PRELIMINARY

SRS 3D SURROUND AUDIO PROCESSOR

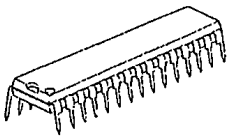
■GENERAL DESCRIPTION

The NJM2178 is a SRS 3D surround audio processor regenerating the 3D surround sound by two speakers.

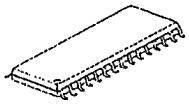
It regenerates 3D surround sound from both of monaural and stereo input.

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

■PACKGE OUTLINE



NJM2178L

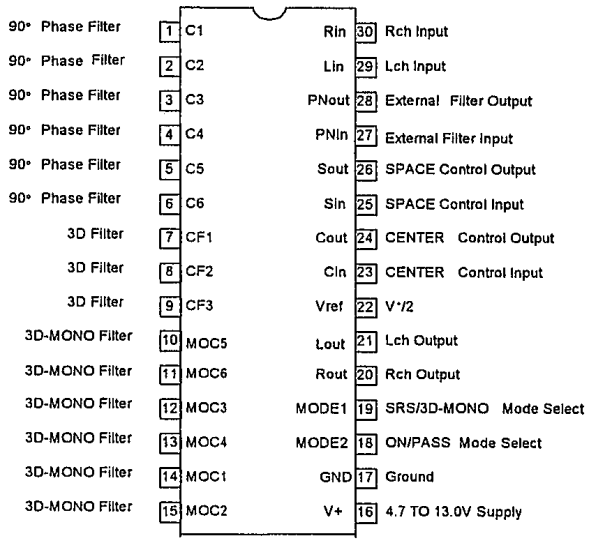


NJM2178M

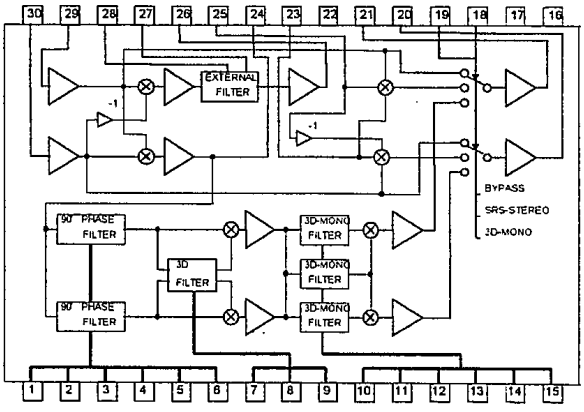
■FEATURES

- Operating Voltage (4.7 to 13V)
- Low Supply Current (11mA typ. at 3D-STEREO mode)
- Wide Dynamic Range (>110dB)
- Low Output Noise (22μVrms typ. at 3D-STEREO mode)
- BYPASS Gain (-3dB typ.)
- BYPASS FUNCTION(Through)
- SPACE and CENTER control
- Internal Mode Control Switch(2bit)
- Bipolar Technology
- Package Outline SDIP30, SDMP30

■PIN CONFIGURATION



■BLOCK DIAGRAM



■ABSOLUTE MAXIMUM RATING (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V^+	7	V
Power Dissipation	P_D	(SDIP30) 700 (SDMP30) 700	mW
Operating Temperature Range	T_{opr}	-20 to +75	°C
Storage Temperature Range	T_{stg}	-40 to +125	°C

