High Speed Interface Evaluation Kit

# THEVA252-SMA-V1 User's Guide

## THCS252 Evaluation Kit

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# Contennts

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# 1. Introduction

## 1.1 Overview

THEVA252-SMA-V1 is an evaluation board with THCS252 installed. THS252 is a transceiver IC that aggregates 20bit I/O and allows full-duplex bidirectional communication between master and slave. THEVA252-SMA-V1 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. 48-bit connector for 20bit I/O are not mounted.
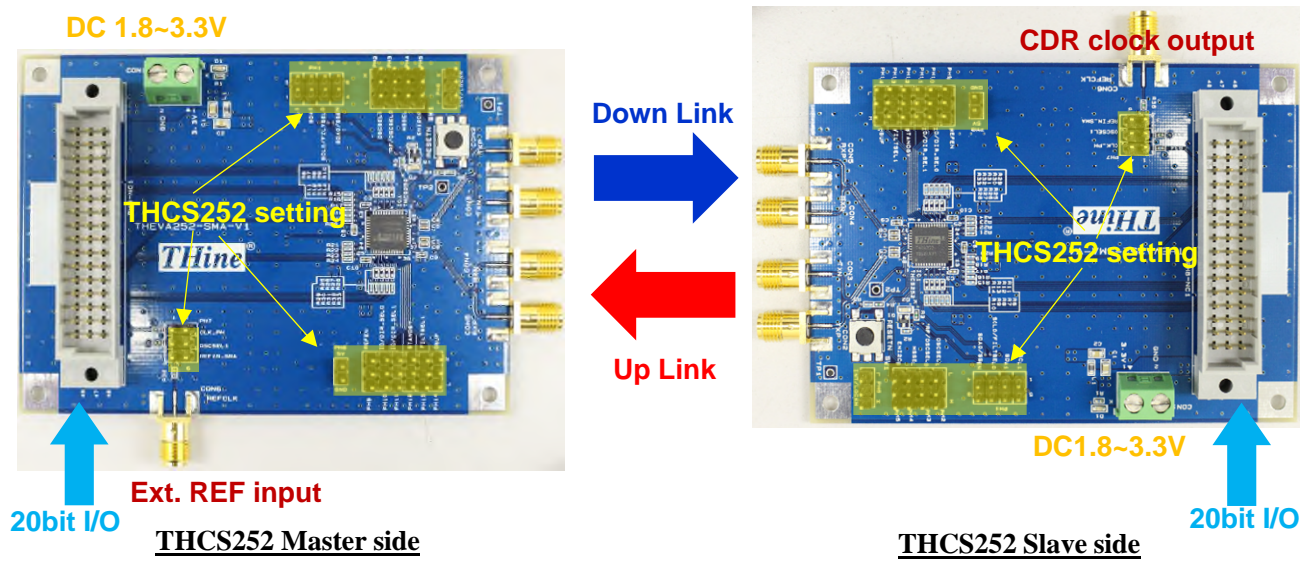


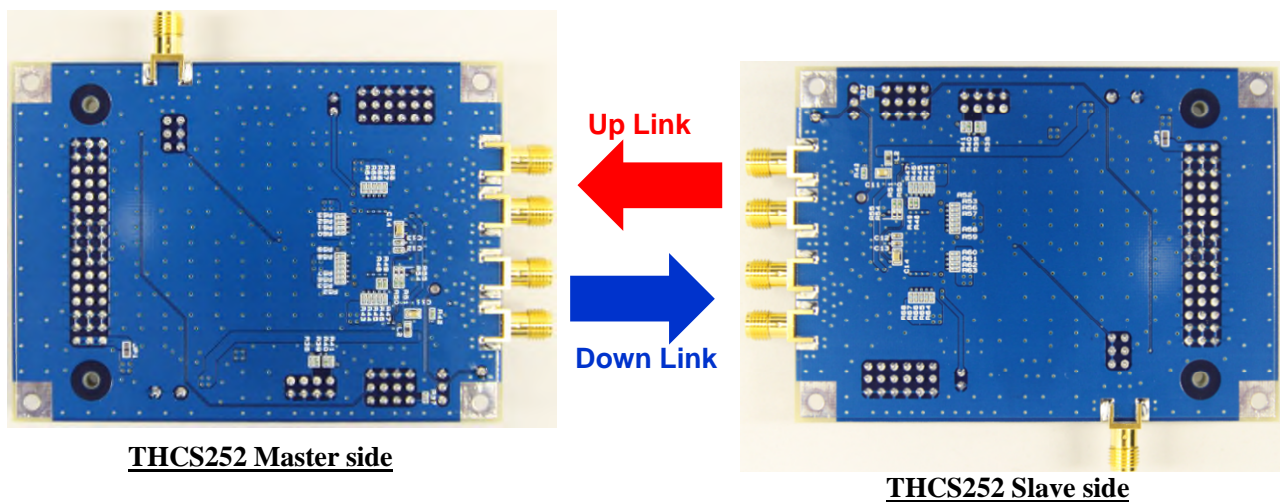**Figure 1 THEVA252-SMA-V1 Master Side / Slave Side top view**



**Figure 2 THEVA252-SMA-V1 Master Side / Slave Side bottom view**

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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.

* 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.

