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 V; V_{SS} = 0 V; T_{amb} = 25 °C; f_i = 1 kHz; R_L = 32 Ω; unless otherwise specified.

SYMBOL	PARAMETER	CONDITIONS	MIN.	TYP.	MAX.	UNIT
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
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 kΩ	–	−101	–	dB
S/N	signal-to-noise ratio		100	110	–	dB
α_{cs}	channel separation		–	70	–	dB
		R_L = 5 kΩ	–	105	–	dB
PSRR	power supply ripple rejection	f_i = 100 Hz; $V_{ripple(p-p)}$ = 100 mV	–	90	–	dB
T_{amb}	operating ambient temperature		−40	–	+85	°C

Note

1. V_{DD} = 5 V; $V_{O(p-p)}$ = 3.5 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

BLOCK DIAGRAM

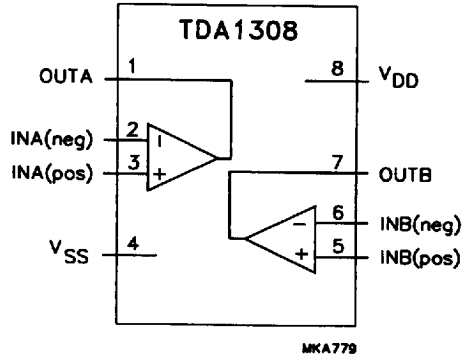

Fig.1 Block diagram.

PINNING

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

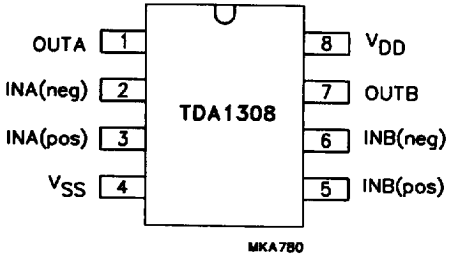

Fig.2 Pin configuration.

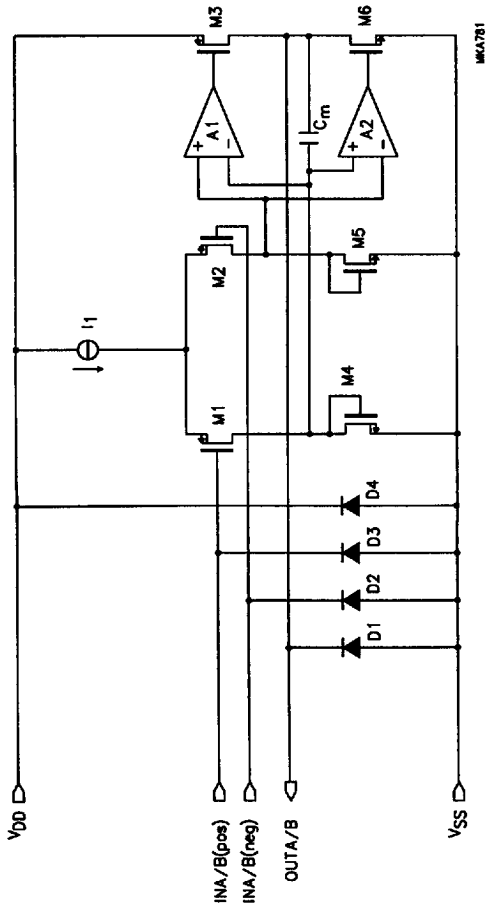

Fig.3 Equivalent schematic diagram.

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 °C; P_{tot} = 1 W	20	–	s
T_{stg}	storage temperature		−65	+150	°C
T_{amb}	operating ambient temperature		−40	+85	°C
V_{esd}	electrostatic discharge	note 1	−2000	+2000	V
		note 2	−200	+200	V

Notes

1. Human body model: C = 100 pF; R = 1500 Ω; 3 pulses positive plus 3 pulses negative.
2. Machine model: C = 200 pF: L = 0.5 mH: R = 0 Ω; 3 pulses positive plus 3 pulses negative.

THERMAL CHARACTERISTICS

SYMBOL	PARAMETER	VALUE	UNIT
$R_{th\ j\text{-}a}$	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.

