



# THEVA251-SMA-V3 User's Guide

THCS251 Evaluation Kit

**THine Electronics, Inc.**

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# 1. Introduction

## 1.1 Overview

THEVA251-SMA-V3 is an evaluation board with THCS251 installed. THS251 is a transceiver IC that aggregates 35-bit I/O and allows full-duplex bidirectional communication between master and slave. THEVA251-SMA-V3 is a single board that supports both master and slave. The board set as the master and slave can be connected with a coaxial cable via the SMA connector.

If you prepare a conversion board to the desired connector or cable, you can experiment with various transmission lines. SMA connector land is available. Mount SMAJ103-T16 by soldering. The SMA connector and the 48-bit connector for 35bit I / O are not mounted.

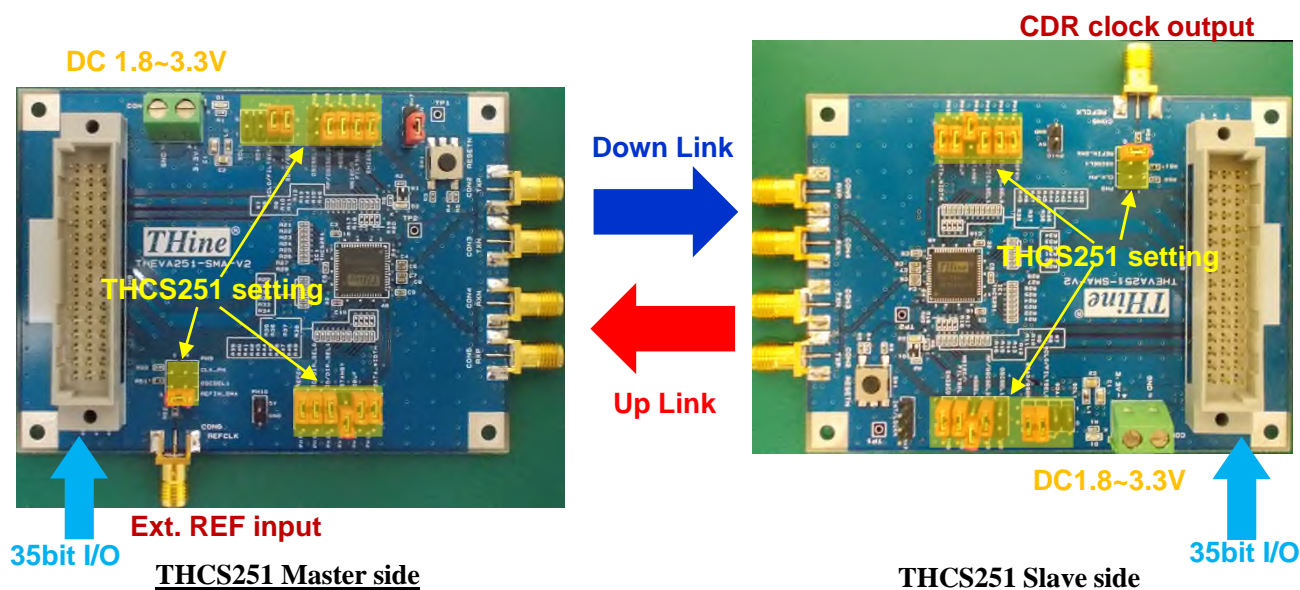


Figure 1 THEVA251-SMA-V3 Master Side / Slave Side top view

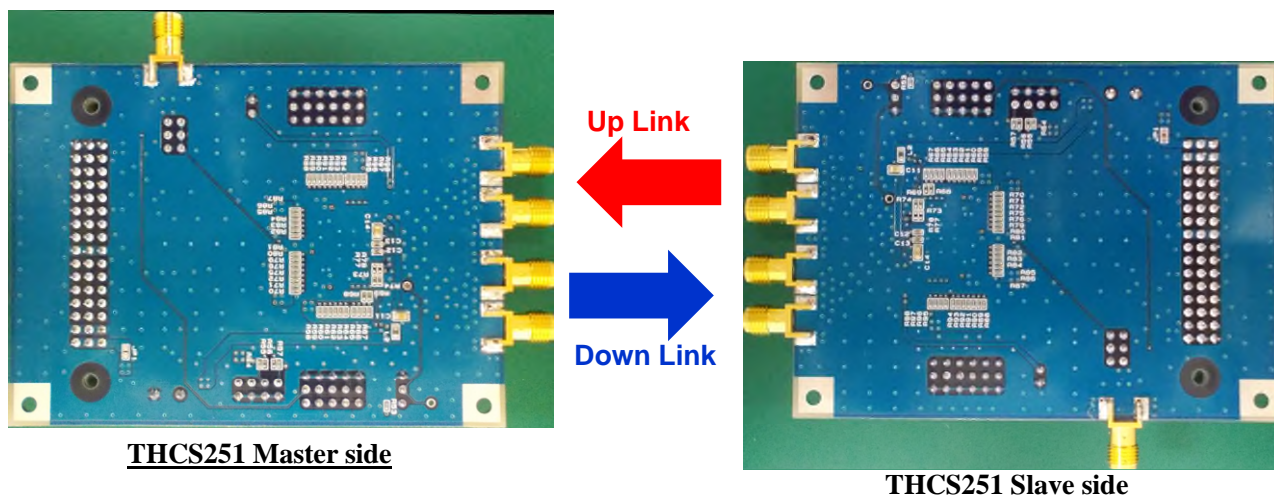


Figure 2 THEVA251-SMA-V3 Master Side / Slave Side bottom view

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 at a data rate of about 600Mbps is established.

\* Eight SMAJ103-T16s, DC power supply, four SMA coaxial cables or four SMA connectors, and jumper pins must be prepared.

### 1.2 Contents of evaluation kit

This evaluation kit includes the contents of Table 1.

