

Class AB stereo headphone driver

TDA1308

FEATURES

- Wide temperature range
- No switch ON/OFF clicks
- Excellent power supply ripple rejection
- Low power consumption
- Short-circuit resistant
- High performance
 - high signal-to-noise ratio
 - high slew rate
 - low distortion
- Large output voltage swing.

GENERAL DESCRIPTION

The TDA1308 is an integrated class AB stereo headphone driver contained in an SO8 or a DIP8 plastic package. The device is fabricated in a 1 mm CMOS process and has been primarily developed for portable digital audio applications.

QUICK REFERENCE DATA

$V_{DD} = 5\text{ V}$; $V_{SS} = 0\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$; $f_i = 1\text{ kHz}$; $R_L = 32\text{ }\Omega$; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
V_{DD}	supply voltage single dual		3.0	5.0	7.0	V
			1.5	2.5	3.5	V
V_{SS}	negative supply voltage		-1.5	-2.5	-3.5	V
I_{DD}	supply current	no load	–	3	5	mA
P_{tot}	total power dissipation	no load	–	15	25	mW
P_o	maximum output power	THD < 0.1%; note 1	–	60	–	mW
(THD + N)/S	total harmonic distortion plus noise-to-signal ratio	note 1				
			–	0.03	0.06	%
			–	-70	-65	dB
		$R_L = 5\text{ k}\Omega$	–	-101	–	dB
S/N	signal-to-noise ratio		100	110	–	dB
α_{cs}	channel separation		–	70	–	dB
		$R_L = 5\text{ k}\Omega$	–	105	–	dB
PSRR	power supply ripple rejection	$f_i = 100\text{ Hz}$; $V_{ripple(p-p)} = 100\text{ mV}$	–	90	–	dB
T_{amb}	operating ambient temperature		-40	–	+85	$^{\circ}\text{C}$

Note

1. $V_{DD} = 5\text{ V}$; $V_{O(p-p)} = 3.5\text{ V}$ (at 0 dB).

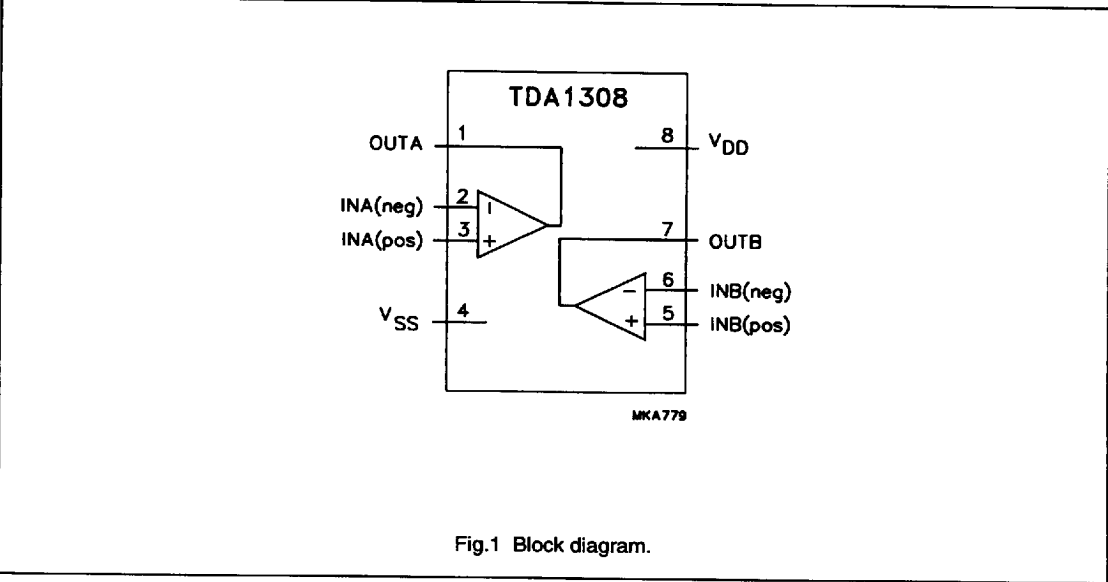
ORDERING INFORMATION

TYPE NUMBER	PACKAGE		
	NAME	DESCRIPTION	VERSION
TDA1308	DIP8	plastic dual in-line package; 8 leads (300 mil)	SOT97-1
TDA1308T	SO8	plastic small outline package; 8 leads; body width 3.9 mm	SOT96-1

