

RN52m DataSheet

v1.2.0-en

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1. Revision History

Date	Version	Description
2020/01	1.0.0	First Release
2021/08	1.1.0	Change dimension data to high resolution
2021/11	1.2.0	Change dimension data (Chip Antenna)

2. Overview



The RN52m module (based nRF52832 SoC) is a powerful, highly flexible ultra-low power multiprotocol SoC ideally suited for Bluetooth® low energy (previously called Bluetooth Smart), ANT and 2.4GHz ultra low-power wireless applications. The RN52m is built around a 32-bit ARM® Cortex™-M4F CPU with 512kB + 64kB RAM. The embedded 2.4GHz transceiver supports Bluetooth low energy, ANT and proprietary 2.4 GHz protocol stack. It is on air compatible with the nRF51 Series, nRF24L and nRF24AP Series products from Nordic Semiconductor.

Bluetooth 5

The RN52m has hardware support on-chip for Bluetooth 5. This includes high throughput and advertising extension.



Processing power

The RN52m incorporates a powerful Cortex-M4F processor enabling the most demanding applications with complex arithmetic requirements to be realized in a single chip solution. The IC supports DSP instructions, a Floating Point Unit (FPU), single-cycle multiply and accumulate, and hardware divide for energy-efficient process of computationally complex operations.

Multiprotocol radio

The 2.4GHz radio supports multiple protocols including Bluetooth low energy, ANT and 2.4GHz proprietary. The radio has high definition RSSI and highly automated functionality, including EasyDMA for direct memory access during packet send and retrieve. Nordic provides protocol stacks for Bluetooth low energy. ANT protocol stacks are available from ANT here: www.thisisant.com.

Power Efficiency

The RN52m module is an extremely power efficient device that can run from a supply between 1.7V and 3.6V. All individual peripherals and clocks offer complete flexibility of power down when not required for task operation thus minimizing power consumption to a minimum. The IC has a comprehensive system of automated and adaptive power management features. These features range across the entire IC's operation from power supply switching to peripheral bus/EasyDMA memory management, to automated shut down of all but the absolute essential peripherals required to perform a task.

SoftDevice

The RN52m is supported by the S132 SoftDevice, a Bluetooth 5 pre-qualified protocol stack.

