PRELIMINARY
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MITSUBISHI SOUND PROCESSORS

M62430FP

DIGITAL SOUND CONTROLLER WITH SRSsurround

DESCRIPTION

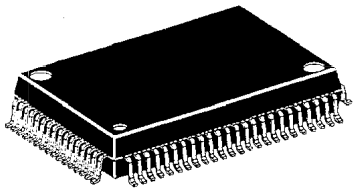
SRS everything else is only stereo™

The M62430FP is dual channel sound volume/quality.
The volume section is designed to the 2 channel either simultaneously or respectively in steps of 1dB. It incorporates the ladder resistance mechanism to reduce noise and distortion.
The tone control section is capable of controlling the tone within ±10dB in steps of 2dB.
The M62430FP is built in Sound Retrieval System.

FEATURES

- Electric volume (MAIN and REC Volume)
  - •Volume level..... 0dB ~ -79dB,- ∞dB (1dB / step)
- Tone control
  - •Bass / Mid / Treble , 0dB ~ ±10dB(2dB / step)
  - •Bass boost +10dB(ON / OFF)
- **SRS** Surround
- Space/Center volume ... 0dB ~ -∞dB
- 4 Output ports
- Built-in microcomputer interface circuit controlled by 16-bit serial data.

PACKAGE



Outline 80P6N-A

0.8mm Pitch QFP
(20.0 mmx14.0mmx2.8mm)

APPLICATION

Home Audio equipment,Radio-Cassette tape recorder,TV

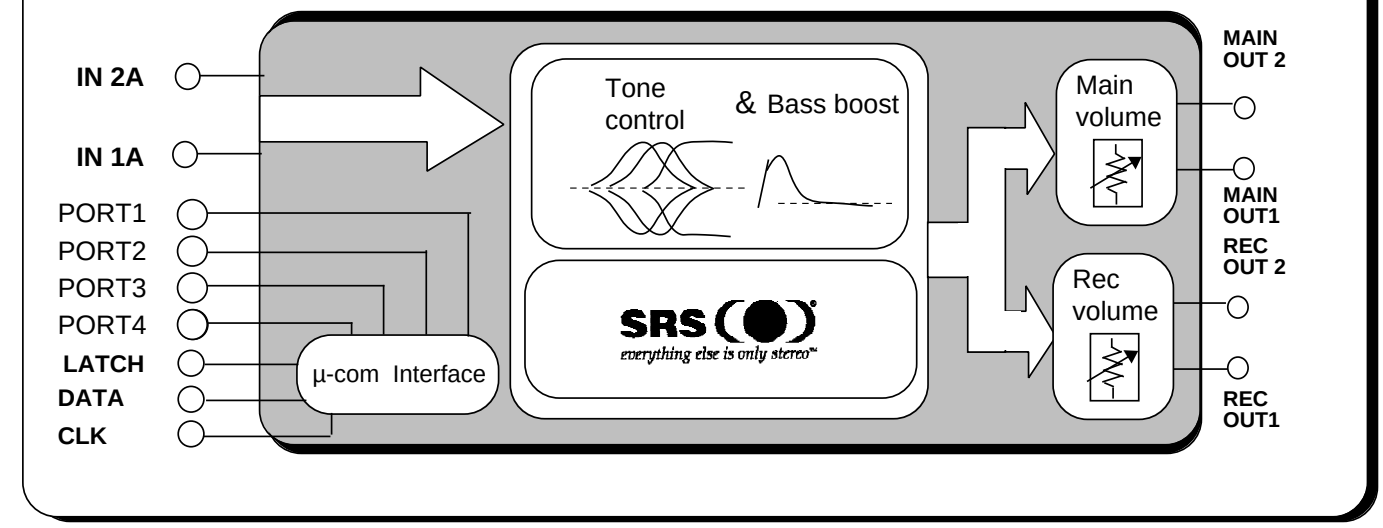
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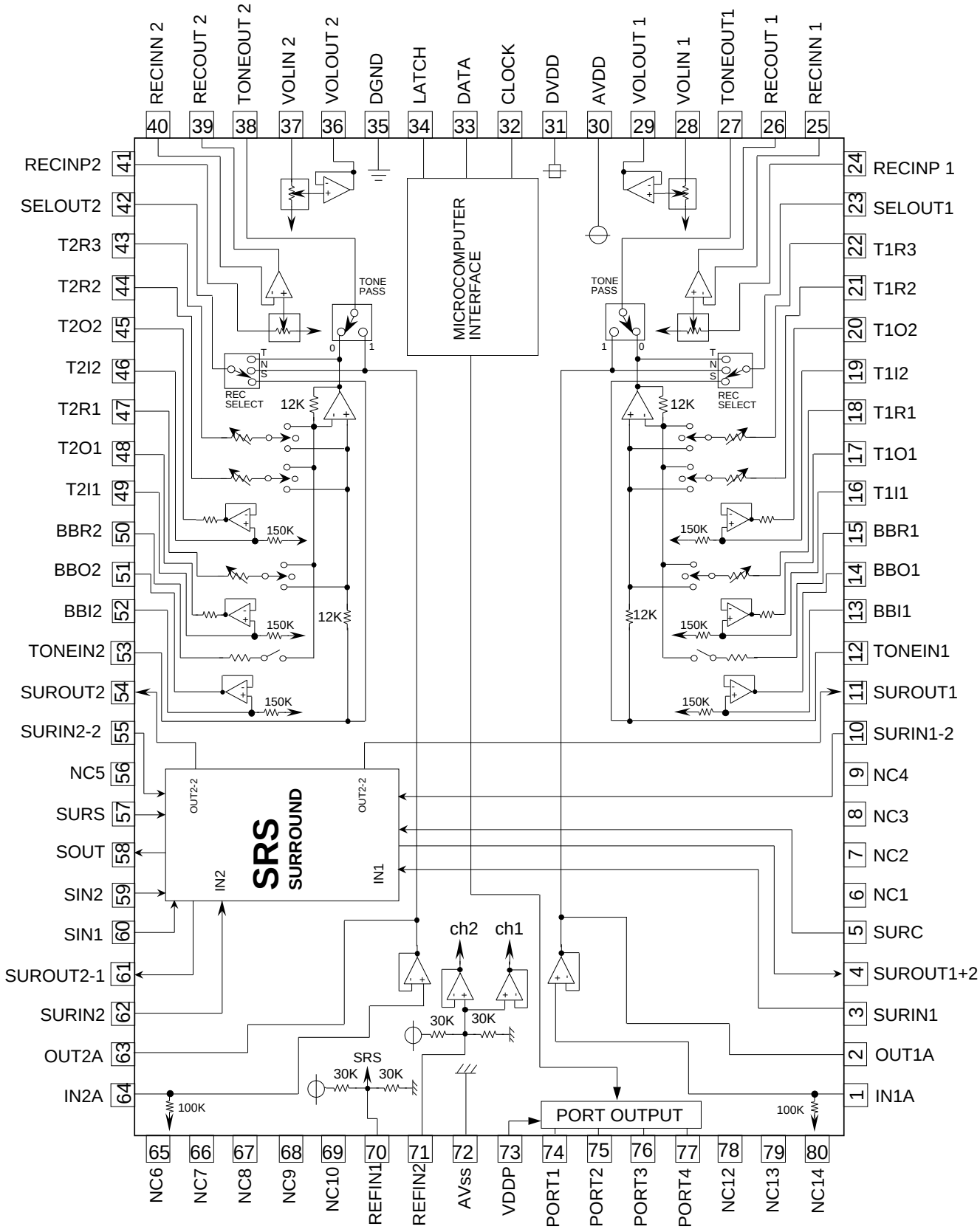
RECOMMENDED OPERATING CONDITIONS

