8-IN 4-OUT STEREO AUDIO SELECTOR

■ GENERAL DESCRIPTION

The **NJW1112** is an 8-input 4-output stereo audio selector. It includes four independent 8-input-1output stereo audio selectors and 0dB fixed gain buffers.

The **NJW1112** performs superior audio characteristics such as low distortion, low output noise and low crosstalk.

In addition, the **NJW1112** is available to expand to 16-input 4-output stereo audio selector without sound quality deterioration, because it is able to connect in parallel by Output switch function.

All of internal status and variables are controlled by three-wired serial bus. Selectable two Chip address is available for using two chips on same serial bus line. It is suitable for AV amplifiers, AV receivers, Analog audio switchers, Video conferencing, Security systems and others.

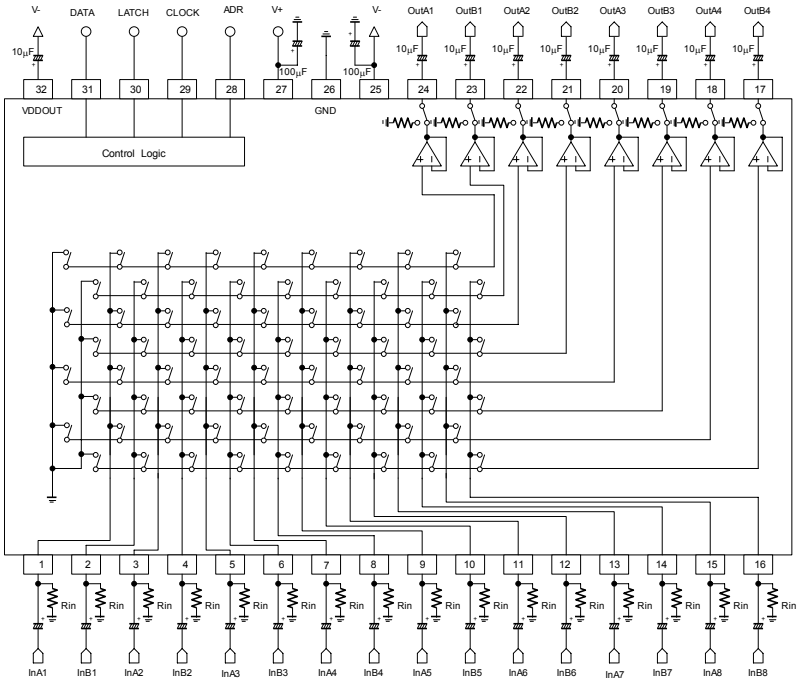
■ PACKAGE OUTLINE

NJW1112V

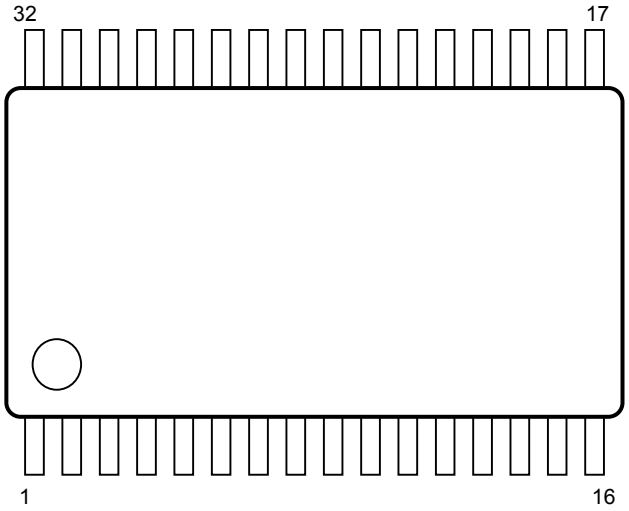
■ FEATURES

• Operating Voltage	±4.5 to ±7.5V
• 8-Input, 4-Output Stereo Audio Selector	
• Operating Current	14mA typ.
• Low On Resistance Output Switch	On Resistance :15Ω typ.
• Low Distortion	0.0007% typ.
• Low Output Noise	-119dBV typ.
• Low Crosstalk	120dB typ.
• Channel Separation	116dB typ.
• 3-Wired Serial Control	
• Bi-CMOS Technology	
• Package Outline	SSOP32

