

TOSHIBA BIPOLAR LINEAR INTEGRATED CIRCUIT SILICON MONOLITHIC

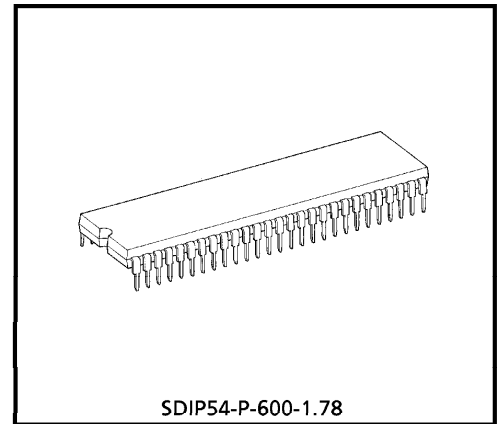
TA8851BN, TA8851CN

AUDIO / VIDEO SWITCH IC FOR TV WITH S-TERMINALS

The TA8851BN/CN is an A/V SWITCH IC, which has 7 input channels and 2 output channels. Because the 2 output channels can be switched independently of each other, the TA8851BN/CN allows you to configure a PIP system input switching circuit easily.

The TA8851BN/CN can be interfaced easily to a microcontroller via the I²C bus.

3 of 7 input channels can be used for Y/C separated input.



Weight : 1.0g (Typ.)

FEATURES

Video Stage

- Input
 - Composite video input : 7 channels
 - Y/C input : 3 channels
- Output
 - Composite video output : 2 channels (Main and Sub)
 - Y/C output : 2 channels (Main and Sub)

Audio Stage

- Input
 - L/R input : 7 channels
- Output
 - L/R output : 3 channels (2 of 3 depend on video, and the other is selectable from Main or Sub)

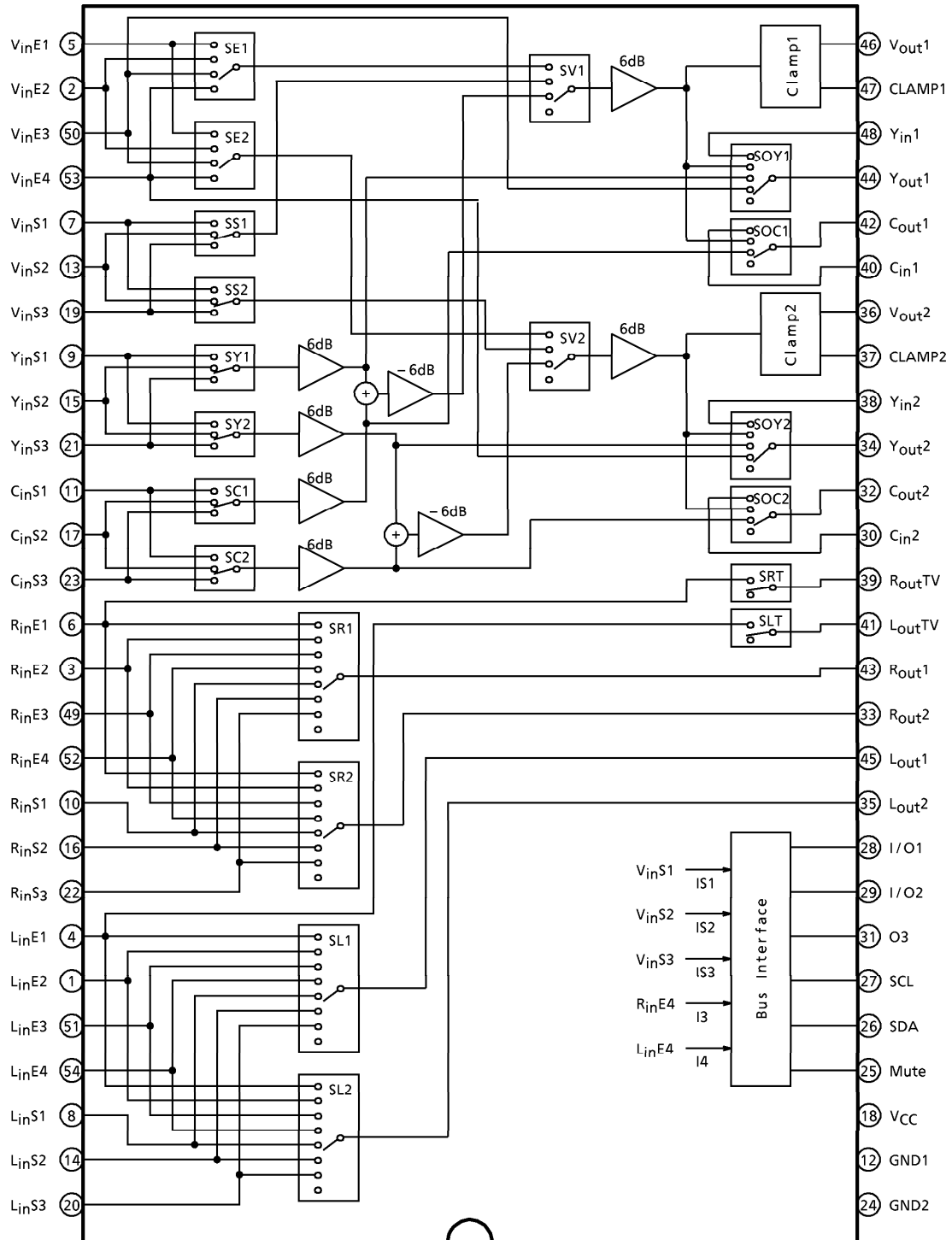
Functions

- I²C bus interface
- External mute circuit
- DAC output (3 outputs)
- Video clamp circuit
- Mode output
- ADC input (4 inputs)

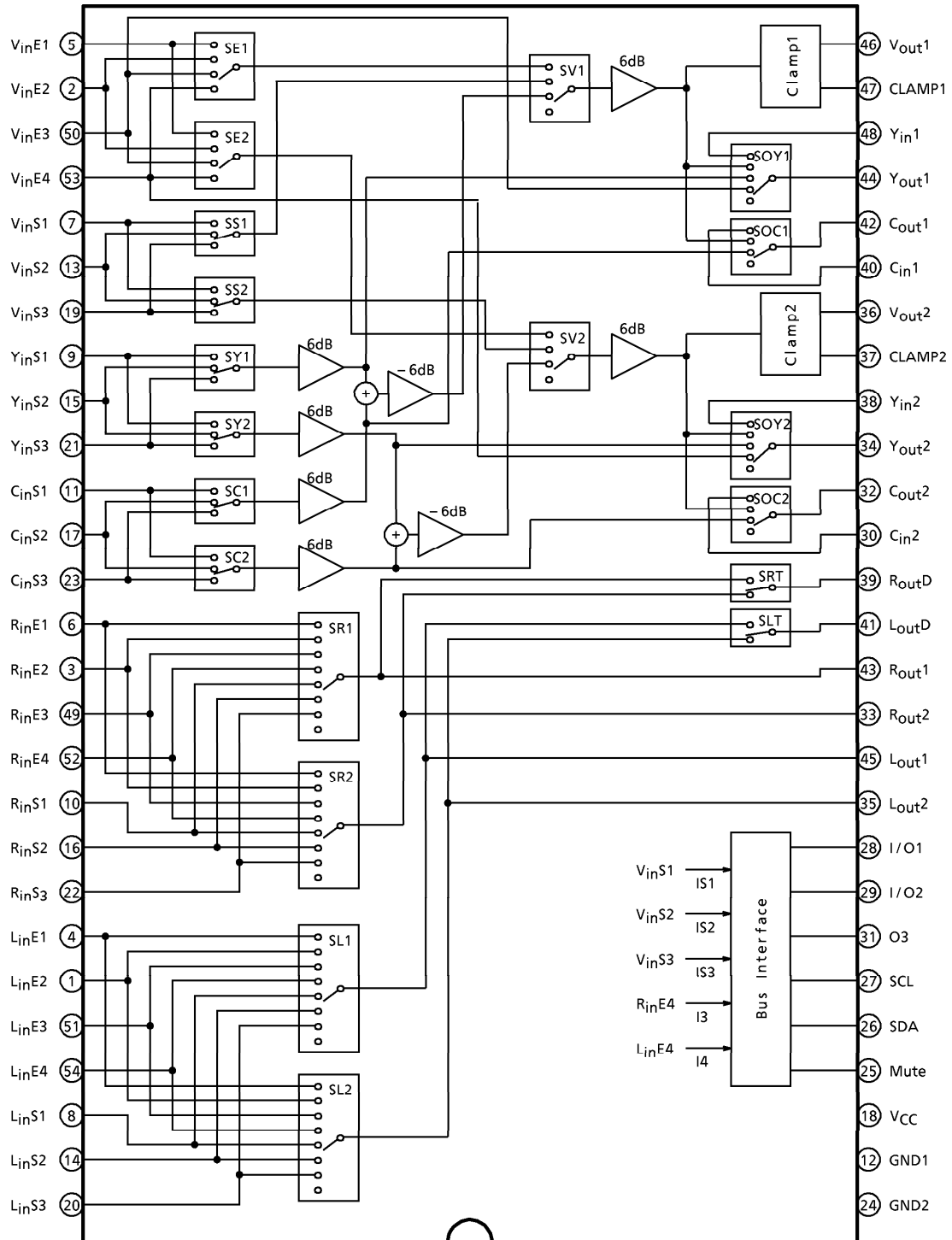
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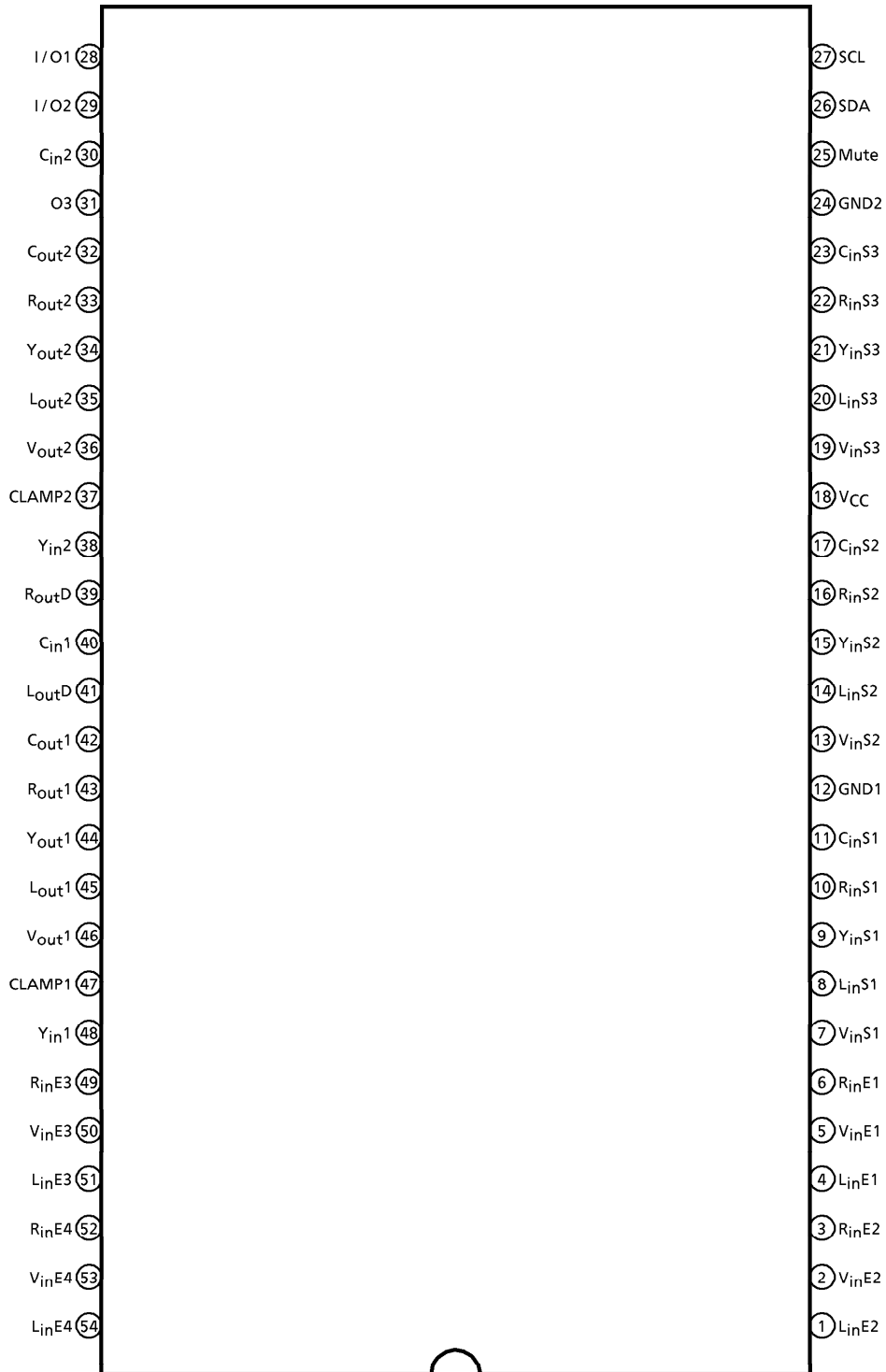
BLOCK DIAGRAM
TA8851BN



