

## LOW VOLTAGE HEADPHONE AMPLIFIER for PORTABLE AUDIO

### ■ GENERAL DESCRIPTION

The **NJM2171A** is a low voltage headphone amplifier designed for portable audio items.

The **NJM2171A** operates directly for battery supply. It includes mute and standby circuit which require few external components and realize low current consumption and very low turn-noise at standby mode.

It is suitable for portable Mini-Disc, portable Compact-Disc, and other headphone amplifier application.

### ■ PACKAGE OUTLINE

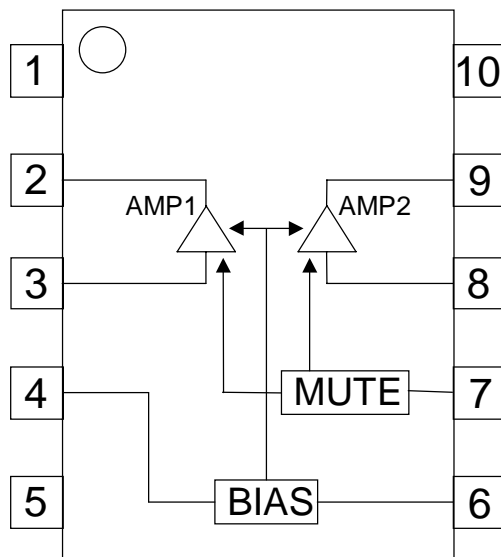


NJM2171AR

### ■ FEATURES

- Operating Voltage V<sup>+</sup>1=1.8 to 4.5V  
V<sup>+</sup>2=0.9 to 4.5V
- Operating Current 450μA typ. @V<sup>+</sup>1=2.3V  
700μA typ. @V<sup>+</sup>2=1.2V
- Supply Current in Power Down Mode 10μA typ. @V<sup>+</sup>1=2.3V  
25μA typ. @V<sup>+</sup>2=1.2V
- Output Power Exceeds 5mW R<sub>L</sub>=16Ω @THD=10%
- Fixed Voltage Gain 11.5dB typ.
- Package Outline VSP10
- Bipolar Technology

### ■ PIN CONFIGURATION



#### PIN FUNCTION

- 1.V<sup>+</sup>2
- 2.OUT1
- 3.IN1
- 4.STBY
- 5.V<sup>+</sup>1
- 6.V<sub>REF</sub>
- 7.MUTE
- 8.IN2
- 9.OUT2
- 10.GND

**■ ABSOLUTE MAXIMUM RATINGS**

(Ta=25°C)

| PARAMETER                   | SYMBOL           | RATINGS     | UNIT |
|-----------------------------|------------------|-------------|------|
| Supply Voltage              | V <sup>+</sup>   | 5           | V    |
| Power Dissipation           | P <sub>D</sub>   | (VSP8) 320  | mW   |
| Operating Temperature Range | T <sub>opr</sub> | -20 to +75  | °C   |
| Storage Temperature Range   | T <sub>stg</sub> | -40 to +125 | °C   |

**■ RECOMMENDED OPERATING CONDITIONS**

(Ta=25°C)

| PARAMETER                | SYMBOL           | MIN. | TYP. | MAX. | UNIT |
|--------------------------|------------------|------|------|------|------|
| Operating Voltage Range1 | V <sup>+</sup> 1 | 1.8  | 2.3  | 4.5  | V    |
| Operating Voltage Range2 | V <sup>+</sup> 2 | 0.9  | 1.2  | 4.5  | V    |

**■ ELECTRICAL CHARACTERISTICS** (V<sup>+</sup>1=2.3V, V<sup>+</sup>2=1.2V, R<sub>g</sub>=600Ω, R<sub>L</sub>=16Ω, f=1kHz, Ta=25°C)

| PARAMETER                      | SYMBOL           | TEST CONDITION  | MIN. | TYP. | MAX. | UNIT |
|--------------------------------|------------------|---|------|------|------|------|
| Operating Current              | I <sub>CC0</sub> | V <sup>+</sup> 1=0V(1pin)                             | -    | -    | 1    | μA   |
|                                | I <sub>CC1</sub> | STANDBY ON, MUTE ON(1pin)                             | -    | 25   | 40   |      |
|                                | I <sub>CC2</sub> | STANDBY ON, MUTE ON(5pin)                             | -    | 10   | 15   |      |
|                                | I <sub>CC3</sub> | No signal(1pin)                                       | -    | 700  | 1200 |      |
|                                | I <sub>CC4</sub> | No signal(5pin)                                       | -    | 450  | 700  |      |
|                                | I <sub>CC5</sub> | P <sub>O</sub> =0.5mW+0.5mW(1pin)                     | -    | 5.5  | -    | mA   |
|                                | I <sub>CC6</sub> | P <sub>O</sub> =0.5mW+0.5mW(5pin)                     | -    | 0.8  | -    |      |
| Reference Voltage              | V <sub>REF</sub> | No signal   | 0.55 | 0.60 | 0.65 | V    |
| Closed Loop Gain               | G <sub>V</sub>   | V <sub>IN</sub> =-30dBV                               | 10.5 | 11.5 | 12.5 | dB   |
| Output Power                   | P <sub>O1</sub>  | THD=10%   | 5.0  | 8.5  | -    | mW   |
|                                | P <sub>O2</sub>  | V <sup>+</sup> 1=1.8V, V <sup>+</sup> 2=0.9V, THD=10% | 2.0  | 4.0  | -    |      |
| Total Harmonic Distortion      | THD1             | P <sub>O</sub> =1mW, R <sub>L</sub> =16Ω              | -    | 0.15 | 0.3  | %    |
|                                | TED2             | P <sub>O</sub> =5mW, R <sub>L</sub> =16Ω              | -    | 0.4  | 0.6  |      |
| Output Noise Voltage           | V <sub>NO</sub>  | A-Weighted  | -    | -100 | -96  | dBV  |
| Crosstalk                      | CT               | V <sub>IN</sub> =-30dBV                               | -    | -80  | -70  | dBV  |
| Mute Level                     | MUTE             | MUTE-ON, V <sub>IN</sub> =-30dBV, A-Weighted          | -    | -95  | -80  | dBV  |
| Supply Voltage Rejection Ratio | SVR1             | V <sup>+</sup> 1=1.8V+0.1Vrms, V <sup>+</sup> 2=0.9V  | 60   | 70   | -    | dB   |
|                                | SVR2             | V <sup>+</sup> 1=1.8V, V <sup>+</sup> 2=0.9V+0.1Vrms  | 60   | 70   | -    |      |

