How to Build Download and Run the KG200Z mode

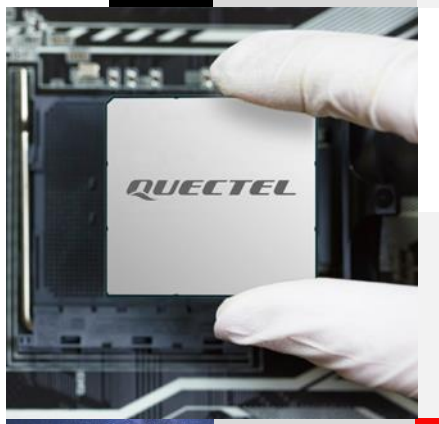
Quentin ShortRange 2024/02/01

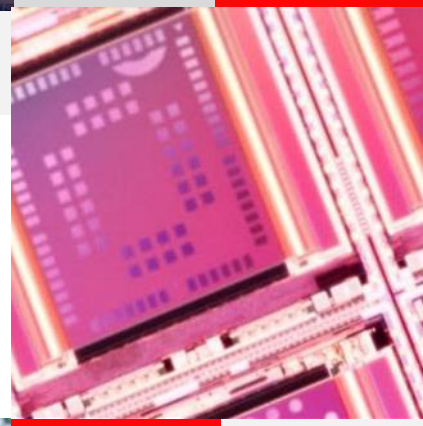
Build a Smarter World

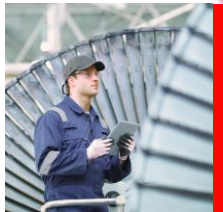
1 Software and hardware environment

2 build and download

3 Run and connect to LoRa gateway







Build a Smarter World

www.quectel.com

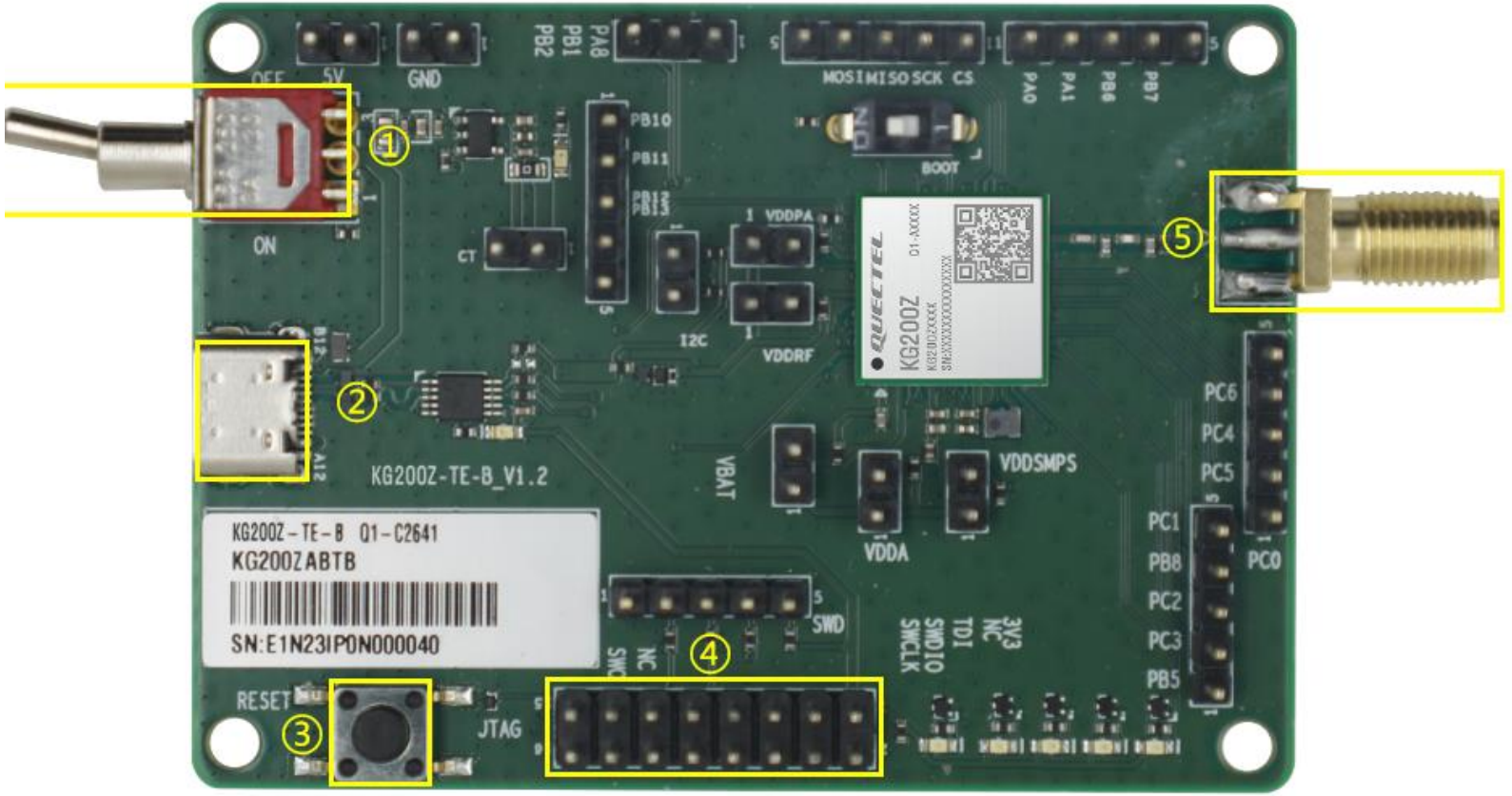
01 Software and hardware environment

Part One

Software and hardware environment

Hardware environment

① Power Switch
② USART&Power Supply
③ Reset Button
④ JTAG PIN
⑤ LoRa Antenna Interface

