

PRELIMINARY

Notice. This is not a final specification.
Some parametric limits are subject to change.

MITSUBISHI ICs (AV COMMON)

M52791SP/FP

AV SWITCH with I2C BUS CONTROL

DESCRIPTION

The M52791 is AV switch semiconductor integrated circuit with I2C bus control .

This IC contains 1-channel of 4-input audio switches and 1-channel of 4-input video switches. Each audio switches and video switches can be controled independently .

The video switches contain amplifiers can be controled a gain of output 0dB or 6dB .

FEATURES

- Video and stereo sound switches in one package
- Wide frequency range (video switch).....DC~20MHz
- High separation (video switch)
.....Crosstalk -60dB (typ.) at 1MHz
- Two types of packages are provided : SDIP with a lead pitch of 1.778mm (M52791SP) ; and SSOP with a lead pitch of 0.8mm (M52791FP) .

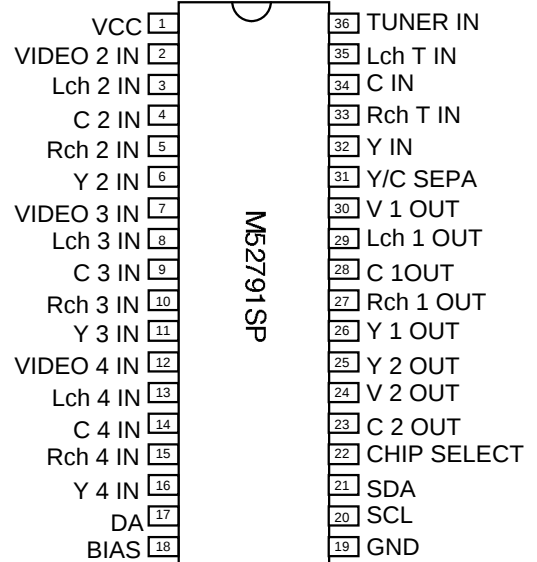
APPLICATION

Video equipment

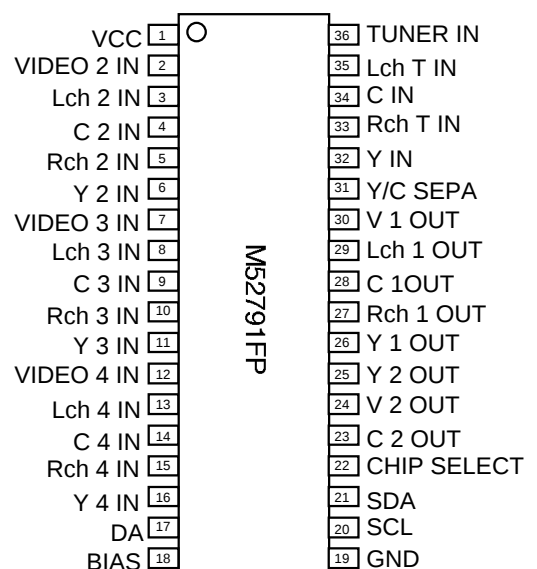
RECOMMENDED OPERATING CONDITION

Supply voltage	4.7V ~ 9.3V
Rated supply voltage	5V,9V
Maximum output current	49mA(at 9V)

PIN CONFIGURATION (TOP VIEW)



PIN CONFIGURATION (TOP VIEW)



