

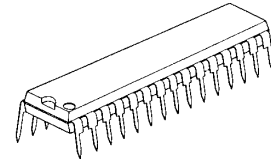
## SRS 3D Stereo & SRS HEADPHONE AUDIO PROCESSOR

### ■GENERAL DISCRIPTION

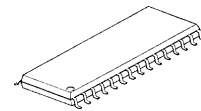
The **NJM2191** is a SRS 3D Stereo and SRS HEADPHONE audio processor. The 3D Stereo regenerates 3D surround sound with only two speakers, and also the SRS HEADPHONE provides a realistic and spacious listening experience through standard headphones.

The **NJM2191** is suitable for mini component, CD radio cassette, multimedia speaker system for PC and others.

### ■PACKAGE OUTLINE



**NJM2191L**



**NJM2191M**

### ■FEATURES

- Operating Voltage 4.7 to 13V
- Low Operating Current 10.0 mA typ. at 3D Stereo Mode  
11.0mA typ. at SRS HP Mode
- Low Output Noise 17.8 $\mu$ Vrms typ.at 3D Stereo Mode  
17.8 $\mu$ Vrms typ at SRS HP Mode
- Bypass Gain 0dB typ.
- Sound Field Adjustment by Width Volume
- Internal Mode Switch 3D Stereo / SRS HP
- Bipolar Technology
- Package Outline SDIP30, SDMP30

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SRS Labs requires that all users of the NJM2191 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.

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# NJM2191

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## ■ABSOLUTE MAXIMUM (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Operating Voltage	V <sup>+</sup>	15	V
Power Dissipation	P <sub>D</sub>	700	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<sup>+</sup>=12V, Ta=25°C, V<sub>IN</sub>=-10dBV(316mVrms), unless otherwise specification)

PARAMETER	SYMBOL	CONDITION	CONDITION				MIN	TYP	MAX	UNIT	
			INPUT		OUTPUT	MODE					WIDTH VR
			L	R							
Operating Voltage	V <sup>+</sup>	-	-	-	-	-	4.7	12.0	13.0	V	
Operating Current	I <sub>CC</sub>	No Signal	0	0	-	BYPASS	-	5.0	9.0	13.0	mA
			0	0	-	3D Stereo	MAX	6.0	10.0	14.0	
			0	0	-	SRS HP	MAX	7.0	11.0	15.0	
			0	0	-	3D Stereo SRS HP	MAX	8.0	12.0	16.0	
Reference Voltage	V <sub>REF</sub>	V <sup>+</sup> /2	0	0	-	-	5.8	6.0	6.2	V	
Maximum Input Voltage	V <sub>IM</sub>	f=1kHz T.H.D.=3%	V <sub>IN</sub>	-	L	BYPASS	-	11.0	12.0	-	dBV (Vrms)
			-	V <sub>IN</sub>	R	3D Stereo	-	(3.5)	(4.0)	-	
		f=1kHz T.H.D.=3%	V <sub>IN</sub>	-	L	BYPASS	-	11.0	12.0	-	
			-	V <sub>IN</sub>	R	SRS HP	-	(3.5)	(4.0)	-	
		f=125kHz T.H.D.=3%	V <sub>IN</sub>	-	L	3D Stereo	MAX	-1.3	0.7	-	
			V <sub>IN</sub>	-	R	3D Stereo	MAX	(0.9)	(1.1)	-	
		f=125kHz T.H.D.=3%	V <sub>IN</sub>	V <sub>IN</sub>	L	3D Stereo	MAX	10.0	12.0	-	
			V <sub>IN</sub>	-V <sub>IN</sub>	L	3D Stereo	MAX	(3.2)	(4.0)	-	
f=125kHz T.H.D.=3%	V <sub>IN</sub>	-V <sub>IN</sub>	L	3D Stereo	MAX	-7.1	-5.1	-			
	V <sub>IN</sub>	-	L	3D Stereo	MAX	(0.4)	(0.6)	-			
f=100Hz T.H.D.=3%	V <sub>IN</sub>	-	L	SRS HP	MAX	-6.1	-4.1	-			
	V <sub>IN</sub>	-	R	SRS HP	MAX	(0.5)	(0.6)	-			
f=100Hz T.H.D.=3%	V <sub>IN</sub>	V <sub>IN</sub>	L	SRS HP	MAX	9.9	11.9	-			
	V <sub>IN</sub>	-V <sub>IN</sub>	L	SRS HP	MAX	(3.1)	(3.9)	-			
f=100Hz T.H.D.=3%	V <sub>IN</sub>	-V <sub>IN</sub>	L	SRS HP	MAX	-12.1	-10.1	-			
	V <sub>IN</sub>	-	L	SRS HP	MAX	(0.2)	(0.3)	-			

