BDE-SG1311P3 USER GUIDE

1. Introduction

This user guide is for BDE-SG1311P3, a Wireless Module based on TI CC1311P3. It is a quick start guide for how to connect the module with the evaluation board BDE-EVB07, and how to build the first application. It also shows a demo for how BDE-SG1311P3 receives a data packet that is sent from another BDE-SG1311P3.

2. Get Ready

The following tools are recommended to develop with BDE-SG1311P3.

Hardware tools:

- Two modules of BDE-SG1311P3(BDE-SG1311P3-BDE Technology Inc. (bdecomm.com))
- PC or Laptop
- Two Evaluation boards of BDE-EVB07 (BDE-EVB07-BDE Technology Inc. (bdecomm.com))
- USB cable for power supply and debugging

Software tools:

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

3. Build Your First Application

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

3.1. Connect the Hardware

Connect the EVB07 to a PC or laptop using a USB cable. As shown in Figure 1, plug BDE-SG1311P3 with adapter board into the development board and connect all pins with jumper caps. Note that TXD and RXD need to be connected to DIO13 and DIO12 with jumpers. Users can connect according to the mapping in Table 1.

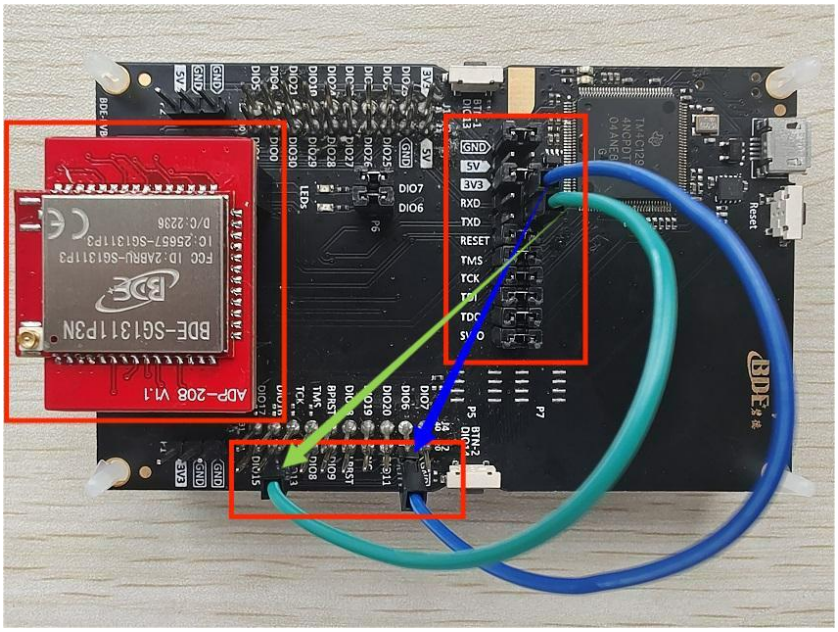

Figure 1. Diagram of pin connection

Table 1. Pin mapping between BDE-EVB07 and BDE-SG1311P3

Connection Designator	BDE-SG1311P3
3V3 Power	VDD
Ground	GND
RXD	DIO12
TXD	DIO13
RST	RST
TMS	TMS
TCK	TCK
TDO	DIO16
TDI	DIO17

3.2. 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**

Step 1: Click the “Download options” option

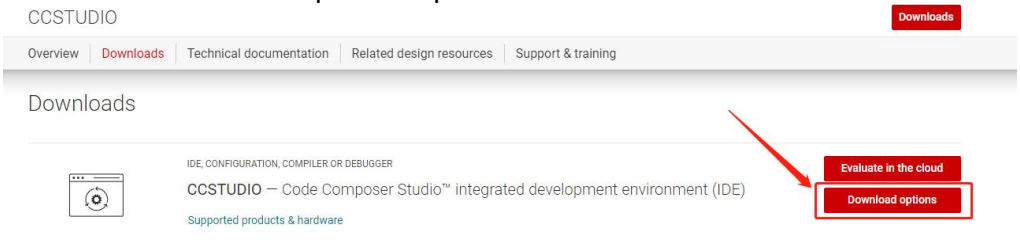

Figure 2. Download CCS

Step 2: Select an option to download CCS

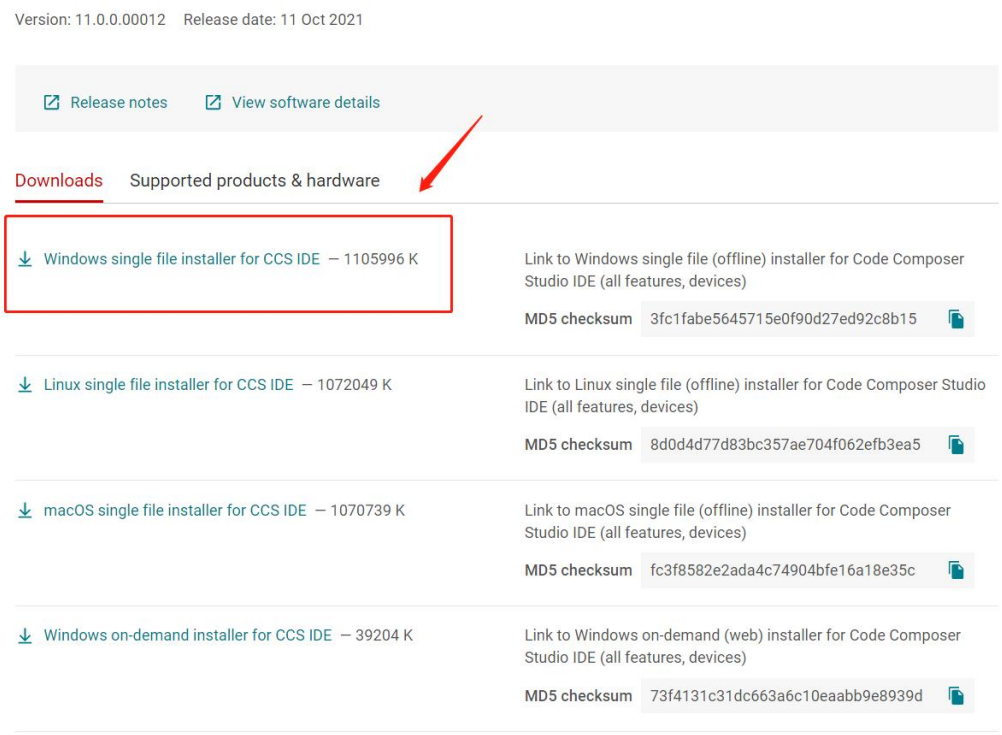

Figure 3. Download the appropriate version for CCS

Step 3: Unzip the package to a local disc

Figure 4. Unzip the CCS package

Step 4: Double-click the setup of CCS

Figure5. Setup CCS

Step 5: Click “Next”