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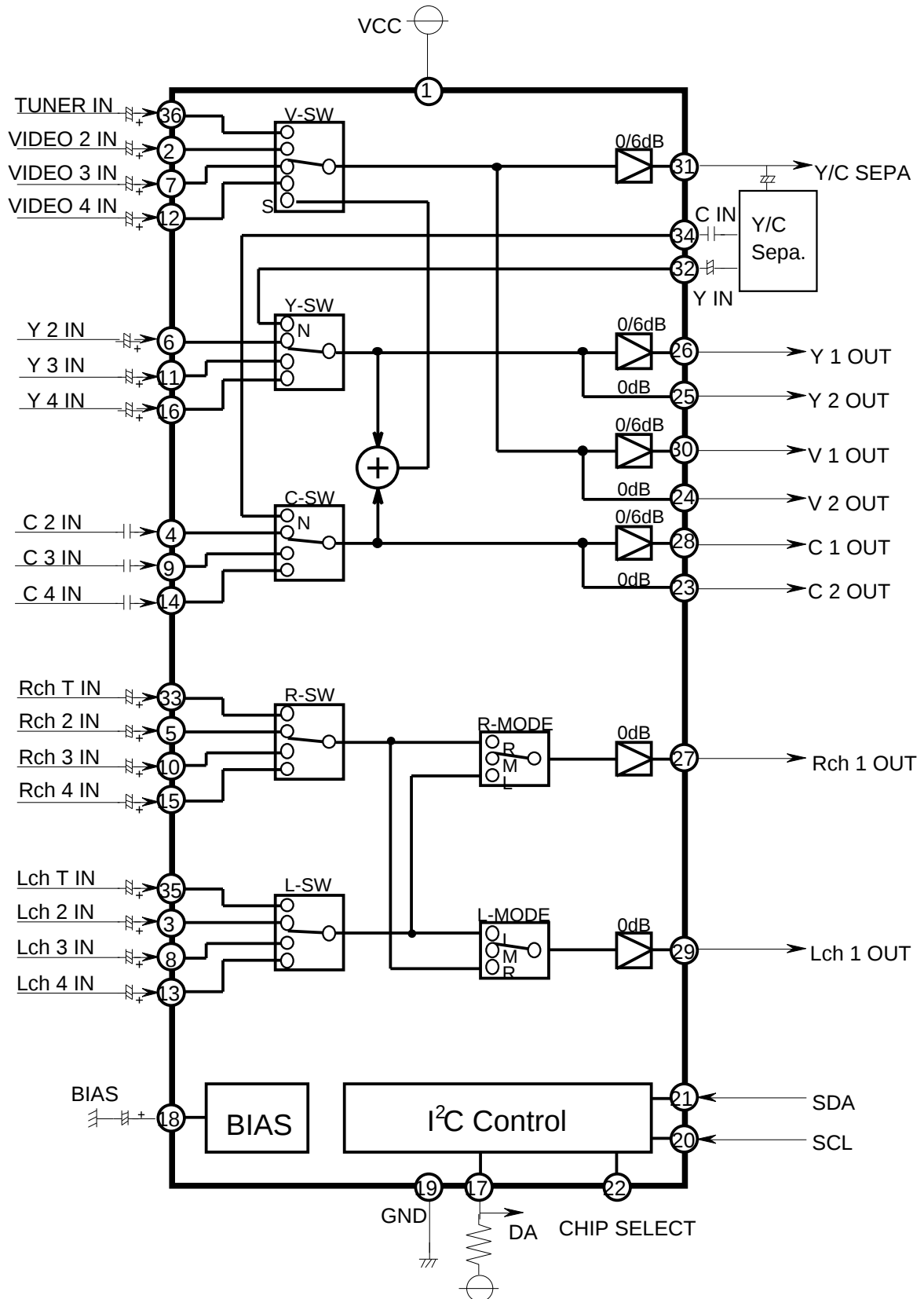
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BLOCK DIAGRAM



PRELIMINARY

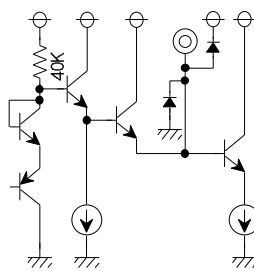
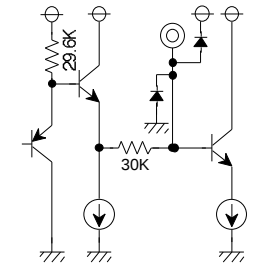
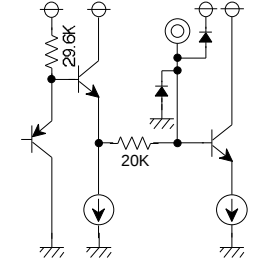
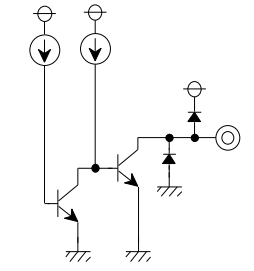
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DESCRIPTION OF PIN

