BA3520
BA3520F

3 V dual pre- and power amplifier

The BA3520 and BA3520F ICs are dual channel preamplifier and power amplifiers that contain all basic signal circuits necessary for a tape player.

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

Features

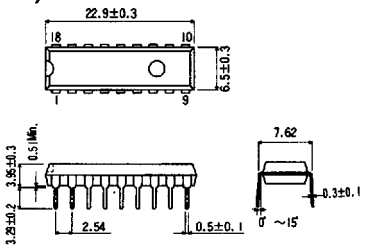
- available in DIP18 and SOP18 packages
- low voltage operation (1.8 ~ 4.0 Vdc)
- preamplifier has high voltage gain (78 dB), low noise (1.1 μV_{rms}) and low distortion (0.03%).
- power amplifier has high output (30 mW × 2), low noise (50 μV_{rms}) and low distortion (0.5%)
- has a built in EVR. A-curve characteristics for EVR obtained are from the VR of the B-curve
- no oscillation protector required for power amplifier
- built in muting circuit

Applications

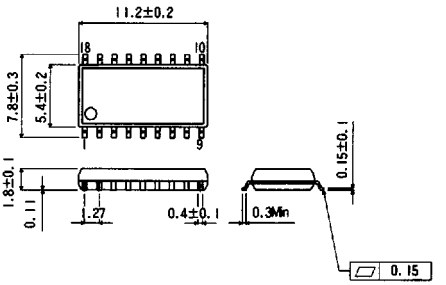
- 3 V tape player
- 3 V radio cassette player

Dimensions (Units : mm)

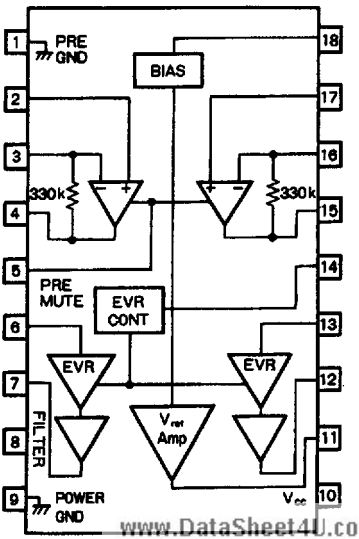
BA3520 (DIP18)



BA3520F (SOP18)



Block diagram



Absolute maximum ratings (T_a= 25°C)

Parameter		Symbol	Limits	Unit	Conditions
Power supply voltage		V_{CC}	6.0	V	
Power dissipation	BA3520	P_d	1000	mW	Reduce power by 10 mW for each degree above 25°C.
	BA3520F		550		Reduce power by 5.5 mW for each degree above 25°C. Mounted on a 50 × 50 ×1.6 mm glass epoxy PCB.
Operating temperature		T_{opr}	−25 ~ +75	°C	
Storage temperature		T_{stg}	−55 ~ +125	°C	

Recommended operating conditions (T_a= 25°C)

Parameter	Symbol	Min	Typ	Max	Unit	Conditions
Power supply voltage	V_{CC}	1.8	3.0	4.0	V	

Electrical characteristics (unless otherwise noted, T_a = 25°C, V_{CC} = 3 V, f = 1 kHz) (Sheet 1 of 2)

Parameter	Symbol	Min	Typical	Max	Unit	Conditions
Quiescent current	I_Q	10	15	20	mA	V_{IN} = 0 V_{rms}
Channel separation	CS	30	40		dB	R_G = 2.2 kΩ, R_L = 32 Ω
Preamplifier (R_L = R_{IN} (EVR))						
Open loop voltage gain	G_{VO}	72	78		dB	V_O = 200 mV_{rms}
Closed loop voltage gain	G_{VC1}	28	31	34	dB	V_O = 100 mV_{rms}
Output voltage	V_{OM}	300	500		mV_{rms}	THD = 1%
Total harmonic distortion	THD_1		0.03	0.15	%	V_O = 0.2 V_{rms}
Input bias current	I_{B1}		100	300	nA	V_{IN} = 0 V_{rms}
Input conversion noise voltage	V_{NIN}		1.1	1.8	μV_{rms}	R_g = 2.2 kΩ, BPF = 20 Hz ~ 20 kHz
Ripple rejection	RR_1	59	65		dB	V_{RR} = −20 dBV, f_{RR} = 100 Hz
Power amplifier (R_L = 32Ω) (except P_{OUT1})						
Rated output 1	P_{OUT1}	25	30		mW/ch	R_L = 16 Ω, THD = 10%
Rated output 2	P_{OUT2}	15	18		mW/ch	R_L = 32 Ω, THD = 10%
Closed loop voltage gain	G_{VC2}	33	36	39	dB	V_O = 300 mV_{rms}
Total harmonic distortion	THD_2		0.5	1.5	%	EVR = max, P_O = 5 mW
Output noise voltage	V_{NO}		50	80	μV_{rms}	EVR = min, BPF = 20 Hz ~ 20 kHz

