

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.

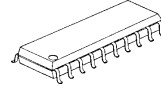
The **NJM2151A** was stereo headphone power amplifier for low distortion single-end output , and monaural power amplifier for high power bridge(BTL).

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

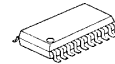
The **NJM2151A** includes MUTE , SUSPEND mode, and suitable for NOTE PC, PDA, CAMCODER, and other battery equipment.

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

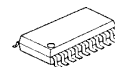
■ PACKAGE OUTLINE



NJM2151AM



NJM2151AV

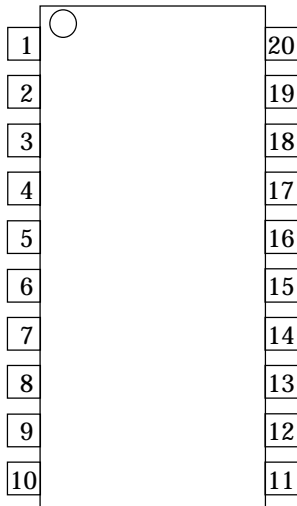


NJM2151AVF1

■ 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 NJM2151A: 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 ⁺ |
| 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 ⁺ |

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V ⁺	15	V
Power Dissipation	P _D	(DMP) 375 (SSOP) 375 (SSOP-F1) 750	mW
Operating Temperature Range	T _{opr}	-40 to +85	°C
Storage Temperature Range	T _{stg}	-50 to +150	°C

■ RECOMMENDED OPERATING CONDITIONS (Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	UNIT
Operating Voltage	V _{opr}	+2.7 to +9.0	V

■ ELECTRICAL CHARACTERISTICS (HP V⁺=SP, V⁺=5V, Ta=25°C)

● Operating Current

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I _q	No Signal :I _{qHP} +I _{qSP}	-	3.0	5.0	mA
Operating Current (Suspend Mode)	I _{qs}	No Signal :I _{qHP} +I _{qSP} , V _{HS} =L, V _{SS} =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 _{ohp1}	V _{in} =-10.0dBV	-7.4	-4.0	-1.5	dBV
Total Harmonic Distortion	THD _{hp}	V _{in} =-10.0dBV (note1)	-	0.1	1.0	%
EVR Adjustable Range	G _{evr}	V _{in} =-10.0dBV (note2), V _{evr} =HP V ⁺ →GND	70	90	-	dB
Maximum Output Level	V _{omhp}	THD=1% (note1)	-1.6	+0.6	-	dBV
Output Remain	V _{onhp}	R _g =1kΩ (note2)	-	-80	-73	dBV
Crosstalk	C _{Thp}	V _{in} =-10dBV (note2)	-	-79	-70	dBV
Muting Level	M _{Thp}	V _{in} =-10dBV:V _M =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 _{ohp2}	V _{in} =3.0Vp-p	0.22	0.32	0.42	Vp-p
Input Threshold Level	V _{THHP}		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 _{OMsp}	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 _L =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 _{ML}		GND	-	0.4	V
HP Mute On	V _{MH}		1.5	-	V ⁺	V

HEADPHONE SUSPEND CONTROL (9pin:HPSUS-CTRL)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
HP Suspend On	V _{HPSL}		GND	-	0.4	V
HP Suspend Off	V _{HPSH}		1.5	-	V ⁺	V

SPEAKER SUSPEND Control (10pin:SPSUS-CTRL)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
SP Suspend On	V _{SPSL}		GND	-	0.4	V
SP Suspend Off	V _{SPSH}		1.5	-	V ⁺	V

