

**PRELIMINARY**  
 Notice : This is not a final specification.  
 some parametric limits are subject to change.

MITSUBISHI SOUND PROCESSORS

# M62492FP

DIGITAL SOUND CONTROLLER WITH SURROUND

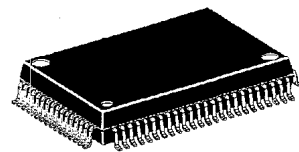
## DESCRIPTION

The M62492FP is an optimum digital sound controller IC for home audio. It has a 5ch input selector, input trimmer, surround(3 variation), tone control(3 band) and master volume. It can control all of these functions with serial data. The IC is also available for Dolby Pro-logic Surround, because it has independent 4ch volume.

## FEATURES

- Built-in 5ch input selector
- Built-in input volume
- Built-in Surround(ON / OFF, High / Middle / Low(3 variation))
- Electric volume(A and B volume)
- Volume level ---- 0dB to -79dB, -∞ dB(1dB / step)
- Tone control
  - Bass / Mid / Treble, 0dB to ±10dB(2dB / step)
  - Bass boost +10dB(ON / OFF)
- 3 Output ports
- Built-in microcomputer interface controlled by 16-bit serial data.

## PACKAGE



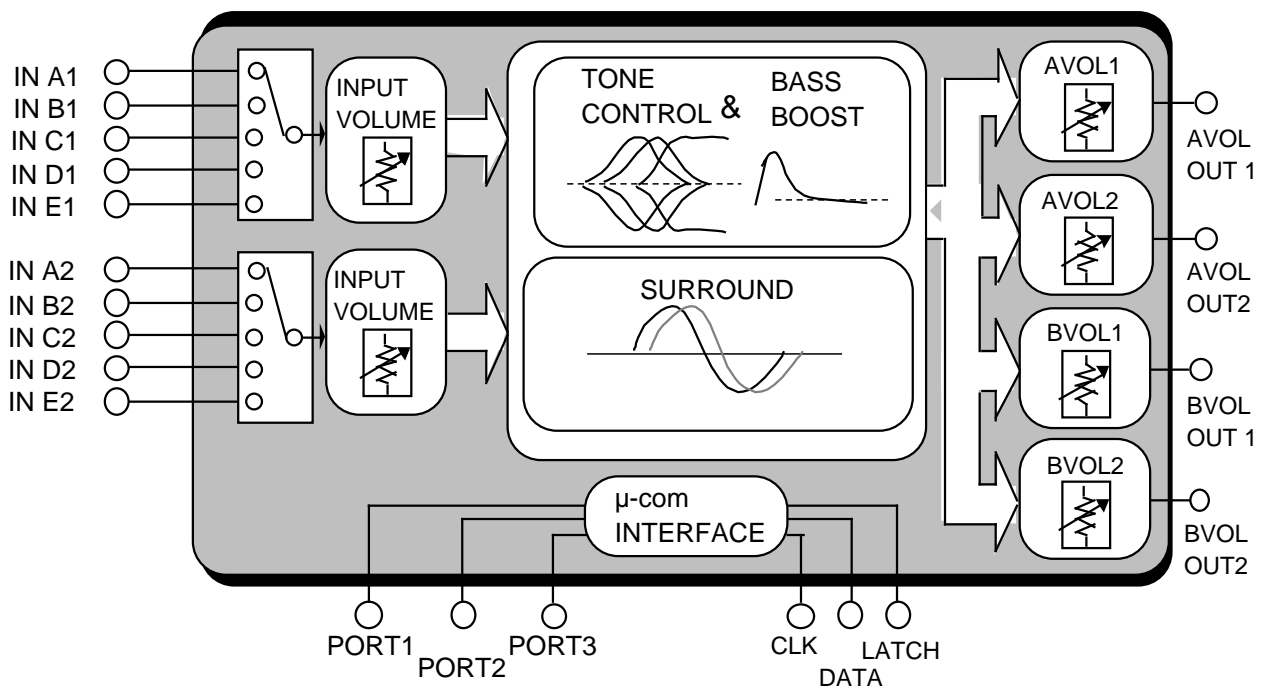
Outline 80P6N-A

0.8mm Pitch QFP  
 (20.0 mm x 14.0 mm x 2.8 mm)

## RECOMMENDED OPERATING CONDITIONS

Supply voltage range (analog) AVDD=4.5 to 7.3V	Rated supply voltage (analog) AVDD=7V
AVSS=-7.3 to 4.5V	AVSS=-7V
(logic) DVDD=4.5 to 5.5V	(logic) DVDD=5V

## SYSTEM CONFIGURATION



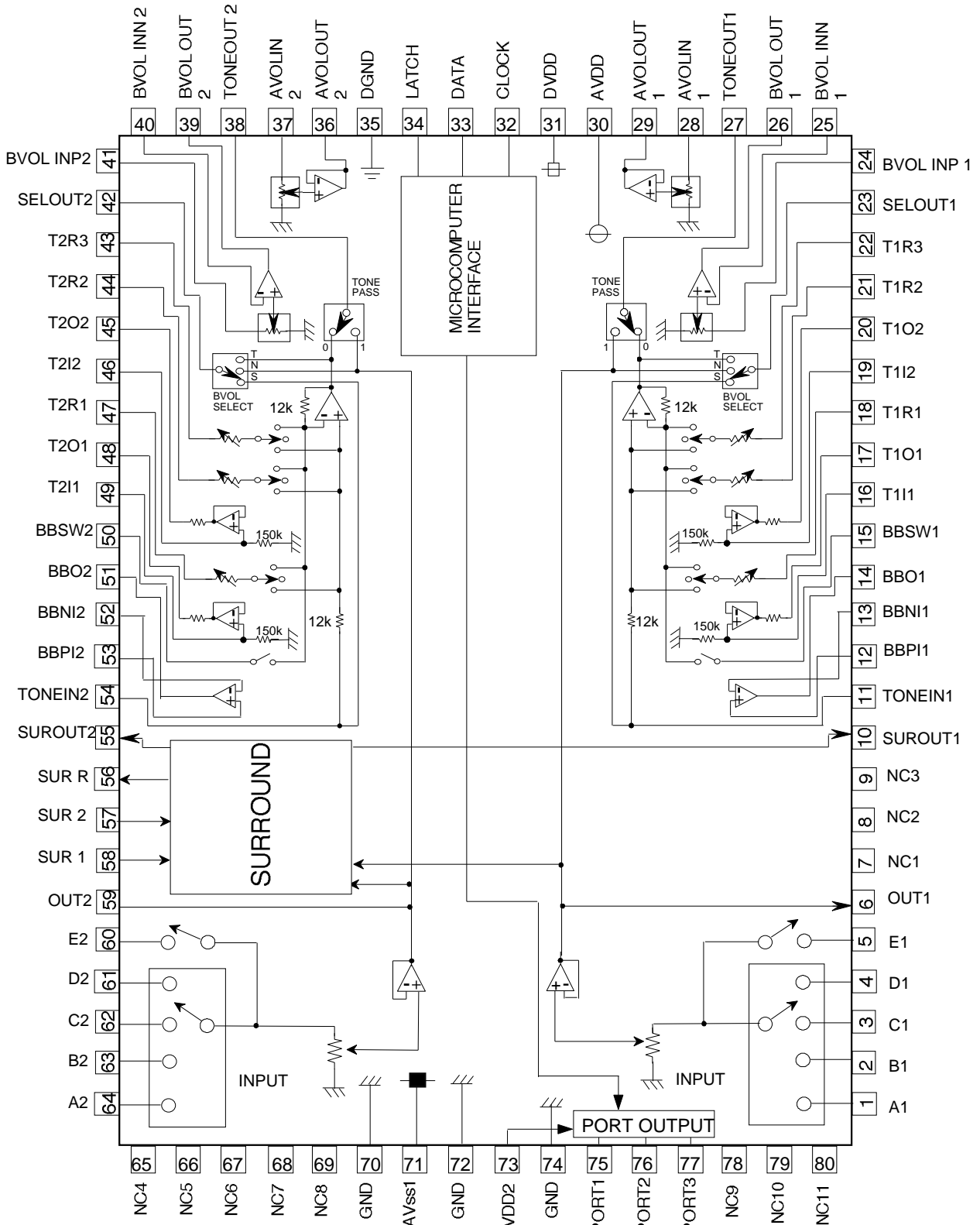
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## PIN CONFIGURATION AND IC INTERNAL BLOCK DIAGRAM



