

32-bit, 768 kHz Sampling Stereo Audio D/A Converter

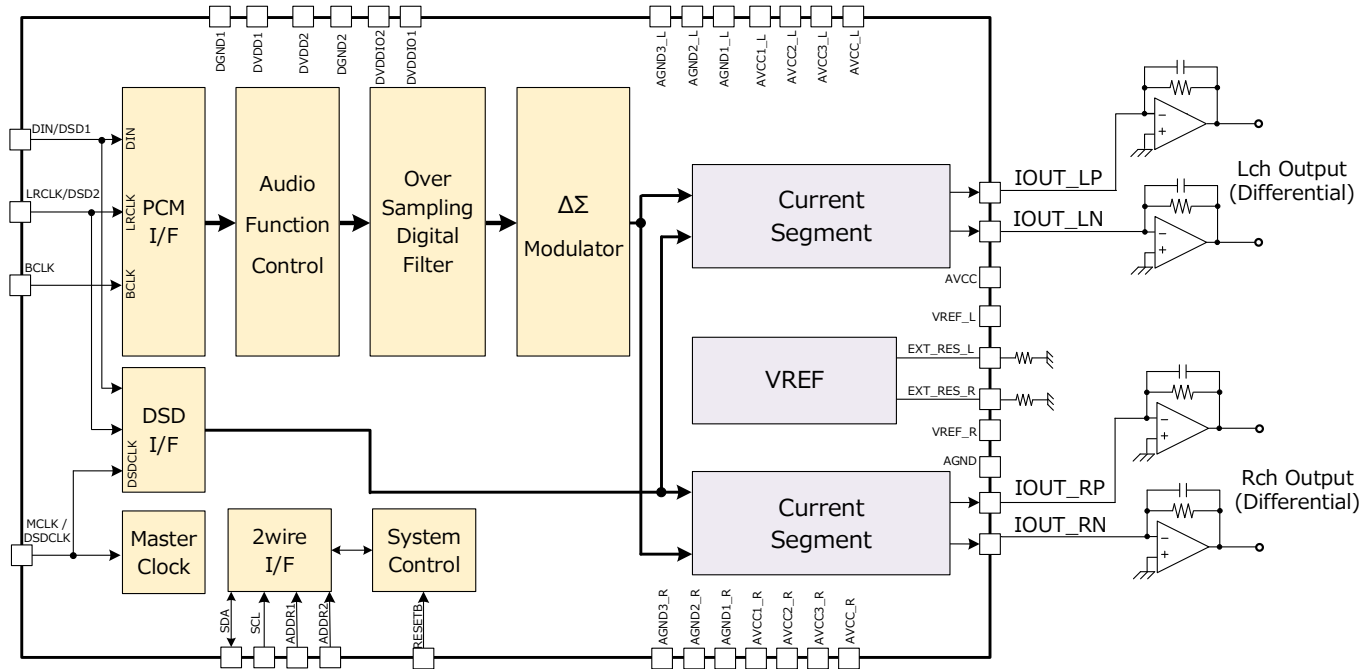
# BD34301EKV Evaluation Board

IC Introduction

BD34301EKV is a 32-bit Stereo Audio D/A Converter with ROHM original sound quality design, realizing excellent performance (SNR: 130 dB (Typ), THD+N: -115 dB (Typ))\*<sup>1</sup> suitable for high-end audio. Different type sound is realized by selecting 2 kinds of digital FIR filters (Sharp Roll-Off, Slow Roll-Off). PCM I/F supports up to 768 kHz and DSD I/F supports up to 22.4 MHz.

\*<sup>1</sup> BD34301EKV-EVK is tuned for listening evaluation. Electrical performance, External CR values are different from BD34301EKV Datasheet. (SNR: 125 dB (Typ) at Balance Output)

## BD34301EKV Block Diagram



## Recommended Operating Conditions

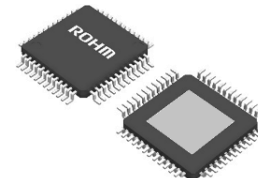
Item	Symbol	Ratings	Unit
Power Supply Voltage	AVCC* <sup>1</sup>	4.5 to 5.5	V
	DVDDIO	3.0 to 3.6	
	DVDD	1.4 to 1.6	
Operating Temperature	Topr	-25 to +85	°C

\*<sup>1</sup> AVCC, AVCC\_R, AVCC\_L in Block Diagram.

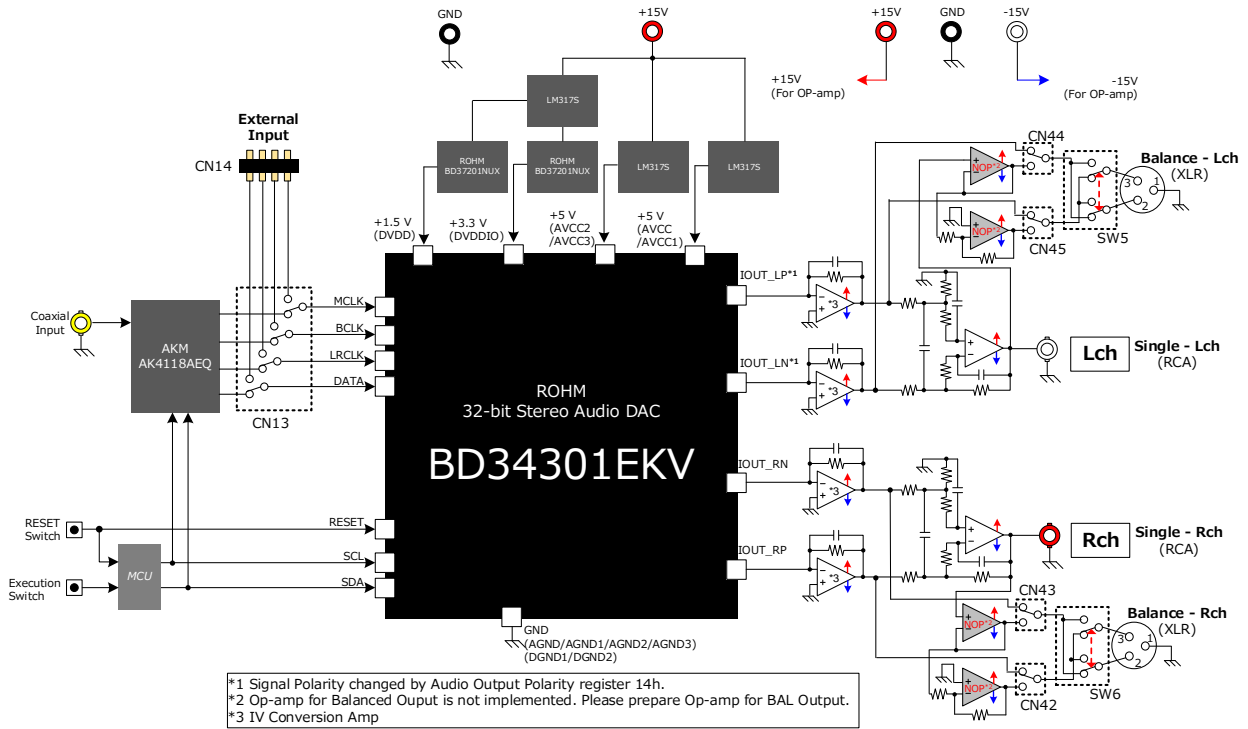
## Package

HTQFP64BV (64 pin, 0.5 mm pitch)

