

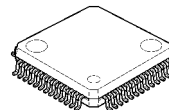
2ch Electronic Volume with Dynamic Bass Boost

■ GENERAL DESCRIPTION

The NJW1201A is a 2-channel electronic volume with Dynamic Bass Boost. 5+1diff-in 1-out selector. It includes 5+1diff input selector, 1st-volume, 2nd-volume, 3 band Tone, Sound mode, Dynamic Bass Boost. The NJW1201A performs low noise and low distortion characteristics with resistance ladder circuit.

All of functions are controlled by I²C BUS interface.

■ PACKAGE OUTLINE

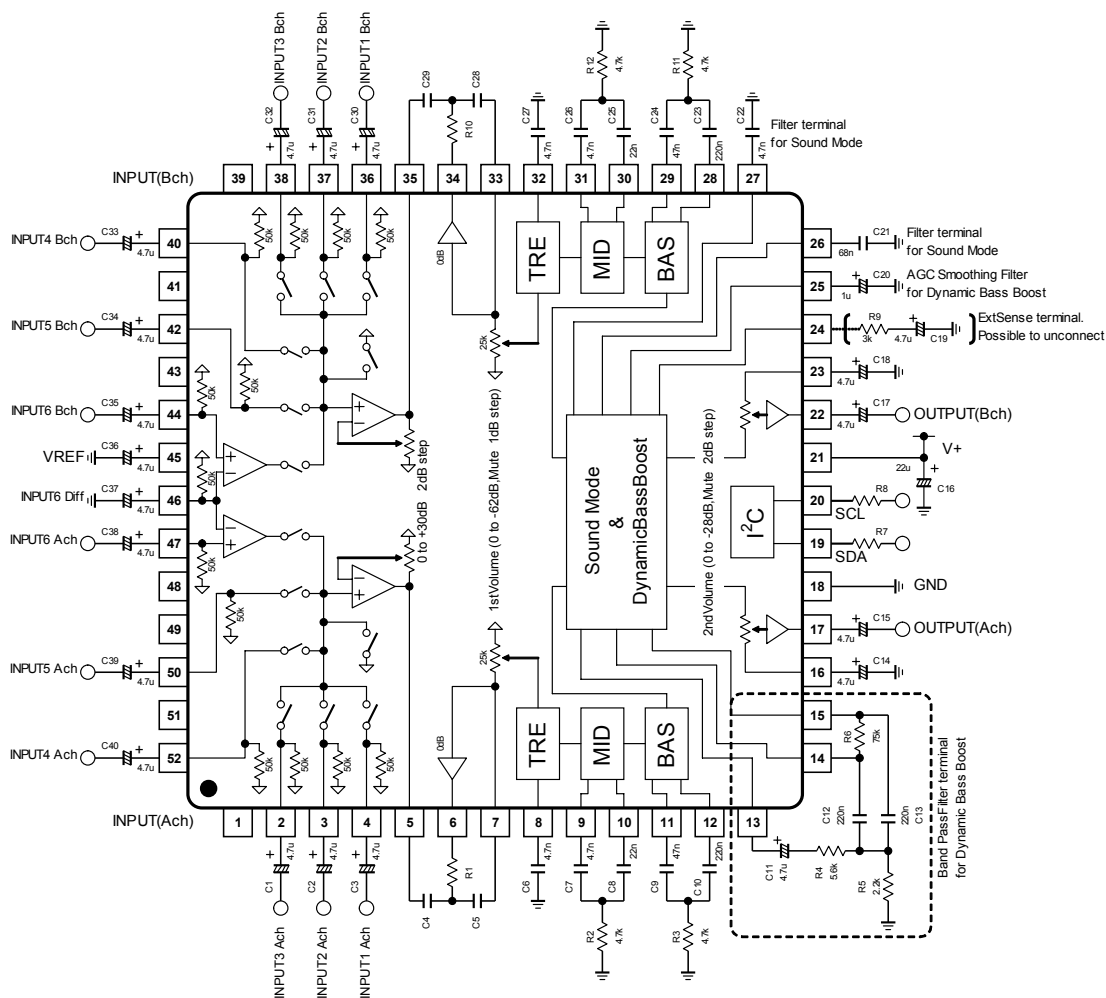


NJW1201AFH2

■ FEATURES

- Operating Voltage +7.5 to +10V
- I²C BUS Control
- Low output noise -110dBVtyp.
- Low THD 0.01%typ.
- 5+1diff Input Selector
- Input Gain 0 to +30dB/2dBstep
- 1st-Volume 0 to -62dB / 1dBstep, MUTE
- 2nd-Volume 0 to -28dB / 2dBstep, MUTE
- 3 Band Tone 0 to ±14dB/ 2dBstep (Treble,Middle), 0 to ±17.5dB/ 2.5dBstep (Bass)
- Sound mode 3 modes (eala, ealaTreble, eala & ealaTreble)
- Sound Gain 2-level Gains
- Dynamic Bass Boost 3-level Gains
- Bi-CMOS Technology
- Package Outline LQFP52-H2

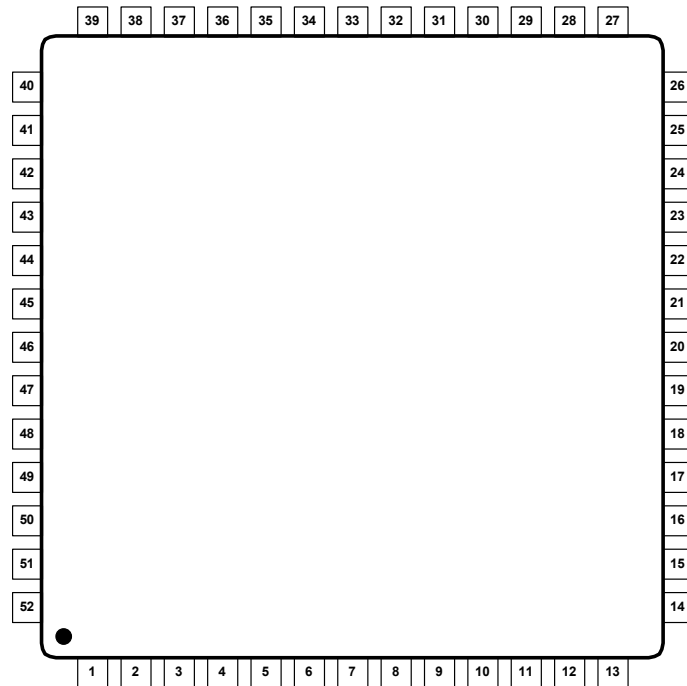
■ BLOCK DIAGRAM



New Japan Radio Co., Ltd.

PIN CONFIGURATION

LQFP52



No.	Symbol	Function	No	Symbol	Function
1	NC	Not Connected	27	SRFil	Filter for Sound Mode
