

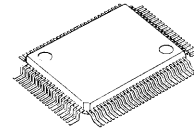
8-CHANNEL ELECTRONIC VOLUME WITH INPUT SELECTOR

■ GENERAL DESCRIPTION

NJW1197A is an 8-channel electronic volume IC. It includes Input selector, tone control, volume, mute, input selector gain control, volume output gain control and 5 REC outputs. Each mode and conditions are set by the 3-wired serial control data.

NJW1197A improves low Residual Output Noise Voltage compared with **NJW1197**.

■ PACKAGE OUTLINE

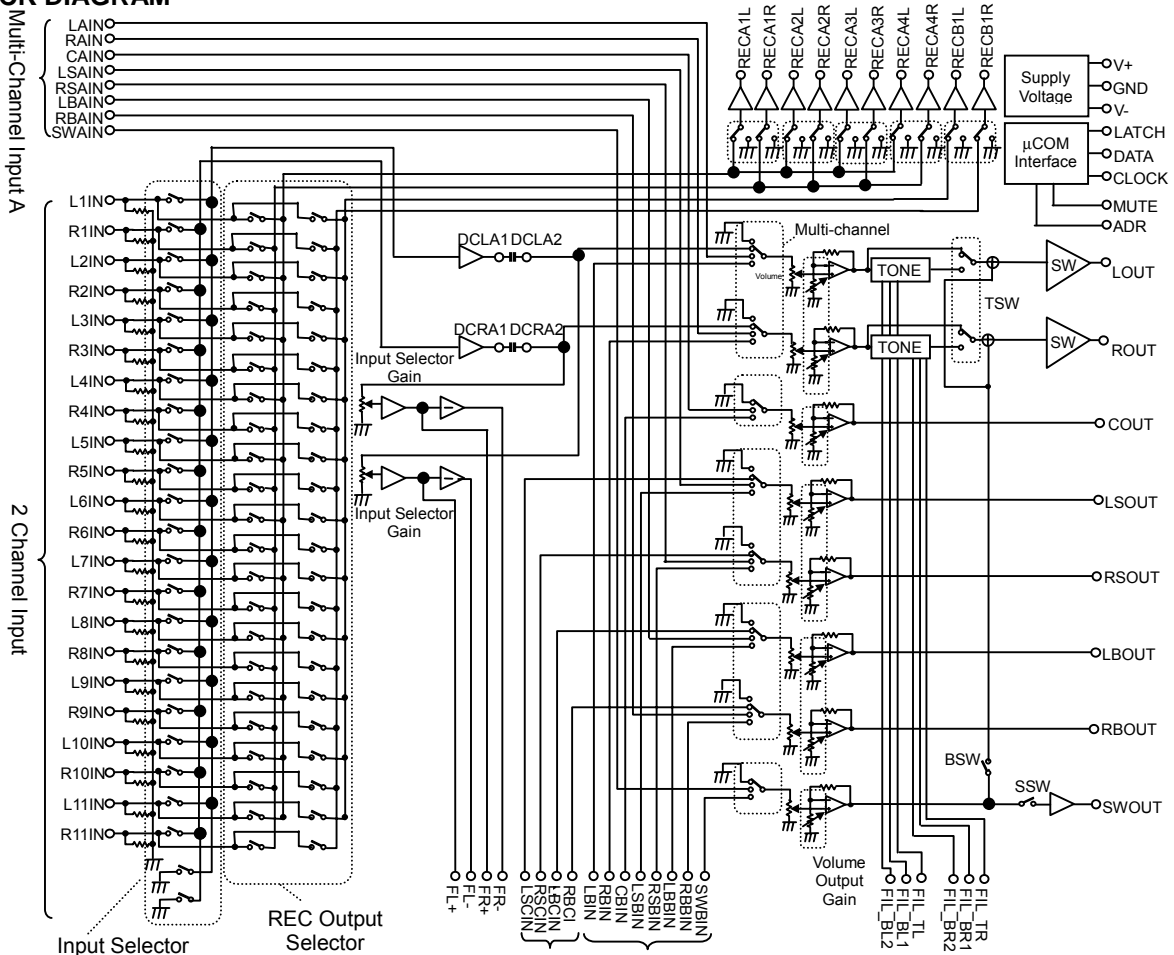


NJW1197AFC2

■ FEATURES

- | | |
|--|--|
| ● Operating Voltage | ±4.5 to ±7.5V |
| ● 3-Wired Serial Control | Chip Address Select Function |
| ● Input Selector (x 11) | |
| ● REC Output (x 5) | Independent Mute function |
| ● Input Selector Gain Control | Gain : 0/-3/-6/-9/-12dB |
| ● Volume Output Gain Control | Gain : 0/+12/+13/+14/+15/+16/+17/+18dB (L,R,C,LS,RS,LB,RBch) |
| | Gain : 0/+22/+23/+24/+25/+26/+27/+28dB (SWch) |
| | Independent Control: L,Rch / Cch / LS,RSch / LB,RBch / SWch |
| | 0 to -100dB/0.5dBstep, MUTE |
| | -114dBV typ. @Volume=-95dB (Output Noise 3) |
| | 0 to ±10dB/1dBstep |
| ● Volume | |
| ● Residual Output Noise Voltage | |
| ● Tone Control | |
| ● Subwoofer output addition to L, R channel output | |
| ● Subwoofer output ON/OFF control | |
| ● Bi-CMOS Technology | |
| ● Package Outline | QFP100-C2 |

