PRELIMINARY

SRS™ FOCUS™

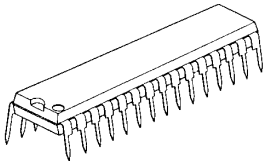
FOCUS & SRS AUDIO PROCESSOR

■ GENERAL DESCRIPTION

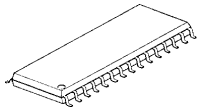
The **NJM2193** is a FOCUS & SRS audio processor, based on SRS FOCUS and 3D Stereo technology. It is capable of raising sound and regenerating 3D sound field.

The **NJM2193** is suitable for car audio, projection TV, home stereo applications, and others.

■ PACKAGE OUTLINE



NJM2193L



NJM2193M

■ FEATURES

- Operating Voltage 4.7 to 13V
- Low Operating Current 6mA typ.
- Low Output Noise 25μVrms typ. at FOCUS&3D Sound mode
- Adjusted by Width,FOCUS,LF Elevation and Bass Compensation Volume
- Independent Audio Input for Bypass MODE
- Bipolar Technology
- Package Outline SDIP30, SDMP30

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

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V^+	15	V
Power Dissipation	P_D	(SDIP30)700 (SDMP30)700	mW
Operating Temperature Range	T_{opr}	-40 to +85	°C
Storage Temperature Range	T_{stg}	-50 to +150	°C

■ **ELECTRICAL CHARACTERISTICS**(V^+=8V,Ta=25°C,V_{IN}=-20dBV(0.1Vrms))

PARAMETER	SYMBOL	TEST CONDITION	IN L	IN R	OUT	MODE	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V^+						4.7	8.0		V
Supply Current	I_{CC}	No Signal					-	6.0	12.0	mA
Reference Voltage	V_{REF}	V^+/2					3.8	4.0	4.2	V
Maximum Input Voltage	V_{INMAX}	F=1kHz THD=3%	V_{IN} 0	0 V_{IN}	L R	BYPASS	-	7.5 (24)	-	dBV (Vrms)
		f=150Hz THD=3%	V_{IN} $-V_{IN}$	$-V_{IN}$ V_{IN}	L R	3D Sound		-9.0 (0.35)	-	
		f=1kHz THD=3%	V_{IN} $-V_{IN}$	$-V_{IN}$ V_{IN}	L R	3D Sound		-3.0 (0.71)	-	
		f=15kHz THD=3%	V_{IN} 0	0 V_{IN}	L R	FOCUS		-6.5 (0.47)	-	
		f=1kHz THD=3%	V_{IN} 0	0 V_{IN}	L R	FOCUS		-5.0 (0.56)	-	
		f=15kHz THD=3%	V_{IN} 0	0 V_{IN}	L R	3D Sound +FOCUS	-17.5 (0.13)	-15.5 (0.17)	-	
		f=1kHz THD=3%	V_{IN} 0	0 V_{IN}	L R	3D Sound +FOCUS	-14.5 (0.19)	-12.5 (0.24)	-	
		f=15kHz THD=3%	V_{IN} $-V_{IN}$	$-V_{IN}$ V_{IN}	L R	3D Sound +FOCUS		-19.5 (0.11)	-	
		f=1kHz THD=3%	V_{IN} $-V_{IN}$	$-V_{IN}$ V_{IN}	L R	3D Sound +FOCUS		-16.0 (0.16)	-	
Output Noise	V_{NOISE}	Rg=0Ω A-Weighted	0	0	L R	BYPASS	-	-113 (2.2)	-94 (20.0)	dBV (µVrms)
		Rg=0Ω A-Weighted	0	0	L R	3D Sound	-	-108 (4.0)	-	
		Rg=0Ω f=20~20kHz	0	0	L R	3D Sound	-	-104 (6.0)	-	
		Rg=0Ω A-Weighted	0	0	L R	FOCUS	-	-94 (20.0)	-	
		Rg=0Ω f=20~20kHz	0	0	L R	FOCUS	-	-92 (25.0)	-	
		Rg=0Ω A-Weighted	0	0	L R	3D Sound +FOCUS	-	-92 (25.0)	-86 (50.0)	
		Rg=0Ω f=20~20kHz	0	0	L R	3D Sound +FOCUS	-	-90 (35.0)	-	