\*NC:NO CONNECTION

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## PIN DESCRIPTION

Pin No.	Symbol	Function
1,2,3,4,5 60,61,62,63,64	A1,B1,C1,D1,E1 A2,B2,C2,D2,E2	Input pin for channel 1 and 2 of the input selector switch block
6,59	OUT1,OUT2	Output pin of the input volume 1 and 2 block
10,55	SUROUT1, SUROUT2	Output pin of the surround block
11,54	TONEIN1, TONEIN2	Input pin of the tone control block
12,53	BBPI1,BBPI2	External parts of bass boost block connection pin
13,52	BBNI1,BBNI2	
14,51	BBO1,BBO2	
15,50	BBSW1,BBSW2	Resonant impedance(band-pass filter) connection pin for bass boost section
16,49	T1I1,T2I2	Input pin of resonance buffer amplifier of the 1st element
17,48	T1O1,T2O2	Output pin of resonance buffer amplifier of the 1st element
18,47	T1R1,T2R1	(Band-pass filter)connection pin of resonance impedance of the 1st element
19,46	T1I2,T2I2	Input pin of resonance buffer amplifier of the 2nd element
20,45	T1O2,T2O2	Output pin of resonance buffer amplifier of the 2nd element
21,44	T1R2,T2R2	(Band-pass filter)connection pin of resonance impedance of the 2nd element
22,43	T1R3,T2R3	(Band-pass filter)connection pin of resonance impedance of the 3rd element
23,42	SELOUT1, SELOUT2	Output pin of the Bvol selector
24,41	BVOL INP1, BVOL INP2	This is non-inverted input pin of the Bvol
25,40	BVOL INN1, BVOL INN2	This is inverted input pin of the Bvol
26,39	BVOL OUT1, BVOL OUT2	Output pin of Bvol
27,38	TONEOUT1, TONEOUT2	Output pin of the tone pass selector
28,37	AVOL IN1, AVOL IN2	Input pin of the Avol block

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DIGITAL SOUND CONTROLLER WITH SURROUND

Pin No.	Symbol	Function
29,36	AVOL OUT1, AVOL OUT2	Output pin of the Avol block
30	AVDD	Positive power pin of the internal analog circuit
31	DVDD	Power supply of internal logic circuit
32	CLOCK	Clock input pin for serial data transfer
33	DATA	Input pin of control data
34	LATCH	Input pin of latch signal
35	DGND	Ground pin of the internal logic circuit
56	SUR R	External parts of surround block connection pin
57	SUR2	
58	SUR1	
70,72,74	GND	IC signal ground. Apply 1/2AVDD. (Connect to GND when used by double-power sources)
71	AVSS1	This is a power pin on minus side. This has the lowest potential in this IC
73	VDD2	Power supply of port
75,76,77	PORT1 to 3	Output pin of port
7,8,9,65,66,67, 68,69,78,79,80	NC1 to 11	Non-connection pin

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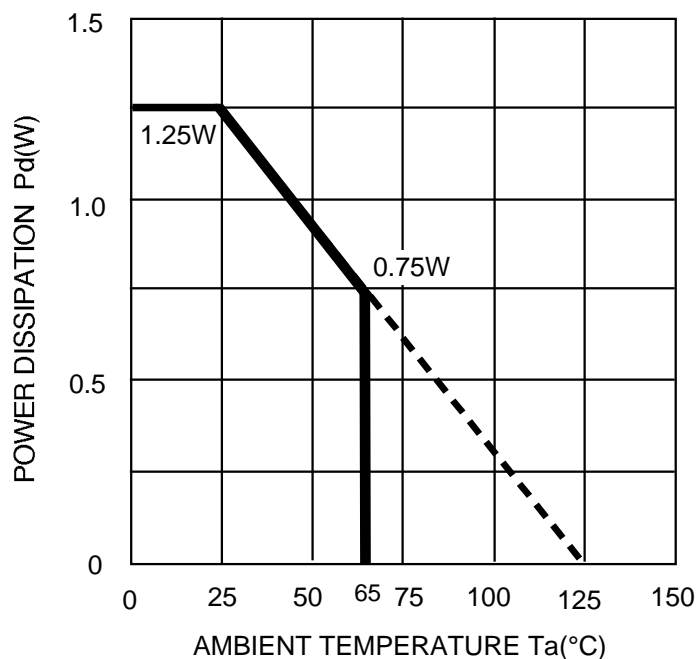
# M62492FP

DIGITAL SOUND CONTROLLER WITH SURROUND

## ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Conditions	Limits	Units
AVDD, VDD2	Analog supply voltage		15.6	V
DVDD	Digital supply voltage		6.0	V
Pd	Power dissipation	Ta ≤ 25°C	1.25	W
K	Thermal derating	Ta > 25°C Equipped with standard board(Note1)	12.5	mW/°C
Topr	Operating temperature		-20 to +65	°C
Tstg	Storage temperature		-55 to +125	°C

THERMAL DERATING (MAXIMUM RATING)



(Note1) Standard board  
 Size of printed circuit board  
 140mm x 140mm  
 Thickness of printed circuit board  
 1.6mm  
 Material of printed circuit board  
 Glass epoxy  
 Single-side Cu pattern  
 Thickness of Cu  
 18μm  
 Size of Cu pattern  
 0.25mm(Width)  
 x 50mm(length) / lead

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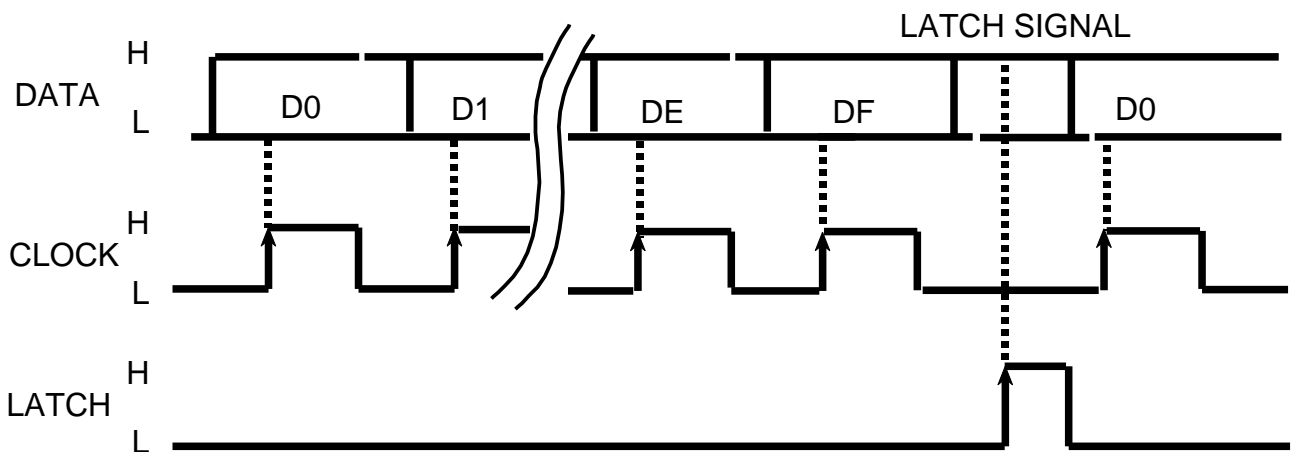
## RECOMMENDED OPERATING CONDITION

(Ta=25°C, unless otherwise noted)

Parameter	Symbol	Conditions	MIN	TYP	MAX	Units
Positive supply voltage	AVDD		4.5	7.0	7.3	V
	DVDD		4.5	5.0	5.5	
Negative supply voltage	AVSS		-7.3	-7.0	-4.5	V
Logic "H" level input voltage	VIH	DGND reference	(DVDD/2)+1	—	DVDD	V
Logic "L" level input voltage	VIL	DGND reference	DGND	—	(DVDD/2)-1	V

Note: AVSS ≤ DGND < DVDD ≤ AVDD

## RELATIONSHIP BETWEEN DATA AND CLOCK



Data signal is read at the rising edge of clock.  
 Signal is latched at the rising edge of the latch signal.

