



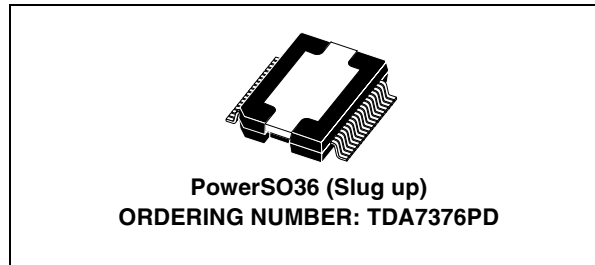
TDA7376PD

2 X 35W POWER AMPLIFIER FOR CAR RADIO

- HIGH OUTPUT POWER CAPABILITY
 - 2 x 40W max./4Ω
 - 2 x 35W/4Ω EIAJ
 - 2 x 25W/4Ω @ 14.4V, 1KHz, 10%
 - 2 x 25W/2Ω @ 14.4V, 1KHz, 10%
- 2Ω DRIVING
- DIFFERENTIAL INPUTS
- MINIMUM EXTERNAL COMPONENTS COUNT
- INTERNALLY FIXED GAIN (26dB)
- MUTE FUNCTION (CMOS COMPATIBLE)
- AUTOMUTE AT MINIMUM SUPPLY VOLTAGE DETECTION
- STAND-BY FUNCTION
- NO AUDIBLE POP DURING MUTE AND SY-BY OPERATIONS
- CLIPPING DETECTOR WITH PROGRAMMABLE DISTORTION THRESHOLD

Protections:

- SHORT CIRCUIT (OUT TO GROUND, OUT TO SUPPLY VOLTAGE, ACROSS THE LOAD)
- OVERRATING CHIP TEMPERATURE WITH

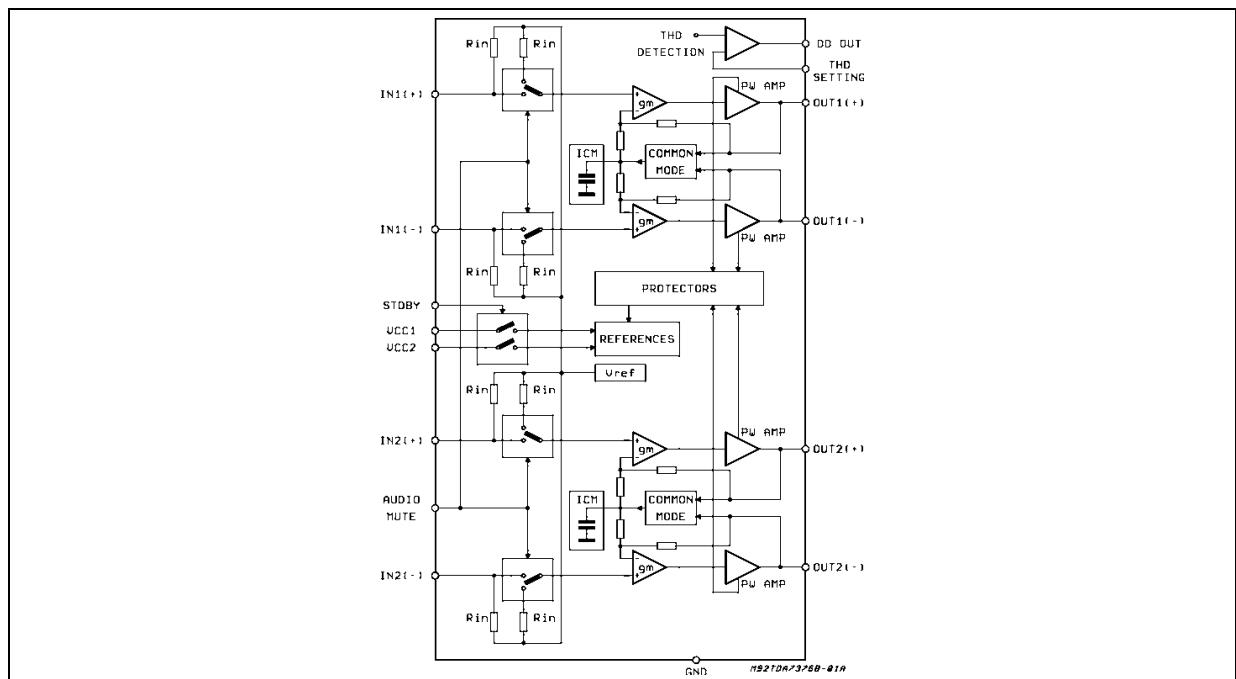


- SOFT THERMAL LIMITER
- LOAD DUMP VOLTAGE
- FORTUITOUS OPEN GROUND
- LOUDSPEAKER DC CURRENT
- ESD

DESCRIPTION

The TDA7376PD is a new technology dual bridge Audio Amplifier in PowerSO36 package designed for car radio applications. Thanks to the fully complementary PNP/NPN output stage configuration the TDA7376PD delivers a rail-to-rail voltage swing with no need of bootstrap capacitors.