■ BLOCK DIAGRAM



■PIN CONFIGURATION



No.	Symbol	Function	No.	Symbol	Function
1	InA1	Ach Input 1	17	OutB4	Bch Output 4
2	InB1	Bch Input 1	18	OutA4	Ach Output 4
3	InA2	Ach Input 2	19	OutB3	Bch Output 3
4	InB2	Bch Input 2	20	OutA3	Ach Output 3
5	InA3	Ach Input 3	21	OutB2	Bch Output 2
6	InB3	Bch Input 3	22	OutA2	Ach Output 2
7	InA4	Ach Input 4	23	OutB1	Bch Output 1
8	InB4	Bch Input 4	24	OutA1	Ach Output 1
9	InA5	Ach Input 5	25	V-	V- Power Supply Terminal
10	InB5	Bch Input 5	26	GND	Ground Terminal
11	InA6	Ach Input 6	27	V+	V+ Power Supply Terminal
12	InB6	Bch Input 6	28	ADR	Chip address setting terminal
13	InA7	Ach Input 7	29	CLOCK	CLOCK
14	InB7	Bch Input 7	30	LATCH	LATCH
15	InA8	Ach Input 8	31	DATA	DATA
16	InB8	Bch Input 8	32	VDDOUT	Internal Digital Power Supply 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^-	V
Power Dissipation	P_D	800 NOTE: EIA/JEDEC STANDARD Test board (76.2x114.3x1.6mm, 2layer, FR-4) mounting	mW
Operating Temperature Range	Topr	-40 to +85	°C
Storage Temperature Range	Tstg	-40 to +125	°C

■ RECOMMENDED OPERATING CONDITIONS (Ta=25°C)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V^+/V^-	-	±4.5	±7.0	±7.5	V

■ ELECTRICAL CHARACTERISTICS

♦Power Supply (Ta=25°C, V^+/V^-=±7V)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Supply Current 1	I_{CC}	V^+, No Signal	7.0	14.0	21.0	mA
Supply Current 2	I_{EE}	V^-, No Signal	7.0	14.0	21.0	mA

♦AC CHARACTERISTICS (Ta=25°C, V^+/V^-=±7V, V_{IN}=2Vrms,f=1kHz,R_L=47kΩ)

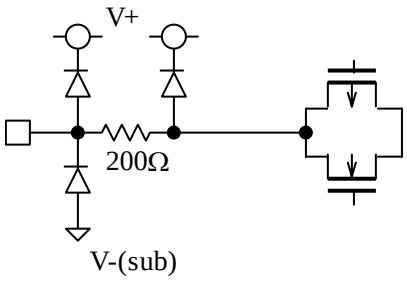
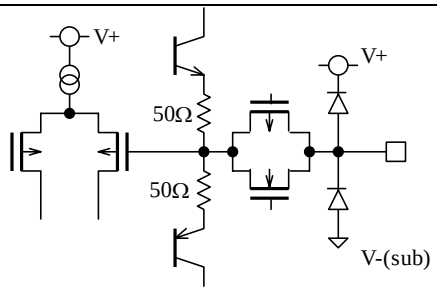
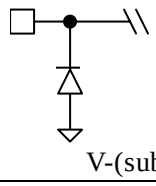
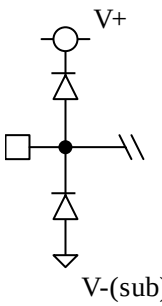
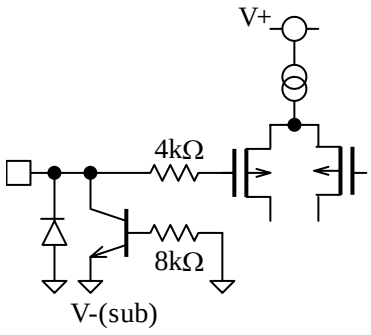
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Maximum Output Voltage	V_{OM}	THD=1%	11.1 (3.6)	12.9 (4.4)	-	dBV (Vrms)
Voltage Gain	G_V	-	-1.0	0	1.0	dB
Total Harmonic Distortion 1	THD1	BW=400Hz-30kHz	-	0.001	0.02	%
Total Harmonic Distortion 2	THD2	Vin=1Vrms, BW=400Hz-30kHz	-	0.0007	-	
Total Harmonic Distortion 3	THD3	f=10kHz, BW=400Hz-30kHz	-	0.002	-	
Mute Level	A_{TT}	Selector=Mute, A-weighted	-	-120	-	dB
Output Noise	V_{NO}	Rg=0Ω, A-Weighted	-	-119 (1.1)	-110 (3.2)	dBV (μVrms)
Cross Talk 1	CT1	Rg=0Ω, A-Weighted	-	-120	-	dB
Cross Talk 2	CT2	Rg=0Ω, f=20kHz	-	-100	-	
Channel Separation 1	CS1	Rg=0Ω, A-Weighted	-	-116	-90	dB
Channel Separation 2	CS2	Rg=0Ω, f=20kHz	-	-96	-	
Output impedance	R_{OUT}	Output Switch = ON	-	15	30	Ω

BW: Band Width

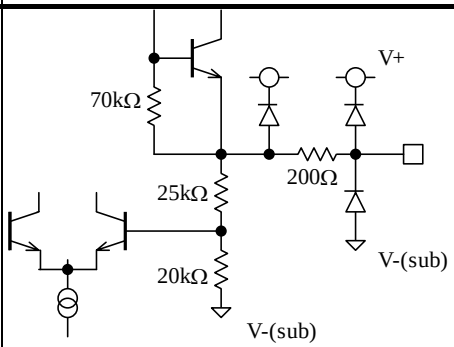
♦Logic Control Characteristics (Ta=25°C, V^+/V^-=±7V)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
High Level Input Voltage	V_H	ADR, LATCH, DATA, CLOCK Terminal	2.5	-	V^+	V
Low Level Input Voltage	V_L	ADR, LATCH, DATA, CLOCK Terminal	0	-	1.5	