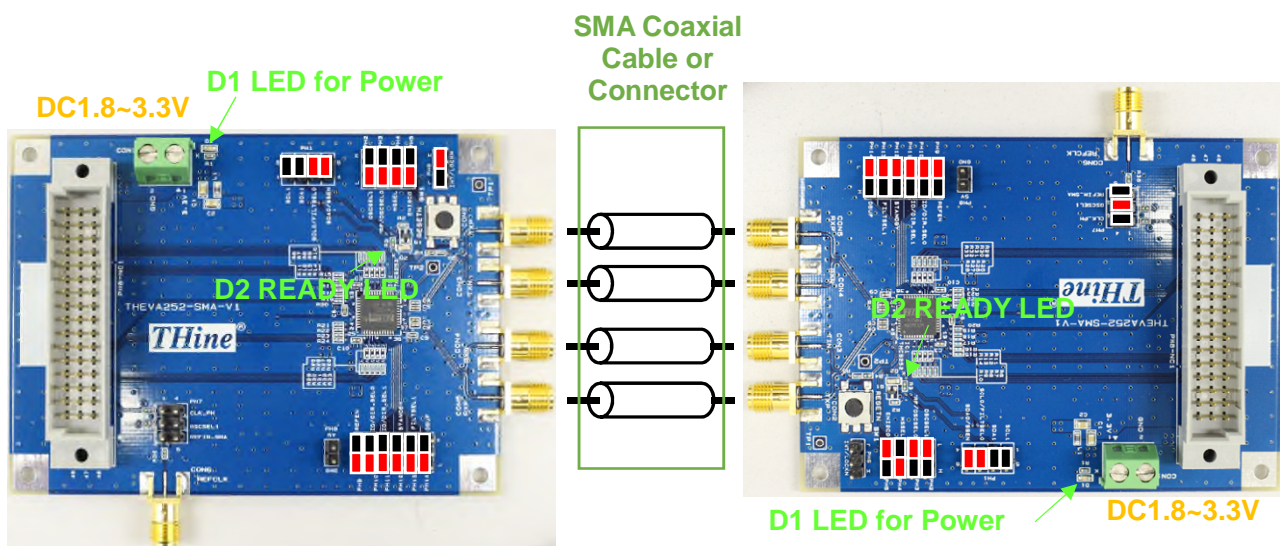| Product | Article | Quantity |
|---|---|---|
| THEVA252-SMA-V1 | THEVA252-SMA-V1 Board | 2 |

**Table 1 THEVA252-SMA-V1 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 THCS252 internal oscillator starts operating at 20MHz and outputs a downlink signal. When this signal is received by THCS252 of the slave board and the internal circuit is locked, an uplink signal is output. When this signal is received by THCS252 of the master board and the internal circuit is locked, communication between the master and slave is established. When communication is established, THCS252 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. 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 THEVA252-SMA-V1 Quit start pin setting**

## 2. Details about each part of the board

2.1 Power Supply

For THEVA252-SMA-V1, 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 THEVA252-SMA-V1 Power supply**
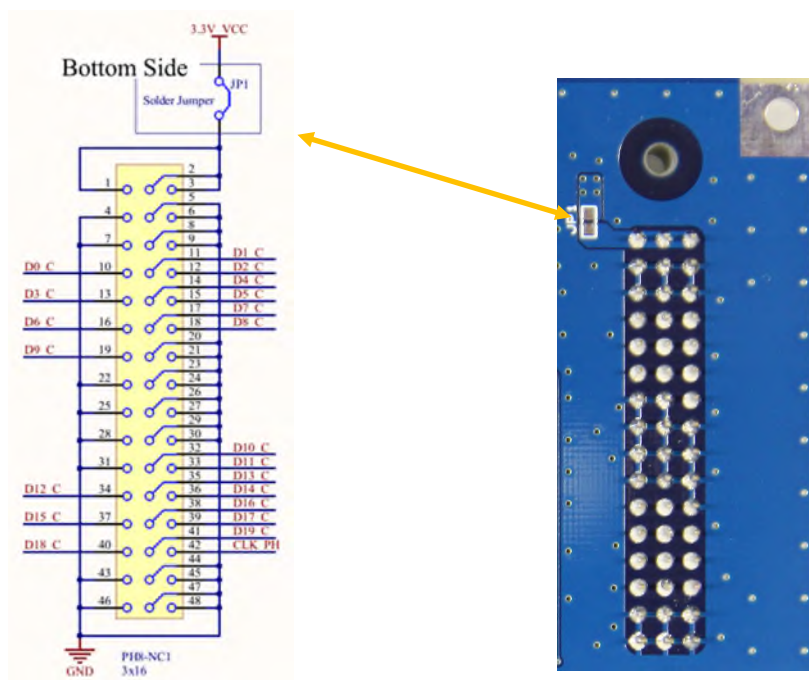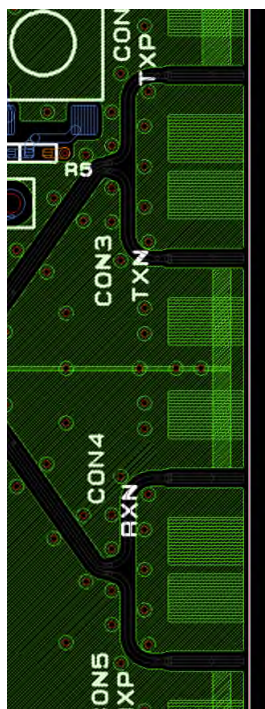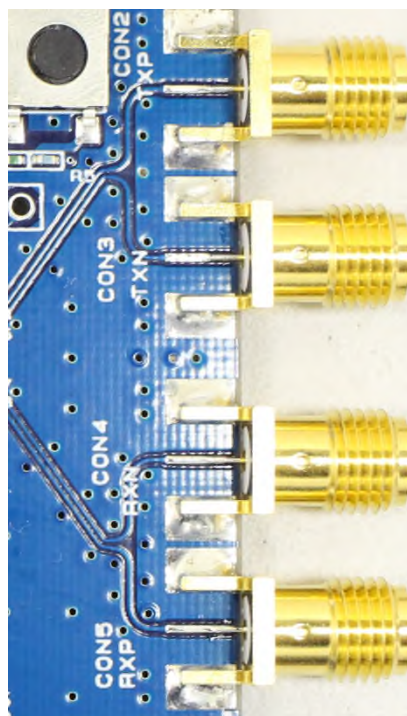


**Figure 5  THEVA252-SMA-V1 Power sharing**

## 2.2 Full-duplex high-speed signal connector

THEVA252-SMA-V1 uses SMA connectors for high-speed signal input / output.
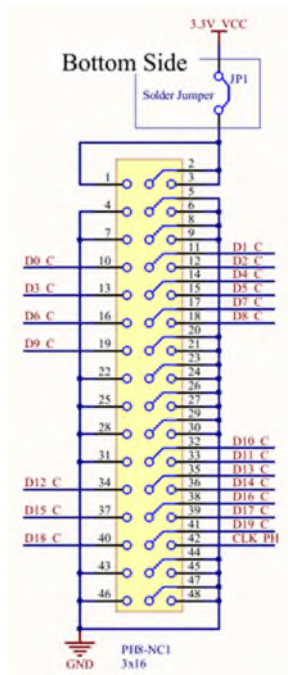


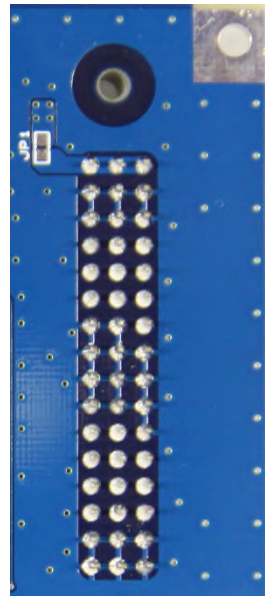**Figure 6  THEVA252-SMA-V1 High Speed CML I/O connector**

## 2.2 Pin header and Connector

\* PH8 is not mounted.

