



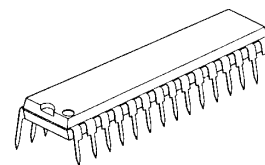
FOCUS & SRS AUDIO PROCESSOR

■ GENERAL DESCRIPTION

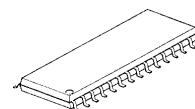
The **NJM2193** is a FOCUS & SRS audio processor, based on SRS FOCUS and 3D Stereo technology. It is capable of raising sound and regenerating 3D sound field.

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 μ 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

The SRS, FOCUS technology rights incorporated in the NJM2193 are owned by SRS Labs, a U.S. Corporation and licensed to New Japan Radio Co., Ltd. SRS, FOCUS are protected under U.S. and foreign patents issued and/or pending. SRS, FOCUS and the  are trademarks of SRS Labs, Inc. in the United States and selected foreign countries. Neither the purchase of the NJM2193, nor the corresponding sale of audio enhancement equipment conveys the right to sell commercialized recordings made with any SRS technology.

SRS Labs requires that all users of the NJM2193 must enter into a license agreement directly with SRS Labs if the royalty is not included in the purchase price. SRS Labs also requires any users to comply with all rules and regulations as outlined in the SRS Trademark Usage Manual.

For further information, please contact:

SRS Labs, Inc.
2909 Daimler Street. Santa Ana, CA 92705 USA
Tel: 949-442-1070 Fax: 949-852-1099 <http://www.srslabs.com>

■ 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 | | | | | MIN. | TYP. | MAX. | UNIT |
|-----------------------|--------------------|-------------------|-----------------------------------|-----------------------------------|--------|--------------------|-----------------|-----------------|---------------|---------------|
| | | IN | | OUT | MODE | | | | | |
| | | L | R | | | | | | | |
| 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 _N 0 | 0 V _N | L R | BYPASS | - | 7.5 (24) | - | dBV (Vrms) |
| | | f=150Hz THD=3% | V _N -V _N | -V _N V _N | L R | 3D Sound | | -9.0 (0.35) | - | |
| | | f=1kHz THD=3% | V _N -V _N | -V _N V _N | L R | 3D Sound | | -3.0 (0.71) | - | |
| | | f=15kHz THD=3% | V _N 0 | 0 V _N | L R | FOCUS | | -6.5 (0.47) | - | |
| | | f=1kHz THD=3% | V _N 0 | 0 V _N | L R | FOCUS | | -5.0 (0.56) | - | |
| | | f=15kHz THD=3% | V _N 0 | 0 V _N | L R | 3D Sound +FOCUS | -17.5 (0.13) | -15.5 (0.17) | - | |
| | | f=1kHz THD=3% | V _N 0 | 0 V _N | L R | 3D Sound +FOCUS | -14.5 (0.19) | -12.5 (0.24) | - | |
| | | f=15kHz THD=3% | V _N -V _N | -V _N V _N | L R | 3D Sound +FOCUS | | -19.5 (0.11) | - | |
| | | f=1kHz THD=3% | V _N -V _N | -V _N V _N | L R | 3D Sound +FOCUS | | -16.0 (0.16) | - | |
| | | Output Noise | V _{NOISE} | 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

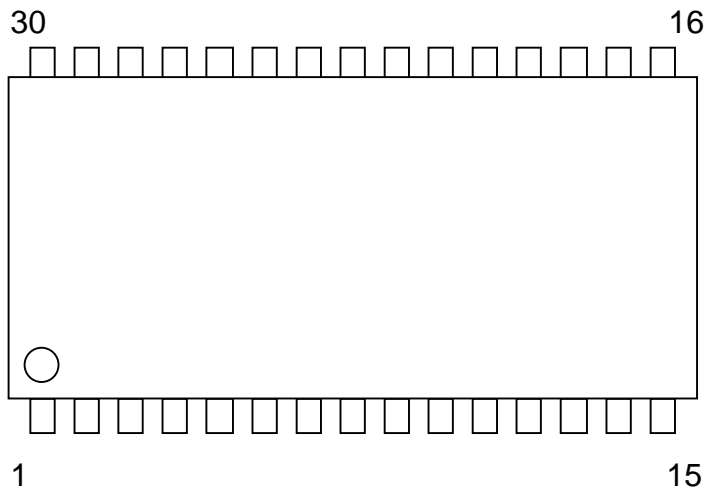
| PARAMETER | SYMBOL | | CONDITION | | | | MIN. | TYP. | MAX | UNIT |
|-----------------------------|-------------------|------------|-----------------------------------|-----------------------------------|--------|-----------------|------|-------|----------------|------|
| | | | IN | | OUT | MODE |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

