

# **NODIC 资料搜索 NRF52832 环境搭建 代码测试和 Sniffer 使用**

如有错误敬请谅解并可一起探讨

Email: 450547566@qq.com

# 一、资源准备(搜索 NORDIC 官网 NRF52832 资源)

## 1.1、需要的资料有如下图

名称	大小	类型
mdk514	355,626 KB	应用程序
Keil_ARM_MDK_5.00_Keygen_serial_Crack	42 KB	应用程序
s132_nrf52_2.0.0-8.alpha	263 KB	WinRAR ZIP 压缩...
nRF52_SDK_0.9.2_dbc28c9	4,672 KB	WinRAR ZIP 压缩...
nrfzostudio win-32 1.20.0 installer	62.572 KB	Windows Install...
NordicSemiconductor.nRF DeviceFamilyPack.8.0.3	312 KB	uVision Softwar...

A:MDK5.14 安装包和破解工具

B:协议栈 HEX 文件以及相关文档

C:NORDIC 提供的一些 Demo 代码软件开发包

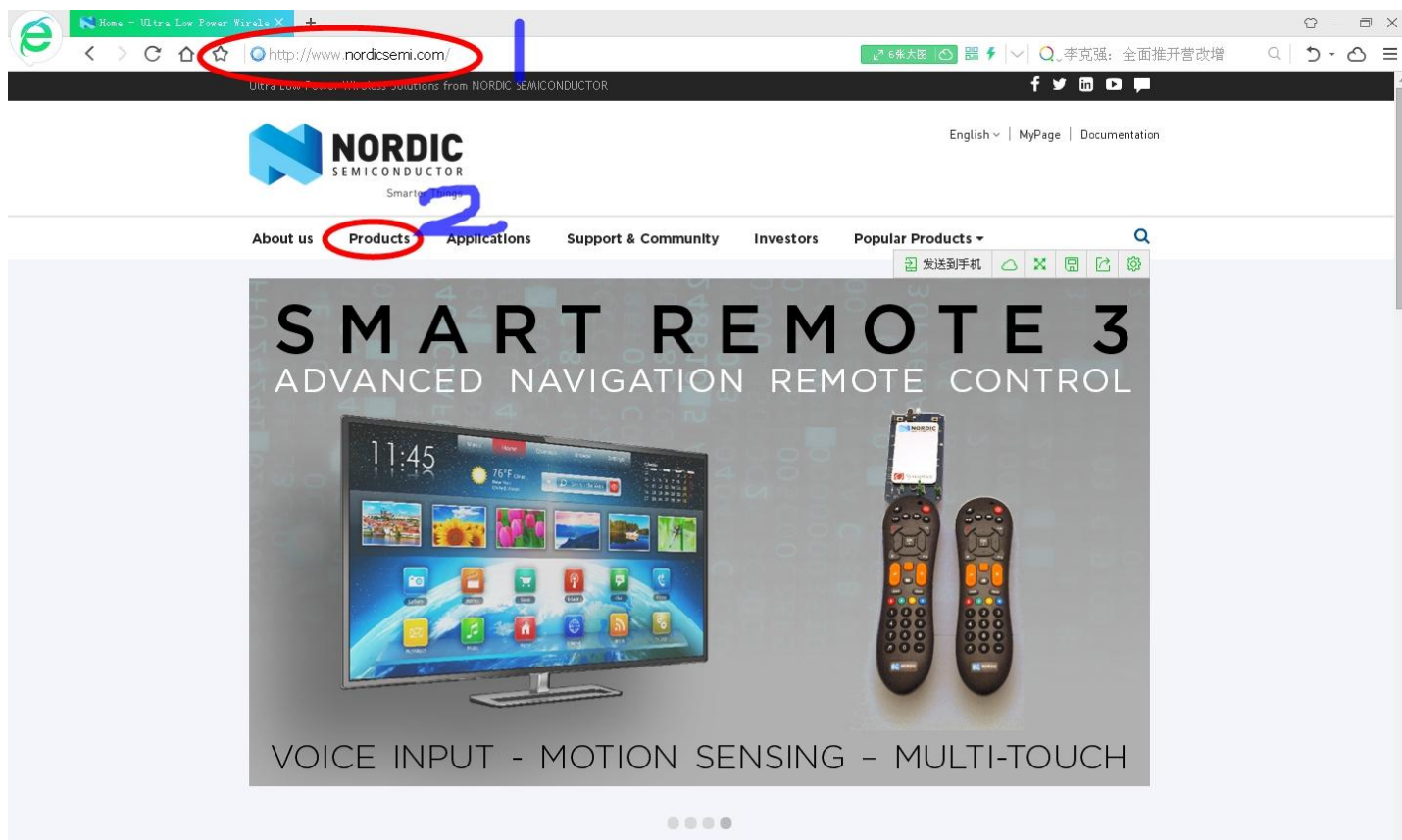
D:NORDIC 提供下载协议栈用的工具

E:KEIL 需要加装的关于 nrf51822 和 nrf52832 的相关启动配置用的文件的 PACK

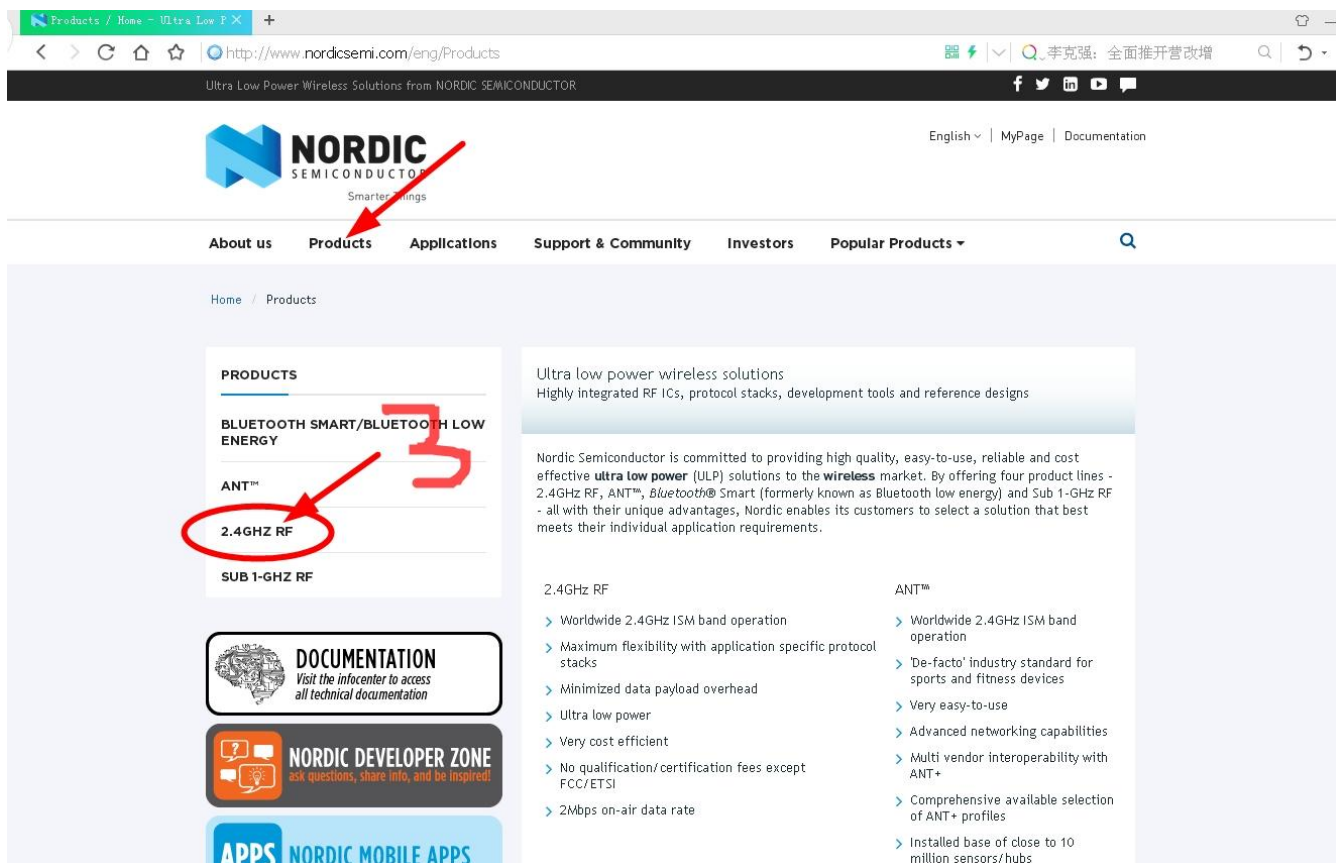
## 1.2、从官网下载 B、C、D 和 E

1、网站: [www.nordicsemi.com](http://www.nordicsemi.com)

2、点击 Products



### 3、点击 2.4GHZ RF



## 5、点击 nrf52832

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**2.4GHZ RF**

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ask questions, share info, and be inspired!

**APPS NORDIC MOBILE APPS**

**2.4GHz RF**  
Ultra low power **2.4GHz RF** ICs/solutions

Nordic Semiconductor offers a complete range of ultra low power **2.4GHz** ISM band wireless solutions including **RF** system-on-chips and transceiver ICs, protocol stacks, development tools, and reference designs. Our solutions are an ideal fit for cost-sensitive, battery-powered applications that require short operating range, low data rate wireless connectivity.