Product	Article	Quantity
THEVA251-SMA-V3	THEVA251-SMA-V3 Board	2

**Table 1 THEVA251-SMA-V3 contents**

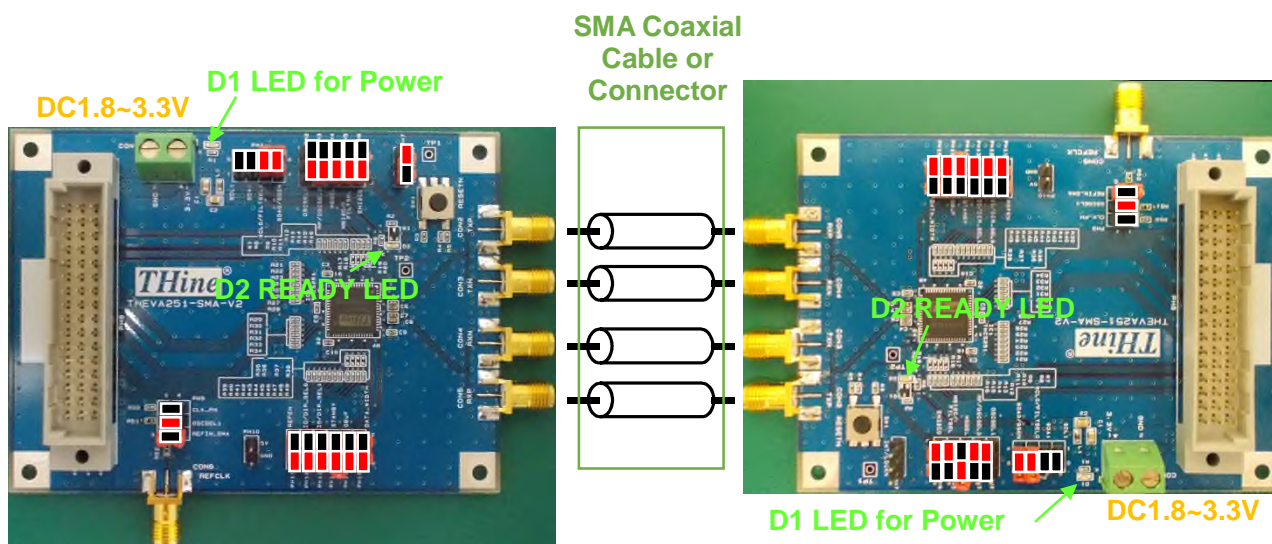
### 1.3 Quick start guide

1.3.1 Connect the master and slave boards with jumper pin settings as shown in Figure 3 using SMA coaxial cables.

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. When this signal is received by THCS251 of the slave board and the internal circuit is locked, an uplink signal is output. When this signal is received by THCS251 of the master board and the internal circuit is locked, 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 built-in oscillator 20MHz operates as the sampling clock, and serialization of 30 times is applied when DATAWIDTH = L. Communication is performed at a speed of 600Mbps for both downlink and uplink.

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



**Figure 3 THEVA251-SMA-V3 Quick start pin setting**

## 2. Details about each part of the board

### 2.1 Power Supply

For THEVA251-SMA-V3, there is a method to supply the desired voltage in the range of 1.7V to 3.6V to the CON1 power terminal block of the master side board and the slave side board. Alternatively, pins 1, 2, and 3 of 48-pin PH8 can be connected to CON1 via JP1 on the bottom of the board, power can be shared from the front and rear circuits via pins 1, 2, and 3 of PH8 is possible.

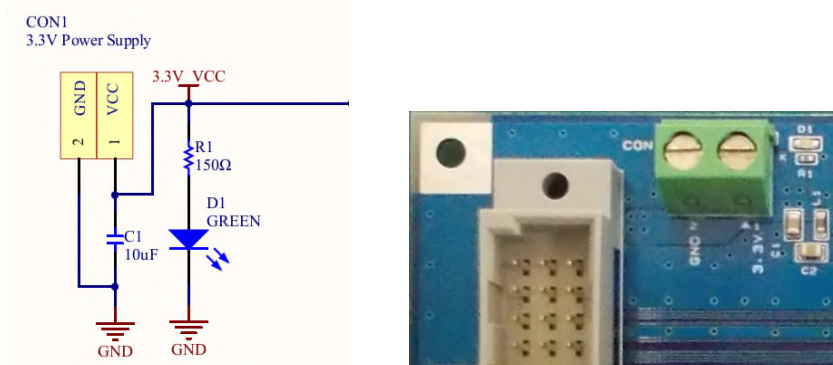


Figure 4 THEVA251-SMA-V3 Power supply

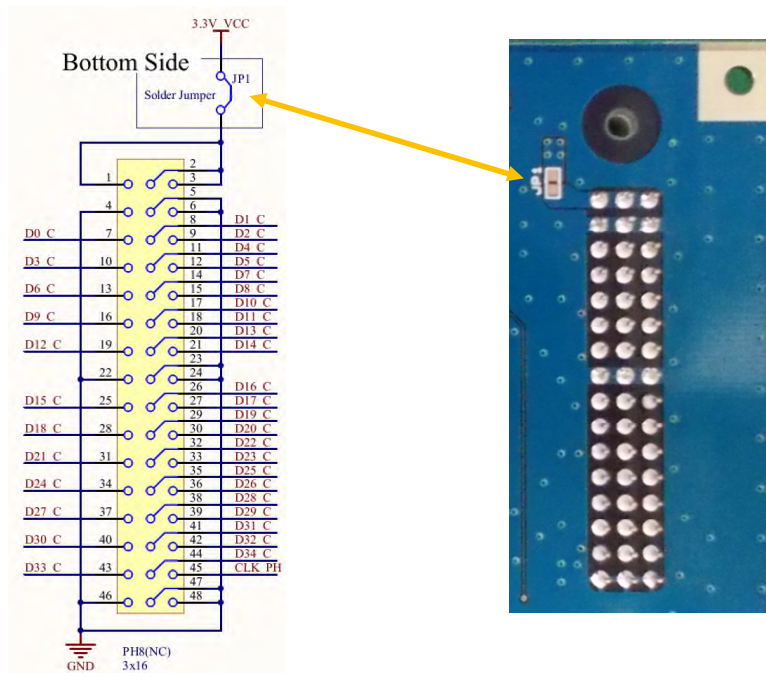


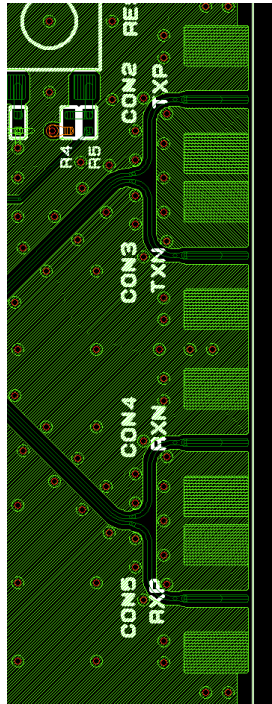
Figure 5 THEVA251-SMA-V3 Power sharing



## 2.2 Full-duplex high-speed signal connector

THEVA251-SMA-V3 uses SMA connectors for high-speed signal input / output. Prepare SMAJ103-T16 because the board layout is SMAJ103-T16 land pattern design.

