TDA7391PD

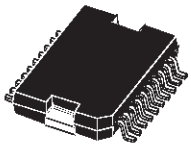
32W BRIDGE CAR RADIO AMPLIFIER

PRODUCT PREVIEW

- HIGH POWER CAPABILITY:
  40W/3.2Ω EIAJ
  32W/3.2Ω @ Vs = 14.4V, f = 1KHz, d = 10%
  26W/4Ω @ Vs = 14.4V, f = 1KHz, d = 10%
- DIFFERENTIAL INPUTS (EITHER SINGLE ENDED OR DIFFERENTIAL INPUT SIGNAL ARE ACCEPTED)
- MINIMUM EXTERNAL COMPONENT COUNT:
  - NO BOOTSTRAP CAPACITORS
  - NO BOUCHEROT CELLS
  - INTERNALLY FIXED GAIN (30dB)
  - NO SVR CAPACITOR
- ST.-BY FUNCTION (CMOS COMPATIBLE)
- PROGRAMMABLE TURN-ON/OFF DELAY
- NO AUDIBLE POP DURING MUTE AND ST-BY OPERATIONS

PROTECTIONS:

- SHORT CIRCUIT (TO GND, TO V_S, ACROSS THE LOAD)
- VERY INDUCTIVE LOADS
- CHIP OVERTEMPERATURE
- LOAD DUMP
- OPEN GND
- ESD



PowerSO20
ORDERING NUMBER: TDA7391PD

DESCRIPTION

The TDA7391PD is a BRIDGE class AB audio power amplifier specially intended for car radio High Power applications.
The high power capability together with the possibility to operate either in DIFFERENTIAL INPUT MODE or SINGLE ENDED INPUT MODE makes it suitable for boosters and high end car radio equipments.
The exclusive fully complementary output stage and the internal fixed gain configuration drop the external component count.
The on board clipping detector allows easy implementation of gain compression systems.