At the core of our offerings is the industry's lowest power ISM band **2.4GHz** transceiver technology - the nRF24L01+ transceiver core - that features an on-air data rate of up to 2Mbps, sub-14mA peak currents, and excellent co-existence performance.

**Ultra low power 2.4GHz RF ICs**

nRF52 Series  
New Product - Click to learn more about the nRF52 Series SoC

Part #	Brief Description
nRF52832	Multiprotocol Bluetooth Smart/ANT/2.4GHz SoC

nRF52 Development Tools

Part #	Brief Description
nRF52 Preview DK	Development kit for nRF52832 SoC
nRF52 SDK	Software Development Kit for nRF52832 SoC

如下图：（记得点击 **DOWNLOADS**）

**7** 为协议栈即为第一张图的 **B**;

**8** 是留给 **KEIL4** 用的，因为 **4** 版本不能加装 **PACK**，这里没有用;

**9** 是 **KEIL5** 需要加装的 **PACK**，也就是第一张图的 **E**;

**10** 是协议栈和应用代码用的下载工具，也就是第一张图的 **D**;

那么 SDK 软件开发包在哪？ ？ ？ ？ ？ ？ ？ ？ ？ ？ ？ ？ ？ ？ ？ ？ ？

nRF52832

Multiprotocol Bluetooth

Smart/ANT/2.4GHz RF SoC

Active

Replacement products ▾

OVERVIEW

DEVELOPMENT TOOLS AND SOFTWARE

DOCUMENTATION

DOWNLOADS

## SOFTDEVICES

Code	Name	Version
S132-SD	S132 nRF52 SoftDevice	1.0.0-3.alpha
S132-SD-v2	S132 nRF52 SoftDevice	2.0.0-8.alpha

协议栈

## SOFTWARE

Code	Name	Version
nRF5x-Command-Line-Tools-Linux32	nRF5x toolset tar for Linux 32-bit (nrfjprog and mergehex)	8.1.0
nRF5x-Command-Line-Tools-Linux64	nRF5x toolset tar for Linux 64-bit (nrfjprog and mergehex)	8.1.0
nRF5x-Command-Line-Tools-Win32	nRF5x toolset installer for Windows (JLinkARM, JLink CDC, nRFjprog, and mergehex)	8.1.0
nRF5x-MDK-GCC	nRF5x MDK for Gcc.	8.1.0
nRF5x-MDK-IAR	nRF5x MDK for IAR Embedded Workbench.	8.1.0
nRF5x-MDK-Keil4	nRF5x MDK for Keil4 and Keil5 compatibility version.	8.1.0
nRF5x-MDK-Pack	nRF5x MDK pack.	8.1.0
nRF5x-Pynrfjprog	Python binding for nrfjprog.dll. Only usable in 32 bit Python 2.7, 3.4, and 3.5, in Windows and Linux.	8.1.0
nRFgo Studio-Win32	Software tool for nRFgo Starter kit and Development kits for 32-bit (x86) Windows XP, Windows Vista, Windows 7, and Windows 8	1.21.1
nRFgo Studio-Win64	Software tool for nRFgo Starter kit and Development kits for 64-bit (x64) Windows Vista, Windows 7, and Windows 8	1.21.1

这个怎么说呢？就是建工程时可以选择NRF52832这款芯片

NRF52832不像51822一样安装一个工具之后，代码什么的就在某个目录。这里需要用KEIL5以上的版本将这个PACK添加到MDK

这个就是下载协议栈用的studio了  
32位版本和64位版本

## PRODUCT BRIEF

Code	Name	Version
nRF52832-PB	nRF52832 Product Brief	1.2



如下图, 点击 NRF52 SDK 进入下下张图

The screenshot shows the Nordic Semiconductor website's product page for ultra-low power 2.4GHz RF ICs. The left sidebar contains navigation links: BLUETOOTH SMART/BLUETOOTH LOW ENERGY, ANT™, 2.4GHZ RF, SUB 1-GHZ RF, DOCUMENTATION, NORDIC DEVELOPER ZONE, APPS NORDIC MOBILE APPS, 3rd PARTY BLUETOOTH SMART MODULES, and 3rd PARTY DEVELOPMENT BOARD DK-PLUGIN CARD ARDUINO BOARD. The main content area is titled 'Ultra low power 2.4GHz RF ICs/solutions' and describes Nordic's offerings. It includes a table for 'nRF52 Series' with one entry: nRF52832, Multiprotocol Bluetooth Smart/ANT/2.4GHz SoC. Below this is a table for 'nRF52 Development Tools' with two entries: nRF52 Preview DK (Development kit for nRF52832 SoC) and nRF52 SDK (Software Development Kit for nRF52832 SoC). The nRF52 SDK entry is circled in red, and a red arrow points to it from the left sidebar. Further down, there are tables for 'nRF51 Series' (nRF51822) and 'nRF24L Series' (nRF24LE1).

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nRF51 Series

Part #	Brief Description
nRF51822	Bluetooth Smart and 2.4GHz proprietary SoC

nRF24L Series

Part #	Brief Description
nRF24LE1	2.4GHz RF System-on-Chip (SoC) with Flash
nRF24E1 QTP	2.4GHz RF System-on-Chip (SoC) with QTP

由上图进入下图后再次点击如下图页码的 nRF52 SDK,进入真正的下载界面。

Home / Products / Bluetooth Smart/Bluetooth low energy / nRF52832

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**ANT™**

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OVERVIEW
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**Important: All ANT-related SoftDevices for the nRF52 series are now obtained from ANT. This applies to both ANT only and ANT/Bluetooth Smart combo SoftDevices. For more information on this please contact : [ANTstacks@thisisant.com](mailto:ANTstacks@thisisant.com)**

The nRF52832 SoC is supported by the nRF52 Preview DK development kit. Software support for the nRF52832 SoC is split in two major parts: SoftDevices, which are complete wireless protocol stacks; and the nRF52 Software Development Kit (SDK) forming a common code base for the nRF52832 SoC.

nRF52 Preview DK / nRF52 DK  
The nRF52 Preview DK / nRF52 DK are versatile single board development kits for Bluetooth® Smart, ANT and 2.4GHz proprietary applications using the nRF52832 SoC. The kits supports development for the nRF52832 SoC. nRF52 Preview DK contains nRF52832 preview SoC, while nRF52 DK contains nRF52832 production version.

The kits are hardware compatible with the Arduino Uno Revision 3 standard, making it possible to use 3rd-party shields that are compatible to this standard. An NFC antenna can be connected the kit to enable NFC tag functionality. The kits gives access to all I/O and interfaces via connectors and has 4 LEDs and 4 buttons which are user-programmable.

The kits supports the standard Nordic Software Development Tool-chain using Keil, IAR and GCC. Program/Debug options on the kits are Segger J-Link OB.

Product	Brief Description
nRF52 Preview DK	Development kit for nRF52832 SoC
nRF52 DK Available Q1 2016!	Development kit for nRF52832 SoC
nRF52 SDK	Software Development Kit (SDK) for the nRF52 Series

Location:

Name	Last modified	Size
Parent Directory		
doc/	15-Oct-2015 14:37	
nRF52_SDK_v0.x.x/	15-Oct-2015 14:28	

Location:

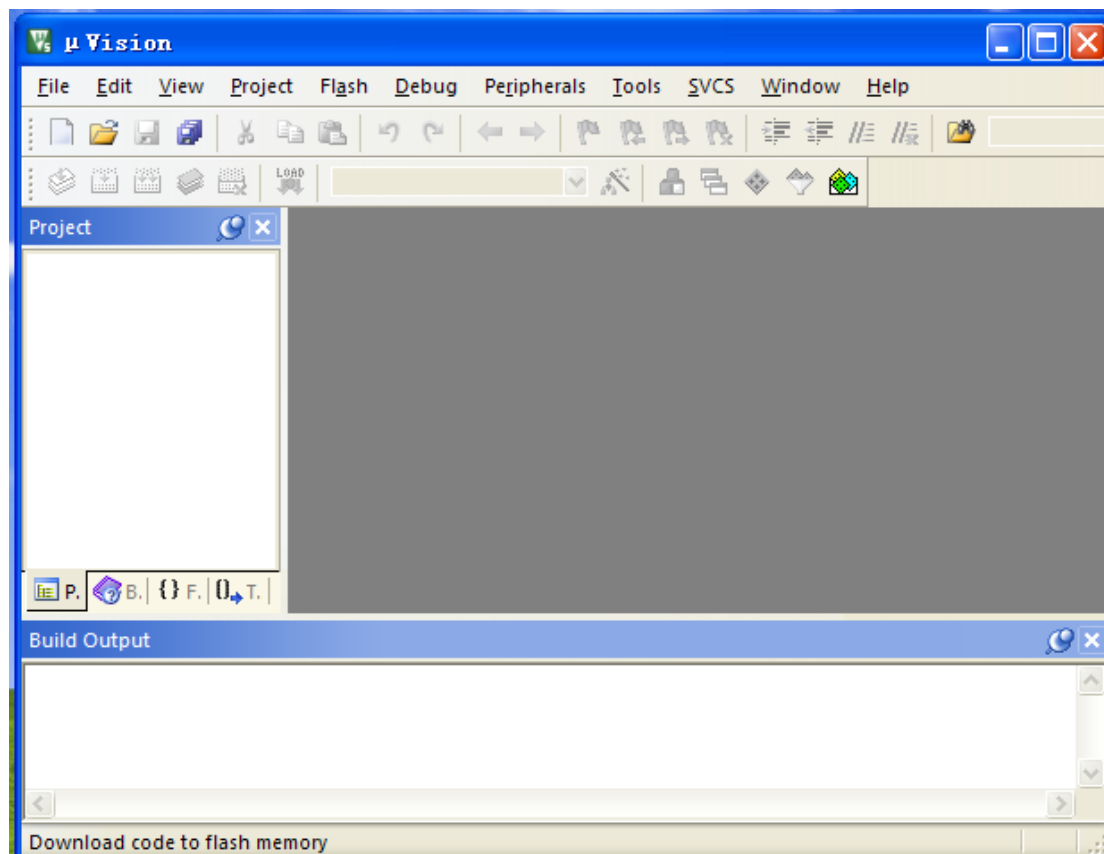
Name	Last modified	Size
Parent Directory		
doc/	15-Oct-2015 14:30	
NordicSemiconductor.nRF_DeviceFamilyPack.8.0.3.pack	17-Jun-2015 23:58	
nRF52_SDK_0.9.0_0c82e3e.zip	17-Jun-2015 23:58	
nRF52_SDK_0.9.1_3639cc9.zip	15-Jul-2015 14:34	
nRF52_SDK_0.9.2_dbc28c9.zip	15-Oct-2015 14:28	

如上图，15 即为 PACK；16 为 SDK，注意这个 SDK 是不需要安装的，解压后直接可以用 KEIL5.14 打开。

## 二、安装和破解 MDK5.14

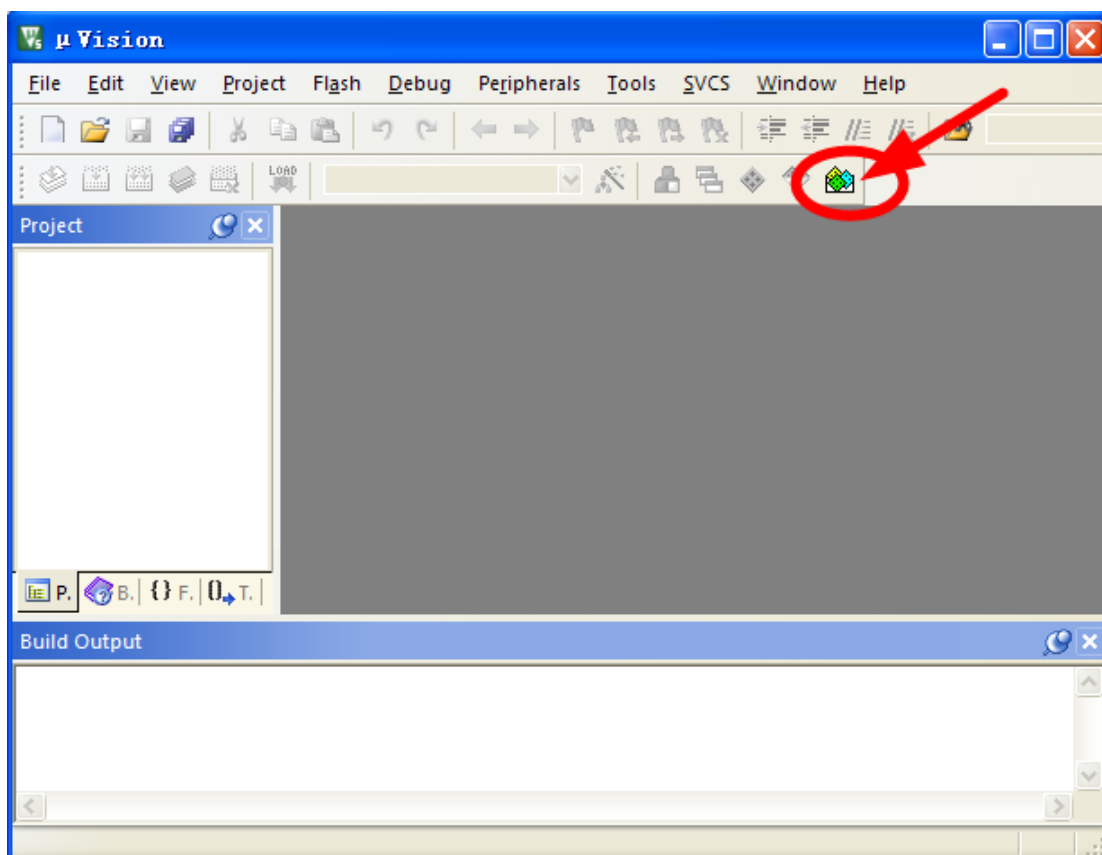
这里安装文件和破解文件都有，就不再啰嗦怎么安装了。

看结果吧!!!!

