

2-CHANNEL ELECTRONIC VOLUME WITH INPUT SELECTOR

■ GENERAL DESCRIPTION

NJW1154 is a two channel electronic volume with 6 in 1 out selector IC. It's suitable for Input signal trimmer of audio equipments such as DVD recorder and VCR. These functions are controlled by I²C Bus.

■ PACKAGE OUTLINE

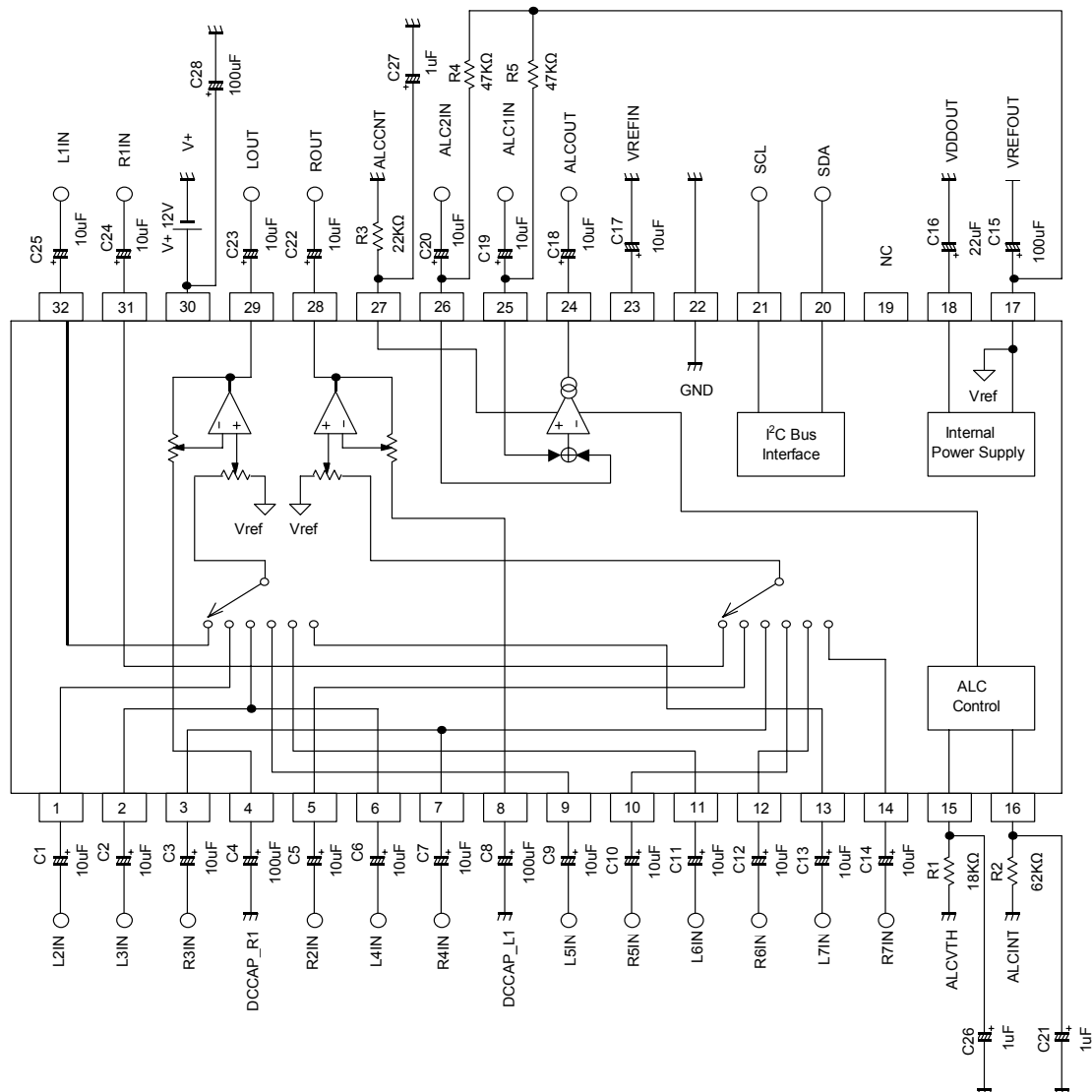


NJW1154V

■ FEATURES

- Operating Voltage 8 to 13V
- I²C Bus control
- 6in 1out Input Selector
- Volume +12 to -12dB/3dBstep, MUTE
- Bi-CMOS Technology
- Package Outline SSOP32

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATING (Ta=25°C)