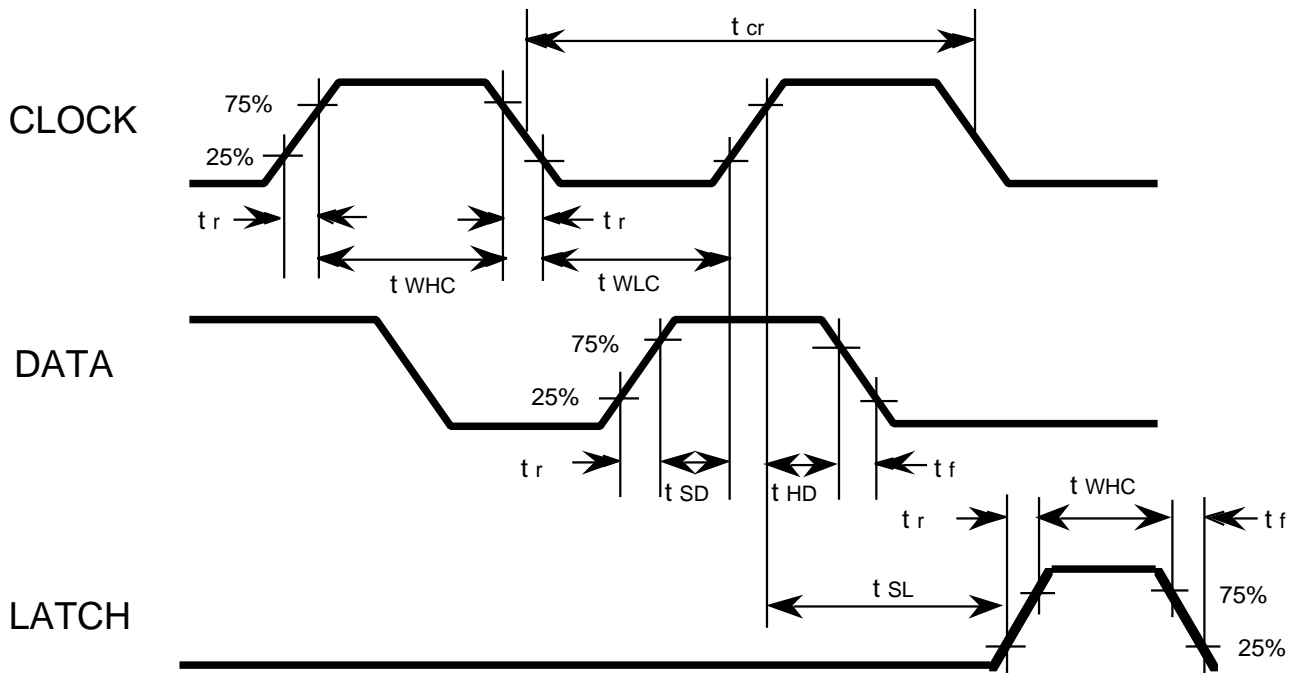
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DIGITAL SOUND CONTROLLER WITH SURROUND

## CLOCK, DATA, LATCH TIMING



## DIGITAL BLOCK TIMING REGULATION

Symbol	Parameter	Limits			Units
		Min	typ	Max	
$t_{cr}$	CLOCK cycle time	8	-	-	$\mu s$
$t_{WHC}$	CLOCK pulse width ("H"level)	3.2	-	-	
$t_{WLC}$	CLOCK pulse width ("L"level)	3.2	-	-	
$t_r$	CLOCK, DATA, LATCH rise time	-	-	0.8	
$t_f$	CLOCK, DATA, LATCH fall time	-	-	0.8	
$t_{SD}$	DATA setup time	1.6	-	-	
$t_{HD}$	DATA hold time	1.6	-	-	
$t_{SL}$	LATCH setup time	2	-	-	
$t_{WHL}$	LATCH pulse width	3.2	-	-	

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## DIGITAL SOUND CONTROLLER WITH SURROUND

### DIGITAL CONTROL SPECIFICATION

Fore kinds of input format options are available by changing slot settings of DE and DF.  
 (When the IC is powered up , the internal settings are not fixed.)

Input format  
 selection slot

(1)

DO1	D11	D21	D31	D41	D51	D61	D71	D81	D91	DA1	DB1	DC1	DD1	DE	DF
TONE CONT TREBLE				TONE CONT MID				TONE CONT BASS				BASS BOOST 1: ON 0: OFF	TONE PASS 1: ON 0: OFF	0	0

(2)

DO2	D12	D22	D32	D42	D52	D62	D72	D82	D92	DA2	DB2	DC2	DD2	DE	DF
A VOLUME CH 1							A VOLUME CH 2							0	1

(3)

DO3	D13	D23	D33	D43	D53	D63	D73	D83	D93	DA3	DB3	DC3	DD3	DE	DF
B VOLUME CH 1							B VOLUME CH 2							1	0

(4)

DO4	D14	D24	D34	D44	D54	D64	D74	D84	D94	DA4	DB4	DC4	DD4	DE	DF
INPUT SELECTOR		INPUT VOLUME			SURROUND		BVOL SELECTOR		Ech INPUT 1:ON 0:OFF	PORT1 1:H 0:L	PORT2 1:H 0:L	PORT3 1:H 0:L	1	1	



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## DIGITAL SOUND CONTROLLER WITH SURROUND

### SETTING CODE

#### (1) TONE CONTROL (BASS / MID / TREBLE)

ATT	TREBLE	D01	D11	D21	D31
	MID	D41	D51	D61	D71
	BASS	D81	D91	DA1	DB1
- 10dB	1	1	1	0	0
- 8dB	1	1	0	0	0
- 6dB	1	0	1	1	0
- 4dB	1	0	1	0	0
- 2dB	1	0	0	0	1
+ 0dB	0	0	0	0	0
+ 2dB	0	0	0	0	1
+ 4dB	0	0	1	1	0
+ 6dB	0	0	1	1	1
+ 8dB	0	1	0	0	0
+ 10dB	0	1	1	0	0

#### (2) BASS BOOST

ATT	DC1
+ 0dB	0
+10dB	1

#### (3) BVOL SELECTOR

	D84	D94
NORMAL	0	0
SURROUND	0	1
TONE	1	0

#### (4) PORT OUTPUT

		DB4	DC4	DD4
PORT1	0	L	—	—
	1	H	—	—
PORT2	0	—	L	—
	1	—	H	—
PORT3	0	—	—	L
	1	—	—	H

#### (5) INPUT SELECTOR

INPUT	D04	D14	D24
A ch	0	0	0
B ch	0	0	1
C ch	0	1	0
D ch	0	1	1
ALL OFF	1	*	*

#### (6) Ech INPUT

E INPUT	DA4
OFF	0
ON	1

#### (7) SURROUND

SURROUND	D64	D74
OFF	0	0
L	1	0
M	0	1
H	1	1

#### (8) INPUT VOLUME

INPUT	D34	D44	D54
0 dB	0	0	0
-2 dB	0	0	1
-4 dB	0	1	0
-6 dB	0	1	1
-8 dB	1	0	0
-10 dB	1	0	1
-12 dB	1	1	0
-14 dB	1	1	1

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DIGITAL SOUND CONTROLLER WITH SURROUND

(9)-1 A VOLUME / B VOLUME (0 to -39dB)