Electrical characteristics (unless otherwise noted, T_a = 25°C, V_{CC} = 3 V, f = 1 kHz) (Sheet 2 of 2)

Parameter	Symbol	Min	Typical	Max	Unit	Conditions
Ripple rejection	RR_2	60	65		dB	V_{RR} = –20 dBV, f_{RR} = 100 Hz,
EVR input resistance	R_{IN}	21	30	39	kΩ	
EVR attenuation ratio	ATT	70	80		dB	0 dB = –10 dBV, EVR = max When EVR = max, set the input so power amp output V_0 = –10 dBV. Measure the attenuation of V when EVR = min in that state.

Figure 1 Test circuit

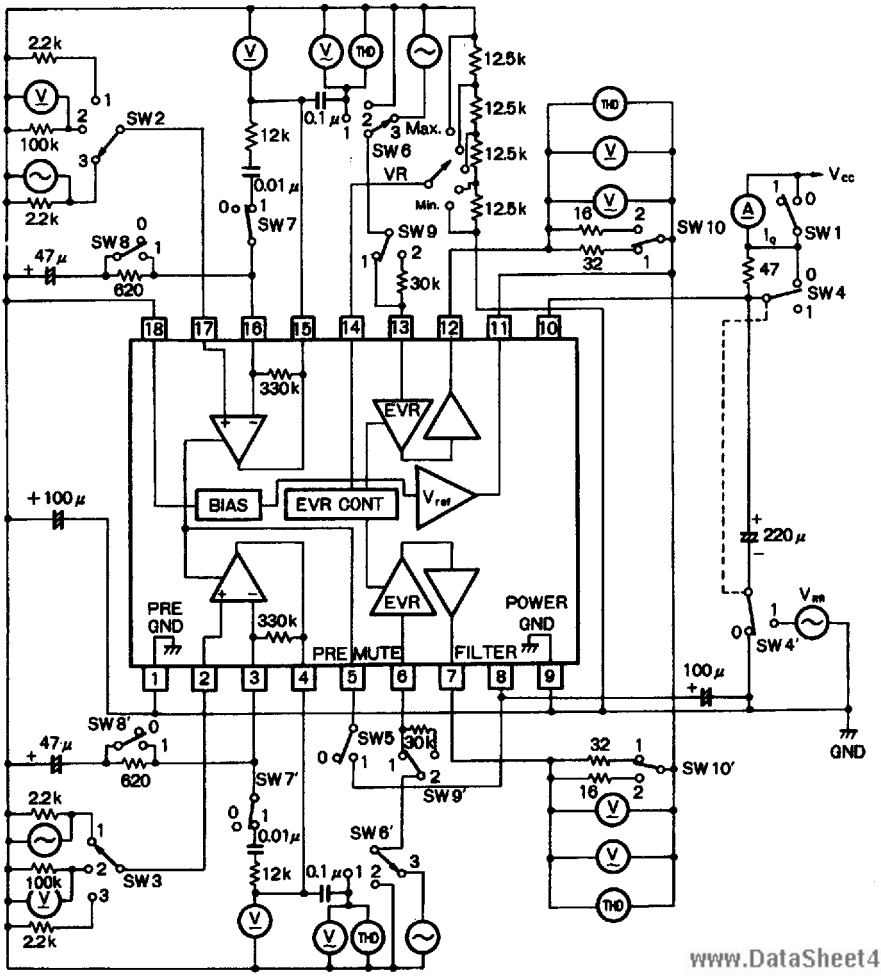
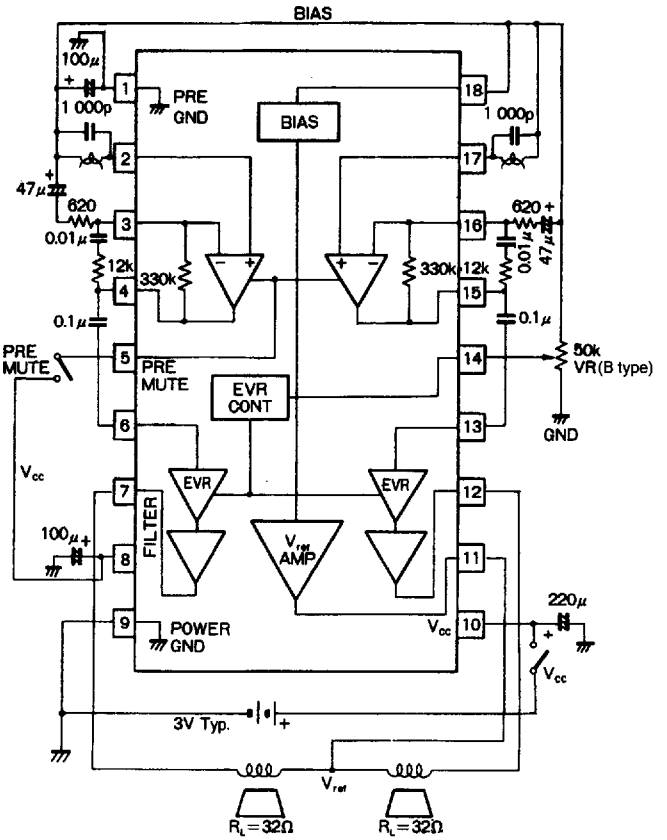


