



## SRS 3D SURROUND AUDIO PROCESSOR

### ■GENERAL DESCRIPTION

The **NJM2199** is a SRS 3D surround audio processor regenerating the 3D surround sound with two speakers.

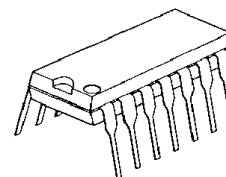
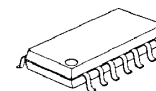
It regenerates 3D surround sound from stereo input only.

The features of wide operating voltage range, wide dynamic range, low output noise are suitable for any audio applications.


### ■FEATURES

- Operating Voltage (4.7 to 13V)
- Low Supply Current (5.7mA typ. at 3D Stereo mode)
- Low Output Noise (32 $\mu$ Vrms typ. at 3D Stereo mode)
- BYPASS Gain (0dB typ.)
- BYPASS FUNCTION (Through)
- WIDTH control
- Internal Mode Control Switch (2bit)
- Bipolar Technology
- Package Outline DIP14, DMP14, SSOP14

### ■PACKAGE OUTLINE


**NJM2199D**

**NJM2199M**

**NJM2199V**

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## ■ABSOLUTE MAXIMUM RATING (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V+	15	V
Power Dissipation	P <sub>D</sub>	(DIP14) 500 (DMP14) 350 (SSOP14) 300	mW
Operating Temperature Range	T <sub>opr</sub>	-40 to +85	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to +125	°C

## ■ELECTRICAL CHARACTERISTICS (V+=12V, Ta=25°C, V<sub>IN</sub>=-10dBV(316mVrms) unless otherwise noted)

PARAMETER	SYMBOL		TEST CONDITION				MIN.	TYP.	MAX.	UNIT	
			INPUT		OUTPUT	MODE					WIDTH VOLUME
			L	R							
Operating Voltage	V+		-	-	-	-	4.7	12.0	13.0	V	
Operating Current	I <sub>cc</sub>	No Signal	-	-	-	BYPASS	-	2.9	5.7	8.6	mA
			-	-	-	3D Stereo	MAX	2.9	5.7	8.6	
Reference Voltage	V <sub>REF</sub>	V+/2	-	-	-	-	5.8	6.0	6.2	V	
Maximum Input Voltage	V <sub>INMAX</sub>	f=1kHz T.H.D.=3%	V <sub>IN</sub> -	- V <sub>IN</sub>	L R	BYPASS	-	10.0 (2.51)	12.0 (3.98)	-	dBV (Vrms)
		f=125Hz T.H.D.=3%	V <sub>IN</sub> -	- V <sub>IN</sub>	L R	3D Stereo	MAX	-1.5 (0.84)	0.50 (1.08)	-	
		f=125Hz T.H.D.=3%	V <sub>IN</sub> -	- V <sub>IN</sub>	L R	3D Stereo	MIN	-	11.5 (3.76)	-	
		f=125Hz T.H.D.=3%	- V <sub>IN</sub>	V <sub>IN</sub> -	L R	3D Stereo	MAX	-	0.45 (1.05)	-	
		f=125Hz T.H.D.=3%	V <sub>IN</sub> V <sub>IN</sub>	V <sub>IN</sub> V <sub>IN</sub>	L R	3D Stereo	MAX	-	11.9 (3.94)	-	
		f=125Hz T.H.D.=3%	V <sub>IN</sub> V <sub>IN</sub>	-V <sub>IN</sub> -V <sub>IN</sub>	L R	3D Stereo	MAX	-7.50 (0.42)	-5.50 (0.53)	-	
Channel Valance	CH <sub>BAL</sub>	f=1kHz L-R Output	- V <sub>IN</sub>	V <sub>IN</sub> -	L R	3D Stereo	MAX	-1.0	0.0	1.0	dB

■ **ELECTRICAL CHARACTERISTICS** ( $V_+=12V, T_a=25, ^\circ C$  unless otherwise noted)