A T T	A VOLUME CH 1	D02	D12	D22	D32	D42	D52	D62
	A VOLUME CH 2	D72	D82	D92	DA2	DB2	DC2	DD2
	B VOLUME CH 1	D03	D13	D23	D33	D43	D53	D63
	B VOLUME CH 2	D73	D83	D93	DA3	DB3	DC3	DD3
	0dB	0	0	0	0	0	0	0
	-1dB	0	0	0	0	0	0	1
	-2dB	0	0	0	0	0	1	0
	-3dB	0	0	0	0	0	1	1
	-4dB	0	0	0	0	1	0	0
	-5dB	0	0	0	0	1	0	1
	-6dB	0	0	0	0	1	1	0
	-7dB	0	0	0	0	1	1	1
	-8dB	0	0	0	1	0	0	0
	-9dB	0	0	0	1	0	0	1
	-10dB	0	0	0	1	0	1	0
	-11dB	0	0	0	1	0	1	1
	-12dB	0	0	0	1	1	0	0
	-13dB	0	0	0	1	1	0	1
	-14dB	0	0	0	1	1	1	0
	-15dB	0	0	0	1	1	1	1
	-16dB	0	0	1	0	0	0	0
	-17dB	0	0	1	0	0	0	1
	-18dB	0	0	1	0	0	1	0
	-19dB	0	0	1	0	0	1	1
	-20dB	0	0	1	0	1	0	0
	-21dB	0	0	1	0	1	0	1
	-22dB	0	0	1	0	1	1	0
	-23dB	0	0	1	0	1	1	1
	-24dB	0	0	1	1	0	0	0
	-25dB	0	0	1	1	0	0	1
	-26dB	0	0	1	1	0	1	0
	-27dB	0	0	1	1	0	1	1
	-28dB	0	0	1	1	1	0	0
	-29dB	0	0	1	1	1	0	1
	-30dB	0	0	1	1	1	1	0
	-31dB	0	0	1	1	1	1	1
	-32dB	0	1	0	0	0	0	0
	-33dB	0	1	0	0	0	0	1
	-34dB	0	1	0	0	0	1	0
	-35dB	0	1	0	0	0	1	1
	-36dB	0	1	0	0	1	0	0
	-37dB	0	1	0	0	1	0	1
	-38dB	0	1	0	0	1	1	0
	-39dB	0	1	0	0	1	1	1

Note :  
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 than the above.

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DIGITAL SOUND CONTROLLER WITH SURROUND

(9)-2 A VOLUME / B VOLUME (-40 to  $-\infty$  dB)

A T T	A VOLUME CH 1	D02	D12	D22	D32	D42	D52	D62
	A VOLUME CH 2	D72	D82	D92	DA2	DB2	DC2	DD2
	B VOLUME CH 1	D03	D13	D23	D33	D43	D53	D63
	B VOLUME CH 2	D73	D83	D93	DA3	DB3	DC3	DD3
-40dB	0	1	0	1	0	0	0	0
-41dB	0	1	0	1	0	0	0	1
-42dB	0	1	0	1	0	1	0	0
-43dB	0	1	0	1	0	1	1	1
-44dB	0	1	0	1	1	0	0	0
-45dB	0	1	0	1	1	0	0	1
-46dB	0	1	0	1	1	1	1	0
-47dB	0	1	0	1	1	1	1	1
-48dB	0	1	1	0	0	0	0	0
-49dB	0	1	1	0	0	0	0	1
-50dB	0	1	1	0	0	1	0	0
-51dB	0	1	1	0	0	1	1	1
-52dB	0	1	1	0	1	0	0	0
-53dB	0	1	1	0	1	0	0	1
-54dB	0	1	1	0	1	1	1	0
-55dB	0	1	1	0	1	1	1	1
-56dB	0	1	1	1	0	0	0	0
-57dB	0	1	1	1	0	0	0	1
-58dB	0	1	1	1	0	1	0	0
-59dB	0	1	1	1	0	1	1	1
-60dB	0	1	1	1	1	0	0	0
-61dB	0	1	1	1	1	1	0	1
-62dB	0	1	1	1	1	1	1	0
-63dB	0	1	1	1	1	1	1	1
-64dB	1	0	0	0	0	0	0	0
-65dB	1	0	0	0	0	0	0	1
-66dB	1	0	0	0	0	0	1	0
-67dB	1	0	0	0	0	0	1	1
-68dB	1	0	0	0	0	1	0	0
-69dB	1	0	0	0	0	1	0	1
-70dB	1	0	0	0	0	1	1	0
-71dB	1	0	0	0	0	1	1	1
-72dB	1	0	0	0	1	0	0	0
-73dB	1	0	0	0	1	0	0	1
-74dB	1	0	0	0	1	0	1	0
-75dB	1	0	0	0	1	0	1	1
-76dB	1	0	0	0	1	1	0	0
-77dB	1	0	0	0	1	1	0	1
-78dB	1	0	0	0	1	1	1	0
-79dB	1	0	0	0	1	1	1	1
$-\infty$ dB	1	0	0	0	0	0	0	0

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## DIGITAL SOUND CONTROLLER WITH SURROUND

### ELECTRICAL CHARACTERISTICS

(Ta=25°C, AVDD=7.0V, AVSS=-7.0V, DVDD=5.0V, f=1kHz, unless otherwise noted.  
 INPUT VOLUME, TONE CONTROL, A/B VOLUME=0dB, BASS BOOST=OFF, SURROUND=OFF)

#### (1) Power supply characteristics

Parameter	Symbol	Test conditions	Limits			Units
			MIN	TYP	MAX	
Analog positive power circuit current	A <sub>Idd</sub>	With AVDD=7.0V, AVSS=-7.0V, pin30 pin current, when no signal is provided	—	35	55	mA
Analog negative power circuit current	A <sub>Iss</sub>	With AVDD=7.0V, AVSS=-7.0V, pin71 pin current, when no signal is provided	-55	-35	—	mA
Digital power circuit current	D <sub>Idd</sub>	With DVDD=5.0V, pin31 pin current, when no signal is provided	—	0.3	1.2	mA

#### (2) Input/Output characteristics

Parameter	Symbol	Test conditions	Limits			Units
			Min	typ	Max	
Input resistance	R <sub>in</sub>	pin1, pin64	32	47	68	kohm
Maximum output voltage	V <sub>OM</sub>	input to pin1,64, Output from pin29,30 RL=10kohm, THD=1%	3.0	4.0	—	V <sub>rms</sub>
Pass gain	G <sub>v</sub>	V <sub>i</sub> =0.2V <sub>rms</sub> , flat, pin1,64 - 29,36 gains	-2.0	0	2.0	dB
Distortion factor	THD	pin29, pin36, BW=400 to 30kHz V <sub>i</sub> =0.2V <sub>rms</sub> , RL=10kohm	—	0.006	0.09	%
	THDBvolA	pin26, pin39, BW=400 to 30kHz V <sub>i</sub> =0.2V <sub>rms</sub> , RL=30kohm	—	0.006	0.07	%
	THDBvolB	BvolA : NORMAL OUT BvolB : SURROUND OUT	—	0.009	0.09	%
	THDBvolC	BvolC : TONE OUT	—	0.009	0.09	%
Output noise voltage	V <sub>ono</sub>	pin29, pin36, R <sub>g</sub> =10kohm, JIS-A, VOL=0dB	—	10	24	μV <sub>rms</sub>
	V <sub>onop</sub>	pin29, pin36, R <sub>g</sub> =10kohm, JIS-A, PASS MODE, VOL=MIN	—	3	6	μV <sub>rms</sub>
		pin29, pin36, R <sub>g</sub> =10kohm, JIS-A, PASS MODE, VOL=0dB	—	4	10	μV <sub>rms</sub>
	VBvolnoA	pin26, pin39, R <sub>g</sub> =10kohm, JIS-A, VOL=0dB	—	4	10	μV <sub>rms</sub>
	VBvolnoB	BvolnoA : NORMAL OUT BvolnoB : SURROUND OUT	—	8	18	μV <sub>rms</sub>
	VBvolnoC	BvolnoC : TONE OUT	—	10	24	μV <sub>rms</sub>
Cross talk between channels	CT	V <sub>o</sub> =0.5V <sub>rms</sub> , RL=10kohm, JIS-A between pin29-pin36 R <sub>g</sub> =10kohm	—	-80	-65	dB
	CTBvol	V <sub>o</sub> =0.5V <sub>rms</sub> , RL=30kohm, JIS-A between pin26-pin39 R <sub>g</sub> =10kohm	—	-80	-65	dB

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### (3) Tone control characteristics

