Wio–WM1110 Module

LoRa® Wireless Module – Powered by Semtech

Datasheet

V1.3

Content

1 Introduction

The Wio-WM1110 is a fusion positioning module for developing low-power, long-range IoT applications. It's embedded with Semtech LR1110 and Nordic nRF52840, features Semtech's LoRa® technology for long-range wireless communication, GNSS, Wi-Fi, and Bluetooth for location tracking services.

1.1 Feature

- **Low–Power High–Sensitivity LoRaWAN® Network**: Support the global LoRaWAN® frequency plan.

- **Multi–Purpose Radio Front–End Targeting Geolocation Purposes:** GNSS (GPS/ BeiDou)、Wi–Fi、Bluetooth, suitable for indoor and outdoor positioning

- **Nordic nRF52840 Bluetooth 5.3 SoC:** Support Bluetooth Low Energy, Bluetooth mesh, NFC, Thread and Zigbee

- **Low–power Consumption**: 7.6 µA in sleep mode

- **FCC, CE, TELEC Certified**

This product specification includes a detailed description of the WM1110 module's performance and functions. For the latest firmware, product updates or errata, please contact Seeed Studio.

2 Description

Wio–WM1110 module is embedded with high–performance [Semtech LR1110](#) and [Nordic nRF52840](#), providing developers with low–power, long–range LoRaWAN® communication, and covering the global frequency band, making it highly versatile and adaptable to various low–power wide–area IoT scenarios like smart agriculture, wireless meter reading, and smart city applications.

The Wio–WM1110 module also utilizes GNSS (Global Navigation Satellite System) tracking for outdoor applications, additionally, the Wi–Fi passive scanning and Bluetooth mesh are suitable for the IPS (Indoor Positioning System), providing all–around location coverage while reducing complexity and cost. It's a perfect development platform for asset tracking、inventory management、asset loss and theft prevention, etc. Learn more about the [LoRa® Edge™ LR1110 solution](#).