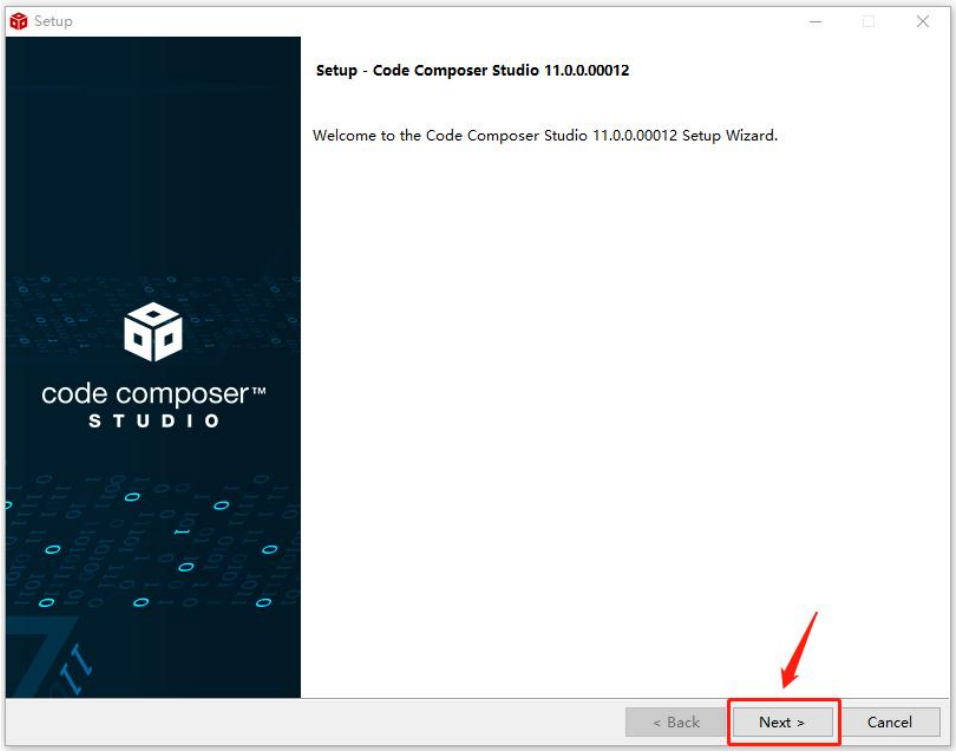

Figure6. Welcome screen for setup CCS

Step 6: Select the default option

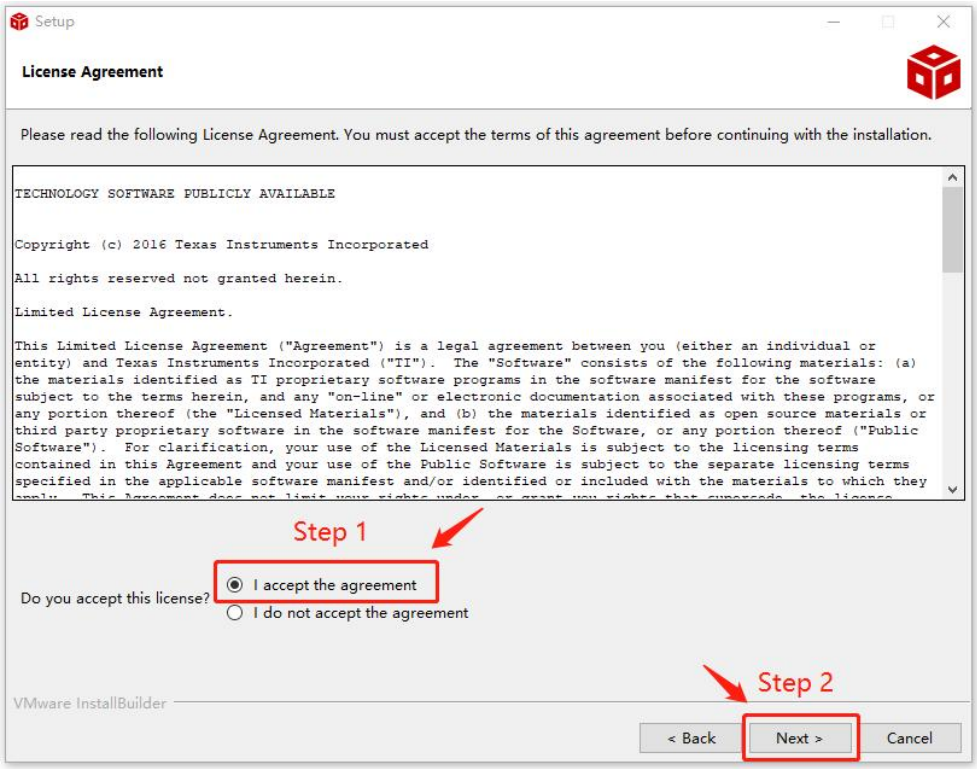

Figure7. Accept the agreement for CCS

Step 7: Click “Next”

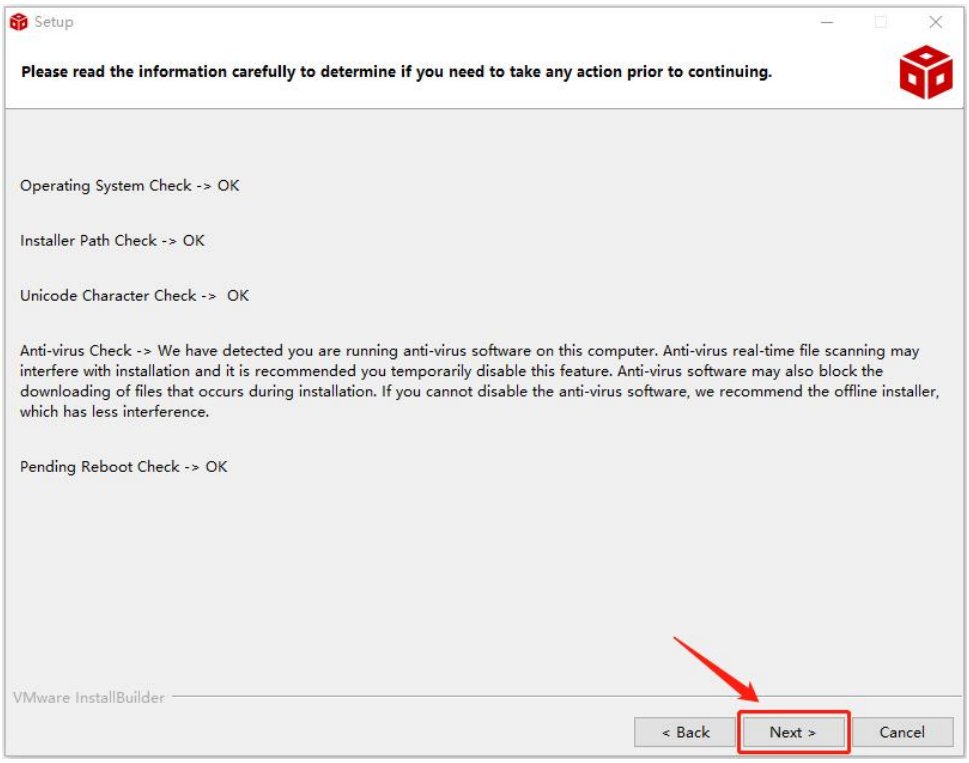

Figure8. Check the installation for CCS

Step 8: Select the Installation Directory (Usually by default)

