PRELIMINARY

SRS 3D SURROUND AUDIO PROCESSOR

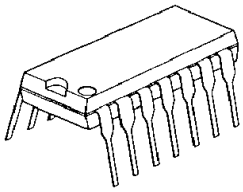
■GENERAL DESCRIPTION

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

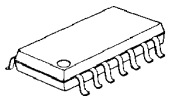
It regenerates 3D surround sound from stereo input only.

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

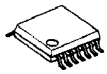
■PACKAGE OUTLINE



NJM2199D



NJM2199M



NJM2199V

■FEATURES

- Operating Voltage (4.7 to 13V)
- Low Supply Current (5.7mA typ. at 3D Stereo mode)
- Low Output Noise (32µVrms 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

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

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V+	15	V
Power Dissipation	P_D	(DIP14) 500 (DMP14) 350 (SSOP14) 300	mW
Operating Temperature Range	T_{opr}	-40 to +85	°C
Storage Temperature Range	T_{stg}	-40 to +125	°C

■**ELECTRICAL CHARACTERISTICS** (V+=12V,Ta=25°C, V_{IN}=-10dBV(316mVrms) unless otherwise noted)

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

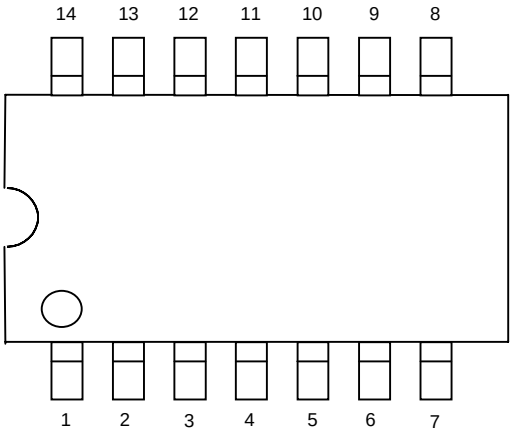
■**ELECTRICAL CHARACTERISTICS** (V+=12V,Ta=25,°C unless otherwise noted)

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 (μVrms)
		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**

