

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

BD34301EKV Evaluation Board

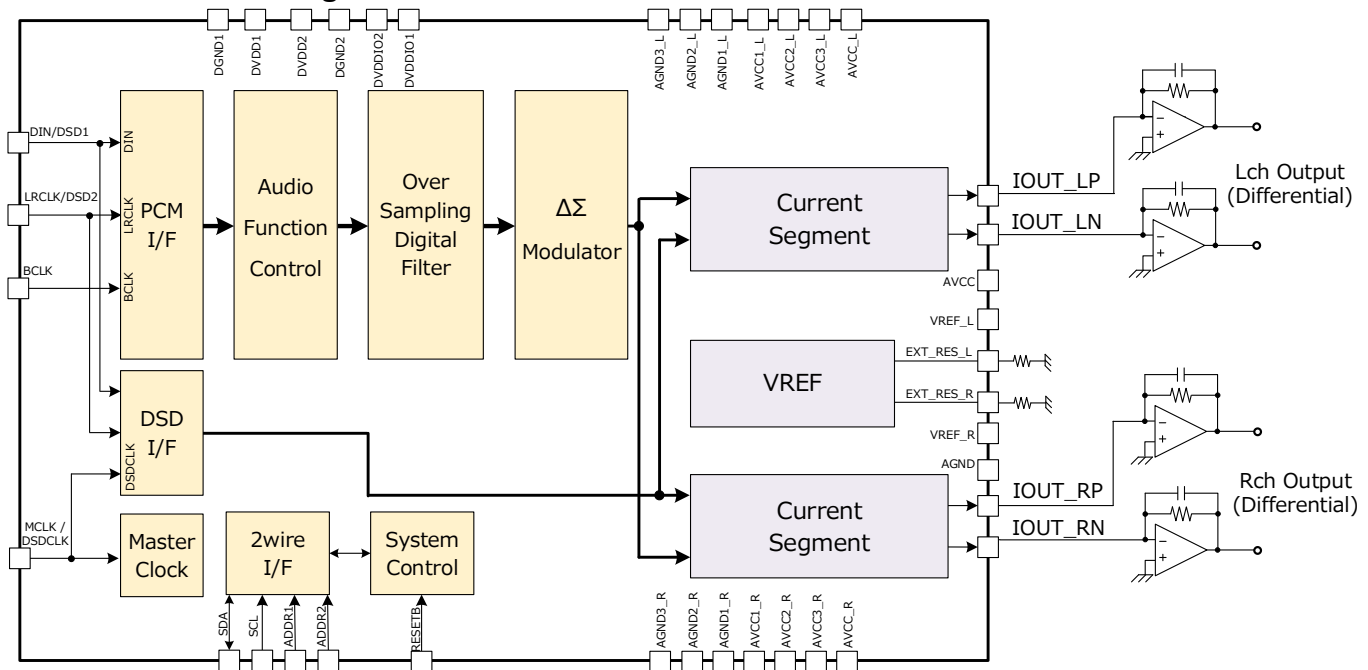
(BD34301EKV-EVK-003)

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))^{*1} 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.

^{*1} 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

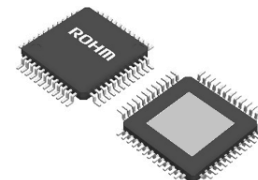
Item	Symbol	Ratings	Unit
Power Supply Voltage	AVCC ^{*1}	4.5 to 5.5	V
	DVDDIO	3.0 to 3.6	
	DVDD	1.4 to 1.6	
Operating Temperature	Topr	-25 to +85	°C

^{*1} AVCC, AVCC_R, AVCC_L in Block Diagram.

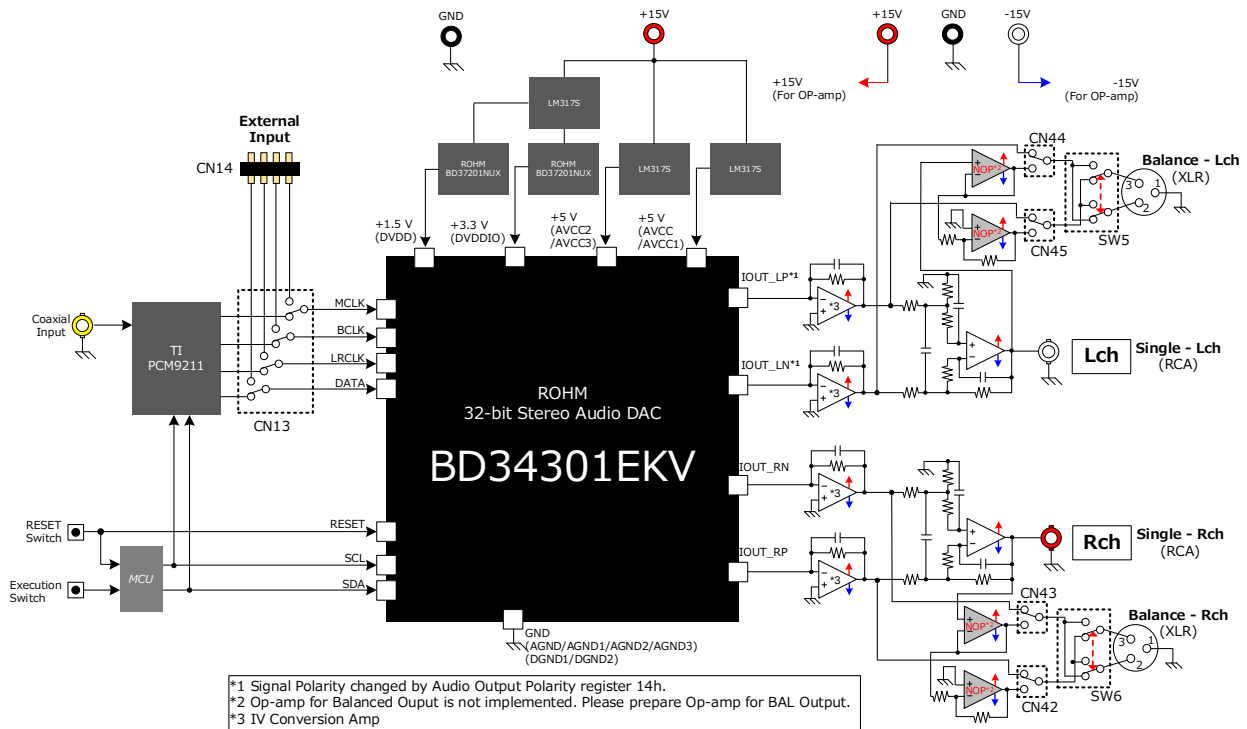
Package

HTQFP64BV (64 pin, 0.5 mm pitch)