2.1 System Diagram

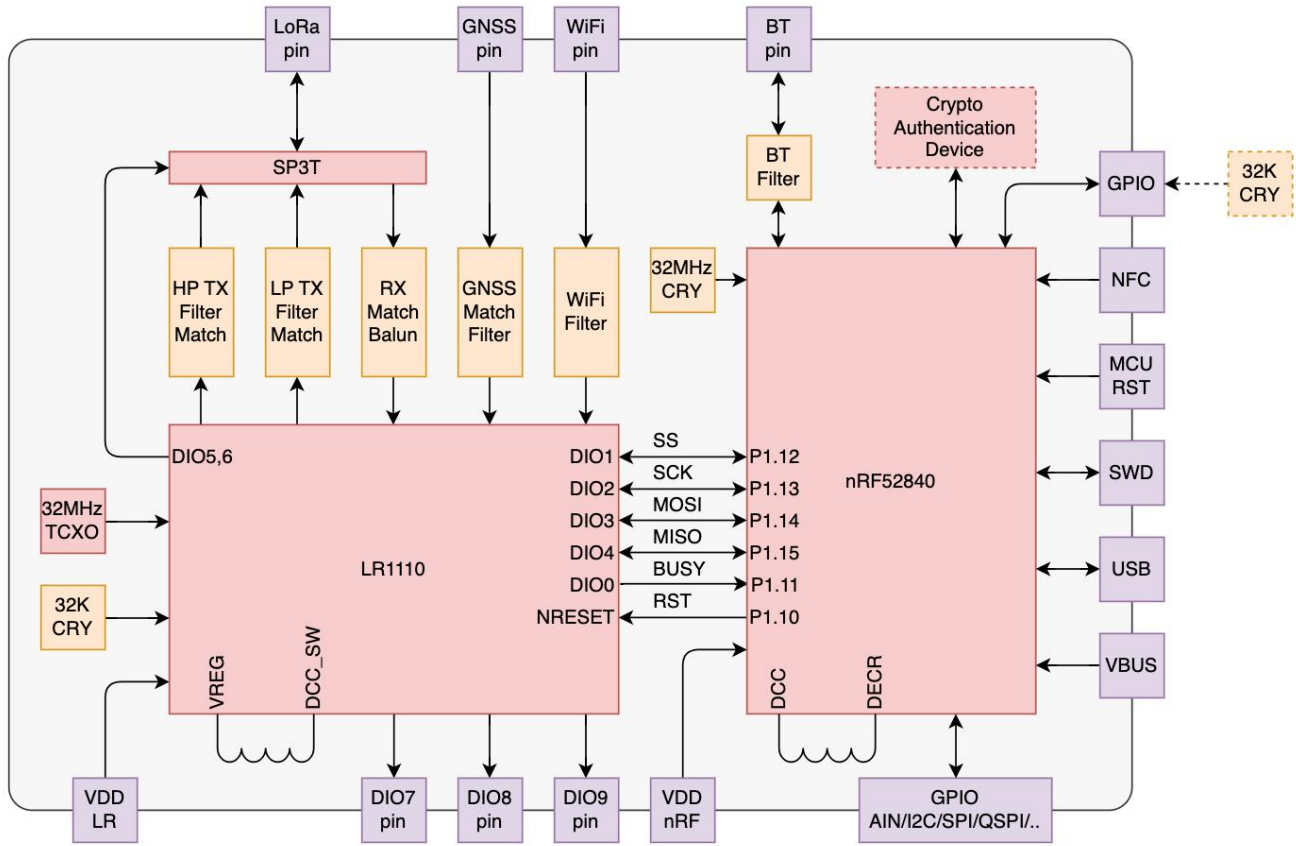**Figure 1 WM1110 Schematic diagram**

2.2 Pin Definition
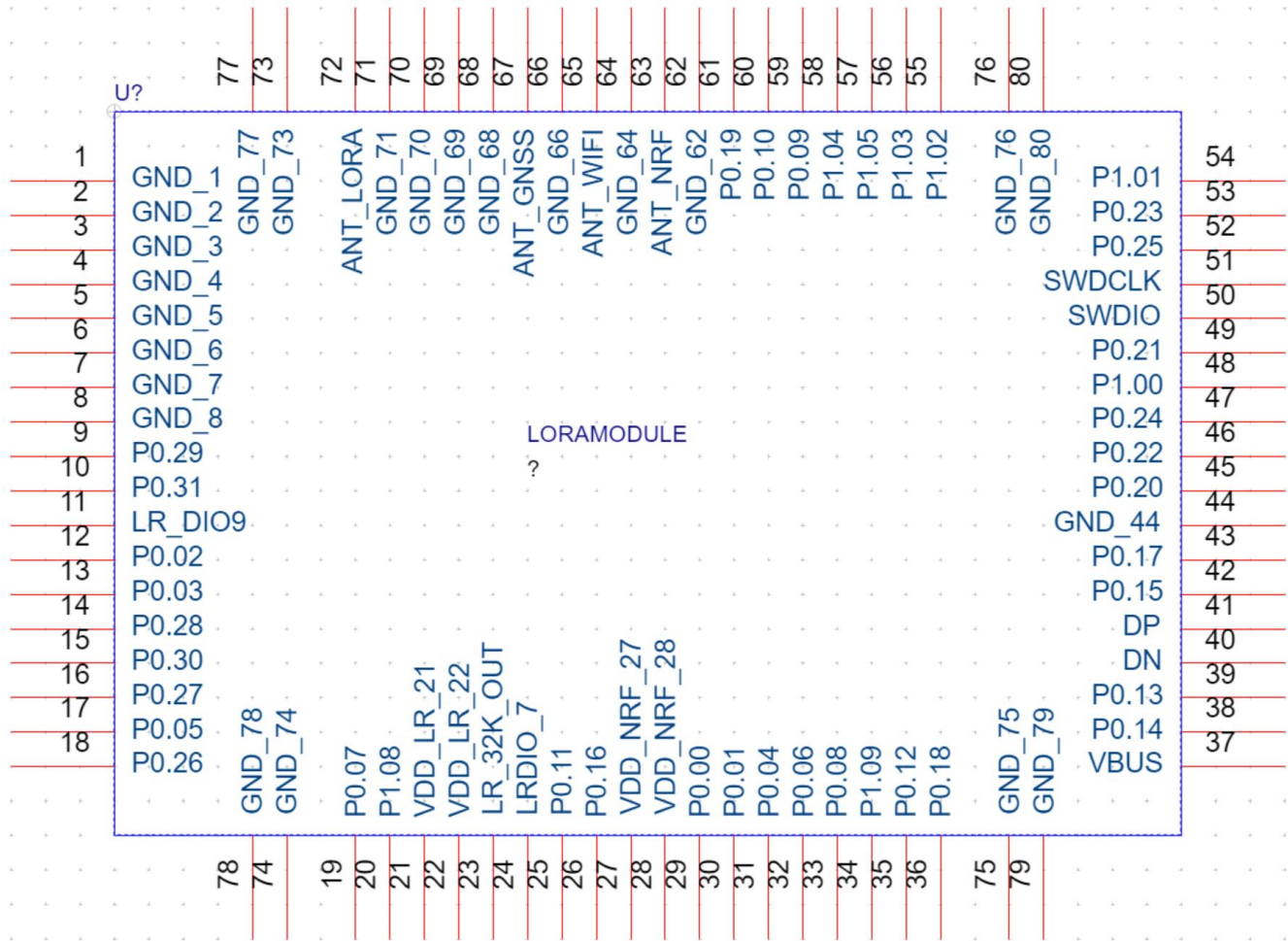
Figure 2 WM1110 Pin arrangement

Table 1 WM1110 pinout

Number	Name	Type	Description
1	GND	-	Ground
2	GND	-	Ground
3	GND	-	Ground
4	GND	-	Ground
5	GND	–	Ground
6	GND	–	Ground
7	GND	–	Ground
8	GND	–	Ground

9	P0.29	I/O	MCU GPIO P0.29
10	P0.31	I/O	MCU GPIO P0.31
11	LR_DIO9	O	LR1110 DOUT
12	P0.02	I/O	MCU GPIO P0.02
13	P0.03	I/O	MCU GPIO P0.03
14	P0.28	I/O	MCU GPIO P0.28
15	P0.30	I/O	MCU GPIO P0.30
16	P0.27	I/O	MCU GPIO P0.27
17	P0.05	I/O	MCU GPIO P0.05
18	P0.26	I/O	MCU GPIO P0.26
19	P0.07	I/O	MCU GPIO P0.07
20	P1.08	I/O	MCU GPIO P1.08
21	VDD_LR	–	Supply voltage for LoRa®
22	VDD_LR	–	Supply voltage for LoRa®
23	LR_DIO8	O	LR1110 DOUT
24	LR_DIO7	O	LR1110 DOUT
25	P0.11	I/O	MCU GPIO P0.11
26	P0.16	I/O	MCU GPIO P0.16
27	VDD_NRF	–	Supply voltage for Bluetooth