**SMA Connector  
SMAJ103-T16 Land pattern**



**SMA Connector  
SMAJ103-T16 Mounting image**

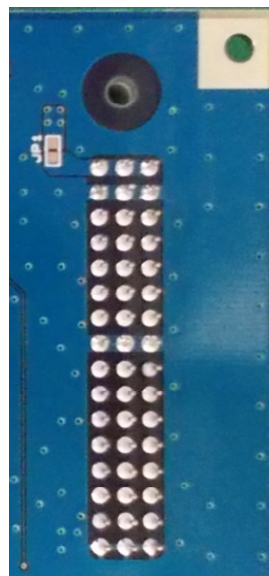
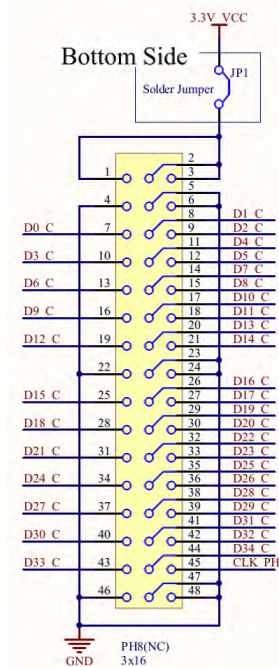


**Figure 6 THEVA251-SMA-V3 High Speed CML I/O connector**

### 2.3 Pin header and Connector

\* PH8 is not mounted.

PH8 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 10 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	D17 / D17	27
28	D18 / D16	D19 / D15	D20 / D14	30
31	D21 / D13	D22 / D12	D23 / D11	33
34	D24 / D10	D25 / D9	D26 / D8	36
37	D27 / D7	D28 / D6	D29 / D5	39
40	D30 / D4	D31 / D3	D32 / D2	42
43	D33 / D1	D34 / D0	CLK	45
46	GND	GND	GND	48

Chip Slave Side

48	GND	GND	GND	46
45	CLK	D34 / D0	D33 / D1	43
42	D32 / D2	D31 / D3	D30 / D4	40
39	D29 / D5	D28 / D6	D27 / D7	37
36	D26 / D8	D25 / D9	D24 / D10	34
33	D23 / D11	D22 / D12	D21 / D13	31
30	D20 / D14	D19 / D15	D18 / D16	28
27	D17 / D17	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

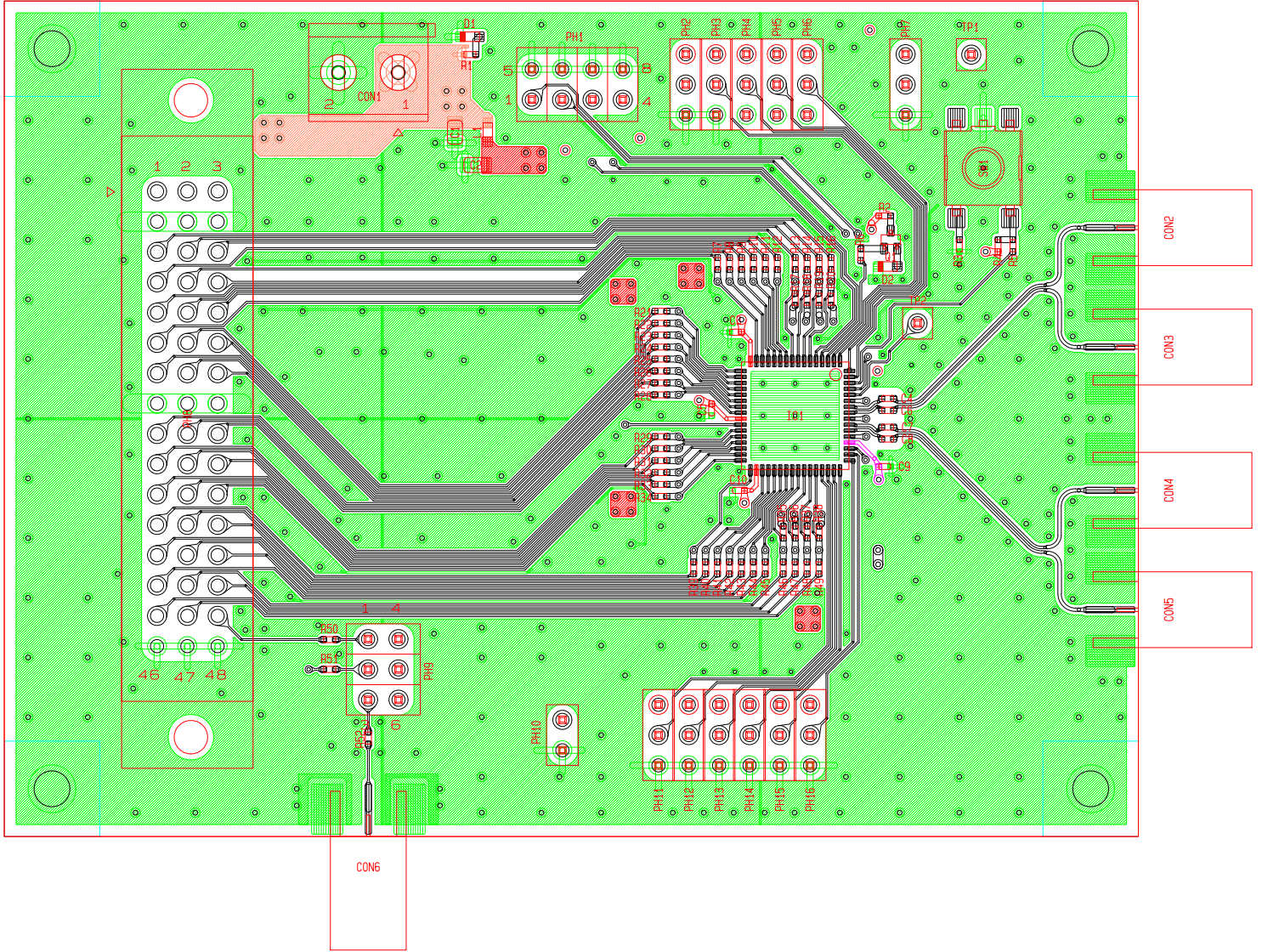
Figure 7 HEVA251-SMA-V3 Pin header for I/O\_PH8



