

WIDE BAND VIDEO SWITCH WITH I²C BUS

■ GENERAL DESCRIPTION

The **NJW1320** is a Wide Band Video Switch with I²C BUS. The **NJW1320** includes switch of 4-input 3-output and 6dB amplifier. It is suitable for Y, Pb, and Pr signal because frequency range is 50MHz. The **NJW1320** includes external logic control terminals and external logic discernment terminals. The **NJW1320** is suitable for PTV, DTV, PDP and other high quality AV systems.

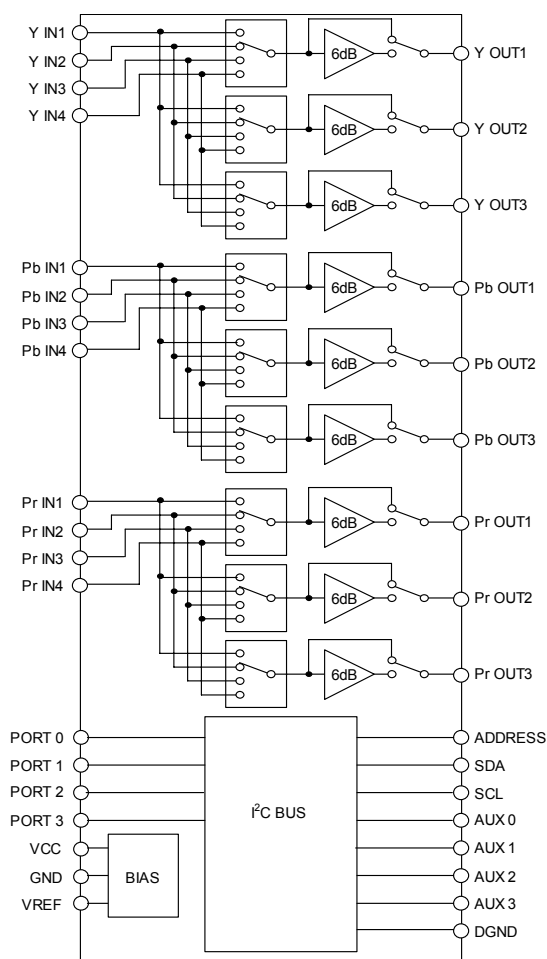
■ PACKAGE OUTLINE


NJW1320FP1

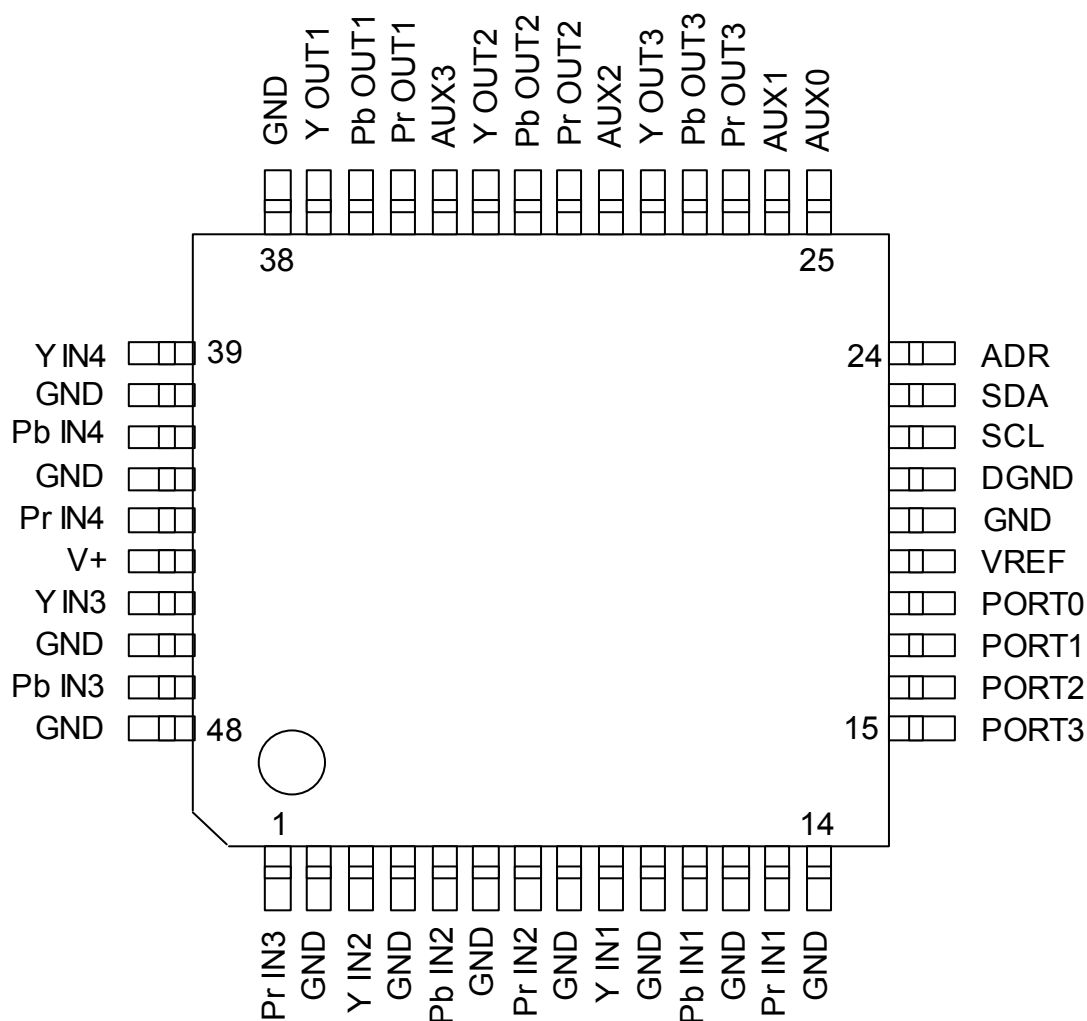
■ FEATURES

- Operating Voltage 9.0V
- 4-input 3-output 3-Circuits (Y, Pb, and Pr signal)
- Wide frequency range 0dB at 50MHz typ.
- Internal 6dB amplifier (Selectable Bypass or 6dB)
- External logic discernment terminal
- External logic control terminal
- Selectable slave address
- Power Save Circuit
- I²C BUS control
