

## MONAURAL POWER AMP. & HEADPHONE POWER AMP. IC

### ■ GENERAL DESCRIPTION

The **NJM2151A** is a monaural audio power amplifier and stereo headphone amplifier for wide voltage operation.

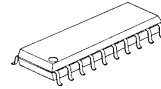
The **NJM2151A** was stereo headphone power amplifier for low distortion single-end output , and monaural power amplifier for high power bridge(BTL).

The **NJM2151A** operate low voltage supply , low operating current and low power-down current.

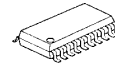
The **NJM2151A** includes MUTE , SUSPEND mode, and suitable for NOTE PC, PDA, CAMCODER, and other battery equipment.

The **NJM2151AVF1** is packaged in the power package.

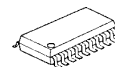
### ■ PACKAGE OUTLINE



**NJM2151AM**



**NJM2151AV**

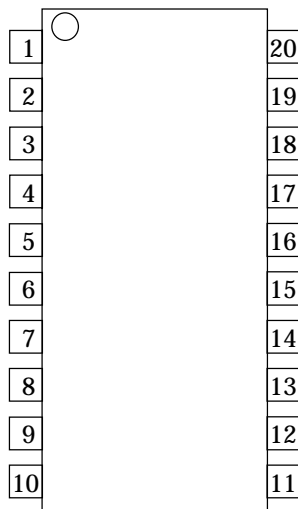


**NJM2151AVF1**

### ■ FEATURES

- Operating Voltage (2.7V to 9.0V)
- Electric Volume Function (Headphone Amplifier)
- LINE Input Mode
- System BEEP Input (Headphone)
- BEEP Level Control Function
- BEEP Input (Monaural Amplifier)
- Suspend Mode (Monaural Amplifier , Headphone Amplifier)
- Mute Mode (Headphone Amplifier)
- Bipolar Technology
- Package Outline DMP20,SSOP20,SSOP20-F1

### ■ PIN CONFIGURATION



#### PIN CONFIGURATION

- |                |                      |
|----------------|----------------------|
| 1. EVR         | 11.SP.GND            |
| 2. LINE IN L   | 12.LM                |
| 3. MUTE        | 13.SP.OUT 2          |
| 4. LINE IN R   | 14.SP.OUT 1          |
| 5. BEEP BIAS   | 15.BEEP LEVEL        |
| 6. SYS.BEEP IN | 16.SP.V <sup>+</sup> |
| 7. SP.IN       | 17.HP.GND            |
| 8. BEEP IN     | 18.HP.OUT R          |
| 9. HP.SUSPEND  | 19.HP.OUT L          |
| 10. SP.SUSPEND | 20.HP.V <sup>+</sup> |

**■ ABSOLUTE MAXIMUM RATINGS** (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V <sup>+</sup>	9	V
Power Dissipation	P <sub>D</sub>	(DMP) 375 (SSOP) 375 (SSOP-F1) 750	mW
Operating Temperature Range	T <sub>opr</sub>	-40 to +85	°C
Storage Temperature Range	T <sub>stg</sub>	-50 to +150	°C

**■ RECOMMENDED OPERATING CONDITIONS** (Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	UNIT
Operating Voltage	V <sub>opr</sub>	+2.7 to +9.0	V

**■ ELECTRICAL CHARACTERISTICS** (HP V<sup>+</sup>=SP, V<sup>+</sup>=5V, Ta=25°C)

**● Operating Current**

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I <sub>q</sub>	No Signal :I <sub>qHP</sub> +I <sub>qSP</sub>	-	3.0	5.0	mA
Operating Current (Suspend Mode)	I <sub>qs</sub>	No Signal :I <sub>qHP</sub> +I <sub>qSP</sub> , V <sub>HS</sub> =L, V <sub>SS</sub> =L	-	252	422	μA