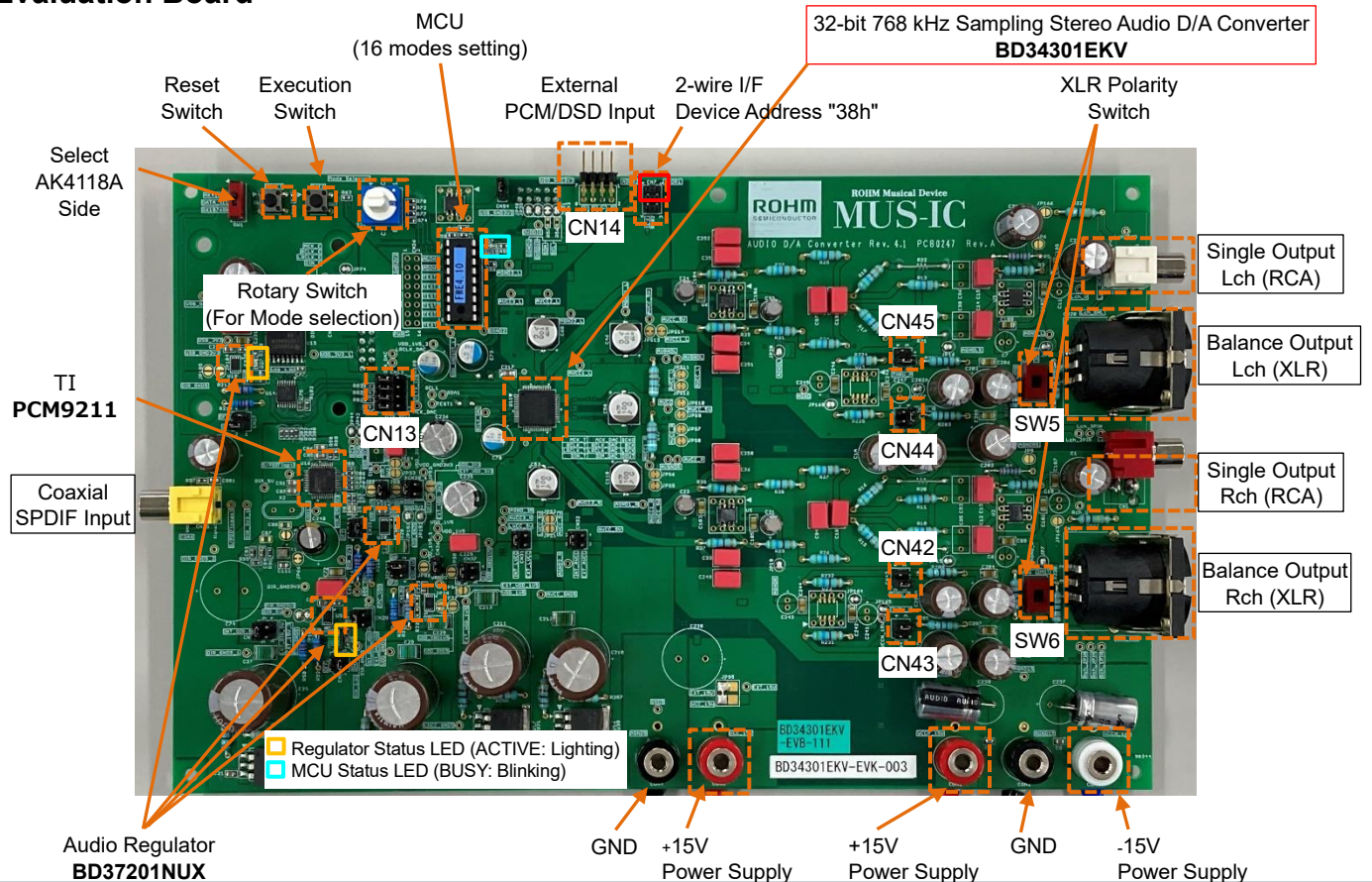
W(Typ) D(Typ) H(Max)
12.0 mm x 12.0 mm x 1.00 mm