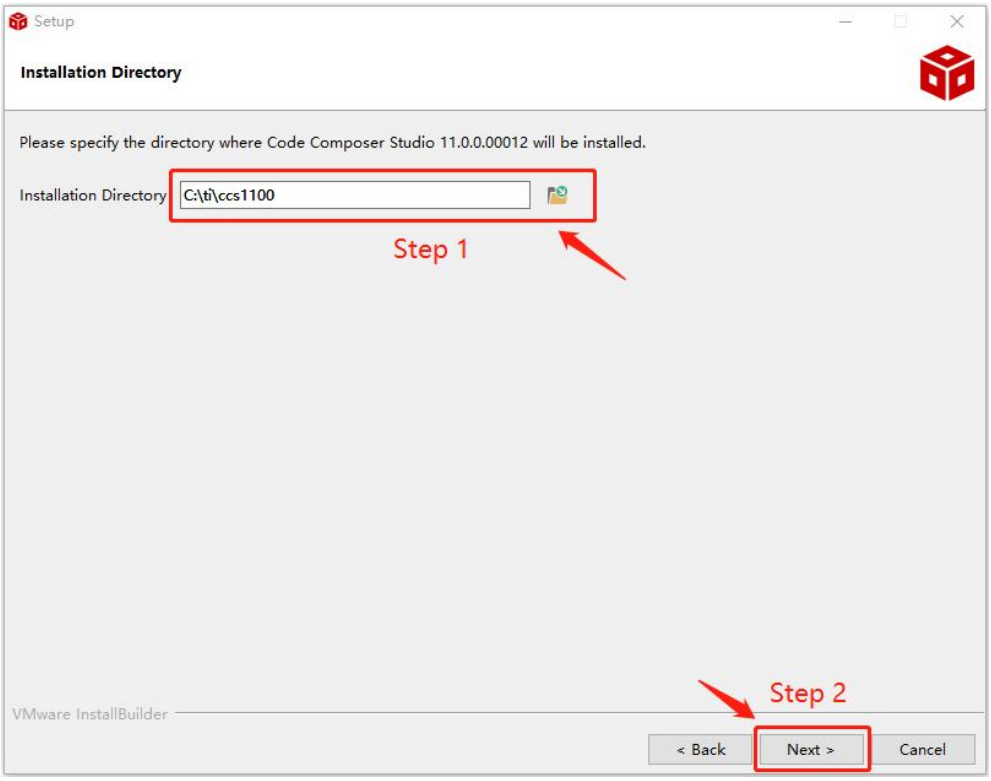

Figure9. Specify the directory for CCS

Step 9: Select the default option

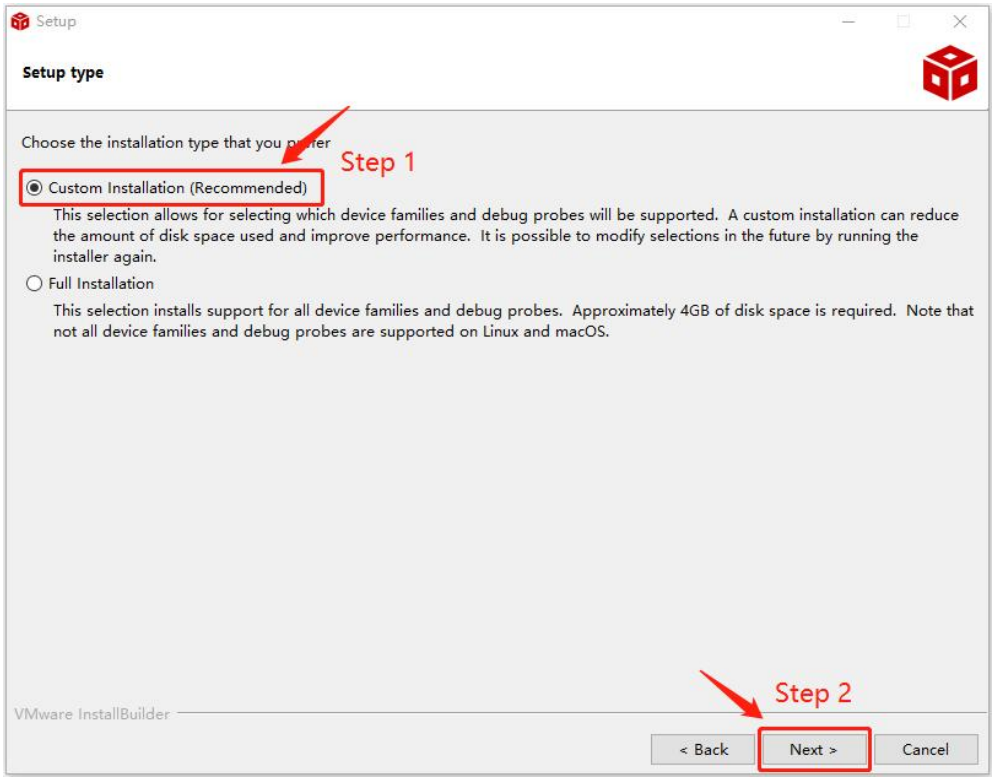

Figure10. Choose the installation type for CCS

Step 10: Select the component

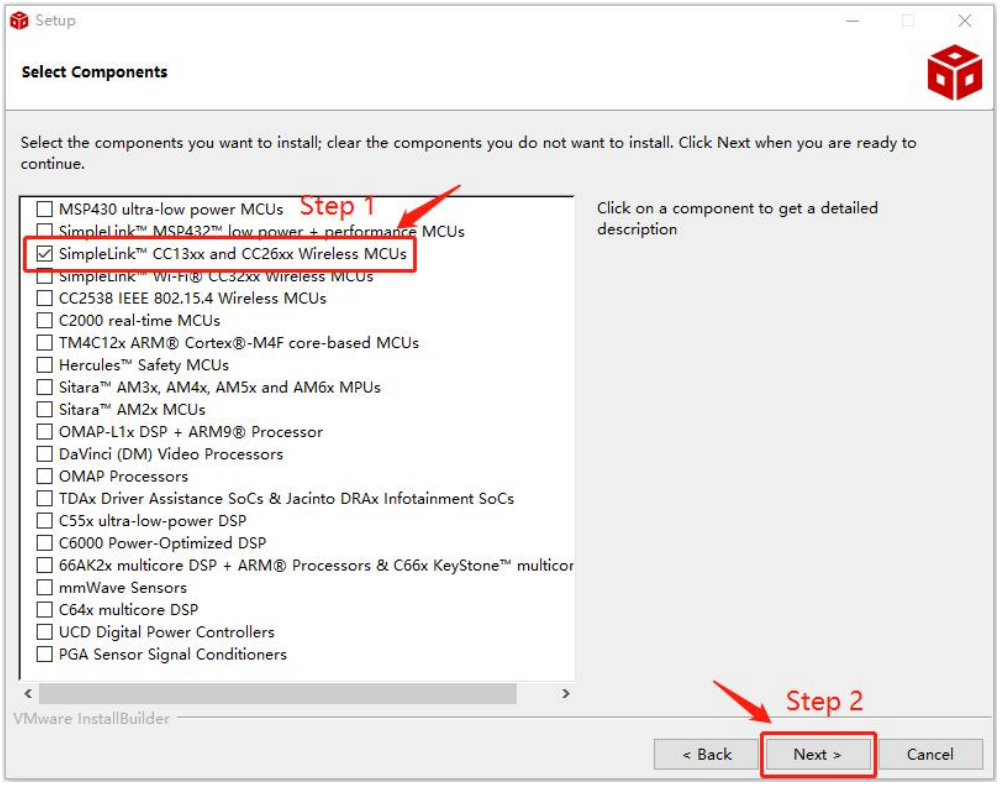

Figure11. Select the components for CCS

Step 11: Select the default option

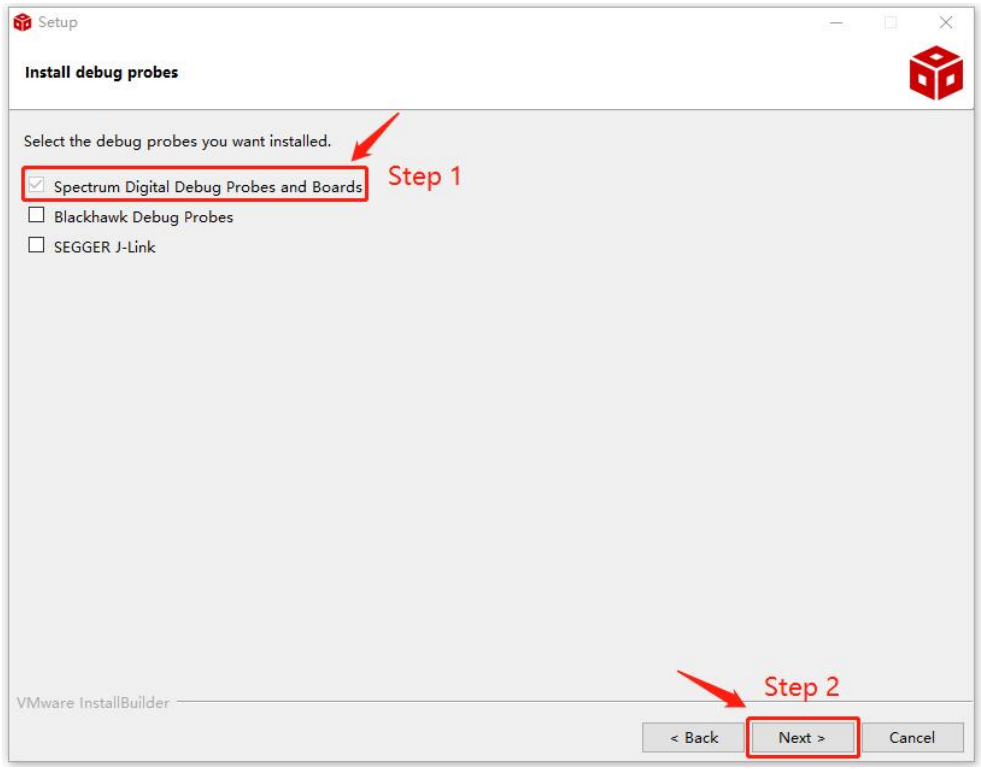

Figure12. Select the debug probes for CCS

Step 12: Click “Next”

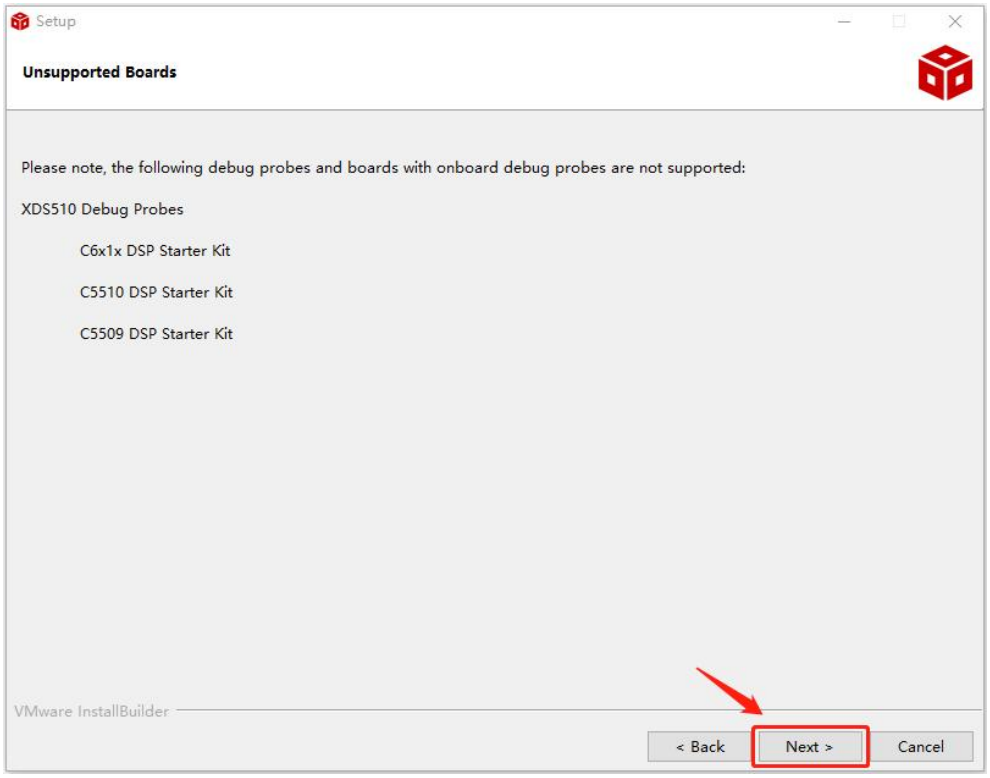

Figure13. Unsupported boards for CCS

Step 13: Click “Next”