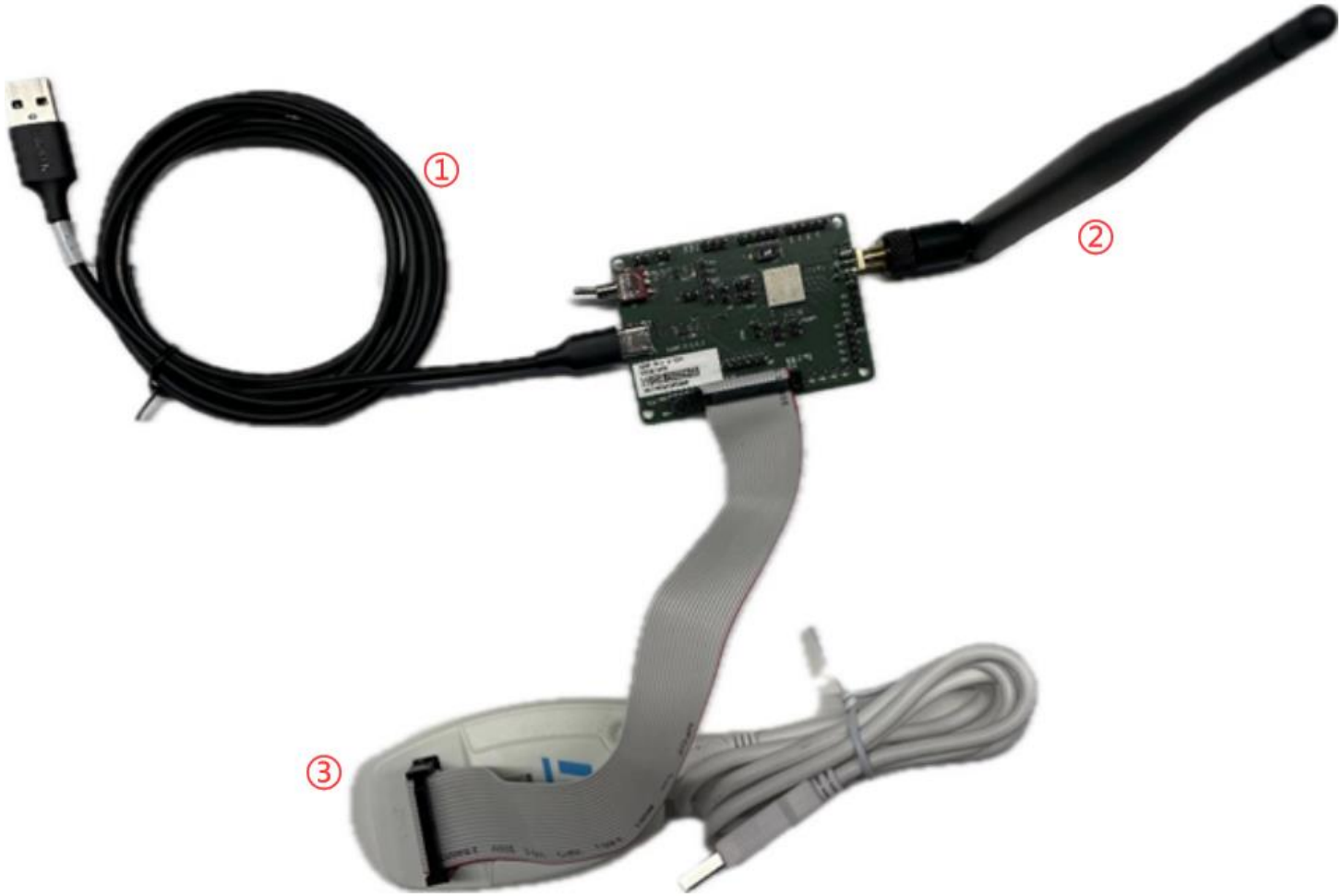


KG200Z-TE-B

Software and hardware environment

Hardware environment

① Usb to Type-C Cable
② LoRa antenna
③ ST-LINK

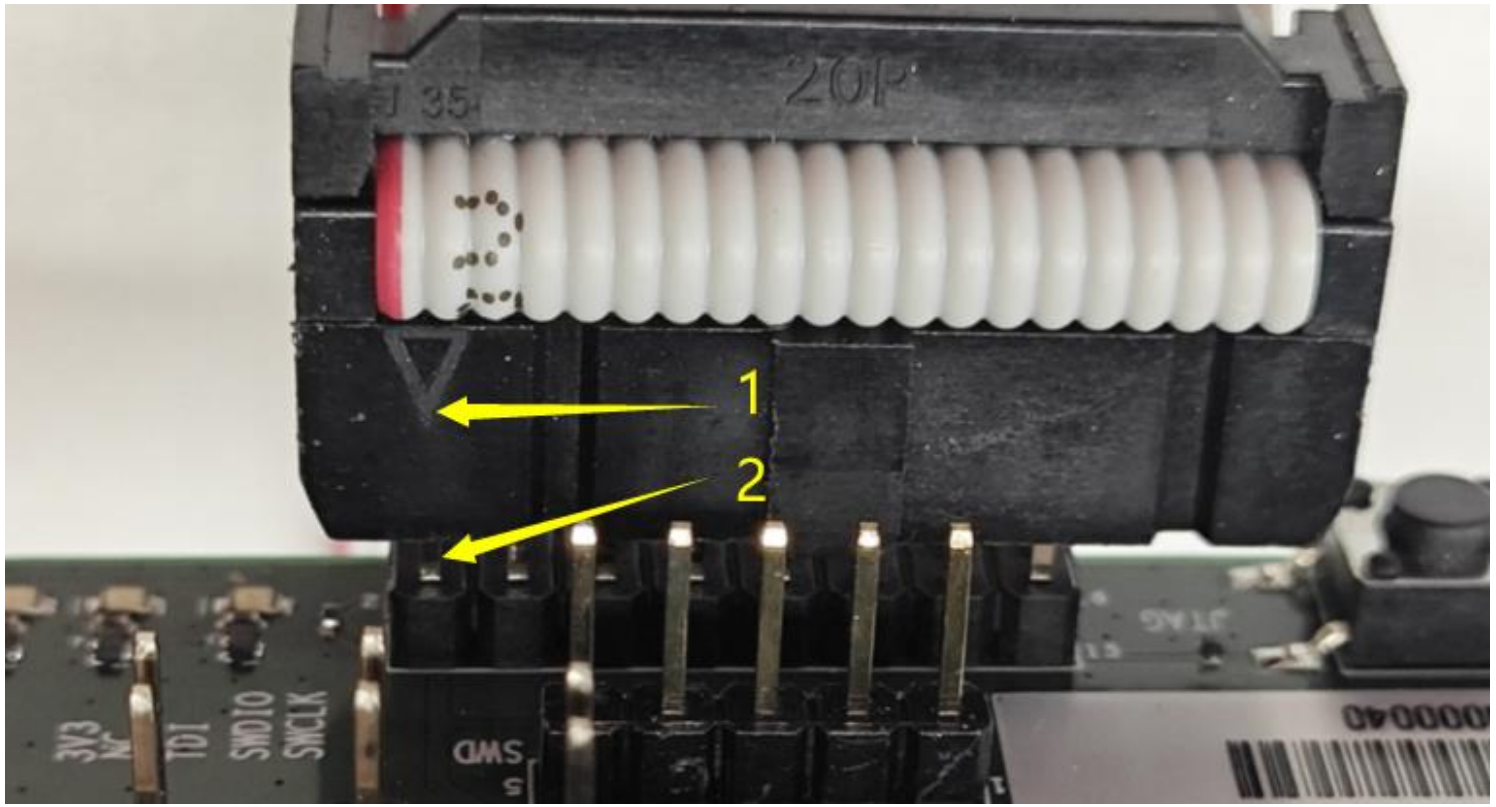


Accessory Assembly

Software and hardware environment

Hardware environment

1 Installation indicating arrow
2 JTAG PIN



STlink installation

Software and hardware environment

Hardware environment

LoRa Gateway

LoRa gateway generally has a small server built in, enough for testing.

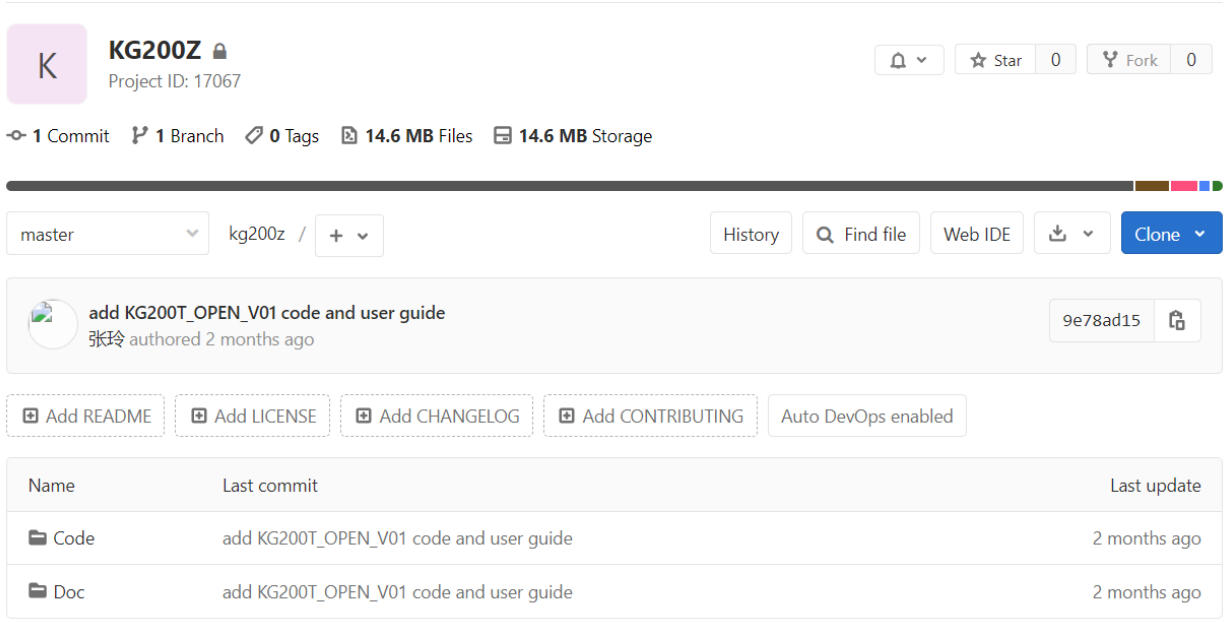
LoRa Gateway

Software and hardware environment

Software environment

KG200Z_OPEN SDK

Visit website https://git-master.quectel.com/wifi.bt/KG200Z to get OPEN SDK.

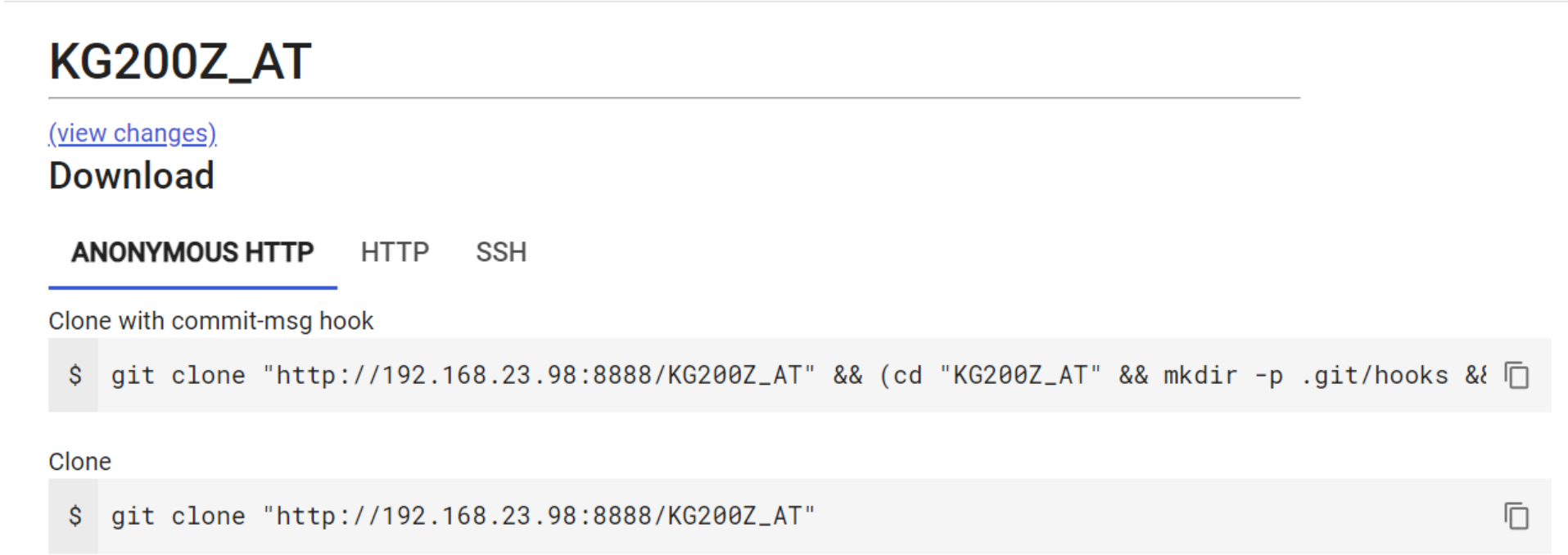


Software and hardware environment

Software environment

KG200Z_AT SDK

Visit website https://git-master.quectel.com/wifi.bt/KG200Z to get AT SDK.



Software and hardware environment

Software environment

STM32CubeIDE – Build tool

Visit website https://www.st.com/en/development-tools/stm32cubeide.html#get-software to get STM32CubeIDE.

Get Software

	Part Number	General Description	Latest version	Download	All versions
+	STM32CubeIDE-DEB	STM32CubeIDE Debian Linux Installer	1.14.0	Get latest	Select version
+	STM32CubeIDE-Lnx	STM32CubeIDE Generic Linux Installer	1.14.0	Get latest	Select version
+	STM32CubeIDE-Mac	STM32CubeIDE macOS Installer	1.14.0	Get latest	Select version
+	STM32CubeIDE-RPM	STM32CubeIDE RPM Linux Installer	1.14.0	Get latest	Select version
+	STM32CubeIDE-Win	STM32CubeIDE Windows Installer	1.14.1	Get latest	Select version

Software and hardware environment

Software environment

STM32CubeProgrammer – Download tool

Visit website https://www.st.com/en/development-tools/stm32cubeprog.html#get-software to get STM32CubeProgrammer.

