



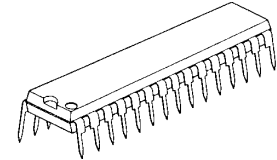
## FOCUS & SRS AUDIO PROCESSOR

### ■ GENERAL DESCRIPTION

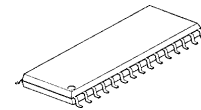
The **NJM2193** is a FOCUS & SRS audio processor, based on SRS FOCUS and 3D Stereo technology. It is capable of raising sound and regenerating 3D sound field.

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 25 $\mu$ Vrms 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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# NJM2193

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

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V <sup>+</sup>	15	V
Power Dissipation	P <sub>D</sub>	(SDIP30)700 (SDMP30)700	mW
Operating Temperature Range	T <sub>opr</sub>	-40 to +85	°C
Storage Temperature Range	T <sub>stg</sub>	-50 to +150	°C

## ■ ELECTRICAL CHARACTERISTICS (V<sup>+</sup>=8V, Ta=25°C, V<sub>IN</sub>=-20dBV(0.1Vrms))

PARAMETER	SYMBOL	TEST CONDITION					MIN.	TYP.	MAX.	UNIT
		IN		OUT	MODE					
		L	R							
Operating Voltage	V <sup>+</sup>						4.7	8.0		V
Supply Current	I <sub>CC</sub>	No Signal					-	6.0	12.0	mA
Reference Voltage	V <sub>REF</sub>	V <sup>+</sup> /2					3.8	4.0	4.2	V
Maximum Input Voltage	V <sub>INMAX</sub>	F=1kHz THD=3%	V <sub>N</sub> 0	0 V <sub>N</sub>	L R	BYPASS	-	7.5 (24)	-	dBV (Vrms)
		f=150Hz THD=3%	V <sub>N</sub> -V <sub>N</sub>	-V <sub>N</sub> V <sub>N</sub>	L R	3D Sound		-9.0 (0.35)	-	
		f=1kHz THD=3%	V <sub>N</sub> -V <sub>N</sub>	-V <sub>N</sub> V <sub>N</sub>	L R	3D Sound		-3.0 (0.71)	-	
		f=15kHz THD=3%	V <sub>N</sub> 0	0 V <sub>N</sub>	L R	FOCUS		-6.5 (0.47)	-	
		f=1kHz THD=3%	V <sub>N</sub> 0	0 V <sub>N</sub>	L R	FOCUS		-5.0 (0.56)	-	
		f=15kHz THD=3%	V <sub>N</sub> 0	0 V <sub>N</sub>	L R	3D Sound +FOCUS	-17.5 (0.13)	-15.5 (0.17)	-	
		f=1kHz THD=3%	V <sub>N</sub> 0	0 V <sub>N</sub>	L R	3D Sound +FOCUS	-14.5 (0.19)	-12.5 (0.24)	-	
		f=15kHz THD=3%	V <sub>N</sub> -V <sub>N</sub>	-V <sub>N</sub> V <sub>N</sub>	L R	3D Sound +FOCUS		-19.5 (0.11)	-	
		f=1kHz THD=3%	V <sub>N</sub> -V <sub>N</sub>	-V <sub>N</sub> V <sub>N</sub>	L R	3D Sound +FOCUS		-16.0 (0.16)	-	
		Output Noise	V <sub>NOISE</sub>	Rg=0Ω A-Weighted	0	0	L R	BYPASS	-	
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

