THEVA251-BF4-V1 User's Guide

THCS251 & BF4M Evaluation Kit

THine Electronics, Inc.

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1. Introduction

1.1 Overview

THEVA251-BF4-V1 is an evaluation board equipped with a full-duplex serial transceiver IC_THCS251 and receptacles BF4-TX-14DS-0.5V and BF4-RX-14DS-0.5V that connect to the optical active connector harness.

*The 48-pin connector for 35bit I/O and optical conversion plug harness are not mounted or included.

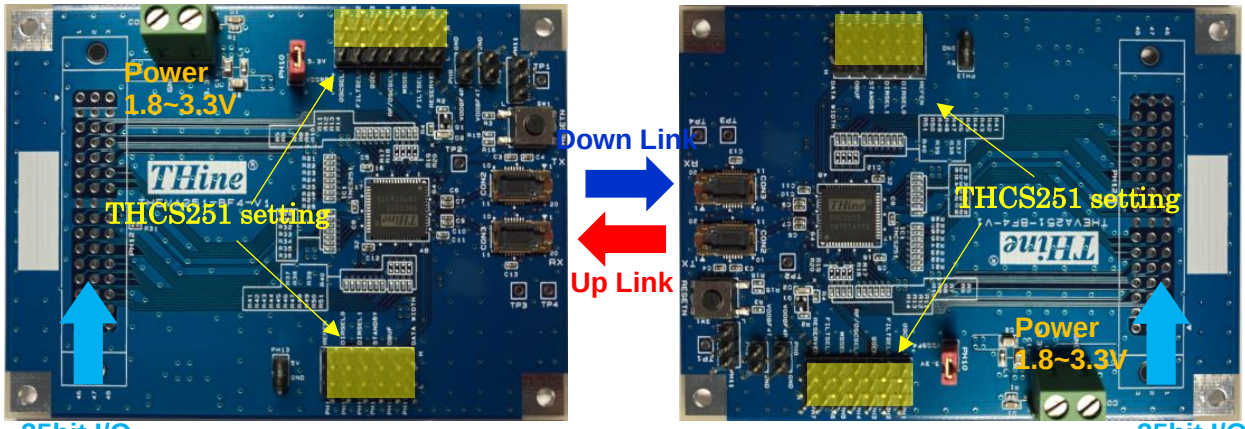


Figure 1 THEVA251-BF4-V1 Master Side / Slave Side top view

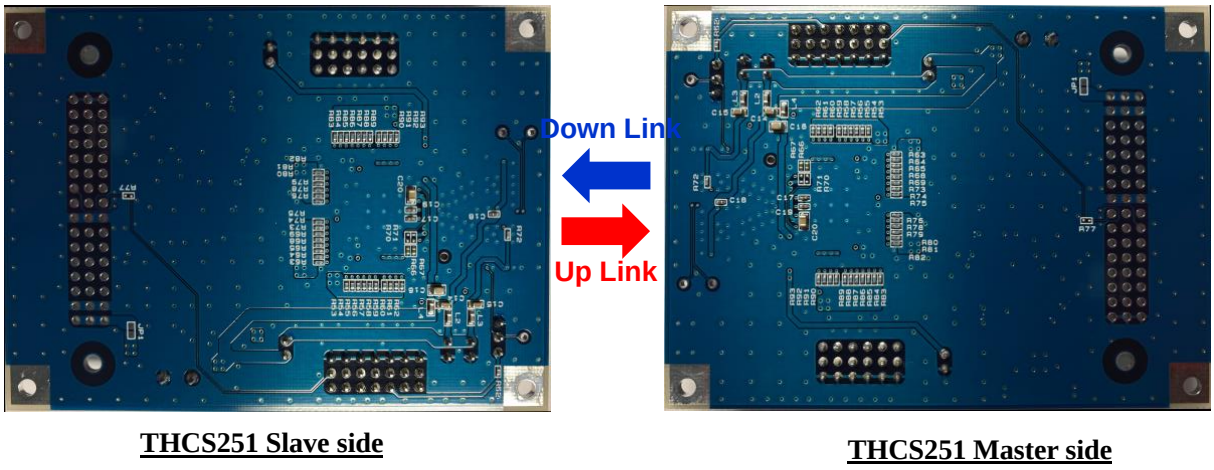


Figure 2 THEVA251-BF4-V1 Master Side / Slave Side bottom view

This document describes the functions and usage of a pair of boards. If you want to check the operation immediately, see 1.3 Quick Start Guidelines. Communication. The THCS251 establishes communication at a data rate of approximately 600Mbps.

* BF4-TX-14DS-0.5V and BF4-RX-14DS-0.5V receptacles are installed for the input and output of Down/Up Link. The user should prepare the plug harness BF4MC-6GTXRX series. In addition, prepare a DC power supply and jumper pins.

1.2 Contents of evaluation kit

This evaluation kit includes the contents of Table 1.

Product	Article	Quantity
THEVA251-BF4-V1	THEVA251-BF4-V1 Board	2

Table 1 THEVA251-BF4-V1 contents

1.3 Quick start guide

1.3.1 Set the jumper pins as shown in Figure 3 for the master board and slave board. The board connects with a BF4MC-6GTXRX series plug harness.

1.3.2 When DC3.3V is supplied to the power supply terminals of both boards, the LED of D1 lights up. The master board THCS251 internal oscillator starts operating at 20MHz and outputs a downlink signal. The optical active connector converts this electrical signal into an optical signal and transmits it to the slave board via optical fiber. On the slave board, the optical active connector converts the optical signal into an electrical signal and inputs it to the THCS251. When the THCS251's internal circuitry locks, an uplink signal is output. The optical active connector converts it to an optical signal. Similarly, on the master board side, when the optical active connector converts the optical signal into an electrical signal and inputs it to the THCS251, and the internal circuit locks, communication between the master and slave is established. When communication is established, THCS251 READY = H and D2 LED lights.

1.3.3. In this state, the 20MHz internal oscillator is used as the sampling clock, and 30-multiplication serialization is applied with DATAWIDTH=L, so the THCS251 downlink and uplink speeds are 600Mbps.

* Since this is an internal oscillator of the LSI, the sampling clock and transmission rate may vary up to +/- 20%.

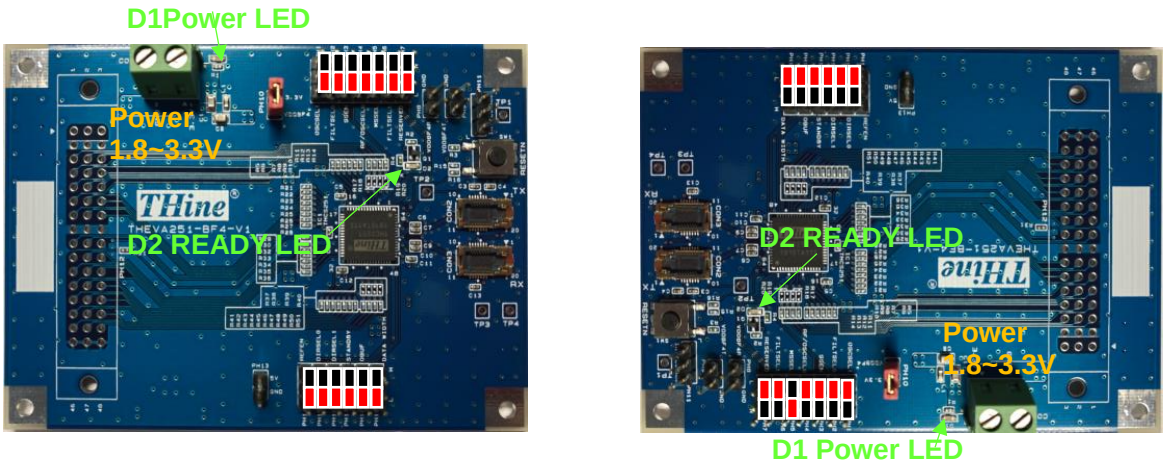


Figure 3 THEVA251-BF4-V1 Quick start pin setting

2. About each part of the board

2.1 Power Supply

THEVA251-BF4-V1 has three power supply methods.

