E104-BT5040UA User Manual

nRF52840 USB type Bluetooth packet capture tool

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Chapter 1 Overview

1.1 Introduction

E104-BT5040UA is a small USB port Bluetooth wireless packet capture tool produced by Ebyte; it comes with a high-performance PCB on-board antenna and uses a Bluetooth Low Energy (BLE) SOC solution.

E104-BT5040UA adopts the original imported nRF52840 radio frequency chip from Nordic, supports Bluetooth 4.2 and Bluetooth 5.0; the chip comes with high-performance ARM CORTEX-M4 core, 32M+32.768kHz industrial-grade crystal oscillator, and has UART, I2C, SPI, ADC, DMA Rich peripheral resources such as, PWM.

E104-BT5040UA is a packet capture tool developed by Chengdu Ebyte basic Nordic official development board PCA10056. The capture tool firmware is provided by Nordic, and Ebyte has not made any changes.

1.2 Features

- Under ideal conditions, the communication distance can reach 250m;
- The maximum transmit power is 6mW, and the software is multi-level adjustable;
- Support the global license-free ISM 2.4GHz frequency band;
- Onboard 32.768kHz clock crystal oscillator;
- Built-in high-performance low-power ARM@Cortex-M4 processor;
- Abundant resources: 1024kB Flash, 256kB RAM;
- USB power supply, USB has ESD protection treatment;
- Industrial-grade standard design, supporting long-term use at -40℃~85℃;
- PCB onboard antenna, no need for external antenna.

1.3 Application scenarios

- Smart home and industrial sensors, etc.;
- Security system, positioning system;
- Wireless remote control, UAV;
- Wireless game remote control;
- Healthcare products;
- Wireless voice
- Automotive industry applications.

Chapter 2 Specifications

2.1 Limit parameters

Main parameters	Performance		Remark
	Min	Max	
USB power supply voltage (V)	0	5.5	Over 5.5V will permanently burn the module
Blocking power (dBm)	-	10	It is less likely to burn when used at close range
Working temperature (℃)	-40	+85	Industrial grade

2.2 Operating parameter

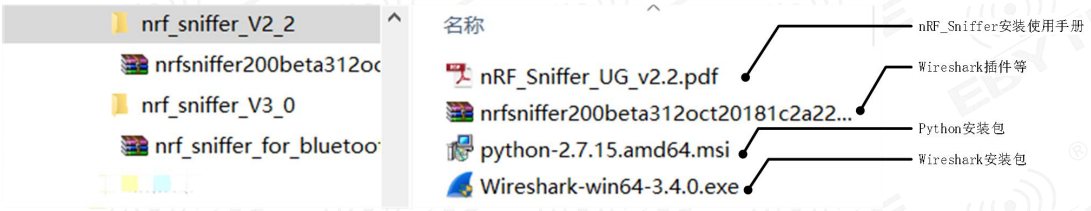
Main parameter		Performance			Remark
		Min	Type	Max	
Operating voltage（V）		4.35	5	5.5	USB/VBUS power supply
Operating temperature （℃）		-40	-	+85	Industrial design
Operating frequency（Mhz）		2360	2402	2500	Support ISM frequency band
Emission current	TX only run current (DCDC, 3V) PRF =+8 dBm（mA）	-	17.05	-	-
	TX only run current (DCDC, 3V) PRF =+4 dBm（mA）	-	12.68	-	-
	TX only run current (DCDC, 5V, REG0 out = 3.3 V)PRF = 0dBm（mA）	-	7.25	-	-
	TX only run current (DCDC, 3V)PRF = 0dBm（mA）	-	7.63	-	-
	TX current (3V) 1Mbps BLE measured from VBAT with PRF=9dBm（mA）	-	32	-	-
Receive current	RX only run current (DCDC, 3V) 1Mbps / 1Mbps BLE（mA）	-	7.71	-	-
	RX only run current (DCDC, 3V) 2Mbps / 2Mbps BLE（mA）	-	8.27	-	-
Maximum transmit power (dBm)		7.5	8	8.5	-
Receiving sensitivity (dBm)		-103dBm@BLE 125kbps			Long distance mode
		-95dBm@BLE 1Mbps			

