

# Microphone Amplifier

## BA7760 / BA7760F

The BA7760 and BA7760F are dual microphone amplifiers designed for audio signal amplification. These are low noise amplifiers with a low -122dBV (typically) equivalent input noise voltage. Each IC has an internal mixer buffer amplifier for the mixing of signals from two channels. When used with the BA7725S or BA7725FS, the BA7726AS or BA7726AFS and BU9252S or BU9252F, these ICs simplify the configuration of digital echo systems with two inputs (for karaoke duets, for instance).

### ● Applications

Audio equipment with karaoke features, VCRs, LDs, etc.

### ● Features

- 1) Internal 2-channel low noise microphone amplifier.
- 2) Internal mixer buffer amplifier with mute function.
- 3) Available in 2 types of packages: DIP 14-pin or SOP 14-pin.

### ● Absolute maximum ratings (Ta = 25°C)

Parameter	Symbol	Limits	Unit
Applied voltage	V <sub>cc</sub>	15	V
Power dissipation	P <sub>d</sub>	600 <sup>*1</sup>	mW
BA7760F		450 <sup>*2</sup>	
Operating temperature	T <sub>opr</sub>	- 25 ~ + 75	°C
Storage temperature	T <sub>stg</sub>	- 55 ~ + 125	°C

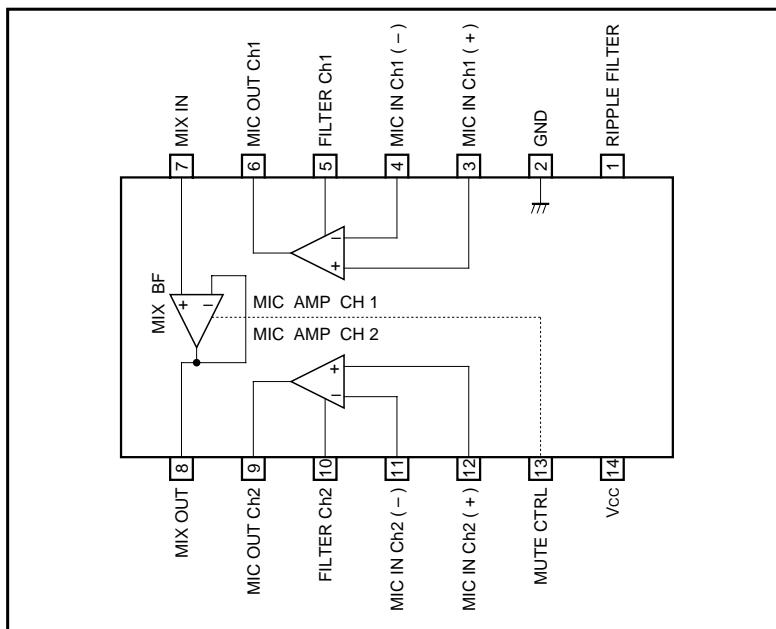
\*1 Unmounted. Reduced by - 6.0mW for each increase in Ta of 1°C over 25°C.

\*2 Unmounted. Reduced by - 4.5mW for each increase in Ta of 1°C over 25°C.

### ● Recommended operating conditions

Parameter	Symbol	Limits	Unit
Power supply voltage	V <sub>cc</sub>	6 ~ 14	V

## ● Block diagram



## ● Pin descriptions

Pin No.	Pin name	Function	Pin type
1	RIPPLE FILTER	Ripple filter	Base (NPN) // 15kΩ
2	GND	GND	—
3	MIC IN ( + ) Ch1	CH1 microphone amplifier input ( + )	Base (NPN) // 120kΩ
4	MIC IN ( - ) Ch1	CH1 microphone amplifier input ( - )	Base (NPN)
5	FILTER Ch1	CH1 microphone amplifier fc	Base (NPN) ~ 450Ω
6	MIC OUT Ch1	CH1 microphone amplifier output	Push-pull
7	MIX IN	Mixer buffer input	Base (NPN) // 65kΩ
8	MIX OUT	Mixer buffer output	Push-pull
9	MIC OUT Ch2	CH2 microphone amplifier output	Push-pull
10	FILTER Ch2	CH2 microphone amplifier fc	Base (NPN) ~ 450Ω
11	MIC IN ( + ) Ch2	CH2 microphone amplifier input ( - )	Base (NPN)
12	MIC IN ( - ) Ch2	CH2 microphone amplifier input ( + )	Base (NPN) // 120kΩ
13	MUTE CTRL	Mute control	Fig.1
14	Vcc	Vcc	—

\* "Parallel" and "series" respectively refer to parallel and series insertion. All figures are standard values.