Supply voltage range.....9.0 ~ 14.6V (analog)
4.5 ~ 5.5V (digital)
Rated supply voltage ..... 14.0V (analog)
5.0V (digital)

SYSTEM BLOCK DIAGRAM



PIN CONFIGURATION AND IC INTERNAL BLOCK DIAGRAM

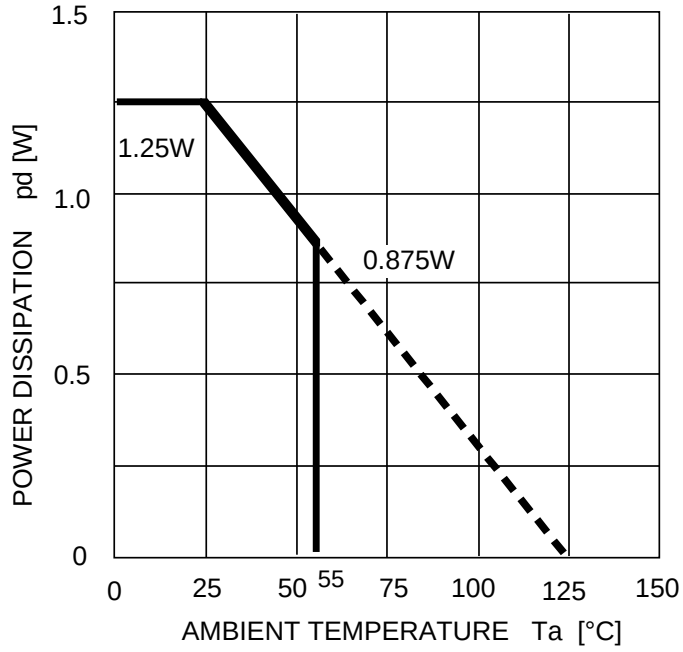


PRELIMINARY
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ABSOLUTE MAXIMUM RATINGS

Symbol	Parameter	Conditions	Ratings	Unit
VDD	Supply Voltage		16.0	V
Pd	Power dissipation	Ta≤25°C	1.25	W
Kθ	Thermal derating	Ta>25°C *standard board	12.5	mW/°C
Topr	Operating temperature		-20 ~+55	°C
Tstg	Storage temperature		-55 ~+125	°C

THERMAL DERATING
(MAXIMUM RATING)



