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Datasheet

产品名称 (Product): BT 5.2 module (nRF5340)

产品型号 (Model No.): HOLYIOT-21069-5340

1. Description

HOLYIOT-21069 module is based on Nordic nRF5340 SoC, nRF5340 Soc is an ultra-low power wireless System on Chip (SoC) with two Arm® Cortex®-M33 processors and a multiprotocol 2.4 GHz transceiver. The two flexible processors, combined with advanced security features and an operating temperature of up to 105°C, make nRF5340 a great choice for LE Audio, professional lighting, advanced wearables and other complex IoT applications.

The nRF5340 SoC supports an extensive range of wireless protocols. It supports Bluetooth Low Energy and is capable of all angle-of-arrival (AoA) and angle-of-departure (AoD) roles in Bluetooth Direction Finding. In addition, it supports LE Audio, high-throughput 2 Mbps, Advertising Extensions and Long Range. Mesh protocols like Bluetooth mesh, Thread and Zigbee can be run concurrently with Bluetooth LE, enabling smartphones to provision, commission, configure and control mesh nodes. NFC, ANT, 802.15.4 and 2.4 GHz proprietary protocols are also supported.

Hardware

SWD programmer (SWDIO, SWCLK, VDD, GND)
nRF5340 QKAA
Size: 19mm*13.5mm
Bluetooth® 5.2, IEEE 802.15.4-2006, 2.4 GHz transceiver
Support NFC functions

Features

- 1.7 V to 5.5 V supply voltage range
- Single 32 MHz crystal operation
- Package variants
- 1.8 V to 3.3 V regulated supply for external components
- Operating temperature from -40 to +105°C
- 48 general purpose I/O pins

- Distributed programmable peripheral interconnect (DPPI) Distributed programmable peripheral interconnect (DPPI)
- Inter-processor communication (IPC)
- Mutually exclusive peripheral (MUTEX)

Application core

- Arm® Cortex®-M33 with TrustZone® technology
- 1 MB flash and 512 kB low leakage RAM
- Arm TrustZone CryptoCell™-312 security subsystem
- Two-way set associative cache towards flash and QSPI XIP code regions
- QSPI peripheral for communicating with an external flash memory device
- Near field communication (NFC-A) tag with wake-on field
- Up to 5x SPI master/slave with EasyDMA
- Up to 4x I2C compatible two-wire master/slave with EasyDMA
- Up to 4x UART (CTS/RTS) with EasyDMA
- Audio peripherals: I2S, digital microphone interface (PDM)
- Up to 4x pulse width modulator (PWM) units with EasyDMA
- 12-bit, 200 ksps ADC with EasyDMA - eight configurable channels with programmable gain
- Up to 3x 32-bit timer with counter mode
- Up to 2x 24-bit real-time counter (RTC)
- Up to 2x Quadrature decoder (QDEC)

Network core

- Arm Cortex-M33
- 256 kB flash
- 64 kB low leakage RAM
- Bluetooth® 5.2, IEEE 802.15.4-2006, 2.4 GHz transceiver
- SPI master/slave with EasyDMA
- I2C compatible two-wire master/slave with EasyDMA
- UART (CTS/RTS) with EasyDMA

- Up to 3x 32-bit timer with counter mode
- Up to 2x real-time counter (RTC)
- Temperature sensor
- Distributed programmable peripheral interconnect (DPPI)
- Inter-processor communication (IPC)
- Mutually exclusive peripheral (MUTEX)

Applications

- Advanced computer peripherals and I/O devices
  - Multi-touch trackpad
- Advanced wearables
  - Health/fitness sensor and monitor devices
  - Wireless payment enabled devices
- Wireless audio devices
  - Bluetooth Low Energy Audio
  - True wireless earbuds
  - Headphones, microphones, and speakers
- Internet of things (IoT)
  - Smart home sensors and controllers
  - Industrial IoT sensors and controllers
- Interactive entertainment devices
  - Remote controls
  - Gaming controllers
- Professional lighting
  - Wireless connected luminaire
- Medical
- Asset tracking and RTLS

2. Introduction

HOLYIOT-21069 module is based on Nordic nRF5340 SoC, the nRF5340 SoC is a wireless, ultra-low power multicore System on Chip (SoC), integrating two fully programmable Arm Cortex-M33 processors, advanced security features, a range of peripherals, and a multiprotocol 2.4 GHz transceiver. The transceiver supports Bluetooth Low Energy, ANT™, and 802.15.4 for, among others, Thread and Zigbee protocols. It also allows the implementation of proprietary 2.4 GHz protocols.

