

**TruSurround™**  
with SRS (●)®

## Passive Matrix TruSurround™ 3D AUDIO PROCESSOR

### ■ GENERAL DESCRIPTION

The NJM2187 is a Passive Matrix TruSurround™\*) 3D audio processor. It regenerates the full surround sound field directly from any kind of surround encoded stereo signal input. The internal passive matrix circuit decodes the surround encoded stereo signal, then the TruSurround Virtualizer encodes into two speaker virtual surround signal. Therefore no front processor which decode the surround encoded stereo signal to the 4 channel signals is required.

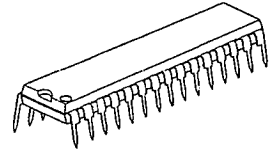
The NJM2187 also includes the SRS 3D-STEREO, and regenerates a 3D sound field from normal L/R input.

The NJM2187 is suitable for TV, mini component, CD radio cassette, multimedia speaker systems and others.

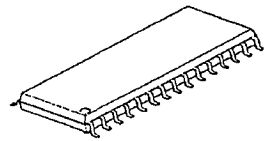
### ■ FEATURES

- Operating Voltage (4.7 to 13V)
- Maximum Input Voltage (2.1Vrms typ. at TRU mode,  $V^+ \geq 11V$ )
- Low Output Noise ( $35\mu V$ rms typ. at TRU mode)
- SRS 3D-STEREO FUNCTION
- BYPASS FUNCTION (THROUGH)
- Bipolar Technology
- Package Outline SDIP30, SDMP30

### ■ PACKAGE OUTLINE



NJM2187L



NJM2187M

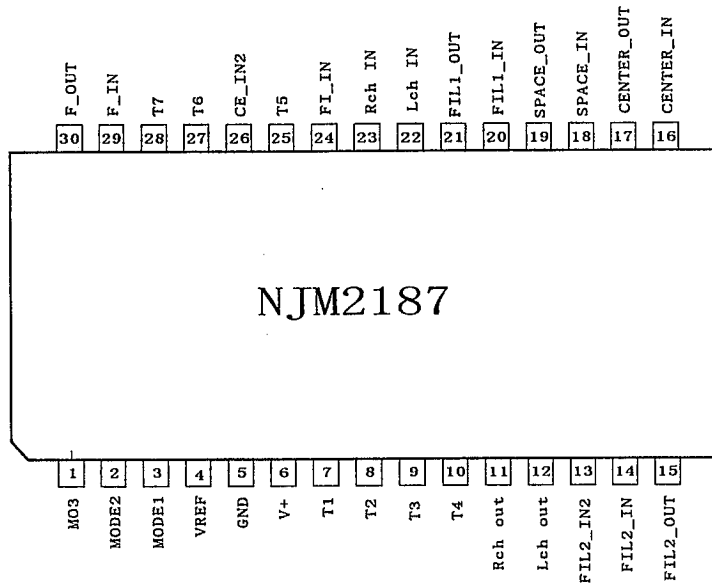
4

\*) The TruSurround technology rights incorporated in the NJM2187 is owned by SRS Labs, a US Corporation and licensed to New Japan Radio Co., Ltd. The TruSurround technology is protected under United States Patent No. 4,748,669 with numerous additional pending domestic and foreign patents. TruSurround is a trademark of SRS Labs, Inc. SRS and the SRS symbol are registered trademarks of SRS Labs, Inc. in the United States and selected foreign countries. Neither the purchase of the NJM2187, nor the corresponding sale of audio enhancement equipment conveys the right to sell commercialized recordings made with the TruSurround technology. SRS Labs requires that all users of the NJM2187 must enter into a license agreement directly with SRS Labs and comply with all rules and regulations as outlined in the TruSurround Trademark Usage Manual of SRS Labs, Inc.