Parameter	Symbol	Test conditions	Limits			Units
			Min	typ	Max	
Tone control voltage gain	T -10dB	Vo=0.2Vrms,f=1kHz TREBLE,MID,BASS  Input pin12,53-pin29,36 gains	-12	-10	-8	dB
	T - 8dB		-10	-8	-6	dB
	T - 6dB		-7.5	-6	-4.5	dB
	T - 4dB		-5.5	-4	-2.5	dB
	T - 2dB		-3	-2	-1	dB
	T+2dB		1	2	3	dB
	T+4dB		2.5	4	5.5	dB
	T+6dB		4.5	6	7.5	dB
	T+8dB		6	8	10	dB
	T+10dB		8	10	12	dB
Bass boost voltage gain	BB10dB	f=100Hz,Vo=0.2Vrms Input pin12,53-pin29,36 gains (Test circuit is in page(22/23))	-	(reference data) 10	-	dB
Balance between channel	BALT	Input pin12,53 V0=0.2Vrms Output pin23,42, boost condition +10,-10dB	-1.5	0	+1.5	dB

### (4)Port

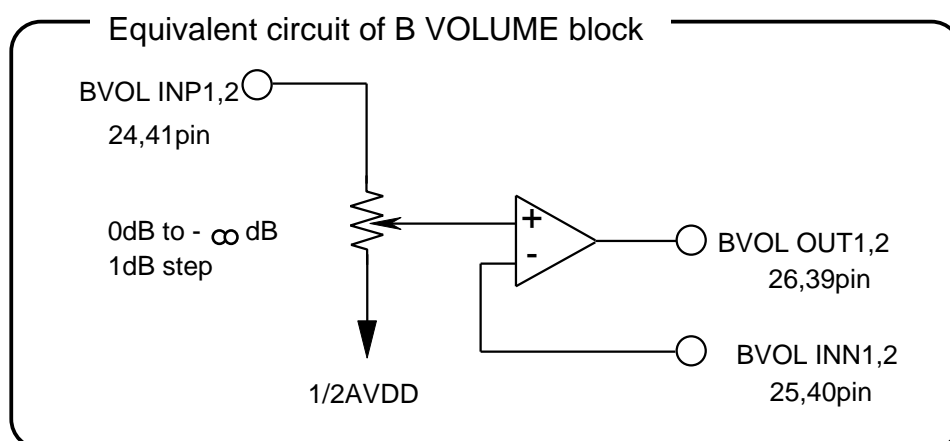
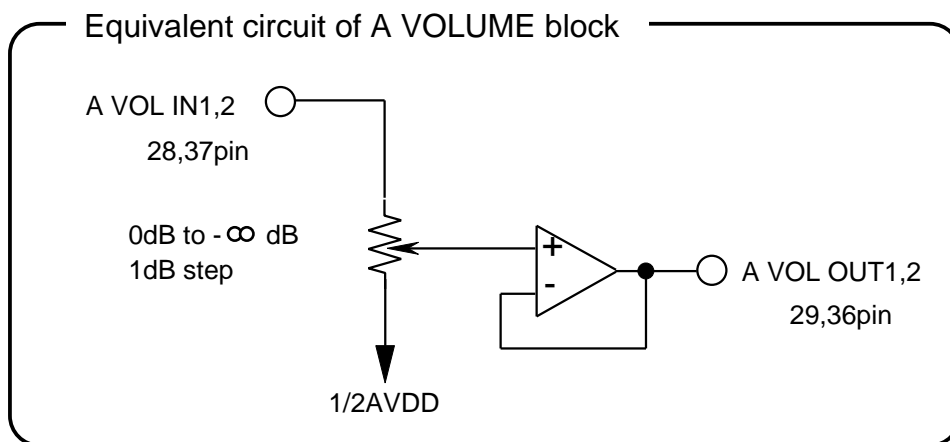
Parameter	Symbol	Test conditions	Limits			Units
			Min	typ	Max	
Port output	Vport	RL=20kohm VDD2=5V	4	4.9	—	V
Maximum Port output current	IOH	VoH=4V * PchCMOS open drain output	—	-6.0	-3.0	mA

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**FUNCTION DESCRIPTION**

(1). A,B volume

This IC is also available for Dolby Pro-logic Surround,  
because it has independent 4ch volume.



**PRELIMINARY**  
 Notice : This is not a final specification.  
 some parametric limits are subject to change.

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DIGITAL SOUND CONTROLLER WITH SURROUND

## (2).Equivalent circuit of tone control(bass boost,bass,mid) resonance circuit block

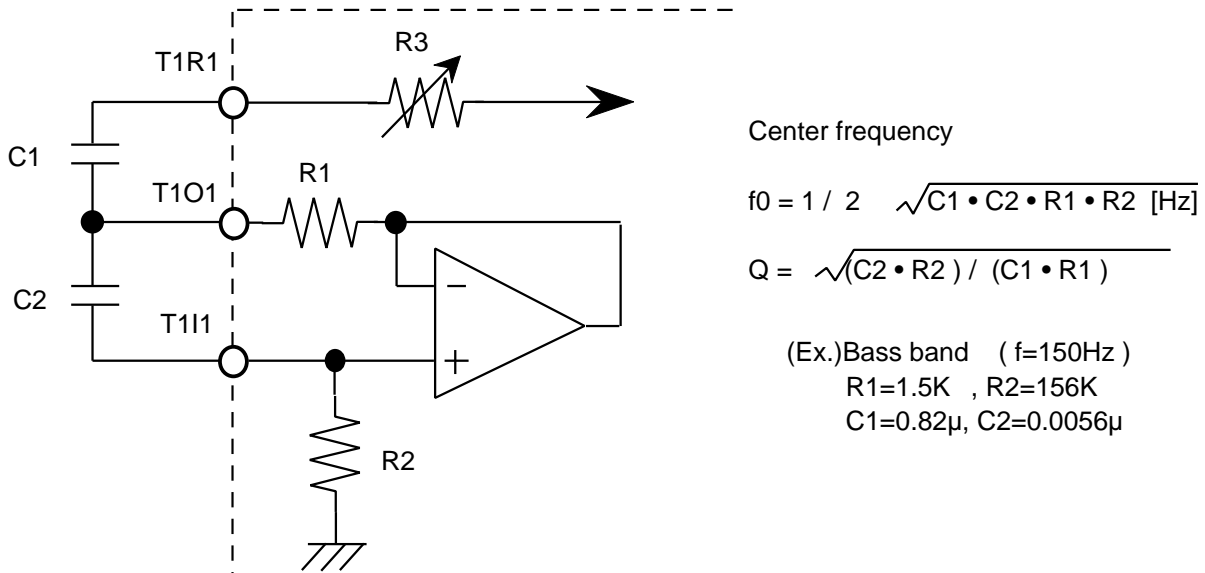


Fig.1 Internal resonance equivalent circuit(bass,mid)

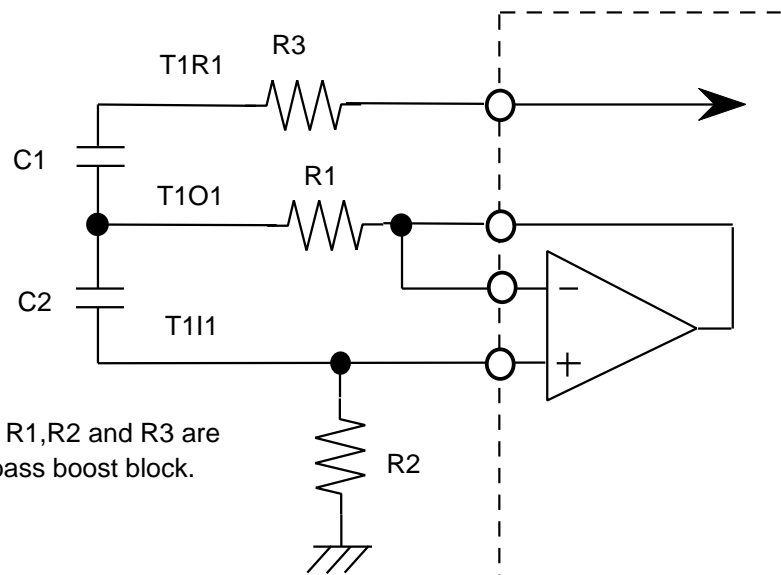
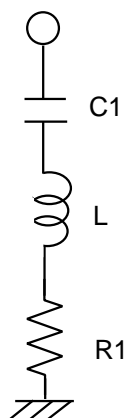


Fig.2 Internal resonance equivalent circuit(bass boost)

Fig.1 and 2 mean Fig.3 in equivalence.  
 The part constant is converted by the following formula.