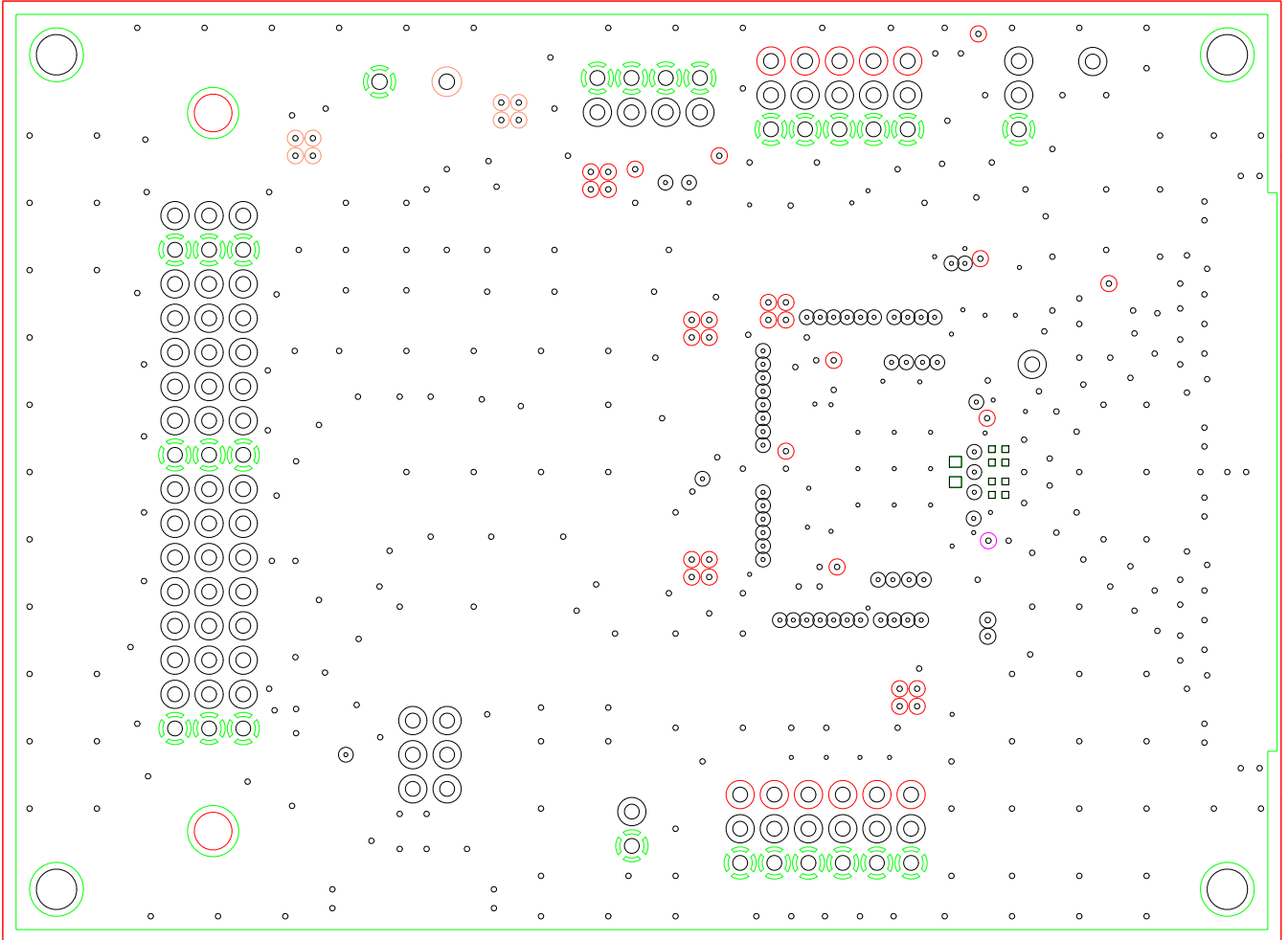


### 3.2 Layout

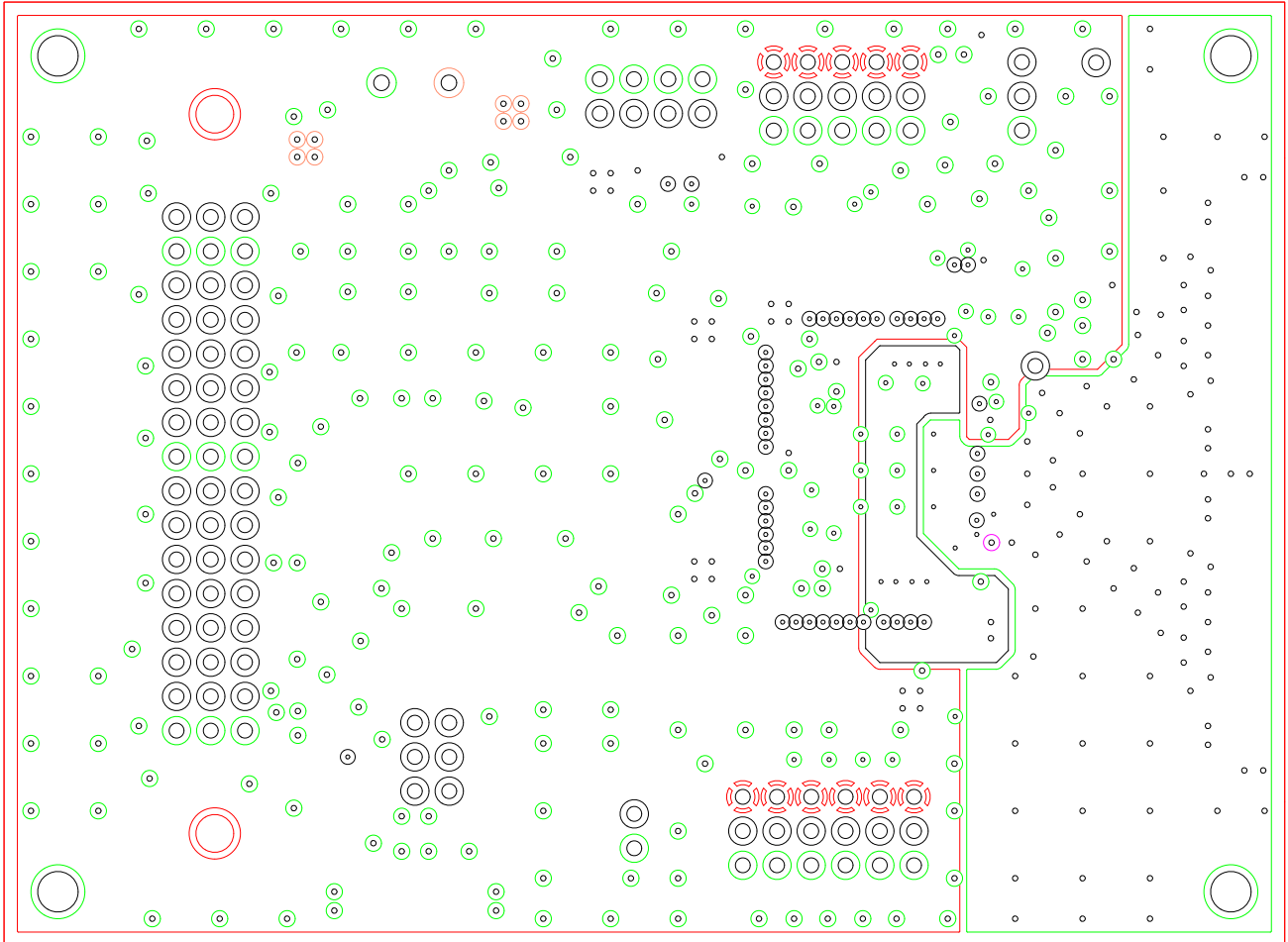
#### 3.2.1 L1(TOP)pattern



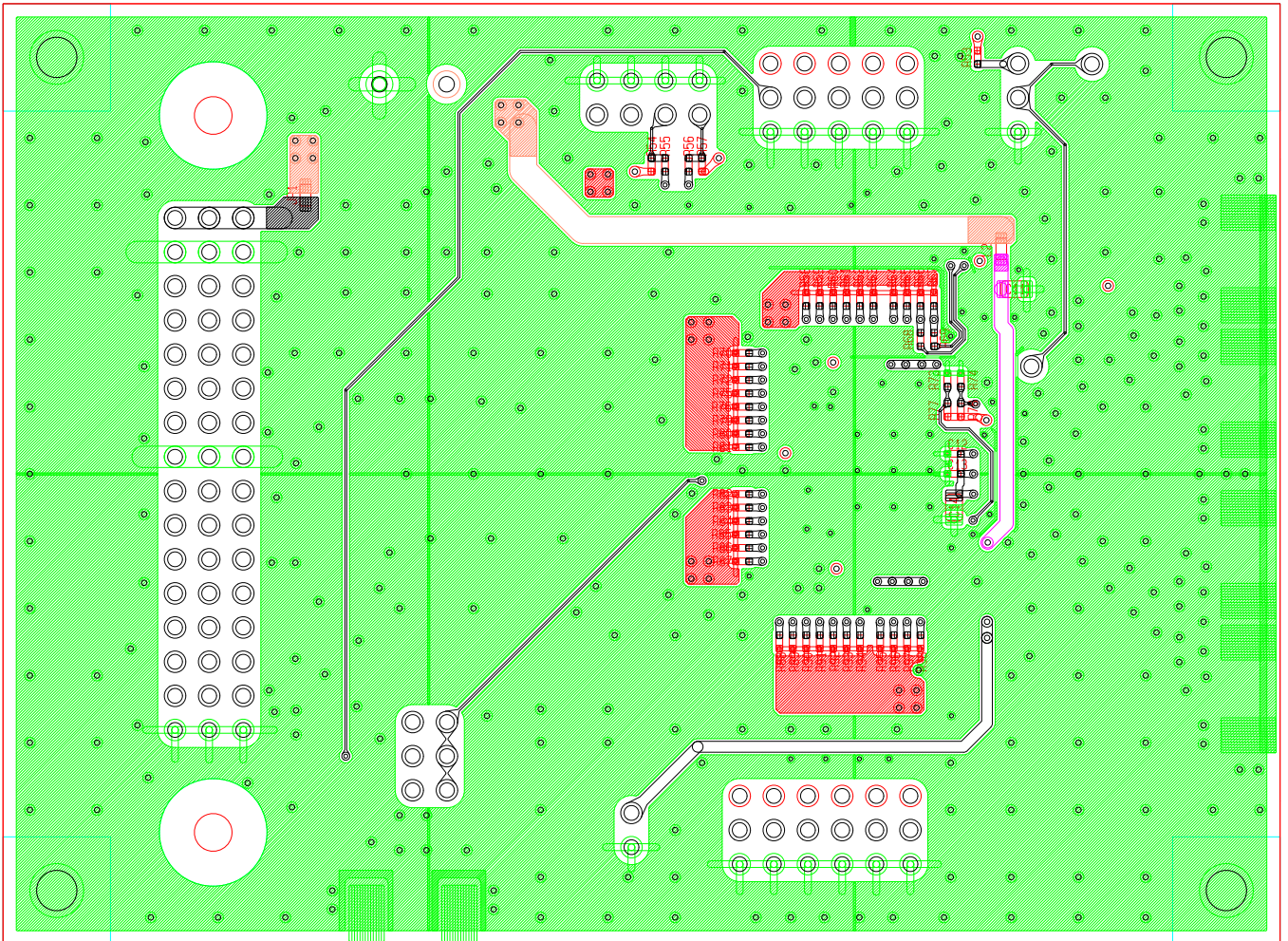
3.2.2 L2 pattern



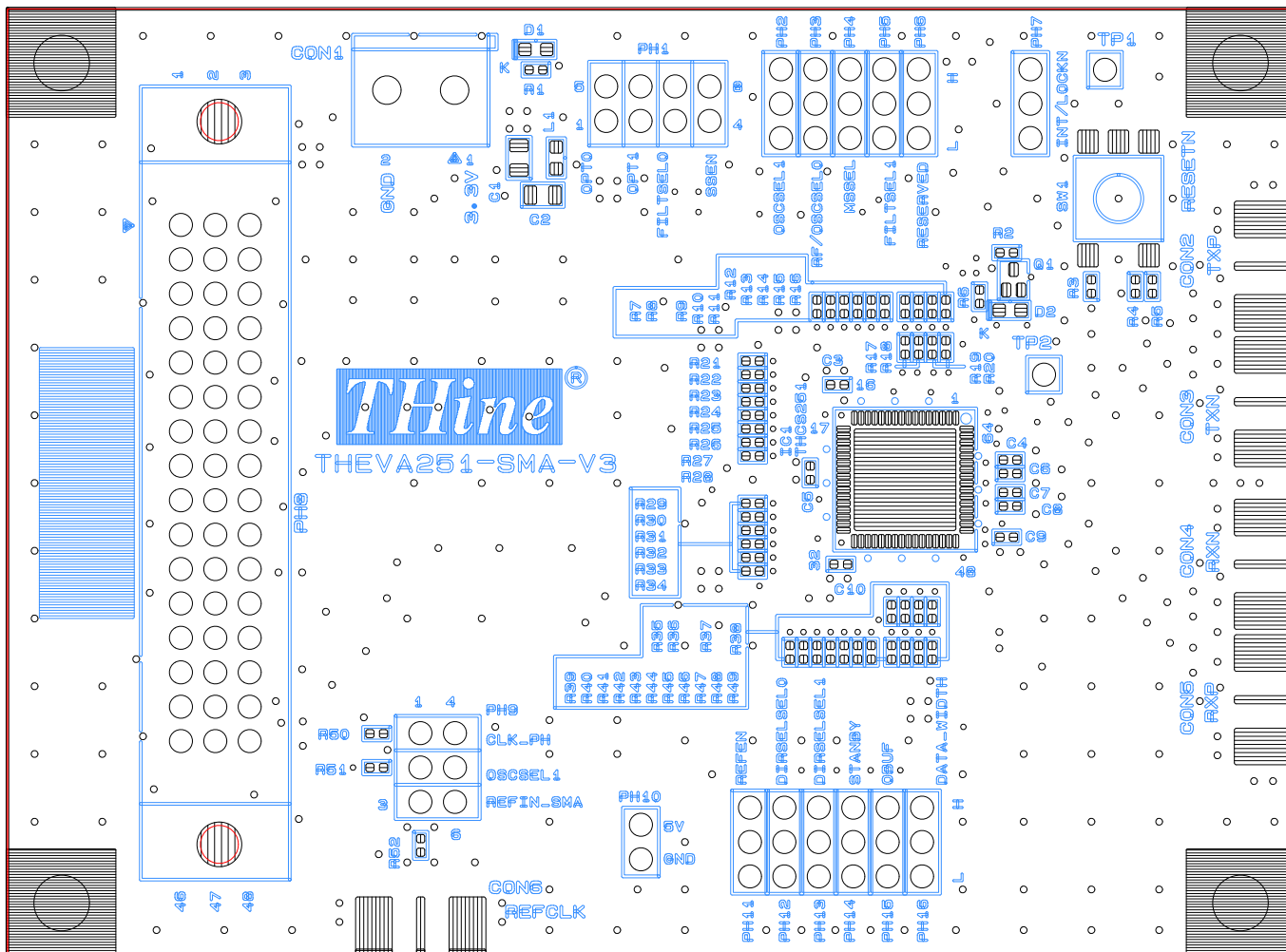
3.2.3 L3 pattern



3.2.4 L4 pattern



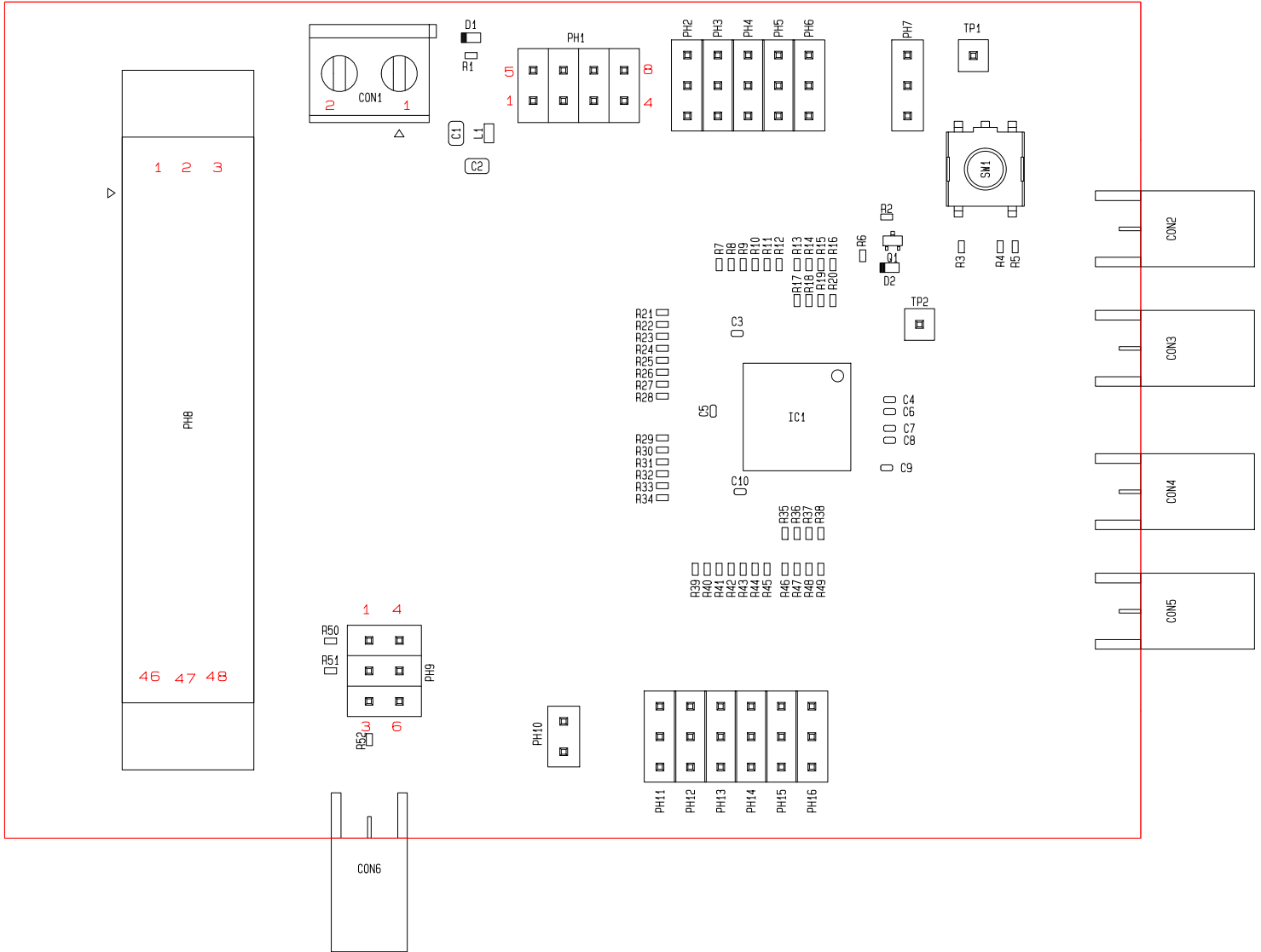
3.2.5 TOP side silk



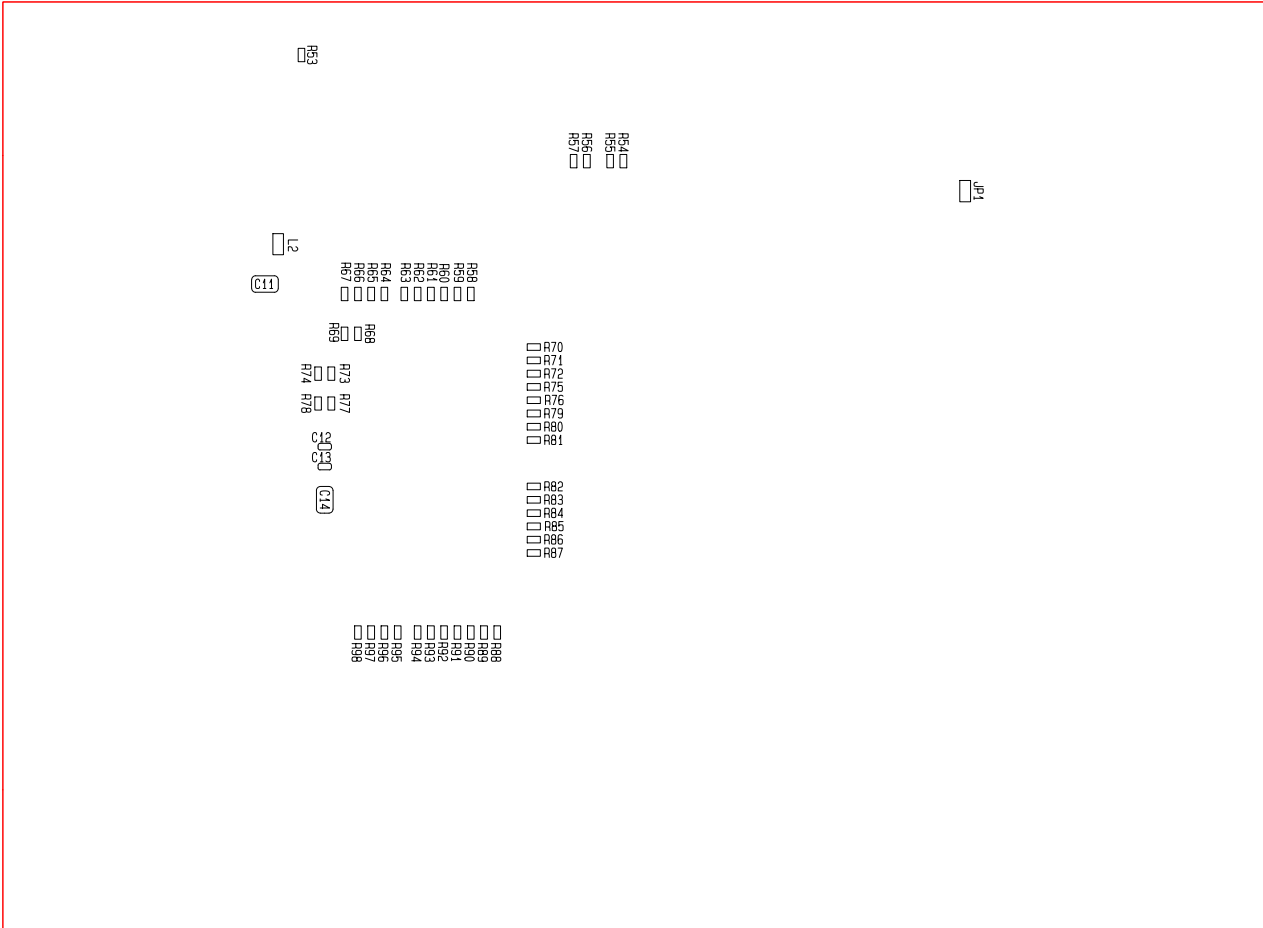




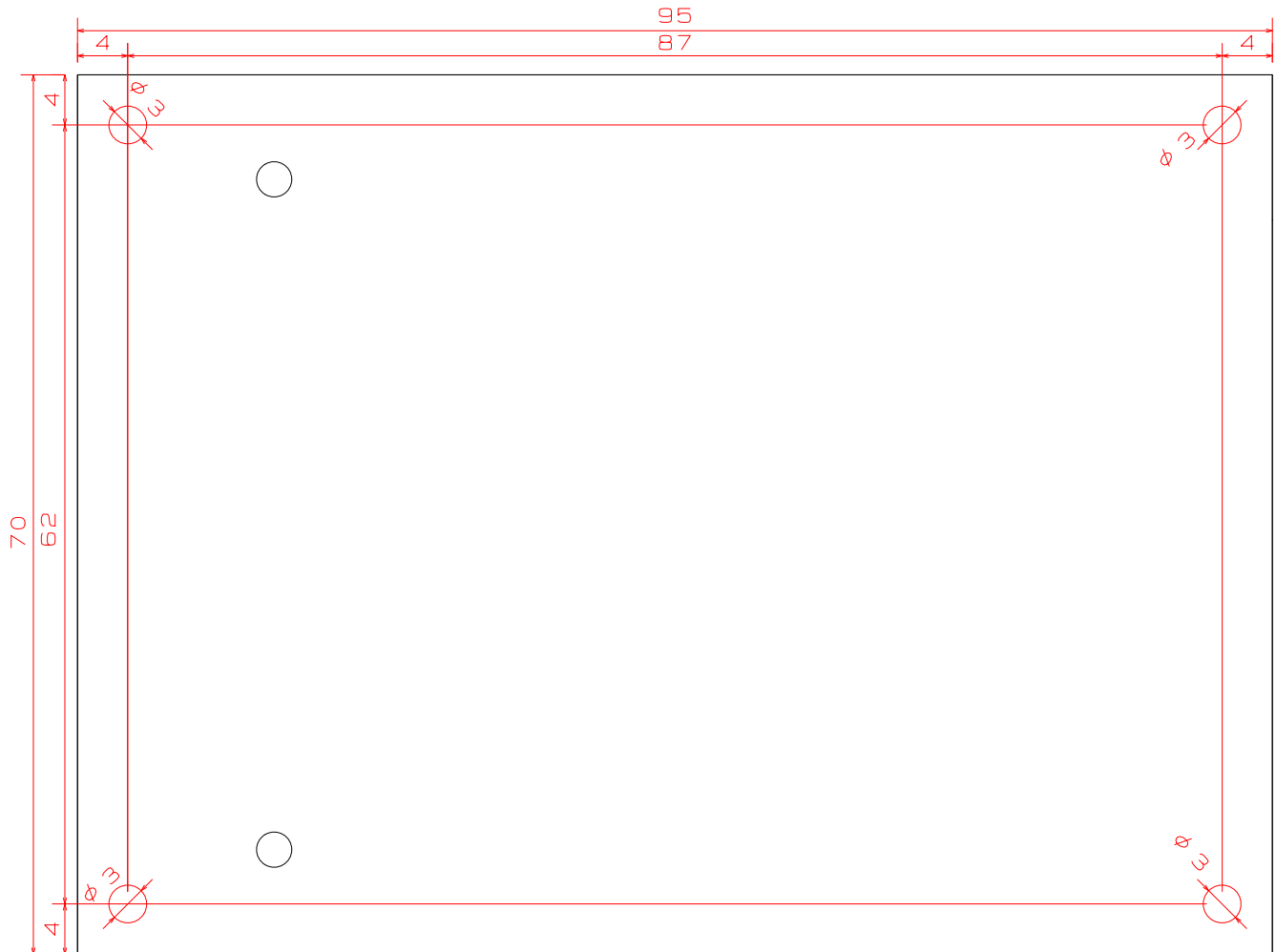
