Rev. 5.0 — 16 April 2025

User manual

Document information

Information	Content
Keywords	MCUXpresso SDK, RW61x evaluation board, FreeRTOS image
Abstract	Provides the step-by-step guidance to set up RW61x evaluation board, build the application image, and run Wi-Fi and Bluetooth LE demo applications.



1 About this document

1.1 Purpose and scope

This document describes RW61X-EVK board along with the overall architectures, platform interfacing, related configurations, and software package.

1.2 Considerations

The RW61x is powered by FreeRTOS^T and the FreeRTOS-based Wi-Fi drivers are added to support RW61x evaluation board. This document includes a brief description of RW61x evaluation kit (RW61X-EVK), while MCUXpresso SDK implementation and configuration are covered in RW61X-EVK documentation (ref.[4] and ref.[5]).

2 Wireless MCU RW61x

RW61x Wireless MCUs feature NXP's advanced implementation of the Arm Cortex-M33 core with Wi-Fi 6 and Bluetooth Low Energy (LE) 5.4 / 802.15.4 radios designed for a broad array of applications, with support of FreeRTOS available within MCUXpresso SDK. Applications includes connected smart home devices, smart appliances, enterprise and industrial automation, smart accessories and smart energy. For more details on RW61x products, see ref.[10] and ref.[11].

The following products support NXP-based wireless features:

- RW610 (Wi-Fi +Bluetooth LE)
- RW612 (Wi-Fi + Bluetooth LE/ 802.15.4)

2.1 RW61x processor

The RW61x processor Arm Cortex-M33 offers high-performance processing optimized for the lowest power consumption and best real-time response. The RW61x products provide various memory interfaces and types including pSRAM, and NOR flash through Quad SPI (FlexSPI). The RW61x MCUs also feature a wide range of other interfaces for peripherals, such as Ethernet, USB, SDIO, USIM, and Flexcomm (SPI/I2C/USART/I2S). RW61x series supports rich audio and video features, including LCD display, DMIC, and I2S audio interface.

2.2 RW61x architecture

<u>Figure 1</u> shows RW610 block diagram. IMU interface is used for Wi-Fi/Bluetooth LE communication between the application CPU and Wi-Fi/Bluetooth LE MCU.



<u>Figure 2</u> shows RW612 block diagram. IMU interface is used for the communication between the application CPU and Wi-Fi/Bluetooth LE/802.15.4 MCU.



2.3 RW61x MCUXpresso SDK

This section describes the architectural overview for the MCUXpresso software development kit (SDK) including NXP-based wireless drivers and related dependencies. The MCUXpresso SDK architecture consists of the following key components:

- The Arm Cortex Microcontroller Software Interface Standard (CMSIS) CORE compliance device-specific header files, SOC Header, and CMSIS math/DSP libraries
- Cloud connectivity APIs for Amazon AWS
- Peripheral drivers such as SPI, I2C, ADC, uSDHC, UART
- Real-time Operating Systems (FreeRTOS and Zephyr)
- Stacks and Middleware that are part of MCUXpresso SDK and include:
- Connectivity, Security, DMA, File System, MCU boot, and other software features
- Specific features for Wi-Fi connectivity: IwIP stack, DHCP, Wireless connection manager, and Wi-Fi module driver
- Specific features for Bluetooth connectivity: Bluetooth stack, Bluetooth module driver
- Demo Applications based on the MCUXpresso SDK



3 RW61x evaluation board

3.1 RW61x evaluation board overview

The RW61x EVK boards are USB powered printed circuit boards (PCB). At their heart lies the RW61x SoC, featuring highly integrated Arm Cortex-M33 core, Wi-Fi 6, Bluetooth LE and 802.15.4. Cortex-M33 core operates at sufficient speed to provide high CPU performance and excellent real-time response.

For more details on RW61X-EVK, look for *Design resources* on RW610 and RW612 web pages (<u>ref.[10]</u> and <u>ref.[11]</u>).



Note: RW61x EVB (RD-RW61x-xxx) is preconfigured for the dual-antenna configuration. The antennas used for Wi-Fi and Bluetooth/802.15.4 are on separate paths.

3.2 Jumper configuration

RW61x EVB (RD-RW61x-xxx) is preconfigured with the default jumper settings shown in <u>Table 1</u>. For more details, refer to the schematic included in the design package available in the design section of <u>ref.[10]</u> and <u>ref.</u>[11].