PH8 48-pin layout has 20 pins for I/O, 1 pin for external REF input (master) / CDR clock output (slave), 3 pins for power supply sharing, and 24 pins for GND. Connect the I/O circuits on the master side and slave side according to the THCS252 mode setting.



Chip Master Side



Chip Slave Side

| 1 | VCC | VCC | VCC | 3 |
|---|-----|-----|-----|---|
| 4 | GND | GND | GND | 6 |
| 7 | GND | GND | GND | 9 |
| 10 | D0 / D19 | D1 / D18 | D2 / D17 | 12 |
| 13 | D3 / D16 | D4 / D15 | D5 / D14 | 15 |
| 16 | D6 / D13 | D7 / D12 | D8 / D11 | 18 |
| 19 | D9 / D10 | GND | GND | 21 |
| 22 | GND | GND | GND | 24 |
| 25 | GND | GND | GND | 27 |
| 28 | GND | GND | GND | 30 |
| 31 | GND | D10 / D9 | D11 / D8 | 33 |
| 34 | D12 / D7 | D13 / D6 | D14 / D5 | 36 |
| 37 | D15 / D4 | D16 / D3 | D17 / D2 | 39 |
| 40 | D18 / D1 | D19 / D0 | CLK | 42 |
| 43 | GND | GND | GND | 45 |
| 46 | GND | GND | GND | 48 |

| 48 | GND | GND | GND | 46 |
|----|-----|-----|-----|----|
| 45 | GND | GND | GND | 43 |
| 42 | CLK | D19 / D0 | D18 / D1 | 40 |
| 39 | D17 / D2 | D16 / D3 | D15 / D4 | 37 |
| 36 | D14 / D5 | D13 / D6 | D12 / D7 | 34 |
| 33 | D11 / D8 | D10 / D9 | GND | 31 |
| 30 | GND | GND | GND | 28 |
| 27 | GND | GND | GND | 25 |
| 24 | GND | GND | GND | 22 |
| 21 | GND | GND | D9 / D10 | 19 |
| 18 | D8 / D11 | D7 / D12 | D6 / D13 | 16 |
| 15 | D5 / D14 | D4 / D15 | D3 / D16 | 13 |
| 12 | D2 / D17 | D1 / D18 | D0 / D19 | 10 |
| 9 | GND | GND | GND | 7 |
| 6 | GND | GND | GND | 4 |
| 3 | VCC | VCC | VCC | 1 |

**Figure 7 THEVA252-SMA-V1 Pin header for I/O_PH8**
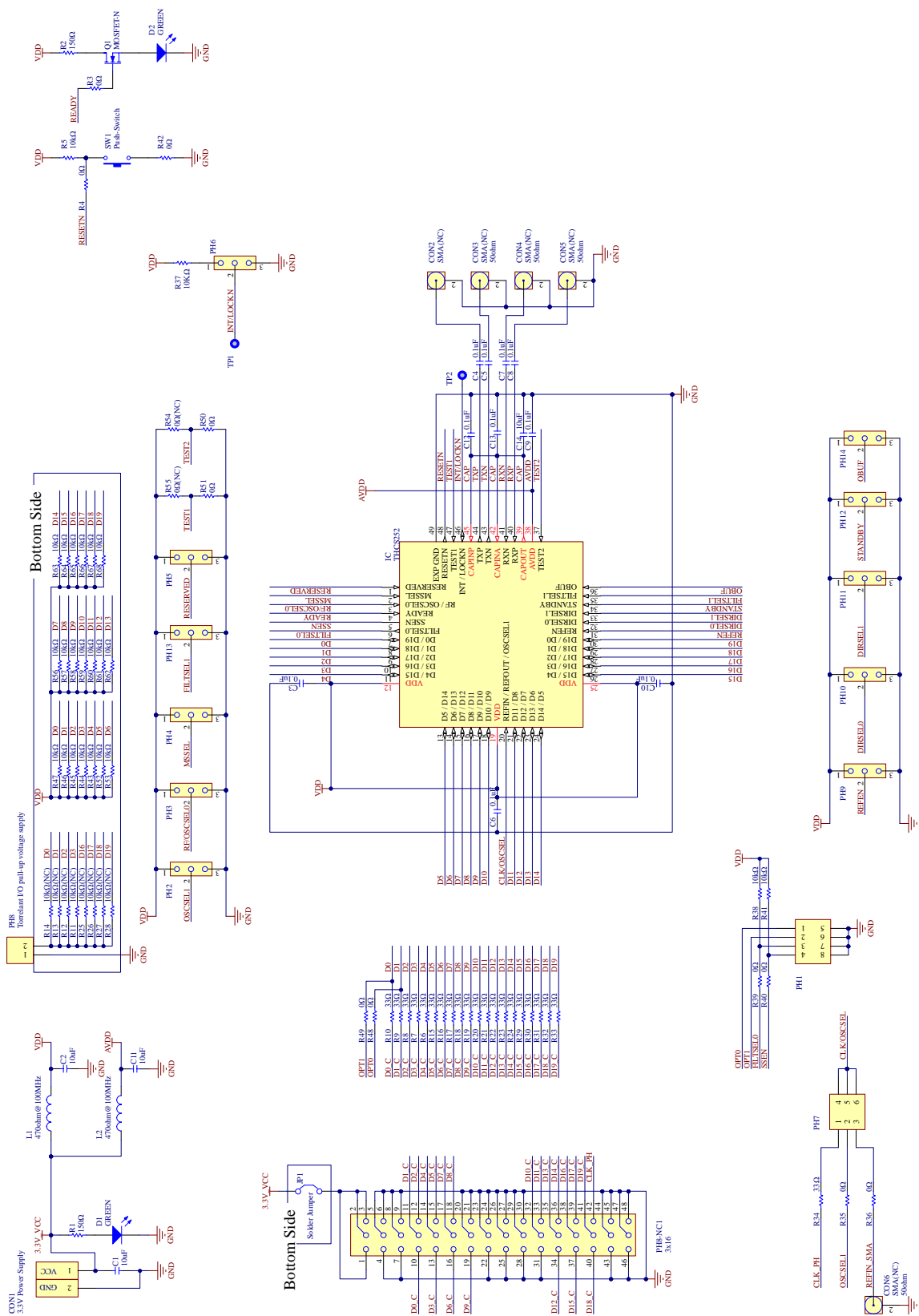
## 2.3 Silk indication matching