■ELECTRICAL CHARACTERISTICS (V^+=12V, Ta=25°C, Vin=0dBu(775mVrms), unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION		MIN	TYP	MAX	UNIT
Operating Voltage	V^+			4.7	12.0	13.0	V
Operating Current	I_{CC}	No Signal	BYPASS	-	9.0	14.0	mA
			3D-STEREO	-	11.0	17.0	
			3D-MONAURAL	-	14.0	21.0	
Reference Voltage	V_{REF}	$V^+/2$	-	5.5	$V^+/2$	6.5	V
Maximum Input Voltage	V_{INMAX}	Vin=Lch f=1kHz Vout=Lch at THD=3%	BYPASS	8.0 (1.95)	10.0 (2.45)	-	dBu (Vrms)
		Vin=Lch f=125Hz Vout=Rch at THD=3% SPACE VR Max CENTER VR Min	3D-STEREO	2.8 (1.07)	4.8 (1.35)	-	
		Vin=L, Rch f=300Hz Vout=Lch at THD=3%	3D-MONAURAL	5.0 (1.38)	7.0 (1.74)	-	
Channel Balance	CH_{BAL}	f=1kHz SPACE VR Min CENTER VR Min Lch→Rch Rch→Lch	3D-STEREO	-1.0	0.0	1.0	dB
Output Noise	V_{NOISE}	Vin=GND DIN-AUDIO	3D-STEREO	-	22.0	60.0	μVrms
		Vin=GND DIN-AUDIO	3D-MONAURAL	-	35.0	60.0	
Total Harmonic Distortion	THD	Vin=-10dBu Lch f=1kHz SPACE VR Max CENTER VR Min	3D-STEREO	-	0.10	-	%
		Vin=-10dBu L, Rch f=1kHz	3D-MONAURAL	-	0.05	-	
Bypass Gain	G_{Bypass}	f=1kHz	BYPASS	-5.0	-3.0	-1.0	dB
Feed Through Gain	$G_{THROUGH}$	f=1kHz SPACE VR Min CENTER VR Min L, Rch→L or Rch	3D-STEREO	-15.3	-13.3	-11.3	dB

■ELECTRICAL CHARACTERISTICS (V^+=12V, Ta=25°C, Vin=0dBu(775mVrms), unless otherwise specified)

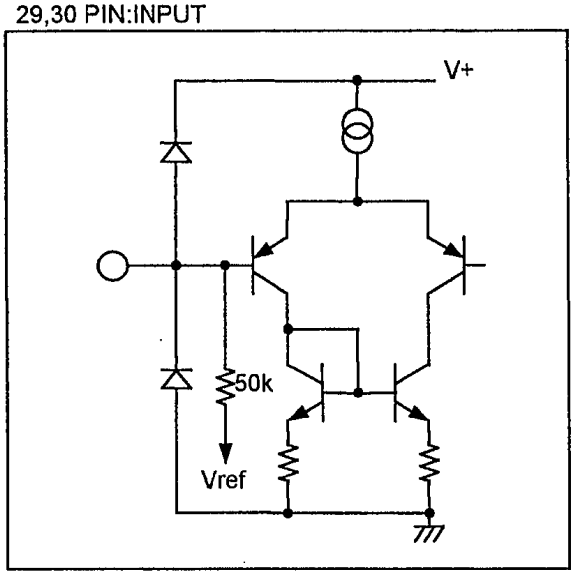
PARAMETER	SYMBOL	TEST CONDITION		MIN	TYP	MAX	UNIT
L+R Gain	G_{L+R}	f=1kHz SPACE VR Min CENTER VR Max Lch→Rch	3D-STEREO	-10.5	-8.5	-6.5	dB
L-R Gain	G_{L-R}	f=125Hz SPACE VR Max CENTER VR Min Lch→Rch	3D-STEREO	7.0	9.0	11.0	dB
3D-MONO Gain at Lch out	G_{MONOEL}	f=125Hz L, Rch→Lch	3D-MONAURAL	2.4	4.4	6.4	dB
3D-MONO Gain at Rch out	G_{MONOER}	f=125Hz L, Rch→Rch	3D-MONAURAL	2.2	4.2	6.2	dB
MODE Select Control Voltage	V_{MODE}	Vin=HIGH LEVEL		2.0	-	V^+	V
		Vin=LOW LEVEL		0.0	-	0.7	

■MODE Switch

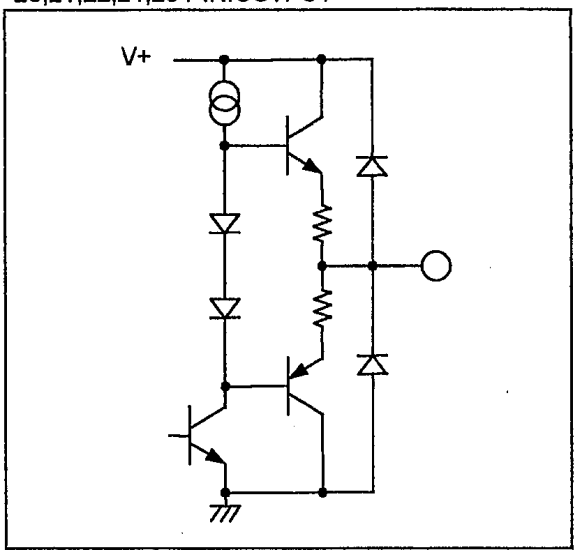
	MODE1	MODE2
BYPASS MODE	—	L
3D-STEREO	H	H
3D-MONAURAL	L	H