BLOCK DIAGRAM
TA8851CN



TERMINAL CONNECTION DIAGRAM



TERMINAL FUNCTION

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
2 : V_{inE2} 5 : V_{inE1}	Composite Video Signal Input	These pins are for composite video signal input. The recommendable input level is $1.0V_{p-p}$.	
50 : V_{inE3} 53 : V_{inE4}	Composite Video Signal / Y Signal Input	These pins can be used for composite video signal or Y signal input. The recommendable input level is $1.0V_{p-p}$.	
7 : V_{inS1} 13 : V_{inS2} 19 : V_{inS3}	Composite Video Signal Input and S-Mode Switch	These pins are for composite video signal input and S mode Switch. By setting DC voltage of one of these pins lower than 2.6V, that channel (S1, S2 or S3) turns to S-mode. And when it is higher than 2.6V, that pin is for composite video input. The recommendable input level is $1.0V_{p-p}$.	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
9 : Y _{in} S1 15 : Y _{in} S2 21 : Y _{in} S3 11 : C _{in} S1 17 : C _{in} S2 23 : C _{in} S3	Y Signal Input/ C Signal Input	These pins accept a Y signal from the S-terminal and a C signal as input. The recommended input signal level is 1.0V _{p-p} for Y signal and 300mV _{p-p} for C signal (burst).	
4 : L _{in} E1 6 : R _{in} E1	Audio Input (TV)	These pins accept the sound of the internal TV signal as input. The signal input to this pin is output from the main/sub output after being selected, as well as from the TV audio output terminal. The recommended input signal level is 300mV _{rms} .	
52 : R _{in} E4 54 : L _{in} E4	Audio Input/ ADC Input	These pins accept an audio signal as input. They also accept input from a 1bit ADC. In this case, if the voltage on these pins is below 2.3V the ADC outputs I ₃ and I ₄ become logic is. The recommended input signal level is 300mV _{rms} .	
8 : L _{in} S1 10 : R _{in} S1 14 : L _{in} S2 16 : R _{in} S2 20 : L _{in} S3 22 : R _{in} S3 1 : L _{in} E2 3 : R _{in} E2 51 : L _{in} E3 49 : R _{in} E3	Audio Input	These pins accept an audio signal as input. The recommended input signal level is 300mV _{rms} .	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
25 : Mute	Mute	If the voltage on this pin is above 1.5V, all audio outputs (main, sub, and TV) are disabled.	
46 : V _{out1} 36 : V _{out2}	Monitor Output	These pins output the selected composite signal. The standard output signal amplitude is 2.0V _{p-p} . These pins can sink a maximum current of 3.0mA.	
47 : CLAMP1 37 : CLAMP2	Clamp Filter	These pins are a filter terminal for the clamp circuit to maintain the monitor output at a constant DC level. If these pins are tied to GND, the clamp circuit is disabled, so that the DC voltage of the monitor output cannot be clamped to a constant level.	
48 : Y _{in1} 40 : C _{in1} 38 : Y _{in2} 30 : C _{in2}	Comb Y/C Input	These pins accept a Y/C separated signal from the comb filter as input. The recommended input signal level is 2.0V _{p-p} for Y signal and 600mV _{p-p} for C signal (burst).	

PIN No.	PIN NAME	FUNCTION	INTERFACE CIRCUIT
44 : Yout1 42 : Cout1 34 : Yout2 32 : Cout2	Y/C Output	These pins output the Y and C signals that are fed to the V/C/D circuits. The standard output signal level is 2.0V _{p-p} for Y signal and 600mV _{p-p} for C signal (burst). These pins can sink a maximum current of 2.5mA.	
28 : I/O1 29 : I/O2	I/O	These pins are for input and output to and from the 1bit DAC/ADC of the bus signal. These pins can source a maximum current of 2.0mA.	
31 : O3	O3	This pin is for output of the 1bit DAC of the bus signal. This pin can source a maximum current of 2.0mA.	
26 : SDA 27 : SCL	SCL/SDA	These pins are for input of the I ² C bus.	
33 : Rout2 35 : Lout2 39 : RoutD/ RoutTV 41 : LoutD/ LoutTV 43 : Rout1 45 : Lout1	Audio Output	These pins output an audio signal. These pins can sink a maximum current of 1.4mA.	

ADDRESS MAP

(Slave address 90H, 91H)

MODE	DATA No.	DATA							
		D07	D06	D05	D04	D03	D02	D01	D00
Write	Data 1								
	TA8851BN	DAC Output			Sound Mute				
				(0)	(1)	(1)	(1)	(1)	(1)
	TA8851CN	—			Dual Sound Output		Sound Mute		
						(1)	(1)	(1)	
	Data 2 (main)	D17	D16	D15	D14	D13	D12	D11	D10
						F.VIDEO (0)			
	Data 3 (sub)	D27	D26	D25	D24	D23	D22	D21	D20
		Y/C Output Switching				F.VIDEO	Output Switching		
		(0)	(0)	(0)	(0)	(0)	(0)	(0)	(0)
Read	Data 4	D37	D36	D35	D34	D33	D32	D31	D30
		ADC Ident				S Input Ident			P.O.R
		(0)	(0)	(0)	(0)	(0)	(0)	(0)	(1)

F.VIDEO : Forced video mode

P.O.R : Power On reset (power : ON (1))

(0) (1) : preset

© Write mode
Output switching (main)

MODE		BUS DATA				S INPUT			OUTPUT SIGNAL			
		D ₁₃	D ₁₂	D ₁₁	D ₁₀	IS1	IS2	IS3	V _{out1}	R _{out1}	L _{out1}	
TV	E1	—	1	1	1	—	—	—	V _{inE1}	R _{inE1}	L _{inE1}	
	E2	—	1	1	0	—	—	—	V _{inE2}	R _{inE2}	L _{inE2}	
	E3	—	1	0	1	—	—	—	V _{inE3}	R _{inE3}	L _{inE3}	
	E4	—	1	0	0	—	—	—	V _{inE4}	R _{inE4}	L _{inE4}	
	S1	V	0	0	1	1	0	—	—	V _{inS1}	R _{inS1}	L _{inS1}
		S	1				—			Y _{inS1} + C _{inS1}		
			—				1					
	S2	V	0	0	1	0	—	0	—	V _{inS2}	R _{inS2}	L _{inS2}
		S	1					—		Y _{inS2} + C _{inS2}		
			—					1				
	S3	V	0	0	0	1	—	—	0	V _{inS3}	R _{inS3}	L _{inS3}
		S	1						—	Y _{inS3} + C _{inS3}		
		—						1				
Mute		—	0	0	0	—	—	—	Mute	Mute	Mute	

Output switching (sub)

MODE		BUS DATA				S INPUT			OUTPUT SIGNAL			
		D ₂₃	D ₂₂	D ₂₁	D ₂₀	IS1	IS2	IS3	V _{out2}	R _{out2}	L _{out2}	
TV	E1	—	1	1	1	—	—	—	V _{inE1}	R _{inE1}	L _{inE1}	
	E2	—	1	1	0	—	—	—	V _{inE2}	R _{inE2}	L _{inE2}	
	E3	—	1	0	1	—	—	—	V _{inE3}	R _{inE3}	L _{inE3}	
	E4	—	1	0	0	—	—	—	V _{inE4}	R _{inE4}	L _{inE4}	
	S1	V	0	0	1	1	0	—	—	V _{inS1}	R _{inS1}	L _{inS1}
		S	1				—			Y _{inS1} + C _{inS1}		
			—				1					
	S2	V	0	0	1	0	—	0	—	V _{inS2}	R _{inS2}	L _{inS2}
		S	1					—		Y _{inS2} + C _{inS2}		
			—					1				
	S3	V	0	0	0	1	—	—	0	V _{inS3}	R _{inS3}	L _{inS3}
		S	1						—	Y _{inS3} + C _{inS3}		
		—						1				
Mute		—	0	0	0	—	—	—	Mute	Mute	Mute	

Output switching (Dual sound output) : This table is only applied for TA8851CN.

MODE		BUS DATA		OUTPUT SIGNAL	
		D ₀₂		R _{out TV}	L _{out TV}
TV	Main	1		R _{out1}	L _{out1}
	Sub	0		R _{out2}	L _{out2}

Y/C output switching (main)

MODE		BUS DATA				OUTPUT SIGNAL		
		D17	D16	D15	D14	Y _{out1}	C _{out1}	
Y	S-terminal Input	EXCEPT	0	0	1	1	Y _{inS1} to Y _{inS3} (*1)	—
	Video Input				1	0	V _{out1}	
	Comb1				0	1	Y _{in1}	
	Comb2				0	0	V _{inE3}	
C	S-terminal Input	1	1	—	—	—	C _{inS1} to C _{inS3} (*2)	
	Video Input	1	0				V _{out1}	
	Comb	0	1				C _{in1}	
	Mute	0	0				—	—

(*1): SY1 switches between Y_{inS1}~Y_{inS3}

(*2): SC1 switches between C_{inS1}~C_{inS3}

Y/C output switching (sub)

MODE		BUS DATA				OUTPUT SIGNAL		
		D27	D26	D25	D24	Y _{out2}	C _{out2}	
Y	S-terminal Input	EXCEPT	0	0	1	1	Y _{inS1} to Y _{inS3} (*1)	—
	Video Input				1	0	V _{out2}	
	Comb1				0	1	Y _{in2}	
	Comb2				0	0	V _{inE4}	
C	S-terminal Input	1	1	—	—	—	C _{inS1} to C _{inS3} (*2)	
	Video Input	1	0				V _{out2}	
	Comb	0	1				C _{in2}	
	Mute	0	0				—	—

(*1): SY2 switches between Y_{inS1}~Y_{inS3}

(*2): SC2 switches between C_{inS1}~C_{inS3}

Mute mode

MODE		BUS		PIN 25	VIDEO OUTPUT				SOUND OUTPUT		
		BIT	DATA		MAIN		SUB		MAIN	SUB	Dual
					V _{out1}	Y _{out1} C _{out1}	V _{out2}	Y _{out2} C _{out2}	R _{out1} L _{out1}	R _{out2} L _{out2}	R _{outD} L _{outD}
Ext Mute		—	—	High level	—	—	—	—	Mute	Mute	Mute
Bus Line Mute	Sound Mute SW	Main	D00	1	—	—	—	—	Mute	—	—
		Sub	D01	1	—	—	—	—	—	Mute	—
		TV (*)	D02	1	—	—	—	—	—	—	Mute
	Video & Sound Mute SW	Main	D10	0	—	Mute	—	—	—	Mute	—
			D11	0	—	—	—	—	—	—	—
		Sub	D20	0	—	—	—	Mute	—	—	Mute
			D21	0	—	—	—	—	—	—	—
Y/C	Main	D14	0	—	—	Mute	—	—	—	—	
	Sub	D15	0	—	—	—	—	—	—	—	
Y/C	Main	D24	0	—	—	—	—	Mute	—	—	
	Sub	D25	0	—	—	—	—	—	Mute	—	

(*) : TV mode is only applied for TA8851BN

DAC output

TERMINAL	BUS		OUTPUT
	BIT	DATA	
I/O1	D03	1	Open
		0	Low level
I/O2	D04	1	Open
		0	Low level
O3	D05	1	Open
		0	Low level

