

Introduction

This user guide is for BDE-RFM204, a Wireless Module based on TI CC1310. It is a quick start guide for how to connect the module with the evaluation board BDE-EVB07 or with the TI launchpad, and how to build the first application. It also shows a demo for how BDE-RFM204 receives a data packet that is sent from another BDE-RFM204.

Get Ready

The following tools are recommended to develop with BDE-RFM204.

Hardware tools:

- Two modules of BDE-RFM204(<u>BDE-RFM204-915-BDE Technology Inc. (bdecomm.com</u>) BDE-RFM204-868-BDE Technology Inc. (bdecomm.com))
- Two BDE-ADP203D V1.0 (adaptor board)
- PC or Laptop
- Two BDE-EVB07 (<u>BDE-EVB07-BDE Technology Inc. (bdecomm.com</u>)) or
- Two TI Launchpad (LAUNCHXL-CC1310 Evaluation board | TI.com)
- USB cable for power supply and debugging

Software tools:

- Terminal software such as CCS, IAR.
- <u>CCS download</u>
- <u>Software Development Kit (SDK)</u>

Build Your First Application

Once have the Hardware and Software tools in place, please following the following steps:

A. Connect the Hardware

If chose EVB07:

Use USB cable to connect EVB07 and PC or laptop. Plug BDE-RFM204 with the adaptor board into the dev board and connect all the pins with Jumpers as the following picture shows.



Wireless Module



If chose TI Launchpad: The connection is as following.



Wireless Module



Connection Designator	BDE-RFM204	LaunchPad Pin
3V3 Power	VDD	3V3
Ground	GND	GND
RST	RST	RESET
TMS	TMS	TMS
ТСК	ТСК	ТСК
TDO	DIO16	TDO
TDI	DIO17	TDI

Optional: TDO, TDI, RXD, TXD

B. Build the Application

Download and install the CCS and SDK

From the above links, follow the instructions in the following steps to download and install the CCS and SDK.

CCS Installation

1. Click on this option

CCSTUDIO-WCS		Downloads
Overview Downloads	Technical documentation Support & training	
Downloads		
Ó	IDE, CONFIGURATION, COMPILER OR DEBUGGER CCSTUDIO – Code Composer Studio (CCS) Integrated Development Environment (IDE)	ad options
	Code Composer Studio is an integrated development environment (IDE) that supports TI's Microcontroller and Embedded Processors portfolio. Code Composer Studio comprises a suite of tools used to develop and debug embedded applications. It includes an optimizing C/C++ compiler, source code editor ()	
	Supported products & hardware	

2. Select an option to download CCS

BDE-I	RFM204 USER GUIDE	TEXAS INSTRUMENTS Partner
ireless	s Module	User Guide
	Download options	×
	Code Composer Studio (CCS) Integrated Development Environment (IDE)	
	Version: 10.3.0.00007	
	Release date: 05 Apr 2021	
	SINGLE FILE INSTALLERS	
	$ \underline{\downarrow} $ Windows single file installer for CCS IDE (1181753652 KB)	
	$ \underline{\downarrow} $ Linux single file installer for CCS IDE (1102001729 KB)	
	$ \underline{\downarrow} $ macOS single file installer for CCS IDE (1083552986 KB)	
	ON-DEMAND INSTALLERS	
	↓ Windows on-demand installer for CCS IDE (40136960 KB)	
	↓ Linux on-demand installer for CCS IDE (25338386 KB)	

3. Unzip the package to a local disc



	4. Click the setup of CCS	1.0 · · · · · · · · · · · · · · · · · · ·
	📙 binary	2021/3/29 21:38
	📜 CCS10.3.0.00007_win64	2021/4/19 11:23
	📜 components	2021/3/29 21:38
•	📜 features	2021/3/29 21:38
Þ	📄 artifacts.jar	2021/3/29 21:38
	馣 ccs_setup_10.3.0.00007.exe	2021/3/29 21:37
	content.jar	2021/3/29 21:38
	README_FIRST_win64.txt	2021/3/29 21:38
	itimestamp.txt	2021/3/29 21:38