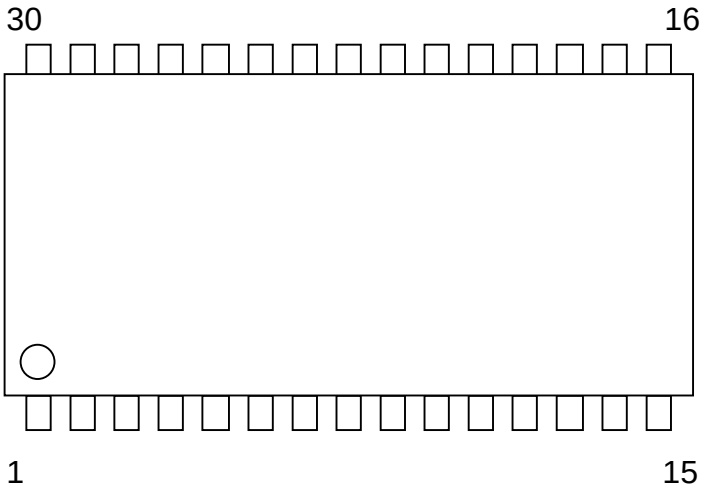
■ ELECTRICAL CHARACTERISTICS

PARAMETER	SYMBOL	CONDITION	IN L	IN R	OUT	MODE	MIN.	TYP.	MAX	UNIT
Total Harmonic Distortion	THD	f=1kHz	V_{IN}	0	L	BYPASS	-	0.005	0.02	%
			0	V_{IN}	R					
			V_{IN}	0	L	3D Sound	-	0.005	-	
			0	V_{IN}	R					
			V_{IN}	0	L	FOCUS	-	0.04	-	
			0	V_{IN}	R					
			V_{IN}	0	L	3D Sound +FOCUS	-	0.1	0.5	
			0	V_{IN}	R					
BYPASS Gain	G_{VBYP}	f=1kHz	V_{IN}	0	L	BYPASS	-1.0	0.0	1.0	dB
			0	V_{IN}	R					
3D Sound(L-R) Gain	G_{VS1}	f=150Hz	V_{IN}	$-V_{IN}$	L	3D Sound	15.0	17.0	19.0	dB
			$-V_{IN}$	V_{IN}	R					
3D Sound(L+R) Gain	G_{VS2}	f=150Hz	V_{IN}	V_{IN}	L	3D Sound	-2.0	0.0	2.0	dB
			V_{IN}	V_{IN}	R					
FOCUS Gain1	G_{VF1}	f=70Hz	V_{IN}	0	L	FOCUS	8.5	10.5	12.5	dB
			0	V_{IN}	R					
FOCUS Gain2	G_{VF2}	f=15kHz	V_{IN}	0	L	FOCUS	12.0	14.0	16.0	dB
			0	V_{IN}	R					
PROCESS Gain	G_{VP}	f=15kHz	V_{IN}	$-V_{IN}$	L	3D Sound +FOCUS	-	27.0	-	dB
			$-V_{IN}$	V_{IN}	R					
MODE Select Control Voltage	V_{IH}	High Level	-	-	-	-	2.0	-	V^+	V
	V_{IL}	Low Level	-	-	-	-	0.0	-	0.7	

