



AmebaZ2 Amazon FreeRTOS Getting Started Guide



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USING THIS DOCUMENT

Though every effort has been made to ensure that this document is current and accurate, more information may have become available subsequent to the production of this guide.

1 AmebaZ2 RTL8720CM Board

1.1 AmebaZ2 Demo EVB

Ameba Demo board home page: <https://www.amebaiot.com/amebaz2/>

Ameba RTL8720CM Board (AMB 31)



CPU

- 32-bit Arm®Cortex®-M4, up to 100MHz

Memory

- 256KB SRAM + 4MB PSRAM

Key Features

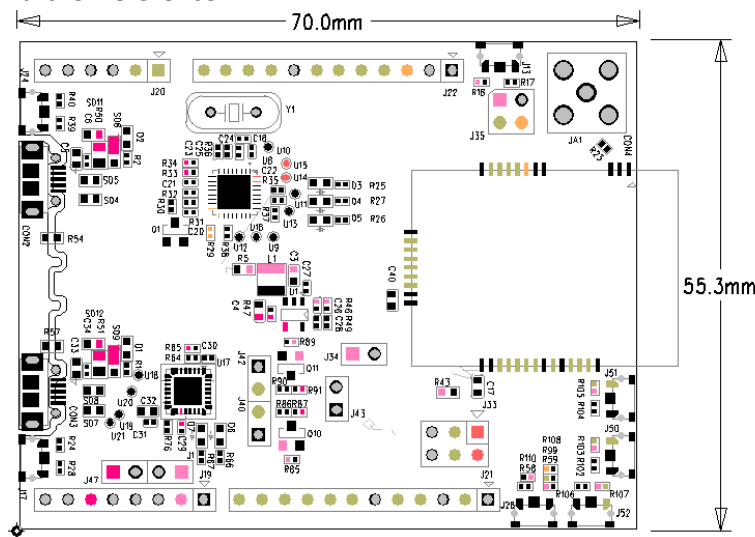
- Integrated 802.11n Wi-Fi SoC
- Hardware SSL Engine
- Root Trust Secure Boot
- BLE4.2

[Manual](#) / [Schematic](#) / [Layout](#)

Buy it 

1.2 PCB Layout Overview

RTL8720C embedded on Ameba-ZII DEV demo board, which consists of various I/O interfaces. For the details of the HDK, please contact us for further reference.



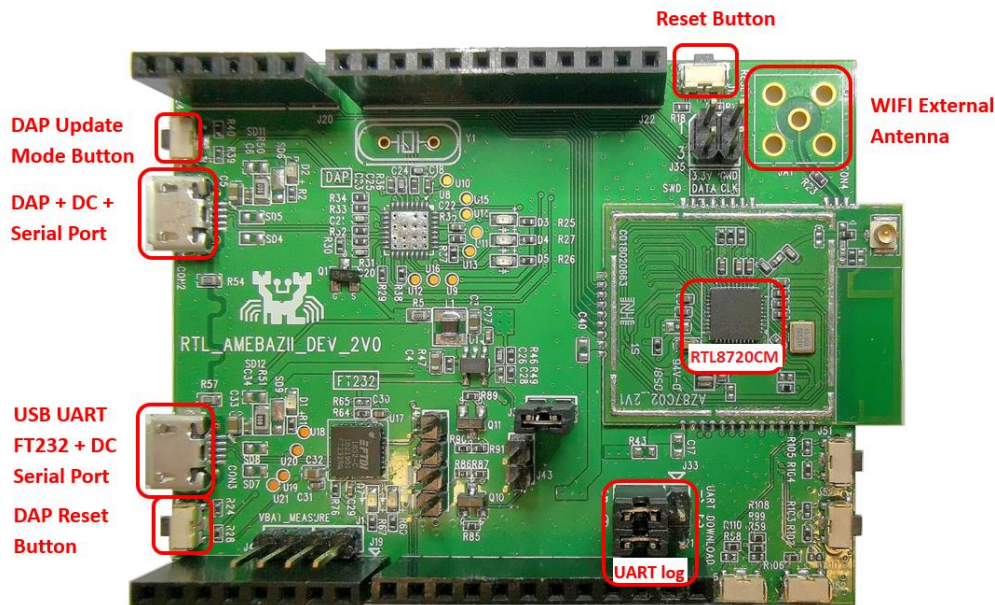
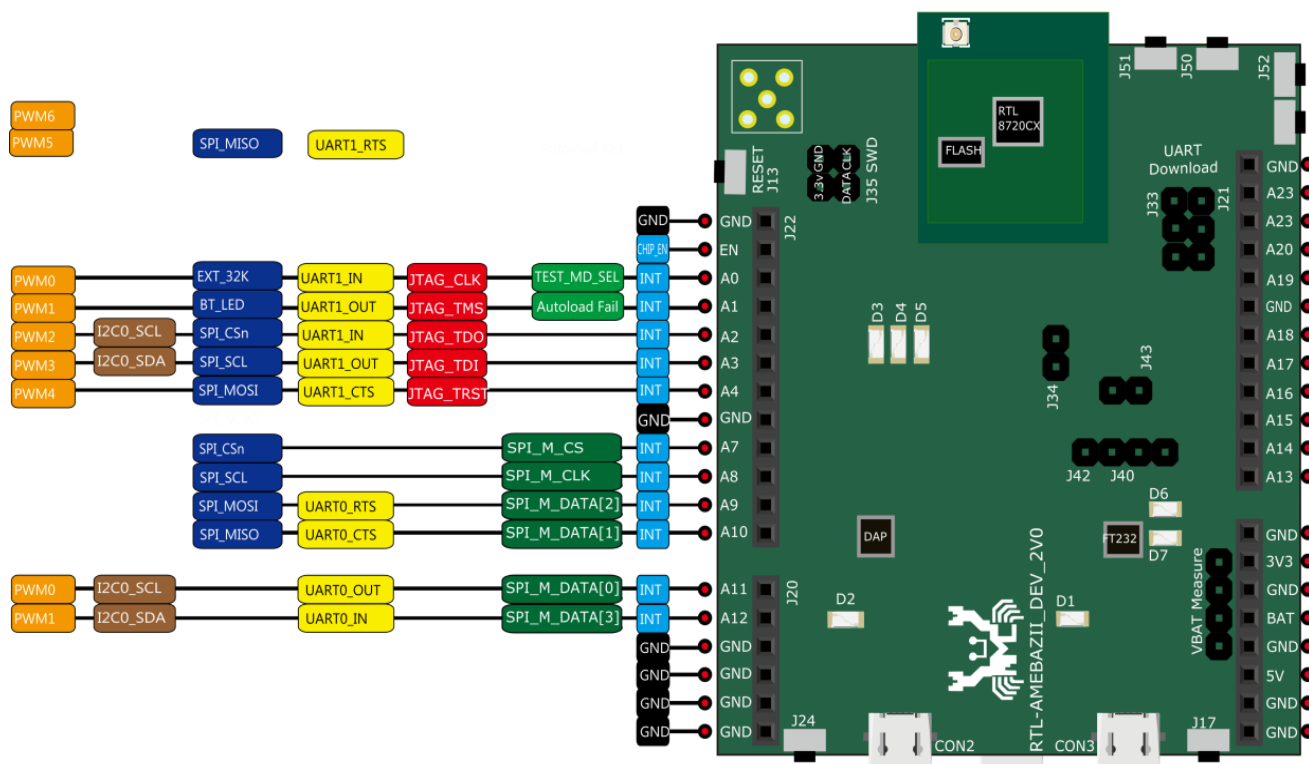