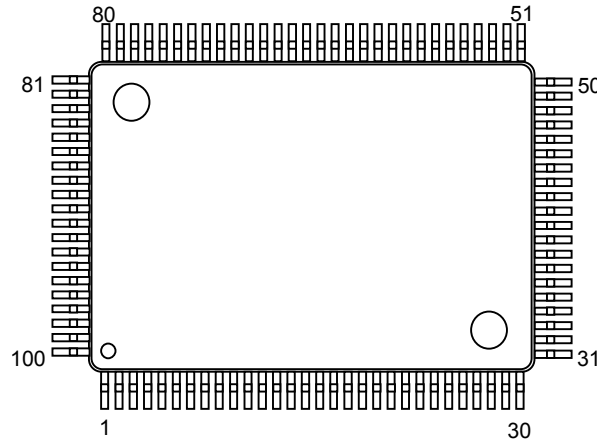
■ BLOCK DIAGRAM



Multi-Channel Input C Multi-Channel Input B
New Japan Radio Co., Ltd.

Note) This is not a final specification. Some parametric limits are subject to change without notice at any time.

■ PIN FUNCTION



No.	SYMBOL	FUNCTION	No.	SYMBOL	FUNCTION
1	ROUT	Rch output	51	DCR_IN	"Multi-channel selector" Rch input
2	COUT	Cch output	52	DCR_OUT	"Input selector" Rch output
3	LSOUT	LSch output	53	GND	Ground
4	RSOUT	RSch output	54	DCL_IN	"Multi-channel selector" Lch input
5	LBOUT	LBch output	55	DCL_OUT	"Input selector" Lch output
6	RBOUT	RBch output	56	GND	Ground
7	SWOUT	SWch output	57	REC_B1R	"Input selector" Rch REC output B1
8	GND	Ground	58	REC_B1L	"Input selector" Lch REC output B1
9	FIL_BL2	Lch Bass filter terminal 2	59	REC_A4R	"Input selector" Rch REC output A4
10	FIL_BL1	Lch Bass filter terminal 1	60	REC_A4L	"Input selector" Lch REC output A4
11	FIL_TL	Lch Treble filter terminal	61	REC_A3R	"Input selector" Rch REC output A3
12	TCAP	Switching noise rejection capacitor	62	REC_A3L	"Input selector" Lch REC output A3
13	FIL_BR2	Rch Bass filter terminal 2	63	REC_A2R	"Input selector" Rch REC output A2
14	FIL_BR1	Rch Bass filter terminal 1	64	REC_A2L	"Input selector" Lch REC output A2
15	FIL_TR	Rch Treble filter terminal	65	REC_A1R	"Input selector" Rch REC output A1
16	V+	+ Power supply voltage input	66	REC_A1L	"Input selector" Lch REC output A1
17	ADR	Chip address select input	67	VDDOUT	Internal Digital +Power Supply Output
18	V-	- Power supply voltage input	68	DATA	Control data signal input
19	L1IN	"Input selector" Lch input 1	69	CLOCK	Clock signal input
20	DCCAP_SW	Switching noise rejection capacitor	70	LATCH	Latch signal input
21	R1IN	"Input selector" Rch input 1	71	MUTE	External mute control
22	DCCAP_RB	Switching noise rejection capacitor	72	FL+	"Input selector gain control" Lch no-inverted output
23	L2IN	"Input selector" Lch input 2	73	FL-	"Input selector gain control" Lch inverted output
24	DCCAP_LB	Switching noise rejection capacitor	74	FR+	"Input selector gain control" Rch no-inverted output
25	R2IN	"Input selector" Rch input 2	75	FR-	"Input selector gain control" Rch inverted output
26	DCCAP_RS	Switching noise rejection capacitor	76	GND	Ground
27	L3IN	"Input selector" Lch input 3	77	LSCIN	Multi-channel LSch input C
28	DCCAP_LS	Switching noise rejection capacitor	78	RSCIN	Multi-channel RSch input C
29	R3IN	"Input selector" Rch input 3	79	LBCIN	Multi-channel LBch input C
30	DCCAP_C	Switching noise rejection capacitor	80	RBCIN	Multi-channel RBch input C
31	L4IN	"Input selector" Lch input 4	81	GND	Ground
32	DCCAP_R	Switching noise rejection capacitor	82	LAIN	Multi-channel Lch input A
33	R4IN	"Input selector" Rch input 4	83	RAIN	Multi-channel Rch input A
34	DCCAP_L	Switching noise rejection capacitor	84	CAIN	Multi-channel Cch input A
35	L5IN	"Input selector" Lch input 5	85	LSAIN	Multi-channel LSch input A
36	GND	Ground	86	RSAIN	Multi-channel RSch input A
37	R5IN	"Input selector" Rch input 5	87	LBAIN	Multi-channel LBch input A
38	GND	Ground	88	RBAIN	Multi-channel RBch input A
39	L6IN	"Input selector" Lch input 6	89	SWAIN	Multi-channel SWch input A
40	L9IN	"Input selector" Lch input 9	90	GND	Ground
41	R6IN	"Input selector" Rch input 6	91	LBIN	Multi-channel Lch input B
42	R9IN	"Input selector" Rch input 9	92	RBIN	Multi-channel Rch input B
43	L7IN	"Input selector" Lch input 7	93	CBIN	Multi-channel Cch input B
44	L10IN	"Input selector" Lch input 10	94	LSBIN	Multi-channel LSch input B
45	R7IN	"Input selector" Rch input 7	95	RSBIN	Multi-channel RSch input B
46	R10IN	"Input selector" Rch input 10	96	LBBIN	Multi-channel LBch input B
47	L8IN	"Input selector" Lch input 8	97	RBBIN	Multi-channel RBch input B
48	L11IN	"Input selector" Lch input 11	98	SWBIN	Multi-channel SWch input B
49	R8IN	"Input selector" Rch input 8	99	GND	Ground
50	R11IN	"Input selector" Rch input 11	100	LOUT	Lch output