■PIN FUNCTION

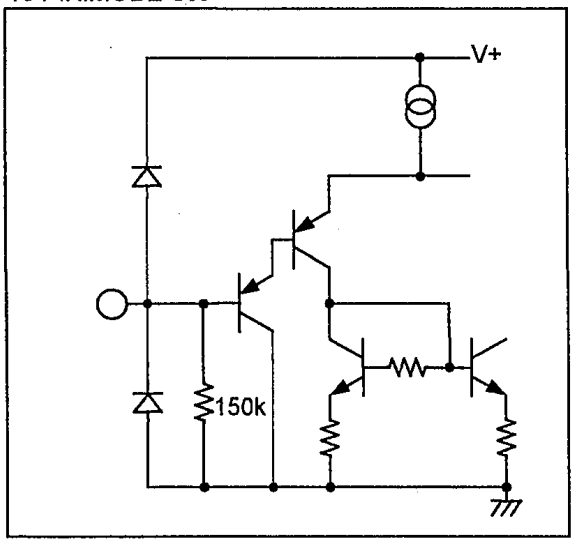
29,30 PIN:INPUT



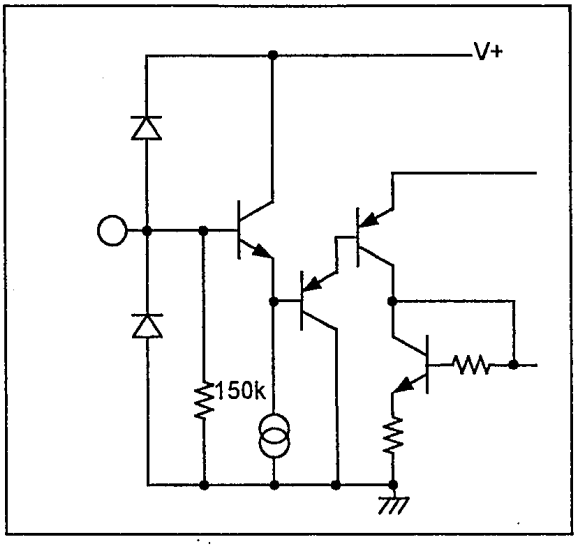
20,21,22,24,26 PIN:OUTPUT



18 PIN:MODE SW