(1)3.3V is commonly supplied from the CON1 power supply terminal block to THCS251, BF4-TX-14DS-0.5V, and BF4-RX-14DS-0.5V. In this case, 1st, 2nd and 3rd pins of the 48-pin PH12 can be connected to CON1 via JP1 on the bottom of the board. It is also possible to share the power supply from the circuit of PH12 via the 1st, 2nd and 3rd pins of PH12. In this case, only the PH10 power supply pin header is equipped with a jumper.

(2) Supply 1.7V to 3.6V to THCS251 from the CON1 power supply terminal block, and supply 3.3V to BF4-TX-14DS-0.5V and BF4-RX-14DS-0.5V from PH8 and PH9 individually.

In this case, connect 3.3V power supply and GND to PH8 and PH9 without jumper on PH10.

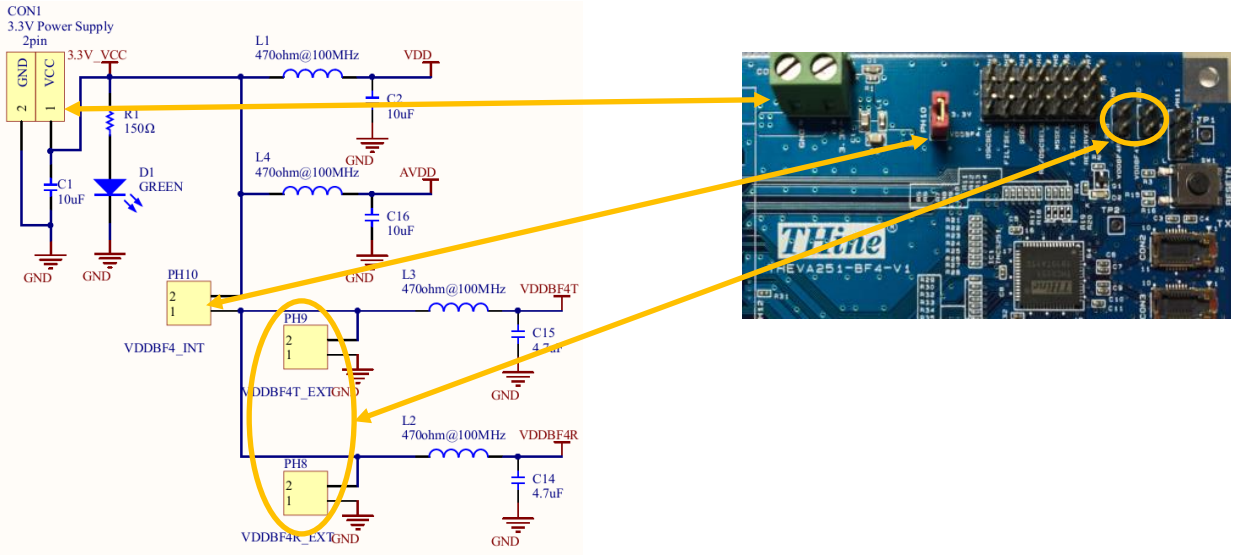


Figure 4 THEVA251-BF4-V1 Power supply

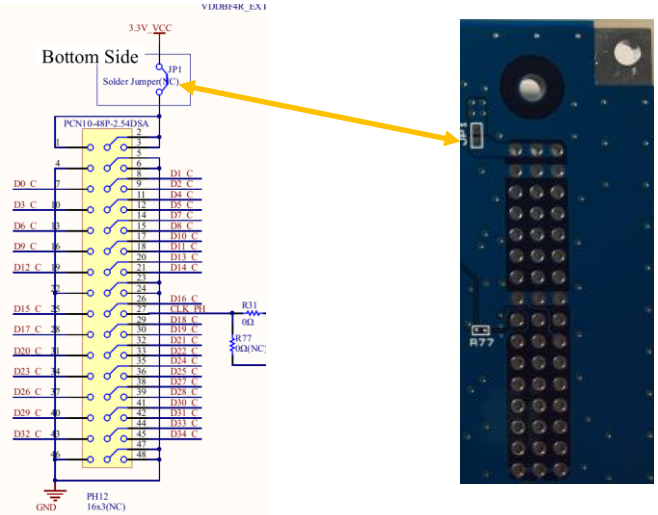


Figure 5 THEVA251-BF4-V1 Power sharing

2.2 Full-duplex high-speed signal => Optical active connector

The THEVA251-BF4-V1 high-speed signal input and output are equipped with IX61G-B-10P receptacles.

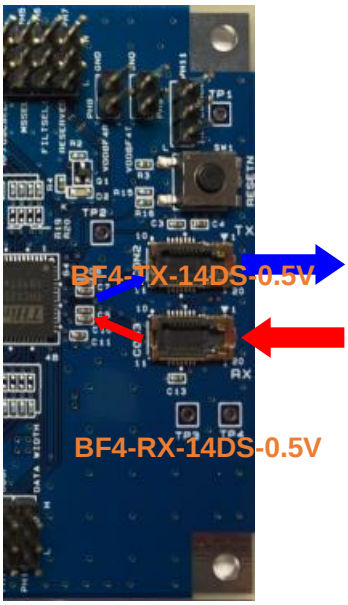


Figure 6 THEVA251-BF4-V1 High Speed CML I/O connector

2.3 Signal assign of 48 pin header

* PH12 is not mounted.

PH12 48-pin layout has 35 pins for I/O, 1 pin for external REF input (master) / CDR clock output (slave), 3 pins for power supply sharing, and 9 pins for GND. Connect the I/O circuits on the master side and slave side according to the THCS251 mode setting.