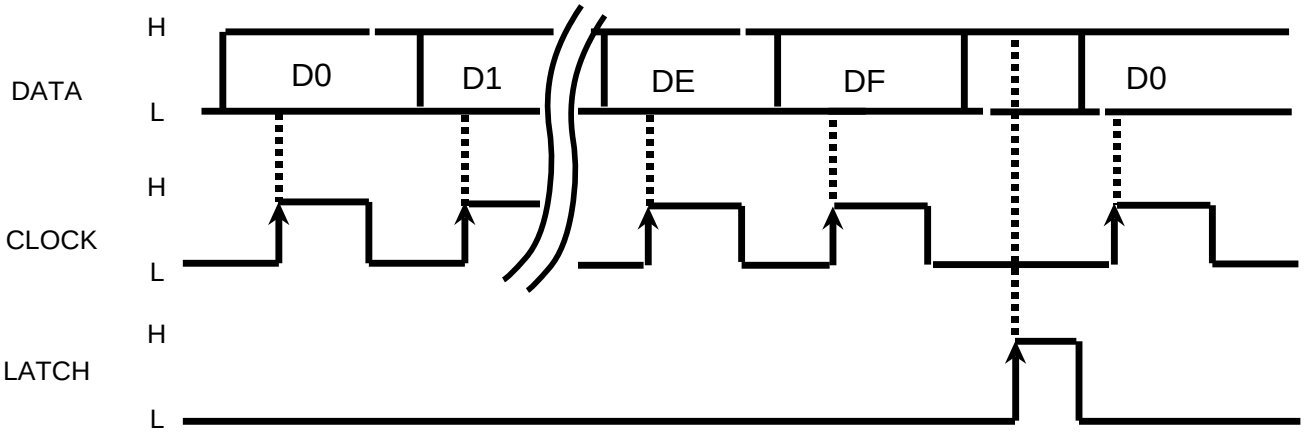
*Standard board
- •board size 140mmx140mm
- •board thickness 1.6mm
- •board material glass epoxy
- •copper pattern
  - copper thickness 18 µm
  - copper size 0.25mm(width)
    50mm (length/lead)

PRELIMINARY
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RECOMMENDED OPERATING CONDITION

Parameter	Symbol	Condition	MIN	TYP	MAX	Unit
Analog Supply Voltage	AVDD		9.0	14.0	14.6	V
PORT Supply Voltage	VDDP	AVDD≥VDDP	4.5	5.0	14.6	V
Digital Supply Voltage	DVDD		4.5	5.0	5.5	V
High-level Input Voltage	VIH		DVDD-0.7	—	DVDD	V
Low-level Input Voltage	VIL		0	—	DGND+0.7	V

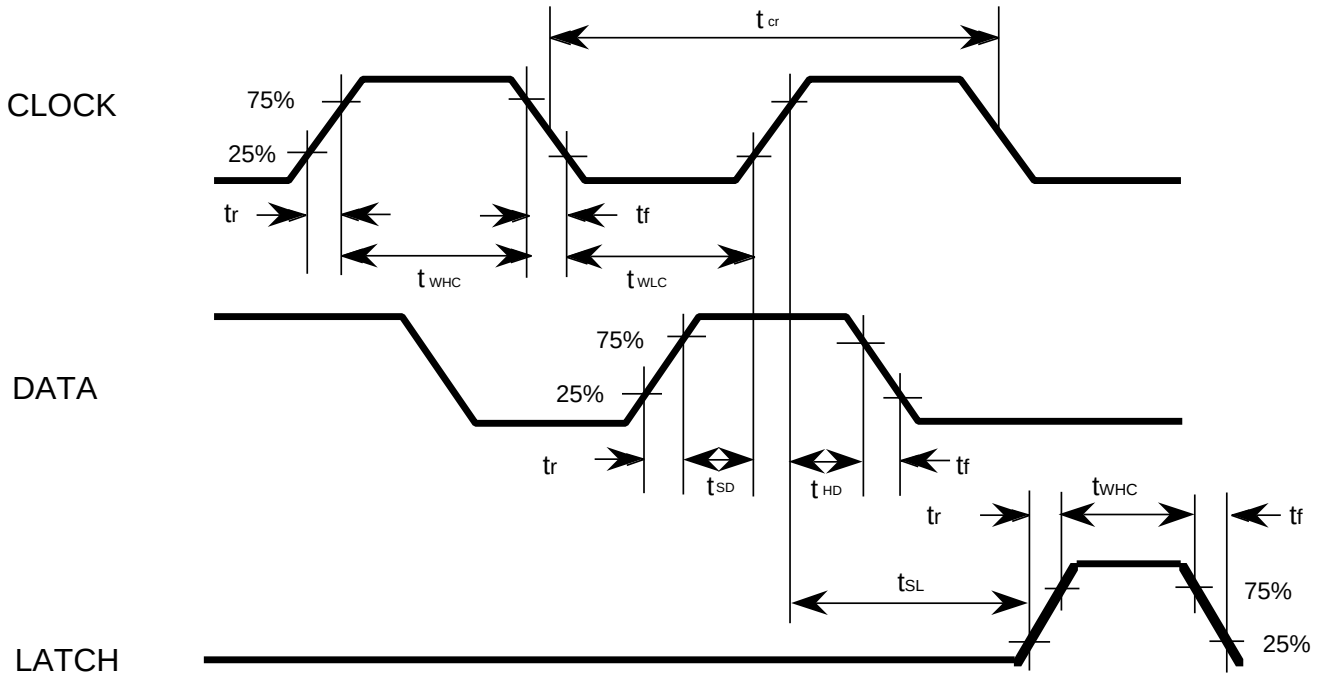
DATA TIMING (Recommended conditions)



note : CLOCK and LATCH function at raising edges of pulse .

