



Dolby Pro Logic II / Virtual Dolby Surround Decoder

■ General Description

The NJU26106 is a digital audio signal decoder that provides the function of Dolby Pro Logic II and Virtual Dolby Surround.

The NJU26106 processes the stereo matrix-encoded signal into spacious sound of 5.1 channels by Dolby Pro Logic II and Bass Management System. Also non matrix-encoded audio signal can be processed into effective spacious sound by Music mode.

The decoded 5-channel signal can be downmixed into 2-channel virtual surround output by the Dolby Virtual technology.

The NJU26106 is suitable for multi-channel products such as AV AMP and Car Audio, or ordinary audio products such as small speaker system.

■ Package



NJU26106

■ FEATURES

- 5.1 Channel signal outputs by Dolby Pro Logic II
- 2 Channel outputs by Virtual Dolby Surround
- Movie mode / Music mode
- Available for Center width control, Dimension control, Panorama mode
Music mode and Custom mode

■ Digital Signal Processor Specification

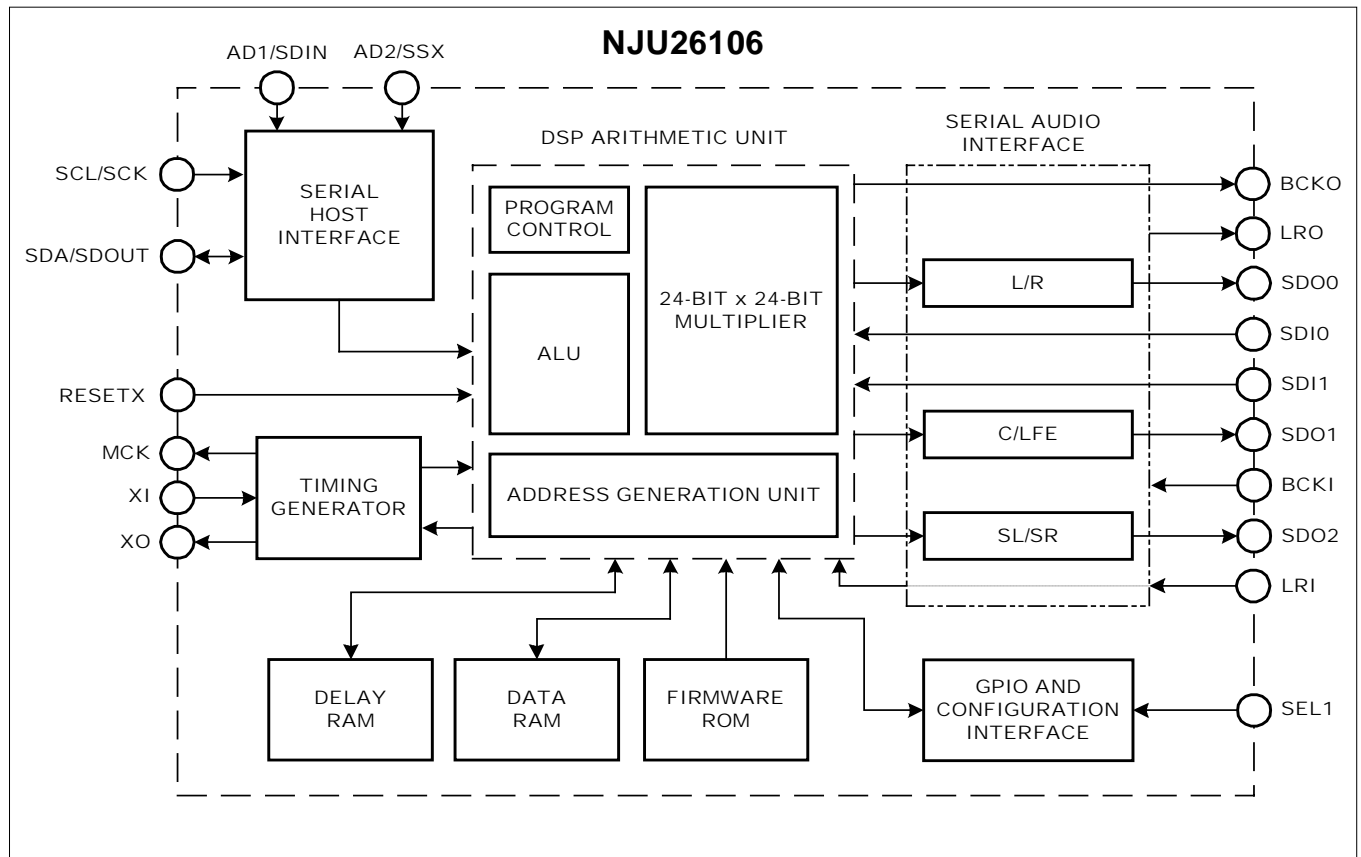
- 24bit Fixed-point Digital Signal Processing
- Maximum Clock Frequency : 38MHz
- Digital Audio Interface : 2 Input ports / 3 Output ports
- Digital Audio Format : I²S 24bit, Left-Justified, Right-Justified, BCK : 32Fs / 64Fs
- Master / Slave Mode
- Master Mode MCK : 1/2 fclk, 1/3 fclk
ex. MCK = 384Fs(1/2) or MCK = 256Fs(1/3) at fclk=768Fs
- Two kinds of micro computer interface
 - I²C Bus (standard-mode/100Kbps)
 - 4-Wire Serial Bus (4-Wire: Clock, Enable, Input data, Output data)
- Power Supply : DSP Core : 2.5V I/O interface: 2.5V (+3.3V tolerant)
- Package : QFP 32pin