**● HEADPHONE 1 (INPUT:LINE IN L/R, OUTPUT:HP OUT L/R)**

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage Level	V <sub>ohp1</sub>	V <sub>in</sub> =-10.0dBV	-7.4	-4.0	-1.5	dBV
Total Harmonic Distortion	THD <sub>hp</sub>	V <sub>in</sub> =-10.0dBV (note1)	-	0.1	1.0	%
EVR Adjustable Range	G <sub>evr</sub>	V <sub>in</sub> =-10.0dBV (note2), V <sub>evr</sub> =HP V <sup>+</sup> →GND	70	90	-	dB
Maximum Output Level	V <sub>omhp</sub>	THD=1% (note1)	-1.6	+0.6	-	dBV
Output Remain	V <sub>onhp</sub>	R <sub>g</sub> =1kΩ (note2)	-	-80	-73	dBV
Crosstalk	C <sub>Thp</sub>	V <sub>in</sub> =-10dBV (note2)	-	-79	-70	dBV
Muting Level	M <sub>Thp</sub>	V <sub>in</sub> =-10dBV:V <sub>M</sub> =H (note2)	-	-94	-83	dBV

**● HEADPHONE 2 (INPUT:SYSTEM BEEP IN, OUTPUT:HP OUT L/R)**

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage Level	V <sub>ohp2</sub>	V <sub>in</sub> =3.0Vp-p	0.22	0.32	0.42	Vp-p
Input Threshold Level	V <sub>THHP</sub>		4.50	-	5.00	Vp-p

**● SPEAKER AMP1 (INPUT:SP IN,OUTPUT:SP OUT1/2)**

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Voltage Level	Vosp	Vin=-10.0dBV	-1.4	+2.0	+4.5	dBV
Total Harmonic Distortion	THDsp	Vin=-10.0dBV (note1)	-	0.7	2.0	%
Maximum Output Level	V <sub>OMsp</sub>	THD=3% (note1)	+3.5	+5.7	-	dBV
Output Remain Noise	Vonsp	Rg=1kΩ (note2)	-	-82	-78	dBV
Line Mix Off Level	Vooffsp	Vin=-12dBV, V <sub>L</sub> =H (note2)	-	-78	-70	dBV

**● SPEAKER AMP2 (INPUT:PM BEEP IN,OUTPUT:SP OUT 1/2)**

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Output Level	Vosp2	Vin=-10.0dBV	-7.4	-4.0	-1.5	dBV

(note1):B.W.=0.4 to 30kHz ,(note2):CCIR

**● CONTROL BLOCK**
**MUTE CONTROL (3pin:MUTE-CTRL)**

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
HP Mute Off	V <sub>ML</sub>		GND	-	0.4	V
HP Mute On	V <sub>MH</sub>		1.5	-	V <sup>+</sup>	V

**HEADPHONE SUSPEND CONTROL (9pin:HPSUS-CTRL)**

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
HP Suspend On	V <sub>HPSL</sub>		GND	-	0.4	V
HP Suspend Off	V <sub>HPSH</sub>		1.5	-	V <sup>+</sup>	V

**SPEAKER SUSPEND Control (10pin:SPSUS-CTRL)**

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
SP Suspend On	V <sub>SPSL</sub>		GND	-	0.4	V
SP Suspend Off	V <sub>SPSH</sub>		1.5	-	V <sup>+</sup>	V

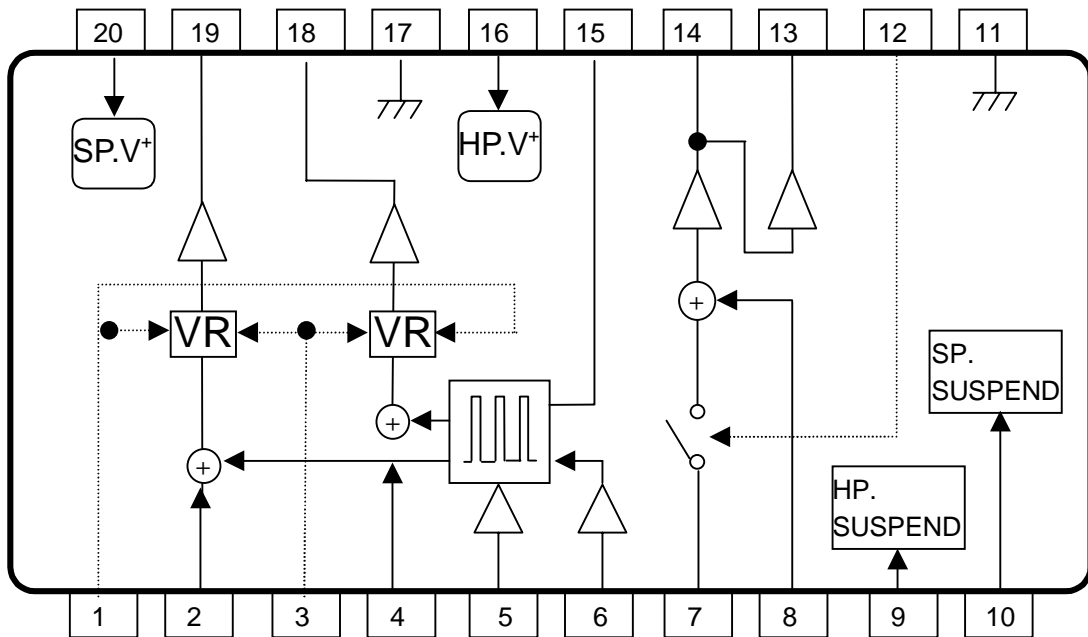
**LINE MIX ON/OFF Control (12pin:LINE MIX ON/OFF CTRL)**