Get Software

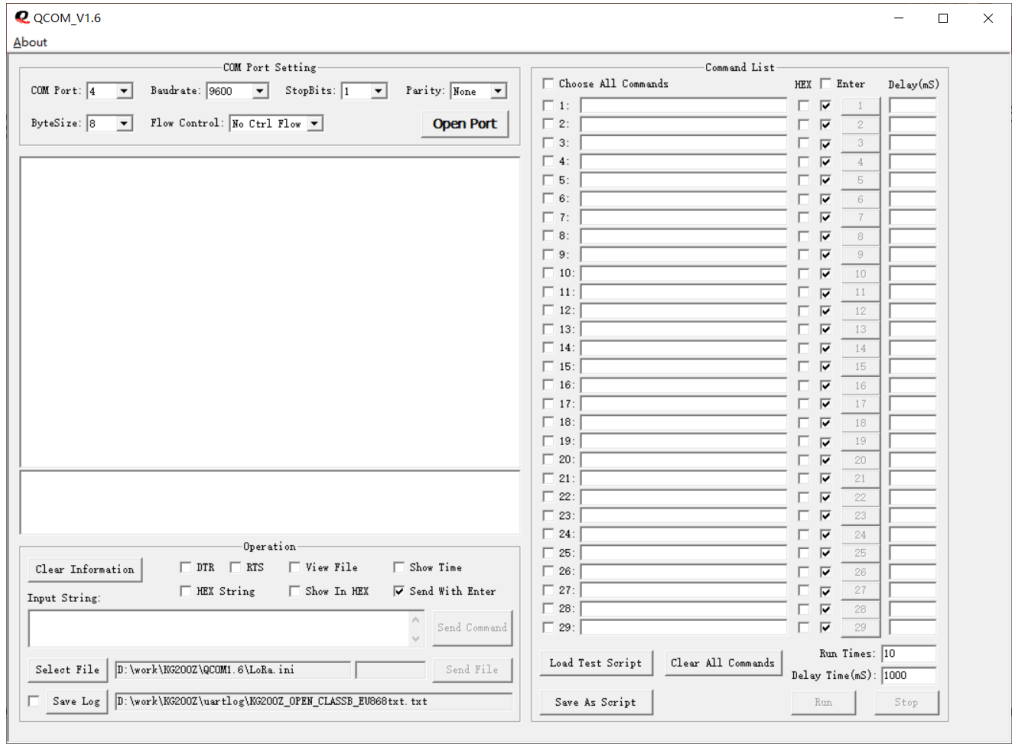
	Part Number	General Description	Latest version	Download	All versions
+	STM32CubePrg-Lin	STM32CubeProgrammer software for Linux	2.15.0	Get latest	Select version
+	STM32CubePrg-Mac	STM32CubeProgrammer software for Mac	2.15.0	Get latest	Select version
+	STM32CubePrg-W32	STM32CubeProgrammer software for Win32	2.15.0	Get latest	Select version
+	STM32CubePrg-W64	STM32CubeProgrammer software for Win64	2.15.0	Get latest	Select version

Software and hardware environment

Software environment

Uart tool

install QCOM_V1.6 uart tool.Or any other tool that can connect the UART.



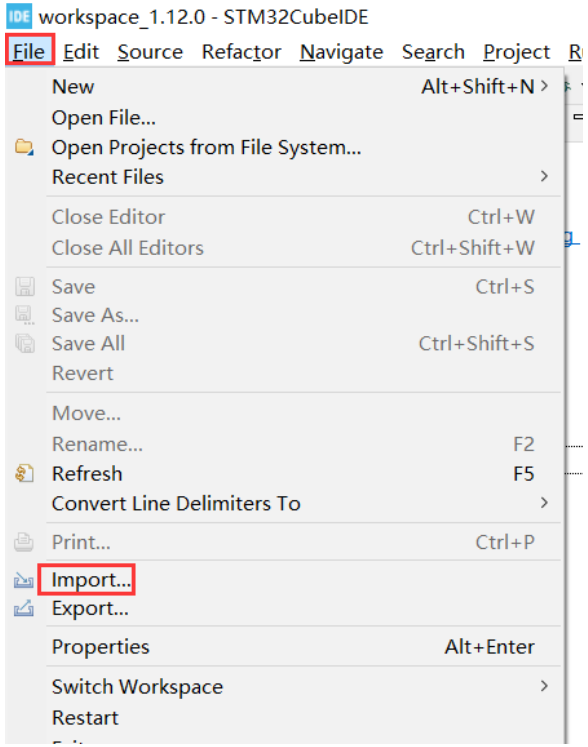
02 Build and Download

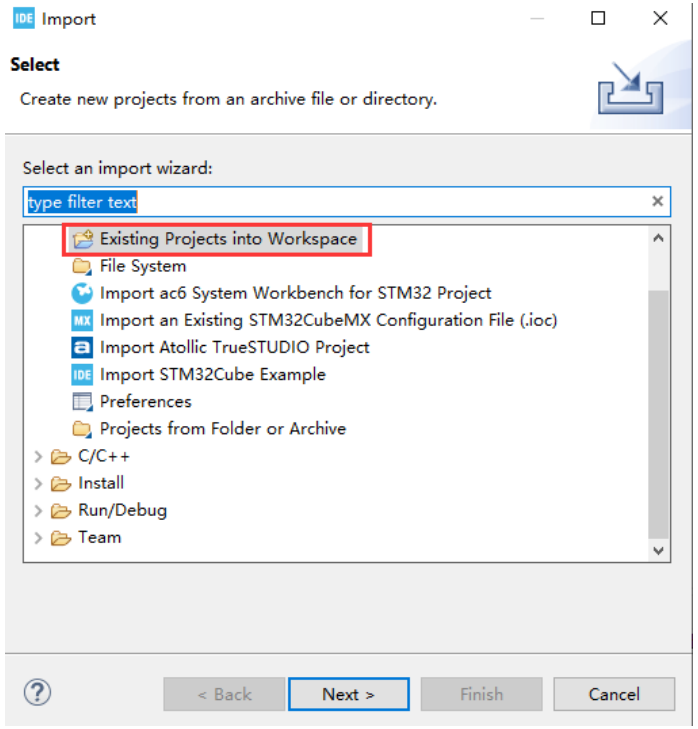
Part Two

Build and Download

Build

Open the STM32CubeIDE tool and click "**File**" -> "**Import**" -> "**Existing Projects into Workspace**".

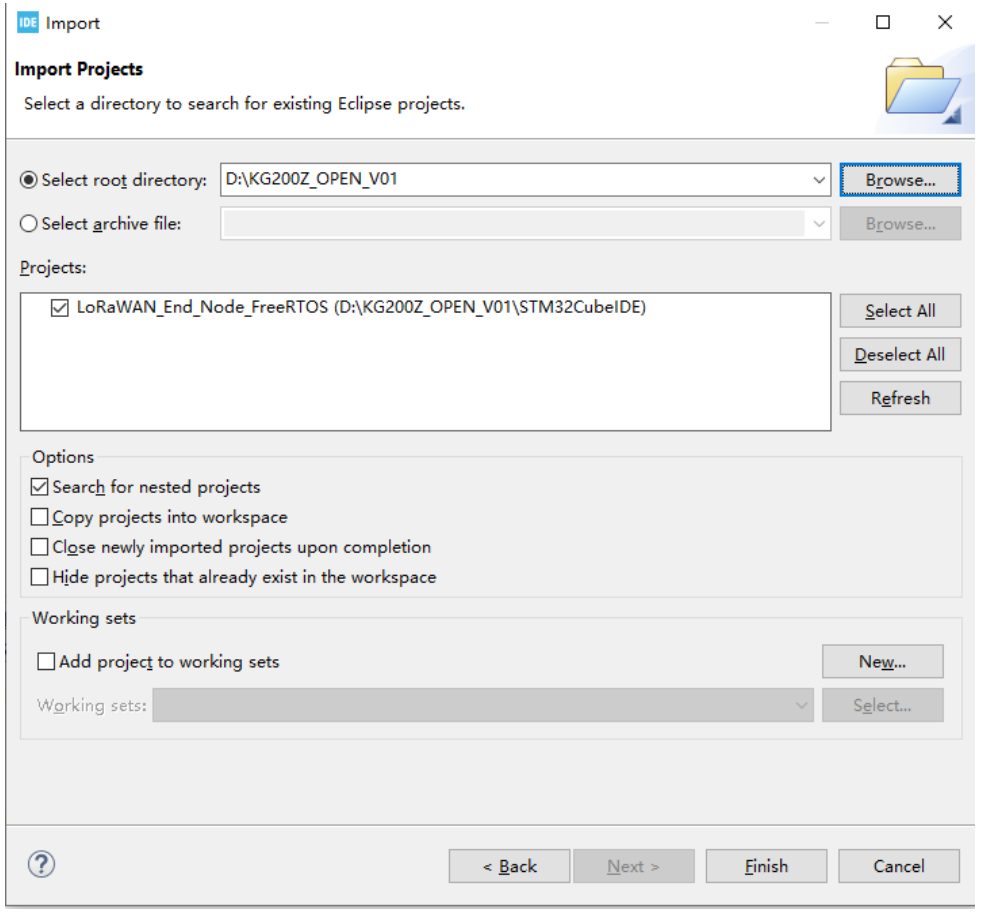




Build and Download

Build

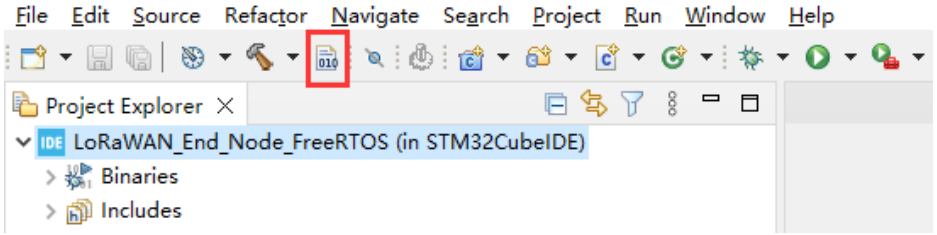
Select the extract directory of the SDK package and import it.