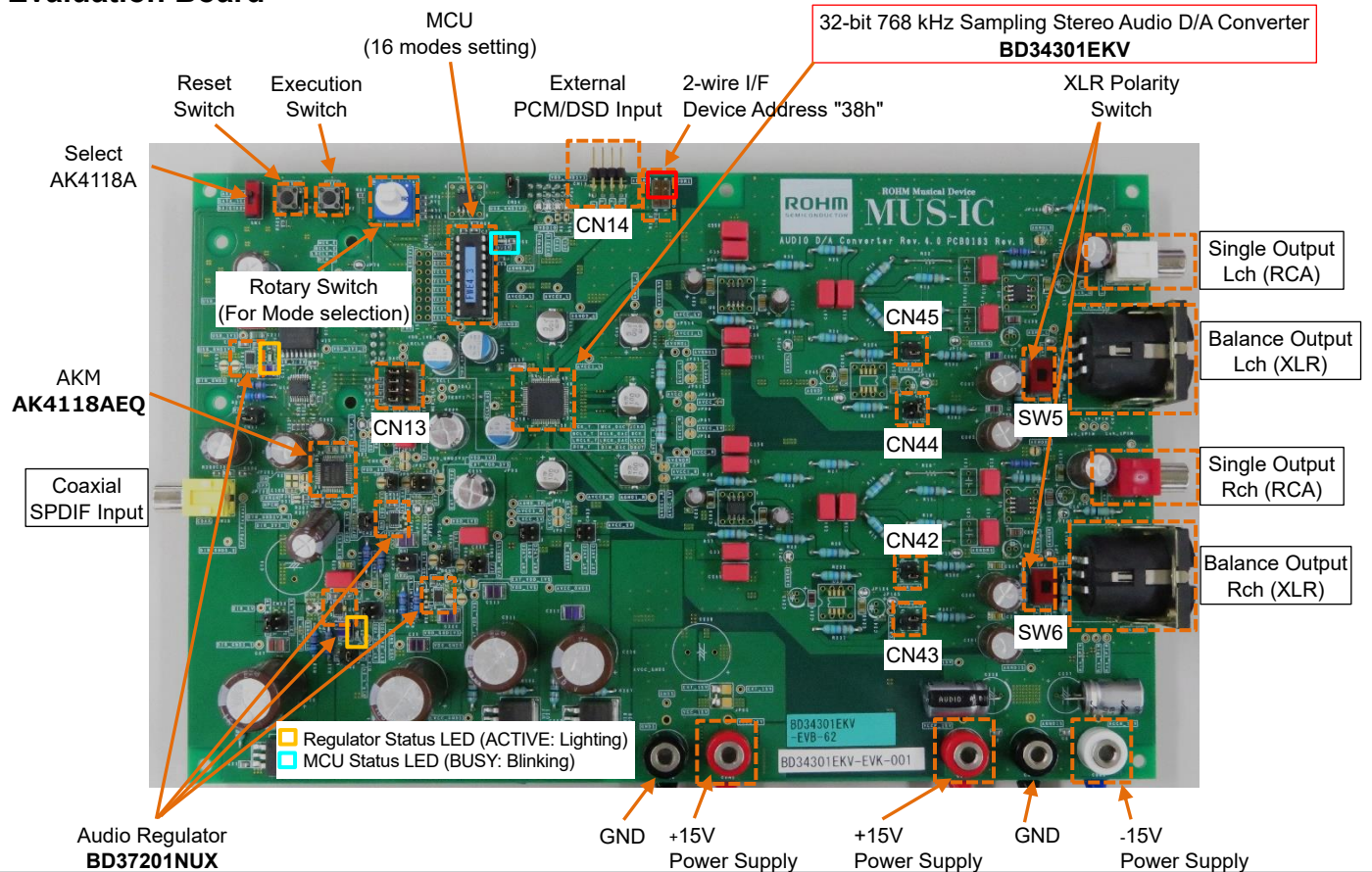
W(Typ) D(Typ) H(Max)  
12.0 mm x 12.0 mm x 1.00 mm



Evaluation Board Block Diagram

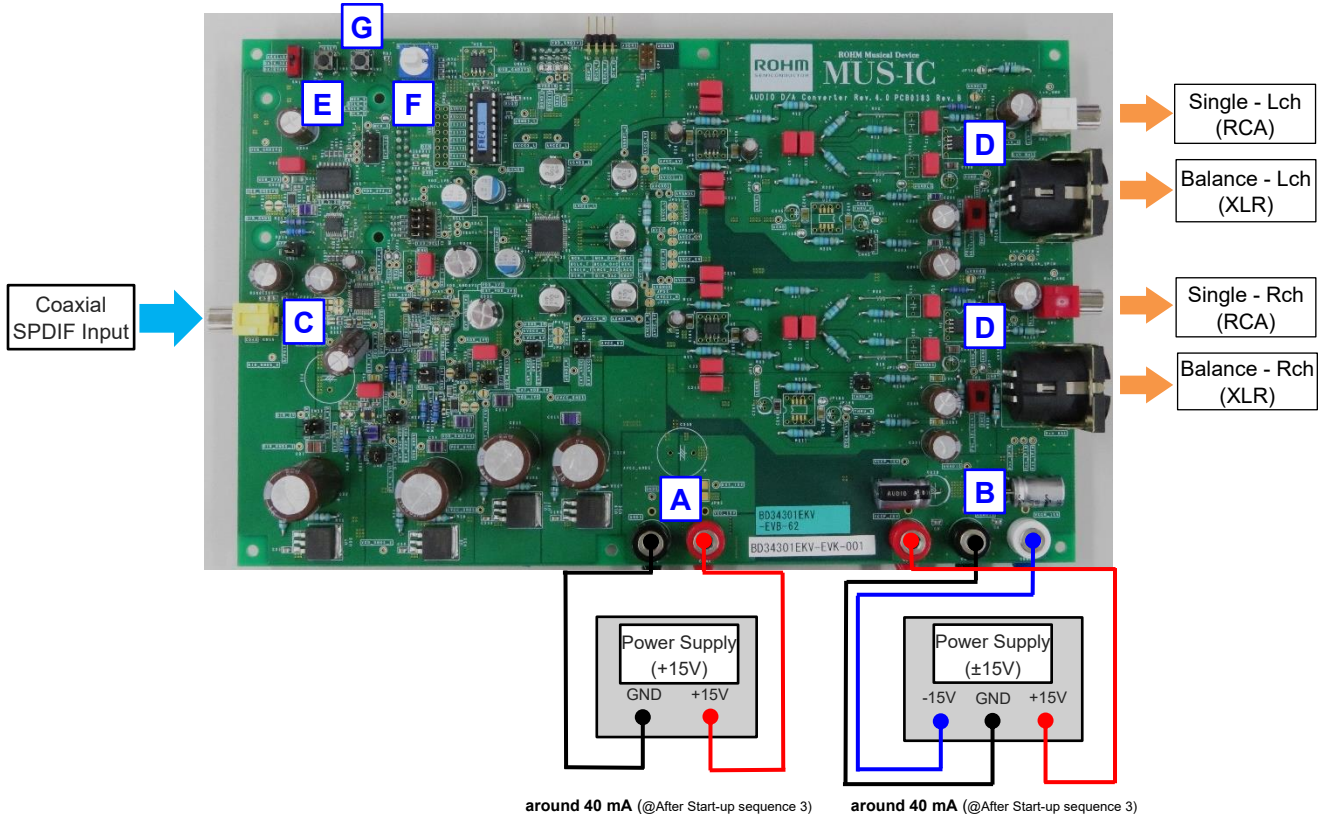


Evaluation Board



## Hardware Setup (Proceed set-up procedure from "A" to "G" in sequence)

- 1) Connect "+15V Power Supply" to "A".
- 2) Connect "±15V Power Supply" to "B".
- 3) Connect "Coaxial SPDIF Input" to "C".
- 4) Connect "Single Output" or "Balance Output" to "D".