Figure 1-2 Ameba-ZII 2V0 Dev Board PCB Layout

1.3 Pin-Out Reference





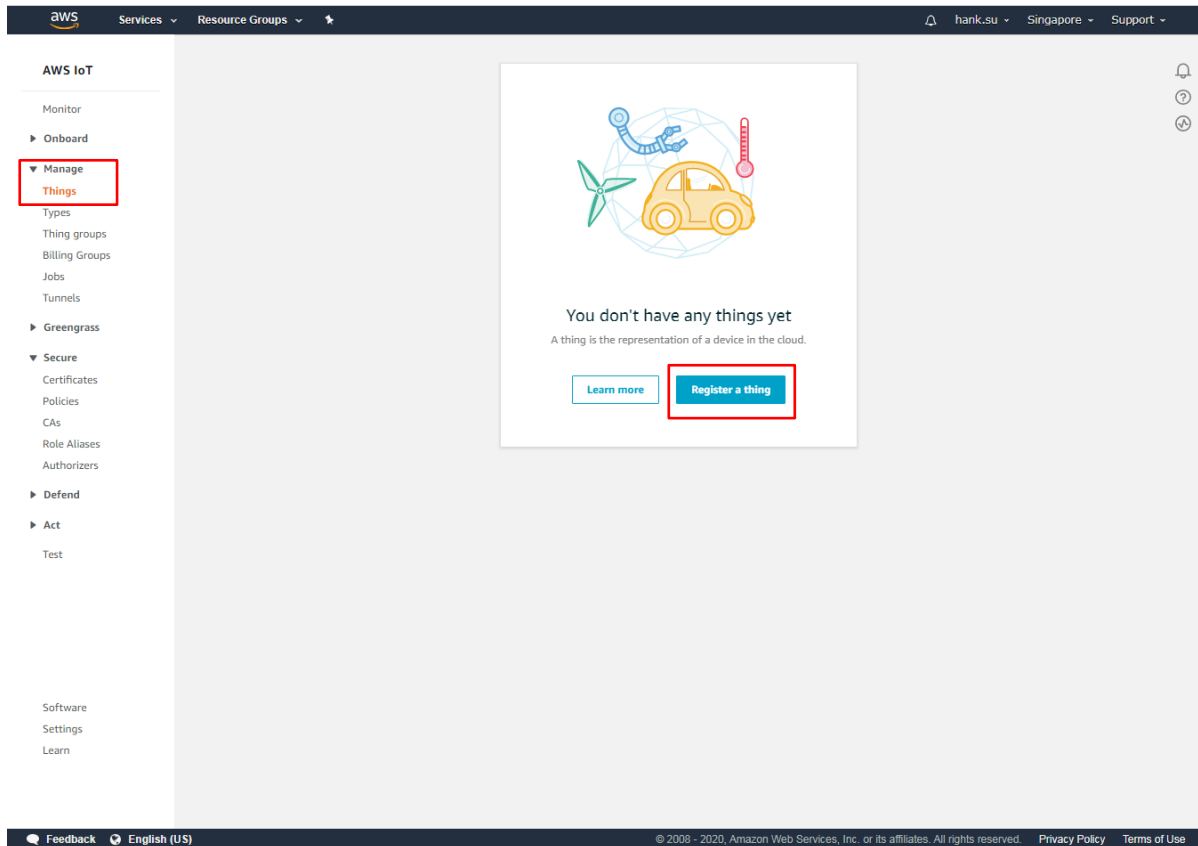
There are four LED on the AmebaZ2 EVB. LED1 lights steady green and LED2 steady red when device have power. LED3 and LED4 go with log uart, they flash red and green when uart communicating.

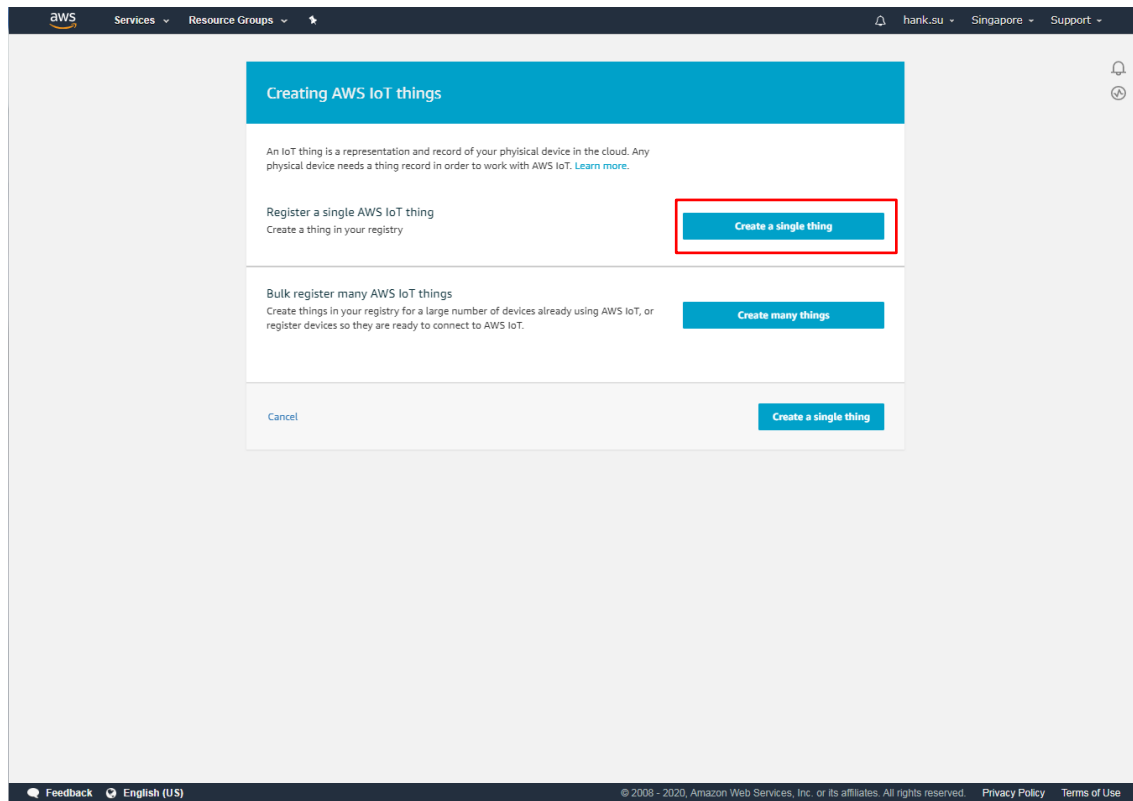


2 Configure AWS IoT Core

2.1 Create a New Device

To create a new device, navigate to Manage -> Things in the left-hand navigation menu. Then click “Register a thing”.





