

TDA1908

Findip

8W AUDIO AMPLIFIER

ORDERING NUMBER : TDA1908

DESCRIPTION

The TDA1908 is a monolithic integrated circuit in 12 lead quad in-line plastic package intended for low frequency power applications. The mounting is compatible with the old types TBA800, TBA810S, TCA830S and TCA940N. Its main features are:

- flexibility in use with a max output curent of 3A and an operating supply voltage range of 4V to 30V;
- protection against chip overtemperature;
- soft limiting in saturation conditions;
- low "switch-on" noise;
- low number of external components;
- high supply voltage rejection;
- very low noise.

ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Value	Unit
Vs	Supply voltage	30	V
lo	Output peak current (non repetitive)	3.5	А
lo	Output peak current (repetitive)	3	А
P _{tot}	Power dissipation: at T _{amb} = 80°C	1	W
	at T _{amb} = 90°C	5	W
T _{stg} , T _j	Storage and junction temperature	-40 to 150	°C

APPLICATION CIRCUIT



TDA1908

PIN CONNECTION (top view)



SCHEMATIC DIAGRAM





TEST CIRCUIT



THERMAL DATA

Symbol	Parameter	Value	Unit
R _{th j-tab}	Thermal resistance junction-tab max	12	°C/W
R _{th} j-amb	Thermal resistance junction-ambient max	(°) 70	°C/W

(°) Obtained with tabs soltered to printed circuit board with min copper area.

ELECTRICAL CHARACTERISTICS (Refer to the test circuit, $T_{amb} = 25 \degree C$, R_{th} (heatsink)= 8 °C/W, unless otherwise specified)

Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
Vs	Supply voltage		4		30	V
Vo	Quiescent output voltage	$V_{s} = 4V$ $V_{s} = 18V$ $V_{s} = 30V$	1.6 8.2 14.4	2.1 9.2 15.5	2.5 10.2 16.8	V
I _d	Quiescent drain current	$V_{s} = 4V$ $V_{s} = 18V$ $V_{s} = 30V$		15 17.5 21	35	mA
V _{CEsat}	Output stage saturation voltage (each output transistor)	I _C = 1A I _C = 2.5A		0.5 1.3		V
Po	Output power		7 6.5 4.5	2.5 5.5 9 8 5.3		w



Symbol	Parameter	Test conditions	Min.	Тур.	Max.	Unit
d	Harmonic distorsion			0.1 0.1 0.1		%
Vi	Input sensivity	$\begin{array}{llllllllllllllllllllllllllllllllllll$	1	37 52 64 90 110		mV
Vi	Input saturation voltage (rms)		0.8 1.3 1.8 2.4			v
Ri	Input resistence (pin 8)	f = 1 KHz	60	100		KΩ
ls	Drain current		1	570 730 500 310		mA
η	Efficiency	$V_{s} = 18V \qquad f = 1 \text{ KHz} \\ R_{L} = 4\Omega \qquad P_{o} = 9W$		72		%
BW	Small signal bandwitdth (-3 dB)	$V_s = 18V$ $R_L = 4\Omega$ $P_o = 1W$	4	0 to 40 00	00	Hz
Gv	Voltage gain (open loop)	f = 1 KHz		75		dB
Gv	Voltage gain (closed loop)		39.5	40	40.5	dB
e _N	Total input noise	$ \begin{array}{l} R_{g}=50\Omega\\ R_{g}=1\mathrm{K}\Omega\\ R_{g}=10\mathrm{K}\Omega \end{array} $		1.2 1.3 1.5	4.0	μV
		$ \begin{array}{l} R_{g} = 50\Omega \\ R_{g} = 1K\Omega \\ R_{g} = 10K\Omega \end{array} $		2.0 2.0 2.2	6.0	μV
S/N	Signal to noise ratio	$V_{s} = 18V \qquad R_{g} = 10K\Omega \qquad (^{\circ})$ $P_{o} = 9W \qquad R_{g} = 0 \qquad (^{\circ})$		92 94		dB
		$R_{g} = 10K\Omega \qquad (^{\circ \circ})$ $R_{g} = 0$		88 90		dB
SVR	Supply voltage rejection	$\label{eq:Vs} \begin{array}{c} V_{s} = 18V & R_{L} = 4\Omega \\ f_{ripple} = 100 \; Hz & R_{g} = 10K\Omega \end{array}$	40	50		dB
T _{sd}	Termal shut-down junction (*)			145		ÉC

ELECTRICAL CHARACTERISTICS (continued)

Note : (°) Weighting filter = curve A. (°°) Filter with noise bandwidth: 22 Hz to 22 KHz.