Jumper	Default setting	Description
U38 DIP-Switch CON[3:0]	1111: FlexSPI flash boot	Boot mode selection 0 - Switch ON position 1 - Switch OFF position Other available Boot modes: 1110: ISP boot (UART/I2C/SPI/USB) 1101: Serial boot (UART/I2C/SPI/USB) 1100: ISP boot (SDIO) 1011: Serial boot (SDIO)
JP31	(1-2): RW61x internal Buck	To select the source of VCORE supply.
JP34	(2-3): RW61x internal Buck	To select the source of 1.8 V voltage.

Note:

- For details on the configuration options and configuration pins, see <u>ref.[1]</u> and <u>ref.[2]</u>.
- Do not change the other jumper configurations

Getting Started with Wireless on RW61x Evaluation Board Running FreeRTOS

Figure 5 shows the top view of RW61x evaluation board.



Getting Started with Wireless on RW61x Evaluation Board Running FreeRTOS

Figure 6 shows the bottom view of RW61x evaluation board.



Figure 6. Bottom view of RW61x evaluation board

4 Software download

This section provides the instructions on where and how to download the MCUXpresso SDK development environment for RW61x Wi-Fi and Bluetooth radios.

4.1 SDK download

- 4.1.1 MCUXpresso SDK download
- Go to MCUXpresso SDK Builder page on NXP website (ref.[9]).
- · Click Select Development Board.

NP		IDE CFG SEC SDK
MCUXpresso SDK brings open	SDK Builder source drivers, middleware, and reference example	
applications to speed your software specific to your processor or evaluat	development. Customize and download an SDK Ion board selections.	
Select Development Board	Access My SDK Dashboard	Config
NXP strongly recommends you upo	ate to the latest version of MCUXpresso SDK that contains	s essential security

• Select the development board and the latest SDK version.

- RD-RW612-BGA: RW61x BGA board

arc	h for your board or kit to get started.	
Sea	irch for Hardware	
	RW612	8
Se	Boards RD-RW612-QFN	
	RD-RW612-BGA	
	Show 1 more (1)	
F	Processors RW612	
	RW610	

• The selection details are displayed on the right side. Use the arrow to select the SDK version.

Selection Details
RD-RW612-BGA RD-RW612-BGA
Actions
Add to Filtering Criteria
Explore selection with Pins tool
Explore selection with Clocks tool
v2.15.000 - Build MCUXpresso SDK
Matched Hardware Platforms
Found 827 HW solutions that match your criteria.
(Boards: 167), Kits: 109), Processors: 551)
Figure 9. Selection details

- Click Build MCUXpresso SDK.
- Define the Developer Environment Settings.
 - Host OS: Windows, MacOS, Linux
 - Toolchain/IDE: MCUXpresso IDE, ARM-GCC, IAR (ref.[6]), Arm GCC, IAR (ref.[8]), Keil

enerale a downloadable St eveloper Environment Setting rections here (operating host system	JK archive for use wi s 1 toolchain or middleware)	In desktop MCUX presso Tools		
NOTE For SDK bellow v2.13	MCUXpresso for VS Cr	SDK Version	2.15.000 (released 2024-04-10)	
SDK v2.15.xxx requires MCU	Xpresso IDE v11.9.0 or	later	SUK lag	REL_Z 15 000_RW610_RFP3
Hest OS		- Teclehard I JEIE		
at the second se	*	All Toolchains		

Getting Started with Wireless on RW61x Evaluation Board Running FreeRTOS

• Click SELECT ALL or select the SDK components to download.

	Name	Category	Description	Dependencies	
~	CJSON	Middleware	Ultralightweight JSON parser in ANSI C		
	CMSIS DSP Library	CMSIS DSP Lib	CMSIS DSP Software Library		
~	coreHTTP	Middleware	CORENTTP	lihttp	1.1
	emWin	Middleware	emWin graphics library		
~	Fatfs	Middleware	FAT File System stack		
	FreeMASTER	Middleware	FreeMASTER communication driver for 32bit platforms		
	FreeRTOS Plus TCP	Middleware	FreeRTOS Plus TCP		
	FreeRTOS (6 selected)		Real-time operating system for microcontrollers from Amazon		~

- Scroll down and click DOWNLOAD SDK.
- Click **Download SDK** on MCUXpresso SDK Dashboard.