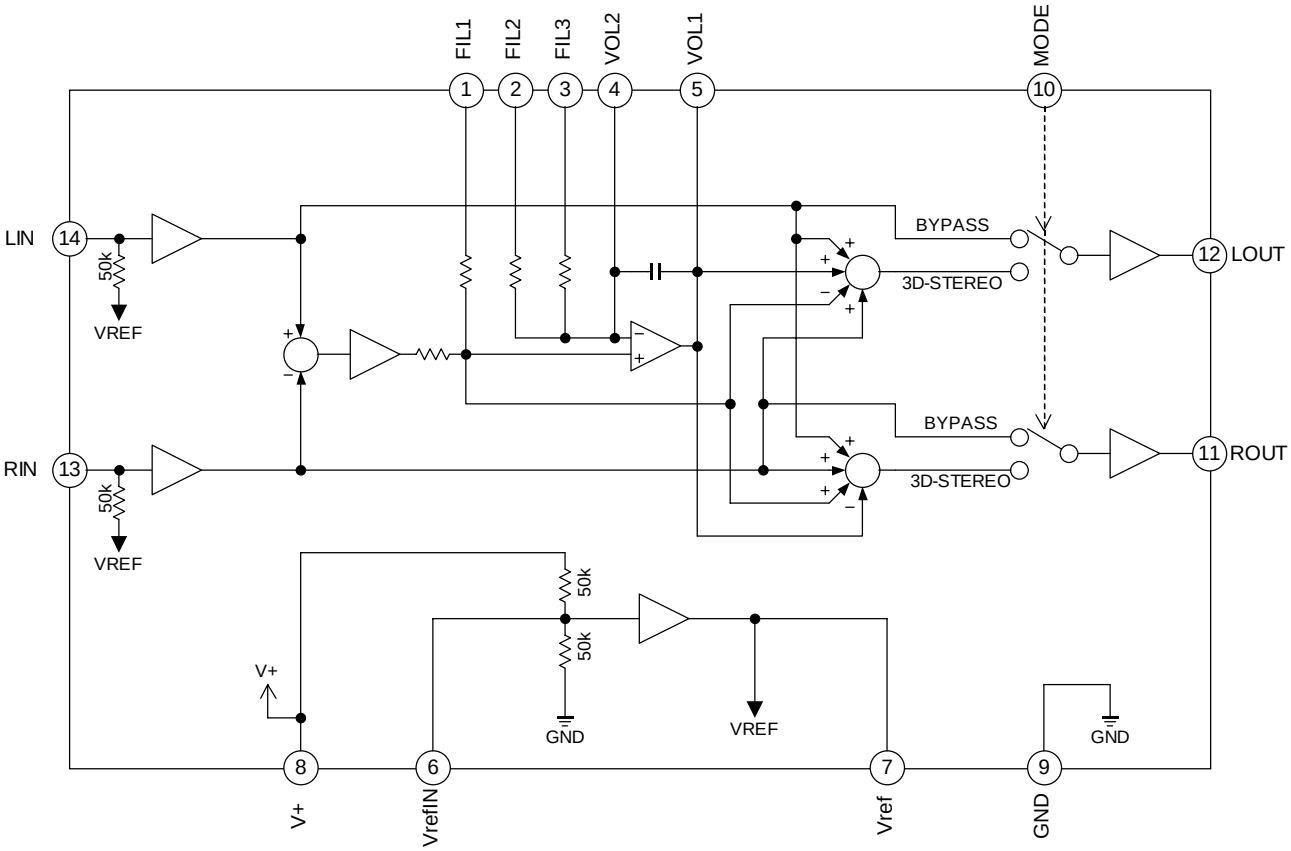
MODE	MODE
BYPASS	L
3D Stereo	H

■PIN CONFIGURATION

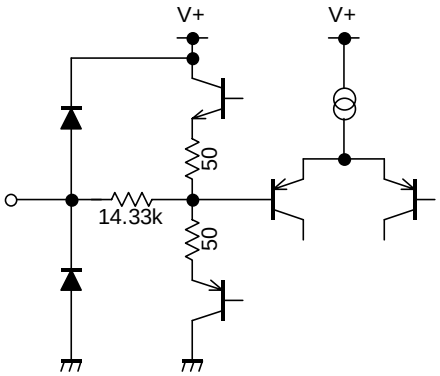
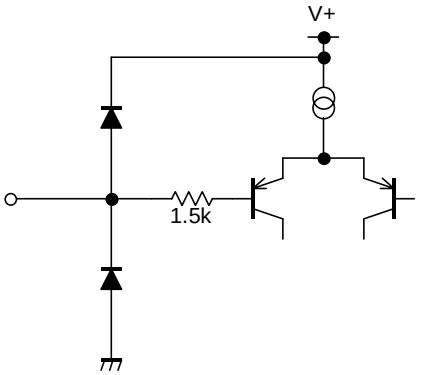
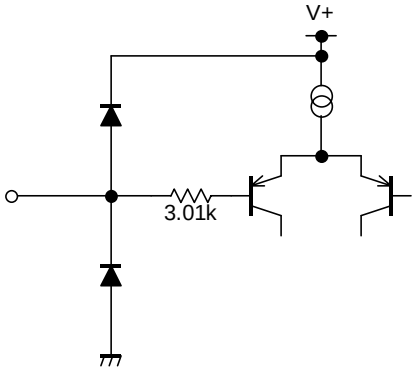
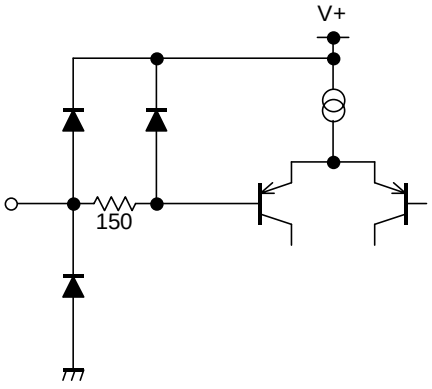