28	VDD_NRF	–	Supply voltage for Bluetooth
29	P0.00	I/O	MCU GPIO P0.00
30	P0.01	I/O	MCU GPIO P0.01
31	P0.04	I/O	MCU GPIO P0.04
32	P0.06	I/O	MCU GPIO P0.06
33	P0.08	I/O	MCU GPIO P0.08
34	P1.09	I/O	MCU GPIO P1.09
35	P0.12	I/O	MCU GPIO P0.12

36	P0.18	I/O	MCU GPIO P0.18
37	VBUS	I/O	MCU GPIO VBUS
38	P0.14	I/O	MCU GPIO P0.14
39	P0.13	I/O	MCU GPIO P0.13
40	DN	I/O	MCU USB DN
41	DP	I/O	MCU USB DP
42	P0.15	I/O	MCU GPIO P0.15
43	P0.17	I/O	MCU GPIO P0.17
44	GND	–	Ground
45	P0.20	I/O	MCU GPIO P0.20
46	P0.22	I/O	MCU GPIO P0.22
47	P0.24	I/O	MCU GPIO P0.24
48	P1.00	I/O	MCU GPIO P1.00
49	P0.21	I/O	MCU GPIO P0.21
50	SWDIO	I/O	MCU SWDIO
51	SWDCLK	I	MCU SWDCLK
52	P0.25	I/O	MCU GPIO P0.25
53	P0.23	I/O	MCU GPIO P0.23
54	P1.01	I/O	MCU GPIO P1.01
55	P1.02	I/O	MCU GPIO P1.02
56	P1.03	I/O	MCU GPIO P1.03
57	P1.05	I/O	MCU GPIO P1.05
58	P1.04	I/O	MCU GPIO P1.04
59	P0.09	I/O	MCU GPIO P0.09
60	P0.10	I/O	MCU GPIO P0.10
61	P0.19	I/O	MCU GPIO P0.19
62	GND	–	Ground