Build and Download

Build

In the STM32CubeIDE tool interface, click the button shown in the figure or use the keyboard shortcut "**Ctrl+B**" to compile the project.



Build and Download

Build

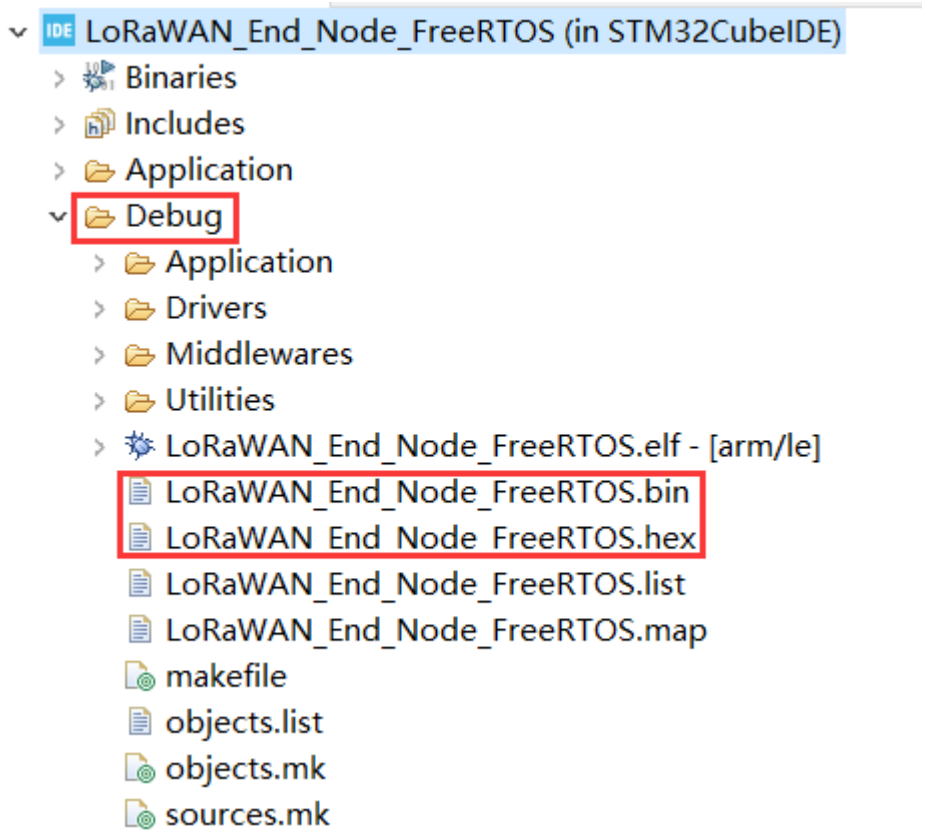
After the compilation is complete, the project is compiled successfully if the following information is displayed.

```
arm-none-eabi-size   LoRaWAN_End_Node_FreeRTOS.elf
arm-none-eabi-objdump -h -S  LoRaWAN_End_Node_FreeRTOS.elf  > "LoRaWAN_End_Node_FreeRTOS.list"
arm-none-eabi-objcopy  -O ihex  LoRaWAN_End_Node_FreeRTOS.elf  "LoRaWAN_End_Node_FreeRTOS.hex"
   text    data     bss     dec     hex filename
  86848     296   22928  110072   1adf8 LoRaWAN_End_Node_FreeRTOS.elf
arm-none-eabi-objcopy  -O binary  LoRaWAN_End_Node_FreeRTOS.elf  "LoRaWAN_End_Node_FreeRTOS.bin"
Finished building: default.size.stdout

Finished building: LoRaWAN_End_Node_FreeRTOS.hex
Finished building: LoRaWAN_End_Node_FreeRTOS.bin


Finished building: LoRaWAN_End_Node_FreeRTOS.list


15:23:04 Build Finished. 0 errors, 0 warnings. (took 11s.24ms)
```

Build and Download

Build

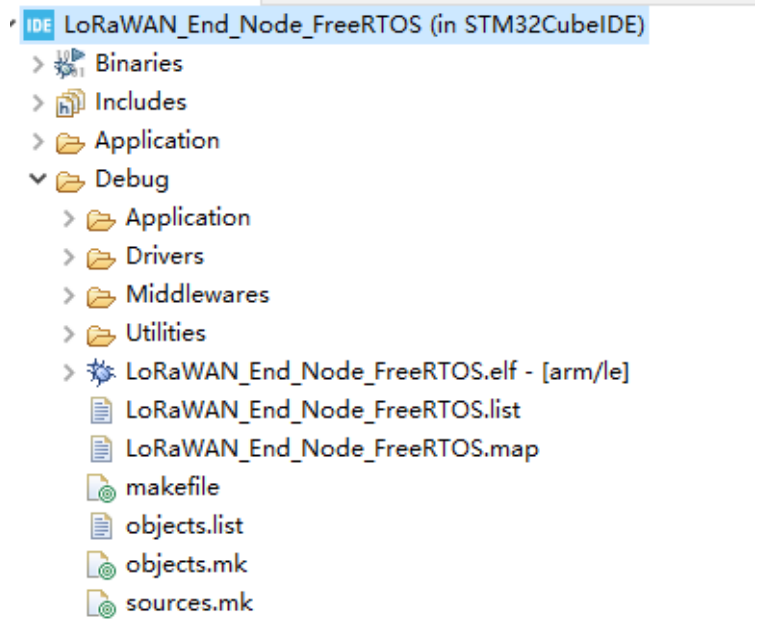
The target files *LoRaWAN_End_Node_FreeRTOS.hex* and *LoRaWAN_End_Node_FreeRTOS.bin* will be generated in the *KG200Z_OPEN_V01\STM32CubeIDE\Debug* directory after the compiled successfully.



Build and Download

Build

Sometimes the *bin* and *hex* firmware files are not generated in the *Debug* directory after compilation.

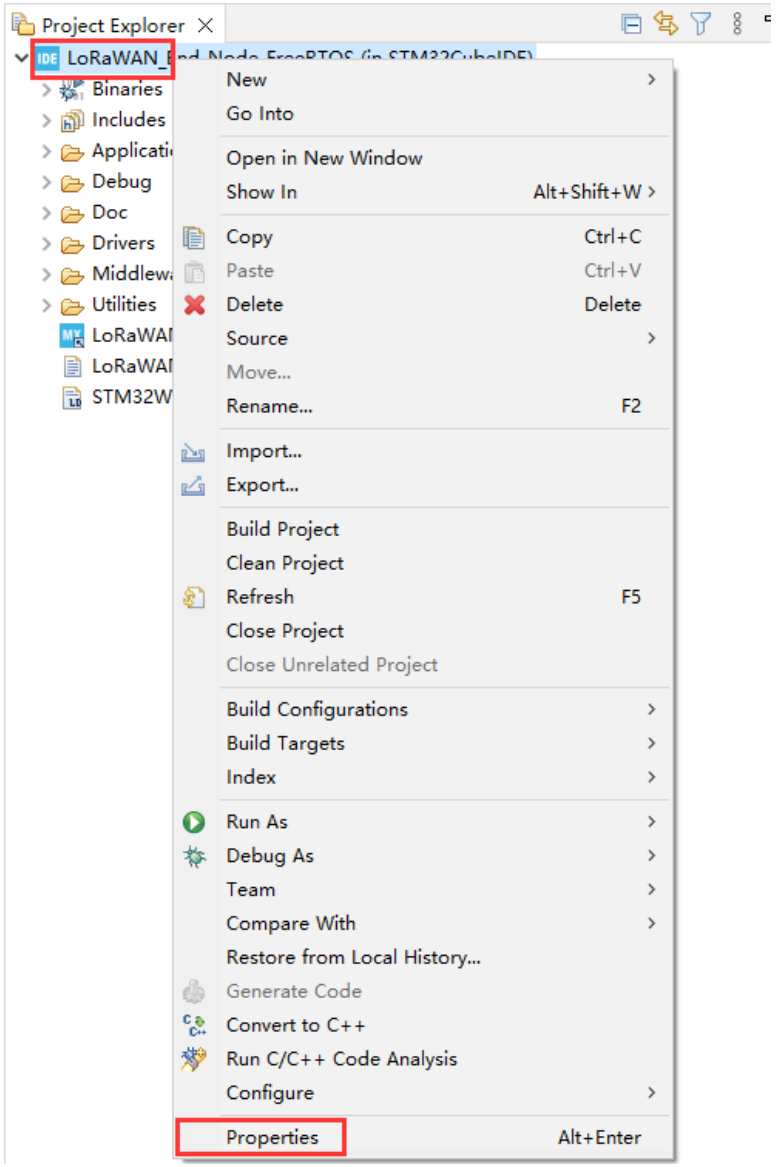


Build and Download

Build

Perform the following steps to generate *bin* and *hex* firmware files.