Some of the silk indication of THEVA252-SMA-V1 is inconsistent with the schematic indication and the terminal name symbol of the data sheet. The table below shows the consistency of the notation.

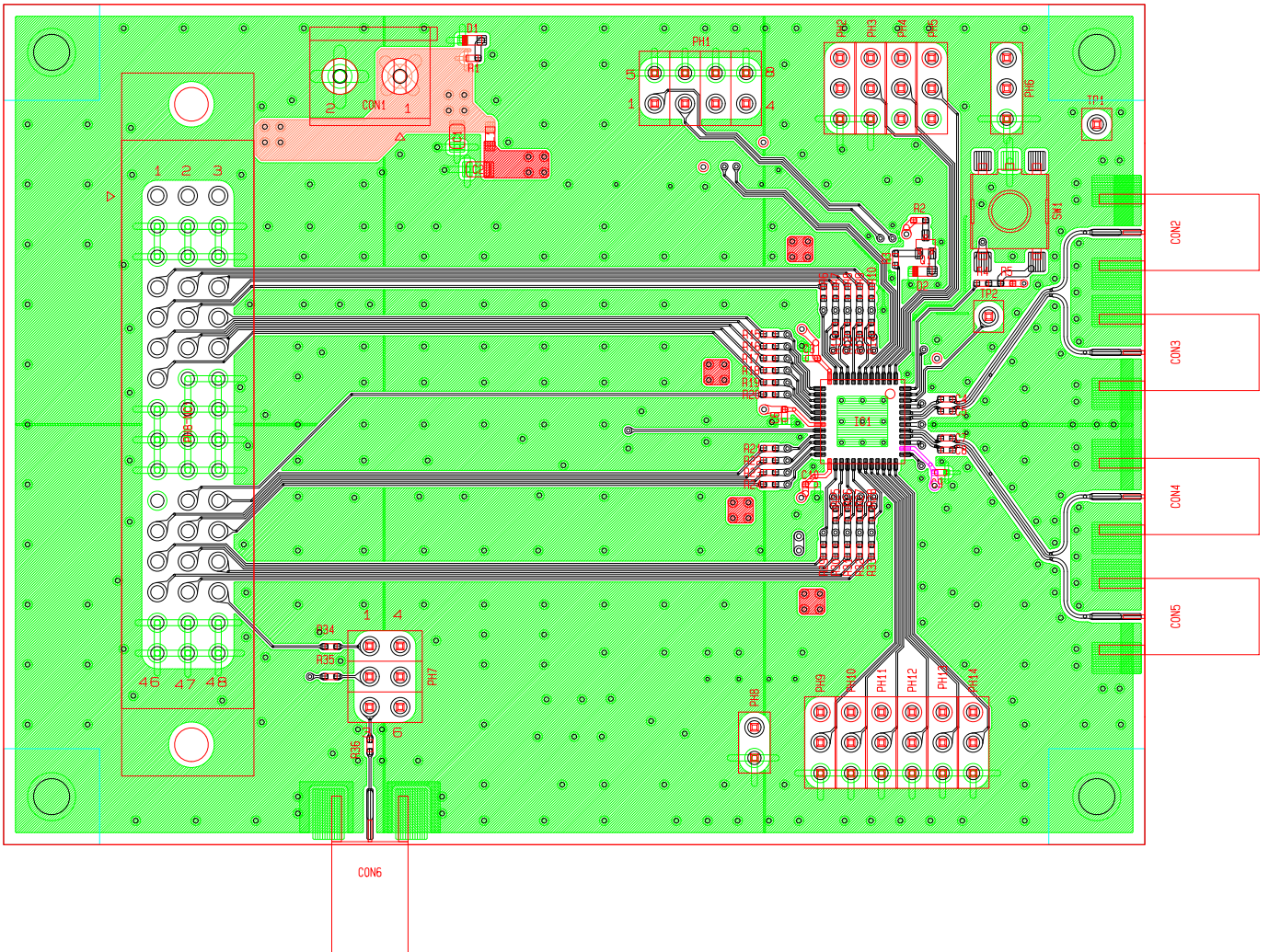| Silk indication | Circuit diagram indication and data sheet symbols | Remarks |
|---|---|---|
| SCL1 | OPT0 (Schematic) <br> Not listed in the data sheet | PH1, Not used. |
| SDA1 | OPT1（Schematic）<br> Not listed in the data sheet | PH1 Not used. |
| SCL0/FILTSEL0 | FILTSEL0 | PH1 |
| SDA0/SSEN | SSEN | PH1 |
| ENI2C0 | RESERVED | PH5, Used with L fixed |
| ID/DIR_SEL0 | DIRSEL0 | PH10 |
| ID/DIR_SEL1 | DIRSEL1 | PH11 |

