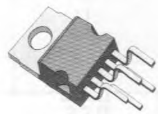
12W AUDIO AMPLIFIER (V_S=22V, R_L=4Ω)

The TDA2008 is a monolithic class B audio power amplifier in Pentawatt® package designed for driving low impedance loads (down to 3.2Ω). The device provides a high output current capability (up to 3A), very low harmonic and crossover distortion.

In addition, the device offers the following features:

- very low number of external components;
- assembly ease, due to Pentawatt® power package with no electrical insulation requirements;
- space and cost saving;
- high reliability;
- flexibility in use;
- thermal protection.



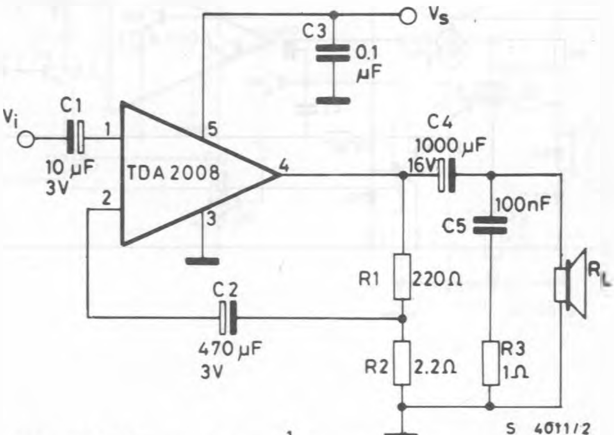
Pentawatt

ORDERING NUMBER: TDA2008V

ABSOLUTE MAXIMUM RATINGS

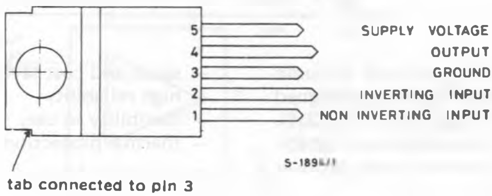
V_s	DC supply voltage	28	V
I_o	Output peak current (repetitive)	3	A
I_o	Output peak current (non repetitive)	4	A
P_{tot}	Power dissipation at T_{case} = 90°C	20	W
T_{stg}, T_j	Storage and junction temperature	-40 to 150	°C

TYPICAL APPLICATION CIRCUIT

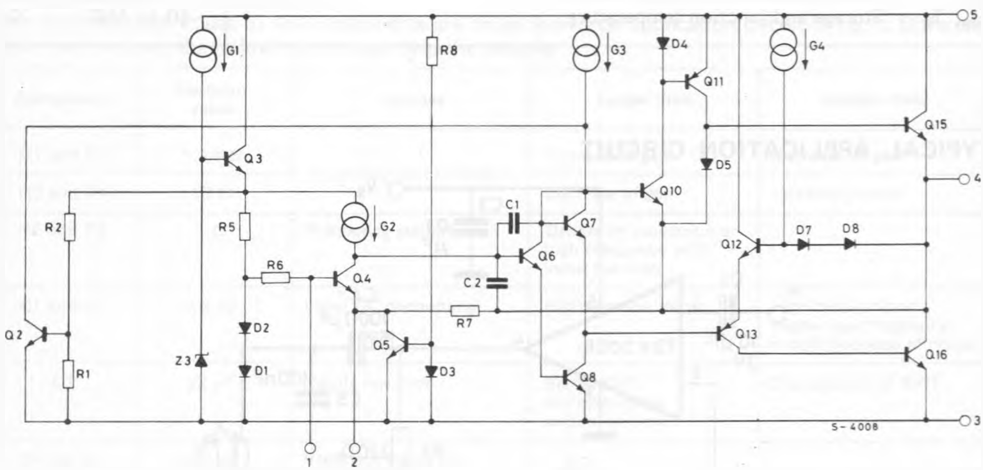


$R_x = 20 \cdot R2$; $C_x = \frac{1}{2\pi B R1}$

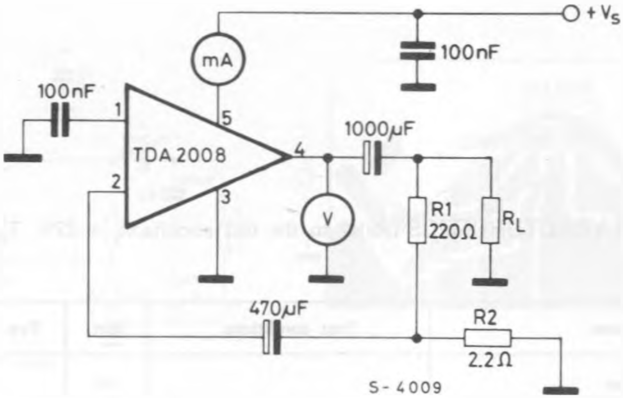
CONNECTION DIAGRAM (top view)