For further information, please contact:

• SRS Labs, Inc.  
2909 Daimler Street, Santa Ana, CA 92705 USA  
Tel: 714-442-1070 Fax: 714-852-1099 <http://www.srslabs.com>

## PIN COFIGURATION



No.	SYMBOL	FUNCTION	No.	SYMBOL	FUNCTION
1	MO3	V <sup>+</sup> IN	16	CENTER_IN	CENTER gain adjustment
2	MODE2	Mode Switch	17	CENTER_OUT	CENTER gain adjustment
3	MODE1	Mode Switch	18	SPACE_IN	SPACE gain adjustment
4	VREF	V <sup>+</sup> /2 output	19	SPACE_OUT	SPACE gain adjustment
5	GND	Ground	20	FIL1_IN	Perspective Network_1 input
6	V <sup>+</sup>	Supply Voltage 4.5 to 13V	21	FIL1_OUT	Perspective Network_1 output
7	T1	test pin	22	Lch in	Left channel input
8	T2	test pin	23	Rch in	Right channel input
9	T3	test pin	24	FI in	Perspective Network input
10	T4	test pin	25	T5	test pin
11	Rch OUT	Right channel output	26	CE in	CENTER input
12	Lch OUT	Left channel output	27	T6	test pin
13	FIL2_IN2	Perspective Network_2 input	28	T7	test pin
14	FIL2_IN	Perspective Network_2 input	29	F_IN	Perspective Network_3 input
15	FIL2_OUT	Perspective Network_2 output	30	F_OUT	Perspective Network_3 output

■ ABSOLUTE MAXIMUM RATING (Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Supply Voltage	V <sup>+</sup>	15	V
Power Dissipation	P <sub>D</sub>	700	mW
Operating Temperature Range	T <sub>OPR</sub>	-20 to +75	°C
Storage Temperature Range	T <sub>stg</sub>	-40 to +125	°C

■ ELECTRICAL CHARACTERISTICS (V<sup>+</sup>=12V, Ta=25°C, OdBu=775mVrms)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V <sup>+</sup>		4.7	12.0	13.0	V
Supply Current	I <sub>cc</sub>	No Signal      BYPASS MODE	10.0	20.0	30.0	mA
Reference Voltage	V <sub>REF</sub>	V <sup>+</sup> /2	5.5	6.0	6.5	V
Maximum Input Voltage	V <sub>INMAX</sub>	V <sub>IN</sub> =L, Rch f=1kHz V <sub>OUT</sub> =L, Rch at THD=3%      BYPASS MODE	11.5 (2.9)	13.5 (3.7)	15.5 (4.6)	dBu (Vrms)
		V <sub>IN</sub> =L, Rch f=125Hz V <sub>OUT</sub> =L, Rch at THD=3%      3D-STEREO MODE	9.3 (2.3)	11.3 (2.8)	13.3 (3.6)	
		V <sub>IN</sub> =Lch f=125Hz V <sub>OUT</sub> =L, Rch at THD=3%      TRU MODE	6.5 (1.6)	8.5 (2.1)	10.5 (2.6)	
Output Noise	V <sub>NOISE</sub>	CCIR-ARM V <sub>IN</sub> =GND V <sub>OUT</sub> =L, Rch      BYPASS MODE	—	-98.0 (13)	-84.0 (63)	dBV (uVrms)
		CCIR-ARM V <sub>IN</sub> =GND V <sub>OUT</sub> =L, Rch      3D-STEREO MODE	—	-89.0 (35)	-84.0 (63)	
		CCIR-ARM V <sub>IN</sub> =GND V <sub>OUT</sub> =L, Rch      TRU MODE	—	-89.0 (35)	-84.0 (63)	
Total Harmonic Distortion	THD	V <sub>IN</sub> =-10dBu Lch f=1kHz, V <sub>OUT</sub> =Lch      BYPASS MODE	—	0.01	—	%
		V <sub>IN</sub> =-10dBu Lch f=1kHz, V <sub>OUT</sub> =L, Rch      3D-STEREO MODE	—	0.1	—	
		V <sub>IN</sub> =-10dBu Lch f=1kHz, V <sub>OUT</sub> =L, Rch      TRU MODE	—	0.1	—	
BYPASS Gain	G <sub>BYPASS</sub>	V <sub>IN</sub> =0dBu Lch f=1kHz, V <sub>OUT</sub> =L, Rch      BYPASS MODE	-1.0	0.0	1.0	dB
Passive Gain	G <sub>PASV-L</sub>	V <sub>IN</sub> =0dBu Lch f=1kHz, V <sub>OUT</sub> =Lch      TRU MODE	1.3	2.3	3.3	dB
Passive Gain	G <sub>PASV-R</sub>	V <sub>IN</sub> =0dBu Lch f=1kHz, V <sub>OUT</sub> =Rch      TRU MODE	-12.4	-11.4	-10.4	dB

