



RN52s DataSheet

v1.2.0-en

Contents

1. Revision History	3
2. Overview	4
2.1. Key Features	6
2.2. Application	8
2.3. Block Diagram	9
3. Pin Assignments and Functions	10
4. Module Layout	12
5. Module Schematics	13
6. Module Reference	14
6.1. Used GPIO Reference	14
6.2. Not-Used GPIO Reference	15
7. SMT Reflow Profile	18

1. Revision History

Date	Version	Description
2017/01	1.0.0	First Release
2020/03	1.1.0	Add Dimension Data Add Recommended metal mask for solder printing Add SMT Reflow Profile Add 3D Model
2020/04	1.2.0	Add Bottom pad

2. Overview



The RN52s 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 RN52s 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 RN52s has hardware support on-chip for Bluetooth 5. This includes high throughput and advertising extension.



Processing power

The RN52s 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 RN52s 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.

On-chip NFC tag

NFC™-A tag support is included on chip. Out-of-Band (OOB) pairing using NFC simplifies the process of authenticated pairing between two Bluetooth devices by exchanging authentication information over an NFC link.

SoftDevice

The RN52s is supported by the S132 SoftDevice, a Bluetooth 5 pre-qualified protocol stack.

2.1. Key Features

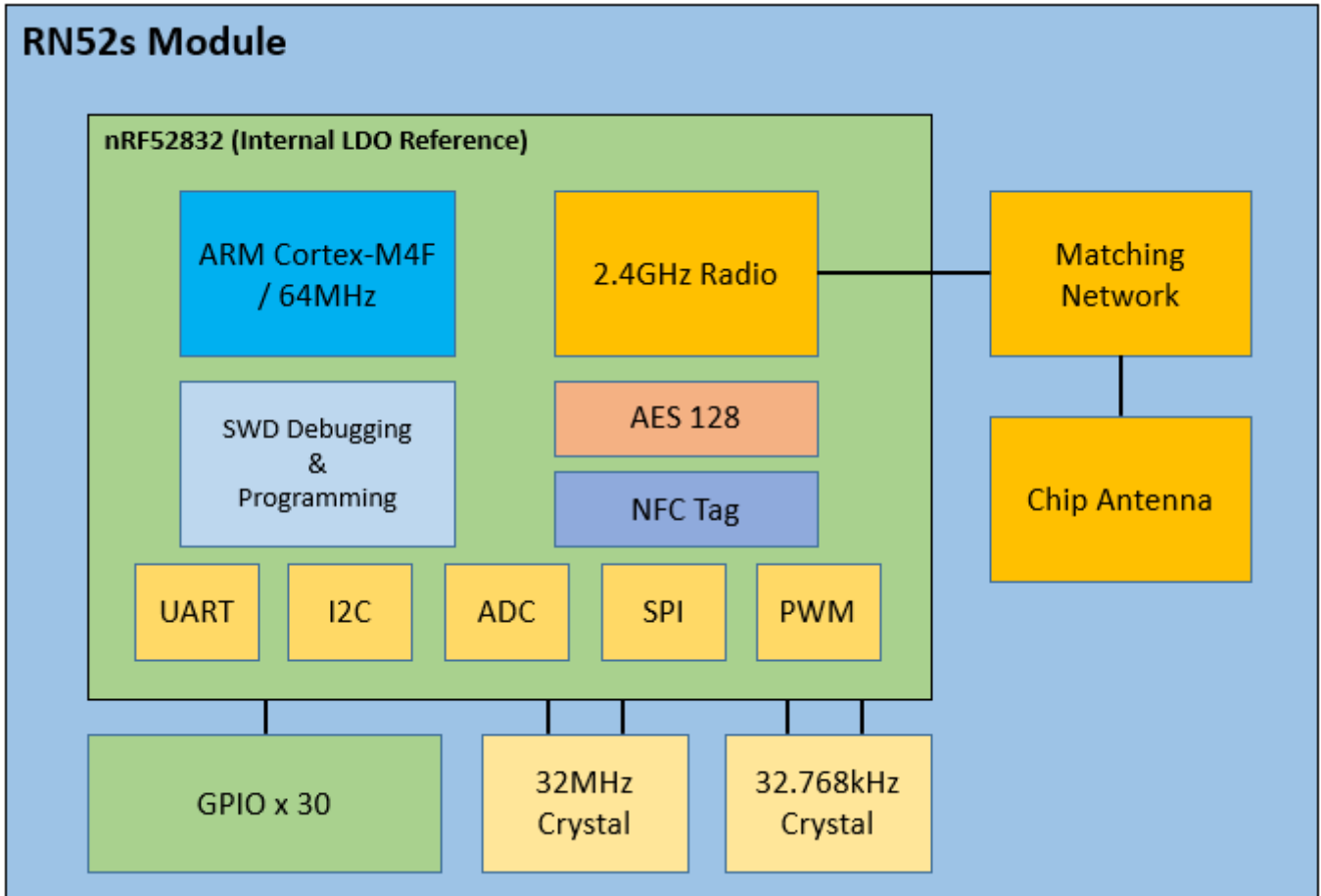
- 2.4 GHz transceiver
 - -96 dBm sensitivity in Bluetooth® low energy mode
 - Supported data rates: 1 Mbps, 2 Mbps Bluetooth® low energy mode
 - -20 to +4 dBm TX power, configurable in 4 dB steps
 - On-chip balun (single-ended RF)
 - 5.3 mA peak current in TX (0 dBm)
 - 5.4 mA peak current in RX
 - RSSI (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
- Type 2 near field communication (NFC-A) tag with wakeup-on-field and touch-to-pair capabilities
- 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 RN52s module includes a matching network for chip antenna and antenna matching and an external 32.768kHz crystal.