Evaluation Board Block Diagram

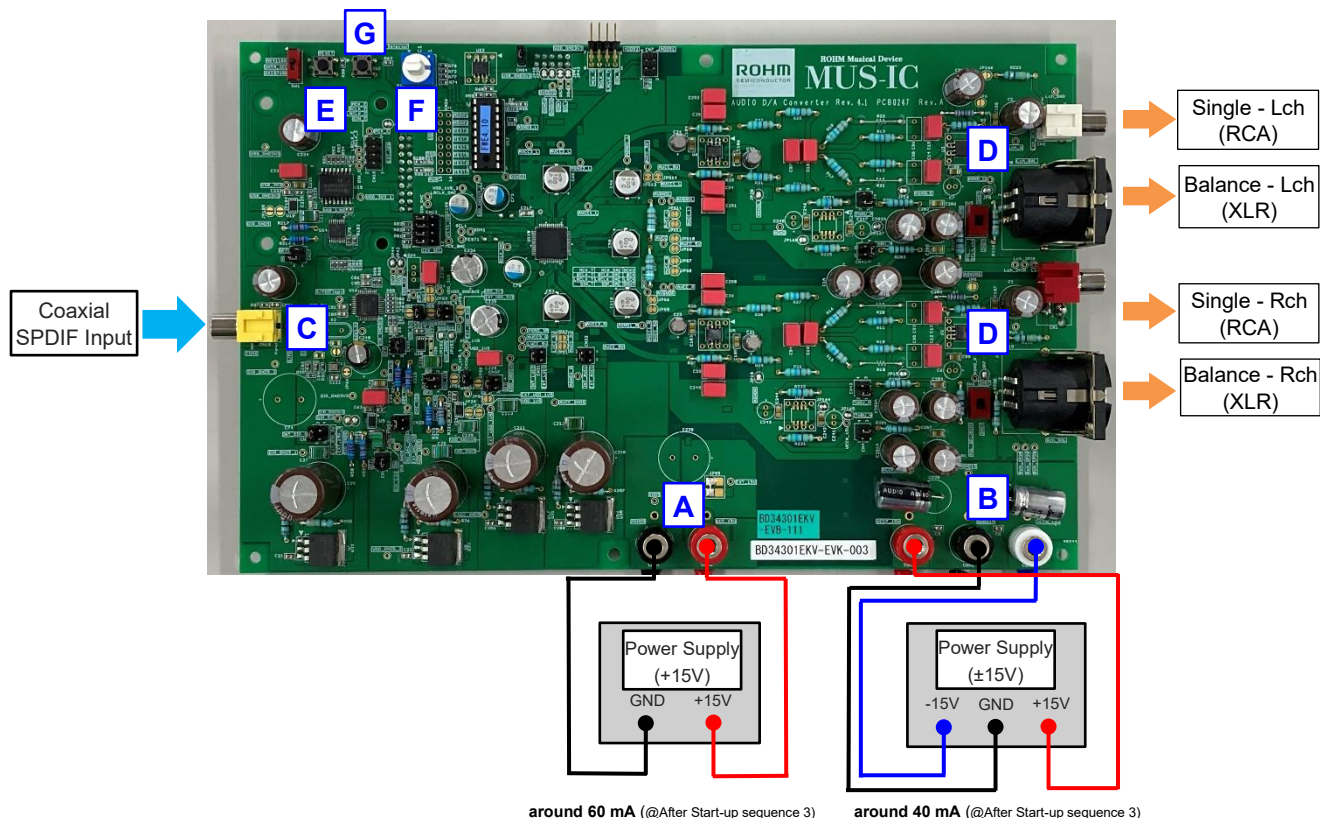


Evaluation Board



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 ⁴		Over Sampling Rate						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 ¹	PCM (I ² S)	Sharp1	Coaxial SPDIF	512 x fs	1h	0h				O			O				
Mode 1 ¹				256 x fs	2h	1h				O				O			
Mode 2 ¹				128 x fs	4h	2h			O						O		
Mode 3 ¹			External PCM (I ² S)	22.579 MHz (fs=705.6 k) 24.576 MHz (fs=768 k)	8h	0h	O									O	
Mode 4		Not Available															
Mode 5 ²		Sharp2	Coaxial SPDIF	512 x fs	1h	0h						O	O				
Mode 6 ²				256 x fs	2h	1h					O			O			
Mode 7 ²				128 x fs	4h	2h				O					O		
Mode 8 ^{2,3}		Slow		512 x fs	1h	3h					O	O					
Mode 9 ²			256 x fs	2h	4h					O			O				
Mode A ²			128 x fs	4h	5h				O					O			
Mode B ²		—	External PCM (I ² S)	22.579 MHz (fs=352.8 k, 705.6 k) 24.576 MHz (fs=384 k, 768 k)	8h	0h									O		
Mode C ²					8h	0h											O
Mode D ²	DSD	—	External DSD	—	0h	0h	DSD Filter ⁵	02	Input Signal: DSD64(2.8M), DSD128(5.6M)								
Mode E ²					0h	0h		01	Input Signal: DSD256(11.2M)								
Mode F ²					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.

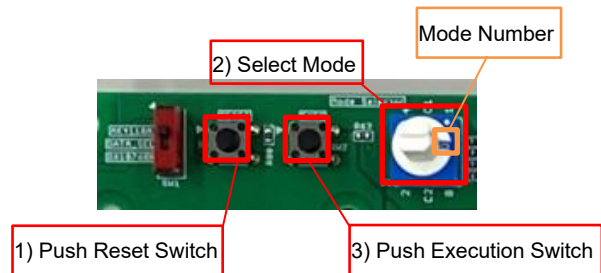
*3 Although Recommended setting is HpcMode = 1, only Mode 8 uses HpcMode = 0.

*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)]

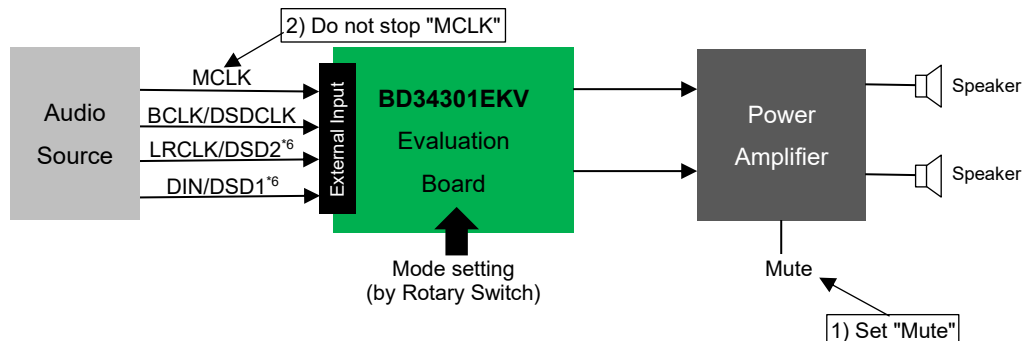
Mode Setting

- 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.