2.1. Features

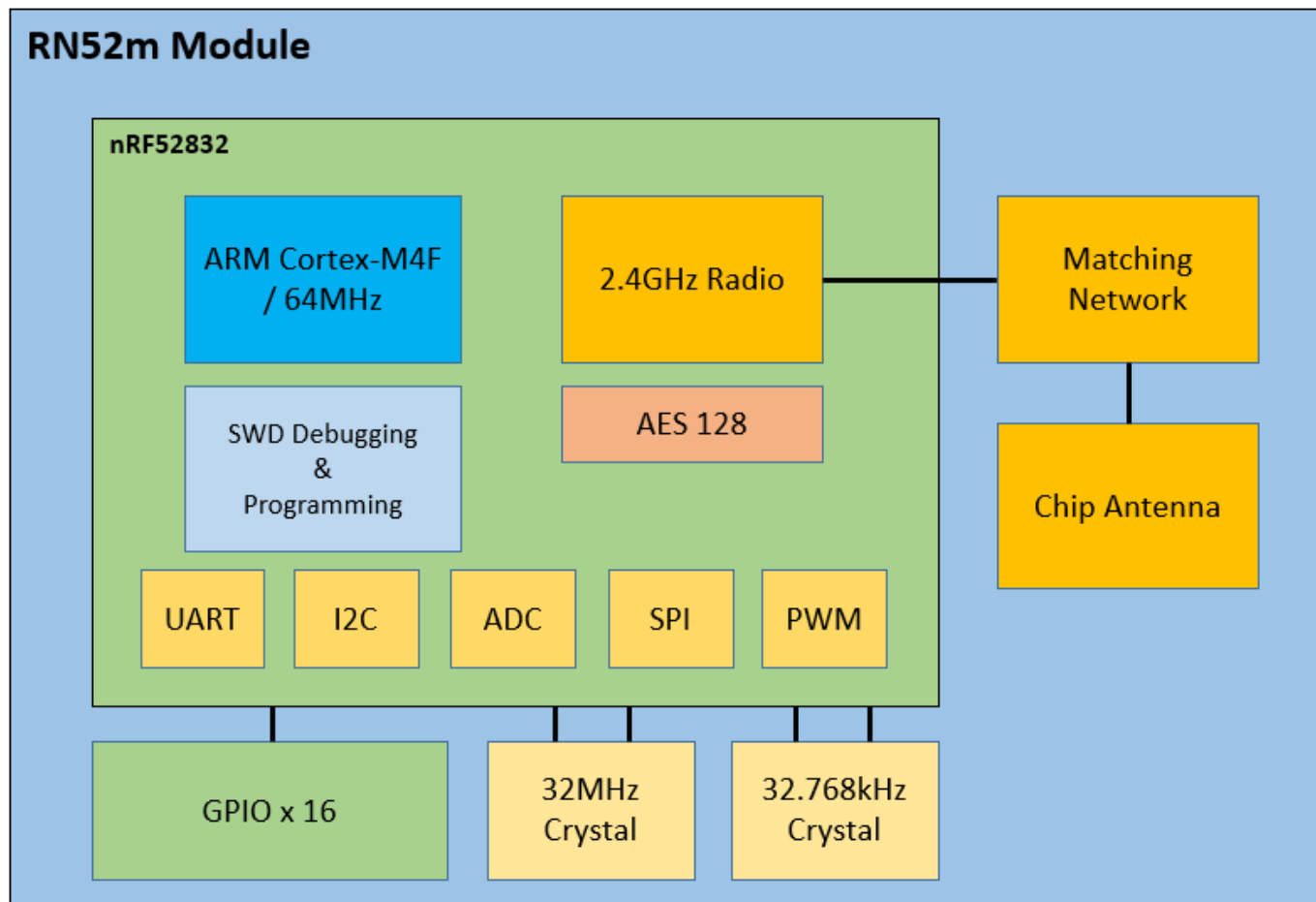
- 2.4 GHz transceiver
 - -96 dBm sensitivity in Bluetooth® low energy mode
 - Supported data rates: 1 Mbps, 2 Mbps Bluetooth® low energy mode
 - -20 to +4 dBm TX power, configurable in 4 dB steps
 - On-chip balun (single-ended RF)
 - 5.3 mA peak current in TX (0 dBm)
 - 5.4 mA peak current in RX
 - RSSI (1 dB resolution)
- ARM® Cortex®-M4 32-bit processor with FPU, 64 MHz
 - 215 EEMBC CoreMark® score running from flash memory
 - Serial wire debug (SWD)
 - Trace port
- Flexible power management
 - 1.7 V–3.6 V supply voltage range
 - Fast wake-up using 64 MHz internal oscillator
- Memory
 - 512 kB flash/64 kB RAM
- Nordic SoftDevice ready
- Support for concurrent multi-protocol
- 12-bit, 200 ksps ADC - 8 configurable channels with programmable gain
- 64 level comparator
- 15 level low power comparator with wakeup from System OFF mode
- Temperature sensor
- 30 general purpose I/O pins
- 3x 4-channel pulse width modulator (PWM) unit with EasyDMA
- Digital microphone interface (PDM)
- 5x 32-bit timer with counter mode

- Up to 3x SPI master/slave with EasyDMA
- Up to 2x I2C compatible 2-wire master/slave
- I2S with EasyDMA
- UART (CTS/RTS) with EasyDMA
- Programmable peripheral interconnect (PPI)
- Quadrature decoder (QDEC)
- AES HW encryption with EasyDMA
- Autonomous peripheral operation without CPU intervention using PPI and EasyDMA
- 3x real-time counter (RTC)
- Single crystal operation