The detail hardware specification of the NJU26106 is described in the "NJU26100 Series Hardware Data Sheet". In respect to software commands, request NJR.

NJU26106

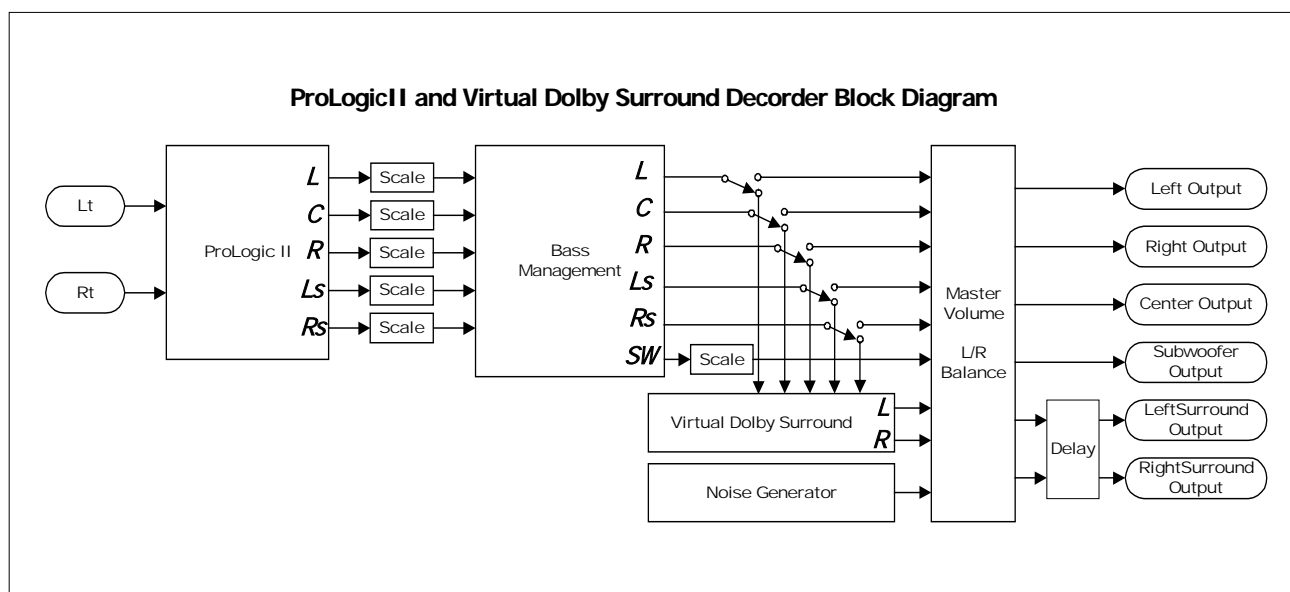
DSP Block Diagram

Fig. 1 NJU26106 Block Diagram



Pro Logic II & Virtual Dolby Surround Decoder

Fig. 2 NJU26106 Function Diagram



Pin Configuration

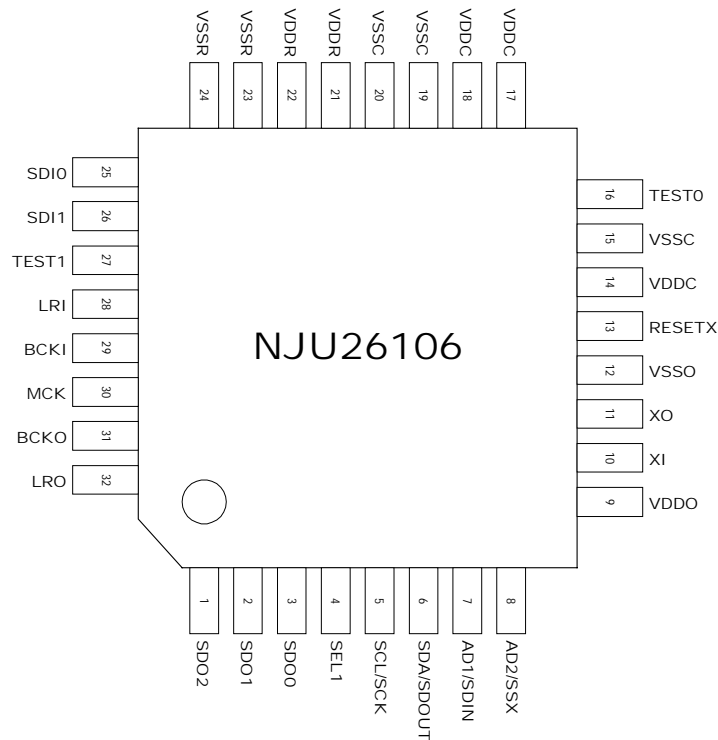


Fig. 3 NJU26106 Pin Configuration

Pin Description

Table 1 Pin Description

No.	Symbol	I/O	Description	No.	Symbol	I/O	Description
1	SDO2	O	Audio Data Output CH2 SI / Sr	17	VDDC	P	Core Power Supply +2.5V
2	SDO1	O	Audio Data Output CH1 C / SW	18	VDDC	P	Core Power Supply +2.5V
3	SDO0	O	Audio Data Output CH0 L / R	19	VSSC	G	Core GND
4	SEL1	I	Select I ² C (L) or Serial bus (H)	20	VSSC	G	Core 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 Output	22	VDDR	P	I/O Power Supply +2.5V
7	AD1/SDIN	I	I ² C Address / Serial Input	23	VSSR	G	I/O GND
8	AD2/SSX	I	I ² C Address / Serial Enable	24	VSSR	G	I/O GND
9	VDDO	P	OSC Power Supply +2.5V	25	SDIO	I	Audio Data Input CH0 L / R
10	XI	I	X'tal Clock Input	26	SDI1	I	Audio Data Input CH1 L / R
11	XO	O	X'tal Clock Output	27	TEST1	I	GND
12	VSSO	G	OSC GND	28	LRI	I	LR Clock Input
13	RESETX	I	RESET	29	BCKI	I	Bit Clock Input
14	VDDC	P	Core Power Supply +2.5V	30	MCK	O	Master Clock Output
15	VSSC	G	Core GND	31	BCKO	O	Bit Clock Output
16	TEST0	IO	OPEN	32	LRO	O	LR Clock Output

