深圳市弘毅云佳科技有限公司
Shenzhen Holyiot Technology Co.,Ltd
tel：+8615220262142 Email:info@holyiot.com

Version: 1
Issued Date: 2025/01/15

Datasheet

产品名称 (Product): BT 6.0 module

产品型号 (Model No.): HOLYIOT-24008 -nRF54H20

目录

1.Description

Overview

nRF54H20 is Nordic's 4th generation multiprotocol, multiprocessor 2.4GHz wireless SoC, released as the first member of the nRF54H Series. nRF54H20 is a highly integrated, ultra-low power, and very efficient solution.

nRF54H20's radio supports Bluetooth® Low Energy 6.0 and is ready for future developments, 802.15.4 with support for Thread® and Matter, and other standard and proprietary protocols. It has improved efficiency, range, and robustness. Using a dedicated processor and the available memories, it can concurrently support multiple protocols while adding new, advanced features.

Four processors are available for use. The processors are clocked from 16 MHz up to 320 MHz and optimized for specific types of workloads. Two powerful and efficient Arm® Cortex® M33 processors for application and radio; two Nordic VPR processors (RISC-V Compatible™) for ultra-low power operations and software-defined peripherals. Integrated and power-efficient memories feature 2 MB of non-volatile MRAM and 1 MB of static RAM. Memory can be expanded with a high-performance interface for external memory. nRF54H20 is also equipped with a set of advanced and low-power peripherals with DMA support. It includes HS-USB, CAN-FD Controller, 14-bit ADC, NFC, I3C, and many more.

Security is designed for PSA Level 3. This level of security is achieved with a combination of hardware and software components in a separated Secure Domain. A dedicated processor with firmware provided by Nordic handles system security and provides security services for the application and radio stack. Security features are available through an API.

nRF54H20 is equipped with advanced power management for precise control of current consumption both in sleep and active modes. This, combined with low-power technology, significantly increases battery life and enables designs with much smaller batteries.

nRF54H20 exceeds the capabilities, processing power, and energy efficiency of previous wireless SoCs by a large margin and is designed for demanding high end applications.

Key features

Multiprotocol radio
• Bluetooth Low Energy 6.0, Bluetooth LE Audio, Auracast, Bluetooth mesh,Bluetooth Direction Finding
• 802.15.4, Thread, Matter
• Proprietary 4Mbps PHY

• ANT™

Security
• Designed for PSA Level 3
• Secure Boot, Secure Firmware Update, and Secure Storage
• Root of Trust and Physically Unclonable Function (PUF)
• Cryptographic accelerators hardened against side-channel attacks
• Tamper detection

Application processor
• Up to 320 MHz Arm Cortex-M33
• Dynamic Voltage-Frequency Scaling (DVFS)
• TrustZone®, FPU, DSP
• 32 KB of tightly coupled RAM

Radio processor
• 256 MHz Arm Cortex-M33
• TrustZone, FPU, DSP
• 192 KB of tightly coupled RAM

Co-processors
• 320 MHz VPR with 64 KB of tightly coupled RAM
• 16 MHz VPR with 64 KB of tightly coupled RAM

Memory
• 2 MB non-volatile MRAM (2 independent banks)
• 768 KB RAM
• External memory interface, XiP-capable, supporting QSPI, xSPI, HyperBus, up to 400 MB/s

Peripherals
• High-speed USB (480 Mbps)
• CAN FD controller
• 2x I3C
• Audio PLL, 2x TDM, PDM
• 8x SPI/TWI/UART
• High speed SPIS, High speed SPIM, High speed SPIM/UART
• 14-bit ADC, COMP and LPCOMP
• High speed PWM and 4x PWM
• NFC
• 2x High speed Timer and 8x Timer, Global RTC
• SIMIF (ISO 7816-compatible interface to smart cards)
• 2x QDEC
• 64 GPIOs (split across 6 ports, independent voltage supply per port)

Operating values
• -40 to 105 °C extended operating temperature
• 1.7-5.5 V supply voltage range

Package
• 4.7x4.3 mm WLCSP117 (0.35 mm ball pitch), height 0.48 mm

Application:

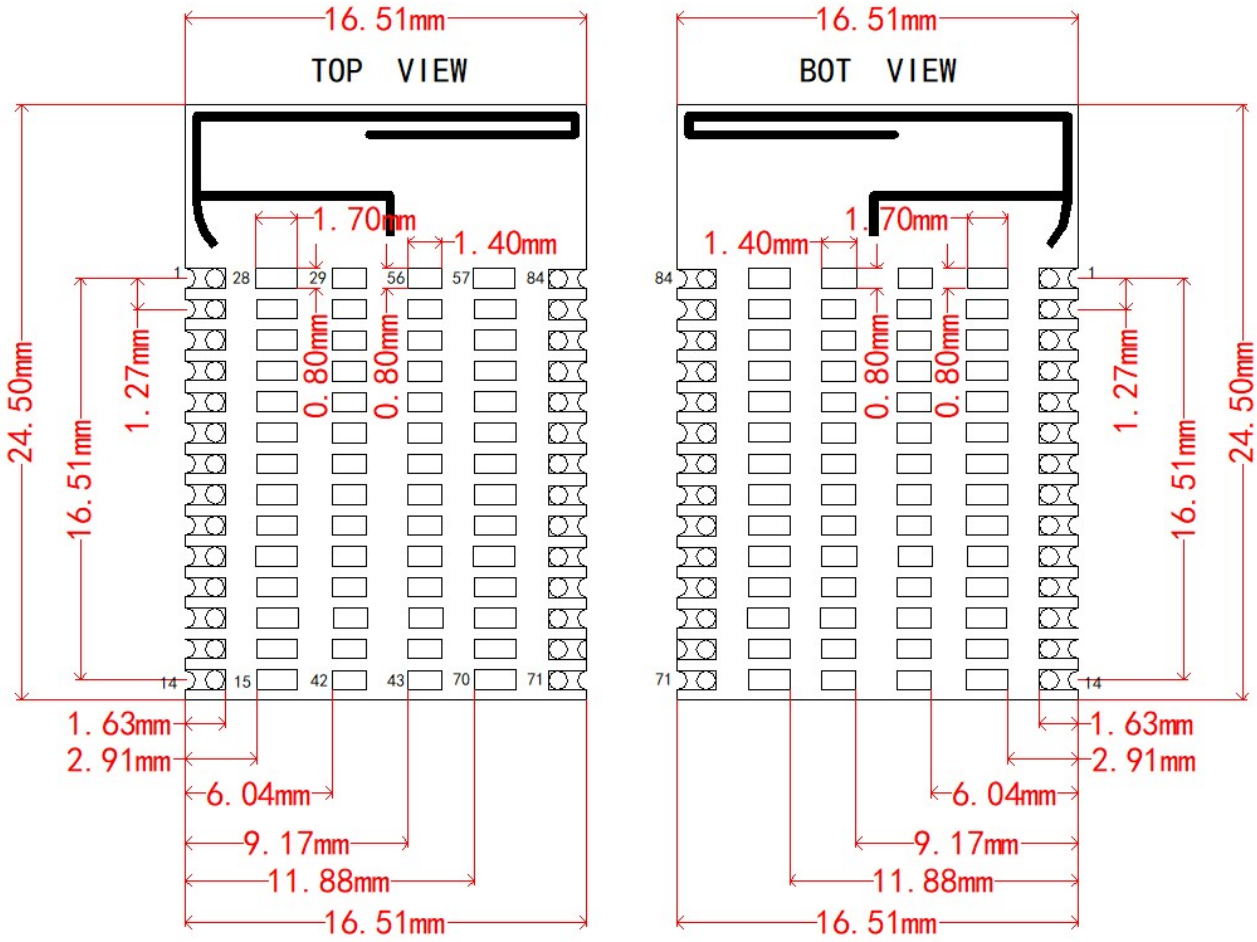
• Advanced wearables
• LE Audio
• Smart Home
• Medical and Healthcare
• Industrial
• Gaming
• Virtual Reality and Augmented Reality
• Machine Learning models at the Edge
• Sensor fusion
• E-Mobility