	SDK_2.15.000_RD-RW612-	BGA	2024-04-11	X Remove SDK	
	Windows	2.15.000	RD-RW612-BGA	Rebuild SOK	
	All Toolchains	REL_2 15 000_RW610_I	RFP3_RC3		
	CMSIS DSP Library, mbedTLS 3.X, Secure Element Host Library, FreeMASTER, cJSON, NXP Wi-Fi, wpa_supplicant-rtos, emWin, Fatts, AWS toT Core, FreeRTOS, coreHTTP, FreeRTOS Plus TCP, VoiceSeeker (no AEC), Voice intelligent technology library.				
	LittleFS, lihttp, lwIP, Maestr TinyCBOR, USB Host, Dev 802.15.4 MACPHY Software	 Audio Framework for MCU, MCUBool, ice, OTG Stack, NXP PSA CRYPTO DRIV Wireless Connectivity Framework, EdgeF 	PKCS #11, mbedTLS, Mbed Crypto, PSA Test Suite, TF-M, /ER, NXP ELS PKC, LVGL, Ethermind BT/BLE Stack, IEEE ast BT/BLE stack, Wireless OpenThread stack	A Share SDK	
	Add SDK Description				

Figure 12. Download RW61x SDK

• Select the items to download, for example SDK Archive (includes documentation).

moonpicuot	SDK
Download S MD5: 1fd	DK archive including documentation (185 MB) aab3370392b04ce12714f34607220
Download S	standalone Example Project
For MCUX projects di	(presso IDE, example projects can be imported as standalone rectly within the IDE by downloading the SDK Archive
Online Docu	mentation
Ø View SDK A	PI Reference Manual
MCUXPress	o Config Tools

• Accept the terms and conditions.

ULA	SOFTWARE CONTENT REGISTER
LA_OF	/T_NXP_Software_License v49 September 2023
IMPOR	(TANT, Read the following NXP Software License Agreement ("Agreement") completely, By selecting the "I Accept" button at the end of this page, or by downloading,
installir	ig, or using the Licensed Software, you indicate that you accept the terms of the Agreement, and you acknowledge that you have the authority, for yourself or on behalf
of your	company, to bind your company to these terms. You may then download or install the file. In the event of a conflict between the terms of this Agreement and any license
terms a	and conditions for NXP's proprietary software embedded anywhere in the Licensed Software file, the terms of this Agreement shall control. If a separate license
agreen	nent for the Licensed Software has been signed by you and NXP, then that agreement shall govern your use of the Licensed Software and shall supersede this
Agreer	nent.
NXP S	OFTWARE LICENSE AGREEMENT
This is	a legal agreement between your employer, of which you are an authorized representative, or, if you have no employer, you as an individual ("you" or "Licensee"), and
NXP B	V. ("NXP"). It concerns your rights to use the software provided to you in binary or source code form and any accompanying written materials (the "Licensed Software").
The Lic	ensed Software may include any updates or error corrections or documentation relating to the Licensed Software provided to you by NXP under this Agreement. In
conside	eration for NXP allowing you to access the Licensed Software, you are agreeing to be bound by the terms of this Agreement. If you do not agree to all of the terms of
this Ag	reement, do not download or install the Licensed Software. If you change your mind later, stop using the Licensed Software and delete all copies of the Licensed

The SDK starts to download automatically.

4.1.2 GitHub download

• Go to GitHub nxp-mcuxpresso/mcux-sdk web page ref.[7].

Vanadar 1. araba	and the second se					-	Contraction of the
C nxp-mcuxpresso / n	ncux-sdk main				Q Notifications Y Fork 185	17 Star 286	
Code 🕑 Issues 20	17 Pull requests 4 🖓 Discussions 🥥 Security	12 Insights					
	\$ ² main → \$ ² 14 Branches (\$ 47 Tegs	q	Go to Re	<> Code +	About		
	mcuxsusan west fit the examples revision not	lound asue	adalati 1 daya ago	3 423 Commits	MCUXpresso SDK		
	.github	Fix markdown = introduce comment	15.	2 years ago	1 RSD G-Clause license		
	arch	Add MCUXpresso S0X 2.14.0 update		B months ago	G Code of sundura		
	boards	Merge tag 'MCUX_2.14.0_MKE1X29'	into main	2 weeks ago	Custom properties		
	Cmake	Add MCUXpresso 50% 2 14.0 update	č.	il months ago	☆ 285 stars		
	Cmsis_drivers	Merge tag MCUX_214.0_MKE1X29	into main	2 weeks ago	33 watching Y 135 torks		
	components	components wart Fix marge error in	nissing "#end#"	2 weeks ago	Report repusitory		
	devices	devices LPC55XX: clean up the unor	reded power bisary	last week	Releases 20		
	adocs	Apply MCUXpresso SDK 2.15.000 rei	ieate update	3 months ago	S MCUXpresso SDK 2.15.000 release Littent		

- Scroll down to the README.md file.
- Click README.md to open the overview.