2.2. Application

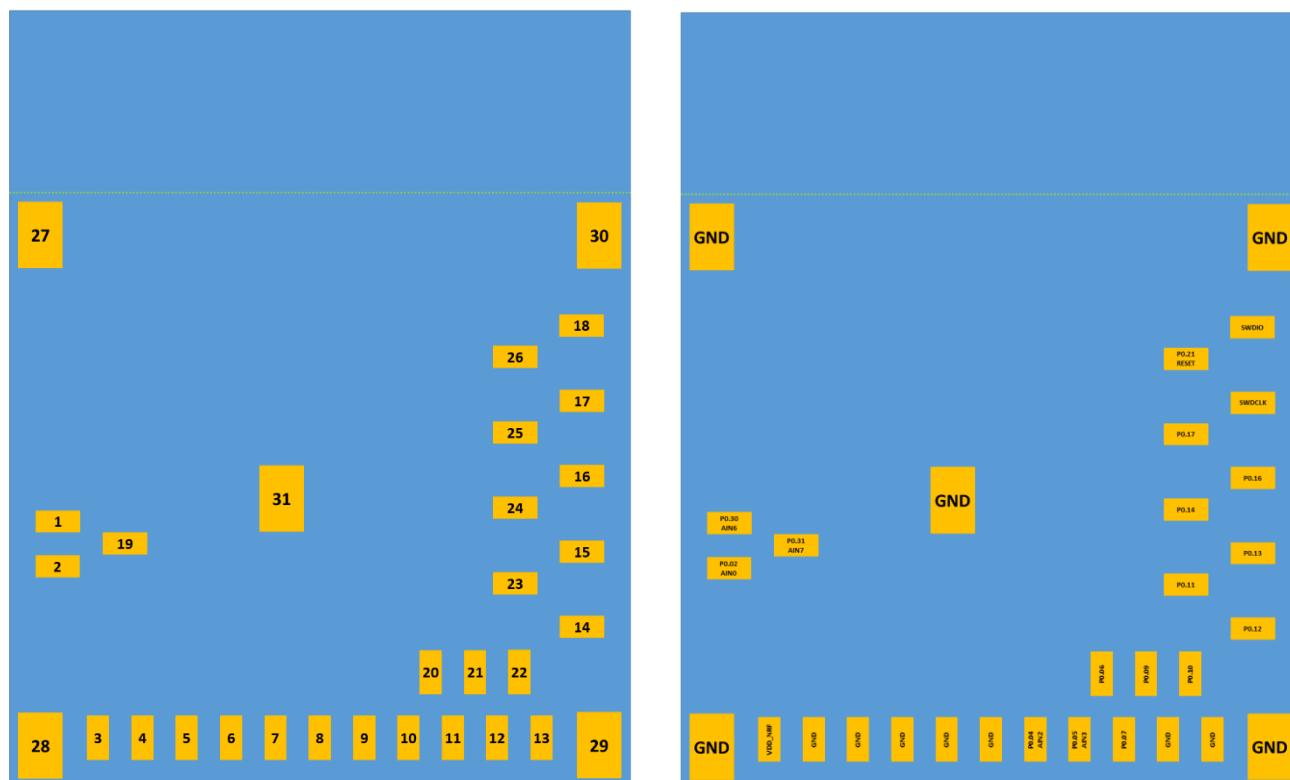
- Internet of Things (IoT)
 - Home automation
 - Sensor networks
 - Building automation
 - Industrial
 - Retail
- Computer peripherals and I/O devices
 - Mouse
 - Keyboard
 - Multi-touch trackpad
- Interactive entertainment devices
 - Remote control
 - Gaming controller
- Beacons
- Personal Area Networks
 - Health/fitness sensor and monitor devices
 - Medical devices
 - Key-fobs + wrist watches
- Remote control toys
- Wireless Mesh Network

2.3. Block Diagram



The RN52m module includes a matching network for chip antenna and external 32.768k crystal.

