



## SRS CSII 5.1 & TruSurround XT Decoder

### ■ Package

### ■ General Description

The NJU26108 is a digital signal processor that provides the function of Circle Surround II 5.1 / TruSurroundXT and Mono-to-Stereo.

The NJU26108 processes the stereo matrix-encoded signal into spacious sound of 5.1 channels by Circle Surround II 5.1. Also non matrix-encoded audio signal can be processed into effective spacious sound.

The decoded 2-channel signal can be converted into spacious 2-channel virtual surround output by the TruSurroundXT technology.

The applications of NJU26108 are suitable for multi-channel products such as DVD Receivers, AV Amplifiers, TV, Car Audio or ordinary audio products such as small speakers system.



**NJU26108FR1**

### ■ FEATURES

- 5.1-Channel signal outputs by Circle Surround II 5.1
- 2-Channel outputs by SRS TruSurroundXT
- Mono-to-Stereo function
- LFE by SRS TruBass
- SRS Focus
- Two kinds of micro computer interfaces
  - I<sup>2</sup>C bus ( standard-mode / 100Kbps )
  - Serial Interface (4 lines: Clock, Enable, Input data, Output data)

### ■ Digital Signal Processor Specification

- 24bit Fixed-point Digital Signal Processing
- Maximum System Clock Frequency : 38MHz
- Digital Audio Interface : 2 Input ports / 3 Output ports
- Master / Slave Mode
- Master Mode MCK : 1/2 fclk, 1/3 fclk  
ex. MCK = 384Fs(1/2) or MCK = 256Fs(1/3) at fclk=768Fs
- Two kinds of micro computer interface
  - I<sup>2</sup>C bus (standard-mode/100kbps)
  - Serial interface (4 lines: clock, enable, input data, output data)
- Power Supply : 2.5V ( 3.3V Input tolerant )
- Package : QFP32-R1

The detail hardware specification of the NJU26108 is described in the “ NJU26100 Series Hardware Data Sheet”.