Dual Sound Selection

MODE	BUS		OUTPUT	
	BIT	DATA	R _{outD}	L _{outD}
MAIN	D02	1	Main Sound	Main Sound
SUB		0	Sub Sound	Sub Sound

© Read mode
S-Output ident

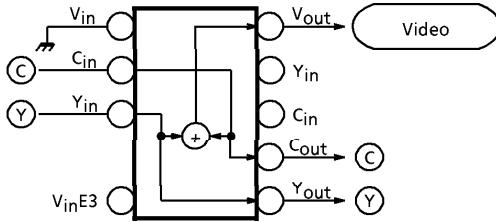
TERMINAL	INPUT	BUS	
		BIT	DATA
V _{inS1}	L	D31	1
	H		0
V _{inS2}	L	D32	1
	H		0
V _{inS3}	L	D33	1
	H		0

ADC ident

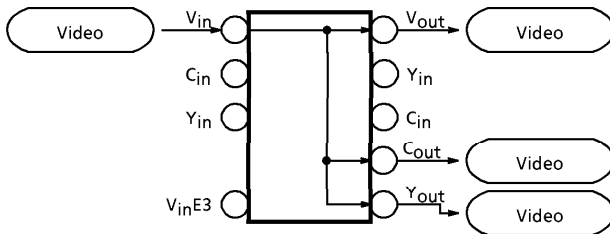
TERMINAL	INPUT	BUS	
		BIT	DATA
I/O1	L	D34	1
	H		0
I/O2	L	D35	1
	H		0
I3	L	D36	1
	H		0
I4	L	D37	1
	H		0

MODE EXPLANATION

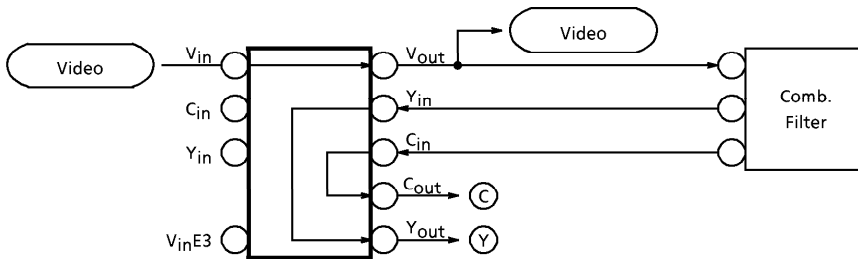
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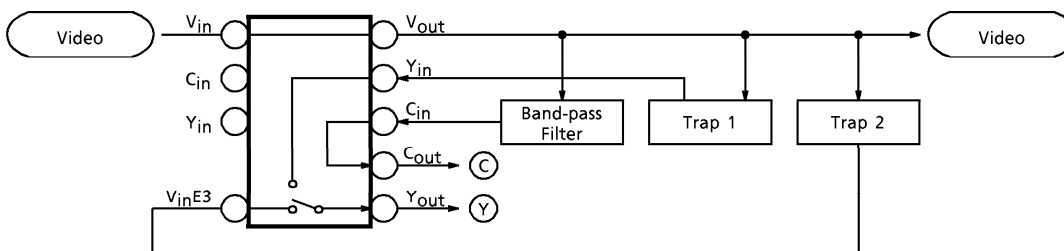
<Video input mode>



<Comb.1 input mode>



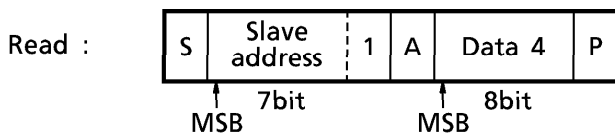
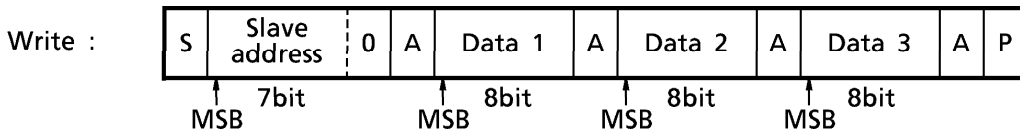
<Comb.2 input mode>



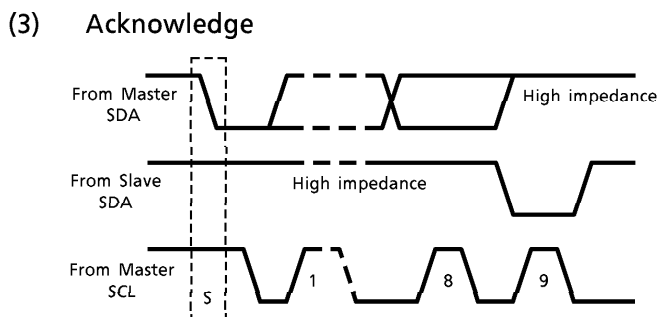
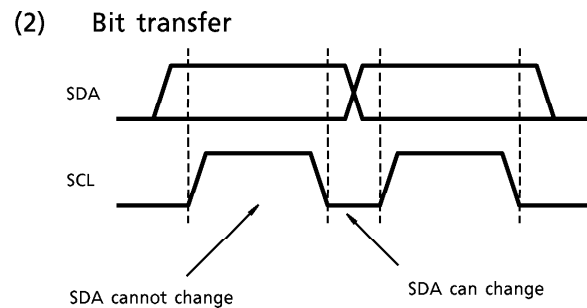
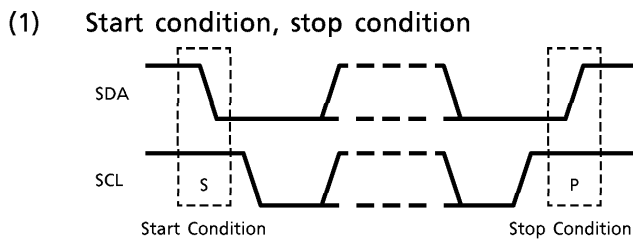
I²C BUS CONTROLLED FORMAT SUMMARY

Bus Controlled format of TA8851CN is based on I²C Bus Control format of Philips.

Data transfer format



S : Start Condition
P : Stop Condition
A : Acknowledge



(4) Slave address

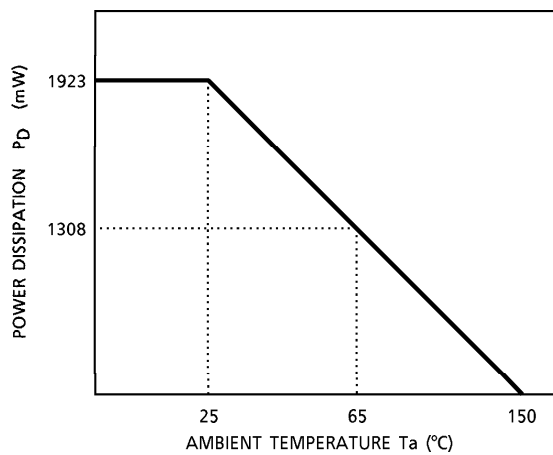
A6	A5	A4	A3	A2	A1	A0	R/ \bar{W}
1	0	0	1	0	0	0	1/0

Purchase of TOSHIBA I²C components 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.

MAXIMUM RATINGS (Ta = 25°C)

CHARACTERISTIC	SYMBOL	RATING	UNIT
Supply Voltage	V _{CC}	13	V
Power Dissipation	P _{Dmax}	1923 (Note)	mW
Input Signal Voltage	e _{in}	5	V _{p-p}
Operating Temperature	T _{opr}	- 20~65	°C
Storage Temperature	T _{stg}	- 55~150	°C

(Note) When using the device at above Ta = 25°C, decrease the power dissipation by 15.4mW for each increase of 1°C.



RECOMMENDED OPERATING CONDITION

PIN No.	PIN NAME	MIN.	TYP.	MAX.	UNIT
18	V _{CC}	8.1	9.0	9.9	V

ELECTRICAL CHARACTERISTICS

DC CHARACTERISTICS

DC voltage characteristics (Unless other wise specified, $V_{CC} = 9V$, $T_a = 25^\circ C$)

PIN No.	PIN NAME	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
1	L _{in} E2	V ₁	1	—	5.0	5.2	5.4	V
2	V _{in} E2	V ₂		—	5.0	5.2	5.4	
3	R _{in} E2	V ₃		—	5.0	5.2	5.4	
4	L _{in} E1	V ₄		—	5.0	5.2	5.4	
5	V _{in} E1	V ₅		—	5.0	5.2	5.4	
6	R _{in} E1	V ₆		—	5.0	5.2	5.4	
7	V _{in} S1	V ₇		—	5.0	5.2	5.4	
8	L _{in} S1	V ₈		—	5.0	5.2	5.4	
9	Y _{in} S1	V ₉		—	5.0	5.2	5.4	
10	R _{in} S1	V ₁₀		—	5.0	5.2	5.4	
11	C _{in} S1	V ₁₁		—	5.0	5.2	5.4	
13	V _{in} S2	V ₁₃		—	5.0	5.2	5.4	
14	L _{in} S2	V ₁₄		—	5.0	5.2	5.4	
15	Y _{in} S2	V ₁₅		—	5.0	5.2	5.4	
16	R _{in} S2	V ₁₆		—	5.0	5.2	5.4	
17	C _{in} S2	V ₁₇		—	5.0	5.2	5.4	
19	V _{in} S3	V ₁₉		—	5.0	5.2	5.4	
20	L _{in} S3	V ₂₀		—	5.0	5.2	5.4	
21	Y _{in} S3	V ₂₁		—	5.0	5.2	5.4	
22	R _{in} S3	V ₂₂		—	5.0	5.2	5.4	
23	C _{in} S3	V ₂₃		—	5.0	5.2	5.4	
25	MUTE	V ₂₅		—	—	1.5	—	
26	SDA	V ₂₆		—	—	4.2	—	
27	SCL	V ₂₇		—	—	4.2	—	
28	I/O1	V ₂₈		—	8.5	9.0	—	
29	I/O2	V ₂₉		—	8.5	9.0	—	
30	C _{in} 2	V ₃₀		—	5.0	5.2	5.4	
31	O3	V ₃₁		—	8.5	9.0	—	
32	C _{out} 2	V ₃₂		—	3.4	3.7	4.0	
33	R _{out} 2	V ₃₃		—	3.7	4.0	4.3	
34	Y _{out} 2	V ₃₄		—	3.4	3.7	4.0	
35	L _{out} 2	V ₃₅		—	3.7	4.0	4.3	
36	V _{out} 2	V ₃₆		—	2.3	2.8	3.3	
37	CLAMP2	V ₃₇		—	2.7	3.2	3.7	
38	Y _{in} 2	V ₃₈		—	5.0	5.2	5.4	
39	R _{out} TV	V ₃₉		—	3.7	4.0	4.3	
40	C _{in} 1	V ₄₀		—	5.0	5.2	5.4	
41	L _{out} TV	V ₄₁		—	3.7	4.0	4.3	
42	C _{out} 1	V ₄₂		—	3.4	3.7	4.0	
43	R _{out} 1	V ₄₃		—	3.7	4.0	4.3	

PIN No.	PIN NAME	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
44	Y _{out1}	V ₄₄	1	—	3.4	3.7	4.0	V
45	L _{out1}	V ₄₅		—	3.7	4.0	4.3	
46	V _{out1}	V ₄₆		—	2.3	2.8	3.3	
47	CLAMP1	V ₄₇		—	2.7	3.2	3.7	
48	Y _{in1}	V ₄₈		—	5.0	5.2	5.4	
49	R _{inE3}	V ₄₉		—	5.0	5.2	5.4	
50	V _{inE3}	V ₅₀		—	5.0	5.2	5.4	
51	L _{inE3}	V ₅₁		—	5.0	5.2	5.4	
52	R _{inE4}	V ₅₂		—	5.0	5.2	5.4	
53	V _{inE4}	V ₅₃		—	5.0	5.2	5.4	
54	L _{inE4}	V ₅₄		—	5.0	5.2	5.4	

DC current characteristics (Unless other wise specified, V_{CC} = 9V, Ta = 25°C)

PIN No.	PIN NAME	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
18	V _{CC}	I _{CC}	1	—	48	60	80	mA