■ ABSOLUTE MAXIMUM RATING (Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Power Supply Voltage	V _{+/-}	+8/-8	V
Maximum Input Voltage	V _{IM}	V _{+/-}	V
Power Dissipation	P _D	1600 NOTE: EIA/JEDEC STANDARD Test board (76.2x114.3x1.6mm, 2layer, FR-4) mounting	mW
Operating Temperature Range	Topr	-40 to +75	°C
Storage Temperature Range	Tstg	-40 to +150	°C

■ ELECTRICAL CHARACTERISTICS (Ta=25°C, V_{+/-}=±7V, R_L=47kΩ, Volume=0dB, Gain=0dB, TONE=OFF)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
◆ Power Supply						
Operating Voltage 1	V ₊		4.5	7.0	7.5	V
Operating Voltage 2	V ₋		-7.5	-7.0	-4.5	V
Supply Current 1	I _{CC}	No signal	-	40	50	mA
Supply Current 2	I _{EE}	No signal	-	40	50	mA
◆ Input/Output Characteristics (Output)						
Maximum Output Voltage	V _{OM}	f=1kHz, THD=1% Volume=0dB	3.0	4.4	-	Vrms
Voltage Gain	G _V	V _{IN} =2Vrms, f=1kHz Volume=0dB	-0.5	0	0.5	dB
Voltage Gain Error	ΔG _V	V _{IN} =2Vrms, f=1kHz Volume=0dB	-0.5	0	0.5	dB
Maximum Attenuation 1	A _{TT1}	f=1kHz, V _{IN} =2Vrms Volume=Mute, A-weight	-	-120	-	dB
Maximum Attenuation 2	A _{TT2}	f=1kHz, V _{IN} =2Vrms Volume=Mute, A-weight TONE=ON (Bass=Treble=0dB)	-	-115	-	dB
Attenuation Error	ΔA _{TT}	f=1kHz, V _{IN} =2Vrms Volume=-60dB	-1	0	1	dB
Output Noise1	V _{NO1}	Volume=0dB, Rg=0, A-weight	-	-114 (2.0μ)	-	dBV (Vrms)
Output Noise2	V _{NO2}	Volume=0dB, Rg=0, A-weight TONE=ON (Bass=Treble=0dB)	-	-110 (3.2μ)	-102 (7.9μ)	dBV (Vrms)
Output Noise3	V _{NO3}	Volume=-95dB, Rg=0, A-weight	-	-114 (2.0μ)	-105 (5.6μ)	dBV (Vrms)

■ ELECTRICAL CHARACTERISTICS (Ta=25°C, V⁺/V⁻=±7V, RL=47kΩ, Volume=0dB, Gain=0dB, TONE=OFF)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
◆ Input/Output Characteristics (Output)						
Total Harmonic Distortion 1	T.H.D.1	f=1kHz, V _{IN} =200mVrms, VOL=0dB, Gain=0dB, BW=400Hz-30kHz TONE=ON (Bass=Treble=0dB)	-	0.003	0.02	%
Total Harmonic Distortion 2	T.H.D.2	f=10kHz, V _{IN} =200mVrms, VOL=0dB, Gain=0dB, BW=400Hz-30kHz TONE=ON (Bass=Treble=0dB)	-	0.003	-	%
Total Harmonic Distortion 3	T.H.D.3	f=1kHz, V _{IN} =2Vrms, VOL=0dB, Gain=0dB, BW=400Hz-30kHz TONE=ON (Bass=Treble=0dB)	-	0.0015	0.02	%
Total Harmonic Distortion 4	T.H.D.4	f=10kHz, V _{IN} =2Vrms, VOL=0dB, Gain=0dB, BW=400Hz-30kHz TONE=ON (Bass=Treble=0dB)	-	0.006	-	%
Total Harmonic Distortion 5	T.H.D.5	f=1kHz, V _{IN} =200mVrms, VOL=0dB, Gain=+15dB, BW=400Hz-30kHz, TONE=ON (Bass=Treble=0dB)	-	0.005	0.02	%
Total Harmonic Distortion 6	T.H.D.6	f=10kHz, V _{IN} =200mVrms, VOL=0dB, Gain=+15dB, BW=400Hz-30kHz, TONE=ON (Bass=Treble=0dB)	-	0.005	-	%
Total Harmonic Distortion 7	T.H.D.7	f=1kHz, V _{IN} =2Vrms, VOL=-18dB, Gain=0dB, BW=400Hz-30kHz, TONE=ON (Bass=Treble=0dB)	-	0.008	0.02	%
Total Harmonic Distortion 8	T.H.D.8	f=10kHz, V _{IN} =2Vrms, VOL=-18dB, Gain=0dB, BW=400Hz-30kHz, TONE=ON (Bass=Treble=0dB)	-	0.01	-	%
Cross Talk 1	CT1	f=1kHz, V _{IN} =2Vrms, A-weight Volume=0dB, Rg=0Ω	-	-110	-	dB
Cross Talk 2	CT2	f=20kHz, V _{IN} =2Vrms, Volume=0dB, Rg=0Ω	-	-90	-	dB
Channel Separation 1	CS1	f=1kHz, V _{IN} =2Vrms, A-weight Volume=0dB, Rg=0Ω	-	-110	-90	dB
Channel Separation 2	CS2	f=20kHz, V _{IN} =2Vrms, Volume=0dB, Rg=0Ω	-	-90	-	dB
Channel Separation 3	CS3	f=1kHz, V _{IN} =2Vrms, A-weight Volume=0dB, Rg=0Ω TONE=ON (Bass=Treble=0dB)	-	-110	-	dB
Channel Separation 4	CS4	f=20kHz, V _{IN} =2Vrms, Volume=0dB, Rg=0Ω TONE=ON (Bass=Treble=0dB)	-	-90	-	dB