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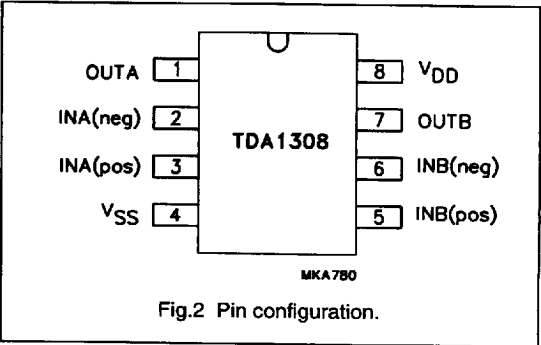
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BLOCK DIAGRAM



PINNING

SYMBOL	PIN	DESCRIPTION
OUTA	1	output A
INA(neg)	2	inverting input A
INA(pos)	3	non-inverting input A
Vss	4	negative supply
INB(pos)	5	non-inverting input B
INB(neg)	6	inverting input B
OUTB	7	output B
VDD	8	positive supply



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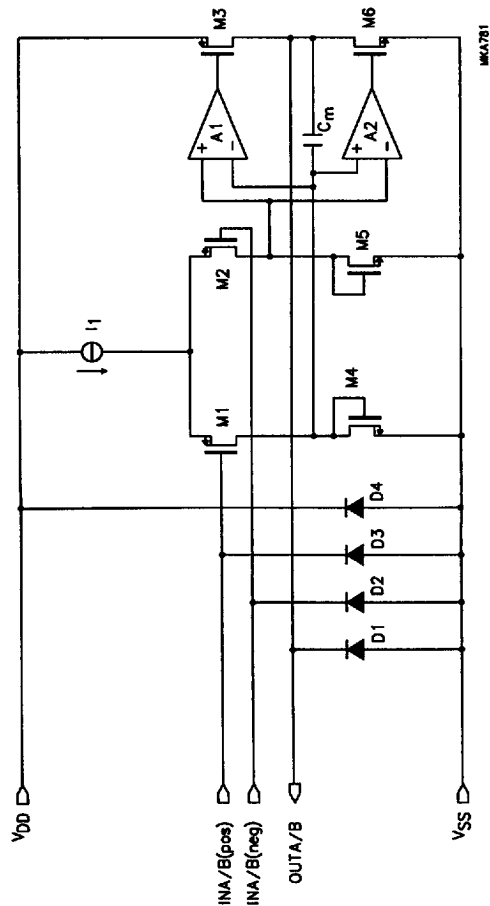


Fig.3 Equivalent schematic diagram.

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LIMITING VALUES

In accordance with the Absolute Maximum Rating System (IEC134).

SYMBOL	PARAMETER	CONDITIONS	MIN.	MAX.	UNIT
V_{DD}	supply voltage		0	8.0	V
$t_{SC(O)}$	output short-circuit duration	$T_{amb} = 25\text{ }^{\circ}\text{C}$; $P_{tot} = 1\text{ W}$	20	—	s
T_{stg}	storage temperature		−65	+150	$^{\circ}\text{C}$
T_{amb}	operating ambient temperature		−40	+85	$^{\circ}\text{C}$
V_{esd}	electrostatic discharge	note 1	−2000	+2000	V
		note 2	−200	+200	V

Notes

- Human body model: $C = 100\text{ pF}$; $R = 1500\text{ }\Omega$; 3 pulses positive plus 3 pulses negative.
- Machine model: $C = 200\text{ pF}$; $L = 0.5\text{ mH}$; $R = 0\text{ }\Omega$; 3 pulses positive plus 3 pulses negative.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j-a}$	thermal resistance from junction to ambient in free air		
	DIP8	109	K/W
	SO8	210	K/W

QUALITY SPECIFICATION

In accordance with "UZW-BO/FQ-0601". The numbers of the quality specification can be found in the "Quality Reference Handbook". The handbook can be ordered using the code 9398 510 63011.