## Start-up/Shutdown Procedure

### Start-up Procedure

- 1) Power Amplifier connecting Evaluation Board Output set to "Mute ON".
- 2) Set "+15V Power Supply" turn "ON".
- 3) Set "±15V Power Supply" turn "ON".
- 4) Push Reset switch "E".
- 5) Turn the Rotary Switch "F" to select Mode.
- 6) Push Execution Switch "G".
- 7) MCU status indicator LED will blink during BUSY. Wait for LED to turn off.
- 8) Power Amplifier connecting Evaluation Board Output set to "Mute OFF".
- 9) Start playback.

### Shutdown Procedure

- 1) Stop playback.
- 2) Power Amplifier connecting Evaluation Board Output set to "Mute ON"
- 3) Set "±15V Power supply" turn "OFF".
- 4) Set "+15V Power supply" turn "OFF".

### Mode Selection

There are 16 Modes selectable on BD34301EKV Evaluation Board, as listed in the following table:

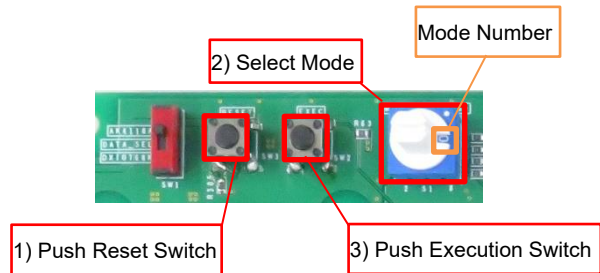
It is possible to select each mode by Rotary Switch.

Mode No. of Rotary Switch	Format	Filter Type	Input	MCLK	FIR Filter <sup>*4</sup>		Over Sampling Rate <sup>*6</sup>						Sampling Frequency fs [kHz]									
					FirAlgo [3:0]	FirCoef [2:0]	X8	X16	x32	x64	x128	x256	44.1 / 48	88.2 / 96	176.4 / 192	352.8 / 384	705.6 / 768					
Mode 0 <sup>*1</sup>	PCM (I <sup>2</sup> S)	Sharp1	Coaxial SPDIF	512 x fs	1h	0h																
Mode 1 <sup>*1</sup>				256 x fs	2h	1h																
Mode 2 <sup>*1</sup>				128 x fs	4h	2h																
Mode 3 <sup>*1</sup>			External PCM (I <sup>2</sup> S)	22.579 MHz (fs=705.6 k) 24.576 MHz (fs=768 k)	8h	0h	O															O
Mode 4		Not Available																				
Mode 5 <sup>*2</sup>		Sharp2	Coaxial SPDIF	512 x fs	1h	0h																
Mode 6 <sup>*2</sup>				256 x fs	2h	1h																
Mode 7 <sup>*2</sup>		128 x fs		4h	2h																	
Mode 8 <sup>*2,3</sup>		Slow		512 x fs	1h	3h																
Mode 9 <sup>*2</sup>			256 x fs	2h	4h																	
Mode A <sup>*2</sup>			128 x fs	4h	5h																	
Mode B <sup>*2</sup>		-	External PCM (I <sup>2</sup> S)	22.579 MHz (fs=352.8 k, 705.6 k) 24.576 MHz (fs=384 k, 768 k)	8h	0h																O
Mode C <sup>*2</sup>				8h	0h																	
Mode D <sup>*2</sup>		DSD	-	External DSD	-	0h	0h	DSD Filter <sup>*5</sup>	02	Input Signal: DSD64(2.8M), DSD128(5.6M)												
Mode E <sup>*2</sup>						0h	0h		01	Input Signal: DSD256(11.2M)												
Mode F <sup>*2</sup>						0h	0h		00	Input Signal: DSD512(22.4M)												

\*1 Mode 0 to 3 are Electrical Characteristics in BD34301EKV Datasheet.  
 \*2 Mode 5 to F are Recommended Settings in BD34301EKV Datasheet.  
 \*3 Although Recommended setting is HpcMode = 1, only Mode 8 uses HpcMode = 0.  
 \*4 Refer to BD34301EKV Datasheet P28 [18. Address 30h, 31h (FIR Filter 1, FIR Filter 2)]  
 \*5 Refer to BD34301EKV Datasheet P23 [11. Address 16h (DSD Filter)]  
 \*6 Over Sampling Rate of FIR filter is included.

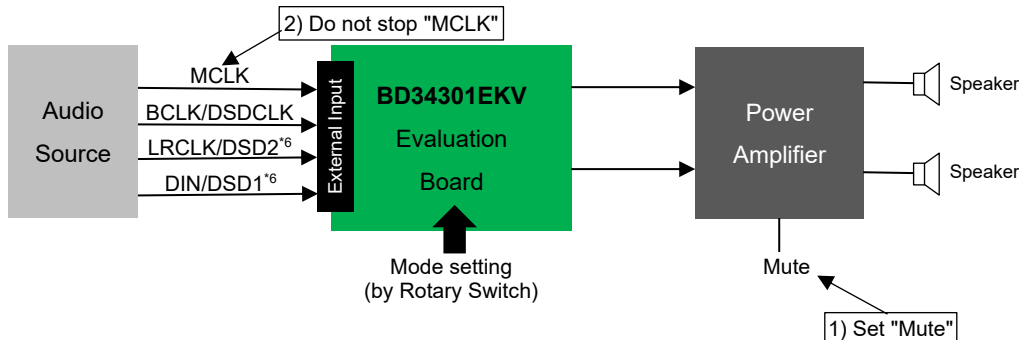
### Mode Setting

- 1) Push Reset Switch.
- 2) Turn the Rotary Switch to select Mode.
- 3) Push Execution Switch.



### Mode Change

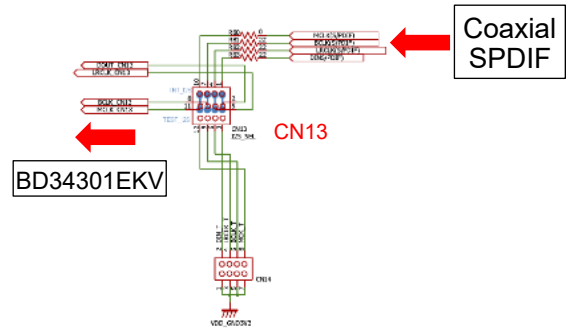
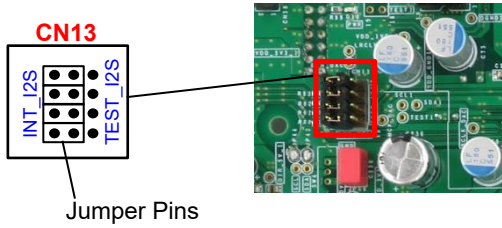
- 1) Set to Mute the Power Amplifier connecting Evaluation Board Output to avoid pop-noise when changing Mode in the Rotary Switch.
- 2) Do not stop input to "MCLK" when changing Mode, while selecting the "External PCM or DSD" input.