63	ANT_NRF	RFIO	Bluetooth Antenna
64	GND	–	Ground
65	ANT_WIFI	RFIO	WIFI SCAN Antenna
66	GND	–	Ground
67	ANT_GNSS	RFIO	GNSS Antenna
68	GND	–	Ground
69	GND	–	Ground
70	GND	–	Ground
71	GND	–	Ground
72	ANT_LoRa®	RFIO	LoRa® Antenna
73	GND	–	Ground
74	GND	–	Ground
75	GND	–	Ground
76	GND	–	Ground
77	GND	–	Ground
78	GND	–	Ground
79	GND	–	Ground
80	GND	–	Ground

3 Electrical Characteristics

3.1 Maximum Ratings

Reaching or exceeding the maximum ratings listed in the table below can cause equipment damage.

Table 2 Absolute Maximum Ratings

Item	Description	min	max	unit
VDD_LR	LoRa® supply voltage	−0.5	+3.9	V
VDD_NRF	MCU supply voltage	−0.3	+3.9	V
VBUS	MCU USB VBUS	−0.3	+5.8	V
P_NRF	Bluetooth RF input power		+10	dBm
P_LR	LoRa® RF input power	−	+10	dBm

3.2 Normal Working Conditions

Table 3 Recommended Operating Conditions

Item	Description	min	max	unit
VDD_LR	LoRa® supply voltage	+1.8	+3.7	V
VDD_NRF	MCU supply voltage	+1.7	+3.6	V
VBUS	MCU USB VBUS	+4.35	+5.5	V
TA	Ambient temperature	−40	+85	℃
ML_GNSS	GNSS maximum input power		0	dBm
ML_LR	LoRa® maximum input power	−	0	dBm

3.3 Module Specifications

Table 4 WM1110 features

ITEMs	Parameter	Specifications	Unit
Structure	Size	20(W) X 20(L) X 2.3(H)	mm
	Package	80 pin LGA Module	
Electrical Characteristics	power supply	3.3V typical	V
	Sleep current	7.6uA (WDT on)	uA

	Operation current (Transmitter + MCU)	125mA @ LoRa® TX 22dBm				mA
	Operation current (Receiver + MCU)	10mA @ LoRa® SF12 125 kHz				mA
		7mA @ Bluetooth Scan				
		7mA @ Wi–Fi Scan				
	Output power	20dBm max @LoRa®				dBm
		6dBm max @ Bluetooth				
	Sensitivity	SF				dBm
			min	type	max	
		SF7	–	–125	–	
		SF12	–	–141	–	
Peripheral Interface	Full–speed 12 Mbps USB					
	QSPI/SPI/TWI/I²S/PDM/QDEC					
	High speed 32 MHz SPI					
	Quad SPI interface 32 MHz					
	Manual reset pin input					