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Line Mix On	V <sub>LL</sub>		GND	-	0.4	V
Line Mix Off	V <sub>LH</sub>		1.5	-	V <sup>+</sup>	V

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

FUNCTION	SYMBOL	PIN.No	CONDITION	STATUS
EVR Control	V <sub>evr</sub>	1pin	V <sub>evr</sub> =V <sup>+</sup>	EVR=Max
Mute Control	V <sub>M</sub>	3pin	V <sub>M</sub> =L	Mute Off
Headphone Suspend Control	V <sub>HPS</sub>	9pin	V <sub>HPS</sub> =H	Suspend Off
Speaker Suspend Control	V <sub>SPS</sub>	10pin	V <sub>SPS</sub> =H	Suspend Off
Line Mix Control	V <sub>L</sub>	12pin	V <sub>L</sub> =L	Line Mix On

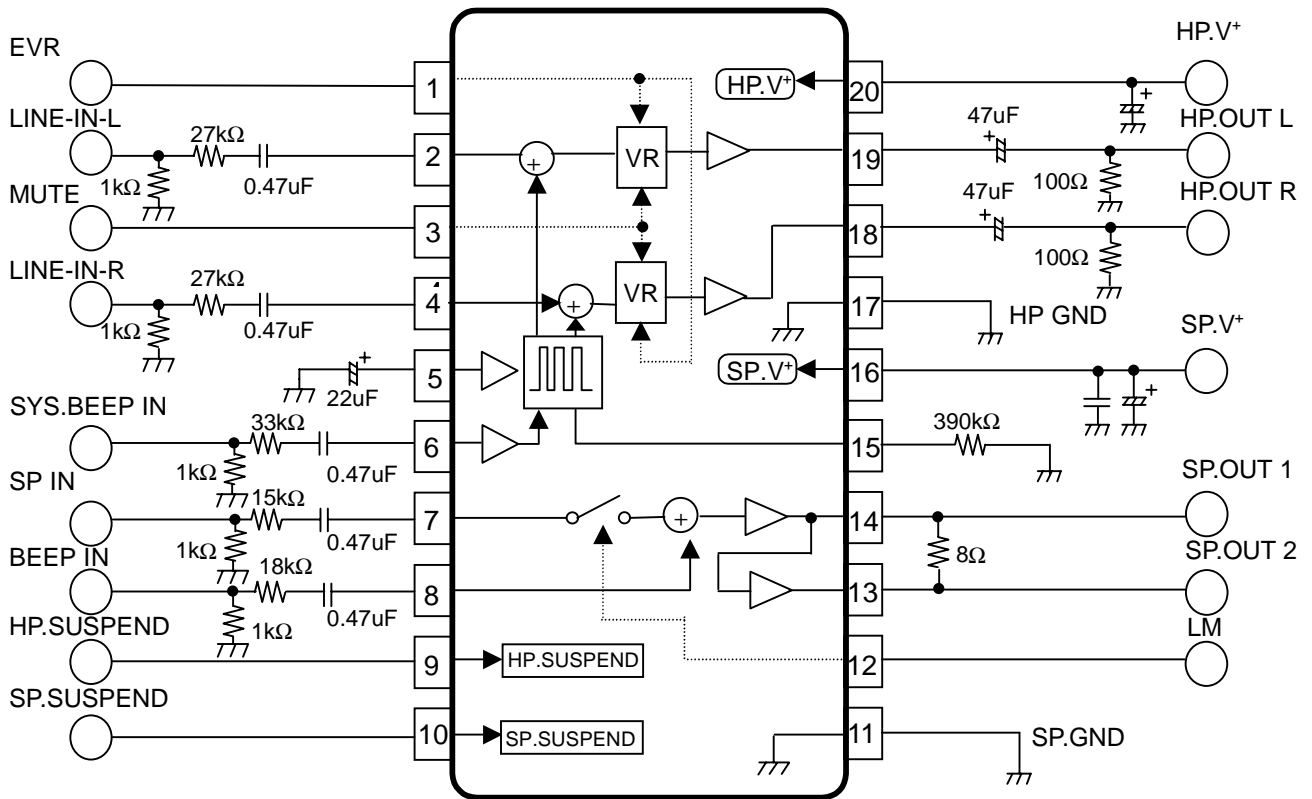
## ■ BLOCK DIAGRAM



## ■ PIN FUNCTION (SP V<sup>+</sup>=3.0V,HP V<sup>+</sup>=3.0V)

PIN No.	SYMBOL	FUNCTION	PIN VOLTAGE(V)	EQUIVALENT CIRCUIT
1	EVR	EVR Control	-	Base(PNP)
2	LINE-IN-L	Line Lch Input	1.5	Base(PNP)
3	MUTE	Headphone Mute Control	3.0	100kΩ Pull Down Base(PNP)
4	LINE-IN-R	Line Rch Input	2.5	Base(PNP)
5	BEEP BIAS	Bias	1.5	64kΩ
6	SYS.BEEP-IN	System BEEP Input	1.5	Base(PNP)