2	In3A	Ach Input3	28	TONEB2B	Bch Bass(Tone) Filter 1
3	IN2A	Ach Input2	29	TONEB1B	Bch Bass(Tone) Filter 2
4	In1A	Ach Input1	30	TONEM2B	Bch Middle(Tone) Filter 1
5	MonOutA	Ach Monitor Output	31	TONEM1B	Bch Middle(Tone) Filter 2
6	RecOutA	Ach Rec Output	32	TONEHB	Bch Treble(Tone) Filter
7	VOLInA	Ach 1 st Volume Input	33	VOLInB	Bch 1 st Volume Input
8	TONEHA	Ach Treble(Tone) Filter	34	RecOutB	Bch Rec Output
9	TONEM1A	Ach Middle(Tone) Filter 1	35	MonOutB	Bch Monitor Output
10	TONEM2A	Ach Middle(Tone) Filter 2	36	In1B	Bch Input1
11	TONEB1A	Ach Bass(Tone) Filter 1	37	IN2B	Bch Input2
12	TONEB2A	Ach Bass(Tone) Filter 2	38	IN3B	Bch Input3
13	BPF1	Filter 1 for DBB	39	NC	Not Connected
14	BPF2	Filter 2 for DBB	40	IN4B	Bch Input4
15	BPF3	Filter 3 for DBB	41	NC	Not Connected
16	VOL2CAPA	Ach DC coupling for 2 nd Volume	42	IN5B	Bch Input5
17	OutA	Ach Output	43	NC	Not Connected
18	GND	Ground	44	IN6B	Bch Input6
19	SDA	I2C DATA	45	VREF	Reference Voltage
20	SCL	I2C CLOCK	46	In6Diff	Negative Input for Input6
21	V+	Supply Voltage	47	In6A	Ach Input6
22	OutB	Bch Output	48	NC	Not Connected
23	VOL2CAPB	Bch 2 nd Volume DC coupling	49	NC	Not Connected
24	ExtSense	AGC Boost Level for DBB	50	In5A	Ach Input5
25	INT	AGC Smoothing Filter for DBB	51	NC	Not Connected
26	SurTC	Filter for Sound Mode	52	In4A	Ach Input4

