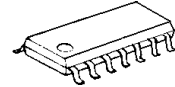


MONAURAL AUDIO POWER AMPLIFIER IC

■ GENERAL DESCRIPTION

The **NJM2166** are monaural power amplifier suitable for mobile communication equipment. It is possible to operate on low operating voltage such as 2.7V and incorporates mute function, suspend function and AUX input.

■ PACKAGE OUTLINE



NJM2166E



NJM2166V

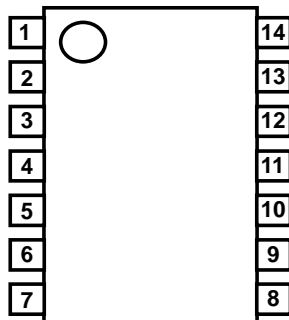


NJM2166R

■ FEATURES

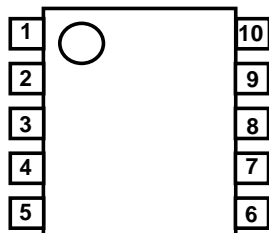
- Operating Voltage (2.7V to 8.5V)
- AUX input
- Suspend Mode Function
- Mute Function
- EVR function
- Bipolar Technology
- Package outline EMP14, SSOP14, VSP10

■ PIN CONFIGURATION



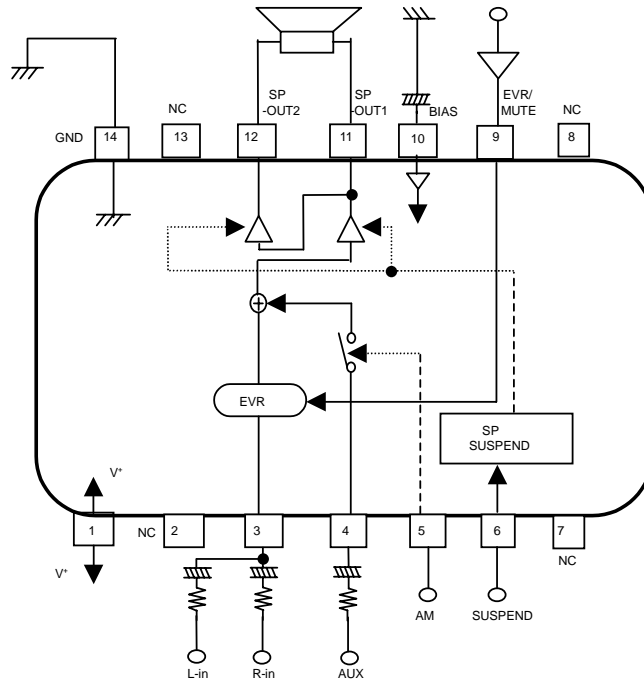
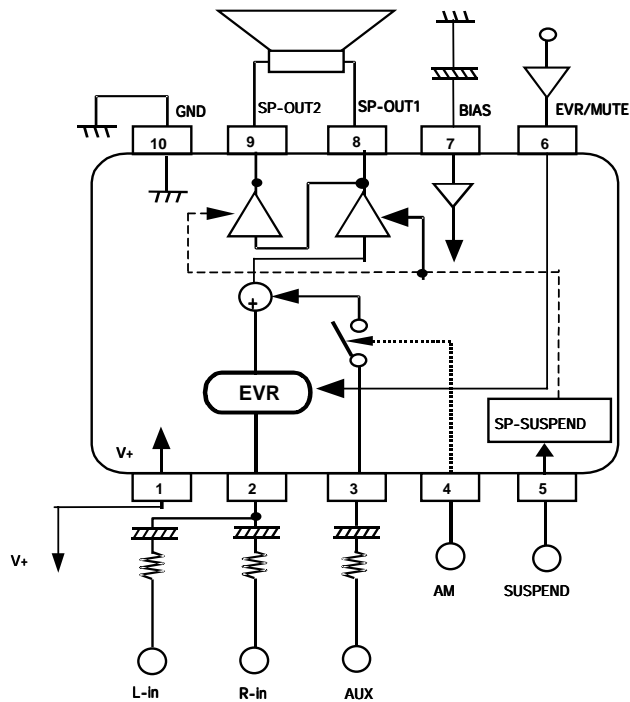
NJM2166E/V

