

AAP200X

ECM Microphone Pre-Amplifier

PRELIMINARY DATA

DESCRIPTION

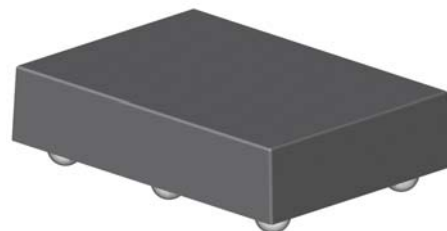
The AAP200C is part of AAI's new family of specialty products for Portable Electronics applications, in this case aimed at two terminal ECMs requiring integrated pre-amplifiers. The AAP200X ECM pre-amplifiers offer ultra low noise, require low current and feature ultra low input capacitance.

The AAP200X family will be offered in a chip scale SMD package. The package size is a tiny 630μm x 530μm, and its height is 350μm including solder bumps.

The AAP200X is offered in a chip scale SMD package with a size and aspect ratio (630μm x 530μm) that is optimum for the smallest (2mm dia.) microphones. The lead free solder pads are nominally 110μm dia. The AAP200X is supplied in tape and reel packaging.

The AAP200X family has multiple operating voltage and gain options available, where the 'X' suffix designates the gain value. The following options available are:

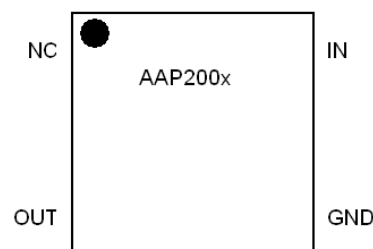
- AAP200**A**: Gain = 16dB $V_{op} = 1.25V$
- AAP200**B**: Gain = 19dB $V_{op} = 1.25V$
- AAP200**C**: Gain = 16dB $V_{op} = 1.33V$
- AAP200**D**: Gain = 19dB $V_{op} = 1.33V$



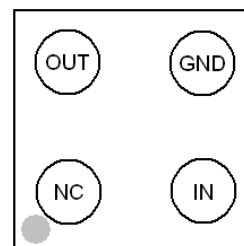
FEATURES

- Multiple gain options:
 - 16dB
 - 19dB
- Multiple output voltage options
 - 1.25V
 - 1.33V
- Low quiescent current, 200μA typical ($V_{DD}=1.8V$, $R_L=2.2k\Omega$)
- Low noise performance
- Low input capacitance, 0.35uA typical
- < 0.5% THD typical for output swing = 250mV peak to peak.
- Small die size: 630μm x 530μm
- Suitable for small microphones down to 2mm diameter