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# 3. Schematic and Layout
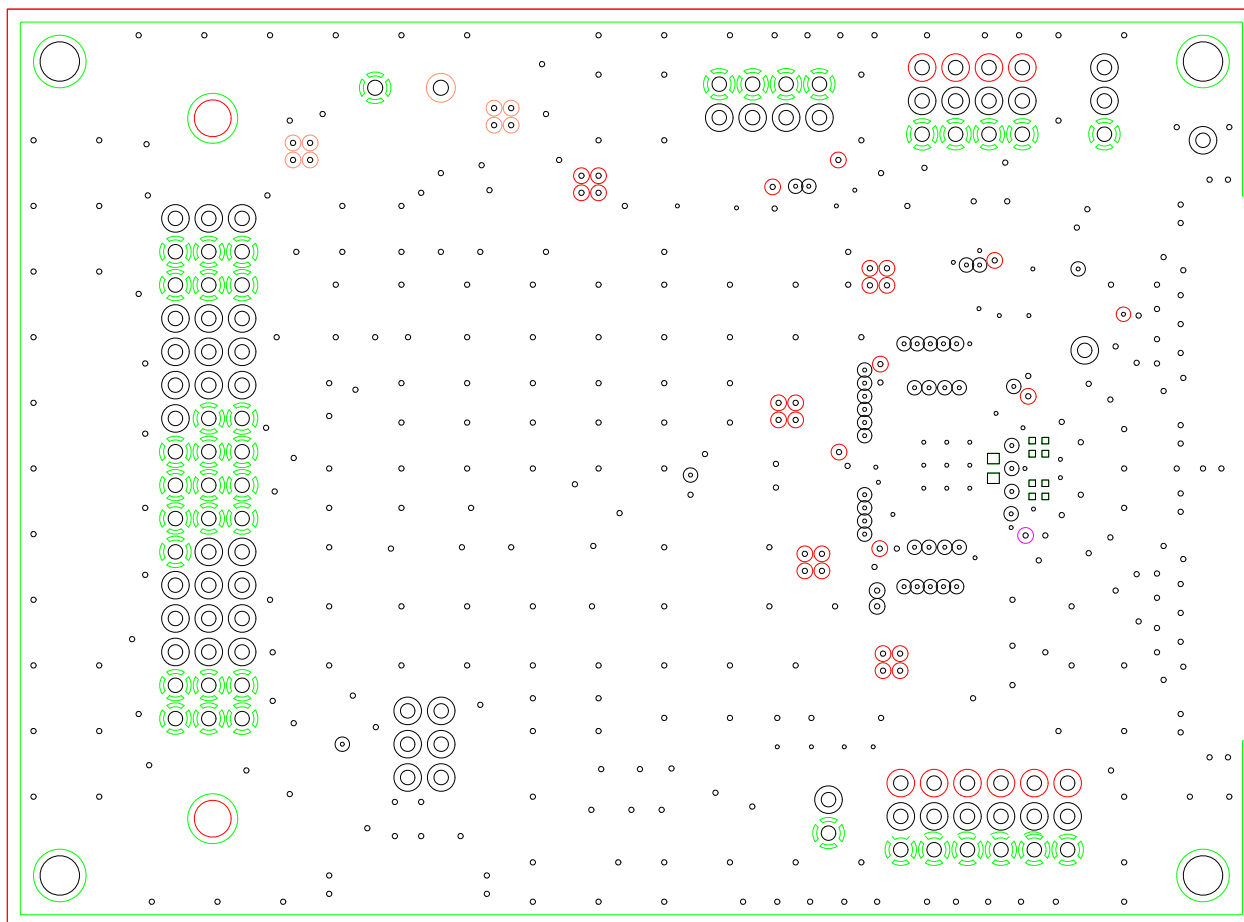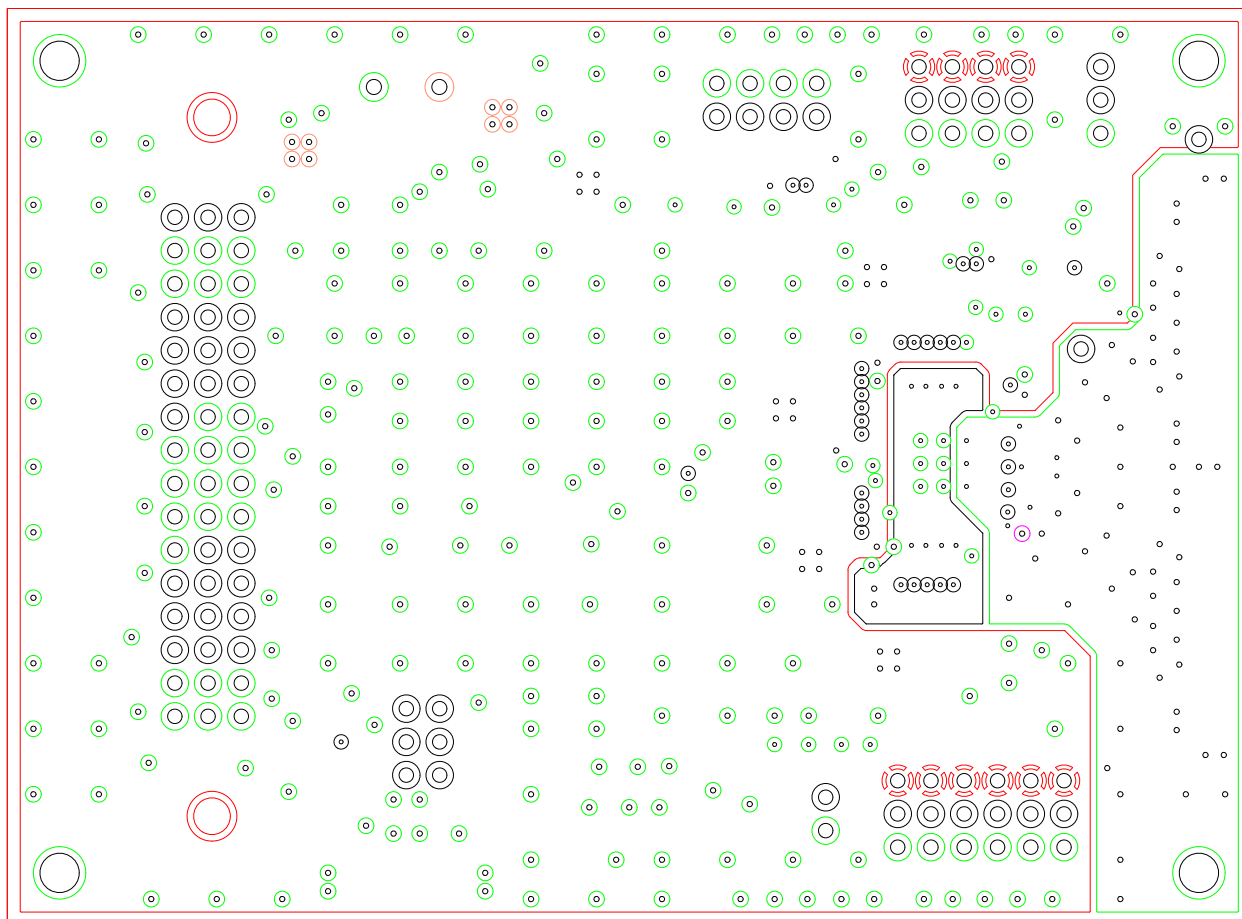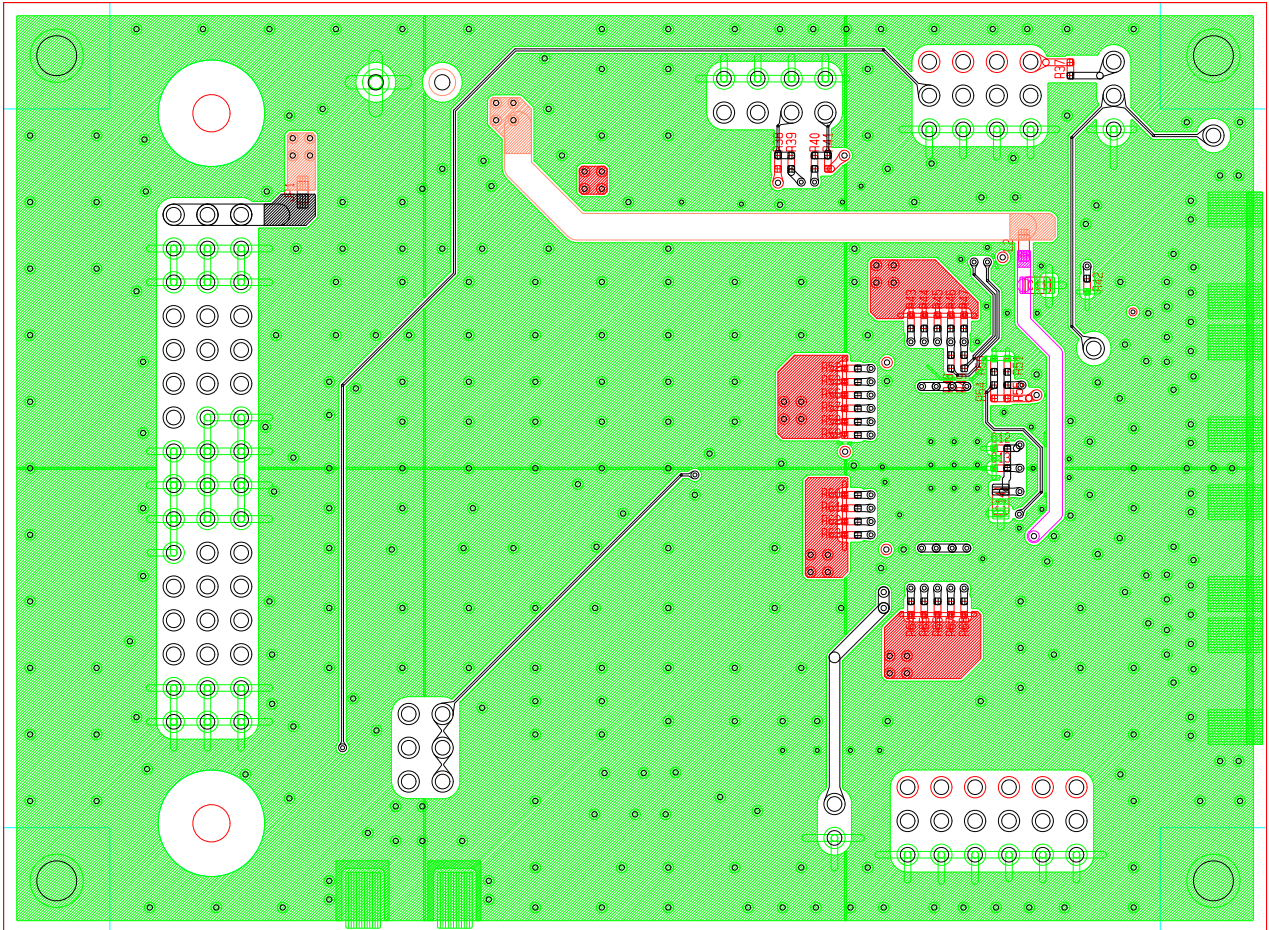
## 3.1 Circuit diagram.