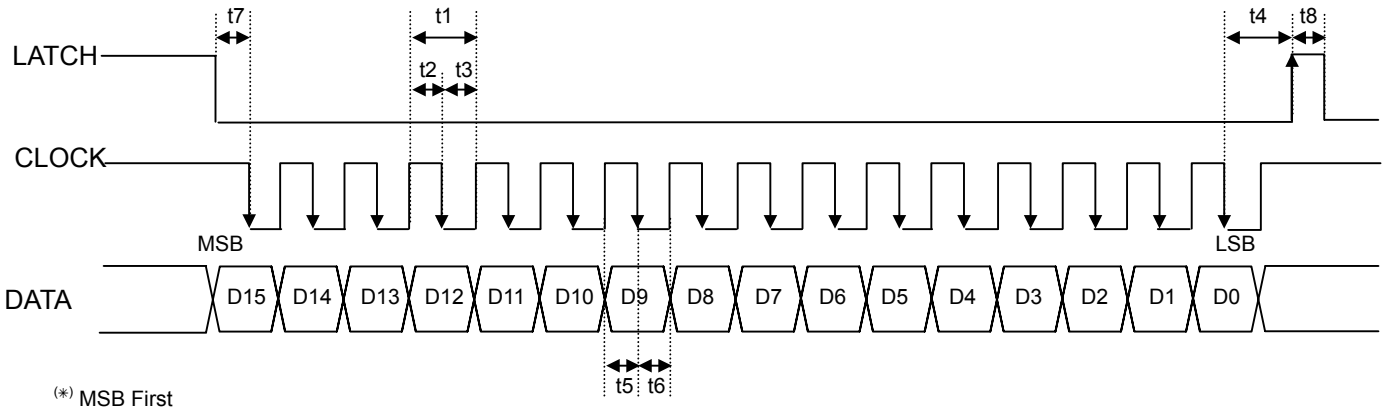
■ **TERMINAL DESCRIPTION**

PIN NO.	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	TERMINAL DC VOLTAGE
1 to 16	InA1 to 8 InB1 to 8	Ach Input 1 to 8 Bch Input 1 to 8		0V
17 to 24	OutA1 to 4 OutB1 to 4	Ach Output 1 to 4 Bch Output 1 to 4		0V
27	V^+	V+ Power Supply Terminal		V+
26	GND	Ground Terminal		0V
28 29 30 31	ADR CLOCK LATCH DATA	Chip address setting terminal CLOCK LATCH DATA		0V

■ **TERMINAL DESCRIPTION**

PIN NO.	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	TERMINAL DC VOLTAGE
32	VDDOUT	Internal Digital Power Supply Output		V-(sub)+5V

■ CONTROL DATA FORMAT



(*) MSB First

Note.) Set CLOCK in High to prevent incorrect operation during a standby period.

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

NJW1112 control data is constructed with 16bits.

MSB LSB

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

MSB

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Don't Care			OutSW1	Selector1				0	0	0	0	*	*	*	*
Don't Care			OutSW2	Selector2				0	0	0	1	*	*	*	*
Don't Care			OutSW3	Selector3				0	0	1	0	*	*	*	*
Don't Care			OutSW4	Selector4				0	0	1	1	*	*	*	*

LSB

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

Chip address				
ADR	D3	D2	D1	D0
Low	1	0	1	0
High	1	0	1	1

■INITIAL CONDITION

MSB

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

LSB

Note.) This product starts up by MUTE setting in power “ON”. Use it after removing MUTE of each setting.
If any audio signal is inputted in input signal terminal before power “ON”, it may cause initial condition abnormality. In conditions of use such as the above, it prevents that abnormality by setting MUTE before power “OFF"

■ CONTROL DATA

◆ **Selector** : Selector for the stereo inputs from InA1/B1 to InA8/B8
OutSW : Output ON/OFF setting

D15	D14	D13	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2	D1	D0
Don’t Care			OutSW1	Selector1				0	0	0	0	*	*	*	*
Don’t Care			OutSW2	Selector2				0	0	0	1	*	*	*	*
Don’t Care			OutSW3	Selector3				0	0	1	0	*	*	*	*
Don’t Care			OutSW4	Selector4				0	0	1	1	*	*	*	*

a) Selector

Data				Setting
D11	D10	D9	D8	
0	0	0	0	Mute(*)
0	0	0	1	InA1/B1
0	0	1	0	InA2/B2
0	0	1	1	InA3/B3
0	1	0	0	InA4/B4
0	1	0	1	InA5/B5
0	1	1	0	InA6/B6
0	1	1	1	InA7/B7
1	0	0	0	InA8/B8