2.Getting started with the nRF54H20

https://docs.nordicsemi.com/bundle/ncslatest/page/nrf/app_dev/device_guides/working_with_nrf/nrf54h/ug_nrf54h20_gs.html#installing_nrf_util_and_its_commands

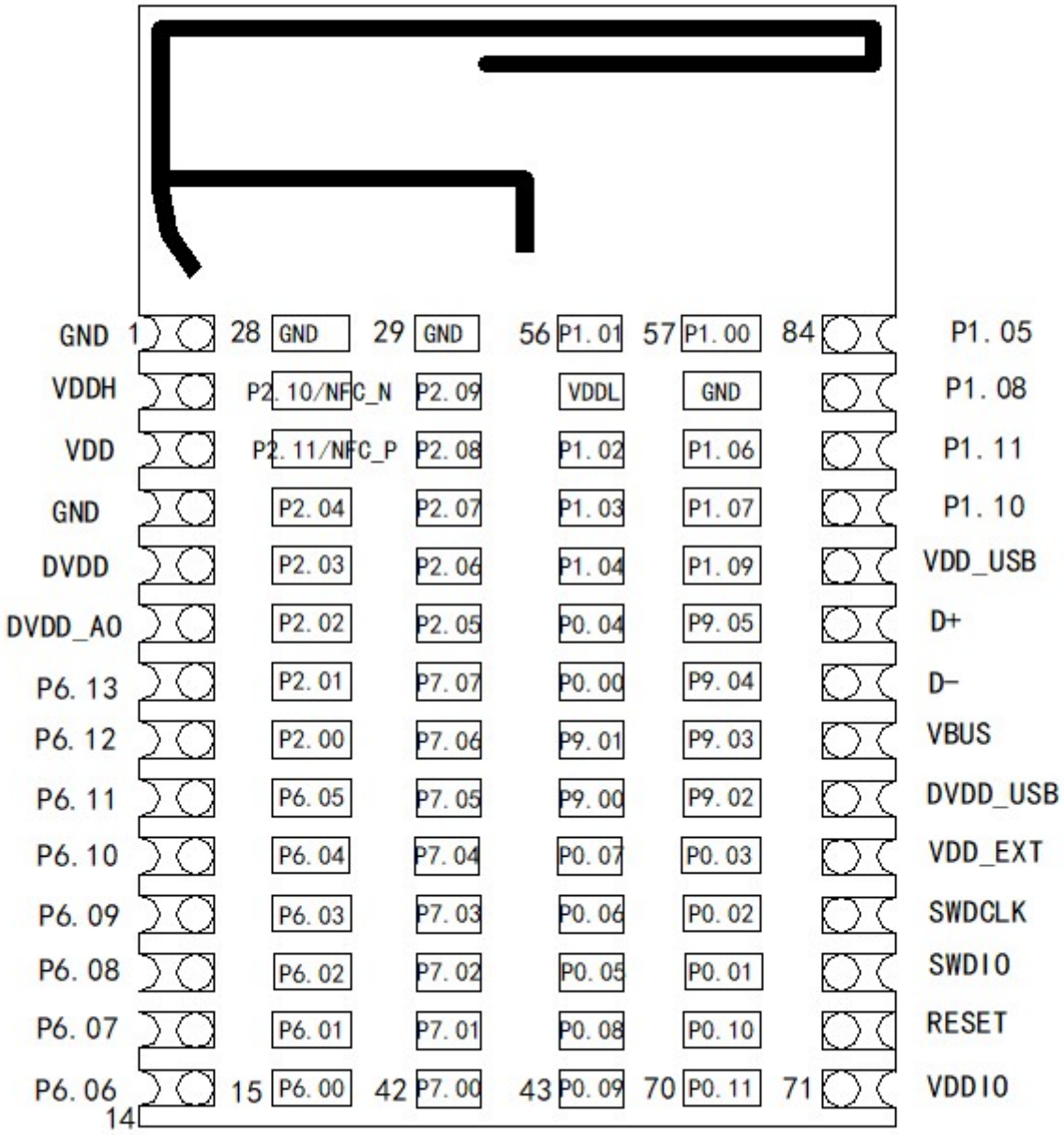
3.Product Descriptions

3.1 Mechanical drawings



3.2 Pin assignments

TOP VIEW



PIN No.	PIN define	Functions
1	GND	Ground
2	VDDH	Power supply
3	VDD	Power supply
4	GND	Ground
5	DVDD	Power supply
6	DVDD_AO	Power supply Analog input
7	P6.13	Digital I/O