Pin No.	Name	Peripheral circuit pins	DC voltage(V)	Remarks
1	VCC		9V	5~9V
2	VIDEO 2 IN		3.6V	Clamp in
6	Y 2 IN			
7	VIDEO 3 IN			
11	Y 3 IN			
12	VIDEO 4 IN			
16	Y 4 IN			
32	Y IN			
36	TUNER IN			
3	Lch 2 IN		4.7V	
5	Rch 2 IN			
8	Lch 3 IN			
10	Rch 3 IN			
13	Lch 4 IN			
15	Rch 4 IN			
33	Rch T IN			
35	Lch T IN			
4	C 2 IN		4.7V	
9	C 3 IN			
14	C 4 IN			
34	C IN			
17	DA			VOL max.=0.4V (at Iin=1mA)

PRELIMINARY

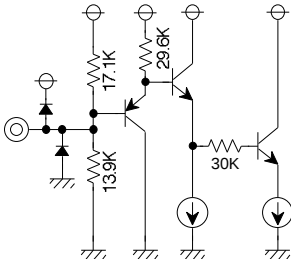
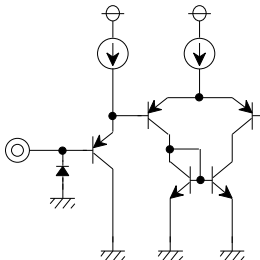
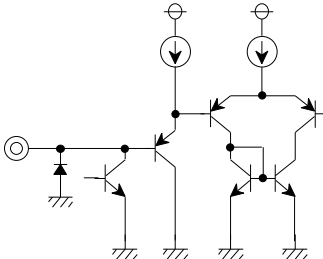
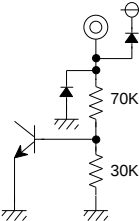
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AV SWITCH with I2C BUS CONTROL

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Peripheral circuit pins	DC voltage(V)	Remarks
18	BIAS		4.2V	
19	GND			
20	SCL			$V_{IL} \text{ max.} = 1.5V$ $V_{IH} \text{ min.} = 3.0V$
21	SDA			$V_{IL} \text{ max.} = 1.5V$ $V_{IH} \text{ min.} = 3.0V$ $V_{OL} \text{ max.} = 0.4V$ (at $I_{in} = 3mA$)
22	CHIP SELECT			SLAVE ADDRESS 0~1.5V-----90H 2.5V~V _{CC} ---92H OPEN-----90H

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AV SWITCH with I2C BUS CONTROL

DESCRIPTION OF PIN (cont.)

Pin No.	Name	Peripheral circuit pins	DC voltage(V)	Remarks
26 28 30	Y 1 OUT C 1 OUT V 1 OUT		C OUT 4.0V V OUT Y OUT SYNC CHIP DC=2.9V	
23 24 25	C 2 OUT V 2 OUT Y 2 OUT		C OUT 3.3V V OUT Y OUT SYNC CHIP DC=2.2V	
27 29	Rch 1 OUT Lch 1 OUT		4.0V	
31	Y/C SEPA		SYNC CHIP DC=2.9V	