■MODE SWICH

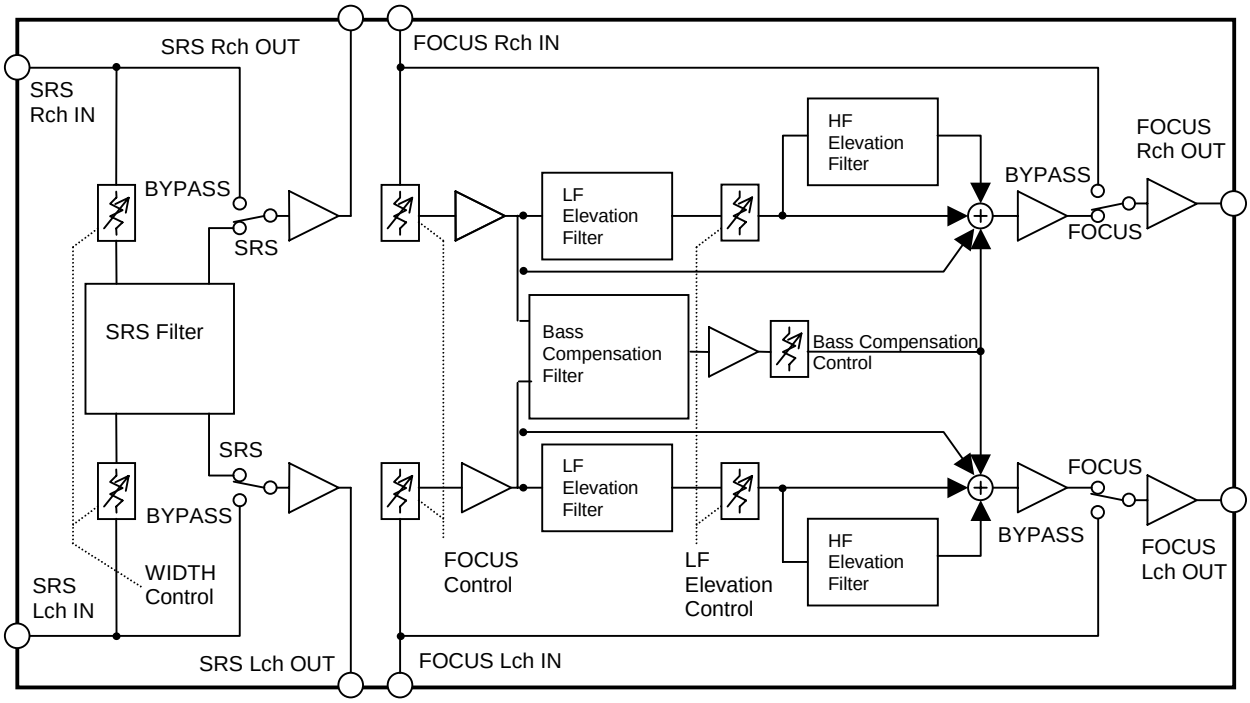
	MODE1	MODE2
BYPASS	L	L
3D Sound	H	L
FOCUS	L	H
3D Sound+ FOCUS	H	H

■ PIN FUNCTION

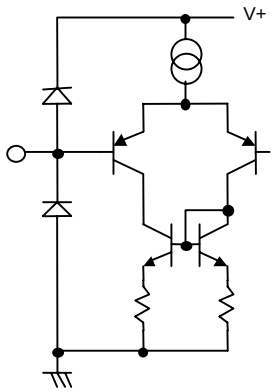
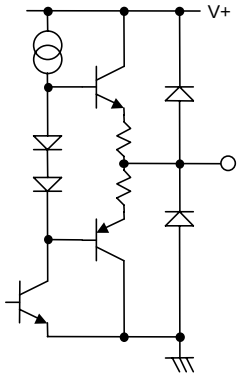
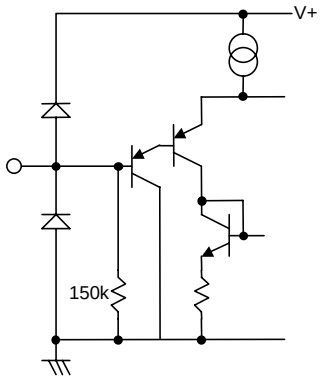
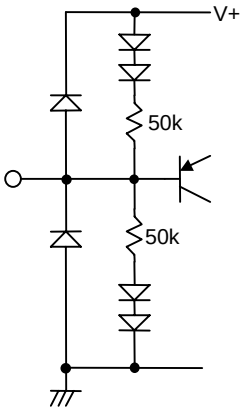


1.SRSINR	16.V+
2.WIDTHR	17.MODE2
3.SRSFILTERR	18.MODE1
4.SRSOUTR	19.FOCUSOUTL
5.FOCUSINR1	20.LPFIN
6.FOCUSINR2	21.LPFOUT
7.LFOUTR	22.HFINL
8.LFINR	23.LFINL
9.HFINR	24.LFOUTL
10.BCOUT	25.FOCUSINL2
11.BCIN	26.FOCUSINL1
12.FOCUSOUTR	27.SRSOUTL
13.REFIN	28.SRSFILTERL
14.VREF	29.WIDTHL
15.GROUND	30.SRSINL