PRELIMINARY
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CLOCK, DATA,LATCH TIMING



DIGITAL BLOCK TIMING REGULATION

Symbol	Parameter	Limits			Unit
		Min	typ	Max	
t_{cr}	CLOCK cycle time	8	–	–	µsec
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	–	–	

PRELIMINARY
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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.)

(1)

DO1	D11	D21	D31	D41	D51	D61	D71	D81	D91	DA1	DB1	DC1	DD1	DE	DF
TONE CONTROL TREBLE				TONE CONTROL MID				TONE CONTROL 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
MAIN VOLUME CH 1							MAIN VOLUME CH 2							0	1

(3)

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

(4)

DO4	D14	D24	D34	D44	D54	D64	D74	D84	D94	DA4	DB4	DC4	DD4	DE	DF
"Space" VOLUME & "Center" VOLUME							SRS SURROUND 1: ON 0: OFF	REC SELECTOR		PORT1 1:H 0:L	PORT2 1:H 0:L	PORT3 1:H 0:L	PORT4 1:H 0:L	1	1

PRELIMINARY
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SETTING CODE

(1) Tone control (bass / mid / treble)

ATT		D01	D11	D21	D31
	treble	D01	D11	D21	D31
	mid	D41	D51	D61	D71
	bass	D81	D91	DA1	DB1
- 10dB		1	1	1	0
- 8dB		1	1	0	0
- 6dB		1	0	1	1
- 4dB		1	0	1	0
- 2dB		1	0	0	1
+ 0dB		0	0	0	0
+ 2dB		0	0	0	1
+ 4dB		0	0	1	0
+ 6dB		0	0	1	1
+ 8dB		0	1	0	0
+ 10dB		0	1	1	0

(2) Bass boost

ATT	DC1
+ 0dB	0
+10dB	1

(3) REC selector

	D84	D94
normal	0	0
surround	0	1
tone	1	0

(4) Port output

		DA4	DB4	DC4	DD4
PORT1	0	L	-	-	-
	1	H			
PORT2	0	-	L	-	-
	1		H		
PORT3	0	-	-	L	-
	1			H	
PORT4	0	-	-	-	L
	1				H

(5) Surround control ("Space"vol / "Center"vol)

ATT	"S"vol	D04	D14	D24	D64
	"C"vol	D34	D44	D54	
0dB		0	0	0	X
-3dB		0	0	1	X
-6dB		0	1	0	X
-9dB		0	1	1	X
-12dB		1	0	0	X
-15dB		1	0	1	X
-18dB		1	1	0	X
-21dB		1	1	1	0
-∞dB		1	1	1	1

Note : Do not input other data than the above.

PRELIMINARY
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(6)-1 MAIN VOLUME / REC VOLUME (0~ -39dB)

Note : Do not input other data than the above.

ATT	MAIN VOLUME CH 1	D02	D12	D22	D32	D42	D52	D62
	MAIN VOLUME CH 2	D72	D82	D92	DA2	DB2	DC2	DD2
	REC VOLUME CH 1	D03	D13	D23	D33	D43	D53	D63
	REC 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

PRELIMINARY
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(6)-2 MAIN VOLUME / REC VOLUME (-40~ - ∞dB)

Note : Do not input other data than the above.

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

ELECTRICAL CHARACTERISTICS

(Ta=25°C, AVDD=14.0V , DVDD=5.0V , f=1kHz, unless otherwise noted.
TONE CONTROL , BASS BOOST , VOLUME are set to 0dB)

(1) Power supply characteristics

Parameter	Symbol	Test conditions	Limits			Unit
			Min	typ	Max	
Analog circuit current	AIdd	Current at pin 30 No signal	—	45	60	mA
Digital circuit current	DIdd	Current at pin 31 No signal	—	0.3	1.2	mA

(2) Input / Output characteristics

Parameter	Symbol	Test conditions	Limits			Unit
			Min	typ	Max	
Input resistance	Rin	1pin,64pin,Ta=25°C	50	100	150	KΩ
Maximum output voltage	VOM	Input to pin1,64,Output from pin29,36 RL =10KΩ,THD=1%	3.0	4.0	—	Vrms
Pass gain	Gv	Vi=0.2Vrms, flat , pin1,64 - 29,36 gains	-2.0	0	2.0	dB
Distortion factor	THD	Pin29,36, BW=400~30kHz Vi=0.2Vrms , RL=10KΩ	—	0.003	0.09	%
	THDrecA	Pin26,39, BW=400~30kHz Vi=0.2Vrms , RL=30KΩ	—	0.003	0.07	%
	THDrecB	recA : SELECTOR OUT recB : SURROUND OUT recC : TONE OUT	—	0.005	0.09	%
	THDrecC					
Output noise voltage	Vono	Pin29,36,Rg=10KΩ,JIS-A, VOL=0dB	—	10	24	µVrms
	Vonop	Pin29,36,Rg=10KΩ,JIS-A, PASS MODE,VOL=MIN	—	3	6	µVrms
	VrecnoA	Pin26,39,Rg=10KΩ,JIS-A, VOL=0dB	—	4	10	µVrms
	VrecnoB	recnoA : SELECTOR OUT recnoB : SURROUND OUT recnoC : TONE OUT	—	8	18	µVrms
	VrecnoC		—	10	24	µVrms
Crosstalk between channels	CT	Vo=0.5Vrms , RL=10KΩ,JIS-A Between pin29-36 RL=10KΩ	—	-80	-65	dB
	CTrec	Vo=0.5Vrms , RL=30KΩ,JIS-A Between pin26-39 RL=10KΩ	—	-80	-65	dB