Creating AWS IoT things

An IoT thing is a representation and record of your physical device in the cloud. Any physical device needs a thing record in order to work with AWS IoT. [Learn more.](#)

Register a single AWS IoT thing
Create a thing in your registry

Create a single thing

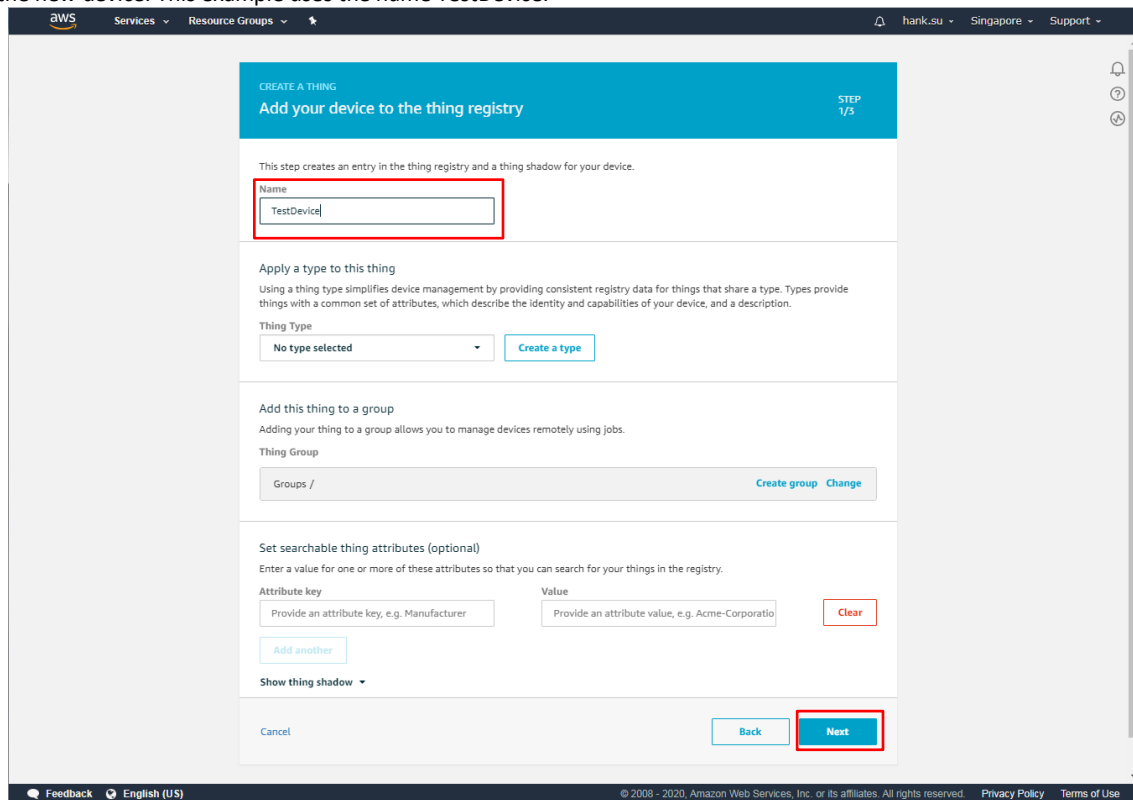
Bulk register many AWS IoT things
Create things in your registry for a large number of devices already using AWS IoT, or register devices so they are ready to connect to AWS IoT.

Create many things

Cancel **Create a single thing**

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Then, name the new device. This example uses the name TestDevice.



CREATE A THING STEP 1/5

Add your device to the thing registry

This step creates an entry in the thing registry and a thing shadow for your device.

Name
TestDevice

Apply a type to this thing
Using a thing type simplifies device management by providing consistent registry data for things that share a type. Types provide things with a common set of attributes, which describe the identity and capabilities of your device, and a description.

Thing Type
No type selected **Create a type**

Add this thing to a group
Adding your thing to a group allows you to manage devices remotely using Jobs.

Thing Group
Groups / **Create group** [Change](#)

Set searchable thing attributes (optional)
Enter a value for one or more of these attributes so that you can search for your things in the registry.

Attribute key
Provide an attribute key, e.g. Manufacturer

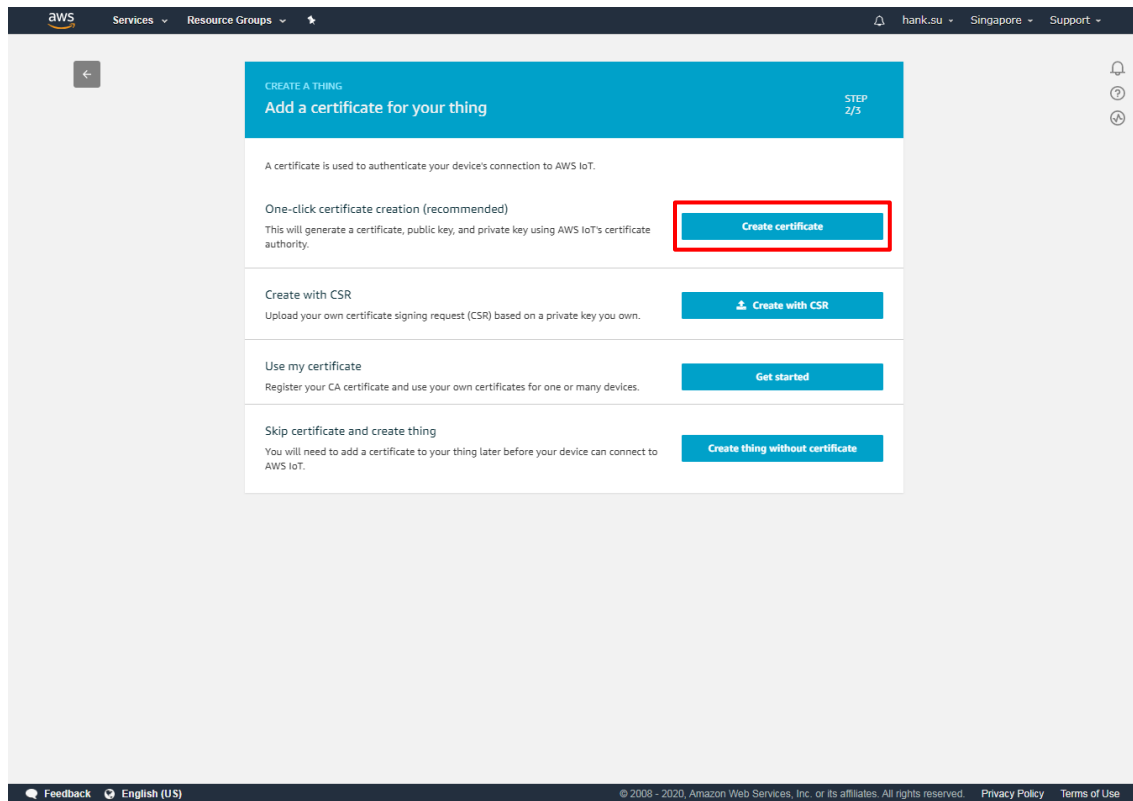
Value
Provide an attribute value, e.g. Acme-Corporatio **Clear**