## ● Input / output circuits

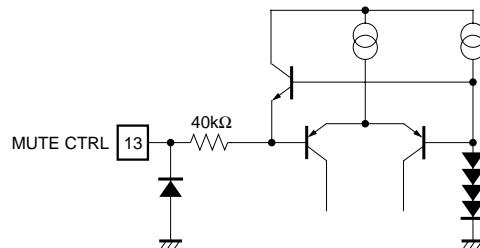


Fig. 1

● Electrical characteristics (unless otherwise noted,  $V_{CC} = 12V$ ,  $T_a = 25^\circ C$ )

Parameter	Symbol	Min.	Typ.	Max.	Unit	Conditions
Supply current	$I_q$	3.65	4.87	6.09	mA	—
⟨MIC AMP ( $G_{VC} = 36dB$ , $f = 1kHz$ )⟩						
Open loop voltage gain	$G_{VOM}$	55.0	65.0	—	dB	$V_{IN} = -70dBV$
Input conversion noise	$V_{nM}$	—	-122	-114	dBV	$R_g = 2.2k\Omega$ , DIN AUDIO
Distortion	$THD_M$	—	0.008	0.1	%	$V_{IN} = -40dBV$ $B.W. = 0.4 \sim 30kHz$
Maximum output level	$V_{omM}$	8.3	10.4	—	dBV	$THD = 1\%$ $B.W. = 0.4 \sim 30kHz$
Input impedance	$Z_{inM}$	92	123	—	kΩ	$V_{IN} = -40dBV$ , $100k\Omega$ Attenuation
Crosstalk	$CT_M$	—	-86	-78	dBV	$V_{IN} = -36dBV$ $R_g = 2.2k\Omega$ , DIN AUDIO
⟨MIX BF ( $f = 1kHz$ )⟩						
Voltage gain	$G_{VB}$	-0.7	0	0.7	dB	$V_{IN} = -10dBV$
Output residual noise	$V_{nB}$	—	-110	-100	dBV	$R_g = 2.2k\Omega$ , DIN AUDIO
Distortion	$THD_B$	—	0.002	0.07	%	$V_{IN} = -10dBV$ $B.W. = 0.4 \sim 30kHz$
Maximum output level	$V_{OMB}$	8.3	10.5	—	dBV	$THD = 1\%$ $B.W. = 0.4 \sim 30kHz$
Input impedance	$Z_{inB}$	50.0	66.5	—	kΩ	$V_{IN} = -10dBV$ , $50k\Omega$ Attenuation
Mute level	$MT_B$	—	-110	-100	dBV	$V_{IN} = -10dBV$ , DIN AUDIO
Mute threshold voltage	$V_{THMUTE}$	2.12	2.62	3.12	V	—