## Function Block Diagram

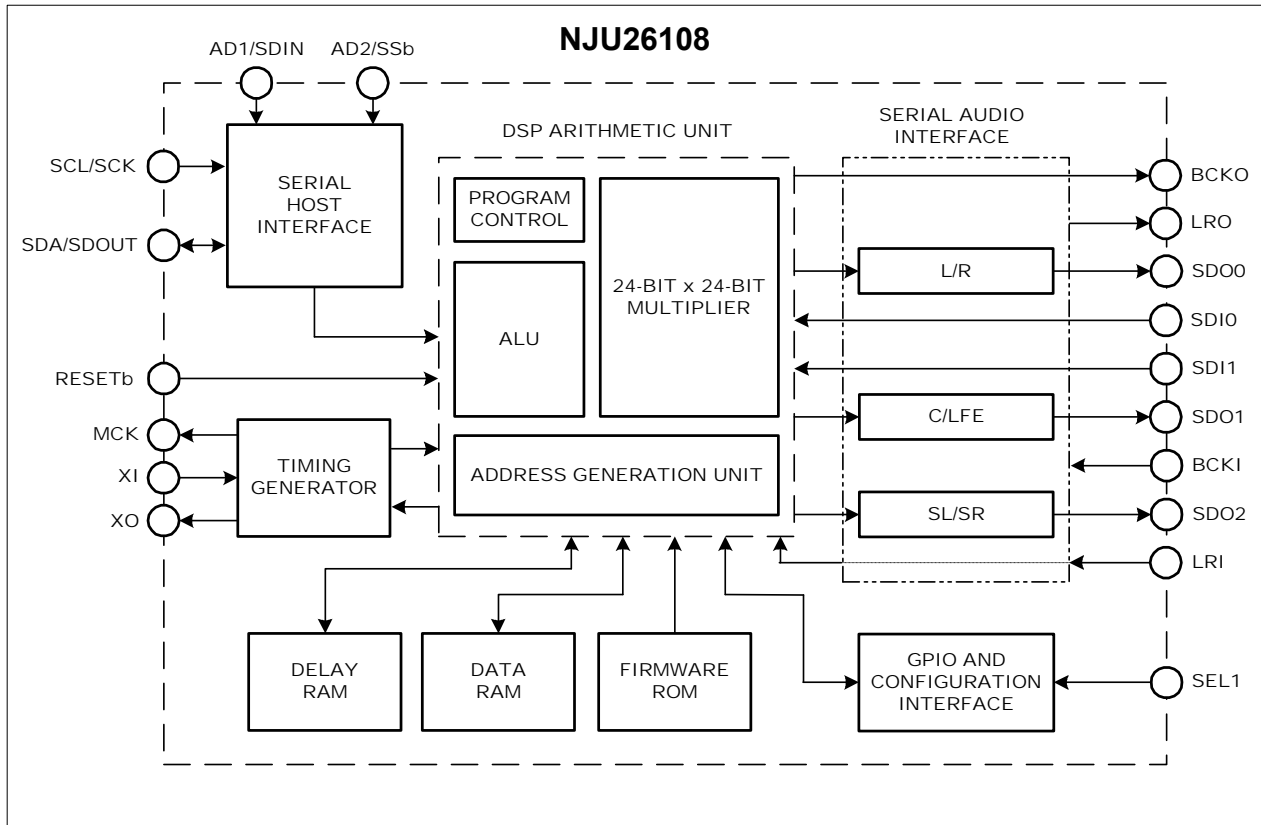


Fig. 1 NJU26108 Block Diagram

## DSP Block Diagram

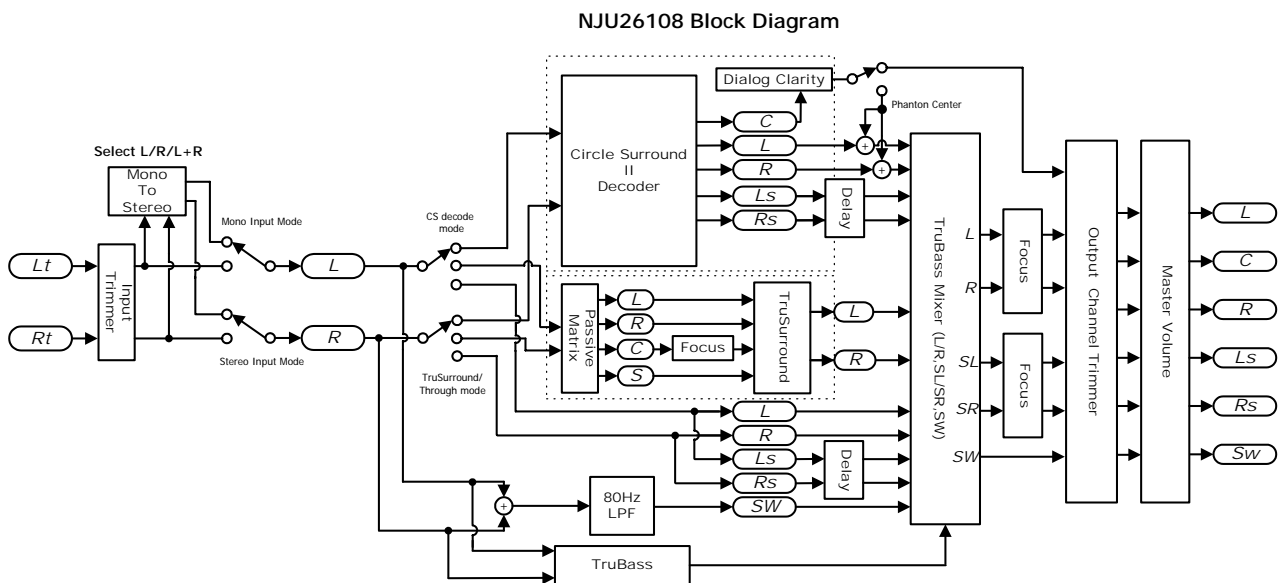


Fig. 2 NJU26108 Function Diagram

## Pin Configuration

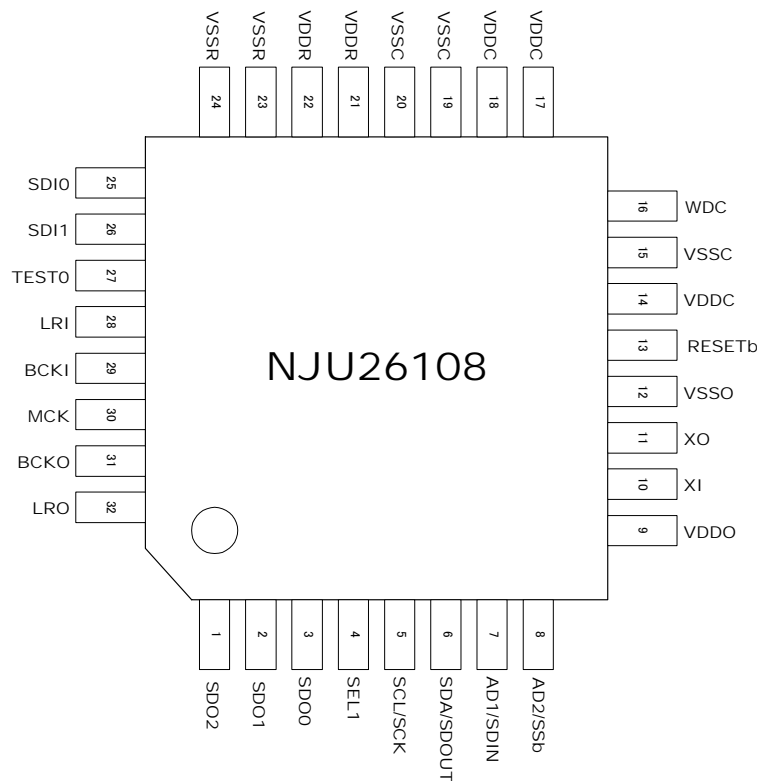


Fig. 3 NJU26108 Pin Configuration

## Pin Description

Table 1 Pin Description

No.	Symbol	I/O	Description	No.	Symbol	I/O	Description
1	SDO2	O	Audio Data Output 2 $S_L/S_R$	17	VDDC	--	Core Power Supply +2.5V
2	SDO1	O	Audio Data Output 1 $C/SW$	18	VDDC	--	Core Power Supply +2.5V
3	SDO0	O	Audio Data Output 0 $L/R$	19	VSSC	--	Core GND
4	SEL1	I <sup>*2</sup>	Select I <sup>2</sup> C or Serial bus	20	VSSC	--	Core GND
5	SCL/SCK	I	I <sup>2</sup> C Clock / Serial Clock	21	VDDR	--	I/O Power Supply +2.5V
6	SDA/SDOUT	I/O	I <sup>2</sup> C I/O / Serial Output	22	VDDR	--	I/O Power Supply +2.5V
7	AD1/SDIN	I	I <sup>2</sup> C Address / Serial Input	23	VSSR	--	I/O GND
8	AD2/SSb	I	I <sup>2</sup> C Address / Serial Enable	24	VSSR	--	I/O GND
9	VDDO	--	OSC Power Supply +2.5V	25	SDIO	I	Audio Data Input 0 $L/R$
10	XI	I	X'tal Clock Input	26	SDI1	I	Audio Data Input 1 $L/R$
11	XO	O	OSC Output	27	TEST0	I	Connect to GND
12	VSSO	--	OSC GND	28	LRI	I	LR Clock Input
13	RESETb	I	RESET (active Low)	29	BCKI	I	Bit Clock Input
