DOLBY PRO LOGIC SURROUND DECODER

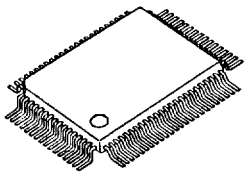
■ GENERAL DESCRIPTION

The NJW1103 is a surround processor including all of the necessary circuits of Dolby Pro Logic Surround decoder and digital delay.

In addition to Dolby Pro Logic Surround function, it performs easily other surround function such as Hall, Live, Disco and others.

It also includes echo and microphone mixing functions for Karaoke.

■ PACKAGE OUTLINE



NJW1103FC3

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Licensing and application information may be obtained from Dolby Lab.

■ FEATURE

- Operating Voltage : V_{CC}=9V(Analog Block), V_{DD}=5V(Digital Block)
- Digital Delay on chip
- Center and Surround Channel Level Trimmer : -31 TO 0dB / 1dB step (0dB = Dolby Level)
- Karaoke Function(Echo, Mic.mixing)
- Serial Data Interface(3-wire) DATA, REQ, SCK
- Bi-CMOS Technology
- Package Outline QFP80

■ FUNCTION

【Dolby Pro Logic Surround】

- Automatic input balance
- Noise sequencer
- Adaptive matrix
- Center channel control (wideband, normal, phantom)
- Modified B-type noise reduction
- 7kHz low-pass filter
- Dolby 3 stereo mode
- Digital time delay

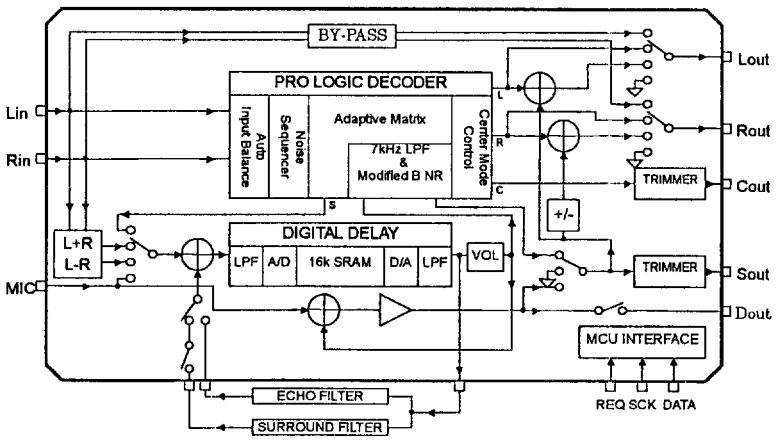
【Other Surround】

- Sound field control
- Front mixing control
- Digital time delay

【Karaoke】

- Echo control
- Mic mixing

■ BLOCK DIAGRAM



■ ABSOLUTE MAXIMUM RATINGS (T_a=25℃)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V_{CC}	11	V
	V_{DD}	7	V
Power Dissipation	P_D	1.37	W
Operating Temperature Range	T_{opr}	−20～+75	℃
Storage Temperature Range	T_{stg}	−40～+125	℃