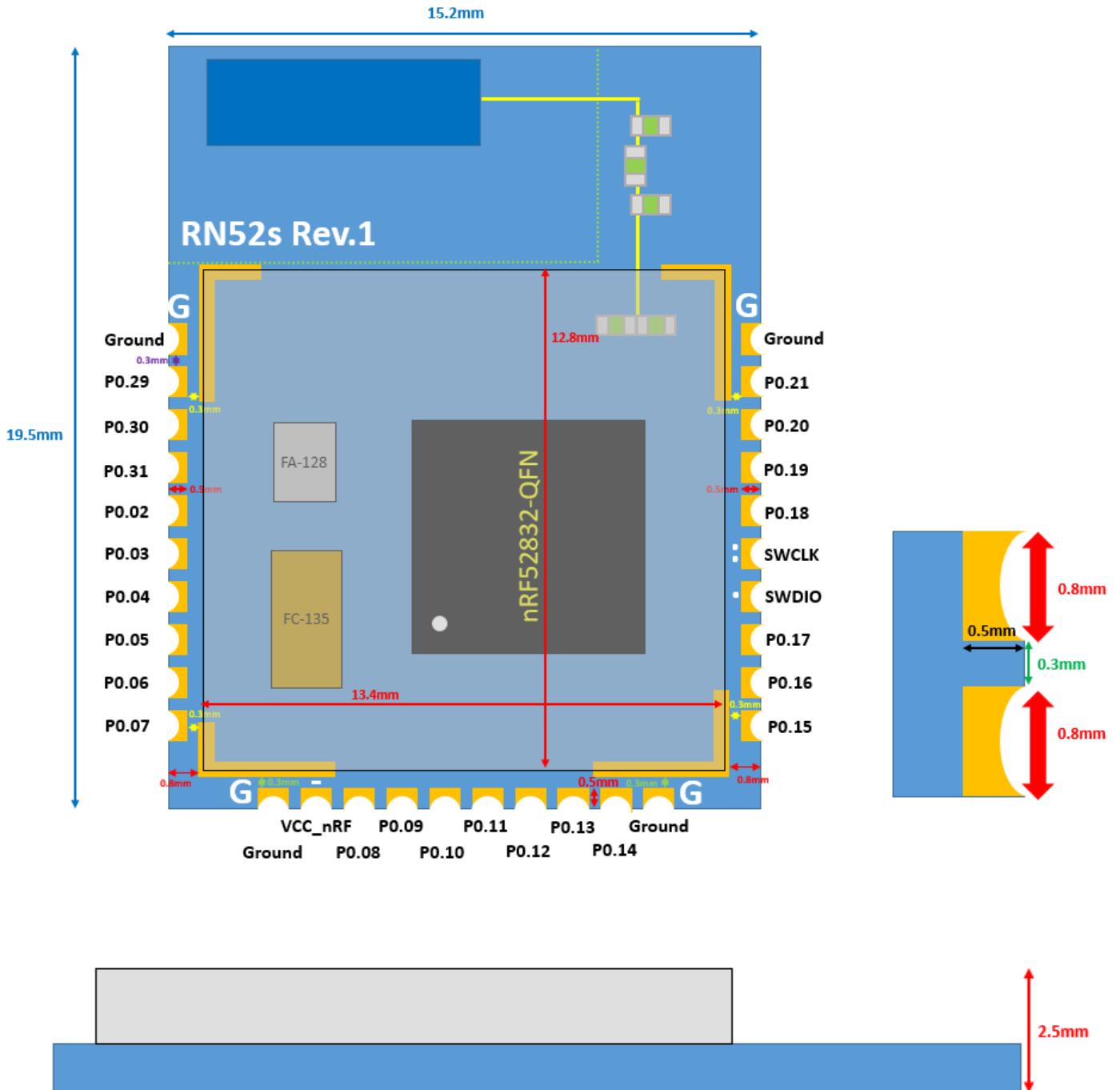
3. Pin Assignments and Functions

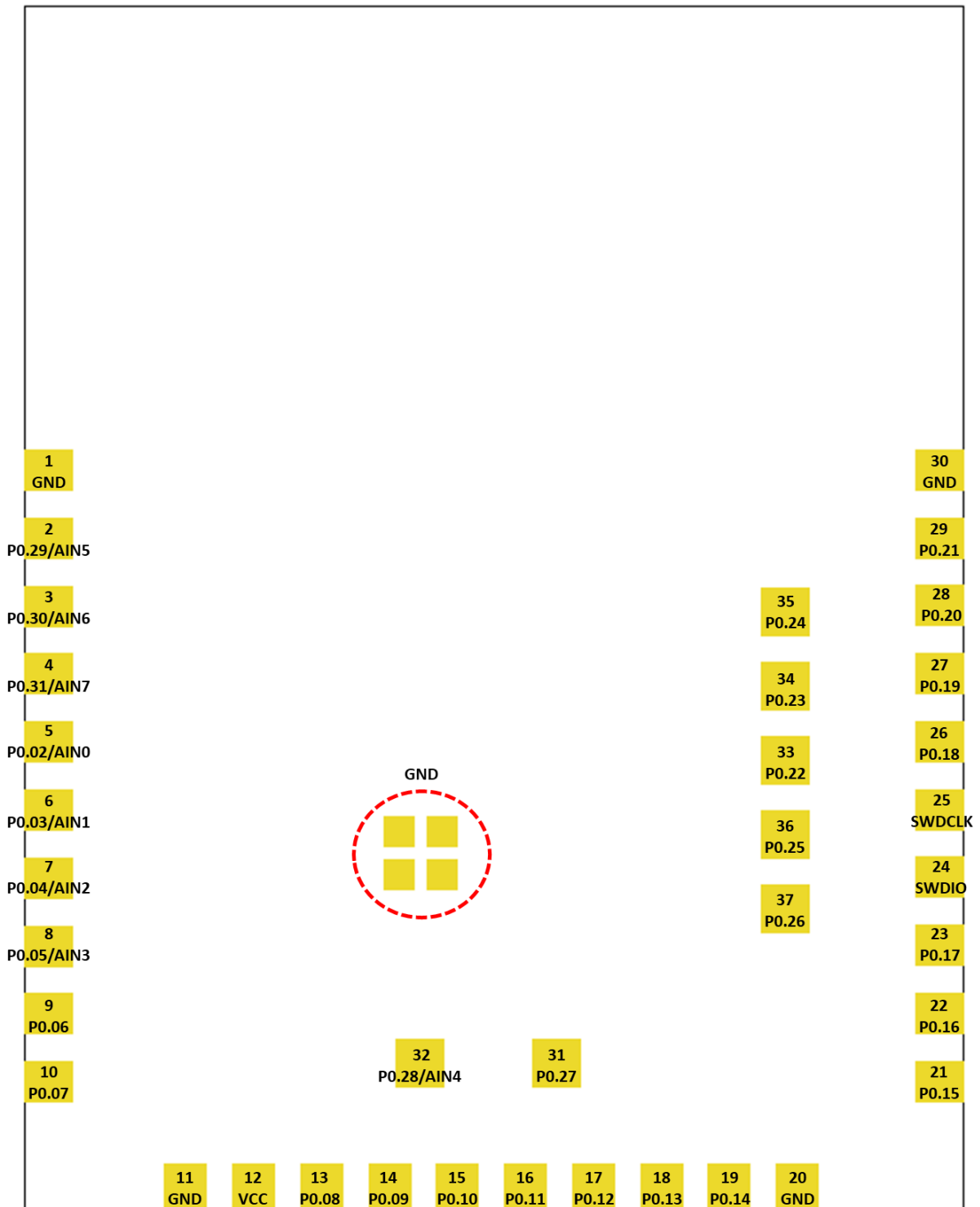


Pin	Pin Name	Pin Function	Description
1	GND	Power	Ground (0 V).
2	P0.29 AIN5	Digital I/O Analog Input	General purpose I/O pin (GPIO located near the radio) SAADC/COMP/LPCOMP Input
3	P0.30 AIN6	Digital I/O Analog Input	General purpose I/O pin (GPIO located near the radio) SAADC/COMP/LPCOMP Input
4	P0.31 AIN7	Digital I/O Analog Input	General purpose I/O pin (GPIO located near the radio) SAADC/COMP/LPCOMP Input
5	P0.02 AIN0	Digital I/O Analog Input	General purpose I/O pin. SAADC/COMP/LPCOMP Input