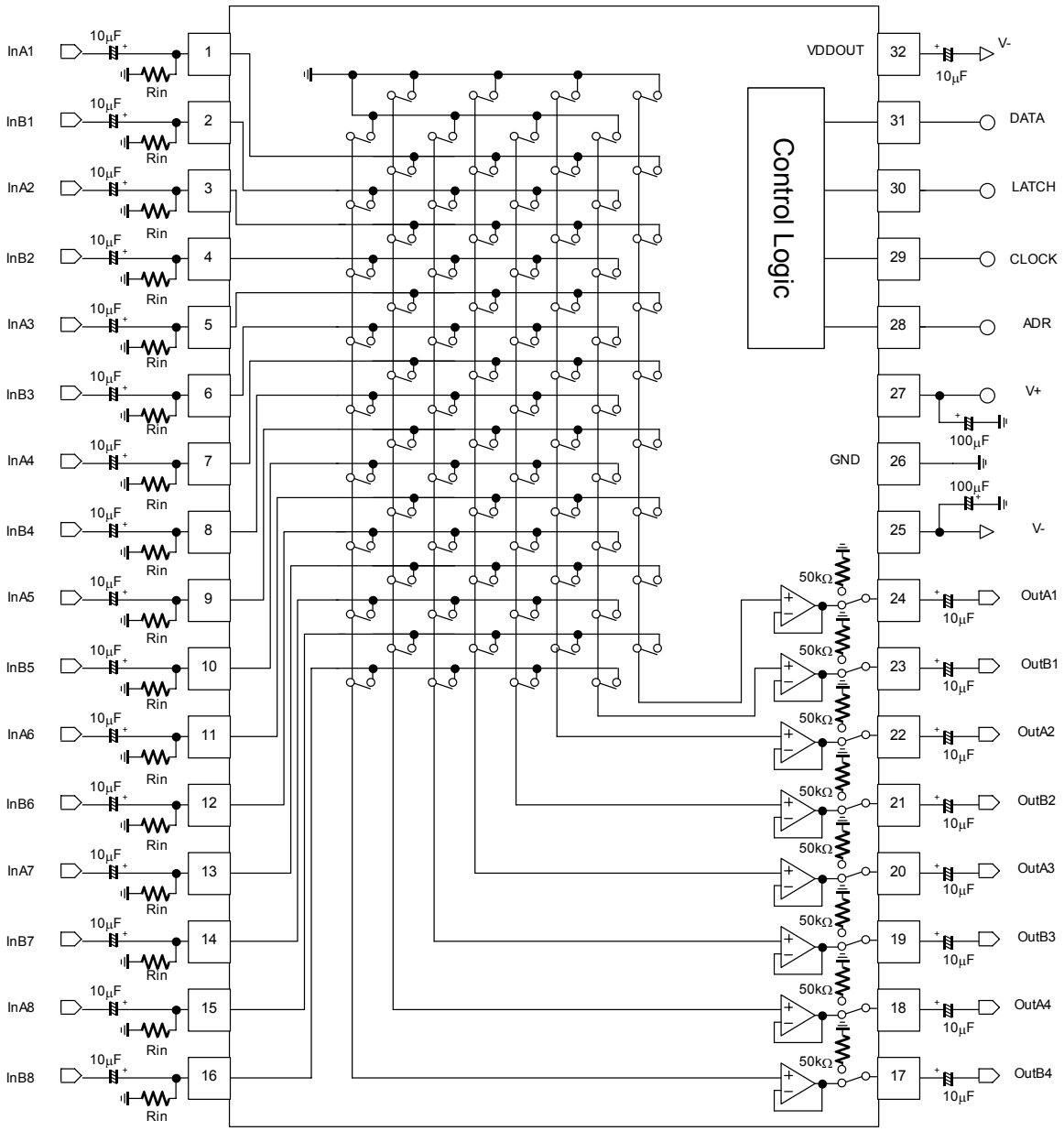
(*)Initial Setting

b) OutSW

Data	Setting
D12	
0	Output ON(*)
1	Output OFF

(*)Initial Setting

■ APPLICATION CIRCUIT 1



■ NOTES

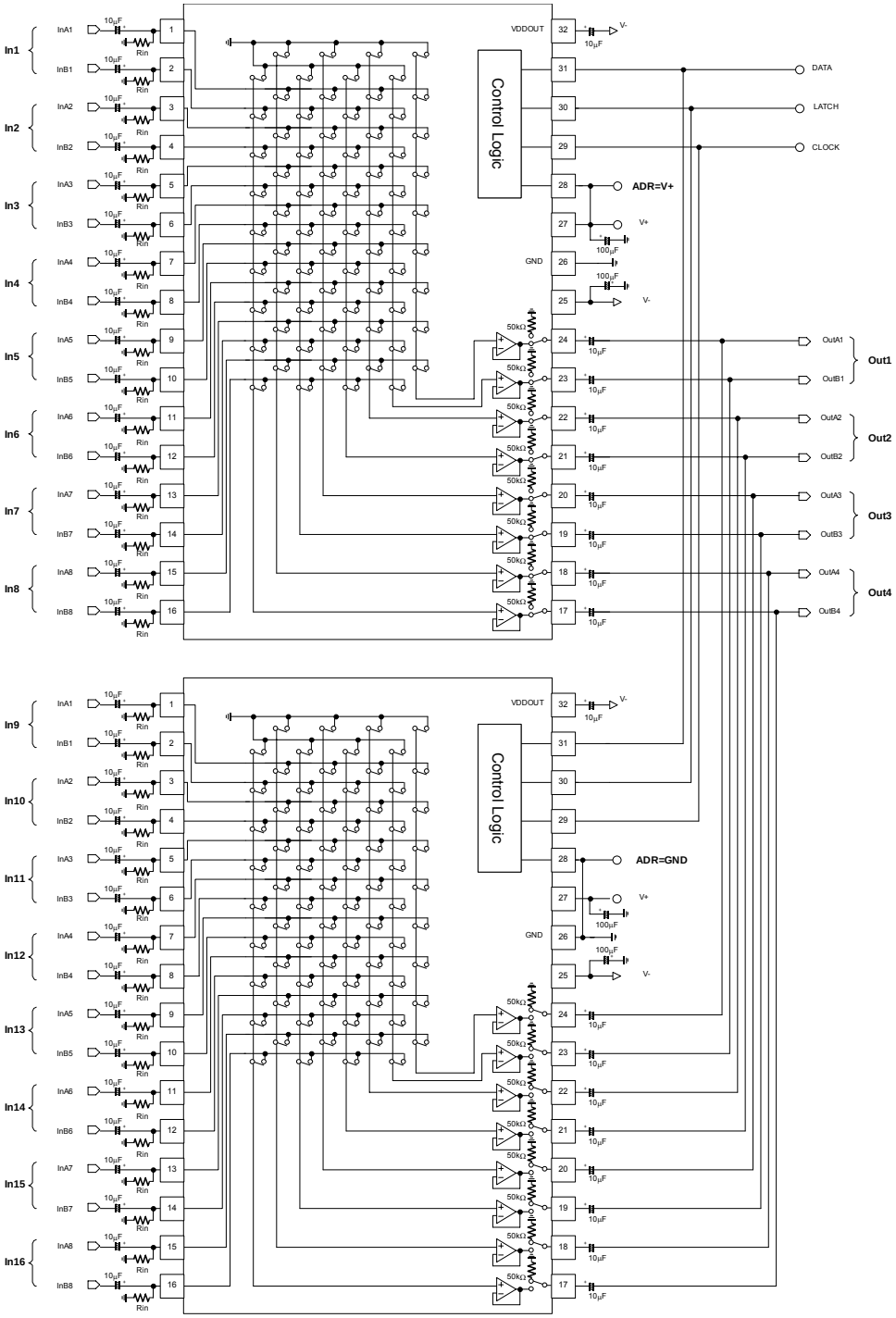
(✳) Separate the 3-wired serial control bus line from the input terminals (1pin to 16pin) for avoiding digital noise problem and cross talk.

(✳) Cross talk performance may be effected by PCB patterning and Input resistor “Rin” in relation to input impedance. Widen intervals of input lines (1pin to 16pin) and put guard patterns (ground patterns) among input lines for avoiding cross talk problem.
Further, cross talk performance may be effected by input resistor “Rin”. In consideration of an actual operating condition, please decide Rin values after evaluating.

(✳) The output terminals of this device are designed as a line driver. Use them by load resistances more than 2kΩ because output waveforms may be in an unstable condition.