* I : Input, O : Output, IO : Bi-directional, P : +Power, G : GND

■ Audio Data Output

The NJU26106 audio interface provides Industry standard serial data formats of I²S, MSB-first left-justified or MSB-first right-justified. The NJU26106 audio interface provides two data inputs, SDI0 and SDI1, and three data outputs, SDO0, SDO1 and SDO2, as shown in fig.1. The input serial data is selected by the firmware command. In Virtual Dolby Surround mode, SDO output generates Lch. and Rch. signal. The other channels are muted. The input serial data is selected by the firmware command.

Table 2 Serial Audio Input Pin

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

Table 3 Serial Audio Output Pin

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

(*) In Virtual Dolby Surround mode, only front Lch/Rch output signal. The other channels are muted.

■ 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 addresses. In the NJU26106, AD2-pin should be connected to "H". 2 kinds of addresses could be chosen for AD1. The AD1 address is decided by the connection of AD1-pin. The AD1 address should be the same level as AD1-pin.

Table 4 I²C Bus SLAVE Address

bit7	bit6	bit5	bit4	Bit3	bit2	bit1	bit0
0	0	1	1	1	AD2*1	AD1*2	R/W

*1 AD2-pin should be connected to high level. AD2 address should be 1.

*2 AD1 address is 0 when AD1-pin is "L". AD1 address is 1 when AD1-pin is "H".

The detail I²C bus timing of the NJU26106 is described in the "NJU26100 Series Hardware Data Sheet".

■ NJU26106 Bass Management

1. The specification of Bass Management is the extended version from Dolby.
2. The 4 types of crossover frequencies for speaker are selectable. (fig. 5, 6)
100, 150, 200, 250Hz (12dB / Oct.)
3. The 4 types of low frequency destinations are selectable. (fig. 4)
Subwoofer, Left / Right, Left Surr / Right Surr, Left / Right + Left Surr / Right Surr