AC CHARACTERISTICS (Unless otherwise specified, V_{CC} = 9V, Ta = 25°C)

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Clamp Current	I _{DIS}	2	Discharge current	11	17	28	μA
	I _{CHR}		charge current	0.50	1.25	1.80	mA
Output Resistance	R _{M-AUD}	2	—	50	100	150	Ω
	R _{S-AUD}		—	65	130	195	
	R _{T-AUD}		—	40	80	120	
	R _{M-VID}		—	25	50	75	
	R _{S-VID}		—	50	100	150	
	R _{M-Y/C}		—	25	50	75	
	R _{S-Y/C}		—	40	80	120	
Input Resistance	R _{iAUD}	2	—	49	70	100	kΩ
	R _{iVID}		—	20	30	40	
	R _{iY/C}		—	20	30	40	
Video Input Dynamic Range	(Main) V _{dVID1}	2	(Note 1)	1.6	2.1	—	V _{p-p}
	(Sub) V _{dVID2}			1.6	2.1	—	
	(Clamp off) V _{dVID3}			2.4	2.8	—	
Y/C Input Dynamic Range	(Main) V _{dY/C1}	2	(Note 2)	2.4	2.8	—	V _{p-p}
	(Sub) V _{dY/C2}			2.4	2.8	—	
Comb Input Dynamic Range	(Main) V _{dCOM1}	2	(Note 2)	5.1	6.5	—	V _{p-p}
	(Sub) V _{dCOM2}			5.1	6.5	—	
S Video Dynamic Range	(Main) V _{dS-V1}	2	(Note 3)	1.6	2.1	—	V _{p-p}
	(Sub) V _{dS-V2}			1.6	2.1	—	
	(Clamp off) V _{dS-V3}			2.4	2.8	—	
Monochrome Mode Dynamic Range	(Main) V _{dB/W1}	2	(Note 4)	1.6	2.1	—	V _{p-p}
	(Sub) V _{dB/W2}			1.6	2.1	—	

CHARACTERISTIC	SYMBOL	TEST CIR-CUIT	TEST CONDITION	MIN.	TYP.	MAX.	UNIT
Video Gain	(Main)	G _{VID1}	(Note 5)	5.7	6.2	6.7	dB
	(Sub)	G _{VID2}		5.7	6.2	6.7	
	(Clamp Off)	G _{VID3}		5.8	6.3	6.8	
Y / C Gain	(Main)	G _{Y / C1}	(Note 6)	5.9	6.4	6.9	dB
	(Sub)	G _{Y / C2}		5.9	6.4	6.9	
Comb Gain	(Main)	G _{COM1}		-0.5	0	0.5	
	(Sub)	G _{COM2}		-0.5	0	0.5	
S Video Gain	(Main)	G _{S-V1}	(Note 7)	5.7	6.2	6.7	dB
	(Sub)	G _{S-V2}		5.7	6.2	6.7	
	(Clamp Off)	G _{S-V3}		6.0	6.5	7.0	
B / W Mode Gain	(Main)	G _{B / W1}	(Note 8)	5.7	6.2	6.7	dB
	(Sub)	G _{B / W2}		5.7	6.2	6.7	
Video Switch Crosstalk	(Main)	C _{VID1}	(Note 9)	50	60	—	dB
	(Sub)	C _{VID2}		50	60	—	
	(Clamp Off)	C _{VID3}	(Note 12)	50	60	—	
Y Switch Crosstalk	(Main)	C _{Y1}	(Note 10)	50	60	—	dB
	(Sub)	C _{Y2}		50	60	—	
C Switch Crosstalk	(Main)	C _{C1}	(Note 11)	50	60	—	dB
	(Sub)	C _{C2}		50	60	—	
Video Mute Attenuation		G _{VM}	(Note 13)	50	60	—	dB
Video Frequency Response	(Main)	f _{VID1}	(Note 14)	9.0	—	—	MHz
	(Sub)	f _{VID2}		9.0	—	—	
	(Clamp Off)	f _{VID3}		9.0	—	—	
Y / C Frequency Response	(Main)	f _{Y / C1}	(Note 15)	9.0	—	—	MHz
	(Sub)	f _{Y / C2}		9.0	—	—	
Comb Frequency Response	(Main)	f _{COM1}		9.0	—	—	
	(Sub)	f _{COM2}		9.0	—	—	
S Video Frequency Response	(Main)	f _{S-V1}	(Note 16)	9.0	—	—	MHz
	(Sub)	f _{S-V2}		9.0	—	—	
	(Clamp Off)	f _{S-V3}		9.0	—	—	
B / W Mode Frequency Response	(Main)	f _{B / W1}	(Note 17)	9.0	—	—	MHz
	(Sub)	f _{B / W2}		9.0	—	—	
Clamp Level		C _L	(Note 18)	—	21	—	%
Audio Dynamic Range		V _{dAUD}	(Note 19)	5.0	6.0	—	V _{p-p}
Audio Gain		G _{AUD}	(Note 20)	-0.5	0	0.5	dB
Audio Frequency Response		f _{AUD}	(Note 21)	0.1	3.0	—	MHz
Audio Switch Crosstalk		C _{AUD}	(Note 22)	60	70	—	dB
Audio Mute Attenuation		G _{AM}	(Note 23)	60	70	—	dB
Audio Select Offset		ΔV _{AUD}	(Note 24)	-30	0	30	mV
S Input Discriminating Voltage		V _{thS}	(Note 25)	2.4	2.6	2.8	V
ADC Input Discriminating Voltage		V _{thADC}	(Note 26)	1.8	2.3	2.8	V
External Mute-ON Voltage		V _{thMUTE}	(Note 27)	1.0	1.5	2.0	V
DAC Output Low Level Voltage		V _{DAC}	(Note 28)	0	—	0.5	V

TEST CONDITIONS

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, T _a = 25 ± 3°C)			MEASUREMENT METHOD
		SW & VR MODE			
		SW MODE	DATA 2	DATA 3	
1-(1)	V Input Dynamic Range (Main)	V _{in} E2	S2-a , others-b / off	DATA 2 ****0110	(1) V ₁ 15kHz, variable-amplitude input. (2) For each, measure the amplitude of V ₁ at which the waveform on pin 46 is distorted.
		V _{in} E1	S5-a , others-b / off	****0111	
1-(2)	V Input Dynamic Range (Sub)	V _{in} S1	S7A-a , others-b / off	DATA 3 ****0111	(1) V ₁ 15kHz, Variable-amplitude input. (2) For each, measure the amplitude of V ₁ at which the waveform on pin 36 is distorted.
		V _{in} S2	S13A-a, others-b / off	****0011	
1-(3)	V Input Dynamic Range (Clamp Off) (Main)	V _{in} S3	S19A-a, others-b / off	DATA 2 ****0010	(1) V ₁ 15kHz, Variable-amplitude input, V ₃ = 0V. (2) For each, measure the amplitude of V ₁ at which the waveform on pin 46 is distorted.
		V _{in} E3	S50-a , others-b / off	****0001	
1-(4)	V Input Dynamic Range (Clamp Off) (Sub)	V _{in} E4	S53-a , others-b / off	DATA 3 ****0101	(1) V ₁ 15kHz, variable-amplitude input, V ₃ = 0V. (2) For each, measure the amplitude of V ₁ at which the waveform on pin 36 is distorted.
		V _{in} E2	S2-a , others-b / off	****0100	

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, T _a = 25 ± 3°C)			
		SW & VR MODE			
		SW MODE	DATA 2	DATA 3	MEASUREMENT METHOD
2-(1)	YC Input Dynamic Range (Main)	Y _{in} S1	11111011	DATA 3	Measure the amplitude in the same way using pin 44.
		Y _{in} S2	11111010		
		Y _{in} S3	11111001		
		Y _{in} 1	0101****		
		V _{in} E3	0100****		
	C _{in} S1	11111011	DATA 3	Measure the amplitude in the same way using pin 42.	
	C _{in} S2	11111010			
	C _{in} S3	11111001			
	C _{in} 1	0101****			
		0100****			
2-(2)	YC Input Dynamic Range (Sub)	Y _{in} S1	11111011	DATA 3	Measure the amplitude in the same way using pin 34.
		Y _{in} S2	11111010		
		Y _{in} S3	11111001		
		Y _{in} 2	0101****		
		V _{in} E4	0100****		
	C _{in} S1	11111011	DATA 3	Measure the amplitude in the same way using pin 32.	
	C _{in} S2	11111010			
	C _{in} S3	11111001			
	C _{in} 2	0101****			
		0100****			
3-(1)	S Video Dynamic Range (Main)	Y _{in} S1	11111011	DATA 2	Measure the amplitude in the same way using pin 46.
		Y _{in} S2	11111010		
		Y _{in} S3	11111001		
		C _{in} S1	11111011		
		C _{in} S2	11111010		
	C _{in} S3	11111001	DATA 2	Measure the amplitude in the same way using pin 36.	
	Y _{in} S1	11111011			
	Y _{in} S2	11111010			
	Y _{in} S3	11111001			
	C _{in} S1	11111011			

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, T _a = 25±3°C)		
		SW & VR MODE		
		SW MODE	DATA 2	MEASUREMENT METHOD
3-(3)	S Video Dynamic Range (Clamp Off) (Main)	Y _{in} S1	11111011	Measure the amplitude in the same way using pin 46.
		Y _{in} S2	11111010	
		Y _{in} S3	11111001	
C _{in} S1	11111011			
C _{in} S2	11111010			
C _{in} S3	11111001			
3-(4)	S Video Dynamic Range (Clamp Off) (Sub)	Y _{in} S1	DATA 3	Measure the amplitude in the same way using pin 36.
		Y _{in} S2	11111011	
		Y _{in} S3	11111010	
C _{in} S1	11111001			
C _{in} S2	11111011			
C _{in} S3	11111010			
4-(1)	B/W Mode Dynamic Range (Main)	V _{in} E2	DATA 2	Measure the amplitude in the same way using pins 44 and 42 to find the smaller one.
		V _{in} E1	10100110	
		V _{in} S1	10100111	
V _{in} S2	10100011			
V _{in} S3	10100010			
V _{in} E3	10100001			
V _{in} E4	10100101			
4-(2)	B/W Mode Dynamic Range (Sub)	V _{in} E2	DATA 3	Measure the amplitude in the same way using pins 34 and 32 to find the smaller one.
		V _{in} E1	10100110	
		V _{in} S1	10100111	
V _{in} S2	10100011			
V _{in} S3	10100010			
V _{in} E3	10100001			
V _{in} E4	10100101			

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, T _a = 25 ± 3°C)			
		SW & VR MODE		MEASUREMENT METHOD	
		SW MODE	DATA 2		
5-(1)	Video Gain (Main)	V _{in} E2	S2-a , others-b / off	****0110	(1) V ₁ 15kHz, 1V _{p-p} input. (2) For each, measure the amplitude on pin 46 to find the gain.
		V _{in} E1	S5-a , others-b / off	****0111	
V _{in} S1	S7A-a , others-b / off	****0011			
V _{in} S2	S13A-a, others-b / off	****0010			
V _{in} S3	S19A-a, others-b / off	****0001			
V _{in} E3	S50-a , others-b / off	****0101			
V _{in} E4	S53-a , others-b / off	****0100			
5-(2)	Video Gain (Sub)	V _{in} E2	S2-a , others-b / off	DATA 3	
		V _{in} E1	S5-a , others-b / off	****0110	
V _{in} S1	S7A-a , others-b / off	****0111			
V _{in} S2	S13A-a, others-b / off	****0011			
V _{in} S3	S19A-a, others-b / off	****0010			
V _{in} E3	S50-a , others-b / off	****0001			
V _{in} E4	S53-a , others-b / off	****0101			
5-(3)	Video Gain (Clamp Off) (Main)	V _{in} E2	S2-a , S47-on, others-b / off	DATA 2	(1) V ₁ 15kHz, 1V _{p-p} input. (2) For each, measure the amplitude on pin 46 to find the gain.
		V _{in} E1	S5-a , S47-on, others-b / off	****0110	
V _{in} S1	S7A-a , S47-on, others-b / off	****0111			
V _{in} S2	S13A-a, S47-on, others-b / off	****0011			
V _{in} S3	S19A-a, S47-on, others-b / off	****0010			
V _{in} E3	S50-a , S47-on, others-b / off	****0001			
V _{in} E4	S53-a , S47-on, others-b / off	****0101			
5-(4)	Video Gain (Clamp Off) (Sub)	V _{in} E2	S2-a , S37-on, others-b / off	DATA 3	
		V _{in} E1	S5-a , S37-on, others-b / off	****0110	
V _{in} S1	S7A-a , S37-on, others-b / off	****0111			
V _{in} S2	S13A-a, S37-on, others-b / off	****0011			
V _{in} S3	S19A-a, S37-on, others-b / off	****0010			
V _{in} E3	S50-a , S37-on, others-b / off	****0001			
V _{in} E4	S53-a , S37-on, others-b / off	****0101			