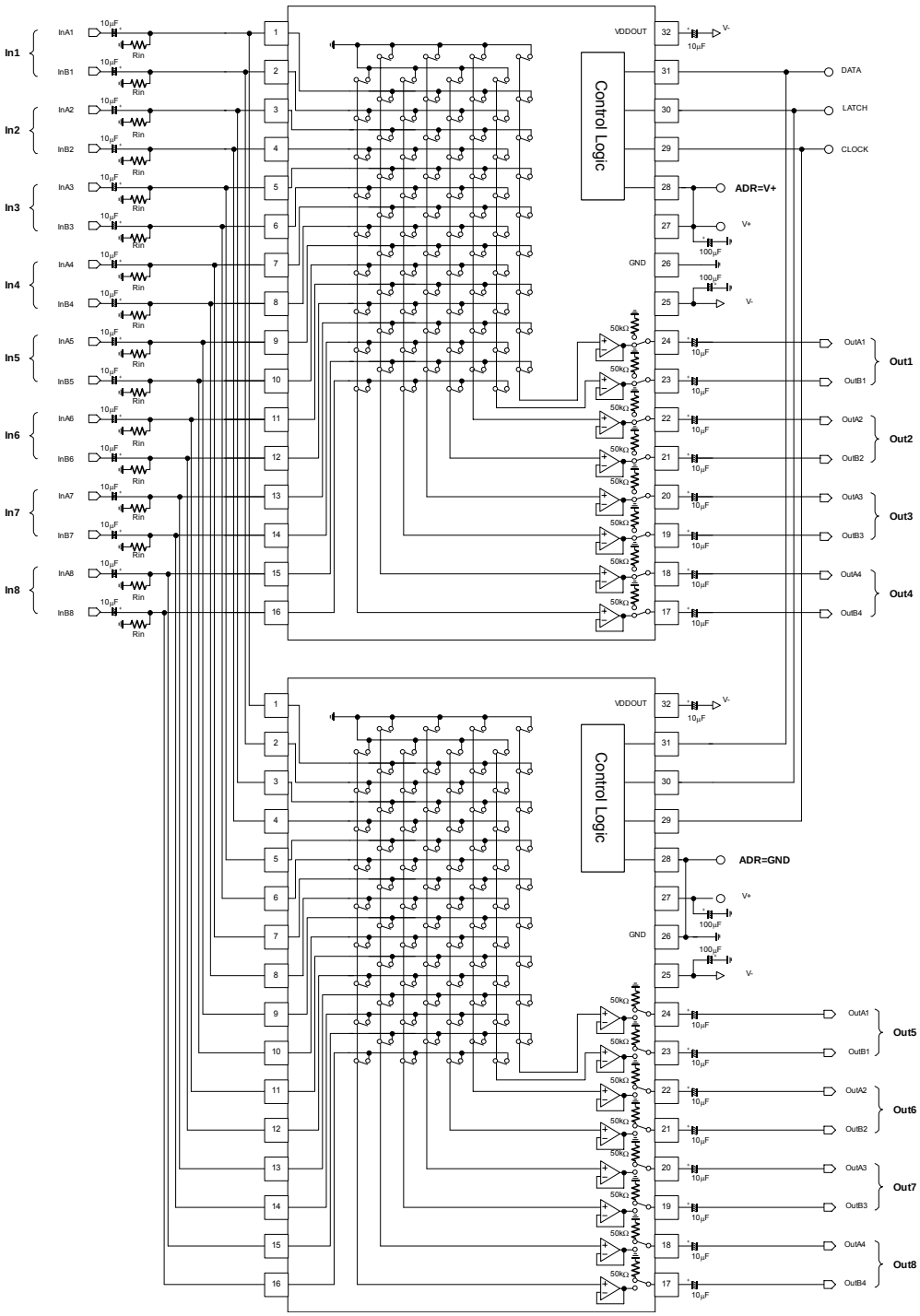
■ APPLICATION CIRCUIT 2

The **NJW1112** is available to expand to 16-input 4-output stereo audio selector without sound quality deterioration, because it is able to connect in parallel by Output switch function.



■ APPLICATION CIRCUIT 3

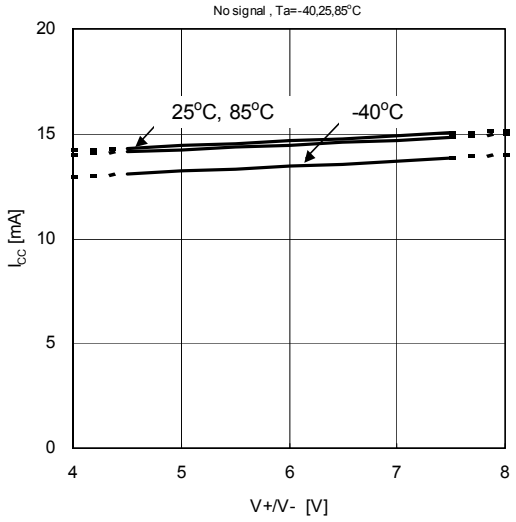
The **NJW1112** is available to expand to 8-input 8-output stereo audio selector.