CHARACTERISTICS

V_{DD} = 5 V; V_{SS} = 0 V; T_{amb} = 25 °C; f_i = 1 kHz; R_L = 32 Ω; 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						
$V_{I(os)}$	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 kΩ	–	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 Ω; note 1	1.5	–	3.5	V
		R_L = 5 kΩ; note 1	0.1	–	4.9	V
PSRR	power supply rejection ratio	f_i = 100 Hz; $V_{ripple(p-p)}$ = 100 mV	–	90	–	dB
α_{cs}	channel separation		–	70	–	dB
		R_L = 5 kΩ	–	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 kΩ	–	−101	–	dB
			–	0.0009	–	%
S/N	signal-to-noise ratio		100	110	–	dB
f_G	unity gain frequency	open-loop; R_L = 5 kΩ	–	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/µs
B	power bandwidth	unity gain inverting	–	20	–	kHz

Notes

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

TEST AND APPLICATION INFORMATION

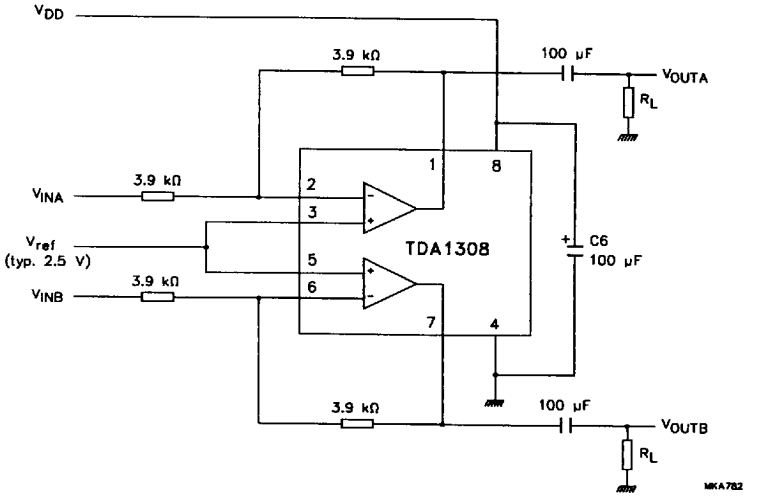

Fig.4 Measurement circuit for inverting application.

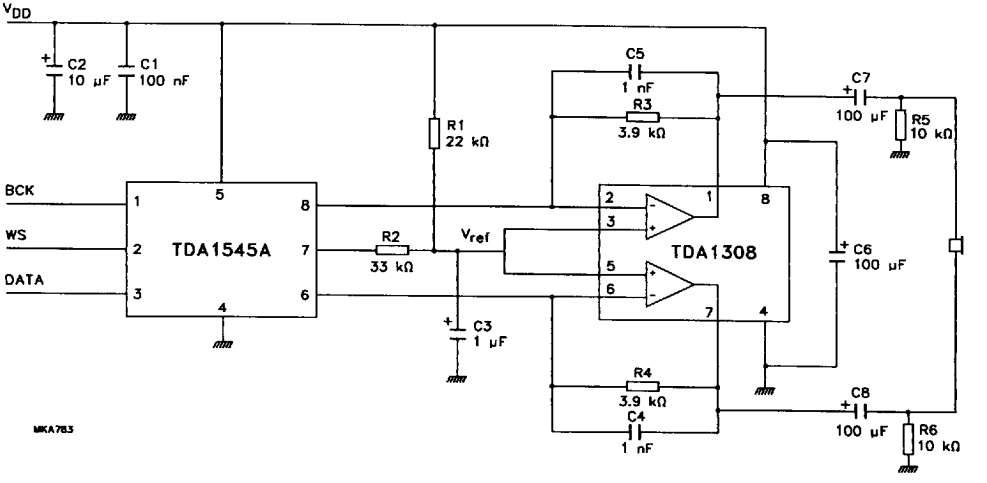

Fig.5 Example of application with TDA1545A (stereo continuous calibration DAC).

