NRFLR1121 LoRaWAN Module

LoRa@ Wireless Module-Powered by Semtech

Datasheet

V1.0

Content

1 Introduction

The NRFLR1121 is a wireless communication module designed for developing low-power, long-range IoT applications. It integrates the Semtech LR1121 and Nordic nRF52840, featuring Semtech's LoRa® technology and Nordic's low-power Bluetooth technology. This module supports long-range wireless communication via LoRa and also enables Bluetooth communication.

1.1 Feature

- LoRaWAN 1.0.4 specification compliant
- Supported bands:868/915MHz LoRa®/(G)FSK,2.4GHz LoRa®/(G) FSK
- LoRaWAN Activation by OTAA/ABP
- LoRa Point-to-Point (P2P) communication
- Easy-to-use AT Command set via UART interface
- TCXO crystal for LoRa chip
- IO ports: UART, I2C, GPIO, USB
- Temperature range: -40℃ to +85℃
- Supply voltage: 2.0 ~ 3.6 V
- Low-Power Wireless Systems with 7.8 kHz to 500 kHz bandwidth
- Ultra-Low Power Consumption 6 uA in sleep mode
- LoRa PA Boost mode with 22 dBm@Sub-Ghz/13 dBm@2.4-Ghz

output power

- Serial Wire Debug (SWD) interface
- Module size: 20 mm x 20 mm x 3.5mm
- CE,FCC Certified

2 Description

The NRFLR1121 module integrates the high-performance Semtech LR1121 and Nordic nRF52840, offering developers low-power, long-range LoRaWAN® communication with global frequency band coverage. This makes it highly versatile for various low-power wide-area IoT applications, such as smart agriculture, wireless meter reading, and smart city programs.

The NRFLR1121 also supports multi-band LoRa and long-range frequency hopping spread spectrum (LR-FHSS) communication over Sub-GHz and 2.4GHz ISM bands, as well as satellite S-band connectivity. This multi-band capability enables the module to address diverse application requirements and proprietary protocols while maintaining flexibility.