PRELIMINARY
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(3) Tone control characteristics

Parameter	Symbol	Test condition	Limits			Unit
			Min	typ	Max	
Tone control voltage gain	T -10dB	Vo=0.2Vrms,f=1kHz TLEBLE,MID,BASS Input pin12,53 -29,36 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 -29,36 gains	8	10	12	dB
Balance between channel	BALT	Input pin12,53 Vo=0.2Vrms Output pin23,42, boost condition +10,-10dB	-1.5	0	+1.5	dB

(4) Port

Parameter	Symbol	Test condition	Limits			Unit
			Min	typ	Max	
Port output	Vport	RL=20KΩ VDDP2=5V	4.0	4.9	—	V

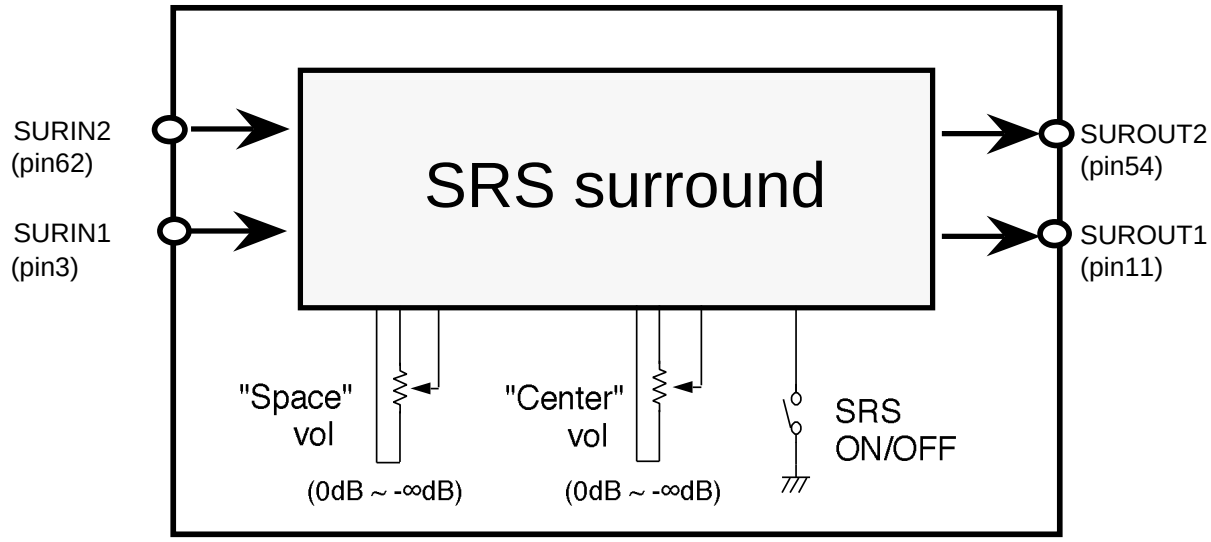
(5) SRSSurround characteristics

(Vi=500mVrms,f=1kHz, unless otherwise noted.)

Parameter	Symbol	Test condition	Limits			Unit
			Min	typ	Max	
Feed through gain	Gvsrsf	"S" VOL : MIN "C" VOL : MIN Input : pin3,62 Output : pin11,54	-12.5	-10.5	-8.5	dB
By-pass gain	Gvsrsb	SRS OFF Input : pin3,62 Output : pin11,54	-2.0	0	+2.0	dB
L (2)- R(1) gain	GvsrsL-R	"S" VOL : MAX "C" VOL : MIN Input : pin62 Output : pin54	9.6	11.6	13.6	dB
L(2) + R(1) gain	GvsrsL+R	"S" VOL : MIN "C" VOL : MAX Input : pin62 Output : pin54	-8.0	-6.0	-4.0	dB

(R:ch1 , L:ch2 , MAX:0dB , MIN:-∞dB)

