



Digital Signal Processor for TV

■ Package

■ General Description

The NJU26101 is a digital signal processor that provides the function of AGC, 3D Sound, Sound Enhancement, Tone Control, and Digital Volume.

The NJU26101 is suitable for audio products such as TV, CD radio-cassette, speakers system, and others.



NJU26101

■ FEATURES

- 3D sound:
eala, simulated stereo, SRS 3D Stereo, SRS 3D Mono, SRS TruSurround
BBE VIVA, BBE VIVA+
- Sound Enhancement: BBE, BBE Mach3Bass, SRS TruBass
- AGC to control sound-volume difference between channels or programs
- Tone Control
- Digital Volume

■ Digital Signal Processor Specification

- 24bit Fixed-point Digital Signal Processing
- Maximum Clock Frequency : 38MHz
- Digital Audio Interface : 2 Input ports / 1 Output port
- Power Supply : DSP Core : 2.5V, I/O interface: 2.5V (+3.3V tolerant)
- Package : QFP 32pin

The detail hardware specification of the NJU26101 is described in the “NJU26100 Series Hardware Data Sheet”. In respect to software commands, request NJR.

Function Block Diagram

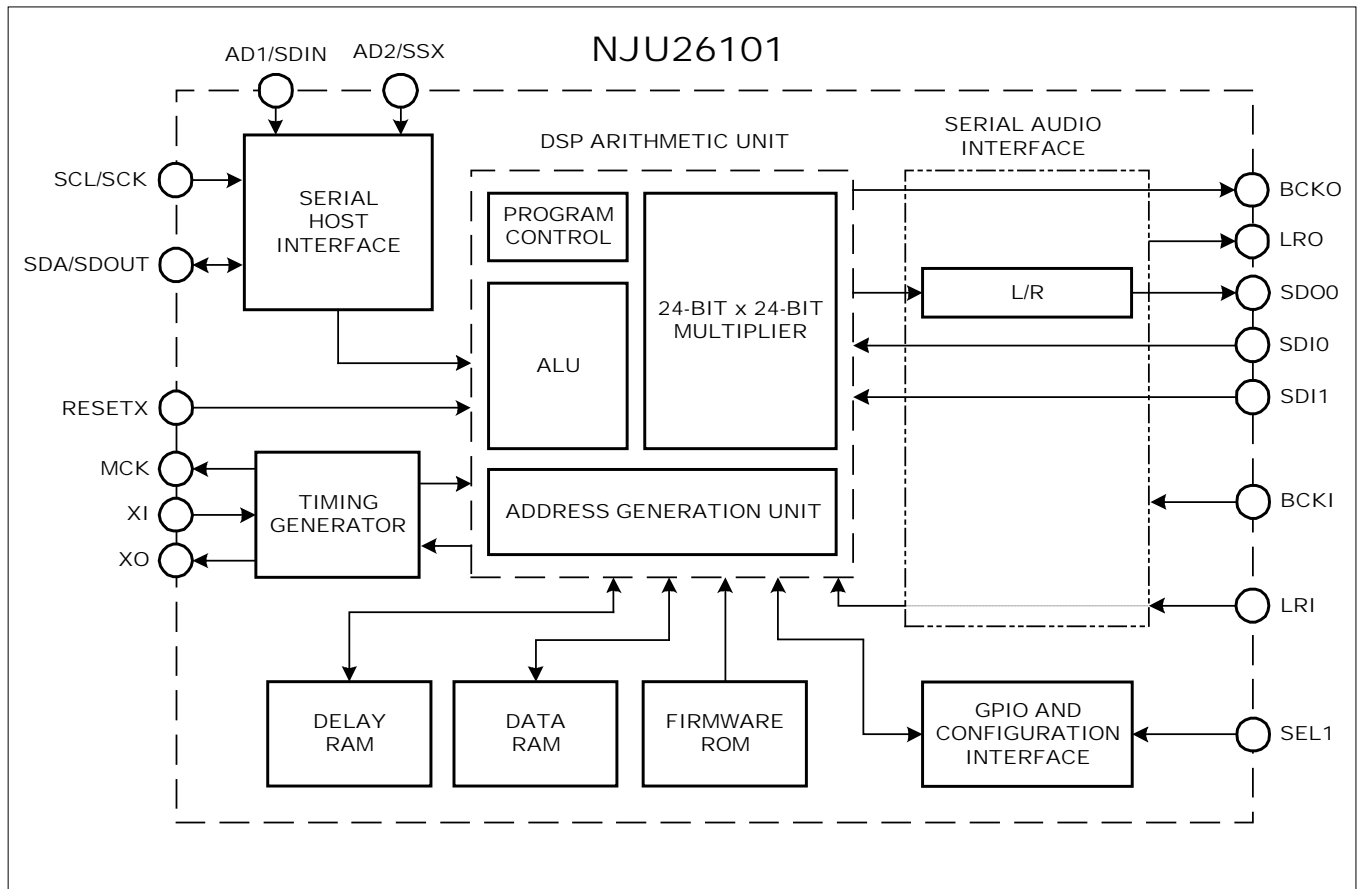


Fig. 1 NJU26101 Block Diagram

DSP Block Diagram

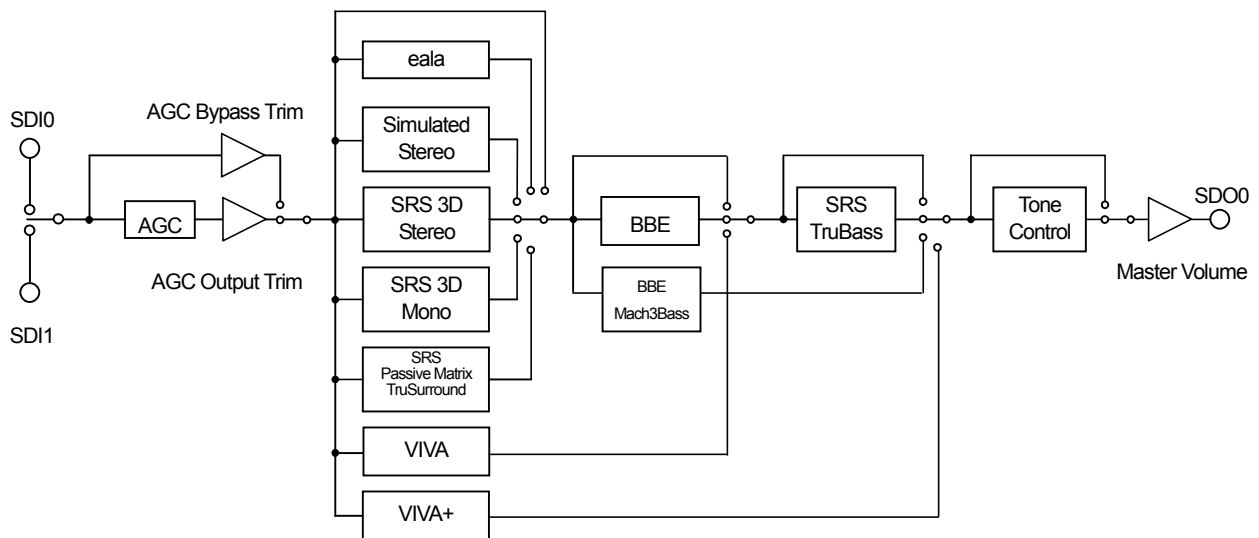


Fig. 2 NJU26101 Function Diagram

■ Pin Configuration

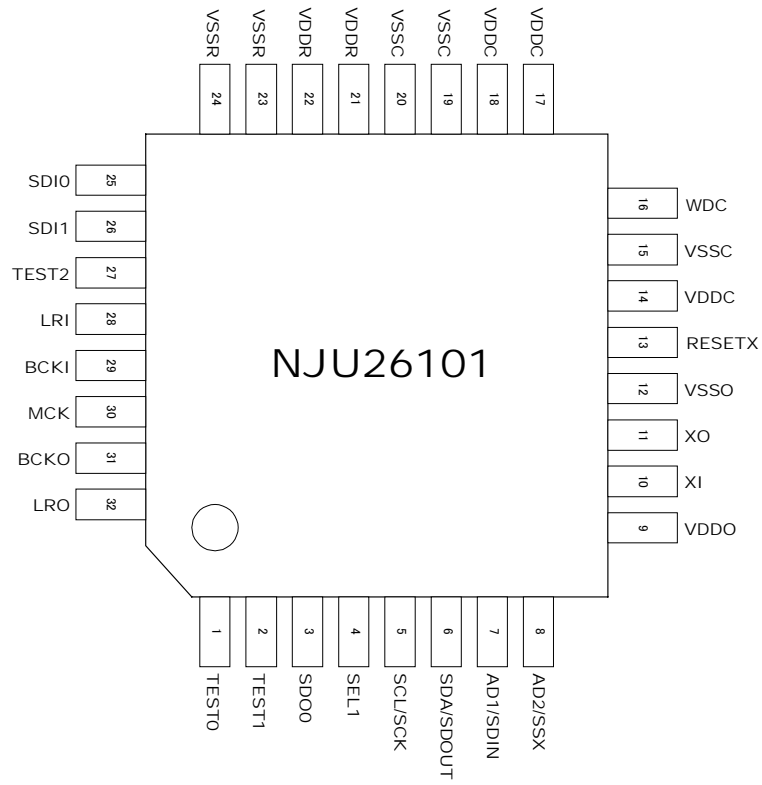


Fig. 3 NJU26101 Pin Configuration

■ Pin Description

Table 1 Pin Description

No.	Pin Name	I/O	Pin Description	No.	Pin Name	I/O	Pin Description
1	TEST0	O	Open	17	VDDC	P	DSP Core Power Supply +2.5V
2	TEST1	O	Open	18	VDDC	P	DSP Core Power Supply +2.5V
3	SDO0	O	Audio Data Output L/R	19	VSSC	G	DSP Core Power Supply GND
4	SEL1	I	Select I ² C or Serial bus	20	VSSC	G	DSP Core Power Supply GND
5	SCL/SCK	I	I ² C clock / Serial clock	21	VDDR	P	I/O Power Supply +2.5V
6	SDA/SDOUT	IO	I ² C I/O / Serial Out	22	VDDR	P	I/O Power Supply +2.5V
7	AD1/SDIN	I	I ² C Address / Serial In	23	VSSR	G	I/O Power Supply GND
8	AD2/SSX	I	I ² C Address/Serial enable	24	VSSR	G	I/O Power Supply GND
9	VDDO	P	OSC Power Supply +2.5V	25	SDI0	I	Audio Data Input
10	XI	I	OSC Clock Input	26	SDI1	I	Audio Data Input
11	XO	O	OSC Clock Output	27	TEST2	I	Connect to GND
12	VSSO	G	OSC Power Supply GND	28	LRI	I	LR Clock Input
13	RESETX	I	Reset	29	BCKI	I	Bit Clock Input
14	VDDC	P	DSP Core Power Supply +2.5V	30	MCK	O	A/D,D/A Clock Output
15	VSSC	G	DSP Core Power Supply GND	31	BCKO	O	Bit Clock Output
16	WDC	O	Clock for Watch Dog Timer	32	LRO	O	LR Clock Output

* I : Input, O : Output, IO : Bi-directional, P : +Power, G : GND * Package is shown in fig. 3.

■ Audio Data Output

The NJU26101 audio interface provides industry standard serial data formats of I²S, MSB-first left-justified or MSB-first right-justified. The NJU26101 audio interface provides two data inputs, SDI0 and SDI1, and a data output, SDO0, as shown in table 2 and 3. The input serial data is selected by the firmware command.

