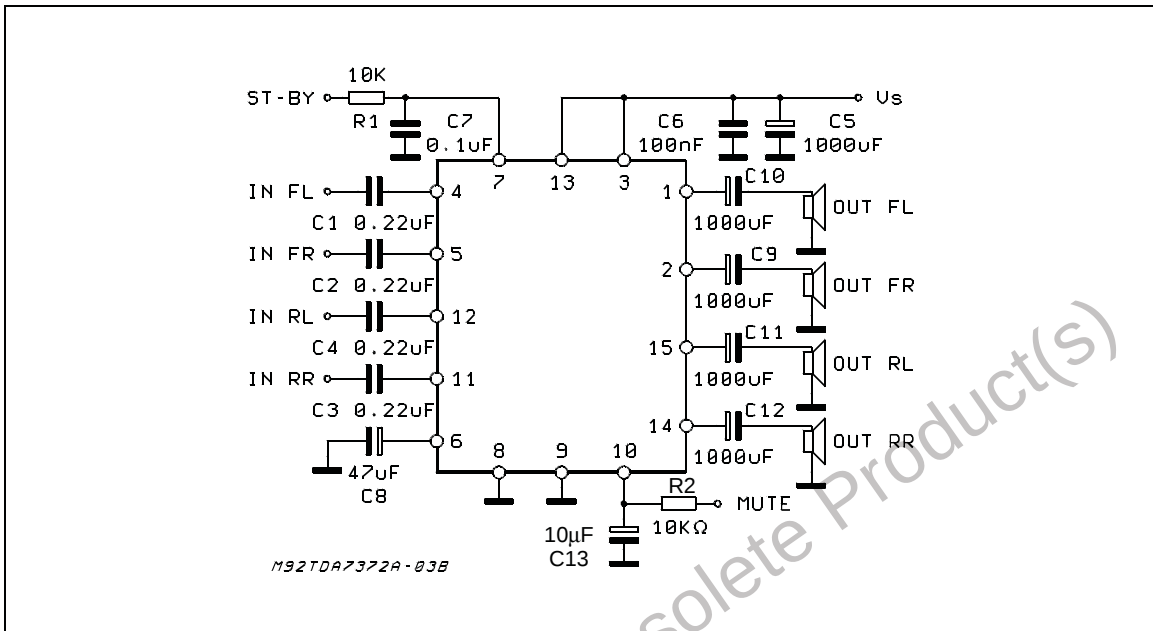
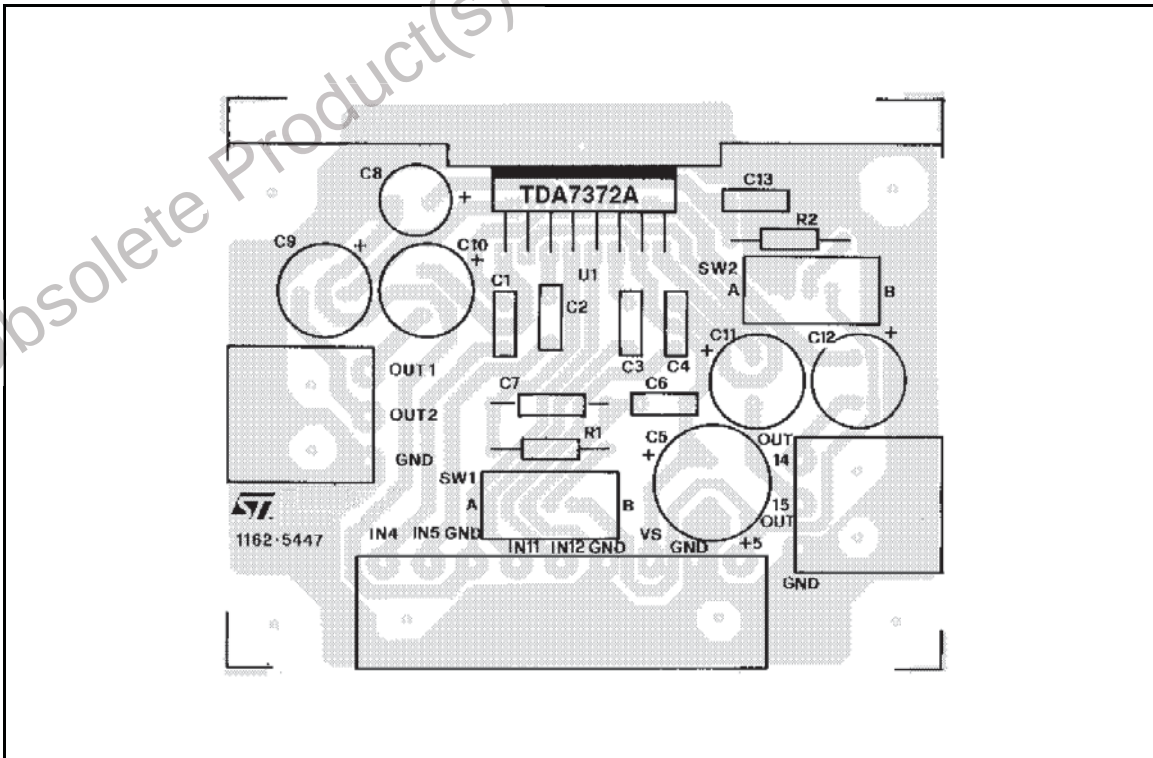
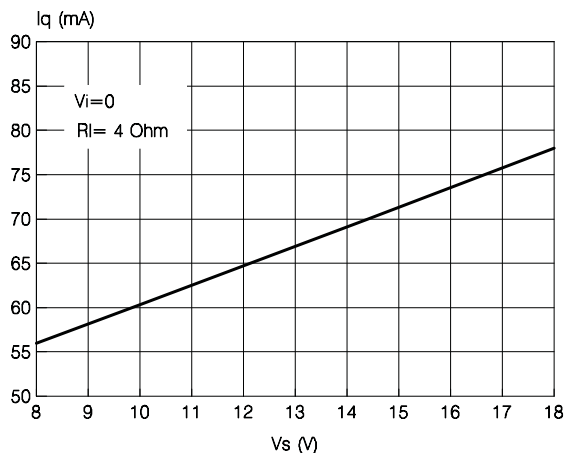
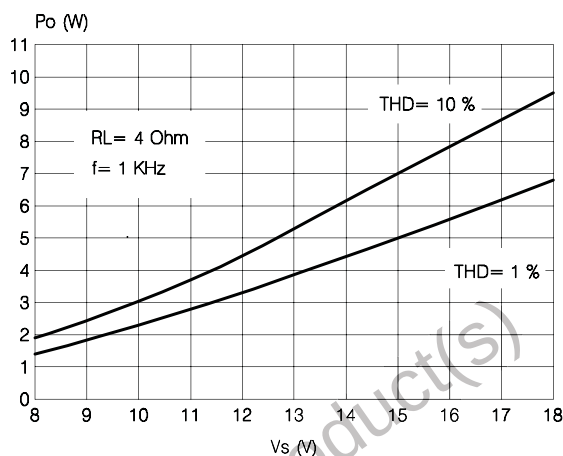
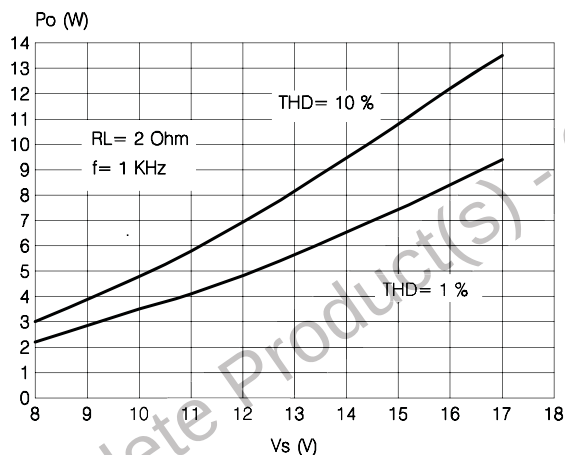
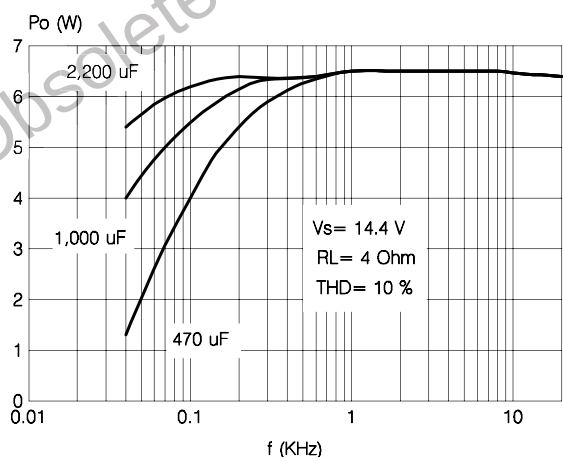
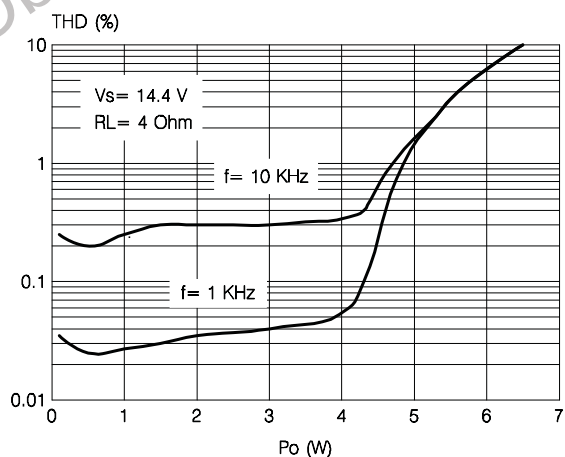
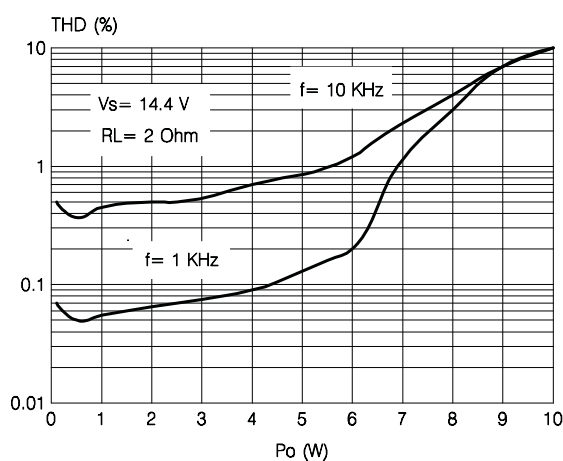


Figure 1: P.C. Board and components layout of the Test and Application Circuit (1:1 scale)



**Figure 2:** Quiescent Drain Current vs. Supply Voltage**Figure 3:** Output Power vs. Supply Voltage**Figure 4:** Output Power vs Supply Voltage**Figure 5:** Output power vs. Frequency vs.  $C_{OUT}$  Value**Figure 6:** Distortion vs. Output Power**Figure 7:** Distortion vs. Output Power

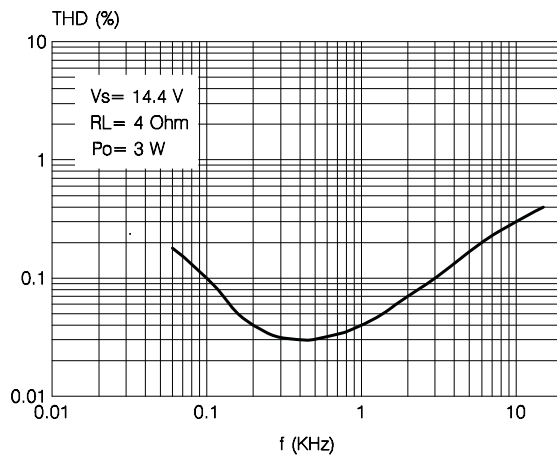