| No. | NAME | No. | NAME |
|-----|---------|-----|---------|
| 1 | V* | 8 | NC |
| 2 | NC | 9 | EVR |
| 3 | SP-IN | 10 | BIAS |
| 4 | AUX | 11 | SPOUT-1 |
| 5 | AM | 12 | SPOUT-2 |
| 6 | SUSPEND | 13 | NC |
| 7 | NC | 14 | GND |



NJM2166R

| No. | NAME | No. | NAME |
|-----|---------|-----|---------|
| 1 | V* | 6 | EVR |
| 2 | SP-IN | 7 | BIAS |
| 3 | AUX | 8 | SPOUT-1 |
| 4 | AM | 9 | SPOUT-2 |
| 5 | SUSPEND | 10 | GND |

■ BLOCK DIAGRAM

NJM2166 E/V Block Diagram

NJM2166R Block Diagram

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|-----------------------------|----------------|--|------|
| Supply Voltage | V ⁺ | +9.0 | V |
| Power Dissipation | P _D | (EMP14) 300 (SSOP14) 300 (VSP10) 320 | mW |
| Operating Temperature Range | Topr | -40 to +85 | °C |
| Storage Temperature Range | Tstg | -50 to +150 | °C |

■ RECOMMENDATION OPERATING LIMITS (Ta=25°C)

| PARAMETER | SYMBOL | RATINGS | UNIT |
|-----------|-------------------|----------------|--------------|
| | Operating Voltage | V ⁺ | +2.7 to +8.5 |

■ ELECTRICAL CHARACTERISTICS (V⁺=3.0V, Ta=25°C)
● OPERATING CURRENT

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---------------------------|-----------------------------------|-----------------|------|------|------|------|
| Operating Current | No signal, V _{evr} =0.3V | I _q | 2.0 | 2.5 | 3.5 | mA |
| Operating Current SUSPEND | No signal, V _{SUS} =H | I _{qs} | 100 | 150 | 200 | μA |

● SPEAKER AMP1

 (Input : SP IN, R_{INSP}=15kΩ)

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|---------------------------|---|----------------------|------|------|------|------|
| Output Voltage Level | V _{in} =-16.0dBV, R _L =8Ω | V _o | -6.5 | -4.0 | -1.5 | dBV |
| Total Harmonic Distortion | V _{in} =-16.0dBV, R _L =8Ω | THD | - | 0.9 | 1.8 | % |
| Maximum Output Level1 | R _L =8Ω, THD=3%, A-Weighted | V _{om1} | -2.5 | 0.0 | - | dBV |
| Maximum Output Level2 | V ⁺ =5V, R _L =16Ω, THD=3%, A-Weighted | V _{om2} | -4.5 | 7.0 | - | dBV |
| Output Remain Noise | R _g =1kΩ, A-Weighted | V _{on} | - | -82 | -75 | dBV |
| Mute Level | V _{in} =-16dBV, V _{evr} =0.3V, A-Weighted | V _{o offSP} | - | -78 | -70 | dBV |

● SPEAKER AMP2

 (Input : AUX IN, R_{INAUX}=30kΩ)

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|-------------------|--|-----------------------|-------|-------|------|------|
| Output Level | V _{inAUX} =-16.0dBV, R _L =8Ω | V _{oAUX} | -12.5 | -10.0 | -7.5 | dBV |
| AUX Mix Off Level | V _{inAUX} =-16.0dBV, V _{AM} =L, A-Weighted | V _{o offAUX} | - | -78 | -70 | dBV |

●CONTROL BLOCK
MUTE JUDGMENT LEVEL (EVR TERMINAL)

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|-----------|----------------|-------------------|------|--------------------|------|------|
| MUTE ON | | V _{MON} | - | GND-0.4 | - | V |
| MUTE OFF | | V _{MOFF} | - | 0.4-V ⁺ | - | V |