## Input Terminal

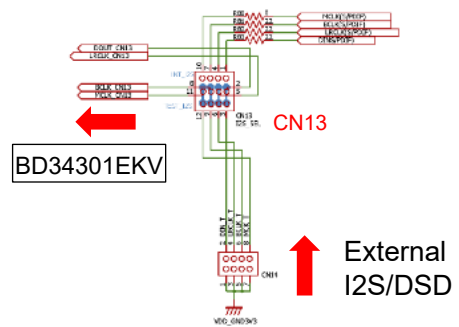
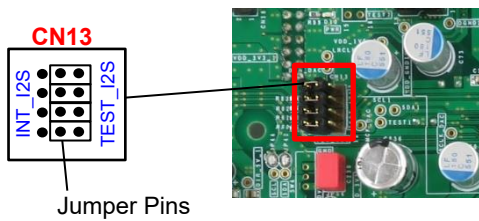
### Coaxial SPDIF Input

Connect between BD34301EKV(Center) and "INT\_I2S"(Left side) by using 4 Jumper Pins.

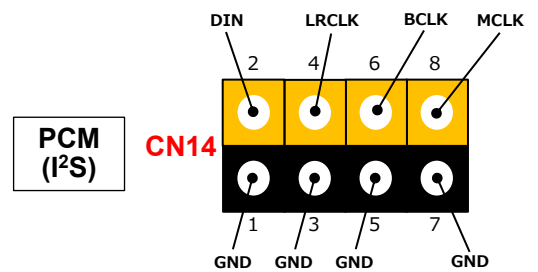
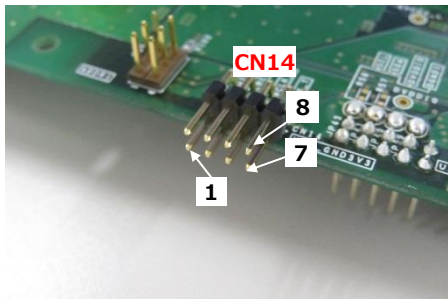


### External PCM(I<sup>2</sup>S) /DSD Input

Connect between BD34301EKV(Center) and "TEST\_I2S"(Right side) by using 4 Jumper Pins.

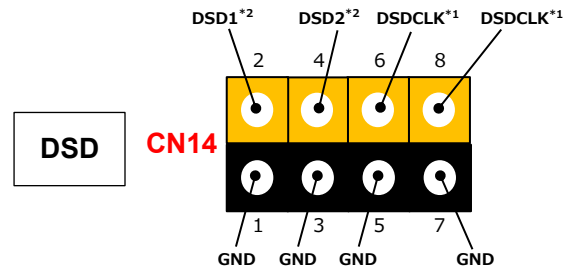


When using External Input, Pin assignments are as follows.



\*1 "DSDCLK" should be input to both the 6pin and 8pin of CN14.

\*2 DSD1 and DSD2 are swapped because Register 13h sets to 1h on this board.



### Output Terminal

#### UNBAL(RCA) - (default)

The sound quality is tuned using this pin for this EVK.

#### BAL(THRU-XLR)<sup>\*1</sup> - (Direct Output from IV Conversion Amp<sup>\*2</sup>)

Connect Jumper Pins to "THRU\_P" side at CN42, CN44.

Connect Jumper Pins to "THRU\_N" side at CN43, CN45.

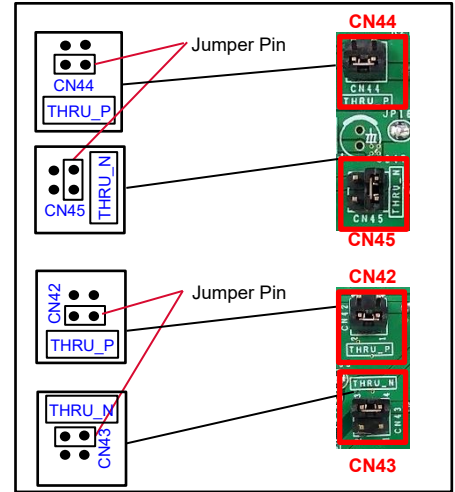
The Polarity of XLR (Hot/Cold) can be switched by SW5, SW6.

<sup>\*1</sup> This terminal is direct output from IV Conversion Amp.

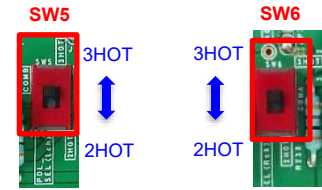
<sup>\*2</sup> Refer to Page 2, Evaluation Board Block Diagram.

XLR Output Polarity	Switch Position	
	SW5(Lch)	SW6(Rch)
2-HOT, 3-COLD	"3-HOT" <sup>*3</sup>	"2-HOT"
2-COLD, 3-HOT	"2-HOT"	"3-HOT"

<sup>\*3</sup> Polarity inverted by register 14h.



Jumper Pin Setting for BAL(THRU-XLR)



Polarity Switch for XLR Output

#### BAL(Op-amp-XLR) - (Additional Op-amp needed)<sup>\*4</sup>

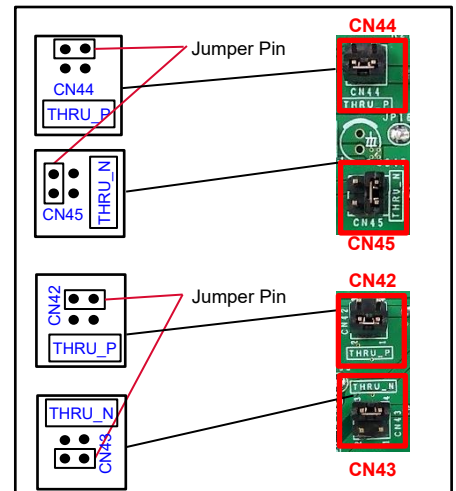
Connect Jumper Pins to "NOT THRU\_P" side at CN42, CN44.

Connect Jumper Pins to "NOT THRU\_N" side at CN43, CN45.

The Polarity of XLR Hot/Cold can be switched by SW5, SW6.

<sup>\*4</sup> Op-amp for XLR Output is not implemented. Implement prepared Op-amp to U23 and U24.  
Operation confirmed: NE5532, OPA2134

XLR Output Polarity	Switch Position	
	SW5(Lch)	SW6(Rch)
2-HOT, 3-COLD	"2-HOT"	"2-HOT"
2-COLD, 3-HOT	"3-HOT"	"3-HOT"



Jumper Pin setting for BAL(Op-amp-XLR)