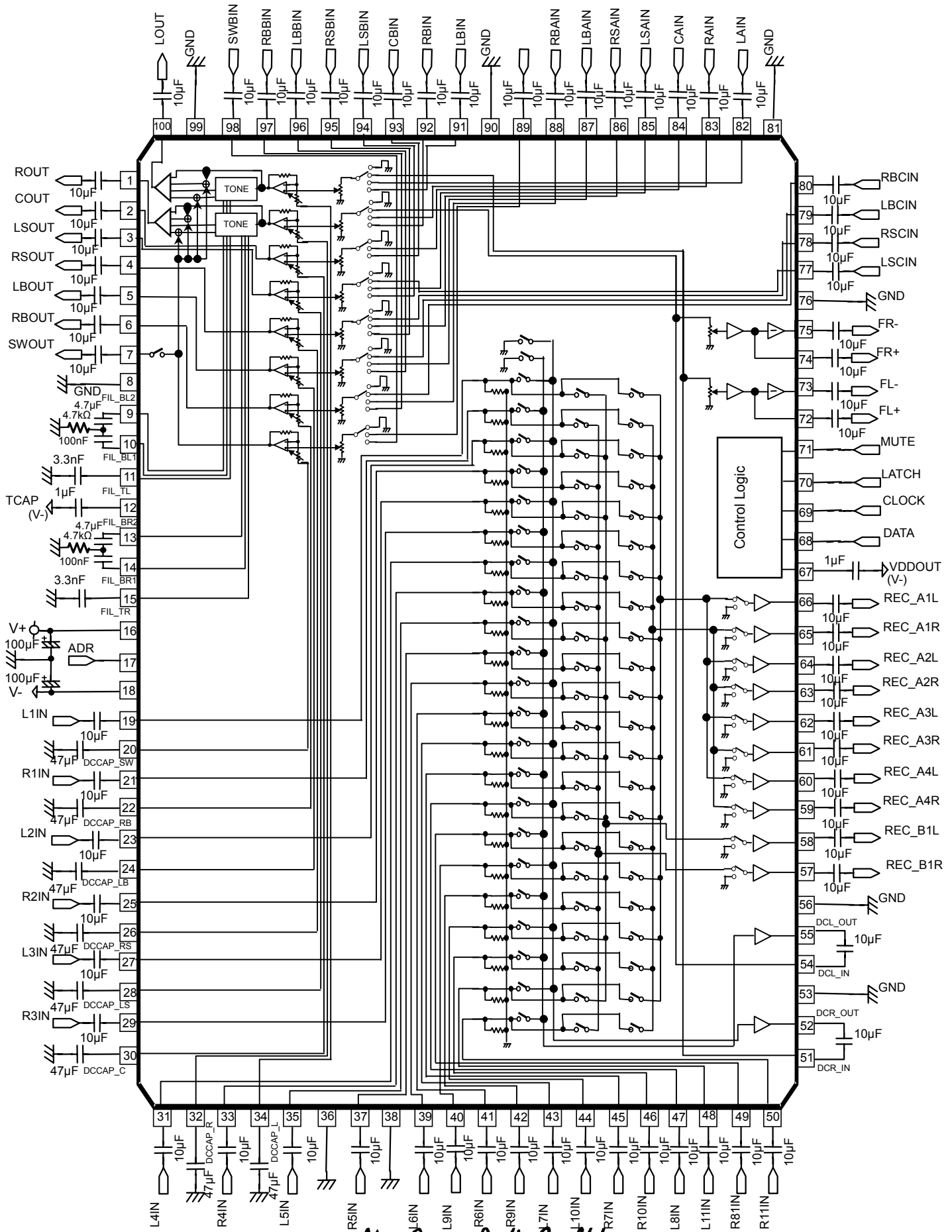
◆ Input/Output Characteristics (REC output)

REC Out Voltage Gain	G _{VREC}	V _{IN} =2Vrms, f=1kHz	-0.5	0	0.5	dB
REC Out Output Noise	V _{NOREC}	Rg=0, A-weight	-	-117 (1.41μ)	-	dBV (Vrms)
REC Out Total Harmonic Distortion 1	T.H.D _{REC1}	f=1kHz, V _{IN} =2Vrms, BW=400Hz-30kHz	-	0.001	0.05	%
REC Out Total Harmonic Distortion 2	T.H.D _{REC2}	f=1kHz, V _{IN} =1Vrms, BW=400Hz-30kHz	-	0.0003	-	%
REC Out Maximum Attenuation	A _{TTREC}	f=1kHz, V _{IN} =2Vrms REC Out=Mute, A-weight	-	-105	-	dB