■ ABSOLUTE MAXIMUM RATING (Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Power Supply Voltage	V ₊	10.5	V
Power Dissipation	P _D	1200 (Note1)	mW
Maximum Input Voltage	V _{IMAX}	0 ~ V ₊ (Note2)	V
Operating Temperature Range	T _{opr}	-20 ~ +75	°C
Storage Temperature Range	T _{stg}	-40 ~ +125	°C

(Note1) EIA/JEDEC STANDARD Test board (76.2x114.3x1.6mm, 2layer, FR-4) mounting

(Note2) Don't put Input Voltage more than Power Supply Voltage.

■ ELECTRICAL CHARACTERISTICS

(Ta=25°C, V⁺=9V, R_g=0Ω, R_L=47kΩ, V_{in}=1Vrms, f=1kHz, 1stVOL=0dB, all controls flat unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V ₊		7.5	9.0	10.0	V
Supply Current	I _{DD}	No signal	-	12	18	mA
Reference Voltage	V _{REF}	No signal	4.0	4.5	5.0	V
Volume Input Resistance	R _{INVOL}	No signal	-	26.5	-	kΩ
Maximum Input Voltage	V _{IM}	1st Volume=-20dB THD=1%	2.0	2.4	-	Vrms
Maximum Output Voltage	V _{OM}	THD=1%	2.0	2.4	-	Vrms
Maximum Input Gain	G _{VINMAX}	Input Gain=+30dB V _{in} =50mVrms	-	30	-	dB
Maximum Gain	G _{VMAX}		-1	0	1	dB
Mute Level	Mute	1st Volume = Mute 2nd Volume = Mute	-	-100	-90	dB
Channel Balance	G _{CB}		-1	0	1	dB
Total Harmonic Distortion	THD+N	V _O =0.5Vrms, BW=400Hz-30kHz	-	0.01	0.05	%
Output Noise Voltage 1	V _{NO1}	R _g =0Ω, Filter : A-Weighted	-	-100 (10)	-94 (20)	dBV (uVrms)
Output Noise Voltage 2	V _{NO2}	1st Volume = Mute 2nd Volume=Mute R _g =0Ω, Filter : A-Weighted	-	-110 (3)	-100 (10)	dBV (uVrms)
Cross Talk	CT	Selected Input : R _g =0Ω Unselected Input : Signal	-	-	-80	dB
Channel Separation	CS	R _g =0Ω	-	-	-80	dB