Chip Master Side

1	VCC	VCC	VCC	3
4	GND	GND	GND	6
7	D0 / D34	D1 / D33	D2 / D32	9
10	D3 / D31	D4 / D30	D5 / D29	12
13	D6 / D28	D7 / D27	D8 / D26	15
16	D9 / D25	D10 / D24	D11 / D23	18
19	D12 / D22	D13 / D21	D14 / D20	21
22	GND	GND	GND	24
25	D15 / D19	D16 / D18	CLK	27
28	D17 / D17	D18 / D16	D19 / D15	30
31	D20 / D14	D21 / D13	D22 / D12	33
34	D23 / D11	D24 / D10	D25 / D9	36
37	D26 / D8	D27 / D7	D28 / D6	39
40	D29 / D5	D30 / D4	D31 / D3	42
43	D32 / D2	D33 / D1	D34 / D0	45
46	GND	GND	GND	48

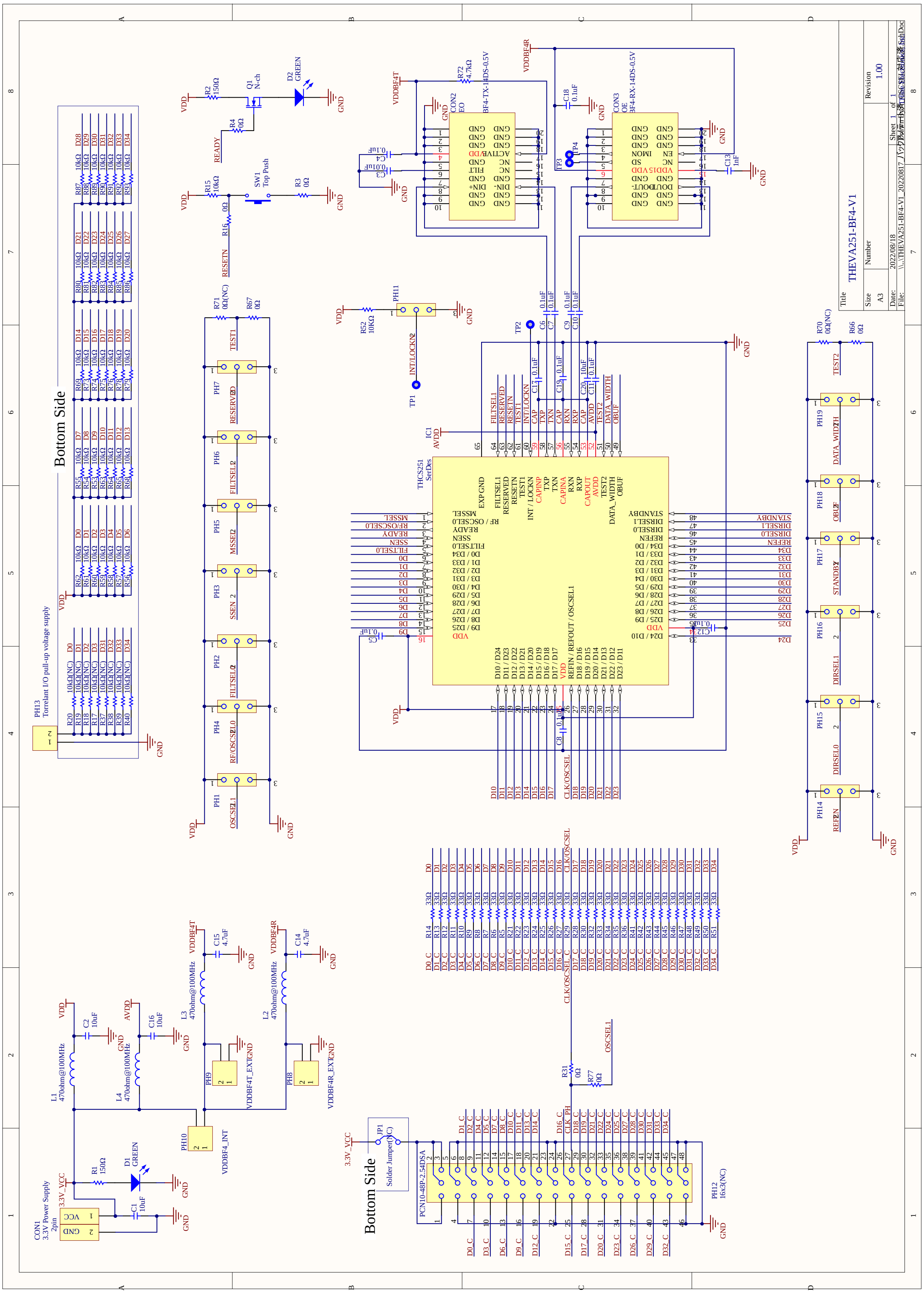
Chip Slave Side

48	GND	GND	GND	46
45	D34 / D0	D33 / D1	D32 / D2	43
42	D31 / D3	D30 / D4	D29 / D5	40
39	D28 / D6	D27 / D7	D26 / D8	37
36	D25 / D9	D24 / D10	D23 / D11	34
33	D22 / D12	D21 / D13	D20 / D14	31
30	D19 / D15	D18 / D16	D17 / D17	28
27	CLK	D16 / D18	D15 / D19	25
24	GND	GND	GND	22
21	D14 / D20	D13 / D21	D12 / D22	19
18	D11 / D23	D10 / D24	D9 / D25	16
15	D8 / D26	D7 / D27	D6 / D28	13
12	D5 / D29	D4 / D30	D3 / D31	10
9	D2 / D32	D1 / D33	D0 / D34	7
6	GND	GND	GND	4
3	VCC	VCC	VCC	1

