

GigaDevice Semiconductor Inc.

**GD32VW553H-START Evaluation Board
User Guide**

Rev1.0

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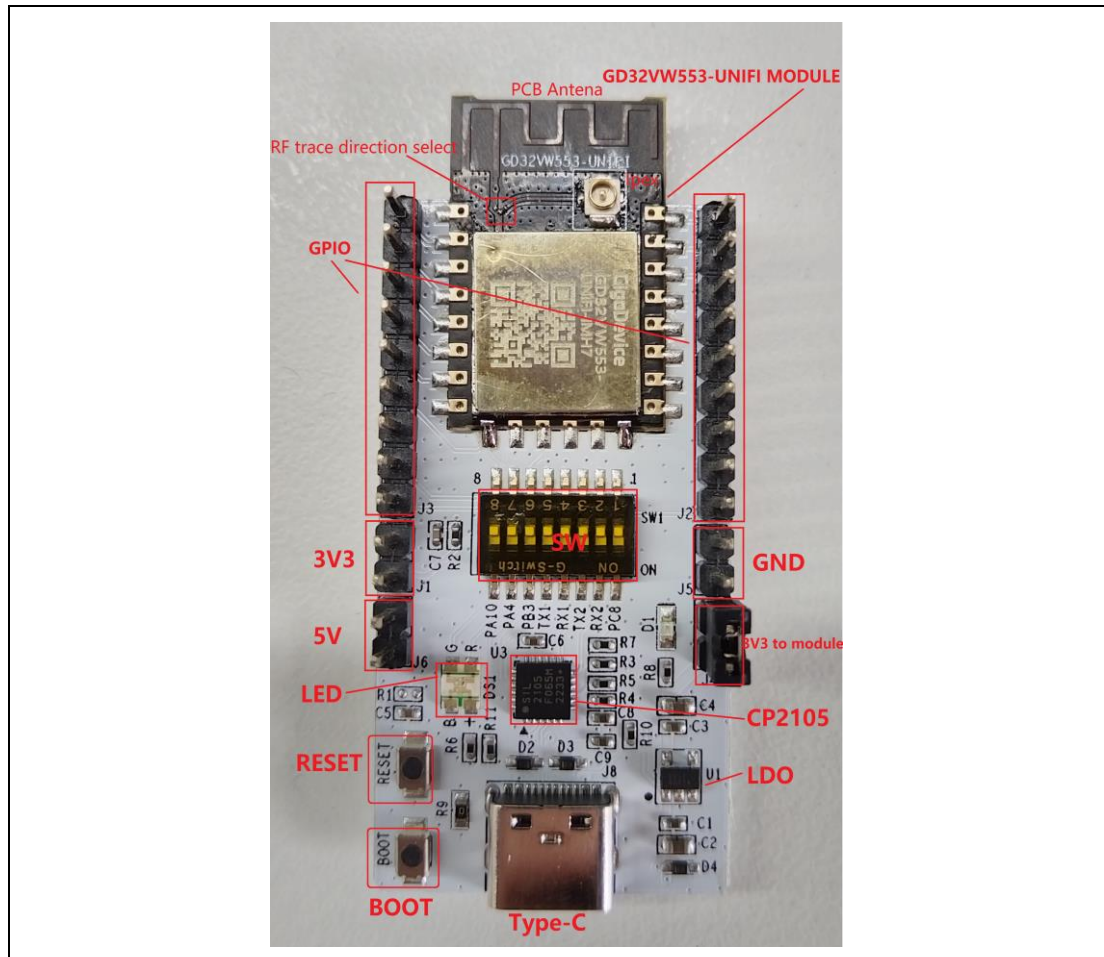
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1. Summary

The GD32VW553H-START evaluation board is an RF performance evaluation board developed for the GD32VW553 series of dual-mode wireless microcontrollers. The core device is the GD32VW553 wireless module, which contains a GD32VW553 series MCU. The GD32VW553 series MCU adopts a new open-source instruction set architecture RISC-V processor core with a main frequency of up to 160MHz. The integrated 2.4GHz Wi-Fi 6 and Bluetooth LE 5.2 RF module provides advanced baseband and RF performance, which is suitable for a wide range of wireless application scenarios, such as smart home systems, industrial internet of things (IoT), and communication gateways.