A free the trees		
Overview		
MCUXpresso SDK is a co	omprehensive software enablement package designed to simplify and accelerate applicat	ion
development with Arm	® Cortex®-M-based devices from NXP, including its general purpose, crossover and	
Bluetooth™-enabled M	CUs.	
Previously user should g	get MCUXpresso SDK via mcuxpresso.nxp.com or MCUXpresso IDE. Now NXP MCUXpress	0
SDK project provides a	new way for user to achieve this. You could find all NXP hot parts in this project and get b	elow
eatures:		
Arm CMSIS-CORI	E startup and device header files and CMSIS-DSP standard libraries	
Open-source perip	heral drivers that provide stateless, high-performance, easy-to-use APIs	
 Drivers for community transfers 	nication peripherals also include high-level transactional APIs for high-performance data	
• High-quality softwa	are: all drivers and startup code are MISRA-C: 2012 compliant and checked with Coverity®	Ð
static analysis tools		

• Follow the instructions in the README to "Clone/check-out a new delivery of whole SDK" or "Update existing west cloned SDK whole delivery".

4.2 Serial console tool setup

The serial console tool is used to read out the demo application logs on the computer connected to RW61X-EVK board.

- Download and install the terminal emulator software such as Tera Term (Windows) or Minicom (Linux or Mac OS)
- To connect RW61X-EVK board to the host computer running Windows, Linux, or Mac OS, use a micro USB to USB cable
- Open a terminal emulator program like Minicom or Tera Term, and configure the settings for serial console
 access

Determine COM port.

• Linux: issue the following command once the USB Serial is connected to host.

```
# dmesg | grep "ttyACM"
[503175.307873] cdc_acm 1-1.2:1.0: ttyACM0: USB ACM device
```

• Windows: click the Start menu and type Device Manager in the search bar. In the Device Manager, expand the Ports (COM and LPT) section to view the available ports.



Settings for serial console access with the COM port:

```
115200 baud rate
8 data bits
No parity
One stop bit
No flow control
```

Before starting the demo application, update the serial console configuration to avoid extra spacing.

For Tera Term:

- Go to Setup > Terminal
- Look for the New line section
- Set the **Receive** to **Auto**

For Minicom:

- To open the Help menu, press the Ctrl + A keys and then press the Z key
- To add a carriage return, press the **U** key

4.3 SDK development environment

RW61x MCUXpresso SDK currently supports the following development environments:

- MCUXpresso IDE
- IAR Embedded Workbench
- Arm[®] GCC
- Keil MDK/µVision

5 RW61x product image setup

This section introduces the pre-requisites and instructions to build and download application image to RW61x board. RW61x supports image building with MCUXpresso IDE, IAR Embedded Workbench, Arm GCC, and Keil MDK/µVision.

5.1 Pre-requisites for RW61x image setup

IAR IDE and SEGGER J-Link version older than v7.92c¹ do not support RW61x. Additional patches for IAR IDE and J-Link are required. To download the patch files from NXP website, see <u>ref.[3]</u>.

SEGGAR J-Link

- Unzip iar_segger_support_patch_rw610_flash.zip
- Copy *Devices* directory folder and *JLinkDeivces.xml* files to J-Link install directory at the following location *C:* *Program Files*\SEGGER\JLink\

lame	~	Date modified
Devices		4/18/2022 5:47 PM
JLinkDevices.xm	al	3/9/2022 3:42 PM

IAR

- Unzip iar_segger_support_patch_rw610_flash.zip
- Copy debugger, devices, flashloader to IAR install directory at the following location C:\Program Files\IAR Systems\Embedded Workbench 9.0\arm/config

lame	Date modified
debugger	4/15/2022 7:55 PM
devices	4/15/2022 7:55 PM
flashloader	4/15/2022 7:55 PM

¹ J-Link supports RW61x from version v7.92c.

5.2 RW61x application image setup

The detailed steps for RW61x application image setup are introduced in <u>ref.[4]</u>. Refer to the sections:

- Run a demo application using MCUXpresso IDE.
- Run a demo application using IAR.
- Run a demo application using Arm GCC.
- Run a demo application using Keil MDK/µVision.

6 Run a Wi-Fi demo application

RW610x MCUXpresso SDK offers a series of Wi-Fi application examples. Use *wifi_cli* example in the SDK to demonstrate Wi-Fi functionality.