■ MODE SWITCH

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

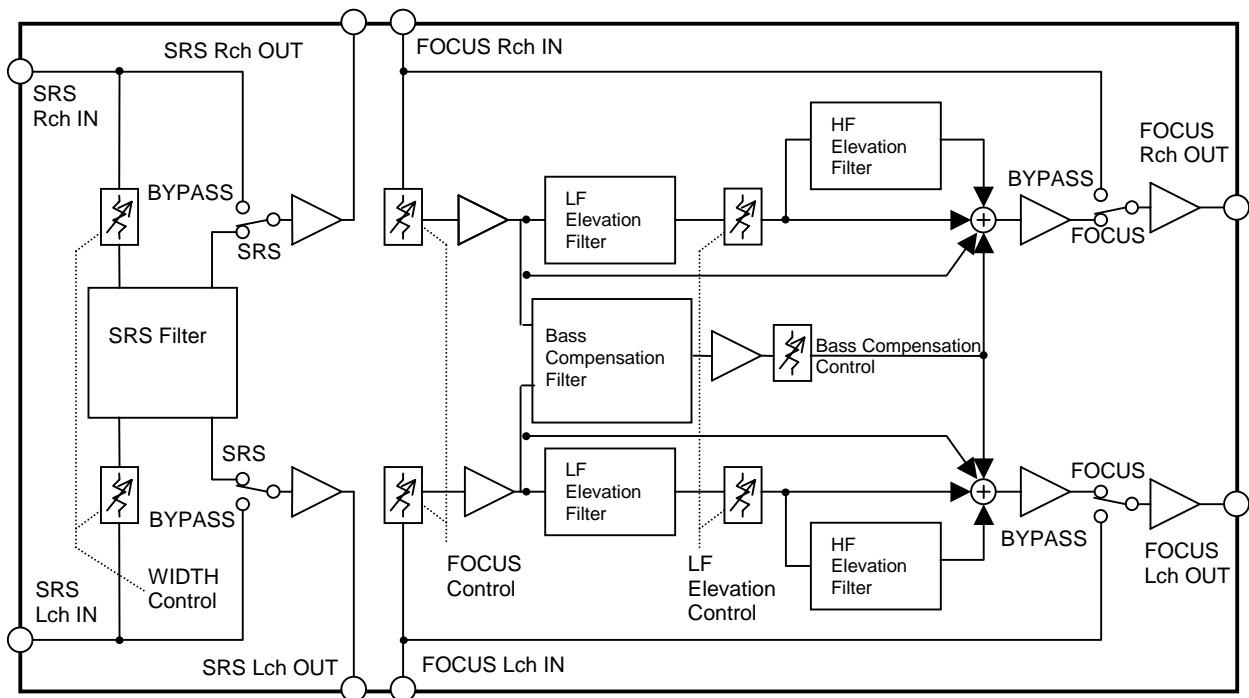
NJM2193

■ PIN FUNCTION

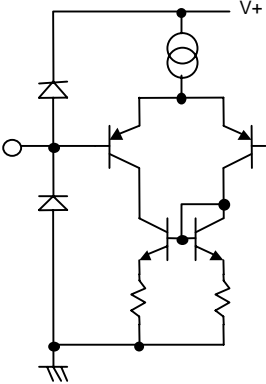
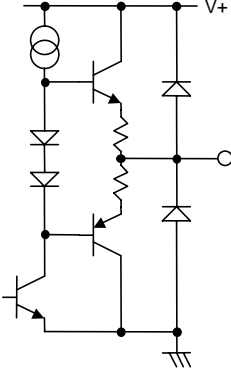
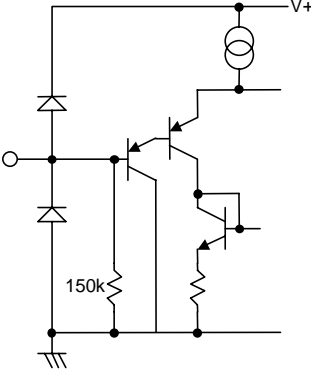
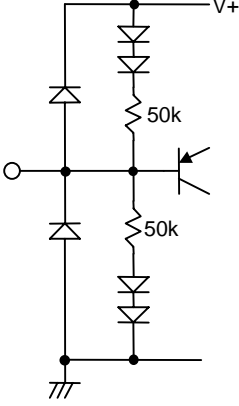


| | |
|--------------|---------------|
| 1.SRSINR | 16.V+ |
| 2.WIDTHR | 17.MODE2 |
| 3.SRSFILTERR | 18.MODE1 |
| 4.SRSOUTR | 19.FOCUSOUTL |
| 5.FOCUSINR1 | 20.LPFIN |
| 6.FOCUSINR2 | 21.LPFOUT |
| 7.LFOUTR | 22.HFINL |
| 8.LFINR | 23.LFINL |
| 9.HFINR | 24.LFOUTL |
| 10.BCOUT | 25.FOCUSINL2 |
| 11.BCIN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