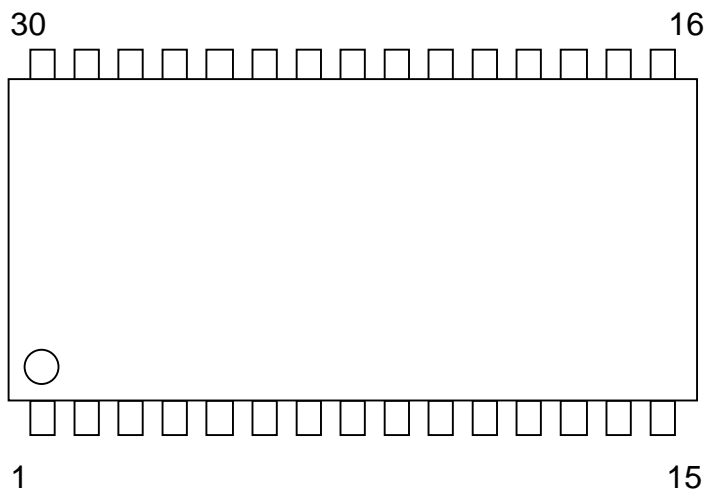
PARAMETER	SYMBOL		CONDITION				MIN.	TYP.	MAX	UNIT
			IN		OUT	MODE				
			L	R						
Total Harmonic Distortion	THD	f=1kHz	$V_N$	0	L	BYPASS	-	0.005	0.02	%
			0	$V_N$	R					
			$V_N$	0	L	3D Sound	-	0.005	-	
			0	$V_N$	R					
BYPASS Gain	$G_{VBYP}$	f=1kHz	$V_N$	0	L	BYPASS	-1.0	0.0	1.0	dB
			0	$V_N$	R				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