■ ELECTRICAL CHARACTERISTICS (Ta=25°C, V⁺/V⁻=±7V, RL=47kΩ, Volume=0dB, Gain=0dB, TONE=OFF)

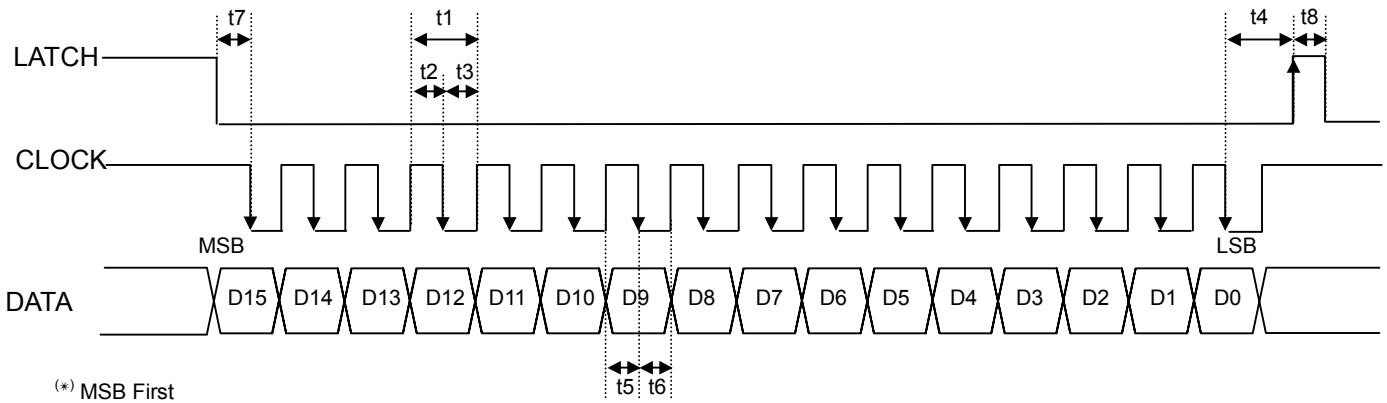
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
◆ Input Selector Gain Control Characteristics						
Input Selector Gain Control Voltage Gain 1	G _{VINC1}	f=1kHz, V _{IN} =2Vrms, Input Selector Gain = 0dB	-0.5	0	+0.5	dB
Input Selector Gain Control Voltage Gain 2	G _{VINC2}	f=1kHz, V _{IN} =2Vrms, Input Selector Gain = -6dB	-6.5	-6.0	-5.5	dB
Input Selector Gain Control Voltage Gain 3	G _{VINC3}	f=1kHz, V _{IN} =2Vrms, Input Selector Gain = -12dB	-12.5	-12.0	-11.5	dB
◆Tone Control Characteristics						
Treble Voltage Gain 1	G _{VTREB1}	V _{IN} =100mVrms, f=10kHz Volume=0dB Treble=0dB	-2.0	0	2.0	dB
Treble Voltage Gain 2	G _{VTREB2}	V _{IN} =100mVrms, f=10kHz Volume=0dB Treble=10dB	8.0	10.0	12.0	dB
Treble Voltage Gain 3	G _{VTREB3}	V _{IN} =100mVrms, f=10kHz Volume=0dB Treble=-10dB	-12.0	-10.0	-8.0	dB
Bass Voltage Gain 1	G _{VBASS1}	V _{IN} =100mVrms, f=100Hz Volume=0dB Bass=0dB	-2.0	0	2.0	dB
Bass Voltage Gain 2	G _{VBASS2}	V _{IN} =100mVrms, f=100Hz Volume=0dB Bass=10dB	8.0	10.0	12.0	dB
Bass Voltage Gain 3	G _{VBASS3}	V _{IN} =100mVrms, f=100Hz Volume=0dB Bass=-10dB	-12.0	-10.0	-8.0	dB
◆Volume Output Gain Control Characteristics (Lch, Rch, Cch, LSch, RSch, LBch, RBch)						
Volume Output Gain Control Voltage Gain 1	G _{VOUTC1}	f=1kHz, V _{IN} =100mVrms, Volume=0dB Volume Output Gain=+12dB	11.0	12.0	13.0	dB
Volume Output Gain Control Voltage Gain 2	G _{VOUTC2}	f=1kHz, V _{IN} =100mVrms, Volume =0dB Volume Output Gain =+18 dB	17.0	18.0	19.0	dB
◆SWch Volume Output Gain Control Characteristics						
SWch Volume Output Gain Control Voltage Gain 1	G _{SVOUTC1}	f=1kHz, V _{IN} =100mVrms, Volume=0dB Volume Output Gain=+22dB	21.0	22.0	23.0	dB
SWch Volume Output Gain Control Voltage Gain 2	G _{SVOUTC2}	f=1kHz, V _{IN} =100mVrms, Volume =0dB Volume Output Gain =+28 dB	27.0	28.0	29.0	dB
◆Logic Control Characteristics						
High Level Input Voltage	V _{IH}	DATA, CLOCK, LATCH, ADR, MUTE Terminal Input	2.5	-	V ⁺	V
Low Level Input Voltage	V _{IL}	DATA, CLOCK, LATCH, ADR, MUTE Terminal Input	0	-	1.5	V

APPLICATION CIRCUIT



New Japan Radio Co., Ltd.