- Build *wifi_cli* application For guidance on how to build a demo application, see <u>Section 5.2</u>.
- Program Wi-Fi firmware for RW61X-EVK
- Program *wifi_cli* image for RW61X-EVK For the detailed steps to program the Wi-Fi firmware and application image, see <u>ref.[5]</u>.
- Apply a power reset on RW61X-EVK
- · Check the console on the connected computer screen to see the application start-up log



Figure 20. Example of console output for wifi_cli application

Note: For wifi_cli commands, see <u>ref.[5]</u>.

7 Run a Bluetooth LE demo application

RW61x MCUXpresso SDK offers a series of Bluetooth LE application examples. This section describes the steps to run *peripheral_ht* demo application. The application demonstrates the Bluetooth LE peripheral role, more specifically, it exposes the health thermometer (HT) GATT Service. Peer devices that subscribe to receive temperature indications get temperature readings every second. The temperature readings show values between 20°C and 25°C.

7.1 Starting the demo

- Build *peripheral_ht* application.
- Refer to <u>Section 5.2</u> for guidance on how to build a demo application.
- Program Bluetooth LE firmware for RW61X-EVK board
- Program *peripheral_ht* image for RW61X-EVK board
- For the detailed steps to program Bluetooth LE firmware and application image, see ref.[5].
- Apply a power reset on RW61X-EVK board
- · Check the console on the connected computer screen to see the application start-up logs

The demo application first loads the Bluetooth LE firmware. Next, the application automatically sets the Bluetooth LE advertisement parameters and enables the advertisements for a sample Bluetooth LE service. The following logs can be observed once the RW61X-EVK board and NXP-based wireless module are up and running.

```
Bluetooth initialized
Advertising successfully started
```

The stack is ready to accept incoming connections from any peer device.

7.2 Establishing a Bluetooth LE connection

This section describes the steps to establish a Bluetooth LE connection between a smartphone and RW61X-EVK board.

- Install and launch the IoT Toolbox application on the smartphone
- Enable the Bluetooth and Location service of the smartphone
- To scan the available devices using the Health Thermometer service, select Thermometer



- Look for *peripheral_ht* in *IoT Toolbox* application. From the application, it is now possible to connect to the device.
- Upon successful connection, temperature readings show on the smartphone



Note: The SDK package includes other Bluetooth LE demo applications. For the detailed steps to build and run those applications, see <u>ref.[5]</u>.

8 Abbreviations

Table 2. Abbreviati	ions
Abbreviation	Definition
Bluetooth LE	Bluetooth low energy
EVB	Evaluation board
EVK	Evaluation kit
FCB	FlexSPI configuration block
FW	Firmware
I/O	Input/output
IDE	Integrated development environment
IMU	Inter-CPU message unit
MCU	Microcontroller unit
SDIO	Secure digital I/O
SDK	Software development kit
SPI	Serial peripheral interface
SPSDK	Secure provisioning software development kit
SWD	ARM Serial Wire Debug
UART	Universal asynchronous receiver-transmitter

9 References

- [1] Data sheet RW610: Wireless MCU with Integrated 1x1 Wi-Fi 6, Bluetooth Low Energy (link)
- [2] Data sheet RW612: Wireless MCU with Integrated 1x1 Wi-Fi 6, Bluetooth Low Energy / 802.15.4 (link)
- [3] Software Patch files for IAR IDE and J-Link (link)
- [4] User manual Getting Started with MCUXpresso SDK for RDRW610. SDK document available at: SDK_<version>_RDRW610\docs\
- [5] User manual UM11799: Wi-Fi and Bluetooth Demo Applications for RW61x (link)
- [6] Webpage MCUXpresso Integrated Development Environment (IDE) (link)
- [7] Webpage GitHub NXP MCUXpresso/MCU SDK (link)
- [8] Webpage IAR embedded development tools (link)
- [9] Webpage MCUXpresso SDK Builder (link)
- [10] Webpage RW610: Wireless MCU with Integrated 1x1 Wi-Fi[®] 6 + Bluetooth[®] Low Energy Radios (link)
- [11] Webpage RW612: Wireless MCU with Integrated Tri-radio: 1x1 Wi-Fi[®] 6 + Bluetooth[®] Low Energy / 802.15.4 (<u>link</u>)

10 Note about the source code in the document

The example code shown in this document has the following copyright and BSD-3-Clause license:

Copyright 2022-2025 NXP Redistribution and use in source and binary forms, with or without modification, are permitted provided that the following conditions are met:

- 1. Redistributions of source code must retain the above copyright notice, this list of conditions and the following disclaimer.
- 2. Redistributions in binary form must reproduce the above copyright notice, this list of conditions and the following disclaimer in the documentation and/or other materials must be provided with the distribution.
- 3. Neither the name of the copyright holder nor the names of its contributors may be used to endorse or promote products derived from this software without specific prior written permission.