Figure 1-1 GD32VW553H-START Appearance



Based on the GD32VW553H-START board, the tests that can be accomplished include but are not limited to: tests for RF indicators of non-signaling mode Wi-Fi and BLE transmitting and receiving, tests for throughput indicators of signaling mode Wi-Fi transmitting and receiving, tests for power consumption indicators of Wi-Fi and BLE in various scenarios, tests for FCC, CE, and SRRC certification regulations, and other tests of Wi-Fi and BLE hardware and software system functions and performance.

The GD32VW553H-START can also help developers to complete the compilation and debugging of applications developed based on the Wi-Fi and BLE APIs of the GD32VW553 series chips. For more details on the above test and use operation guide, please refer to the [Operation Guide](#) section of this document.

Note: The conduction test requires modification of the module antenna configuration. For specific modification methods, [refer to Chapter 3.1](#).

Table 1-1 GD32VW553H-START RF characteristics

Parameter Items	Description
Operation Frequency	2400-2483.5MHz
Wi-Fi Specification	IEEE 802.11b / g / n / ax
Transmission data type	11b: 1,2,5.5,11 (Mbps) 11g: 6,9,12,18,24,36,48,54 (Mbps) 11n: HT20 MCS0-7; 11ax: HE20 MCS0-9; BLE 5.2: 125, 500 (Kbps) , 1, 2 (Mbps)
Antenna type	PCB antenna, gain 2dBi External lpex antenna

2. Function Pin Assign

This chapter describes each IO connections and main interfaces of GD32VW553H-START connectors.

2.1. IO Connection

Table 2-1. GD32VW553H-START Evaluation Board Connectors and Switch Functions

Connector	Description
J1	3.3V pin.
J2	Connect the main chip IO interface PA6/PA9/PA3/PB0/PC8/PB1/PC15/PA8/PB15
J3	Connect the main chip IO interfaces PB4/PB3/PA7/PA10/PA4/PA5/PA2/PA0/PA1
J4	Module 3.3V power supply pin, short J4: LDO outputs 3.3V power to UNIFI module. During power consumption testing, supply 3.3v power to the module from J4.2.
J5	GND pin.
J6	5V pin.
J8	Type-C USB interface, UART communication and 5V power supply.
Button	Description
BOOT	Connect the BOOT button to the PC8 (Boot0) pin of the module. When pressed, this will pull the PC8 up to 3V3. To download the firmware (FW), press the BOOT button, then press the RESET button, then release the RESET button, and finally release the BOOT button to enter download mode.
RESET	Module reset button.
SW1	
PIN	Description
1	PC8, dial ON, normal operation PC8 pulls down, firmware starts from internal flash.
2	PA6-TX2, dial ON to connect USB to UART chip ECI-RX. The communication speed is greater than 2Mbps.
3	PA7-RX2, dial ON to connect USB to UART chip ECI-TX. The communication speed is greater than 2Mbps.
4	PB15-TX1, dial ON to connect USB to UART chip SCI-RX. The communication speed is below 1Mbps.
5	PA8-RX1, dial ON to connect USB to UART chip SCI-TX. The communication speed is below 1Mbps.

Connector	Description
6	PB3, dial ON to connect LED-B, PB3 low level blue light is on.
7	PA4, dial ON to connect LED-R, PA4 low level red light is on.
8	PA10, dial ON to connect LED-G, PA10 low level green light is on.

2.2. Main Interface

Table 2-2. Main Interface Description of GD32VW553H-START Evaluation Board

Interface	Describe
PA0	IO port, can be configured.
PA1	IO port, can be configured.
PA2	IO port, can be configured.
PA3	IO port, can be configured.
PA4	IO port, can be configured.
PA5	IO port, can be configured.
PA6 / UART2_TX	IO port; Users can be configured; UART TX2.
PA7 / UART2_RX	IO port; Users can be configured; UART RX2.
PB0	IO port, can be configured.
PB1 / BOOT1	IO port, Boot mode selection.
PB15	IO port, can be configured; UART TX1.
PA8	IO port, can be configured; UART RX1.
PA9	IO port, can be configured.
PA10	IO port, can be configured.
PB3	IO port, can be configured.
PB4	IO port, can be configured.
PC8 / BOOT0	IO port; Boot mode selection.
PC15	IO port, can be configured.
NRST	Module reset pin, when press the button reset module, low reset.
PU	Module enable, with 10K ohm pull-up resistor on evaluation board
3V3	3.3V power supply pin
GND	Power Ground

3. Basic Operation

This chapter covers the hardware configuration, software configuration, and basic usage guidelines of the GD32VW553H-START Evaluation Board.