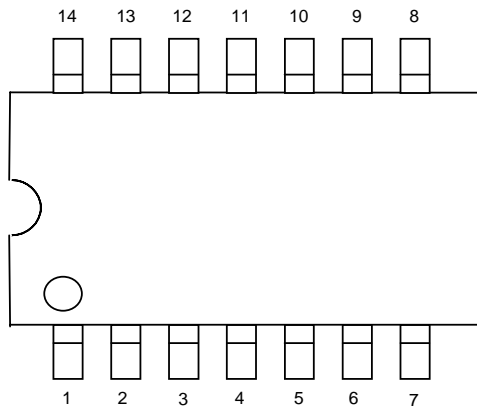
PARAMETER	SYMBOL	TEST CONDITION						MIN.	TYP.	MAX.	UNIT
		INPUT		OUTPUT	MODE	WIDTH VOLUME					
		L	R								
Output Noise	$V_{NOISE}$	Rg=0Ω A-Weighte	0	0	L R	BYPASS	-	-	-110 (3.16)	-95 (17.8)	dB ( $\mu V_{rms}$ )
		Rg=0Ω A-Weighte	0	0	L R	3D Stereo	MAX	-	-90 (31.6)	-85 (56.2)	
Total Harmonic Distortion	T.H.D	f=1kHz	$V_{IN}$ -	- $V_{IN}$	L R	BYPASS	-	-	0.005	0.01	%
		f=1kHz	$V_{IN}$ -	- $V_{IN}$	L R	3D Stereo	MAX	-	0.1	1.0	
Bypass Gain	$G_{Bypass}$	f=1kHz	$V_{IN}$ -	- $V_{IN}$	L R	BYPASS	-	-1.0	0.0	1.0	dB
SRS Gain	$G_{SRS}$	f=125Hz	$V_{IN}$ -	- $V_{IN}$	L R	3D Stereo	MAX	9.4	11.4	13.4	dB
		f=125Hz	$V_{IN}$ -	- $V_{IN}$	L R	3D Stereo	MIN	-1.5	0.5	2.5	
		f=125Hz	- $V_{IN}$	$V_{IN}$ -	L R	3D Stereo	MAX	6.8	8.8	10.8	
Mode Select Control Voltage	$V_{MODE}$	$V_{IN}$ = High Level	-	-	-	-	-	2.0	-	$V_+$	V
		$V_{IN}$ = Low Level	-	-	-	-	-	0.0	-	0.7	

■ **MODE SWITCH**

MODE	MODE
BYPASS	L
3D Stereo	H

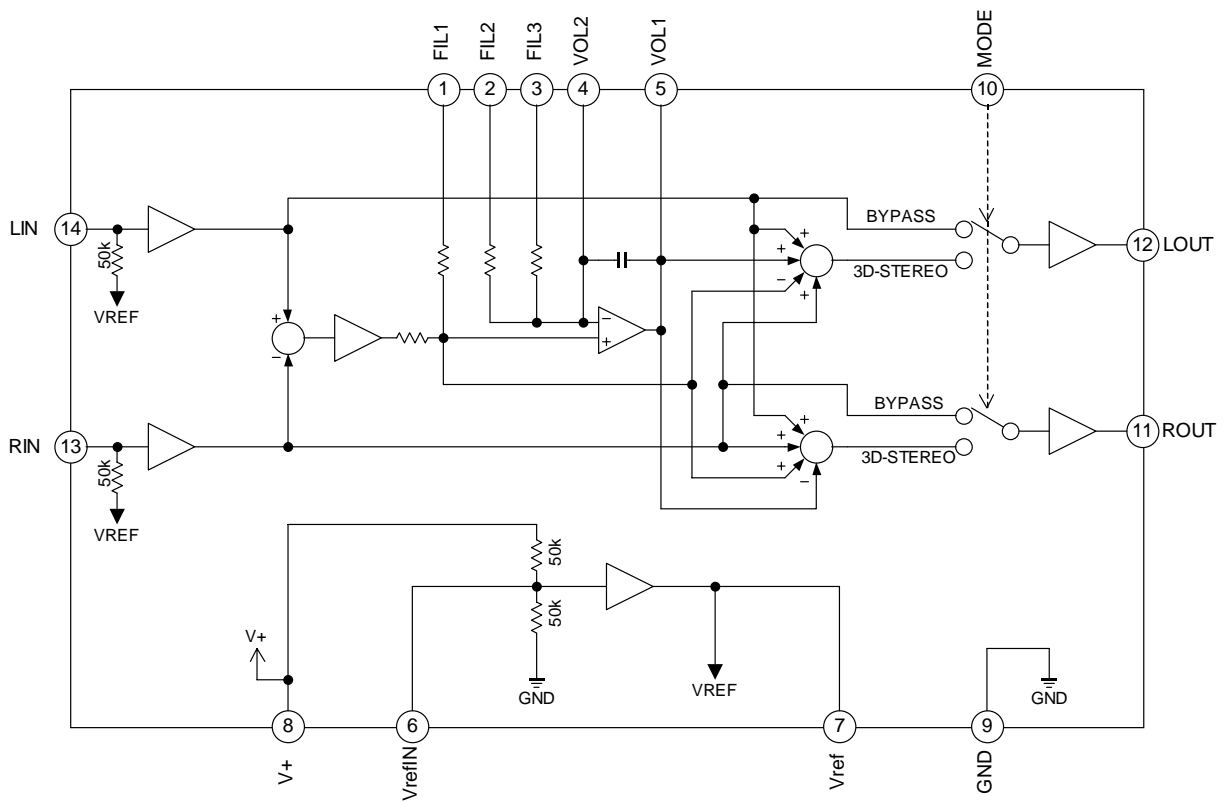
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## ■ PIN CONFIGURATION