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, T _a = 25 ± 3°C)				MEASUREMENT METHOD
		SW & VR MODE				
		SW MODE	DATA 2	DATA 3		
6-(1)	Y/C Gain (Main)	Y _{in} S1	11111011		Measure the amplitude in the same way using pin 44.	
		Y _{in} S2	11111010			
		Y _{in} S3	11111001			
		Y _{in} 1	0101****			
		V _{in} E3	0100****			
		C _{in} S1	11111011		Measure the amplitude in the same way using pin 42.	
		C _{in} S2	11111010			
		C _{in} S3	11111001			
		C _{in} 1	0101****			
			DATA 3			
6-(2)	Y/C Gain (Sub)	Y _{in} S1	11111011		Measure the amplitude in the same way using pin 34.	
		Y _{in} S2	11111010			
		Y _{in} S3	11111001			
		Y _{in} 2	0101****			
		V _{in} E4	0100****			
		C _{in} S1	11111011		Measure the amplitude in the same way using pin 32.	
		C _{in} S2	11111010			
		C _{in} S3	11111001			
		C _{in} 2	0101****			
			DATA 2			
7-(1)	S Video Gain (Main)	Y _{in} S1	11111011		Measure the amplitude in the same way using pin 46.	
		Y _{in} S2	11111010			
		Y _{in} S3	11111001			
		C _{in} S1	11111011			
		C _{in} S2	11111010			
		C _{in} S3	11111001		Measure the amplitude in the same way using pin 36.	
		Y _{in} S1	11111011			
		Y _{in} S2	11111010			
		Y _{in} S3	11111001			
		C _{in} S1	11111011			

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, T _a = 25±3°C)			MEASUREMENT METHOD
		SW & VR MODE			
		SW MODE	DATA 2	DATA 3	
7-(3)	S Video Gain (Clamp Off) (Sub)	Y _{in} S1	S9-a , S37-on, others-b/off	11111011	Measure the amplitude in the same way using pin 36.
		Y _{in} S2	S15-a , S37-on, others-b/off	11111010	
		Y _{in} S3	S21-a , S37-on, others-b/off	11111001	
	S Video Gain (Clamp Off) (Main)	C _{in} S1	S11-a , S37-on, others-b/off	11111011	Measure the amplitude in the same way using pin 46.
		C _{in} S2	S17-a , S37-on, others-b/off	11111010	
		C _{in} S3	S23-a , S37-on, others-b/off	11111001	
7-(4)	S Video Gain (Clamp Off) (Main)	Y _{in} S1	S9-a , S47-on, others-b/off	DATA 3 11111011	Measure the amplitude in the same way using pin 46.
		Y _{in} S2	S15-a , S47-on, others-b/off	11111010	
		Y _{in} S3	S21-a , S47-on, others-b/off	11111001	
	B / W Mode Gain (Main)	C _{in} S1	S11-a , S47-on, others-b/off	11111011	Measure the amplitude in the same way using pin 44.
		C _{in} S2	S17-a , S47-on, others-b/off	11111010	
		C _{in} S3	S23-a , S47-on, others-b/off	11111001	
8-(1)	B / W Mode Gain (Main)	V _{in} E2	S2-a , others-b/off	DATA 2 10100110	Measure the amplitude in the same way using pin 42.
		V _{in} E1	S5-a , others-b/off	10100111	
		V _{in} S1	S7A-a , others-b/off	10100011	
		V _{in} S2	S13A-a, others-b/off	10100010	
		V _{in} S3	S19A-a, others-b/off	10100001	
		V _{in} E3	S50-a , others-b/off	10100101	
		V _{in} E4	S53-a , others-b/off	10100100	
		V _{in} E2	S2-a , others-b/off	10100110	
		V _{in} E1	S5-a , others-b/off	10100111	
		V _{in} S1	S7A-a , others-b/off	10100011	
		V _{in} S2	S13A-a, others-b/off	10100010	
		V _{in} S3	S19A-a, others-b/off	10100001	

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, T _a = 25 ± 3°C)		
		SW & VR MODE		MEASUREMENT METHOD
		SW MODE	DATA 3	
8-(2) B/W Mode Gain (Sub)	V _{in} E2	S2-a , others-b / off	10100110	Measure the amplitude in the same way using pin 34.
	V _{in} E1	S5-a , others-b / off	10100111	
	V _{in} S1	S7A-a , others-b / off	10100011	
	V _{in} S2	S13A-a, others-b / off	10100010	
	V _{in} S3	S19A-a, others-b / off	10100001	
	V _{in} E3	S50-a , others-b / off	10100101	
	V _{in} E4	S53-a , others-b / off	10100100	
	V _{in} E2	S2-a , others-b / off	10100110	
	V _{in} E1	S5-a , others-b / off	10100111	
	V _{in} S1	S7A-a , others-b / off	10100011	
	V _{in} S2	S13A-a, others-b / off	10100010	
	V _{in} S3	S19A-a, others-b / off	10100001	
	V _{in} E3	S50-a , others-b / off	10100101	
	V _{in} E4	S53-a , others-b / off	10100100	

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, T _a = 25 ± 3°C)			
		SW & VR MODE		MEASUREMENT METHOD	
		SW MODE	DATA 2		
9-(1)	V Switch Crosstalk (Main)	V _{inE2} All-b/off except those specified on the left	***0110	(1) V ₁ 3.58MHz, 1V _{p-p} input. (2) While sequentially switching S ₂ , S ₅ , S _{7A} , S ₉ , S ₁₁ , S _{13A} , S ₁₅ , S ₁₇ , S _{19A} , S ₂₁ , S ₂₃ , S ₃₀ , S ₃₈ , S ₄₀ , S ₄₈ , S ₅₀ , and S ₅₃ to 'a', measure the maximum level of crosstalk to pin 46 and find its ratio to output in selected mode.	
		V _{inE1} All-b/off except those specified on the left	***0111		
V _{inS1} All-b/off except those specified on the left	***0011				
V _{inS2} All-b/off except those specified on the left	***0010				
V _{inS3} All-b/off except those specified on the left	***0001				
V _{inE3} All-b/off except those specified on the left	***0101				
V _{inE4} All-b/off except those specified on the left	***0100				
Y _{inS1} , C _{inS1} All-b/off except those specified on the left	***1011				
Y _{inS2} , C _{inS2} All-b/off except those specified on the left	***1010				
Y _{inS3} , C _{inS3} All-b/off except those specified on the left	***1001				
9-(2)	V Switch Crosstalk (Sub)	V _{inE2} All-b/off except those specified on the left	DATA 3 ***0110	(1) V ₁ 3.58MHz, 1V _{p-p} input. (2) While sequentially switching S ₂ , S ₅ , S _{7A} , S ₉ , S ₁₁ , S _{13A} , S ₁₅ , S ₁₇ , S _{19A} , S ₂₁ , S ₂₃ , S ₃₀ , S ₃₈ , S ₄₀ , S ₄₈ , S ₅₀ , and S ₅₃ to 'a', measure the maximum level of crosstalk to pin 36 and find its ratio to output in selected mode.	
		V _{inE1} All-b/off except those specified on the left	***0111		
V _{inS1} All-b/off except those specified on the left	***0011				
V _{inS2} All-b/off except those specified on the left	***0010				
V _{inS3} All-b/off except those specified on the left	***0001				
V _{inE3} All-b/off except those specified on the left	***0101				
V _{inE4} All-b/off except those specified on the left	***0100				
Y _{inS1} , C _{inS1} All-b/off except those specified on the left	***1011				
Y _{inS2} , C _{inS2} All-b/off except those specified on the left	***1010				
Y _{inS3} , C _{inS3} All-b/off except those specified on the left	***1001				
10-(1)	Y Switch Crosstalk (Main)	Y _{inS1} All-b/off except those specified on the left	DATA 2 11111011	Measure the maximum level of crosstalk in the same way using pin 44.	
		Y _{inS2} All-b/off except those specified on the left	11111010		
Y _{inS3} All-b/off except those specified on the left	11111001				
Y _{in1} All-b/off except those specified on the left	0101****				
V _{inE3} All-b/off except those specified on the left	0100****				
10-(2)	Y Switch Crosstalk (Sub)	Y _{inS1} All-b/off except those specified on the left	DATA 3 11111011		Measure the maximum level of crosstalk in the same way using pin 34.
		Y _{inS2} All-b/off except those specified on the left	11111010		
Y _{inS3} All-b/off except those specified on the left	11111001				
Y _{in2} All-b/off except those specified on the left	0101****				
V _{inE3} All-b/off except those specified on the left	0100****				

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, Ta = 25±3°C)			
		SW & VR MODE		MEASUREMENT METHOD	
		SW MODE	DATA 2		
11-(1)	C Switch Crosstalk (Main)	C _{in} S1	All-b/off except those specified on the left	11111011	Measure the maximum level of crosstalk in the same way using pin 42.
		C _{in} S2	All-b/off except those specified on the left	11111010	
		C _{in} S3	All-b/off except those specified on the left	11111001	
		C _{in} 1	All-b/off except those specified on the left	0101****	
11-(2)	C Switch Crosstalk (Sub)	C _{in} S1	All-b/off except those specified on the left	DATA 3	Measure the maximum level of crosstalk in the same way using pin 32.
		C _{in} S2	All-b/off except those specified on the left	11111011	
		C _{in} S3	All-b/off except those specified on the left	11111010	
		C _{in} 2	All-b/off except those specified on the left	11111001	
12-(1)	V Switch Crosstalk (Clamp Off) (Main)	V _{in} E2	All-b/off except those specified on the left	DATA 2	(1) S47-ON, V ₃ = 0V. (2) Measure the maximum level of crosstalk in the same way using pin 46.
		V _{in} E1	All-b/off except those specified on the left	****0110	
		V _{in} S1	All-b/off except those specified on the left	****0111	
		V _{in} S2	All-b/off except those specified on the left	****0011	
		V _{in} S3	All-b/off except those specified on the left	****0010	
		V _{in} E3	All-b/off except those specified on the left	****0001	
		V _{in} E4	All-b/off except those specified on the left	****0101	
		Y _{in} S1, C _{in} S1	All-b/off except those specified on the left	****0100	
		Y _{in} S2, C _{in} S2	All-b/off except those specified on the left	****1011	
		Y _{in} S3, C _{in} S3	All-b/off except those specified on the left	****1010	
			All-b/off except those specified on the left	****1001	
			All-b/off except those specified on the left	DATA 3	
			All-b/off except those specified on the left	****0110	
			All-b/off except those specified on the left	****0111	
			All-b/off except those specified on the left	****0011	
			All-b/off except those specified on the left	****0010	
12-(2)	V Switch Crosstalk (Clamp Off) (Sub)	V _{in} E2	All-b/off except those specified on the left	DATA 3	(1) S37-ON, V ₃ = 0V. (2) Measure the maximum level of crosstalk in the same way using pin 36.
		V _{in} E1	All-b/off except those specified on the left	****0110	
		V _{in} S1	All-b/off except those specified on the left	****0111	
		V _{in} S2	All-b/off except those specified on the left	****0011	
		V _{in} S3	All-b/off except those specified on the left	****0010	
		V _{in} E3	All-b/off except those specified on the left	****0001	
		V _{in} E4	All-b/off except those specified on the left	****0101	
		Y _{in} S1, C _{in} S1	All-b/off except those specified on the left	****0100	
		Y _{in} S2, C _{in} S2	All-b/off except those specified on the left	****1011	
		Y _{in} S3, C _{in} S3	All-b/off except those specified on the left	****1010	
			All-b/off except those specified on the left	****1001	
			All-b/off except those specified on the left	DATA 3	
			All-b/off except those specified on the left	****0110	
			All-b/off except those specified on the left	****0111	
			All-b/off except those specified on the left	****0011	
			All-b/off except those specified on the left	****0010	