3.1. Hardware Configuration

The appearance of the GD32VW553H-START evaluation board is shown Figure 1-1, where:

- UART function: Use CP2105 chip to achieve USB to 2-channel UART function, connect the PA6/PA7 and PA8/PB15 UART interfaces respectively, and both UART ports can realize firmware burning and debugging control. It should be noted that due to the inherent limitations of the CP2105 chip, the two UART channels have different baud rates, there may be a difference in the firmware burning rate between the two URAT ports.
- Main chip mode configuration:
 - The chip PIN "**BOOT0**" needs to be at a low level (boot from flash) to start from flash normally, and can be achieved by dialing PIN1 ON through SW1.
 - The chip PIN "**PU**" needs to be at a high level, and the evaluation board had connected to the high level.
- Module antenna switching: Switch the position of the resistor by soldering to select the RF signal path of the module: when the left side of the resistor is upward, the RF path leads to the PCB antenna and can only be used for radiation testing. When the right side of the resistor is upward, the RF path leads to the RF (Iplex) test stand, which is used for conducting tests and external antenna radiation tests. The module on the GD32VW553H-START evaluation board defaults to using the PCB onboard antenna.
- Module power supply: The LDO on the evaluation board converts the 5V power input from the USB interface into 3.3V output. This 3.3V supplies power to the module through J4. For module power consumption testing, disconnect the J4 jumper and connect an external 3.3V supply to J4.2.

3.2. Software Configuration

3.2.1. Driver Installation

Connect the GD32VW553H-START evaluation board to the PC through a USB cable, and you can find the serial device and COM number in the "Device Manager" on the PC side. There is a need to install the USB driver., The USB chip model is CP2105, you can download the driver from the chip's website. The evaluation board has two COM ports: the larger COM port is connected to PB15-TX1/PA8-RX1, while the smaller one is connected to PA6-TX2/PA7-RX2.

3.2.2. Firmware Download

For the GD32VW553H-START evaluation board, firmware can only be downloaded through the serial port. The [GD32 All-In-One Programmer](#) serial port download tool is required to download the firmware. For detailed instructions, please refer to the *GigaDevice All-In-One Programmer User Manual*.

Note that firmware can be downloaded through both serial ports. If both serial ports are connected, the tool will prioritize downloading through the small COM port. TX2/RX2 ports are small COM ports that support download speeds greater than 2M Baud rate, while TX1/RX1 ports are large COM ports with download speeds less than 1M Baud rate (The download rate is limited by the CP2105 itself). All UART ports of the GD32VW553 chip support download speeds greater than 2 Mbps.

3.3. Operation Guide

[The GD32VW5 series MCU](#) resource download page provides complete test and application notes for the chip. Most of the test and development descriptions in these notes are based on the GD32VW553K-START. The GD32VW553K-START evaluation board and the GD32VW553H-START evaluation board use different forms of modules; therefore, this operation guide subsection will not repeat the content of the User Guide for the GD32VW553K-START.

3.3.1. AN154 GD32VW553 Quick Development Guide

[GD32VW553 Quick Development Guide](#) aims to guide developers to get started with Wi-Fi and BLE development on the corresponding evaluation boards for the GD32VW553 series chips. The main contents include the building of GD32Eclipse IDE development environment, SDK configuration, compiling and debugging SDK under GD32Eclipse IDE.

3.3.2. AN158 GD32VW553 Wi-Fi Development Guide

[GD32VW553 Wi-Fi Development Guide](#) aims to help developers familiarize themselves with the SDK and develop their own applications using the APIs. The main contents include the Wi-Fi SDK software framework, the startup process, and the introduction of Wi-Fi and related component APIs. The Development Guide is composed of three parts: OSAL API usage, Wi-Fi Netif API usage, and Wi-Fi management related API usage. It also uses a specific use case to introduce how to use the component API to scan wireless networks, connect to APs, start soft AP and connect to Alibaba Cloud and other operations.

3.3.3. AN152 GD32VW553 BLE Development Guide

[GD32VW553 BLE Development Guide](#) aims to help developers familiarize themselves with

and develop their own applications using the BLE API. It describes in detail the BLE software framework and the related API interfaces, and introduces BLE Scanning, BLE Broadcasting, BLE GATT server application, and BLE Distribution Networking content with a specific use case.

3.3.4. **AN153 GD32VW553 Basic Command User Guide**

[The GD32VW553 Basic Commands User Guide](#) aims to introduce the various basic UART-based commands required for Wi-Fi and BLE hardware and software system functionality and performance testing of the GD32VW553 series chips.