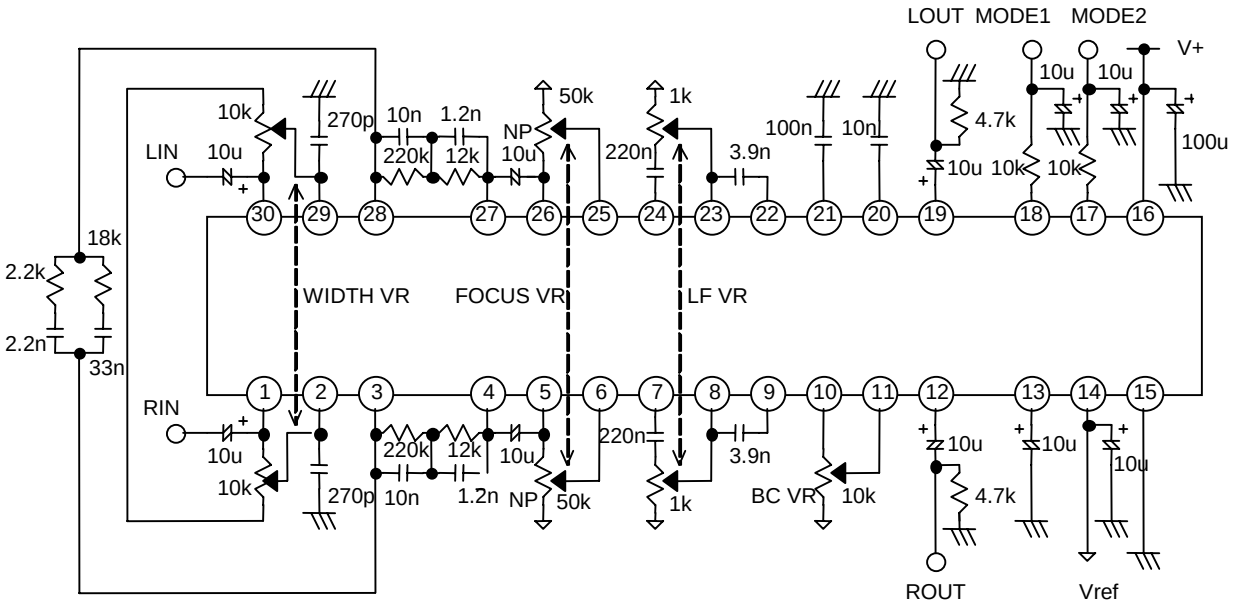
■ BLOCK DIAGRAM



■ **TERMINAL DESCRIPTION**

PIN NO.	SYMBOL	EQUIVALENT CIRCUIT	TERMINAL VOLTAGE
1 2 5 6 25 26 29 30	SRSINR WIDTHR FOCUSINR1 FOCUSINR2 FOCUSINL2 FOCUSINL1 WIDTHL SRSINL		
4 12 14 19 27	SRSOUTR FOCUSOUTR VREF FOCUSOUTL SRSOUTL		VREF(14pin)=1/2V+
17 18	MODE2 MODE1		
13	REFIN		1/2V+