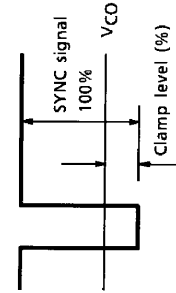
NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, Ta = 25±3°C)		MEASUREMENT METHOD	
		SW & VR MODE			
		SW MODE	DATA 2		
13	Mute Attenuation	V _{out1} Output	All-b/off except those specified on the left	****0000	(1) V ₁ 3.58MHz, 1V _{p-p} input. (2) While sequentially switching S ₂ , S ₅ , S _{7A} , S ₉ , S ₁₁ , S _{13A} , S ₁₅ , S ₁₇ , S _{19A} , S ₂₁ , S ₂₃ , S ₃₀ , S ₃₈ , S ₄₀ , S ₄₈ , S ₅₀ , and S ₅₃ to 'a', measure the maximum level of crosstalk to pin 46 and find its ratio to output in selected mode.
		Y _{out1} Output	All-b/off except those specified on the left	00*****	Measure the maximum level of crosstalk in the same way using pin 44.
		C _{out1} Output	All-b/off except those specified on the left	00*****	Measure the maximum level of crosstalk in the same way using pin 42.
		V _{out2} Output	All-b/off except those specified on the left	DATA 3 ****0000	Measure the maximum level of crosstalk in the same way using pin 36.
		Y _{out2} Output	All-b/off except those specified on the left	00*****	Measure the maximum level of crosstalk in the same way using pin 34.
		C _{out2} Output	All-b/off except those specified on the left	00*****	Measure the maximum level of crosstalk in the same way using pin 32.
		V _{out1} Output (Clamp Off)	All-b/off except those specified on the left	DATA 2 ****0000	(1) S ₄₇ -ON, V ₃ = 0V (2) Measure the maximum level of crosstalk in the same way using pin 46.
		V _{out2} Output (Clamp Off)	All-b/off except those specified on the left	DATA 3 ****0000	(1) S ₄₇ -ON, V ₃ = 0V (2) Measure the maximum level of crosstalk in the same way using pin 36.

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} =9V, T _a = 25±3°C)			
		SW & VR MODE		MEASUREMENT METHOD	
		SW MODE	DATA 2		
14-(1)	Video Frequency Response (Main)	V _{in} E2	S2-a , others-b / off	DATA 2 ****0110	(1) V ₁ frequency-variable, 1V _{p-p} input. (2) For each, measure the output amplitude on pin 46 to find the frequency equivalent to -3dB.
		V _{in} E1	S5-a , others-b / off	****0111	
		V _{in} S1	S7A-a , others-b / off	****0011	
		V _{in} S2	S13A-a, others-b / off	****0010	
		V _{in} S3	S19A-a, others-b / off	****0001	
		V _{in} E3	S50-a , others-b / off	****0101	
		V _{in} E4	S53-a , others-b / off	****0100	
				DATA 3	
14-(2)	Video Frequency Response (Sub)	V _{in} E2	S2-a , others-b / off	DATA 3 ****0110	(1) V ₁ 15kHz, 1V _{p-p} input (2) For each, measure the output amplitude on pin 36 to find the frequency equivalent to -3dB.
		V _{in} E1	S5-a , others-b / off	****0111	
		V _{in} S1	S7A-a , others-b / off	****0011	
		V _{in} S2	S13A-a, others-b / off	****0010	
		V _{in} S3	S19A-a, others-b / off	****0001	
		V _{in} E3	S50-a , others-b / off	****0101	
		V _{in} E4	S53-a , others-b / off	****0100	
				DATA 2	
14-(3)	Video Frequency Response (Clamp Off) (Main)	V _{in} E2	S2-a , S47-on, others-b / off	DATA 2 ****0110	(1) V ₁ frequency-variable, 1V _{p-p} input, V ₃ = 0V. (2) For each, measure the output amplitude on pin 46 to find the frequency equivalent to -3dB.
		V _{in} E1	S5-a , S47-on, others-b / off	****0111	
		V _{in} S1	S7A-a , S47-on, others-b / off	****0011	
		V _{in} S2	S13A-a, S47-on, others-b / off	****0010	
		V _{in} S3	S19A-a, S47-on, others-b / off	****0001	
		V _{in} E3	S50-a , S47-on, others-b / off	****0101	
		V _{in} E4	S53-a , S47-on, others-b / off	****0100	
				DATA 3	
14-(4)	Video Frequency Response (Clamp Off) (Sub)	V _{in} E2	S2-a , S37-on, others-b / off	DATA 3 ****0110	(1) V ₁ frequency-variable, 1V _{p-p} input, V ₃ = 0V. (2) For each, measure the output amplitude on pin 36 to find the frequency equivalent to -3dB.
		V _{in} E1	S5-a , S37-on, others-b / off	****0111	
		V _{in} S1	S7A-a , S37-on, others-b / off	****0011	
		V _{in} S2	S13A-a, S37-on, others-b / off	****0010	
		V _{in} S3	S19A-a, S37-on, others-b / off	****0001	
		V _{in} E3	S50-a , S37-on, others-b / off	****0101	
		V _{in} E4	S53-a , S37-on, others-b / off	****0100	
				DATA 3	

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, T _a = 25±3°C)		MEASUREMENT METHOD			
		SW & VR MODE					
		SW MODE	DATA 2				
15-(1)	Y/C Frequency Response (Main)	Y _{in} S1	11111011	Measure the amplitude in the same way using pin 44.			
		Y _{in} S2	11111010				
		Y _{in} S3	11111001				
		Y _{in} 1	0101****				
		V _{in} E3	0100****				
		C _{in} S1	11111011				
		C _{in} S2	11111010				
		C _{in} S3	11111001				
		C _{in} 1	0101****				
		DATA 3					
15-(2)	Y/C Frequency Response (Sub)	Y _{in} S1	11111011	Measure the amplitude in the same way using pin 34.			
		Y _{in} S2	11111010				
		Y _{in} S3	11111001				
		Y _{in} 2	0101****				
		V _{in} E4	0100****				
		C _{in} S1	11111011				
		C _{in} S2	11111010				
		C _{in} S3	11111001				
		C _{in} 2	0101****				
		DATA 2					
16-(1)	S Video Frequency Response (Main)	Y _{in} S1	11111011	Measure the amplitude in the same way using pin 46.			
		Y _{in} S2	11111010				
		Y _{in} S3	11111001				
		C _{in} S1	11111011				
		C _{in} S2	11111010				
		C _{in} S3	11111001				
		DATA 2					
		16-(2)	S Video Frequency Response (Sub)		Y _{in} S1	11111011	Measure the amplitude in the same way using pin 36.
					Y _{in} S2	11111010	
					Y _{in} S3	11111001	
C _{in} S1	11111011						
C _{in} S2	11111010						
C _{in} S3	11111001						
DATA 3							

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} =9V, T _a = 25±3°C)			MEASUREMENT METHOD
		SW & VR MODE		DATA 2	
		SW MODE	DATA 2		
16-(3)	S Video Frequency Response (Clamp Off) (Main)	Y _{in} S1	S9-a , S47-on, others-b / off	11111011	Measure the amplitude in the same way using pin 46.
		Y _{in} S2	S15-a , S47-on, others-b / off	11111010	
		Y _{in} S3	S21-a , S47-on, others-b / off	11111001	
16-(4)	S Video Frequency Response (Clamp Off) (Sub)	C _{in} S1	S11-a , S47-on, others-b / off	11111011	Measure the amplitude in the same way using pin 36.
		C _{in} S2	S17-a , S47-on, others-b / off	11111010	
		C _{in} S3	S23-a , S47-on, others-b / off	11111001	
17-(1)	B / W Mode Frequency Response (Main)	Y _{in} S1	S9-a , S37-on, others-b / off	DATA 3 11111011	Measure the amplitude in the same way using pin 44.
		Y _{in} S2	S15-a , S37-on, others-b / off	11111010	
		Y _{in} S3	S21-a , S37-on, others-b / off	11111001	
17-(1)	B / W Mode Frequency Response (Main)	C _{in} S1	S11-a , S37-on, others-b / off	11111011	Measure the amplitude in the same way using pin 42.
		C _{in} S2	S17-a , S37-on, others-b / off	11111010	
		C _{in} S3	S23-a , S37-on, others-b / off	11111001	
17-(1)	B / W Mode Frequency Response (Main)	V _{in} E2	S2-a , others-b / off	DATA 2 10100110	Measure the amplitude in the same way using pin 44.
		V _{in} E1	S5-a , others-b / off	10100111	
		V _{in} S1	S7A-a , others-b / off	10100011	
		V _{in} S2	S13A-a, others-b / off	10100010	
		V _{in} S3	S19A-a, others-b / off	10100001	
		V _{in} E3	S50-a , others-b / off	10100101	
		V _{in} E4	S53-a , others-b / off	10100100	
		V _{in} E2	S2-a , others-b / off	10100110	
		V _{in} E1	S5-a , others-b / off	10100111	
		V _{in} S1	S7A-a , others-b / off	10100011	
		V _{in} S2	S13A-a, others-b / off	10100010	
		V _{in} S3	S19A-a, others-b / off	10100001	
V _{in} E3	S50-a , others-b / off	10100101			
V _{in} E4	S53-a , others-b / off	10100100			

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, Ta = 25±3°C)		MEASUREMENT METHOD	
		SW & VR MODE			
		SW MODE	DATA 3		
17-(2) B / W Mode Frequency Response (Sub)	V _{in} E2	S2-a , others-b / off	10100110	Measure the amplitude in the same way using pin 34.	
	V _{in} E1	S5-a , others-b / off	10100111		
	V _{in} S1	S7A-a , others-b / off	10100011		
	V _{in} S2	S13A-a , others-b / off	10100010		
	V _{in} S3	S19A-a , others-b / off	10100001		
	V _{in} E3	S50-a , others-b / off	10100101		
	V _{in} E4	S53-a , others-b / off	10100100		
	V _{in} E2	S2-a , others-b / off	10100110		Measure the amplitude in the same way using pin 32.
	V _{in} E1	S5-a , others-b / off	10100111		
	V _{in} S1	S7A-a , others-b / off	10100011		
	V _{in} S2	S13A-a , others-b / off	10100010		
	V _{in} S3	S19A-a , others-b / off	10100001		
	V _{in} E3	S50-a , others-b / off	10100101		
	V _{in} E4	S53-a , others-b / off	10100100		
	18 Clamp Level	V _{out} 1 Output	S2-a , others-b / off	DATA 2 ****0110	(1) Measure the voltage V _{CO} on pin 46 during no-signal intervals. (2) Input a V ₁ NTSC signal. (3) Observe the waveform on pin 46 and find the V _{CO} level from the sync tip in percentage assuming that the SYNC signal level = 100%
		V _{out} 2 Output	S2-a , others-b / off	DATA 3 ***0110	Measure the V _{CO} level in the same way using pin 36.



NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, T _a = 25±3°C)			
		SW & VR MODE		MEASUREMENT METHOD	
		SW MODE	DATA 2		
19	Audio L Dynamic Range	LinE2	S1-a , others-b / off	DATA 2 ****0110	(1) V ₂ 1kHz, amplitude-variable input. (2) For each, measure the amplitude of V ₁ at which the waveform on pin 45 is distorted. (Data 1 D ₀₀ = 0 : mute off)
		LinE1	S4-a , others-b / off	****0111	
		LinS1	S8-a , others-b / off	****0011	
		LinS2	S14-a , others-b / off	****0010	
		LinS3	S20-a , others-b / off	****0001	
		LinE3	S51-a , others-b / off	****0101	
		LinE4	S54A-a , others-b / off	****0100	
				DATA 3	
			****0110	Measure the amplitude in the same way using pin 35. (Data 1 D ₀₁ = 0 : mute off)	
			****0111		
			****0011		
			****0010		
			****0001		
			****0101		
			****0100		
			DATA 2, 3		
			****0110	Measure the amplitude in the same way using pin 41. (Data 1 D ₀₂ = 0 : mute off)	
			****0111		
			S4-a , others-b / off	*****	

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, T _a = 25 ± 3°C)				
		SW & VR MODE		MEASUREMENT METHOD		
		SW MODE	DATA 2			
19	Audio R Dynamic Range	R _{in} E2	S3-a , others-b / off	****0110	Measure the amplitude in the same way using pin 43. (Data 1 D ₀₀ = 0 : mute off)	
		R _{in} E1	S6-a , others-b / off	****0111		
		R _{in} S1	S10-a , others-b / off	****0011		
		R _{in} S2	S16-a , others-b / off	****0010		
		R _{in} S3	S22-a , others-b / off	****0001		
		R _{in} E3	S49-a , others-b / off	****0101		
		R _{in} E4	S52A-a , others-b / off	****0100		
				DATA 3		
			****0110			
			****0111			
			****0011			
			****0010			
			****0001			
			****0101			
			****0100			
			DATA 2, 3			

		R _{in} E1	S6-a , others-b / off			Measure the amplitude in the same way using pin 39. (Data 1 D ₀₂ = 0 : mute off)

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} =9V, Ta=25±3°C)				
		SW & VR MODE		MEASUREMENT METHOD		
		SW MODE	DATA 2			
20	Audio L Gain	L _{in} E2	S1-a , others-b / off	DATA 3 ****0110	(1) V ₂ 1kHz, 1V _{p-p} input. (2) For each, measure the output amplitude on pin 45 to find the gain. (Data 1 D ₀₀ = 0 : mute off)	
		L _{in} E1	S4-a , others-b / off	****0111		
		L _{in} S1	S8-a , others-b / off	****0011		
		L _{in} S2	S14-a , others-b / off	****0010		
		L _{in} S3	S20-a , others-b / off	****0001		
		L _{in} E3	S51-a , others-b / off	****0101		
		L _{in} E4	S54A-a, others-b / off	****0100		
		L _{in} E2	S1-a , others-b / off	DATA 3 ****0110		Find the gain in the same way using pin 35. (Data 1 D ₀₁ = 0 : mute off)
		L _{in} E1	S4-a , others-b / off	****0111		
		L _{in} S1	S8-a , others-b / off	****0011		
L _{in} S2	S14-a , others-b / off	****0010				
L _{in} S3	S20-a , others-b / off	****0001	Find the gain in the same way using pin 41. (Data 1 D ₀₂ = 0 : mute off)			
L _{in} E3	S51-a , others-b / off	****0101				
L _{in} E4	S54A-a, others-b / off	****0100				
L _{in} E1	S4-a , others-b / off	DATA 2, 3 *****				

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, T _a = 25 ± 3°C)			
		SW & VR MODE		MEASUREMENT METHOD	
		SW MODE	DATA 2		
20	Audio R Gain	R _{in} E2 R _{in} E1 R _{in} S1 R _{in} S2 R _{in} S3 R _{in} E3 R _{in} E4	S3-a , others-b / off S6-a , others-b / off S10-a , others-b / off S16-a , others-b / off S22-a , others-b / off S49-a , others-b / off S52A-a, others-b / off	DATA 2 ****0110 ****0111 ****0011 ****0010 ****0001 ****0101 ****0100	Find the gain in the same way using pin 43. (Data 1 D ₀₀ = 0 : mute off)
		R _{in} E2 R _{in} E1 R _{in} S1 R _{in} S2 R _{in} S3 R _{in} E3 R _{in} E4	S3-a , others-b / off S6-a , others-b / off S10-a , others-b / off S16-a , others-b / off S22-a , others-b / off S49-a , others-b / off S52A-a, others-b / off	DATA 3 ****0110 ****0111 ****0011 ****0010 ****0001 ****0101 ****0100	
	R _{in} E1	S6-a , others-b / off	DATA 2, 3 *****	Find the gain in the same way using pin 39. (Data 1 D ₀₂ = 0 : mute off)	

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, T _a = 25 ± 3°C)			
		SW & VR MODE		MEASUREMENT METHOD	
		SW MODE	DATA 2		
21	Audio L Frequency Response	L _{in} E2 L _{in} E1 L _{in} S1 L _{in} S2 L _{in} S3 L _{in} E3 L _{in} E4	S1-a , others-b / off S4-a , others-b / off S8-a , others-b / off S14-a , others-b / off S20-a , others-b / off S51-a , others-b / off S54A-a, others-b / off	DATA 2 ****0110 ****0111 ****0011 ****0010 ****0001 ****0101 ****0100	(1) V ₂ frequency-variable, 1V _{p-p} input. (2) Measure the output amplitude on pin 45 and find the frequency equivalent to -3dB. (Data 1 D ₀₀ = 0 : mute off)
		L _{in} E2 L _{in} E1 L _{in} S1 L _{in} S2 L _{in} S3 L _{in} E3 L _{in} E4	S1-a , others-b / off S4-a , others-b / off S8-a , others-b / off S14-a , others-b / off S20-a , others-b / off S51-a , others-b / off S54A-a, others-b / off	DATA 3 ****0110 ****0111 ****0011 ****0010 ****0001 ****0101 ****0100	
	L _{in} E1	S4-a , others-b / off	DATA 2, 3 *****	Measure the amplitude in the same way using pin 41. (Data 1 D ₀₂ = 0 : mute off)	

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, T _a = 25±3°C)				
		SW & VR MODE		MEASUREMENT METHOD		
		SW MODE	DATA 2			
21	Audio R Frequency Response	R _{in} E2	S3-a , others-b / off	DATA 2 ****0110	Measure the amplitude in the same way using pin 43. (Data 1 D ₀₀ = 0 : mute off)	
		R _{in} E1	S6-a , others-b / off	****0111		
		R _{in} S1	S10-a , others-b / off	****0011		
		R _{in} S2	S16-a , others-b / off	****0010		
		R _{in} S3	S22-a , others-b / off	****0001		
		R _{in} E3	S49-a , others-b / off	****0101		
		R _{in} E4	S52A-a, others-b / off	****0100		
		R _{in} E2	S3-a , others-b / off	DATA 3 ****0110		Measure the amplitude in the same way using pin 33. (Data 1 D ₀₁ = 0 : mute off)
		R _{in} E1	S6-a , others-b / off	****0111		
		R _{in} S1	S10-a , others-b / off	****0011		
R _{in} S2	S16-a , others-b / off	****0010				
R _{in} S3	S22-a , others-b / off	****0001				
R _{in} E3	S49-a , others-b / off	****0101				
R _{in} E4	S52A-a, others-b / off	****0100				
R _{in} E1	S4-a , others-b / off	DATA 2, 3 *****	Measure the amplitude in the same way using pin 39. (Data 1 D ₀₂ = 0 : mute off)			

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} =9V, T _a =25±3°C)		MEASUREMENT METHOD
		SW & VR MODE		
		SW MODE	DATA 2	
22	L Switch Crosstalk	LinE2 All-b/off except those specified on the left	***0110	(1) V ₂ 1kHz, 1V _{p-p} input. (2) While sequentially switching S ₁ , S ₃ , S ₄ , S ₆ , S ₁₀ , S ₁₄ , S ₁₆ , S ₂₀ , S ₂₂ , S ₄₉ , S ₅₁ , S _{52A} , and S _{54A} to 'a', measure the maximum level of crosstalk to pin 45 and find its ratio to selected output. (Data 1 D ₀₀ = 0 : mute off)
		LinE1 All-b/off except those specified on the left	***0111	
		LinS1 All-b/off except those specified on the left	***0011	
		LinS2 All-b/off except those specified on the left	***0010	
		LinS3 All-b/off except those specified on the left	***0001	
		LinE3 All-b/off except those specified on the left	***0101	
		LinE4 All-b/off except those specified on the left	***0100	
			DATA 3	
		LinE2 All-b/off except those specified on the left	***0110	Measure the maximum level of crosstalk in the same way using pin 35. (Data 1 D ₀₁ = 0 : mute off)
		LinE1 All-b/off except those specified on the left	***0111	
		LinS1 All-b/off except those specified on the left	***0011	
		LinS2 All-b/off except those specified on the left	***0010	
		LinS3 All-b/off except those specified on the left	***0001	
		LinE3 All-b/off except those specified on the left	***0101	
		LinE4 All-b/off except those specified on the left	***0100	

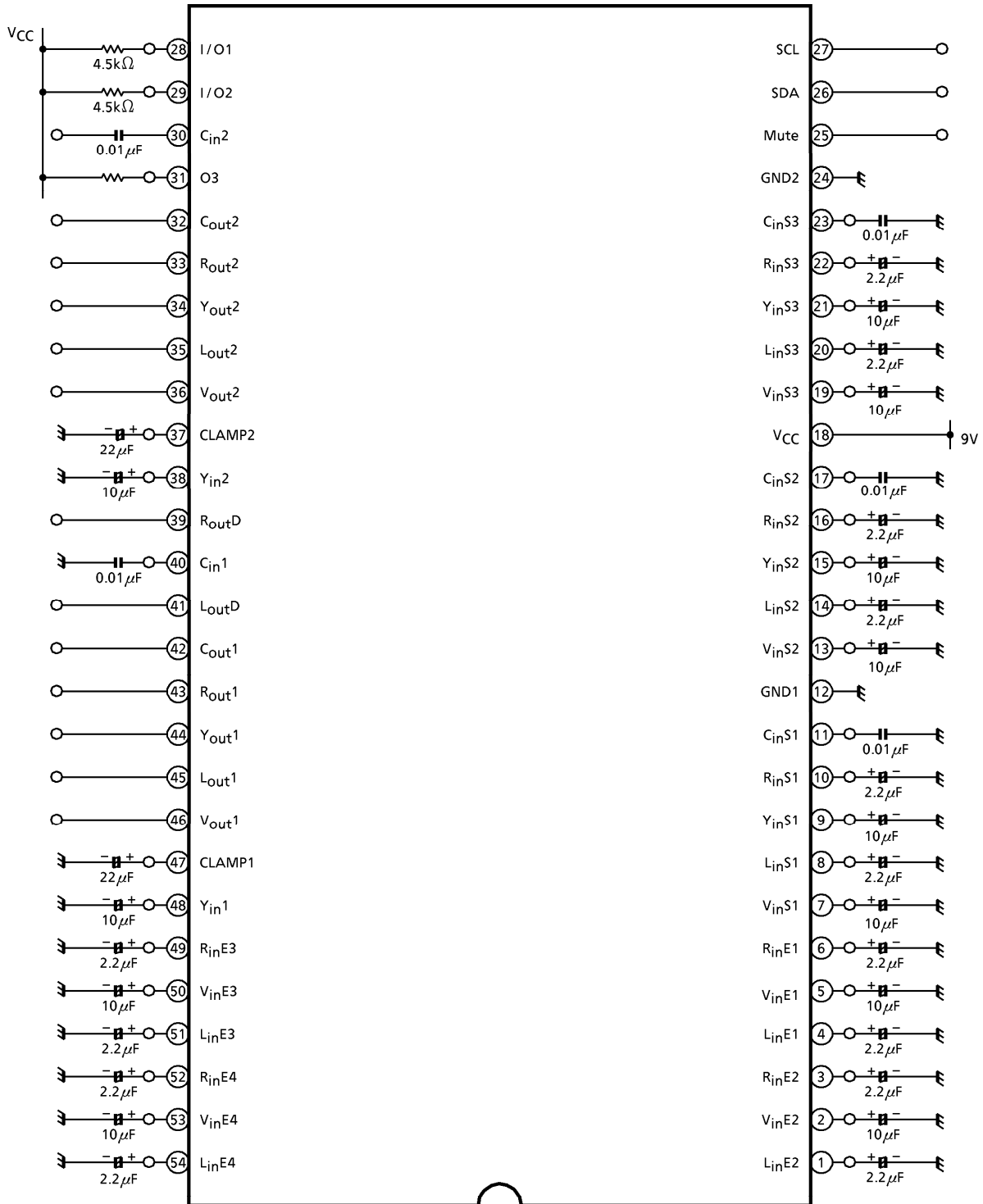
NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, T _a = 25 ± 3°C)		MEASUREMENT METHOD
		SW & VR MODE		
		SW MODE	DATA 2	
22	R _{in} E2 R _{in} E1 R _{in} S1 R _{in} S2 R _{in} S3 R _{in} E3 R _{in} E4	All-b/off except those specified on the left All-b/off except those specified on the left All-b/off except those specified on the left All-b/off except those specified on the left All-b/off except those specified on the left All-b/off except those specified on the left All-b/off except those specified on the left	***0110 ***0111 ***0011 ***0010 ***0001 ***0101 ***0100	Measure the maximum level of crosstalk in the same way using pin 43. (Data 1 D ₀₀ = 0 : mute off)
	R Switch Crosstalk R _{in} E2 R _{in} E1 R _{in} S1 R _{in} S2 R _{in} S3 R _{in} E3 R _{in} E4	All-b/off except those specified on the left All-b/off except those specified on the left All-b/off except those specified on the left All-b/off except those specified on the left All-b/off except those specified on the left All-b/off except those specified on the left All-b/off except those specified on the left	DATA 3 ***0110 ***0111 ***0011 ***0010 ***0001 ***0101 ***0100	Measure the maximum level of crosstalk in the same way using pin 33. (Data 1 D ₀₁ = 0 : mute off)
	TV-L Crosstalk	All-b/off except those specified on the left	DATA 2, 3 *****	Measure the maximum level of crosstalk in the same way using pin 41. (Data 1 D ₀₂ = 0 : mute off)
	TV-R Crosstalk	All-b/off except those specified on the left	*****	Measure the maximum level of crosstalk in the same way using pin 39. (Data 1 D ₀₂ = 0 : mute off)

