Dual preamplifier with ALC detector circuit

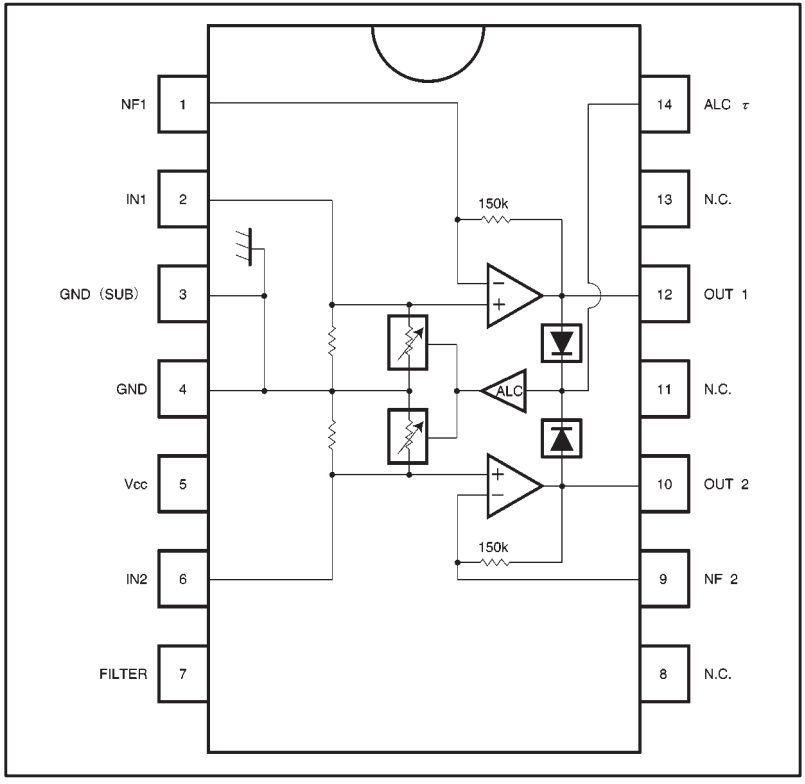
BA3314F

The BA3314F is a dual preamplifier IC with built-in ALC detector circuit, designed for audio applications. It comes in a compact 14-pin SOP package, and has two record / playback preamplifiers, and an ALC detector circuit. The preamplifier can be directly coupled to the tape head without coupling capacitors to prevent tape head magnetization and "pop" noise generation.
With the built-in ALC detector circuit, an ALC circuit with large dynamic range can be constructed with addition of just an external time constant circuit.

●Applications
Audio equipment

●Features
1) Input bias circuit does not require coupling capacitors.
2) Built-in ALC circuit with external time constant circuit.
3) Wide operating power supply voltage range.
4) High gain.
5) Low noise.

●Block diagram



●Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Power supply voltage	V_{CC}	14	V
Power dissipation	Pd	450*	mW
Operating temperature	Topr	−25～+75	℃
Storage temperature	Tstg	−55～+125	℃

* Reduced by 4.5mW for each increase in Ta of 1°C over 25°C.

●Recommended operating conditions (Ta = 25°C)

Parameter	Symbol	Min.	Typ.	Max.	Unit
Power supply voltage	V_{CC}	5.0	—	12.0	V

●Electrical characteristics (unless otherwise noted, Ta = 25°C, V_{CC} = 8V and f= 1kHz)

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Quiescent current	I_Q	1.5	3.0	6.0	mA	
Open loop voltage gain	G_{VO}	70	85	—	dB	V_O=1V_{rms}
Closed loop voltage gain	G_{VC}	49	52	55	dB	V_O=0.3V_{rms}
Total harmonic distortion	THD 1	—	0.3	1.0	%	V_O=0.3V_{rms}
Maximum output voltage	V_{OM}	1.5	2.0	—	V_{rms}	THD=1%
Input conversion noise voltage	V_{NIN}	—	1.0	1.8	μV_{rms}	R_g=2.2kΩ,DIN AUDIO 45dB at 1kHz NAB
Input resistance	R_{IN}	35	51	71	kΩ	
Channel separation	CS	40	55	—	dB	R_g=2.2kΩ
ALC range *	ALC	40	53	—	dB	
ALC balance	ALB	—	0	3.0	dB	V_{IN}=−45dBV
ALC distortion	THD 2	—	0.3	1.0	%	V_{IN}=−45dBV
ALC output voltage	V_{ALC}	700	850	1000	mV_{rms}	V_{IN}=−45dBV

* The range for which the ALC begins to operate is the output voltage + 3dB with respect to the output voltage.

◎Not designed for radiation resistance.