Figure 1: Test And Application Circuit

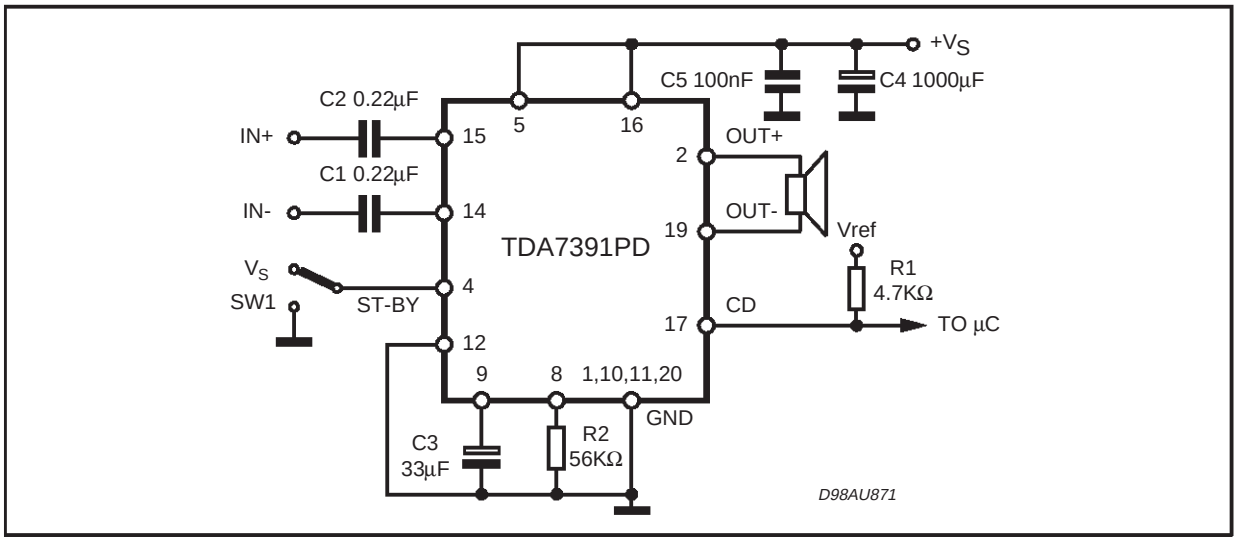
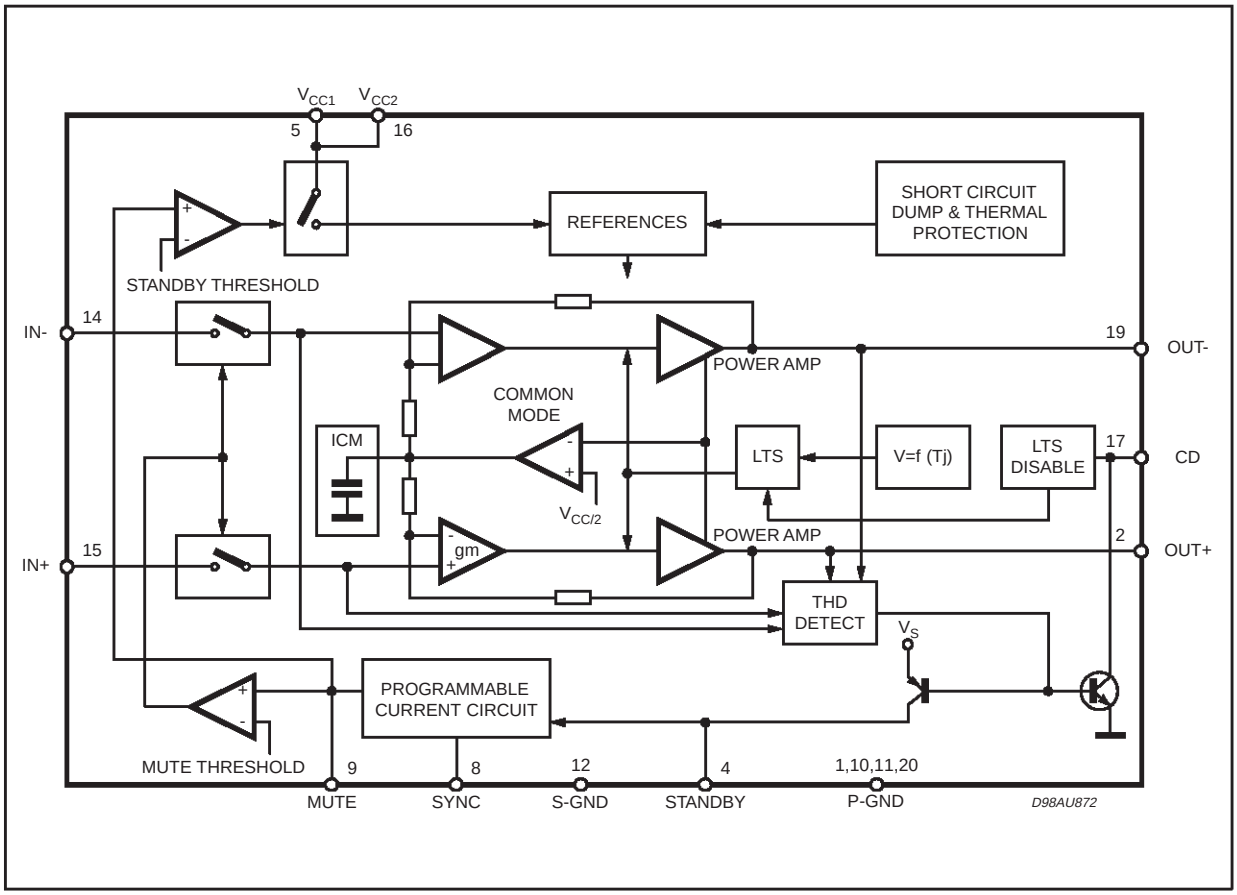
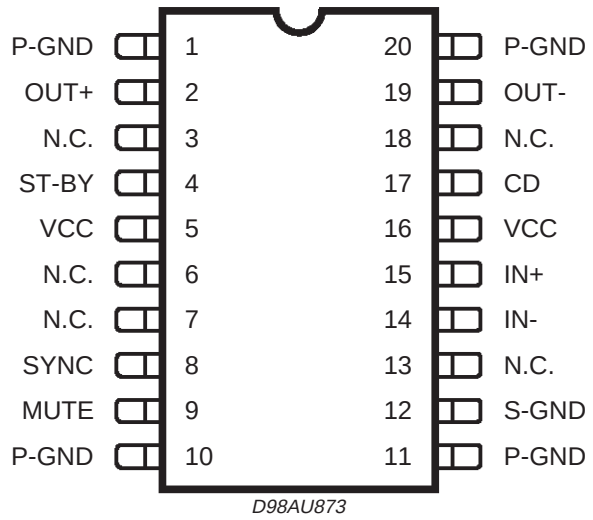


