SRS CSII 5.1 & TruSurround XT Decoder

■Package

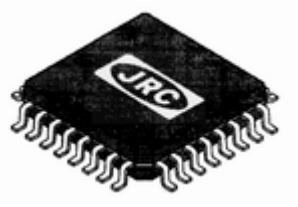
■ General Description

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^2C 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^2C 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

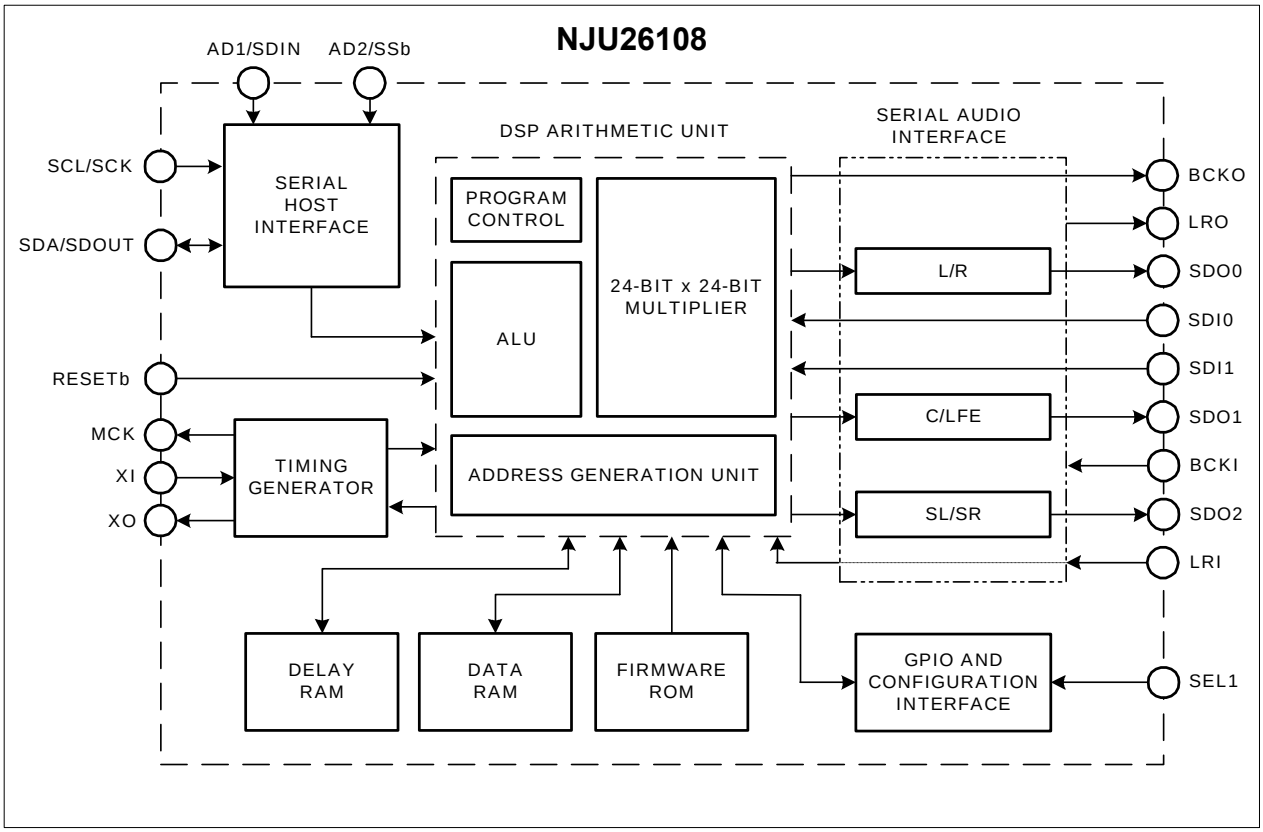


Fig. 1 NJU26108 Block Diagram

■ DSP Block Diagram

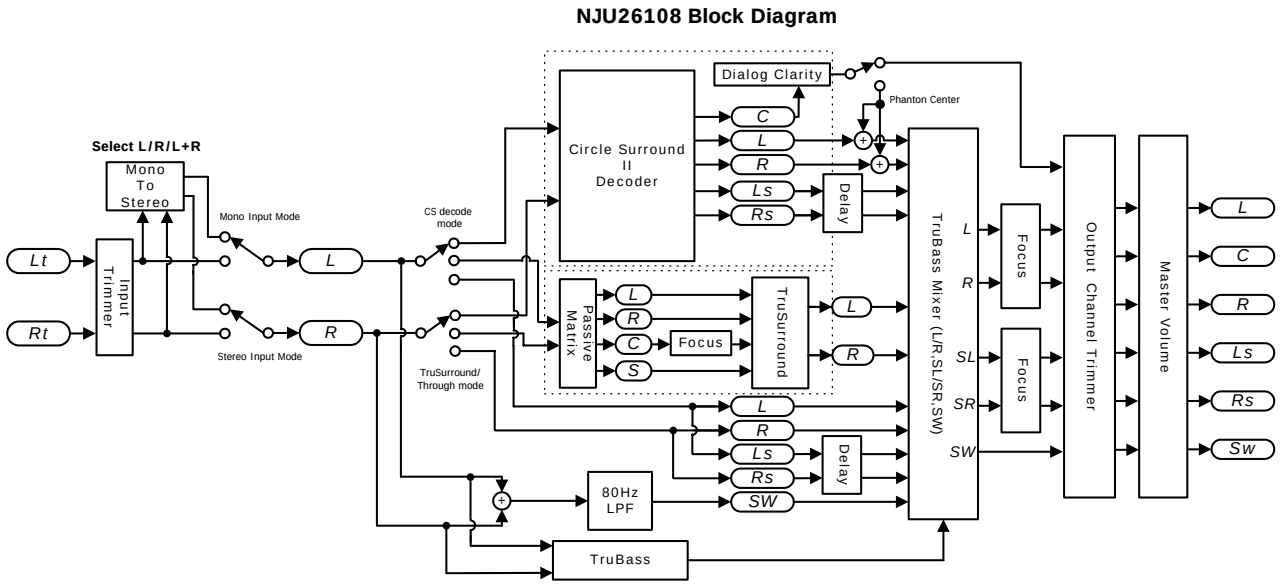


Fig. 2 NJU26108 Function Diagram

■ Pin Configuration

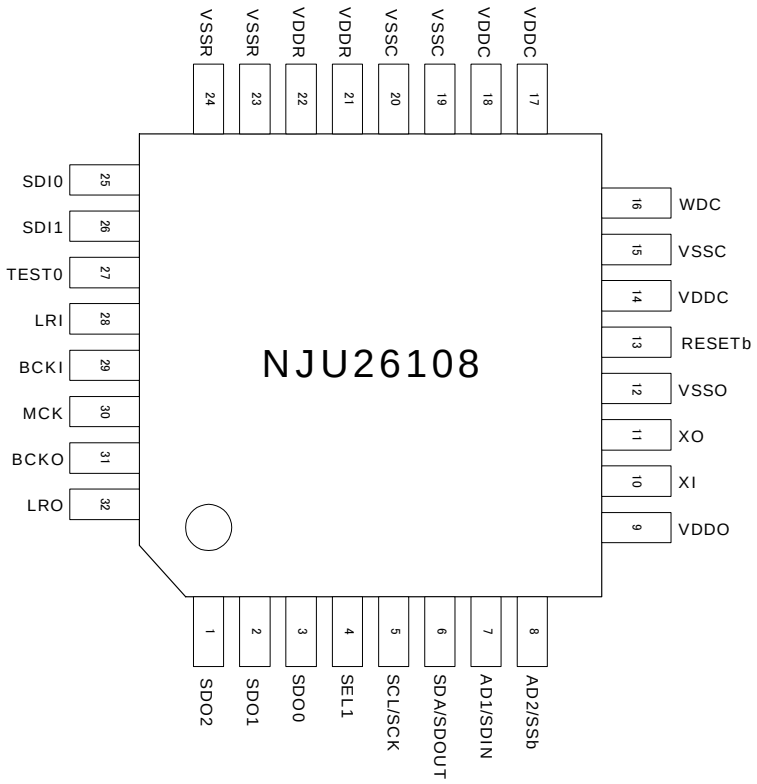


Fig. 3 NJU26108 Pin Configuration

■ 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 *2	Select I^2C or Serial bus	20	VSSC	--	Core GND
5	SCL/SCK	I	I^2C Clock / Serial Clock	21	VDDR	--	I/O Power Supply +2.5V
6	SDA/SDOUT	I/O	I^2C I/O / Serial Output	22	VDDR	--	I/O Power Supply +2.5V
7	AD1/SDIN	I	I^2C Address / Serial Input	23	VSSR	--	I/O GND
8	AD2/SSb	I	I^2C Address / Serial Enable	24	VSSR	--	I/O GND
9	VDDO	--	OSC Power Supply +2.5V	25	SDI0	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 *2	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^{2}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 firmaware 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^{2}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.

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Table 4 I^{2}C Bus SLAVE Address

bit7	bit6	bit5	bit4	Bit3	bit2	bit1	bit0
0	0	1	1	1	AD2*[1]	AD1*[1]	R/$\overline{W}$

*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^{2}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/Sl, Sub Woofer, L/R, Speaker Size
4	TruBass Base Control	Set TruBass Base : Gang Mode, Mute, TruBass Level
5	Focus Mode	Set Focus mode : Sl / 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	Sl Volume	Set Sl 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 Sl / Sr	TruBass Base Control Sl / Sr : Gang Mode, Mute, TruBass Level
24	Focus Control L / R	Focus Control L / R : Gang Mode, Mute, Focus Level
25	Focus Control Sl / Sr	Focus Control Sl / Sr : Gang Mode, Mute, Focus Level
26	NOP	Check DSP status

In respect to detail command information, request NJR.

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