- Bi-CMOS Technology
- Package Outline QFP48

■ BLOCK DIAGRAM



PIN CONFIGURATION



1. Pr IN3	15. PORT3	25. AUX0	39. Y IN4
2. GND	16. PORT2	26. AUX1	40. GND
3. Y IN2	17. PORT1	27. Pr OUT3	41. Pb IN4
4. GND	18. PORT0	28. Pb OUT3	42. GND
5. Pb IN2	19. VREF	29. Y OUT3	43. Pr IN4
6. GND	20. GND	30. AUX2	44. V+
7. Pr IN2	21. DGND	31. Pr OUT2	45. Y IN3
8. GND	22. SCL	32. Pb OUT2	46. GND
9. Y IN1	23. SDA	33. Y OUT2	47. Pb IN3
10. GND	24. ADR	34. AUX3	48. GND
11. Pb IN1		35. Pr OUT1	
12. GND		36. Pb OUT1	
13. Pr IN1		37. Y OUT1	
14. GND		38. GND	

■ ABSOLUTE MAXIMUM RATINGS (Ta=25°C)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	V ⁺	12.0	V
Power Dissipation	P _D	1875(note)	mW
Operating Temperature Range	Topr	-25 to +75	°C
Storage Temperature Range	Tstg	-40 to +150	°C

(Note) At on a board of EIA/JEDEC specification. (76.2 × 114.3 × 1.6mm Two layers, FR-4)