7	SP.IN	Speaker Amp. Input	1.5	Base(PNP)
8	BEEP IN	Speaker BEEP Input	1.5	Base(PNP)
9	HP.SUSPEND	Headphone Suspend	-	Base(PNP)
10	SP.SUSPEND	Speaker Suspend Control	-	Base(PNP)
11	SP.GND	GND for Speaker	0.0	-
12	LM	Speaker Line Mix On/Off Control	3.0	100k Ω Pull Up Base(PNP)
13	SP.OUT2	BTL Invert Output	1.5	Emitter Follower (NPN)
14	SP.OUT1	BTL Non-Invert Output	1.5	Emitter Follower (NPN)
15	BEEP LEVEL	System BEEP Output Level Control	2.3	C(PNP)-3kΩ
16	SP.V <sup>+</sup>	Supply for Speaker	3.0	-
17	HP.GND	GND for Headphone	0.0	-
18	HP.OUT R	Headphone Rch Output	1.5	Emitter Follower (NPN)
19	HP.OUT L	Headphone Lch Output	1.5	Emitter Follower (NPN)
20	HP.V <sup>+</sup>	Supply for Headphone	3.0	-

## TEST CIRCUIT



## CONTROL TERMINAL EXPLANATION

### 1:MUTE CTRL (3pin)

PARAMETER	STATUS	NOTE
HP. Mute On	H	HP.AMP. is not given off signal.
HP. Mute Off	L	HP.AMP. is given off signal.

### 2:HP.SUSPEND CTRL (9pin)

PARAMETER	STATUS	NOTE
HP. Suspend Off	H	HP.AMP. is active.
HP. Suspend On	L	HP.AMP. is non-active.

