

ACTIVE ELEMENT FOR POST FILTERING

GENERAL DESCRIPTION

The TDA1542 is a dual channel monolithic integrated circuit encapsulated in a 28 pin DIL plastic package. Each channel incorporates five high performance amplifiers and is designed for use in hi-fi digital audio equipment such as a compact disc player.

Features

- Mute function for click and pop free switching (on and off)
- Switch function for activating a de-emphasis circuit
- Two separate output amplifiers per channel
- Flexible use of filtering
- Extremely low distortion
- High slew-rate input amplifier

QUICK REFERENCE DATA

parameter	conditions	symbol	min.	typ.	max.	unit
Supply voltage						
pin 28		V _{DD1}	4.75	12.0	13.0	V
pin 1		V _{DD2}	4.5	5.0	5.5	V
pin 26		-V _{DD3}	4.75	12.0	13.0	V
Input amplifier (A)						
Slew-rate		$\Delta V/\Delta t$	—	30	—	V/ μs
Line amplifier (D)						
Output voltage (pins 10 and 19) (r.m.s. value)		V _{O(rms)}	1.9	2	—	V
Signal to noise ratio		S/N	110	115	—	dB
Total harmonic distortion	R _L = 1 k Ω	THD	—	-110	-100	dB
Channel separation		α	95	100	—	dB
Headphone amplifier (E)						
Output voltage (pins 13 and 16) (r.m.s. value)		V _{O(rms)}	—	6	—	V
Signal to noise ratio		S/N	110	115	—	dB
Total harmonic distortion	R _L = 600 Ω	THD	—	-110	-100	dB
Channel separation		α	95	100	—	dB
Filter amplifiers (A, B and C)						
Amplifiers conform to line amplifier D, without mute function						

PACKAGE OUTLINE

28-lead DIL; plastic (with internal heat spreader) (SOT117).

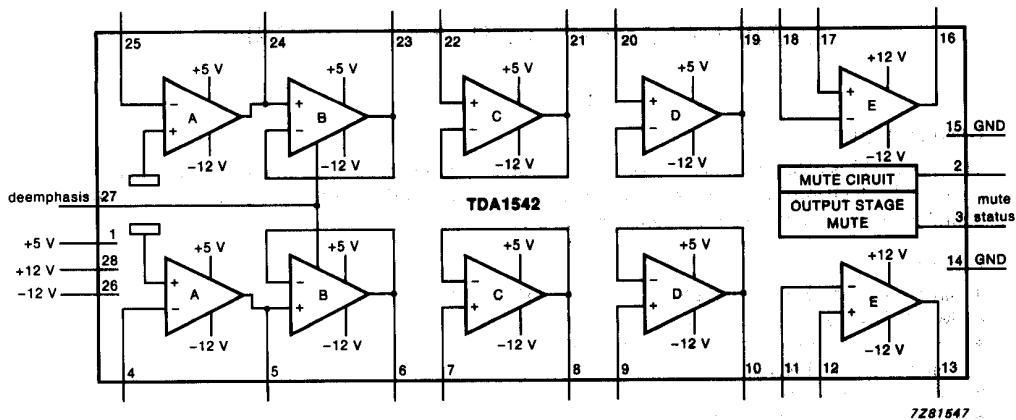


Fig. 1 Block diagram.

PINNING

- | | | | |
|----|--|----|---|
| 1 | +5 V supply voltage (V_{DD2}) | 15 | Ground left |
| 2 | Mute timing capacitor | 16 | Amplifier E left output |
| 3 | Mute status | 17 | Amplifier E left non-inverting input |
| 4 | Amplifier A right input | 18 | Amplifier E left inverting input |
| 5 | Amplifier A right output/Amplifier B input | 19 | Amplifier D left output |
| 6 | Amplifier B right output | 20 | Amplifier D left input |
| 7 | Amplifier C right input | 21 | Amplifier C left output |
| 8 | Amplifier C right output | 22 | Amplifier C left input |
| 9 | Amplifier D right input | 23 | Amplifier B left output |
| 10 | Amplifier D right output | 24 | Amplifier A left output/Amplifier B input |
| 11 | Amplifier E right inverting input | 25 | Amplifier A left input |
| 12 | Amplifier E right non-inverting input | 26 | -12 V supply voltage (V_{DD3}) |
| 13 | Amplifier E right output | 27 | De-emphasis on/off function |
| 14 | Ground right | 28 | +12 V supply voltage (V_{DD1}) |

FUNCTIONAL DESCRIPTION

The TDA1542 is a high performance, dual channel device designed to perform post filtering in a compact disc player. Since only the active part of the filter is integrated, the user has the option of selecting the desired filter type e.g. Bessel or Cauer etc. Each channel contains two separate output amplifiers, one with fixed gain for line output and the other with variable gain for driving low/high impedance headphones.