14	VDDC	--	Core Power Supply +2.5V	30	MCK	O	Master Clock Output
15	VSSC	--	Core GND	31	BCKO	O	Bit Clock Output
16	WDC	O <sup>*2</sup>	Clock for Watch Dog Timer	32	LRO	O	LR Clock Output

\*1 I : Input, O : Output, I/O : Bi-directional

\*2 SEL1 : Input, WDC : Output

## ■ Audio Data Output

The NJU26108 audio interface provides industry standard serial data formats of I<sup>2</sup>S, MSB-first left-justified or MSB-first right-justified. The NJU26108 audio interface provides two data inputs, SDI0 and SDI1, and three data outputs, SDO0, SDO1 and SDO2, as shown in table 2 and 3. The input serial data is selected by the firmware command.

**Table 2 Serial Audio Input Pin**

Pin No.	Symbol	Description
25	SDI0	Audio Data Input 0 L / R
26	SDI1	Audio Data Input 1 L / R

**Table 3 Serial Audio Output Pin**

Pin No.	Symbol	Description
3	SDO0	Front Lch/Rch Output
2	SDO1	Center/Sub Woofer Output
1	SDO2	Rear Lch/Rch Output

## ■ I<sup>2</sup>C address

AD1 and AD2 pins are used to configure the seven-bit SLAVE address of the serial host interface. These pins offer additional flexibility to SLAVE address. 4 addresses could be chosen by AD1 and AD2-pin. The AD1 and AD2-pin addresses are decided by the connections of AD1 and AD2-pin. The AD1 and AD2 addresses should be the same level as AD1 and AD2-pin connections.

