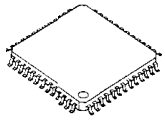
Multi Input Wide Band Video Interface with I²C Control

■ GENERAL DESCRIPTION

The **NJW1326** is a multi input wide band video interface IC with I²C control. Also the **NJW1326** includes 3-input 5 channel video switch for SD, 3-input 3 channel video switch for HD, 9 channel 75-ohm driver for SD and 9 channel 75-ohm driver for HD.

■ PACKAGE OUTLINE

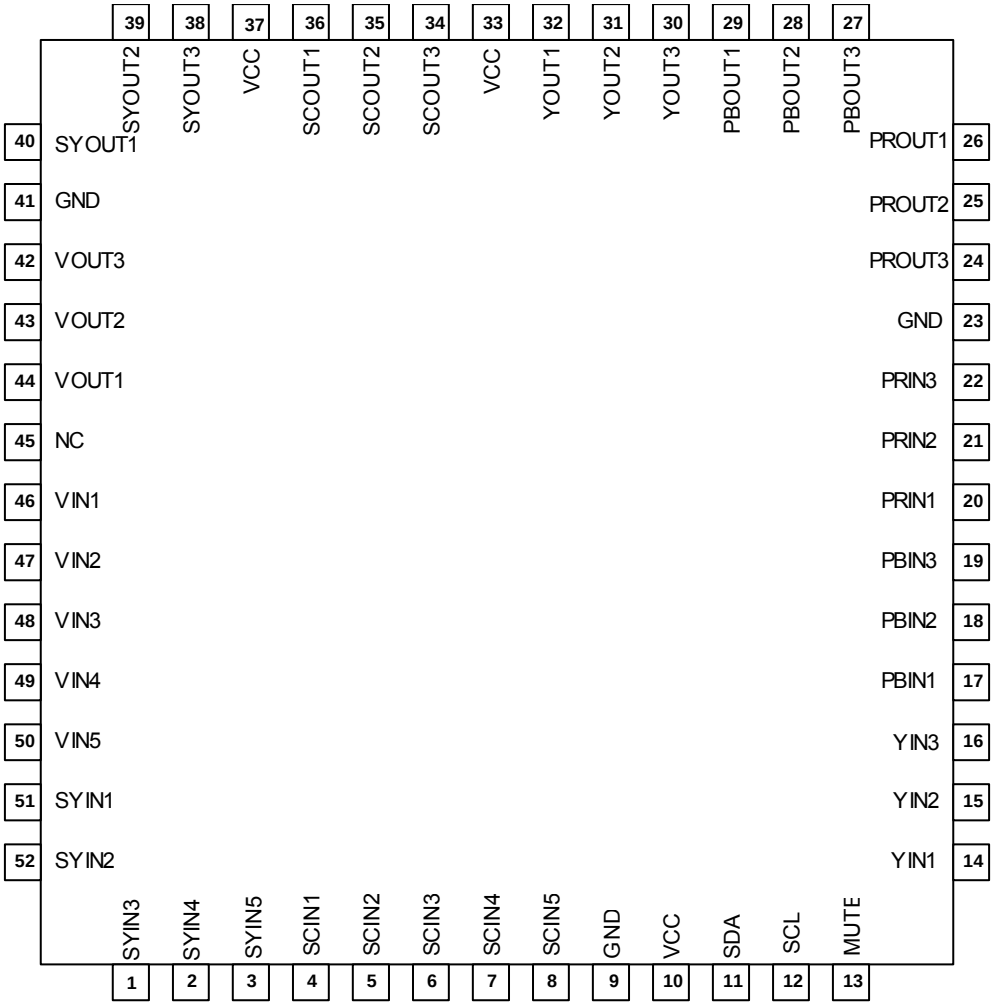


NJW1326FH2

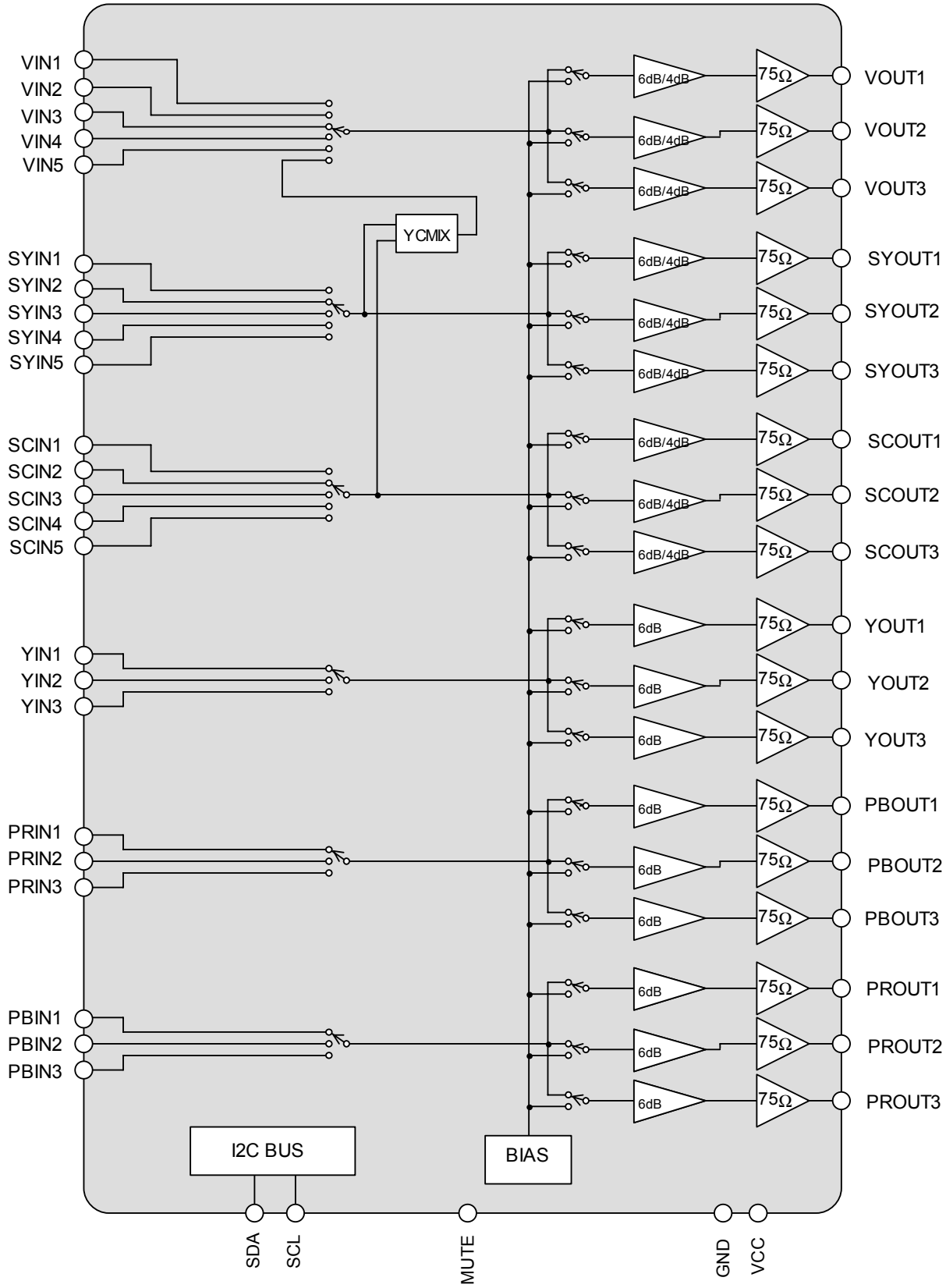
■ FEATURES

- Operating Voltage 4.5 to 5.5V
- 3-input 5 channel video switch for SD
- 3-input 3 channel video switch for HD
- 9 channel 75-ohm driver for SD
- 9 channel 75-ohm driver for HD
- I²C control function
- Bi-CMOS Technology
- Package Outline LQFP52

■ PIN CONFIGURATION



■BLOCK DIAGRAM



■**ABSOLUTE MAXIMUM RATINGS** (Ta=25ºC)

PARAMETER	SYMBOL	RATINGS	UNIT
Supply Voltage	VCC	7.0	V
Power Dissipation	P_D	1900 (Note)	mW
Operating Temperature Range	Topr	-25 to +75	ºC
Storage Temperature Range	Tstr	-40 to +150	ºC

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

■ **RECOMMEND OPERATING VOLTAGE** (Ta=25ºC)

PARAMETER	SYMBOL	CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Voltage	Vopr	VCC-GND	4.5	5.0	5.5	V

■ **ELECTRICAL CHARACTERISITICS**

(TEST CONDITION: Ta=25ºC, VCC= 5.0V all controls unless otherwise specified)

● **DC CHARACTERISITICS**

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Operating Current	I_{CC}	VCC, No Signal	-	145	215	mA
Operating Current at power save mode	Isave	VCC, Power Save Mode	-	1.5	3.0	mA

