



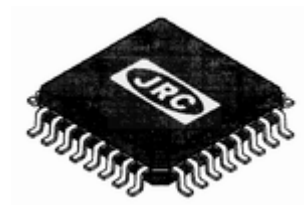
Digital Signal Processor for TV

■ 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

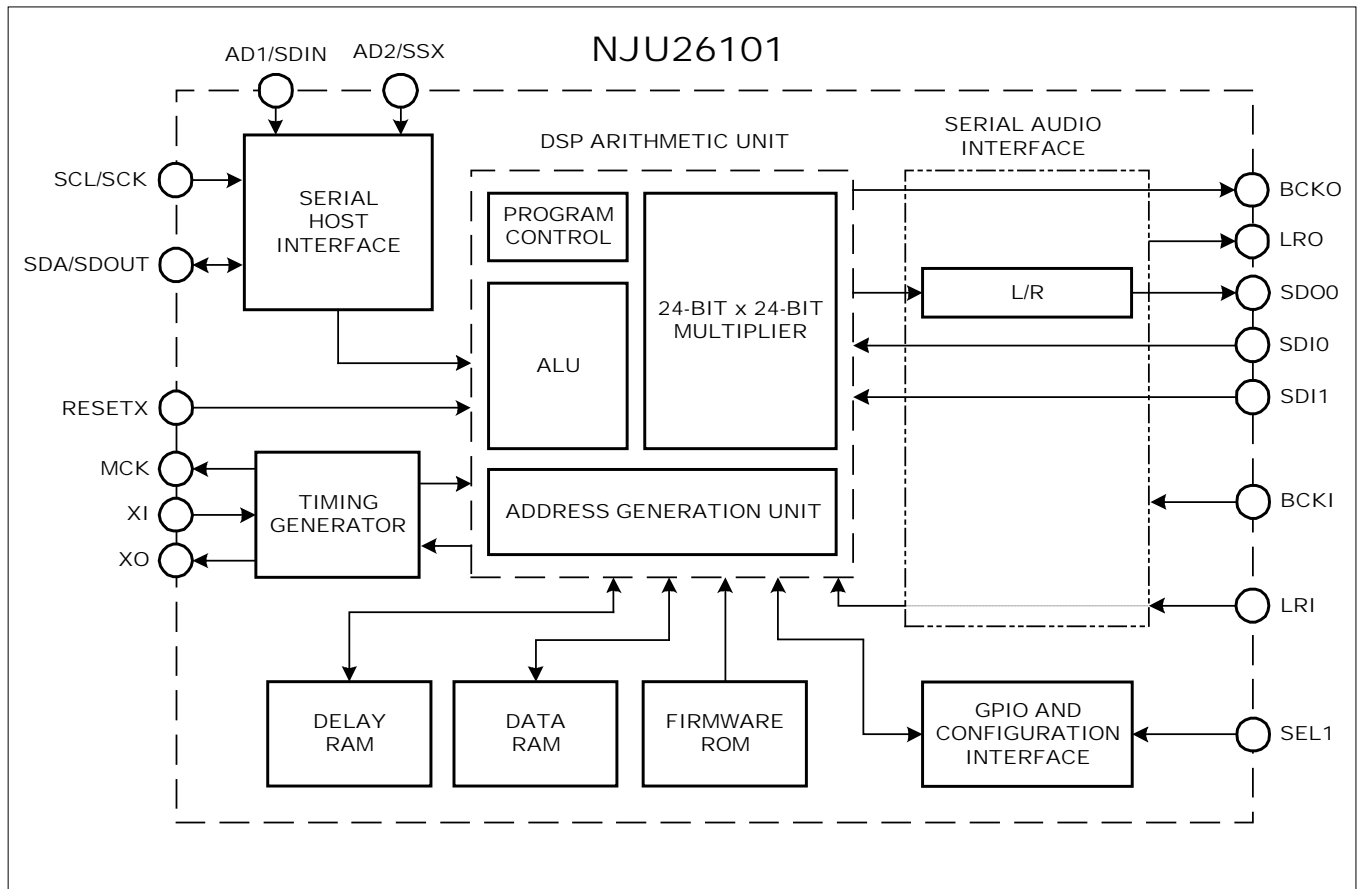


Fig. 1 NJU26101 Block Diagram

DSP Block Diagram

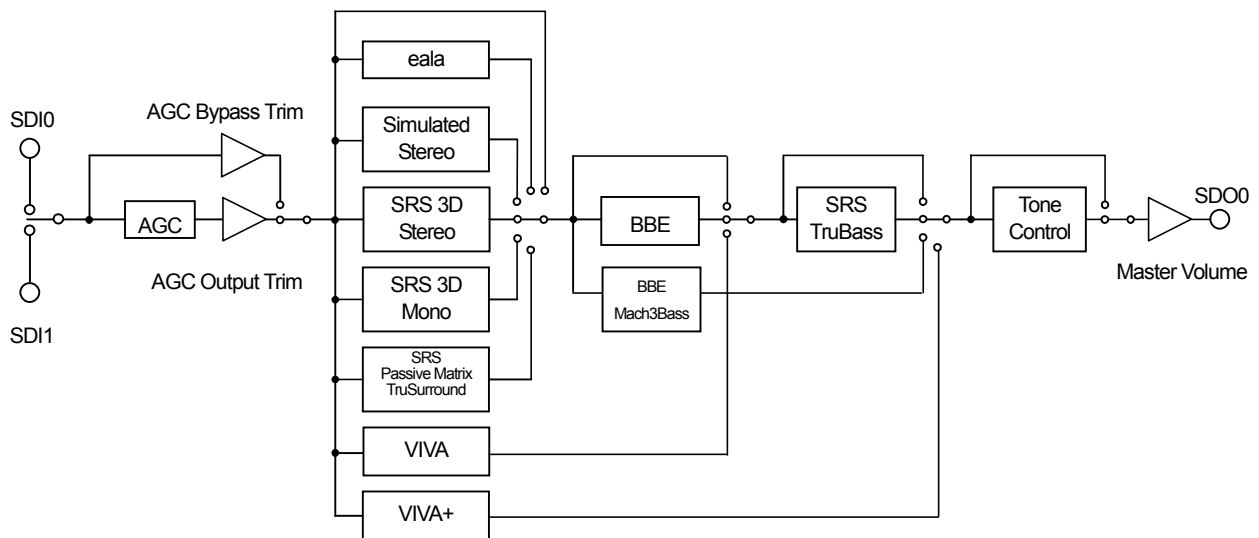