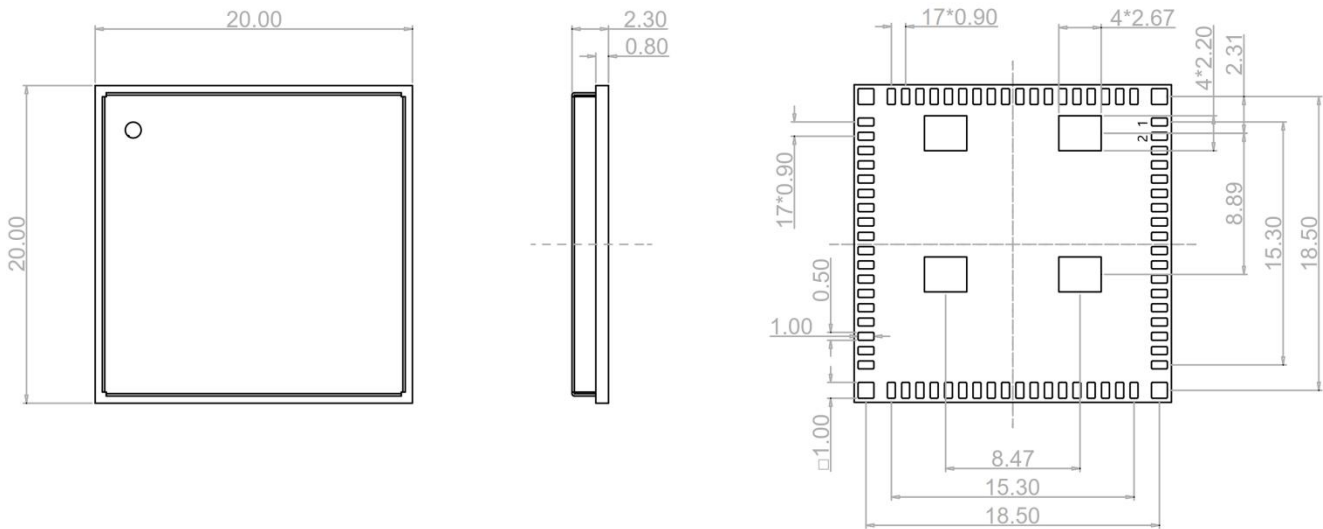# 4 Application Information

4.1 Package Information

Figure 3 Package Outline Drawing

Eagle Library:

https://files.seeedstudio.com/products/SenseCAP/Wio-WM1110/Eagle_Library_MODULE-LORAMODULE-WM1110-A.zip

Kicard Library:

https://files.seeedstudio.com/products/SenseCAP/Wio-WM1110/Kicad_Library_MODULE-LORAMODULE-WM1110-A.zip