BLOCK DIAGRAM



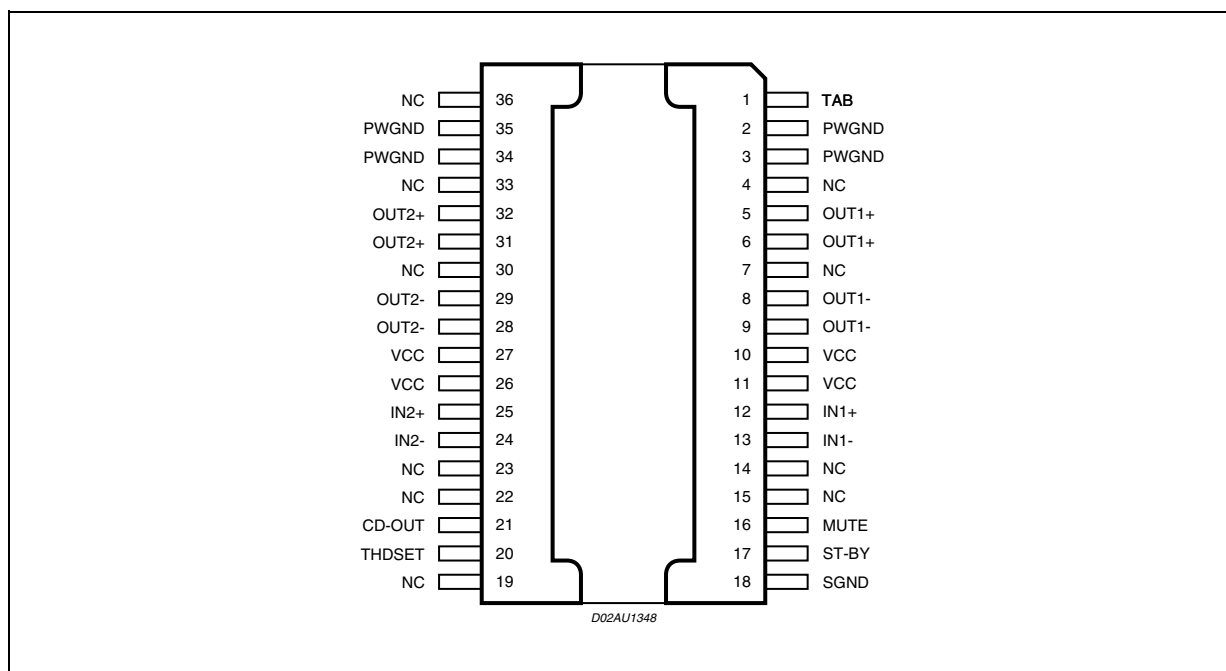
TDA7376PD

DESCRIPTION (Continued)

Differential input pairs, that will accept either single ended or differential input signals, guarantee high noise immunity making the device suitable for both car radio and car boosters applications.

The audio mute control, that attenuates the output signal of the audio amplifiers, suppresses pop on - off transients and cuts any noises coming from previous stages. The St-By control, that de-biases the amplifiers, reduces the cost of the power switch. The on-board programmable distortion detector allows compression facility whenever the amplifier is overdriven, so limiting the distortion at any levels inside the presettable range.

PIN CONNECTION (Top view)



ABSOLUTE MAXIMUM RATINGS

| Symbol | Parameter | Value | Unit |
|----------------|--|------------|------------|
| V_{OP} | Operating Supply Voltage | 18 | V |
| V_S | DC Supply Voltage | 28 | V |
| V_{peak} | Peak Supply Voltage ($t = 50ms$) | 50 | V |
| I_O | Output Peak Current (not repetitive $t = 100\mu s$) | 8 | A |
| | Output Peak Current (repetitive $f > 10Hz$) | 6 | A |
| P_{tot} | Power Dissipation $T_{case} = 85^\circ C$ | 36 | W |
| T_{stg}, T_j | Storage and Junction Temperature | -40 to 150 | $^\circ C$ |