Figure 2: Block Diagram



PIN CONNECTION (Top view)



THERMAL DATA

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

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 = 50ms)	50	V
I_O	Output Peak Current repetitive (f > 10Hz) Output Peak Current non repetitive	4.5 6	A A
P_{tot}	Power Dissipation (T_{CASE} = 85°C)	32	W
T_{stg}, T_j	Storage and Junction-Case Temperature	-40 to 150	°C

ELECTRICAL CHARACTERISTICS (V_S = 14.4V; R_L = 4Ω, f = 1KHz, T_{amb} = 25°C, unless otherwise specified)

Symbol	Parameter	Test Condition	Min.	Typ.	Max.	Unit
V_S	Supply Voltage Range		8		18	V
I_q	Total Quiescent Current			60	150	mA
V_{OS}	Output Offset Voltage				120	mV
I_{SB}	ST-BY Current	V_{ST-BY} = 1.5V			100	µA
I_{SBin}	ST-BY Input Bias Current	V_{ST-BY} = 5V			10	µA
V_{SBon}	ST-BY On Threshold Voltage				1.5	V
V_{SBoff}	ST-BY Off threshold Voltage		3.5			V
ATT_{ST-BY}	ST-BY Attenuation			90		dB
$I_{M\ in}$	Mute Input Bias Current	(V_{MUTE} = 5V)			10	µA
A_M	Mute Attenuation			90		dB
P_O	RMS Output Power	d = 10% d = 1% d = 10%; R_L = 3.2Ω	20	26 21 32		W W W
	EIAJ Output Power	V_S = 13.7V		40		W
d	Distortion	 P_O = 0.1 to 15W		0.06 0.03		% %
G_V	Voltage Gain		29.5	30	30.5	dB
f_H	High Frequency rolloff	P_O = 1W; -3dB	75			KHz
R_{IN}	Input Impedance	Differential	36	60		KΩ
		Single Ended	30	55		KΩ
E_{IN}	Input Noise Voltage	R_g = 0Ω ; f = 22Hz to 22KHz		4		mV
CMRR	Input Common Mode Rejection	f = 1KHz; V_{IN} = 1Vrms		65		dB
SVR	Supply Voltage Rejection	R_g = 0Ω; V_r = 1Vrms		60		dB
CDL	Clipping Detection Level		5	10	15	%
T_{sd}	Absolute Thermal Shutdown Junction Temperature			160		°C

FUNCTIONAL DESCRIPTION

Pin	Function	Description
14, 15	INPUTS	The input stage is a high impedance type also capable of operation in single ended mode with one input capacitively coupled to the signal GND. The impedance seen by the inverting and non inverting input pins must be matched.
5,16	$+V_S$	Supply Voltage.
17	CD	The TDA7391PD is equipped with a diagnostic circuitry able to detect the clipping in the Output Signal (distortion = 10%). The CD pin (open collector) gives out low level signal during clipping.
2,19	OUTPUTS	The output stage is a bridge type able to drive loads as low as 3.2Ω. It consists of two class AB fully complementary PNP/NPN stages fully protected. A rail to rail output voltage swing is achieved without need of bootstrap capacitors. No external compensation is necessary.
1,10, 11,20	P-GND	Power Ground.
12	S-GND	Signal Ground.
4	STAND-BY	The device features a ST-BY function which shuts down all the internal bias supplies when the ST-BY pin is low. In ST-BY mode the amplifier sinks a small current (in the range of few μA). When the ST-BY pin is high the IC becomes fully operational.
8	SYNC	A resistor (R_2) has to be connect between pin 8and GND in order to program the current that flows in the C_3 capacitor (pin 9). The values of C_3 and R_2 determine the time required to bias the amplifier.
9	MUTE	The pin will have a capacitor (C_3) tied to GND to set the MUTE/STAND-BY time. An automatic Mute during turn on/off is provided to prevent noisy transients.