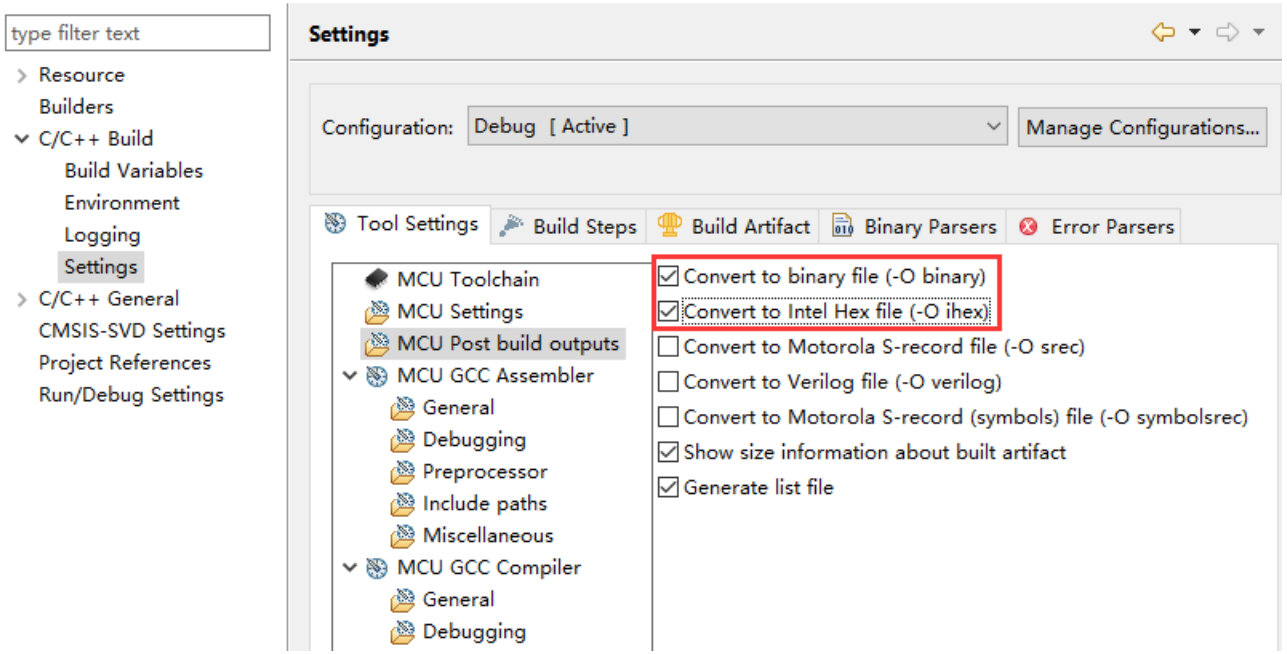
Step 1:Right-click the project name and select "**Properties**" or use the keyboard shortcut "**Alt+Enter**" to open the software setup page.



Build and Download

Build

Step 2:Click "**C/C++ Build**" -> "**Settings**" -> "**Tool Settings**" -> "**MCU Post build outputs**" and check the "**Convert to binary file (-O binary)**" and "**Convert to Intel Hex file (-O ihex)**" options.



Step 3: Build again.

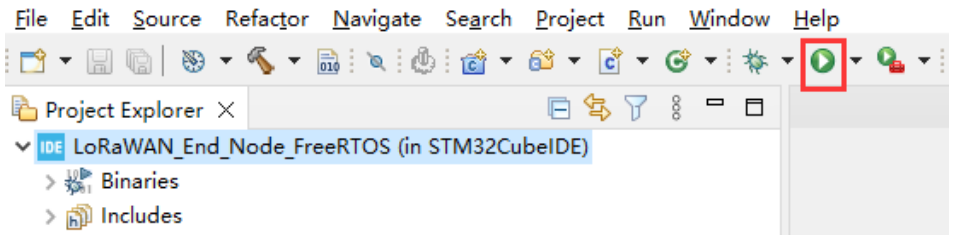
Build and Download

Download

Firmware can be downloaded using both STM32CubeIDE and STM32CubeProgrammer.

Download with STM32CubeIDE

After compiled, the firmware can be downloaded by clicking the button below on the STM32CubeIDE tool page.



After the firmware is downloaded successfully, the console will print the information on the right.
固件下载成功后，控制台会打印右边的信息。

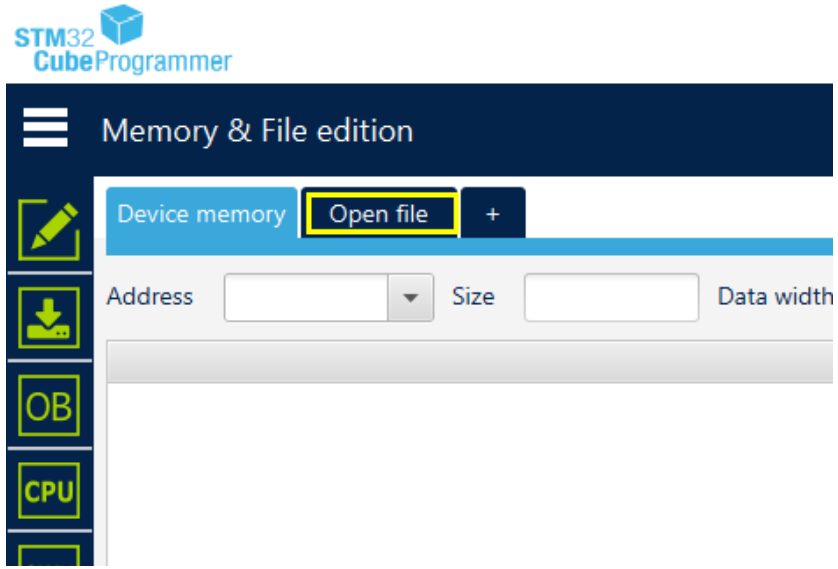
```
Memory Programming ...
Opening and parsing file: ST-LINK_GDB_server_a73328.srec
  File          : ST-LINK_GDB_server_a73328.srec
  Size          : 85.11 KB
  Address       : 0x08000000


Erasing memory corresponding to segment 0:
Erasing internal memory sectors [0 42]
Erasing memory corresponding to segment 1:
Erasing internal memory sector 124
Download in Progress:


File download complete
Time elapsed during download operation: 00:00:02.855



Verifying ...



Download verified successfully


Shutting down...
Exit.
```

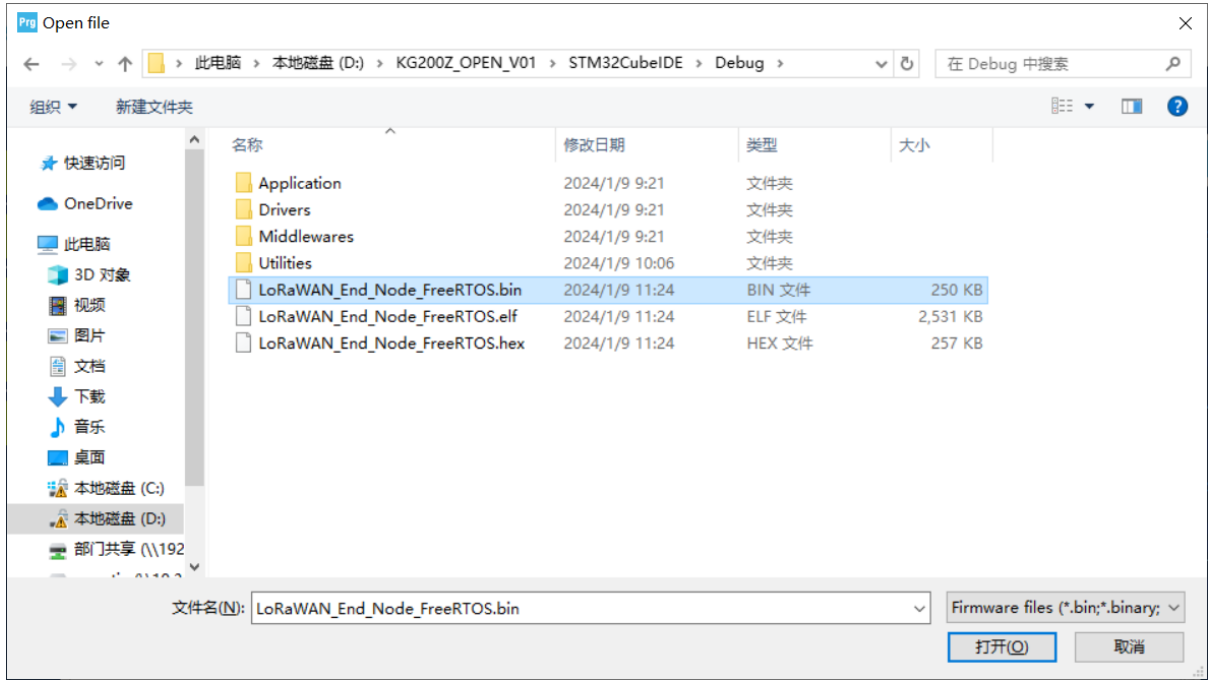
Build and Download

Download

Download with STM32CubeProgrammer

Open the STM32CubeProgrammer tool and click "**Open file**" to import the firmware file.