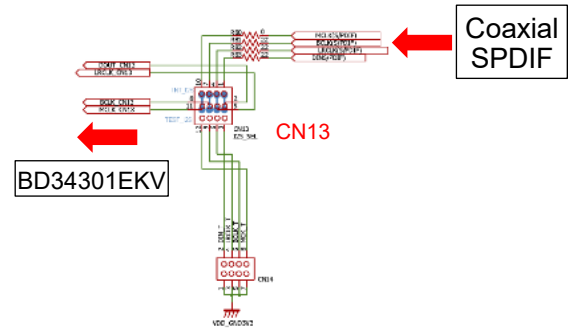
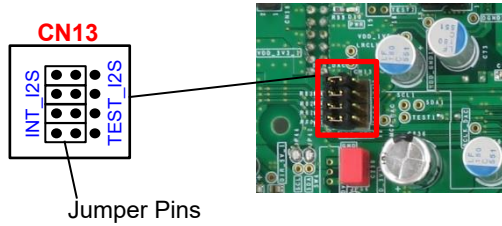


*6 DSD1 and DSD2 are swapped because Register 13h sets to 1h on this board.

Input Terminal

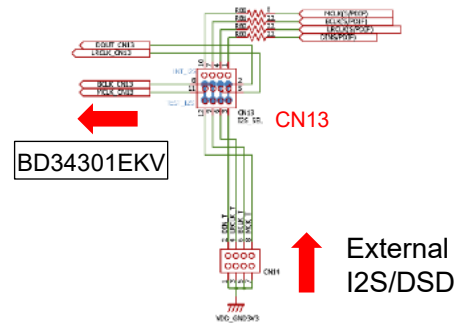
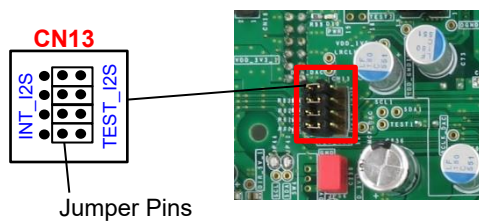
Coaxial SPDIF Input

Connect between BD34301EKV(Center) and "INT_I2S"(Left side) by using 4 Jumper Pins.

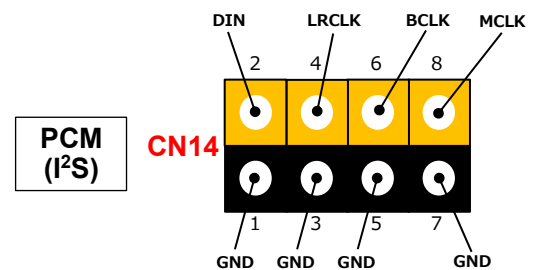
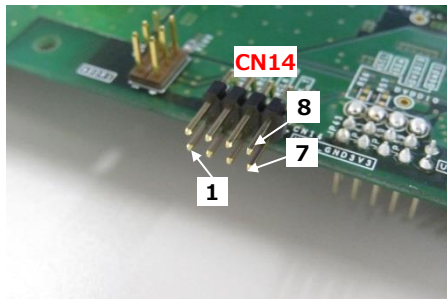


External PCM(I²S) /DSD Input

Connect between BD34301EKV(Center) and "TEST_I2S"(Right side) by using 4 Jumper Pins.

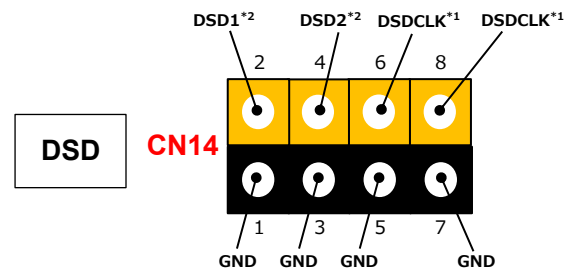


When using External Input, Pin assignments are as follows.



*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)^{*1} - (Direct Output from IV Conversion Amp^{*2})

Connect Jumper Pins to "THRU_P" side at CN42, CN44.

Connect Jumper Pins to "THRU_N" side at CN43, CN45.

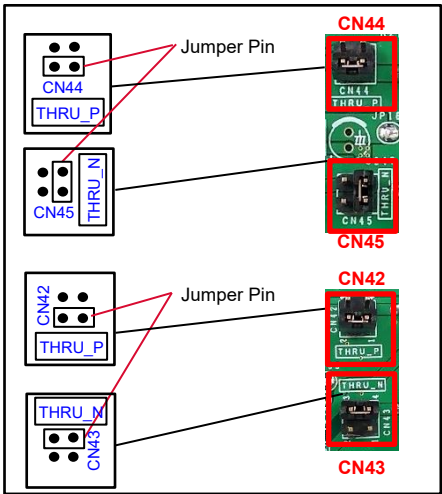
The Polarity of XLR (Hot/Cold) can be switched by SW5, SW6.

^{*1} This terminal is direct output from IV Conversion Amp.

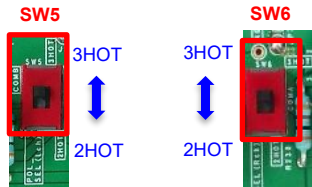
^{*2} Refer to Page 2, Evaluation Board Block Diagram.

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

^{*3} 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)^{*4}

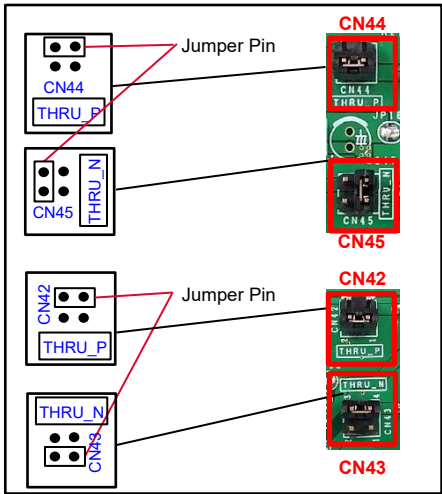
Connect Jumper Pins to "NOT THRU_P" side at CN42, CN44.

Connect Jumper Pins to "NOT THRU_N" side at CN43, CN45.