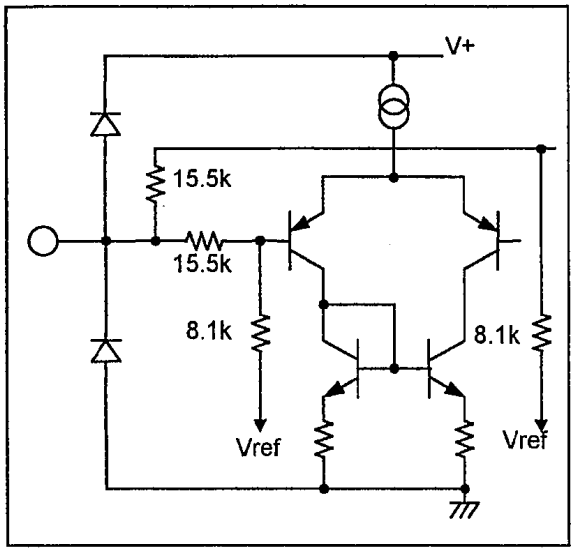


19 PIN:MODE SW

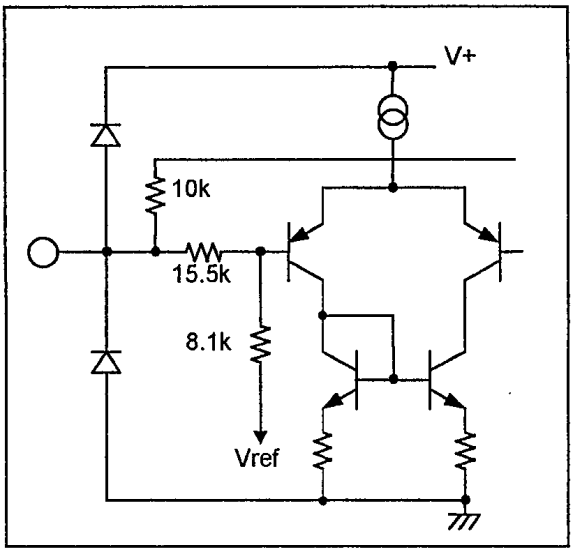


■PIN FUNCTION

23 PIN:INPUT



25 PIN:INPUT