U23

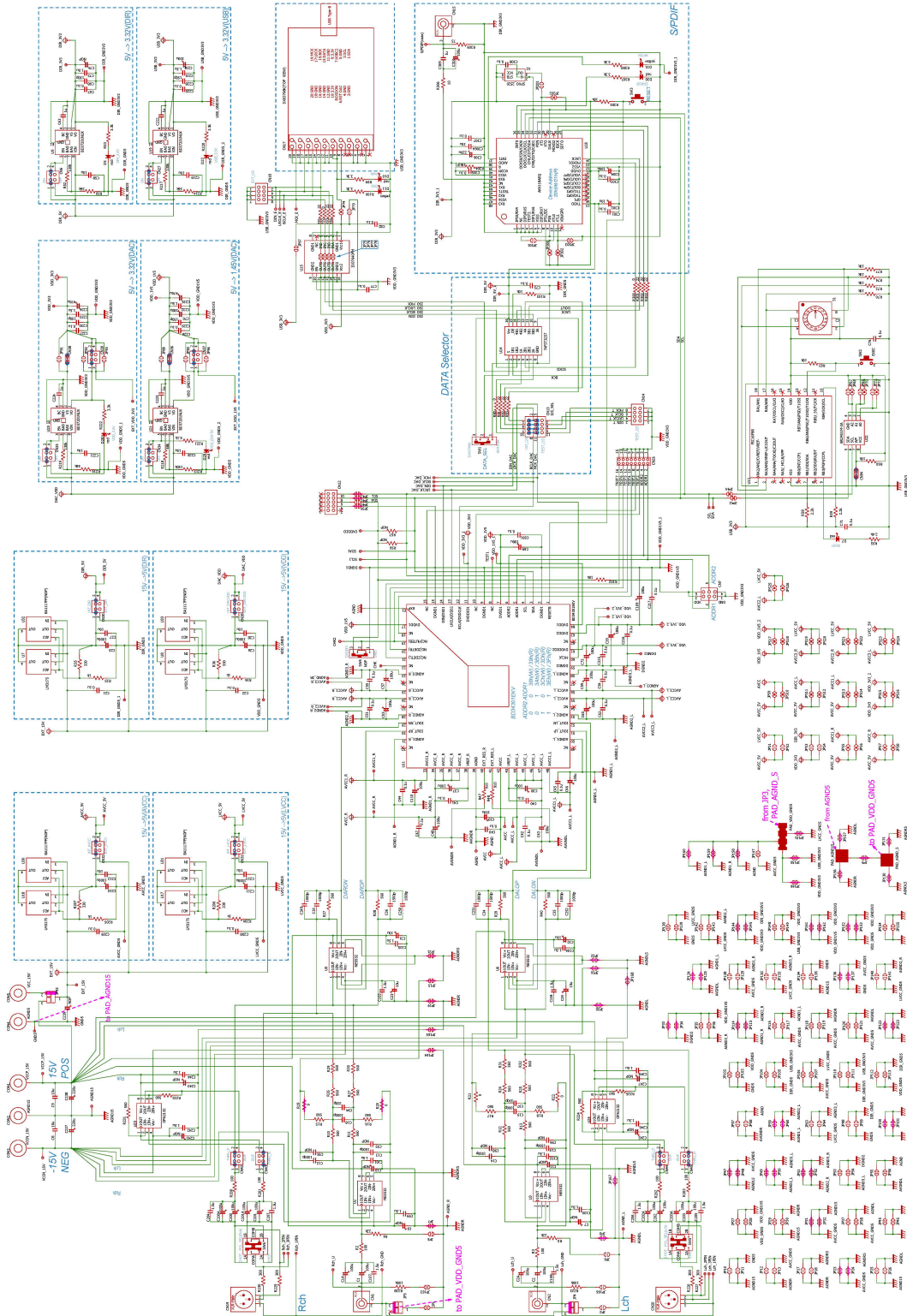


U24

Op-amp placement for BAL(Op-amp-XLR)

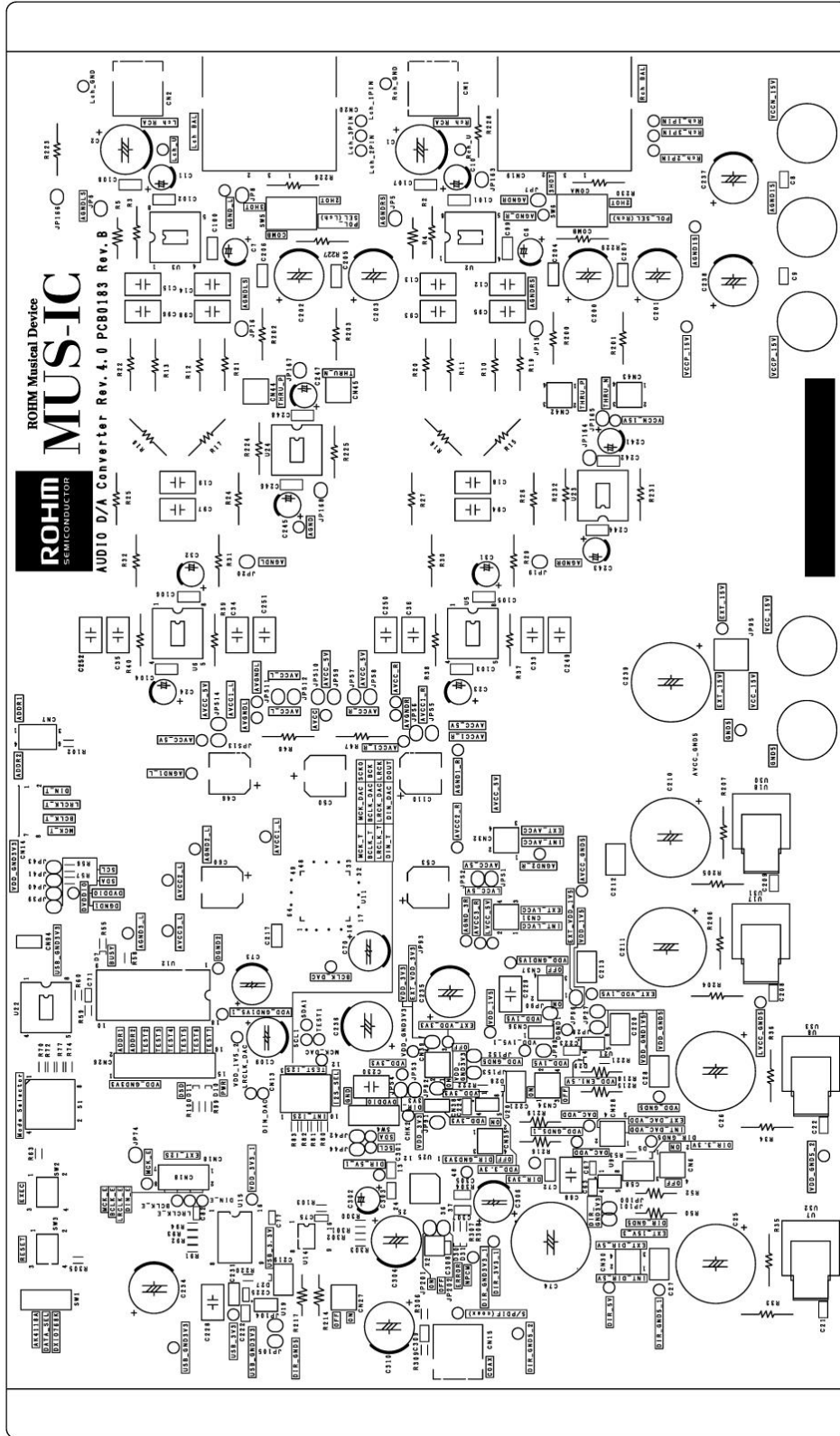
### Evaluation Board Schematic

Click inside Circuit Diagram area to open high resolution Circuit Diagram.



