

AAP662

Electret Microphone (ECM) Pre-Amplifier w/Programmable Filter

ADVANCED DATA

DESCRIPTION

The AAP662 ECM Pre Amplifier is a low gain pre-amplifier aimed at offering a feature-rich alternative to a typical JFET preamp solution. The performance of this Pre-Amplifier is such that it enables design of enhanced end system products due to its ultra-low noise, integrated high-pass filter, and other high performance features.

The AAP662 ECM Pre-Amplifier provides a number of performance advantages over prior ECM Pre-Amplifier products. Key features include ultra low input capacitance (0.35pF typical) and quiescent current (100 μ A minimum), with low equivalent input noise (2.5 μ V RMS, A-Weighted, with the microphone capacitor short circuited). Additionally, the Pre-Amplifier sports a programmable high pass filter and DC output operation down to 1.23V. Other key features include THD performance below 0.5% maximum, output impedance of 25 Ω typical, with exceptionally high tolerance to RF interference and ESD tolerance (8kV).

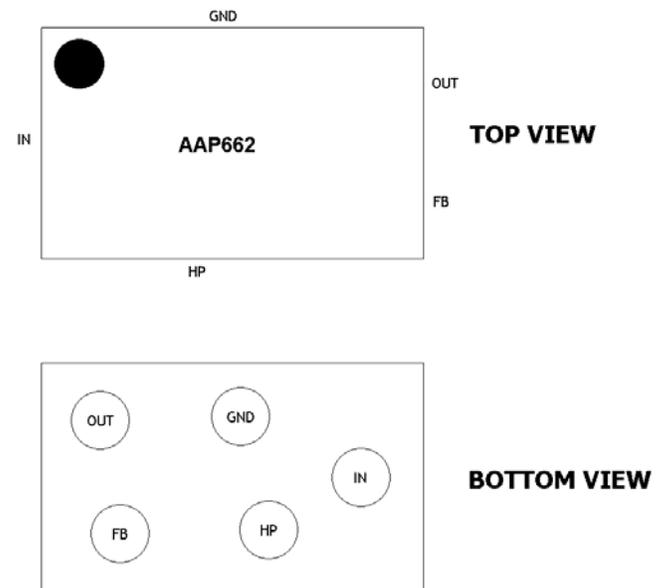
The AAP662 is offered with a 6dB gain. Packaging is bumped chip scale SMD configuration with a size of 930 μ m x 580 μ m and an overall thickness of 320 μ m (including solder bumps). Optimum for small diameter microphones, the die is RoHS compliant, with lead free solder pads of 118 μ m diameter. Packing styles available are 2" x 2" Waffle Pack or Tape and Reel.

FEATURES

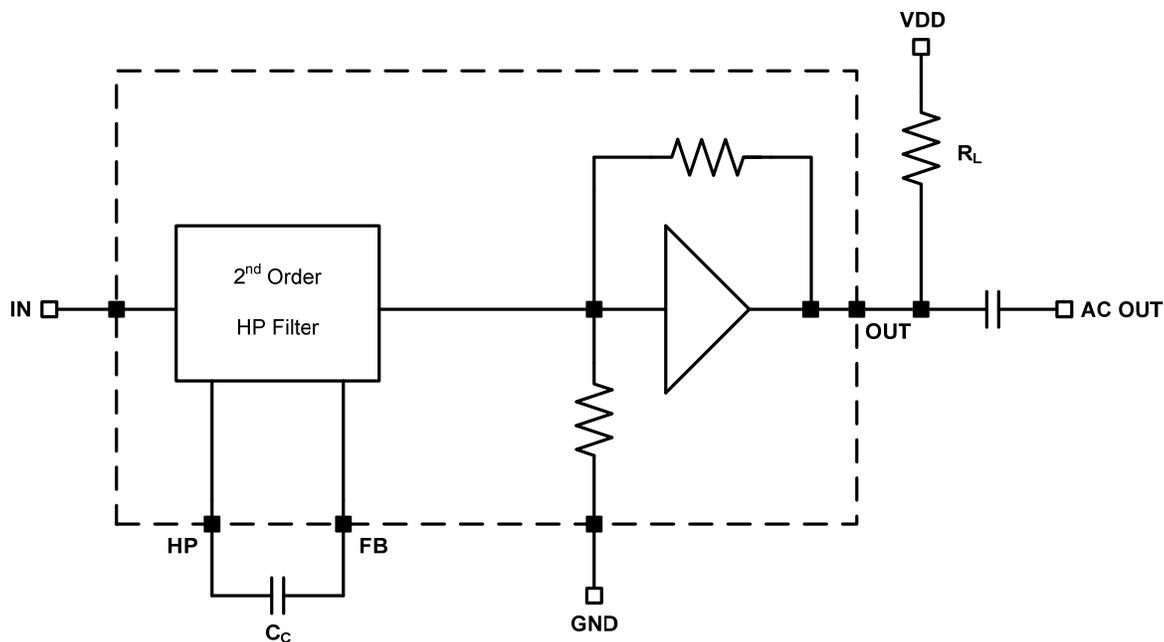
- Gain: 6dB, Cmic shorted
- Low Input Capacitance—0.35pF Typ.
- Low Equivalent Input Noise Performance—2.5 μ V RMS, Cmic = 5pF
- 8kV ESD Tolerance
- High RFI Tolerance, Low Output Impedance (25 Ω)
- Excellent THD Performance (< 0.5%)
- Low Quiescent Current (120 μ A Minimum)
- Chip-Scale SMD Bumped Packaging (930 μ m x 580 μ m, 320 μ m thick)