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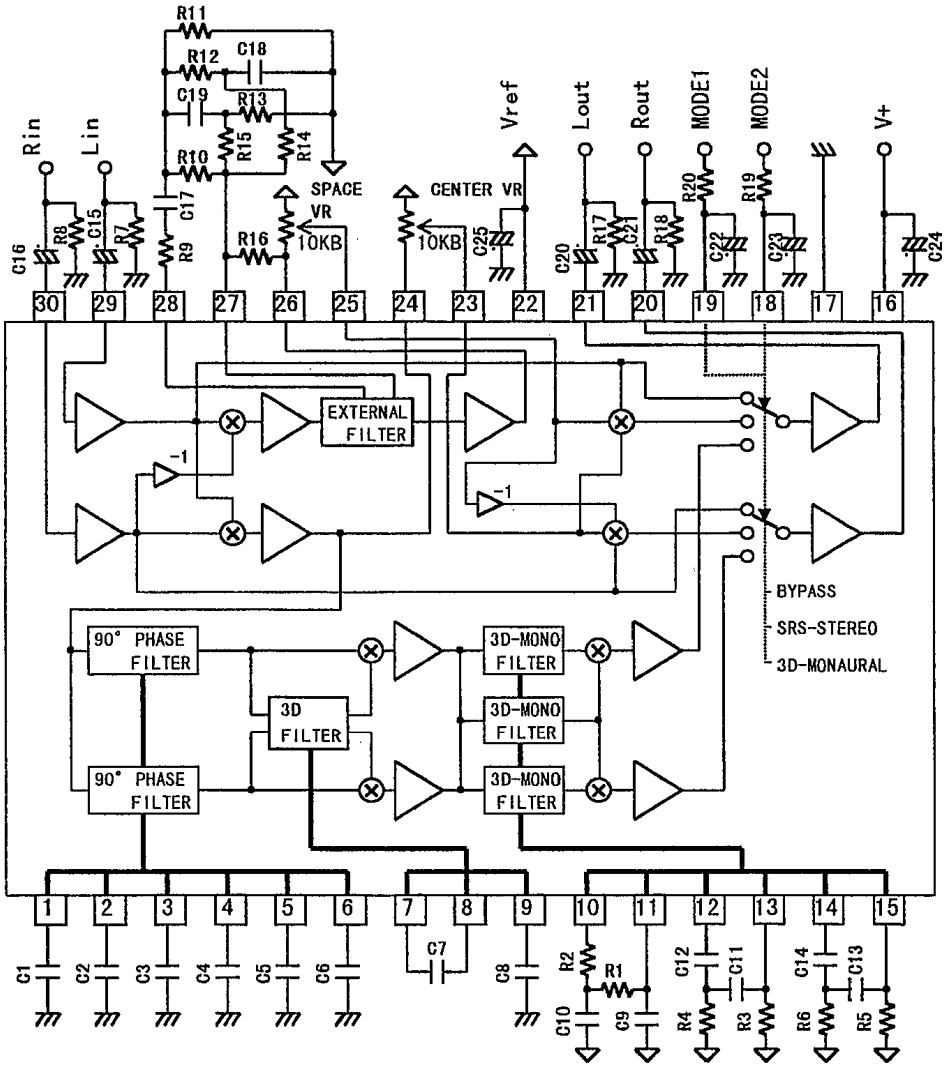
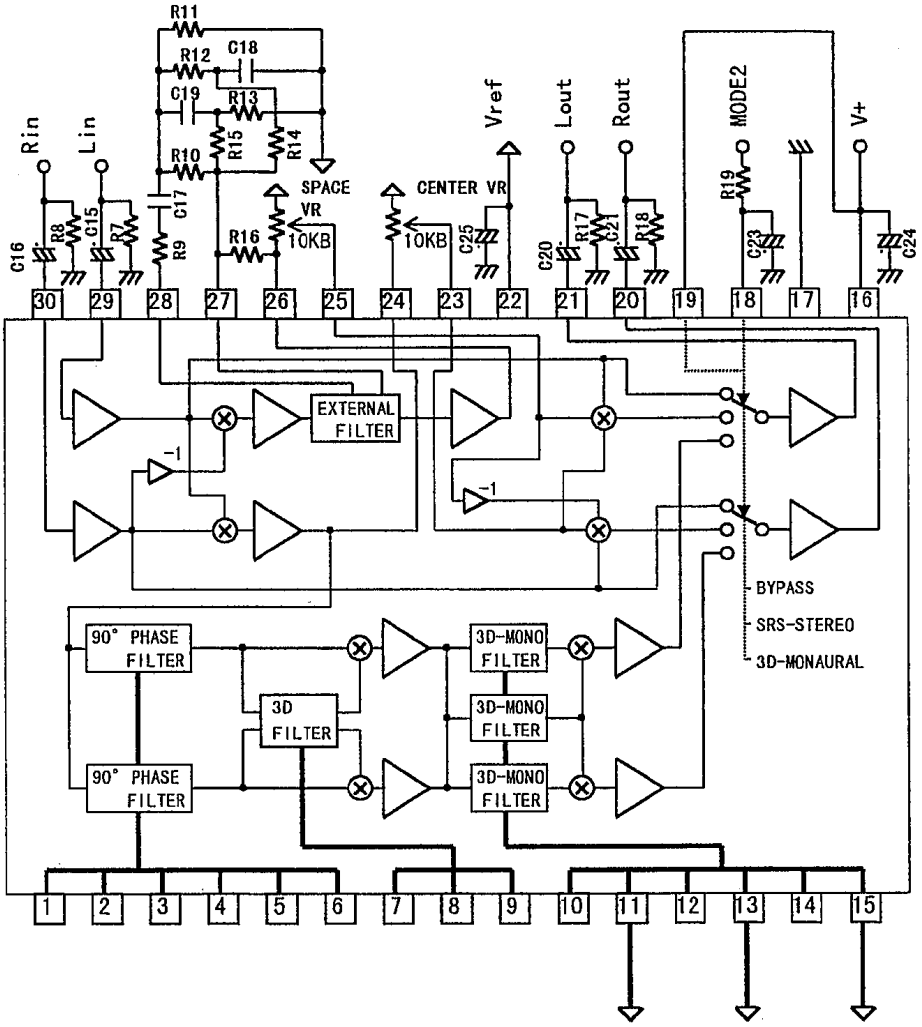
■APPLICATION CIRCUIT