SUSPEND CONTROL BLOCK (SUSPEND TERMINAL)

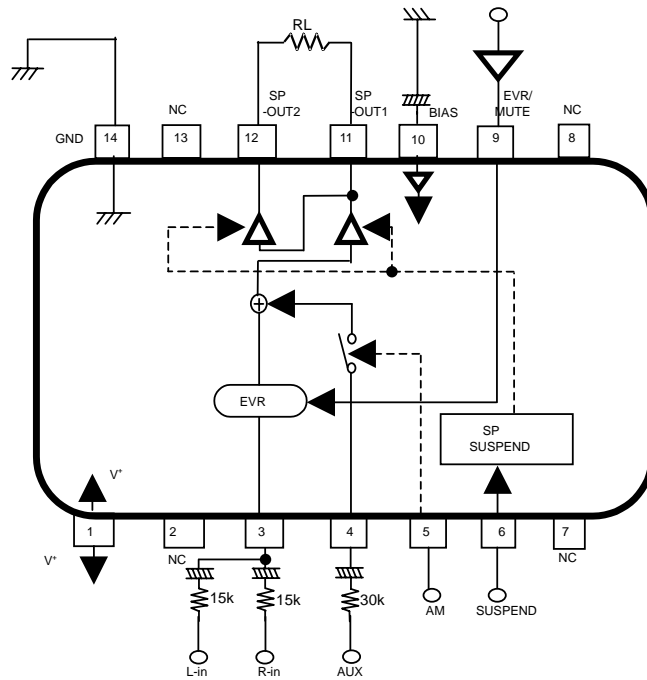
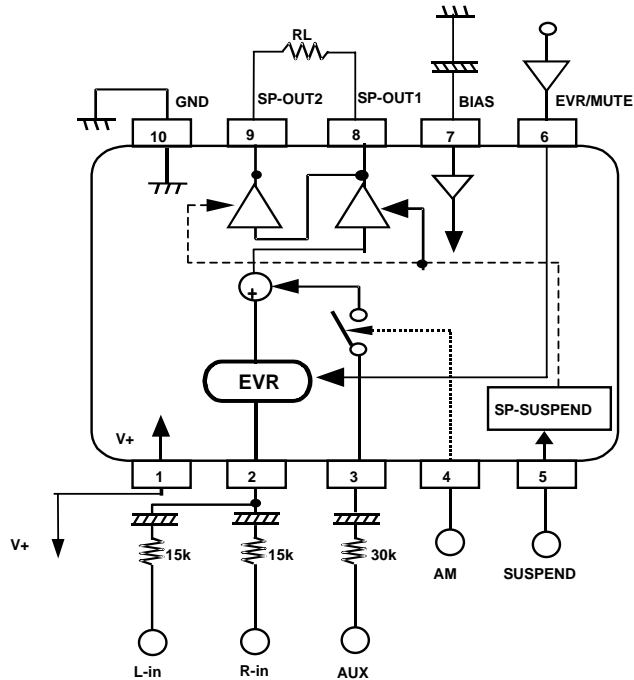
| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|-------------|----------------|-----------------|------|------|----------------|------|
| SUSPEND ON | | V _{SH} | 1.5 | - | V ⁺ | V |
| SUSPEND OFF | | V _{SL} | GND | - | 0.4 | V |

AUX.MIX CONTROL BLOCK (AMTERMINAL)

| PARAMETER | TEST CONDITION | SYMBOL | MIN. | TYP. | MAX. | UNIT |
|-------------|----------------|------------------|------|------|----------------|------|
| AUX MIX ON | | V _{AMH} | 1.5 | - | V ⁺ | V |
| AUX MIX OFF | | V _{AML} | GND | - | 0.4 | V |

(Note) Unless specified, tested with next mode below.