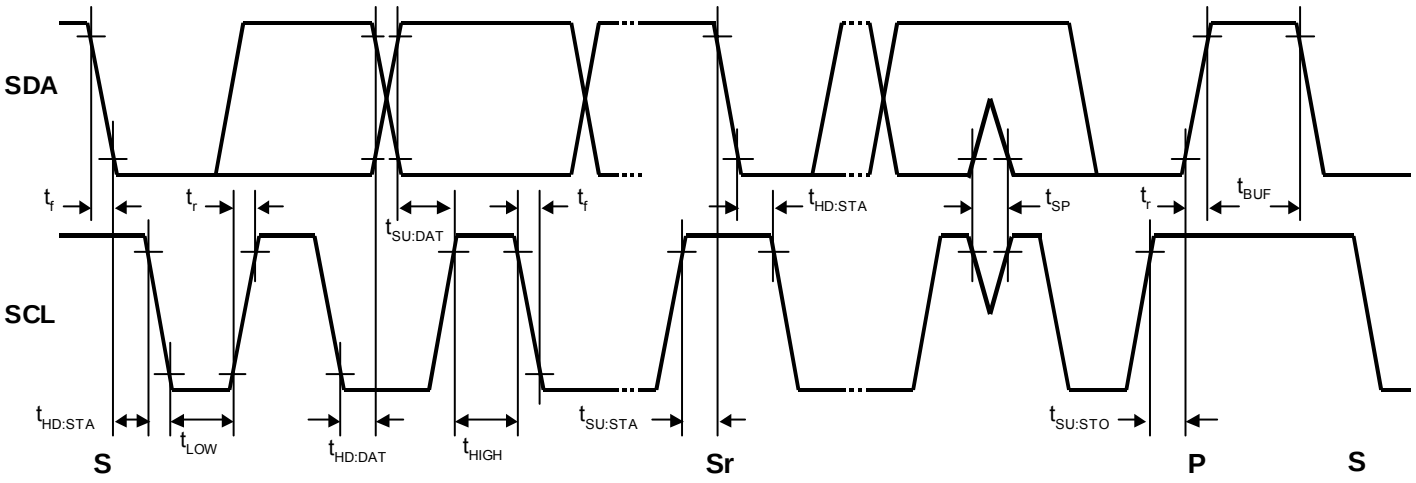
● **AC CHARACTERISITICS**

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Maximum Output Voltage	Vom	Input sine signal (100kHz), THD=1%	2.4	-	-	Vp-p
Voltage Gain 1	Gv1	Input sine signal (100kHz, 1.0Vp-p), 4dB mode	3.5	4.0	4.5	dB
Voltage Gain 2	Gv2	Input sine signal (100kHz, 1.0Vp-p), 6dB mode	5.5	6.0	6.5	dB
Frequency Characteristic 1	Gf1	Input sine signal (12MHz/100kHz, 1.0Vp-p) 6dB mode for V/SY/SC input terminal	-3.0	0	-	dB
Frequency Characteristic 2	Gf2	Input sine signal (100MHz/100kHz,1.0Vp-p) for Y/PB/PR input terminal	-	-3.0	-	dB
Frequency Characteristic 3	Gf3	Input sine signal (150MHz/100kHz, 1.0Vp-p) for Y/PB/PR input terminal	-	-3.0	-	dB
Cross Talk between Input terminals	CTI	Input sine signal (3.58MHz, 1.0Vp-p)	-	-60	-50	dB
Differential Gain	DG	Input Video signal (1.0Vp-p, 10step)	-	0.5	-	%
Differential Phase	DP	Input Video signal (1.0Vp-p, 10step)	-	0.5	-	deg
Output/output voltage difference on mute mode	dVDo	On mute mode	-0.4	-	0.4	V
S/N ratio	SNv	Input White Video signal (1.0Vp-p, 100%) for Y/PB/PR input terminal	-	75	-	dB
Switch Change Over Voltage	VthH	All inside Switch ON	2.0	-	VCC	V
Switch Change Over Voltage	VthL	All inside Switch OFF	0	-	1.0	V

PARAMETER	SYMBOL	TEST CONDITION	MIN.	TYP.	MAX	UNIT
Maximum inflow current on Switch ON	IthH	V=5.0V	-	-	120	μA
Maximum inflow current on Switch OFF	IthL	V=0.3V	-	-	8	μA

■ MUTE CONTROL
NJW1326 performs Mute for all output voltages simultaneously with MUTE terminal.
L: MUTE ON
H: MUTE OFF

■TIMING on the I²C BUS (SDA, SCL)



■CHARACTERISITICS OF I/O STAGES FOR I²C BUS (SDA, SCL)

I²C BUS Load Conditions

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

PARAMETER	SYMBOL	STANDARD MODE			UNIT
		MIN.	TYP.	MAX.	
Low Level Input Voltage	V_{IL}	0.0	-	VCC*0.3	V
High Level Input Voltage	V_{IH}	VCC*0.7	-	5.5	V
Low Level Output Voltage (3mA at SDA pin)	V_{OL}	0	-	0.4	V
Input current each I/o pin with an input voltage between 0.1Vcc and 0.9Vcc	I_i	-10	-	10	μA