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

^{*4} 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

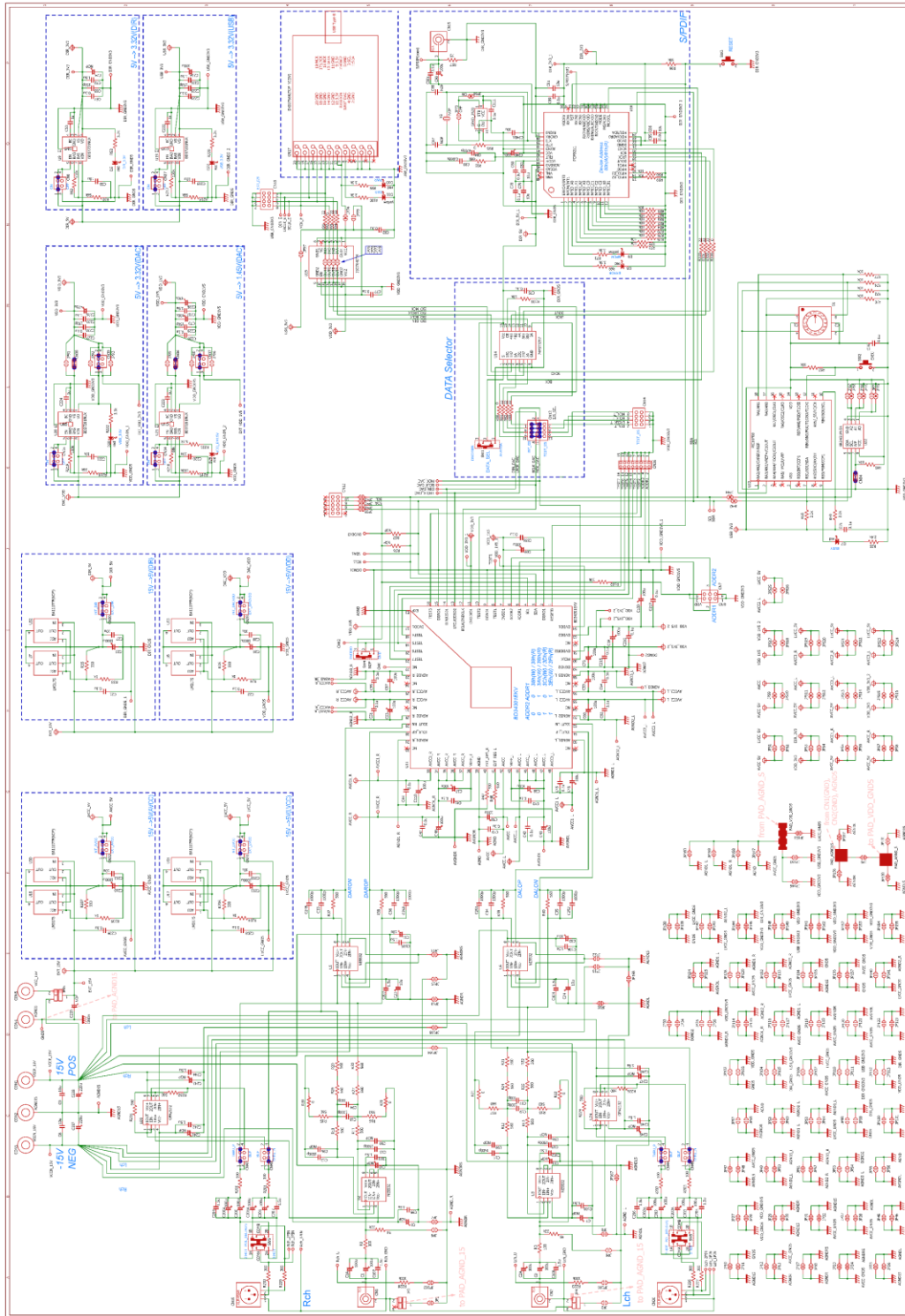


U24

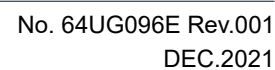
Op-amp placement for BAL(Op-amp-XLR)