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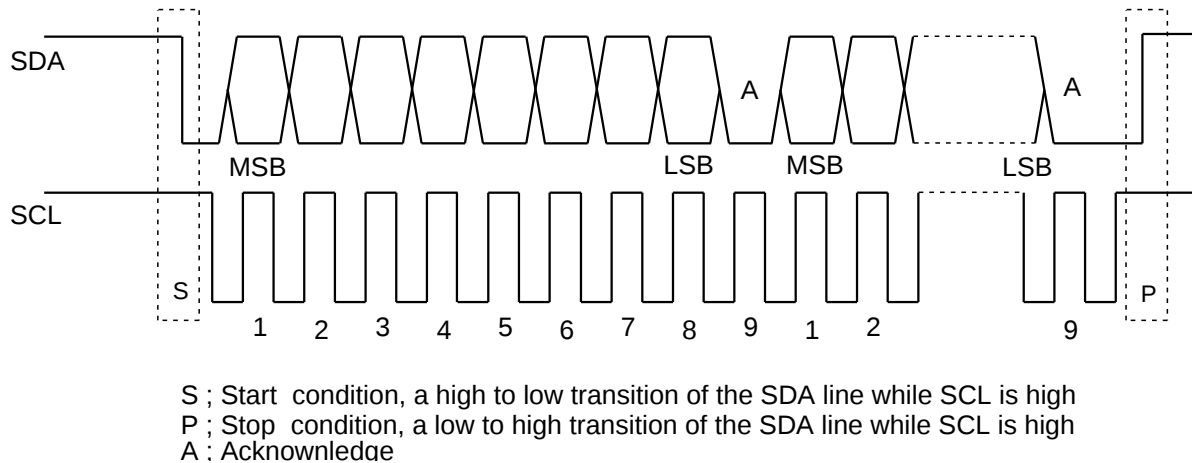
MITSUBISHI ICs (AV COMMON)

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AV SWITCH with I2C BUS CONTROL

I²C BUS

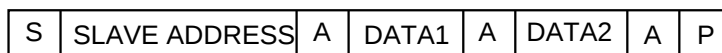
I²C BUS (Inter IC BUS) is multi master bus system developed by PHILIPS . Two wires (SDA - serial data, SCL - serial clock) realize functions of start , stop , transferring data , synchronization and arbitration. The output stages of device connected to the bus must have an open drain or open collector in order to perform the wired-AND function .



Every byte put on the SDA line must be 8-bits long . Each byte has to be followed by an acknowledge bit. Data is transferred with the most significant bit (MSB) first . The data on the SDA line must be stable during the HIGH period of the clock . The HIGH or LOW state of the data line can only change when the clock signal on the SCL line is LOW .

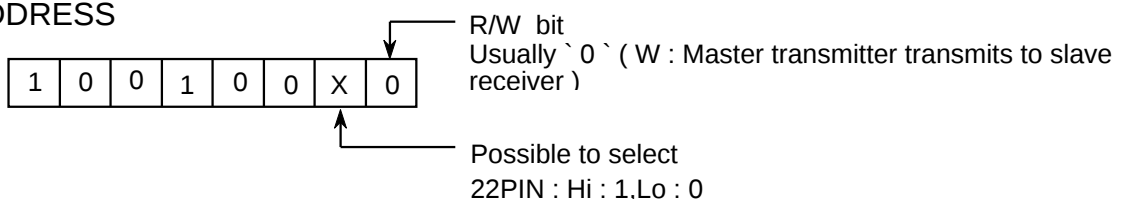
CONTROL

This IC controls 2-channel switches with 2-byte data (DATA1 and DATA2) . Video switches are controlled by DATA1 . audio switches are controlled by DATA2 .



S : Start
A : Acknowledge
P : Stop

SLAVE ADDRESS



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AV SWITCH with I2C BUS CONTROL

Data byte format

M52791 FUNCTION TABLE

S	SLAVE ADDRESS	A	DATA(D7~D0)	A	DATA(DF~D8)	A	P
---	---------------	---	-------------	---	-------------	---	---

SLAVE ADDRESS

SLAVE ADDRESS	A6	A5	A4	A3	A2	A1	A0	R/W
	1	0	0	1	0	0	0/1	0

DATA1(D7~D0) CONT

DATA	D7	D6	D5	D4	D3	D2	D1	D0
CONT	0 FIX	0 FIX	SEPA AMP	Y/C AMP	V AMP1	S/N	VIDEO SW CONT	

VIDEO SW CONT

DATA			OUT		
S/N(S:1)	V-SW		V OUT Y/C SEPA	Y OUT	C OUT
D2	D1	D0			
0	0	0	0 T IN	Y IN	C IN
0	0	1	1 V 2 IN	Y IN	C IN
0	1	0	0 V 3 IN	Y IN	C IN
0	1	1	1 V 4 IN	Y IN	C IN
1	0	0	0 Y/C MIX T	Y IN	C IN
1	0	1	1 Y/C MIX 2	Y 2 IN	C 2 IN
1	1	0	0 Y/C MIX 3	Y 3 IN	C 3 IN
1	1	1	1 Y/C MIX 4	Y 4 IN	C 4 IN

AMP GAIN CONT.