◆ Tone Control

(Ta=25°C, V⁺=9V, R_g=0Ω, R_L=47kΩ, V_{in}=0.1Vrms, f=1kHz, all controls flat unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
High Frequency Boost	HF _{BST}	TREB="1111", f=10kHz	11.5	14.0	16.5	dB
High Frequency Cut	HF _{CUT}	TREB="0111", f=10kHz	-16.5	-14.0	-11.5	dB
Mid Frequency Boost	MF _{BST}	MIDD="1111", f=1kHz	11.5	14.0	16.5	dB
Mid Frequency Cut	MF _{CUT}	MIDD="0111", f=1kHz	-16.5	-14.0	-11.5	dB
Low Frequency Boost	LF _{BST}	BASS="1111", f=100Hz	15.0	17.5	20.0	dB
Low Frequency Cut	LF _{CUT}	BASS="0111", f=100Hz	-20.0	-17.5	-15.0	dB

◆ Sound mode Characteristics

(Ta=25°C, V⁺=9V, R_g=0Ω, R_L=47kΩ, V_{in}=0.1Vrms, f=1kHz, all controls flat unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
SOUND MODE 1	G _{Vm1}	SOUNDMODE="01" Ain-Aout, f=10kHz	-	4.0	-	dB
SOUND MODE 2	G _{Vm2}	SOUNDMODE="10" Ain-Aout,	-	4.0	-	dB
SOUND MODE 3	G _{Vm3}	SOUNDMODE="11" Ain-Aout	-	4.5	-	dB

◆ Sound Gain Characteristics

(Ta=25°C, V⁺=9V, R_g=0Ω, R_L=47kΩ, V_{in}=0.1Vrms, f=1kHz, all controls flat unless otherwise specified)

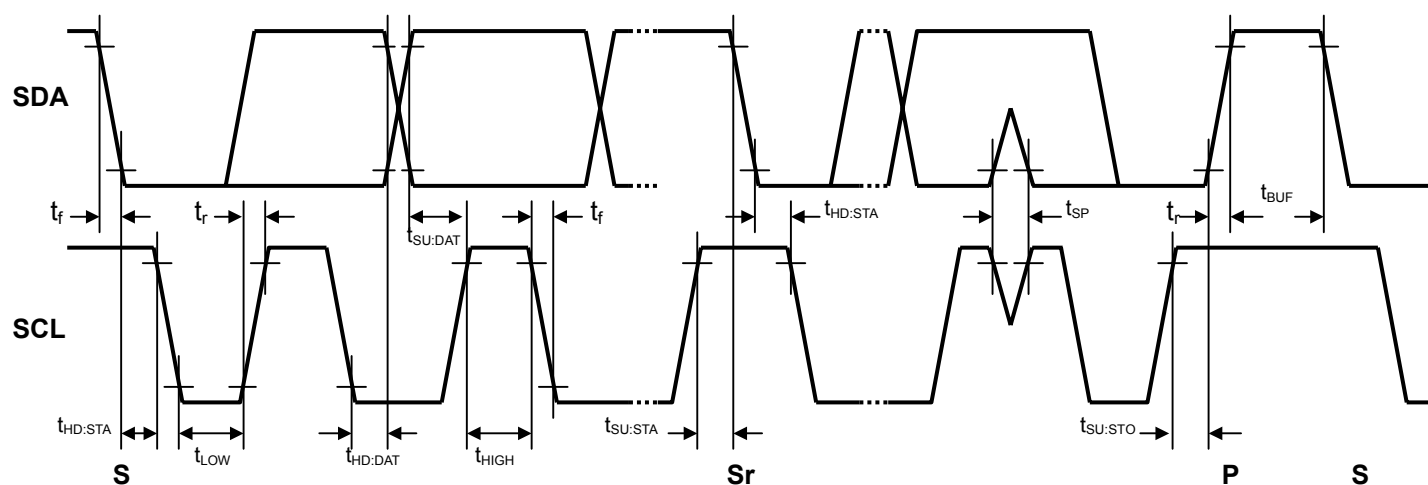
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
SOUND GAIN 1	G _{VS1}	SOUNDGAIN ="0" SOUNDMODE="10" Ain-Aout,	-	4.0	-	dB
SOUND GAIN 2	G _{VS2}	SOUNDGAIN ="1" SOUNDMODE="10" Ain-Aout,	-	6.5	-	dB