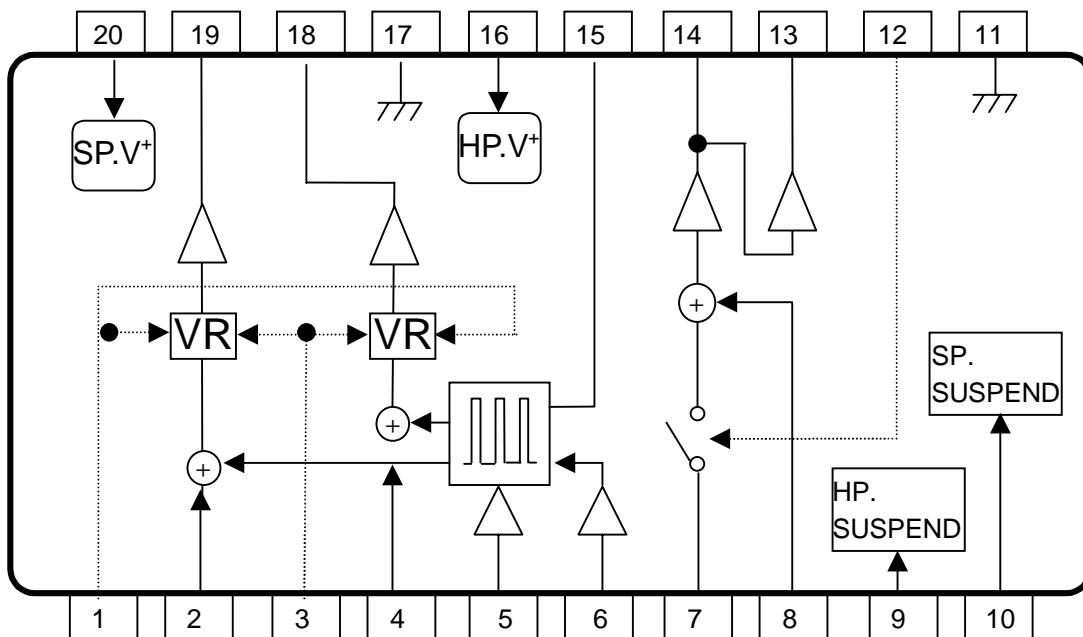
LINE MIX ON/OFF Control (12pin:LINE MIX ON/OFF CTRL)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Line Mix On	V _{LL}		GND	-	0.4	V
Line Mix Off	V _{LH}		1.5	-	V ⁺	V

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

FUNCTION	SYMBOL	PIN.No	CONDITION	STATUS
EVR Control	V _{evr}	1pin	V _{evr} =V ⁺	EVR=Max
Mute Control	V _M	3pin	V _M =L	Mute Off
Headphone Suspend Control	V _{HS}	9pin	V _{HS} =H	Suspend Off
Speaker Suspend Control	V _{SS}	10pin	V _{SS} =H	Suspend Off
Line Mix Control	V _L	12pin	V _L =L	Line Mix On

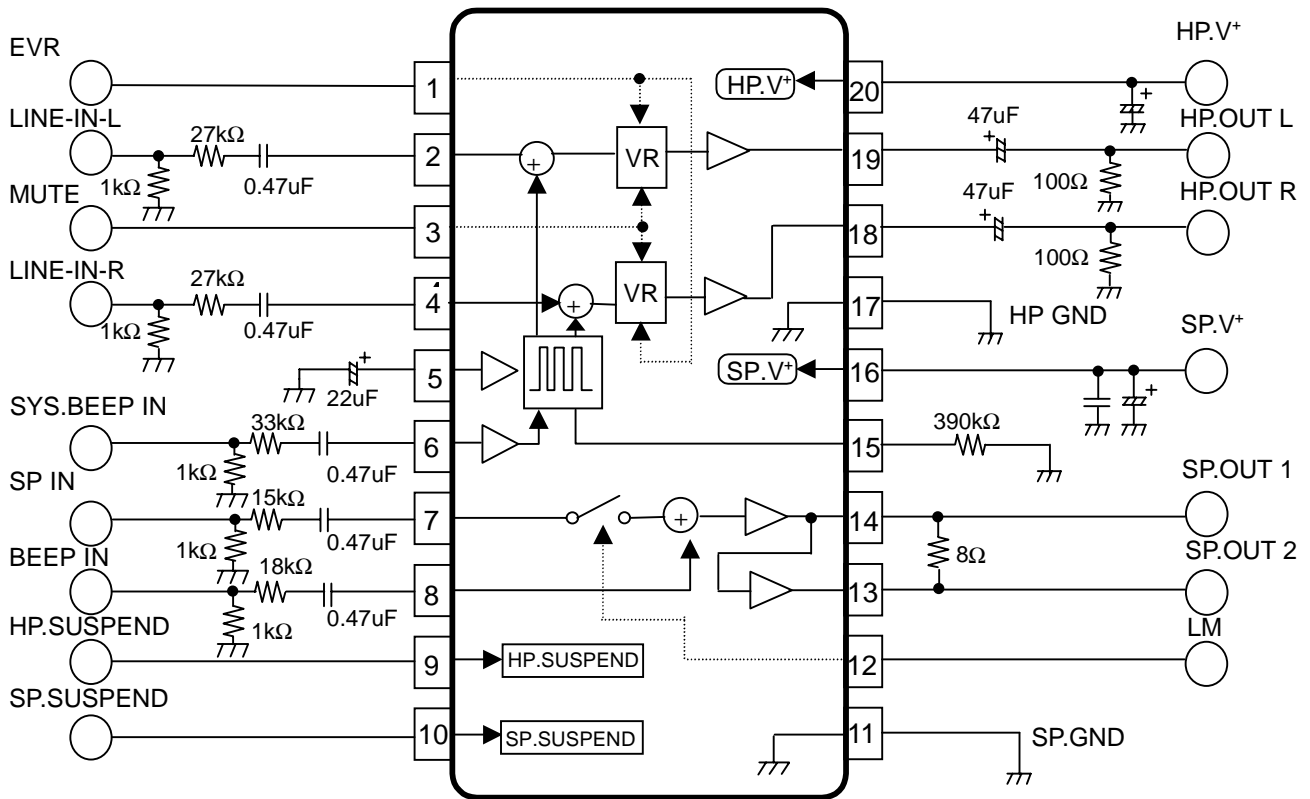
■ BLOCK DIAGRAM



■ PIN FUNCTION (SP V⁺=3.0V,HP V⁺=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 ⁺	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 ⁺	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.