Fig. 4 Bass Management Function Block Diagram

NJU26106 Pro Logic II Bass Management

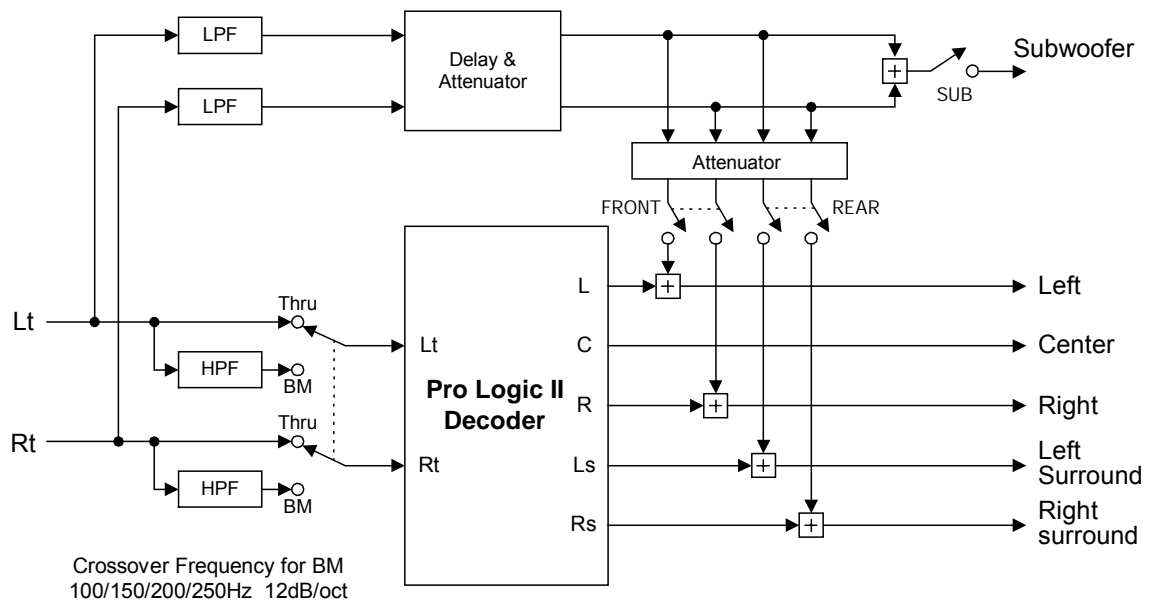


Fig. 5 NJU26106 High Pass Filter