◆ Dynamic Bass Boost Characteristics

(Ta=25°C, V⁺=9V, R_g=0Ω, R_L=47kΩ, V_{in}=0.05Vrms, f=1kHz, all controls flat unless otherwise specified)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
DBB Gain 1	G _{VSDBB1}	DBBGain="01", (A+B)in-Aout	-	7.5	-	dB
DBB Gain 2	G _{VSDBB2}	DBBGain="10", (A+B)in-Aout	-	10.5	-	dB
DBB Gain 3	G _{VSDBB3}	DBBGain="11", (A+B)in-Aout	-	14.0	-	dB

■TIMING ON THE I²C BUS (SDA,SCL)



■CHARACTERISTICS OF I/O STAGES FOR I²C BUS (SDA,SCL)

I²C BUS Load Conditions

STANDARD MODE : Pull up resistance 4k Ω (Connected to +5V), Load capacitance 200pF (Connected to GND)

FAST MODE : Pull up resistance 4k Ω (Connected to +5V), Load capacitance 50pF (Connected to GND)

PARAMETER	SYMBOL	Standard mode			Fast mode			UNIT
		MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
Low Level Input Voltage	V_{IL}	0.0	-	1.5	0.0	-	1.5	V
High Level Input Voltage	V_{IH}	2.7	-	5.0	2.7	-	5.0	V
Low level output voltage (3mA at SDA pin)	V_{OL}	0	-	0.4	0	-	0.4	V
Input current each I/O pin with an input voltage between 0.1V _{DD} and 0.9V _{DDmax}	I_i	-10	-	10	-10	-	10	μ A

■CHARACTERISTICS OF BUS LINES (SDA,SCL) FOR I²C-BUS DEVICES

PARAMETER	SYMBOL	Standard mode			Fast mode			UNIT
		MIN.	TYP.	MAX.	MIN.	TYP.	MAX.	
SCL clock frequency	f_{SCL}	-	-	100	-	-	400	kHz
Hold time (repeated) START condition.	$t_{HD:STA}$	4.0	-	-	0.6	-	-	μs
Low period of the SCL clock	t_{LOW}	4.7	-	-	1.3	-	-	μs
High period of the SCL clock	t_{HIGH}	4.0	-	-	0.6	-	-	μs
Set-up time for a repeated START condition	$t_{SU:STA}$	4.7	-	-	0.6	-	-	μs
Data hold time ^(NOTE)	$t_{HD:DAT}$	0	-	-	0	-	-	μs
Data set-up time	$t_{SU:DAT}$	250	-	-	100	-	-	ns
Rise time of both SDA and SCL signals	t_r	-	-	1000	-	-	300	ns
Fall time of both SDA and SCL signals	t_f	-	-	300	-	-	300	ns
Set-up time for STOP condition	$t_{SU:STO}$	4.0	-	-	0.6	-	-	μs
Bus free time between a STOP and START condition	t_{BUF}	4.7	-	-	1.3	-	-	μs
Capacitive load for each bus line	C_b	-	-	400	-	-	400	pF
Noise margin at the Low level	V_{nL}	0.5	-	-	0.5	-	-	V
Noise margin at the High level	V_{nH}	1	-	-	1	-	-	V

C_b ; total capacitance of one bus line in pF.

NOTE). Data hold time : $t_{HD:DAT}$

Please hold the Data Hold Time ($t_{HD:DAT}$) to 300ns or more to avoid status of unstable at SCL falling edge.

The SDA block in the NJW1201A does not hold data. Add external data-delay-circuit of the SDA terminal, in case of not providing a hold time of at least 300nsec for the SDA in the master device.

The time-consists of the data-delay-circuit of the SDA terminal are as follows.

- (a) Low level → High level : $T_{LH} \approx R_P \cdot C_D$
 (b) High level → Low level : $T_{HL} \approx R_D \cdot C_D$

In addition, Schottky barrier diode (SBD) influences a Low level at the Acknowledge. Therefore choose the low forward voltage (V_f) as much as possible.