Figure 7 THEVA251-SMA-V2 Pin header for I/O_PH9

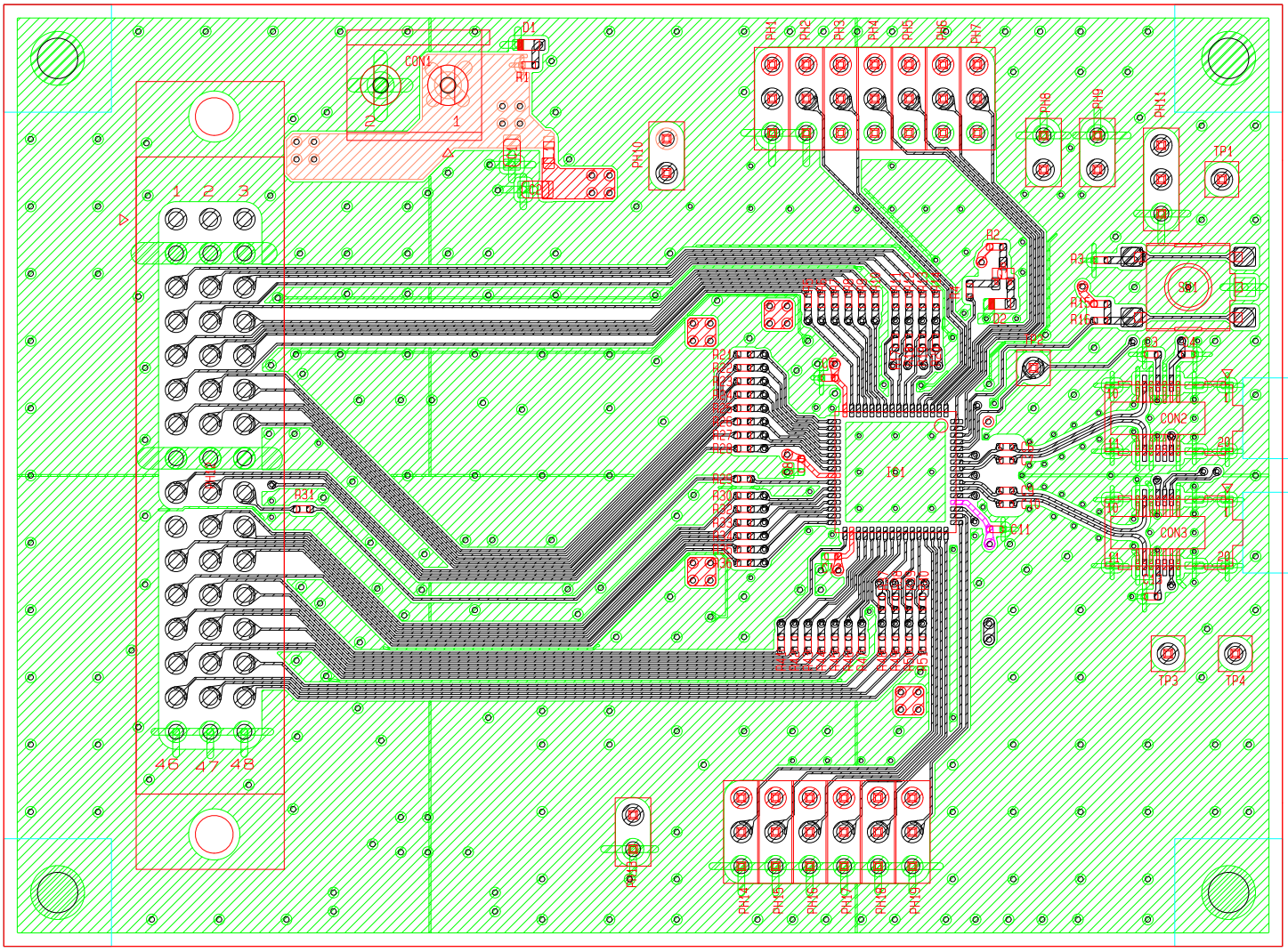
3. Schematic and Layout

3.1 Circuit diagram.

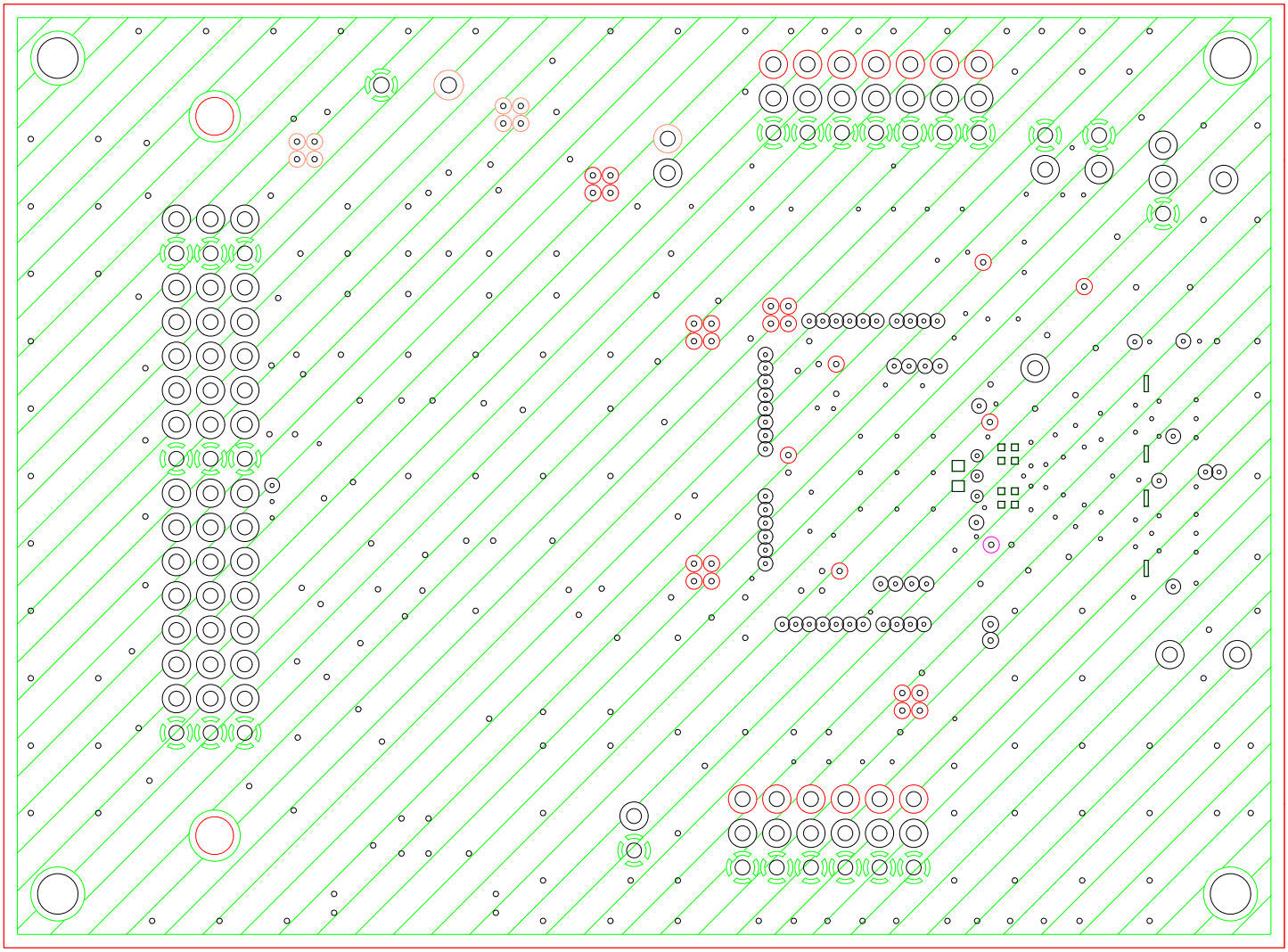


3.2 Layout

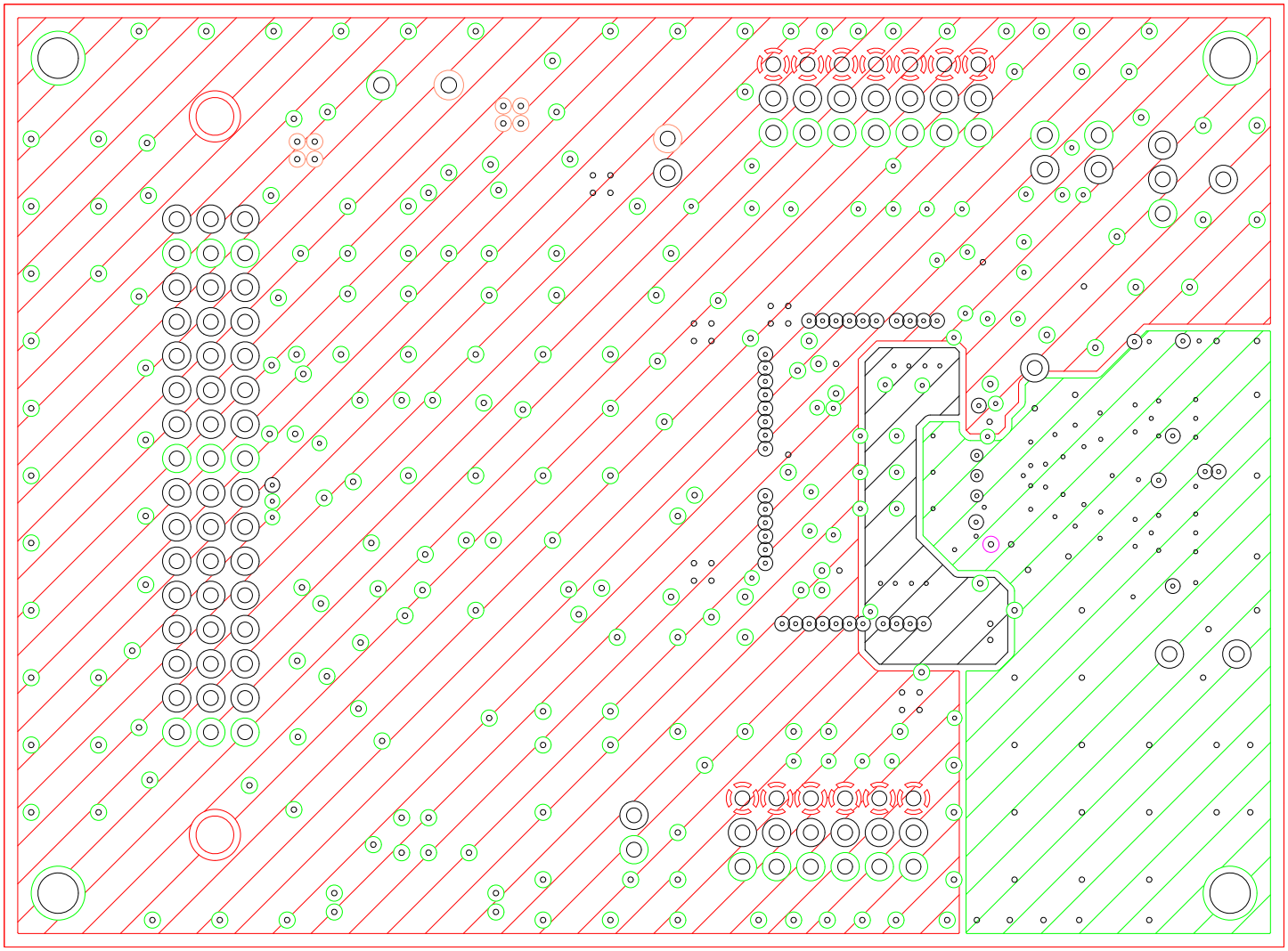
3.2.1 L1(TOP)pattern



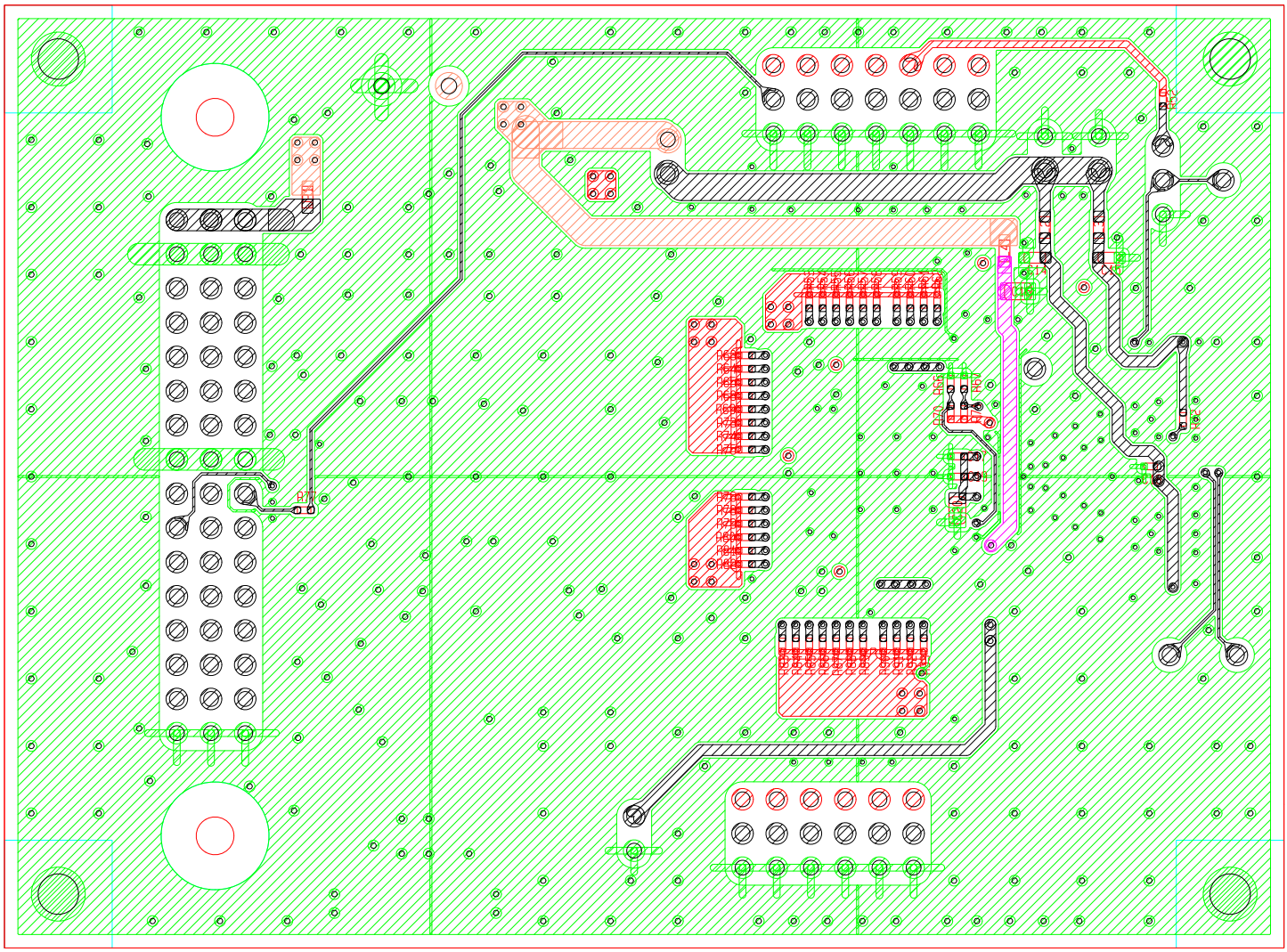
3.2.2 L2 pattern



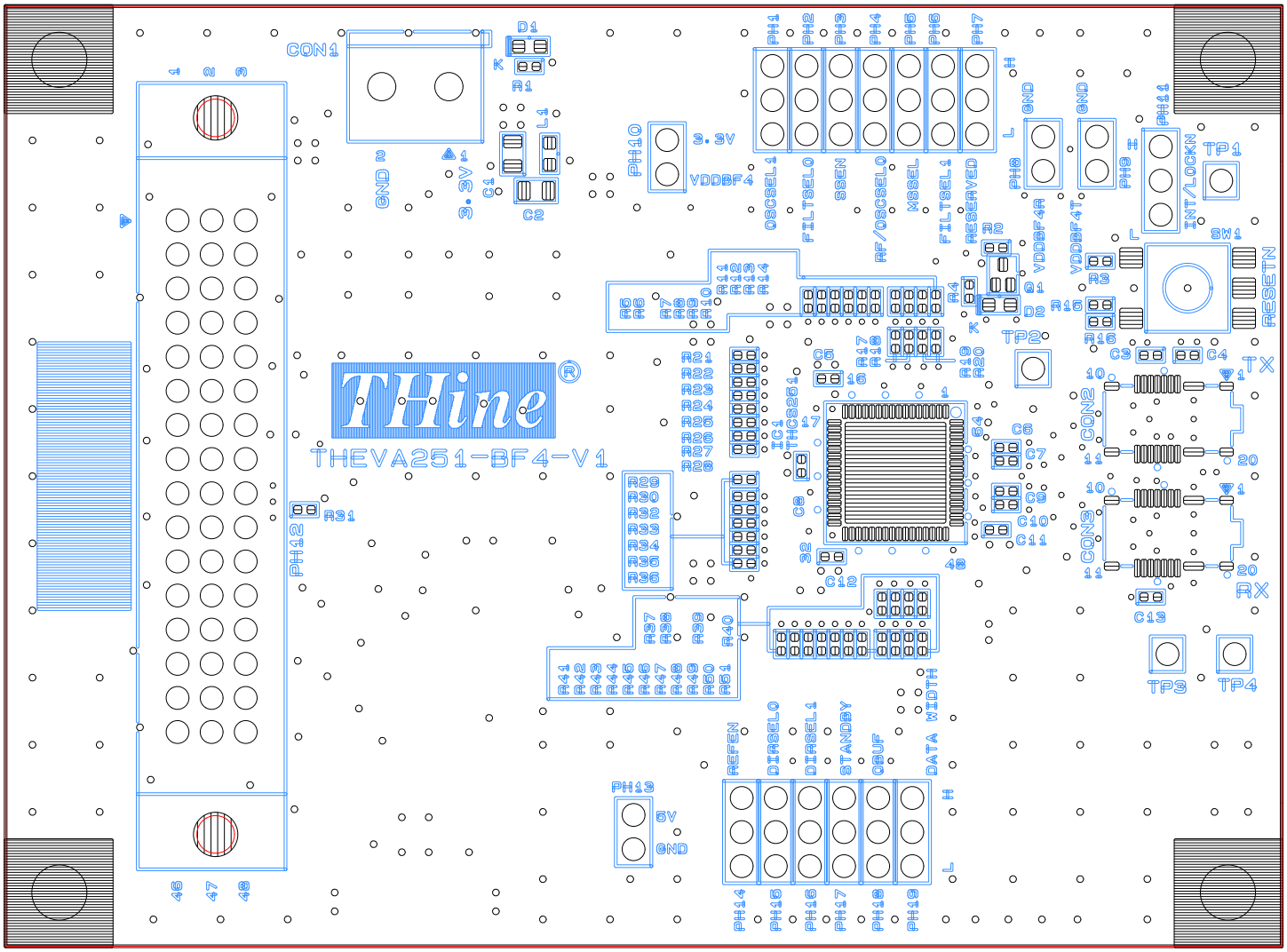
3.2.3 L3 pattern



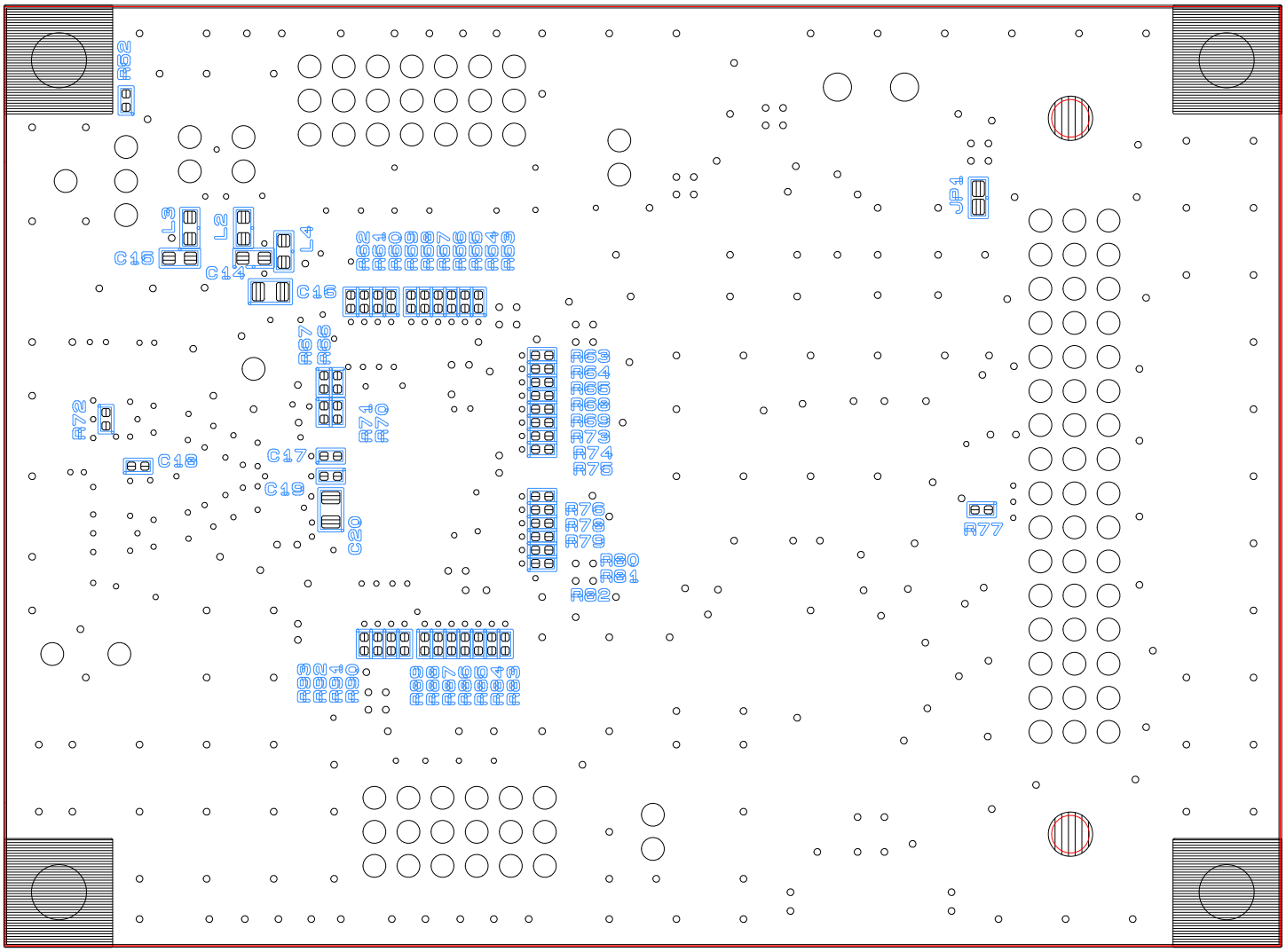
3.2.4 L4 pattern



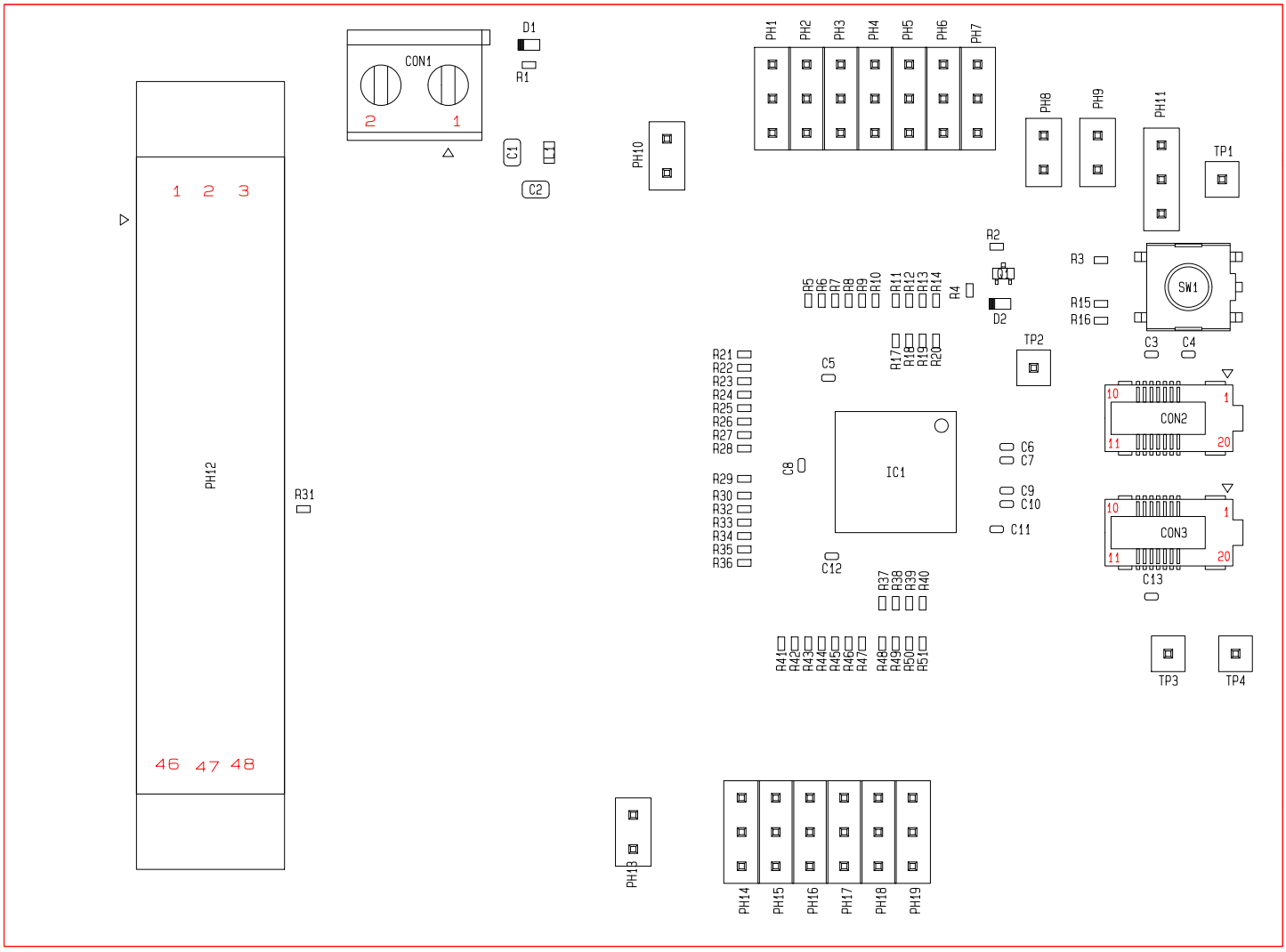