Cutoff Frequency : 100 / 150 / 200 / 250Hz 12dB / Oct.

Audio Precision

Bass Management HPF

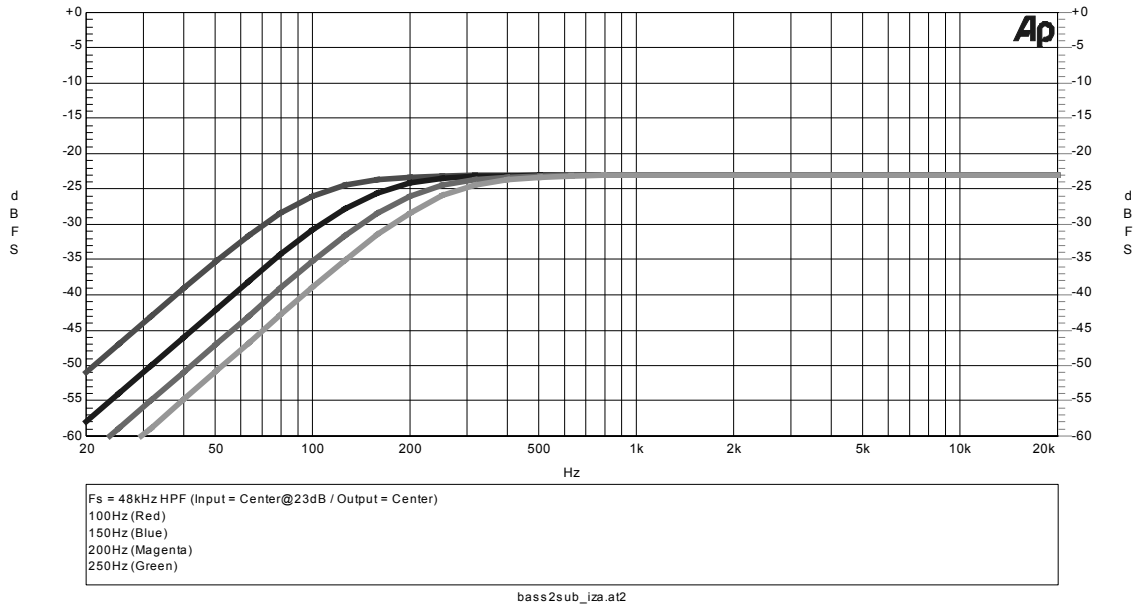
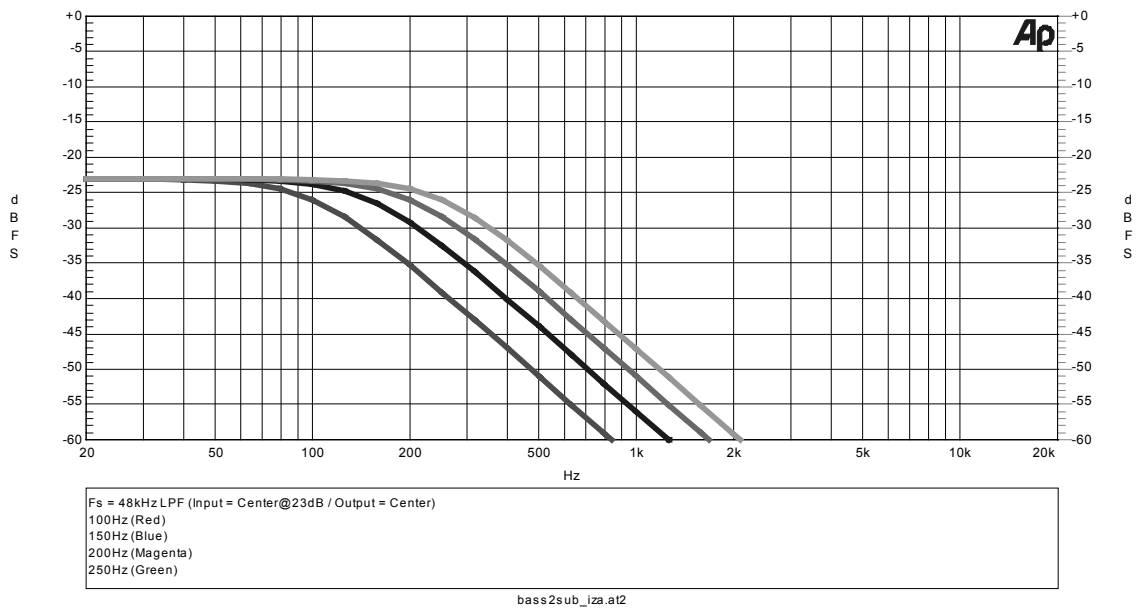