4

■ ELECTRICAL CHARACTERISTICS ( $V^+=12V$ ,  $T_a=25^\circ C$ ,  $0dBu=775mVrms$ )

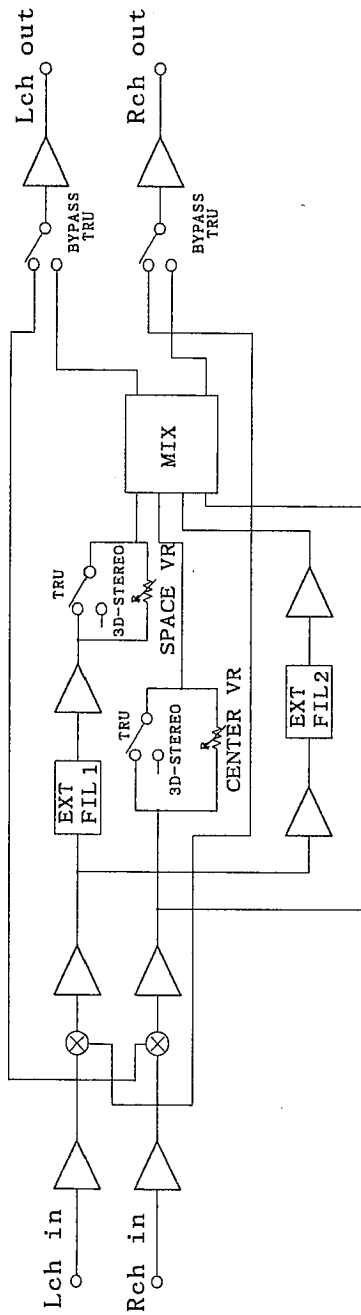
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT	
Feed Through Gain	$G_{THROUGH}$	$V_{IN}=0dBu$ Lch $f=1kHz$ , $V_{OUT}=Lch$ SPACE VR Min CENTER VR Min	3D-STEREO MODE	-19.2	-18.2	-17.2	dB
L + R Gain	$G_{L+R}$	$V_{IN}=0dBu$ Lch $f=1kHz$ , $V_{OUT}=Rch$ SPACE VR Min CENTER VR Max	3D-STEREO MODE	-14.0	-13.0	-12.0	dB
L - R Gain	$G_{L-R}$	$V_{IN}=0dBu$ Lch $f=125Hz$ , $V_{OUT}=Rch$ SPACE VR Max CENTER VR Min	3D-STEREO MODE	-2.0	0.0	2.0	dB
MODE Select Control Voltage	$V_{MODE}$	$V_{IN}=High$ Level		2.0	—	$V^+$	V.
		$V_{IN}=Low$ Level		0.0	—	0.7	

4

■ MODE SELECT FUNCTION

MODE	MODE1	MODE2	NOTE
BYPASS	L	L	INPUT THROUGH MODE
TSV	L	H	TRU MODE + Variable effects by SPACE and CENTER VR
3D-STEREO	H	L	SRS 3D-STEREO MODE (Normal STEREO Source) Variable effects by SPACE and CENTER VR
Passive Matrix TruSurround (TRU)	H	H	Lt/Rt input MODE