3.2.5 TOP side silk and resist



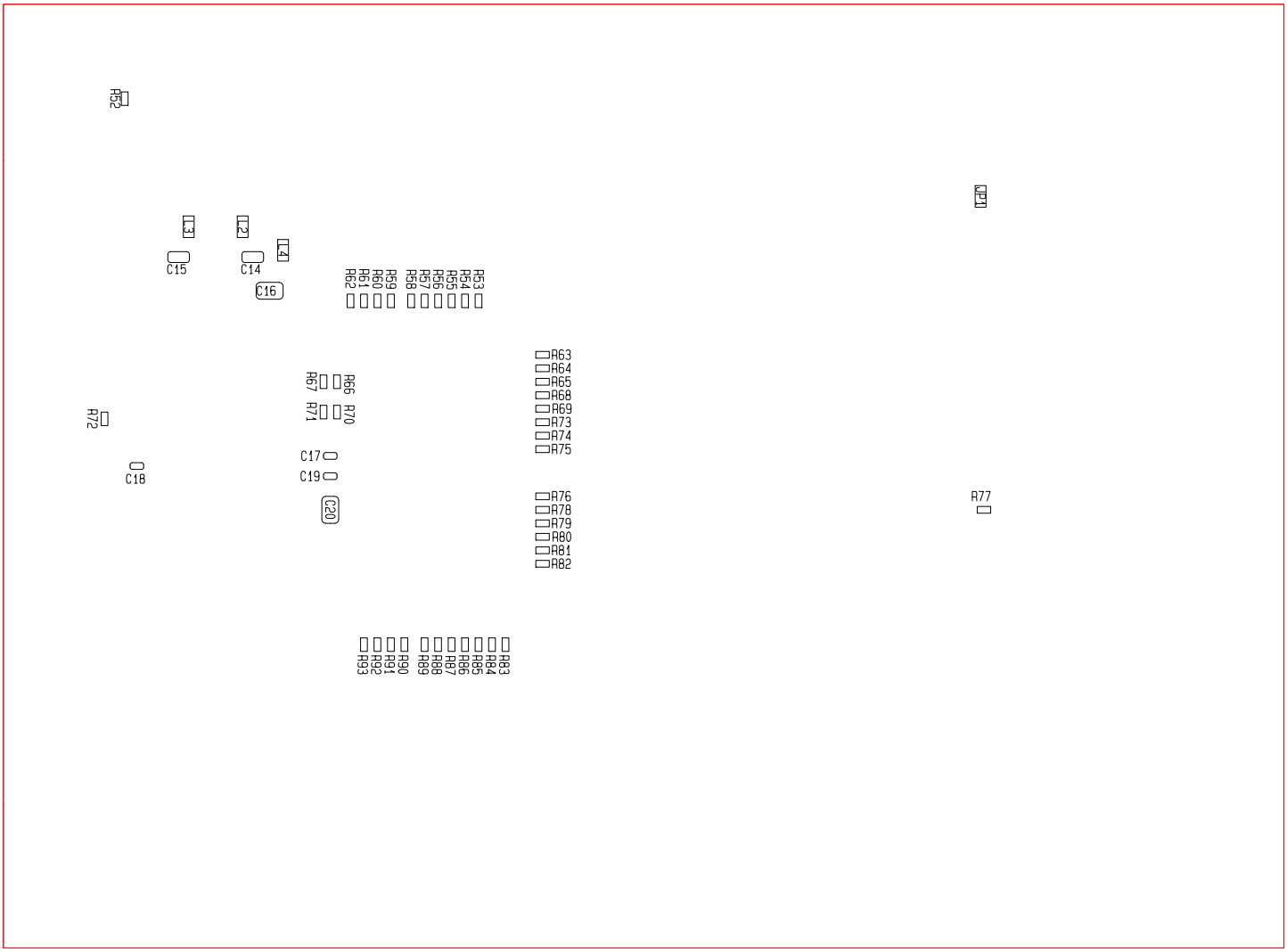
3.2.6 BOTTOM side silk and resist



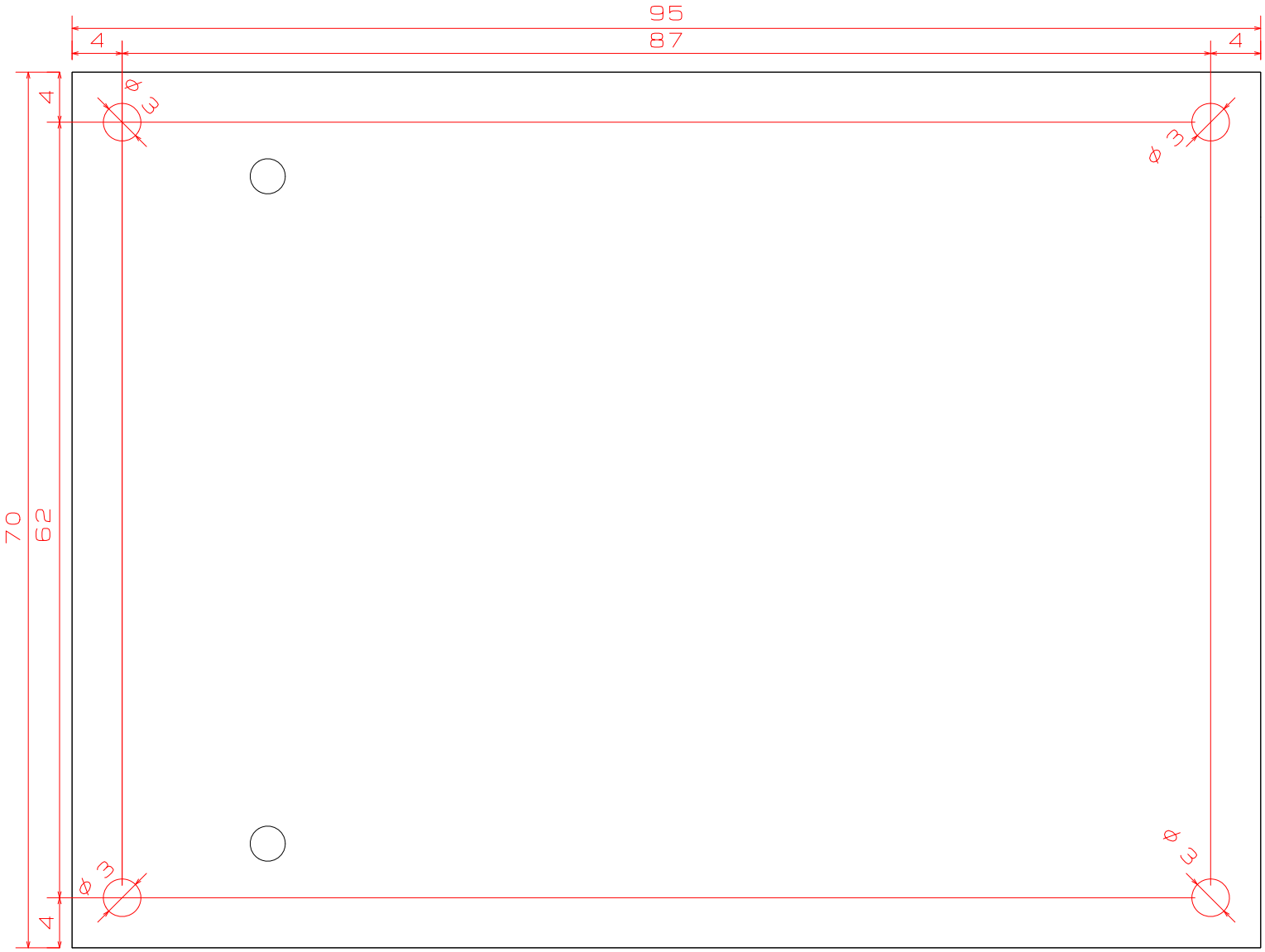
3.2.7 TOP side implementation



3.2.8 BOTTOM side implementation



3.2.9 Dimensions



4. BOM

Designator	Description	Value	Quantity	P/N
C1, C2, C16, C20	Cap. 2012	10uF	4	GRM21BB31C106KE15L
C3	Cap. 1005	0.01uF	1	GMD155B11E103KA01
C4, C5, C6, C7, C8, C9, C10, C11, C12, C17, C18, C19	Cap. 1005	0.1uF	12	GRM155B31E104KA87D