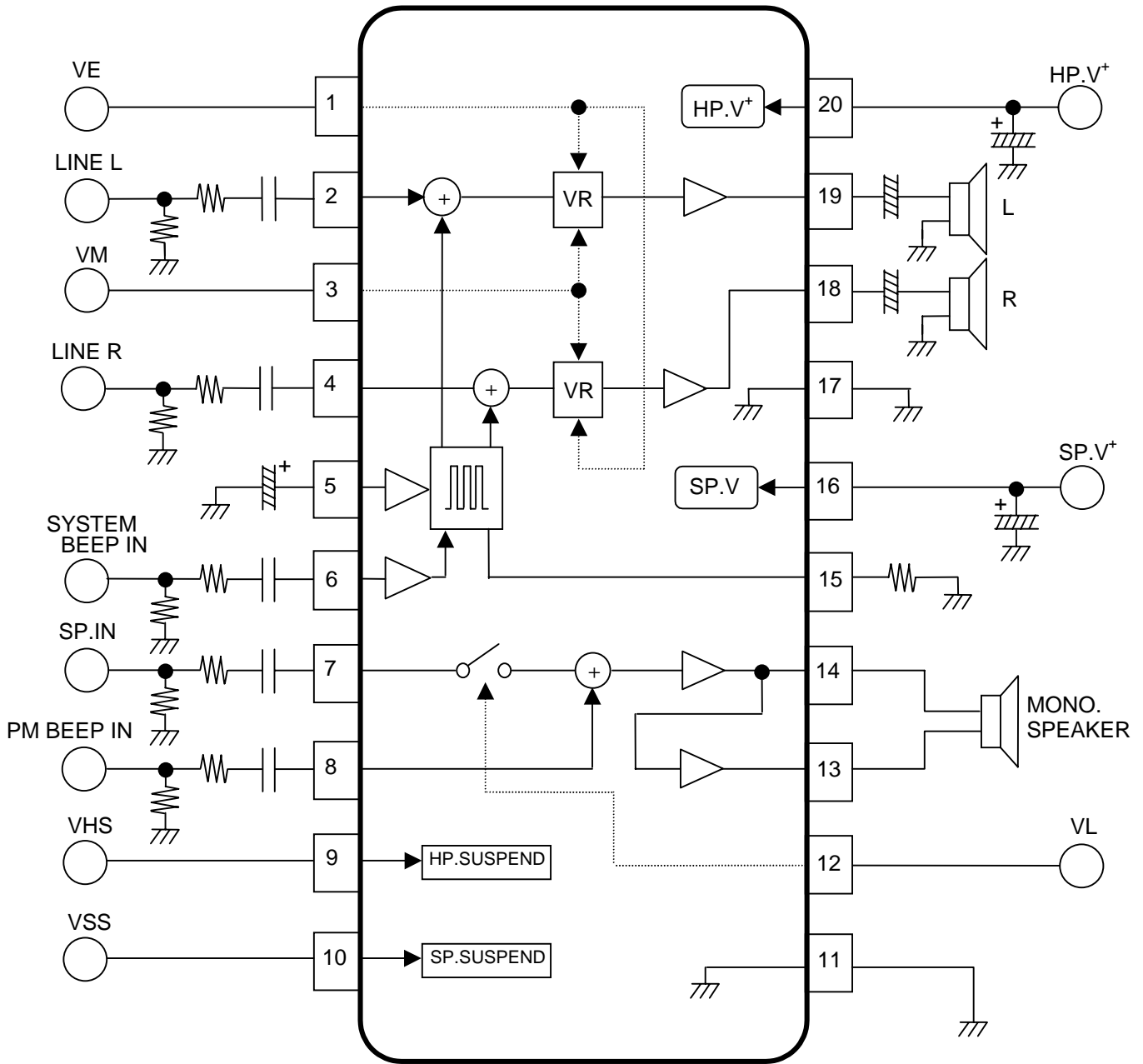
### 3:SP.SUSPEND CTRL (10pin)

PARAMETER	STATUS	NOTE
SP. Suspend Off	H	SP.AMP. is active.
SP. Suspend On	L	SP.AMP. is non-active.

### 4:LINE MIX ON/OFF CTRL (12pin)

PARAMETER	STATUS	NOTE
Line Mix Off	H	Signal don't get in SP.AMP.
Line Mix On	L	Signal get in SP.AMP.

## APPLICATION CIRCUIT



## ■ EQUIVARENT CIRCUIT

PIN No.	FUNCTION	EQUIVARENT CIRCUIT	PIN No.	FUNCTION	EQUIVARENT CIRCUIT
1	EVR		6	SYS.BEEP IN	
2	LINE-IN-L		7	SP.IN	
3	MUTE		8	BEEP-IN	
4	LINE-IN-R		9	HP.SUSPE ND	
5	BEEP BIAS		10	SP.SUSPE ND	

## ■ EQUIVARENT CIRCUIT

PIN No.	FUNCTION	EQUIVARENT CIRCUIT	PIN No.	FUNCTION	EQUIVARENT CIRCUIT
11	SP.GND	—————	16	SP.V <sup>+</sup>	—————
12	LM		17	HP.GND	—————
13	SP.OUT 2		18	HP.OUT R	
14	SP.OUT 1		19	HP.OUT L	
15	BEEP LEVEL		20	HP.V <sup>+</sup>	—————



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# MEMO

**[CAUTION]**

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