3.3.5. **AN151 GD32VW553 AT Command User Guide**

[The GD32VW553 AT Command User Guide](#) aims to guide developers in testing and developing the GD32VW553 series chips based on the AT command.

3.3.6. **AN149 Test Guidelines for RF Performance and Transceiver Power Consumption of GD32VW553**

[The Test Guidelines for RF Performance and Transceiver Power Consumption of GD32VW553](#) aims to guide developers to evaluate the Wi-Fi & BLE transmit and receive RF performance and corresponding power consumption of the GD32VW553K-START in non-signaling mode. The guidelines cover three parts: the test method of RF performance using RF tools, using serial commands, and the test method of non-signaling RF transmitting and receiving power consumption. The Test Guidelines also introduces the configuration of the test system and the hardware and software of the START board, as well as common problems and solutions.

Note: This test requires burning the RF test firmware with the keyword "rf_test".

3.3.7. **AN150 Test Guidelines for Throughput and Scenario-based Power Consumption of GD32VW553**

[Test Guidelines for Throughput and Scenario-based Power Consumption of GD32VW553](#) aims to guide developers to evaluate the Wi-Fi transmitting and receiving throughput performance and various scenario power consumption of GD32VW553K-START in signaling mode.

The Test Guidelines firstly introduces the test method of using serial tools and commands to evaluate the TCP TX/RX and UDP TX/RX throughput metrics in signaling mode, and testers can burn the signaling test firmware with keyword "wifi_signaling_test" for targeted testing. Secondly, it introduces the test methods of power consumption for four scenarios: Wi-Fi off, connecting AP+UDP TX, connecting AP+UDP RX, connecting AP+power saving & DTIM=1. The Test Guidelines also introduces the configuration of the test system and the hardware and software of the START board, as well as common problems and solutions.

3.3.8. AN146 GD32VW553 Certification Test Guidelines

[The GD32VW553 Certification Test Guidelines](#) aims to guide developers to evaluate the START board's RF-related FCC / CE / SRRC certification regulations.

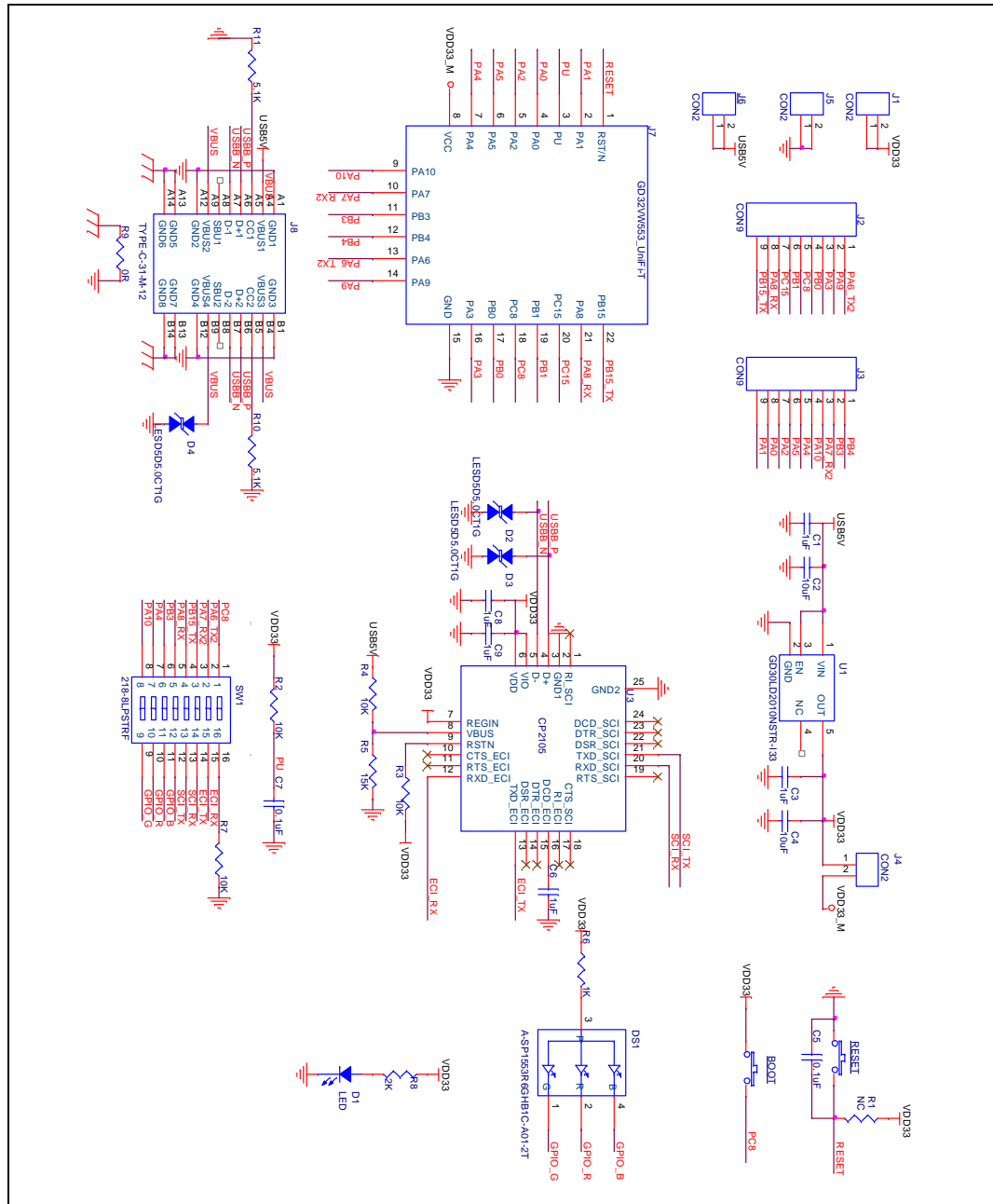
It introduces the methods of using RF tools and serial commands to evaluate the TX/RX indicators of non-signaling modes in each certification, as well as the methods of using serial commands to evaluate the "Blocking" and "Adaptivity" test items of signaling modes in CE certification.