5. Click "Next"

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Wireless Module





6. Select the default option

🔯 Setup				×
License Agreement			ĺ	î
Please read the following License Agreement. You must accept the terms of this agreement	ent before con	tinuing with the i	nstallation	n.
TECHNOLOGY SOFTWARE PUBLICLY AVAILABLE				^
Copyright (c) 2016 Texas Instruments Incorporated				
All rights reserved not granted herein.				
Limited License Agreement.				
This Limited License Agreement ("Agreement") is a legal agreement between entity) and Texas Instruments Incorporated ("TI"). The "Software" consist the materials identified as TI proprietary software programs in the softwa subject to the terms herein, and any "on-line" or electronic documentation any portion thereof (the "Licensed Materials"), and (b) the materials iden third party proprietary software in the software manifest for the Software Software"). For clarification, your use of the Licensed Materials is subject contained in this Agreement and your use of the Public Software is subject specified in the applicable software manifest and/or identified or include mulu. This Agreement does not limit your yights under or grant you right	you (either a s of the fol: remanifest : associated a tified as op , or any port ect to the l to the sepa: d with the m to that cupon	an individual lowing materia for the softwa with these pro- en source mate- tion thereof (icensing terms rate licensing aterials to wh reodo the licensing	or lls: (a) re grams, (rials or "Public ; terms ich they	or r
Do you accept this license? I do not accept the agreement				
VMware InstallBuilder	< Back	Next >	Canc	el



8. Select the Installation Directory

🔀 Setup	- 🗆 X
Installation Directory	Ô
Please specify the directory where Code Composer Studio 10.3.0.00007 will be installed.	
Installation Directory C:\ti\ccs1030	
VMware InstallBuilder	
< Back N	ext > Cancel

Wireless Module



9. Select the default option

😚 Setup	_		×
Setup type		Í	Ŷ
Choose the installation type that you prefer			
 Custom Installation (Recommended) This selection allows for selecting which device families and debug probes will be supported. A custom the amount of disk space used and improve performance. It is possible to modify selections in the futurinstaller again. Full Installation This selection installs support for all device families and debug probes. Approximately 4GB of disk span not all device families and debug probes are supported on Linux and macOS. 	n installatior are by runni	red. No	duce te that
VMware InstallBuilder	Next >	Can	cel

10. Select the component

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Select Components	Û
Select the components you want to install; clear the components you do not continue.	want to install. Click Next when you are ready to
MSP430 ultra-low power MCUs SimpleLink [™] MSP432 [™] low power + performance MCUs SimpleLink [™] W:Fi® CC32xx Wireless MCUs CC2538 IEEE 802.15.4 Wireless MCUs C22000 real-time MCUs TM4C12x ARM® Cortex®-M4F core-based MCUs Hercules [™] Safety MCUs Sitara [™] AMx Processors OMAP-L1x DSP + ARM9® Processor DaVinci (DM) Video Processors OMAP Processors OMAP Processors DAVinci (DM) Video SoCs & Jacinto DRAx Infotainment SoCs	Click on a component to get a detailed description
 C55x ultra-low-power DSP C6000 Power-Optimized DSP G6AK2x multicore DSP + ARM® Processors & C66x KeyStone™ multicor mmWave Sensors C64x multicore DSP UCD Digital Power Controllers PGA Sensor Signal Conditioners 	
VMware InstallBuilder	< Back Next > Cancel

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11. Select the default option Setup	_	
Install debug probes		Ô
Select the debug probes you want installed.		
Spectrum Digital Debug Probes and Boards		
SEGGER J-Link		
VMware InstallBuilder	ck Next >	Cancel

12. Click "Next"

😚 Setup	- 🗆 ×
Unsupported Boards	Ŷ
Please note, the following debug probes and boards with onboard debug probes are not supported:	
XDS510 Debug Probes	
C6x1x DSP Starter Kit	
C5510 DSP Starter Kit	
C5509 DSP Starter Kit	
VMware InstallBuilder	
< Back	Next > Cancel