■ TYPICAL CHARACTERISTICS

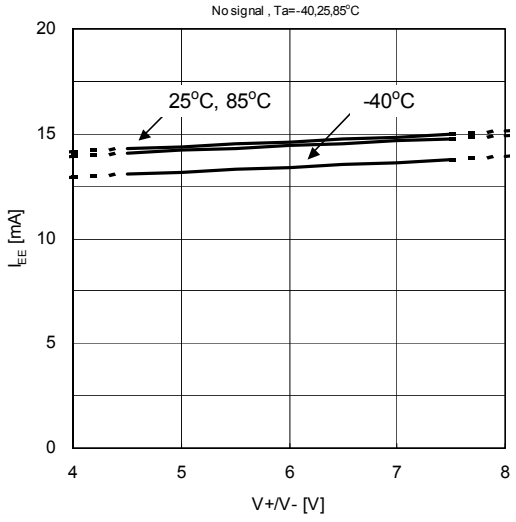
I_{CC} vs Supply Voltage

No signal , Ta=-40,25,85°C



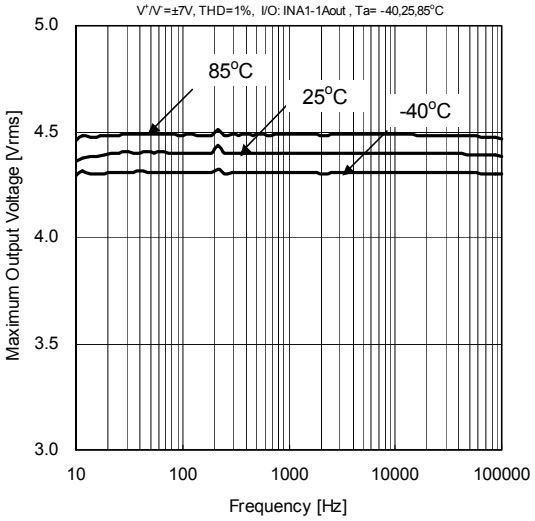
I_{EE} vs Supply Voltage

No signal , Ta=-40,25,85°C



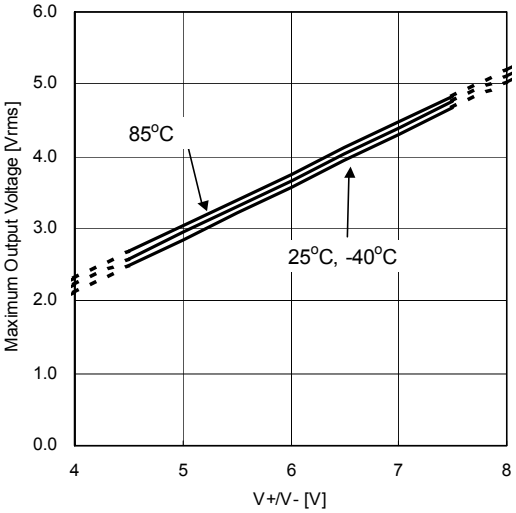
Maximum Output Voltage vs Frequency

V+/V-=±7V, THD=1%, I/O: INA1-1Aout , Ta= -40,25,85°C



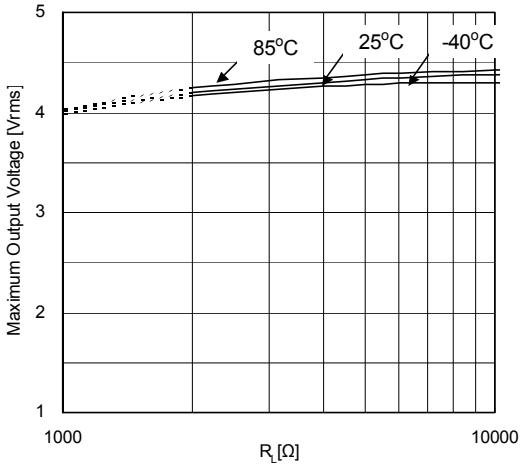
Maximum Output Voltage vs Supply Voltage

V+/V-=±7V,THD=1%, I/O: INA1-1Aout , Ta=-40,25,85°C



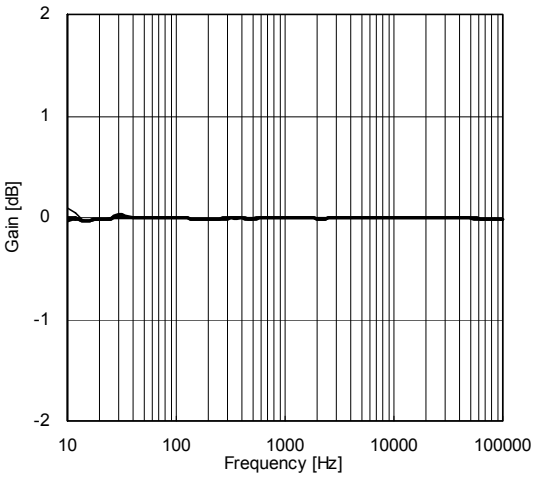
Maxium Output Voltage vs Load Resistance

V+/V-=±7V, f=1kHz , I/O: INA1-1Aout , Ta=-40,25,85°C



Gain vs Frequency

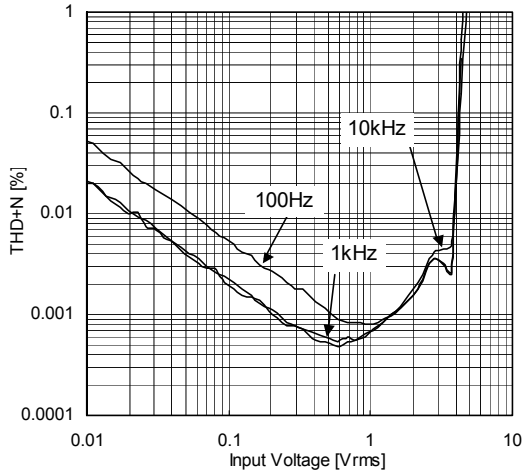
V+/V-=±7V, Vin=2Vrms , I/O: INA1-1Aout , Ta=-40,25,85°C