THERMAL DATA

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

Figure 1. Differential Inputs Test and Application Circuit

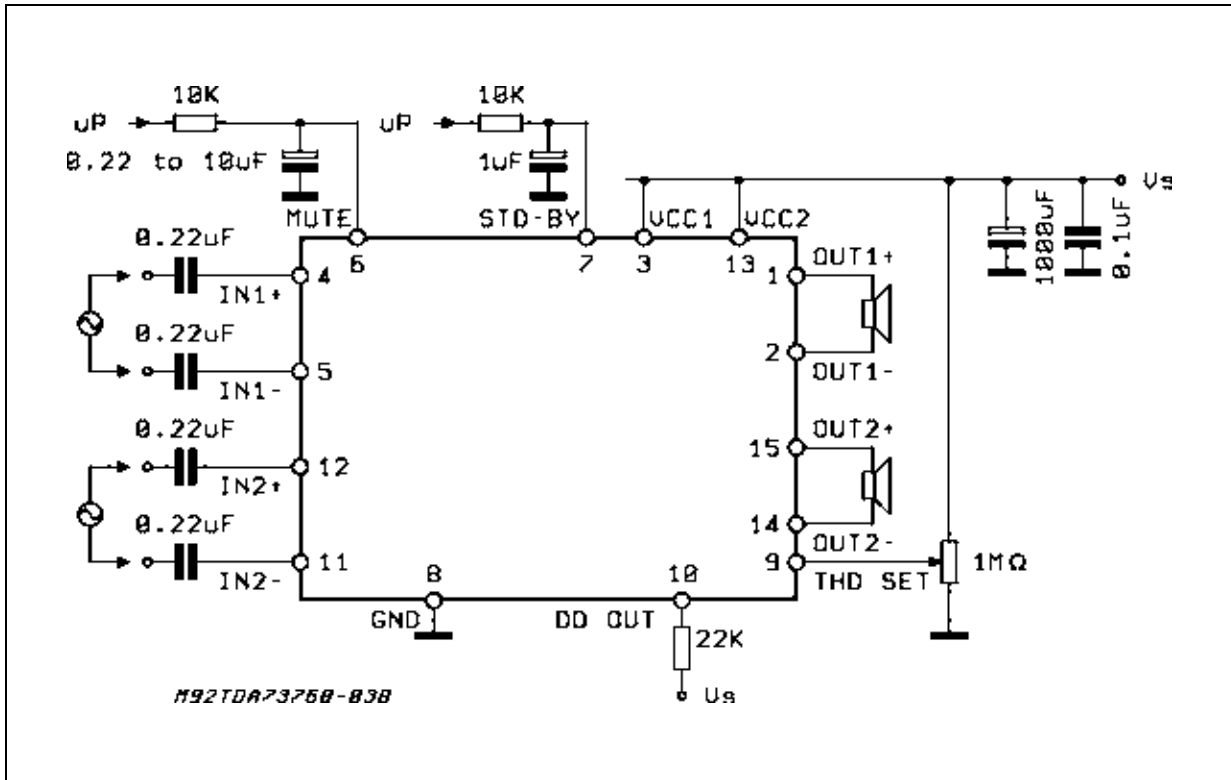
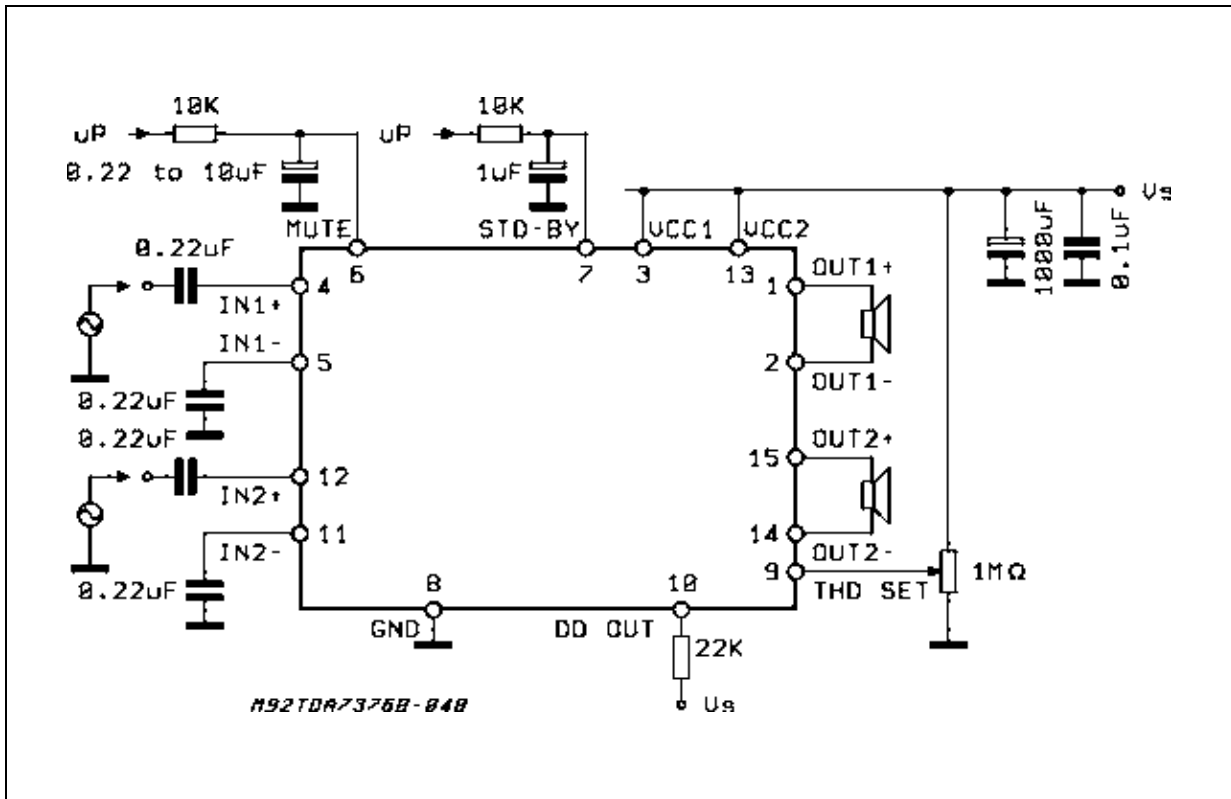


