



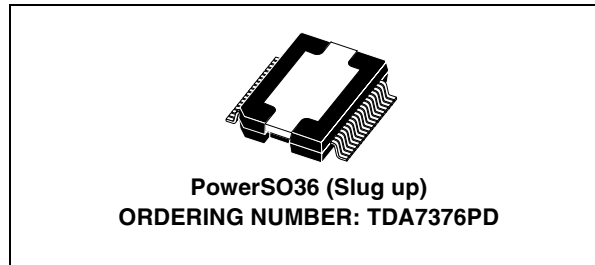
# TDA7376PD

## 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

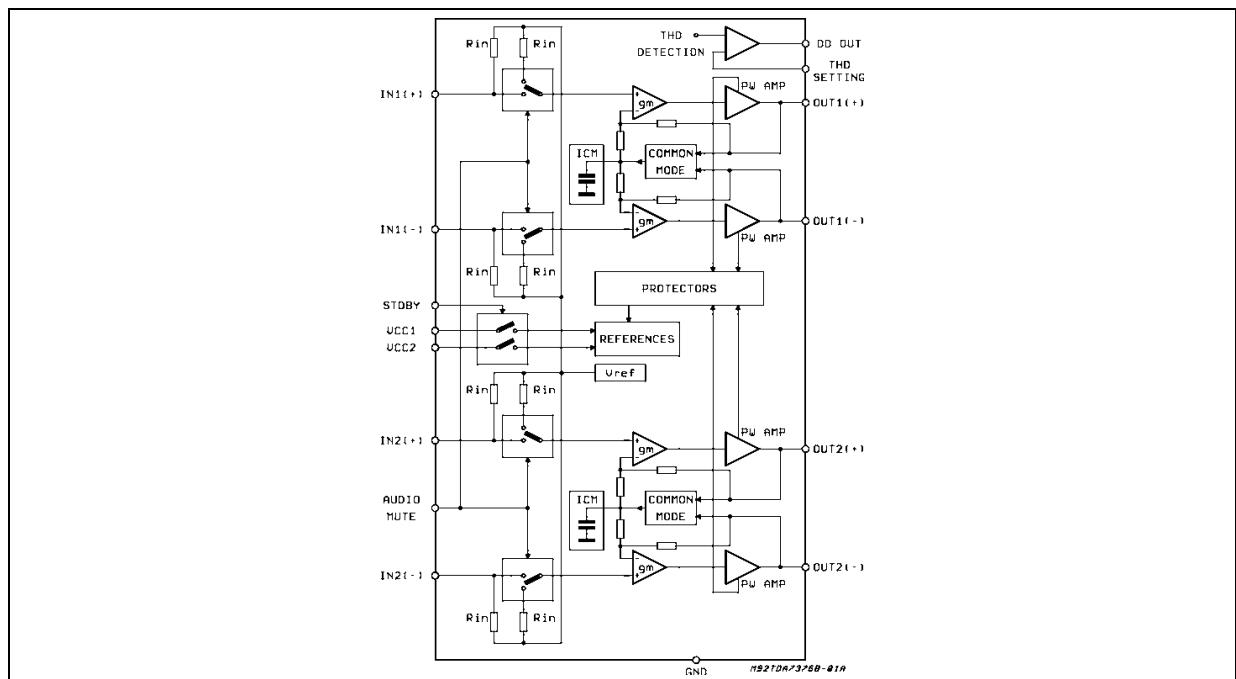


- SOFT THERMAL LIMITER
- LOAD DUMP VOLTAGE
- FORTUITOUS OPEN GROUND
- LOUDSPEAKER DC CURRENT
- ESD

### 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



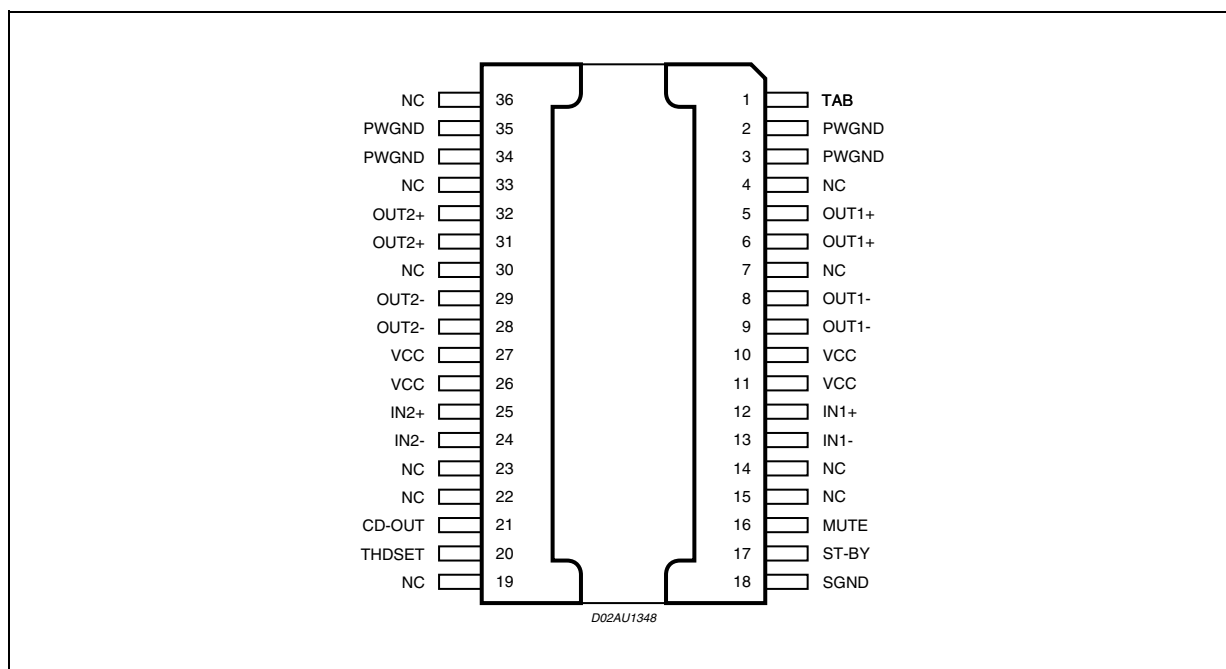