2.1 System Diagrm

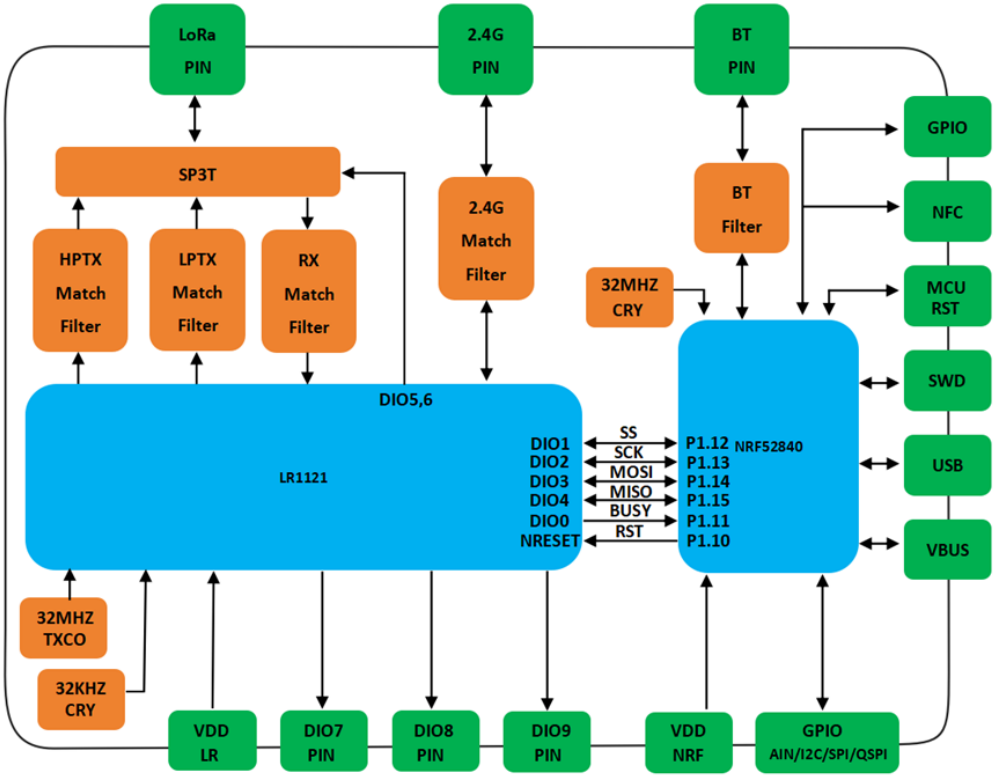

Figure 1:NRFLR1121 Schematic diagram

2.2 Pin Definition

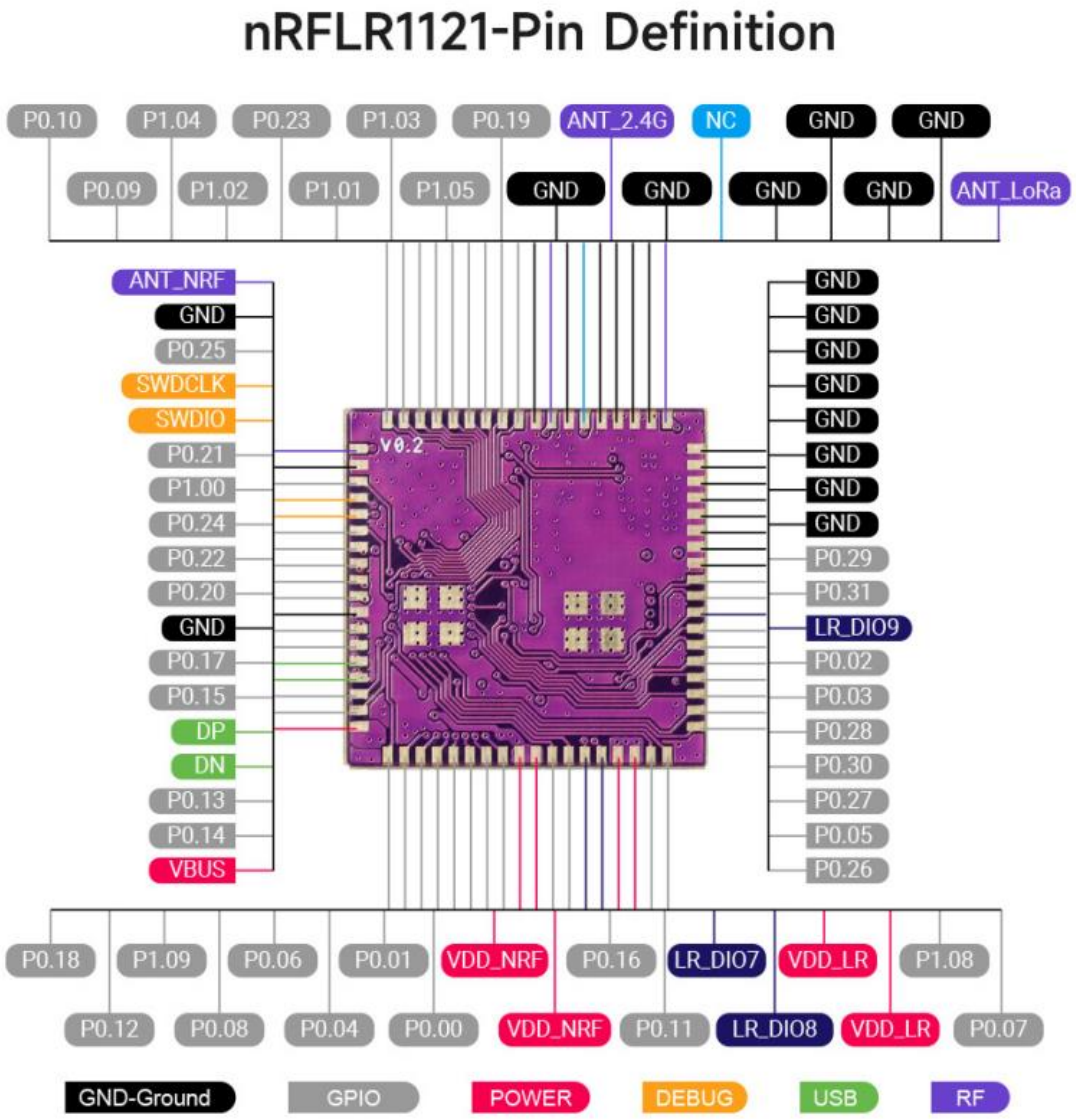

Figure 2:NRFLR1121 Pin Definition

2.3 Pinout

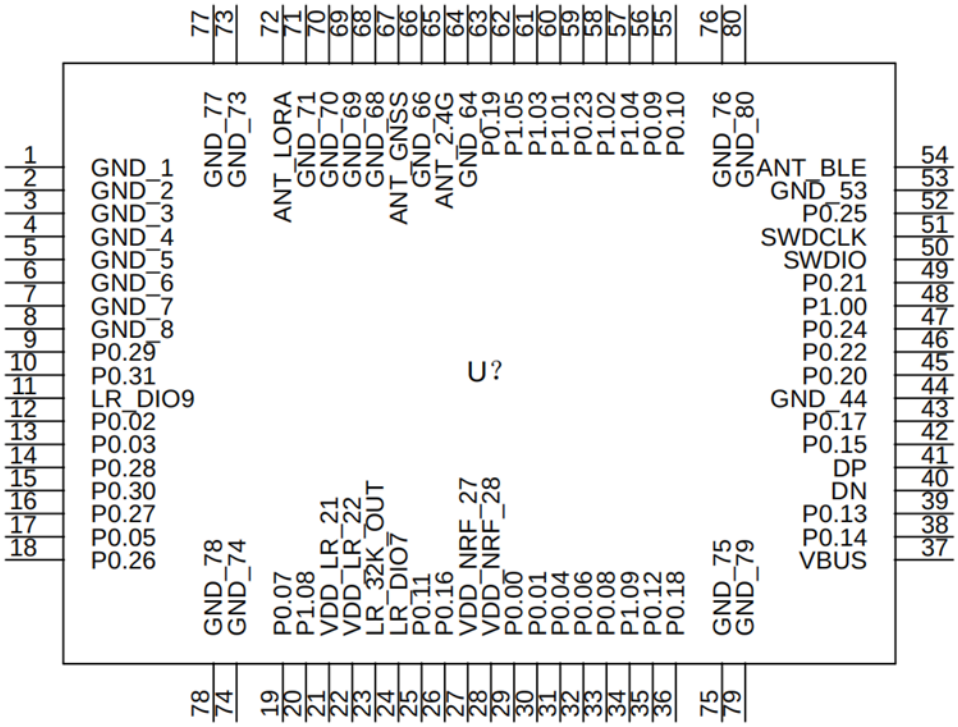

Figure 3:NRFLR1121 Pin arrangement

Table 1:NRFLR1121 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	LR1121 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	LR1121 DOUT
24	LR_DIO7	O	LR1121 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	GND	-	Ground
54	ANT_NRF	RFIO	Bluetooth Antenna
55	P0.10	I/O	MCU GPIO P0.10
56	P0.09	I/O	MCU GPIO P0.09
57	P1.04	I/O	MCU GPIO P1.04
58	P1.02	I/O	MCU GPIO P1.02
59	P0.23	I/O	MCU GPIO P0.23
60	P1.01	I/O	MCU GPIO P1.01
61	P1.03	I/O	MCU GPIO P1.03
62	P1.05	I/O	MCU GPIO P1.05
63	P0.19	I/O	MCU GPIO P0.19
64	GND	-	Ground
65	ANT_2.4G	RFIO	LoRa® 2.4G Antenna
66	GND	-	Ground
67	NC	-	NC
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