	CS1	Dedicated pin for Quad SPI
8	P6.12 RESETN	Digital I/O EXMIF RESETN
9	P6.11 DQ4	Digital I/O EXMIF DQ4
10	P6.10 DQ2	Digital I/O EXMIF DQ2
11	P6.09 DQ3	Digital I/O EXMIF DQ3
12	P6.08 DQ5	Digital I/O EXMIF DQ5
13	P6.07 DQ0	Digital I/O EXMIF DQ0
14	P6.06 DQ6	Digital I/O EXMIF DQ6
15	P6.00 CK	Digital I/O EXMIF CK
16	P6.01 CKN	Digital I/O EXMIF CKN
17	P6.02 RWDS	Digital I/O EXMIF RWDS
18	P6.03 CS0	Digital I/O EXMIF CS0
19	P6.04 DQ7	Digital I/O EXMIF DQ7
20	P6.05 DQ1	Digital I/O EXMIF DQ1
21	P2.00	Digital I/O
22	P2.01	Digital I/O
23	P2.02	Digital I/O
24	P2.03	Digital I/O
25	P2.04	Digital I/O
26	P2.11 NFC_P	Digital I/O NFC input
27	P2.10 NFC_N	Digital I/O NFC input

28	GND	Ground
29	GND	Ground
30	P2.09	Digital I/O
31	P2.08	Digital I/O
32	P2.07	Digital I/O
33	P2.06	D Digital I/O
34	P2.05	Digital I/O
35	P7.07	Digital I/O
36	P7.06	Digital I/O
37	P7.05	Digital I/O
38	P7.04	Digital I/O
39	P7.03	Digital I/O
40	P7.02	Digital I/O
41	P7.01	Digital I/O
42	P7.00	Digital I/O
43	P0.09	Digital I/O
44	P0.08	Digital I/O
45	P0.05	Digital I/O
46	P0.06	Digital I/O
47	P0.07	Digital I/O
48	P9.00	Digital I/O
49	P9.01	Digital I/O
50	P0.00	Digital I/O
51	P0.04	Digital I/O
52	P1.04	Digital I/O
53	P1.03	Digital I/O
54	P1.02	Digital I/O
55	VDDL	Power supply
56	P1.01	Digital I/O
57	P1.00	Digital I/O
58	GND	Ground
59	P1.06	Digital I/O
60	P1.07	Digital I/O
61	P1.09	Digital I/O
62	P9.05	Digital I/O
63	P9.04	Digital I/O