## TDA7376PD

### 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

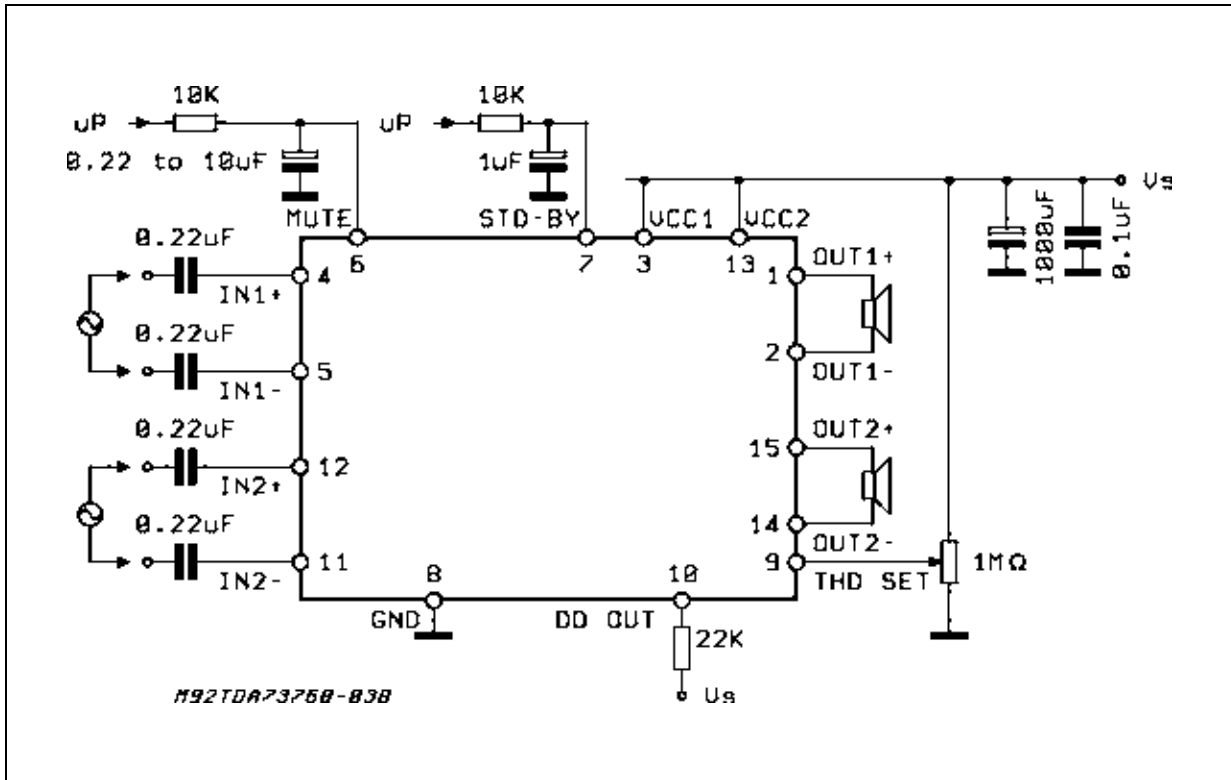


Figure 2. Single Ended Inputs Test and Application Circuit

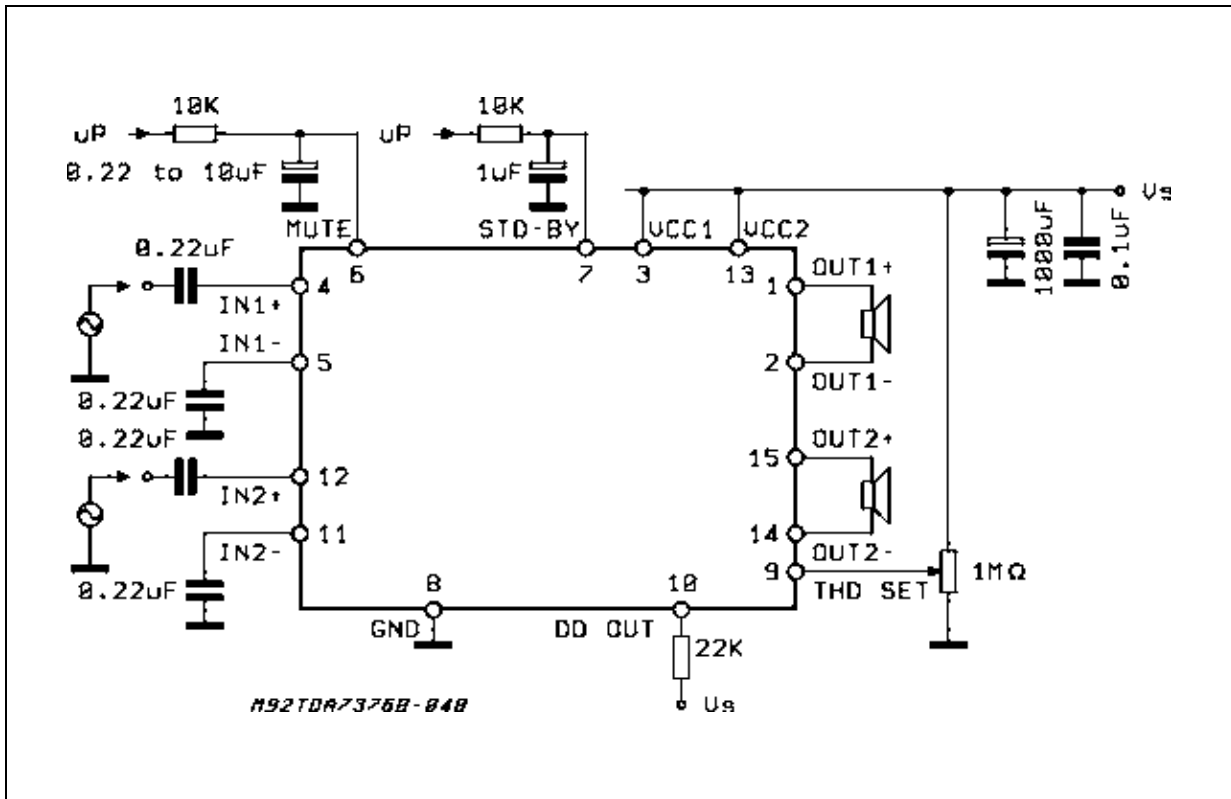
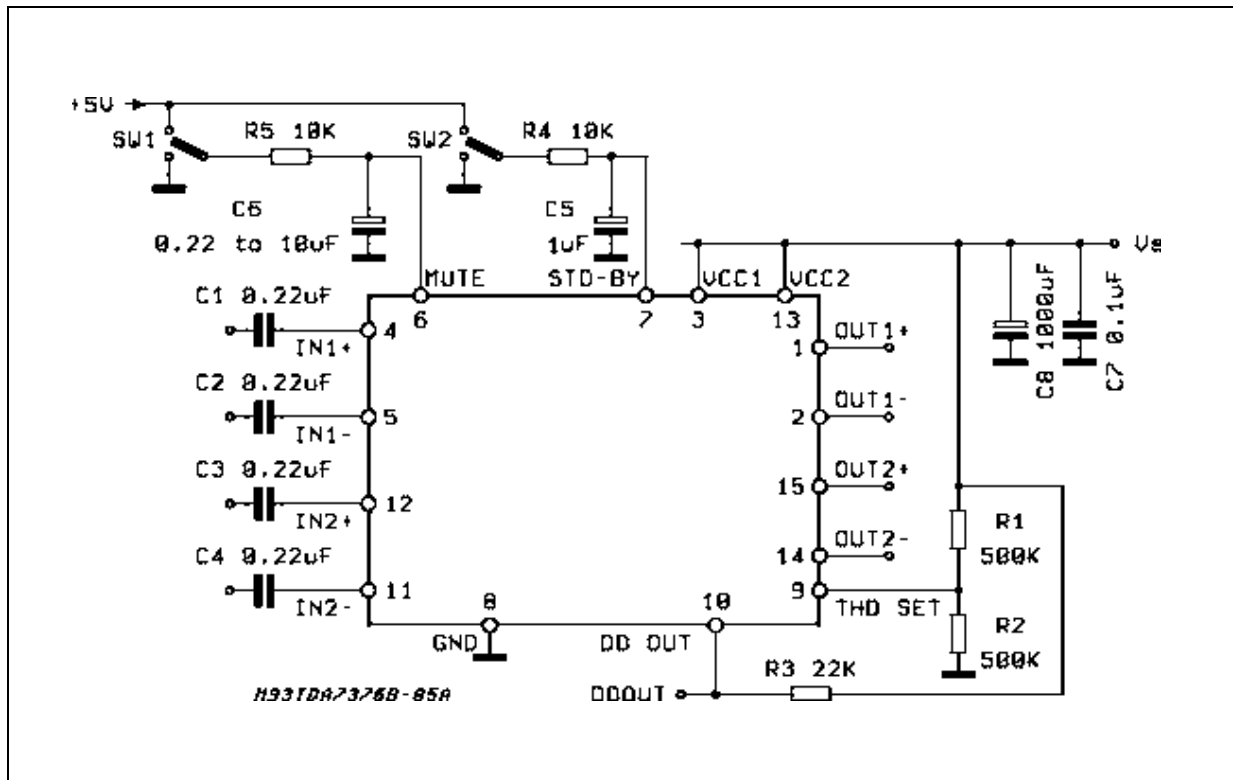


Figure 3. Application Board Reference Circuit



**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 $\Omega$ K $\Omega$
$G_V$	Voltage Gain	differential input Single Ended input	25 25	26 26	27 27	dB dB
$\Delta G_V$	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	$\mu V$ $\mu V$
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	$\mu A$
$A_M$	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	$\mu A$
$D_{DL}$	Distortion Detection Level (**)		3.5			%
$D_{DOU}$	Distortion Detector Output DC Current	Output low, sinked current ( $V_{pin10} = 1.5V$ ) Output high, leakage current ( $V_{pin10} = V_S$ , @ $V_{Smax} = 18V$ )	1		10	mA $\mu A$

(\*) 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.