Main parameter	Description	Remark
Reference distance	250m	Clear and open, air rate 1Mbps
Crystal frequency	32MHz/32.768kHz	-
Power supply	USB	-
Interface method	USB	-
IC full name	nRF52840-QIAAC0/aQFN TM 73	-
FLASH	1024kB	-
RAM	256kB	-
Kernel	ARM@ Cortex ® -M4	-
Dimensions	59 * 18	Plus shell with cap
Antenna form	PCB Onboard antenna	-

Chapter 3 Basic operation

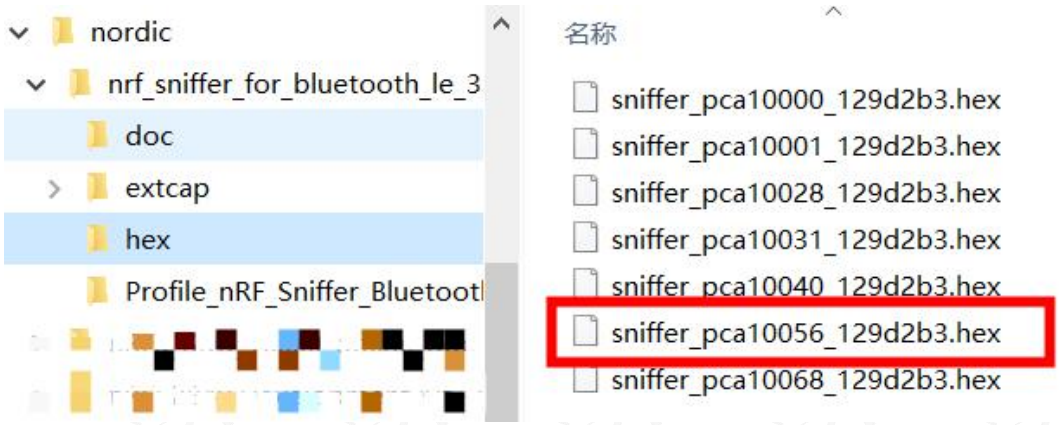
3.1 Presentation of information

wo versions of relevant information are now provided: V2.2--"nrf_sniffer_V2_2.rar", V3.0--"nrf_sniffer_V3_0.rar". V2.2 version is suitable for python 2.7 environment, V3.0 is suitable for python3.6 and above version environment, you can choose the sniffer version to install according to your computer python environment. The structure of the package is as follows：



3.2 Firmware introduction

The factory default firmware is V3.0, and users can burn the firmware according to their own conditions. The nRF_Sniffer firmware is shown in the figure, the firmware name is sniffer_pca10056_xxxxxx.hex.



Users need to open the shell to burn the firmware by themselves. Please refer to section nRF_Sniffer_UG_v2.2 -2.2 Install firmware with SEGGER J-Link for the burning method.