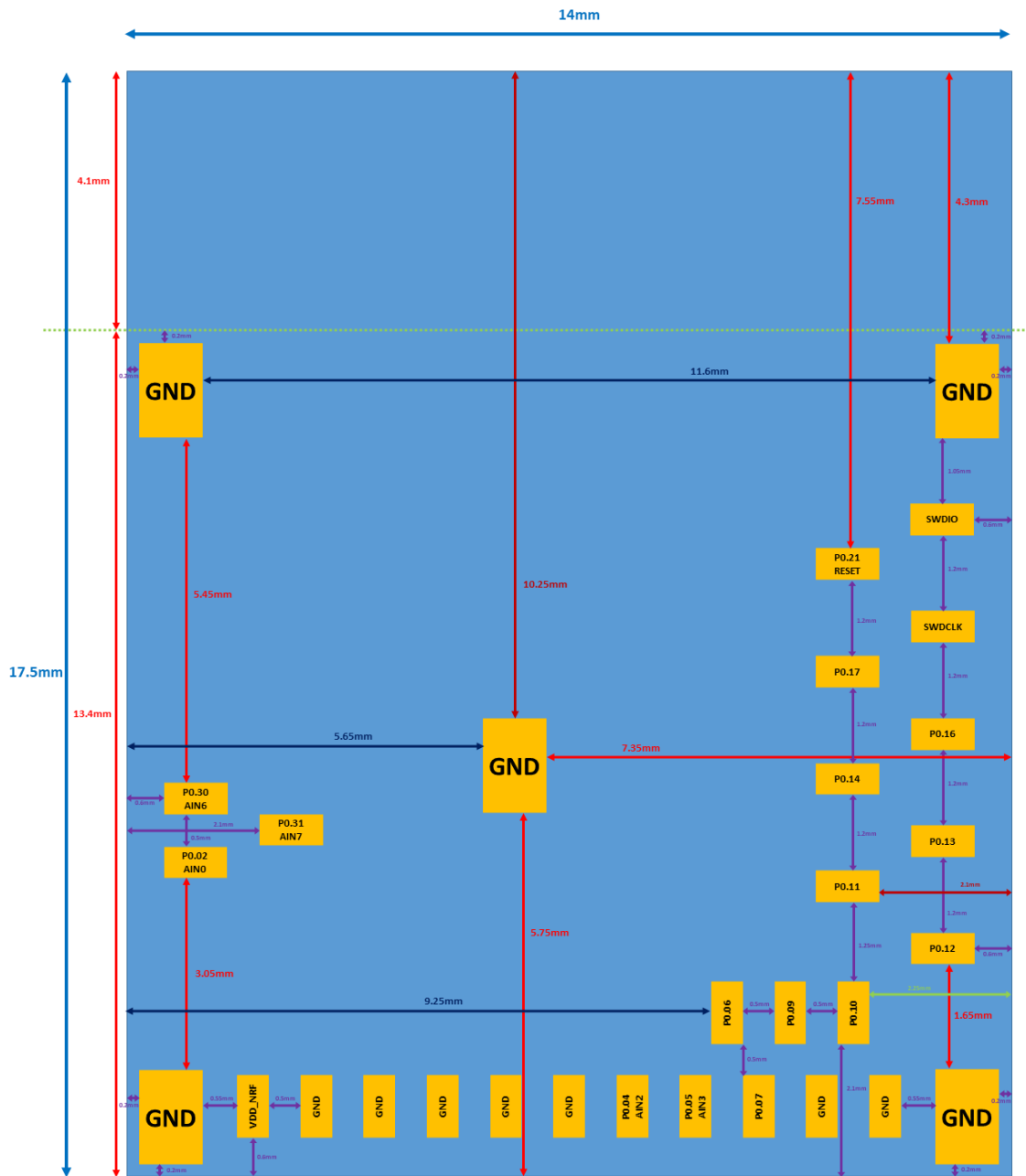
3. Pin Assignments and Functions (Top View)