C13	Cap. 1005	1nF	1	GRM155B11H102KA01D
C14, C15	Cap. 2012	4.7uF	2	GRM188B31C475KAAJ
CON1	Terminal_Block	2pin	1	282836-2
CON2	BF4	50M-6.25Gbps	1	BF4-TX-14DS-0.5V
CON3	BF4	50M-6.25Gbps	1	BF4-RX-14DS-0.5V
D1, D2	LED	GREEN	2	SML-D12P8W
IC1	QFN64	Max. 4Gbps	1	THCS251
JP1	Jumper	Solder Jumper(NC)	1	
L1, L2, L3, L4	Coil, 1608	470ohm@100MHz	4	MPZ1608B471ATA00
PH1, PH2, PH3, PH4, PH5, PH6, PH7, PH11, PH14, PH15, PH16, PH17, PH18, PH19	Header 3	1x3	14	TCHM13-70-003S-803R
PH8, PH9, PH10, PH13	Header 2	1x2	4	TCHM13-70-002S-803R
PH12	Header 48	16x3(NC)	1	PCN10-48P-2.54DSA
Q1	MOSFET	N-ch	1	SSM3K16FS
R1, R2	Res. 1005	150Ω	2	RK73H1ETTP1500F
R3, R4, R16, R31, R66, R67, R77	Res. 1005	0Ω	7	RK73Z1ETTP0
R5, R6, R7, R8, R9, R10, R11, R12, R13, R14, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R32, R33, R34, R35, R36, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50, R51	Res. 1005	33Ω	36	RK73H1ETTP33R0F
R15, R52, R53, R54, R55, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R68, R69, R73, R74, R75, R76, R78, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93	Res. 1005	10kΩ	37	RK73H1ETTP1002F
R17, R18, R19, R20, R37, R38, R39, R40	Res. 1005	10kΩ(NC)	8	RK73H1ETTP1002F
R70, R71	Res. 1005	0Ω(NC)	2	RK73Z1ETTP0
R72	Res. 1005	4.7kΩ	1	RK73H1ETTP4701F
SW1	Push SW	Top Push	1	SKHMQKE010
TP1, TP2, TP3, TP4	Test Point(NC)	Through hole	4	

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