Evaluation Board Schematic

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

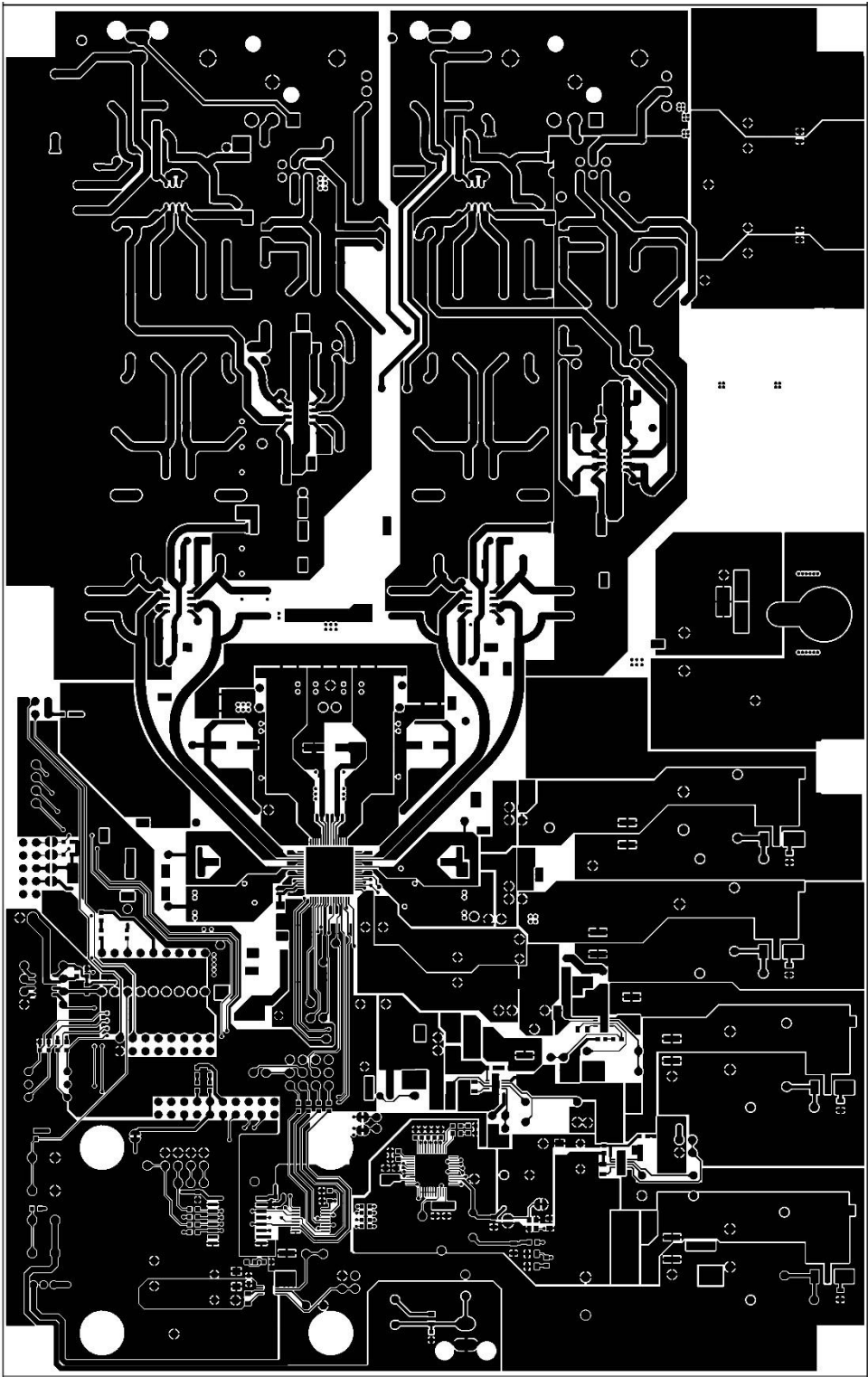


Top Silkscreen Overlay

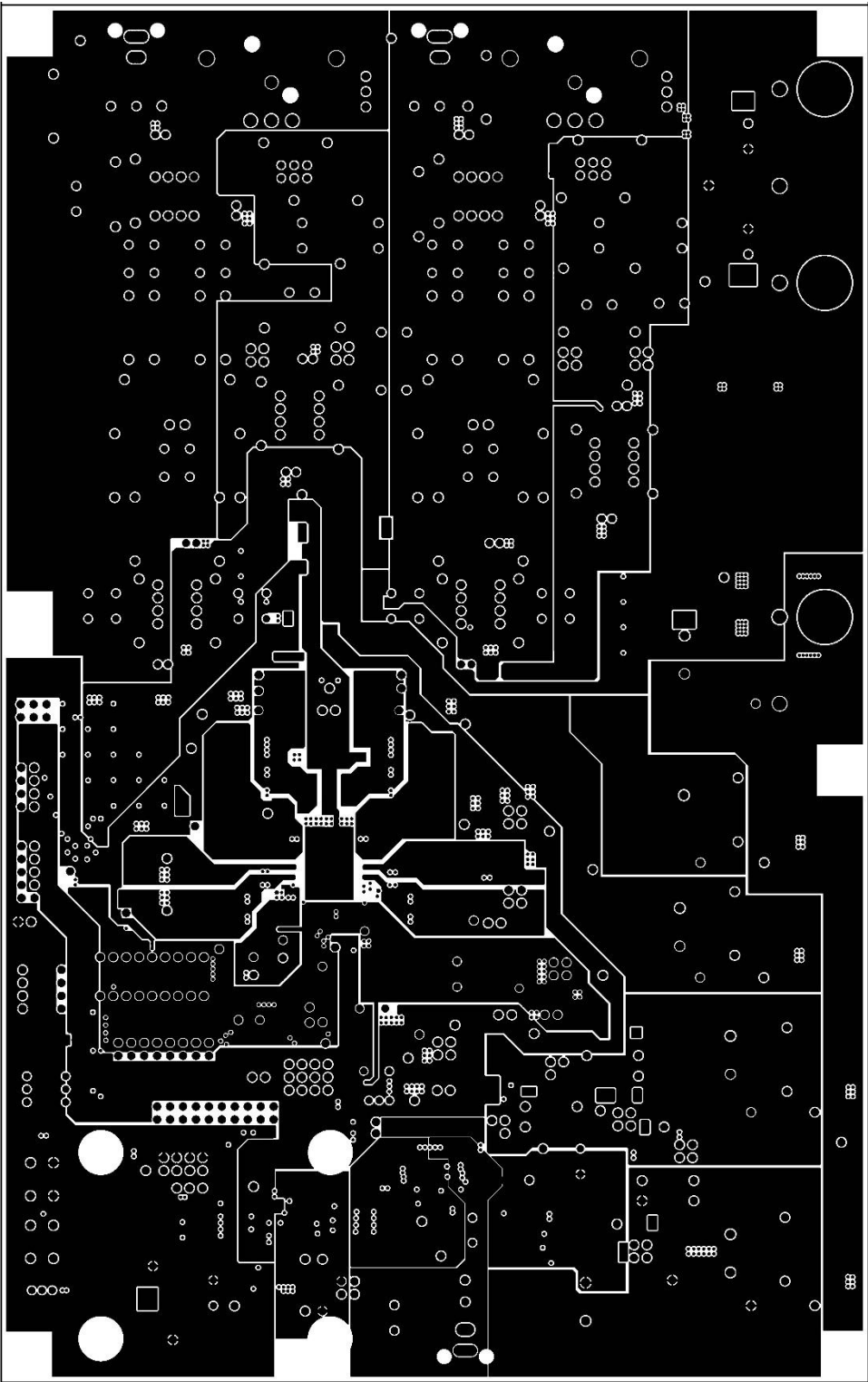


[illegible]