The two Arm Cortex-M33 processors share the power, clock, and peripheral architecture with Nordic Semiconductor nRF51, nRF52, and nRF91 Series of SoCs, ensuring minimal porting efforts. The application core is a full-featured Arm Cortex-M33 processor including DSP instructions and FPU and running at up to 128 MHz with 1 MB of flash and 512 kB of RAM.The option to run the application processor at 64 MHz allows the CPU to increase energy efficiency. The network core is an Arm Cortex-M33 processor with a reduced feature set, designed for ultra-low power operation. It runs at a fixed 64 MHz frequency and contains 256 kB of flash and 64 kB of RAM.

The peripheral set offers a variety of analog and digital functionality enabling single-chip implementation of a wide range of applications. Arm TrustZone technology, Arm CryptoCell-312, and supporting blocks for system protection and key management are embedded for the advanced security needed for IoT applications.

2.1 Programmer

HOLYIOT-21069 module use the Serial Wire Debug(SWD port), the module which layout the SWDIO, SWCLK, VDD, GND for debug and flash your own firmware, more info about the SWD, please visit https://www.silabs.com/community/mcu/32-bit/knowledge-base.entry.html/2014/10/21/serial_wire_debugs-qKCT

You can use the Jlink or Jtag for programmer.

2.2 Software development Tool

It supports the standard Nordic Software Development Tool-chain using Segger Embedded Studio, Keil, IAR and GCC. More info please visit https://www.nordicsemi.com/Software-and-Tools/Development-Tools

2.3 Protocols

This module support Bluetooth 5, Bluetooth Low Energy, Bluetooth mesh, Thread, 802.15.4, ANT, 2.4GHz proprietary. So we can use different protocols for different situations.

Software Development Kit

nRF Connect SDK is a scalable and unified software development kit for building products based on all our nRF52, nRF53 and nRF91 Series wireless devices. It offers developers an extensible framework for building size-optimized software for memory-constrained devices as well as powerful and complex software for more advanced devices and applications. It integrates the the Zephyr RTOS and a wide range of samples, application protocols, protocol stacks, libraries and hardware drivers.

For developing Bluetooth Low Energy, Thread and Zigbee products, the nRF Connect SDK contains all needed software, including protocol stacks