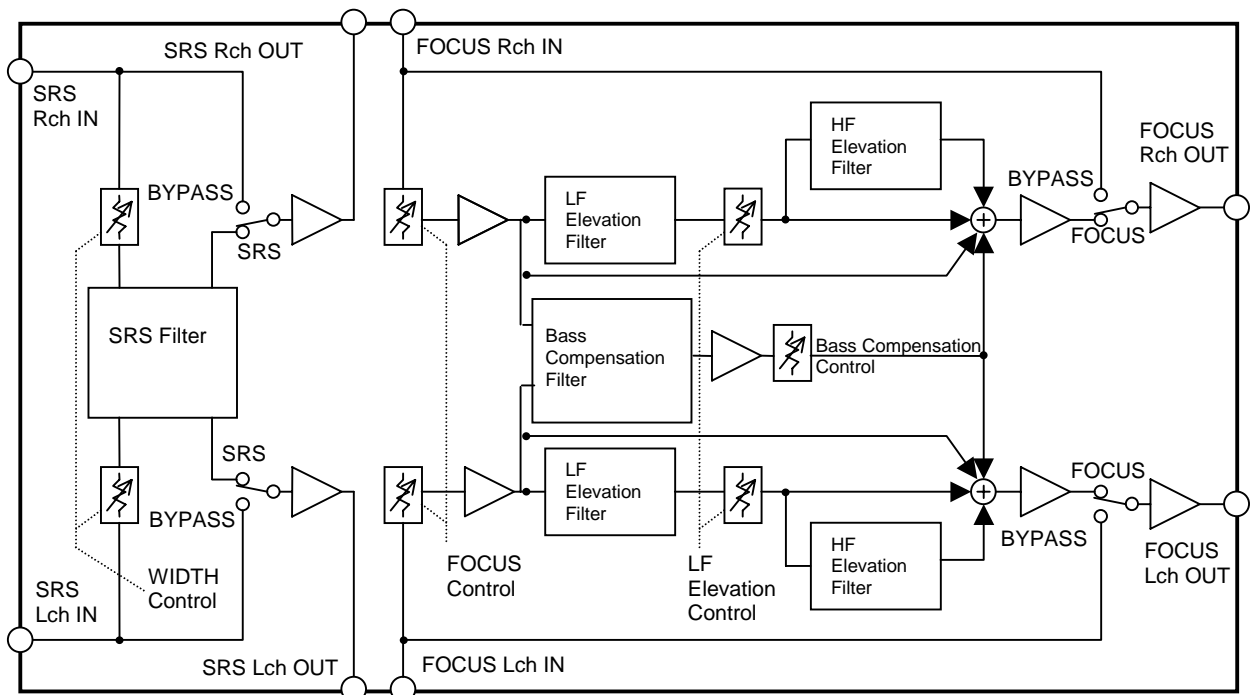
# NJM2193

## ■ 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     |

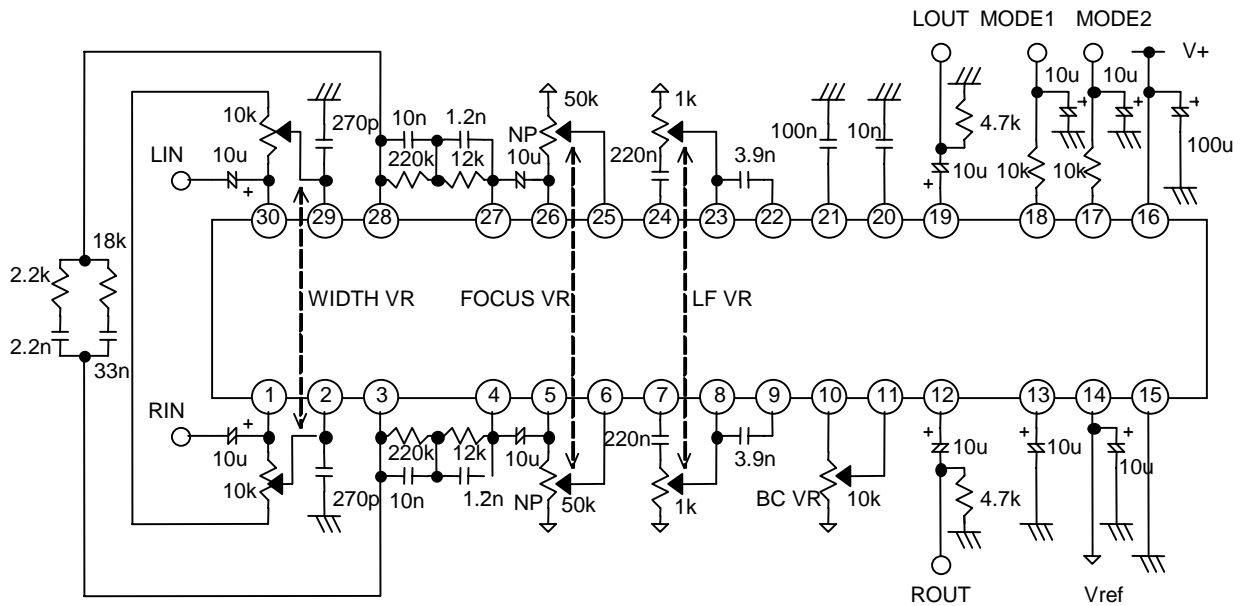
## ■ BLOCK DIAGRAM



## ■ 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+

## ■ APPLICATION CIRCUIT



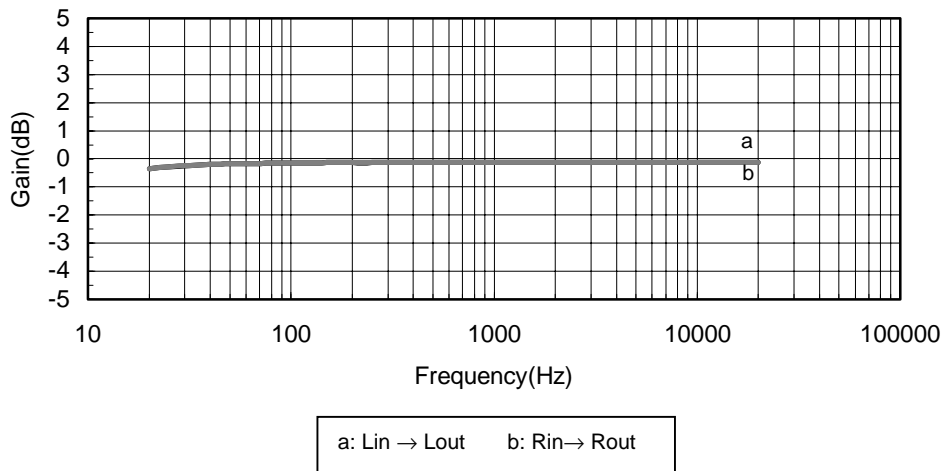
- Width Control : 10kB, Dual VR
- LF Elevation Control : 1kB, Dual VR
- FOCUS Control : 50kB, Dual VR
- Bass Compensation Control : 10kB, Dual VR