■ ELECTRICAL CHARACTERISTICS (V⁺=9.0V, R_L=10KΩ, Ta=25°C)
●VIDEO

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	V ⁺		8.0	9.0	10.0	V
Operating Current	I _{cc}	No signal	-	70	100	mA
Maximum Output Voltage	V _{om}	f=100kHz, THD=1%	2.0	2.5	-	Vp-p
Voltage Gain 1	Gv1	Vin=100kHz, 1.0Vp-p Sin signal 6dB Mode	6.0	6.4	6.8	dB
Voltage Gain 2	Gv2	Vin=100kHz, 1.0Vp-p Sin signal Bypass Mode	-0.5	0.0	0.5	dB
Frequency Characteristic 1	Gf1	Vin=50MHz / 100kHz, 1.0Vp-p Sin signal 6dB Mode	-	0	-	dB
Frequency Characteristic 2	Gf2	Vin=50MHz / 100kHz, 1.0Vp-p Sin signal Bypass Mode	-	0	-	dB
Cross talk 1	CTB1	Vin=4.43MHz, 1.0Vp-p Sin signal	-	-60	-50	dB
Cross talk 2	CTB2	Vin=30MHz, 1.0Vp-p Sin signal	-	-40	-	dB
Differential Gain	DG	Vin=1.0Vp-p 10step Video signal	-	0.3	-	%
Differential Phase	DP	Vin=1.0Vp-p 10step Video signal	-	0.3	-	deg
S/N	SNv	Vin=1.0Vp-p, 100% White Video Signal	-	65	-	dB

●PORT, AUX

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
PORT Input Voltage H	V _{PTH}		3.5	-	5.5	V
PORT Input Voltage M	V _{PTM}		1.4	-	2.4	V
PORY Input Voltage L	V _{PTL}		0	-	0.8	V
AUX Output Voltage H	V _{AUXH}		3.5	-	5.5	V
AUX Output Voltage M	V _{AUXM}		1.4	-	2.4	V
AUX Output Voltage L	V _{AUXL}		0	-	0.8	V
ADR Input Voltage H	V _{ADRH}		3.5	-	5.0	V
ADR Input Voltage L	V _{ADRL}		0	-	1.0	V

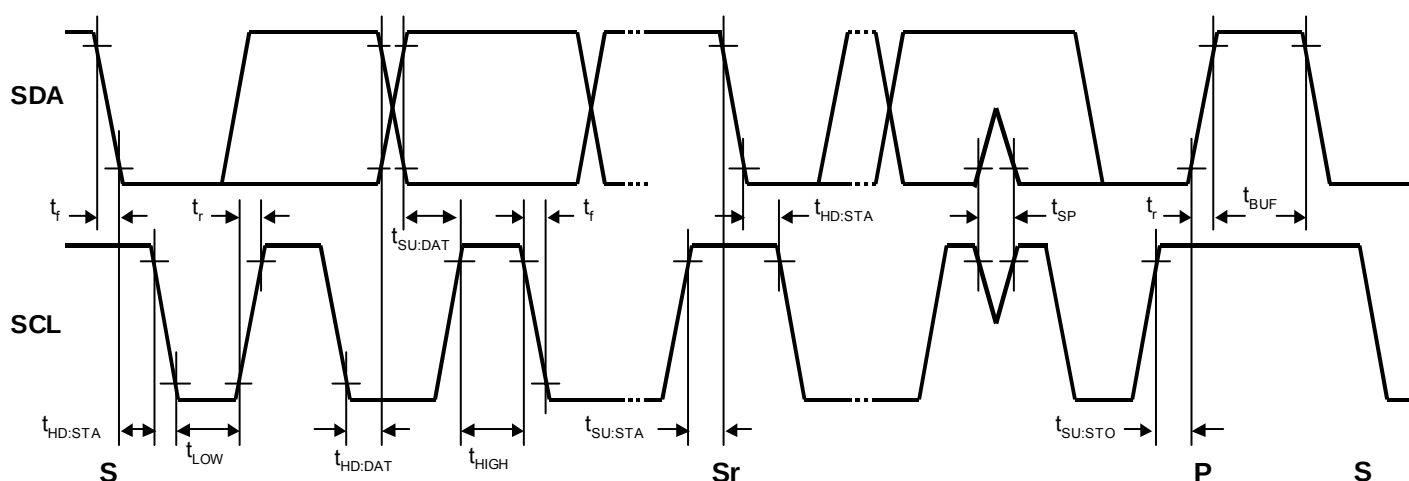
I²C BUS BLOCK CHARACTERISTICS (SDA,SCL)

I²C BUS Load Conditions

STANDARD MODE: Pull up resistance 4k Ω (Connected to +5V), Load capacitance 200pF (Connected to GND)