- |          |         |
|----------|---------|
| 1.FIL1   | 8.V+    |
| 2.FIL2   | 9.GND   |
| 3.FIL3   | 10.MODE |
| 4.VOL2   | 11.ROUT |
| 5.VOL1   | 12.LOUT |
| 6.VrefIN | 13.RIN  |
| 7.Vref   | 14.LIN  |

## ■ BLOCK DIAGRAM



## ■ TERMINAL DESCRIPTION


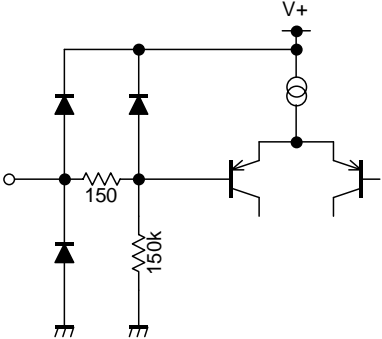
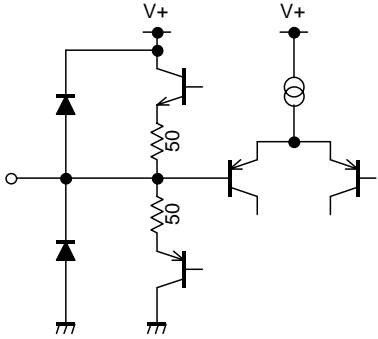
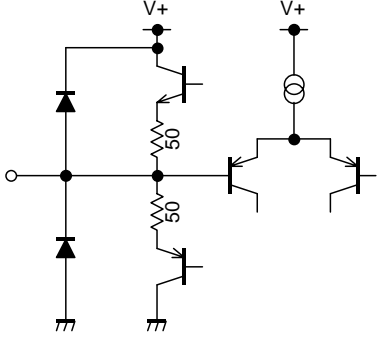
PIN No.	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	VOLTAGE
1	FIL1	Filter Input		V+/2
2	FIL2	Filte Input		V+/2
3	FIL3	Filter Input		V+/2
4	VOL2	WIDTH VR Input		V+/2

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## ■ TERMINAL DESCRIPTION

PIN No.	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	VOLTAGE
5	VOL1	WIDTH VR Output		$V+/2$
6	VREFIN	Reference Voltage Input		$V+/2$
7	VREF	Reference Voltage		$V+/2$
8	V+	Power Supply		$V+$

## ■ TERMINAL DESCRIPTION

PIN No.	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	VOLTAGE
9	GND	GND		0V
10	MODE1	Mode Control		0V
11	ROUT	Rch Output		V+/2
12	LOUT	Lch Output		V+/2

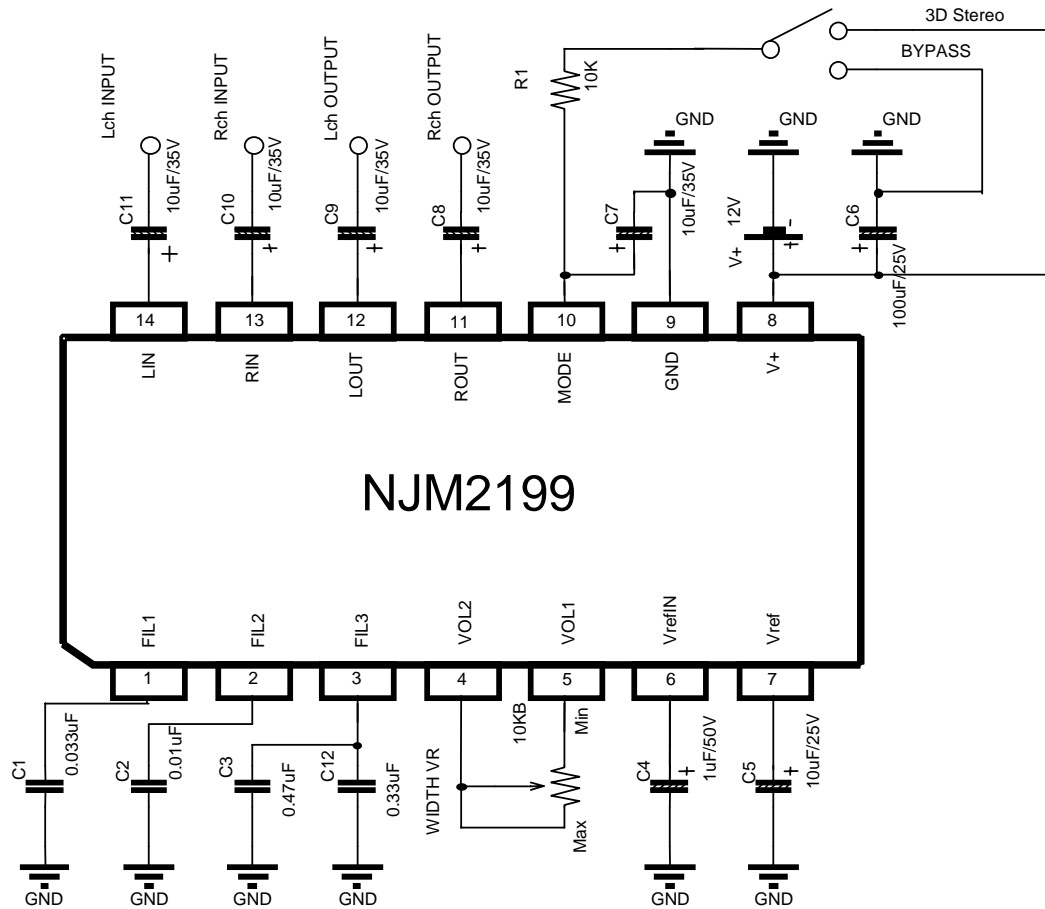
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## ■ TERMINAL DESCRIPTION