Table 2 Serial Audio Input Pin

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

Table 3 Serial Audio Output Pin

Symbol	Pin No.	Description
SDO0	3	Audio Data Output 0 L / R

■ I²C 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 I²C Bus SLAVE Address

bit7	bit6	bit5	bit4	Bit3	bit2	bit1	bit0
0	0	1	1	1	AD2* ¹	AD1* ¹	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 I²C bus timing of the NJU26101 is described in the "NJU26100 Series Hardware Data Sheet".

■ Firmware Command Table


Host processor can control the NJU26101 via I2C bus or 4-Wire serial bus interface. The following table summarizes the available user commands.

Table 5 NJU26101 Command

No.	Command	Command Description
1	System State	Serial Mode, Data Width, MCK, BCK, Master/Slave
2	Version No.	Firmware Version No. Request
3	Input Select / Fs Select	32, 44.1, 48KHz
4	Input mono mode / Smooth Control	Smooth Control : slow, medium, fast Mono mode : L, R, Mix
5	Tone Control (Bass @100Hz)	+/- 12dB
6	Tone Control (Treble @10KHz)	+/- 12dB
7	Channel Balance	0dB to -30dB, inf
8	Firmware Mode Select	Tone Control, Bass Boost, Sound Enhancement, 3D Surround, AGC
9	AGC Ratio / Boost	AGC Boost : 0, 6, 12, 18, 24dB AGC Ratio : 20:1, 8:1, 4:1, 2:1, inf
10	AGC Threshold Level	-6dBFS to -40dBFS
11	AGC Output Trim	0dB to -31dB
12	AGC Attack Time / Release Time	AGC Attack Time : 0.1, 0.2, 0.5, 1, 2, 5 [sec] AGC Release Time : 1, 2, 5, 10, 20, 50 [msec]
13	AGC Noise Compressor Threshold Level	-50 dBFS to -96dBFS, -inf
14	AGC Bypass Trim	0dB to -31dB
15	Eala Surround Gain	0dB to +12dB
16	SRS 3D Stereo Space / Center	0dB to +15dB
17	BBE VIVA/ VIVA+ Surround Gain	0dB to +6dB
18	BBE Counter / BBE Process (BBE I)	0 to 15
19	BBE Level / BBE HF Adjust (BBE III)	Level : 0dB to -15dB HF Adjust : 0 to 15
20	BBE Mach3Bass fo / Q	Fo : 40Hz to 150Hz Q : 2 to 8
21	BBE Mach3Bass Gain	0dB to +12dB
22	SRS TruBass Speaker Size	Medium, Small, Large
23	SRS TruBass Bass / Punch	0dB to +15dB
24	Master Volume	0dB to -96dB, -inf
25	Master Volume Boost / Dither	Boost : 0, 6, 12, 18, 24dB Dither: -98 to -128dB, off
26	NOP	No Operation

In respect to detail command information, request NJR.

■ License Information

1. The SRS technology right incorporated in the NJU26101 are owned by SRS Labs, a U.S. Corporation and licensed to New Japan Radio Co., Ltd. "SRS", "SRS 3D MONO", "SRS TruSurround", "SRS TruBass" are protected under U.S. and foreign patents issued and / or pending. "SRS", "SRS 3D MONO", "SRS TruSurround", "SRS TruBass" and the  are trademarks of SRS Labs, Inc. in the United States and selected foreign countries. Neither the purchase of the NJU26101, 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 NJU26101 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. The NJU26101 is manufactured by New Japan Radio Co.,Ltd. under license from BBE Sound Inc. BBE is a registered trademark of BBE Sound Inc. A license from BBE Sound Inc. must be required before the NJU26101 can be purchased from New Japan Radio Co.,Ltd.

BBE Sound, Inc.
5831 Production Drive
Huntington Beach, CA 92649 USA
Tel: 714-897-6766 Fax: 714-896-0736 <http://www.bbesound.com>

3. Purchase of I²C components of New Japan Radio Co. ,Ltd or one of sublicensed Associated Companies conveys a license under the Philips I²C Patent Rights to use these components in an I²C system, provided that the system conforms to the I²C Standard specification as defined by Philips.

Ver. 1.00

[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.