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CHARACTERISTICS

 $V_{DD} = 5\text{ V}$; $V_{SS} = 0\text{ V}$; $T_{amb} = 25\text{ }^{\circ}\text{C}$; $f_i = 1\text{ kHz}$; $R_L = 32\text{ }\Omega$; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
Supplies						
V_{DD}	supply voltage					
	single		3.0	5.0	7.0	V
	dual		1.5	2.5	3.5	V
V_{SS}	negative supply voltage		-1.5	-2.5	-3.5	V
I_{DD}	supply current	no load	–	3	5	mA
P_{tot}	total power dissipation	no load	–	15	25	mW
DC characteristics						
$V_{I(0s)}$	input offset voltage		–	10	–	mV
I_{bias}	input bias current		–	10	–	pA
V_{CM}	common mode voltage		0	–	3.5	V
G_v	open-loop voltage gain	$R_L = 5\text{ k}\Omega$	–	70	–	dB
I_O	maximum output current	$(THD + N)/S < 0.1\%$	–	60	–	mA
R_O	output resistance		–	0.25	–	Ω
V_O	output voltage swing	note 1	0.75	–	4.25	V
		$R_L = 16\text{ }\Omega$; note 1	1.5	–	3.5	V
		$R_L = 5\text{ k}\Omega$; note 1	0.1	–	4.9	V
PSRR	power supply rejection ratio	$f_i = 100\text{ Hz}$; $V_{ripple(p-p)} = 100\text{ mV}$	–	90	–	dB
α_{cs}	channel separation		–	70	–	dB
		$R_L = 5\text{ k}\Omega$	–	105	–	dB
C_L	load capacitance		–	–	200	pF
AC characteristics						
$(THD + N)/S$	total harmonic distortion plus noise-to-signal ratio	note 2	–	–70	–65	dB
			–	0.03	0.06	%
		note 2; $R_L = 5\text{ k}\Omega$	–	–101	–	dB
			–	0.0009	–	%
S/N	signal-to-noise ratio		100	110	–	dB
f_G	unity gain frequency	open-loop; $R_L = 5\text{ k}\Omega$	–	5.5	–	MHz
P_O	maximum output power	$(THD + N)/S < 0.1\%$	–	60	–	mW
C_i	input capacitance		–	3	–	pF
SR	slew rate	unity gain inverting	–	5	–	V/ μ s
B	power bandwidth	unity gain inverting	–	20	–	kHz

Notes

- Values are proportional to V_{DD} ; $(THD + N)/S < 0.1\%$.
- $V_{DD} = 5.0\text{ V}$; $V_{O(p-p)} = 3.5\text{ V}$ (at 0 dB).

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TEST AND APPLICATION INFORMATION

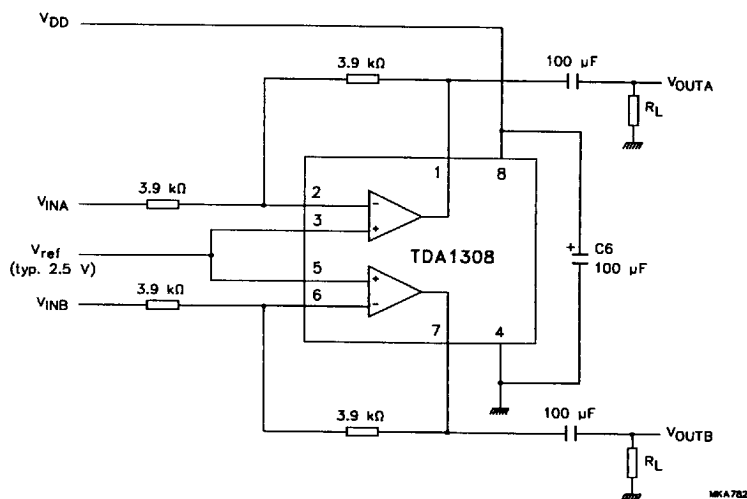


Fig.4 Measurement circuit for inverting application.

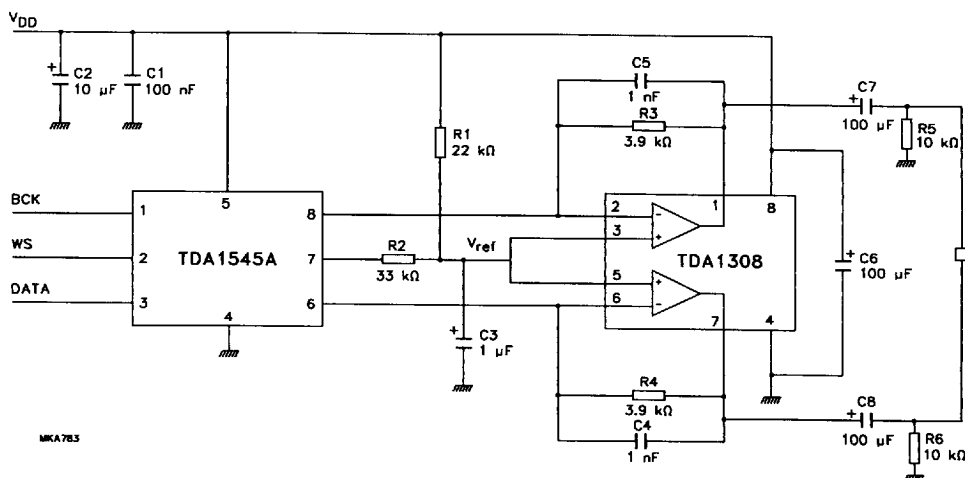


Fig.5 Example of application with TDA1545A (stereo continuous calibration DAC).