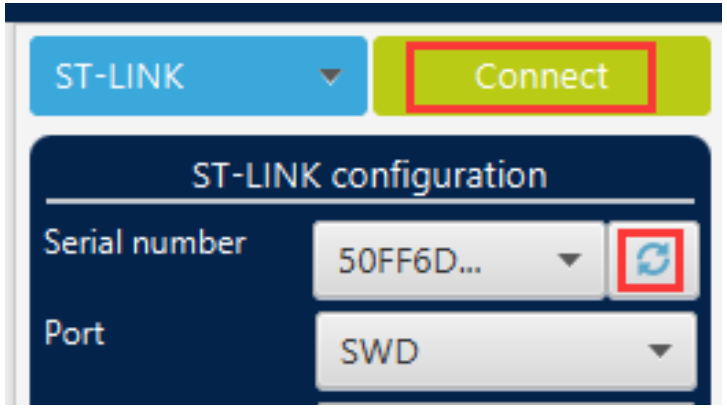




Build and Download

Download

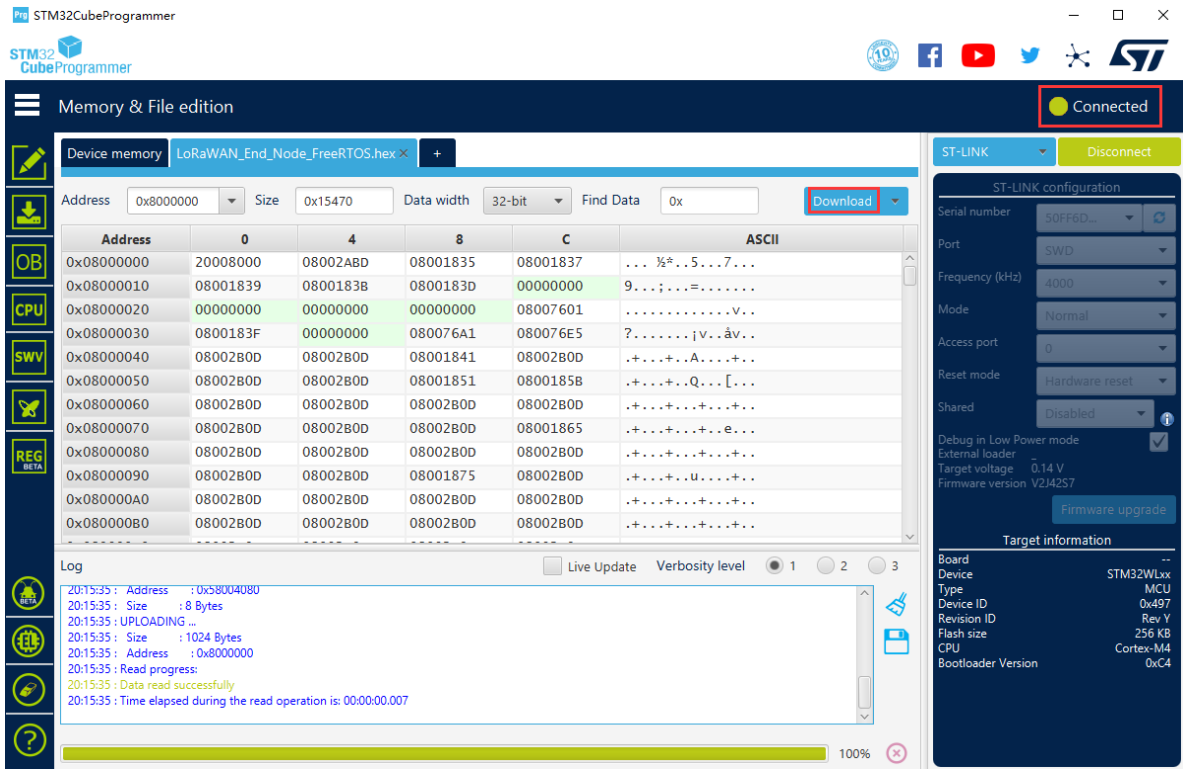
Click  and select the module's corresponding "**Serial number**", then click the "**Connect**" button to connect the module to STM32CubeProgrammer.



Build and Download

Download

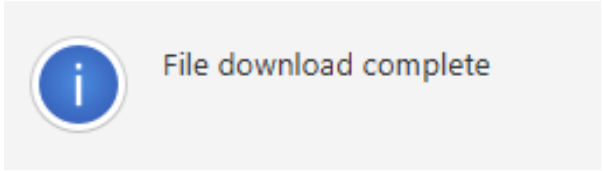
If the connection is successful, the status in the upper right corner will become "Connected".
Then click the "Download" button to start downloading the firmware.



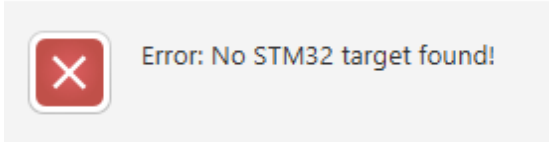
Build and Download

Download

After the download is successful, a message "File download complete" will be displayed.



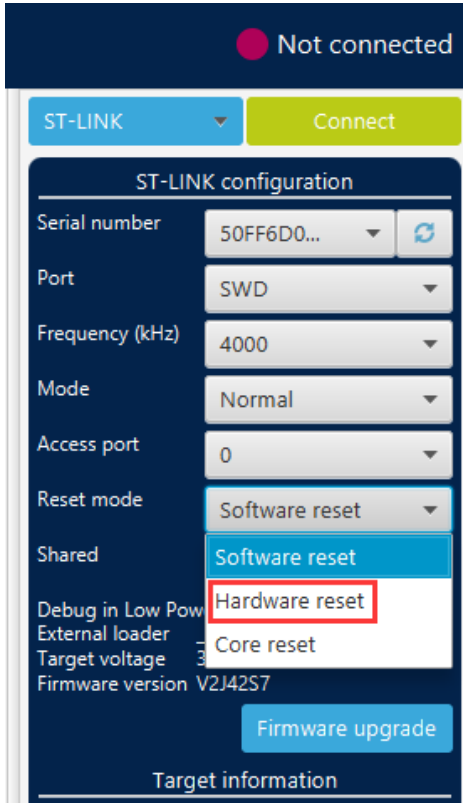
If there is a connection failure when connectiong the module to the STM32CubeProgrammer.



Build and Download

Download

Check whether "Reset mode" option is set to "Software reset". If so, change the "Reset mode" option to "Hardware reset" and click the "Connect" button again to reconnect.



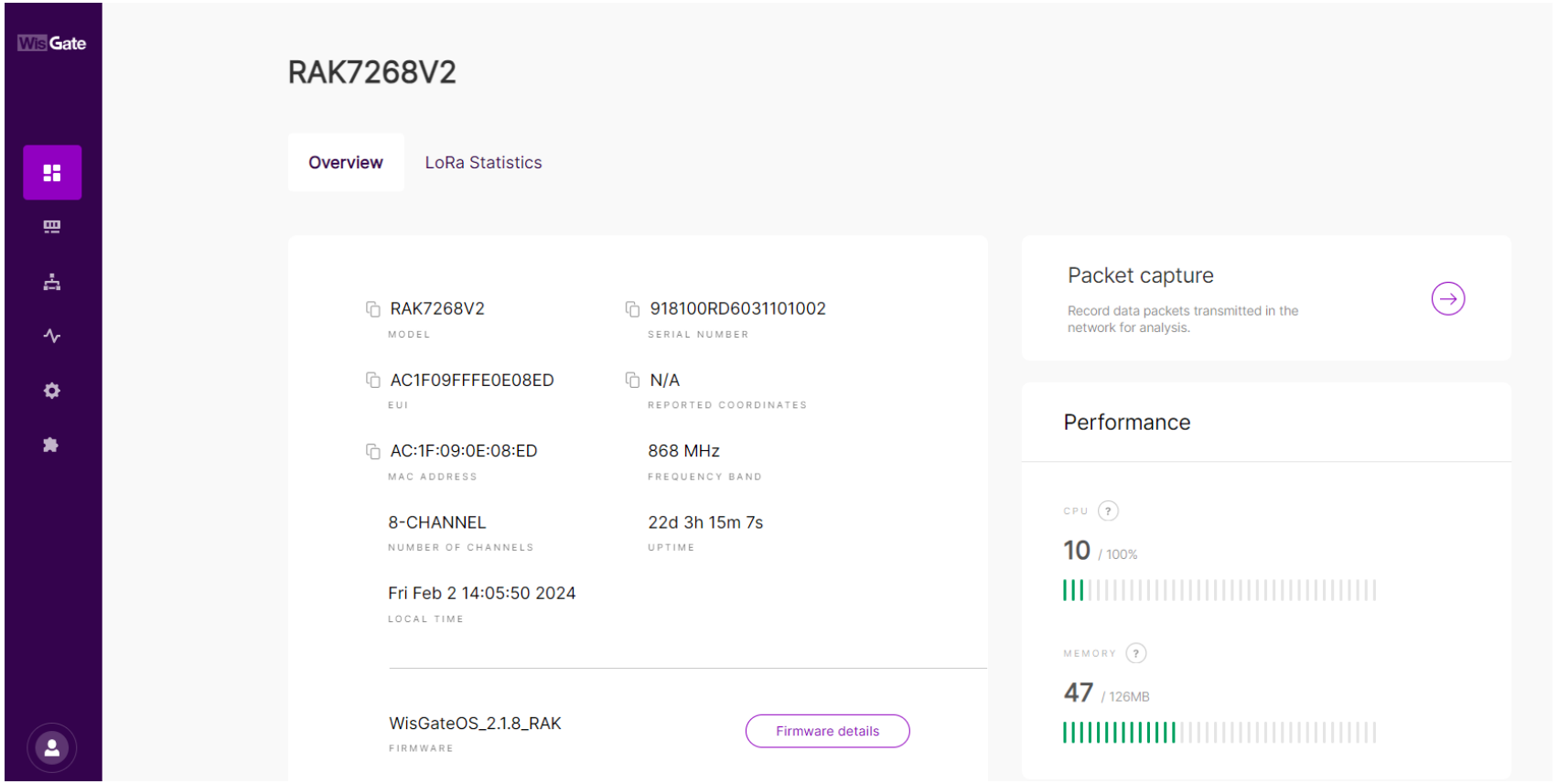
03 Run and Connect

Part Three

Run and Connect

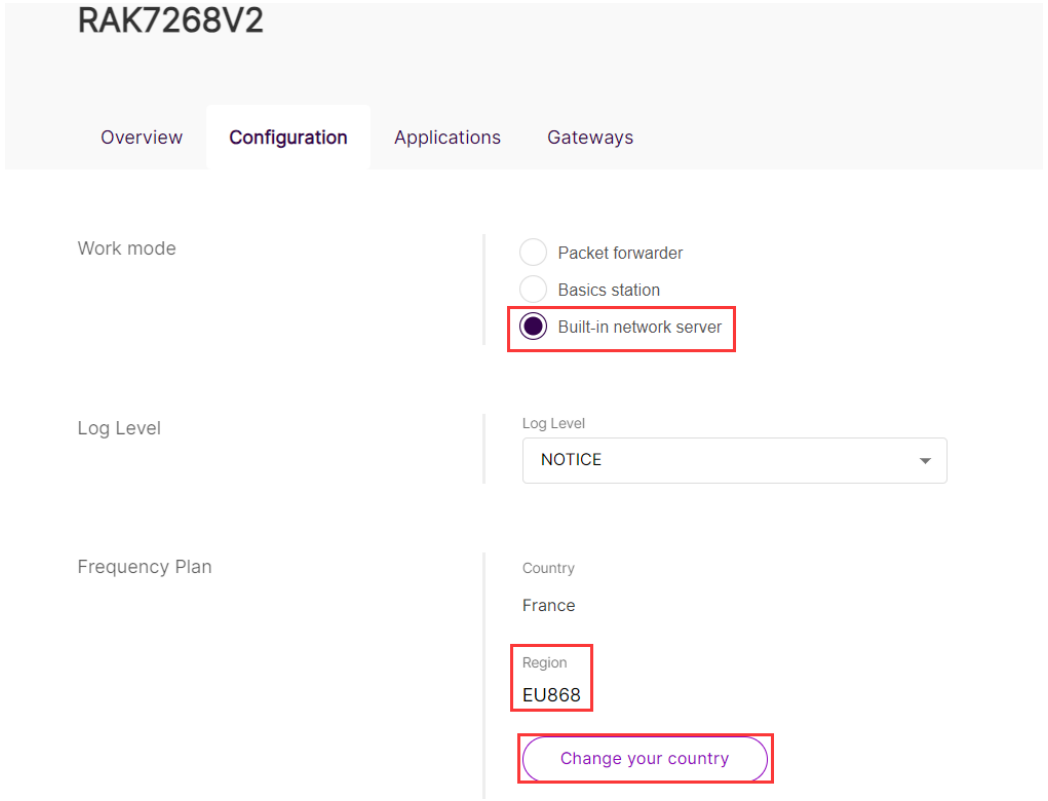
Gateway setting

Open the browser to go to the gateway setting page.