3.2.7 TOP side implementation



### 3.2.8 BOTTOM side implementation



3.2.9 Dimensions



#### 4. BOM

Designator	Description	Value	Quantity	P/N
C1, C2, C11, C14	Cap. 2012	10uF	4	GRM21BB31C106KE15L
C3, C4, C5, C6, C7, C8, C9, C10, C12, C13	Cap. 1005	0.1uF	10	GRM155B31E104KA87D
CON1	Terminal_Block	2pin	1	282836-2
CON2, CON3, CON4, CON5, CON6	SMA(NC)	50ohm	5	SMA103-T16
D1, D2	LED	GREEN	2	SML-D12P8WT86
IC1	SerDes	Max. 4Gbps	1	THCS251
JP1	Jumper(NC)	Solder Jumper	1	
L1, L2	Coil. 1608	470ohm@100MHz	2	MPZ1608B471ATA00
PH1	Header 8	2x4	1	TCHM23-70-008S-803R
PH2, PH3, PH4, PH5, PH6, PH11, PH12, PH13, PH14, PH15, PH16	Header 3	1x3	11	TCHM13-70-003S-803R
PH7	Header 3	1x3	1	TCHM13-70-003S-803R
PH8	Header 48(NC)	3x16	1	PCN10-48P-2.54DSA(72)
PH9	Header 6	2x3	1	TCHM23-70-006S-803R
PH10	Header 2	1x2	1	TCHM13-70-002S-803R
