Rayson Technology Co., Ltd.

BTM-NL15X(Nordic nRF54L15) 燒錄& 開發工具概述

March 2025

A. nRF54L15 Development Getting Started: (a). <u>nRF54L15 SoC Datasheet Link</u> (b). Nordic nRF54L15 DK Development Kit Product Link Nordic nRF54L15 DK Product Image nRF54L15 DK User-programmable LEDs nPMI300 PMIC Current measurement pins NFC antenna connector Power switch SWF RF port for direct RF measurements nRF54LI5 SEGGER J-LINK USB-C III. State External memory connecto Reset button Debug out SEGGER J-Link OB Debug in Programmer/debugger Userprogrammable buttons

- (c). Rayson BTM-NL15X Module Development Kit (BTM-NL15X-DK)
- (d). Nordic Software Development Kit Installation
 - nRF Command Line Tools
 - nRF Connect for Desktop

B. Harware Environment Setup Preparation :

- (a) Nordic NRF54L15-DK (PCA10156-nRF54L15) x 1
- (b) Rayson BTM-NL15X-DK x 1
- (c) IDC Cable x 1
- (d) Micro USB-C Cable x 2

C. Harware Environment Setup :

Please use the Nordic nRF54L15DK/nRF54L15PDK as the programmer, along with the Rayson BTM-NL15X-DK development board as the development tool, to perform code compilation and development for the nRF54L15.

- Step 1: Power the NRF54L15 DK and BTM-NL15X-DK via a USB-C cable.
- Step 2: Connect the Nordic nRF54L15 DK and Rayson BTM-NL15X-DK using an IDC (SWD) cable.





The schematic of the Rayson BTM-NL15X-DK development board is as follows :

< BTM-NL15C Daughter board Schematic > Please contact sales. < BTM-NL15X DK Schematic > Please contact sales.

D. Nordic Software Development Kit Installation

- (a) nRF Command Line Tools Download Link: <u>Download nRF Command</u> <u>Line Tools</u> (Please Click Me)
 Select Windows X86 64 - 10.24.2 Version: nrf-command-line-tools-10.24.2-x64.exe
- (b) nRF Connect for Desktop Download Link: <u>Download nRF Connect For</u> <u>Desktop</u> (Please Click Me)
 Select Windows 64-bit - 5.1.0 Version: nrfconnect-setup-5.1.0-x64.exe
- (c) Segger J-LINK driver Download Link: <u>Donnload Segger J-LINK driver</u> (Please Click Me)

Reminder : When installing the two programs mentioned above, a prompt may appear asking to install SEGGER J-LINK. You need to install version v8.10f or newer.

Nordic Programming Development Tools :

The nRF Connect SDK (NCS) supports the free VS (Visual Studio) Code IDE for development.

It is recommended to use NCS version 2.8.0 or above to implement the functionality of the nRF54L15.

 Step 1: Open "nRF Connect for Desktop" → Select "Toolchain Manager" → Click "Open".

Ø 1	nRF Connect for	Desktop v5.1.0			—		×
	APPS	SETTINGS	ABOUT				
	∓ Filter	Search			Update	all apps	;
	ම	Toolchain M Install and ma official, v1.5.3	anager Inage tools to develo	op with the nRF Connect SDK	Open	•	

 Step 2: Several versions of nRF Connect SDK vx.x.x will appear as shown in the image below; it is recommended to install version NCS v2.8.0 or later.

In this example, we choose to use NCS v2.8.0.

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K ENVIRONMENTS SETT	INGS ABOUT						
Since the nRF Connect SDK v2.0.0, the nRF Connect for VS Code extension is the recommended IDE for managing the Connect SDK Toolchain and working with the nRF Connect SDK. The extension also provides support for the comman environment. Install the extension							
nRF Connect SDK v2	9.1	Install ~					
nRF Connect SDK v2	9.0	Install ~					
nRF Connect SDK v2	8.0	Install					

 Step 3: Before installing the SDK, confirm the desired installation path (C:\ncs).