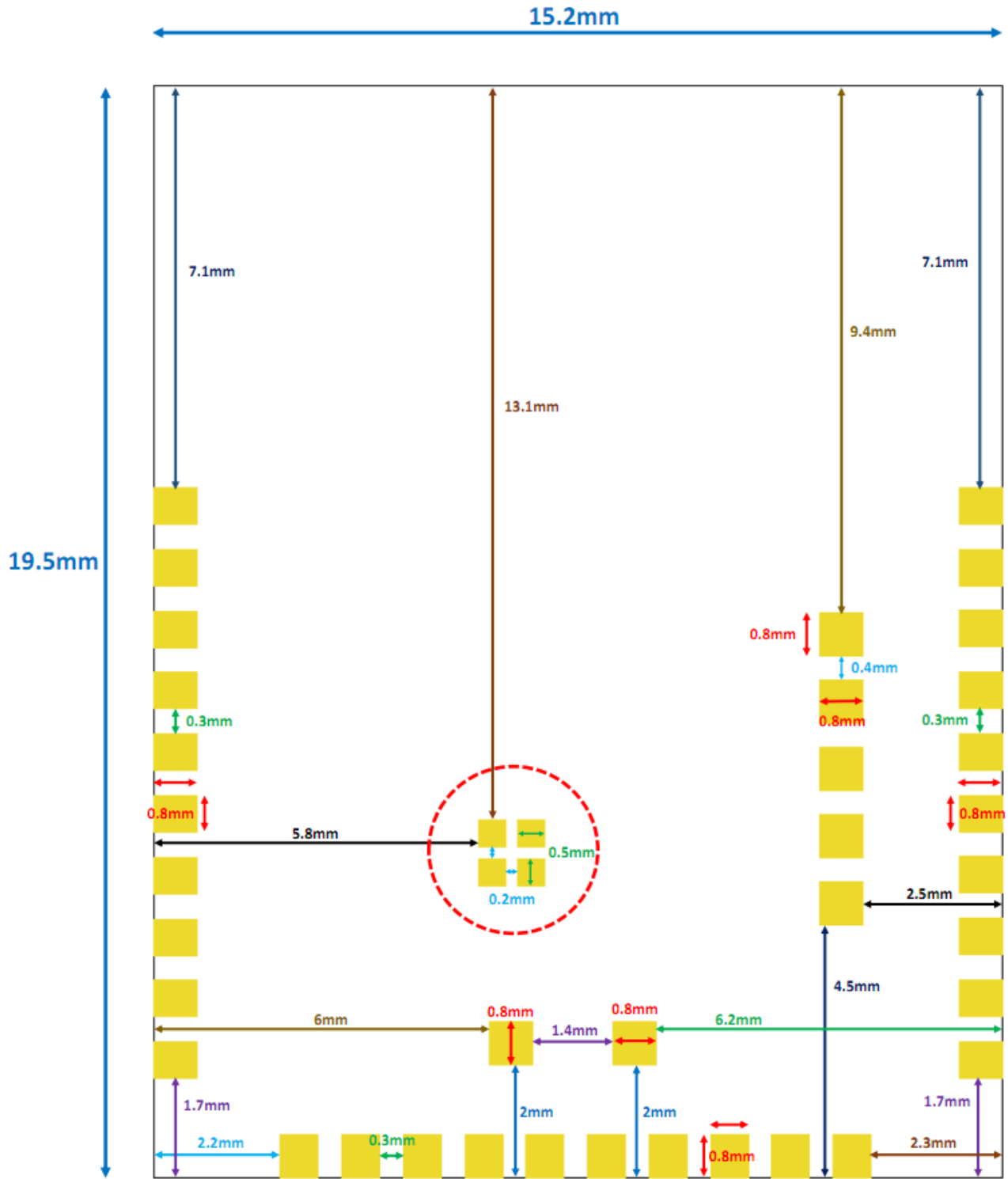
6	P0.03 AIN1	Digital I/O Analog Input	General purpose I/O pin. SAADC/COMP/LPCOMP Input
7	P0.04 AIN2	Digital I/O Analog Input	General purpose I/O pin. SAADC/COMP/LPCOMP Input
8	P0.05 AIN3	Digital I/O Analog Input	General purpose I/O pin. SAADC/COMP/LPCOMP Input
9	P0.06	Digital I/O	General purpose I/O pin.
10	P0.07	Digital I/O	General purpose I/O pin.
11	GND	Power	Ground (0 V).
12	VCC	Power	Power supply.
13	P0.08	Digital I/O	General purpose I/O pin.
14	P0.09 NFC1	Digital I/O NFC Input	General purpose I/O pin. NFC antenna connection
15	P0.10 NFC2	Digital I/O NFC Input	General purpose I/O pin. NFC antenna connection
16	P0.11	Digital I/O	General purpose I/O pin.
17	P0.12	Digital I/O	General purpose I/O pin.
18	P0.13	Digital I/O	General purpose I/O pin.
19	P0.14 TRACEDATA[3]	Digital I/O	General purpose I/O pin. Trace port output
20	GND	Power	Ground (0 V).
21	P0.15 TRACEDATA[2]	Digital I/O	General purpose I/O pin. Trace port output
22	P0.16 TRACEDATA[1]	Digital I/O	General purpose I/O pin. Trace port output