DATA	AMP	DATA	AMP	DATA	AMP
D5	SEPA AMP	D4	YC AMP	D3	V AMP
0	0dB	0	0dB	0	0dB
1	6dB	1	6dB	1	6dB

DATA2(DF~D8) CONT

DATA	DF	DE	DD	DC	DB	DA	D9	D8
CONT	AUDIO MODE		0 FIX	0 FIX	0 FIX	I/O	AUDIO SW CONT	

AUDIO SW CONT

MODE		MUTE		R/R		L/L		NORMAL	
DATA		OUT		OUT		OUT		OUT	
D9	D8	Lch OUT 1	Rch OUT 1	Lch OUT 1	Rch OUT 1	Lch OUT 1	Rch OUT 1	Lch OUT 1	Rch OUT 1
0	0	MUTE	MUTE	Rch T IN	Rch T IN	Lch T IN	Lch T IN	Lch T IN	Rch T IN
0	1	MUTE	MUTE	Rch 2 IN	Rch 2 IN	Lch 2 IN	Lch 2 IN	Lch 2 IN	Rch 2 IN
1	0	MUTE	MUTE	Rch 3 IN	Rch 3 IN	Lch 3 IN	Lch 3 IN	Lch 3 IN	Rch 3 IN
1	1	MUTE	MUTE	Rch 4 IN	Rch 4 IN	Lch 4 IN	Lch 4 IN	Lch 4 IN	Rch 4 IN

I/O CONT.

DATA	OUT
DA	DA OUT
0	HI
1	LO

AUDIO MODE CONT

DATA		MODE
DF	DE	
0	0	MUTE
0	1	R/R
1	0	L/L
1	1	NORMAL

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ELECTRICAL CHARACTERISTICS

(Ta=25°C, Vcc=9V, unless otherwise noted)

Parameter	Symbol	Test condition		Min.	Typ.	Max.	Unit
Supply voltage	Vcc			4.7	-	9.3	V
Circuit current	Icc	Vcc=9V, Vin=0Vp-p, RI=∞Ω		-	49	64	mA
		Vcc=5V, Vin=0Vp-p, RI=∞Ω		-	42	55	
VIDEO							
Voltage gain	G	f=100kHz, 1Vp-p (0dB)(T→V1OUT)		-0.5	0	0.5	dB
		f=100kHz, 1Vp-p (6dB)(T→V1OUT)		5.5	6	6.5	
		f=100kHz, 1Vp-p (0dB)(Y→V1OUT)		-0.5	0	0.5	
		f=100kHz, 1Vp-p (6dB)(Y→V1OUT)		5.5	6	6.5	
Frequency characteristics	F	f=10MHz/100kHz, 1Vp-p (0dB)(T→V1OUT)		-2.0	0	2.0	dB
		f=10MHz/100kHz, 1Vp-p (6dB)(T→V1OUT)		-2.0	0	2.0	
		f=10MHz/100kHz, 1Vp-p (0dB)(Y→V1OUT)		-2.0	0	2.0	
		f=10MHz/100kHz, 1Vp-p (6dB)(Y→V1OUT)		-2.0	0	2.0	
Dynamic Range	D	Vcc=9V(0dB)(T→V1OUT)	f=100kHz Maximum with distortion <1.0%	4	-	-	Vp-p
		Vcc=5V(0dB)(T→V1OUT)		2	-	-	
		Vcc=9V(0dB)(Y→V1OUT)		4	-	-	
		Vcc=5V(0dB)(Y→V1OUT)		2	-	-	
Input impedance	ZIC	(C, C2, C3, C4)		14	20	26	kΩ
	ZIV	Clamp in(T, V2, V3, V4)		-	-	-	
	ZIY	Clamp in(Y, Y2, Y3, Y4)		-	-	-	
Crosstalk	CT	f=1MHz, 1Vp-p T→V1OUT (at V2 mode)		-	-60	-54	dB
AUDIO							
Voltage gain	G	f=1kHz , 1Vp-p (Vcc9V)(RT→R1OUT)		-0.5	0	0.5	dB
		f=1kHz , 1Vp-p (Vcc5V)(RT→R1OUT)		-0.5	0	0.5	
Frequency characteristics	F	f=100kHz/1kHz , 1Vp-p(RT→R1OUT)		-1	0	1	dB
Total harmonic distortion	THD	f=1kHz, 2Vp-p, at 400HzHPF+30kHzLPF (RT→R1OUT)		-	0.01	0.05	%
Dynamic Range	D	f=1kHz , Maximum with distortion<0.5% (RT→R1OUT)		5.5	6.0	-	Vp-p
Output DC offset voltage	VOFF	(MODE:RT, R2, R3, R4→R1OUT)		-20	0	20	mV
Input impedance	Z1	(RT, R2, R3, R4, LT, L2, L3, L4)		22	30	38	kΩ
Crosstalk	CT	1kHz, 1Vp-p RT→R1OUT(at R2 mode)		-	-90	-84	dB