Figure 2: Quiescent Current vs Supply Voltage

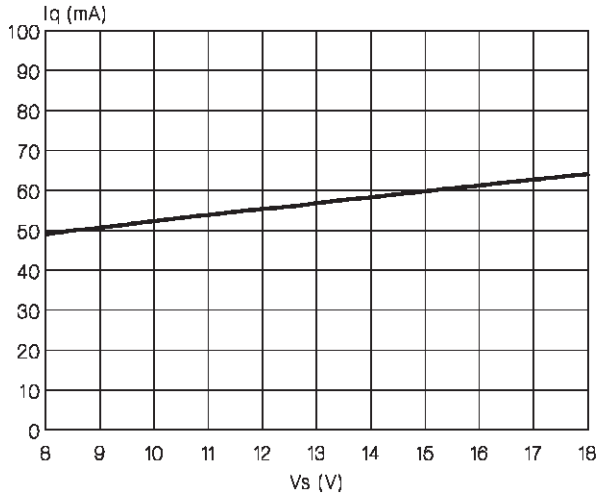


Figure 3: EIAJ power vs Supply Voltage

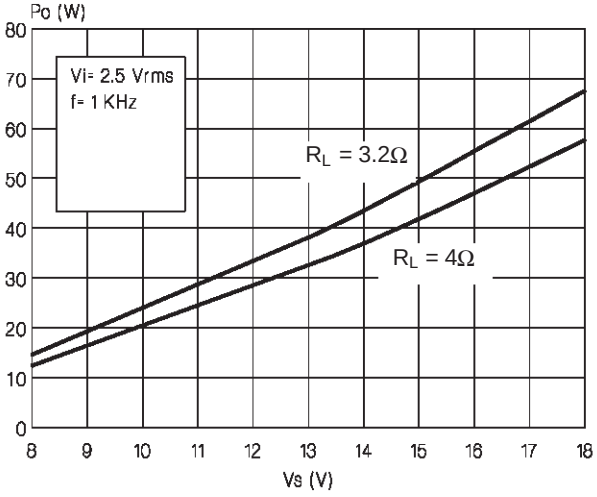


Figure 4: Output Power vs Supply Voltage (@ R_L = 4Ω)

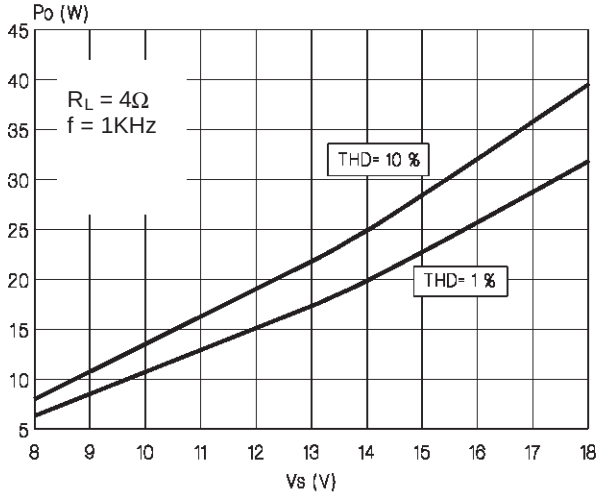


Figure 5: Distortion vs Frequency (@ R_L = 4Ω)