Add another

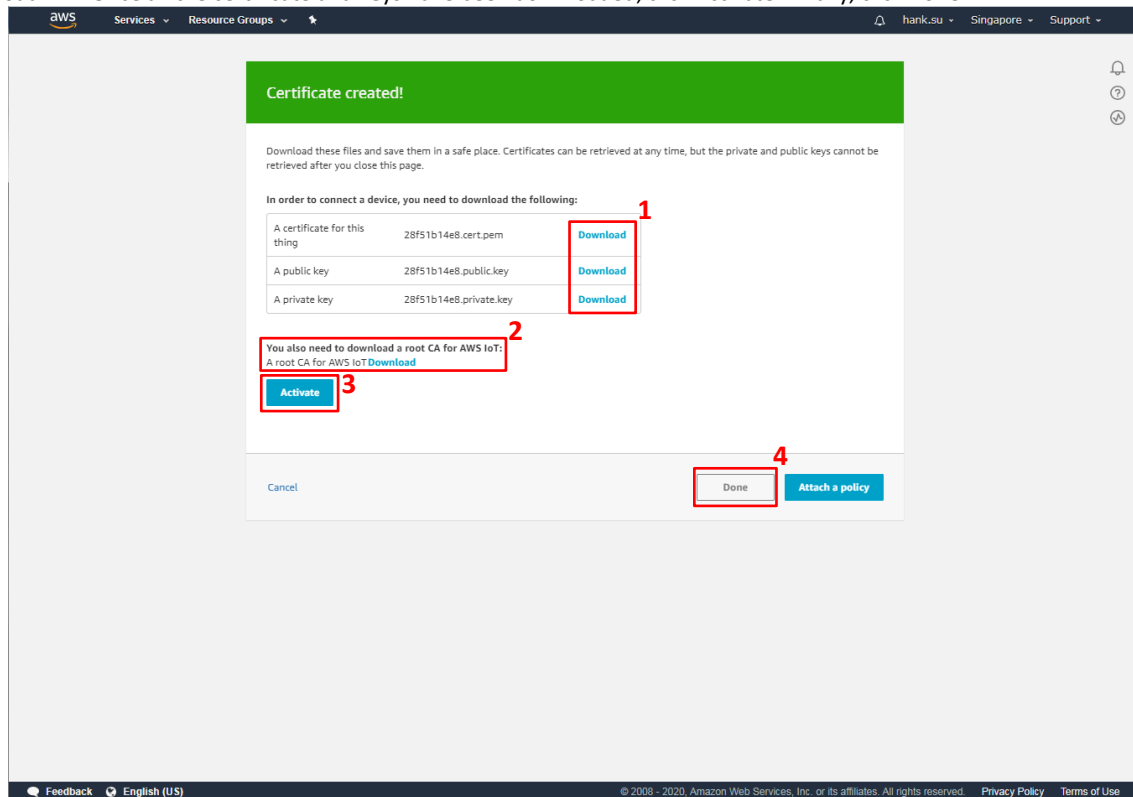
Show thing shadow ▾

Cancel **Back** **Next**

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Download the certificate, public key, and private key for the device by clicking Download. Next, download the root CA for AWS IoT by clicking to the Download link. Once all the certificate and keys have been downloaded, click Activate. Finally, click Done



CA certificates for server authentication

Depending on which type of data endpoint you are using and which cipher suite you have negotiated, AWS IoT Core server authentication certificates are signed by one of the following root CA certificates:

VeriSign Endpoints (legacy)

- RSA 2048 bit key: [VeriSign Class 3 Public Primary G5 root CA certificate](#)

Amazon Trust Services Endpoints (preferred)

Note

You might need to right click these links and select **Save link as...** to save these certificates as files.

- RSA 2048 bit key: [Amazon Root CA 1](#)
- RSA 4096 bit key: Amazon Root CA 2. Reserved for future use.
- ECC 256 bit key: [Amazon Root CA 3](#)
- ECC 384 bit key: Amazon Root CA 4. Reserved for future use.

These certificates are all cross-signed by the [Starfield Root CA Certificate](#). All new AWS IoT Core regions, beginning with the May 9, 2018 launch of AWS IoT Core in the Asia Pacific (Mumbai) Region, serve only ATS certificates.

On this page

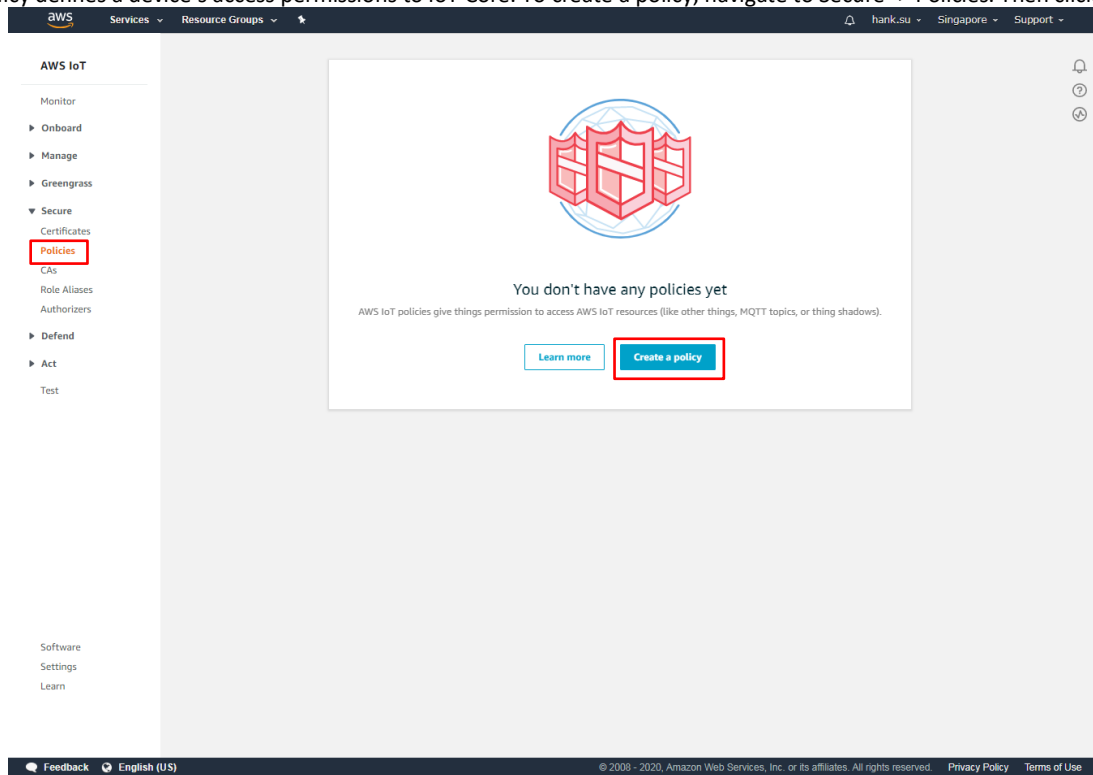
Endpoint types

CA certificates for server authentication

Server authentication guidelines

2.2 Create a policy

A policy defines a device's access permissions to IoT Core. To create a policy, navigate to Secure -> Policies. Then click "Create a policy"



NOTE – this policy grants unrestricted access for all iot operations, and is to be used only in a development environment. For non-dev environments, all devices in your fleet must have credentials with privileges that authorize intended actions only, which include (but not limited to) AWS IoT MQTT actions such as publishing messages or subscribing to topics with specific scope and context. The specific permission policies can vary for your use cases. Identify the permission policies that best meet your business and security requirements.