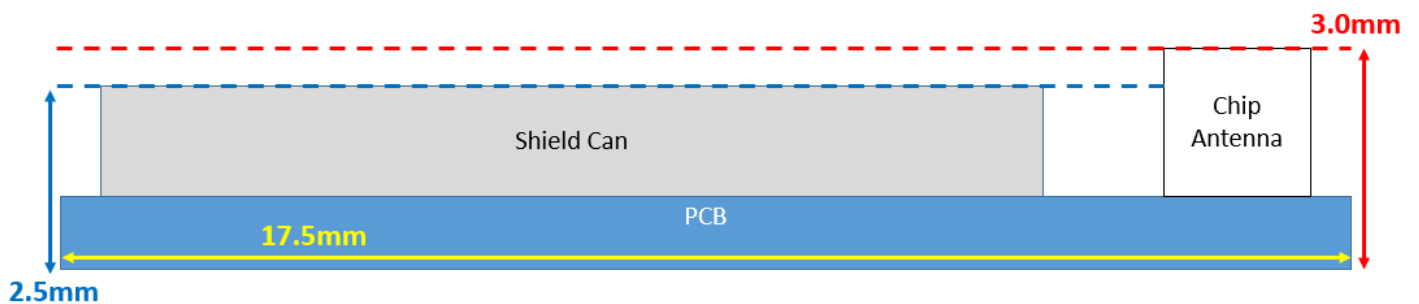
Pin	Pin Name	Pin Function	Description
1	P0.30 AIN6	Digital I/O Analog input	General purpose I/O COMP input SAADC input
2	P0.02 AIN0	Digital I/O Analog input	General purpose I/O COMP input SAADC input
3	VDD_NRF	Power	Power supply.
4	GND	Power	Ground (0 V).
5	GND	Power	Ground (0 V).
6	GND	Power	Ground (0 V).
7	GND	Power	Ground (0 V).
8	GND	Power	Ground (0 V).
9	P0.04 AIN2	Digital I/O Analog input	General purpose I/O COMP input SAADC input
10	P0.05 AIN3	Digital I/O Analog input	General purpose I/O COMP input SAADC input
11	P0.07	Digital I/O	General purpose I/O
12	GND	Power	Ground (0 V).

13	GND	Power	Ground (0 V).
14	P0.12	Digital I/O	General purpose I/O
15	P0.13	Digital I/O	General purpose I/O
16	P0.16	Digital I/O	General purpose I/O
17	SWDCLK	Digital Input	Serial wire debug clock input for debug and programming
18	SWDIO	Digital I/O	Serial wire debug I/O for debug and programming
19	P0.31 AIN7	Digital I/O Analog input	General purpose I/O COMP input SAADC input
20	P0.06	Digital I/O	General purpose I/O
21	P0.09	Digital I/O	General purpose I/O
22	P0.10	Digital I/O	General purpose I/O
23	P0.11	Digital I/O	General purpose I/O
24	P0.14	Digital I/O	General purpose I/O
25	P0.17	Digital I/O	General purpose I/O
26	P0.21 nRESET	Digital I/O	General purpose I/O. Configurable as system RESET.
27	GND	Power	Ground (0 V).
28	GND	Power	Ground (0 V).
29	GND	Power	Ground (0 V).
30	GND	Power	Ground (0 V).
31	GND	Power	Ground (0 V).

4. Module Layout



RN52m Dimension and Bottom Pad (Top View)