1.FIL1	8.V+
2.FIL2	9.GND
3.FIL3	10.MODE
4.VOL2	11.ROUT
5.VOL1	12.LOUT
6.VrefIN	13.RIN
7.Vref	14.LIN

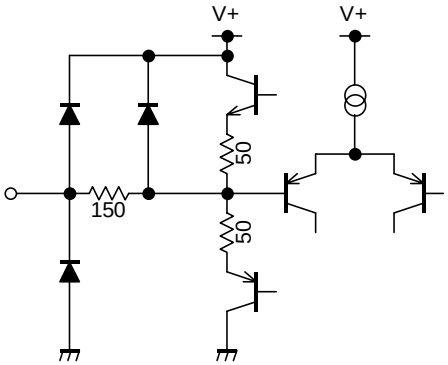
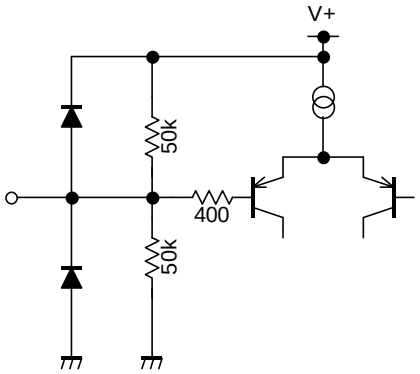
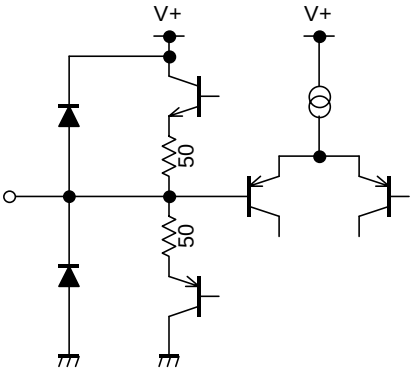
■BLOCK DIAGRAM



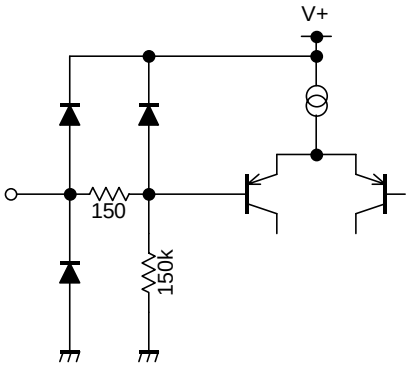
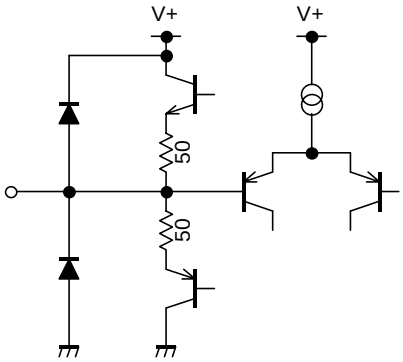
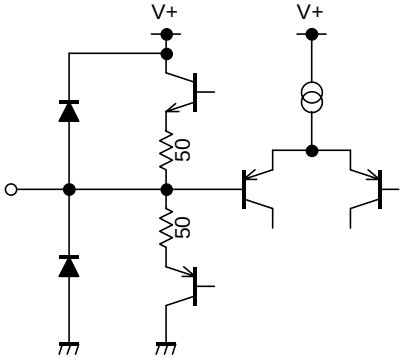
■**TERMINAL DESCRIPTION**

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

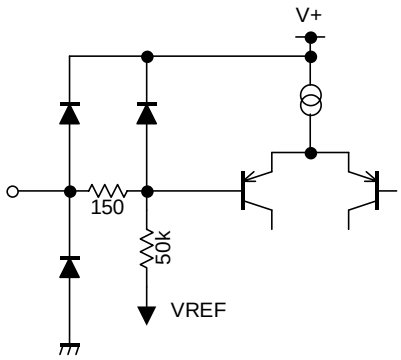
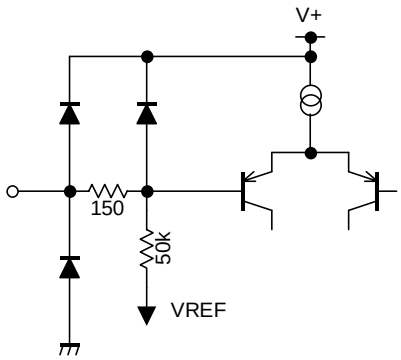
■**TERMINAL DESCRIPTION**