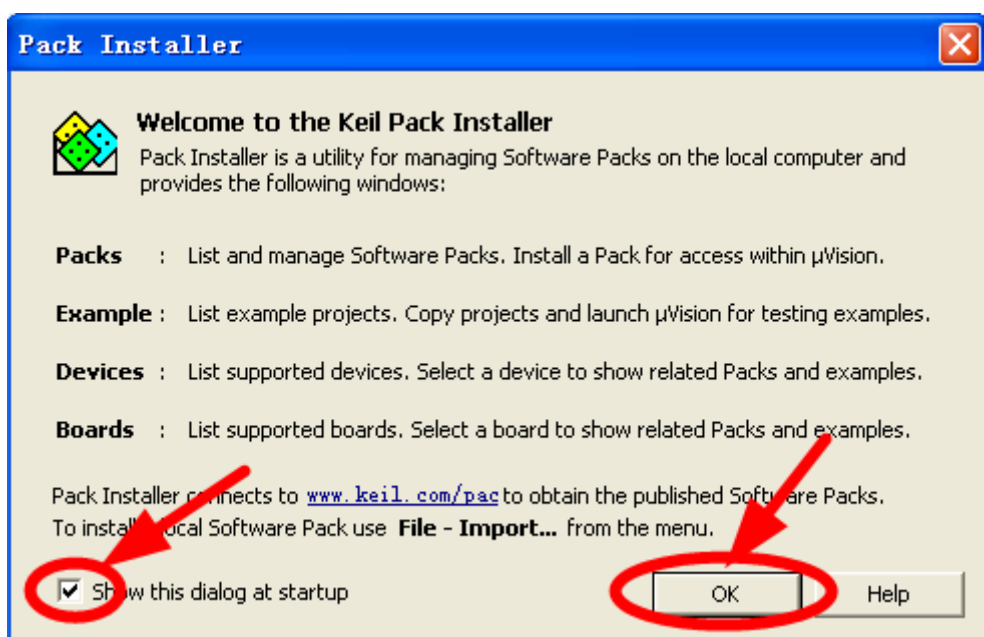




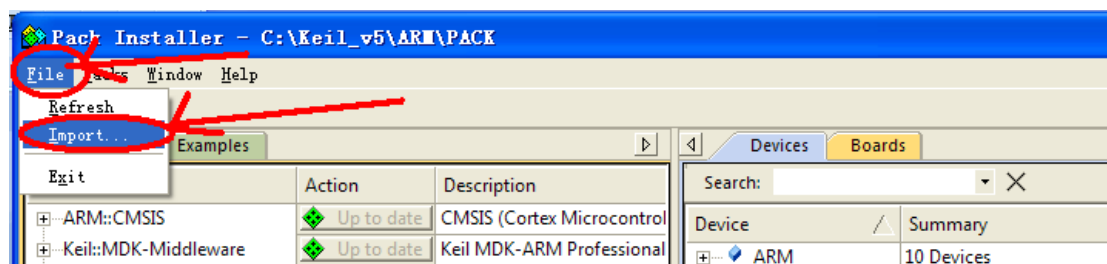
### 三、PACK 包安装



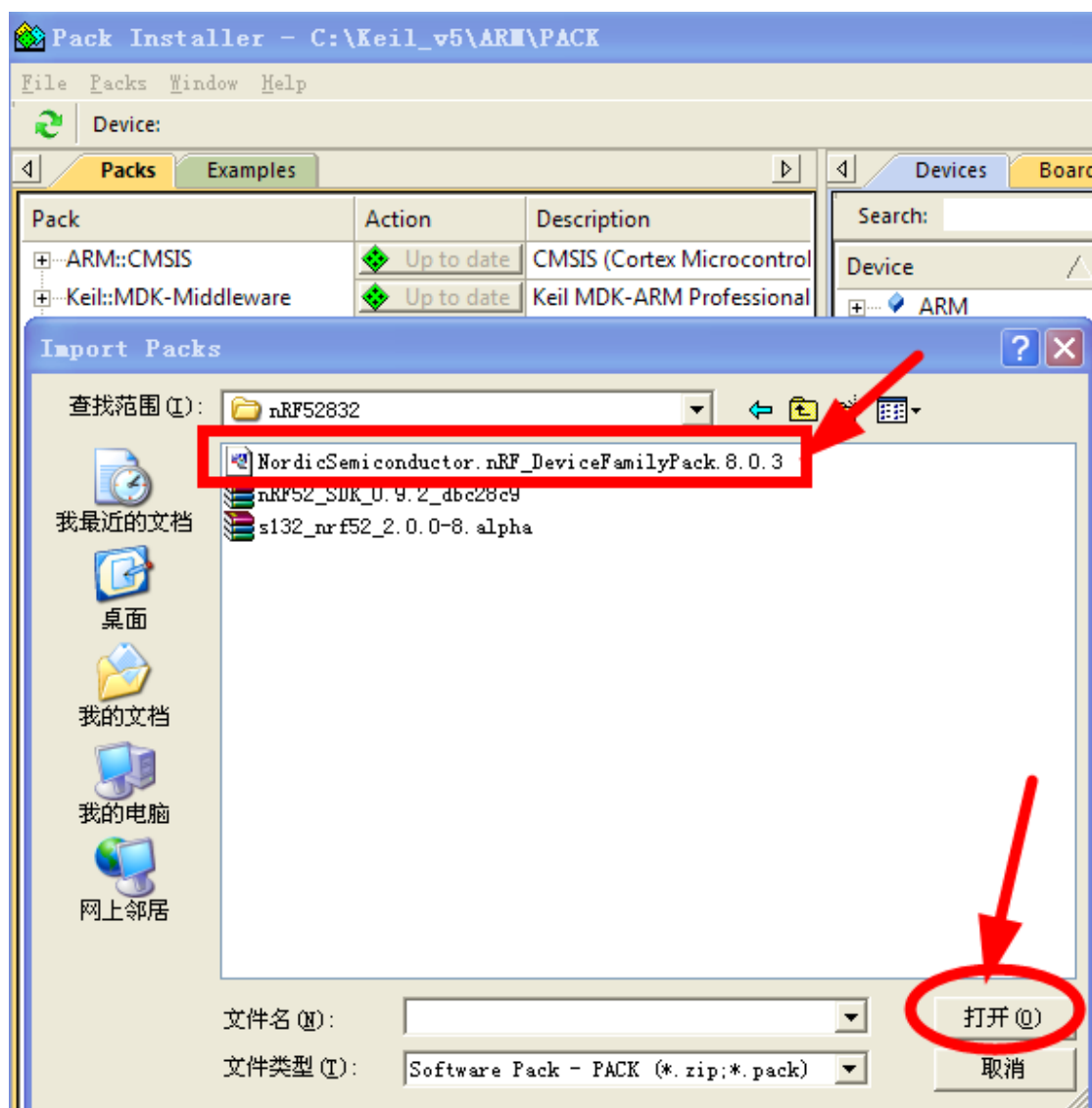
如上图点击 PACK Install 出现如下图，去掉勾然后点击 OK



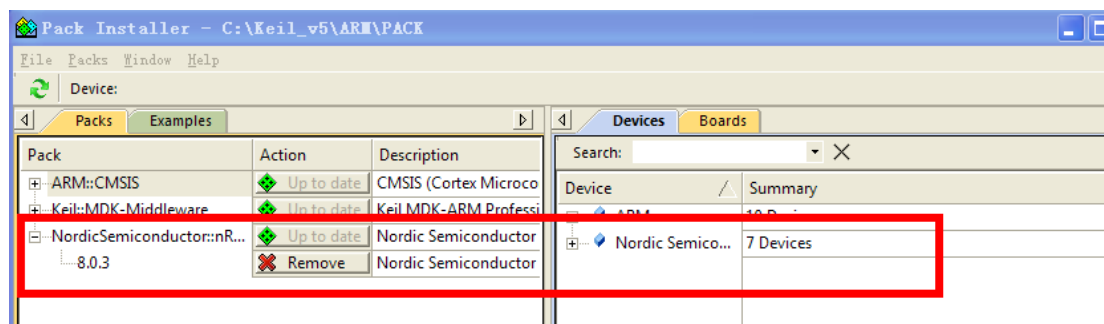
接着如下图 File—>import



如下图选择 需要加装的 PACK，也就是第一张图中的 E 文件

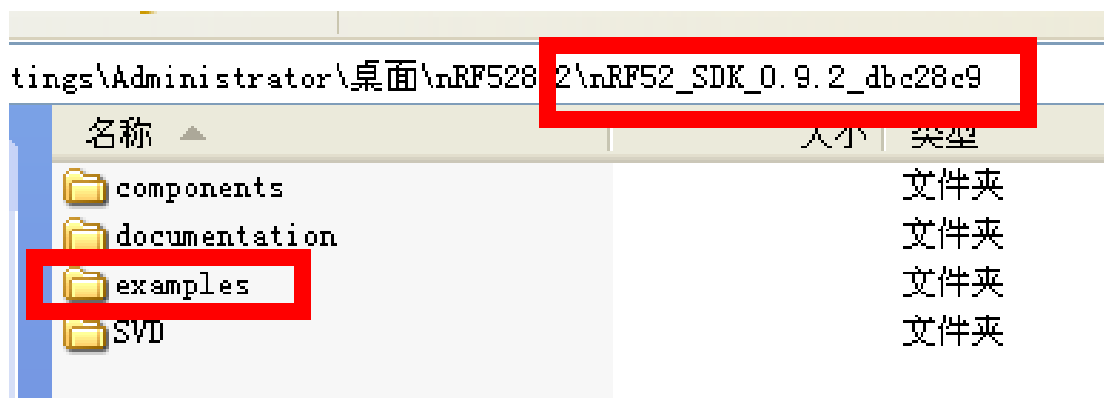


加装结果如下图:



## 四、用 MDK5.14 打开一个作为外围设备的心率计程序

### 4.1、解压 SDK 包



## 4.2 找到程序打开

Windows Explorer window showing the file structure of the nRF52 SDK examples.

Path: .tings\Administrator\桌面\nRF52832\nRF52\_SDK\_0.9.2\_dbc28c9\examples

名称	大小	类型
ant		文件夹
ble_central		文件夹
ble_central_and_peripheral		文件夹
<b>ble_peripheral</b>		文件夹
bsp		文件夹
dfu		文件夹
dtm		文件夹
experimental_nfc		文件夹
peripheral		文件夹
readme	26 KB	文本文档

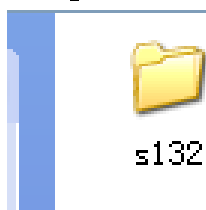
Path: .tings\Administrator\桌面\nRF52832\nRF52\_SDK\_0.9.2\_dbc28c9\examples\ble\_peripheral

名称	大小	类型	修改日期
ble_app_alert_notification		文件夹	2015-10-15 16:17
ble_app_ancs_c		文件夹	2015-10-15 16:17
ble_app_beacon		文件夹	2015-10-15 16:17
ble_app_bps		文件夹	2015-10-15 16:17
ble_app_cscs		文件夹	2015-10-15 16:17
ble_app_cts_c		文件夹	2015-10-15 16:17
ble_app_gls		文件夹	2015-10-15 16:17
ble_app_hids_keyboard		文件夹	2015-10-15 16:17
ble_app_hids_mouse		文件夹	2015-10-15 16:17
<b>ble_app_hrs</b>		文件夹	2015-10-15 16:17
ble_app_ats		文件夹	2015-10-15 16:17
ble_app_proximity		文件夹	2015-10-15 16:17
ble_app_pwr_profiling		文件夹	2015-10-15 16:17
ble_app_rscs		文件夹	2015-10-15 16:17
ble_app_template		文件夹	2015-10-15 16:17
ble_app_uart		文件夹	2015-10-15 16:17
experimental_ble_app_hr...		文件夹	2015-10-15 16:17
experimental_ble_app_mu...		文件夹	2015-10-15 16:15

Path: .tings\Administrator\桌面\nRF52832\nRF52\_SDK\_0.9.2\_dbc28c9\examples\ble\_peripheral\ble\_app\_hrs