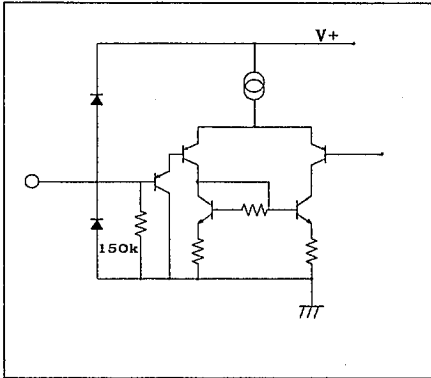
■ BLOCK DIAGRAM



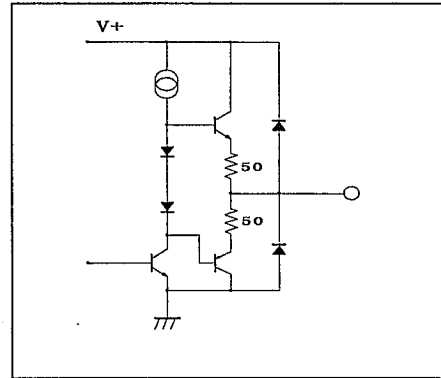
4

## PIN DESCRIPTION

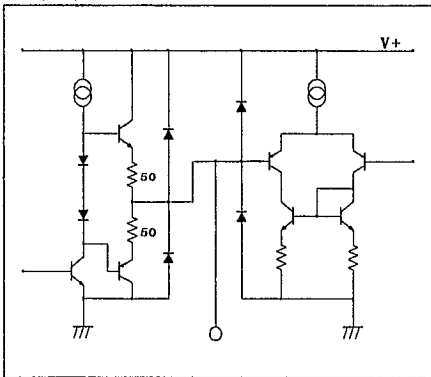
1,2,3 PIN



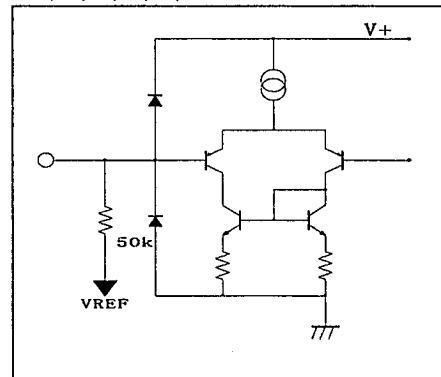
4,7,8,9,10,11,12,15,17,21,28 PIN



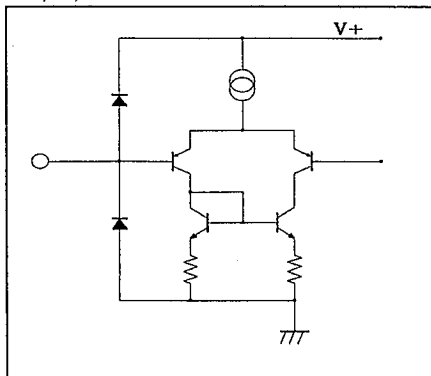
13,19,30 PIN



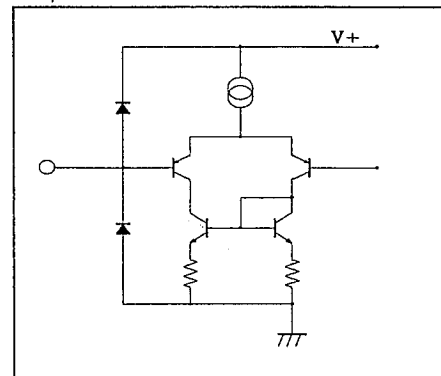
22,23,24,25,26,27 PIN



14,20,29 PIN



16,18 PIN

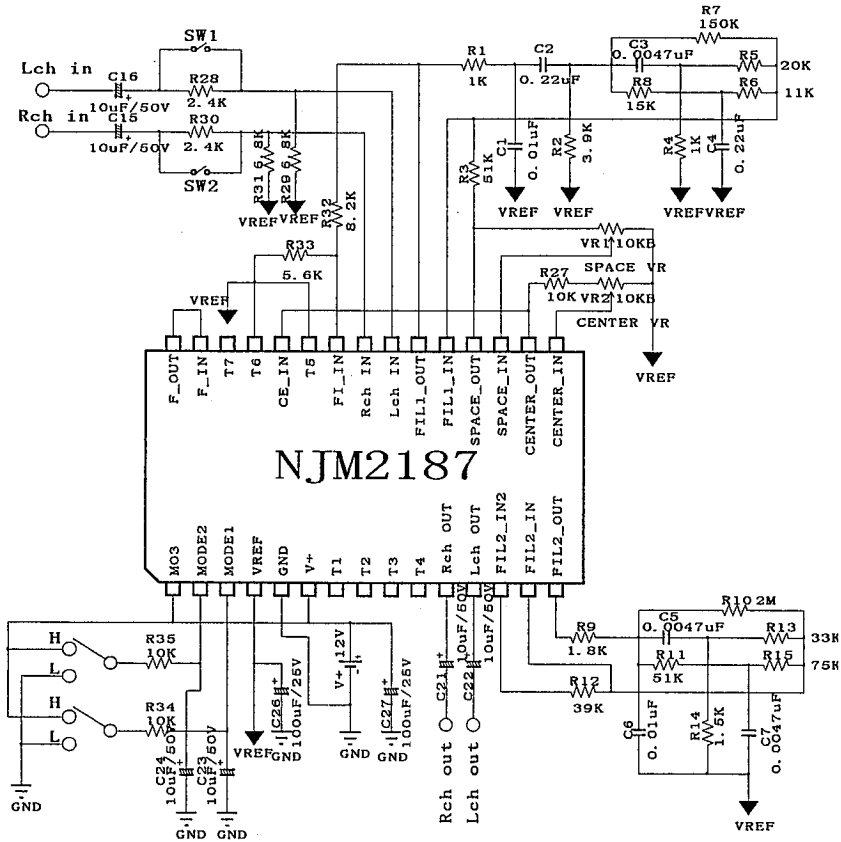


4

## APPLICATION CIRCUIT

Gain control SW (SW1, SW2)

TRU                    OFF  
 3D-Stereo          ON  
 Bypass              ON

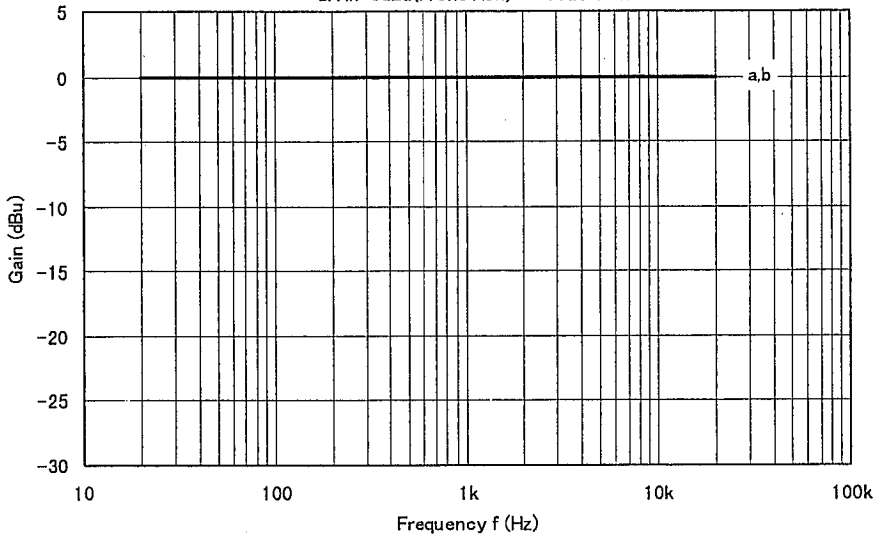