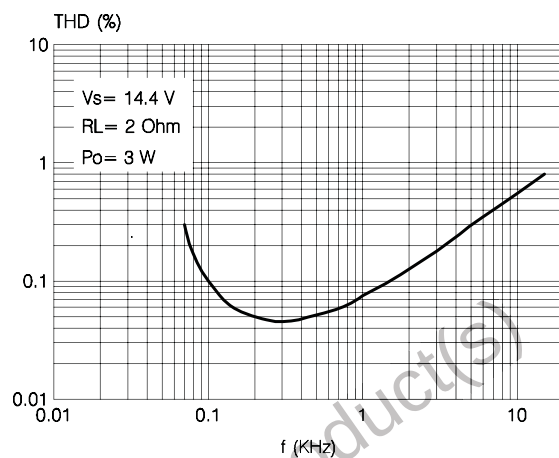
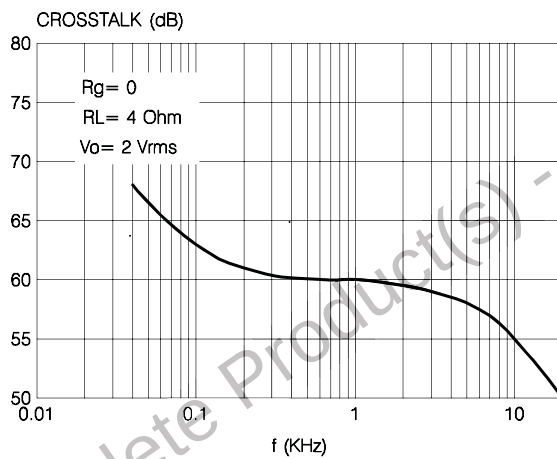
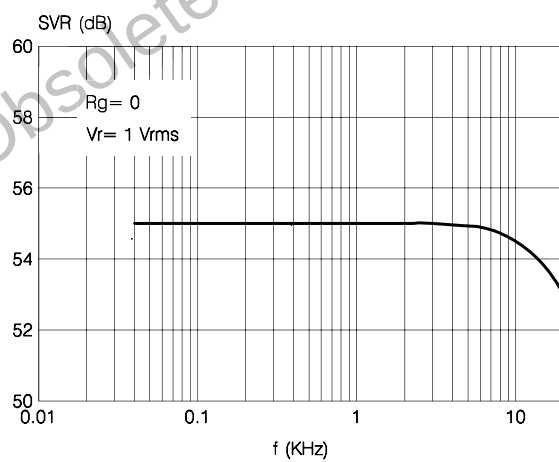
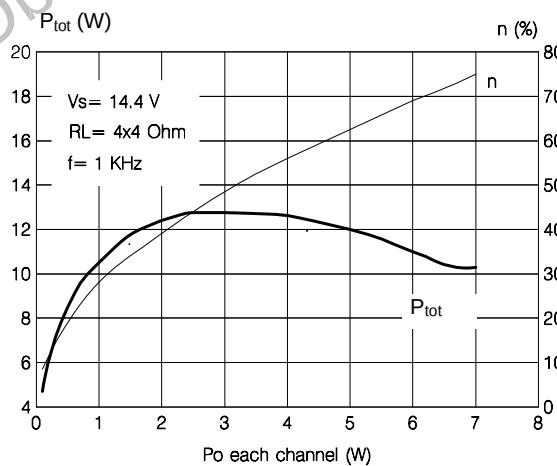
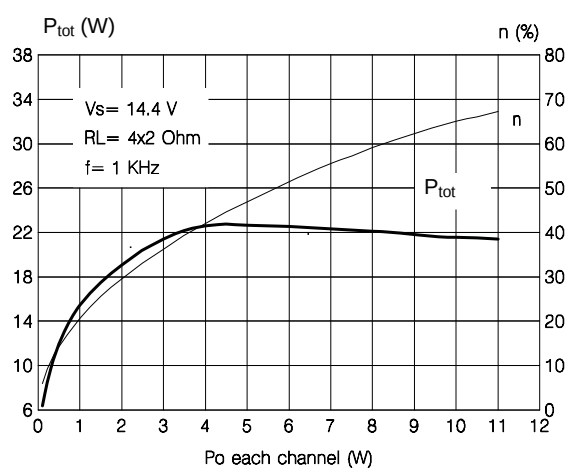
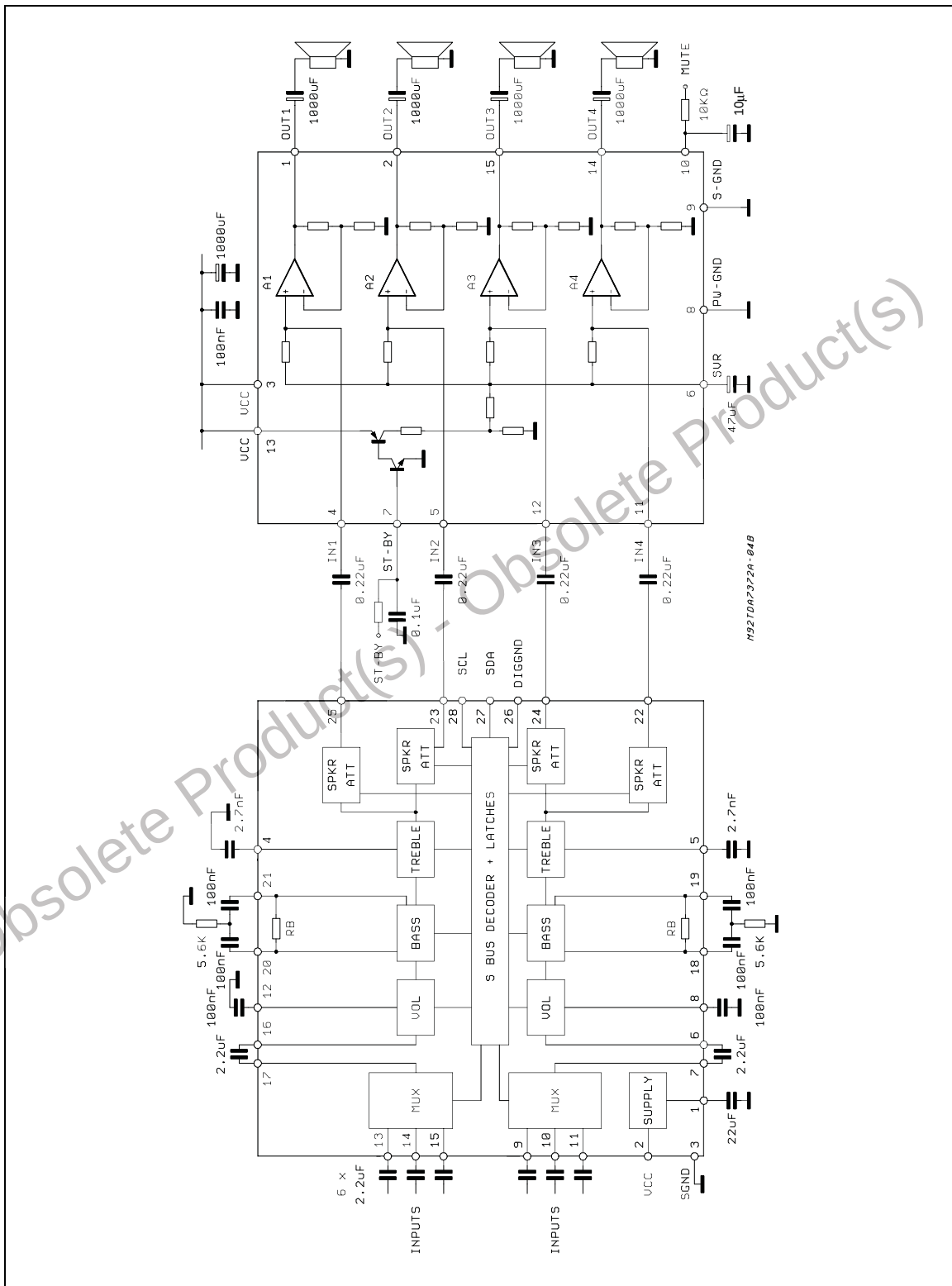
**Figure 8:** Distortion vs. Frequency**Figure 9:** Distortion vs. Frequency**Figure 10:** Cross-Talk vs. Frequency**Figure 11:** Supply Voltage Rejection vs. Frequency**Figure 12:** Total Power Dissipation and Efficiency vs. Output Power**Figure 13:** Total Power Dissipation and Efficiency vs. Output Power

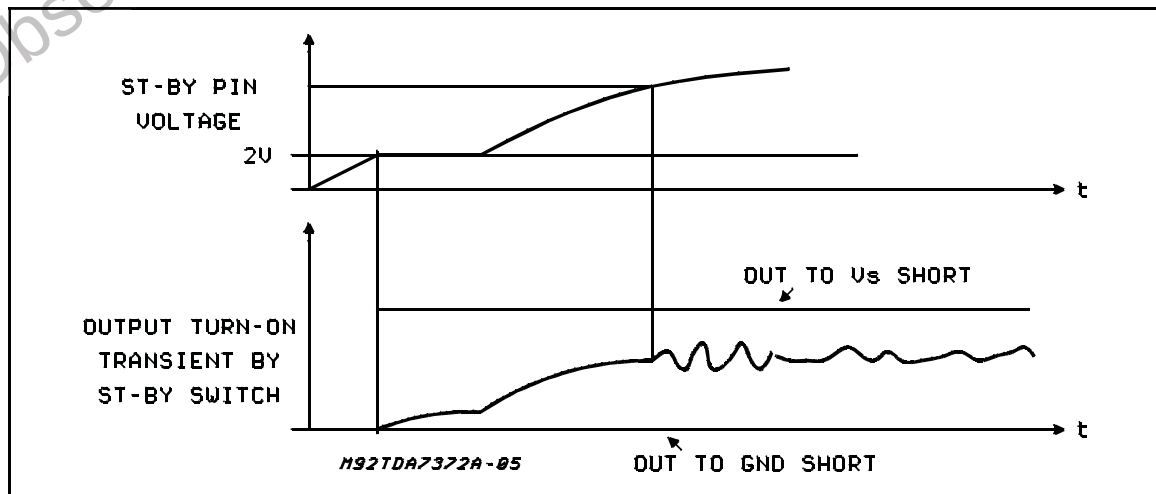