THIS SOFTWARE IS PROVIDED BY THE COPYRIGHT HOLDERS AND CONTRIBUTORS "AS IS" AND ANY EXPRESS OR IMPLIED WARRANTIES, INCLUDING, BUT NOT LIMITED TO, THE IMPLIED WARRANTIES OF MERCHANTABILITY AND FITNESS FOR A PARTICULAR PURPOSE ARE DISCLAIMED. IN NO EVENT SHALL THE COPYRIGHT HOLDER OR CONTRIBUTORS BE LIABLE FOR ANY DIRECT, INDIRECT, INCIDENTAL, SPECIAL, EXEMPLARY, OR CONSEQUENTIAL DAMAGES (INCLUDING, BUT NOT LIMITED TO, PROCUREMENT OF SUBSTITUTE GOODS OR SERVICES; LOSS OF USE, DATA, OR PROFITS; OR BUSINESS INTERRUPTION) HOWEVER CAUSED AND ON ANY THEORY OF LIABILITY, WHETHER IN CONTRACT, STRICT LIABILITY, OR TORT (INCLUDING NEGLIGENCE OR OTHERWISE) ARISING IN ANY WAY OUT OF THE USE OF THIS SOFTWARE, EVEN IF ADVISED OF THE POSSIBILITY OF SUCH DAMAGE.

11 Revision history

Document ID	Release date	Description
UM11798 v.5.0	16 April 2025	Changed the document access to public. No other change in the document.
UM11798 v.4	22 April 2024	 <u>Section 2 "Wireless MCU RW61x"</u>: updated RW61x description. <u>Section 2.2 "RW61x architecture"</u>: updated the block diagrams. <u>Section 2.3 "RW61x MCUXpresso SDK"</u>: updated the list of key components. <u>Section 3.2 "Jumper configuration"</u>: updated the figures. <u>Section 4.1.1 "MCUXpresso SDK download"</u>: updated the figures and added Keil to the list of toolchain/IDE. <u>Section 4.1.2 "GitHub download"</u>: added. <u>Section 5 "RW61x product image setup"</u>: added Keil MDK/µVision. <u>Section 5.1 "Pre-requisites for RW61x image setup"</u>: updated the introduction <u>Section 5.2 "RW61x application image setup"</u>: added Keil MDK/µVision. <u>Section 5.2 "RW61x application image setup"</u>: added Keil MDK/µVision.
UM11798 v.3	12 May 2023	 <u>Section 3.2 "Jumper configuration"</u>: updated <u>Section 4.1.1 "MCUXpresso SDK download"</u>: updated
UM11798 v.2	10 August 2022	 Section 2.2 "RW61x architecture": updated Figure 1 and Figure 2 Section 2.3 "RW61x MCUXpresso SDK": updated Figure 3 Section 3 "RW61x evaluation board": added Flexcomm in Figure 4 Section 3.2 "Jumper configuration": Replaced "Setting"with "Default setting" in Table 1 header Added the note about not changing the other jumpers Updated ANT3 and ANT4 descriptions in Figure 5 Added the indication for QSPI Flash in Figure 6 Section 4.1.1 "MCUXpresso SDK download": updated Section 5 "RW61x product image setup": added MCUXpresso IDE Section 5.2 "RW61x application image setup": updated Section 6 "Run a Wi-Fi demo application": updated Section 7 "Run a Bluetooth LE demo application": updated
UM11798 v.1.0	09 May 2022	Initial version

Getting Started with Wireless on RW61x Evaluation Board Running FreeRTOS

Legal information

Definitions

Draft — A draft status on a document indicates that the content is still under internal review and subject to formal approval, which may result in modifications or additions. NXP Semiconductors does not give any representations or warranties as to the accuracy or completeness of information included in a draft version of a document and shall have no liability for the consequences of use of such information.

Disclaimers

Limited warranty and liability — Information in this document is believed to be accurate and reliable. However, NXP Semiconductors does not give any representations or warranties, expressed or implied, as to the accuracy or completeness of such information and shall have no liability for the consequences of use of such information. NXP Semiconductors takes no responsibility for the content in this document if provided by an information source outside of NXP Semiconductors.

In no event shall NXP Semiconductors be liable for any indirect, incidental, punitive, special or consequential damages (including - without limitation lost profits, lost savings, business interruption, costs related to the removal or replacement of any products or rework charges) whether or not such damages are based on tort (including negligence), warranty, breach of contract or any other legal theory.