Figure 2. Single Ended Inputs Test and Application Circuit



ELECTRICAL CHARACTERISTICS (Refer to the test circuits figs 1 and 2, $V_S = 14.4V$; $R_L = 4\Omega$; $f = 1KHz$; $T_{amb} = 25^\circ C$, unless otherwise specified).

| Symbol | Parameter | Test Condition | Min. | Typ. | Max. | Unit |
|--------------|---------------------------------------|---|----------|--------------|----------|--------------------------|
| V_S | Supply Voltage Range | | 8 | | 18 | V |
| I_d | Total Quiescent Drain Current | $R_L = \infty$ | | | 200 | mA |
| V_{OS} | Output Offset Voltage | | | | 120 | mV |
| P_O | Output Power | THD = 10%; THD = 10%; $R_L = 2\Omega$ | 23 33 | 25 37 | | W W |
| P_{Omax} | Max. Output Power (*) | | 36 | 40 | | W |
| P_{OEIAJ} | EIAJ Outout Power (*) | $V_S = 13.7V$ | 32 | 35 | | W |
| THD | Distortion | $P_O = 0.5$ to 10W $P_O = 0.5$ to 15W | | 0.03 0.08 | | % % |
| C_T | Cross Talk | $f = 1KHz$; R_g $f = 10KHz$; R_g | | 80 70 | | dB dB |
| R_{IN} | Input Impedance | differential input Single Ended input | 45 40 | | | K Ω K Ω |
| G_V | Voltage Gain | differential input Single Ended input | 25 25 | 26 26 | 27 27 | dB dB |
| ΔG_V | Channel Gain Balance | | | | 1 | dB |
| E_{IN} | Input Noise Voltage | $R_g = 600\Omega$; "A" weighted $R_g = 600\Omega$; 22Hz to 33KHz | | 3 4 | 6 | μV μV |
| SVR | Supply Voltage Rejection | $f = 100Hz$; $V_r = 1V_{rms}$; $R_g = 0$; $f = 10Hz$; $V_r = 1V_{rms}$; $R_g = 0$; | 45 | 55 | | dB dB |
| BW | Power Bandwidth | (-3dB) | 75 | | | kHz |
| CMRR | Common Mode Rejection Ratio | $V_{CM} = 1V_{rms}$ input referred | 60 | | | dB |
| ASB | Stand-by Attenuation | $V_{SB} = 1.5V$; $P_{Oref} = 1W$ | 80 | 90 | | dB |
| V_{SBIN} | Stand-by In Threshold | | | | 1.5 | V |
| V_{SBOU} | Stand-by Out Threshold | | 3.5 | | | V |
| I_{sb} | Stand-by Current Consumption | $V_{SB} = 0V$ | | | 20 | μA |
| A_M | Mute Attenuation | $V_M = 1.5V$; $P_{Oref} = 1W$ | | 85 | | dB |
| V_{MIN} | Mute in Threshold | | | | 1.5 | V |
| V_{MOUT} | Mute out Threshold | | 3.5 | | | V |
| I_6 | Mute pin Current | $V_6 = 0$ to V_S ; ; $V_{Smax} = 18V$ | | | 100 | μA |
| D_{DL} | Distortion Detection Level (**) | | 3.5 | | | % |
| D_{DOU} | Distortion Detector Output DC Current | Output low, sinked current ($V_{pin10} = 1.5V$) | 1 | | | mA |
| | | Output high, leakage current ($V_{pin10} = V_S$, @ $V_{Smax} = 18V$) | | | 10 | μA |

(*) Saturated square wave output

(**) see figure 5 for THD setting.