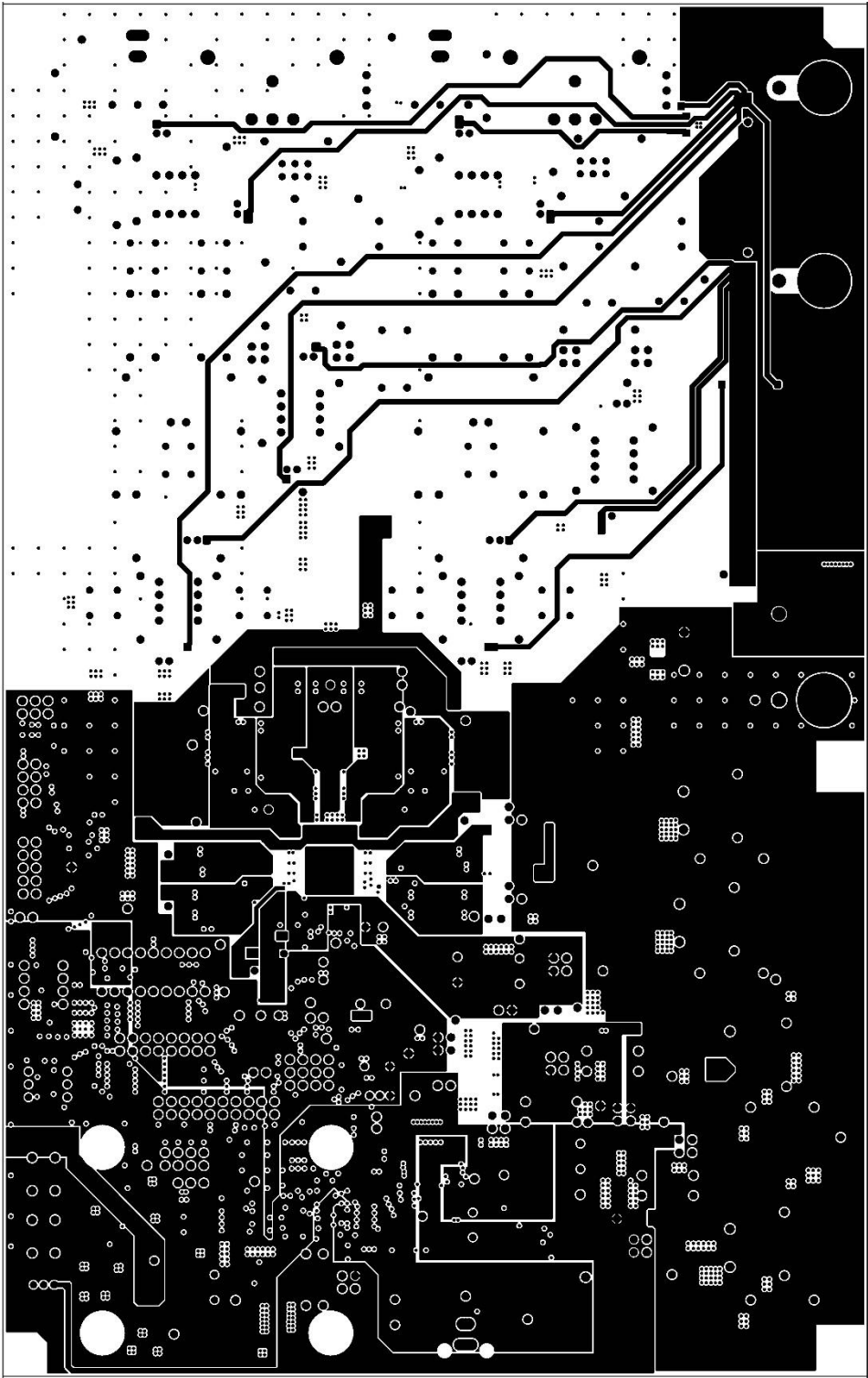
TOP Layer



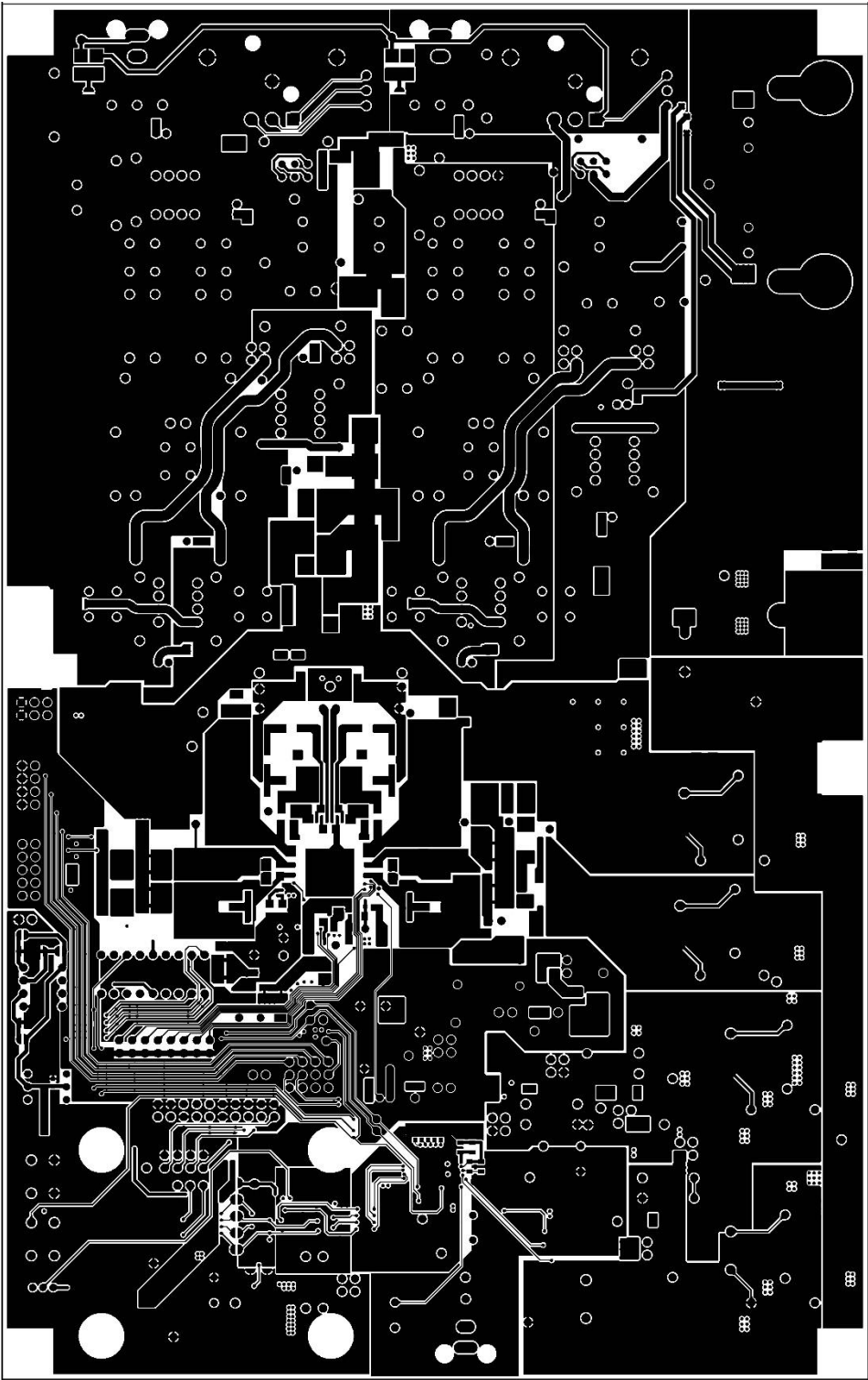
M1 Layer



M2 Layer



Bottom Layer



Bill of Materials

	Quantity	Type	Component No.	Manufacturer	Product No.
Capacitor	1	0.068 μ F	C83	Murata	GRM188R71E683KA01D
	9	0.1 μ F	C67,C71,C75,C76,C77,C82,C225,C226,C227	Murata	GCM188L81H104KA57D
	25	0.1 μ F	C21,C22,C40,C41,C42,C44,C45,C47,C49,C51,C52,C54,C55,C78,C80,C85,C89,C111,C208,C209,C215,C216,C217,C691,C901	Murata	GRM21BB11H104KA01L
	22	1.5 μ 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 μ F	C25,C26,C210,C211	ELNA	RFS-16V102MJ7#5
	14	100 μ F	C1,C1A,C2,C2A,C90,C200,C200A,C201,C201A,C202,C202A,C203,C203A,C234	ELNA	RFS-16V101MH3#5
	2	470 μ F	C235,C236	Toshin Kogyo	1CUTSJ471M0
	2	220 μ F	C237,C238	Toshin Kogyo	1HUTSJ221M0
	11	100 μ F	C37,C38,C43,C46,C48,C50,C53,C57,C59,C60,C110	Nippon Chemi-con	EMAR160ADA101MH63G
	4	10 μ F	C23,C24,C31,C32	ELNA	RFS-35V100ME3#5
	6	10 μ F	C8,C9,C79,C81,C86,C91	Murata	GRM21BR61E106KA73
	9	10 μ F	C27,C28,C58,C212,C213,C219,C220,C221,C240A	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	100 μ F	C39,C69,C70,C73,C109	Nichicon	PLF1C101MDL4TD
	4	1 μ F	C63,C222,C223,C224	Murata	GRM21BB31E105KA98L
	1	220 μ F	C240	ELNA	RFS-16V221MH5#5
	2	330 pF	C94,C97	WIMA	FKP2D003301D00
	1	4700 pF	C84	Murata	GRM188R71E472KA01D
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