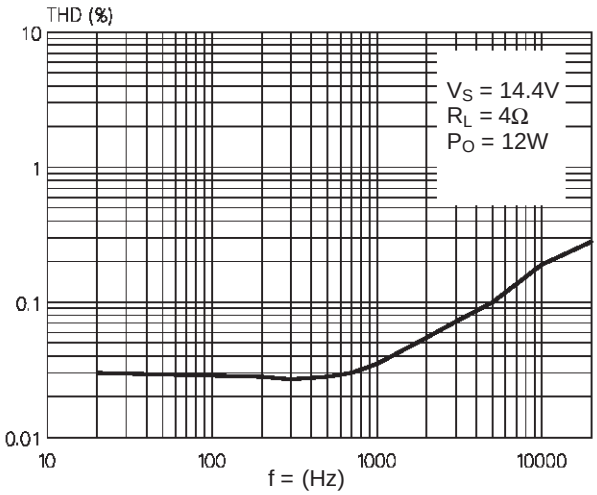


Figure 6: Output Power vs Supply Voltage (@ R_L = 3.2Ω)

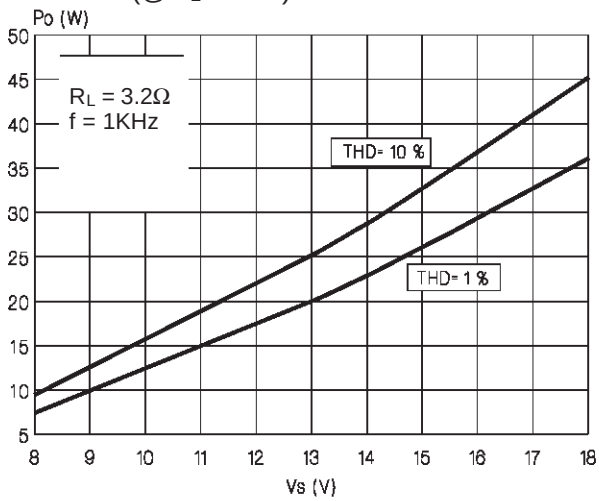


Figure 7: Distortion vs Frequency (R_L =4Ω)