Burn firmware interface as shown below：

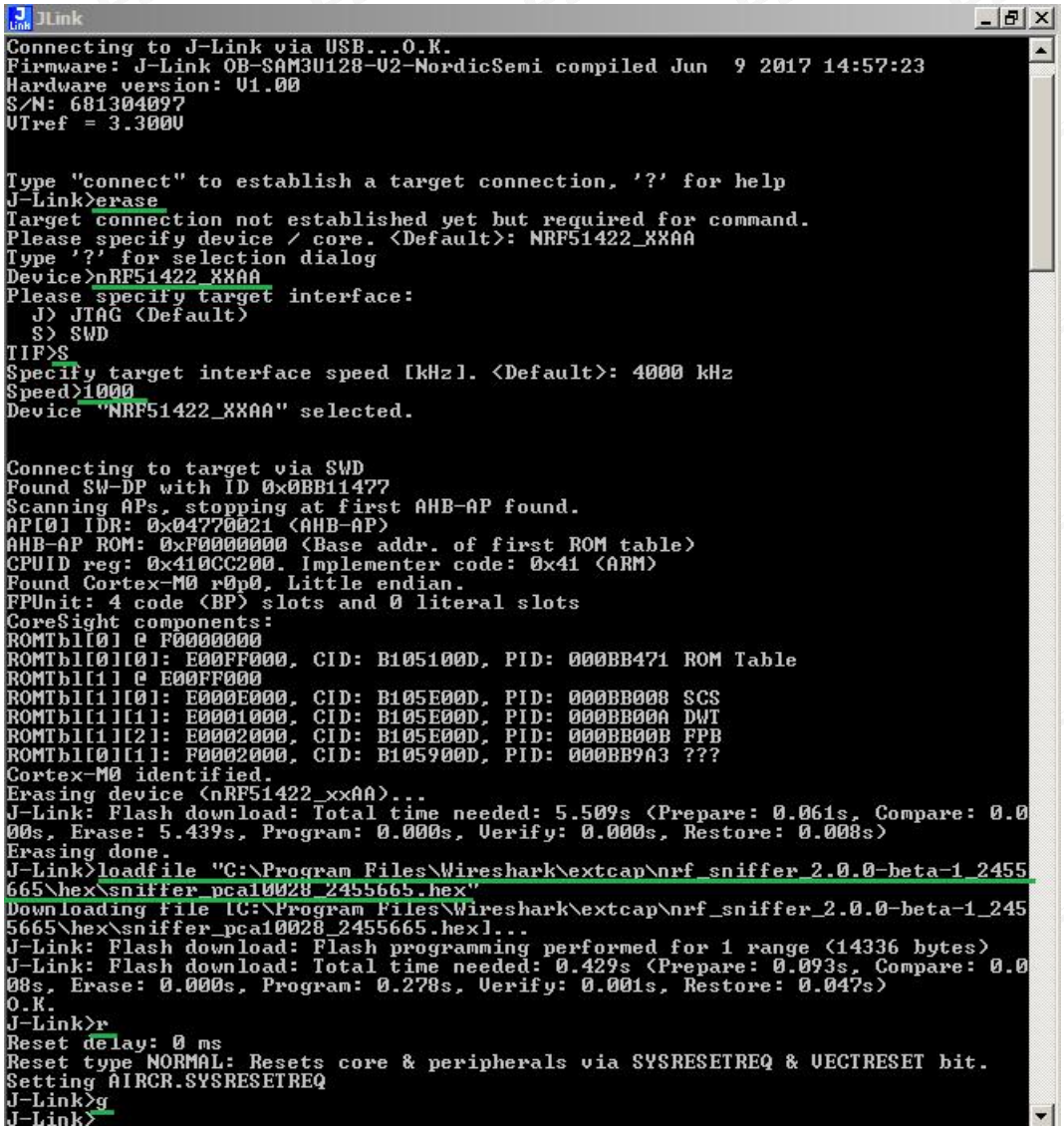
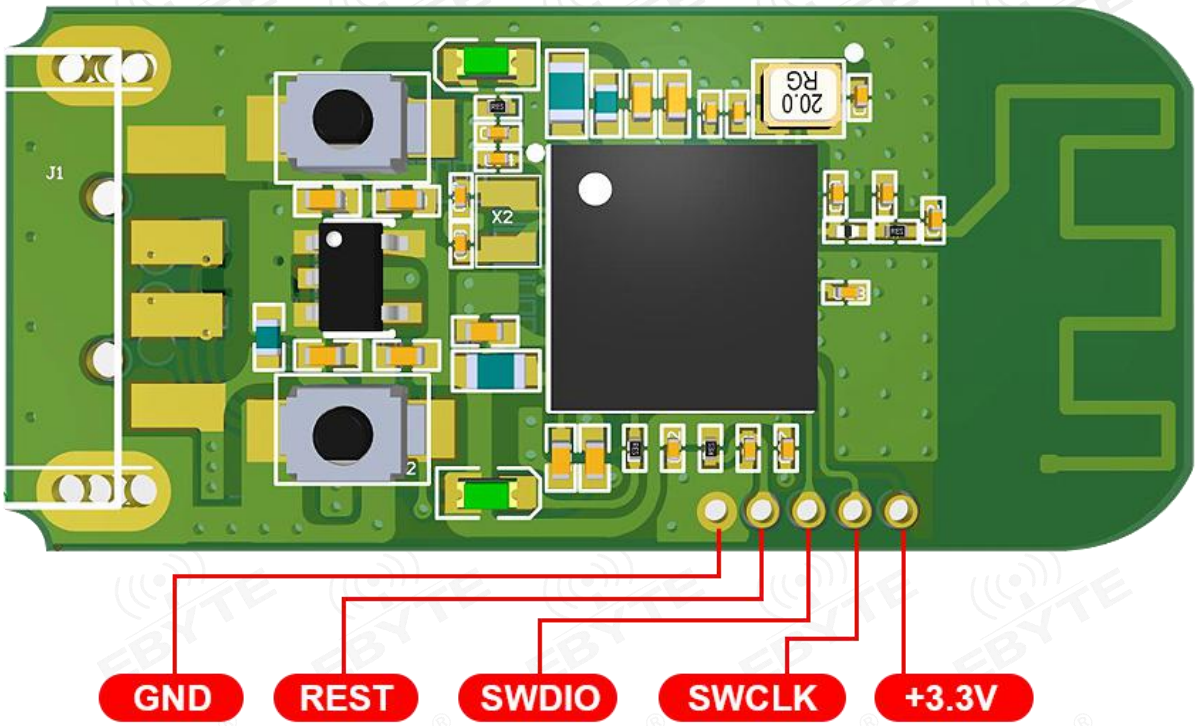