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Wireless Module		User Guide
13. Click "Next"		
😚 Setup	-	
Ready to Install		Û
Setup is now ready to begin installing Code Composer Studio 10.3.0.00007 on your computer.		
	\mathbf{N}	
	\mathbf{X}	
VMware InstallBuilder		
< Bac	k Next >	Cancel

14. Waiting for installation to complete

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VMware InstallBuilder				< Back	Next >	Ca	ncel

Wireless Module



Software Development Kit (SDK) installation

1. Click on this option

SIMPLELINK-CO	C13X0-SDK	Downloads
Overview Download	Technical documentation Related design resources Support & training	
Downloads	proceeding software Supported products & hardware	
	pporting sortware Supported products & hardware	
SDK	software development кit (sdk) SIMPLELINK-CC13X0-SDK — SimpleLink™ CC13x0 Software Development Kit Supported products & hardware	Download options
SDK	software development кit (sdk) SIMPLELINK-CC13X0-SDK-CLOUD — SimpleLink™ CC13X0 software development kit cloud development on TI Resource Explorer	Start evaluation

2. Select an option you need to download SDK



3. Log in to your TI account, if you are a new user, register a TI account first

Wireless Module



myTl account

myTI FAQ

Existing myTl user?

Your email address
Your myTI password
······
Remember me
Login
Forgot your password?
By logging in, you agree to TI's Terms of use & Privacy policy.

4. Select "civil" if your application is for civil use

	U.S. Government export approval:	
ort	All fields are Required. Incomplete information will be DENIED.	
II	First name:	
e will d 1-	Last name:	
	Your email address:	
	Your full company/university name:	
	Country this file will be used in:	
	What end-equipment/application will you use this file for:	
	Civil	
	l certify that the following is true:	

Wireless Module



5. Select "Yes" and submit
compliance with any such import, use, or export restrictions.
I / We hereby certify that we will adhere to the conditions above.
I / We do not know of any additional facts different from the above.
I / We take responsibility to comply with these terms.
I / We understand we are responsible to abide by the most current. versions of the Export Administration Regulations and other U.S. export and sanctions laws.

6. Download SDK

TI Home

TI Request

You have been approved to receive this file. Click "Download" to proceed.

In a few moments, you will also receive an email with the link to this file.



Thank you, Texas Instruments

7. Installation



9. Select the default option

DE-RFM204 USER GUIDE	Partr
eless Module	User Gui
Setup	- 🗆 X
License Agreement	🤴 Texas Instruments
Please read the following License Agreem agreement before continuing with the inst	nent. You must accept the terms of this tallation.
Source and Object Code Software Lic IMPORTANT - PLEASE CAREFULLY READ T WHICH IS LEGALLY BINDING. AFTER YO WHETHER YOU ACCEPT AND AGREE TO ITS ACCEPT" UNLESS: (1) YOU WILL USE TH OWN BENEFIT AND PERSONALLY ACCEPT, BY THESE TERMS; OR (2) YOU ARE AUTH	ense Agreement
Do you accept this license? I accept O I do not	the agreement accept the agreement

10. Select the Installation directory

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Installation Directory	Instf	RUME	NTS
Please specify the directory where SimpleLink CC13x0 SDK installed.	4.20.00.0	5 will be	
The following directories will be created in this directory:			
simplelink_cc13x0_sdk_4_20_00_05 xdctools_3_51_03_28_core			
Installation Directory C:\ti	1		
InstallBuilder Sack Ne	ext >	Canc	el

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reless Module	User Guide
11. Click "Next"	
Setup	– 🗆 X
Ready to Install	🔱 Texas Instruments
Setup is now ready to begin insta computer.	lling SimpleLink CC13x0 SDK 4.20.00.05 on your
InstallBuilder	
	< Back Next > Cancel

12. Waiting for installation to complete		
Setup	— 🗆	×
Installing	Texas Instrume	NTS
Please wait while Setup installs SimpleLink CC computer.	13x0 SDK 4.20.00.05 on your	
Installing		
Creating directory C:[]s\packages\ti\s	sbios\family\arm\m3\doc-files	
L		
InstallBuilder		
< Ba	ck Next > Cano	cel

Wireless Module

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- Run an example/demo code
 - 1. For the first module, find the option named "Import CCS project..."