**Table 4 I<sup>2</sup>C Bus SLAVE Address**

bit7	bit6	bit5	bit4	Bit3	bit2	bit1	bit0
0	0	1	1	1	AD2 <sup>*1</sup>	AD1 <sup>*1</sup>	R/W

\*1 AD1 or AD2 address is 0 when AD1 or AD2-pin is "L". AD1 or AD2 address is 1 when AD1 or AD2-pin is "H".

The detail I<sup>2</sup>C bus timing of the NJU26108 is described in the "NJU26100 Series Hardware Data Sheet".

## ■ Firmware Command Table


Host processor can control the NJU26108 via I2C bus or 4-Wire serial bus interface. The following table summarizes the available user commands.

**Table 5 NJU26108 Command**

No.	Command	Command Description
1	Set Task	Set Task : Mono-Stereo, TruSurround, Focus, TruBass, CSII 5.1, Input Select
2	CSII Mode	Set CSII mode : Cinema / Music, Phantom Center, Rear Boost, Full Band Width, 525 Mode
3	TruBass Mode	Set TruBass mode : Sr/SI, Sub Woofer, L/R, Speaker Size
4	TruBass Base Control	Set TruBass Base : Gang Mode, Mute, TruBass Level
5	Focus Mode	Set Focus mode : SI / Sr, L / R, C
6	Focus Control	Focus Control : Gang, Mute, Focus Value
7	Mono Input Select	Set Mono Input : L / R, L+R
8	Sample Rate	Set Sample Rate : 48, 44.1, 32 KHz
9	Rear Space Gain	Set Rear Space Gain : 0 ~ -15dB
10	4 Ch. Stereo Mode	Select 4 Ch. Stereo Mode : On / Off
11	Delay	Set Delay Time : 0 ~ 10 ms
12	Master Volume	Set Master Volume : 0 ~ -63dB
13	Input Trimmer	Set Input Trimmer : 0 ~ -63dB
14	Left Volume	Set Left Volume : 0 ~ -63dB
15	Right Volume	Set Right Volume : 0 ~ -63dB
16	Left Volume	Set Left Volume : 0 ~ -63dB
17	Center Volume	Set Center Volume : 0 ~ -63dB
18	SI Volume	Set SI Volume : 0 ~ -63dB
19	Sr Volume	Set Sr Volume : 0 ~ -63dB
20	SubWoofer Volume	Set SubWoofer Volume : 0 ~ -63dB
21	System Status	Set System Status : DSP Mode, Data Width, Serial Audio Mode, Audio Clock, MCK clock
22	TruBass Base Control SW	TruBass Base Control SW : Gang Mode, Mute, TruBass Level
23	TruBass Base Control SI / Sr	TruBass Base Control SI / Sr : Gang Mode, Mute, TruBass Level
24	Focus Control L / R	Focus Control L / R : Gang Mode, Mute, Focus Level
25	Focus Control SI / Sr	Focus Control SI / Sr : Gang Mode, Mute, Focus Level
26	NOP	Check DSP status

In respect to detail command information, request NJR.

## ■ License Information

1. The SRS technology right incorporated in the NJU26108 are owned by SRS Labs, a U.S. Corporation and licensed to New Japan Radio Co., Ltd. SRS is protected under U.S. and foreign patents issued and / or pending. "SRS", "Circle Surround II 5.1", "TruSurround XT", "Focus", "TruBass" and the  are trademarks of SRS Labs, Inc. in the United States and selected foreign countries. Neither the purchase of the NJU26108, nor the corresponding sale of audio enhancement equipment conveys the right to sell commercialized recordings made with any SRS technology.

SRS Labs requires that all users of the NJU26108 must enter into a license agreement directly with SRS Labs if the royalty is not included in the purchase price. SRS Labs also requires any users to comply with all rules and regulations as outlined in the SRS Trademark Usage Manual.

For further information, please contact:

SRS Labs, Inc. 2909 Daimler Street. Santa Ana, CA 92705 USA

Tel: 949-442-1070 Fax: 949-852-1099 <http://www.srslabs.com>

2 Purchase of I<sup>2</sup>C components of New Japan Radio Co., Ltd or one of sublicensed Associated Companies conveys a license under the Philips I<sup>2</sup>C Patent Rights to use these components in an I<sup>2</sup>C system, provided that the system conforms to the I<sup>2</sup>C Standard specification as defined by Philips.

[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.