■CHARACTERISITICS OF BUS LINES (SDA, SCL) FOR I²C BUS DEVICES

PARAMETER	SYMBOL	STANDARD MODE			UNIT
		MIN.	TYP.	MAX.	
SCL clock frequency	f_{SCL}	-	-	100	kHz
HOLD time	$t_{HD:STA}$	4.0	-	-	μs
Low period of the SCL clock	t_{LOW}	4.7	-	-	μs
High period of the SCL clock	t_{HIGH}	4.0	-	-	μs
Set-up time for a repeated START condition	$t_{SU:STA}$	4.7	-	-	μs
Data Hold Time NOTE)	$t_{HD:DAT}$	0	-	-	μs
Data set-up Time	$t_{SU:DAT}$	250	-	-	ns
Rise time of both SDA and SCL signals	t_r	-	-	1000	ns
Fall time of both SDA and SCL signals	t_f	-	-	300	ns
Set-up time for STOP condition	$t_{SU:STO}$	4.0	-	-	μs
Bus free time between a STOP and START condition	t_{BUF}	4.7	-	-	μs
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

NOTE) Data hold time: $t_{HD:DAT}$
Please hold the Data Hold Time ($t_{HD:DAT}$) to 300ns or more to avoid status of unstable at SCL falling edge.

■DEFINTION OF I²C RESISTOR

You can send and transmit address by I²C RESISTOR with SDA input and SCA input.

•I²C BUS FORMAT

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

S: Starting term
A: Acknowledge bit
P: Ending term

•SLAVE ADDRESS

Slave Address								Hex
MSB							LSB	-
1	0	0	1	0	1	1	R/W	-
R/W = 0: write mode								-
1	0	0	1	0	1	1	0	96(h)

R/W = 1 NJW1326 is not suitable for read mode.

•WRITE MODE

The auto increment function cycles the select address as follows.

00H → 01H → 02H → 00H

No.	BIT							
	D7	D6	D5	D4	D3	D2	D1	D0
00H	VOUT Select			VOUT1 Mute	VOUT2 Mute	VOUT3 Mute	VOUT Gain	-
01H	SYOUT/SCOUT Select			SYOUT1/ SCOUT1 Mute	SYOUT2/ SCOUT2 Mute	SYOUT3/ SCOUT3 Mute	SYOUT/ SCOUT Gain	-
02H	YOUT/PBOUT/ PROUT Select		YOUT1/ PBOUT1/ PROUT1 Mute	YOUT2/ PBOUT2/ PROUT2 Mute	YOUT3/ PBOUT3/ PROUT3 Mute	Power Save	-	-

■CONTROL REGISTER TABLE

No.	BIT							
	D7	D6	D5	D4	D3	D2	D1	D0
00H	0	0	0	0	0	0	0	0
01H	0	0	0	0	0	0	0	0
02H	0	0	0	0	0	0	0	0

■INSTRUCTION CODE

a)

No.	BIT							
	D7	D6	D5	D4	D3	D2	D1	D0
00H	VOUT Select			VOUT1 Mute	VOUT2 Mute	VOUT3 Mute	VOUT Gain	-

D0: Don't Care

• VOUT SELECT TABLE

VOUT Select			VOUT1/2/3
D7	D6	D5	
0	0	0	VIN1*
0	0	1	VIN2
0	1	0	VIN3
0	1	1	VIN4
1	Don't Care	0	VIN5
1	Don't Care	1	YCMIX

*:Default Value

VOUT1 Mute	VOUT1
D4	
0	Mute*
1	Through

*:Default Value

VOUT2 Mute	VOUT2
D3	
0	Mute*
1	Through

*:Default Value

VOUT3 Mute	VOUT3
D2	
0	Mute*
1	Through

*:Default Value

VOUT Gain	Gain
D1	
0	4dB*
1	6dB

*:Default Value

b)

No.	BIT							
	D7	D6	D5	D4	D3	D2	D1	D0
01H	SYOUT/SCOUT Select			SYOUT1/ SCOUT1 Mute	SYOUT2/ SCOUT2 Mute	SYOUT3/ SCOUT3 Mute	SYOUT/ SCOUT Gain	-