**■ELECTRICAL CHARACTERISTICS** ( $V^+=12V$ ,  $T_a=25^\circ C$ ,  $V_{IN}=-10dBV(316mVrms)$ , unless otherwise specification)

PARAMETER	SYMBOL		CONDITION					MIN	TYP	MAX	UNIT
			INPUT		OUTPUT	MODE	WIDTH VR				
			L	R							
Output Noise	$V_{NOISE}$	Rg=0Ω A-Weighted	0	0	L	BYPASS	-	-	-110	-100	dBV (uVrms)
					R	3D Stereo			(3.2)	(10.0)	
			0	0	L	3D Stereo	MAX	-	-95	-84	
					R				(17.8)	(63.1)	
			0	0	L	BYPASS	-	-	-110	-100	
		R	SRS HP			(3.16)	(10.0)				
			0	0	L	SRS HP	MIN	-	-95	-84	
					R			(17.8)	(63.1)		
			0	0	L	SRS HP	MAX	-	-95	-84	
					R			(17.8)	(63.1)		
Total Harmonic Distortion	THD	f=1kHz	$V_{IN}$	-	L	BYPASS	-	-	0.01	0.05	%
				$V_{IN}$	R	3D Stereo	MAX	-	0.10	0.20	
			-	$V_{IN}$	R	3D Stereo	MAX	-	0.10	0.20	
			$V_{IN}$	-	L	BYPASS	-	-	0.01	0.05	
				$V_{IN}$	R	SRS HP					
			-	$V_{IN}$	R	SRS HP	MIN	-	0.10	0.30	
			$V_{IN}$	-	L	SRS HP	MAX	-	0.01	0.10	
		R	SRS HP	MAX	-	0.20	0.40				
Bypass Gain	$G_{VBYP}$	f=1kHz	$V_{IN}$	-	L	BYPASS	-	-1.0	0.0	1.0	dB
				$V_{IN}$	R	3D Stereo					
			$V_{IN}$	-	L	BYPASS	-	-1.0	0.0	1.0	
				$V_{IN}$	R	SRS HP					
3D Stereo Gain	$G_{VSRS}$	f=125Hz	$V_{IN}$	-	L	3D Stereo	MAX	9.2	11.2	13.2	dB
				$V_{IN}$	R		MIN	-2.5	-0.5	1.5	
			-	$V_{IN}$	L	3D Stereo	MAX	6.5	8.5	10.5	
			$V_{IN}$	-	R						
L+R Gain	$G_{L+R}$	$V_{in}=-20dBV$ f=100Hz	$V_{IN}$	$V_{IN}$	L	SRS HP	MIN	-2.0	0.0	2.0	dB
				$V_{IN}$	R		MAX	-2.0	0.0	2.0	
			$V_{IN}$	$V_{IN}$	L	SRS HP	MIN	-2.0	0.0	2.0	
				$V_{IN}$	R						
L-R Gain	$G_{L-R}$	$V_{in}=-20dBV$ f=100Hz	$V_{IN}$	$-V_{IN}$	L	SRS HP	MIN	3.3	5.3	7.3	dB
				$-V_{IN}$	R		MAX	18.9	20.9	22.9	
			$V_{IN}$	$-V_{IN}$	L	SRS HP	MIN	3.3	5.3	7.3	
				$-V_{IN}$	R						
Mode Select Control Switch	$V_{MODE}$	$V_{IN}$ = "High Level"	-	-	-	-	-	2.0	-	$V^+$	V
		$V_{IN}$ = "Low Level"	-	-	-	-	-	0.0	-	0.7	

✓ The word " $-V_{IN}$ " signifies opposite phase of " $V_{IN}$ "

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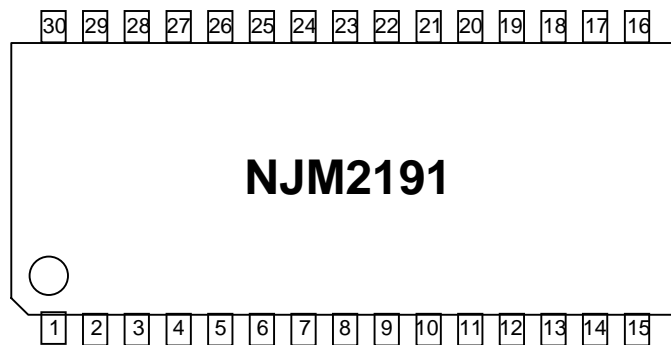
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## MODE SWITCH