The TDA7376PD is equipped with a programmable clipping distortion detector circuitry that allows to signal out the output stage saturation by providing a current sinking into an open collector output (DDout) when the total harmonic distortion of the output signal reaches the preset level. The desired threshold is fixed through an external divider that produces a proper voltage level across the THD set pin. Fig. 4 shows the THD detection threshold versus the THD set voltage. Since it is essential that the THD set voltage be proportional to the supply voltage, fig. 5 shows its value as a fraction of V_{CC} . The actual voltage can be computed by multiplying the fraction corresponding to the desired THD threshold by the application's supply voltage.

Figure 4. Clip Detector Threshold vs. THD set. Voltage.

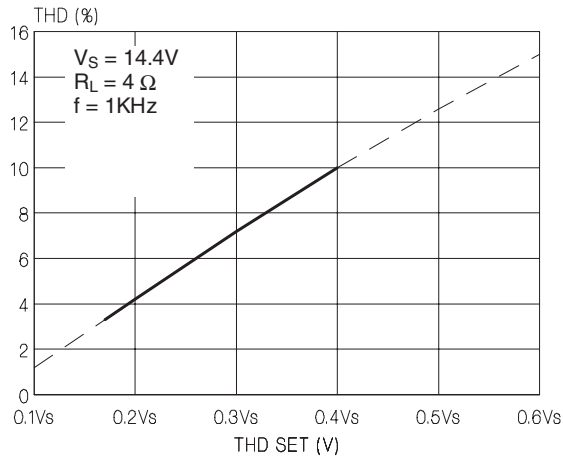


Figure 5. Quiescent Current vs. Supply Voltage

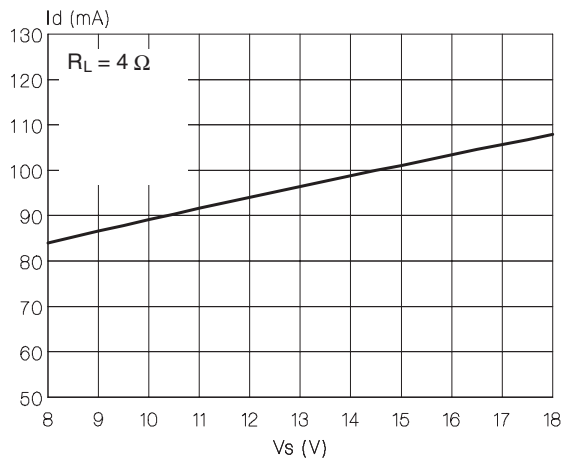


Figure 6. Output Power vs. Supply Voltage

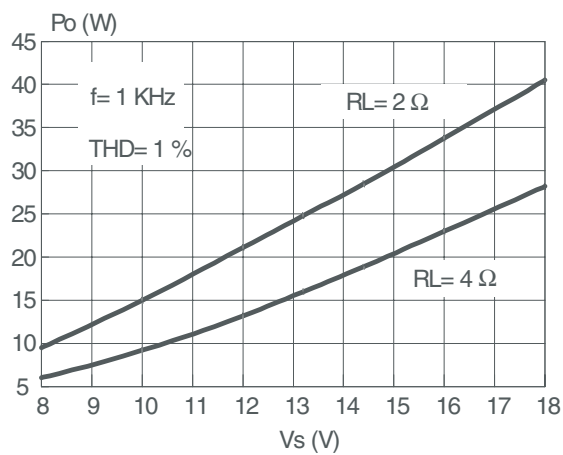


Figure 7. Output Power vs. Supply Voltage

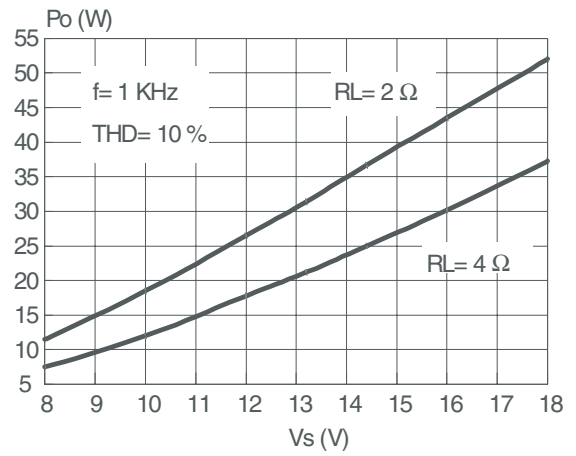


Figure 8. EIAJ Power vs. Supply Voltage

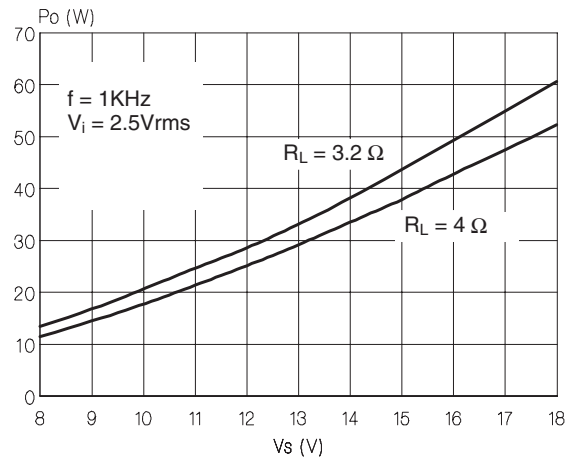


Figure 9. THD vs. Frequency

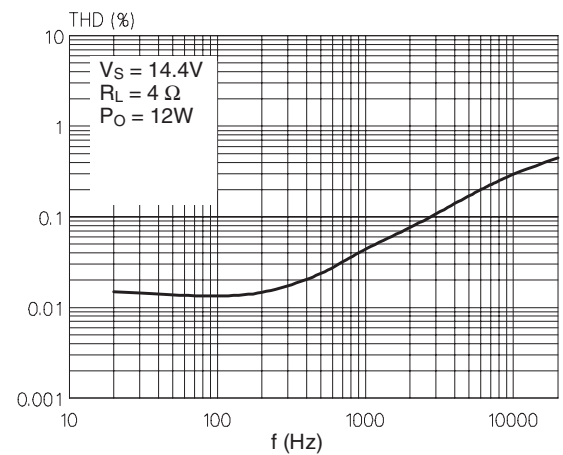


Figure 10. THD vs. Output Power ($R_L = 4\Omega$)

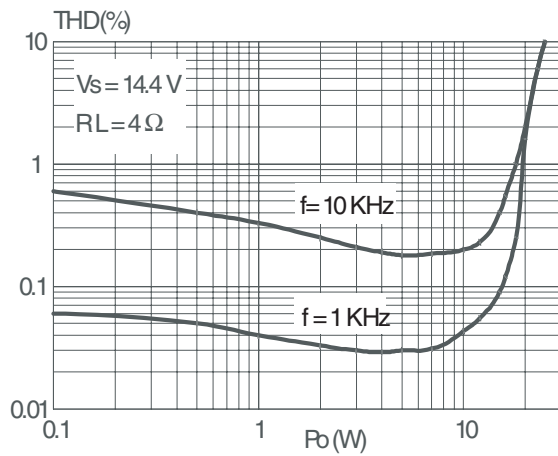


Figure 11. THD vs. Output Power ($R_L = 24\Omega$)