PARAMETER	SYMBOL	MIN	TYP	MAX	UNIT
Low Level Input Voltage	V_{IL}	0.0	-	1.5	V
High Level Input Voltage	V_{IH}	2.7	-	5.5	V
LOW level Output Voltage (3mA at SDA pin)	V_{OL}	0	-	0.4	V
Output Fall Time From V_{IHmin} to V_{ILmax} with a Bus Capacitance from 10pF to 400pF	t_{of}	-	-	250	ns
Input Current each I/O pin with an Input Voltage between 0.1 and 0.9V _{DDmax}	I_i	-10	-	10	μ A
Capacitance for each I/O pin	C_i	-	-	10	pF
SCL Clock Frequency	f_{SCL}	-	-	100	kHz
Data Transfer Start Minimum Waiting Time	$t_{HD:STA}$	4.0	-	-	μ s
Low Level Clock Pulse Width	t_{LOW}	4.7	-	-	μ s
High Level Clock Pulse Width	t_{HIGH}	4.0	-	-	μ s
Minimum Start Preparation Waiting Time	$t_{SU:STA}$	4.7	-	-	μ s
Minimum Data Hold Time	$t_{HD:DAT}$	0	-	-	μ s
Minimum Data Preparation Time	$t_{SU:DAT}$	250	-	-	ns
Rise Time	t_r	-	-	1000	ns
Fall Time	t_f	-	-	300	ns
Minimum Stop Preparation Waiting Time	$t_{SU:STO}$	4.0	-	-	μ s
Data Change Minimum Waiting Time	t_{BUF}	4.7	-	-	μ s
Capacitive load for each bus line	C_b	-	-	400	pF
Noise Margin at the Low Level	V_{nL}	0.5	-	-	V
Noise Margin at the High Level	V_{nH}	1	-	-	V

C_b ; total capacitance of one bus line in pF.



■ TERMINAL DESCRIPTION

No.	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	VOLTAGE
9 11 13 3 5 7 45 47 1 39 41 43	Y1 IN Pb1 IN Pr1 IN Y2 IN Pb2 IN Pr2 IN Y3 IN Pb3 IN Pr3 IN Y4 IN Pb4 IN Pr4 IN	Component signal input terminal		4.4V
18 17 16 15	PORT0 PORT1 PORT2 PORT3	Logic input terminal		-
19	VREF	Reference voltage terminal		5.0V
2 4 6 8 10 12 14 20 38 40 42 46 48	GND	Ground terminal		-
21	DGND	Ground terminal		-

No.	SYMBOL	FUNCTION	EQUIVALENT CIRCUIT	VOLTAGE
22 23	SCL SDA	I ² C clock terminal I ² C data terminal		-
24	ADR	Slave address setting terminal		-
25 26 27 28	AUX0 AUX1 AUX2 AUX3	Auxiliary 3 values voltage output terminal		0V 1.9V 5.0V
37 34 31 36 33 30 35 32 29	Y1 OUT Y2 OUT Y3 OUT Pb1 OUT Pb2 OUT Pb3 OUT Pr1 OUT Pr2 OUT Pr3 OUT	Component signal output terminal		3.0V
44	V+	Supply voltage terminal		-

■ DEFINITION OF I²C REGISTER

◆ I²C BUS FORMAT

MSB	LSB	MSB	LSB	MSB	LSB		
S	Slave Address	A	Data	A	Data	A	P
1bit	8bit	1bit	8bit	1bit	8bit	1bit	1bit

S: Starting Term

A: Acknowledge Bit

P: Ending Term

◆ SLAVE ADDRESS

R/W: Set the Write Mode or Read Mode.

ADR : Set the Slave Address by "ADR" terminal.

Slave Address								Hex
MSB				LSB				
1	0	0	0	0	0	ADR	R/W	-
◆ R/W = 0 : Write Mode, ADR = 0/1								-
1	0	0	1	0	1	0	0	94(h)
1	0	0	1	0	1	1	0	96(h)
◆ R/W = 1 : Read Mode, ADR = 0/1								-
1	0	0	1	0	1	0	1	95(h)
1	0	0	1	0	1	1	1	97(h)

◆ CONTROL REGISTER TABLE

< Write Mode >

No.	BIT							
	D7	D6	D5	D4	D3	D2	D1	D0
Data1	PS2	PS3	OUT1			OUT2		
Data2	OUT3			*				
Data3	AUX0		AUX1		AUX2		AUX3	

* : Don't Care

< Read Mode >

No.	BIT							
	D7	D6	D5	D4	D3	D2	D1	D0
Data	PORT0		PORT1		PORT2		PORT3	

◆ CONTROL REGISTER DEFAULT VALUE

Control register default value is all "0".