PIN CONFIGURATION: 4-Lead Micro SMD

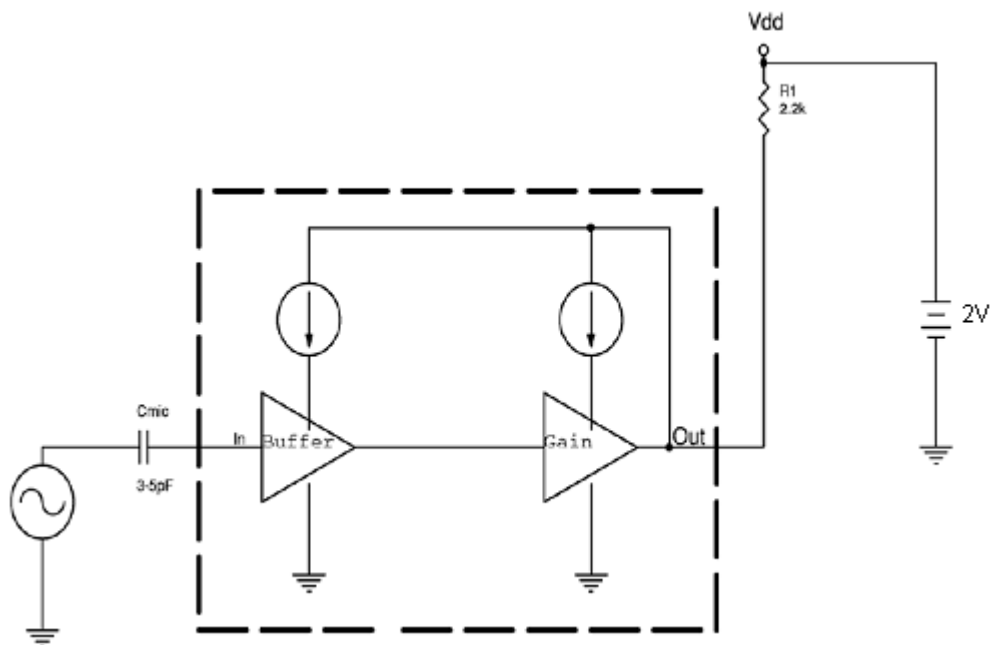


TOP VIEW

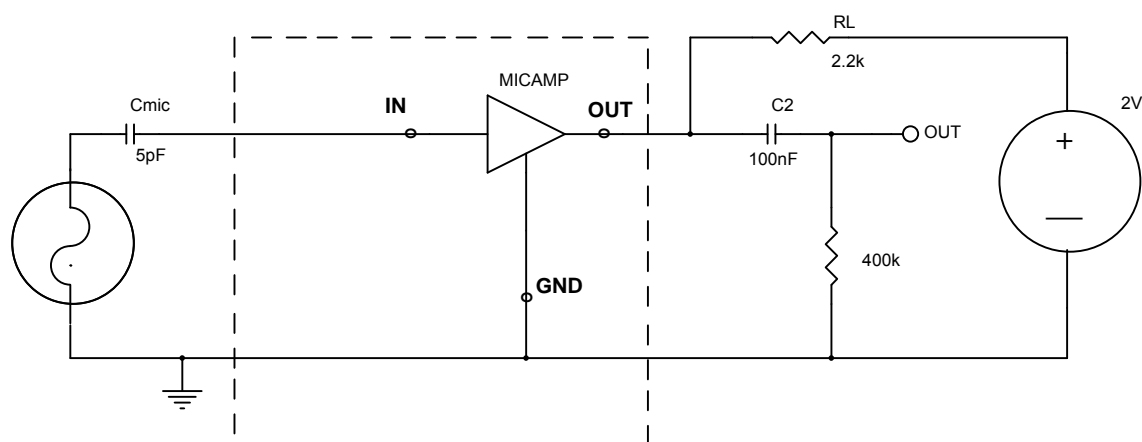


BOTTOM VIEW

Functional Block Diagram



Typical Test Conditions



MAXIMUM RATINGS

| PARAMETER | SYMBOL | PARAMETERS | | UNITS | CONDITIONS |
|----------------------------------|---------------|------------|---------------------------------|-------|---------------------------------|
| | | MIN. | MAX. | | |
| Applied Voltage (all pins) | | -0.5 | 2 | V | Max voltage between pin and GND |
| Supply Voltage | VDD | - | $(I_{DD_{MAX}} * R_L) + V_{op}$ | V | |
| Supply Current | IDD | | 2 | mA | |
| ESD | $V_{esd,out}$ | 2500 | | V | OUT terminal |
| | 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} =-44dBVrms, R_L =2.2k Ω , F=1kHz, C_{mic} =5pF

| PARAMETER | SYMBOL | PARAMETERS | | | UNITS | CONDITIONS |
|----------------------------------|---------------------|------------|------|------|--------|--|
| | | MIN | TYP | MAX | | |
| OPERATING SUPPLY | | | | | | |
| Quiescent Output (option A & B) | V _{op} | 1.2 | 1.25 | 1.3 | V | |
| Quiescent Output (option C & D) | V _{op} | 1.3 | 1.33 | 1.4 | V | |
| Supply Current (option A & B) | IDD | | 250 | | μA | |
| Supply Current (option C & D) | IDD | | 200 | | μA | |
| PSRR | | | 60 | | dB | |
| AC CHARACTERISTICS | | | | | | |
| Transfer Function (option A & C) | TF | 16 | 16.5 | 17 | dB | Source impedance = 500Ω |
| Transfer Function (option B & D) | TF | 18.5 | 19.5 | 20.5 | dB | Source impedance = 500Ω |
| Gain Variation over Temp | Δ Av | | | 0.1 | dB | -5°C < T < 55°C |
| Lower 3dB Frequency | f _{LOW} | | 20 | | Hz | Cc = 82nF, TF = 17dB |
| Upper 3dB Frequency | f _{HIGH} | 20 | 100 | | kHz | TF = 16dB |
| Overload Margin, input | V _{inmax} | | | 40 | mVpp | 1% distortion, TF=19dB |
| Overload Margin, output | V _{outmax} | | | 400 | mVpp | 1% distortion, TF=19dB |
| Input Referred Noise | e _n | | 2.6 | | μV RMS | TF=19dB; C _{mic} shorted, A-weighted values |
| Input Referred Noise | e _n | | 3.0 | | μV RMS | TF=16dB; C _{mic} shorted, A-weighted values |

| PARAMETER | SYMBOL | PARAMETERS | | | UNITS | CONDITIONS |
|---------------------------|------------------|------------|-----|-----|-------|------------|
| | | MIN | TYP | MAX | | |
| Total Harmonic Distortion | THD | | 0.3 | | % | |
| Input Capacitance | C _{IN} | | 0.3 | | pF | |
| Input Impedance | Z _{IN} | 10 | | | GΩ | |
| Output Impedance | Z _{OUT} | | | 50 | Ω | |