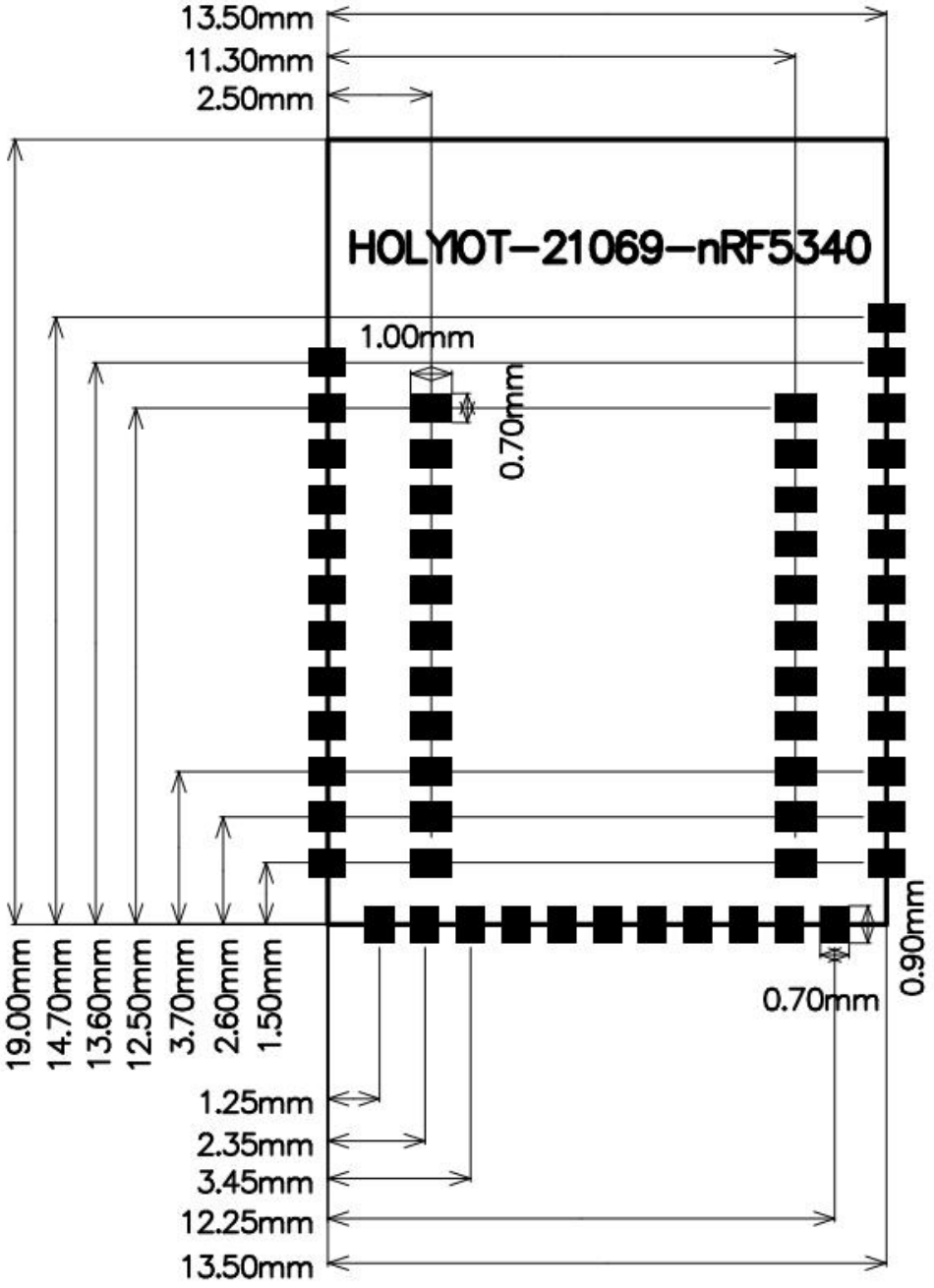
Get Started: https://www.nordicsemi.com/Software-and-tools/Development-Kits/nRF5340-DK/GetStarted#infotabs

More info please visit https://www.nordicsemi.com/Software-and-tools/Software/nRF-Connect-SDK

You can also download the SDK for coding development.