Notwithstanding any damages that customer might incur for any reason whatsoever, NXP Semiconductors' aggregate and cumulative liability towards customer for the products described herein shall be limited in accordance with the Terms and conditions of commercial sale of NXP Semiconductors.

Right to make changes — NXP Semiconductors reserves the right to make changes to information published in this document, including without limitation specifications and product descriptions, at any time and without notice. This document supersedes and replaces all information supplied prior to the publication hereof.

Suitability for use — NXP Semiconductors products are not designed, authorized or warranted to be suitable for use in life support, life-critical or safety-critical systems or equipment, nor in applications where failure or malfunction of an NXP Semiconductors product can reasonably be expected to result in personal injury, death or severe property or environmental damage. NXP Semiconductors and its suppliers accept no liability for inclusion and/or use of NXP Semiconductors products in such equipment or applications and therefore such inclusion and/or use is at the customer's own risk.

Applications — Applications that are described herein for any of these products are for illustrative purposes only. NXP Semiconductors makes no representation or warranty that such applications will be suitable for the specified use without further testing or modification.

Customers are responsible for the design and operation of their applications and products using NXP Semiconductors products, and NXP Semiconductors accepts no liability for any assistance with applications or customer product design. It is customer's sole responsibility to determine whether the NXP Semiconductors product is suitable and fit for the customer's applications and products planned, as well as for the planned application and use of customer's third party customer(s). Customers should provide appropriate design and operating safeguards to minimize the risks associated with their applications and products.

NXP Semiconductors does not accept any liability related to any default, damage, costs or problem which is based on any weakness or default in the customer's applications or products, or the application or use by customer's third party customer(s). Customer is responsible for doing all necessary testing for the customer's applications and products using NXP Semiconductors products in order to avoid a default of the applications and the products or of the application or use by customer's third party customer(s). NXP does not accept any liability in this respect. Terms and conditions of commercial sale — NXP Semiconductors products are sold subject to the general terms and conditions of commercial sale, as published at https://www.nxp.com/profile/terms, unless otherwise agreed in a valid written individual agreement. In case an individual agreement is concluded only the terms and conditions of the respective agreement shall apply. NXP Semiconductors hereby expressly objects to applying the customer's general terms and conditions with regard to the purchase of NXP Semiconductors products by customer.

Export control — This document as well as the item(s) described herein may be subject to export control regulations. Export might require a prior authorization from competent authorities.

Suitability for use in non-automotive qualified products — Unless this document expressly states that this specific NXP Semiconductors product is automotive qualified, the product is not suitable for automotive use. It is neither qualified nor tested in accordance with automotive testing or application requirements. NXP Semiconductors accepts no liability for inclusion and/or use of non-automotive qualified products in automotive equipment or applications.

In the event that customer uses the product for design-in and use in automotive applications to automotive specifications and standards, customer (a) shall use the product without NXP Semiconductors' warranty of the product for such automotive applications, use and specifications, and (b) whenever customer uses the product for automotive applications beyond NXP Semiconductors' specifications such use shall be solely at customer's own risk, and (c) customer fully indemnifies NXP Semiconductors for any liability, damages or failed product claims resulting from customer design and use of the product for automotive applications beyond NXP Semiconductors' standard warranty and NXP Semiconductors' product specifications.

HTML publications — An HTML version, if available, of this document is provided as a courtesy. Definitive information is contained in the applicable document in PDF format. If there is a discrepancy between the HTML document and the PDF document, the PDF document has priority.

Translations — A non-English (translated) version of a document, including the legal information in that document, is for reference only. The English version shall prevail in case of any discrepancy between the translated and English versions.

Security — Customer understands that all NXP products may be subject to unidentified vulnerabilities or may support established security standards or specifications with known limitations. Customer is responsible for the design and operation of its applications and products throughout their lifecycles to reduce the effect of these vulnerabilities on customer's applications and products. Customer's responsibility also extends to other open and/or proprietary technologies supported by NXP products for use in customer's applications. NXP accepts no liability for any vulnerability. Customer should regularly check security updates from NXP and follow up appropriately. Customer shall select products with security features that best meet rules, regulations, and standards of the intended application and make the ultimate design decisions regarding its products and is solely responsible for compliance with all legal, regulatory, and security related requirements concerning its products, regardless of any information or support that may be provided by NXP.

NXP has a Product Security Incident Response Team (PSIRT) (reachable at <u>PSIRT@nxp.com</u>) that manages the investigation, reporting, and solution release to security vulnerabilities of NXP products.