PIN DESCRIPTION

| PIN | NAME | DESCRIPTION |
|-----|------|---|
| 1 | NC | Not connected |
| 2 | OUT | Output. Also used for 'phantom' power supply input. |
| 3 | GND | Ground |
| 4 | IN | Input |

APPLICATION

VDD Supply Voltage

The AAP200x is designed to use the output pin as the power supply input. This is referred to as the 'phantom' power supply input to the OUT pin. A load resistor, R_L, must be used in series with the VDD supply. Refer to the table below for recommended R_L values that correspond to various supply voltage ranges.

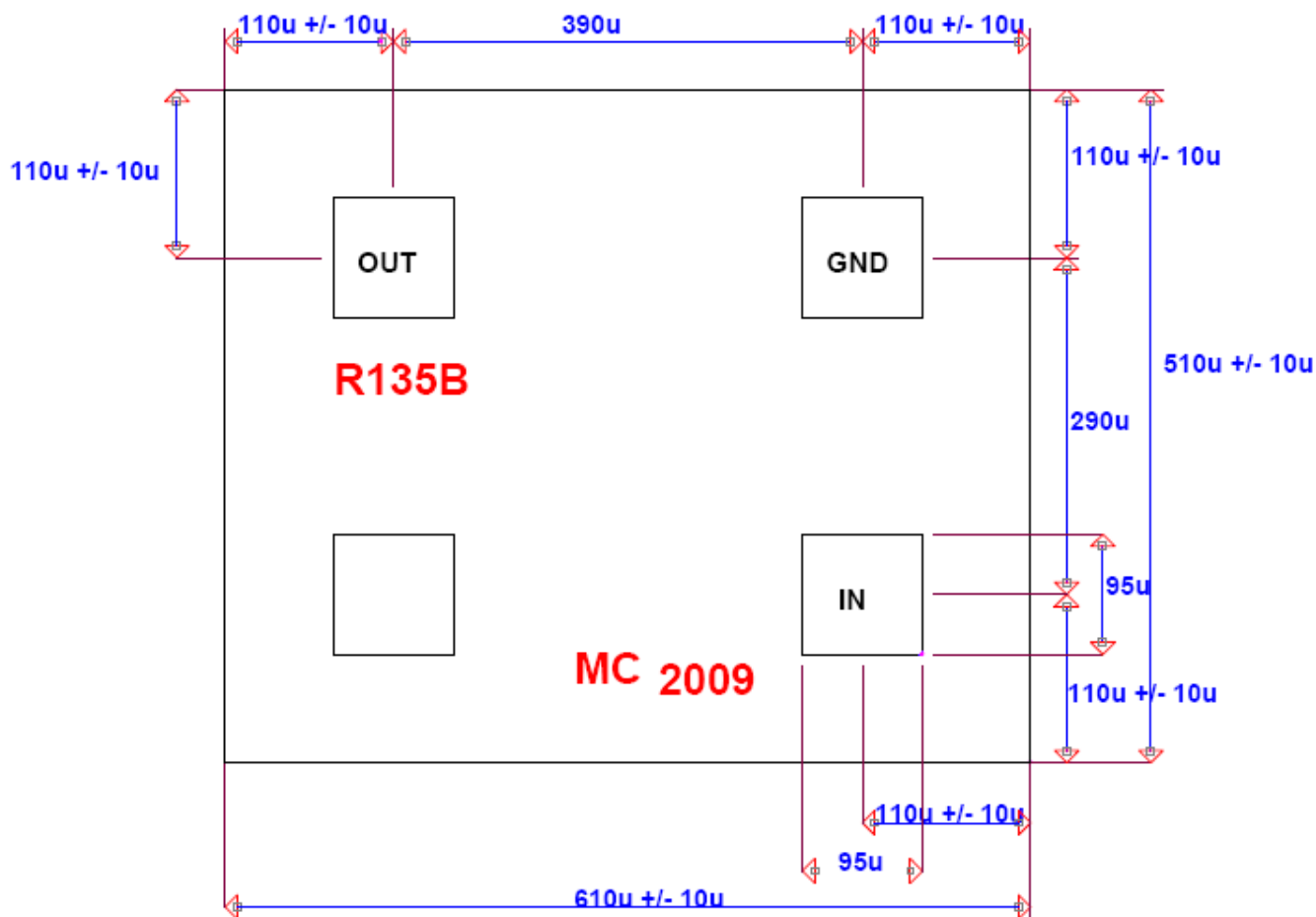
| PARAMETER | SYMBOL | VOLTAGE RANGE | | | UNITS | RECOMMENDED R _L | NOTES |
|--------------|--------|---------------|-----|-----|-------|----------------------------|-------------------------|
| | | MIN | TYP | MAX | | | |
| Power Supply | VDD | 1.5 | 1.6 | 2 | V | R _L =250Ω | A & B versions only |
| | | 1.8 | 2 | 5 | V | R _L =3.3kΩ | Applies to all versions |
| | | 1.6 | 1.8 | 3.6 | V | R _L =2.2kΩ | |
| | | 3.5 | 5 | 10 | V | R _L =10kΩ | |