D0: Don't Care

•: SYOUT/SCOUT SELECT TABLE

SYOUT/SCOUT Select			SYOUT1/2/3	SCOUT1/2/3	YCMIX
D7	D6	D5			
0	0	0	SYIN1*	SCIN1*	SYIN1+SCIN1*
0	0	1	SYIN2	SCIN2	SYIN2+SCIN2
0	1	0	SYIN3	SCIN3	SYIN3+SCIN3
0	1	1	SYIN4	SCIN4	SYIN4+SCIN4
1	Don't Care	Don't Care	SYIN5	SCIN5	SYIN5+SCIN5

*:Default Value

SYOUT1/SCOUT1 Mute D4	SYOUT1	SCOUT1
0	Mute*	Mute*
1	Through	Through

*:Default Value

SYOUT2/SCOUT2 Mute D3	SYOUT2	SCOUT2
0	Mute*	Mute*
1	Through	Through

*:Default Value

SYOUT3/SCOUT3 Mute D2	SYOUT3	SCOUT3
0	Mute*	Mute*
1	Through	Through

*:Default Value

SYOUT/SCOUT Gain D1	Gain
0	4dB*
1	6dB

*:Default Value

c)

No.	BIT							
	D7	D6	D5	D4	D3	D2	D1	D0
02H	YOUT/PBOUT/PROUT Select		YOUT1/ PBOUT1/ PROUT1 Mute	YOUT2/ PBOUT2/ PROUT2 Mute	YOUT3/ PBOUT3/ PROUT3 Mute	Power Save	-	-

D0,D1: Don' t Care

•YOUT/PBOUT/PROUT SELECT TABLE

YOUT/PBOUT/PROUT Select		YOUT1/2/3	PBOUT1/2/3	PROUT1/2/3
D7	D6			
0	0	YIN1*	PBIN1*	PRIN1*
0	1	YIN2	PBIN2	PRIN2
1	Don't Care	YIN3	PBIN3	PRIN3

*:Default Value

YOUT1/PBOUT1/PROUT1 Mute	YOUT1	PBOUT1	PROUT1
D5			
0	Mute*	Mute*	Mute*
1	Through	Through	Through

*:Default Value

YOUT2/PBOUT2/PROUT2 Mute	YOUT2	PBOUT2	PROUT2
D4			
0	Mute*	Mute*	Mute*
1	Through	Through	Through

*:Default Value

YOUT3/PBOUT3/PROUT3 Mute	YOUT3	PBOUT3	PROUT3
D3			
0	Mute*	Mute*	Mute*
1	Through	Through	Through

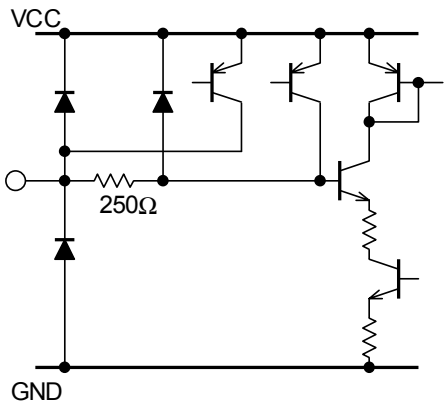
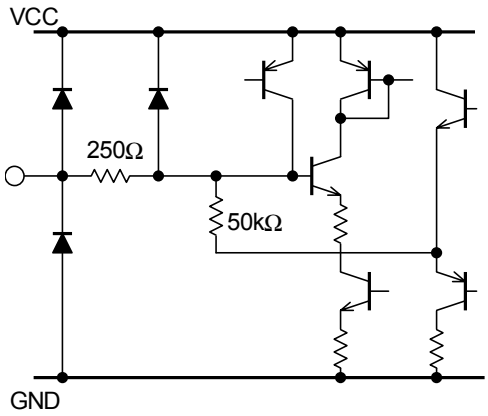
*:Default Value