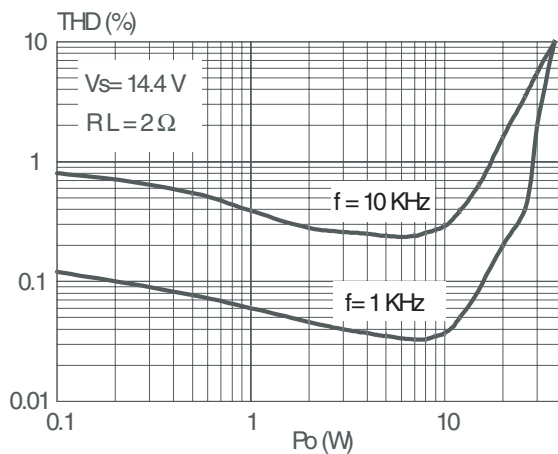


Figure 12. Dissipated Power & Efficiency vs. Output Power

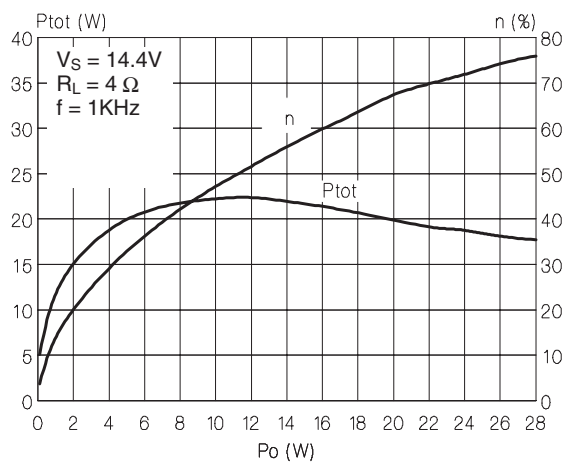


Figure 13. SVR vs. Frequency

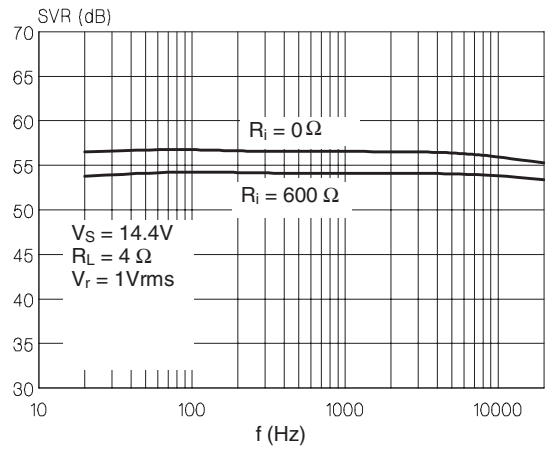


Figure 14. CMRR vs. Frequency

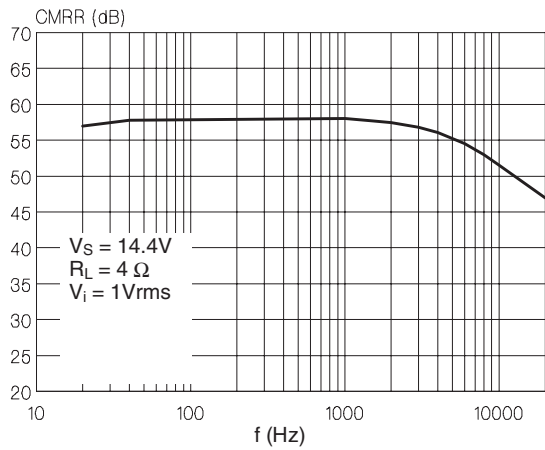
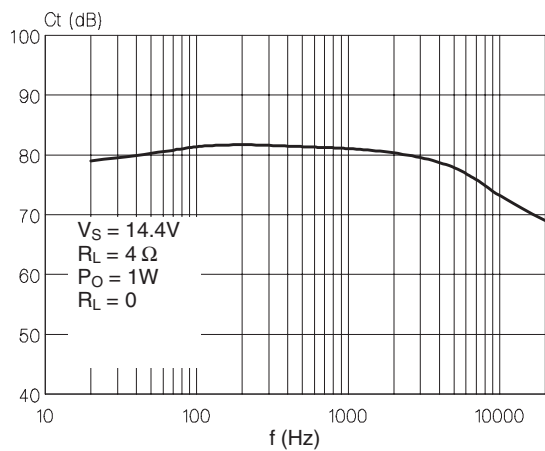