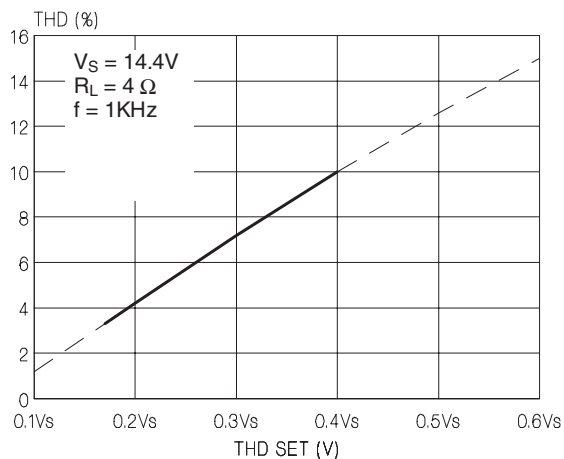


Figure 5. Quiescent Current vs. Supply Voltage

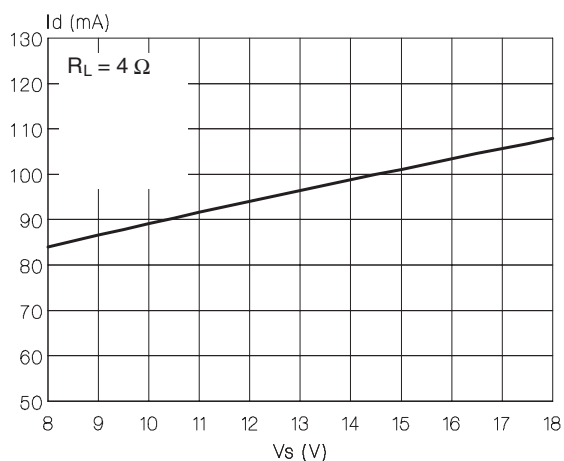


Figure 6. Output Power vs. Supply Voltage

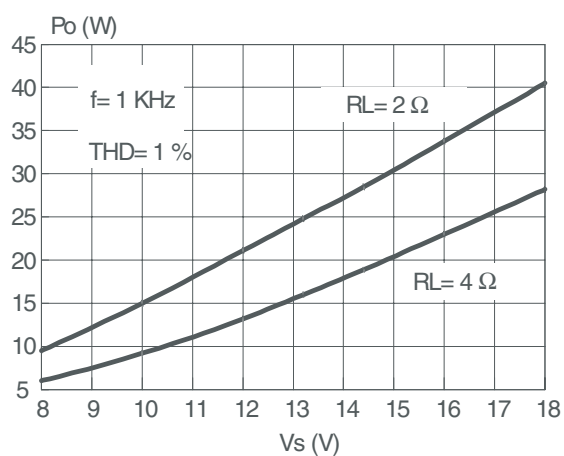


Figure 7. Output Power vs. Supply Voltage

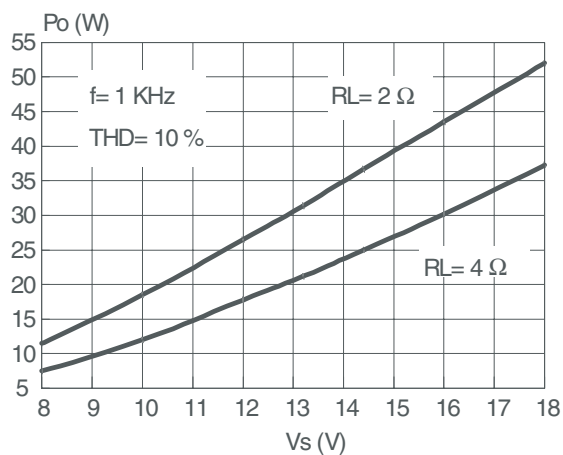