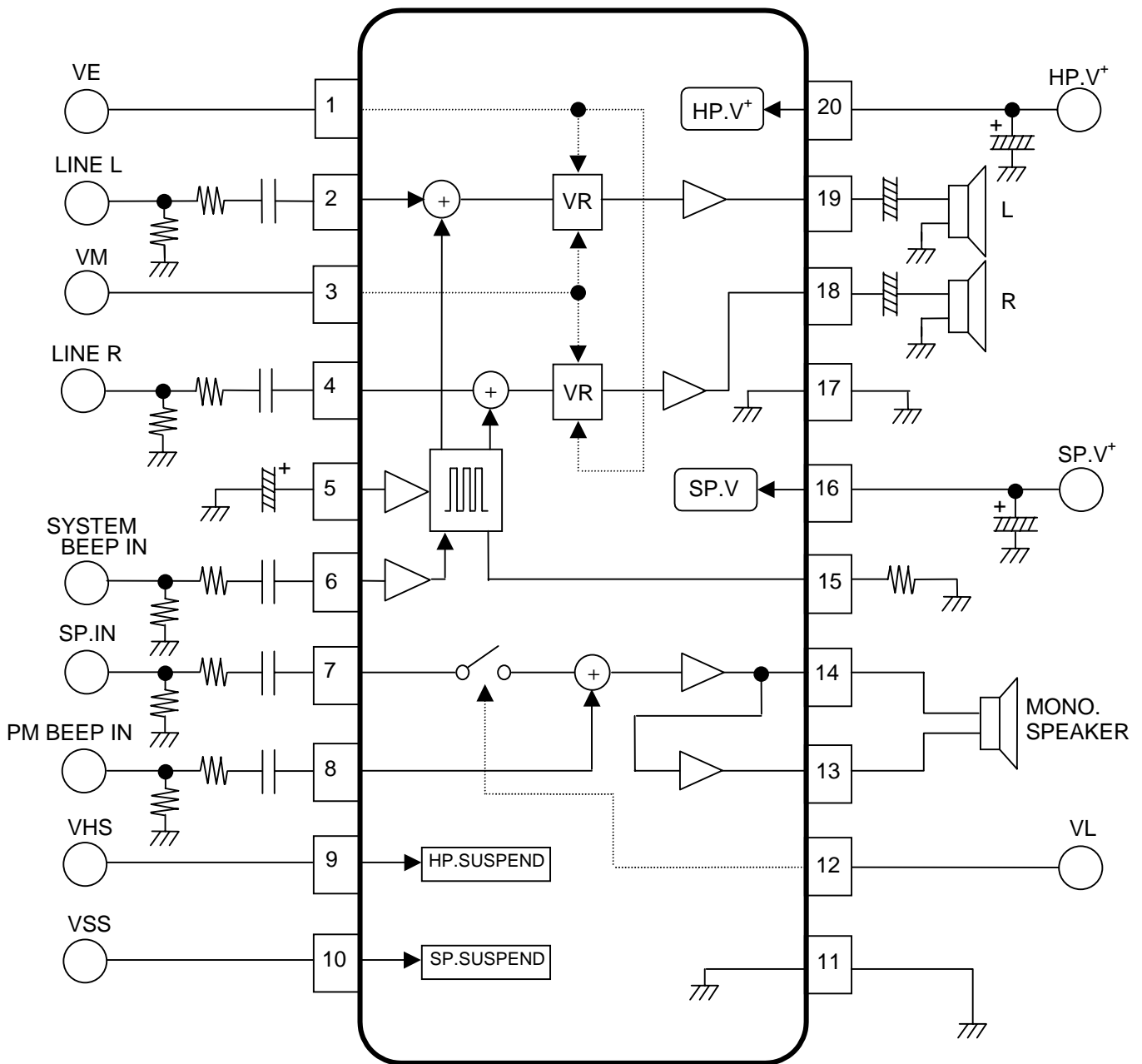
3:SP.SUSPEND CTRL (10pin)

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 ⁺	—————
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 ⁺	—————

MEMO

[CAUTION]

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