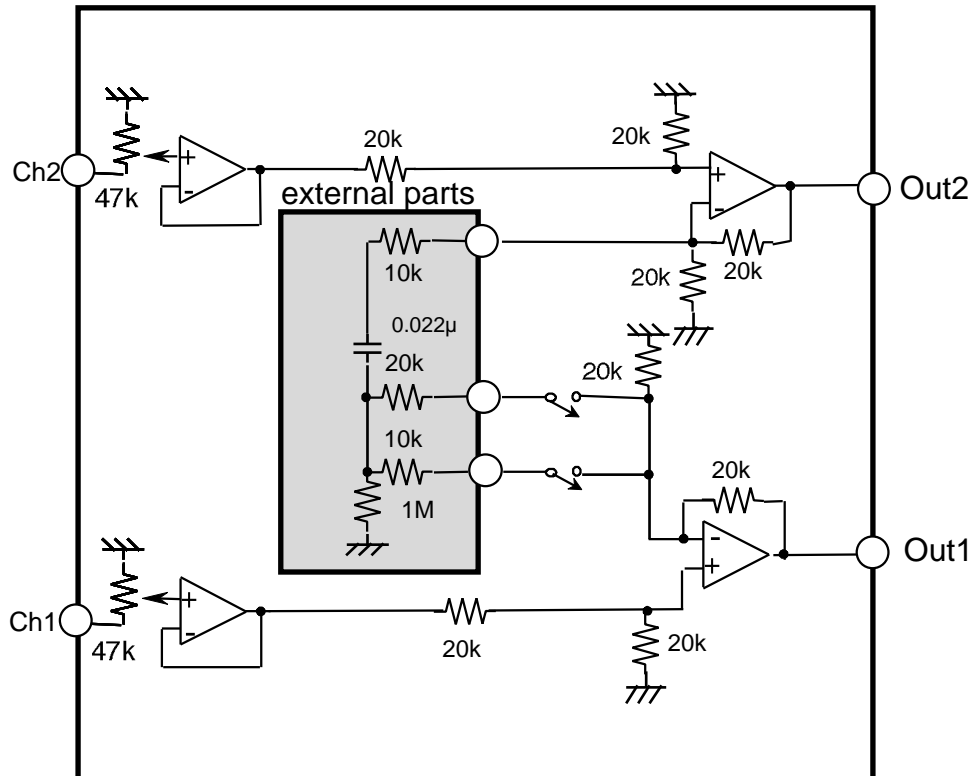
$$L = C2 \cdot R1 \cdot R2$$

Fig.3 Equivalent circuit using L

**PRELIMINARY**  
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### (3)Equivalent circuit of surround block





**PRELIMINARY**  
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## TEST CONDITIONS(SWITCHING CONDITIONS)

(Ta=25°C, AVDD=7.0V, AVSS=-7.0V, DVDD=5.0V, f=1kHz, unless otherwise noted.

INPUT VOLUME, TONE CONTROL, A, B VOLUME=0dB, BASS BOOST=OFF, SURROUND=OFF)

### (1) Power supply characteristics

Parameter	Symbol	Test conditions	Switch								
			S1	S2	S3	S4	S5	S6	S7	S8	S9
Analog positive power circuit current	AIdd	With AVDD=7.0V, AVSS=-7.0V, when no signal is provided pin30 pin current,	1	1	1	2	2	1	1	1	2
Analog negative power circuit current	AIss	With AVDD=7.0V, AVSS=-7.0V, when no signal is provided pin71 pin current,	1	1	1	2	2	1	1	1	2
Digital power circuit current	DIdd	With DVDD=5.0V, pin31 pin current, when no signal is provided	1	1	1	2	2	1	1	1	2

### (2) Input Output characteristics

Parameter	Symbol	Test conditions	Switch								
			S1	S2	S3	S4	S5	S6	S7	S8	S9
Input resistance	Rin	pin1, pin64	1	1	1	1	1	1	1	1	1
Maximum output voltage	VOM	input to pin1, 64, Output from pin29, 30 RL=10kohm, THD=1%	2	1	1	1	1	1	1	1	1
Pass gain	Gv	Vi=0.2Vrms, flat, pin1, 64 - 29, 36 gains	2	1	1	1	1	1	1	2	1
Distortion factor	THD	pin29, pin36, BW=400 to 30kHz Vi=0.2Vrms, RL=10kohm	2	1	1	1	1	1	1	2	1
	THDBvolA	pin26, pin39, BW=400 to 30kHz Vi=0.2Vrms, RL=30kohm	2	1	1	1	1	1	1	2	1
	THDBvolB	BvolA : NORMAL OUT BvolB : SURROUND OUT	2	1	1	1	1	1	1	2	1
	THDBvolC	BvolC : TONE OUT	2	1	1	1	1	1	1	2	1
Output noise voltage	Vonot	pin29, pin36, Rg=10kohm, JIS-A, VOL=0dB	1	1	1	1	1	1	1	1	1
	Vonop	pin29, pin36, Rg=10kohm, JIS-A, PASS MODE, VOL=MIN	1	1	1	1	1	1	1	1	1
		pin29, pin36, Rg=10kohm, JIS-A, PASS MODE, VOL=0dB	1	1	1	1	1	1	1	1	1
	VBvolnoA	pin26, pin39, Rg=10kohm, JIS-A, VOL=0dB	1	1	1	1	1	1	1	1	1
	VBvolnoB	BvolnoA : NORMAL OUT BvolnoB : SURROUND OUT	1	1	1	1	1	1	1	1	1
	VBvolnoC	BvolnoC : TONE OUT	1	1	1	1	1	1	1	1	1
Cross talk between channels	CT	Vo=0.5Vrms, RL=10kohm, JIS-A, between pin29-pin36 Rg=10kohm	CH1	2	1	1	1	1	1	1	1
			CH2	1	1	1	1	1	1	1	2
	CTBvol	Vo=0.5Vrms, RL=30kohm, JIS-A, between pin26-pin39 Rg=10kohm	CH1	2	1	1	1	1	1	1	1
			CH2	1	1	1	1	1	1	1	2

**PRELIMINARY**  
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## DIGITAL SOUND CONTROLLER WITH SURROUND

### (3)Tone control characteristics

Parameter	Symbol	Test condition	Switch								
			S1	S2	S3	S4	S5	S6	S7	S8	S9
Tone control voltage gain	T -10dB	Vo=0.2Vrms,f=1kHz TREBLE,MID,BASS	1	2	1	1	1	1	2	1	1
	T - 8dB		1	2	1	1	1	1	2	1	1
	T - 6dB	Input pin12,53 -pin29,36 gains	1	2	1	1	1	1	2	1	1
	T - 4dB		1	2	1	1	1	1	2	1	1
	T - 2dB		1	2	1	1	1	1	2	1	1
	T+2dB		1	2	1	1	1	1	2	1	1
	T+4dB		1	2	1	1	1	1	2	1	1
	T+6dB		1	2	1	1	1	1	2	1	1
	T+8dB		1	2	1	1	1	1	2	1	1
	T+10dB		1	2	1	1	1	1	2	1	1
Bass boost voltage gain	BB10dB	f=100Hz,Vo=0.2Vrms Input pin12,53 -pin29,36 gains	1	2	1	1	1	1	2	1	1
Balance between channel	BALT	Input pin12,53 V0=0.2Vrms Output pin23,42, boost condition +10,-10dB	1	2	2	1	1	2	2	1	1

### (4) PORT

Parameter	Symbol	Test condition	Switch								
			S1	S2	S3	S4	S5	S6	S7	S8	S9
Port outout	Vport	VDDP=5V RL=20Kohm	1	1	1	1	1	1	1	1	1