Figure 8. EIAJ Power vs. Supply Voltage

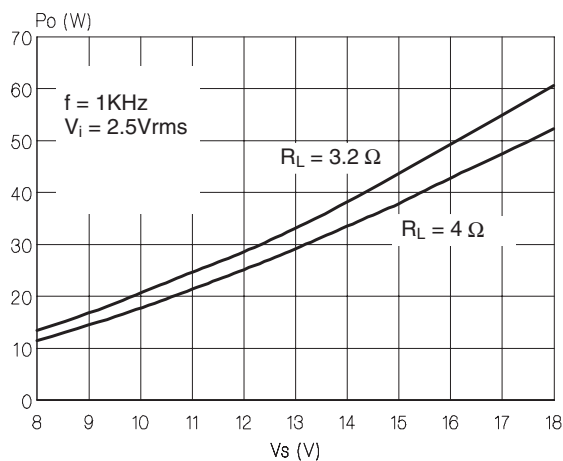


Figure 9. THD vs. Frequency

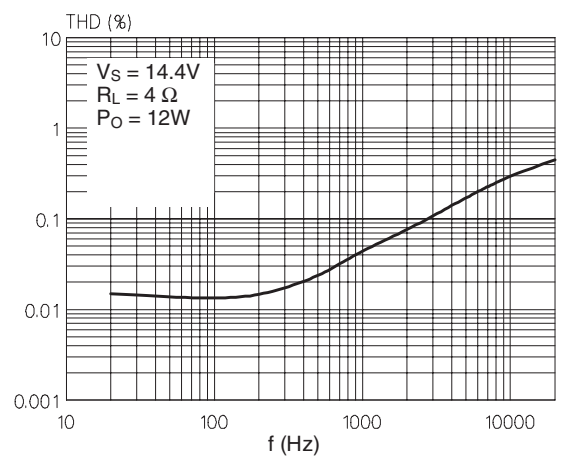


Figure 10. THD vs. Output Power ( $R_L = 4\Omega$ )

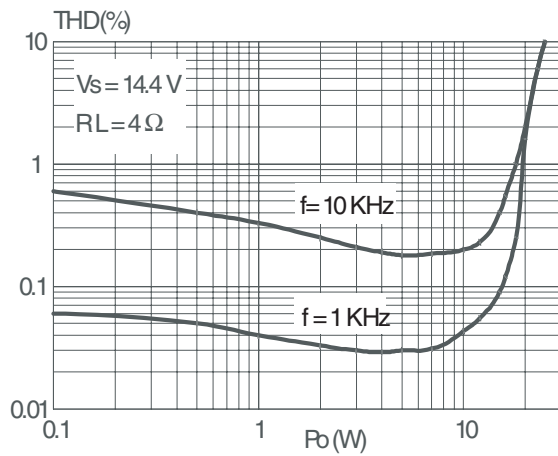


Figure 11. THD vs. Output Power ( $R_L = 24\Omega$ )