• POWER SAVE TABLE

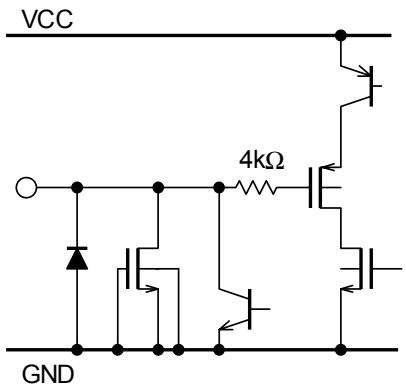
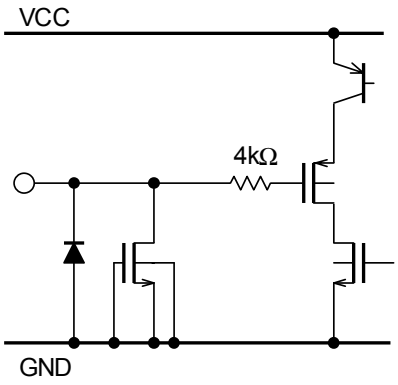
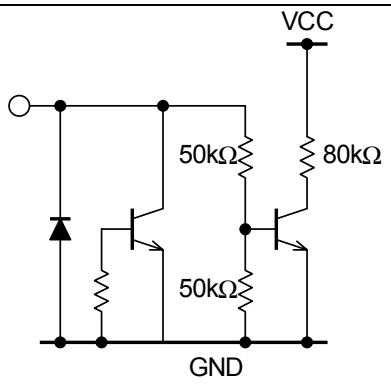
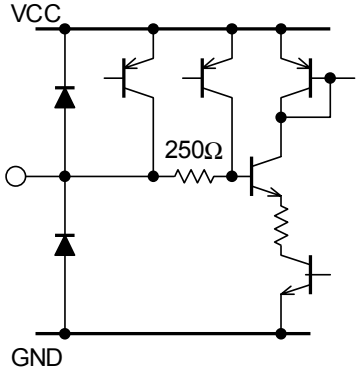
Power Save	Power Save
D2	
0	Power Save Mode*
1	Normal Mode

*:Default Value

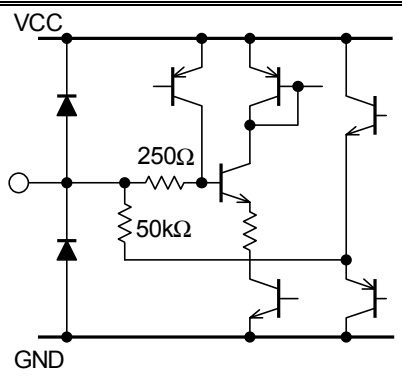
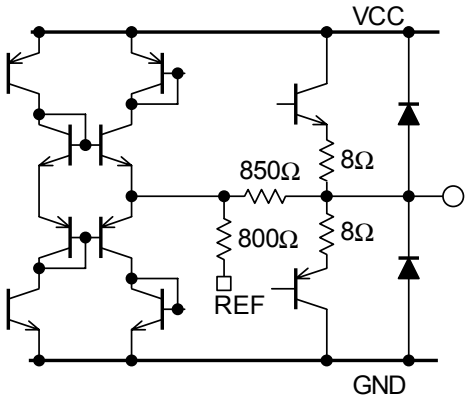
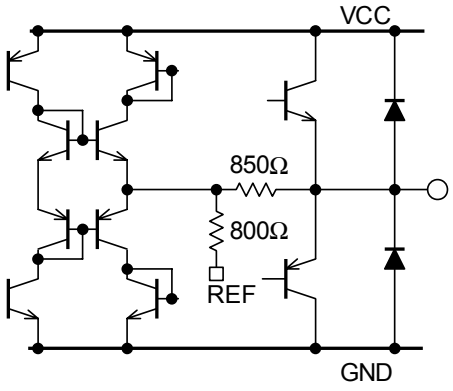
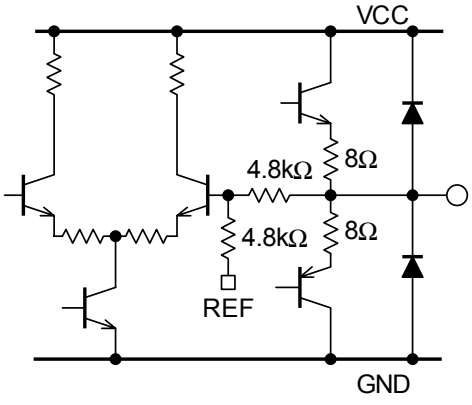
■ **TERMINAL DESCRIPTION**

No.	SYMBOL	EQUIVALENT CIRCUIT	FUNCTION	VOLATGE
46 47 48 49 50 51 52 1 2 3	VIN1 VIN2 VIN3 VIN4 VIN5 SYIN1 SYIN2 SYIN3 SYIN4 SYIN5		V Input SY Input	1.9V
4 5 6 7 8	SCIN1 SCIN2 SCIN3 SCIN4 SCIN5		SC Input	2.5V
9 23 41	GND		Ground	0V
10 33 37	VCC		Supply Voltage	5V

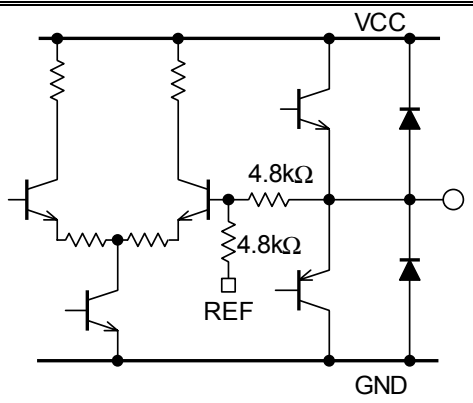
■ **TERMINAL DESCRIPTION**

No.	SYMBOL	EQUIVALENT CIRCUIT	FUNCTION	VOLATGE
11	SDA		I2C Data Input	-
12	SCL		I2C Clock Input	-
13	MUTE		Mute	0V
14 15 16	YIN1 YIN2 YIN3		Y Input	1.9V