4

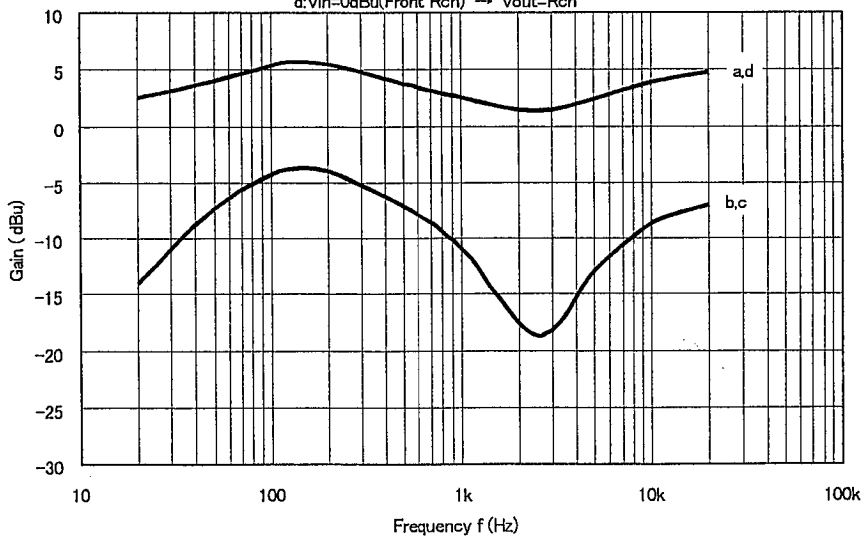
PARTS No.	VALUE	TOLERANCE	PARTS No.	VALUE	TOLERANCE
C1, C6	0.01 $\mu$ F	$\pm 5\%$	R9	1.8k	$\pm 5\%$
C2, C4	0.22 $\mu$ F	$\pm 5\%$	R10	2M	$\pm 5\%$
C3, C5, C7	0.0047 $\mu$ F	$\pm 5\%$	R12	39k	$\pm 5\%$
C15, C16, C21, C22, C23, C24	10 $\mu$ F		R13	33k	$\pm 5\%$
C26, C27	100 $\mu$ F		R14	1.5k	$\pm 5\%$
R1, R4, R34, R35	1k	$\pm 5\%$	R15	75k	$\pm 5\%$
R2	3.9k	$\pm 5\%$	R27	10k	$\pm 5\%$
R3, R11	51k	$\pm 5\%$	R28, R30	2.4k	$\pm 5\%$
R5	20k	$\pm 5\%$	R29, R31	6.8k	$\pm 5\%$
R6	11k	$\pm 5\%$	R32	8.2k	$\pm 5\%$
R7	150k	$\pm 5\%$	R33	5.6k	$\pm 5\%$
R8	15k	$\pm 5\%$			