23	P0.17	Digital I/O	General purpose I/O pin.
24	SWDIO	Digital I/O	Serial wire debug I/O for debug and programming
25	SWDCLK	Digital Input	Serial wire debug clock input for debug and programming
26	P0.18 TRACEDATA[0] SWO	Digital I/O	General purpose I/O pin. Trace port output Single wire output
27	P0.19	Digital I/O	General purpose I/O pin
28	P0.20 TRACECLK	Digital I/O	General purpose I/O pin Trace port clock output
29	P0.21 nRESET	Digital I/O	General purpose I/O pin Configurable as pin reset
30	GND	Power	Ground (0 V).
31	P0.27	Digital I/O	General purpose I/O pin (GPIO located near the radio)
32	P0.28 AIN4	Digital I/O Analog Input	General purpose I/O pin (GPIO located near the radio) SAADC/COMP/LPCOMP Input
33	P0.22	Digital I/O	General purpose I/O pin (GPIO located near the radio)
34	P0.23	Digital I/O	General purpose I/O pin (GPIO located near the radio)
35	P0.24	Digital I/O	General purpose I/O pin (GPIO located near the radio)
36	P0.25	Digital I/O	General purpose I/O pin (GPIO located near the radio)
37	P0.26	Digital I/O	General purpose I/O pin (GPIO located near the radio)