■ CONTROL DATA FORMAT



SYMBOL	PARAMETER	MIN	TYP	MAX	UNIT
t1	CLOCK Clock Width	4	-	-	μsec
t2	CLOCK Pulse Width (High)	2	-	-	μsec
t3	CLOCK Pulse Width (Low)	2	-	-	μsec
t4	LATCH Rise Hold Time	4	-	-	μsec
t5	DATA Setup Time	1.6	-	-	μsec
t6	DATA Hold Time	1.6	-	-	μsec
t7	CLOCK Setup Time	1.6	-	-	μsec
t8	LATCH High Pulse Width	1.6	-	-	μsec

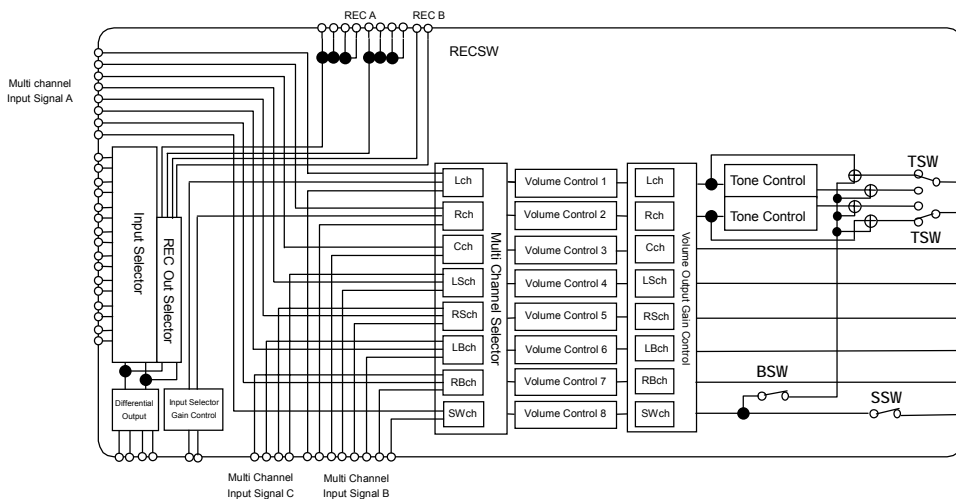
■ CONTROL DATA

NJW1197A control data is constructed with 16bits.

MSB

LSB

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Data								Select Address				Chip Address			



MSB

LSB

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
L channel Volume Control								0	0	0	0	*	*	*	*
R channel Volume Control								0	0	0	1	*	*	*	*
C channel Volume Control								0	0	1	0	*	*	*	*
LS channel Volume Control								0	0	1	1	*	*	*	*
RS channel Volume Control								0	1	0	0	*	*	*	*
LB channel Volume Control								0	1	0	1	*	*	*	*
RB channel Volume Control								0	1	1	0	*	*	*	*
SW channel Volume Control								0	1	1	1	*	*	*	*
Input Selector Gain Control		Input Selector				SSW		1	0	0	0	*	*	*	*
TC/B	Tone Control Treble				TSW	BSW	Don't Care	1	0	0	1	*	*	*	*
BC/B	Tone Control Bass				Don't Care	Don't Care	Don't Care	1	0	1	0	*	*	*	*
REC B Selector				REC A Selector				1	0	1	1	*	*	*	*
SWch Volume Output Gain Control		REC B1	REC A4	REC A3	REC A2	REC A1	1	1	0	0	*	*	*	*	
L,Rch Volume Output Gain Control		Cch Volume Output Gain Control			Don't Care	Don't Care	1	1	0	1	*	*	*	*	
LS,RSch Volume Output Gain Control		LB,RBch Volume Output Gain Control			SWch Selector		1	1	1	0	*	*	*	*	
L,Rch Selector	Cch Selector	LS,RSch Selector		LB,RBch Selector		1	1	1	1	*	*	*	*		

* Chip address is set by chip address select terminal (ADR) status.

chip address select terminal (ADR : 17pin)	Chip Address			
	D3	D2	D1	D0
Low	0	1	0	0
High	0	1	0	1

* The mute function can be controlled externally. If the Mute control terminal (71pin) is switched to High, Multi-Channel outputs are muted immediately (hardware mute).

External mute control terminal (MUTE: 71pin)	Setting
Low	Mute cancellation
High	Mute

■ INITIAL CONDITION

MSB

LSB

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
1	1	1	1	1	1	1	1	0	0	0	0	*	*	*	*
1	1	1	1	1	1	1	1	0	0	0	1	*	*	*	*
1	1	1	1	1	1	1	1	0	0	1	0	*	*	*	*
1	1	1	1	1	1	1	1	0	0	1	1	*	*	*	*
1	1	1	1	1	1	1	1	0	1	0	0	*	*	*	*
1	1	1	1	1	1	1	1	0	1	0	1	*	*	*	*
1	1	1	1	1	1	1	1	0	1	1	0	*	*	*	*
1	1	1	1	1	1	1	1	0	1	1	1	*	*	*	*
0	0	0	0	0	0	0	0	1	0	0	0	*	*	*	*
0	0	0	0	0	0	0	0	1	0	0	1	*	*	*	*
0	0	0	0	0	0	0	0	1	0	1	0	*	*	*	*
0	0	0	0	0	0	0	0	1	0	1	1	*	*	*	*
0	0	0	0	0	0	0	0	1	1	0	0	*	*	*	*
0	0	0	0	0	0	0	0	1	1	0	1	*	*	*	*
0	0	0	0	0	0	0	0	1	1	1	0	*	*	*	*
0	0	0	0	0	0	0	0	1	1	1	1	*	*	*	*

■ DEFINITION OF RESISTOR

◆Volume Control : 0dB to -100dB in 0.5dB/step.