Gateway setting

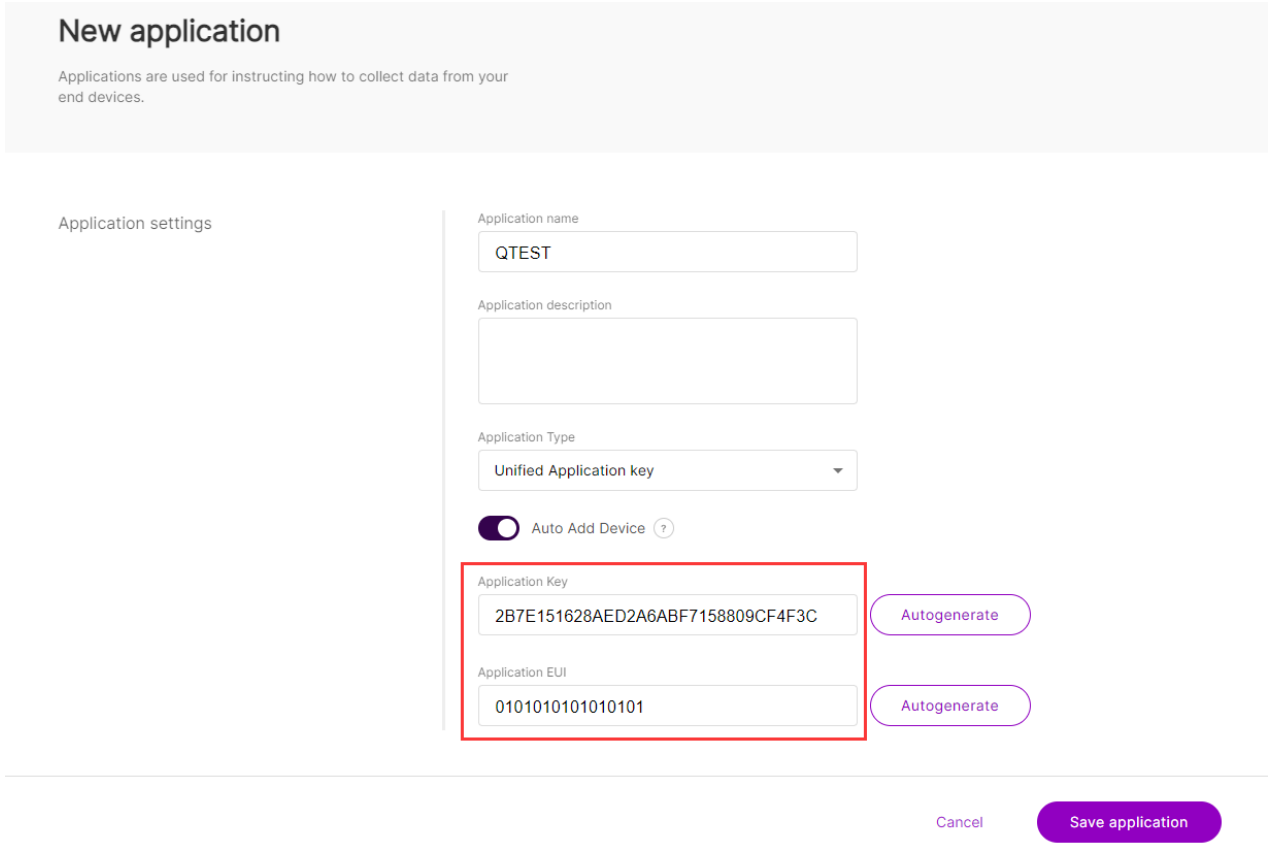
Setp1 :Set the working mode and working band of the gateway.



The following uses the built-in network server of the gateway as an example.

Gateway setting

Setp2 :Create a new Application.Set "**Application Key**" and "**Application EUI**".



Run and Connect

KG200Z_OPEN

Open the *KG200Z_OPEN_V01\LoRaWAN\App\se-identity.h* file.
Set the "**LORAWAN_NWK_KEY**" property to be the same as the gateway's "**Application Key**".
Set the "**LORAWAN_JOIN_EUI**" property to be the same as the gateway's "**Application EUI**".

```
/*!
 * Network root key
 */
#define LORAWAN_NWK_KEY                             2B,7E,15,16,28,AE,D2,A6,AB,F7,15,88,09,CF,4F,3C


/*!
 * App/Join server IEEE EUI (big endian)
 */
#define LORAWAN_JOIN_EUI                            01,01,01,01,01,01,01,01
```

Run and Connect

KG200Z_OPEN

Open the *LoRaWAN\Target\lorawan_conf.h* file.
Enable the "**REGION_EU868**" Band.

```
/* Region -------------------------------------*/
/* the region listed here will be linked in the MW code */
/* the application (on sys_conf.h) shall just configure one region at the time */
/*#define REGION_AS923*/
/*#define REGION_AU915*/
/*#define REGION_CN470*/
/*#define REGION_CN779*/
/*#define REGION_EU433*/
#define REGION_EU868
/*#define REGION_KR920*/
/*#define REGION_IN865*/
#define REGION_US915
/*#define REGION_RU864*/
```

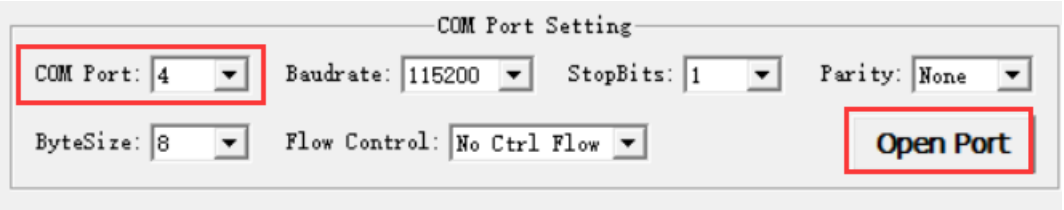
Open the *LoRaWAN\App\lora_app.h* file.
Set the "**ACTIVE_REGION**" to "LORAMAC_REGION_EU868".

```
/* LoraWAN application configuration (Mw is configured by lorawan_conf.h) */
#define ACTIVE_REGION                               LORAMAC_REGION_EU868
```

Run and Connect

KG200Z_OPEN

Rebuild and download firmware, Open the UART tool and perform the following Settings:
Baud Rate: 115200
StopBits:1
ByteSize:8
Select the COM Port and click "Open Port" to connect.



Run and Connect

KG200Z_OPEN

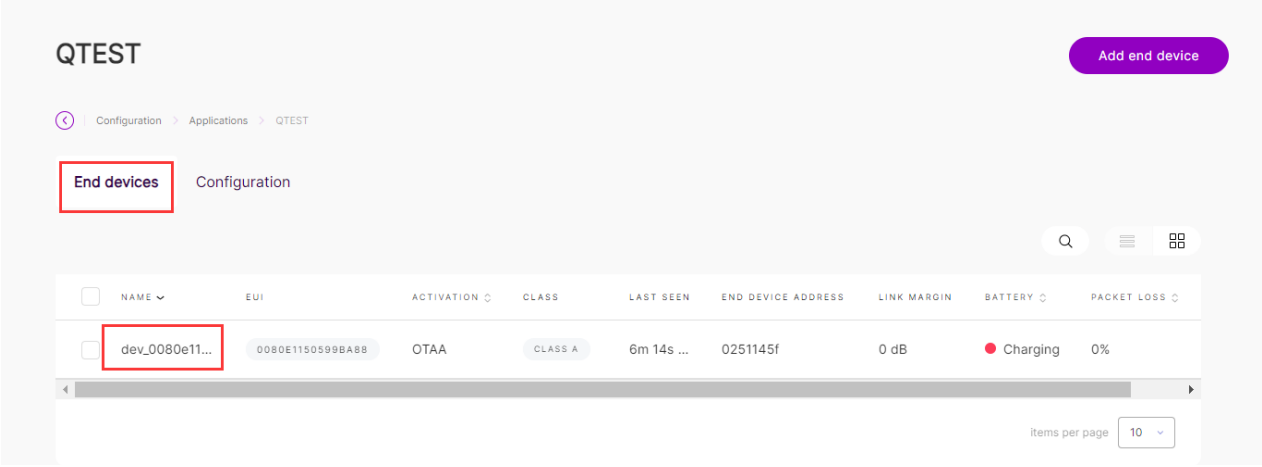
Click the "Reset" button of the KG200Z-TE-B, the device will automatically restart, and automatically join the network in OTAA mode after startup. If the device is successfully join the network, the following information is displayed on the UART.

```
APPLICATION_VERSION: V1.3.0
MW_LORAWAN_VERSION:  V2.5.0
MW_RADIO_VERSION:    V1.3.0
L2_SPEC_VERSION:     V1.0.3
RP_SPEC_VERSION:     V1-1.0.3
###### AppKey:     2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C
###### NwkKey:     2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C
###### AppSKey:    2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C
###### NwkSKey:    2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C
###### DevEUI:     00:80:E1:15:05:99:BA:88
###### AppEUI:     01:01:01:01:01:01:01:01
###### DevAddr:    05:99:BA:88
0s036:TX on freq 868500000 Hz at DR 0
1s520:MAC txDone
6s552:RX_1 on freq 868500000 Hz at DR 0
8s363:MAC rxDone
8s382:RX_C on freq 869525000 Hz at DR 0
Switch to Class C done

###### = JOINED = OTAA ======================
###### MCRootKey:   7D:F7:6B:0C:1A:B8:99:B3:3E:42:F0:47:B9:1B:54:6F
###### MCKEKey:     8C:B8:66:5E:0C:0E:0B:64:5B:2E:D9:E4:8A:19:27:7C
###### AppSKey:     22:25:97:3E:33:1A:C8:29:9D:63:58:60:84:D0:50:C0
###### NwkSKey:     99:99:9E:7B:F0:85:5D:CC:D3:8D:1C:FF:CB:71:23:38
###### DBIntKey:    7A:C4:7C:65:FE:25:9B:B6:54:BD:26:35:19:F8:9C:8E
###### DevEUI:      00:80:E1:15:05:99:BA:88
###### AppEUI:      01:01:01:01:01:01:01:01
###### DevAddr:     02:51:14:5F
```

If "JOIND = OTAA" is displayed, the device is successfully joined the network. The setting page of the gateway also displays that a new end devices is join the network.