名称	大小	类型	修改日期
config		文件夹	2015-10-15 16:16
<b>pca10036</b>		文件夹	2015-10-15 16:16
Abstract	2 KB	文本文档	2015-10-15 16:15
license	9 KB	文本文档	2015-10-15 16:15
main	37 KB	C 文件	2015-10-15 16:15

tings\Administrator\桌面\nRF52832\nRF52\_SDK\_0.9.2\_dbc28c



tings\Administrator\桌面\nRF52832\nRF52\_SDK\_0.9.2\_dbc28c9\examples\ble\_periph

名称	大小	类型	修改日期
arm5_no_packs		文件夹	2015-10-
armgcc		文件夹	2015-10-

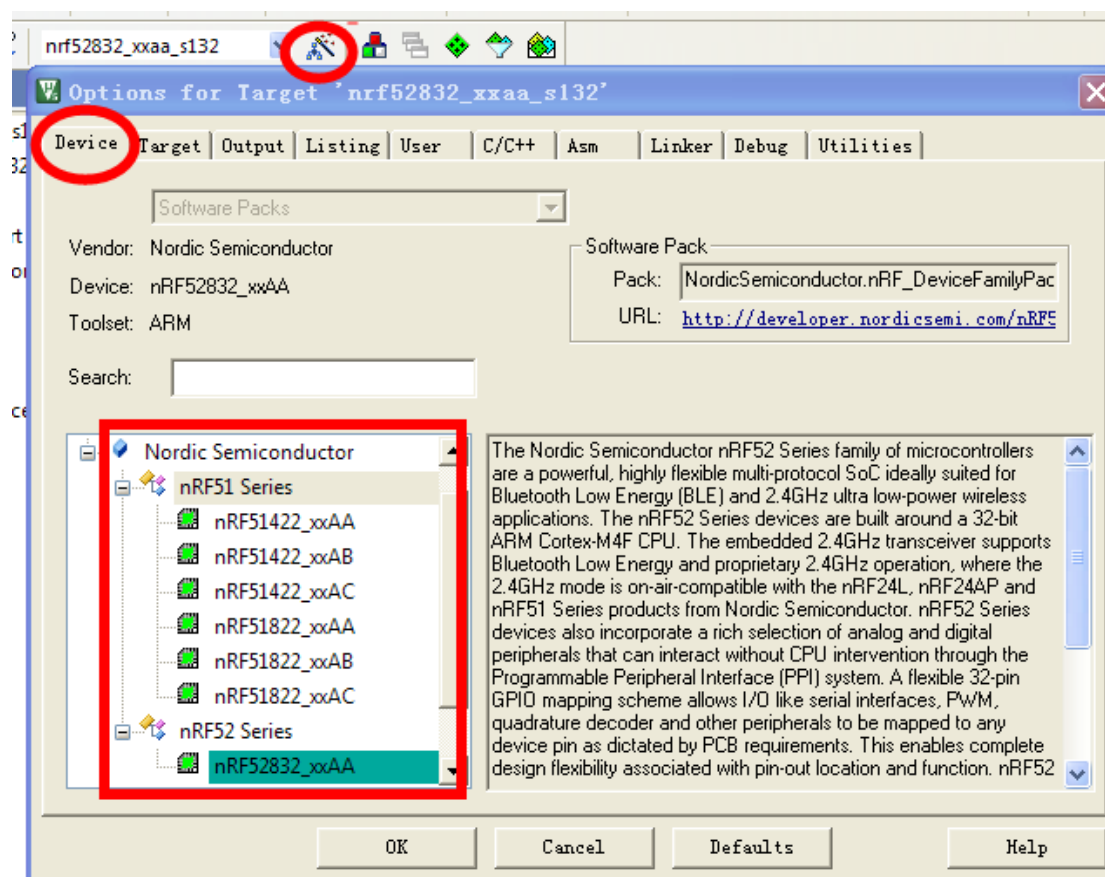
ings\Administrator\桌面\nRF52832\nRF52\_SDK\_0.9.2\_dbc28c9\examples\ble\_peripheral\ble\_app\_hrs\pc

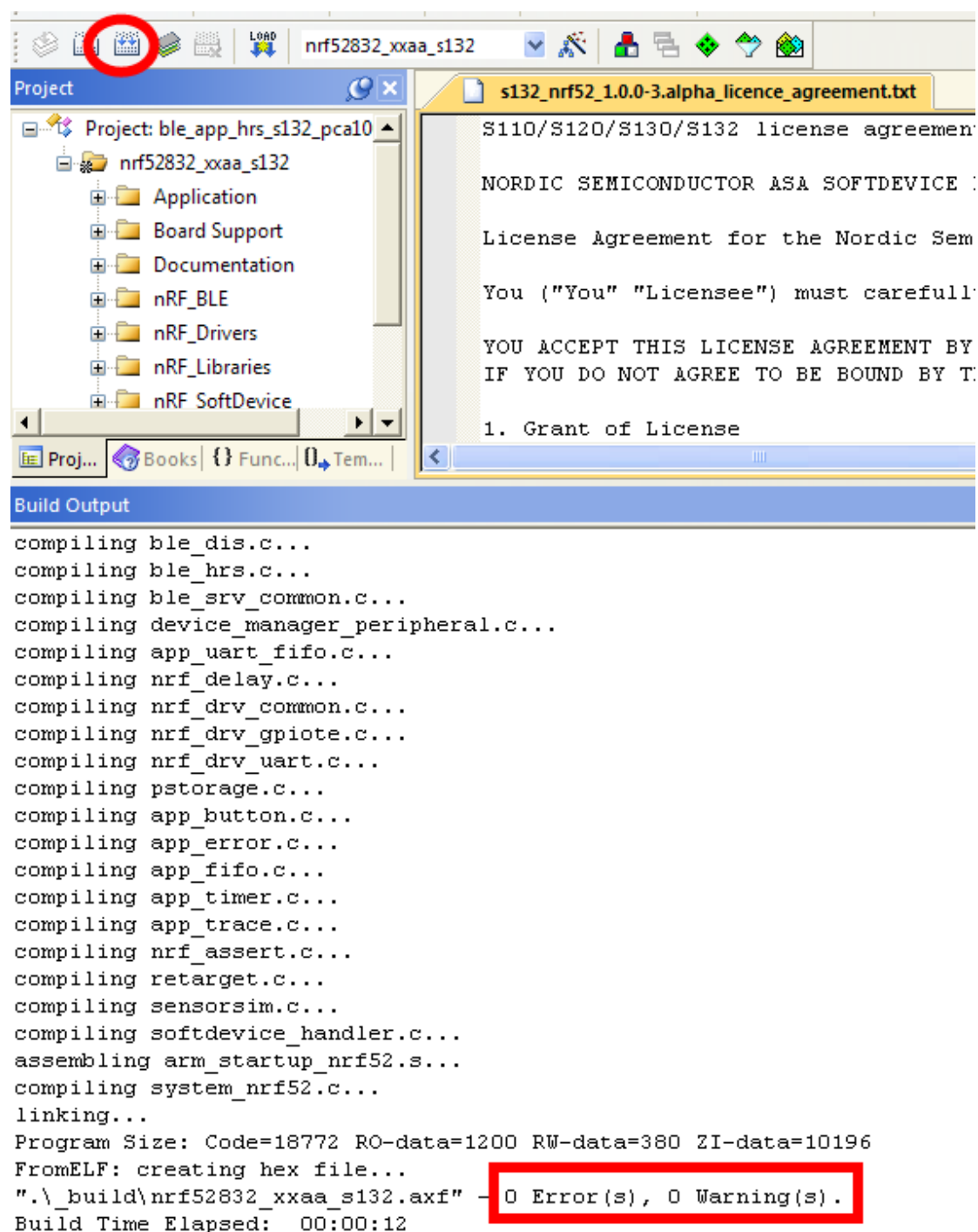
名称	大小	类型	修改日期
ble_app_hrs_s132_pca10036	8 KB	INVOPTX 文件	2015-10-15 16:16
ble_app_hrs_s132_pca10036	141 KB	Revision5 Project	2015-10-15 16:16
ble_app_hrs_s132_pca10036.uvguix	1 KB	UVGUIX 文件	2015-10-15 16:16

C:\Documents and Settings\Administrator\桌面\nRF52832\nRF52\_SDK\_0.9.2\_dbc28c9\examples\ble\_peripheral\ble

A screenshot of the Nordic Semiconductor IDE. The left pane shows a project tree for 'Project: ble\_app\_hrs\_s132\_pca10036'. The tree includes folders for 'nrf52832\_xxaa\_s132', 'Application', 'Board Support', 'Documentation', 'nRF\_BLE', 'nRF\_Drivers', 'nRF\_Libraries', 'nRF\_SoftDevice', 'CMSIS', and 'Device'. The right pane displays the 's132\_nrf52\_1.0.0-3.alpha.licence\_agreement.txt' file, which contains the license agreement text for the Nordic Semiconductor ASA SoftDevice.