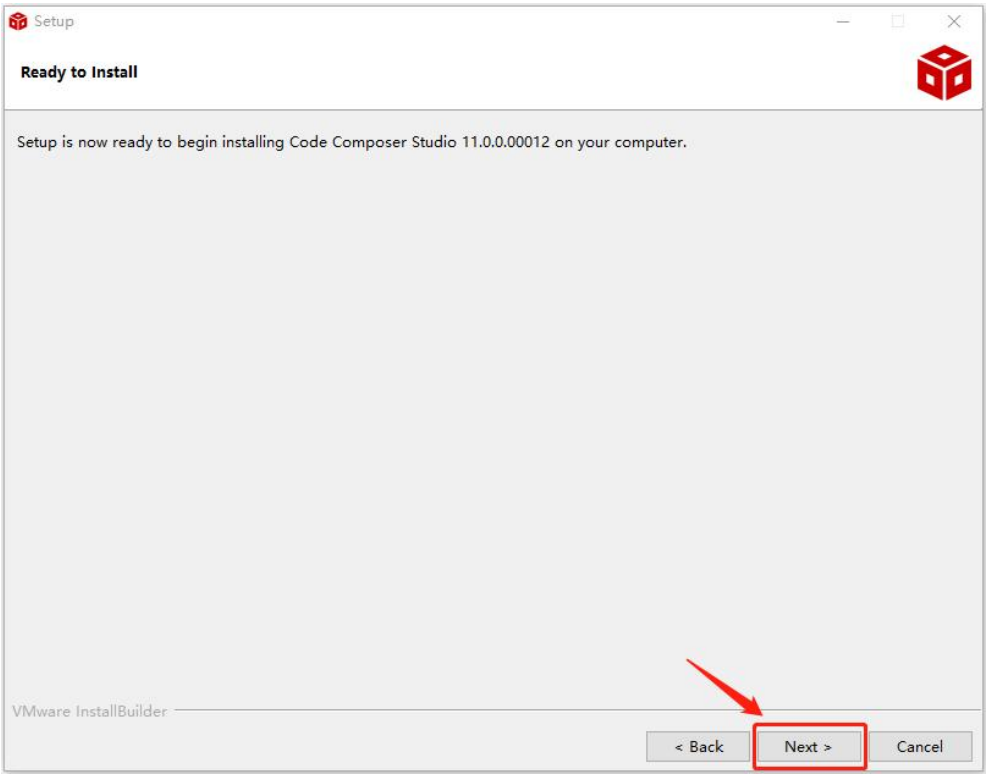

Figure14. Ready to install CCS

Step 14: Waiting for installation to complete

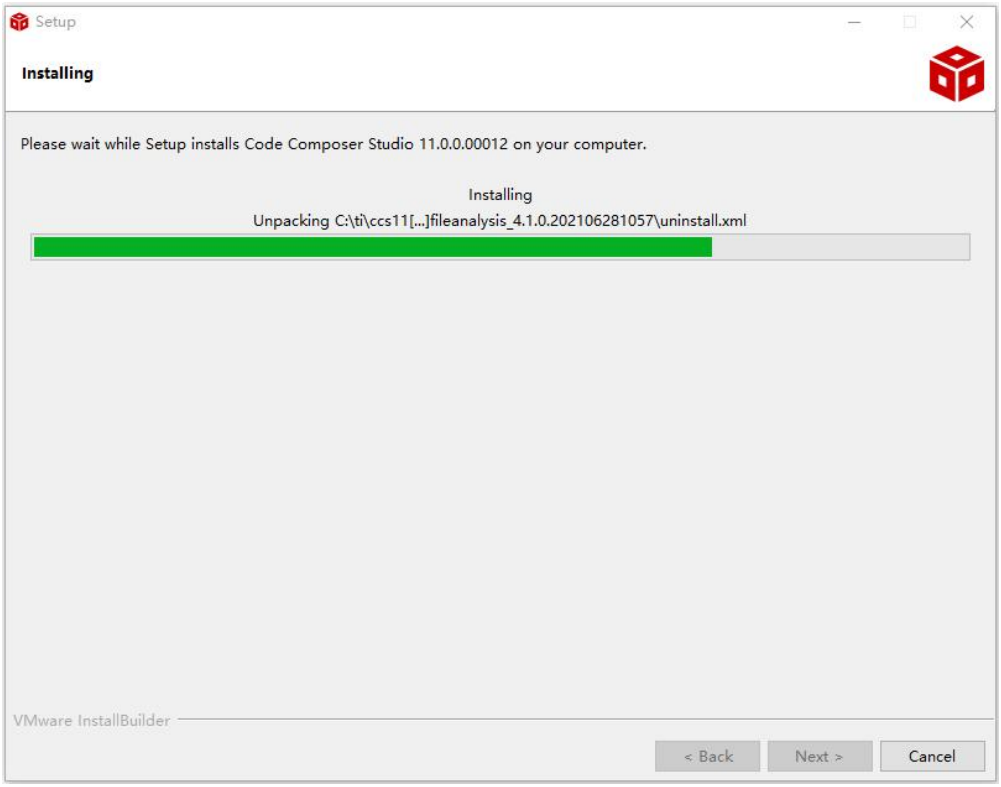

Figure15. Waiting for installation to complete for CCS

Step 15: Finish

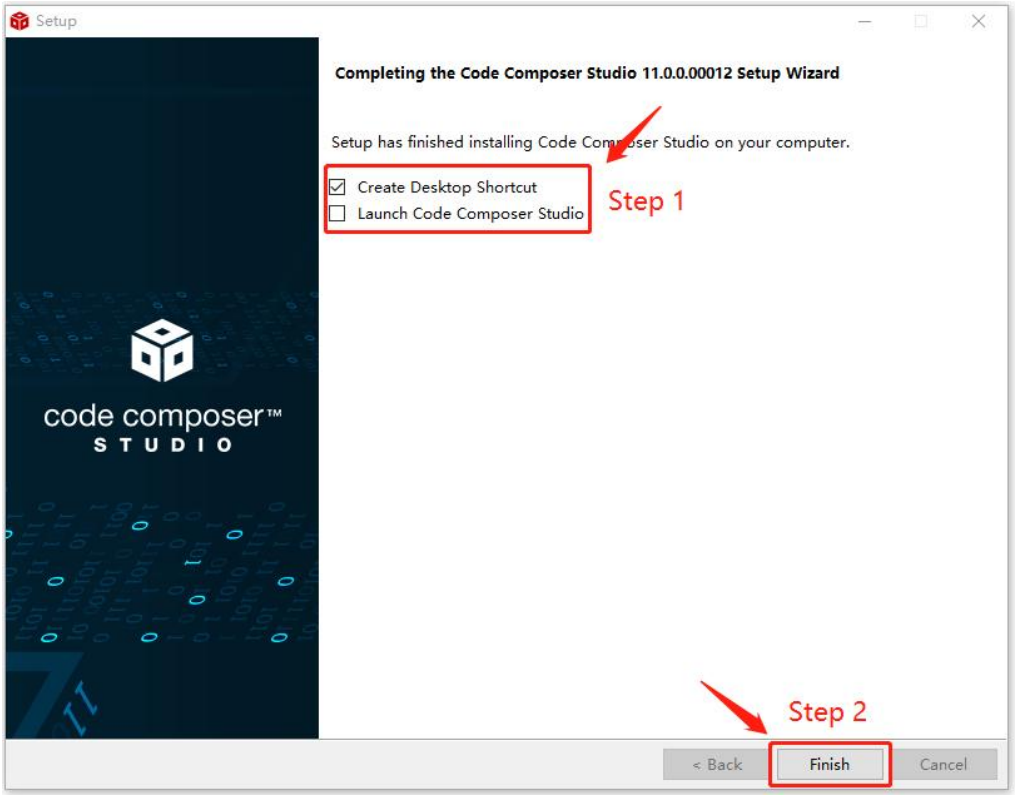

Figure16. Completing the CCS Setup Wizard

- **Software Development Kit (SDK) installation**

Step 1: Click on this option

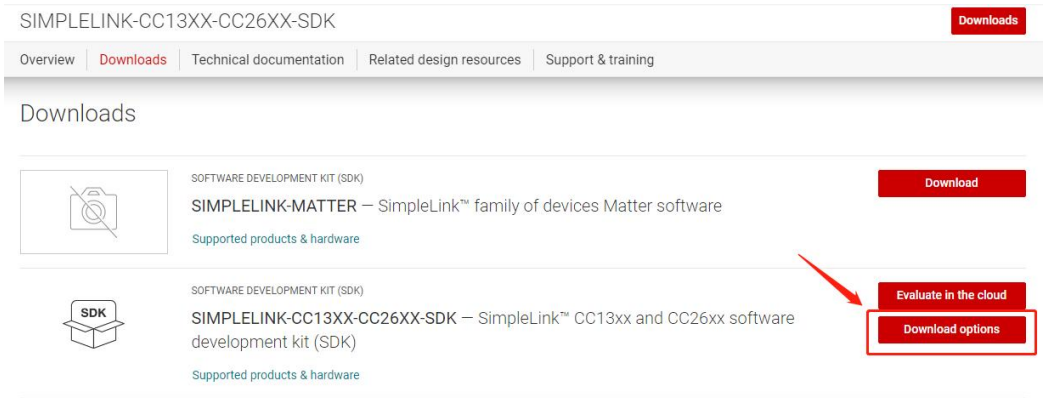

Figure 17. Download SDK

Step 2: Select an option you need to download SDK

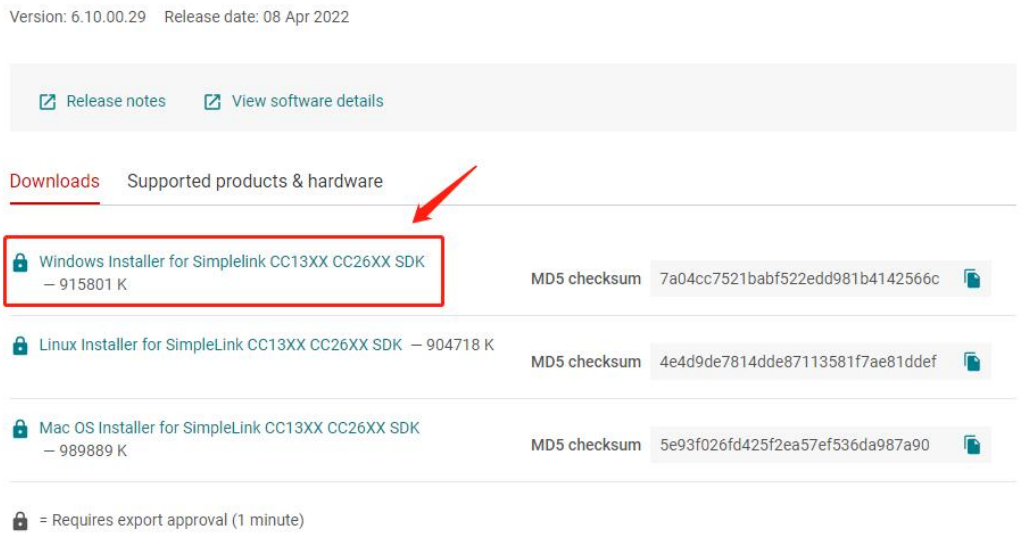

Figure 18. Download the appropriate version for SDK

Step 3: Login to your TI account. If you are a new user, please register a TI account first