Figure 1. Quiescent output voltage vs. supply voltage



Figure 2. Quiescent drain current vs. supply voltage



Figure 3. Output power vs. supply voltage



Figure 4. Distortion vs. output power ($R_L = 16\Omega$)



Figure 5. Distortion vs. output power ($R_L = 8\Omega$)



Figure 6. Distortion vs. output power ($R_L = 4\Omega$)



Figure 7. Distortion vs. frequency ($R_L = 16\Omega$)



Figure 8. Distortion vs. frequency ($R_L = 8\Omega$)



Figure 9. Distortion vs. frequency ($R_L = 4\Omega$)





Figure 10. Open loop frequency response



Figure 11. Output power vs. input voltage



Figure 12. Values of capacitor C_X versus gain and B_W



Figure 13. Supply voltage rejection vs. voltage gain



Figure 14. Supply voltage rejection vs. source resistance



Figure 15. Max power dissipation vs. supply voltage



Figure 16. Power dissipation and efficiency vs. output power ($V_s = 14V$)



Figure 17. Power dissipation and efficiency vs. output power ($V_s = 18V$)



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Figure 18. Power dissipation and efficiency vs. output power ($V_s = 24V$)



APPLICATION INFORMATION

Figure 19. Application circuit with bootstrap



Figure 20. P.C. board and component lay-out of the circuit of fig. 19 (1 : 1 scale)



APPLICATION INFORMATION (continued)



Figure 21. Application circuit without bootstrap





Figure 23. Position control for car headlights





APPLICATION SUGGESTION

The recommended values of the external components are those shown on the application circuit of fig. 19. When the supply voltage Vs is less than 10V, a 100Ω resistor must be connected between pin 1 and pin 4 in order to obtain the maximum output power. Different values can be used. The following table can help the designer.

Component	Raccom.	Purpose	Larger than	Smaller than	Allowed range	
component	value	i dipose	raccomanded value	raccomanded value	Min.	Max.
R ₁	10 KΩ	Close loop gain setting	Increase of gain.	Decrease of gain. Increase quiescent current.	9 R ₂	
R ₂	100 Ω	Close loop gain setting.	Decrease of gain.	Increase of gain.		R ₁ /9
R ₃	1 Ω	Frequency stability	Danger of oscillation at hight frequencies with inductive loads.			
R4	100 Ω	Increaseing of output swing with low Vs.			47Ω	330 Ω
C ₁	2.2 μF	Input DC decoupling.	Lower noise.	Higher low frequency cutoff. Higher noise.	0.1 μF	
C ₂	0,1 μF	Supply voltage bypass.		Danger of oscillations.		
C ₃	2.2 μF	Inverting input DC decoupling.	Increase of the switch-on noise	Higher low frequency cutoff.	0.1µF	
C ₄	10 μF	Ripple Rejection.	Increase of SVR. Increase of the switch-on time.	Degradation of SVR.	2.2 μF	100 μF
C ₅	47 μF	Bootstrap		Increase of the distorsion at low frequency	10 mF	100 μF
C ₆	0.22 μF	Frequency stability.		Danger of oscillation.		
C ₇	1000 μF	Output DC decoupling.		Higher low frequency cutoff.		



THERMAL SHUT-DOWN

The presence of a thermal limiting circuit offers the following advantages:

- An overload on the output (even if it is permanent), or an above limit ambient temperature can be easily supported since the T_j cannot be higher than 150°C.
- The heatsink can have a smaller factor of safety compared with that of a conventional circuit. There is no possibility of device damage due to high junction temperature.

If, for any reason, the junction temperature increase up to 150°C, the thermal shut-down simply reduces the power dissipation and the current consumption.

The maximum allowable power dissipation depends upon the size of the external heatsink (i.e. its thermal resistance); fig. 25 shows the dissipable power as a function of ambient temperature for different thermal resistance.



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MOUNTING INSTRUCTIONS

The thermal power dissipated in the circuit may be removed by soldering the tabs to a copper area on the PC board (see Fig. 27). During soldering, tab temperature must not exceed 260°C and the soldering time must not be longer than 12 seconds.

Figure 27. Mounding example



Figure 28. Maximum power dissipation and thermal resistance vs. side "*i*"



FINDIP PACKAGE MEHANICAL DATA

DIM	mm			inch			
DIM.	MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
А	3.8		4.05	0.150		0.159	
a1	1.5		1.75	0.059		0.069	
b	0.55		0.6	0.022		0.024	
b1	0.3		0.35	0.012		0.014	
с		1.32			0.052		
c1		0.94			0.037		
D	19.2		19.9	0.756		0.783	
E	16.8	17.2	17.6	0.661	0.677	0.693	
E1	4.86		5.56	0.191		0.219	
E2	10.11		10.81	0.398		0.426	
е	2.29	2.54	2.79	0.090	0.100	0.110	
e3	17.43	17.78	18.13	0.686	0.700	0.714	
e4		7.62			0.300		
e5	7.27	7.62	7.97	0.286	0.300	0.314	
e6	12.35	12.7	13.05	0.486	0.500	0.514	
F	6.3		7.1	0.248		0.280	
F1	6.1		6.7	0.240		0.264	
G		9.8			0.386		
I	7.8		8.6	0.307		0.339	
К	6.1		6.5	0.240		0.256	
L	2.5		2.9	0.098		0.114	
М	2.5		3.1	0.098		0.122	



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