◯ SRS Block

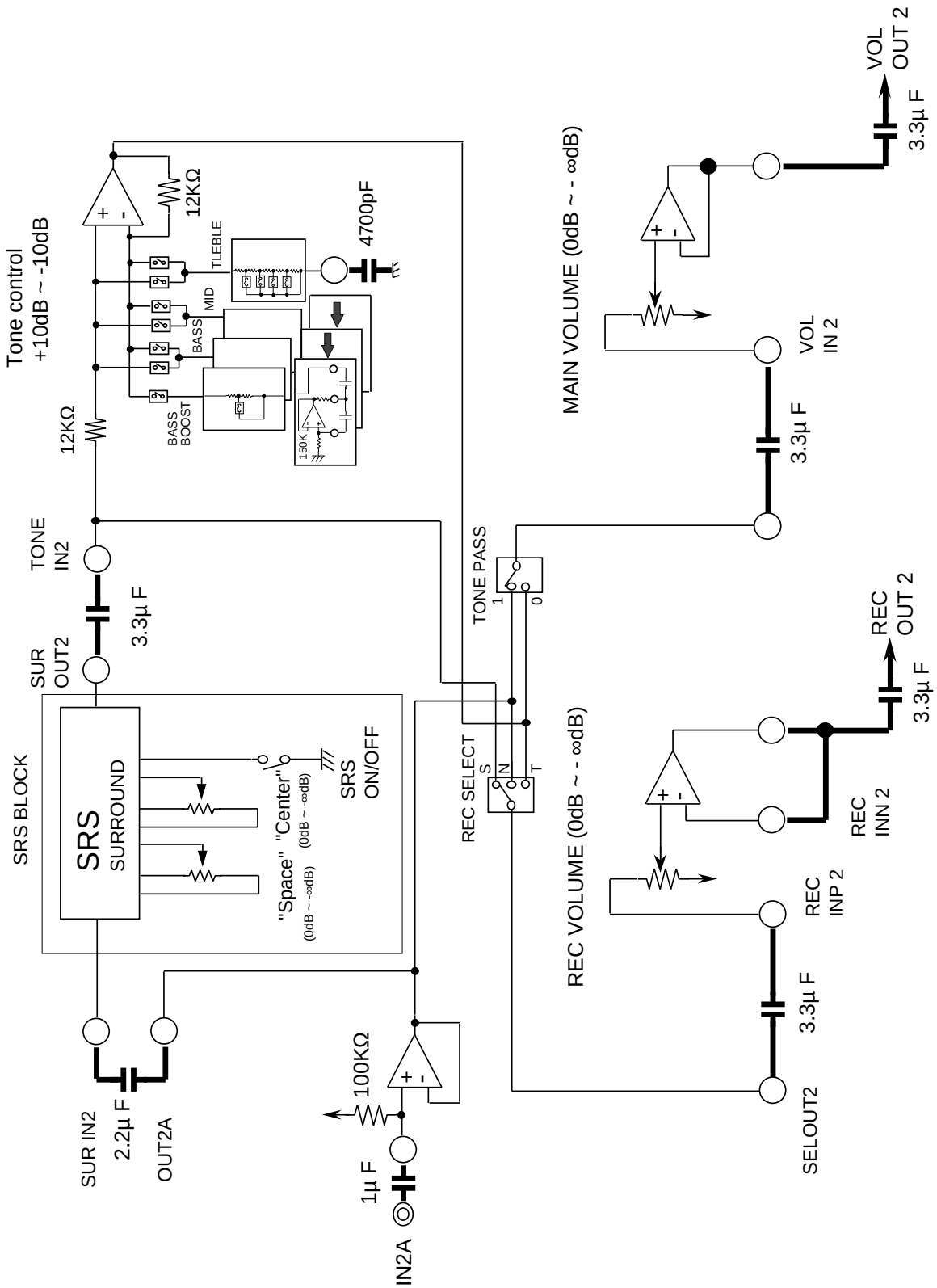


Note:

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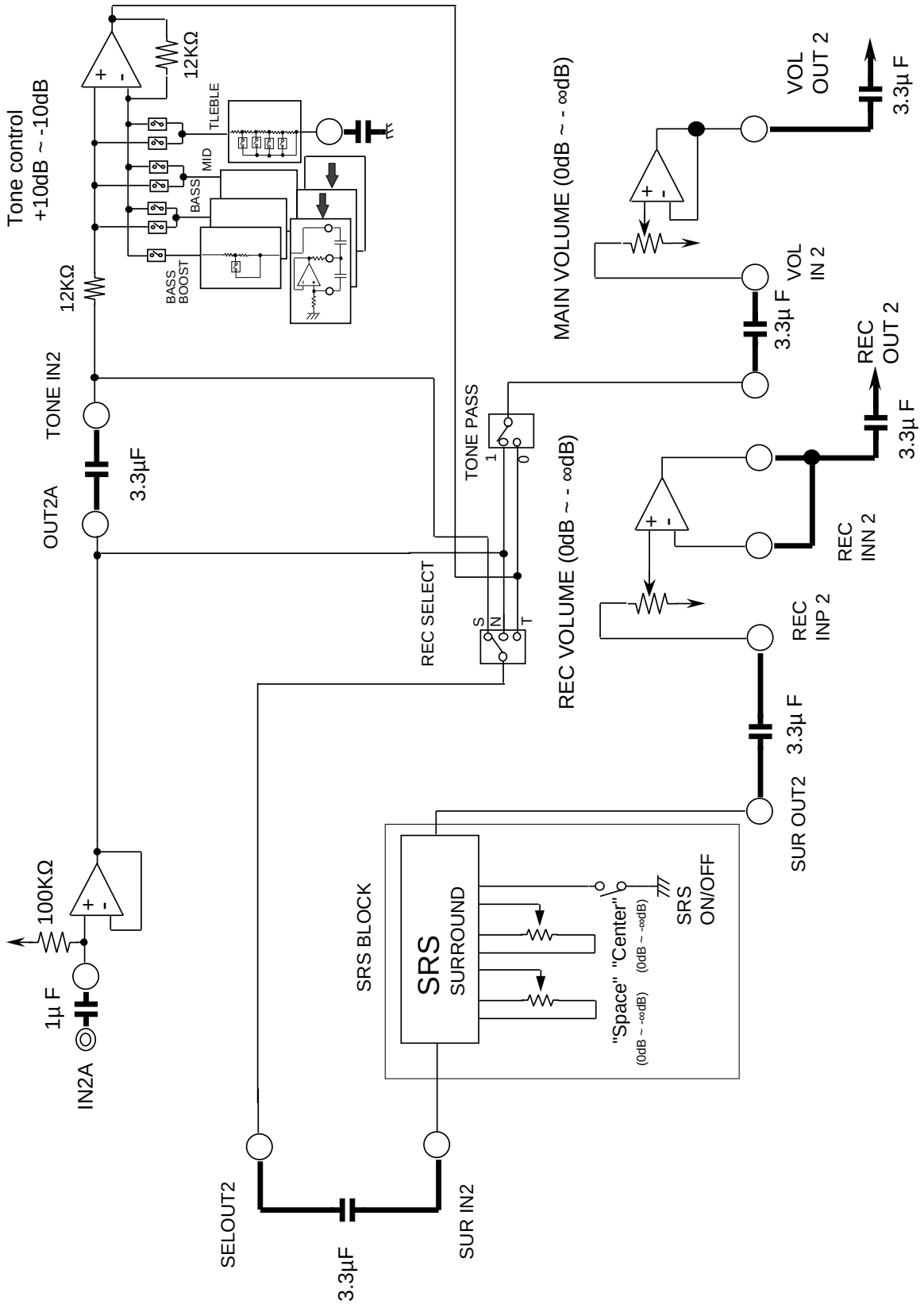
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SYSTEM DIAGRAM 1. (1st SIDE)