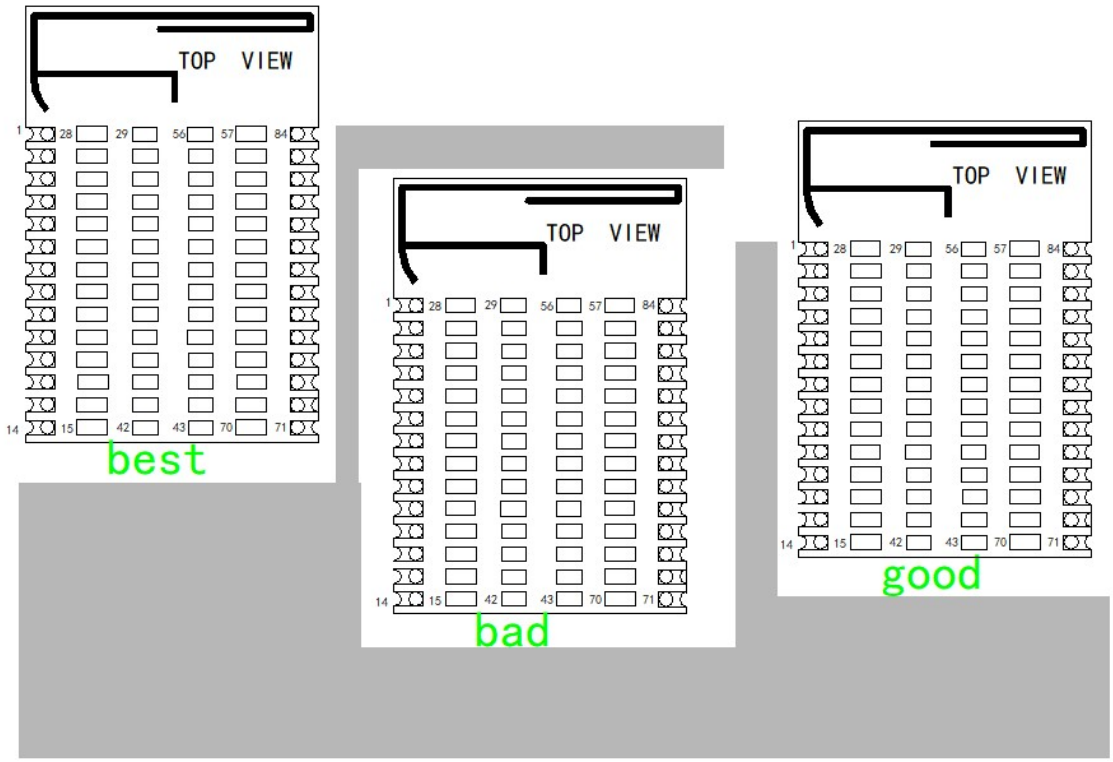
64	P9.03	Digital I/O
65	P9.02	Digital I/O
66	P0.03	Digital I/O
67	P0.02	Digital I/O
68	P0.01	Digital I/O
69	P0.10	Digital I/O
70	P0.11	Digital I/O
71	VDDIO	Power supply
72	nRESET	Reset
73	SWDIO	Debug
74	SWDCLK	Debug
75	VDD_EXT	Power output
76	DVDD_USB	0.8V VREGUSB LDO output
77	VBUS	Power input to VREGUSB
78	D-	USB D-
79	D+	USB D+
80	VDD_USB	3.3V VREGUSB LDO output
81	P1.10	Digital I/O
82	P1.11	Digital I/O
83	P1.08	Digital I/O
84	P1.05	Digital I/O

4.Mounting our board on the host PCBA

We suggest that you mount our RF board(HOLYIOT-24008 -nRF54H20) on the board like that:

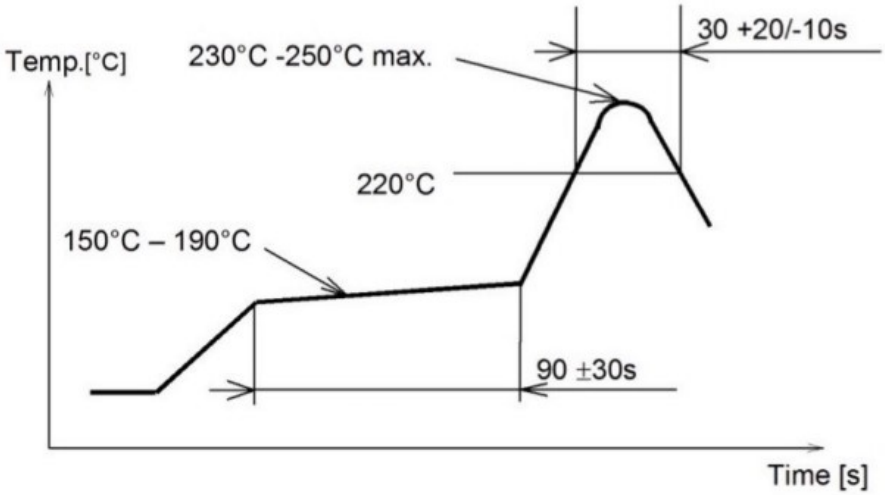
For the best Bluetooth performance, the antenna of the area need to extend about several mm without ground under the antenna of the edge of the host PCB.