## TYPICAL CHARACTERISTICS

TruSurround GAIN STRUCTURE  
 BYPASS Mode ( $V^+ = 12V$ )  
 a:  $V_{in} = 0dBu(\text{Front Lch}) \rightarrow V_{out} = \text{Lch}$   
 b:  $V_{in} = 0dBu(\text{Front Rch}) \rightarrow V_{out} = \text{Rch}$



Passive Matrix TruSurround (Lt/Rt) GAIN STRUCTURE  
 Tru Mode ( $V^+ = 12V$ )  
 a:  $V_{in} = 0dBu(\text{Front Lch}) \rightarrow V_{out} = \text{Lch}$   
 b:  $V_{in} = 0dBu(\text{Front Lch}) \rightarrow V_{out} = \text{Rch}$   
 c:  $V_{in} = 0dBu(\text{Front Rch}) \rightarrow V_{out} = \text{Lch}$   
 d:  $V_{in} = 0dBu(\text{Front Rch}) \rightarrow V_{out} = \text{Rch}$

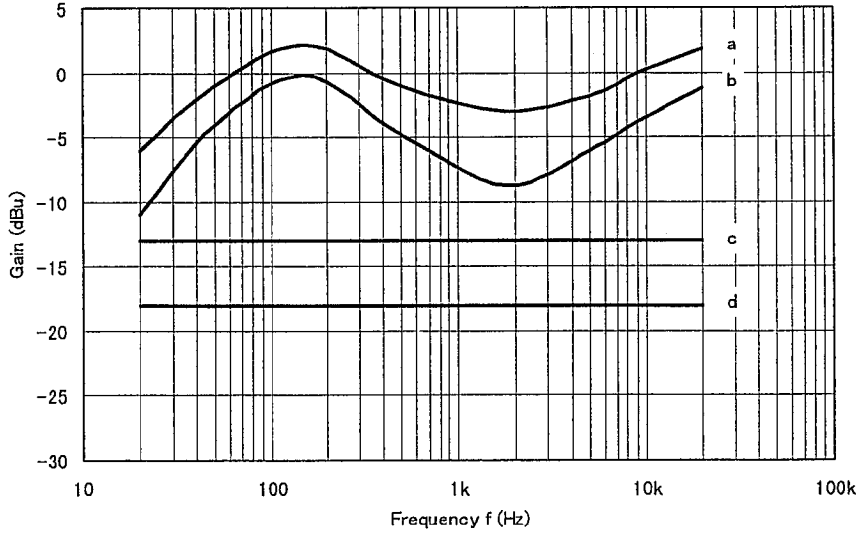




■ TYPICAL CHARACTERISTICS

TruSurround GAIN STRUCTURE  
3D-STEREO Mode ( $V^+=12V$ )

- a:  $V_{in}=0dBu(Lch) \rightarrow V_{out}=Lch, SPACE VR \max, CENTER VR \max$
- b:  $V_{in}=0dBu(Lch) \rightarrow V_{out}=Rch, SPACE VR \max, CENTER VR \min$
- c:  $V_{in}=0dBu(Lch) \rightarrow V_{out}=Rch, SPACE VR \min, CENTER VR \max$
- d:  $V_{in}=0dBu(Lch) \rightarrow V_{out}=Lch, SPACE VR \min, CENTER VR \min$



4

## MEMO

[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.