■ TYPICAL CHARACTERISTICS

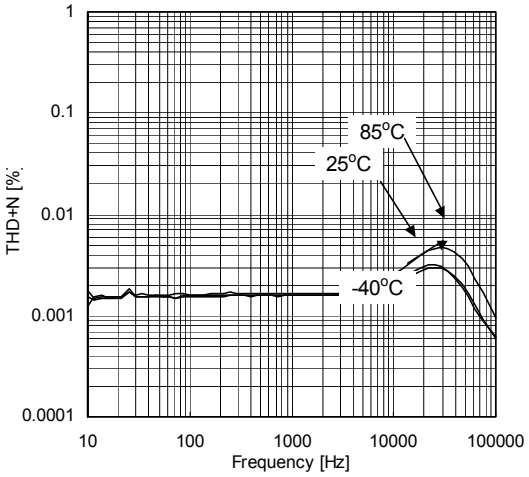
THD+N vs Input Voltage

V+/V-=±7V, I/O: INA1-1Aout , BW:10-22kHz (f=100Hz) 400-30kHz (f = 1,10kHz) , Ta=25°C



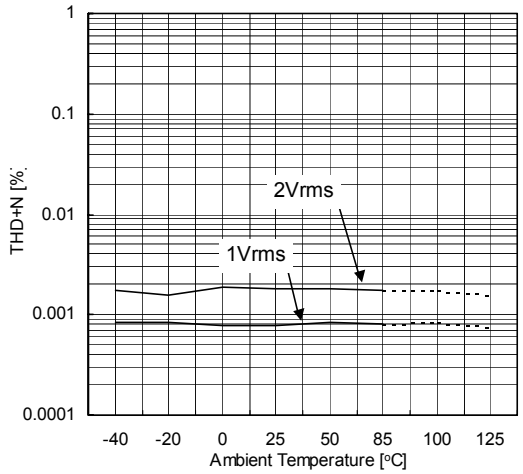
THD+N vs Frequency

V+/V-=±7V, I/O: INA1-1Aout, BW:10-80kHz, Vin=2Vrms , Ta=-40,25,85°C



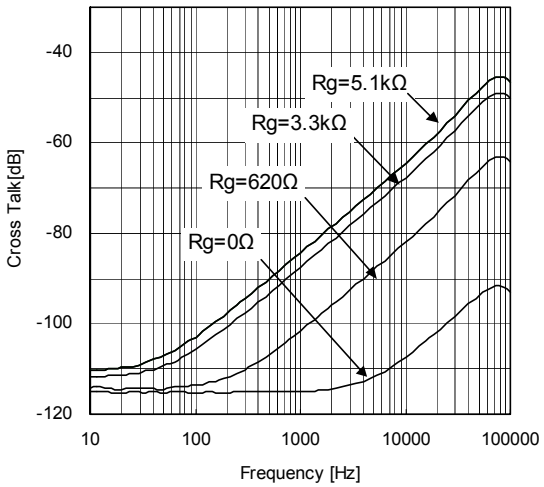
THD+N vs Ambient Temperature

V+/V-=±7V, I/O: INA1-1Aout , BW:400-30kHz (f = 1 kHz)



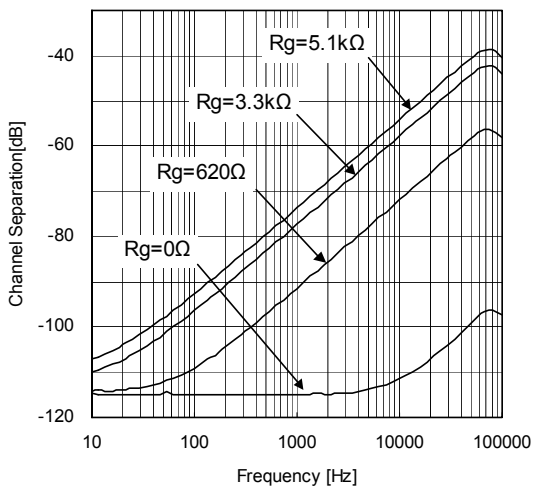
Cross Talk vs Frequency

V+/V-=±7V, Vin=2Vrms, BW:10Hz-80kHz, I/O: INA1,3,4,5,6,7,8 / OutA1,Select channel:INA2, Ta=25°C



Channel Separation vs Frequency

V+/V-=±7V, Vin=2Vrms , BW:10Hz-80kHz, I/O: INB1,2,3,4,5,6,7,8 / OutA1, Select channel:INA2 Ta=25°C



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