For sample policies, refer to <https://docs.aws.amazon.com/iot/latest/developerguide/example-iot-policies.html>.

Also refer to <https://docs.aws.amazon.com/iot/latest/developerguide/security-best-practices.html>

Create a policy

Create a policy to define a set of authorized actions. You can authorize actions on one or more resources (things, topics, topic filters). To learn more about IoT policies go to the [AWS IoT Policies documentation page](#).

Name
TestPolicy

Add statements
Policy statements define the types of actions that can be performed by a resource. Advanced mode

Action
iot:Publish,iot:Receive,iot:Subscribe

Resource ARN
*

Effect
☒ Allow ☐ Deny Remove

Action
iot:Connect

Resource ARN
arn:aws:iot:aaaaaa:bbbbb:client/*

Effect
☒ Allow ☐ Deny Remove

Add statement

Create

2.3 Attach Policy

The last step to configuring the device is attaching a policy. To attach a policy to new device, navigate to Manage -> Things. Then click on the device which was created.

AWS IoT

Monitor

Onboard

Manage

Things

Types

Thing groups

Billing Groups

Jobs

Tunnels

Greengrass

Secure

Certificates

Policies

CAs

Role Aliases

Authorizers

Defend

Act

Test

Software

Settings

Learn

Things

Search things

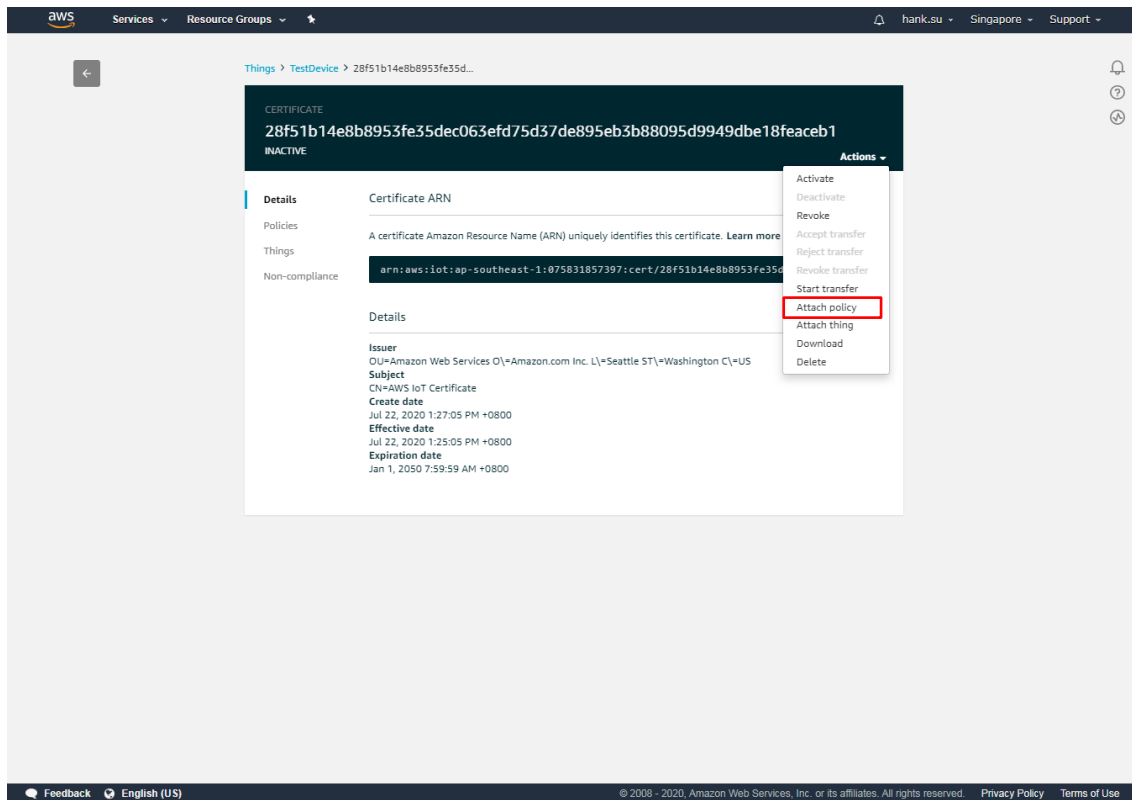
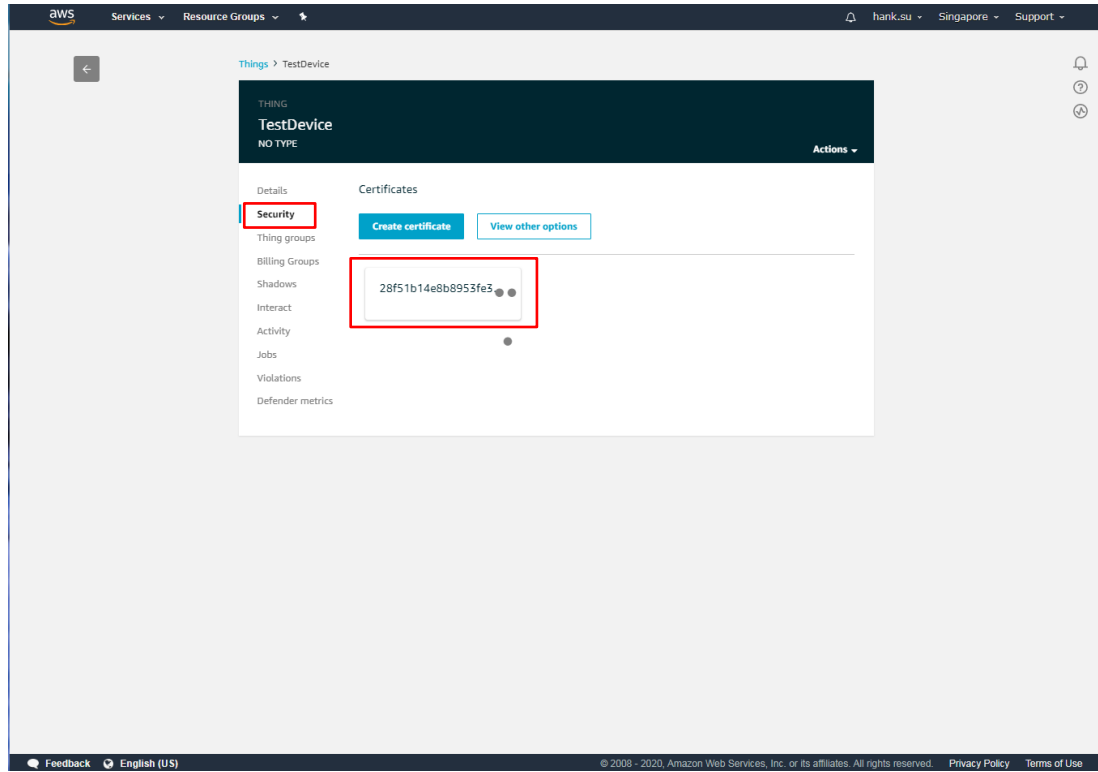
Fleet Indexing