Figure 2 Application example



Gain and the dynamic range with EVR IN

Figure 3 EVR equivalent circuit diagram

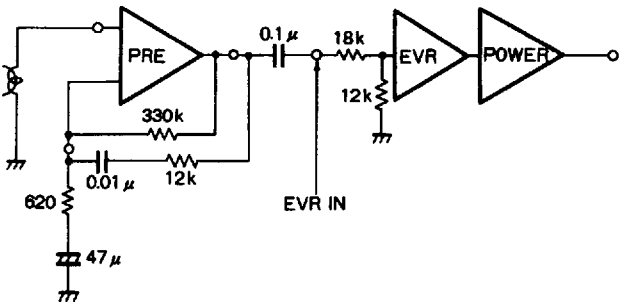
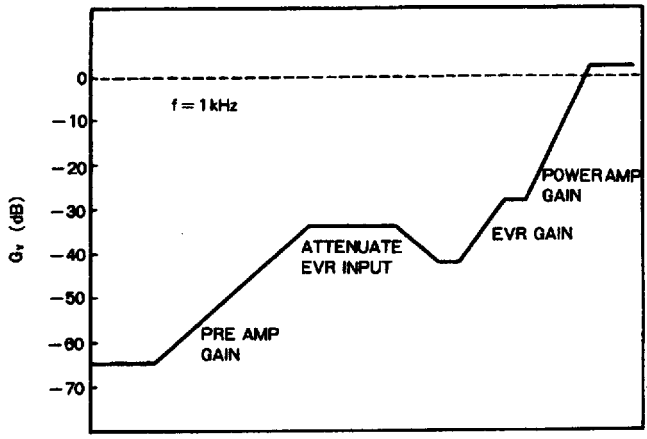


Figure 4 Gain distribution



The total harmonic distortion for the input dynamic range is a minimum for $V_{IN} = -30.4$ dBV as shown in Figure 7. A gain distribution for the application example is shown in Figure 4.

Note: When connecting to a graphic equalizer it is necessary to set the signal level so that it does not exceed the limitations to the EVR IN.