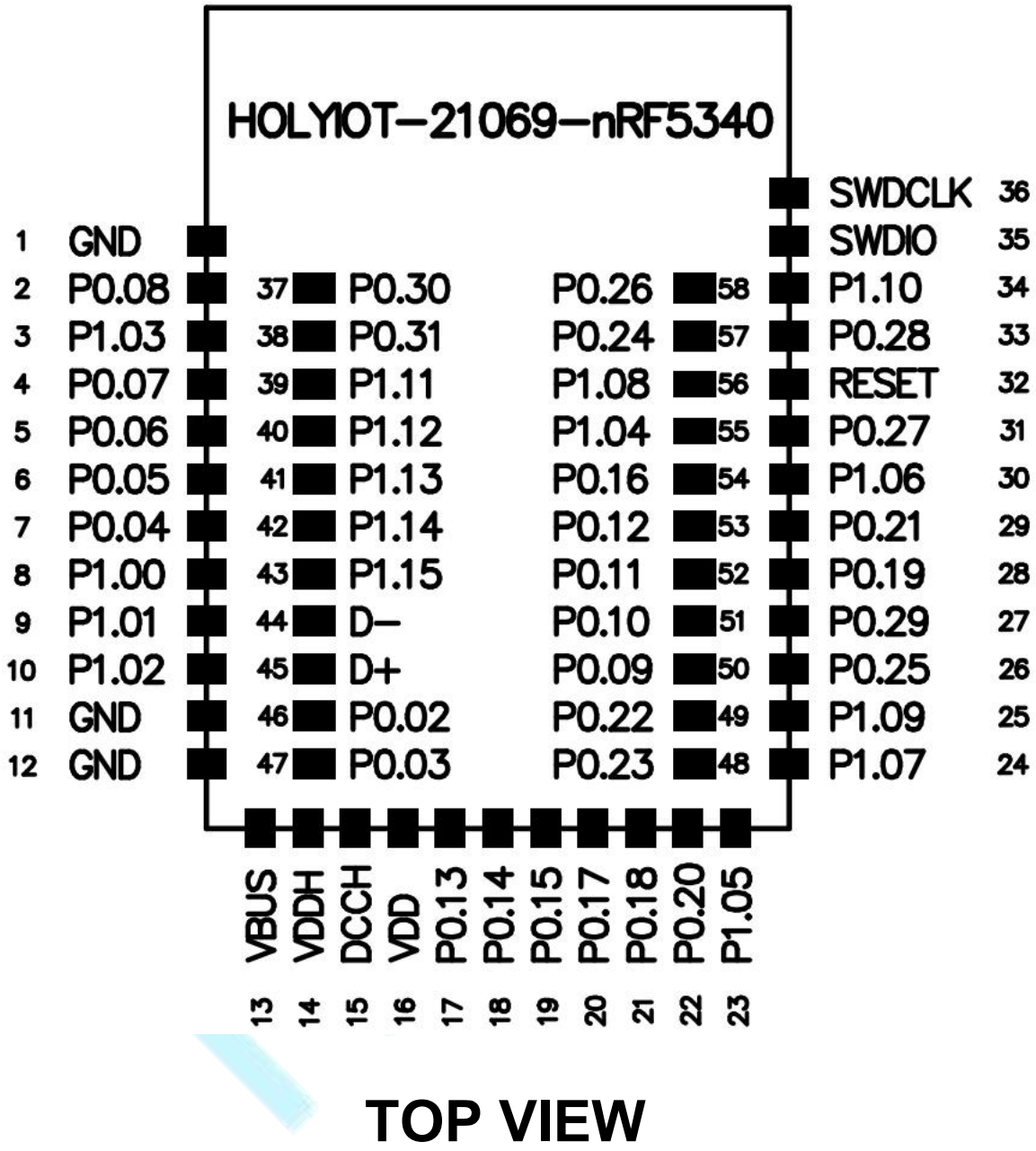
3. Product Descriptions

3.1 Mechanical drawings



TOP VIEW

3.2 Pin assignments



TOP VIEW

PIN No.	PIN define	Functions
1	GND	Ground pad
2	P0.08 TRACEDATA3 SCK	General purpose I/O Trace buffer TRACEDATA[3] Dedicated pin for high-sp
3	P1.03 TWI	General purpose I/O High-speed pin for 1 Mbps TWI
4	P0.07 AIN3	General purpose I/O Analog input
5	P0.06 AIN2	General purpose I/O Analog input
6	P0.05 AIN1	General purpose I/O Analog input
7	P0.04 AIN0	General purpose I/O Analog input
8	P1.00	General purpose I/O
9	P1.01	General purpose I/O
10	P1.02 TWI	General purpose I/O High-speed pin for 1 Mbps TWI
11	GND	Ground pad
12	GND	Ground pad
13	VBUS	5 V input for USB 3.3 V regulator
14	VDDH	High voltage power supply
15	DCCH	DC/DC converter output
16	VDD	Power supply
17	P0.13 IO0	General purpose I/O Dedicated pin for Quad SPI
18	P0.14 IO1	General purpose I/O Dedicated pin for Quad SPI
19	P0.15 IO2	General purpose I/O Dedicated pin for Quad SPI
20	P0.17 SCK	General purpose I/O Dedicated pin for Quad SPI
21	P0.18 CSN	General purpose I/O Dedicated pin for Quad SPI
22	P0.20	General purpose I/O

23	P1.05	General purpose I/O
24	P1.07	General purpose I/O
25	P1.09	General purpose I/O
26	P0.25 AIN4	General purpose I/O Analog input
27	P0.29	General purpose I/O
28	P0.19	General purpose I/O
29	P0.21	General purpose I/O
30	P1.06	General purpose I/O
31	P0.27	General purpose I/O
32	RESET	Pin RESET with internal pull-up resistor
33	P0.28 AIN7	General purpose I/O Analog input
34	P1.10	General purpose I/O
35	SWDIO	Serial wire debug I/O for debug and programming
36	SWDCLK	Serial wire debug clock input for debug and programming
37	P0.30	General purpose I/O
38	P0.31	General purpose I/O
39	P1.11	General purpose I/O
40	P1.12	General purpose I/O
41	P1.13	General purpose I/O
42	P1.14	General purpose I/O
43	P1.15	General purpose I/O
44	D-	USB D-
45	D+	USB D+
46	P0.02 NFC1	General purpose I/O NFC antenna connection
47	P0.03 NFC2	General purpose I/O NFC antenna connection
48	P0.23	General purpose I/O
49	P0.22	General purpose I/O
50	P0.09 TRACEDATA2 MOSI	General purpose I/O Trace buffer TRACEDATA[2] Dedicated pin for high-speed SPI