Meanwhile, the article also introduces the configuration of the test system and the hardware and software of the START board, as well as the common problems and solutions.

It should be noted that this test requires burning the corresponding firmware according to the specific test items.

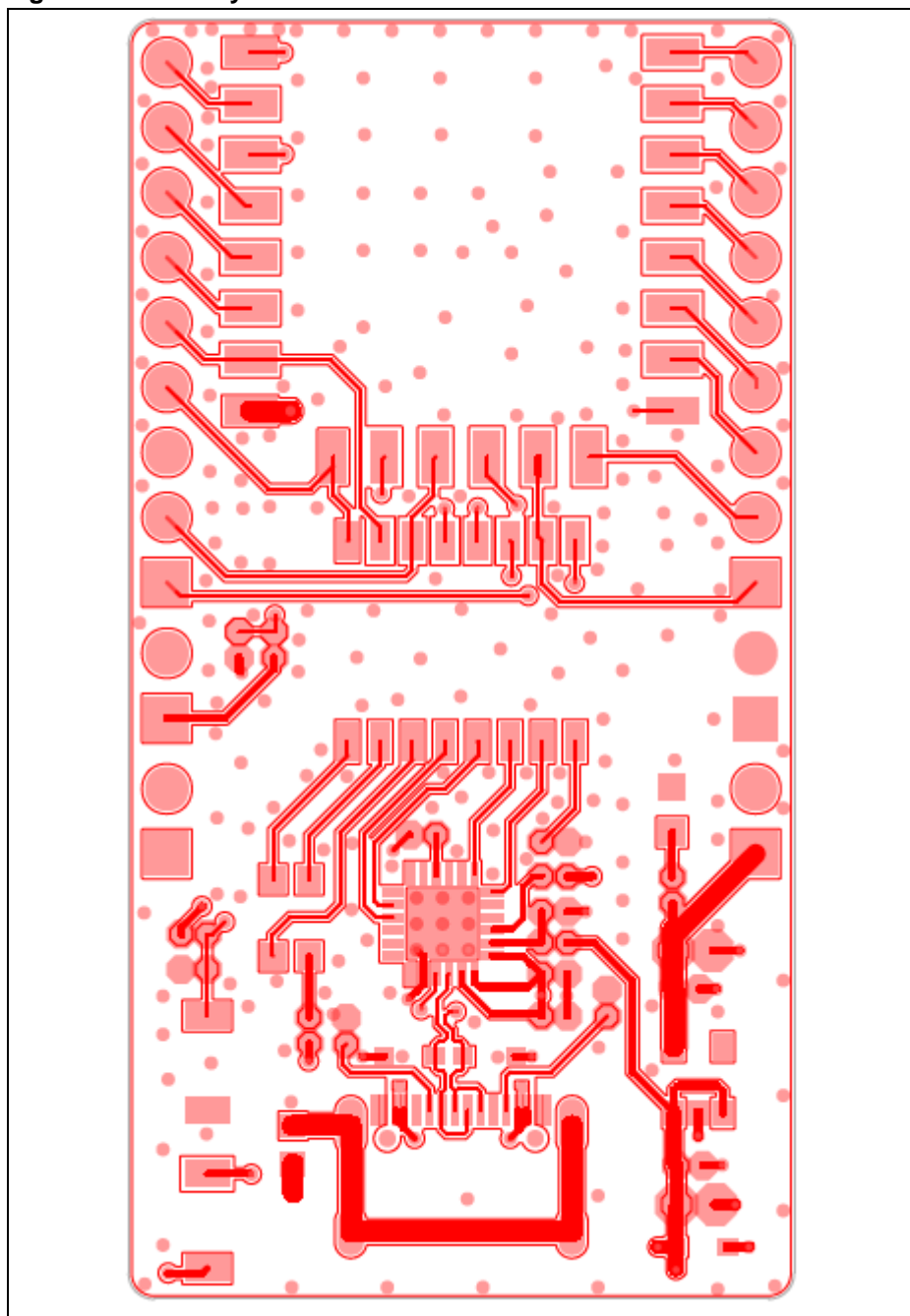
4. Schematic Diagram

Figure 4-1 GD32VW553H-START Evaluation Board Schematic