	3D Stereo SW
BYPASS	Low Level
3D Stereo	High Level

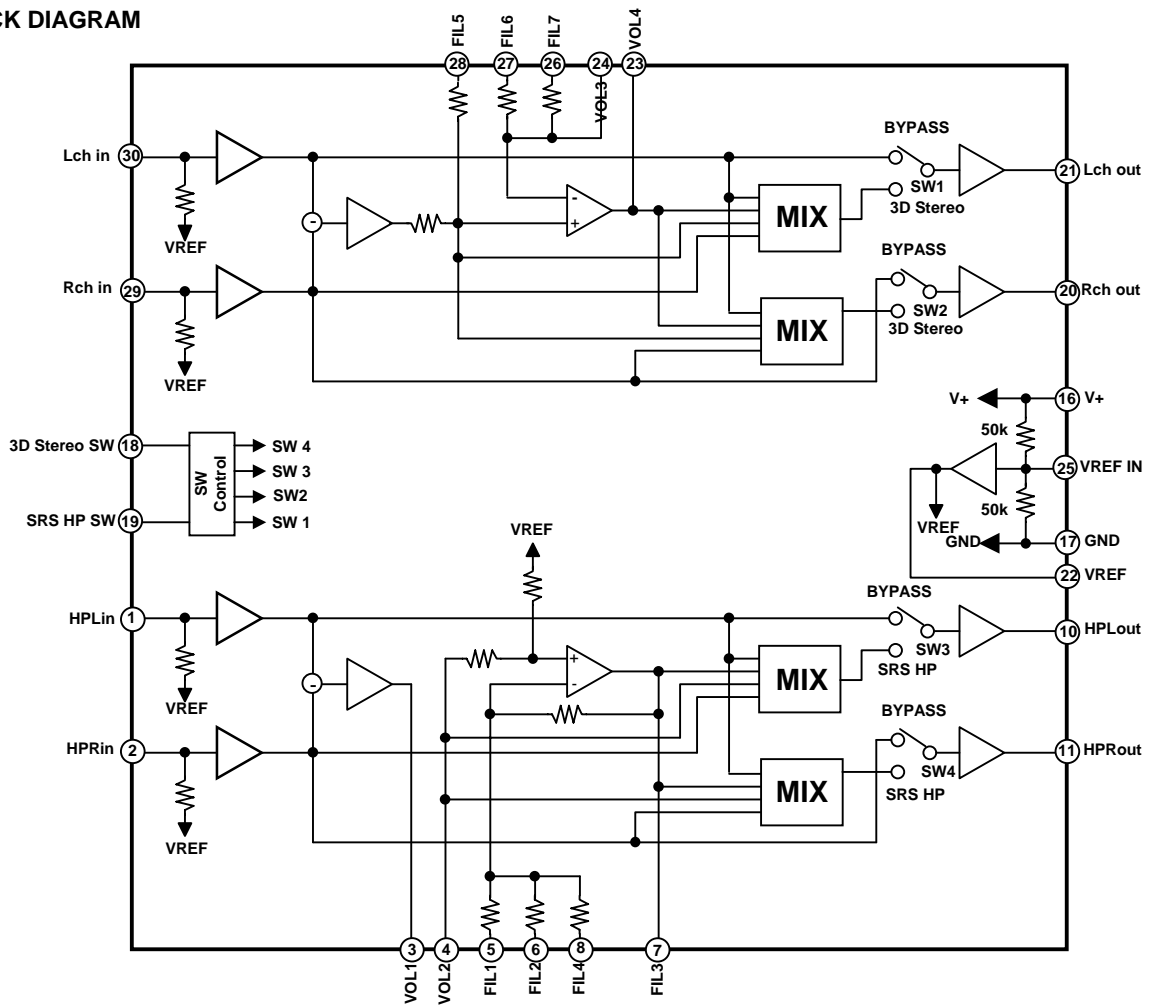
	SRS-HP SW
BYPASS	Low Level
SRS HP	High Level