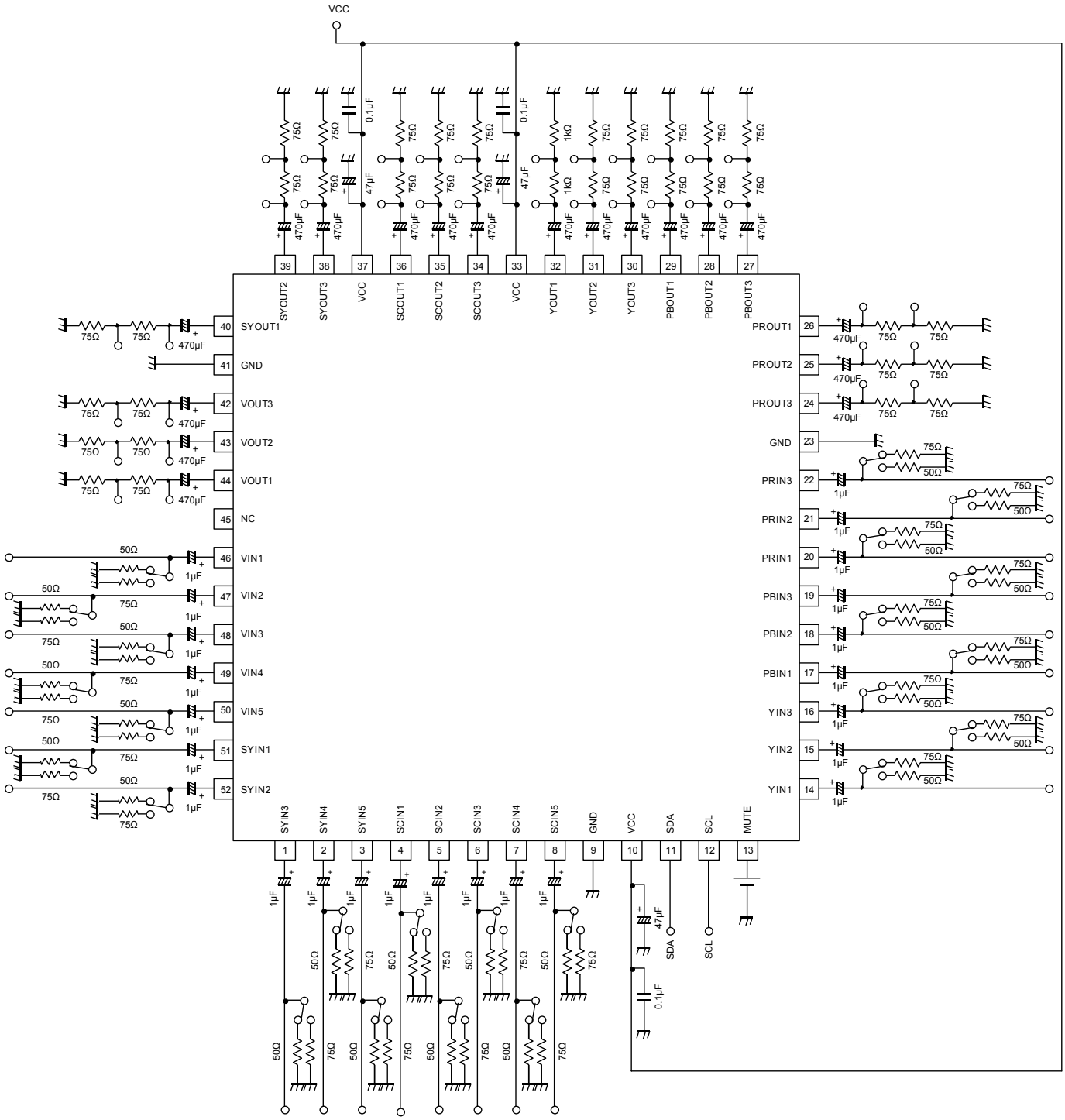
■ **TERMINAL DESCRIPTION**

No.	SYMBOL	EQUIVALENT CIRCUIT	FUNCTION	VOLATGE
17 18 19 20 21 22	PBIN1 PBIN2 PBIN3 PRIN1 PRIN2 PRIN3		Pb Input Pr Input	2.5V
24 25 26 27 28 29	PROUT1 PROUT2 PROUT3 PBOUT1 PBOUT2 PBOUT3		Pr Output Pb Output	2.5V
30 31 32	YOUT1 YOUT2 YOUT3		Y Output	1.3V
34 35 36	SCOUT1 SCOUT2 SCOUT3		SC Output	2.5V