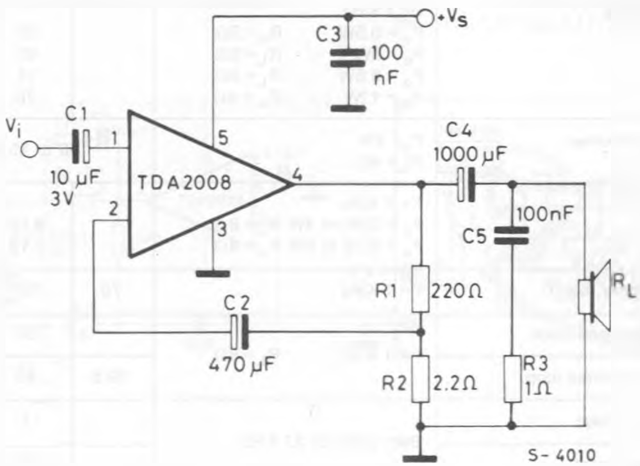
SCHEMATIC DIAGRAM



DC TEST CIRCUIT



AC TEST CIRCUIT



THERMAL DATA

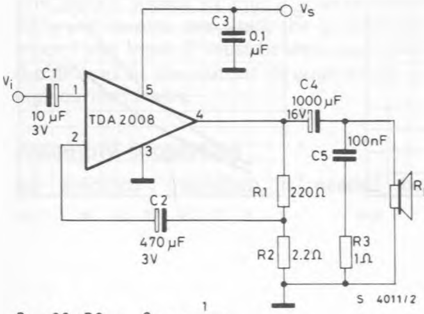
$R_{th\ j\text{-}case}$	Thermal resistance junction-case	max	3	°C/W

ELECTRICAL CHARACTERISTICS (Refer to the test circuits, V_s = 22V, T_{amb} = 25°C unless otherwise specified)

Symbol	Parameter	Test conditions		Min.	Typ.	Max.	Unit
V_s	Supply voltage			10		28	V
V_o	Quiescent output voltage (pin 4)				10.5		V
I_d	Quiescent drain current (pin 5)				65	115	mA
P_o	Output power	d = 10%	R_L = 8Ω		8		W
		f = 1 KHz	R_L = 4Ω	10	12		W
V_i (RMS)	Input saturation voltage			300			mV
V_i	Input sensitivity	f = 1 KHz P_o = 0.5W P_o = 8W P_o = 0.5W P_o = 12W	 R_L = 8Ω R_L = 8Ω R_L = 4Ω R_L = 4Ω		 20 80 14 70		 mV mV mV mV
B	Frequency response (-3 dB)	P_o = 1W R_L = 4Ω		40 to 15 000			Hz
d	Distortion	f = 1 KHz P_o = 0.05 to 4W R_L = 8Ω P_o = 0.05 to 6W R_L = 4Ω			 0.12 0.12	 1 1	 % %
R_i	Input resistance (pin 1)	f = 1 KHz		70	150		KΩ
G_v	Voltage gain (open loop)	f = 1 KHz	R_L = 8Ω		80		dB
G_v	Voltage gain (closed loop)	f = 1 KHz	R_L = 8Ω	39.5	40	40.5	dB
e_N	Input noise voltage	BW = 22Hz to 22 KHz			1	5	μV
i_N	Input noise current	BW = 22Hz to 22 KHz			60	200	pA
SVR	Supply voltage rejection	V_{ripple} = 0.5V f = 100 Hz R_g = 10KΩ R_L = 4Ω		30	36		dB

APPLICATION INFORMATION

Fig. 1 - Typical application circuit



$R_x = 20 \cdot R2$; $C_x = \frac{1}{2\pi BR1}$

Fig. 2 - P.C. board and component layout for the circuit of fig. 1 (1:1 scale)

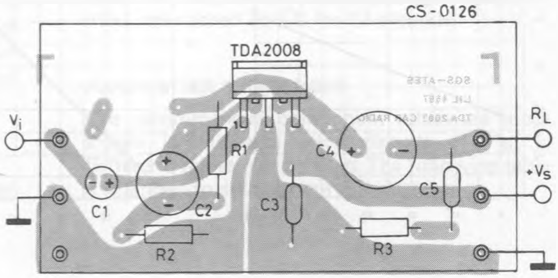


Fig. 3 - 25W bridge configuration application circuit (°)