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
L channel Volume Control								0	0	0	0	*	*	*	*
R channel Volume Control								0	0	0	1	*	*	*	*
C channel Volume Control								0	0	1	0	*	*	*	*
LS channel Volume Control								0	0	1	1	*	*	*	*
RS channel Volume Control								0	1	0	0	*	*	*	*
LB channel Volume Control								0	1	0	1	*	*	*	*
RB channel Volume Control								0	1	1	0	*	*	*	*
SW channel Volume Control								0	1	1	1	*	*	*	*

< Volume Control Data >

Data								Setting
D15	D14	D13	D12	D11	D10	D9	D8	
0	0	0	0	0	0	0	0	0dB
0	0	0	0	0	0	0	1	-0.5dB
0	0	0	0	0	0	1	0	-1dB
0	0	0	0	0	0	1	1	-1.5dB
0	0	0	0	0	1	0	0	-2dB
0	0	0	0	0	1	0	1	-2.5dB
0	0	0	0	0	1	1	0	-3dB
0	0	0	0	0	1	1	1	-3.5dB
0	0	0	0	1	0	0	0	-4dB
0	0	0	0	1	0	0	1	-4.5dB
0	0	0	0	1	0	1	0	-5dB
0	0	0	0	1	0	1	1	-5.5dB
0	0	0	0	1	1	0	0	-6dB
0	0	0	0	1	1	0	1	-6.5dB
0	0	0	0	1	1	1	0	-7dB
0	0	0	0	1	1	1	1	-7.5dB
0	0	0	1	0	0	0	0	-8dB
0	0	0	1	0	0	0	1	-8.5dB
0	0	0	1	0	0	1	0	-9dB
0	0	0	1	0	0	1	1	-9.5dB
0	0	0	1	0	1	0	0	-10dB
...								...
1	1	0	0	0	0	1	0	-97dB
1	1	0	0	0	0	1	1	-97.5dB
1	1	0	0	0	1	0	0	-98dB
1	1	0	0	0	1	0	1	-98.5dB
1	1	0	0	0	1	1	0	-99dB
1	1	0	0	0	1	1	1	-99.5dB
1	1	0	0	1	0	0	0	-100dB
1	1	1	1	1	1	1	1	MUTE ^(*)

^(*)Initial Setting

- ◆ **Input Selector Gain Control** : Gain control for selected signal at the Input Selector.
- Input Selector** : Selector for the stereo inputs from 1IN to 11IN
- SSW** : SW channel output ON/OFF.

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Input Selector Gain Control			Input Selector				SSW	1	0	0	0	*	*	*	*

< Input Selector Gain Control Data >

Data			Setting
D15	D14	D13	
0	0	0	0dB ^(*)
0	0	1	-3dB
0	1	0	-6dB
0	1	1	-9dB
1	0	0	-12dB

< Input Selector Data >

Data				Setting
D12	D11	D10	D9	
0	0	0	0	Mute ^(*)
0	0	0	1	1IN (2ch Input 1)
0	0	1	0	2IN (2ch Input 2)
0	0	1	1	3IN (2ch Input 3)
0	1	0	0	4IN (2ch Input 4)
0	1	0	1	5IN (2ch Input 5)
0	1	1	0	6IN (2ch Input 6)
0	1	1	1	7IN (2ch Input 7)
1	0	0	0	8IN (2ch Input 8)
1	0	0	1	9IN (2ch Input 9)
1	0	1	0	10IN (2ch Input 10)
1	0	1	1	11IN (2ch Input 11)

< SSW : SW channel Output ON/OFF >

D8	Setting
0	SW Output ON ^(*)
1	SW Output OFF

^(*)Initial Setting

- ◆TC/B : Treble Cut / Boost
- Tone Control Treble** : Treble Gain
- TSW** : Tone Control By-pass Switch
- BSW** : SW channel output add to the L,R channel output.

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
TC/B	Tone Control Treble				TSW	BSW	Don't Care	1	0	0	1	*	*	*	*

< TC/B : Treble Cut / Boost >

D15	Setting
0	Cut ^(*)
1	Boost

< Tone Control Treble : Treble Gain >

Data				Cut	Boost
D14	D13	D12	D11		
0	0	0	0	0dB ^(*)	0dB
0	0	0	1	-1dB	1dB
0	0	1	0	-2dB	2dB
0	0	1	1	-3dB	3dB
0	1	0	0	-4dB	4dB
0	1	0	1	-5dB	5dB
0	1	1	0	-6dB	6dB
0	1	1	1	-7dB	7dB
1	0	0	0	-8dB	8dB
1	0	0	1	-9dB	9dB
1	0	1	0	-10dB	10dB

<TSW : Tone Control By-pass Switch >

D10	Setting
0	Tone Control OFF ^(*)
1	Tone Control ON

< BSW : SW channel Output add to L/Rch Output >

D9	Setting
0	OFF ^(*)
1	Add

^(*)Initial Setting

- ◆BC/B : Bass Cut / Boost
- Tone Control Bass** : Bass Gain

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
BC/B	Tone Control Bass				Don't Care			1	0	1	0	*	*	*	*