PIN CONFIGURATION: 5-Lead Micro SMD

AAP662 shown from the top and bottom.



Functional Block Diagram



MAXIMUM RATINGS

PARAMETER	SYMBOL	PARAMETERS		UNITS	CONDITIONS
		MIN.	MAX.		
Applied Voltage (all pins)		-0.5	2.5	V	Max voltage between pin and GND
Supply Current	IDD		2	mA	
ESD	V _{esd,out}	8000		V	OUT terminal, 1nF capacitor between pin and GND
	V _{esd}	2000			Other terminals
Operating Ambient Temp		-40	85	°C	
Storage Temp Range		-40	100	°C	
Performance Operating Temp Range		-5	55	°C	

ELECTRICAL CHARACTERISTICS

Unless otherwise stated: T=25°C, VDD=1.8V, V_{in}=-40dBVrms, R_L=2.2kΩ, C_c=33nF, C_{mic}=short

PARAMETER	SYMBOL	PARAMETERS			UNITS	CONDITIONS
		MIN	TYP	MAX		
OPERATING SUPPLY						
Supply Voltage	VDD	1.6	2.0	5.5	V	R _L =3.3kΩ
Operating Output Voltage	V _{op}	1.25	1.28	1.31	V	
Supply Current	IDD		260		µA	Note 1

Note 1: $IDD = (VDD - V_{op}) / R_L$

AC CHARACTERISTICS						
Transfer Function	TF	5.5	6.5	7.5	dB	
Gain Variation over Supply	ΔA_v			0.1	dB	1.6V < VDD < 3.5V
Gain Variation over Temp	ΔA_v			0.2	dB	-5°C < T < 55 °C
Input Referred Noise	e_n		2.5		$\mu\text{V RMS}$	Input shorted to GND, A-weighted values
Overload Margin	V_{outmax}	300			mVpp	5% distortion, TF=4dB
LF Cutoff	f_{LOW}		50		Hz	
HF Cutoff	f_{HIGH}	85			kHz	
Total Harmonic Distortion	THD		0.4		%	Vout=-40dBVrms
Input Capacitance	C_{IN}		0.35		pF	
Input Impedance	Z_{IN}	10			G Ω	
Output Impedance	Z_{OUT}		25	70	Ω	
Input Impedance of FB	Z_{INFB}		31.8		k Ω	

APPLICATION

Use the following equation to calculate the capacitor (C_c) value to program the low frequency cutoff of the high-pass filter:

Example 1: for a cutoff of $f = 100\text{Hz}$ using the AAP662

$$C_c = \frac{1}{2\pi * Z_{INFB} * f} = \frac{1}{2\pi * 31.8k * 100} = 50\text{nF}$$

Example 2: for a cutoff of $f = 200\text{Hz}$ using the AAPxxx_6

$$C_c = \frac{1}{2\pi * Z_{INFB} * f} = \frac{1}{2\pi * 31.8k * 200} = 25\text{nF}$$

TEST SUGGESTIONS

A suitable input amplitude is -44dBV (6.301 mVRMS). With a gain of 6.5dB, this will give -37.5dBV out (13.3 mVRMS).