📸 workspace v11 - simple peripheral CC26X2R1 LAUNCHXL tirtos ccs/Profiles/ File Edit View Navigate Project Run Scripts Window Help 🗄 🕶 📟 👒 🖳 🖉 🔅 🕶 🛛 🗳 New CCS Project... Project Wizard (Resource Explorer) 🖻 Project Explorer 🛛 > 🛎 simple_peripheral cc 🍯 New Energia Sketch... **Build Project Build All** Ctrl+B **Build Configurations** > **Build Working Set** > Clean... **Build Automatically** Show Build Settings... Import CCS Projects... Import Legacy CCSv3.3 Projects... Add Files... **RTSC Tools** > ዿ Import Energia Sketch... 🛋 Import Energia Libraries... C/C++ Index > Properties

 According to the following path to find the sending end project: ti\simplelink_cc13x0_sdk_4_20_00_05\examples\rtos\CC1310_LAUNCHX L\ easylink\ rfEasyLinkRx\tirtos\ccs

BDE Technology Inc.





3. Open the "CC1310_LAUNCHXL.c", comment these lines as the arrows show.



4. Open the "CC1310_LAUNCHXL_fxns.c", comment the line as the arrows shows.

TEXAS INSTRUMENTS

User Guide

artner

Wireless Module



workspace_v20 - rfEasyLinkRx_CC1310_LAUNCHXL_tirtos_ccs/CC1310_LAUNCHXL_fxns.c - Code Com File Edit View Navigate Project Run Scripts Window Help



5. Right Click the project to build the receiving end project

😚 workspace v20 - Code Composer Studio



6. Click this bug icon (means download and debugging)

Wireless Module



😚 workspace v20 - Code Composer Studio File Edit View Navigate Project Run Scripts Window Help ! 😁 ▾ 🔚 🐚 ! ≪ ▼ ! 🖉 ! 🔗 ▼ ! 🖳 ! 📴 ! 🚱 🔳 💠 ▼ ! 💯 ▼ ! ѷ (> ▼ <> ▼ 🗆 🔄 🏹 🕴 🗖 🖻 Project Explorer 🛛 General Stress Stres > * Project Dependencies >
 final Includes > 🗁 Debug > 🖻 easylink > b smartrf_settings > bargetConfigs > 🖻 Board.h > CC1310 LAUNCHXL fxns.c > CC1310 LAUNCHXL TIRTOS.cmd > CC1310 LAUNCHXL.c >
 CC1310 LAUNCHXL.h > 🖻 ccfg.c > le rfEasyLinkRx.c Reard.html overview.rov.json README.md

> # tirtos builds CC1310 LAUNCHXL release ccs

7. Click on this option to start debugging

😚 workspace_v20 - rfEasyLinkRx_CC1310_LAUNCHXL_tirtos_ccs/rfEasyLinkRx.c - C
File Edit View Proje <u>ct T</u> ools Run Scripts Window Help
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* Debug ∞
v @ rfEasyLinkRx_CC131 LAUNCHXL_tirtos_ccs [Code Composer Studio - Device
Prove Provide Action of the second
≡ main() at rfEasyLin. Rx.c:211 0x00003B38
<pre>_c_int00() at boot.asio:254 0x00005754 (_c_int00 does not contain fram</pre>
In rfEasyLinkRx.c ⊠
211 {
212 /* Call driver init functions */
213 Board_initGeneral();
214
215 /* Open LED pins */
<pre>216 ledPinHandle = PIN_open(&ledPinState, pinTable);</pre>
<pre>217 Assert_isTrue(ledPinHandle != NULL, NULL);</pre>
219 /* Clear LED pins */
220 PIN_setOutputValue(ledPinHandle, Board_PIN_LED1, 0);
221 PIN_SetOutputvalue(ledPinHandle, Board_PIN_LED2, 0);
222 223 nvTask init(ledPinHandle):
224
225 /* Start BIOS */
226 BIOS start():
227