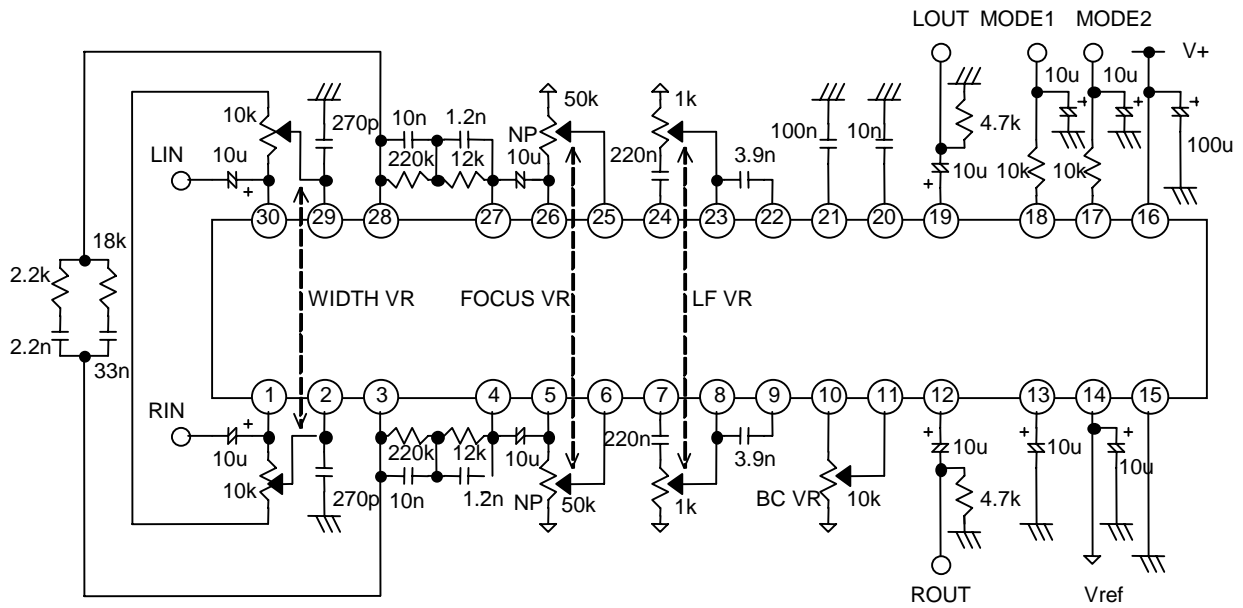
■ BLOCK DIAGRAM



■ 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 |  | $V_{REF}(14pin)=1/2V+$ |
| 17 18 | MODE2 MODE1 |  | |
| 13 | REFIN |  | $1/2V+$ |

■ APPLICATION CIRCUIT



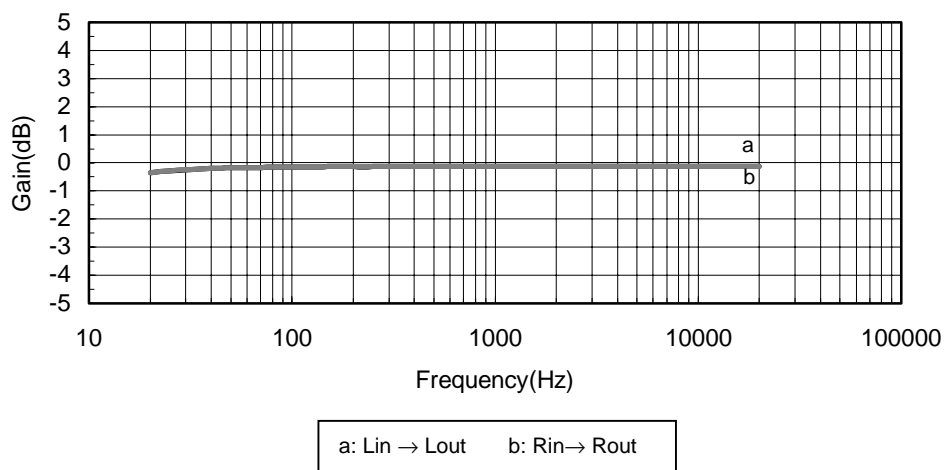
- Width Control : 10kB, Dual VR
- LF Elevation Control : 1kB, Dual VR
- FOCUS Control : 50kB, Dual VR
- Bass Compensation Control : 10kB, Dual VR