4.2 Land Pattern
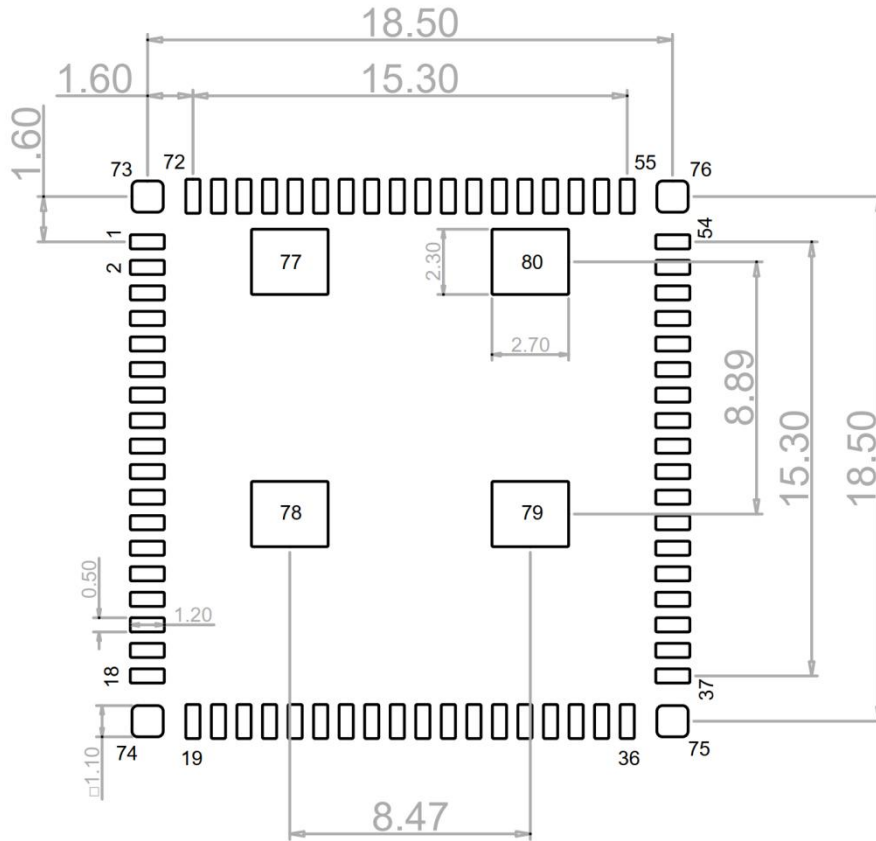
The following figure shows the recommended pad dimensions.

Figure 4 PCB Layout

4.3 Package Marking

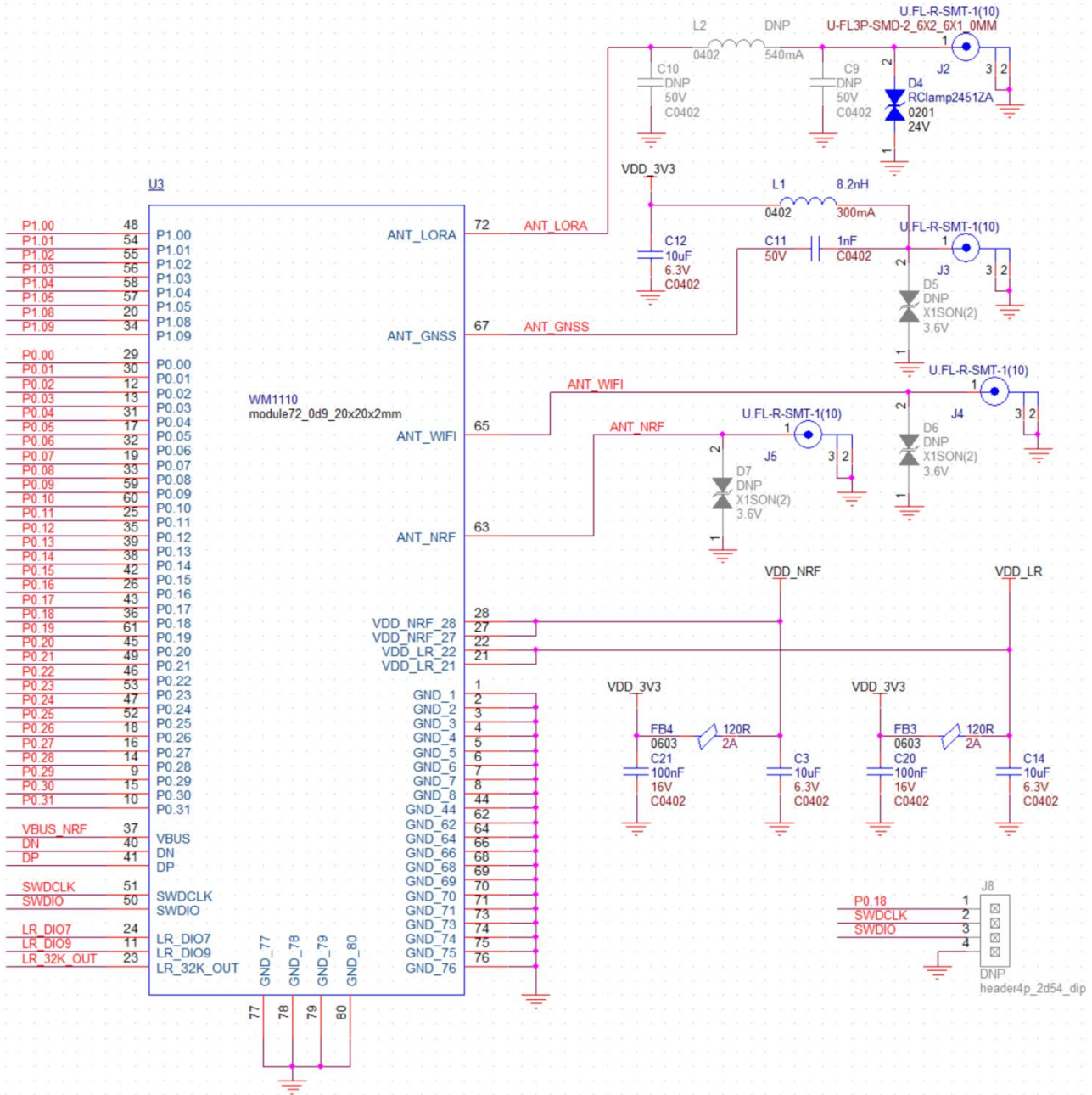# 4.4 Reference Design Based on WM1110 Module

Figure 5 Reference design based on WM1110

P0.18 is configurable as RESET for MCU.

A Pi circuit maybe needed for antenna impedance matching, for the reference design, use a 0 Ohm resistor on L2.

5 Ordering Information

Technical Support: sensecap@seeed.cc

Sales: iot@seeed.cc

6 Reversion

V1.0 2020–07–20 First release

V1.1 2023–04–23 Correct Module Naming

V1.2 2023–06–12 Add footprint.

V1.3 2023–09–01 Correct **Figure 1** Schematic Diagram