| TERMINAL NAME | SYMBOL | TERMINAL NUMBER | CONDITION | STATUS |
|-----------------|---------|--------------------------|-----------------------------------|-------------|
| | | NJM2166E/V (NJM2166R) | | |
| EVR CONTROL | EVR | 9 pin (6 pin) | V _{evr} = V ⁺ | EVR=MAX. |
| SUSPEND CONTROL | SUSPEND | 6 pin (5 pin) | V _{sus} =L | SUSPEND OFF |
| AUX.MIX CONTROL | AM | 5 pin (4 pin) | V _{AM} =H | AUX.MIX ON |

■ TEST CIRCUIT

NJM2166E/V TEST CIRCUIT

NJM2166R TEST CIRCUIT

■ TERMINAL EXPLANATION (CONDITION : $V^+ = 3.0V$)

| TERMINAL NUMBER | | TERMINAL NAME | FUNKTION | TERMINAL VOLTAGE(V) | OTHERS |
|-----------------|----------|---------------|--------------------------------|---------------------|-------------------------|
| NJM2166E/V | NJM2166R | | | | |
| 1 | 1 | V^+ | Supply Terminal | 3.0 | - |
| 3 | 2 | SP-IN | Speaker Input | 1.1 | Base(PNP) |
| 4 | 3 | AUX | AUX Input | 1.1 | Base(PNP) |
| 5 | 4 | AM | Speaker AUX.MIX ON/OFF Control | 0.0 | 100k Ω PULL DOWN |
| 6 | 5 | SUSPEND | Suspend Control | - | Base(PNP) |
| 9 | 6 | EVR/MUTE | EVR & Mute Control | 1.0 | Base(PNP)-R |
| 10 | 7 | BIAS | Bias | 1.1 | Base(PNP) |
| 11 | 8 | SP OUT1 | BTL Negative Output | 1.1 | EMI-F(NPN) |
| 12 | 9 | SP OUT2 | BTL Positive Output | 1.1 | EMI-F(NPN) |
| 14 | 10 | GND | GND | 0.0 | - |
| 2,7,8,13 | - | NC | - | - | - |

■ CONTROL TERMINAL EXPLANATION
1: MUTE CTRL (EVR)

| PARAMETER | STATUS | NOTE |
|-----------|-------------|---------------------------------------|
| MUTE ON | GND-0.4V | The amplifier is not given off signal |
| MUTE OFF | 0.4V- V^+ | The amplifier is given off signal. |

2: SUSPEND CTRL (SUSPEND)

| PARAMETER | STATUS | NOTE |
|-------------|--------|-------------------------|
| SUSPEND ON | H | Amplifier is non-active |
| SUSPEND OFF | L | Amplifier is active |

3: AUX.MIX CTRL (AM)

| PARAMETER | STATUS | NOTE |
|-------------|--------|------------------------------------|
| AUX MIX ON | H | AUX signal get in amplifier. |
| AUX MIX OFF | L | AUX signal don't get in amplifier. |

■ EVR DESCRIPTION

The EVR terminal possesses that interior power amplifier gain control function. It is in proportion to input DC voltage.

And this terminal can reduction pop noise. In that case establish the voltage "mute bias level".

This function's is shown in Figure 1.

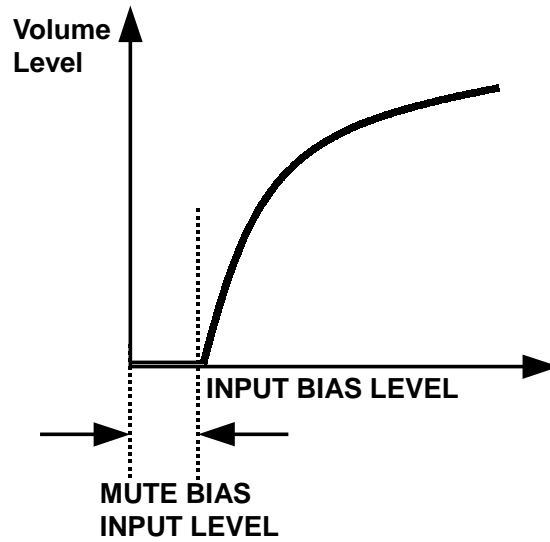


Figure 1

MEMO

[CAUTION]
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