## ■ CONTROL TERMINAL CHARACTERISTICS

| PARAMETER                | SYMBOL   | TEST CONDITION         | MIN. | TYP. | MAX.     | UNIT |
|--------------------------|----------|------------------------|------|------|----------|------|
| High Level Input Voltage | $V_{IH}$ | STBY(4pin), MUTE(7pin) | 1.2  | -    | $V^{+1}$ | V    |
| Low Level Input Voltage  | $V_{IL}$ | STBY(4pin), MUTE(7pin) | 0    | -    | 0.3      | V    |

## ■ CONTROL TERMINAL EXPLANATION

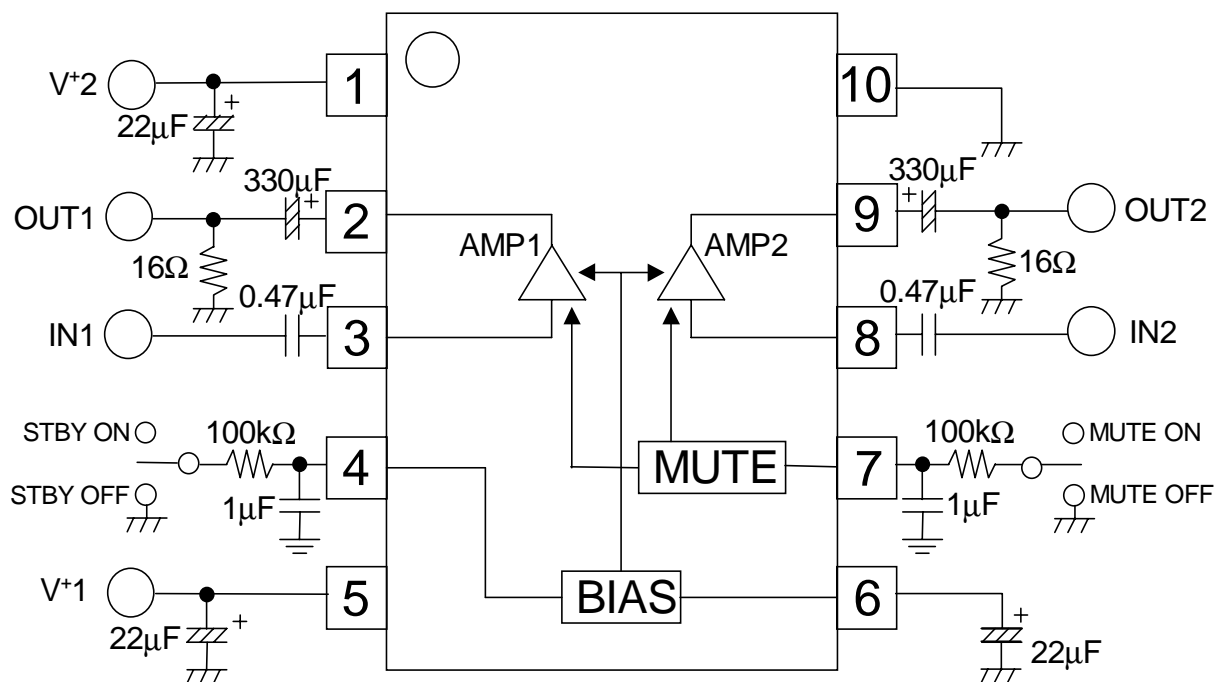
### •STBY (4Pin)

| PARAMETER   | CONTROL SIGNAL | STATUS            |
|-------------|----------------|-------------------|
| STANDBY ON  | H              | IC is non-active. |
| STANDBY OFF | L              | IC is active.     |

### •MUTE (7Pin)

| PARAMETER | CONTROL SIGNAL | STATUS                        |
|-----------|----------------|-------------------------------|
| MUTE ON   | H              | IC doesn't output the signal. |
| MUTE OFF  | L              | IC output the signal.         |

## ■ APPLICATION CIRCUIT



### [CAUTION]

The specifications on this databook are only given for information, without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.