 $\ensuremath{\mathsf{NXP}}\xspace$ B.V. — NXP B.V. is not an operating company and it does not distribute or sell products.

Trademarks

Notice: All referenced brands, product names, service names, and trademarks are the property of their respective owners. **NXP** — wordmark and logo are trademarks of NXP B.V.

Getting Started with Wireless on RW61x Evaluation Board Running FreeRTOS

Amazon Web Services, AWS, the Powered by AWS logo, and FreeRTOS — are trademarks of Amazon.com, Inc. or its affiliates.

AMBA, Arm, Arm7, Arm7TDMI, Arm9, Arm11, Artisan, big.LITTLE, Cordio, CoreLink, CoreSight, Cortex, DesignStart, DynamIQ, Jazelle, Keil, Mali, Mbed, Mbed Enabled, NEON, POP, RealView, SecurCore, Socrates, Thumb, TrustZone, ULINK, ULINK2, ULINK-ME, ULINK-PLUS, ULINKpro, µVision, Versatile — are trademarks and/or registered trademarks of Arm Limited (or its subsidiaries or affiliates) in the US and/or elsewhere. The related technology may be protected by any or all of patents, copyrights, designs and trade secrets. All rights reserved. Apple — is a registered trademark of Apple Inc.

Bluetooth — the Bluetooth wordmark and logos are registered trademarks owned by Bluetooth SIG, Inc. and any use of such marks by NXP Semiconductors is under license.

EdgeLock — is a trademark of NXP B.V.

IAR — is a trademark of IAR Systems AB.

J-Link — is a trademark of SEGGER Microcontroller GmbH.

 $\label{eq:segenerative} \begin{array}{l} \textbf{SEGGER Embedded Studio} \mbox{ ---} \mbox{ is a trademark of SEGGER Microcontroller} \\ \textbf{GmbH}. \end{array}$

Getting Started with Wireless on RW61x Evaluation Board Running FreeRTOS

Tab. 3.

Fig. 15.

Fig. 16. Fig. 17.

Fig. 18.

Fig. 19.

Fig. 20.

Fig. 21.

Fig. 22.

Tables

Tab. 1.	Recommended jumper configuration8
Tab. 2.	Abbreviations25

Figures

Fig. 1.	RW610 block diagram4	
Fig. 2.	RW612 block diagram5)
Fig. 3.	MCUXpresso SDK - Wi-Fi, Bluetooth, and	
	802.15.4 layer 6	i
Fig. 4.	RW61x evaluation board diagram7	
Fig. 5.	Top view of RW61x evaluation board9	
Fig. 6.	Bottom view of RW61x evaluation board10	
Fig. 7.	MCUXpresso SDK builder11	
Fig. 8.	Select the development board 11	
Fig. 9.	Selection details12	
Fig. 10.	Developer environment settings12	
Fig. 11.	Select RW61x SDK components13	

Fig. 12.	Download RW61x SDK	
Fig. 13. Fig. 14.	Select the items to download Accept the terms and conditions	

Example of console output for wifi_cli

GitHub SDK web page16

JLink install directory19

IAR install directory 19

application21

Select Health Thermometer Service 23

Temperature display on smartphone screen24

Getting Started with Wireless on RW61x Evaluation Board Running FreeRTOS

Contents

1	About this document	2
1.1	Purpose and scope	2
1.2	Considerations	2
2	Wireless MCU RW61x	3
2.1	RW61x processor	3
2.2	RW61x architecture	4
2.3	RW61x MCUXpresso SDK	6
3	RW61x evaluation board	7
3.1	RW61x evaluation board overview	7
3.2	Jumper configuration	8
4	Software download	11
4.1	SDK download	11
4.1.1	MCUXpresso SDK download	11
4.1.2	GitHub download	16
4.2	Serial console tool setup	17
4.3	SDK development environment	18
5	RW61x product image setup	19
5.1	Pre-requisites for RW61x image setup	19
5.2	RW61x application image setup	20
6	Run a Wi-Fi demo application	21
7	Run a Bluetooth LE demo application	22
7.1	Starting the demo	22
7.2	Establishing a Bluetooth LE connection	23
8	Abbreviations	25
9	References	26
10	Note about the source code in the	
	document	27
11	Revision history	28
	Legal information	29

Please be aware that important notices concerning this document and the product(s) described herein, have been included in section 'Legal information'.

© 2025 NXP B.V.

All rights reserved.

For more information, please visit: https://www.nxp.com

Document feedback Date of release: 16 April 2025 Document identifier: UM11798