A switchable buffer amplifier is incorporated to enable the deemphasis function without producing clicks.

A mute circuit is incorporated to prevent spurious signals appearing at the output.

Both amplifiers are muted, for a preset period of time, when the 5 V supply is switched on or off.

An external capacitor determines the mute time. When the mute time has elapsed the signal path is switched directly to the output, without clicks. The mute circuit status is available externally.

The TDA1542 is designed to operate over a wide supply voltage range.

RATINGS

Limiting values in accordance with the Absolute Maximum System (IEC 134)

parameter	conditions	symbol	min.	max.	unit
Supply voltage ranges					
pin 28		V _{DD1}	0	18	V
pin 1		V _{DD2}	0	7	V
pin 26		-V _{DD3}	0	18	V
Storage temperature range		T _{stg}	-65	150	°C
Operating ambient temperature range		T _{amb}	-30	85	°C
Electrostatic handling *		V _{es}	-	600	V

THERMAL RESISTANCE

From junction to ambient

R_{th j-a} 30 K/W

* Equivalent to discharging a 100 pF capacitor through a 1.5 kΩ series resistor.

DC CHARACTERISTICS

 $V_{DD1} = +12\text{ V}; V_{DD2} = +5\text{ V}; V_{DD3} = -12\text{ V}; T_{\text{amb}} = 25\text{ }^{\circ}\text{C}$

parameter	conditions	symbol	min.	typ.	max.	unit
Supply voltage						
pin 28		V_{DD1}	4.75	12.0	13.0	V
pin 1		V_{DD2}	4.5	5.0	5.5	V
pin 26		$-V_{DD3}$	4.75	12.0	13.0	V
Supply current						
pin 28		I_{DD1}	—	12	18	mA
pin 1		I_{DD2}	—	34	51	mA
pin 26		$-I_{DD3}$	—	46	69	mA
Input current						
Amplifier A (pins 4 and 25)		I_{IA}	—	1	2	μA
Amplifier C (pins 7 and 22)		I_{IC}	—	320	600	nA
Amplifier D (pins 9 and 20)		I_{ID}	—	50	150	nA
Amplifier E (pins 11 and 18)		I_{IE}	—	300	600	nA
Amplifier E (pins 12 and 17)		I_{IE}	—	30	150	nA
Offset voltage						
Amplifier A (pins 4 and 25)		$ V_{IAos} $	—	1.2	7.0	mV
Amplifier B (pins 6 and 23)		$ V_{IBos} $	—	0.5	7.0	mV
Amplifier C (pins 8 and 21)		$ V_{ICos} $	—	0.6	7.0	mV
Amplifier D (pins 10 and 19)		$ V_{IDos} $	—	1.0	3.0	mV
Amplifier E (pins 11 and 18)		$ V_{IEos} $	—	0.7	3.0	mV
Mute timing capacitor (pin 2)						
Switch-on voltage		V_{sw}	—	3.5	4.1	V
Loading current		$-I_L$	0.1	0.5	2.0	mA

AC CHARACTERISTICS

VDD1 = +12 V; VDD2 = +5 V; VDD3 = -12 V; T_{amb} = 25 °C; f = 1 kHz; measured in Fig. 2

parameter	conditions	symbol	min.	typ.	max.	unit
Amplifier A to Amplifier E						
Open loop gain		G _{ol}	—	90	—	dB
Overall distortion without de-emphasis		THD	—	-110	-100	dB
Slew rate (Amplifier A)		ΔV/Δt	—	30	—	V/μs
Supply voltage ripple rejection						
VDD1	note 1	SVRR	50	60	—	dB
VDD2	note 2	SVRR	50	60	—	dB
VDD3	note 2	SVRR	55	70	—	dB
Line amplifier D						
Output voltage (pins 10 and 19) (r.m.s. value)		V _{O(rms)}	1.9	2.0	—	V
Signal to noise ratio	B = 20 Hz to 20 kHz	S/N	110	115	—	dB
Total harmonic distortion		THD	—	-110	-100	dB
Channel separation		α	95	100	—	dB
Output impedance		Z _O	—	—	0.5	Ω
Difference between mute ON and mute OFF output voltage (pins 10 and 19)		V _O	—	—	4	mV
Headphone amplifier (E)						
Output voltage (pins 13 and 16) (r.m.s. value)	R _L = 600 Ω	V _{O(rms)}	—	6	—	V
	R _L = 132 Ω	V _{O(rms)}	—	5.5	—	V
Signal to noise ratio	B = 20 Hz to 20 kHz	S/N	110	115	—	dB
Total harmonic distortion	R _L = 600 Ω	THD	—	-110	-100	dB
Total harmonic distortion	R _L = 132 Ω	THD	—	-88	-80	dB
Channel separation	20 Hz to 20 kHz; R _L = 600 Ω	α	95	100	—	dB
Output impedance		Z _O	—	—	0.5	Ω
Difference between mute ON and OFF output voltage (pins 13 and 16)		V _O	—	—	6	mV