## 3.2 Layout

### 3.2.1　L1(TOP)pattern

3.2.2 L2 pattern

### 3.2.3 L3 pattern

### 3.2.4 L4 pattern

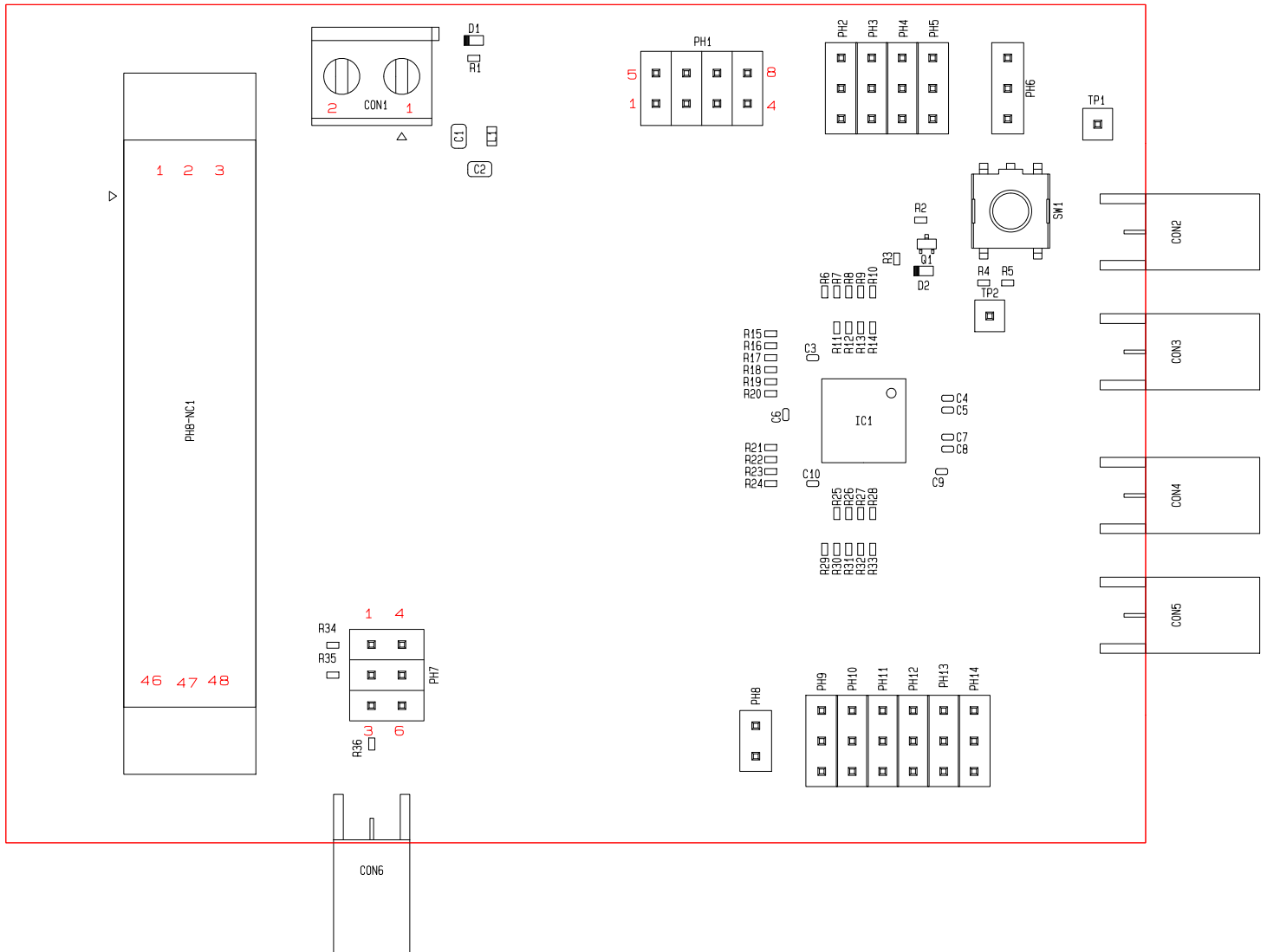