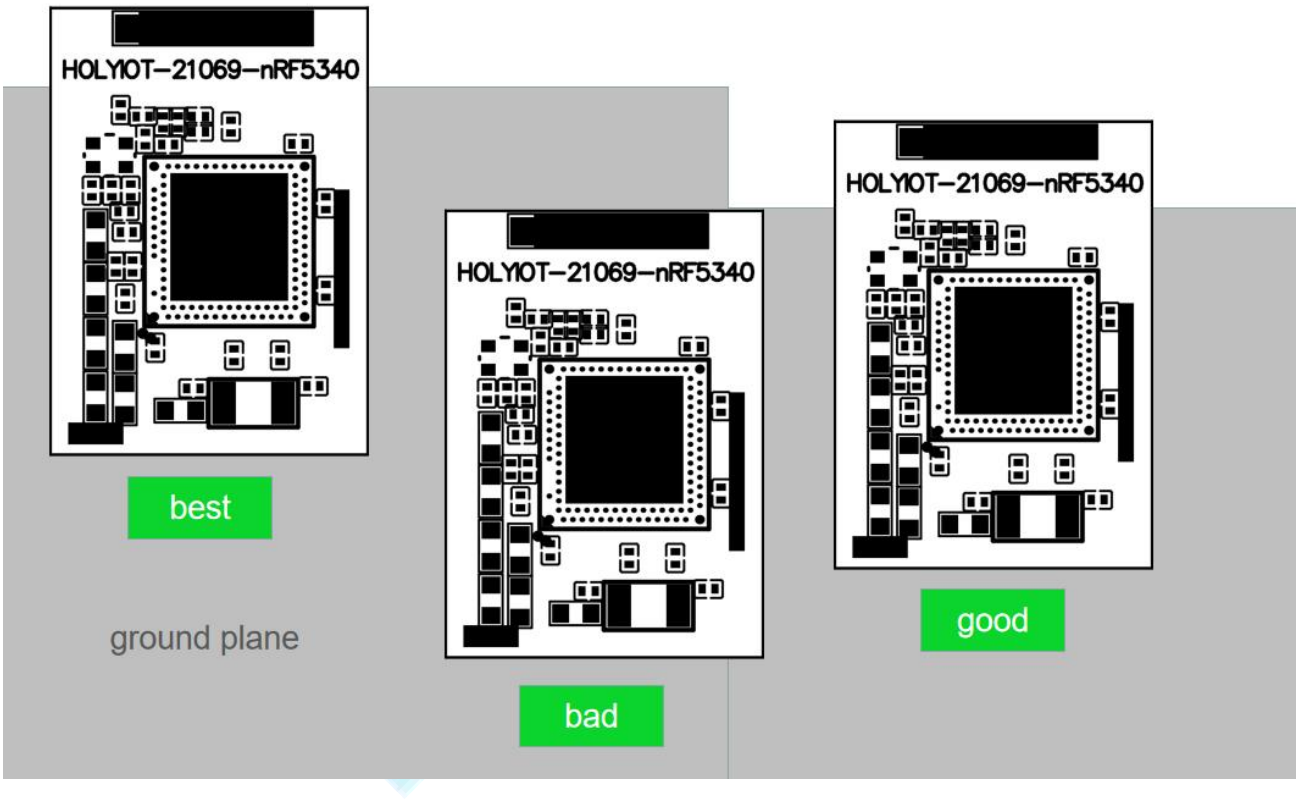
51	P0.10 TRACEDATA1 MISO	General purpose I/O Trace buffer TRACEDATA[1] Dedicated pin for high-speed SPI
52	P0.11 TRACECLK CSN	General purpose I/O Trace buffer TRACEDATA[0] Dedicated pin for high-speed SPI
53	P0.12 TRACECLK DCX	General purpose I/O Trace buffer clock Dedicated pin for high-speed SPI
54	P0.16 IO3	General purpose I/O Dedicated pin for Quad SPI
55	P1.04	General purpose I/O
56	P1.08	General purpose I/O
57	P0.24	General purpose I/O
58	P0.26 AIN5	General purpose I/O Analog input