AC CHARACTERISTICS (continued)

parameter	conditions	symbol	min.	typ.	max.	unit
Mute status (pin 3)	open collector output					
Output voltage LOW (mute ON)	$-I_{OL} = 3 \text{ mA}$	—	—	—	0.4	V
Output voltage HIGH (mute OFF)	$I_{OL} \leq 1 \mu\text{A}$		2.4	—	VDD1	V
Mute timing	note 3					
De-emphasis switch						
Input voltage HIGH	De-emphasis ON	V_{IH}	2.4	—	VDD1	V
Input voltage LOW	De-emphasis OFF	V_{IL}	0	—	1	V
Input current HIGH	De-emphasis ON	I_{IH}	—	—	5.0	μA
Input current LOW	De-emphasis OFF	$-I_{IL}$	—	—	25	μA

Notes to the characteristics

1. The ripple rejection is measured at the output of the line amplifier; amplitude = $0.5 V_{tt}$; $f = 100 \text{ Hz to } 10 \text{ kHz}$.
2. The ripple rejection is measured at the output of the line amplifier; amplitude = $1 V_{tt}$; $f = 100 \text{ Hz to } 10 \text{ kHz}$.
3. The mute timing is provided by an external capacitor connected to pin 2.

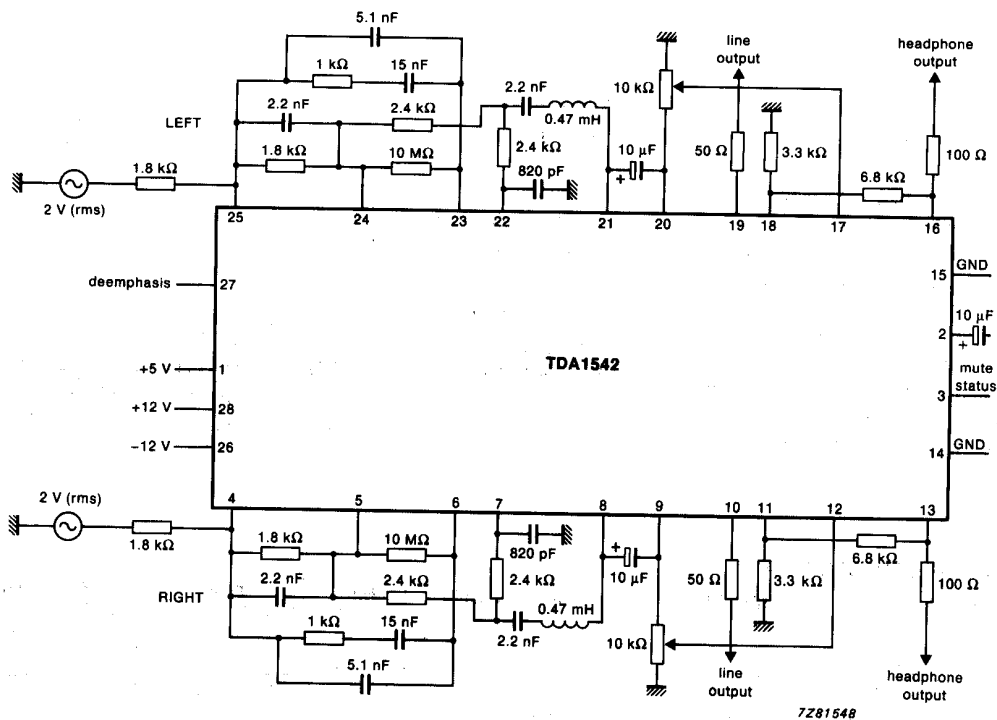


Fig. 2 Test and application circuit.