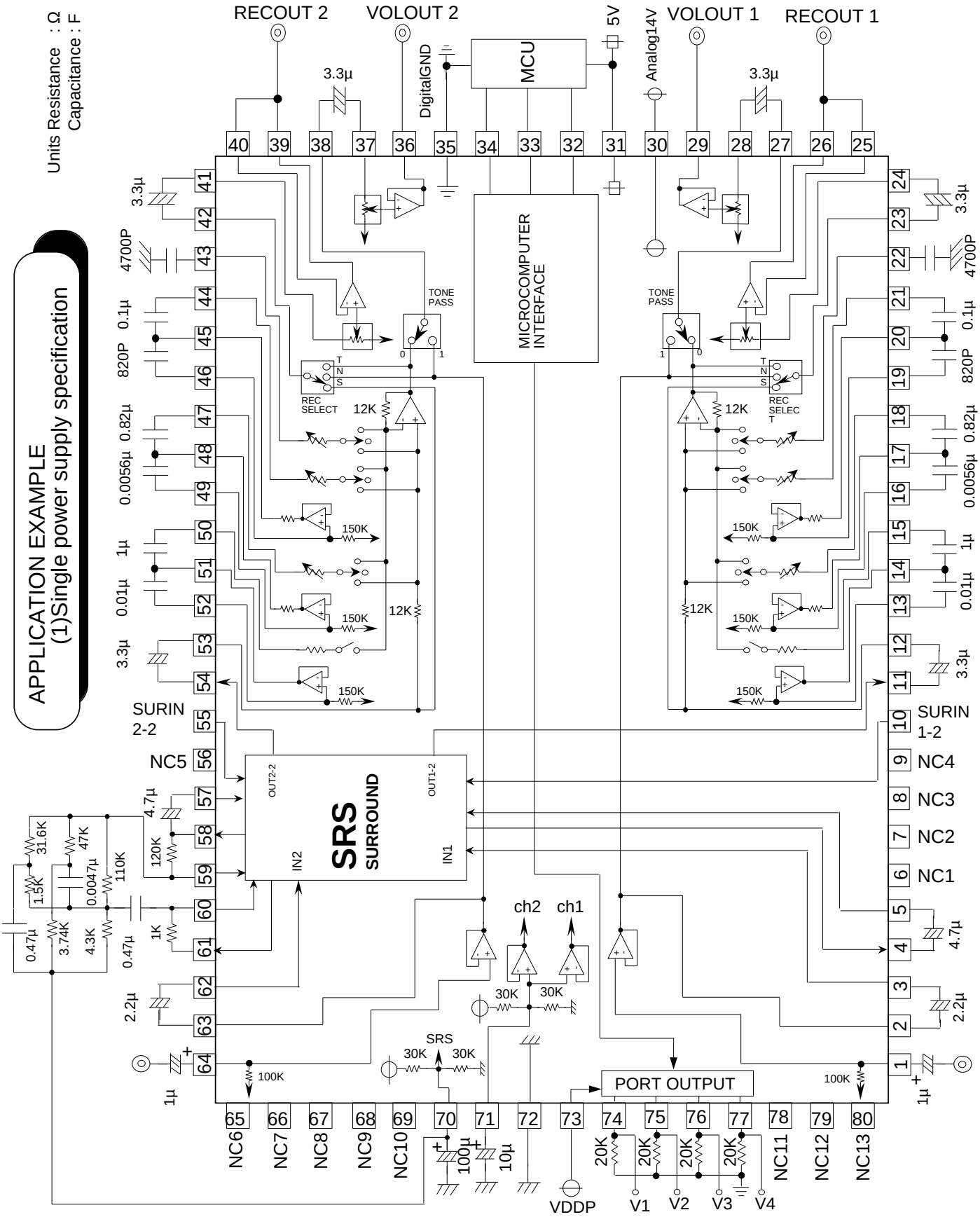


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SYSTEM DIAGRAM 2.(1st SIDE)

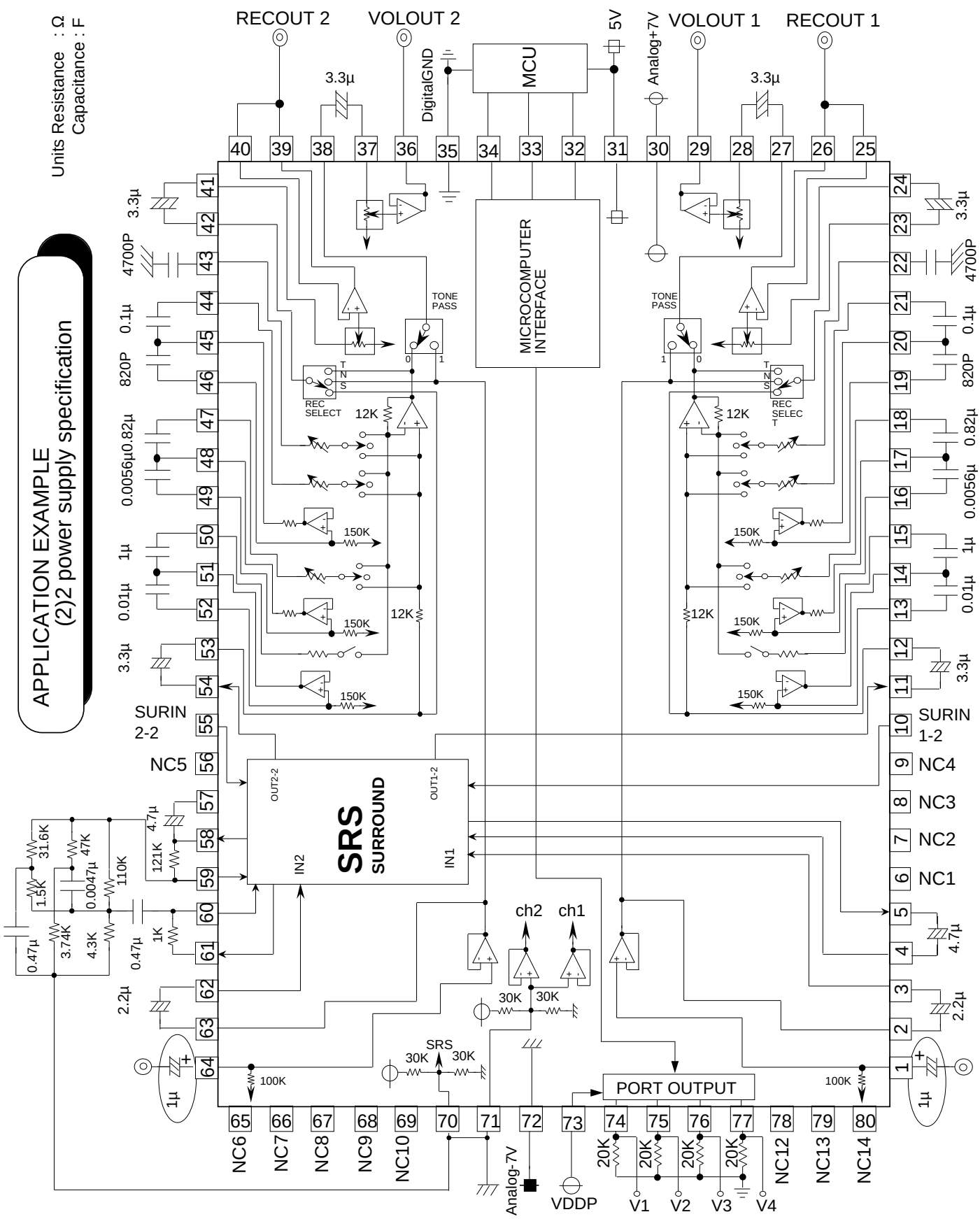


APPLICATION EXAMPLE
(1)Single power supply specification



PRELIMINARY
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APPLICATION EXAMPLE
(2)2 power supply specification



PRELIMINARY
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