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

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	℃

3.3 Module Specifications

Table 4:NRFLR1121 features

ITEMs	Parameter	Specifications	Unit
Structure	Size	20(W) X 20(L) X 3.5(H)	mm
	Package	80 pin Module	
Electrical Characteristics	Power supply	3.3V typical	V
	Sleep current	6uA	uA
	Operation current (Transmitter+MCU)	126mA @ LoRa-Sub-Ghz® TX 22dBm 33mA@ LoRa-2.4Ghz® TX 13dBm	mA
	Operation current (Receiver+MCU)	18mA @ LoRa®-Sub-Ghz SF12 125 kHz	mA
		10mA @ LoRa®-Sub-Ghz SF12 125 kHz	
		8mA @ Bluetooth Scan	
	Output power	20dBm max @LoRa®-Sub-Ghz 11.5dBm max @LoRa®-2.4-Ghz	dBm

		6dBm max @ Bluetooth				dBm
	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

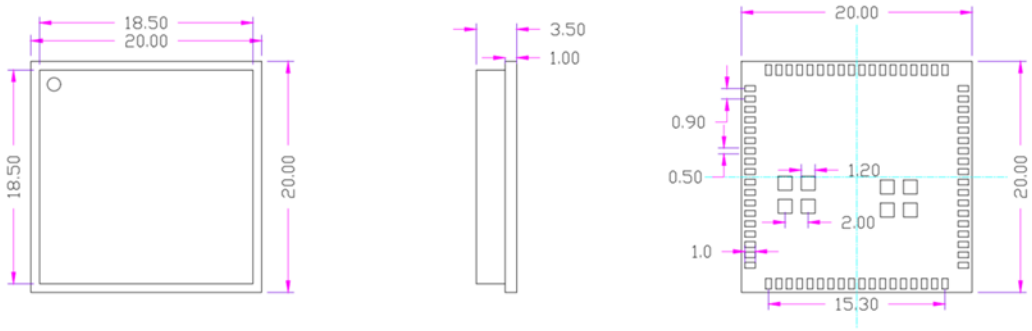

Figure 4:Package Outline Drawing (Unit:mm)