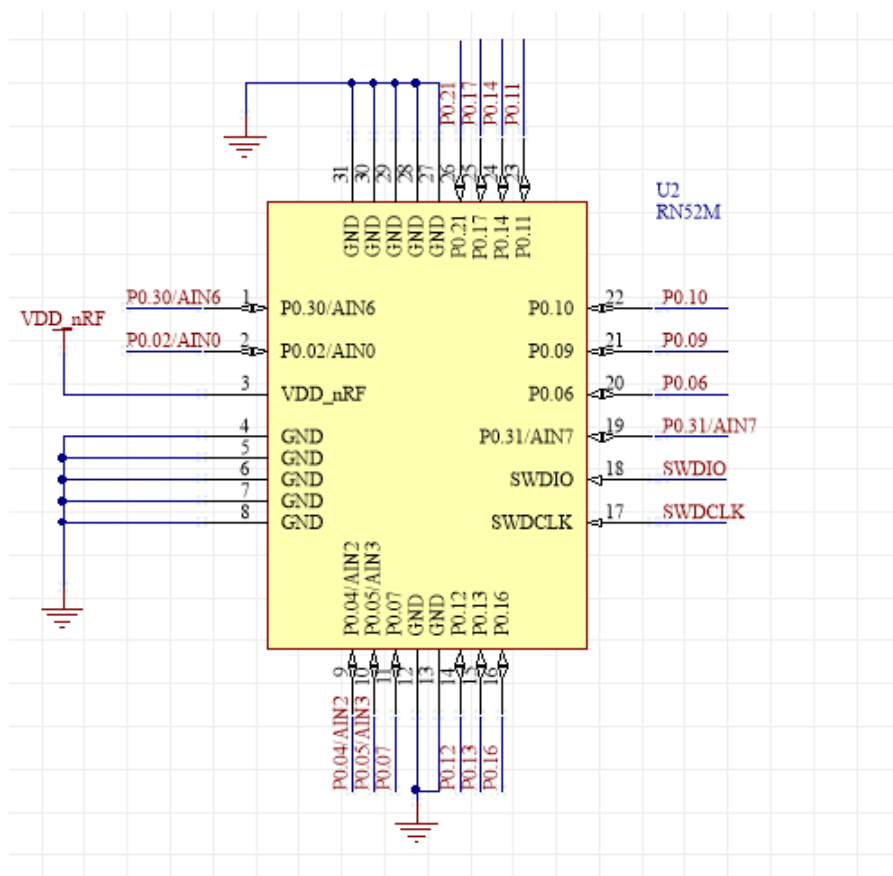
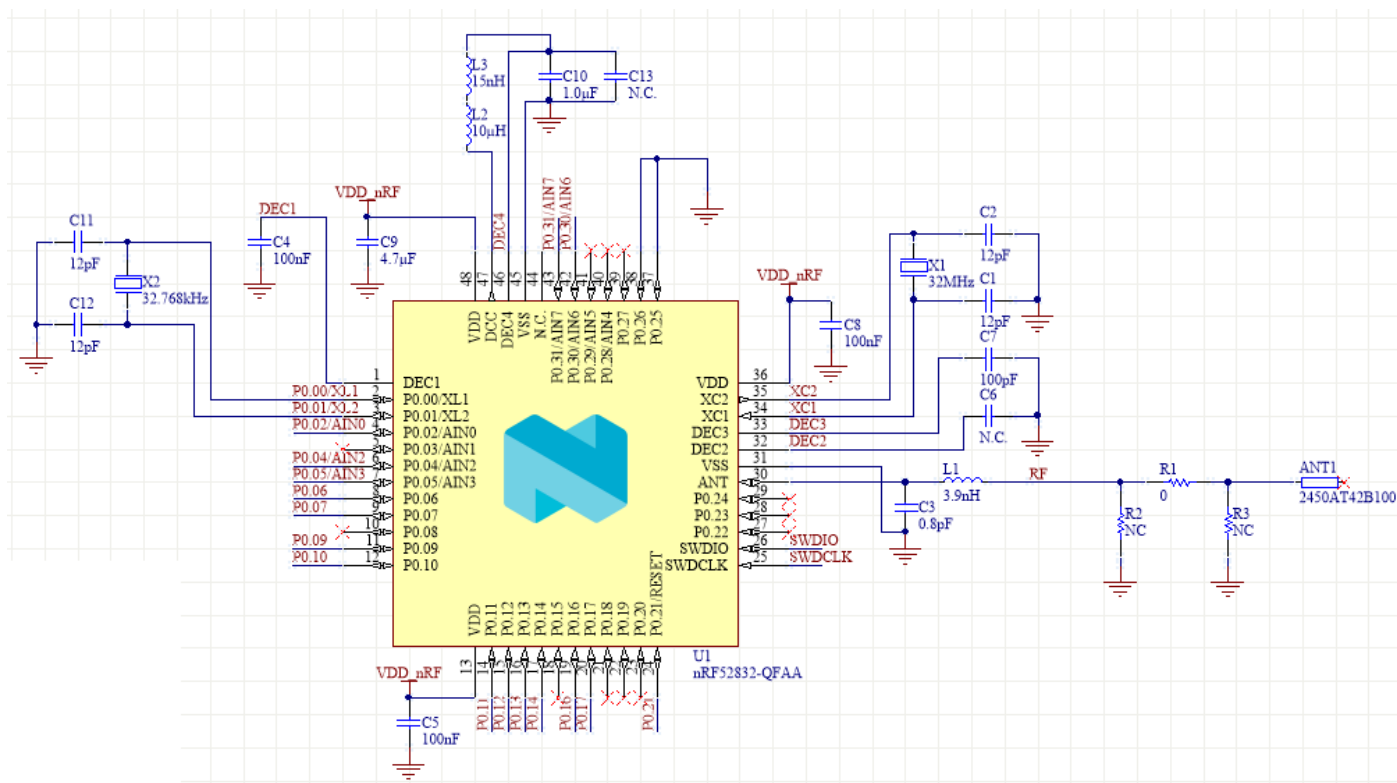
The recommended metal mask sizes for the bottom pad type of the RN52m module are shown below.