4. Module Layout





RN52s GPIO and Pad (Top View)



RN52s Dimension and Pad (Top View)

The recommended metal mask sizes for the bottom pad type of the RN52s module are shown below.

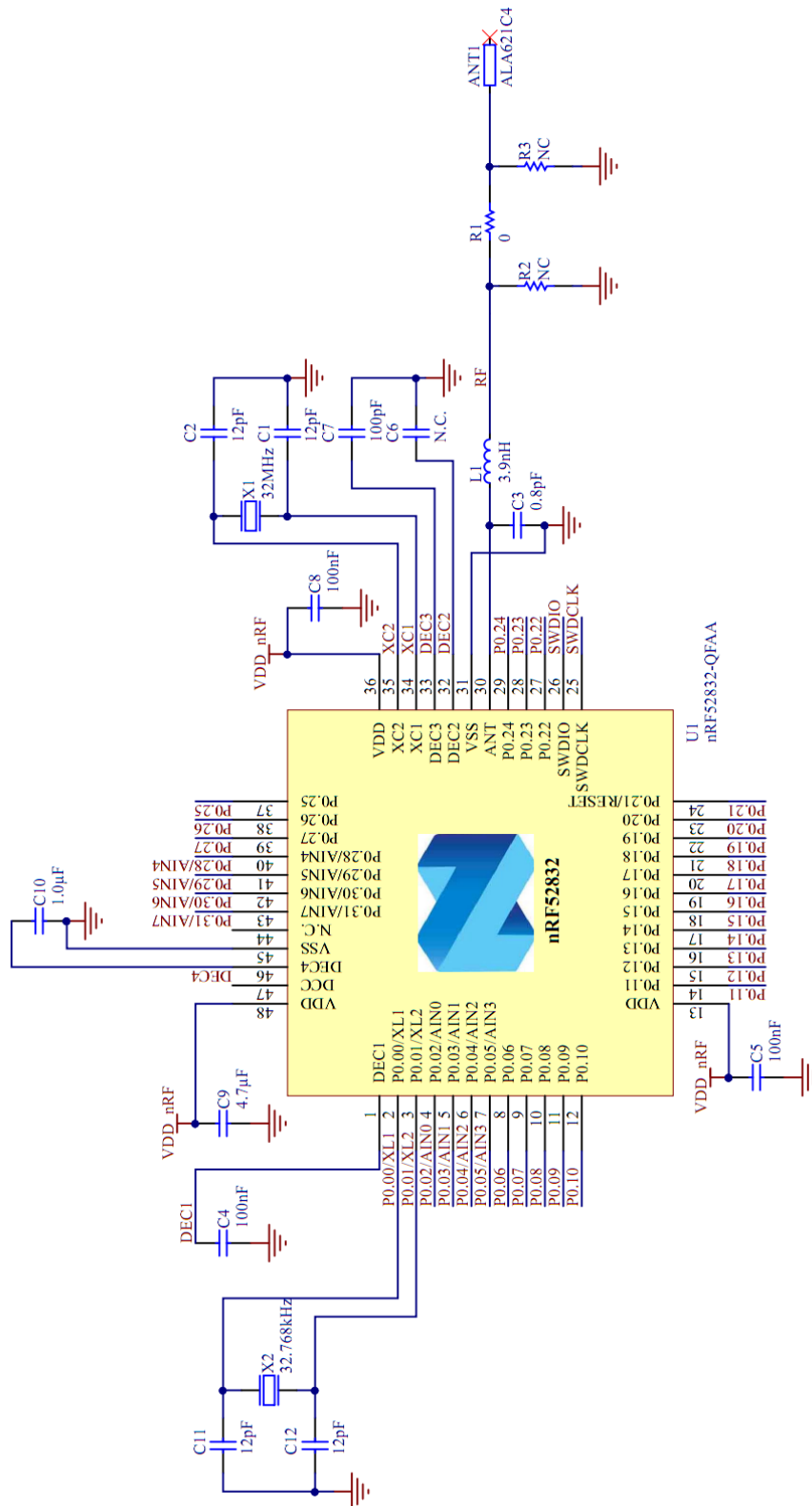
<Recommended metal mask for solder printing>