■ ELECTRICAL CHARACTERISTICS (T_a=25℃, V_{CC}=10V, V_{DD}=5V, V_{IN}=300mV_{rms}/1kHz)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
◆ OVERALL						
Supply Voltage Range	V_{CC}		8	9	10	V
	V_{DD}		4.5	5	5.5	V
Supply Current	I_{CC}	No Signal	—	25	—	mA
	I_{DD}	No Signal	—	25	—	mA
Reference Voltage	V_{ref}	No Signal	3.5	4.0	4.5	V
Threshold voltage	V_{thh}	Digital input high level	0.7V_{DD}	—	V_{DD}	V
	V_{thl}	Digital input low level	0.0	—	0.3V_{DD}	V
◆ INPUT AUTO BALANCE						
Capture Range	CPR		—	±5	—	dB
Error Correction	CER		—	±4	—	dB
◆ ADAPTIVE MATRIX						
Output Level Accuracy relative to Cch.	ΔV_{oi}	L, R, S' ch. out	-0.5	0	0.5	dB
Matrix Rejection relative	MR	L, R, C, S' ch. out	25	40	—	dB
Headrrom	HR-AM	V_{CC}=9V at THD=1%	15	17	—	dB
Total Harmonic Distortion	THD-AM	L, R, C, S' ch. out at 4ch. mode	—	0.05	0.2	%
		L, Rch. out at 2ch. mode	—	0.002	0.05	%
Signal to Noise Ratio	SN-AM	Rg=0, wt:CCIR/ARM 4ch	75	80	—	dB
		L, Rch. out at 2ch. mode	93	100	—	dB
◆ NOISE SEQUENCER						
Output Noise Level	V_{NO}		-15.0	-12.5	-10.0	dB
Output Noise Level Accuracy relative to Cch.	ΔV_{NO}	L, R, S' ch. out	-0.5	0.0	0.5	dB
◆ MODIFIED B-TYPE NOISE REDUCTION						
Voltage Gain	GV-NR	V_{in}= 0dBd, f=100Hz	—	9.2	—	dB
Decode Response 1	DEC1	V_{in}= 0dBd, f=1.0kHz	-1.6	-0.1	1.4	dB
Decode Responce 2	DEC2	V_{in}=-15dBd, f=1.4kHz	-3.0	-1.5	0.0	dB
Decode Responce 3	DEC3	V_{in}=-20dBd, f=1.4kHz	-4.9	-3.4	-1.9	dB
Decode Responce 4	DEC4	V_{in}=-40dBd, f=5.0kHz	-6.8	-5.3	-3.8	dB
Total Harmonic Distortion	THD-NR	V_{in}= 0dBd, f=1kHz	—	0.07	0.3	%
Headroom	HR-NR	Vcc=9V, THD=1%	15	17	—	dB
Signal to Noise Ratio	SN-NR	Rg=0, wt:CCIR/ARM	73	78	—	dB

■ ELECTRICAL CHARACTERISTICS (T_a=25℃, V_{CC}=10V, V_{DD}=5V, V_{IN}=300mV$_{rms}$/1kHz)

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
◆ OTHER SURROUND						
Total Harmonic Distortion	THD-OS	V_{in}=0dBd, f=1kHz, L+R, L-R output	—	0.05	0.2	%
Headroom	HR-OS	Vcc=9V, THD=1%, L+R, L-R output	15	17	—	dB
Signal to Noise Ratio	SN-OS	Rg=0, wt:CCIR/ARM L+R, L-R output	85	90	—	dB
◆ C,S CHANNEL TRIMMER						
Full Scale	FS	Digital Input = -31dB	-25	-31	-37	dB
Trimmer Steps	NL	Digital Input = -1, -2, -4, -8, -16dB	-0.6	1.0	1.4	dB
◆ DIGITAL TIME DELAY						
Delay Time	Td		12.4	15.4	18.4	ms
			17.0	20.0	23.0	ms
			25.6	28.6	31.6	ms
			38.0	41.0	44.0	ms
			46.2	49.2	52.2	ms
			137.5	147.5	157.5	ms
			186.6	196.6	206.6	ms
Total Gain	Gv		-3.0	0.0	3.0	dB
Total Harmonic Distortion		Td=15.4ms	—	0.3	0.6	%
		Td=20.0ms	—	0.3	0.6	%
		Td=28.6ms	—	0.5	1.0	%
		30kHz LPF Td=41.0ms	—	0.6	1.2	%
		Td=49.2ms	—	0.7	1.4	%
		Td=147.5ms	—	1.5	3.0	%
		Td=196.6ms	—	2.0	4.0	%
Maximum Output Voltage	Vomax	30kHz LPF THD=10%	0.7	1.0	—	Vrms
Output Noise Voltage	No	Td=15.4ms	—	-92	-80	dB
		Td=20.0ms	—	-92	-80	dB
		Rg=620Ω Td=28.6ms	—	-92	-80	dB
		Vi=0mVrms Td=41.0ms	—	-90	-75	dB
		JIS-A Td=49.2ms	—	-90	-75	dB
		Td=147.5ms	—	-82	-67	dB
		Td=196.6ms	—	-77	-62	dB
◆ DELAY VOLUME						
Total Gain	Gv	Vol.=Max	0	3	6	dB
Maximum Attenuation	ATTmax	Delay OFF mode, Vol.=min., JIS-A	0	-70	-60	dB

RECOMMENDED PAD PATTERN

The recommended pin patterns are shown in the following examples. When designing products, give adequate consideration to the ease of mounting connection reliability, writing space and the presence of soldering bridge generation.

■ QFP80-C2, QFP80-C3

Body Size	b	l	e	MID	MIE
20×14	0.50	2.00	0.80	20.4	14.4