PIN No.	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	VOLTAGE
13	RIN	Rch Input		V+/2
14	LIN	Lch Input		V+/2

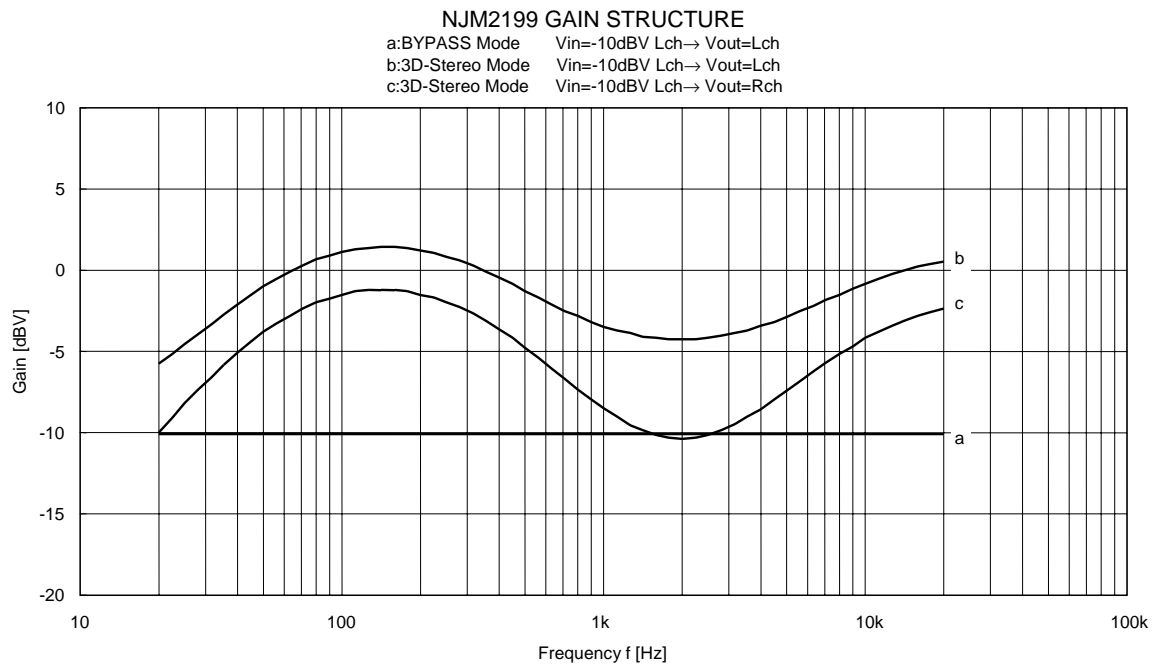


## APPLICATION CIRCUIT



Parts No.	Value	Tolerance	Parts No.	Value	Tolerance
C1	0.033 $\mu$ F	$\pm$ 5%	C5,C6	100 $\mu$ F	$\pm$ 20%
C2	0.01 $\mu$ F	$\pm$ 5%	C7,C8,C9,C10,C11	10 $\mu$ F	$\pm$ 20%
C3	0.47 $\mu$ F	$\pm$ 5%	C12	0.33 $\mu$ F	$\pm$ 5%
C4	1 $\mu$ F	$\pm$ 20%	R1	10k	$\pm$ 5%

## ■ TYPICAL CHARACTERISTICS



**[CAUTION]**  
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