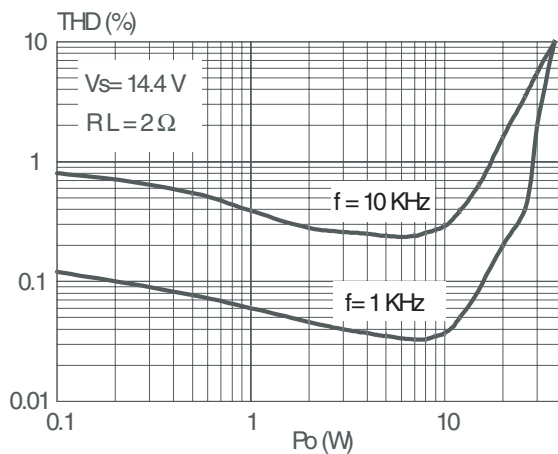


Figure 12. Dissipated Power & Efficiency vs. Output Power

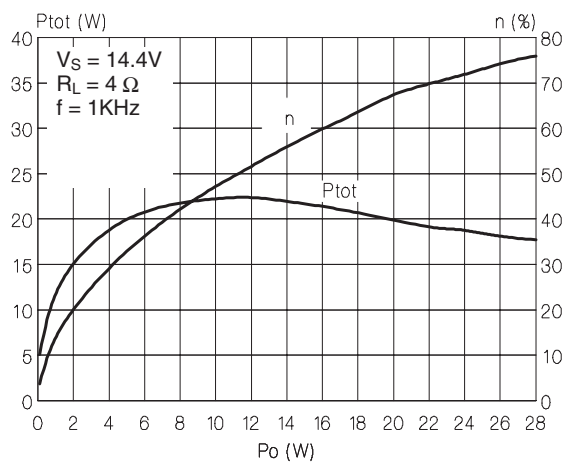


Figure 13. SVR vs. Frequency

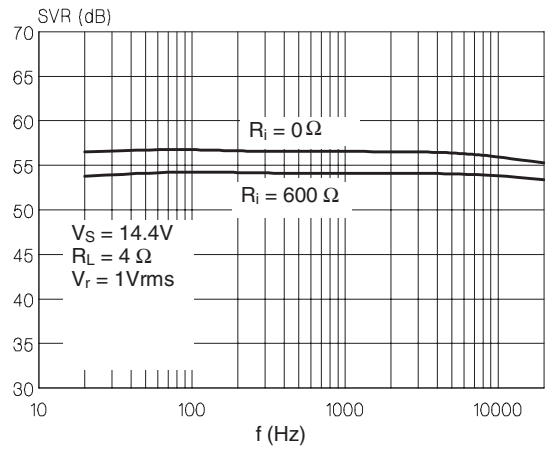


Figure 14. CMRR vs. Frequency

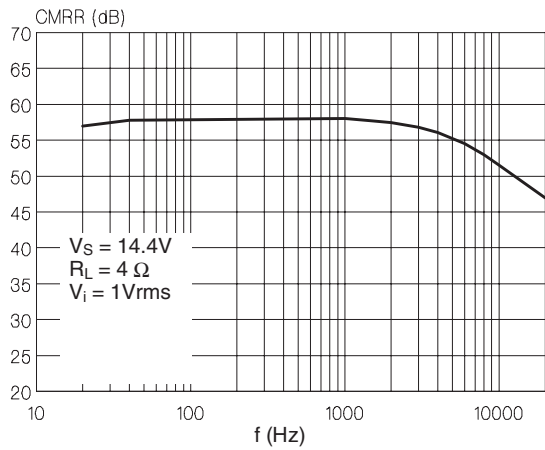
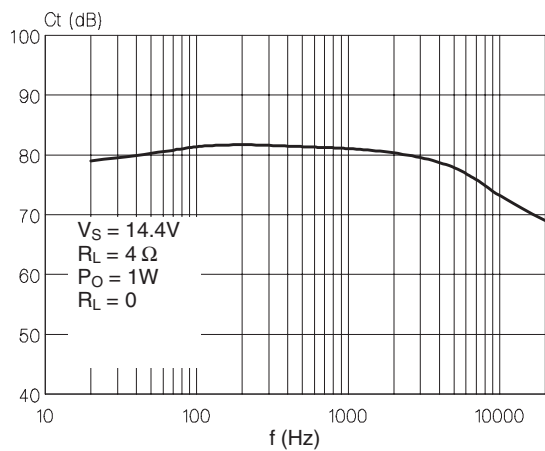