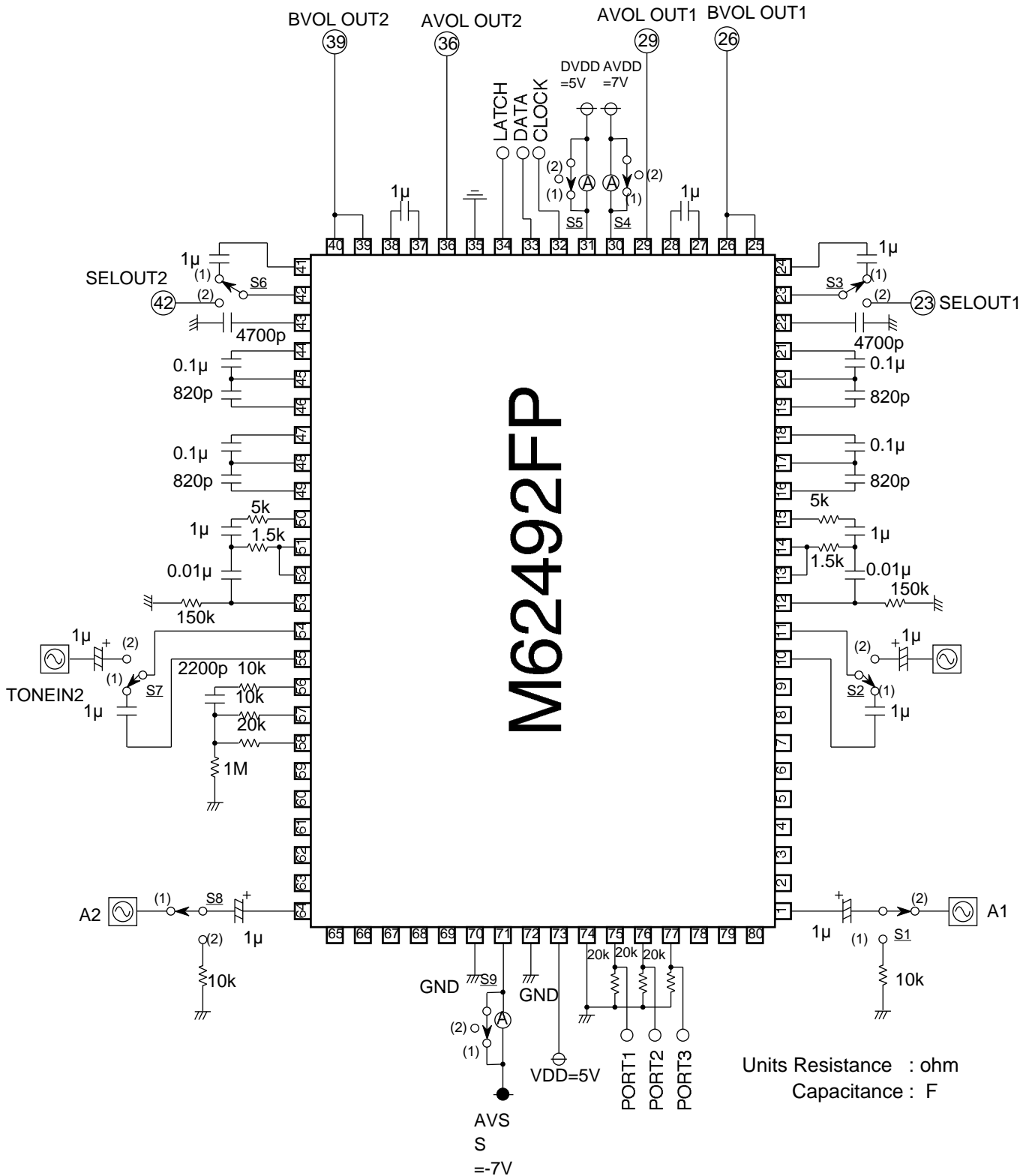
**PRELIMINARY**  
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MITSUBISHI SOUND PROCESSORS

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DIGITAL SOUND CONTROLLER WITH SURROUND

## TEST CIRCUIT

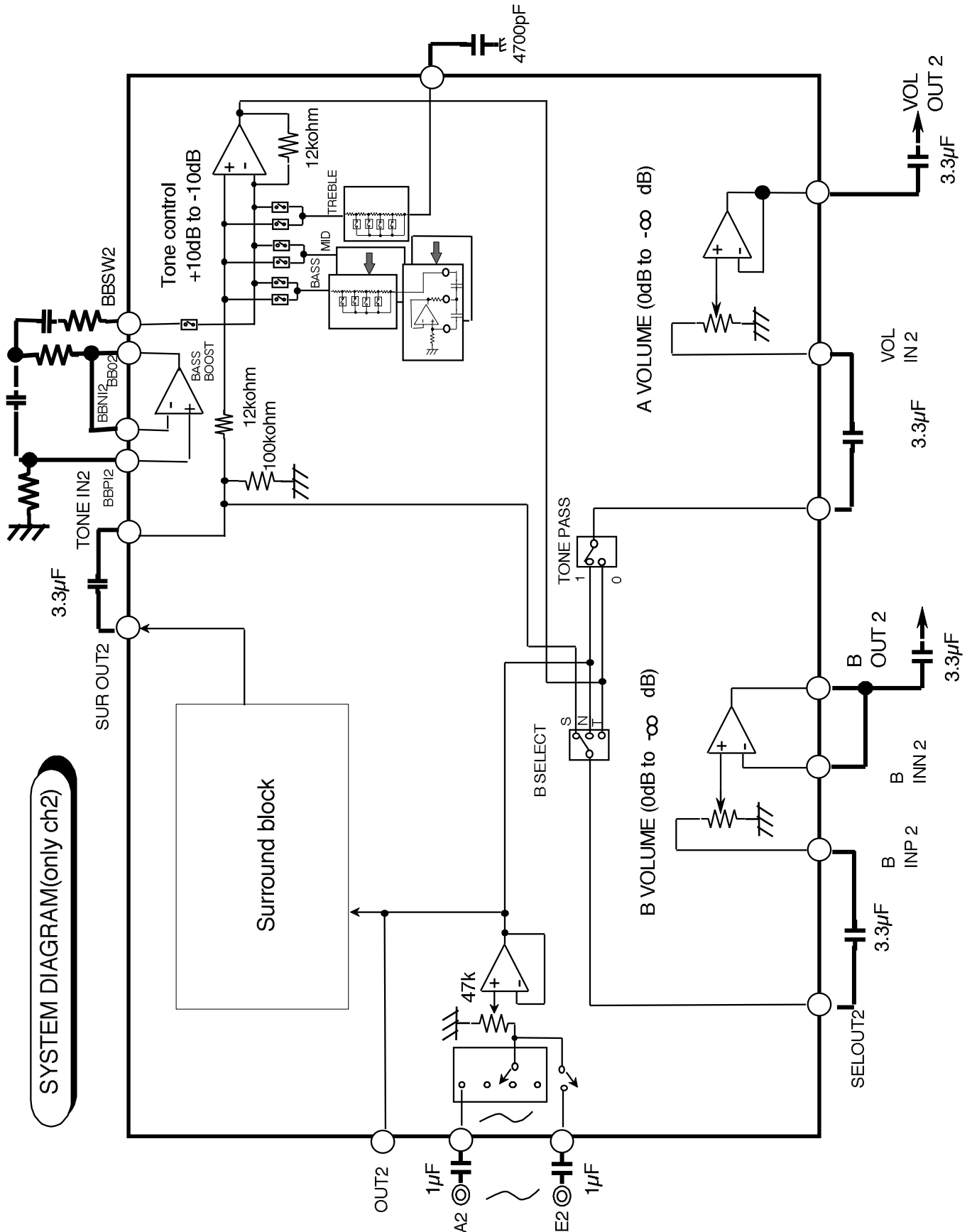


**PRELIMINARY**  
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MITSUBISHI SOUND PROCESSORS

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DIGITAL SOUND CONTROLLER WITH SURROUND