●Measurement circuit

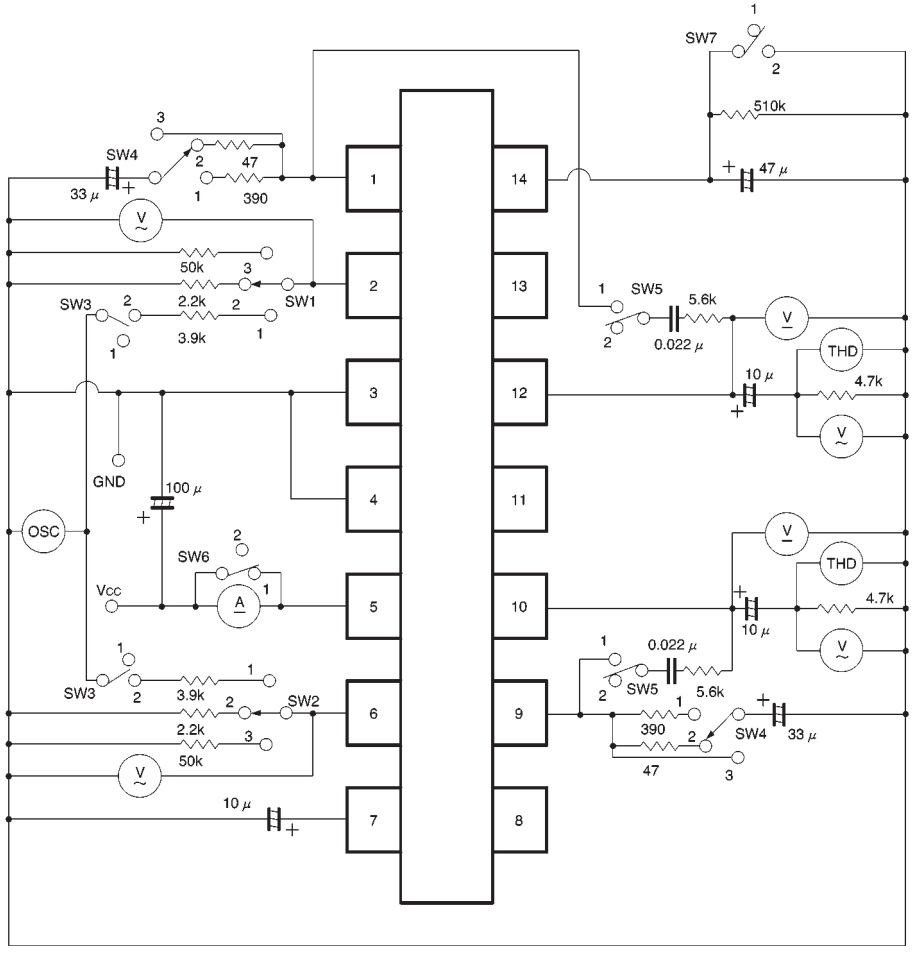


Fig. 1

Units
Resistance : Ω (±1%)
Film capacitors : F (±1%)
Electrolytic capacitors : F (±5%)

●Operation notes

Changing the input resistor R_g, and the ALC time constant influences the ALC transient characteristics. In particular, if R_g is less than 3.9kΩ or the time constant capacitor is less than 47μF, the ALC may operate excessively. Do not use smaller values than those recommended for these components.

●Application example

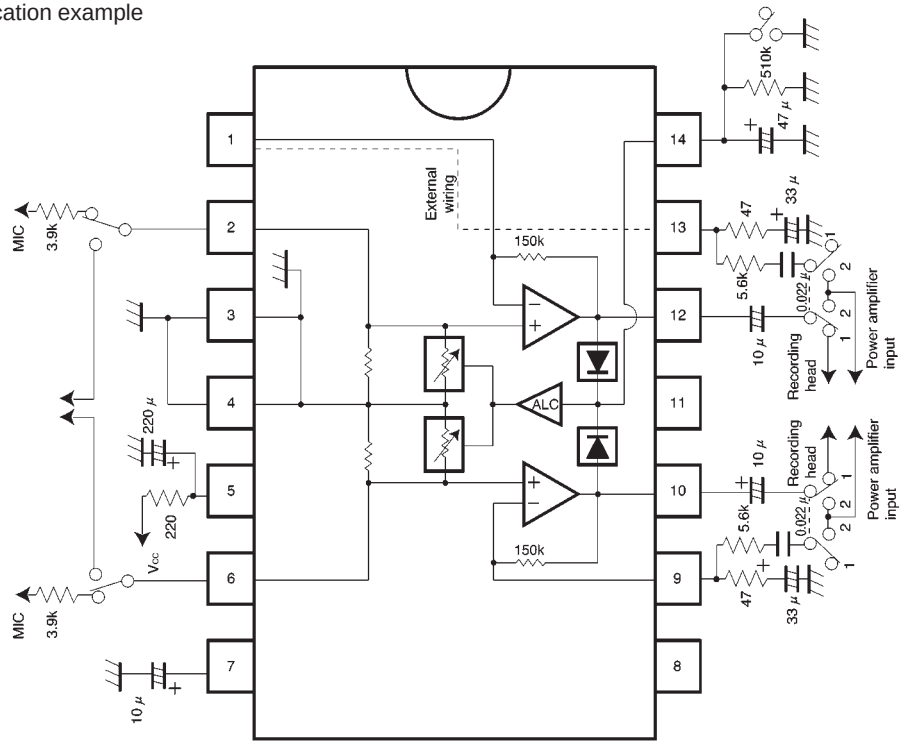


Fig. 2

SW
1: recording
2: playback

Units
Resistance : Ω (± 5%)
Film capacitors : F (±10%)
Electrolytic capacitors : F (±20%)

●Electrical characteristics curve

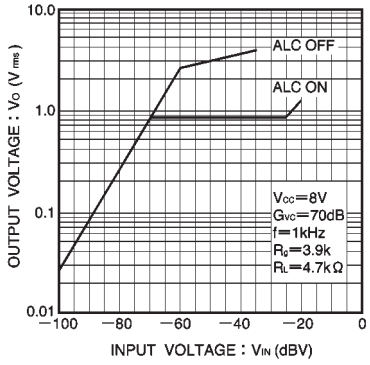


Fig. 3 Input voltage vs. output voltage

●External dimensions (Units: mm)