图 3-3 J-Link erase



Chapter 4 Common problem

4.1 Transmission distance is not ideal

- When there is a straight line communication obstacle, the communication distance will be attenuated accordingly;
- Temperature, humidity, and co-frequency interference will increase the communication packet loss rate;
- The ground absorbs and reflects radio waves, and the test results near the ground are poor;
- Sea water has a strong ability to absorb radio waves, so the seaside test results are poor;
- If there is a metal object near the antenna or placed in a metal shell, the signal attenuation will be very serious;
- The power register setting is wrong, the air speed setting is too high (the higher the air speed, the closer the distance);
- The low voltage of the power supply at room temperature is lower than the recommended value, the lower the voltage, the lower the power output;
- The poor matching degree of the antenna and the module or the quality of the antenna itself;
- Poor or too long extension cords and feeders will also cause high bit error rates.

4.2 Module is easily damaged

- Please check the power supply to ensure that it is within the recommended power supply voltage. If it exceeds the maximum value, it will cause permanent damage to the module;
- Please check the stability of the power supply, the voltage should not fluctuate greatly and frequently;
- Please ensure anti-static operation during installation and use, and high-frequency components are electrostatically sensitive;
- Please ensure that the humidity during installation and use should not be too high, and some components are humidity sensitive devices;
- If there is no special requirement, it is not recommended to use at too high or too low temperature.

4.3 Bit error rate is too high

- There is co-frequency signal interference nearby, stay away from the interference source or modify the frequency and channel to avoid interference;
- The clock waveform on SPI is not standard, check whether there is interference on the SPI line, and the SPI bus line should not be too long;
- Unsatisfactory power supply may also cause garbled codes. Ensure the reliability of the power supply.

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Chapter 5 Related Models

Model	IC	Frequency	Power	Distance	Size	Package form	Interface
		Hz	dBm	km	mm		
E104-BT5040U	nRF52840	2.4G	8	0.25	59*18	-	USB

Revision history

Version	Date	Description	Issued by
1.0	2020-11-06	Initial version	

About us

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