No.	BIT							
	D7	D6	D5	D4	D3	D2	D1	D0
Data1	0	0	0	0	0	0	0	0
Data2	0	0	0	0	0	0	0	0
Data3	0	0	0	0	0	0	0	0

INSTRUCTION CODE

POWER SAVE, OUTPUT SETTING

No.	BIT							
	D7	D6	D5	D4	D3	D2	D1	D0
Data1	PS2	PS3	OUT1			OUT2		
Data2	OUT3			*				

* : Don't Care

PS2, PS3: Power Save Setting

Power Save			D7	D6
OUT1 ON	OUT2 ON	OUT3 ON	0	0
OUT1 ON	OUT2 ON	OUT3 OFF	0	1
OUT1 ON	OUT2 OFF	OUT3 ON	1	0
OUT1 ON	OUT2 OFF	OUT3 OFF	1	1

ON: Power Save OFF, OFF: Power Save ON

OUT1: Output 1 Setting

Output 1			D5	D4
YIN1	PbIN1	PrIN1	0	0
YIN2	PbIN2	PrIN2	0	1
YIN3	PbIN3	PrIN3	1	0
YIN4	PbIN4	PrIN4	1	1

Gain	D3
6dB	0
0dB	1

OUT2: Output 2 Setting

Output 2			D2	D1
YIN1	PbIN1	PrIN1	0	0
YIN2	PbIN2	PrIN2	0	1
YIN3	PbIN3	PrIN3	1	0
YIN4	PbIN4	PrIN4	1	1

Gain	D0
6dB	0
0dB	1

OUT3: Output 3 Setting

Output 3			D7	D6
YIN1	PbIN1	PrIN1	0	0
YIN2	PbIN2	PrIN2	0	1
YIN3	PbIN3	PrIN3	1	0
YIN4	PbIN4	PrIN4	1	1

Gain	D5
6dB	0
0dB	1

◆AUX: AUXILIARY SETTING

Select Address	BIT							
	D7	D6	D5	D4	D3	D2	D1	D0
Data3	AUX0		AUX1		AUX2		AUX3	

AUX0	D7	D6
L	0	0
M	0	1
H	1	1

AUX1	D5	D4
L	0	0
M	0	1
H	1	1

AUX2	D3	D2
L	0	0
M	0	1
H	1	1

AUX3	D1	D0
L	0	0
M	0	1
H	1	1

◆PORT: PORT SETTING

Select Address	BIT							
	D7	D6	D5	D4	D3	D2	D1	D0
Data	PORT0		PORT1		PORT2		PORT3	