Figure 15. Crosstalk vs. Frequency

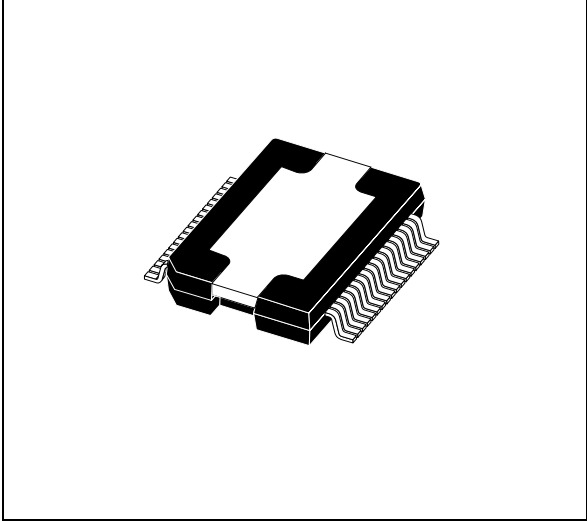


TDA7376PD

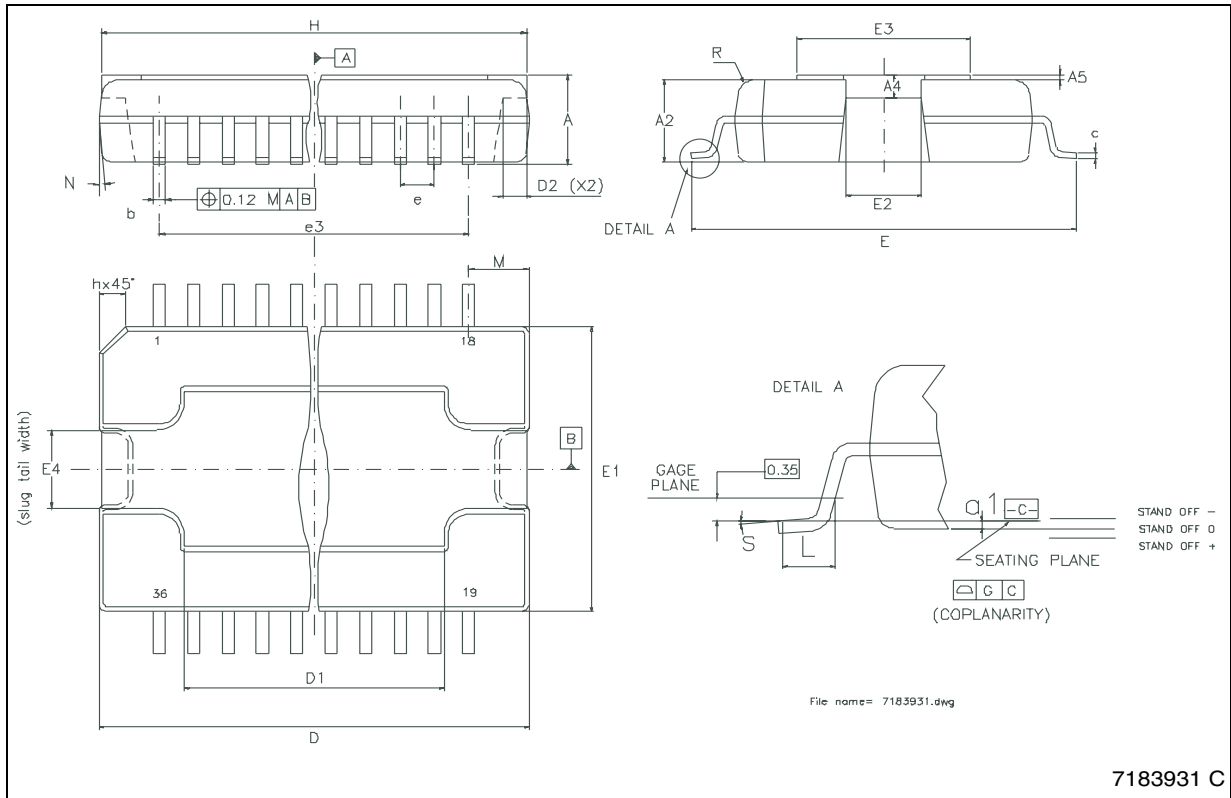
| DIM. | mm | | | inch | | |
|------|-----------|-------|--------|--------|-------|---------|
| | MIN. | TYP. | MAX. | MIN. | TYP. | MAX. |
| A | 3.25 | | 3.43 | 0.128 | | 0.135 |
| A2 | 3.1 | | 3.2 | 0.122 | | 0.126 |
| A4 | 0.8 | | 1 | 0.031 | | 0.039 |
| A5 | | 0.2 | | | 0.008 | |
| a1 | 0.030 | | -0.040 | 0.0011 | | -0.0015 |
| b | 0.22 | | 0.38 | 0.008 | | 0.015 |
| c | 0.23 | | 0.32 | 0.009 | | 0.012 |
| D | 15.8 | | 16 | 0.622 | | 0.630 |
| D1 | 9.4 | | 9.8 | 0.37 | | 0.38 |
| D2 | | 1 | | | 0.039 | |
| E | 13.9 | | 14.5 | 0.547 | | 0.57 |
| E1 | 10.9 | | 11.1 | 0.429 | | 0.437 |
| E2 | | | 2.9 | | | 0.114 |
| E3 | 5.8 | | 6.2 | 0.228 | | 0.244 |
| E4 | 2.9 | | 3.2 | 0.114 | | 1.259 |
| e | | 0.65 | | | 0.026 | |
| e3 | | 11.05 | | | 0.435 | |
| G | 0 | | 0.075 | 0 | | 0.003 |
| H | 15.5 | | 15.9 | 0.61 | | 0.625 |
| h | | | 1.1 | | | 0.043 |
| L | 0.8 | | 1.1 | 0.031 | | 0.043 |
| N | 10° (max) | | | | | |
| s | 8° (max) | | | | | |

- (1) "D and E1" do not include mold flash or protusions.
Mold flash or protusions shall not exceed 0.15mm (0.006")
(2) No intrusion allowed inwards the leads.

OUTLINE AND MECHANICAL DATA



PowerSO36 (SLUG UP)



7183931 C



Information furnished is believed to be accurate and reliable. However, STMicroelectronics assumes no responsibility for the consequences of use of such information nor for any infringement of patents or other rights of third parties which may result from its use. No license is granted by implication or otherwise under any patent or patent rights of STMicroelectronics. Specifications mentioned in this publication are subject to change without notice. This publication supersedes and replaces all information previously supplied. STMicroelectronics products are not authorized for use as critical components in life support devices or systems without express written approval of STMicroelectronics.

The ST logo is a registered trademark of STMicroelectronics.
All other names are the property of their respective owners

© 2004 STMicroelectronics - All rights reserved

STMicroelectronics GROUP OF COMPANIES

Australia - Belgium - Brazil - Canada - China - Czech Republic - Finland - France - Germany - Hong Kong - India - Israel - Italy - Japan -
Malaysia - Malta - Morocco - Singapore - Spain - Sweden - Switzerland - United Kingdom - United States

www.st.com