## ● Measurement circuit

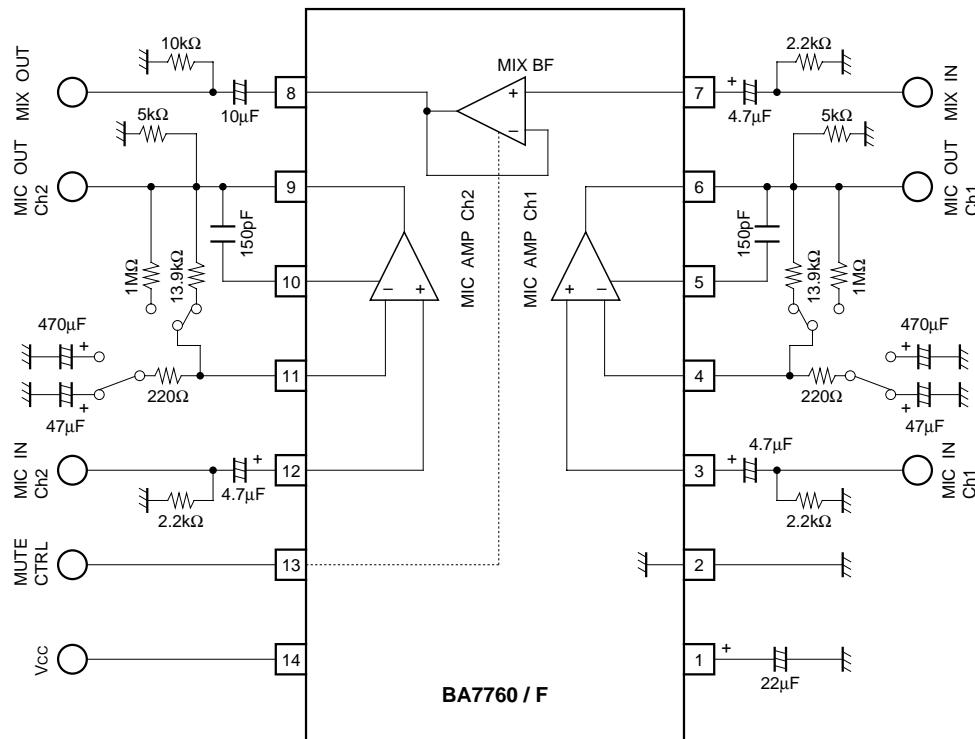
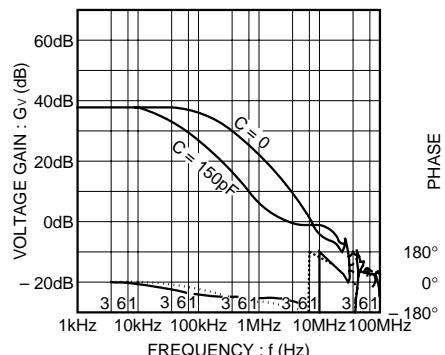


Fig. 2

## ● Circuit operation (Refer to "Application Example")

The BA7760 and BA7760F are dual microphone amplifiers. The audio signals from the microphones are input to pins 3 and 12. The gain at this time is determined by attached resistors R3 / R4 and R6 / R7. By attaching capacitors to pins 5 and 10, the microphone amplifiers can be given frequency characteristics like those shown below.

(Note: The attached component numbers are those used in "Application Example.")



Characteristics when using standard components and standard constants  
Fig. 3 Microphone amplifier frequency characteristics

Output from these dual amplifiers is level-adjusted with an attached volume control (VR) and then input to pin 7 and mixed by the mixer buffer amplifier. The ON / OFF operation of the mixer buffer amplifier can be controlled with the signal input to pin 13 (MUTE CTRL). For DC loads, this volume control (VR) should be set above  $4.5\text{k}\Omega$  to assure proper performance of the IC's internal driver.