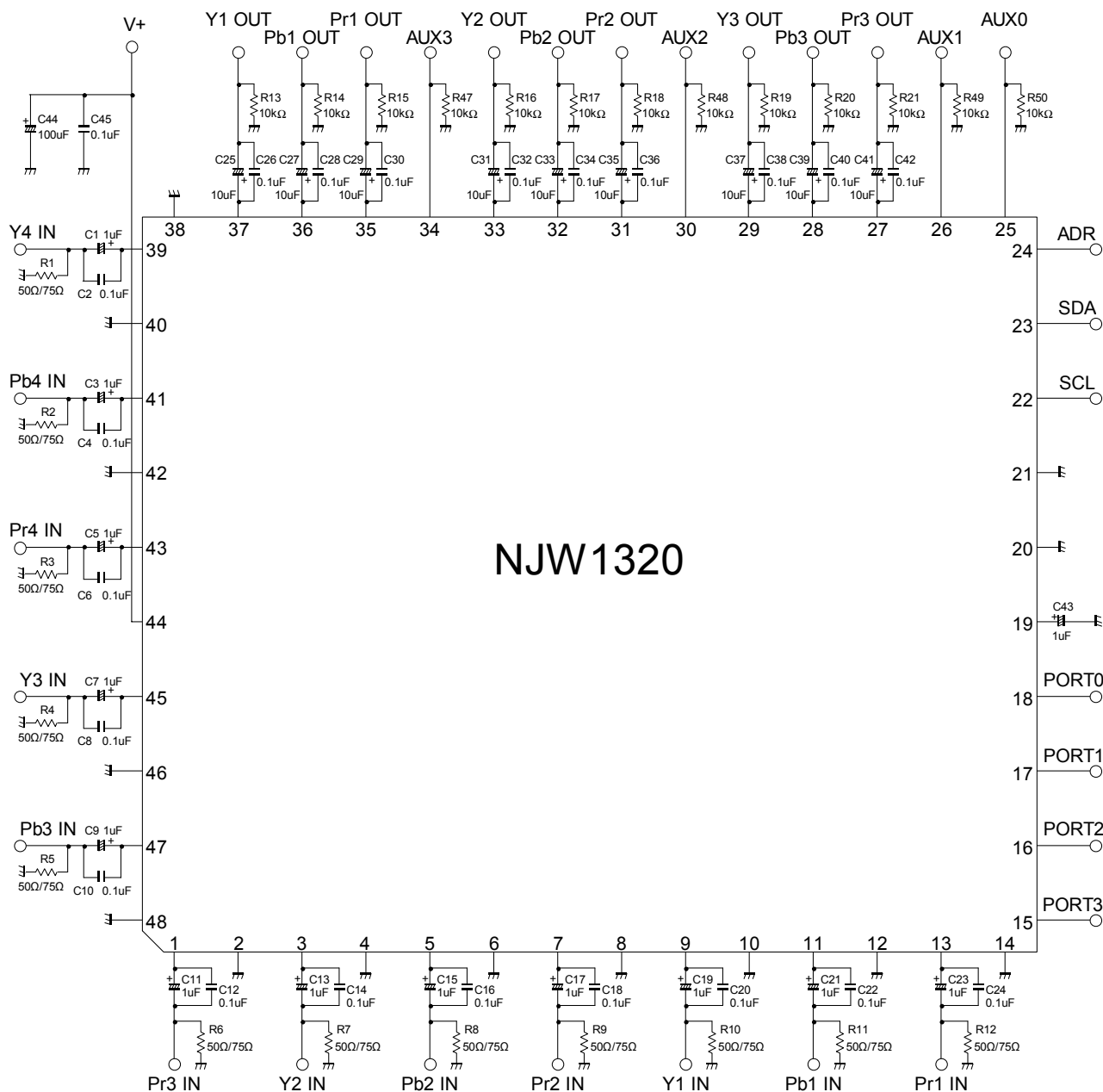
PORT0	D7	D6
OPEN	0	0
L	0	0
M	0	1
H	1	1

PORT1	D5	D4
OPEN	0	0
L	0	0
M	0	1
H	1	1

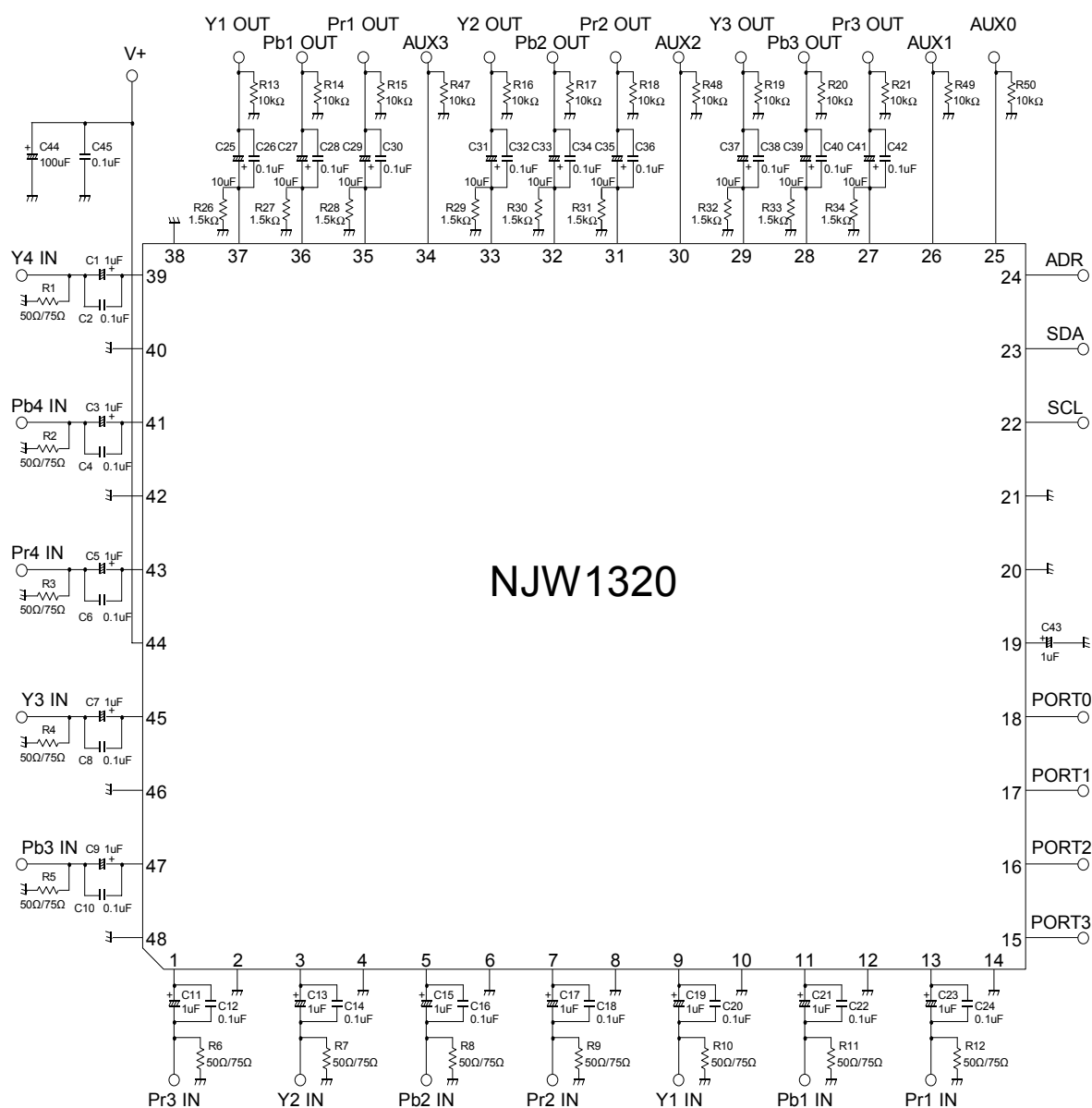
PORT2	D3	D2
OPEN	0	0
L	0	0
M	0	1
H	1	1

PORT3	D1	D0
OPEN	0	0
L	0	0
M	0	1
H	1	1

■ TEST CIRCUIT



■APPLICATION CIRCUIT



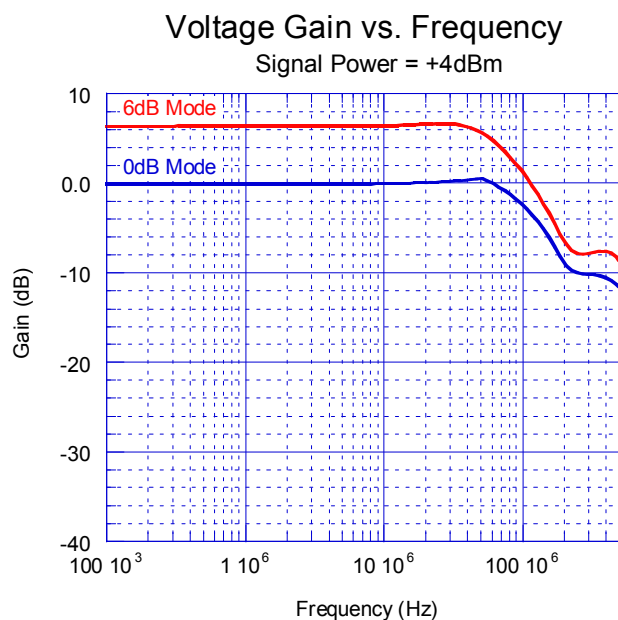
Addition of R26-R34 improves the through rate in high frequency. Resistance turns into a reference value.

NOTE

Please ground all of 2, 4, 6, 8, 10, 12, 14, 20, 21, 38, 40, 42, 46, and 48pin.

When the power supply voltage is not impressing, please do not impress voltage to the ADL terminal.

TYPICAL CHARACTERISTICS



[CAUTION]

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