

# BA3506A

## 3 V dual pre- and power amplifier

The BA3506A IC is a dual channel preamplifier and power amplifier.

The preamplifiers are direct coupled and the power amplifiers have a built-in fixed-gain NF circuit, making an output coupling capacitor unnecessary.

### Features

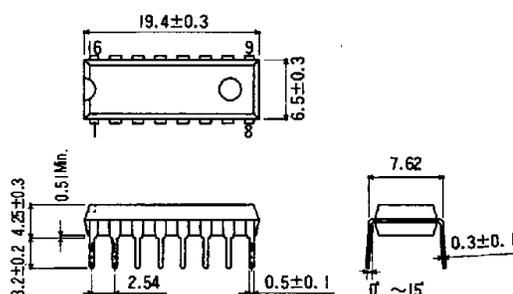
- available in DIP16 package
- low voltage operation (1.8 ~ 3.6 Vdc)
- preamplifier has high voltage gain (83 dB), low noise ( $0.9 \mu\text{V}_{\text{rms}}$ ) and low distortion (0.03%).
- power amplifier has high output ( $69 \text{ mW} \times 2$ ), low noise ( $80 \mu\text{V}_{\text{rms}}$ ) and low distortion (0.6%)

### Applications

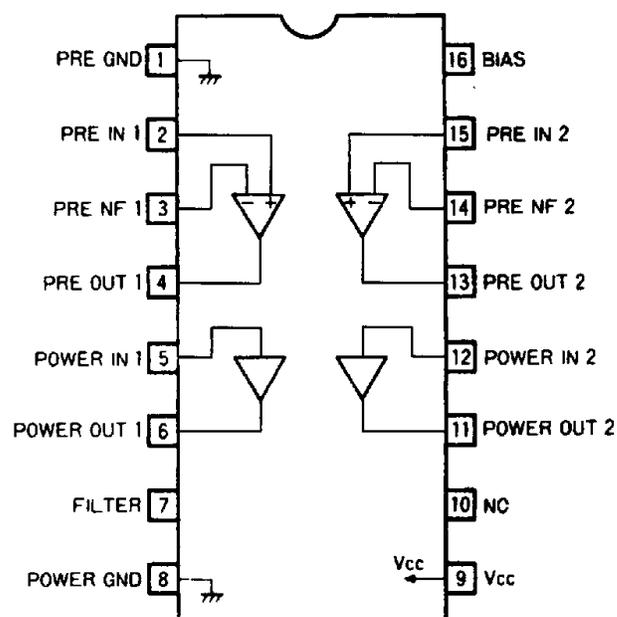
- 3 V headphone stereo player

### Dimensions (Units : mm)

#### BA3506A (DIP18)



### Block diagram



**Absolute maximum ratings (T<sub>a</sub> = 25°C)**

Parameter	Symbol	Limits	Unit	Conditions
Power supply voltage	V <sub>CC</sub>	4.5	V	
Power dissipation	P <sub>d</sub>	1000	mW	Reduce power by 10.0 mW for each degree above 25°C.
Operating temperature	T <sub>opr</sub>	-25 ~ +75	°C	
Storage temperature	T <sub>stg</sub>	-55 ~ +125	°C	

**Recommended operating conditions (T<sub>a</sub> = 25°C)**

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Power supply voltage	V <sub>CC</sub>	1.8	3.0	3.6	V	
Load resistance	R <sub>L</sub>	16		3.2	Ω	V <sub>CC</sub> = 3 V

**Electrical characteristics (unless otherwise noted, T<sub>a</sub> = 25°C, V<sub>CC</sub> = 3 V, f = 1 kHz)  
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Parameter	Symbol	Min	Typical	Max	Unit	Conditions
Quiescent current	I <sub>Q</sub>		9	15	mA	V <sub>IN</sub> = 0 V <sub>rms</sub>
<b>Preamplifier (R<sub>L</sub> = 10 kΩ)</b>						
Open loop voltage gain	G <sub>VO</sub>	72	83		dB	V <sub>O</sub> = -10 dBm
Output voltage	V <sub>OM</sub>	300	450		mV <sub>rms</sub>	THD = 1%
Total harmonic distortion 1	THD <sub>1</sub>		0.03	0.15	%	V <sub>O</sub> = 0.2 V <sub>rms</sub> , NAB 33 dB
Input bias current 1	I <sub>B1</sub>		130	500	nA	V <sub>IN</sub> = 0 V <sub>rms</sub>
Input conversion noise voltage	V <sub>NIN</sub>		0.9	1.8	μV <sub>rms</sub>	R <sub>g</sub> = 2.2 kΩ, BPF = 20 Hz ~ 20 kHz
Ripple rejection	RR <sub>1</sub>	43	53		dB	V <sub>RR</sub> = -20 dBm, f = 100 Hz, R <sub>g</sub> = 2.2 kΩ, NAB 33 dB
<b>Power amplifier (R<sub>L</sub> = 16 Ω)</b>						
Rated output	P <sub>OUT</sub>	50	69		mW	THD = 10%
Closed loop voltage gain	G <sub>VC</sub>	33	36	39	dB	V <sub>IN</sub> = -40 dBm
Total harmonic distortion 2	THD <sub>2</sub>		0.6	2.0	%	P <sub>O</sub> = 1 mW
Output noise voltage	V <sub>NO</sub>		80	125	μV <sub>rms</sub>	R <sub>g</sub> = 0 Ω, BPF = 20 Hz ~ 20 kHz
Ripple rejection	RR <sub>2</sub>	35	51		dB	V <sub>RR</sub> = -20 dBm, f = 100 Hz, R <sub>g</sub> = 0 Ω
Input resistance	R <sub>IN</sub>	21.4	30	38.6	kΩ	
Input bias current	I <sub>B2</sub>		10	90	nA	V <sub>IN</sub> = 0 V <sub>rms</sub>

**Electrical characteristics (unless otherwise noted,  $T_a = 25^\circ\text{C}$ ,  $V_{CC} = 3\text{ V}$ ,  $f = 1\text{ kHz}$ )**  
 (Sheet 2 of 2)

Parameter	Symbol	Min	Typical	Max	Unit	Conditions
<b>Preamplifier and power amplifier</b>						
Channel separation	CS	40	48		dB	Power amp: $V_O = -5\text{ dBm}$ , $R_g = 2.2\text{ k}\Omega$ , BPF = 20 Hz ~ 20 kHz
Signal leak	SL		-66	-60	dBm	Preamp: $V_O = -12\text{ dBm}$ Power amp: $R_g = 0\ \Omega$

**Figure 1 Application example**