<Recommended metal mask for solder printing>

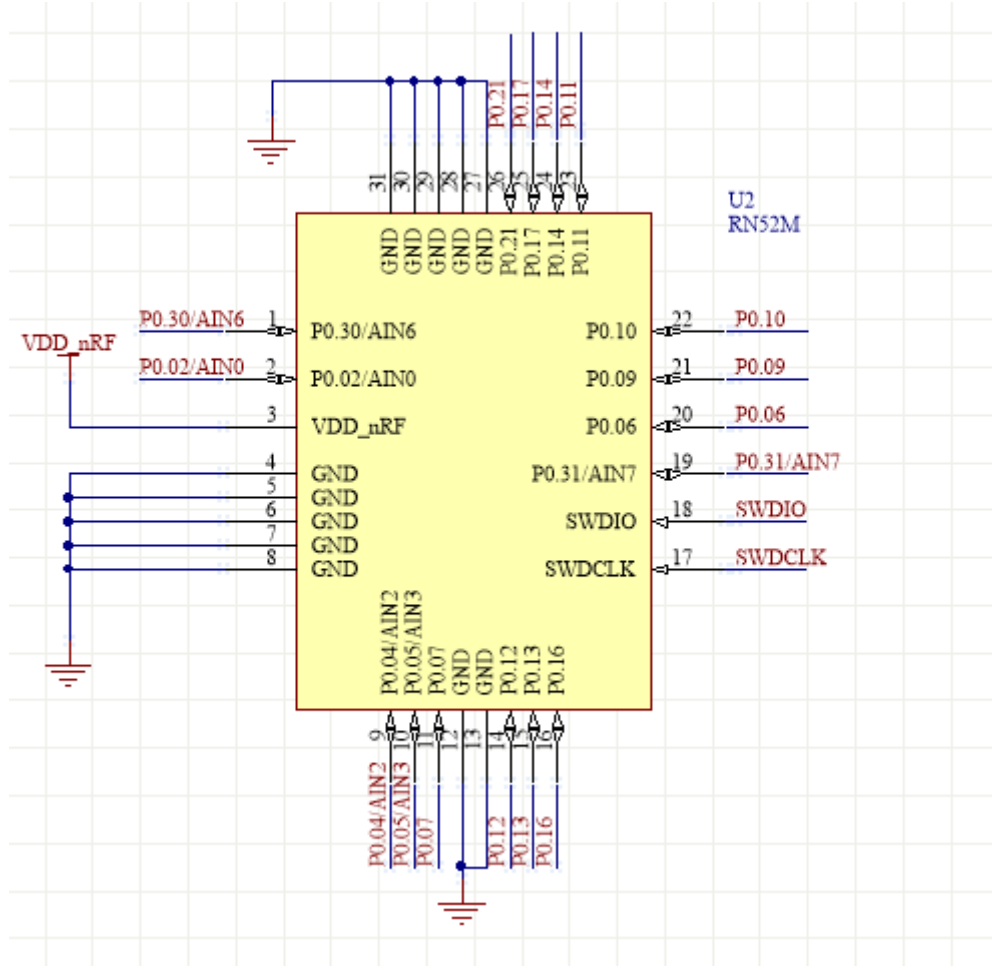
Pad	Pad size	Mask opening
Signal pad	0.5 x 1.0 mm & 1.0 x 0.5 mm	0.4 x 0.9 mm & 0.9 x 0.4 mm
Corner & Center pad	1.0 x 1.5 mm	0.7 x 1.0 mm

The metal mask thickness : $t = 0.1\text{mm}$

The solder volume should be same by changing the mask opening if different metal mask thickness is used.



6. Module Reference



The RN52m module can operate only by connecting VDD and GND.

7. SMT Reflow Profile