Light Sensitivity

If your particular application has the possibility of the AAP200x being exposed to direct or indirect light, we recommend the application of an opaque underfill to limit the devices exposure to light(on the solder bumped side). Light exposure to the device may or may not have negative effects on the device performance (varies per application).

ORDERING TABLE

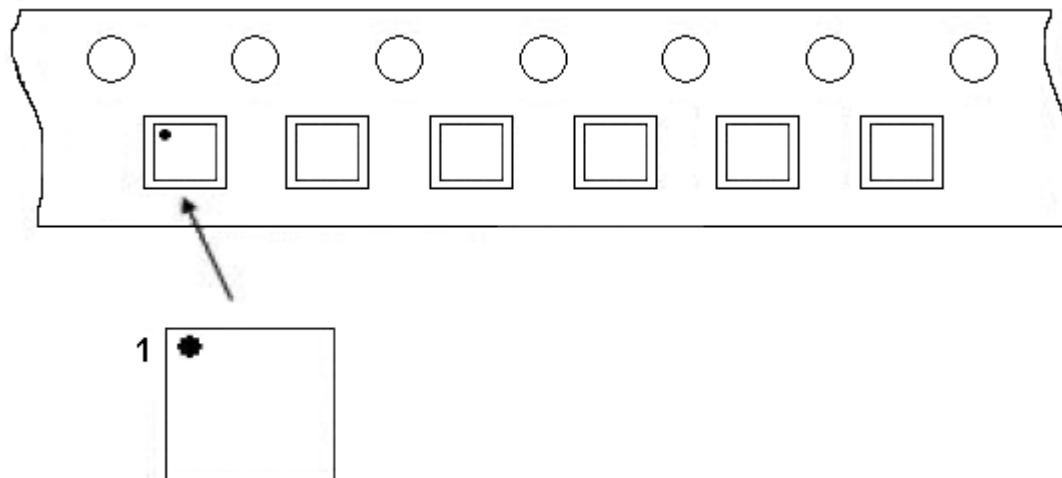
| Ordering PN | Description | Package | Packing Type | Packing Qty |
|-----------------------|---|-----------------|--------------|-------------|
| AAP200A S-M4A-G-LF-W | ECM Pre-Amp, 16dB Gain, $V_{op} = 1.25V$ | 4-Pin Micro SMD | Waffle Pack | TBD |
| AAP200A S-M4A-G-LF-TR | ECM Pre-Amp, 16dB Gain, $V_{op} = 1.25V$ | 4-Pin Micro SMD | T&R | 3500 |
| AAP200B S-M4A-G-LF-W | ECM Pre-Amp, 19dB Gain, $V_{op} = 1.25V$ | 4-Pin Micro SMD | Waffle Pack | TBD |
| AAP200B S-M4A-G-LF-TR | ECM Pre-Amp, 19dB Gain, $V_{op} = 1.25V$ | 4-Pin Micro SMD | T&R | 3500 |
| AAP200C S-M4A-G-LF-W | ECM Pre-Amp, 16dB Gain, $V_{op} = 1.33V$ | 4-Pin Micro SMD | Waffle Pack | TBD |
| AAP200C S-M4A-G-LF-TR | ECM Pre-Amp, 16dB Gain, $V_{op} = 1.33V$ | 4-Pin Micro SMD | T&R | 3500 |
| AAP200D S-M4A-G-LF-W | ECM Pre-Amp, 19dB Gain, $V_{op} = 1.33V$ | 4-Pin Micro SMD | Waffle Pack | TBD |
| AAP200D S-M4A-G-LF-TR | ECM Pre-Amp, 19dB Gain, $V_{op} = 1.33V$ | 4-Pin Micro SMD | T&R | 3500 |

PACKAGE DIMENSIONS

Note: Not drawn to scale

Bottom View

TAPE AND REEL CONFIGURATION



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