4.2 Land Pattern

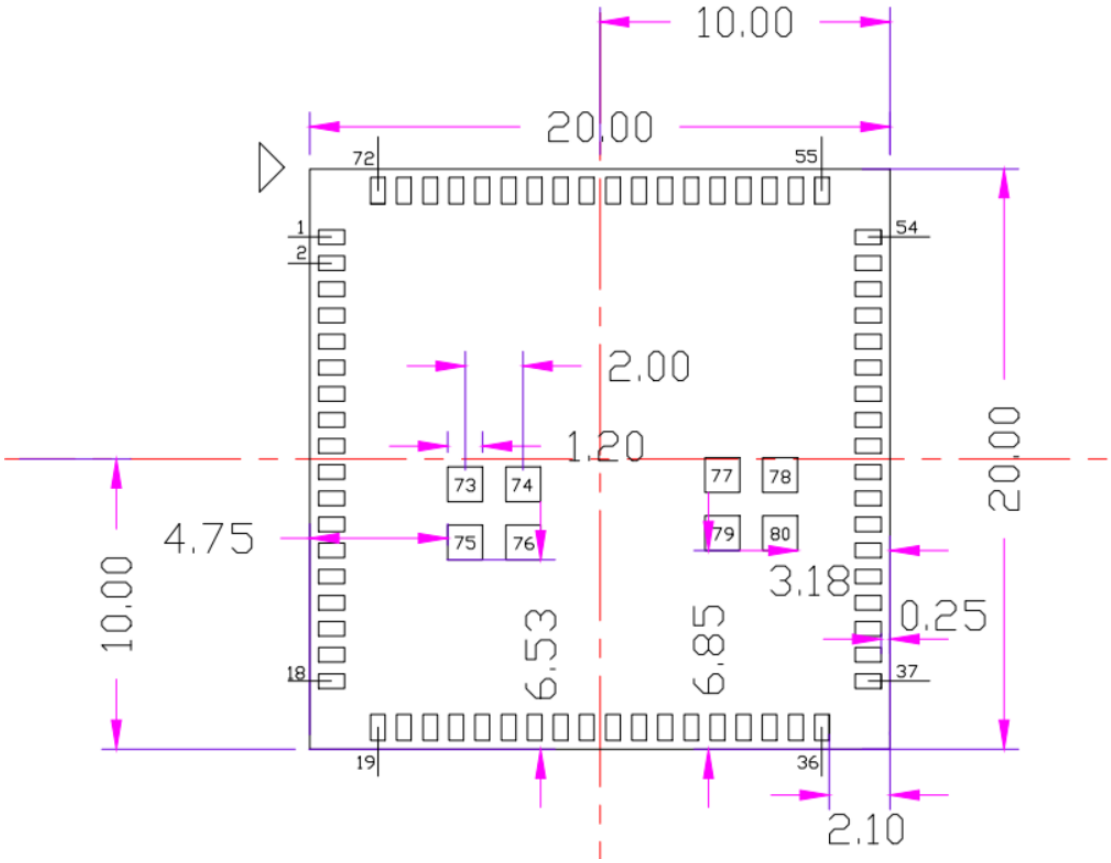

Figure 5:PCB Layout (Unit:mm)

4.3 Label

4.4 Reference Schematic Design Based on NRFLR1121 Module

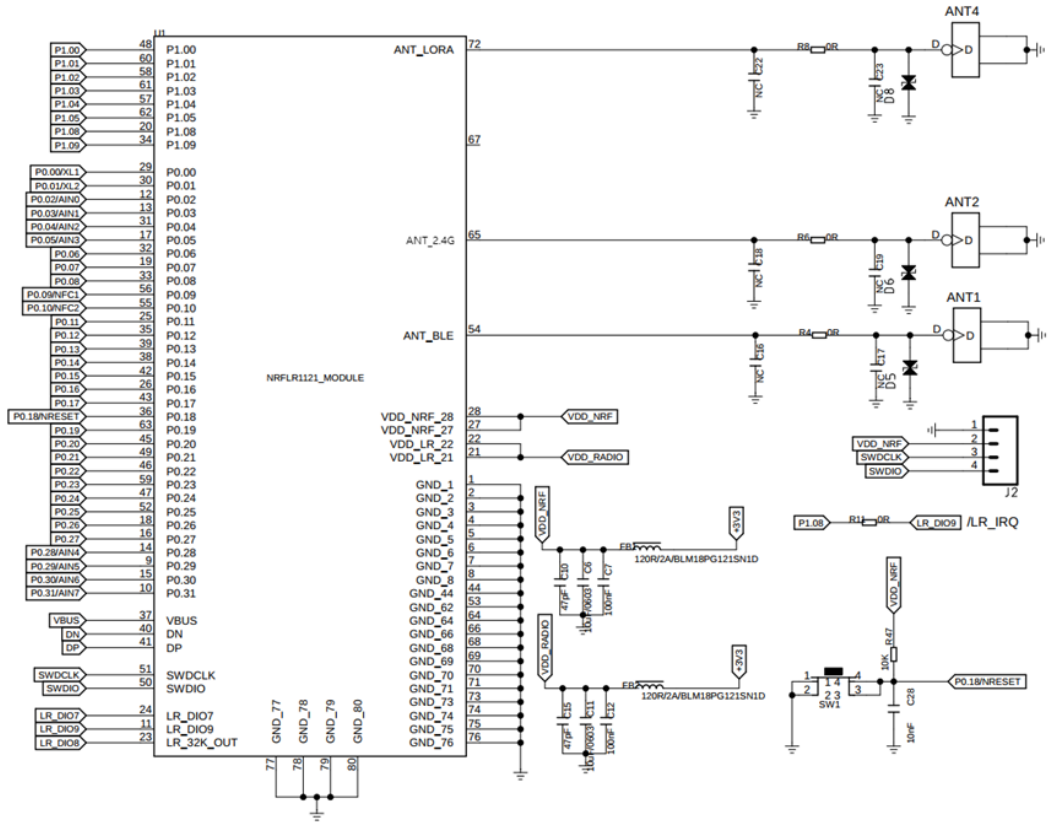

Figure 6:Reference Schematic Design based on NRFLR1121

5 Contact Info

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6 Version

V1.0 2025-01-20 First release