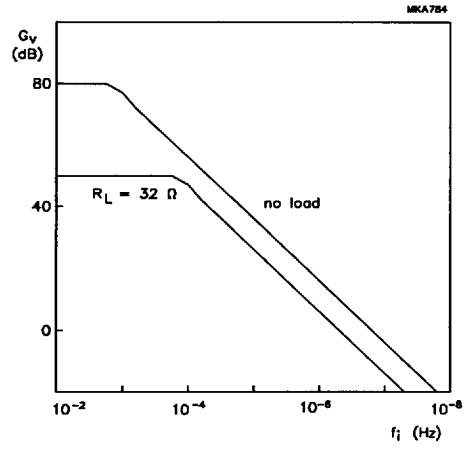

Fig.6 Open-loop gain as a function of input frequency.

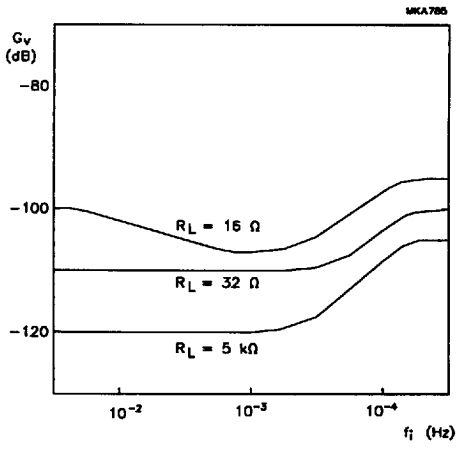

Fig.7 Crosstalk as a function of input frequency.

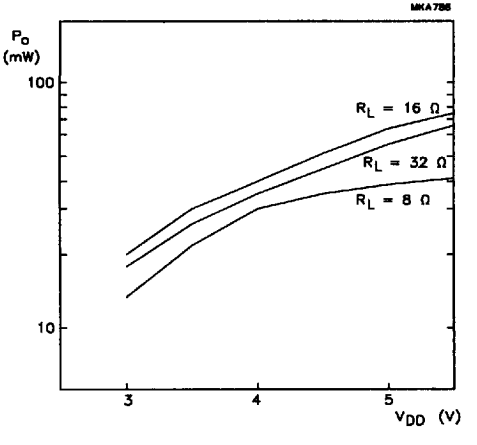

Fig.8 Output power as a function of supply voltage.

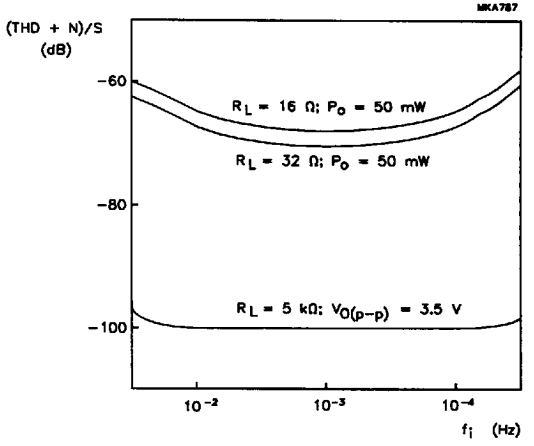

Fig.9 Total harmonic distortion plus noise-to-signal ratio as a function of input frequency.

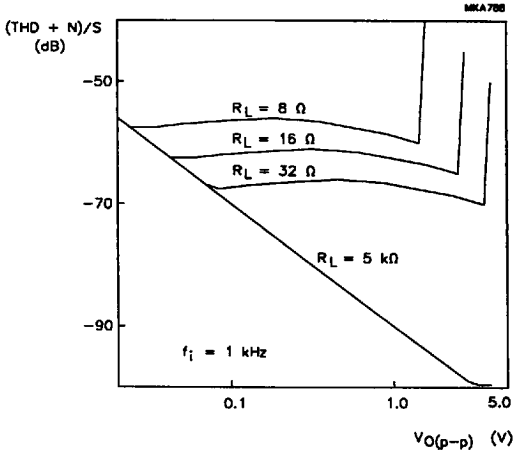

Fig.10 Total harmonic distortion plus noise-to-signal ratio as a function of output voltage level.