Wireless Module



8. Find the file which is named "rfEasyLinkRx.c" and the function which is named "rxDoneCb", and set a breakpoint at the line as the arrows shows

workspace_v20 - rfEasyLinkRx_CC1310_LAUNCHXL_tirtos_ccs/rfEasyLinkRx.c - Code Composer S File Edit View Project Tools Run Scripts Window Help

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-	ऽ ▾ ;ﷺ : ::::::::::::::::::::::::::::::::
* Debug ≈	E 🔆 8 🗖 🗖
✓ ♥ rfEasyL	inkRx CC1310 LAUNCHXL tirtos ccs [Code Composer Studio - Device Debugging]
P Texa	s Instruments XDS110 USB Debug Probe/Cortex M3 0 (Running)
	5, (),
Interpretation of the second secon	Rx.c 🛛
91 #endi	
92	
93 / ****	* Function definitions *****/
94#ifdet	F REFASYLTNKRX ASYNC
95 void r	rxDoneCb(EasyLink_RxPacket * rxPacket, EasyLink_Status status)
96 {	
97 11	f (status == EasyLink_Status_Success)
98 (/* Toggle LED2 to indicate DX */
0100	PIN setOutputValue(ninHandle Board PIN LED2 LPIN getOutputValue(
101	111_becouchactarae(printmate; boar a_121_bbb; h111_Becouchactarae(
02 el	lse if(status == EasyLink_Status_Aborted)
13 {	
101	/* Toggle LED1 to indicate command aborted */
105	PIN_setOutputValue(pinHandle, Board_PIN_LED1,!PIN_getOutputValue(
106 }	
107 e.	Lse
100	
108 {	

9. For another module, according to the following path to find the sending end project:

ti\simplelink_cc13x0_sdk_4_20_00_05\examples\rtos\CC1310_LAUNCHX L\ easylink\ rfEasyLinkTx\tirtos\ccs

😚 Import CCS Projects		_	
Import CCS Projects			
Import existing CCS Project	ts or example CCS Proje	cts.	
		12.0 11.1.20	
• Select search-directory:	C:\1310SDK\simplelink	_cc13x0_sdk_4_20_	Browse
 Select archive file: 			Browse
Discovered projects:			
✓ ■ rfEasyLinkTx_CC13	310_LAUNCHXL_tirtos_co	s [rfEasyLinkTx_CC	Select All
			Deselect All
			Refresh
<		>	
Automatically import re	ferenced projects found	in same search-dire	ctory
Copy projects into work	space		
Open <u>Resource Explorer</u> to	browse a wide selection	of example project	5
3		Finish	Cancel

Wireless Module



10. Open the "CC1310_LAUNCHXL.c", comment these lines as the arrows show.

😚 workspace v21 - rfEasyLinkTx CC1310 LAUNCHXL tirtos ccs/CC1310 LAUNCHXL.c - Code Composer Studio



11. Open the "CC1310_LAUNCHXL_fxns.c", comment the line as the arrows shows.

workspace_v21 - rfEasyLinkTx_CC1310_LAUNCHXL_tirtos_ccs/CC1310_LAUNCHXL_fxns.c - Code Composer S File Edit View Navigate Project Run Scripts Window Help



Wireless Module



12. Right Click the project to build the sending end project workspace_v21 - Code Composer Studio

File Edit View Navigate Project Run Scripts Window Help

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Project Explorer ⊠	
"" "FEasyLinkTx_CC1310_LAUNCHXL_t	New Deb
Project Dependencies	
> 🗊 Inclució	Show In Alt-
› 🗁 Debug	Show in Local Terminal
> 🖻 easylink	
> 🖻 smartrf_settings	Add Flies
> 🖻 targetConfigs	Сору
> 🖻 Board.h	Paste
> 🖻 CC1310 LAUNCHXL fxns.c	× Delete
> CC1310 LAUNCHXL TIRTOS.cmd	Refactor
> © CC1310 LAUNCHXLc	Source
> CC1310 LAUNCHXL.h	Move
> 🖻 ccfg.c	Rename
› 🖻 rfEasyLinkTx.c	Import
🗟 Board.html	
overview.rov.json	a Export
README.md	Show Build Settings
> 🛎 tirtos_builds_CC1310_LAUNCHXL_rel	Build Project
	Clean Project
	Rebuild Project