Fig. 6 NJU26106 Low Pass Filter

Cutoff Frequency : 100 / 150 / 200 / 250Hz 12dB / Oct.

Audio Precision

Bass Management LPF



■ Firmware Command Table

The NJU26106 can be controlled by host processor via I²C bus or 4-Wire serial bus interface. The following table summarizes the available user commands.

Table 5 NJU26106 Command

No.	Command System	Command Description
1	SET_TASK_CMD	Set decoding mode: Pro Logic II, Virtual Dolby Surround, Pink Noise Generator
2	VDS_ANG_CMD	Set Virtual Dolby Surround Speaker separation angle
3	DPL_SUR_CMD	Set Pro Logic II Decode Mode (Movie,Music,etc) and Panorama mode
4	CWIDTH_DIM_CMD	Set Pro Logic II Center Width and Dimension configuration
5	DPL_MOD_CMD	Set Pro Logic II Variable Setting, Auto input Balance and Shelf Filter, Rs Polarity Inversion, etc
6	BASS_MGNT_CMD	Set Bass Management Configuration, LFE Cutoff Frequency Configuration
7	FS_CMD	Set sampling rate
8	NOISE_CMD	Set Output Speaker Configuration for Pink Noise Generator
9	DLY_CMD	Set Surround Channel Delay Time
10	LR_BAL_CMD	Set L/R Volume Balance
11	MST_VOL_CMD	Set MASTER Volume
12	LCH_VOL_CMD	Set L Channel Volume
13	RCH_VOL_CMD	Set R Channel Volume
14	CENT_VOL_CMD	Set Center Channel Volume
15	SURR_LEFT_VOL_CMD	Set Surround Left Channel Volume
16	SURR_RIGHT_VOL_CMD	Set Surround Right Channel Volume
17	SW_VOL_CMD	Set Subwoofer Channel Volume
18	SYS_SET_CMD	Configure serial audio interface format, LR & BCK MASTER/SLAVE, etc.

In respect to detail command information, request NJR.

■ License Information

1. The Word "DOLBY", "Pro Logic" and the double D mark are trademarks of Dolby Laboratories.
The NJU26106 can only be delivered to licensees of Dolby Laboratories.
Please refer to the licensing application manual issued by Dolby Laboratories.
- 2 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. 3.0

[CAUTION]

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