PCB Patterns

Top Silk

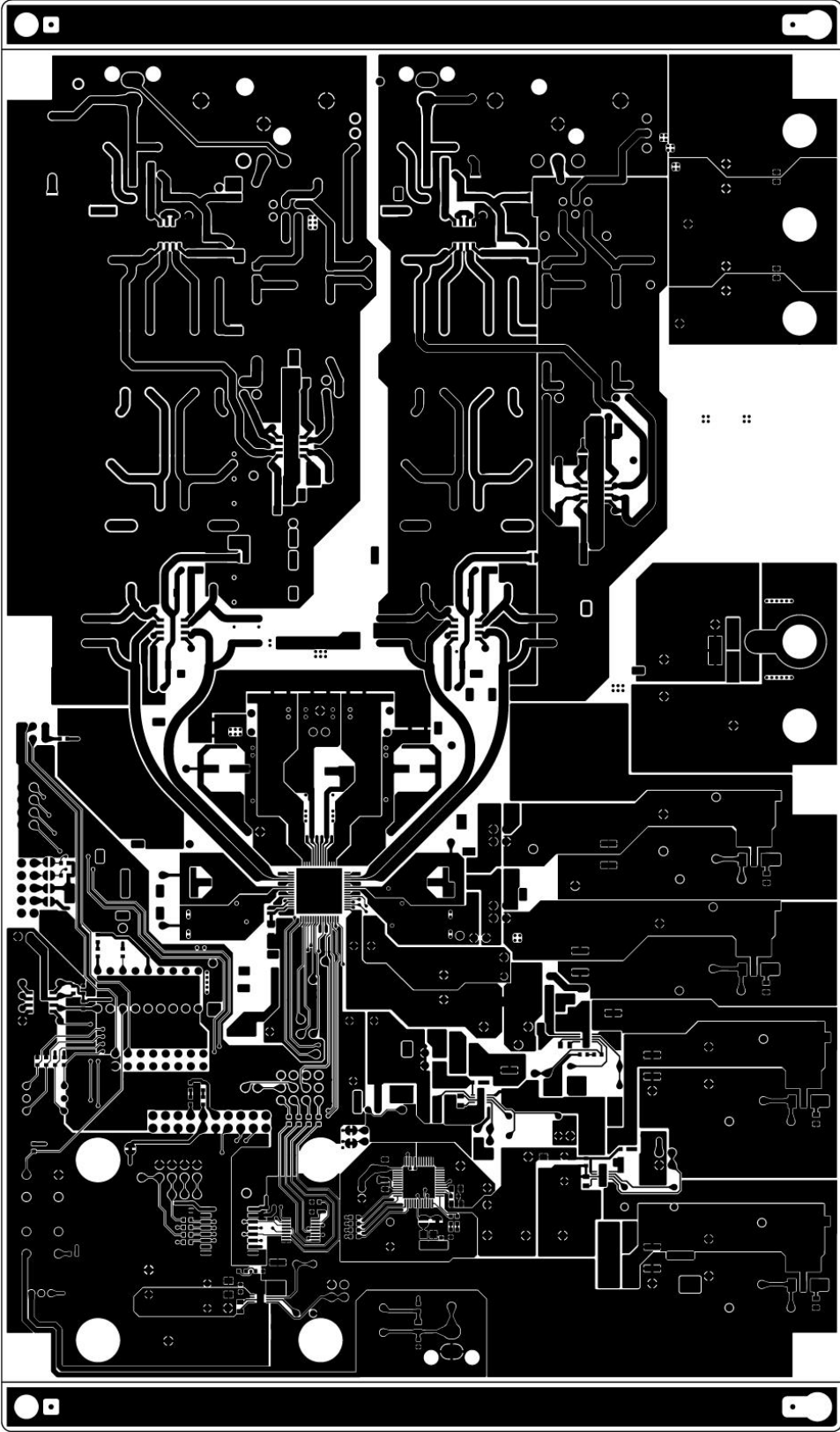




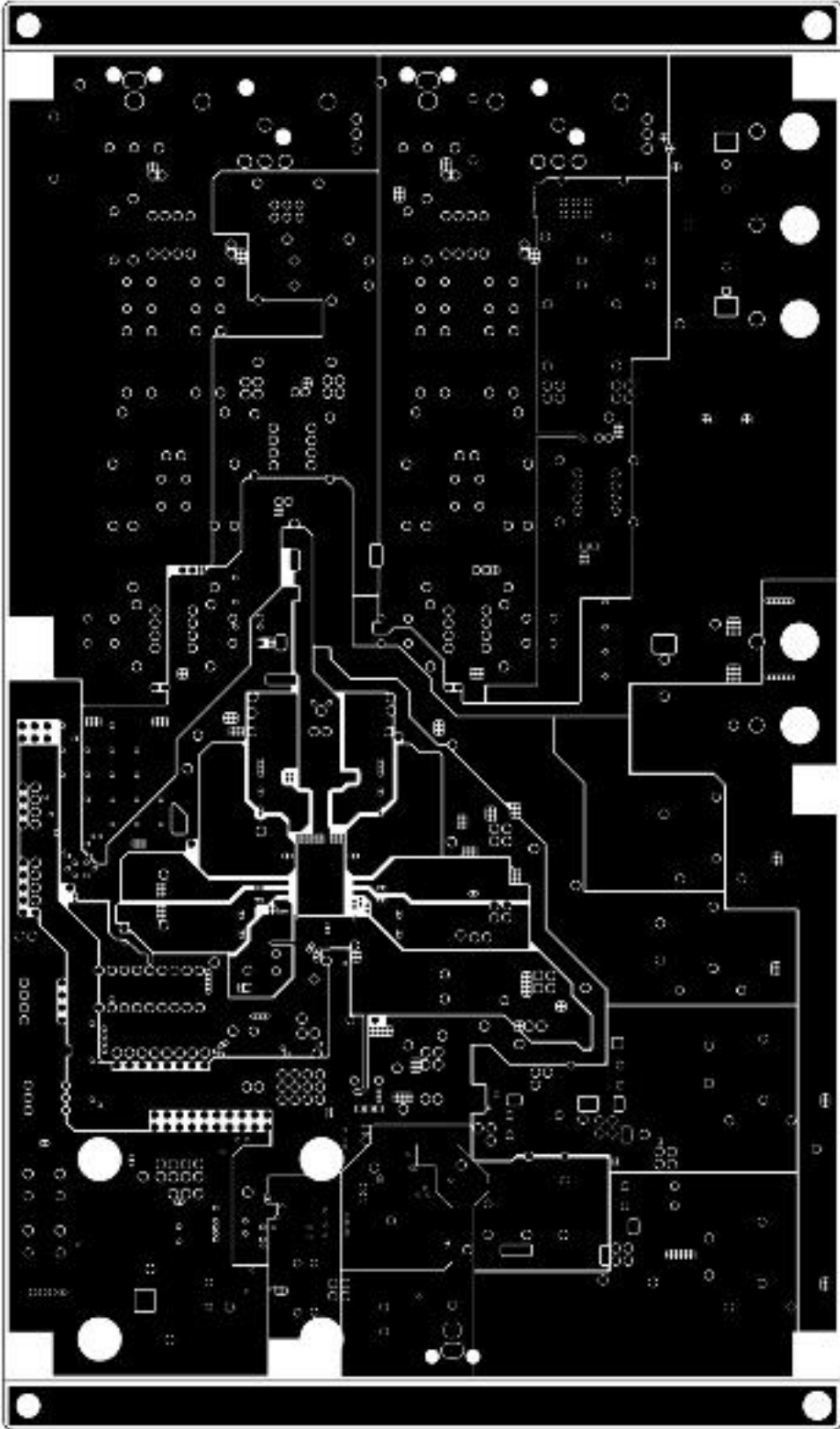
Bottom Silk



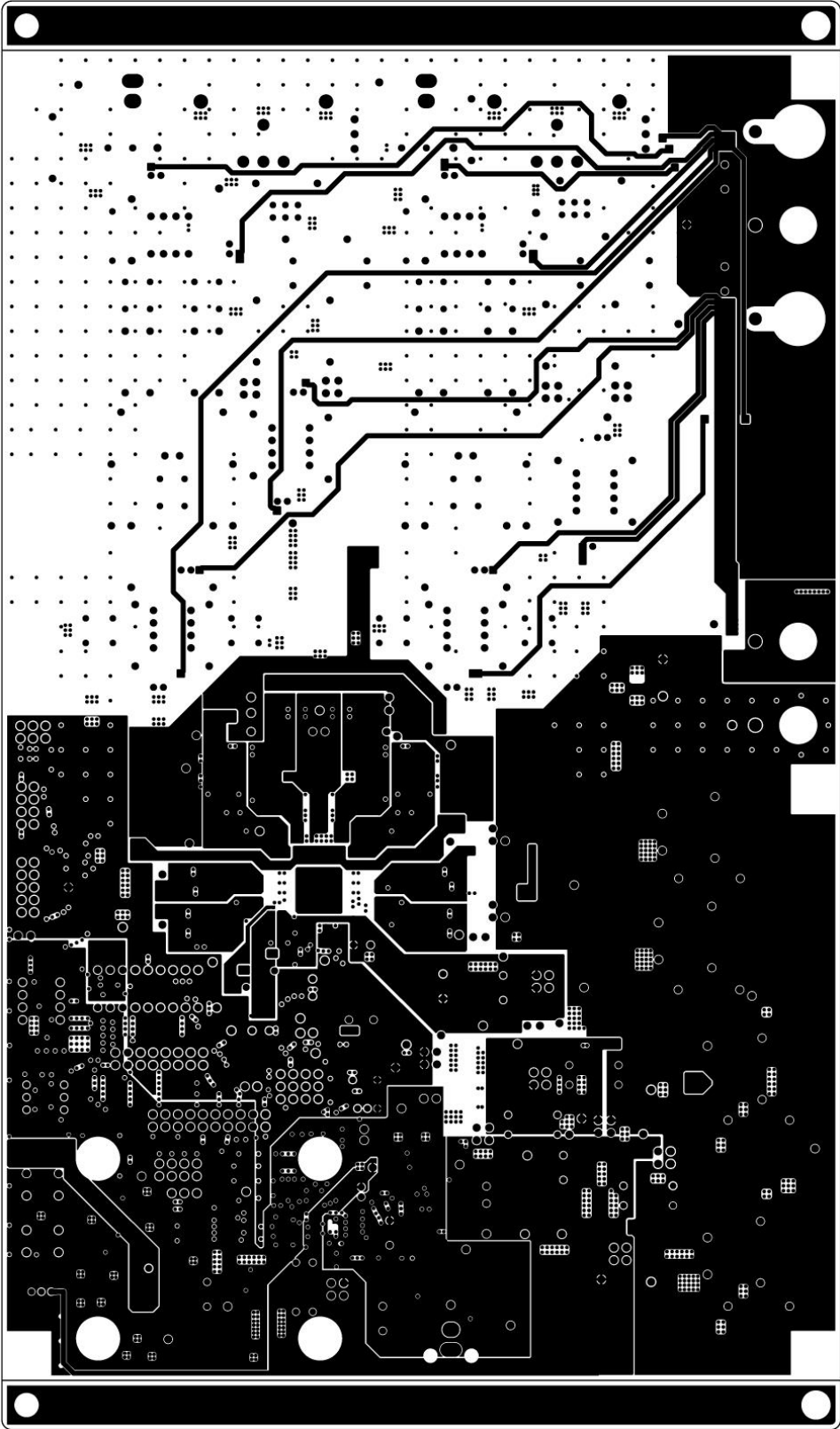
TOP Layer



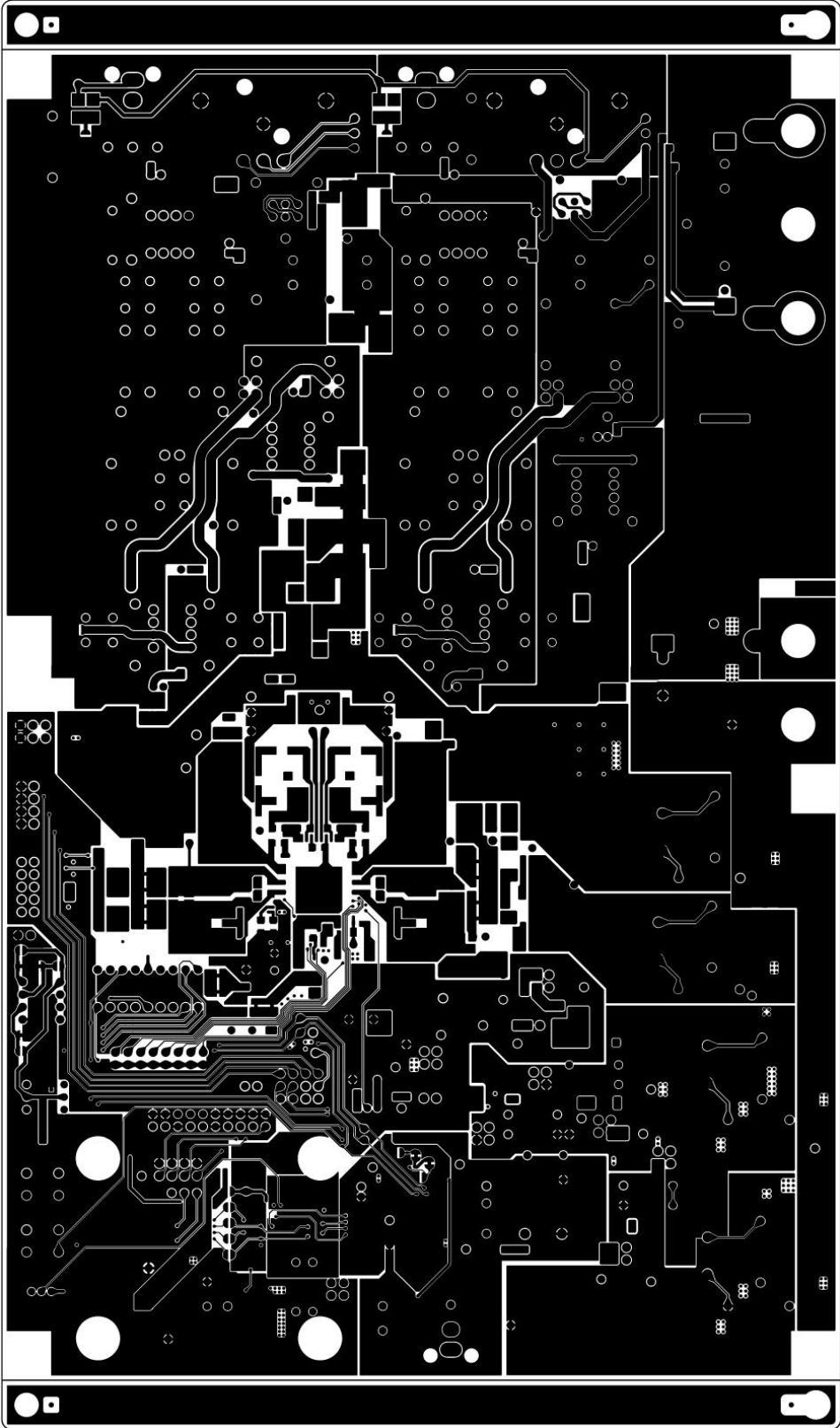
M1 Layer



M2 Layer



Bottom Layer



## Bill of Materials

	Quantity	Type	Component No.	Manufacturer	Product No.
Capacitor	10	0.1 $\mu$ F	C67, C71, C75, C76, C77, C82, C225, C226, C227, C308	Murata	GCM188L81H104KA57D
	4	0.1 $\mu$ F	C301, C303, C305, C307	Rubycon	25MU104KZ22012
	19	0.1 $\mu$ F	C21, C22, C40, C41, C42, C44, C45, C47, C49, C51, C52, C54, C55, C208, C209, C215, C216, C217, C691	Murata	GRM21BB11H104KA01L
	22	1.5 $\mu$ F	C72, C99, C100, C101, C102, C103, C104, C105, C106, C107, C108, C204, C205, C206, C207, C231, C232, C233, C242, C244, C246, C248	Rubycon	16MU155MA23216
	6	1000 pF	C18, C19, C249, C250, C251, C252	WIMA	FKP2D011001D00
	4	1000 $\mu$ F	C25, C26, C210, C211	ELNA	RFS-16V102MJ7#5
	15	100 $\mu$ F	C1A, C1B, C2A, C2B, C200A, C200B, C201A, C201B, C202A, C202B, C203A, C203B, C234, C304, C310	ELNA	RFS-16V101MH3#5
	2	470 $\mu$ F	C235, C236	Toshin Kogyo	1CUTSJ471M0
	2	220 $\mu$ F	C237, C238	Toshin Kogyo	1HUTSJ221M0
	11	100 $\mu$ F	C37, C38, C43, C46, C48, C50, C53, C57, C59, C60, C110	Nippon Chemi-con	EMAR160ADA101MH63G
	5	10 $\mu$ F	C23, C24, C31, C32, C302	ELNA	RFS-35V100ME3#5
	2	10 $\mu$ F	C8, C9	Murata	GRM21BR61E106KA73