< BC/B : Bass Cut / Boost >

D15	Setting
0	Cut ^(*)
1	Boost

<Tone Control Bass : Bass Gain >

Data				Cut	Boost
D14	D13	D12	D11		
0	0	0	0	0dB ^(*)	0dB
0	0	0	1	-1dB	1dB
0	0	1	0	-2dB	2dB
0	0	1	1	-3dB	3dB
0	1	0	0	-4dB	4dB
0	1	0	1	-5dB	5dB
0	1	1	0	-6dB	6dB
0	1	1	1	-7dB	7dB
1	0	0	0	-8dB	8dB
1	0	0	1	-9dB	9dB
1	0	1	0	-10dB	10dB

^(*)Initial Setting

◆**REC A/B Selector** : Selector for the 2 ch Input signal to REC A/B output

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
REC B Selector				REC A Selector				1	0	1	1	*	*	*	*

< REC A/B Selector >

Data				Setting
D15	D14	D13	D12	REC B Selector
D11	D10	D9	D8	REC A Selector
0	0	0	0	1IN (2ch Input 1) ^(*)
0	0	0	1	2IN (2ch Input 2)
0	0	1	0	3IN (2ch Input 3)
0	0	1	1	4IN (2ch Input 4)
0	1	0	0	5IN (2ch Input 5)
0	1	0	1	6IN (2ch Input 6)
0	1	1	0	7IN (2ch Input 7)
0	1	1	1	8IN (2ch Input 8)
1	0	0	0	9IN (2ch Input 9)
1	0	0	1	10IN (2ch Input 10)
1	0	1	0	11IN (2ch Input 11)

(*)Initial Setting

◆**SWch Output Gain Control** : SW channel Gain control for volume output.

RECB1/RECA4/RECA3/RECA2/RECA1

: REC Output ON/OFF

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
SWch Volume Output Gain Control			REC B1	REC A4	REC A3	REC A2	REC A1	1	1	0	0	*	*	*	*

< SWch Volume Output Gain Control Data >

Data			Setting
D15	D14	D13	SWch Gain
0	0	0	0dB ^(*)
0	0	1	+22dB
0	1	0	+23dB
0	1	1	+24dB
1	0	0	+25dB
1	0	1	+26dB
1	1	0	+27dB
1	1	1	+28dB

<RECB1,RECA4,RECA3, RECA2, RECA1 ON/OFF Data>

Data	Setting
D12 to D8	
0	RECB Output 1, RECA Output 4 to 1 OFF ^(*)
1	RECB Output 1, RECA Output 4 to 1 ON

(*)Initial Setting

◆**L,Rch Output Gain Control** : L,R channel Gain control for volume output.
Cch Output Gain Control : C channel Gain control for volume output.

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
L,Rch Volume Output Gain Control			Cch Volume Output Gain Control			Don't Care	Don't Care	1	1	0	1	*	*	*	*

<L,Rch, Cch Volume Output Gain Control Data>

Data			Setting
D15	D14	D13	L,Rch Gain
D12	D11	D10	Cch Gain
0	0	0	0dB ^(*)
0	0	1	+12dB
0	1	0	+13dB
0	1	1	+14dB
1	0	0	+15dB
1	0	1	+16dB
1	1	0	+17dB
1	1	1	+18dB

^(*)Initial Setting

◆**LS,RSch Output Gain Control** : LS,RS channel Gain control for volume output.
LB,RBch Output Gain Control : LB,RB channel Gain control for volume output.
SWch Multi-Channel Selector : Selector for Mute, or multi channel input signal A, or multi channel input signal B

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
LS,RSch Volume Output Gain Control			LB,RBch Volume Output Gain Control			SWch Selector		1	1	1	0	*	*	*	*

<LS,RSch, LB,RBch Volume Output Gain Control Data>

Data			Setting
D15	D14	D13	LS,RSch Gain
D12	D11	D10	LB,RBch Gain
0	0	0	0dB ^(*)
0	0	1	+12dB
0	1	0	+13dB
0	1	1	+14dB
1	0	0	+15dB
1	0	1	+16dB
1	1	0	+17dB
1	1	1	+18dB

<SWch Multi-Channel Selector Data>

Data		Setting
D9	D8	
0	0	MUTE ^(*)
0	1	Multi-Channel Input A
1	0	Multi-Channel Input B

^(*)Initial Setting

- ◆ **L,Rch Multi-Channel Selector** : Selector for Mute, or 2 channel input Selector signal, or multi channel input signal A, or multi channel input signal B
- Cch Multi-Channel Selector** : Selector for Mute, or multi channel input signal A, or multi channel input signal B
- LS,RSch, LB,RBch Multi-Channel Selector** : Selector for Mute, or multi channel input signal A, or multi channel input signal B, or multi channel input signal C

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
L,Rch Selector		Cch Selector		LS,RSch Selector		LB,RBch Selector		1	1	1	1	*	*	*	*

<L,Rch Multi-Channel Selector Data>

Data		Setting
D15	D14	
0	0	MUTE ^(*)
0	1	Multi-Channel Input A
1	0	Multi-Channel Input B
1	1	2ch Input Selector

< Cch Multi-Channel Selector Data >

Data		Setting
D13	D12	
0	0	MUTE ^(*)
0	1	Multi-Channel Input A
1	0	Multi-Channel Input B

< LS,RSch, LB,RBch Multi-Channel Selector Data >

Data		Setting
D11	D10	
		LS,RSch GAin
		LB,RBch Gain
0	0	MUTE ^(*)
0	1	Multi-Channel Input A
1	0	Multi-Channel Input B
1	1	Multi-Channel Input C

^(*)Initial Setting

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