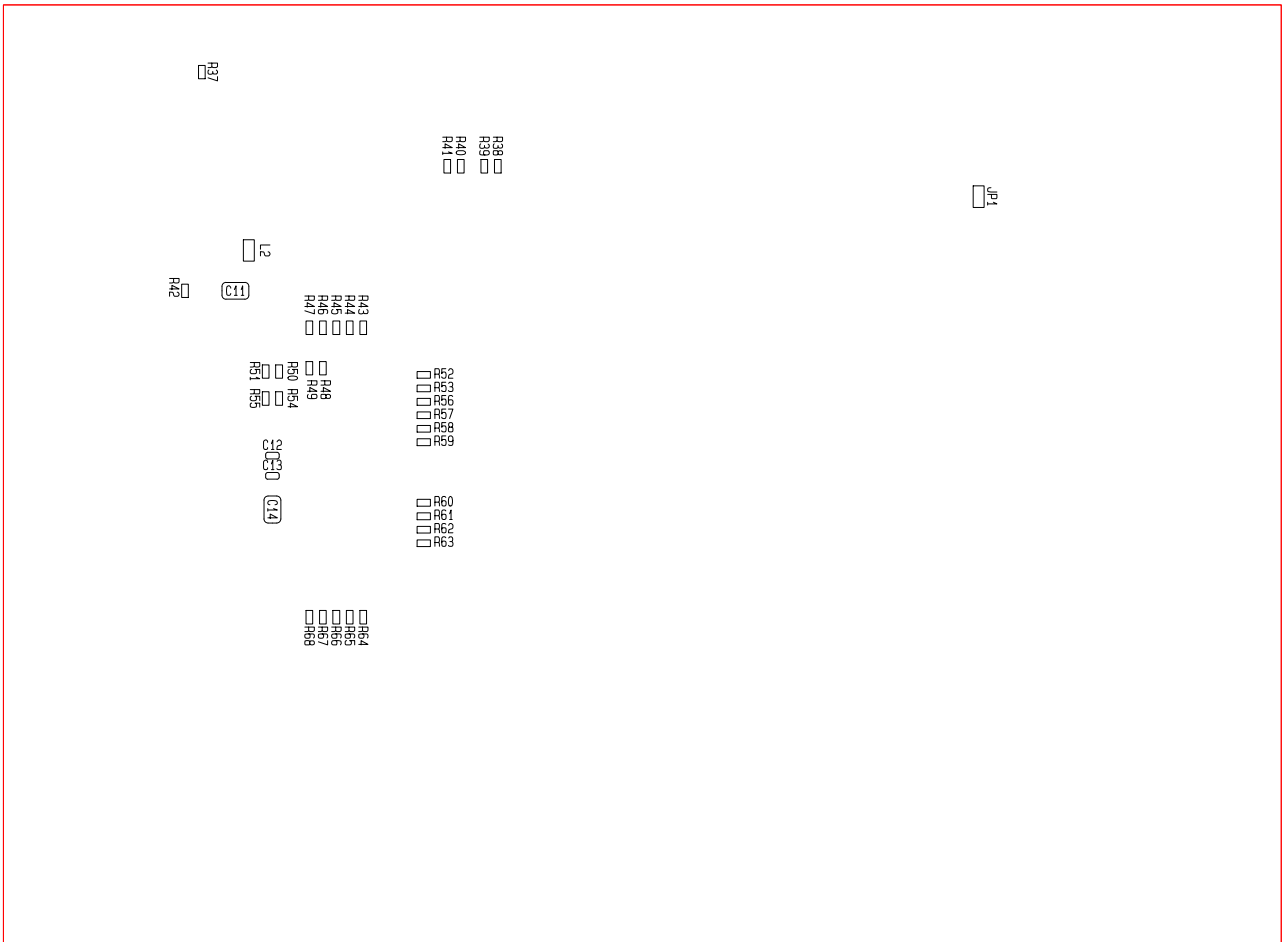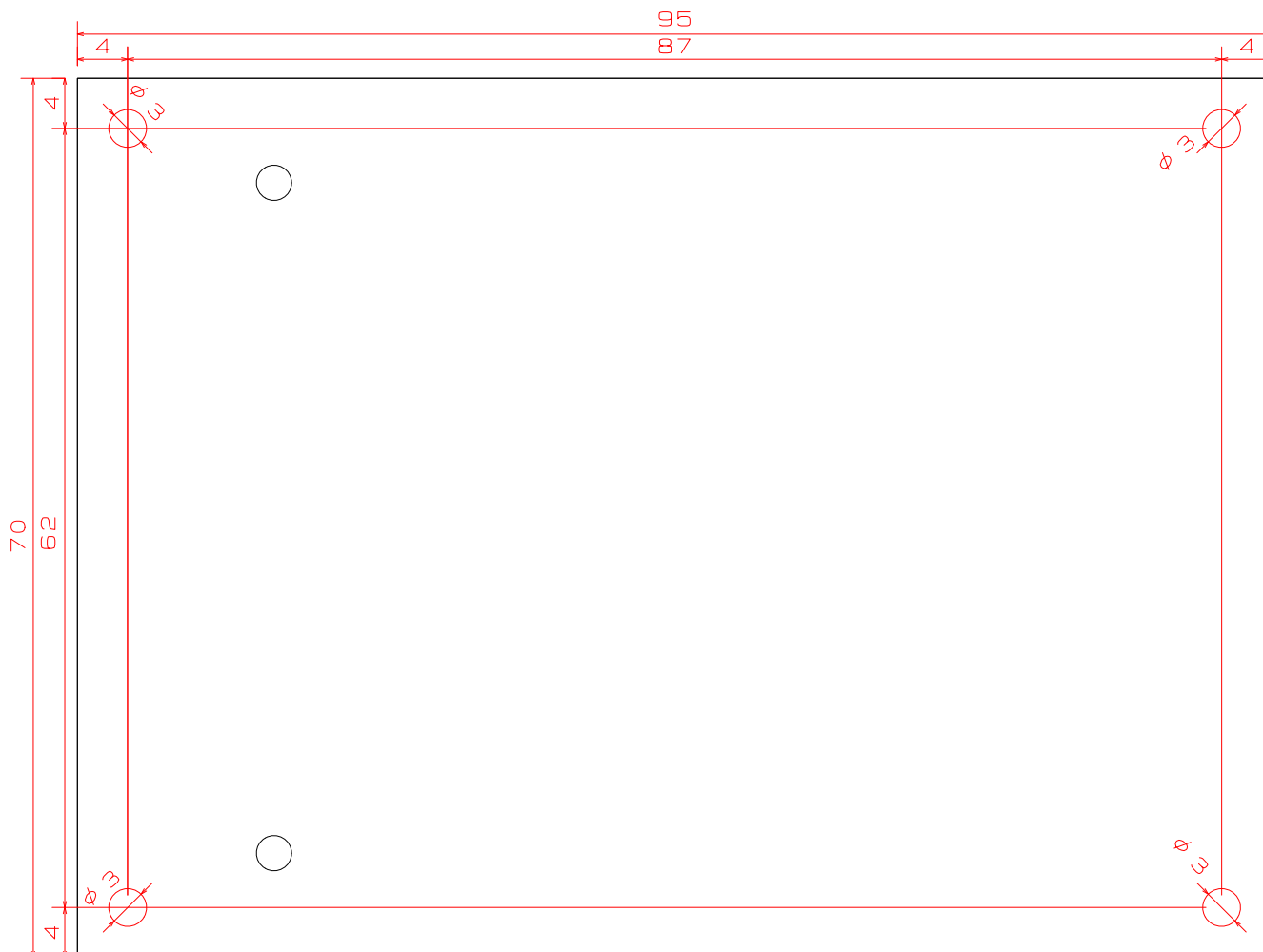### 3.2.5 TOP side silk