	9	10 $\mu$ F	C27, C28, C58, C212, C213, C219, C220, C221, C306A	Rubycon	16MU106MC44532
	8	1500 pF	C12, C13, C14, C15, C33, C34, C35, C36	WIMA	FKP2D011501D00
	4	150 pF	C68, C228, C229, C230	WIMA	FKP2D001501D00
	5	180 $\mu$ F	C39, C69, C70, C73, C109	Nichicon	PLF1C181MDO1
	5	1 $\mu$ F	C63, C222, C223, C224, C309	Murata	GRM21BB31E105KA98L
1	220 $\mu$ F	C306	ELNA	RFS-16V221MH5#5	
2	330 pF	C94, C97	WIMA	FKP2D003301D00	
Connector	1	COAX_JACK	CN1	SMK	LPR6520-0802
	1	COAX_JACK	CN2	SMK	LPR6520-0803
	1	COAX_JACK	CN15	SMK	LPR6520-0804
	2	XLR-M	CN19, CN20	Switchcraft	PQG3MRA112
	2	Terminal(Black)	CON2, CON4	Sato Parts	TJ-563-B
	2	Terminal(Red)	CON1, CON5	Sato Parts	TJ-563-R
LED	5	Red	D5, D7, D10, D27, D30	ROHM	SML-E12V8WT86P
	2	Yellow	D11, D31	ROHM	SML-E12Y8WT86
Resistor	3	0 $\Omega$	R80, R92, R300	KOA	RK73Z1JTDD
	1	10 $\Omega$	R306	KOA	RK73Z1JTD100J
	9	22 $\Omega$	R81, R82, R83, R91, R93, R94, R301, R302, R303	KOA	RK73B1JTDD220J
	1	75 $\Omega$	R309	KOA	RK73B1JTDD750J
	6	100 $\Omega$	R2, R3, R200, R201, R202, R203	Am transformer	AMRT 1/2W 100 $\Omega$
	24	560 $\Omega$	R10, R11, R12, R13, R15, R16, R17, R18, R24, R25, R26, R27, R29, R30, R31, R32, R37, R38, R39, R40, R224, R225, R231, R232	Am transformer	AMRT 1/2W 560 $\Omega$
	2	910 $\Omega$	R47, R48	Am transformer	AMRT 1/2W 910 $\Omega$
	9	10 k $\Omega$	R60, R63, R70, R72, R74, R77, R102, R103, R305	KOA	RK73B1JTDD103J
	1	10 k $\Omega$ (F)	R304	KOA	RK73H1JTDD1002F