Q1	MOSFET	N-ch	1	SSM3K16FS
R1, R2	Res. 1005	150Ω	2	RK73H1ETTP1500F
R3, R5, R6, R51, R52, R55, R56, R68, R69, R73, R74	Res. 1005	0Ω	11	RK73Z1ETTP0
R4, R53, R54, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R70, R71, R72, R75, R76, R79, R80, R81, R82, R83, R84, R85, R86, R87, R88, R89, R90, R91, R92, R93, R94, R95, R96, R97, R98	Res. 1005	10kΩ	39	RK73H1ETTP1002F
R7, R8, R9, R10, R11, R12, R13, R14, R15, R16, R21, R22, R23, R24, R25, R26, R27, R28, R29, R30, R31, R32, R33, R34, R39, R40, R41, R42, R43, R44, R45, R46, R47, R48, R49, R50	Res. 1005	33Ω	36	RK73H1ETTP33R0F
R17, R18, R19, R20, R35, R36, R37, R38	Res. 1005(NC)	10kΩ (NC)	8	RK73H1ETTP1002F
R77, R78	Res. 1005(NC)	0Ω (NC)	2	RK73Z1ETTP0
SW1	SW	Top Push	1	SKHMQKE010
TP1, TP2	Test Point(NC)	Through hole	2	



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