### 3.2.6 BOTTOM 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 | 50ohm | 5 | SMA103-T16 |
| D1, D2 | LED | GREEN | 2 | SML-D12P8WT86 |
| IC1 | QFN48 | | 1 | |
| 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, PH9, PH10, PH11, PH12, PH13, PH14 | Header 3 | 1x3 | 10 | TCHM13-70-003S-803R |
| PH6 | Header 3 | 1x3 | 1 | TCHM13-70-003S-803R |
| PH7 | Header 6 | 2x3 | 1 | TCHM23-70-006S-803R |
| PH8 | Header 2 | 1x2 | 1 | TCHM13-70-002S-803R |
| PH8-NC1 | Header 48(NC) | 3x16(NC) | 1 | PCN10-48P-2.54DSA(72) |
| Q1 | MOSFET | N-ch | 1 | SSM3K16FS |
| R1, R2 | Res. 1005 | 150Ω | 2 | RK73H1ETTP1500F |
| R3, R4, R35, R36, R39, R40, R42, R48, R49, R50, R51 | Res. 1005, Res. 1005(NC) | 0Ω | 11 | RK73Z1ETTP0 |
| R5, R37, R38, R41, R43, R44, R45, R46, R47, R52, R53, R56, R57, R58, R59, R60, R61, R62, R63, R64, R65, R66, R67, R68 | Res. 1005 | 10kΩ | 24 | RK73H1ETTP1002F |
| R6, R7, R8, R9, R10, R15, R16, R17, R18, R19, R20, R21, R22, R23, R24, R29, R30, R31, R32, R33, R34 | Res. 1005 | 33Ω | 21 | RK73H1ETTP33R0F |
| R11, R12, R13, R14, R25, R26, R27, R28 | Res. 1005(NC) | 10kΩ(NC) | 8 | RK73H1ETTP1002F |
| R54, R55 | 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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