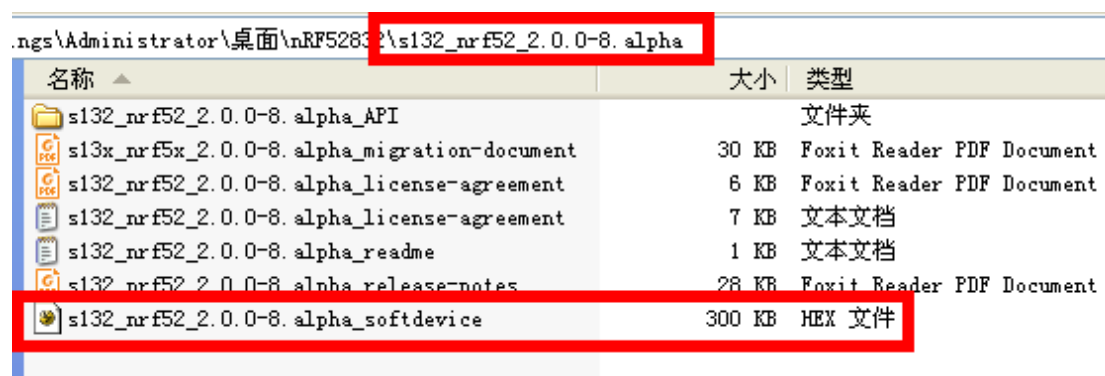


## 五、安装 stdio 下载协议和心率计应用

### 5.1、安装 stdio

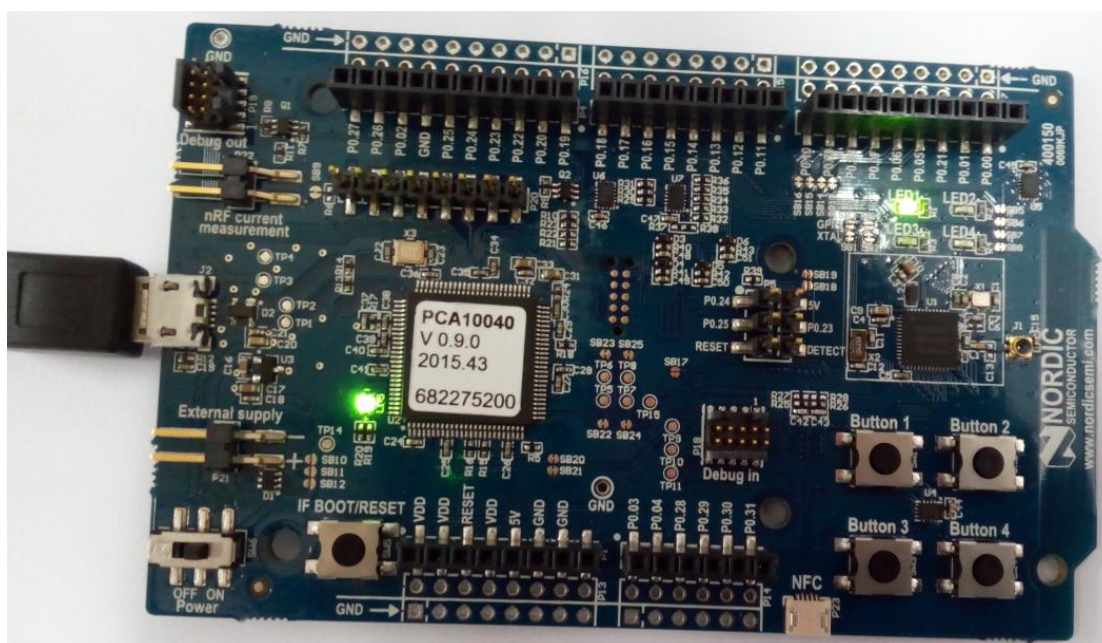
安装就免了，下一步下一步就完事了。

### 5.2、解压协议栈

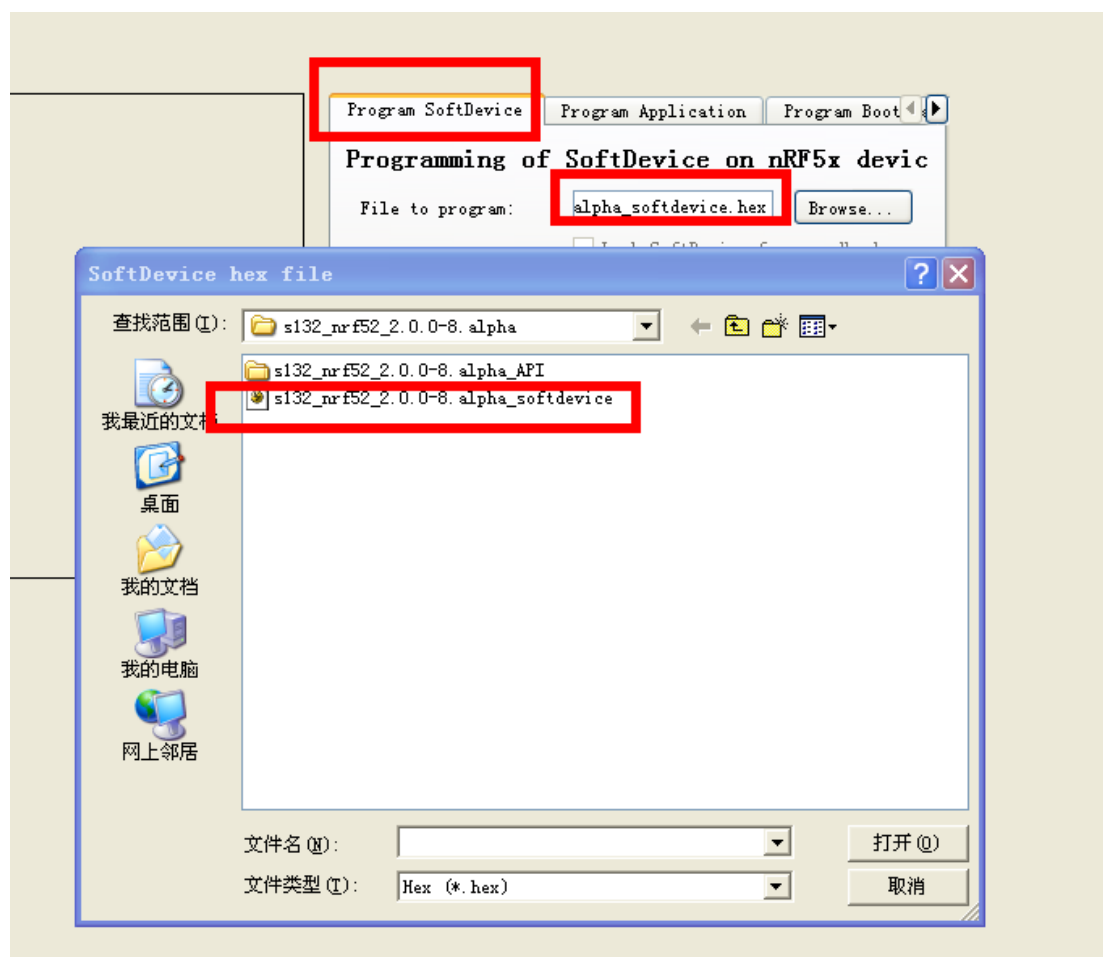
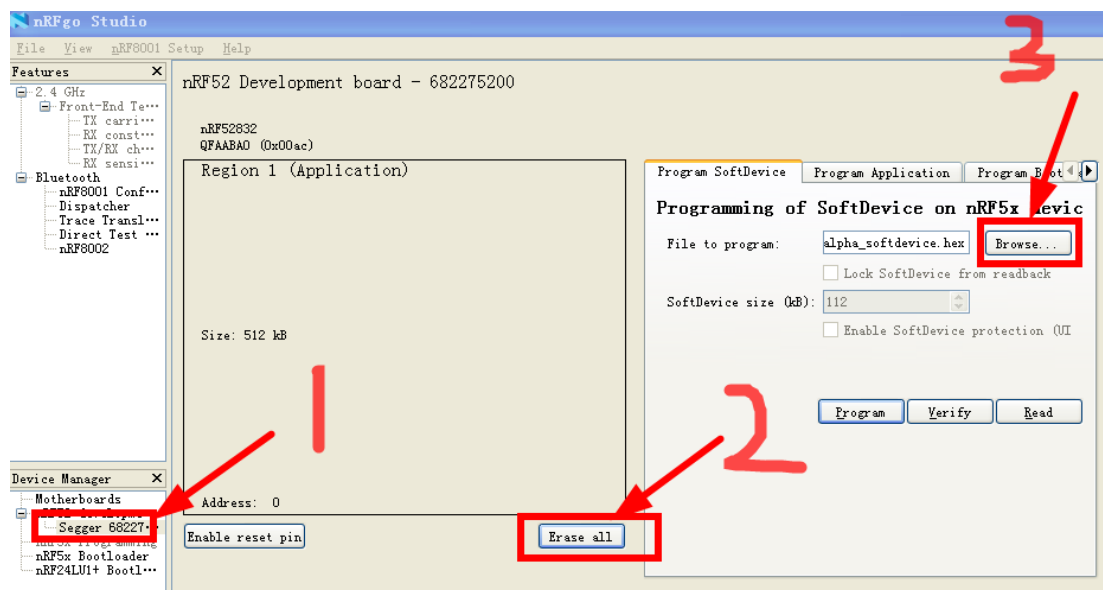