## ■ TYPICAL CHARACTERISTICS

### NJM2193 Gain Structure

BYPASS Mode

Conditions:  $V_{in} = -20\text{dBV}(100\text{mVrms})$ ,  $V_{+} = 8\text{V}$

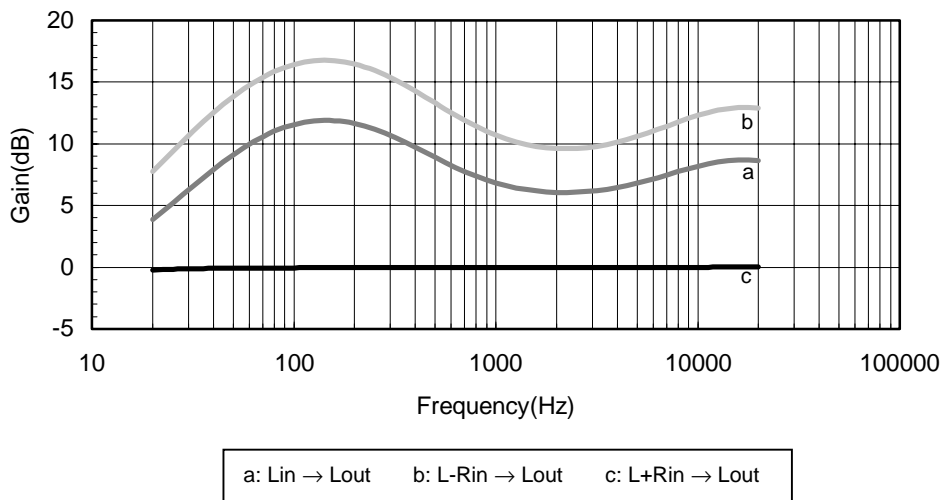


### NJM2193 Gain Structure

3D Stereo Mode

Conditions:  $V_{in} = -20\text{dBV}(100\text{mVrms})$ ,  $V_{+} = 8\text{V}$

WIDTH VR:MAX

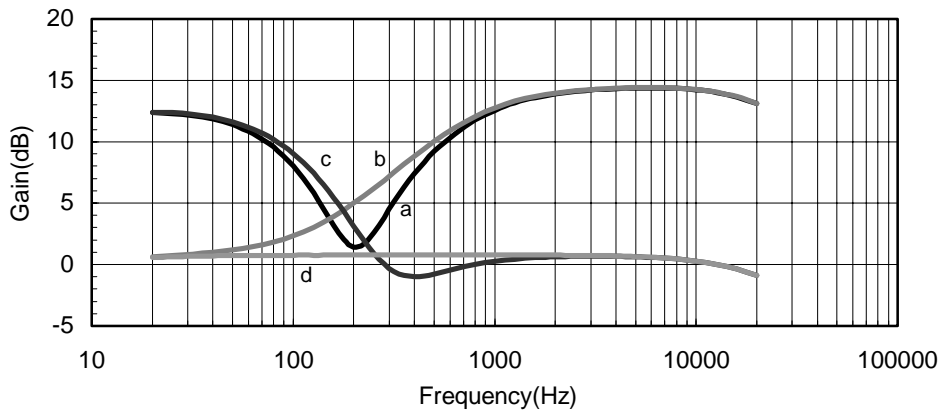


## ■ TYPICAL CHARACTERISTICS

### NJM2193 Gain Structure

FOCUS Mode

Conditions:  $V_{in} = -20\text{dBV}$  (100mVrms) Lch,  $V_{out} = \text{Lch}$ ,  $V_{+} = 8\text{V}$



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

**[CAUTION]**

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