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+

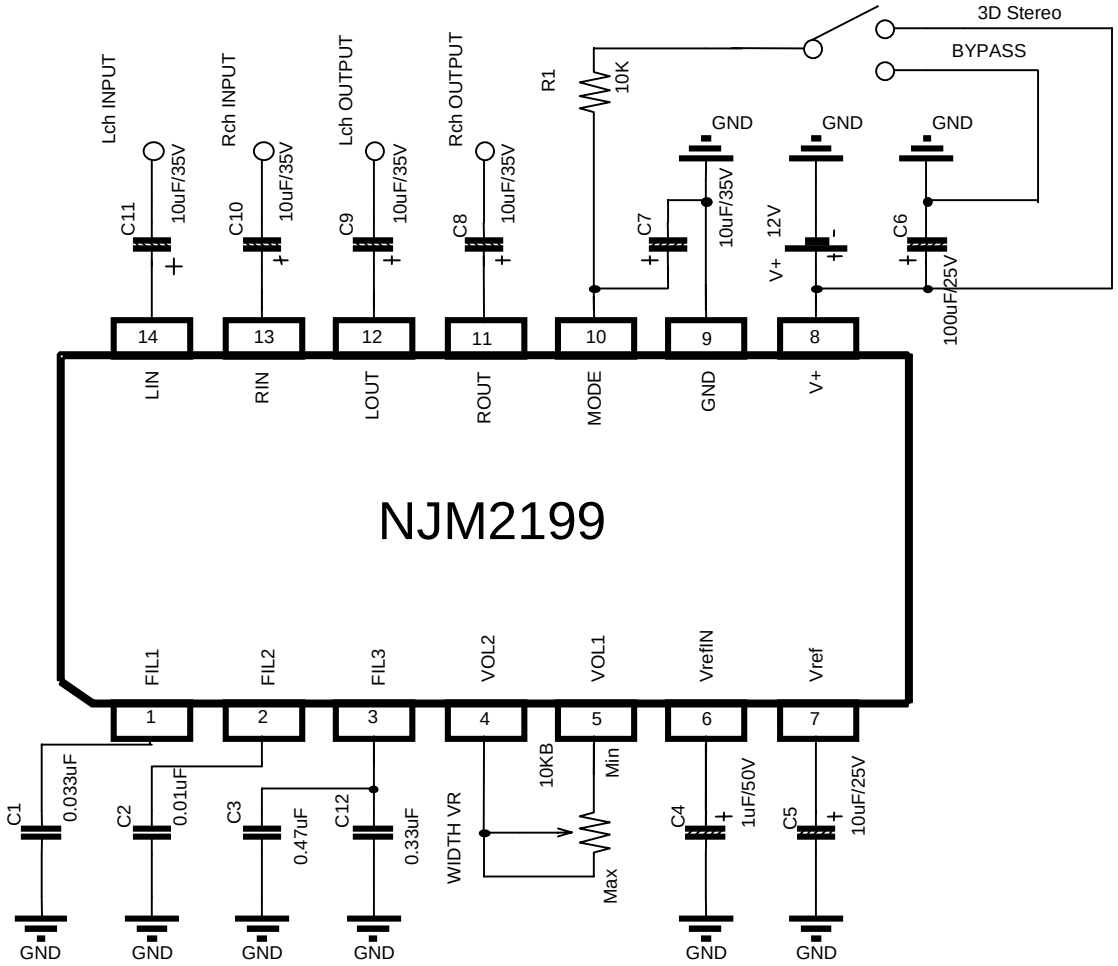
■**TERMINAL DESCRIPTION**

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

■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	0.033µF	±5%	C5,C6	100µF	±20%
C2	0.01µF	±5%	C7,C8,C9,C10,C11	10µF	±20%
C3	0.47µF	±5%	C12	0.33µF	±5%
C4	1µF	±20%	R1	10k	±5%

■TYPICAL CHARACTERISTICS

NJM2199 GAIN STRUCTURE

a:BYPASS Mode Vin=-10dBV Lch→ Vout=Lch
b:3D-Stereo Mode Vin=-10dBV Lch→ Vout=Lch
c:3D-Stereo Mode Vin=-10dBV Lch→ Vout=Rch