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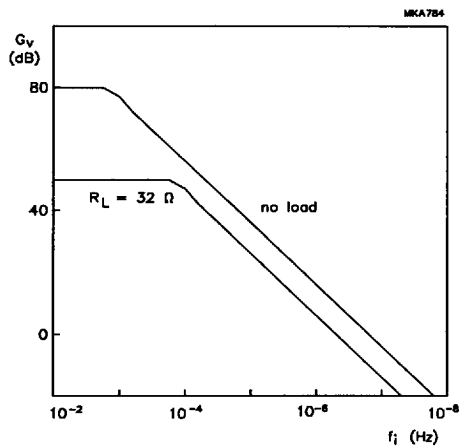


Fig.6 Open-loop gain as a function of input frequency.

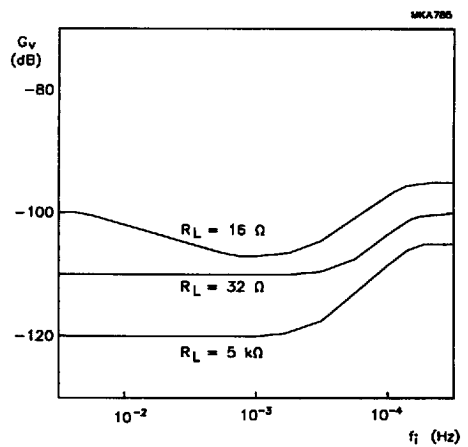


Fig.7 Crosstalk as a function of input frequency.

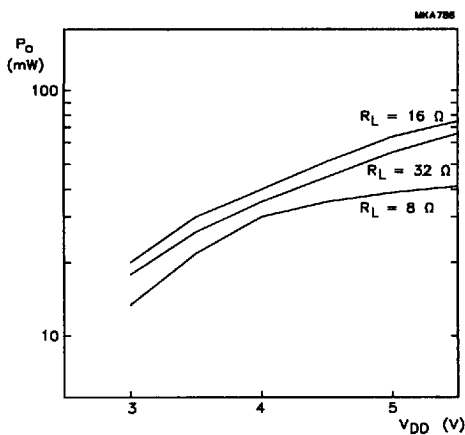


Fig.8 Output power as a function of supply voltage.

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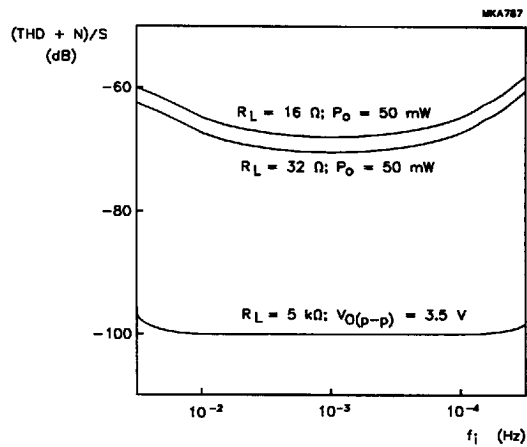


Fig.9 Total harmonic distortion plus noise-to-signal ratio as a function of input frequency.

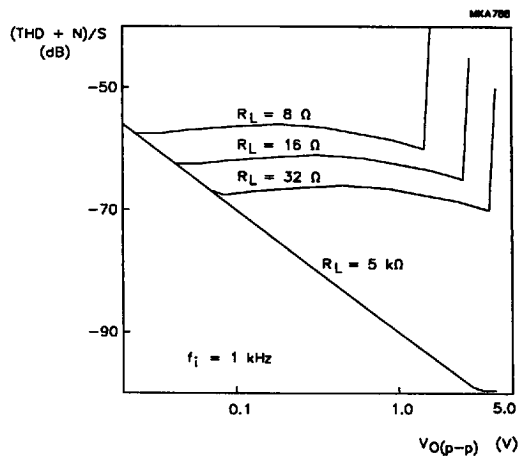


Fig.10 Total harmonic distortion plus noise-to-signal ratio as a function of output voltage level.