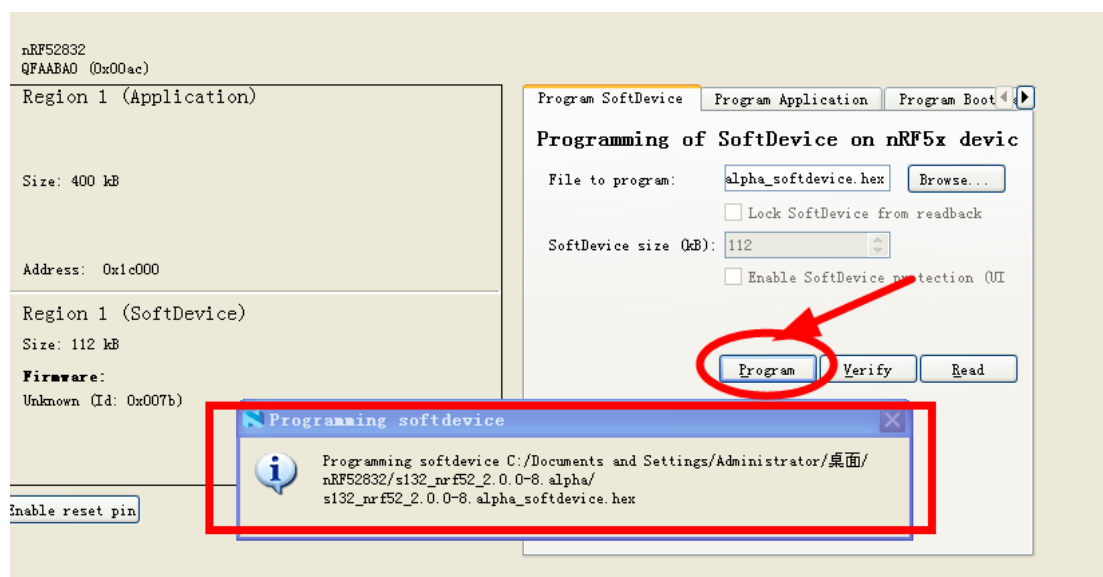
### 5.3、下载协议栈

将 NRF52832 的电池隔离塑料拿掉，将 jlink 插上电脑



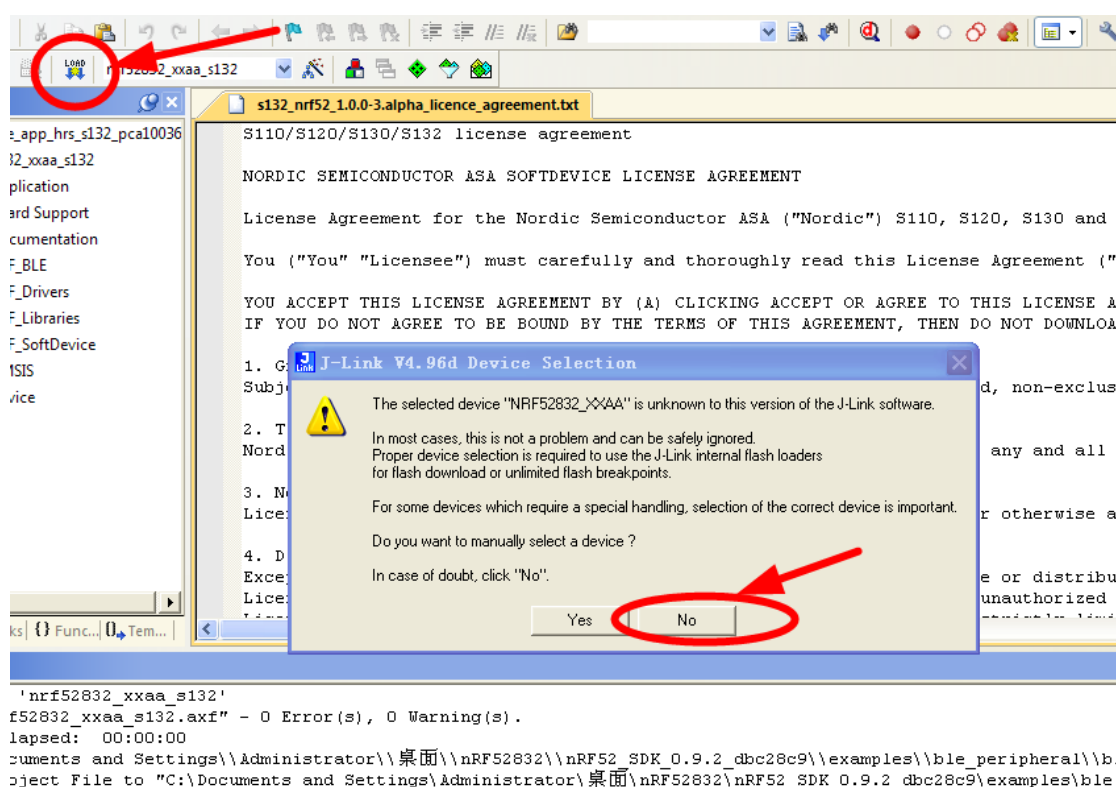
打开 stdio, 选择 1 目标板, 2 擦除全部, 3 选择协议栈





## 5.4、下载心率计应用程序

有两种方法，一种用 `stdio`；一种直接用 MDK5.14 下载，我喜欢用 MDK 下载和调试。

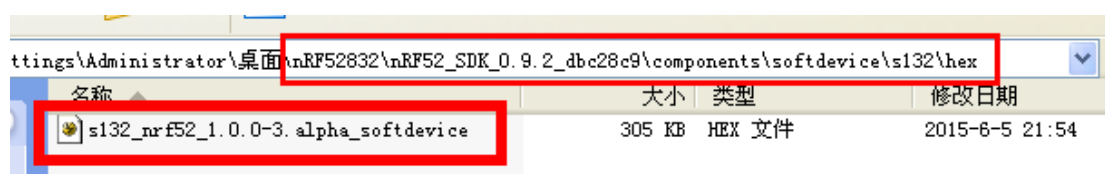


**不过很失败哦!!! 下载的协议栈**

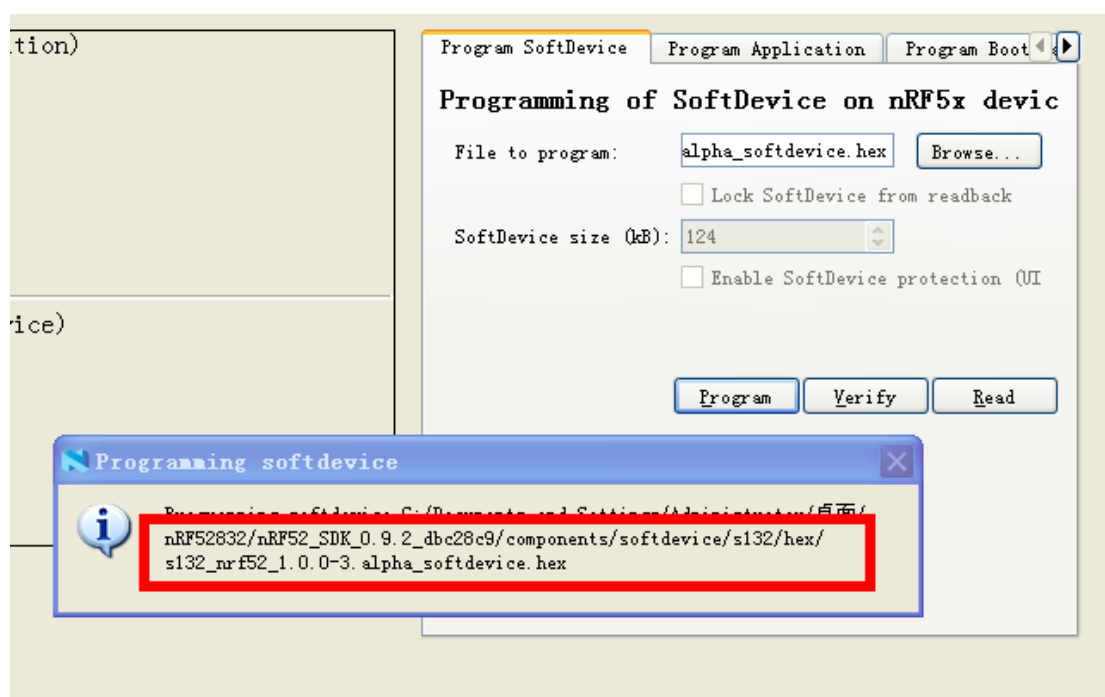


## s132\_nrf52\_2.0.0-8.alpha\_softdevice 用不了哦!!!!

在 SDK 中有一个 HEX 协议栈, 下载这个吧! 可能是应用和协议栈不匹配:

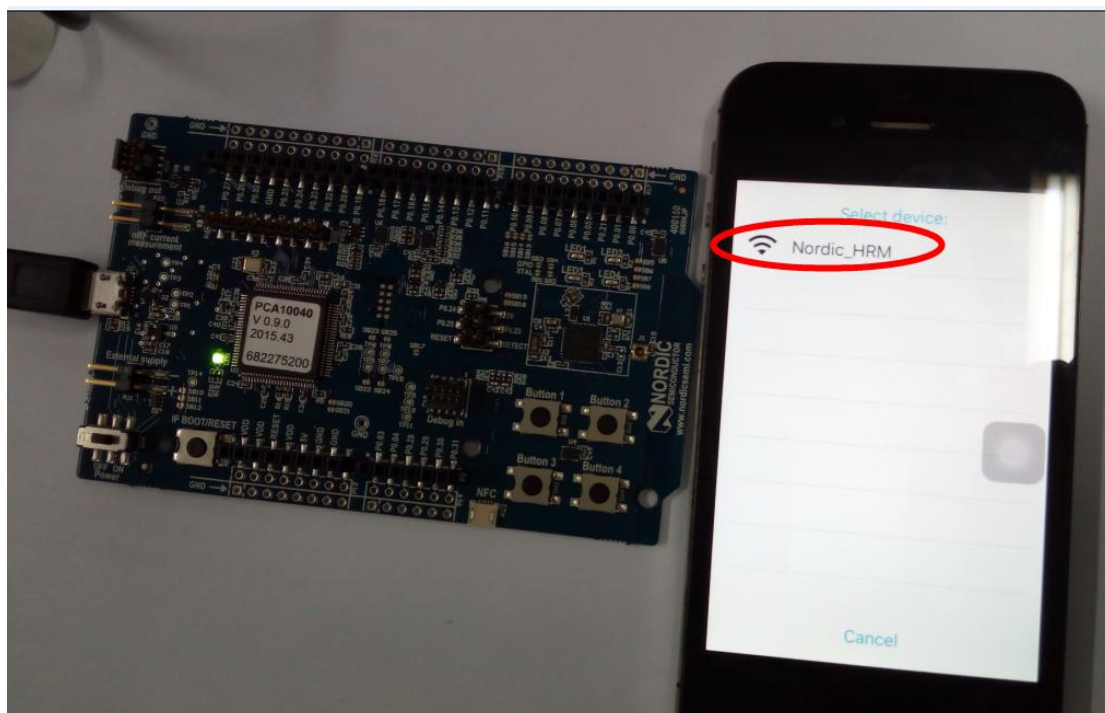


再次下载



下载应用程序后 LED1 每隔一定时间进行闪烁, 这表示程序运行成功了。。。。。

## 六、手机连接测试和 Sniffer 采集





ble-sniffer\_win\_1...

```
ble-sniffer_win_1.0.1_1111_Sniffer

e      Like ENTER, but sniffer will only follow advertisements.
w      Start Wireshark, the primary viewer for the sniffer.
x/q    Exit
c      Display filter: Nearest devices (RSSI > -50 dBm).
v      Display filter: Nearest devices (RSSI > -70 dBm).
b      Display filter: Nearest devices (RSSI > -90 dBm).
a      Remove display filter.
p      Passkey entry
o      OOB key entry
h      Define new adv hop sequence.
s      Get support
u      Launch User Guide (pdf)
CTRL-R Re-program firmware onto board

Available devices:

# public name      RSSI      device address
-----
-> [X] 0 "Nordic_HRM" -62 dBm    f5:77:e9:bf:37:55 random
Sniffing device 0 - "Nordic_HRM"
Starting Wireshark
Wireshark started

搜狗拼音 半:
```

Capturing from \\.\pipe\wireshark\_nordic\_ble [Wireshark 1.10.13 (v1.10.13)]

File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help

Filter: btle Expression... Clear

No.	Time	Source	Destination	Protocol	Length	Info
206	12.88272700	Nordic	<broadcas	BLE ADV	59	ADV_IND
207	13.06982300	Nordic	<broadcas	BLE ADV	59	ADV_IND
208	13.07186600	Nordic	<broadcas	BLE ADV	59	ADV_IND
209	13.07398500	Nordic	<broadcas	BLE ADV	59	ADV_IND
210	13.26529700	Nordic	<broadcas	BLE ADV	59	ADV_IND
211	13.26736000	Nordic	<broadcas	BLE ADV	59	ADV_IND
212	13.26934100	Nordic	<broadcas	BLE ADV	59	ADV_IND
213	13.45376300	Nordic	<broadcas	BLE ADV	59	ADV_IND
214	13.45671800	Nordic	<broadcas	BLE ADV	59	ADV_IND
215	13.45806900	Nordic	<broadcas	BLE ADV	59	ADV_IND
216	13.65005900	Nordic	<broadcas	BLE ADV	59	ADV_IND
217	13.65314800	Nordic	<broadcas	BLE ADV	59	ADV_IND
218	13.65460000	Nordic	<broadcas	BLE ADV	59	ADV_IND
219	13.83802200	Nordic	<broadcas	BLE ADV	59	ADV_IND
220	13.83970800	Nordic	<broadcas	BLE ADV	59	ADV_IND
221	13.84264200	Nordic	<broadcas	BLE ADV	59	ADV_IND
222	14.02687000	Nordic	<broadcas	BLE ADV	59	ADV_IND
223	14.02889600	Nordic	<broadcas	BLE ADV	59	ADV_IND
224	14.03100200	Nordic	<broadcas	BLE ADV	59	ADV_IND
225	14.22421000	Nordic	<broadcas	BLE ADV	59	ADV_IND
226	14.22596900	Nordic	<broadcas	BLE ADV	59	ADV_IND
227	14.22835700	Nordic	<broadcas	BLE ADV	59	ADV_IND

Frame 1: 59 bytes on wire (472 bits), 59 bytes captured (472 bits) on interface 0

Nordic BLE sniffer meta

Bluetooth Low Energy

0000	04 06 34 01 e7 0f 06 0a 01 25 35 00 00 e4 e8 02	..4..... .%5.....
0010	00 d6 be 89 8e 40 21 55 37 bf e9 77 f5 03 19 41	.....@!U 7..w...A
0020	03 02 01 06 07 03 0d 18 0f 18 0a 18 0b 09 4e 6f	..... ..NO
0030	72 64 69 63 5f 48 52 4d 5f e4 ca	rdic_HRM _..

Capturing from \\.pipe\wireshark_nordic_ble [Wireshark 1.10.13 (v1.10.13-0-g3b7ff66 from master-1.10)]						
File Edit View Go Capture Analyze Statistics Telephony Tools Internals Help						
Filter: btle		Expression...		Clear	Apply	Save
Time	Source	Destination	Protocol	Length	Info	
469	28.75001700	Master	Slave	ATT	33	Rcvd Exchange MTU Request, Client Rx MTU: 158
470	28.75072700	Slave	Master	BLE Data	26	Empty Data PDU
471	28.77847000	Master	Slave	BLE Data	26	Empty Data PDU
472	28.77959300	Slave	Master	ATT	33	Rcvd Exchange MTU Response, Server Rx MTU: 23
473	28.80910500	Master	Slave	ATT	37	Rcvd Read By Group Type Request, GATT Primary Service Decla
474	28.81004000	Slave	Master	BLE Data	26	Empty Data PDU
475	28.83897600	Master	Slave	BLE Data	26	Empty Data PDU
476	28.84033800	Slave	Master	ATT	50	Rcvd Read By Group Type Response, Attribute List Length: 3
477	28.86918200	Master	Slave	ATT	37	Rcvd Read By Group Type Request, GATT Primary Service Decla
478	28.86991100	Slave	Master	BLE Data	26	Empty Data PDU
479	28.89853100	Master	Slave	BLE Data	26	Empty Data PDU
480	28.89994700	Slave	Master	ATT	44	Rcvd Read By Group Type Response, Attribute List Length: 2
481	28.92920200	Master	Slave	ATT	37	Rcvd Read By Type Request, GATT Characteristic Declaration,
482	28.92992000	Slave	Master	BLE Data	26	Empty Data PDU
483	28.95850300	Master	Slave	BLE Data	26	Empty Data PDU
484	28.95957400	Slave	Master	ATT	39	Rcvd Read By Type Response, Attribute List Length: 1
485	28.98884300	Master	Slave	ATT	35	Rcvd Find Information Request, Handles: 0x000b..0x000b
486	28.99112300	Slave	Master	BLE Data	26	Empty Data PDU
487	29.01854000	Master	Slave	BLE Data	26	Empty Data PDU
488	29.01954600	Slave	Master	ATT	36	Rcvd Find Information Response
489	29.04911700	Master	Slave	ATT	35	Rcvd Write Request, Handle: 0x000b
490	29.04983100	Slave	Master	BLE Data	26	Empty Data PDU
491	29.07859900	Master	Slave	BLE Data	26	Empty Data PDU
492	29.07943400	Slave	Master	ATT	31	Rcvd Write Response
493	29.10911300	Master	Slave	ATT	37	Rcvd Read By Type Request, GATT Characteristic Declaration,
494	29.11017800	Slave	Master	BLE Data	26	Empty Data PDU
495	29.13853900	Master	Slave	BLE Data	26	Empty Data PDU
496	29.14003400	Slave	Master	ATT	46	Rcvd Read By Type Response, Attribute List Length: 2
497	29.16914000	Master	Slave	ATT	37	Rcvd Read By Type Request, GATT Characteristic Declaration,
498	29.16999400	Slave	Master	BLE Data	26	Empty Data PDU
499	29.19848600	Master	Slave	BLE Data	26	Empty Data PDU
500	29.19991100	Slave	Master	ATT	39	Rcvd Read By Type Response, Attribute List Length: 1
501	29.22872300	Master	Slave	ATT	35	Rcvd Find Information Request, Handles: 0x000f..0x000f
Frame 1: 59 bytes on wire (472 bits), 59 bytes captured (472 bits) on interface 0						
Nordic BLE sniffer meta						
000	04 06 34 01 e7 0f 06 0a 01 25 35 00 00 e4 e8 02	..4.....%5.....				
010	00 d6 be 89 8e 40 21 55 37 bf e9 77 f5 03 19 41	.....@!U 7..w...A				
020	03 02 01 06 07 03 0d 18 0f 18 0a 18 0b 09 4e 6f	.....No				
030	72 64 69 63 5f 48 52 4d 5f e4 ca	rdic_HRM _..				