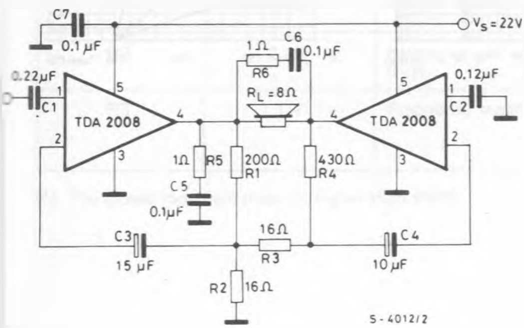
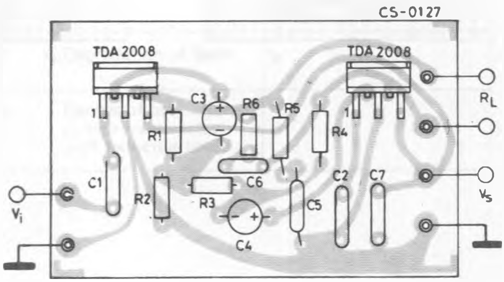


Fig. 4 - P.C. board and component layout for the circuit of fig. 3 (1:1 scale)



(°) The value of the capacitors C3 and C4 are different to optimize the SVR (Typ. = 40 dB)

Fig. 5 - Quiescent current vs. supply voltage

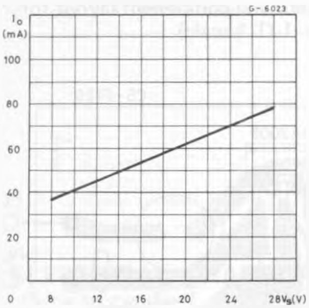


Fig. 6 - Output voltage vs. supply voltage

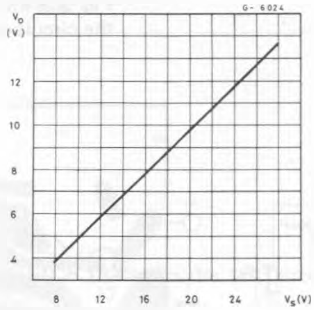


Fig. 7 - Output power vs. supply voltage

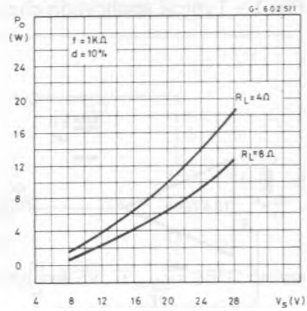


Fig. 8 - Distortion vs. frequency

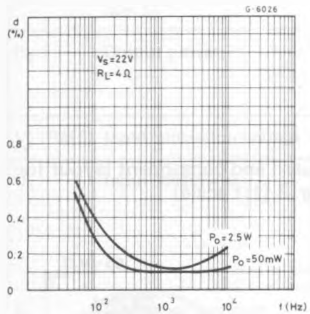


Fig. 9 - Supply voltage rejection vs. frequency

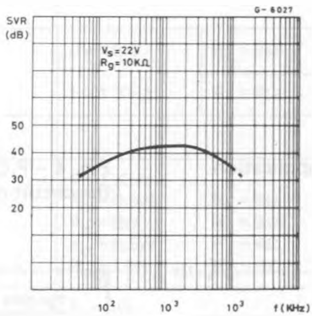
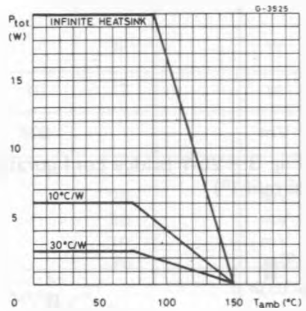


Fig. 10 - Maximum allowable power dissipation vs. ambient temperature



PRACTICAL CONSIDERATIONS

Printed circuit board

The layout shown in Fig. 2 is recommended. If different layouts are used, the ground points of input 1 and input 2 must be well decoupled from the ground of the output through which a rather high current flows.

Assembly suggestion

No electrical insulation is needed between the package and the heat-sink. Pin length should be as short as possible. The soldering temperature must not exceed 260°C for 12 seconds.

Application suggestions

The recommended component values are those shown in the application circuits of Fig. 1. Different values can be used. The following table is intended to aid the car-radio designer.

Component	Recommended value	Purpose	Larger than recommended value	Smaller than recommended value
C1	2.2μF	Input DC decoupling.		Noise at switch–on, switch–off.
C2	470μF	Ripple rejection.		Degradation of SVR.
C3	0.1μF	Supply bypassing.		Danger of oscillation.
C4	1000μF	Output coupling.		Higher low frequency cutoff.
C5	0.1μF	Frequency stability.		Danger of oscillation at high frequencies with inductive loads.
R1	$(G_V-1) \cdot R2$	Setting of gain. (*)		Increase of drain current.
R2	2.2Ω	Setting of gain and SVR.	Degradation of SVR.	
R3	1Ω	Frequency stability.	Danger of oscillation at high frequencies with inductive loads.	

(*) The closed loop gain must be higher than 26dB.