PARAMETER	SYMBOL	RATING	UNIT
Power Supply Voltage	V+	15	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	-20 to +75	°C
Storage Temperature Range	Tstg	-40 to +125	°C

■ ELECTRICAL CHARACTERISTICS (Ta=25°C, V⁺=+12V, R_L=47kΩ)

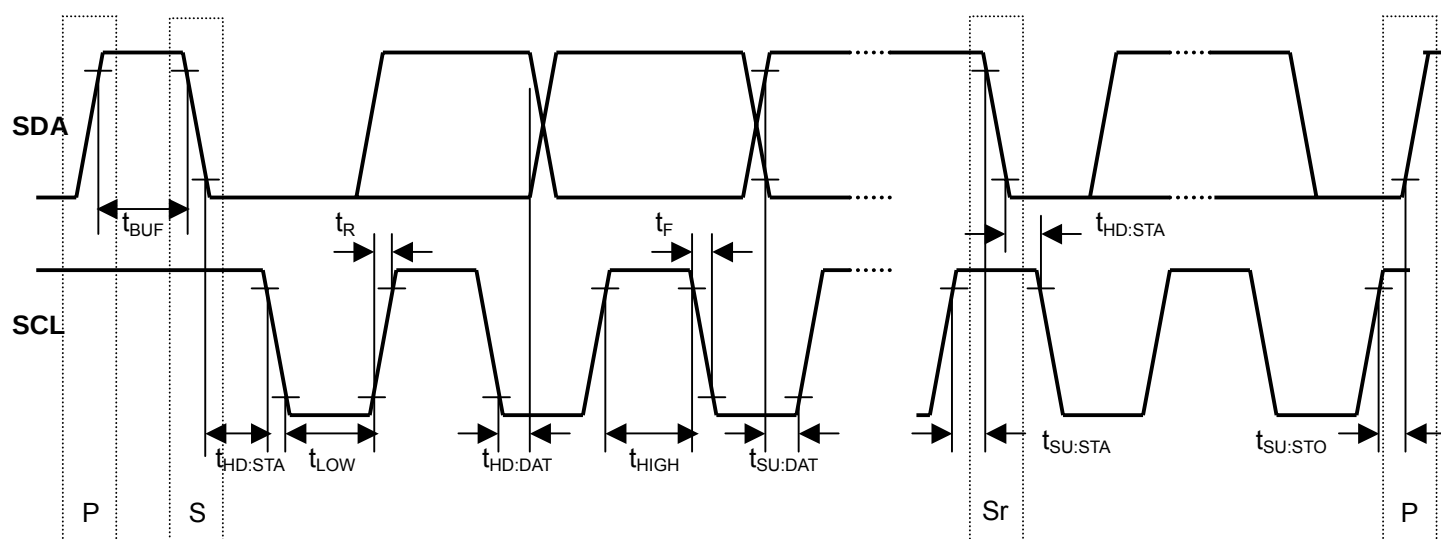
PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
◆ Power Supply						
Operating Voltage	V+		8	12	13	V
Reference Voltage	V _{ref}		5.5	6	6.5	V
Supply Current	I _{CC}	No signal	-	7	9	mA
◆ Input/Output Characteristics (Output)						
Maximum Output Voltage	V _{OM}	f=1KHz, THD=1% Volume=0dB	3.2	3.7	-	Vrms
Voltage Gain 1	G _{V1}	V _{IN} =1Vrms, f=1kHz Volume=0dB	-0.5	0	0.5	dB
Voltage Gain 2	G _{V2}	V _{IN} =0.25Vrms, f=1kHz Volume=+12dB	+11	+12	+13	dB
Voltage Gain 3	G _{V3}	V _{IN} =2.5Vrms, f=1kHz Volume=-12dB	-13	-12	-11	dB
Voltage Gain Error 1	ΔG _{V1}	V _{IN} =0.25Vrms, f=1kHz Volume=+12dB, Ach - Bch	-0.5	0	0.5	dB
Voltage Gain Error 2	ΔG _{V2}	V _{IN} =2.5Vrms, f=1kHz Volume=-12dB, Ach - Bch	-0.5	0	0.5	dB
Maximum Attenuation	A _{TT}	f=1KHz, V _{IN} =1Vrms Volume=Mute, A-weighted	-	-110	-	dB
Output Noise	V _{NO}	Volume=0dB, R _g =0, A-weighted	-	-114 (2μ)	-100 (10μ)	dBV (Vrms)
Total Harmonic Distortion	T.H.D	f=1KHz, V _o =1Vrms, Volume=0dB, BW:400 – 30kHz	-	0.001	0.05	%
Cross Talk	CT	Selected Input : No signal R _g =0Ω Unselected Input : Input signal A-weighted	-	-100	-	dB
Channel Separation	CS	f=1KHz, V _o =1Vrms, A-weighted Volume=0dB	-	-100	-90	dB
◆ ALC						
Flat Level	ALC _{FLT}	Vin = 300mVrms	-	0	-	dB
ALC Cut Level	ALC _{CUT}	Vin = 2Vrms	-	-12	-	dB