■TYPICAL CHARACTERISTICS

NJM2193 Gain Structure

BYPASS Mode

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

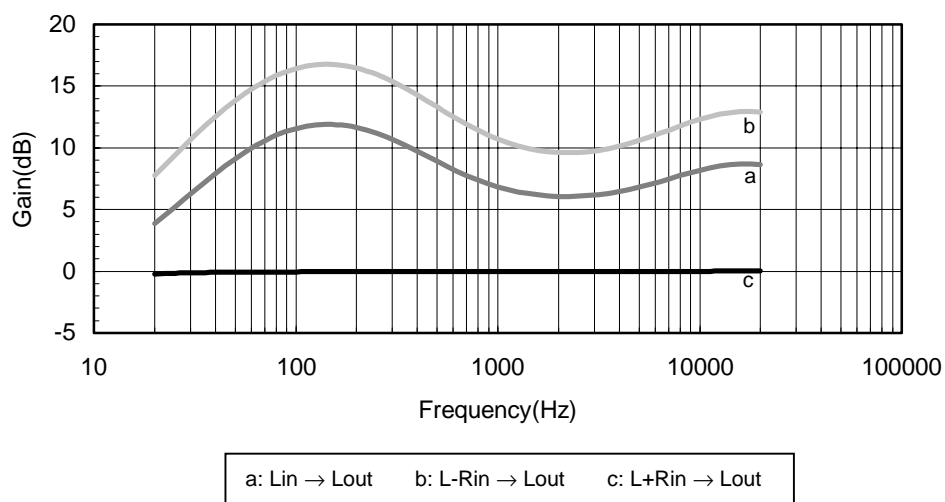


NJM2193 Gain Structure

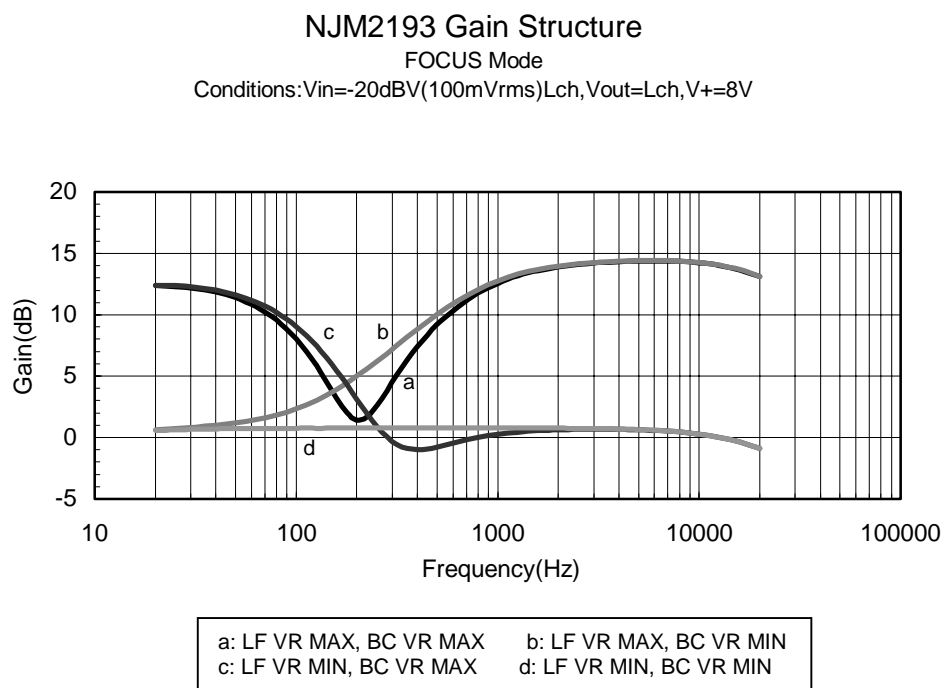
3D Stereo Mode

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

WIDTH VR: MAX



■TYPICAL CHARACTERISTICS



[CAUTION]
The specifications on this databook are only given for information , without any guarantee as regards either mistakes or omissions. The application circuits in this databook are described only to show representative usages of the product and not intended for the guarantee or permission of any right including the industrial rights.