With the input shorted to ground, the DC voltage at the FB pin should be about 600mV, and the DC voltage at the HP pin should be about 800mV. Due to the high impedances, a DVM with 10 MΩ input resistance minimum should be used with the negative input grounded to the lab bench.

ORDERING INFORMATION

Ordering PN	Subgroup	Description	Temp. Range	Package	Packing Type	Packing Qty
AAP662 S-M5A-G-LF-W	Microphone ECM Interface	Pre-Amplifier, 6.5dB gain	S - Special -5°C to +55°C	5-pin Micro SMD	Waffle-Pack	400
AAP662 S-M5A-G-LF-TR	Microphone ECM Interface	Pre-Amplifier, 6.5dB gain	S - Special -5°C to +55°C	5-pin Micro SMD	T&R	3500

The following is a brief overview of certain terms and conditions of sale of product. For a full and complete copy of all the General Terms and Conditions of Sale, visit our webpage <http://www.microsemi.com/en/legal/terms-and-conditions>.

LIMITED WARRANTY

The product is warranted that it will conform to the applicable specifications and be free of defects for one year. Buyer is responsible for selection of, use of and results obtained from use of the product. Buyer indemnifies and holds ASIC Advantage, Inc. harmless for claims arising out of the application of ASIC Advantage, Inc.'s products to Buyer's designs. Applications described herein or in any catalogs, advertisements or other documents are for illustrative purposes only.

CRITICAL APPLICATIONS

Products are not authorized for use in critical applications including aerospace and life support applications. Use of products in these applications is fully at the risk of the Buyer. Critical applications include any system or device whose failure to perform can result in significant injury to the user.

LETHAL VOLTAGES

Lethal voltages could be present in the applications. Please comply with all applicable safety regulations.

INTELLECTUAL PROPERTY RIGHTS AND PROPRIETARY DATA

ASIC Advantage, Inc. retains all intellectual property rights in the products. Sale of products does not confer on Buyer any license to the intellectual property. ASIC Advantage, Inc. reserves the right to make changes without notice to the products at any time. Buyer agrees not to use or disclose ASIC Advantage Inc.'s proprietary information without written consent.

TRADEMARKS AND PATENTS

- IN-PLUG® is a registered trademark of ASIC Advantage, Inc.
- AAI's modified snubber network is patented under the US Patent # 6,233,165

PROTECTION FOR CUSTOM SOLUTIONS

When AAI accepts to design and manufacture products to Buyer's designs or specifications, buyer has certain obligations to provide defense in a suit or proceeding claiming infringement of a patent, copyright or trademark or for misappropriation of use of any trade secrets or for unfair competition.

COMPLIANCE WITH LAWS

Buyer agrees that at all times it will comply with all applicable federal, state, municipal, and local laws, orders and regulations. Buyer agrees to comply with all applicable restrictions on exports and re-exports including obtaining any required U.S. Government license, authorization, or approval. Buyer shall pay any duties, levies, taxes, brokerage fees, or customs fees imposed on the products.

TITLE AND DELIVERY

All shipments of goods shall be delivered ExWorks, Sunnyvale, CA, U.S.A. Title in the goods shall not pass to Buyer until ASIC Advantage, Inc. has received in full all amounts owed by Buyer.

LATEST DATASHEET UPDATES

For the latest datasheet updates, visit our web page: <http://www.asicadvantage.com>.

WORLDWIDE REPRESENTATIVES

To access AAI's list of worldwide representatives, visit our web page <http://www.asicadvantage.com>.

COPYRIGHTS

Copyrights and all other proprietary rights in the Content rests with ASIC Advantage Inc. (AAI) or its licensors. All rights in the Content not expressly granted herein are reserved. Except as otherwise provided, the Content published on this document may be reproduced or distributed in unmodified form for personal non-commercial use only. Any other use of the Content, including without limitation distribution, reproduction, modification, display or transmission without the prior written consent of AAI is strictly prohibited. All copyright and other proprietary notices shall be retained on all reproductions.

Microsemi Corp.

1290-B Reamwood Ave, Sunnyvale California 94089, USA

Tel: (1) 408-541-8686 Fax: (1) 408-541-8675

Website: <http://www.asicadvantage.com>

<http://www.microsemi.com>