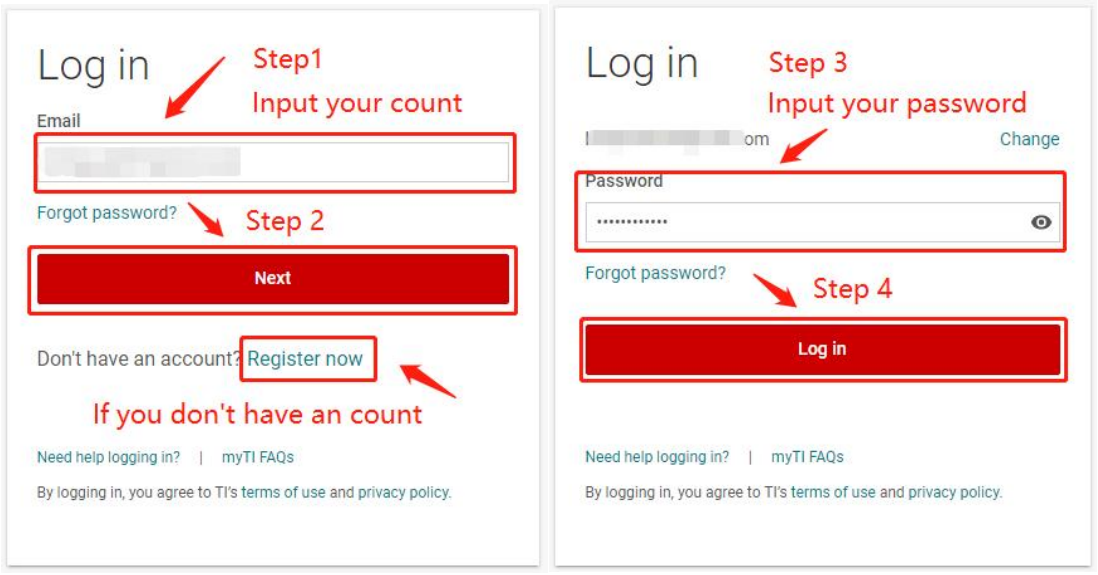

Figure 19. Login TI count

Step 4: Select “civil” if your application is for civil use

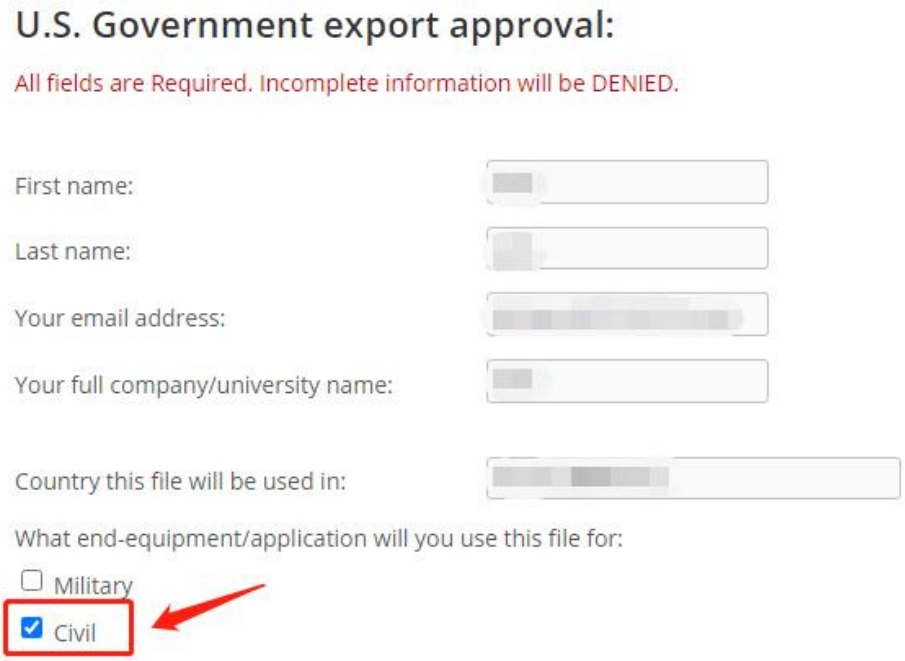

Figure 20. Choose application

Step 5: Select "Yes" and submit

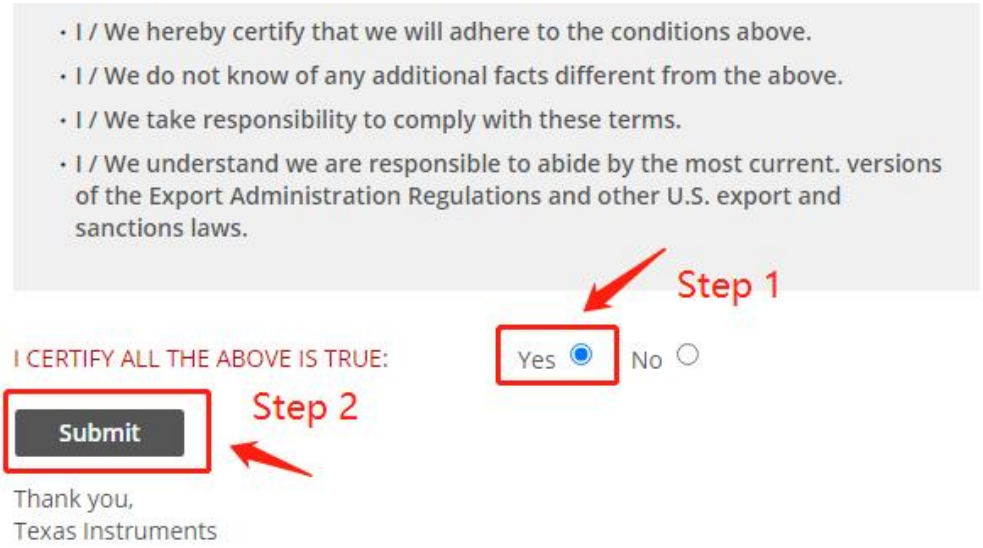

Figure 21. Submit the above

Step 6: Download SDK

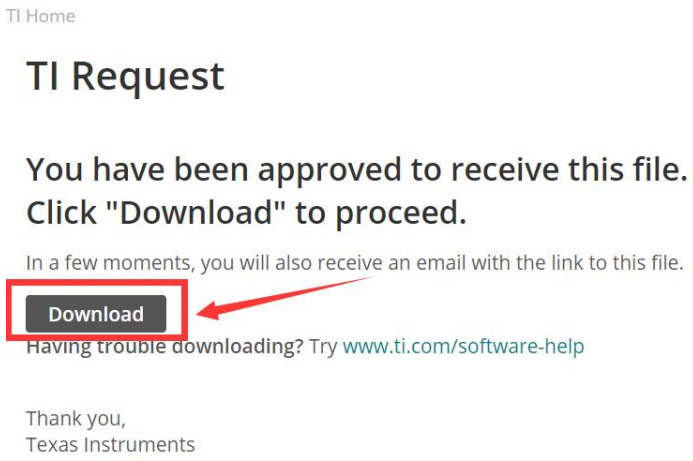

Figure 22. Download the installer

Step 7: Installation

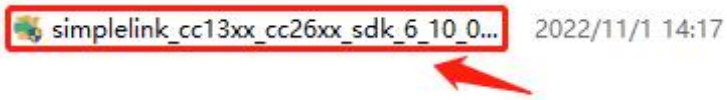

Figure 23. Setup SDK

Step 8: Click “Next”

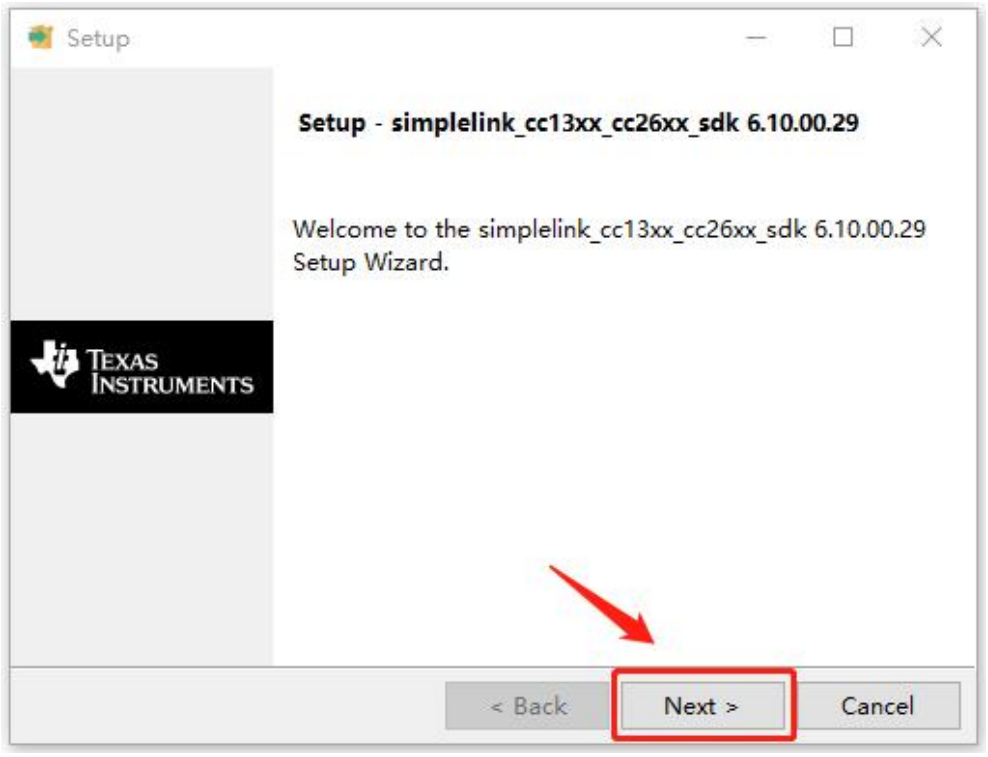

Figure 24. Welcome screen for setup SDK

Step 9: Select the default option

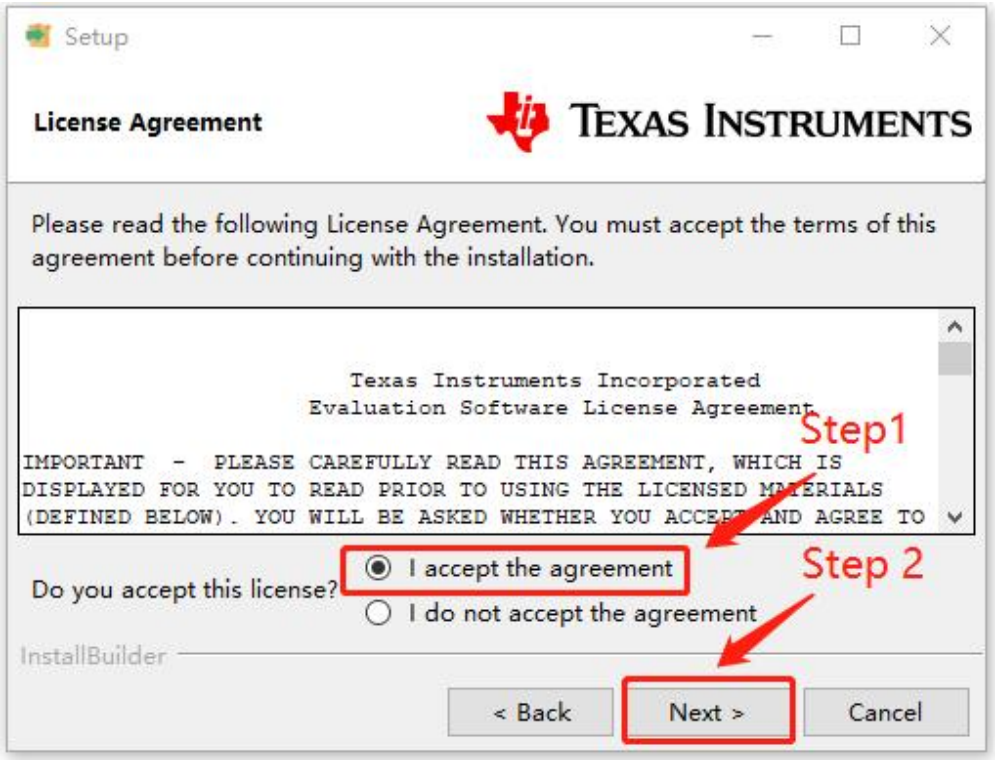

Figure 25. Accept the agreement for SDK

Step 10: Select the Installation directory (Usually by default)