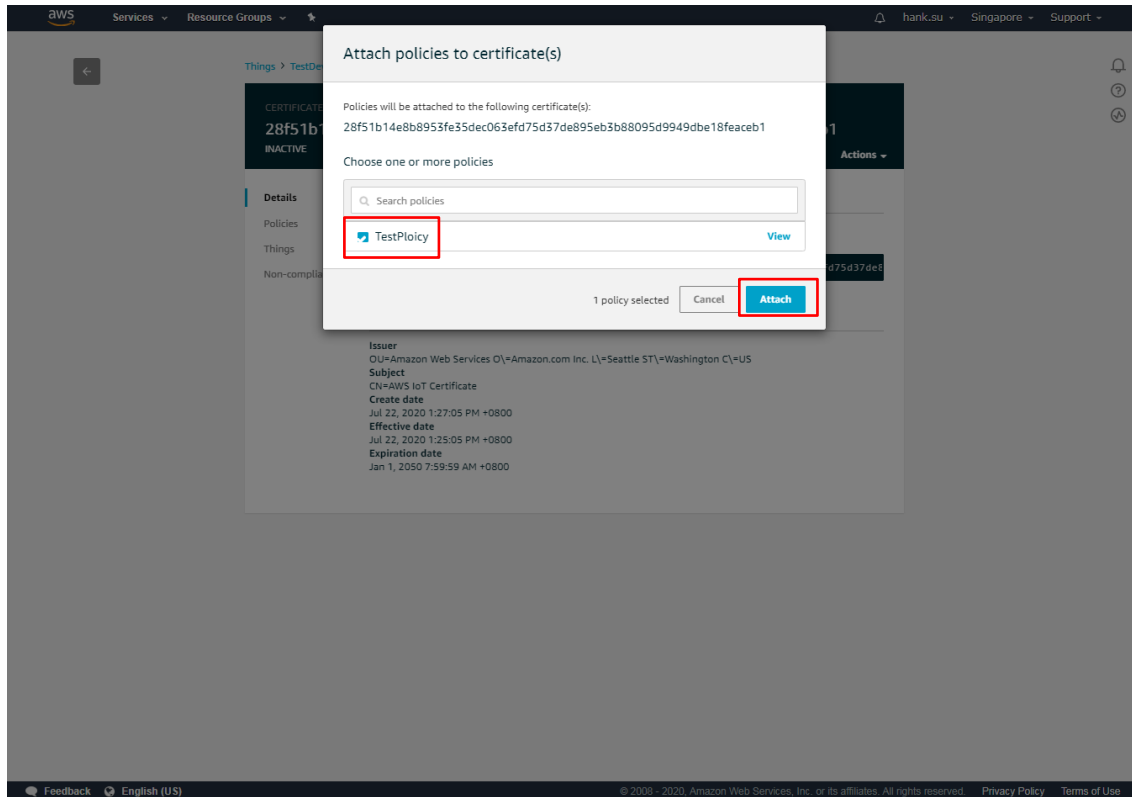
Create

Card

TestDevice
NO TYPE

Click Security, then click the certificate create in previous step.

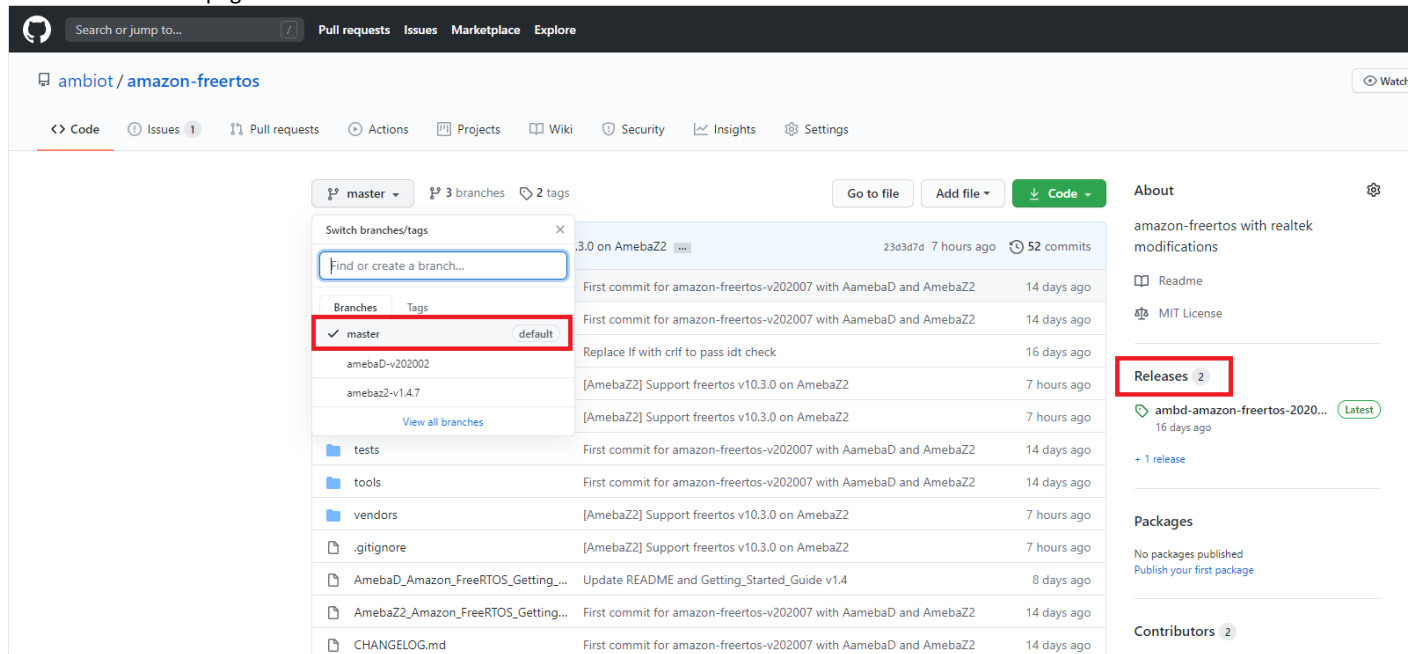




3 Configure AmebaZ2 Amazon FreeRTOS

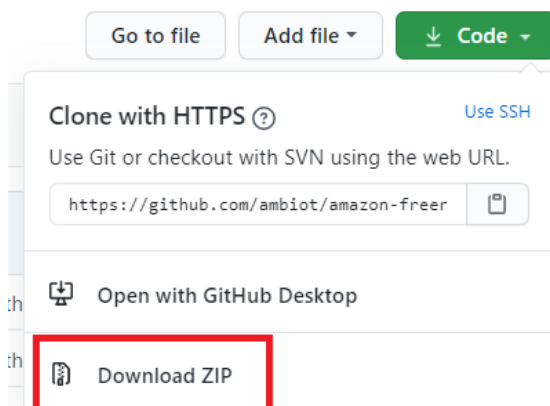
3.1 Download Source Code from github

Open source link: <https://github.com/ambiot/amazon-freertos> and select master for get newest source code. The stable version could be found in "Releases" page.