🙆 Toolchain Manager v1.5.3			
SDK ENVIRONMENTS	SETTINGS	ABOUT	
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Hide pre-release ver Hide pre-release envir	sions onments that are	not installed	
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• Step 4: After nRF Connect SDK v2.8.0 is installed, click "Open VS Code".

Toolchain Manager v1.5.3	
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• Step 5: Open the Bluetooth peripheral_uart example.



 Step 6: In the build configuration, select the corresponding IC development board name and compile (nrf54I15dk/nrf54I15/cpuapp).



• Step 7: After compilation, a .hex programming file will be generated.

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• Step8 : Under ACTIONS, options for Build/Debug/Flash are available for developers to choose from.

< Build >

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< Debug >

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Reminder: If you are unable to use the VS (Visual Studio) Code IDE for programming, follow the steps below:

- (a) Visit this website (<u>https://www.nordicsemi.com/Products/Development-</u> tools/nRF-Util/Download#infotabs) to download nrfutil.exe
- (b) Place the nrfutil.exe file in the C:\Program Files\Nordic Semiconductor\nrfcommand-line-tools\bin folder.
- (c) Then, execute the following command to install it, allowing you to successfully use VSC for programming.

```
C:\Program Files\Nordic Semiconductor\nrf-command-line-tools\bin>nrfutil list
Found 0 installed command(s)
C:\Program Files\Nordic Semiconductor\nrf-command-line-tools\bin>nrfutil install nrf5sdk-tools
[00:00:14] ###### 100% [Install packages] Install packages
C:\Program Files\Nordic Semiconductor\nrf-command-line-tools\bin>nrfutil install device
[00:00:10] ###### 100% [Install packages] Install packages
C:\Program Files\Nordic Semiconductor\nrf-command-line-tools\bin>nrfutil list
Command Version Description
device 2.8.5 Manage and program devices
nrf5sdk-tools 1.1.0 nRF5 SDK tools that were available in nRF Util 6
dfu
keys
pkg
settings
zigbee
Found 2 installed command(s)
```

Programmer 燒錄工具

Developers can use the "Programmer" to program .hex files and observe the Flash configuration.

The following are the programming steps:

 Step 1: Open "nRF Connect for Desktop" → Select "Programmer" → Click "Open".

Ø 1	nRF Connect fo	r Desktop v5.1.0	$ \Box$ $>$
	APPS	SETTINGS ABOUT	
	≇ Filter	Search	Update all apps
	0	Programmer Tool for flash programming Nordic SoCs and SiPs official, v4.5.0	Open 🝷

• Step 2: Click "Select Device".

Programmer v4.5.0				-	×
SELECT DEVICE 🗸	PROGRAMMER	ABOUT			1
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FILE	File memory layo	u		Device memory layout	U
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DEVICE		_		- Ch	
Erase & write					
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Write					
C Rend		Drag & drop HEX/ZIP files here		Connect a device to display memory contents	
J-LINK SETTINGS Auto read memory Auto reset					
MCUBOOT SETTINGS	16:48:57 510 H	sing the bundled care version for arfutil device. 7	13.0		
Enable MCUboot	16:48:58.081 U: 16:48:58.081 U: 16:48:58.081 U: 16:48:58.081 U: 16:48:58.081 U: 16:48:58.083 Yc 16:49:14.827 G	sing mrfutil-device version: 2.6.4 sing mrfutil-device-lib version: 0.17.35 sing mrfprog DLL version: 10.74.2 sing Juink version: Juink, V8.10f xur version of SEGGER J-Link (8.10f) is newer tha sttling serial port options from the persistent store	in the one e for 001(e this app was tested with (7.94i). The tested version is not re 057791038.pc-nrfconnect-programmer	l, and y
					-

• Step 3: Click "nRF54L15 DK".



• Step 4 : Click "Add File".