13. Click this bug icon (means download and debugging)

😚 workspace_v21 - Code Composer Studio

File Edit View Navigate Project Run Scripts Window Help
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> 🐡 Project Dependencies
> 🔊 Includes
> 🗁 Debug
> 🗁 easylink
> >> smartrf_settings
> 🗁 targetConfigs
> 🖻 Board.h
CC1310_LAUNCHXL_fxns.c
> CC1310_LAUNCHXL_TIRTOS.cmd
> CC1310_LAUNCHXL.c
> CC1310_LAUNCHXL.h
> 🖻 ccfg.c
> Id rfEasyLinkTx.c
😪 Board.html
overview.rov.json
README.md
>

Wireless Module



14. Click on this option to start debugging 😚 workspace v21 - rfEasyLinkTx CC1310 LAUNCHXL tirtos ccs/rfEasyLinkTx.c -File Edit View Project Tools Run Scripts Window Help i 📩 🔻 🔚 🐚 🔦 🔻 i 🖾 i 📮 🕨 ■ 3. 19. 12 🔳 🖳 🍬 🚇 🔻 🔊 🗞 🗶 🖛 👌 🖝 🔅 🕶 † Debug ⊠ ✓ ♥ rfEasyLinkTx CC1310 L▲UNCHXL tirtos ccs [Code Composer Studio - Devi main() at rfEasyLinkTx. 250 0x00003A58 ■ c int00() at boot.asm:234 0x00005780 (c int00 does not contain fi Interpretation Interpretatio Interpretation Interpretation Interpretation Int 250 { 251 /* Call driver init functions. */ 252 Board_initGeneral(); 253 254 /* Open LED pins */ pinHandle = PIN_open(&pinState, pinTable); 255 256 Assert_isTrue(pinHandle != NULL, NULL); 257 258 /* Clear LED pins */ 259 PIN_setOutputValue(pinHandle, Board_PIN_LED1, 0); 260 PIN_setOutputValue(pinHandle, Board_PIN_LED2, 0); 261 262 txTask_init(pinHandle); 263 264 /* Start BIOS */ 265 BIOS_start(); 266



15. You can see the lights flashing (means sending a data uninterruptedly)

Wireless Module



16. The program stops at the breakpoint

workspace_v20 - rfEasyLinkRx_CC1310_LAUNCHXL_tirtos_ccs/rfEasyLinkRx.c - Code Con File Edit View Project Tools Run Scripts Window Help



By far you should've built your first application successfully.

For further development, please check out the <u>CC1310 data sheet</u>, product information and <u>support | TI.com</u> page and download the User guide <u>(https://www.ti.com/lit/pdf/swcu185)</u>

Other Resources

Mac OS Installer for SimpleLink CC13X2 26X2 SDK

Linux Installer for SimpleLink CC13X2 26X2 SDK

Mac OS Installer for Code Composer Studio IDE

Linux Installer for Code Composer Studio IDE

<u>CC1310 SimpleLink™ Ultra-Low-Power Sub-1 GHz Wireless MCU</u>

Windows Installer for SmartRF Flash Programmer 2

Wireless Module



More Questions:

Please search existing answers on <u>TI E2E support forums</u>

Contact your local TI sales representative. Or Contact BDE Technology, Inc.

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USA: 67 E Madison St, #1603A, Chicago, IL 60603 Tel: +1-312-379-9589 Website: <u>http://www.bdecomm.com/</u> Email: <u>info@bdecomm.com</u>