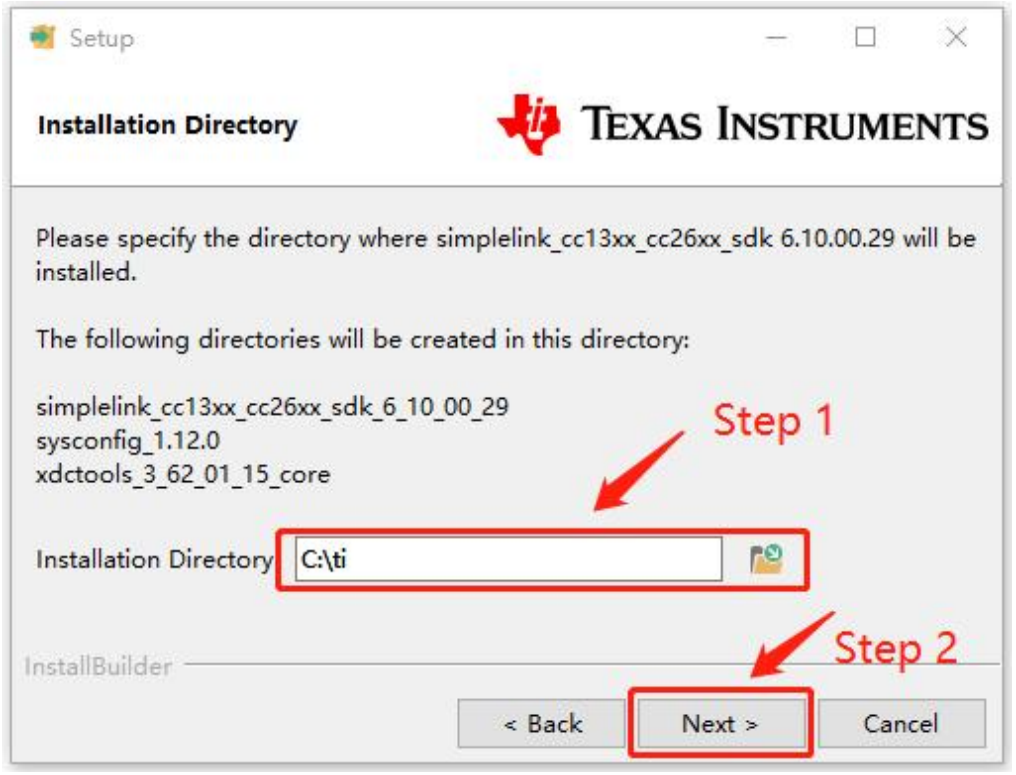

Figure 26. Specify the directory for SDK

Step 11: Click “Next”

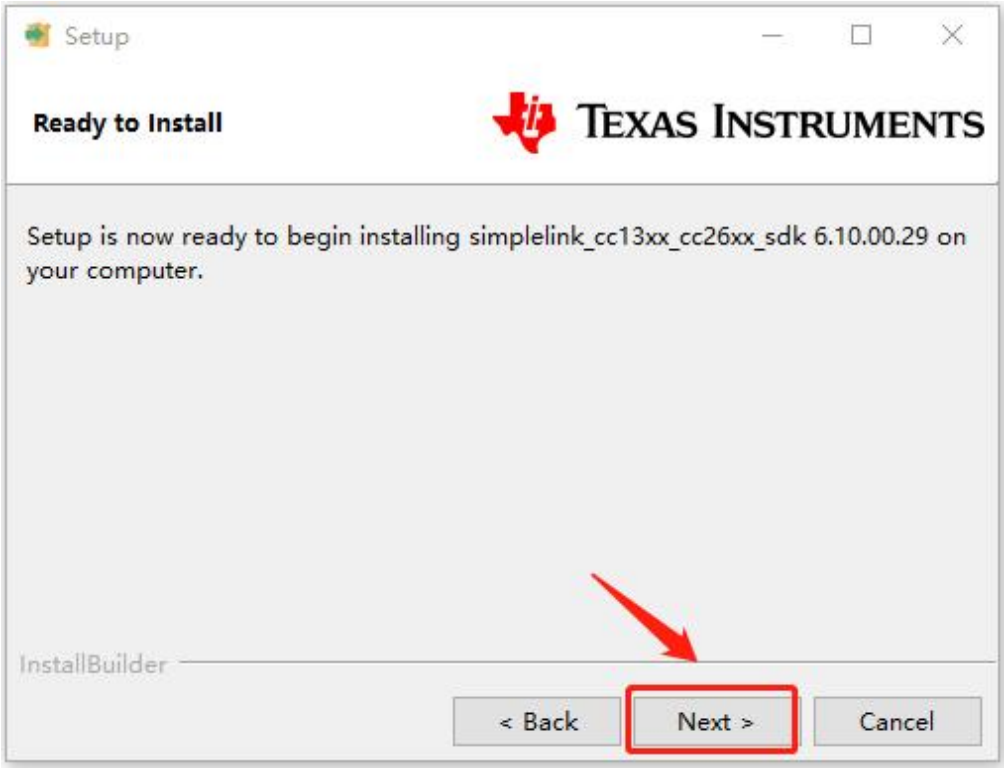

Figure27. Ready to install SDK

Step 12: Waiting for installation to complete

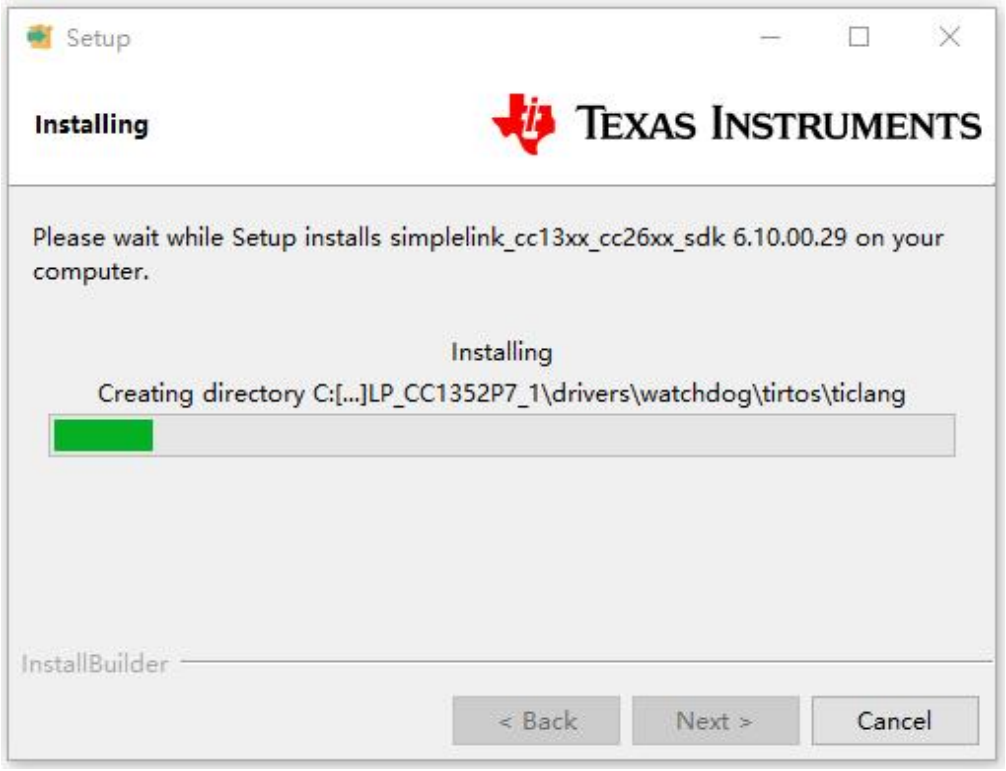

Figure28. Waiting for the SDK installation to complete

3.3. Run an example/demo code

Step 1: For the first module, select a directory as workspace

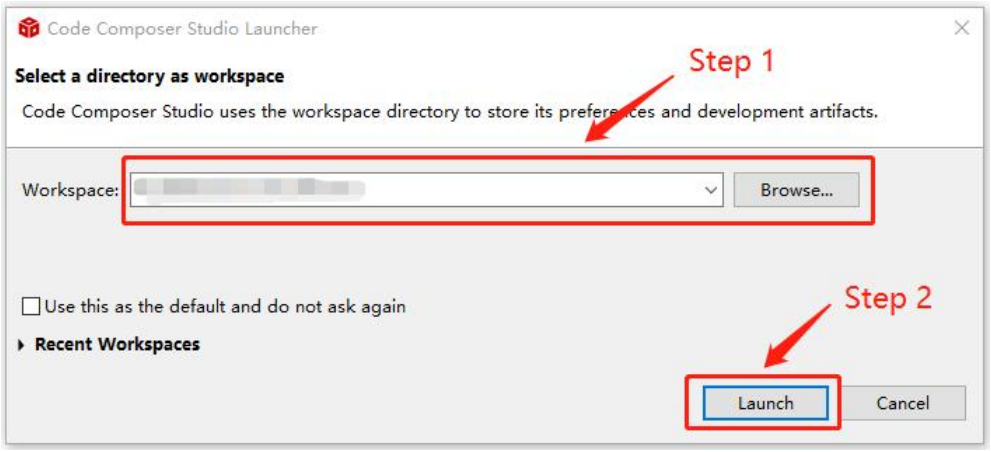

Figure29. Select a directory as workspace

Step 2: Find the option named “Import CCS project…”