Figure 15. Crosstalk vs. Frequency

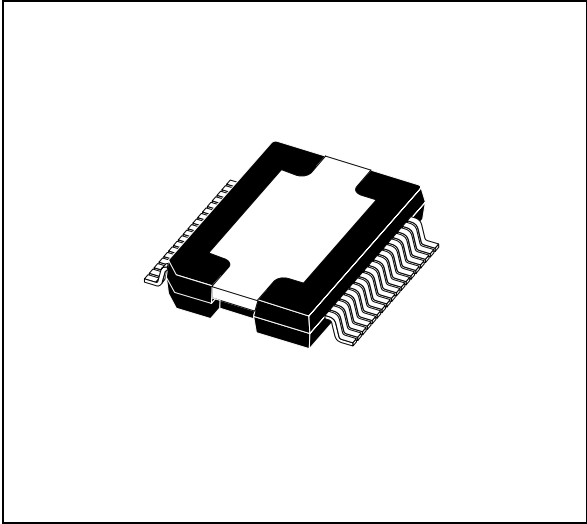


**TDA7376PD**

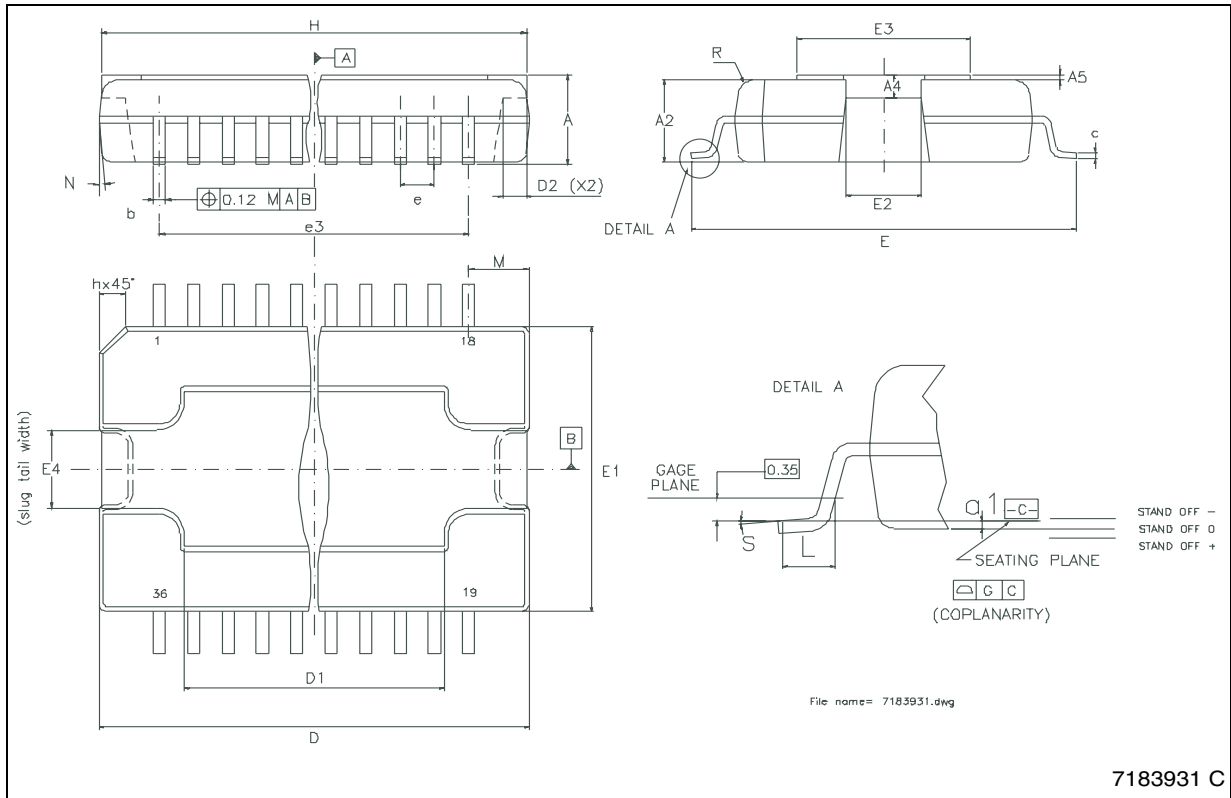
DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A	3.25		3.43	0.128		0.135
A2	3.1		3.2	0.122		0.126
A4	0.8		1	0.031		0.039
A5		0.2			0.008	
a1	0.030		-0.040	0.0011		-0.0015
b	0.22		0.38	0.008		0.015
c	0.23		0.32	0.009		0.012
D	15.8		16	0.622		0.630
D1	9.4		9.8	0.37		0.38
D2		1			0.039	
E	13.9		14.5	0.547		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)**



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