■ I²C BUS BLOCK CHARACTERISTICS (SDA,SCL)

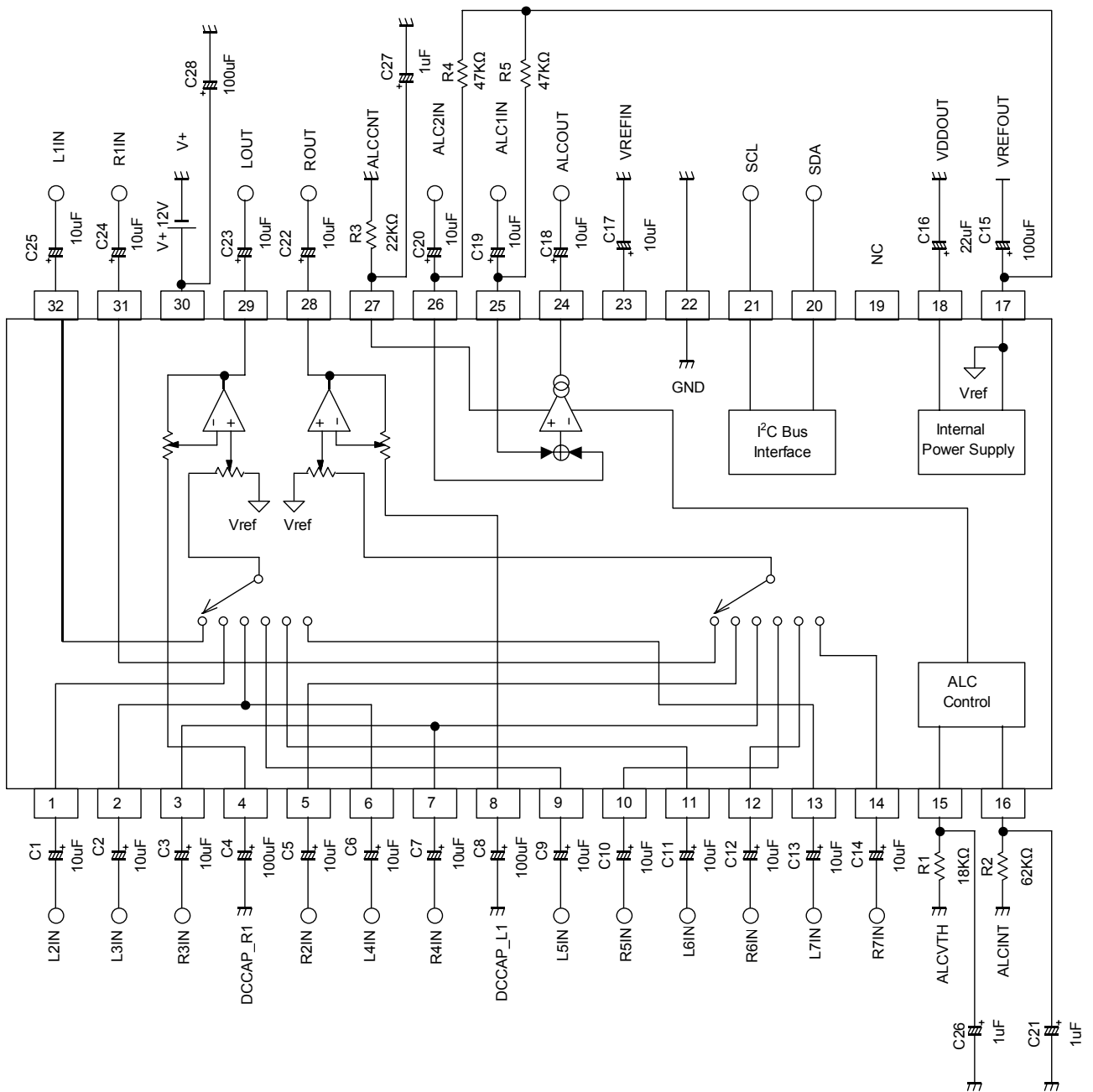
I²C BUS Load Conditions: Pull up resistance 4k Ω (Connected to +5V), Load capacitance 200pF (Connected to GND)