## PIN CONFIGURATION

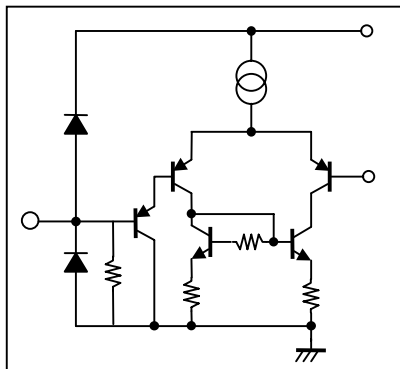


No	SYMBOL	FUNCTION	No.	SYMBOL	FUNCTION
1	HPLin	Lch Input for SRS HP	16	V+	4.7 to 13V
2	HPRin	Rch Input for SRS HP	17	GND	GROUND
3	VOL1	Width Control Output for SRS HP	18	3D Stereo SW	3D Stereo Mode Switch
4	VOL2	Width Control Input for SRS HP	19	SRS HP SW	SRS HP Mode Switch
5	FIL1	Filter1	20	Rch out	Rch Output
6	FIL2	Filter2	21	Lch out	Lch Output
7	FIL3	Filter3	22	VREFOUT	Reference Voltage Input
8	FIL4	Filter4	23	VOL4	Width Control Input for SRS Stereo
9	NC	NC	24	VOL3	Width Control Output for SRS Stereo
10	HPLout	Lch Output for SRS HP	25	VREFIN	Reference Voltage Output
11	HPRout	Rch Output for SRS HP	26	FIL7	Filter6
12	NC	NC	27	FIL6	Filter7
13	NC	NC	28	FIL5	Filter8
14	NC	NC	29	Rch in	Rch Input
15	NC	NC	30	Lch in	Lch Input