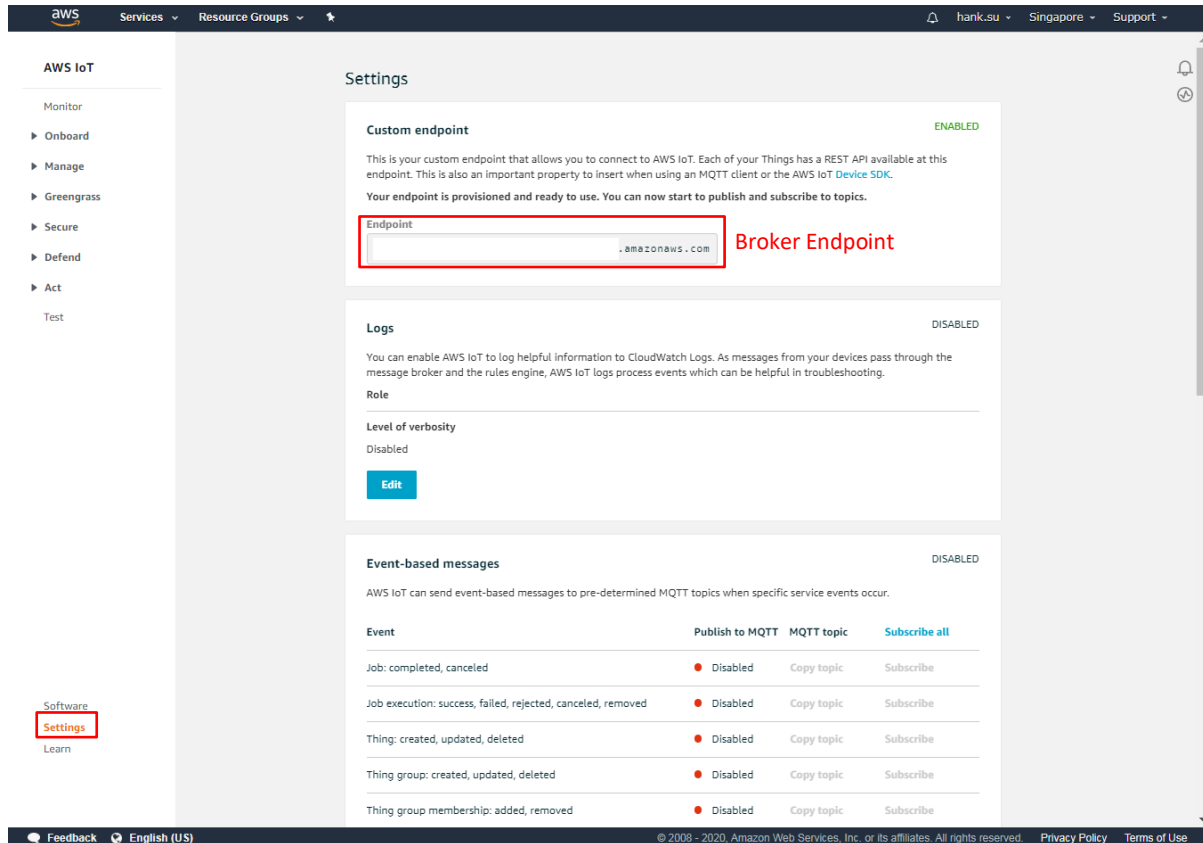
3.1.1 Cloning a repository by Download ZIP

1. On GitHub, navigate to the main page of the repository.
2. Above the list of files, click **Code**.
3. Click **Download ZIP** to get source code.



For more information, please refer "[Cloning a repository from GitHub to GitHub Desktop](#)."

3.2 Get Broker Endpoint by AWS IoT Core



Settings

Custom endpoint ENABLED

This is your custom endpoint that allows you to connect to AWS IoT. Each of your Things has a REST API available at this endpoint. This is also an important property to insert when using an MQTT client or the [AWS IoT Device SDK](#). Your endpoint is provisioned and ready to use. You can now start to publish and subscribe to topics.

Endpoint: **Broker Endpoint**

Logs DISABLED

You can enable AWS IoT to log helpful information to CloudWatch Logs. As messages from your devices pass through the message broker and the rules engine, AWS IoT logs process events which can be helpful in troubleshooting.

Role

Level of verbosity
Disabled

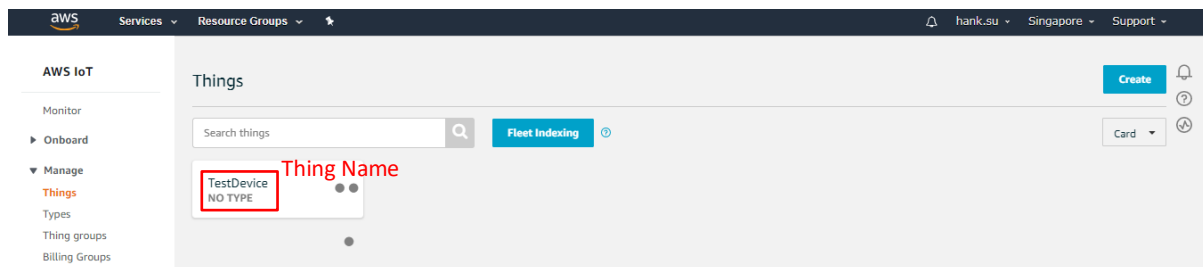
[Edit](#)

Event-based messages DISABLED

AWS IoT can send event-based messages to pre-determined MQTT topics when specific service events occur.

Event	Publish to MQTT	MQTT topic	Subscribe all
Job: completed, canceled	Disabled	Copy topic	Subscribe
Job execution: success, failed, rejected, canceled, removed	Disabled	Copy topic	Subscribe
Thing: created, updated, deleted	Disabled	Copy topic	Subscribe
Thing group: created, updated, deleted	Disabled	Copy topic	Subscribe
Thing group membership: added, removed	Disabled	Copy topic	Subscribe

3.3 Get Thing Name



Things

Search things: [Fleet Indexing](#)

TestDevice **Thing Name**
NO TYPE

3.4 Setup IoT Core Information with AmebaZ2 Amazon FreeRTOS

Setup BROKER_ENDPOINT, THING_NAME, WIFI_SSID, PASSWORD in “amazon-freertos/blob/master/demos/include/aws_clientcredential.h”

```
#define clientcredentialMQTT_BROKER_ENDPOINT "xxxxxxxxxxxxx.amazonaws.com"

/*
 * @brief Host name.
 * @todo Set this to the unique name of your IoT Thing.
 */
#define clientcredentialIOT_THING_NAME "TestDevice"

/*
 * @brief Port number the MQTT broker is using.
 */
#define clientcredentialMQTT_BROKER_PORT 8883

/*
 * @brief Port number the Green Grass Discovery use for JSON retrieval from cloud is using.
 */
#define clientcredentialGREENGRASS_DISCOVERY_PORT 8443

/*
 * @brief Wi-Fi network to join.
 * @todo If you are using Wi-Fi, set this to your network name.
 */
#define clientcredentialWIFI_SSID "TestAP"

/*
 * @brief Password needed to join Wi-Fi network.
 * @todo If you are using WPA, set this to your network password.
 */
#define clientcredentialWIFI_PASSWORD "password"

/*
 * @brief Wi-Fi network security type.
 *
 * @see WIFISecurity_t.
 *
 * @note Possible values are eWiFiSecurityOpen, eWiFiSecurityWEP, eWiFiSecurityWPA,
 * eWiFiSecurityWPA2 (depending on the support of your device Wi-Fi radio).
 */
#define clientcredentialWIFI_SECURITY eWiFiSecurityWPA2

#endif /* ifndef __AWS_CLIENTCREDENTIAL_H__ */
```