Mode	Control signal	Operation
MUTE	L	Muted
MUTE	H	Normal operation

### ● Application example

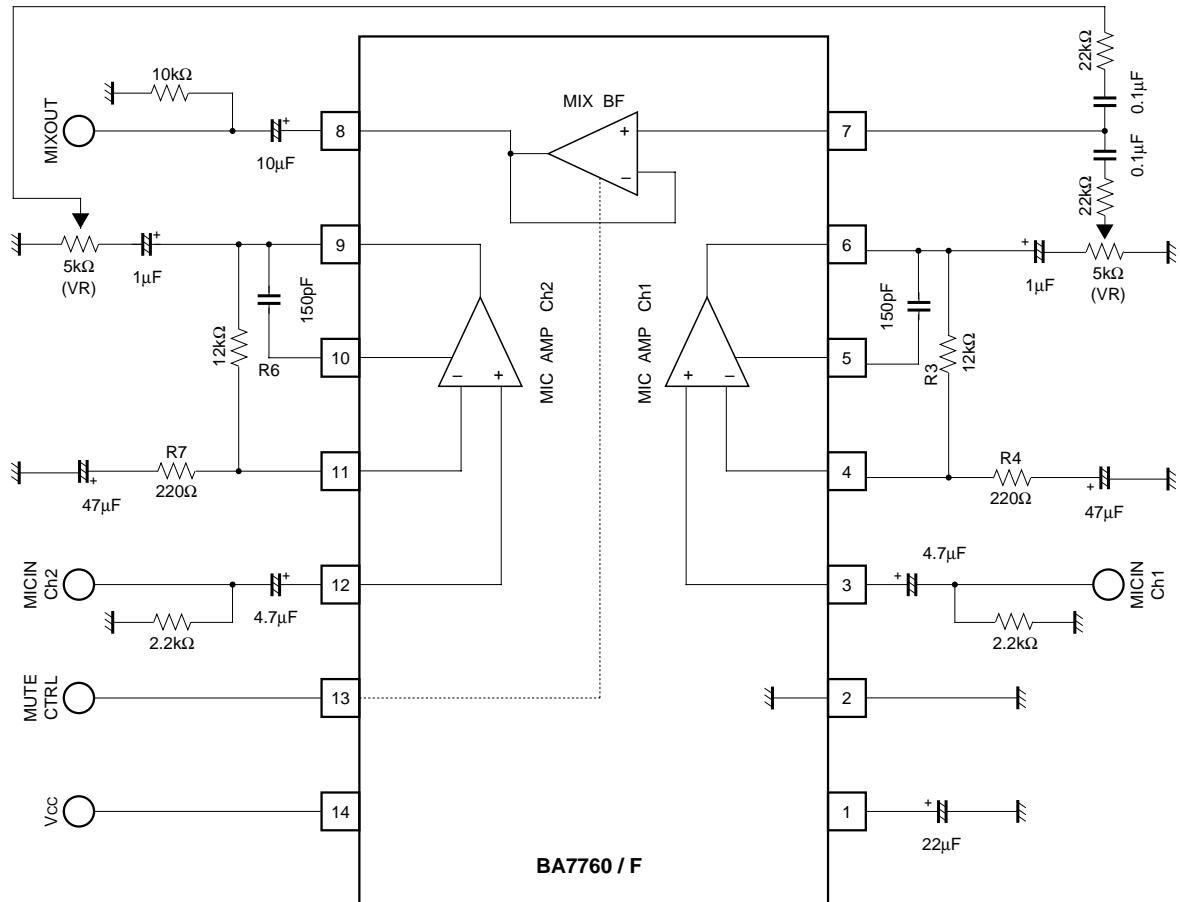
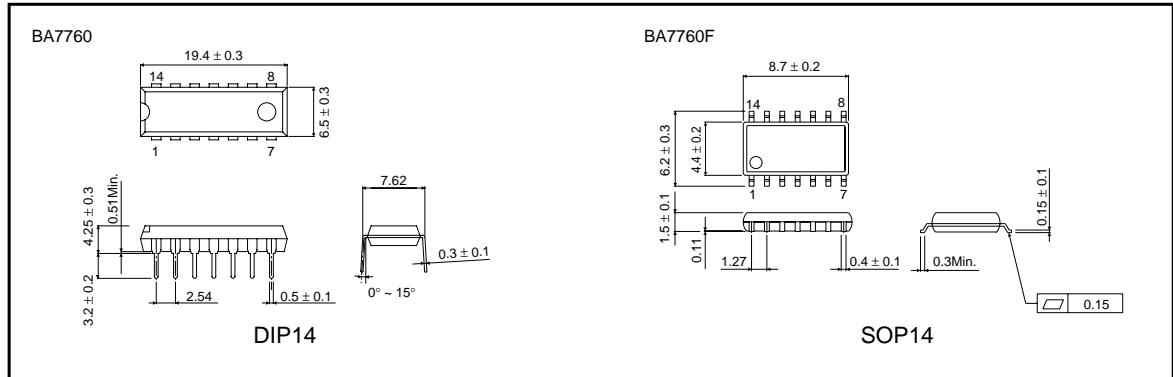


Fig. 4

● External dimensions (Units: mm)



## Appendix

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