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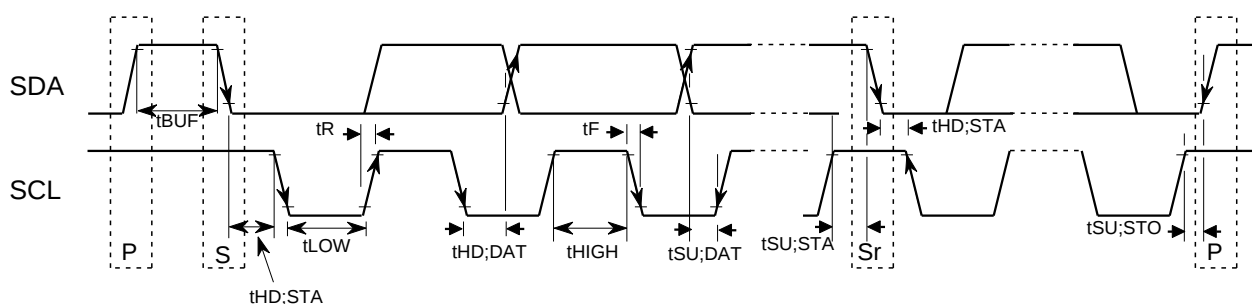
AV SWITCH with I2C BUS CONTROL

ELECTRICAL CHARACTERISTICS

(Ta=25°C,Vcc=9V,unless otherwise noted)

Parameter	Symbol	Test condition	Min.	Typ.	Max.	Unit
I2C BUS CONTROL SIGNAL						
Max. input high voltage	V_{IH}		3.0	-	5.0	V
Min. input low voltage	V_{IL}		0.0	-	1.5	
Low level output voltage(SDA)	V_{OL}	SDA = 3mA	0.0	-	0.4	
High level input current	I_{IH}	SDA , SCL = 4.5 V	-10	-	10	μA
Low level input current	I_{IL}	SDA , SCL = 0.4 V	-10	-	10	
SCL clock frequency	f_{SCL}		0.0	-	100	kHz
Time of bus must be free before a new transmission can start	t_{BUF}		4.7	-	-	μS
Hold time at start condition	$t_{HD;STA}$		4.0	-	-	
The low period of the clock	t_{LOW}		4.7	-	-	
The high period of the clock	t_{HIGH}		4.0	-	-	
Setup time for start condition	$t_{SU;STA}$		4.7	-	-	
Hold time DATA	$t_{HD;DAT}$		5.0	-	-	nS
Setup time DATA	$t_{SU;DAT}$		250	-	-	
Rise time of both SDA and SCL line	t_R		-	-	1000	
Fall time of both SDA and SCL line	t_F		-	-	300	μS
Setup time for stop condition	$t_{SU;STO}$		4.0	-	-	