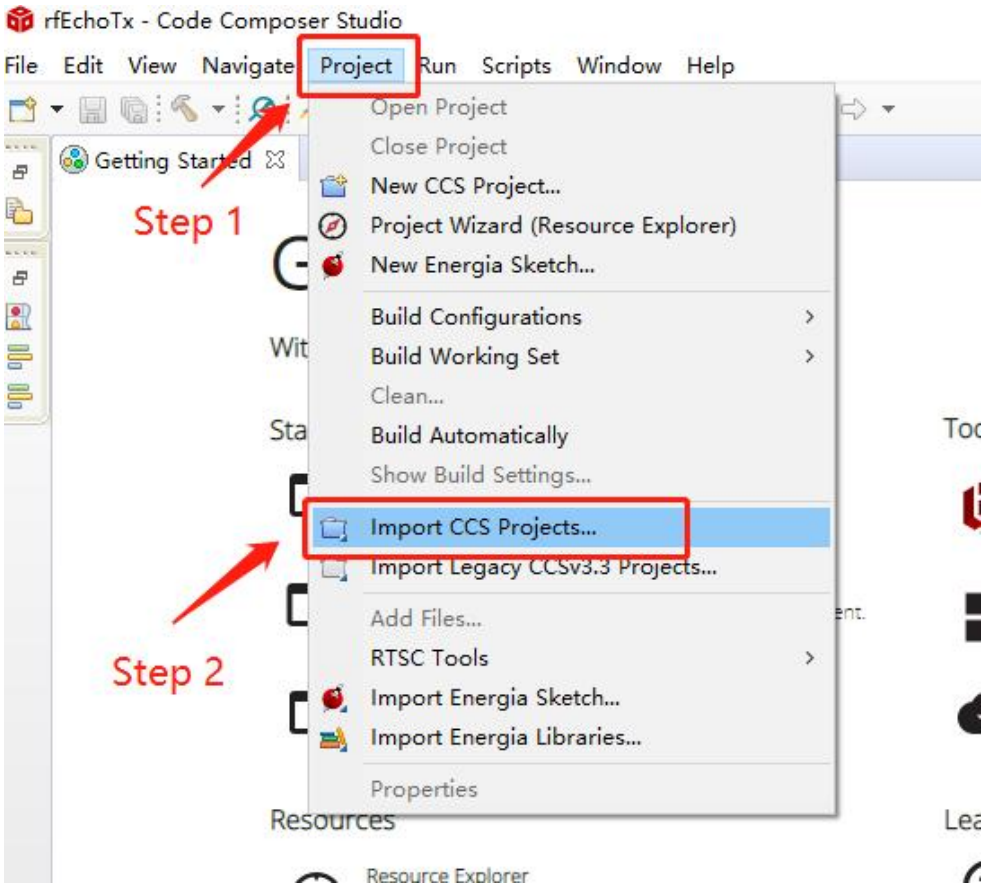

Figure30. Import CCS Projects

Step 3: Click "Browse" and find the following path to import the project:
C:\ti\simplelink_cc13xx_cc26xx_sdk_6_10_00_29\examples\rtos\LP_CC1311P3\prop_rf\rfEchoTx\tirtos7\ccs

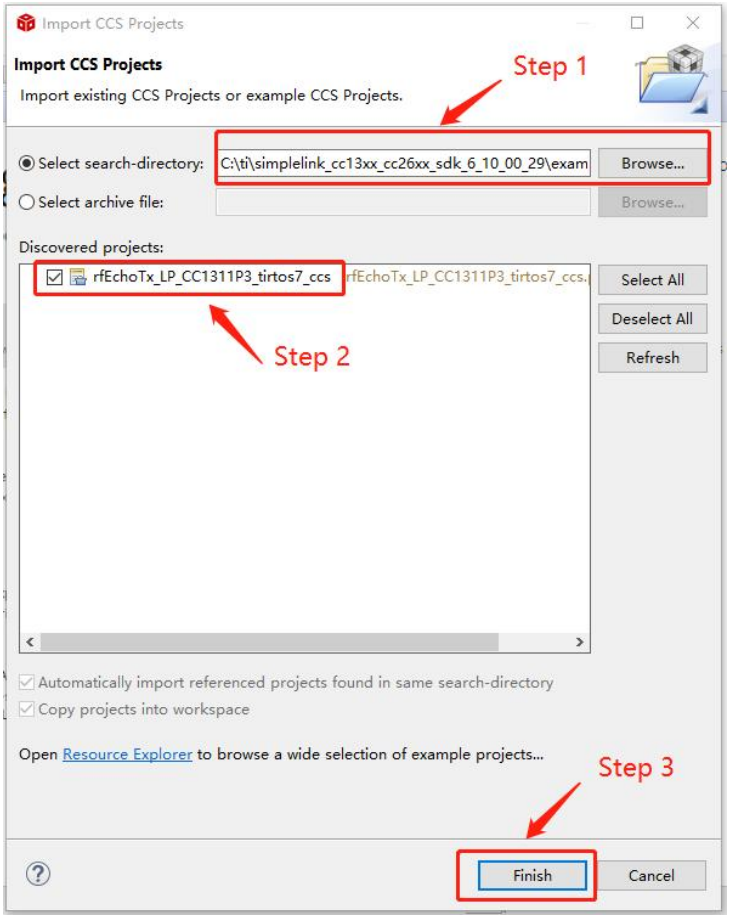

Figure31. Find the following path to import the project

Step 4: Click the “Build” icon to build the project

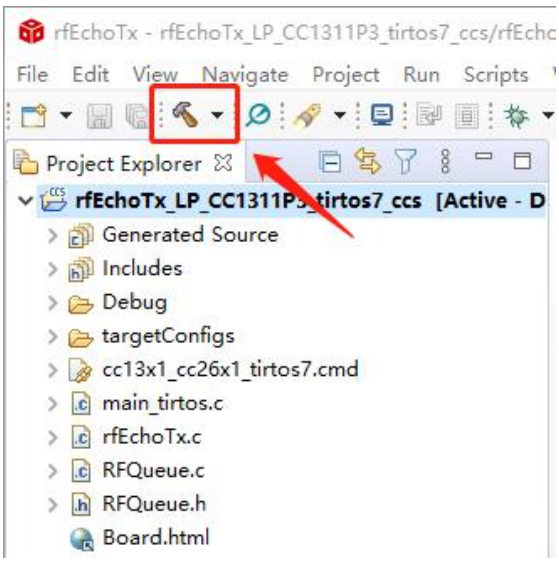

Figure32. Build project

Step 5: Click the “Debug” icon to download

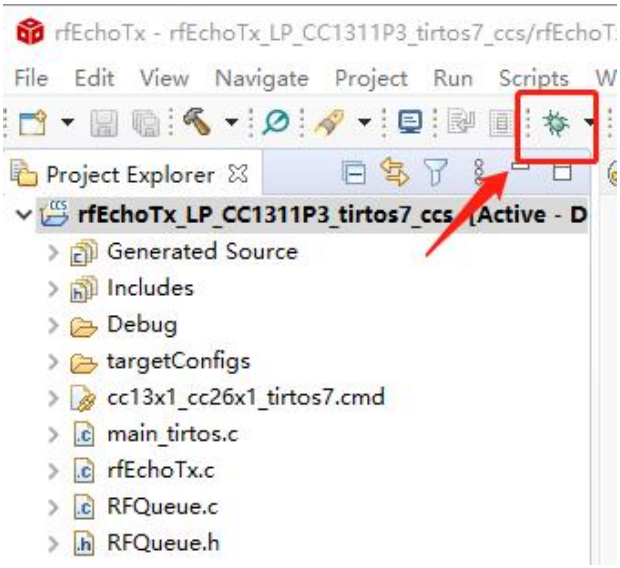

Figure33. Download

Step 6: Click on this option to start debugging

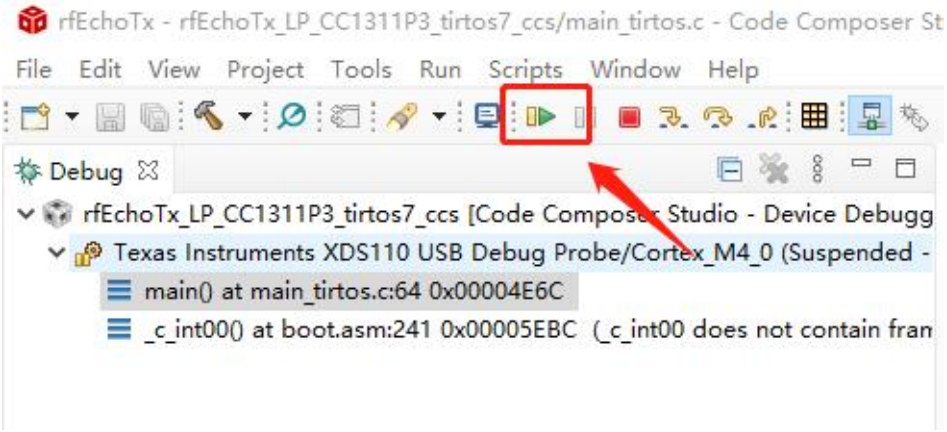

Figure34. start debugging

By far you should have built your first application successfully. Now you should build your second application and download in another module to communicate between the two modules.

For another module, refer to Step 1 to find the discovered items according to the following path:
C:\ti\simplelink_cc13xx_cc26xx_sdk_6_10_00_29\examples\rtos\LP_CC1311P3\prop_rf\rfEchoRx\tirtos7\ccs

Follow steps 4 to 6 to complete the compilation and debug of the application.