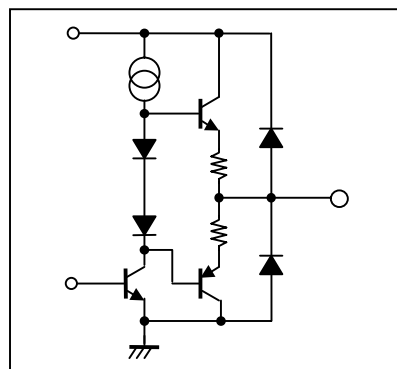
## ■BLOCK DIAGRAM



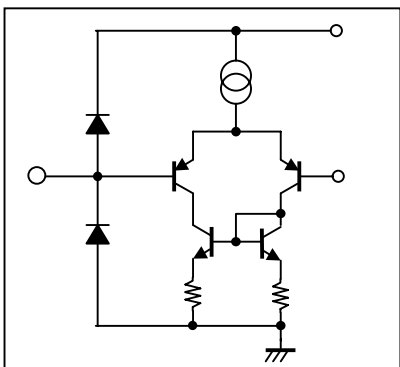
## ■PIN DESCRIPTION



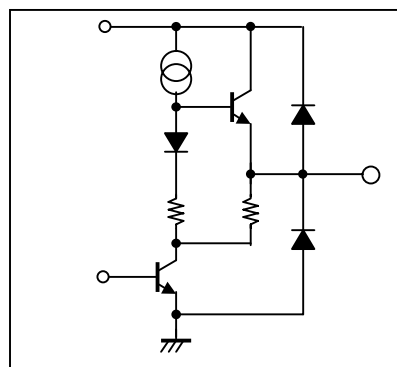
PIN No.  
18,19



PIN No.  
10,11,20,21,22,23



PIN No.  
1,2,4,5,6,8,9,24,  
25,26,27,28,29,30

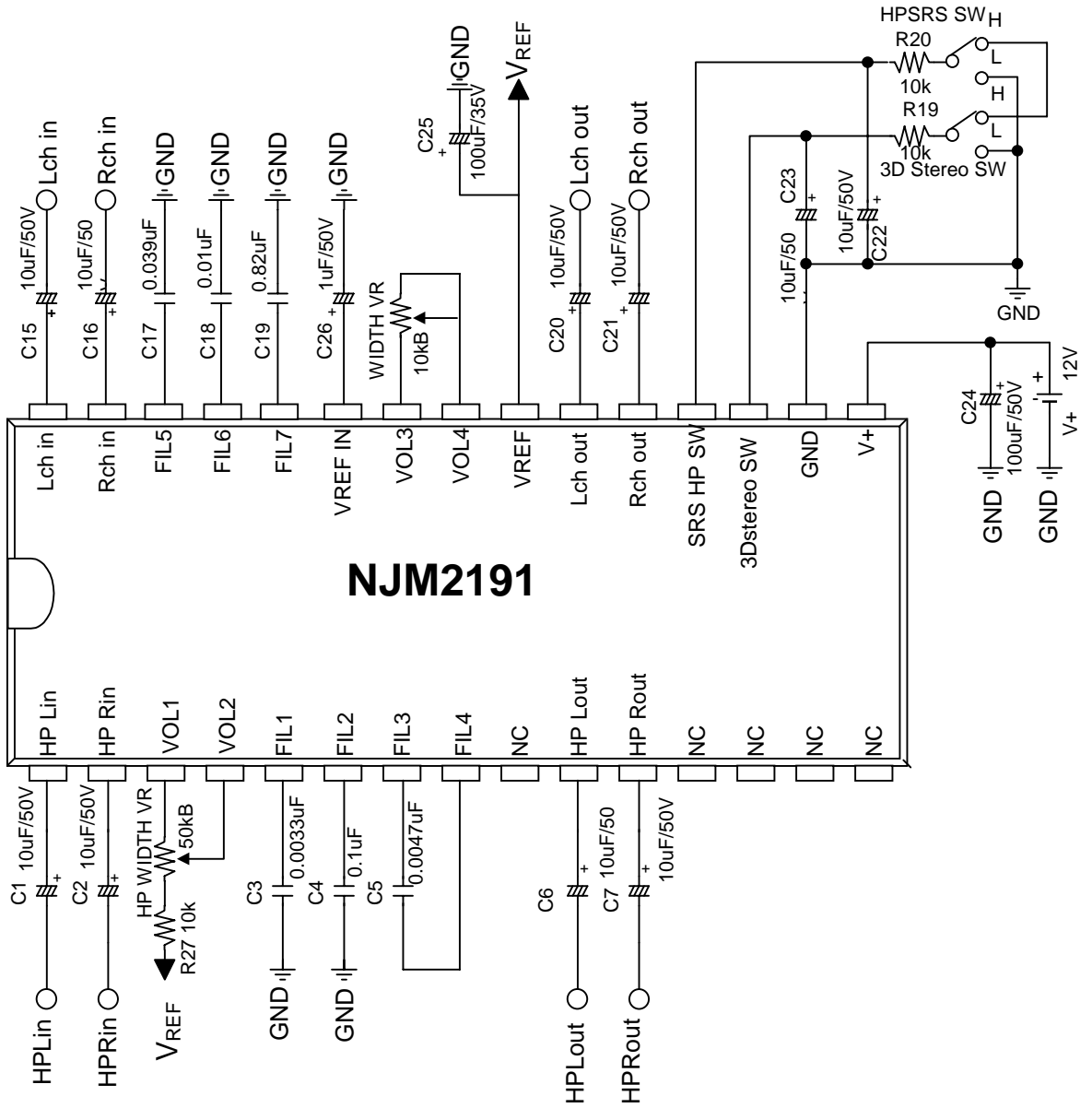


PIN No.  
3,7

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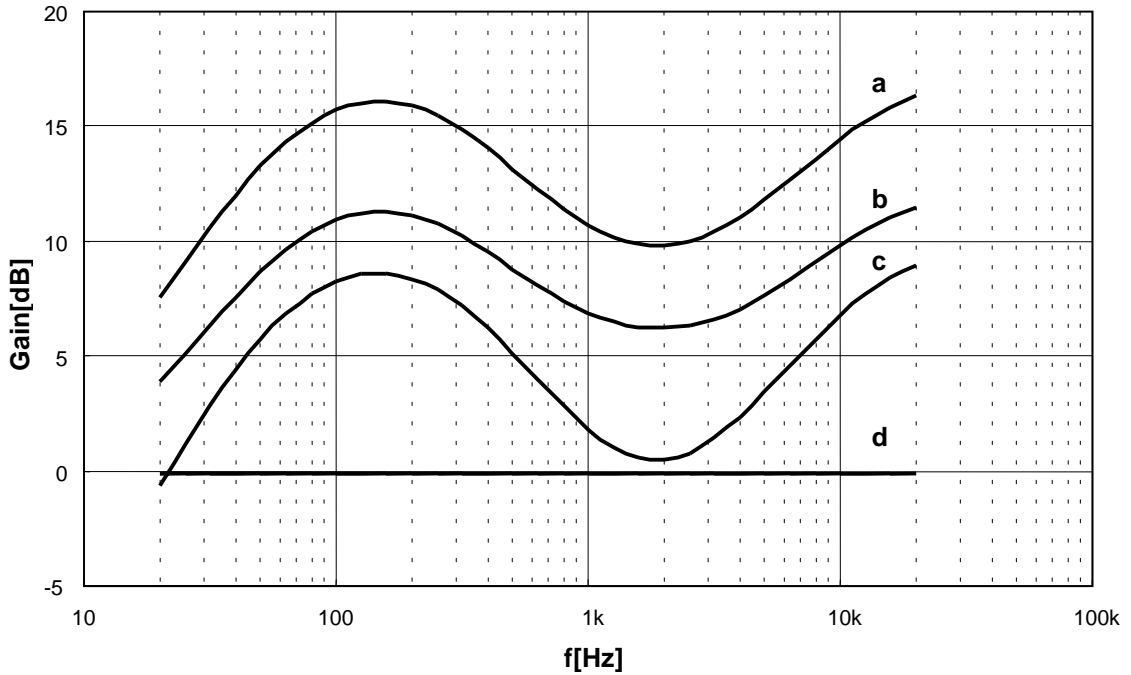