Pad	Pad size	Mask opening
Signal pad	0.8 x 0.8 mm	0.7 x 0.7 mm
Center pad	0.5 x 0.5 mm	0.4 x 0.4 mm

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

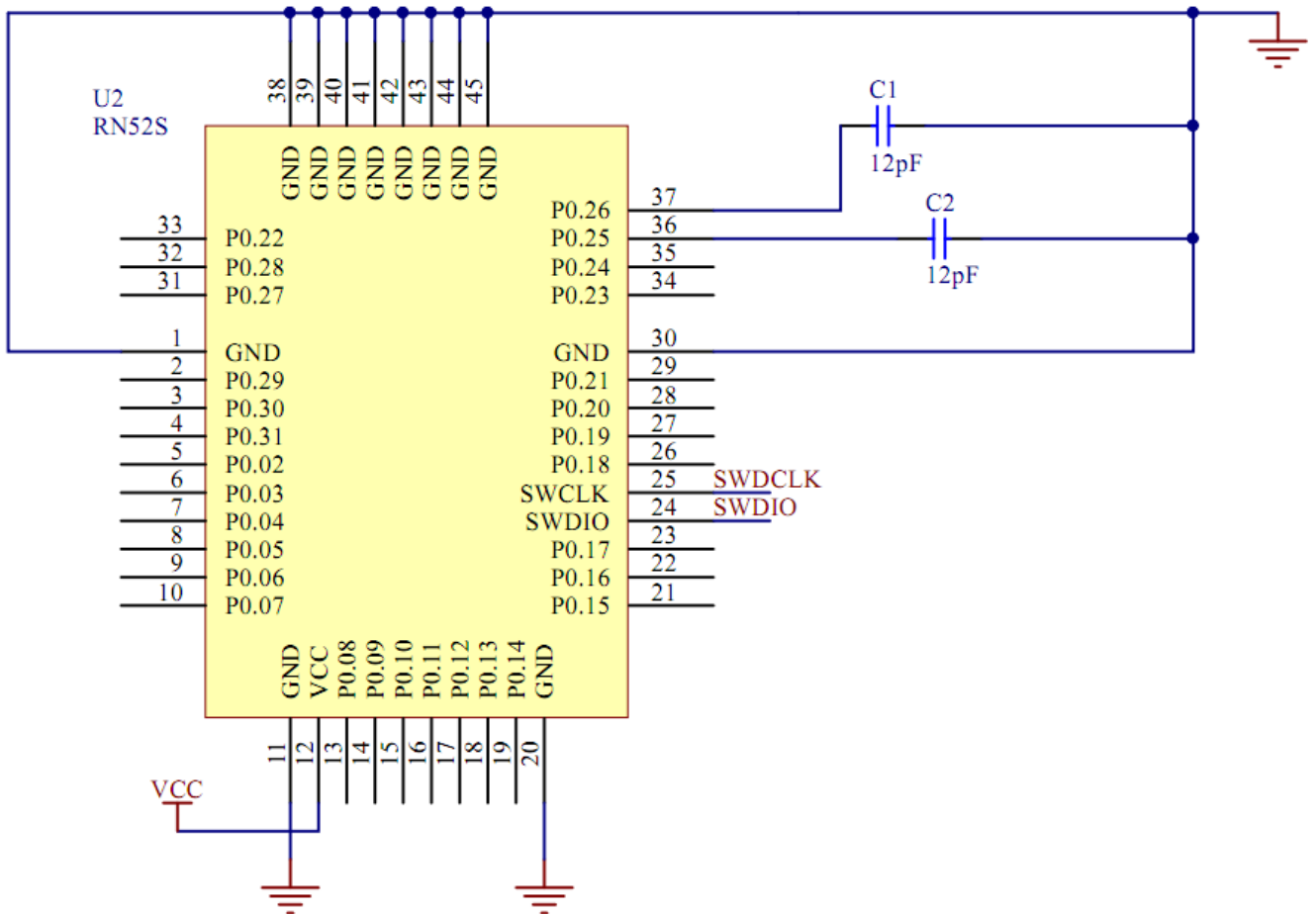
The solder volume should be same by changing the mask opening if different metal mask thickness is used.