Figure 14: TDA7313 + 7372 Application Circuit



## FUNCTIONAL DESCRIPTION

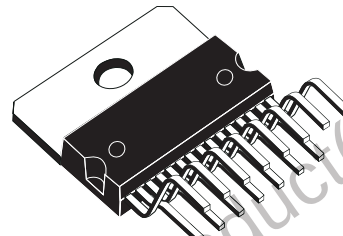
| Function                          | Description                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
|-----------------------------------|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| GENERAL                           | The TDA7372A 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 capable to operate down to 20dB gain so minimizing the output noise and optimizing SVR and distortion.                                                                                                                                                                                                                                                                                                                                                                                                            |
| 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.<br>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 generators 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.<br>The device goes automatically into mute state when the supply voltage goes below the minimum allowable 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 <sub>SVR</sub> capacitor.                                                                                                                                                                             |
| THERMAL PROTECTION                | The Thermal protection principle involves two different steps<br>a) Soft thermal limitation<br>b) Shutdown<br>As long as 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 | A built-in protection circuit assures reliable and safe operation in presence of:<br>- AC short circuit to GND<br>- DC short circuit to GND and to V <sub>S</sub> during power-on phase<br>The DC short protector acts in a way to avoid that the device is being turned on (by ST-BY) when a DC short is present from OUT to GND or OUT to V <sub>S</sub> . Due to this reason it is necessary to introduce a proper delay on the st-by pin (especially when it is driven by V <sub>S</sub> ).<br>Moreover, as the involved circuitry is normally disabled when a current higher than 5mA is fed into the st-by pin, it is important, in order not to disable it, to have the external current source driving the pin itself limited to 5mA. (figure 1 shows the relevant waveforms). |

Figure 15: Fault (DC short) waveforms



| 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 |

## OUTLINE AND MECHANICAL DATA



**Multiwatt15 V**