PARAMETER	SYMBOL	MIN.	TYP.	MAX.	UNIT
Low Level Input Voltage	V_{IL}	0.0	-	1.5	V
High Level Input Voltage	V_{IH}	3.0	-	5.0	V
Hysteresis of Schmitt trigger inputs	V_{hys}	0.25	-	-	V
LOW level output voltage (3mA at SDA pin)	V_{OL}	0	-	0.4	V
Output fall time from V_{IHmin} to V_{ILmax} with a bus capacitance from 10pF to 400pF	t_{of}	$20+0.1C_b$	-	250	ns
Pulse width of spikes which must be suppressed by the input filter	t_{SP}	0	-	50	ns
Input current each I/O pin with an input voltage between 0.1V _{DD} and 0.9V _{DDmax}	I_i	-10	-	10	μ A
Capacitance for each I/O pin	C_i	-	-	10	pF
SCL clock frequency	f_{SCL}	-	-	400	kHz
Hold time (repeated) START condition.	$t_{HD:STA}$	0.6	-	-	μ s
LOW period of the SCL clock	t_{LOW}	1.3	-	-	μ s
HIGH period of the SCL clock	t_{HIGH}	0.6	-	-	μ s
Set-up time for a repeated START condition	$t_{SU:STA}$	0.6	-	-	μ s
Data hold time	$t_{HD:DAT}$	0	-	0.9	μ s
Data set-up time	$t_{SU:DAT}$	100	-	-	ns
Rise time of both SDA and SCL signals	t_r	-	-	300	ns
Fall time of both SDA and SCL signals	t_f	-	-	300	ns
Set-up time for STOP condition	$t_{SU:STO}$	0.6	-	-	μ s
Bus free time between a STOP and START condition	t_{BUF}	1.3	-	-	μ s
Capacitive load for each bus line	C_b	-	-	400	pF
Noise margin at the LOW level	V_{nL}	0.5	-	-	V
Noise margin at the HIGH level	V_{nH}	1	-	-	V

C_b ; total capacitance of one bus line in pF.



■ APPLICATION CIRCUIT



■ DEFINITION OF I²C REGISTER

◆ I²C BUS FORMAT



S: Starting Term

A: Acknowledge Bit

P: Ending Term

◆ SLAVE ADDRESS

MSB							LSB
1	0	0	0	0	0	1	R/W

R/W=0: Receive Only

R/W=1: No Output Data

◆ CONTROL REGISTER TABLE

The select address sets each function (Volume, Selector).

The auto increment function cycles the select address as follows.

00H→01H→02H→00H

Select Address	BIT							
	D7	D6	D5	D4	D3	D2	D1	D0
00H	Don't Care				VOLa			
01H	Don't Care				VOLb			
02H	Don't Care					Selector		

◆ CONTROL REGISTER DEFAULT VALUE

Control register default values are as follows :

Select Address	BIT							
	D7	D6	D5	D4	D3	D2	D1	D0
00H	1	1	1	1	1	1	1	1
01H	1	1	1	1	1	1	1	1
02H	0	0	0	0	0	0	0	0

■ CONTROL COMMAND TABLE

a) Master Volume

Select Address	BIT							
	D7	D6	D5	D4	D3	D2	D1	D0
00H	Don't Care				VOLa			
01H	Don't Care				VOLb			

•VOLa / VOLb : Ach and Bch volume level setting from +12dB to -12dB with 3dB step.

Gain (dB)	VOLa / VOLb			
	D3	D2	D1	D0
+12	0	0	0	0
+9	0	0	0	1
+6	0	0	1	0
+3	0	0	1	1
0	0	1	0	0
-3	0	1	0	1
-6	0	1	1	0
-9	0	1	1	1
-12	1	0	0	0
Mute	1	1	1	1

b) Input Selector

Select Address	BIT							
	D7	D6	D5	D4	D3	D2	D1	D0
02H	Don't Care					Selector		

•Selector : Input signal selecting

Input	Selector		
	D2	D1	D0
L1IN / R1IN	0	0	0
L2IN / R2IN	0	0	1
L3IN, L4IN / R3IN, R4IN	0	1	0
L5IN / R5IN	0	1	1
L6IN / R6IN	1	0	0
L7IN / R7IN	1	0	1

[CAUTION]

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