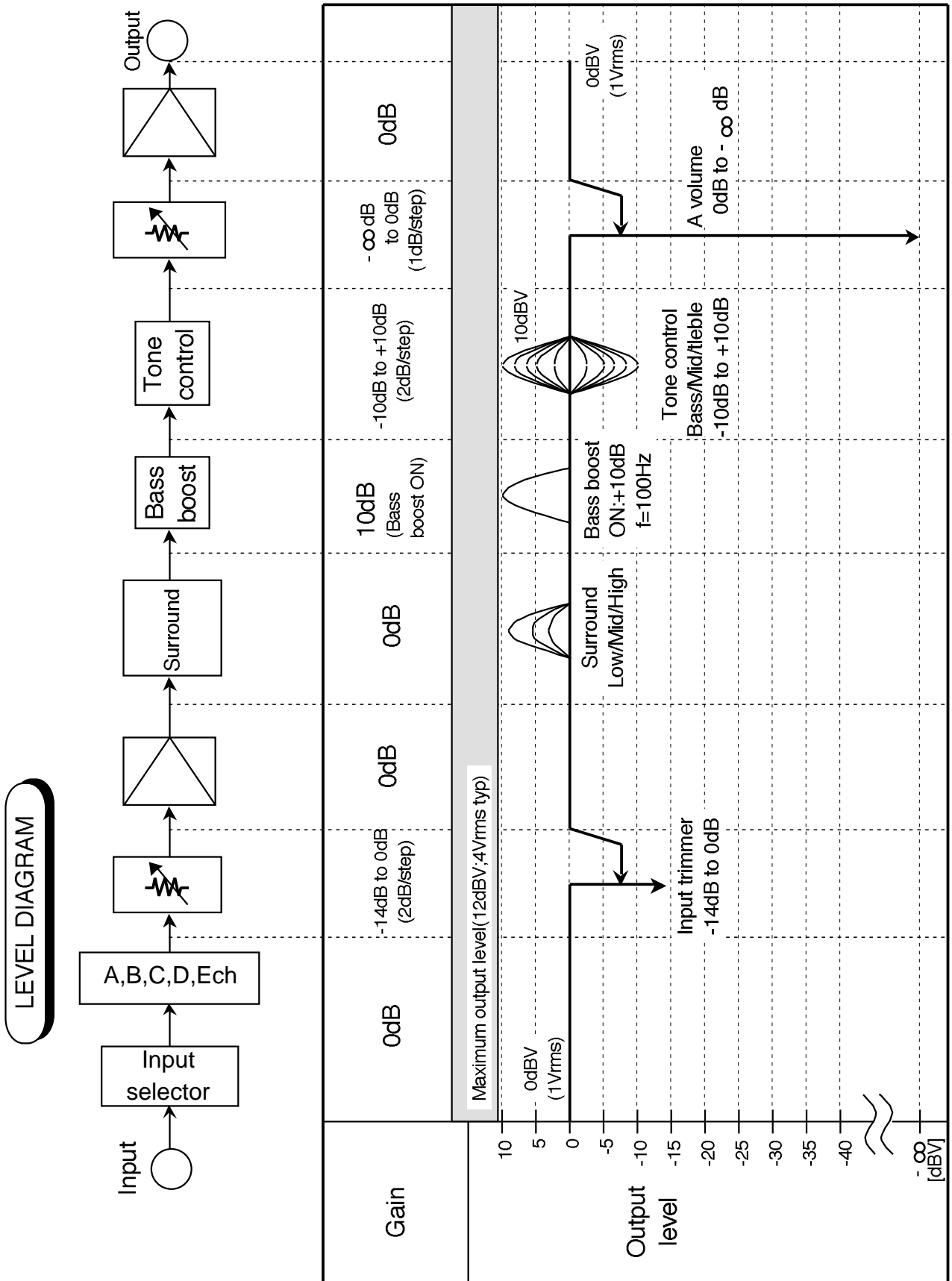


**PRELIMINARY**  
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MITSUBISHI SOUND PROCESSORS

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DIGITAL SOUND CONTROLLER WITH SURROUND



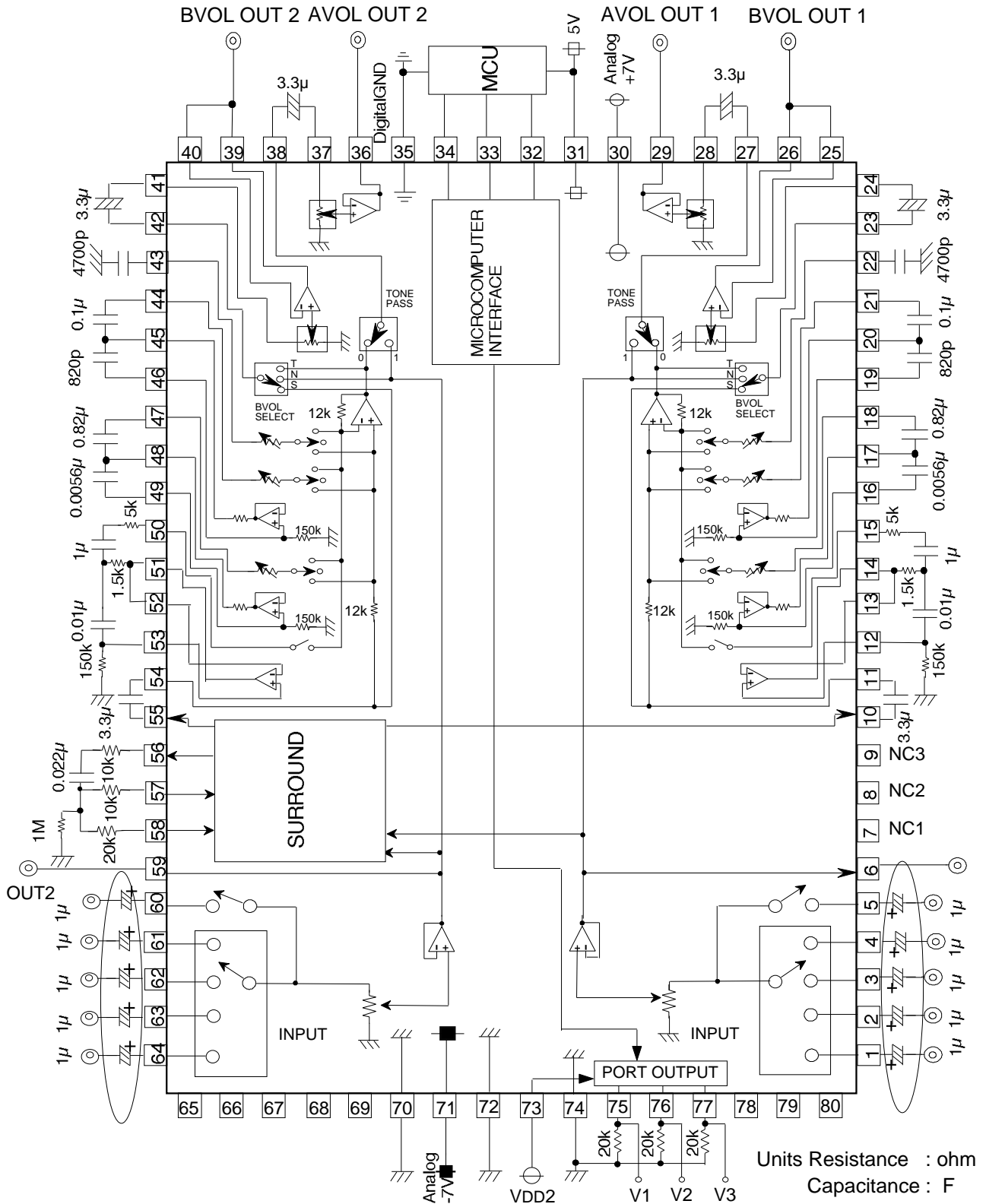
**PRELIMINARY**  
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DIGITAL SOUND CONTROLLER WITH SURROUND

**APPLICATION EXAMPLE**

(1) 2power supply specification



(if output can be muted ,when power is turned on,the components marked with a circle are not required.)

**PRELIMINARY**  
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## DIGITAL SOUND CONTROLLER WITH SURROUND

### (2) Single power supply specification