Parts No.	Value	Tolerance	Parts No.	Value	Tolerance
C1	0.027μF		C24	100μF	
C2, C7	4700pF		R1, R3, R5	100kΩ	±5%
C3	470pF		R2, R4, R6, R17	10kΩ	±5%
C4, C10, C12, C14	0.1μF		R18, R19, R20	10kΩ	±5%
C5	0.015μF		R9	1kΩ	±5%
C6	2200pF		R10	110kΩ	±5%
C8	0.47μF		R11	4.3kΩ	±5%
C9, C11, C13	0.01μF		R12	1.5kΩ	±5%
C17, C18	0.47μF	±5%	R13	3.9kΩ	±5%
C19	4700pF	±5%	R14	33kΩ	±5%
C15, C16, C20, C21	10μF		R7, R8, R15	47kΩ	±5%
C22, C23, C25	10μF		R16	62kΩ	±5%

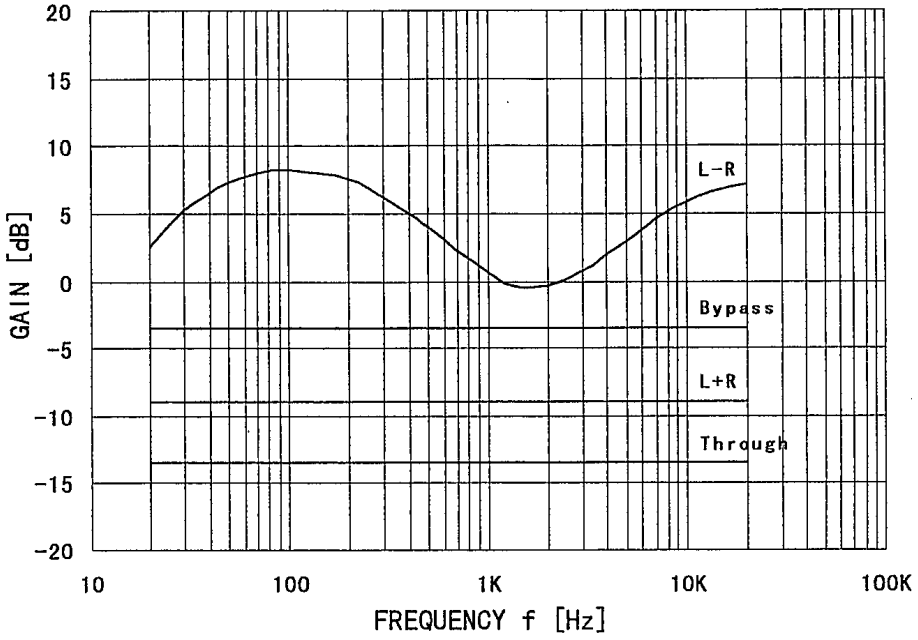
■APPLICATION CIRCUIT(only SRS 3D-STEREO mode)



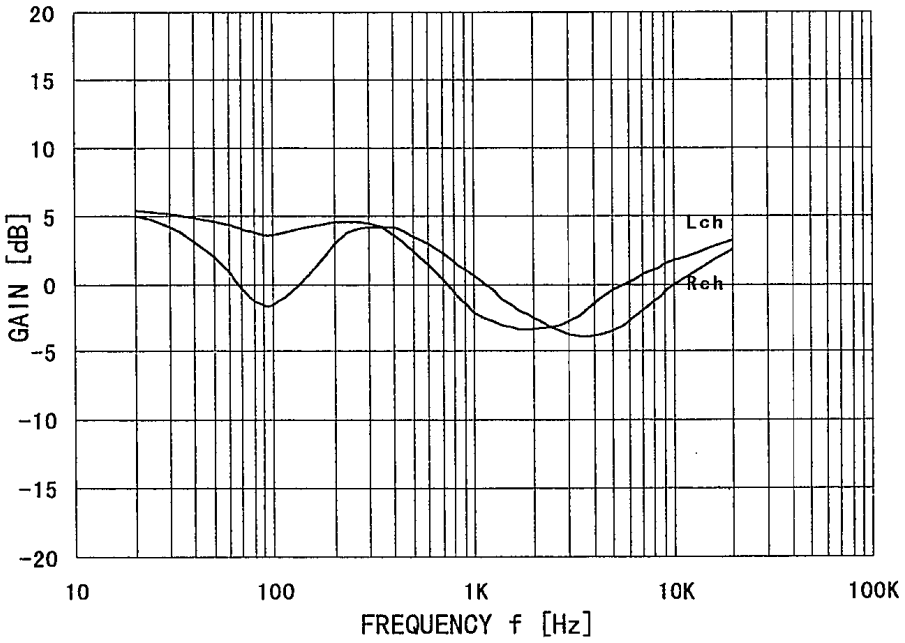
Parts No.	Value	Tolerance	Parts No.	Value	Tolerance
C17, C18	0.47μF	±5%	R10	110kΩ	±5%
C19	4700pF	±5%	R11	4.3kΩ	±5%
C15, C16, C20, C21	10μF		R12	1.5kΩ	±5%
C23, C25	10μF		R13	3.9kΩ	±5%
C24	100μF		R14	33kΩ	±5%
R17, R18, R19	10kΩ	±5%	R7, R8, R15	47kΩ	±5%
R9	1kΩ	±5%	R16	62kΩ	±5%

■TYPICAL CHARACTERISTICS

3D-STEREO GAIN STRUCTURE



3D-MONO GAIN STRUCTURE



■NOTE

The Sound Retrieval System (SRS) technology incorporated in the NJM2178 is owned by SRS Labs, a US Corporation. The SRS technology is protected under U.S. Patent No.4,866,774; 4,748,669; and 4,841,572 with numerous additional issued and pending foreign patents. The trademarks "SRS", "the SRS symbol" and "Sound Retrieval System" are registered in the U.S. and selected foreign countries.

In order to purchase and implement the NJM2178, all customers must enter into a license agreement directly with SRS Labs for the payment of royalties and to ensure proper trademark usage. Neither the purchase of the NJM2178, nor the corresponding sale of audio enhancement equipment conveys the right to commercialized recordings made with the Sound Retrieval System.

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