	4	1 k $\Omega$	R33, R34, R204, R205	Am transformer	AMRT 1/2W 1k $\Omega$
	3	130 k $\Omega$	R52, R217, R219	Yageo	MFR-25FBF52-130K
	1	150 k $\Omega$	R215	Yageo	MFR-25FBF52-150K
	2	2.2 k $\Omega$	R58, R59	KOA	RK73B1JTDD222J
	1	2.4 k $\Omega$	R55	KOA	RK73B1JTDD242J
	2	22 k $\Omega$	R4, R5	Yageo	MFR-25FBF52-22K
	6	3.3 k $\Omega$	R53, R99, R100, R220, R307, R308	KOA	RK73B1JTDD332J
	4	330 $\Omega$	R35, R36, R206, R207	Am transformer	AMRT 1/2W 330 $\Omega$
	3	56 k $\Omega$	R50, R214, R216	Yageo	MFR-25FRF52-56K
	1	68 k $\Omega$	R218	Yageo	MFR-25FRF52-68K
2	100 k $\Omega$	R223, R228	Am transformer	AMRT 1/2W 100k $\Omega$	
4	300 $\Omega$	R226, R227, R229, R230	Am transformer	AMRT 1/2W 300 $\Omega$	

	Quantity	Type	Component No.	Manufacturer	Product No.
Switch	1	Rotary Switch	S1	Excel Cell Electronic	ERD216RSZ
	1	SPDT Switch	SW1	NKK Switches	SS-12SBP2
	2	Tactile Switch	SW2,SW3	Alps Alpine	SKHHAJA010
	2	DPDT Switch	SW5,SW6	NKK Switches	SS-22SDP2
IC	1	Selector	U14	ON Semiconductor	74FST3257
	1	DAC	U11	ROHM	BD34301EKV
	4	Audio Regulator	U9,U19,U20,U21	ROHM	BD37201NUX
	4	LDO	U7,U8,U17,U18	Texas Instruments	LM317S
	1	EEPROM	U22	ROHM	BR24G1M-3A
	1	Digital Isolator	U15	Texas Instruments	ISO7640FM
	4	Op-amp	U2,U3,U5,U6	Texas Instruments	NE5532ADR
	1	MCU	U12	Microchip	PIC16F88
1	Digital Audio I/F	U25	Asahi Kasei Microdevices	AK4118AEQ	

## Notes

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