The second choice is that place our board at the corner of host PCB, the antenna of board need to extend several mm outside of the Ground plane of the host PCB.



5.Miscellaneous

Soldering



Temperature-Time Profile for Re-Flow Soldering. Maximum number of cycles for re-flow is 2. No opposite side re-flow is allowed due to module weight.

6.Recommended operating conditions

	Min.	Max.	Unit
Supply voltages			
VDDH	-0.3	5.8	V
VDD	-0.3	2	V
DVDD_AO	-0.3	0.9	V
DVDD	-0.3	0.9	V
VDDIO_P1	-0.3	2	V
VDDIO_P2	-0.3	2	V
VDDIO_P6	-0.3	2	V
VDDIO_P7	-0.3	2	V
VDDIO_P9	-0.3	3.9	V
VDDL_RF	-0.3	1.4	V
VBUS	-0.3	5.8	V
VSS	-0.3	0	V
I/O pin voltage			
$V_{I/O}$, VDD ≤ 3.6 V	-0.3	VDD + 0.3	V
$V_{I/O}$, VDD > 3.6 V	-0.3	3.9	V

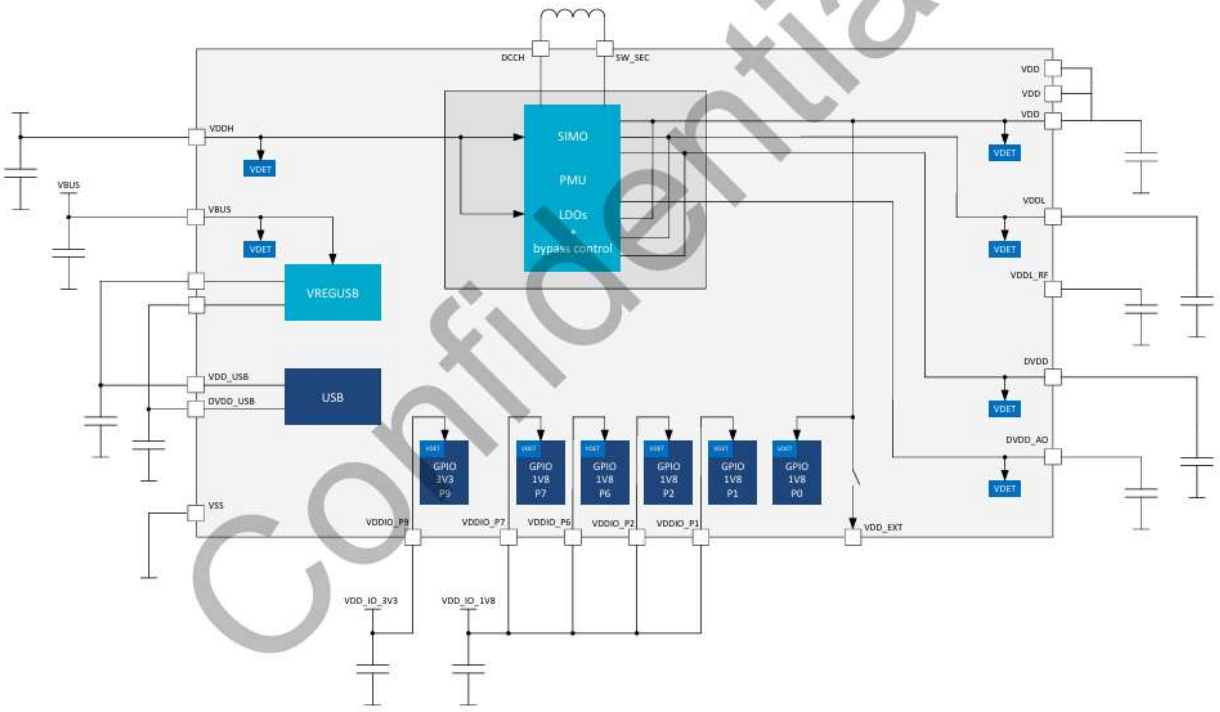


Figure 9: Regulator system overview

The operating conditions are the physical parameters that nRF54H20 can operate with.