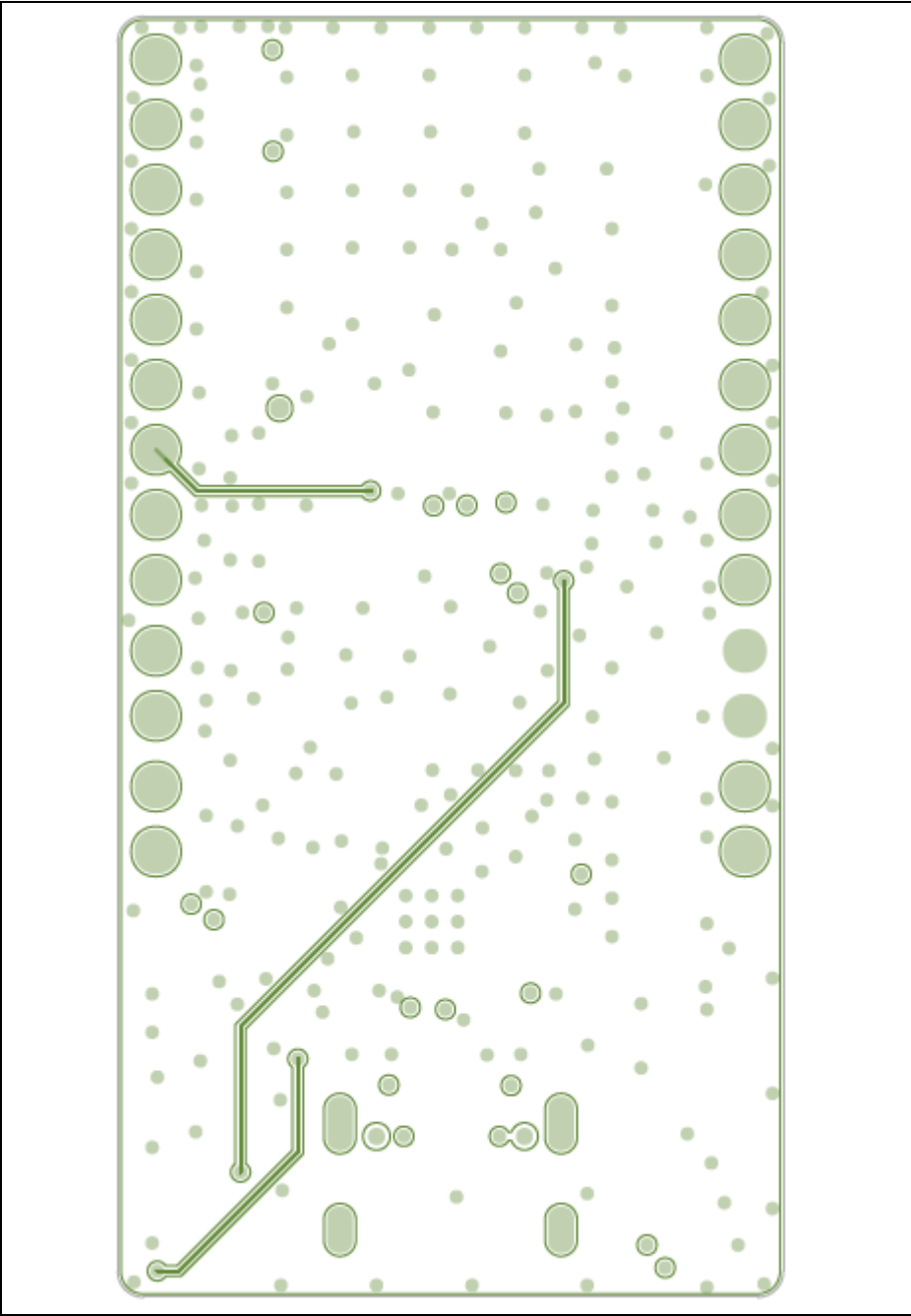
TOP Layer

Figure 5-2 TOP Layer



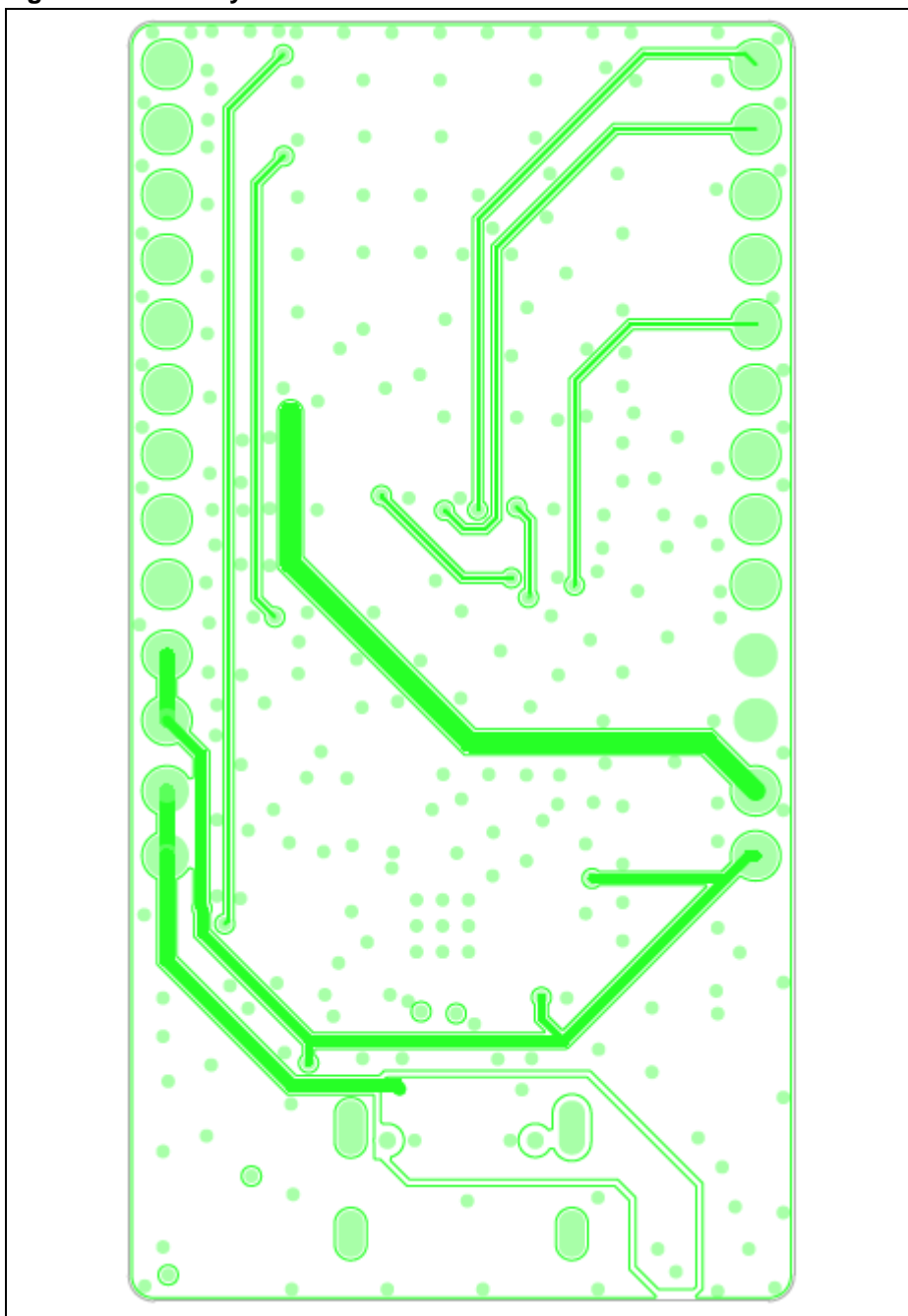
GND Layer

Figure 5-3 GND Layer



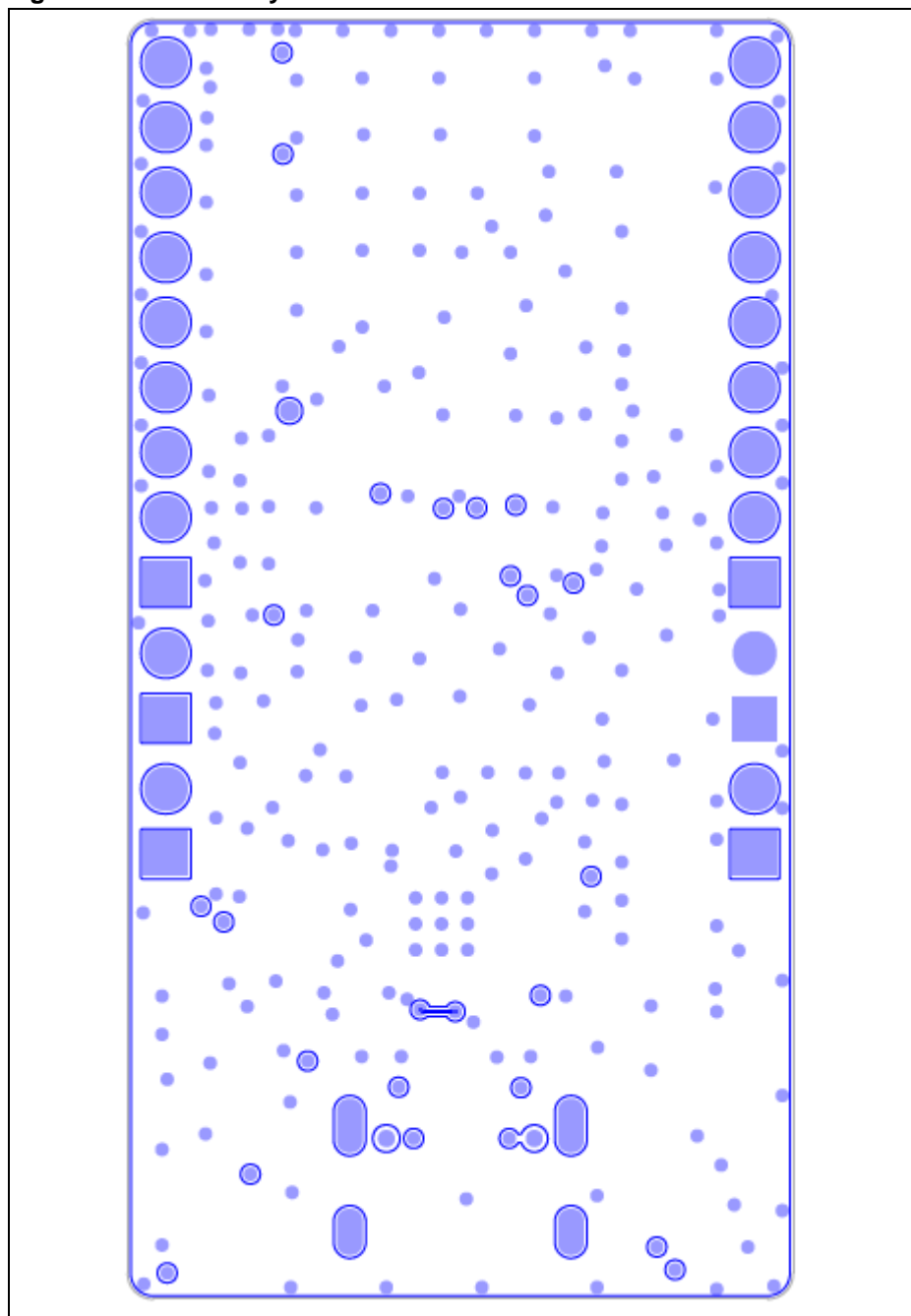
VCC Layer

Figure 5-4 VCC Layer



Bottom Layer

Figure 5-5 Bottom Layer



6. Version History

Table 6-1. Version History

Version number	explain	date
1.0	First draft release	Jan 12, 2026

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