4. Mounting our board on the host PCBA

We suggest that you mount our RF board (HOLYIOT-20046) on the board like that:

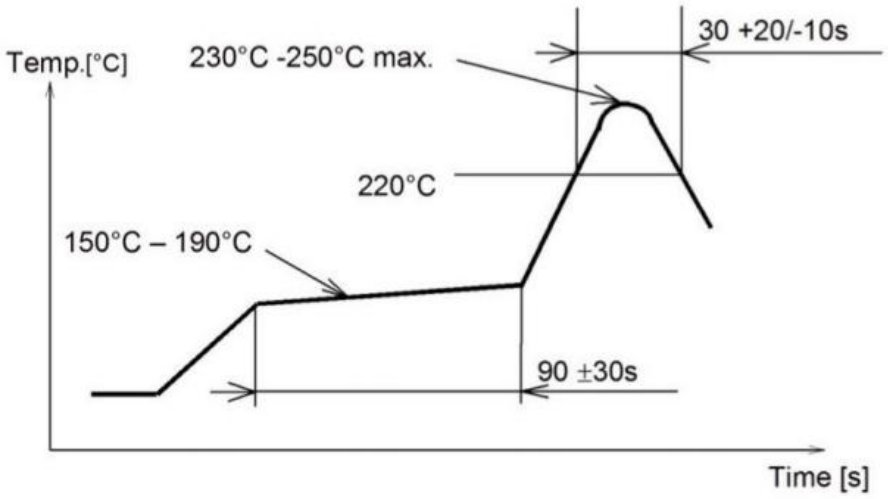
1. For the best Bluetooth performance, the antenna of the area needs to extend about several mm without ground under the antenna of the edge of the host PCB.

2. The second choice is that place our board at the corner of host PCB, the antenna of board needs 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.

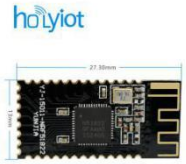


6. Absolute maximum ratings

Maximum ratings are the extreme limits to which the chip can be exposed for a limited amount of time without permanently damaging it. Exposure to absolute maximum ratings for prolonged periods of time may affect the reliability of the device.

	Min.	Max.	Unit
Supply voltages			
VDD	-0.3	+3.9	V
VDDH	-0.3	+5.8	V
VBUS	-0.3	+5.8	V
VSS		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
Environmental aQFN package			
Storage temperature	-40	+125	°C
Moisture Sensitivity Level (MSL)		2	
ESD Human Body Model (HBM)		2 (all pins except DECR and DECN, rated at 1.4 kV)	kV
ESD Charged Device Model (CDM)		500	V
Flash memory			
Endurance	10 000 write/erase cycles		
Retention	10 years at 40°C		

7. List of Holyiot module

Part No.	Nordic chip	Holyiot No.	PA	Antenna	Picture
1	nRF51822	Holyiot-17085-PA	√	IPX antenna	
2	nRF51822	YJ-15011-nRF51822	×	PCB antenna	
3	nRF51822	YJ-14015-nRF51822	×	PCB antenna	
4	nRF52832	YJ-16048-nRF52832	×	PCB antenna	
5	nRF52832	YJ-17029-nRF52832	√	Ceramic antenna	

6	nRF52832	YJ-16002-nRF52832	×	PCB antenna	
7	nRF52832	YJ-17024-nRF52832	√	IPX antenna	
8	nRF52832	YJ-17095-nRF52832	×	Ceramic antenna	
9	nRF52832	YJ-17017-USB	×	Ceramic antenna	
10	nRF52832	YJ-17076-USB	×	PCB antenna	
11	nRF52840	YJ-17120-USB	×	PCB antenna	
12	nRF52840	YJ-18010-nRF52840	×	Ceramic antenna	
13	nRF52840	YJ-18039-nRF52840	×	IPX antenna & PCB antenna