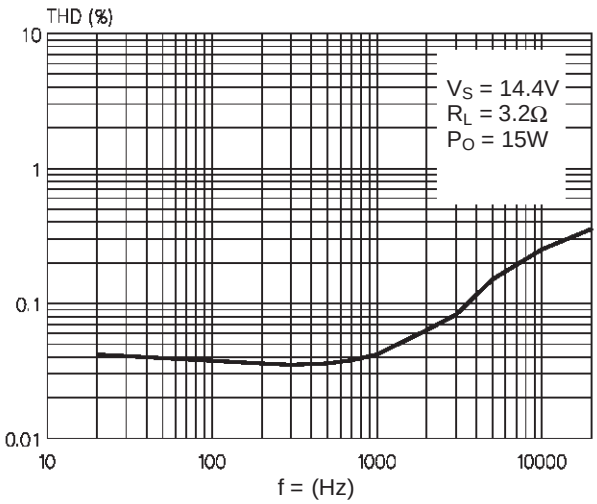


Figure 8: Supply Voltage Rejection vs Frequency

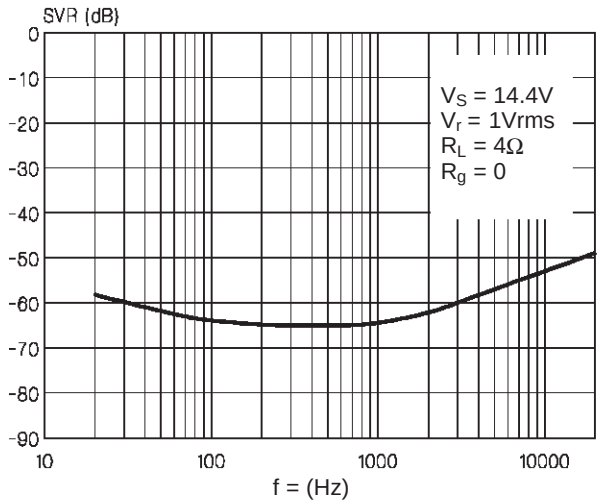


Figure 9: Common Mode Rejection vs. Frequency

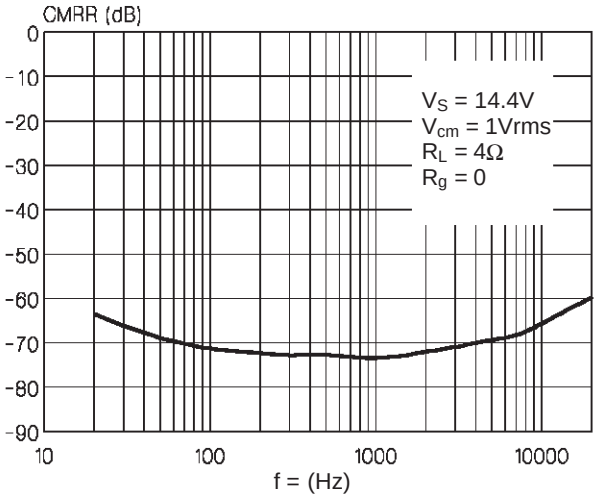


Figure 10: Total Power Dissipation & Efficiency vs. Output Power (@ R_L = 4Ω)

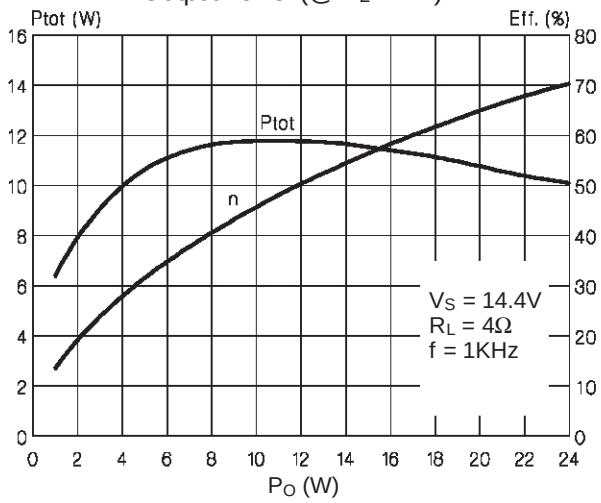
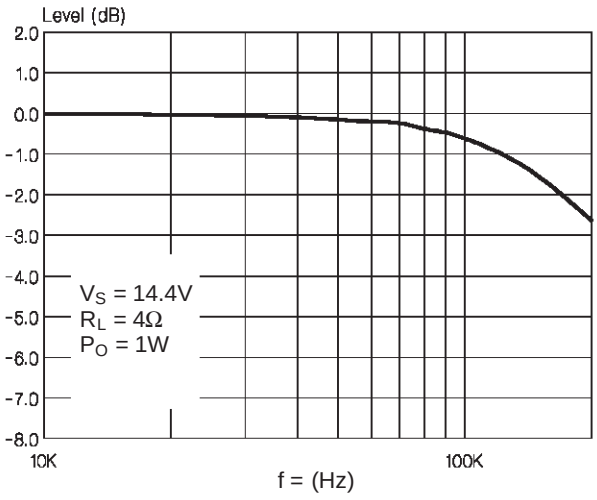


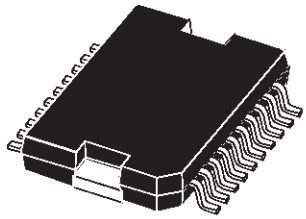
Figure 11: Power Bandwidth



DIM.	mm			inch		
	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.
A			3.6			0.142
a1	0.1		0.3	0.004		0.012
a2			3.3			0.130
a3	0		0.1	0.000		0.004
b	0.4		0.53	0.016		0.021
c	0.23		0.32	0.009		0.013
D (1)	15.8		16	0.622		0.630
D1	9.4		9.8	0.370		0.386
E	13.9		14.5	0.547		0.570
e		1.27			0.050	
e3		11.43			0.450	
E1 (1)	10.9		11.1	0.429		0.437
E2			2.9			0.114
E3	5.8		6.2	0.228		0.244
G	0		0.1	0.000		0.004
H	15.5		15.9	0.610		0.626
h			1.1			0.043
L	0.8		1.1	0.031		0.043
N	10° (max.)					
S	8° (max.)					
T		10			0.394	

(1) "D and F" do not include mold flash or protrusions.
- Mold flash or protrusions shall not exceed 0.15 mm (0.006").
- Critical dimensions: "E", "G" and "a3"

OUTLINE AND MECHANICAL DATA



JEDEC MO-166

PowerSO20