Programm	mer v4.5.0							-	
54 n	RF54L15 DK 01057791038		PROGRAMME	R ABOUT					
FILE			File memory l	ayout		NRF54	4L15_xxAA_ENGB ()		
© 0	Add file Reload files Clear files								
 Image: A second s	Erase all Erase & write Save as file						Device core is connected Memory layout is not available for nRF5	1L family	
•	Reset Write Read			Drag & drop HEX/ZIP files here					
J-LINK 8 Auto read Auto rese	SETTINGS d memory et								
мсивоо Enable M	ot settings ICUboot	•	16:54:10.692 16:54:12.173 16:54:12.174	Loading core information for Applicati Reading readback protection status fo	on core completed r Application core				Ì
			16:54:12.191 16:54:12.191 16:54:12.192	Reading readback protection status fo Application core protection status 'NR Reading readback protection status fo	r Application core 100 FDL_PROTECTION_ST r Application core cor				

• Step 5 : Select the .hex file to be programmed.

Select a HEX / ZIP file					
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組合管理 ▼ 新増資料夾					
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• Step 6 : Click "Erase & write" to start programming.

Programmer v4.5.0	-		×
54 nRF54L15 DK 001057791038 ▲	PROGRAMMER ABOUT	1	
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DEVICE			
	Device core is connected Memory layout is not available for nRF54L family		
MCUBOOT SETTINGS	1112 55 667 Application core protection status 'NPERI_DOTTECTION_STATUS_ALL'		
Enable MCUboot	11:355658 Reading readiate and a function on the Profession of the Charles Trinds Succ 11:3555698 Reading readiate and a function on the completed 11:14:10.755 Parsing HEX file: Charles V2.8 0.NmfSamples\bluetooth\peripheral_uart\build\peripheral_uart\zephyr\zephyr\zephyr\tephy		1
SHOW SIDE PANEL	CLEARLOG OPENLOGFILE AUTOSCHOLLLOG 🌔 SI	IOW LOG	•

• Step 7 : During the programming process, the red-circled area will display a slash.

Programmer v4.5.0							-	- 0	×
54 nRF54L15 DK		PROGRAMME	R ABOUT						
FILE		File memory	layout			NRF54L15_xxAA_ENGB (0)			0
Add file									
C Reload files									
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DEVICE									
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🖋 Erase & write									
🗄 Save as file									
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C Read									
J-LINK SETTINGS					-				
Auto read memory									
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 Step 8: When the LOG shows "completed," it indicates that the programming has been completed.

Programmer v4.5.0		- 0	×
54 nRF54L15 DK A	PROGRAMMER ABOUT		8
Image: Constraints	File memory layout 🐲 NRE54L15	5,xxAA,ENGB ∅	3
Erase all Erase & write Base as file Reset Write Read		Device core is connected Memory layout is not available for nRF54L family	
J-LINK SETTINGS Auto read memory Auto reset MCUROOT SETTINGS			
Enable MCUboot	11:15:55 598 Update files regions according to Application core 11:15:55 598 Parse memory regions for file 11:15:59:282 Reading readback protection status for Application core 11:15:59:288 Reading readback protection status for Application core 0% 11:15:59:287 Reading readback protection status for Application core 0% 11:15:59:347 Reading readback protection status for Application core 100% 11:15:59:348 Reading readback protection status for Application core 100% 11:15:59:348 Reading readback protection status for Application core 100% 11:15:59:348 Reading readback protection status for Application core 100% 11:15:59:348 Reading readback protection status for Application core 100% 11:15:59:348 Reading readback protection status for Application core completed		
SHOW SIDE PANEL	CLEARLOG OPENLOG FILE	AUTOSCROLLLOG 🌅 SHOW L	og 💽

E. <u>nRF Connect APP</u>

After programming is complete, you can use the Nordic nRF Connect mobile app to check if broadcasting is enabled.



Nordic nRF54L15 Reference Information

- nRF54L15 DK hardware
- <u>nRF Connect SDK Documentation</u>
- Nordic nRF54L Series