5. Module Schematics



6. Module Reference

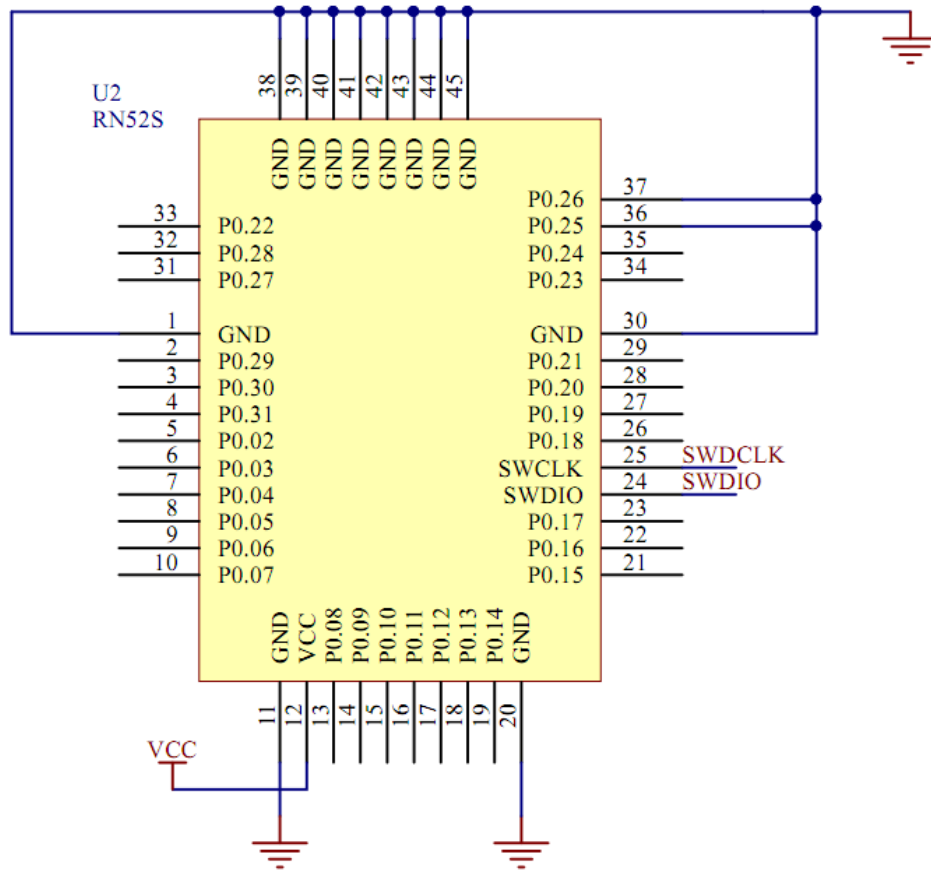
6.1. Used GPIO Reference



For details, refer to nRF52832 Errata.

3.36 [138] RADIO: Spurious emission on GPIO exceeds limits in radiated tests

6.2. Not-Used GPIO Reference



For details, refer to nRF52832 Errata.

3.36 [138] RADIO: Spurious emission on GPIO exceeds limits in radiated tests

7. SMT Reflow Profile