Electrical characteristic curves

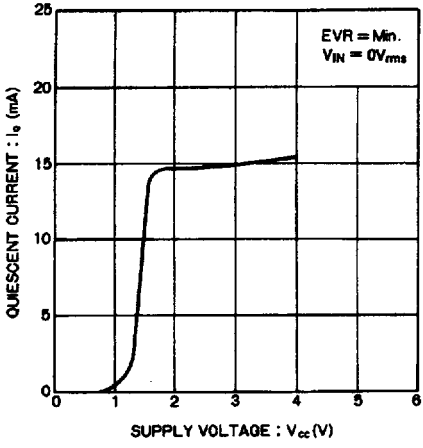


Figure 5

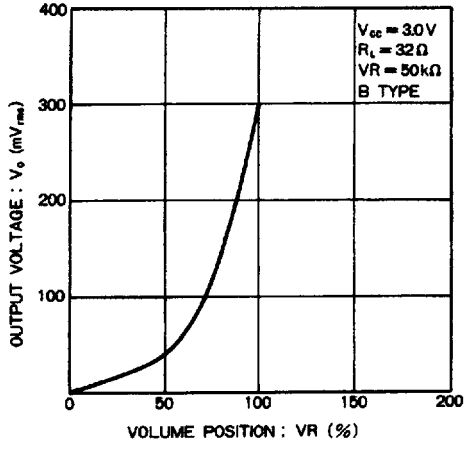


Figure 6

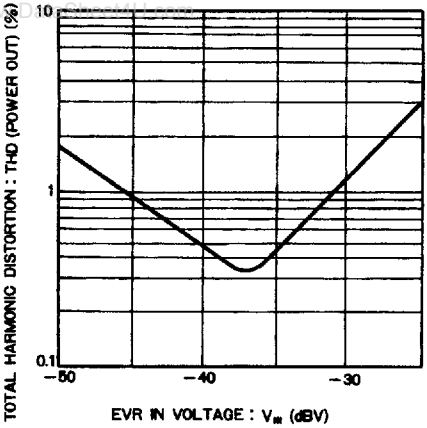


Figure 7

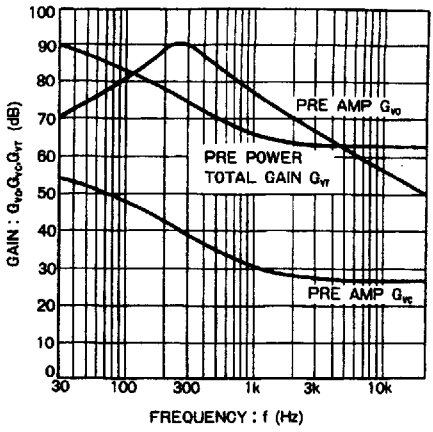


Figure 8

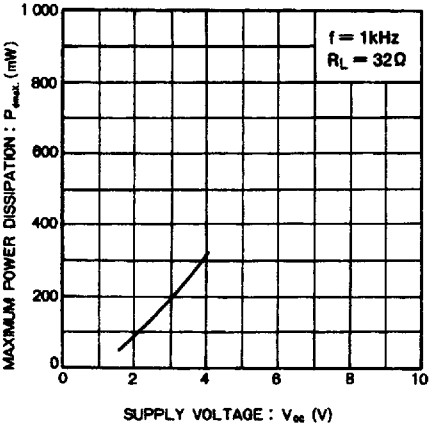


Figure 9

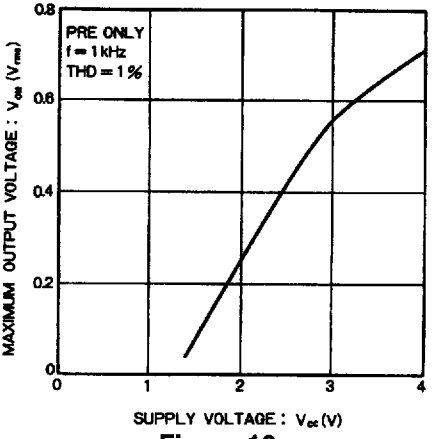


Figure 10

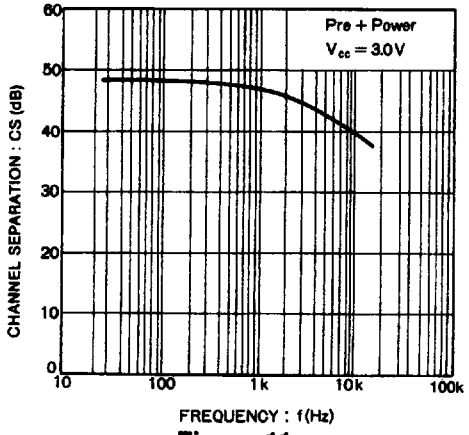


Figure 11

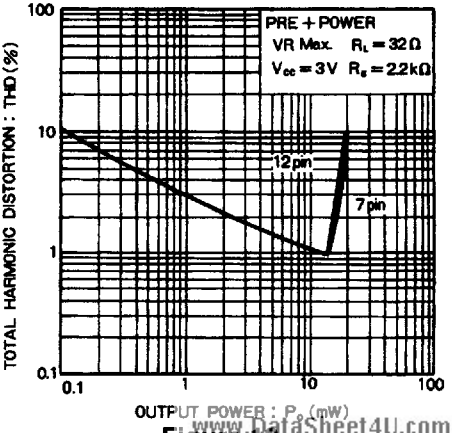


Figure 12