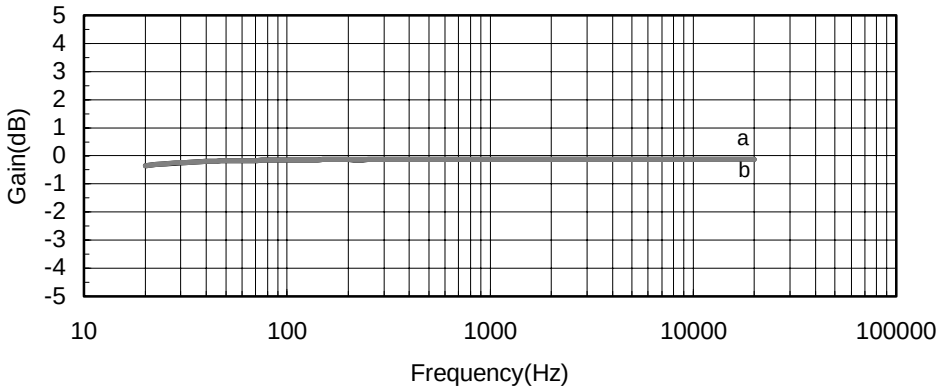
■ APLLICATION CIRCUIT



- Width Control : 10kB, Dual VR
- LF Elevation Control : 1kB, Dual VR
- FOCUS Control : 50kB, Dual VR
- Bass Compensation Control : 10kB, Dual VR

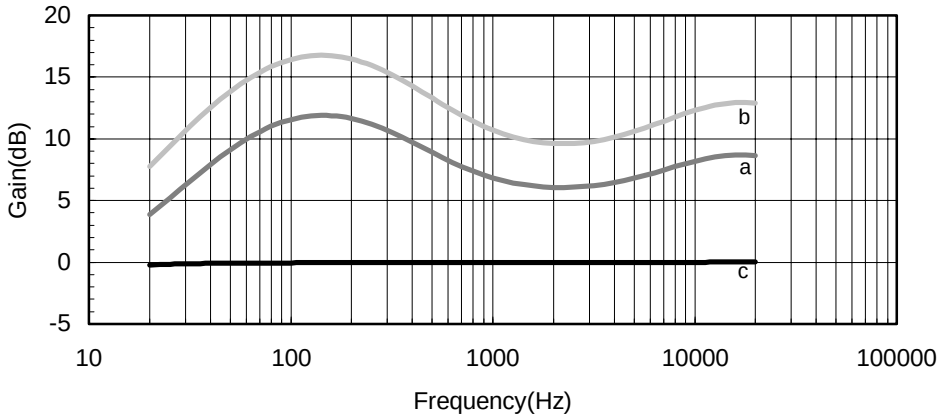
■TYPICAL CHARACTERISTICS

NJM2193 Gain Structure
BYPASS Mode
Conditions:Vin=-20dBV(100mVrms) , V+=8V



a: Lin → Lout b: Rin→ Rout

NJM2193 Gain Structure
3D Stereo Mode
Conditions:Vin=-20dBV(100mVrms) , V+=8V
WIDTH VR:MAX



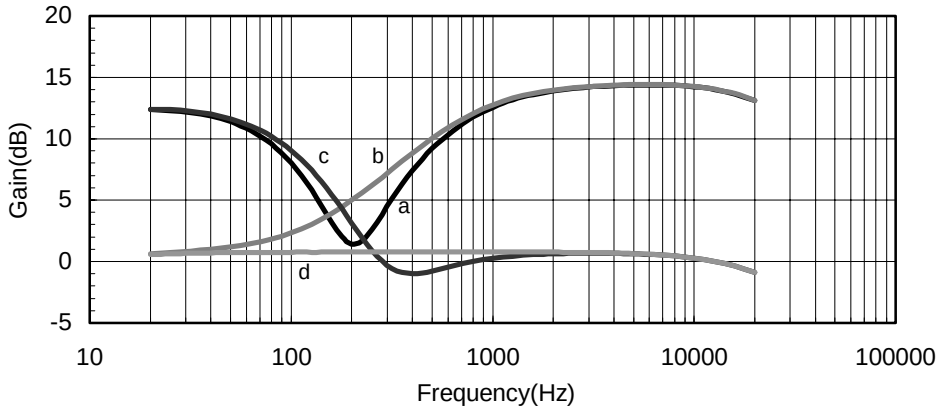
a: Lin → Lout b: L-Rin → Lout c: L+Rin → Lout

■TYPICAL CHARACTERISTICS

NJM2193 Gain Structure

FOCUS Mode

Conditions:Vin=-20dBV(100mVrms)Lch,Vout=Lch,V+=8V



a: LF VR MAX, BC VR MAX b: LF VR MAX, BC VR MIN
c: LF VR MIN, BC VR MAX d: LF VR MIN, BC VR MIN