You can see that the green LED and red LED in the first development board are flashing alternately, which indicates that the module is switching between TX and RX. The green LED means sending the data packet, and the red LED means not receiving the data packet from the other module.

Figure35. The module send the packet

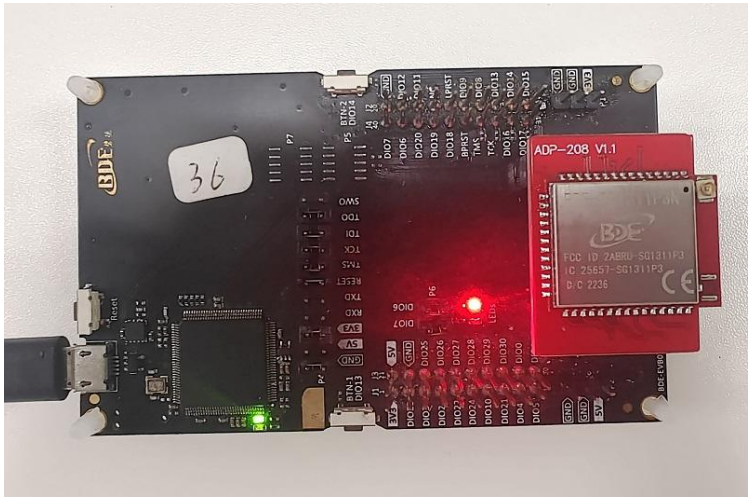

Figure36. The module did not receive the packet

The second module will not have any action on the two LEDs of the evaluation board when no packet is received. When a packet is received, the modules enables the red LED. Then the second module switches from RX state to TX state and sends the data it just received.

When the first module receives the data packet from the second module, it compares the data packet with the previously sent data packet, and if the received data packet is the same as the previously sent data packet, it enables the green light.

When the two modules are in communication state, the first module only enables the green LED and the second module only enables the red LED.

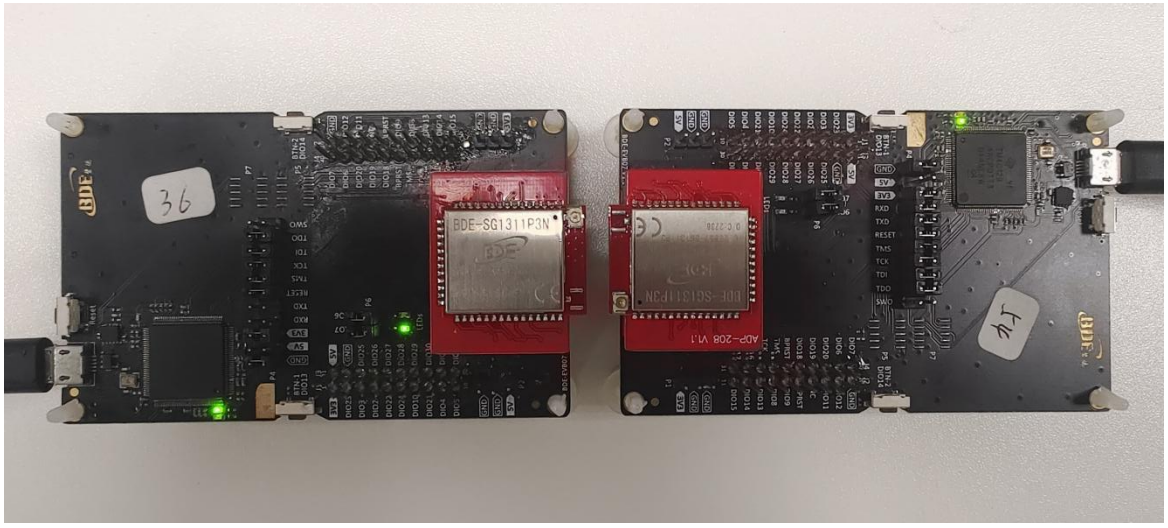

Figure37. The first module is in TX and the second module is in RX

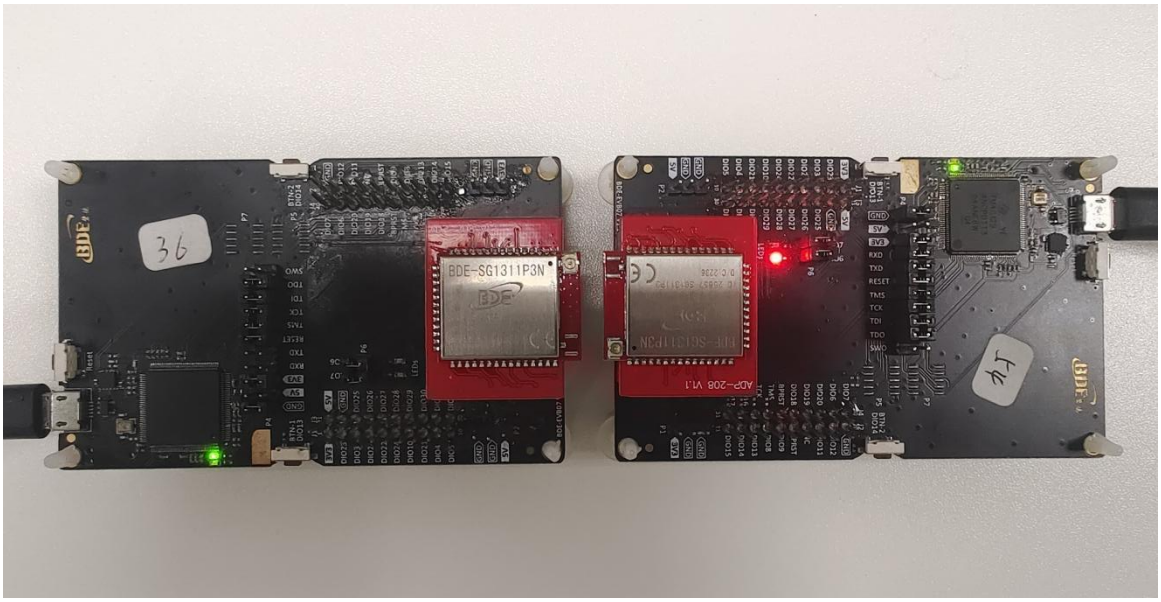

Figure38. The first module is in RX and the second module is in TX

4. Modifications regarding the use of PA

The default HIGH PA and SUB 1 GHZ pin mappings in demo are different from those of the BDE-SG1311P3 module. If HIGH PA is used, the user need to modify the setting of the antenna switch.

In the following tables, Table 2 is the truth table about antenna switch settings in demo and Table 3 is the truth table about antenna switch settings in BDE-SG1311P3 module. The settings of HIGH PA and SUB 1 GHZ in the two truth tables are diametrically opposed.

Table 2. Truth table of demo

Path	DIO30	DIO29
OFF	0	0
HIGH PA	1	0
SUB 1 GHZ	0	1

Table 3. Truth table of BDE-SG1311P3 module

Path	DIO30	DIO29
OFF	0	0
HIGH PA	0	1
SUB 1 GHZ	1	0

If the default antenna switch setting is used, the actual transmitted power will be very low when PA function is turned on. To avoid this kind of situation, user can refer to the following code in the main program rewriting **rfDriverCallbackAntennaSwitching()** function. The prototype of the function is in **ti_drivers_config.c**.

```
void rfDriverCallbackAntennaSwitching(RF_Handle client, RF_GlobalEvent events, void *arg)
{
   if (events & RF_GlobalEventRadioSetup) {
       GPIO_setMux(CONFIG_RF_HIGH_PA, IOC_PORT_GPIO);
       GPIO_setMux(CONFIG_RF_SUB1GHZ, IOC_PORT_GPIO);
       /* Switch off all paths. */
       GPIO_write(CONFIG_RF_HIGH_PA, 0);
       GPIO_write(CONFIG_RF_SUB1GHZ, 0);
       /* Decode the current PA configuration. */
       RF_TxPowerTable_PAType paType = (RF_TxPowerTable_PAType)RF_getTxPower(client).paType;
       if (paType == RF_TxPowerTable_HighPA) {
           /* - High PA    --> HIGH PA
            * - LNA enable --> Sub-1 GHz */
           GPIO_setMux(CONFIG_RF_HIGH_PA, IOC_PORT_RFC_GPO0);
           GPIO_setMux(CONFIG_RF_SUB1GHZ, IOC_PORT_RFC_GPO3);
       } else {
           /* RF Core active --> Sub-1 GHz */
           GPIO_setMux(CONFIG_RF_HIGH_PA, IOC_PORT_GPIO);
           GPIO_setMux(CONFIG_RF_SUB1GHZ, IOC_PORT_GPIO);
           GPIO_write(CONFIG_RF_HIGH_PA, 1);
       }
   }
   else if (events & RF_GlobalEventRadioPowerDown) {
       /* Switch off all paths. */
       GPIO_write(CONFIG_RF_HIGH_PA, 0);
       GPIO_write(CONFIG_RF_SUB1GHZ, 0);
       /* Reset the IO multiplexer to GPIO functionality */
       GPIO_setMux(CONFIG_RF_HIGH_PA, IOC_PORT_GPIO);
       GPIO_setMux(CONFIG_RF_SUB1GHZ, IOC_PORT_GPIO);
   }
}
```

By far you should have successfully implemented communication between the two modules.

For further development, please check out the CC1311P3 data sheet, product information and support | TI.com page and download the User guide (https://www.ti.com/lit/ug/swcu191f)

Other Resources

Mac OS Installer for SimpleLink CC13XX 26XX SDK

Linux Installer for SimpleLink CC13XX 26XX SDK

Mac OS Installer for Code Composer Studio IDE

Linux Installer for Code Composer Studio IDE

CC1311P3 SimpleLink™ High-Performance Sub-1 GHz Wireless MCU With Integrated Power Amplifier

Windows Installer for SmartRF Flash Programmer 2

Revision History

Revision	Date	Description
V1.0	21-Nov-2022	Initial Released

More Questions:

Please search existing answers on TI E2E support forums

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

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