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, $V_{CC}=9V$, $T_a=25\pm 3^{\circ}C$)		
		SW & VR MODE		MEASUREMENT METHOD
		SW MODE	DATA 2, 3	
23	L Switch Mute Attenuation	All-b/off except those specified on the left	*****	(1) V_2 1kHz, 1V _{p-p} input. (2) Mute on (data 1 D00 = 1) and while sequentially switching S1, S3, S4, S6, S8, S10, S14, S16, S20, S22, S49, S51, S52A, and S54A to 'a', measure the maximum level of crosstalk to pin 45 and find its ratio to selected output.
		All-b/off except those specified on the left	*****	Measure the maximum level of crosstalk in the same way using pin 35. (Data 1 D01 = 1 : mute on)
	R Switch Mute Attenuation	All-b/off except those specified on the left	*****	Measure the maximum level of crosstalk in the same way using pin 43. (Data 1 D00 = 1 : mute on)
		All-b/off except those specified on the left	*****	Measure the maximum level of crosstalk in the same way using pin 33. (Data 1 D01 = 1 : mute on)

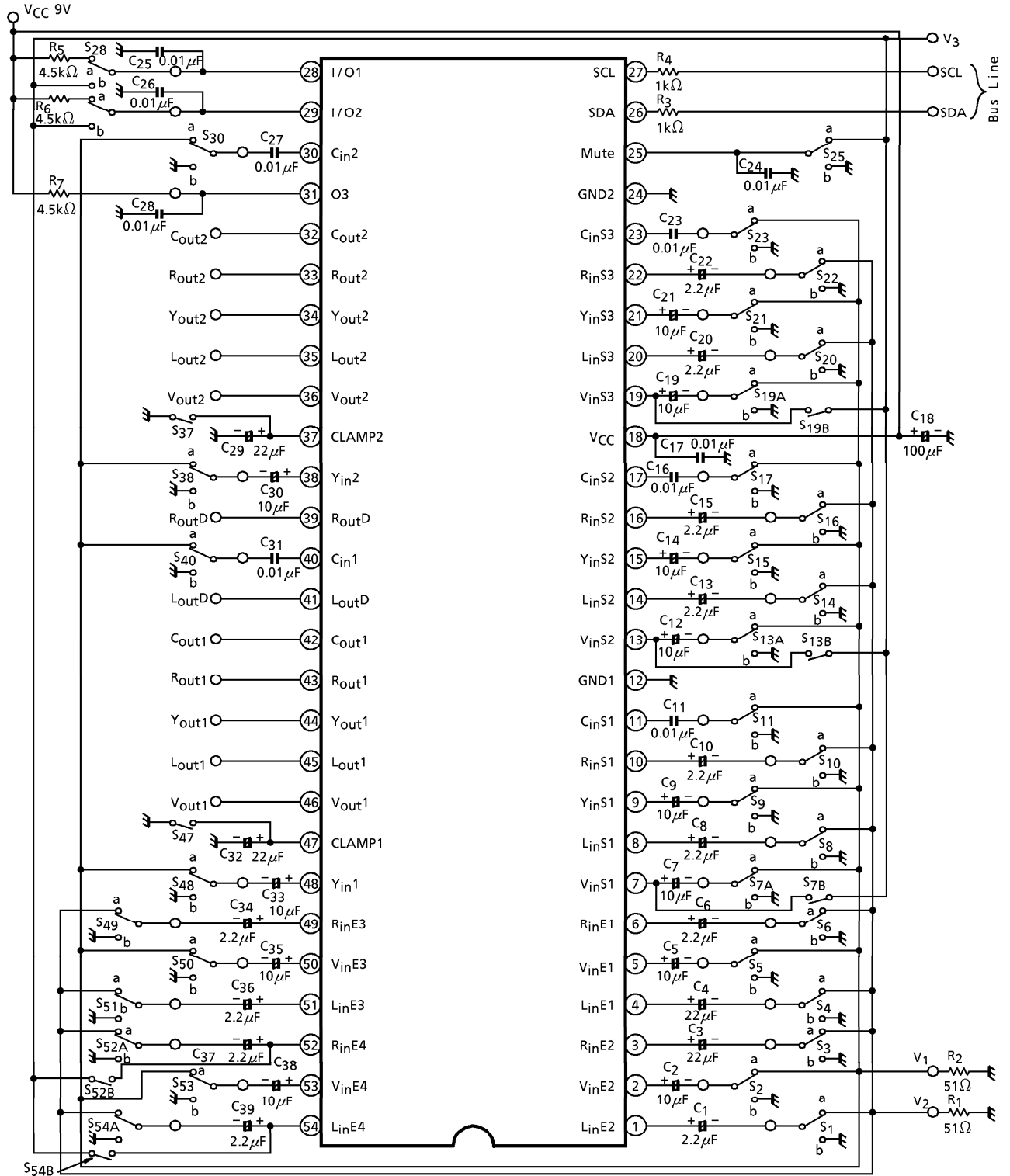
NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, T _a = 25 ± 3°C)		
		SW & VR MODE		MEASUREMENT METHOD
		SW MODE	DATA 2, 3	
24 Mode Switching Offset	L _{in} E2	All-b/off	***0110	(1) No-signal input. (2) Measure voltage fluctuations to find the maximum value in all input modes of data 2 for pin 45, and in all input modes of data 3 for pin 35.
	L _{in} E1	All-b/off	***0111	
	L _{in} S1	All-b/off	***0011	
	L _{in} S2	All-b/off	***0010	
	L _{in} S3	All-b/off	***0001	
	L _{in} E3	All-b/off	***0101	
	L _{in} E4	All-b/off	***0100	
	R _{in} E2	All-b/off	***0110	
	R _{in} E1	All-b/off	***0111	Find the maximum value in the same way using pin 43 (data 2) and pin 33 (data 3).
	R _{in} S1	All-b/off	***0011	
	R _{in} S2	All-b/off	***0010	
	R _{in} S3	All-b/off	***0001	
	R _{in} E3	All-b/off	***0101	
	R _{in} E4	All-b/off	***0100	
L _{in} E1	All-b/off	*****	Find the maximum value in the same way using pin 41.	
R _{in} E1	All-b/off	*****	Find the maximum value in the same way using pin 39.	

NOTE	ITEM	MEASURING CONDITIONS (UNLESS OTHERWISE SPECIFIED, V _{CC} = 9V, T _a = 25 ± 3°C)		MEASUREMENT METHOD		
		SW & VR MODE	DATA 2, 3			
25	S Input Discriminating Voltage	V _{in} S1	S9-a, S7B-on, others-b/off	****0011	(1) V ₁ 1kHz, 1V _{p-p} input. (2) While gradually lowering the V ₃ voltage, find the voltage where the output mode changes to the S mode (i.e., the voltage at which a waveform appears on pin 46). (Data 1 D00, D01, D02 = 0 : mute off)	
			V _{in} S2	S15-a, S13B-on, others-b/off		****0010
			V _{in} S3	S21-a, S19B-on, others-b/off		****0001
26	I Input Discriminating Voltage	I/O1	S28-a , others-b/off	*****	While gradually lowering the V ₃ voltage, find the voltage at which the data of B34, B35, B36, and B37 changes from 0 to 1, respectively. (Data 1 D03, D04 = 1 : I MODE)	
		I/O2	S29-a , others-b/off	*****		
		R _{in} E4	S52B-on , others-b/off	*****		
		L _{in} E4	S54B-on , others-b/off	*****		
27	External Mute-ON Voltage	Mute	S4, S25-a, others-b/off	*****	While gradually raising the V ₃ voltage, find the voltage at which mute is turned on.	
28	O Output Low Level Voltage	I/O1	All-b/off	*****	Find the voltage on pins 28, 29, and 31 when the data D03, D04, and D05 are 0, respectively.	
		I/O2	All-b/off	*****		
		O3	All-b/off	*****		

TEST CIRCUIT 1
DC characteristics

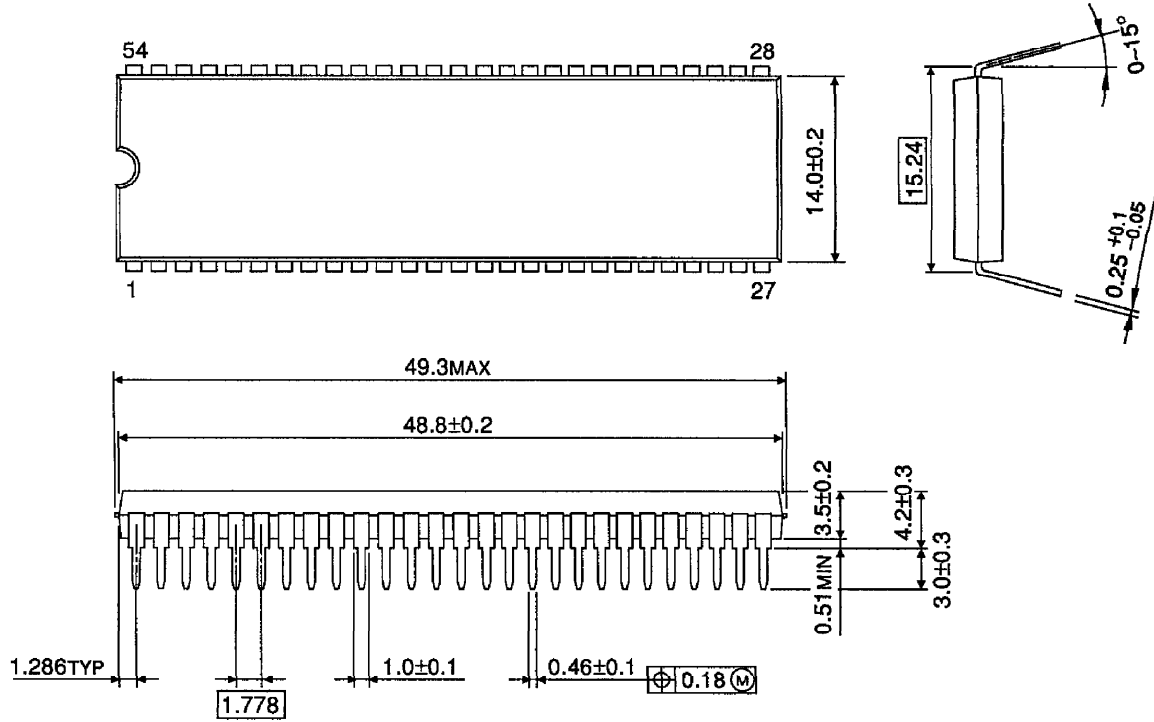


TEST CIRCUIT 2
AC characteristics



PACKAGE DIMENSIONS
SDIP54-P-600-1.78

Unit : mm



Weight : 1.0g (Typ.)