## APPLICATION CIRCUIT



■ TYPICAL CHARACTERISTICS

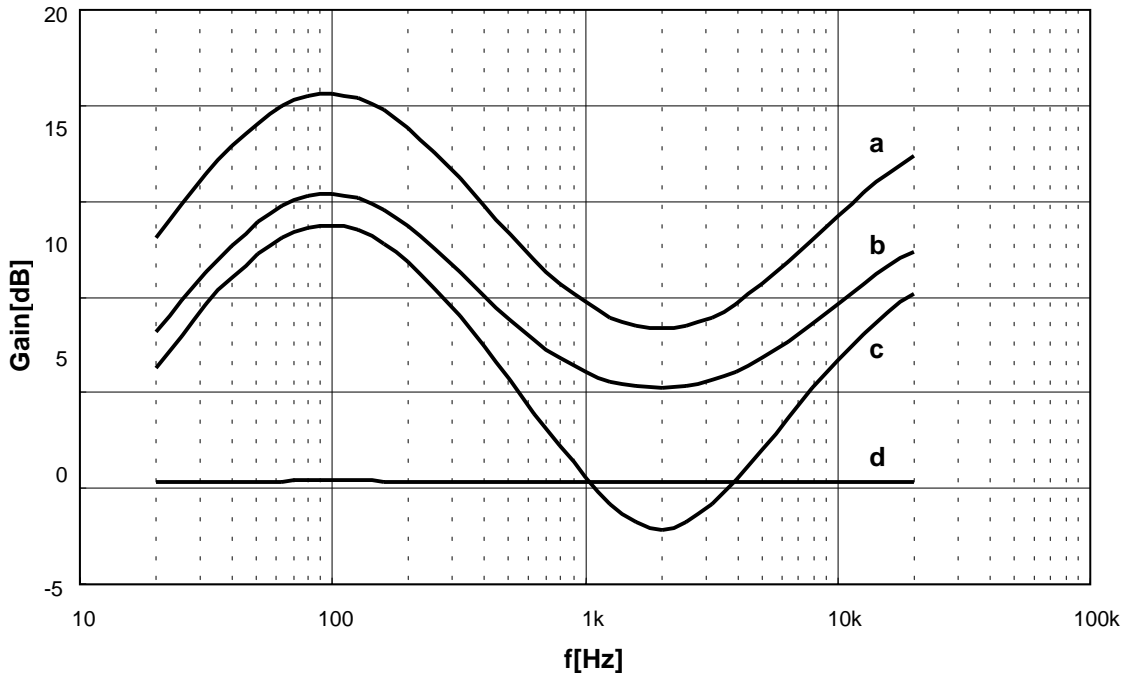
“SRS 3D Stereo GAIN STRUCTURE”

V+=12V, Ta=25°C, Vin=-10dBV, Width VR=Max



“SRS HEADPHONE GAIN STRUCTURE”

V+=12V, Ta=25°C, Vin=-20dBV, Width VR=Max



No.	INPUT	OUTPUT
a	Lch - Rch	Lch
b	Lch	Lch
c	Rch	Lch
d	Lch + Rch	Lch

[CAUTION]  
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