如果显示“JOIND = OTAA”，则设备加入网络成功。

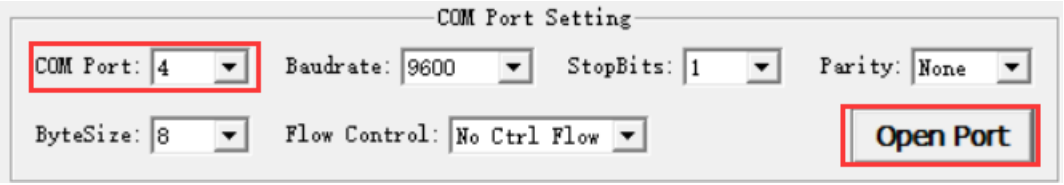
网关的设置页面也会显示有新的终端设备加入网络。



Run and Connect

KG200Z_AT

The KG200Z_AT version uses the AT command to control the module.
Open the UART tool and perform the following Settings:
Baud Rate: 9600
StopBits:1
ByteSize:8
Select the COM Port and click "Open Port" to connect.



Run and Connect

KG200Z_AT

Set NWKKEY with the following command:

AT+QNWKKEY=2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C

Set AppEUI with the following command:

AT+QAPPEUI=01:01:01:01:01:01:01:01

If "**OK**" is displayed on the UART, the Settings are successful.

```
AT+QAPPEUI=01:01:01:01:01:01:01:01

OK

AT+QNWKKEY=2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C

OK
```

Run and Connect

KG200Z_AT

Set work band with the following command:

AT+QBAND=5

If "**OK**" is displayed on the UART, the Settings are successful.

```
AT+QBAND=5
###### AppKey:       2B:7E:15:16:28:AE:D2:a6:AB:F7:15:88:09:CF:4F:3C
###### NwkKey:       2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C
###### AppSKey:      2B:7E:15:16:28:Ae:D2:A6:AB:F7:15:88:09:CF:4F:3C
###### NwkSKey:      2B:7E:15:16:28:AE:D2:A6:AB:F7:15:88:09:CF:4F:3C
###### DevEUI:       00:80:e1:15:05:99:BA:88
###### AppEUI:       01:01:01:01:01:01:01:01
###### DevAddr:      05:99:BA:88

OK

AT+QBAND=?
QBAND:5:EU868

OK
```

Run and Connect

KG200Z_AT

Join the network in OTAA mode using the following instructions :

AT+QJOIN=1

If "**+QEVT:JOINED**" is displayed, the device is successfully joined to the network.

```
AT+QJOIN=1
642s321:TX on freq 868100000 Hz at DR 0

OK
643s806:MAC txDone
648s838:RX_1 on freq 868100000 Hz at DR 0
650s649:MAC rxDone
+QEVT:JOINED
###### MCRootkey:    7D:F7:6B:0C:1A:B8:99:B3:3E:42:F0:47:B9:1B:54:6F
###### MCKEKey:      8C:B8:66:5E:0C:0E:0B:64:5B:2E:D9:E4:8A:19:27:7C
###### AppSKey:      FF:83:1E:23:FA:C5:0A:91:4B:1F:42:A3:EE:32:6B:5D
###### NwkSKey:      56:32:0A:EF:Bc:01:17:EC:B5:E1:CD:E4:EA:70:88:6D
###### DBIntKey:     7A:C4:7C:65:FE:25:9B:B6:54:BD:26:35:19:F8:9C:8E
###### DevEUI:       00:80:E1:15:05:99:BA:88
###### appEUI:       01:01:01:01:01:01:01:01
###### DevAddr:      02:51:AE:54
```

Run and Connect

Send and Recive

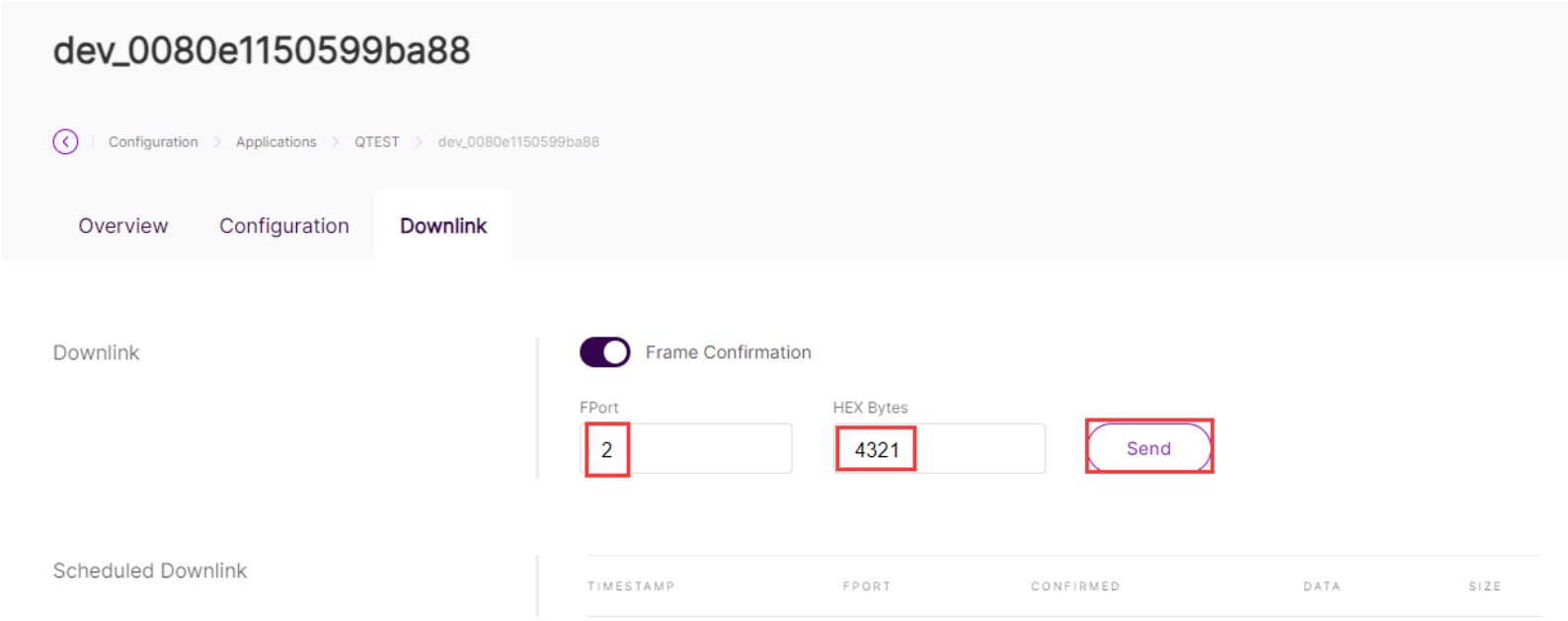
The AT version can send messages using the AT command.
The AT command format is as follows:
AT+QSEND=2:0:1234
Send hex data "1234" to the gateway using port "2".

```
AT+QSEND=2:0:1234
19s811:TX on freq 867900000 Hz at DR 0

OK
20s969:MAC txDone
22s001:RX_1 on freq 867900000 Hz at DR 0
23s319:MAC rxDone
+QEVT:RX_1, PORT 0, DR 0, RSSI 0, SNR 6
```

Run and Connect

Send and Recive

Send hex data "4321" through port "2" on the gateway settings page to the end device.
If "+QEVT:2:02:4321" is displayed, the device successfully receives the message.




```
AT+QSEND=2:0:1234
337s557:TX on freq 868800000 Hz at DR 7

OK
337s564:MAC txDone
338s544:RX_1 on freq 868800000 Hz at DR 7
338s570:MAC rxDone
+QEVT:2:02:4321
+QEVT:RX_1, 2, DR 7, RSSI -3, SNR 0
338s584:TX on freq 868800000 Hz at DR 7
338s589:MAC txDone
339s570:RX_1 on freq 868800000 Hz at DR 7
339s610:IRQ_RX_TX_TIMEOUT
339s610:MAC rxTimeOut
340s622:RX_2 on freq 869525000 Hz at DR 0
340s819:IRQ_RX_TX_TIMEOUT
340s819:MAC rxTimeOut
```

Q & A


QUECTEL
移联万物，志高行远
• 拥有更丰富、完整的物联网模组产品组合，一站式满足不同场景和地区的需求
• 推出类型丰富的天线产品，具备全定制天线设计、集成和制造的能力
• 提供云平台管理服务，满足从硬件接入到软件应用的全流程解决方案需求
• 全自动化生产线、测试线，保障产品质量始终如一，同时具有超高性价比
• 建立了业内规模领先的研发团队，为客户提供及时、专业、贴心的技术支持服务
• 持续研发新技术、新产品，率先发布5G、安卓智能、LPWA、C-V2X等产品
• 富有创新精神的国际化专业团队，始终保证“客户第一”
Thank You
Build a Smarter World
全国热线：400 960 7678
上海市闵行区田林路1016号科技绿洲3期（B区）5号楼 200233
联系电话：+86 21 5108 6236 销售支持：sales@quectel.com
技术支持：support@quectel.com 电子邮件：info@quectel.com
移远微信公众号