Fig. 2 NJU26101 Function Diagram

■ Pin Configuration

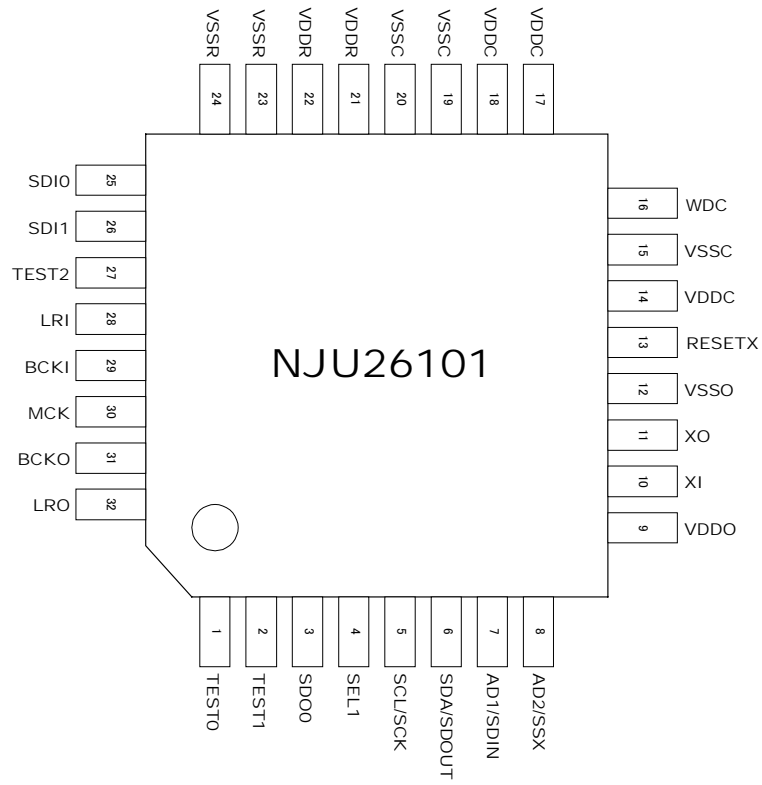


Fig. 3 NJU26101 Pin Configuration

■ 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.

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