I²C BUS CONTROL SIGNAL



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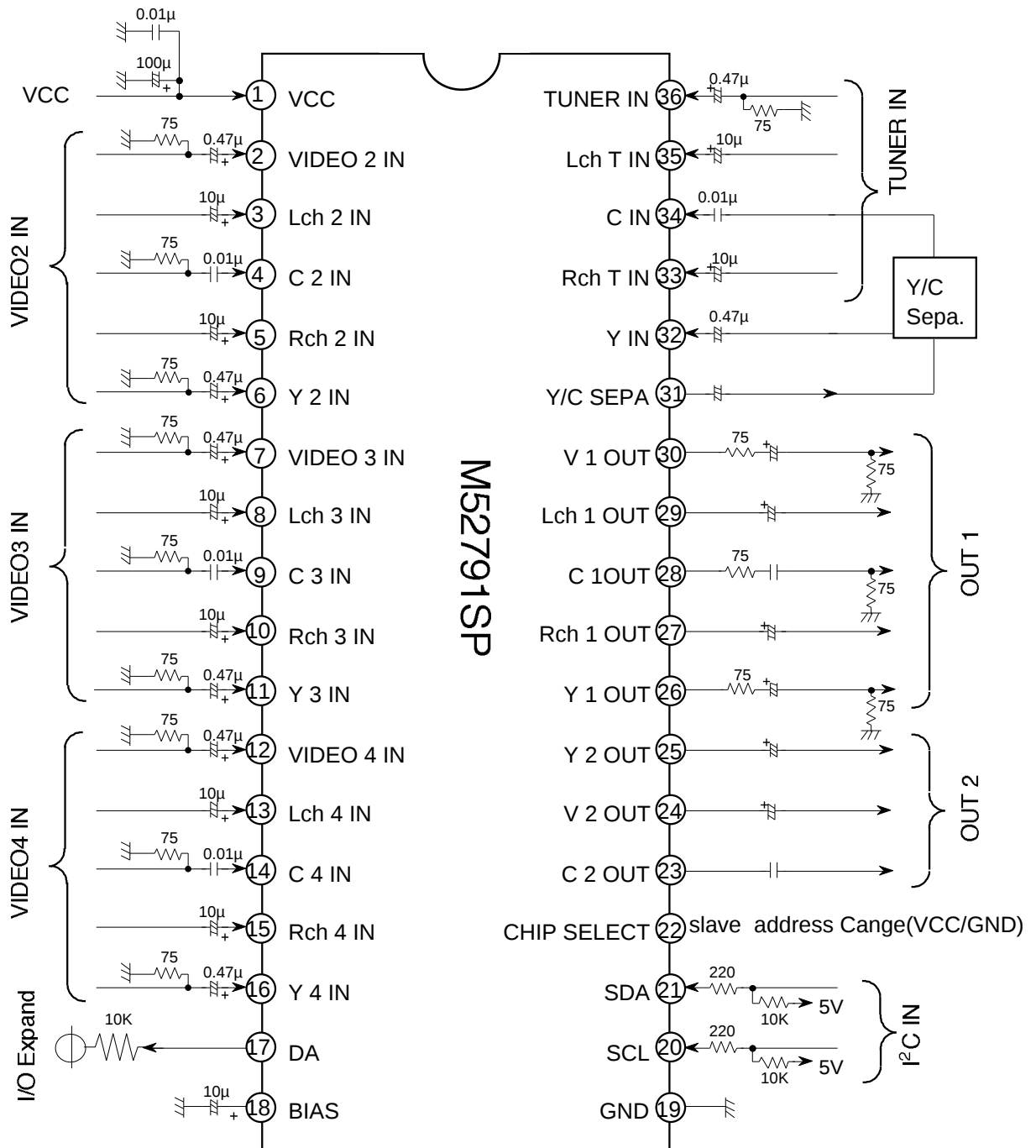
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Application Circuit Example



Note how to use this IC

Input signal with sufficient low impedance to input terminal.

The capacitance of output terminal as small as possible.

Set the capacitance between Vcc and GND near the pins if possible.

Assign an area as large as possible for grounding.

Power-on Reset

The M52791 has an internal power-on reset function that sets each control register to "0" during IC power ON.

The power-on reset VTH has 2.5V.