	1	Terminal(White)	CON3	Sato Parts	TJ-563-W
LED	6	Red	D5,D7,D8,D10,D27	ROHM	SML-E12V8WT86P
	3	Yellow	D9,D11	ROHM	SML-E12Y8WT86
Resistor	4	0 Ω	R80,R92,R96,R300	KOA	RK73Z1JTDD
	9	22 Ω	R81,R82,R83,R91,R93,R94,R301,R302,R303	KOA	RK73B1JTDD220J
	1	75 Ω	R97	KOA	RK73B1JTDD750J
	6	100 Ω	R2,R3,R200,R201,R202,R203	Am transformer	AMRT 1/2W 100 Ω
	24	560 Ω	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 Ω
	2	910 Ω	R47,R48	KOA	AMRT 1/2W 910 Ω
	21	10 k Ω	R60,R63,R70,R72,R73,R74,R75,R76,R77,R78,R79,R84,R85,R86,R87,R88,R89,R90,R98,R102,R103	KOA	RK73B1JTDD103J
	4	1 k Ω	R33,R34,R204,R205	Am transformer	AMRT 1/2W 1k Ω
	3	130 k Ω	R52,R217,R219	Yageo	MFR-25FBF52-130K
	1	150 k Ω	R215	Yageo	MFR-25FBF52-150K
	2	2.2 k Ω	R58,R59	Koa	RK73B1JTDD222J
	1	2.4 k Ω	R55	Koa	RK73B1JTDD242J
	2	22 k Ω	R4,R5	Yageo	MFR-25FBF52-22K
	6	3.3 k Ω	R53,R69,R71,R99,R100,R220	Koa	RK73B1JTDD332J
	4	330 Ω	R35,R36,R206,R207	Am transformer	AMRT 1/2W 330 Ω
	3	56 k Ω	R50,R214,R216	Yageo	MFR-25FRF52-56K
	1	68 k Ω	R218	Yageo	MFR-25FRF52-68K
	2	100 k Ω	R223,R228	Am transformer	AMRT 1/2W 100k Ω
	4	300 Ω	R226,R227,R229,R230	Am transformer	AMRT 1/2W 300 Ω

	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	U16	Texas Instruments	PCM9211
	1	SPXO	X1	DAISHINKU	DSO221SH
X'tal	1				

Notes

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