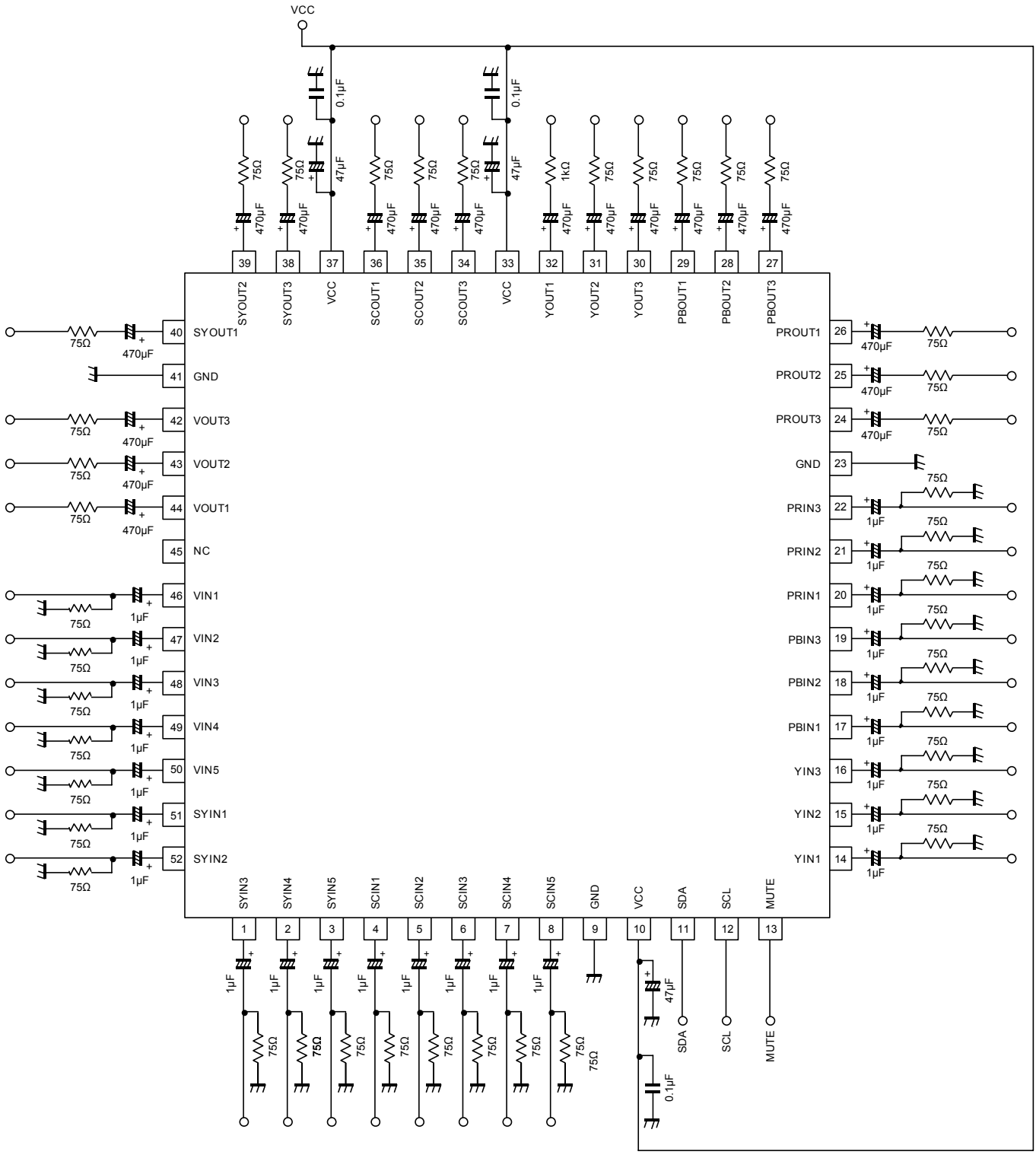
■ **TERMINAL DESCRIPTION**

No.	SYMBOL	EQUIVALENT CIRCUIT	FUNCTION	VOLATGE
38 39 40 42 43 44	SYOUT1 SYOUT2 SYOUT3 VOUT1 VOUT2 VOUT3		SY Output V Output	1.3V

■ TEST CIRCUIT



■ APPLICATION CIRCUIT



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