3.4.1 Setup Thing’s Private Key and Certificate

Filled keyCLIENT_CERTIFICATE_PEM and keyCLIENT_PRIVATE_KEY_PEM in “amazon-freertos/blob/master/demos/include/aws_clientcredential_keys.h” by xxxxxxxx-certifiacte.pem and xxxxxxxx-private.pem.key.

Certificate created!

Download these files and save them in a safe place. Certificates can be retrieved at any time, but the private and public keys cannot be retrieved after you close this page.

In order to connect a device, you need to download the following:

A certificate for this thing	28f51b14e8.cert.pem	Download
A public key	28f51b14e8.public.key	Download
A private key	28f51b14e8.private.key	Download

You also need to download a root CA for AWS IoT:
A root CA for AWS IoT [Download](#)

[Activate](#)

It can done by amazon-freertos/tools/certificate_configuration/CertificateConfigurator.html

Certificate Configuration Tool

FreeRTOS Developer Demos

Provide client certificate and private key PEM files downloaded from the AWS IoT Console.

Certificate PEM file:

選擇檔案 未選擇任何檔案

Private Key PEM file:

選擇檔案 未選擇任何檔案

⬇️ Generate and save `aws_clientcredential_keys.h`

 Save the generated header file to the *demos/common/include* folder of the demo project.

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Final aws_clientcredential_keys.h overview.

[illegible]

3.4.2 Enable FreeRTOS demo on AmebaZ2

Find platform_opts.h in amazon-freertos\vendors\realtek\boards\amebaZ2\aws_demos\config_files and enable **CONFIG_EXAMPLE_AMAZON_FREERTOS**

```
/* For Amazon FreeRTOS SDK example */
#define CONFIG_EXAMPLE_AMAZON_FREERTOS 1
```

Find aws_demo_config.h in amazon-freertos\vendors\realtek\boards\amebaZ2\aws_demos\config_files and add **CONFIG_MQTT_DEMO_ENABLED**

```
/* To run a particular demo you need to define one of these.
 * Only one demo can be configured at a time
 *
 * CONFIG_MQTT_DEMO_ENABLED
 * CONFIG_SHADOW_DEMO_ENABLED
 * CONFIG_OTA_UPDATE_DEMO_ENABLED
 *
 * These defines are used in iot_demo_runner.h for demo selection */
#define CONFIG_MQTT_DEMO_ENABLED
```

Now you can start to compile AmebaZ2 Amazon FreeRTOS

4 Compile AmebaZ2 Amazon FreeRTOS

4.1 Pre-Requisite

- Required source code. (<https://github.com/ambiot/amazon-freertos>)
- AmebaZ2 Demo board
- Realtek Image Tool
- IAR Embedded Workbench ver.8.30.1

4.2 IAR Build Environment Setup

The IAR IDE (integrated development environment) only supports Windows OS, this section is applicable for **Windows OS only**.

4.3 Install IAR IDE

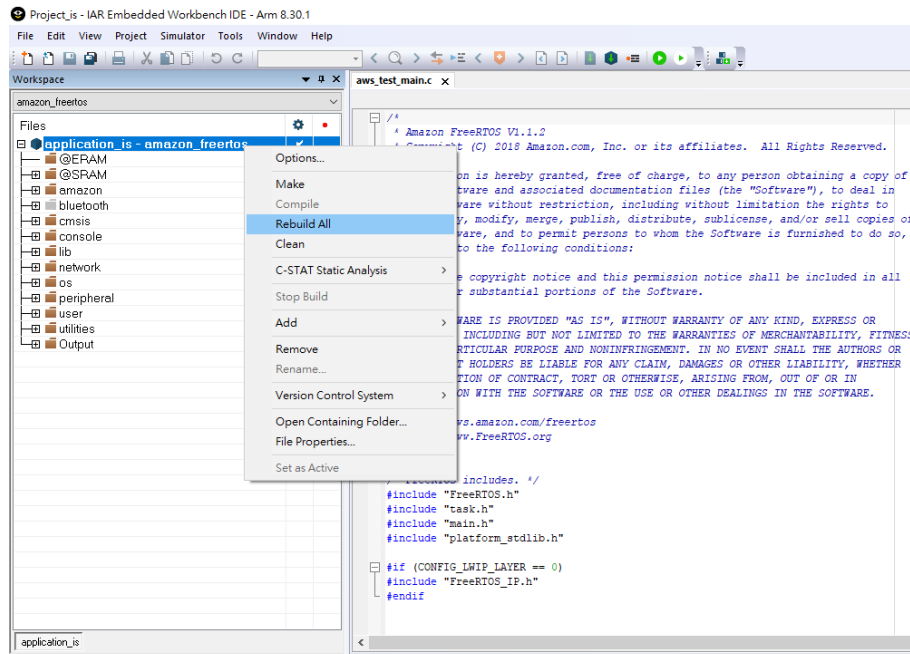
IAR IDE provides the toolchain for Ameba-ZII. It allows users to write programs, compile and upload them to your board. Also, it supports step-by-step debug function.

User can visit the official website of **IAR Embedded Workbench** and install the IDE by following its instructions.

Note: Please use IAR version **8.30** or above.

4.4 Compilation

- 1) Open `amazon-freertos/projects/realtek/amebaZ2/IAR/aws_demos/Project_is.eww`.
- 2) Confirm 'application_is' in Work Space, right click 'application_is' and choose **"Rebuild All"** to compile.
- 3) Make sure there is no error after compile.



4.5 Generate Image Binary

After compile, the images **partition.bin**, **bootloader.bin**, **firmware_is.bin** and **flash_is.bin** can be seen in the amazon-freertos/projects/realtek/amebaZ2/IAR/aws_demos/Debug/Exe.

- 1) **partition.bin** stores partition table, recording the address of Boot image and firmware image;
- 2) **bootloader.bin** is bootloader image;
- 3) **firmware_is.bin** is application image;
- 4) **flash_is.bin** links partition.bin, bootloader.bin and firmware_is.bin. Users need to choose flash_is.bin when downloading the image to board by Image Tool

5 ImageTool

The tool can be find in `amazon-freertos/vendors/realtek/tools/AmebaZ2_PGTool_v1.2.8`

5.1 Introduction

This chapter introduces how to use Image Tool to generate and download images. As show in picture below, Image Tool has two menu pages:

- Download: used as image download server to transmit images to Ameba through UART.

Note: If you need to download code via external uart, must use **FT232** USB to connect UART dongle.

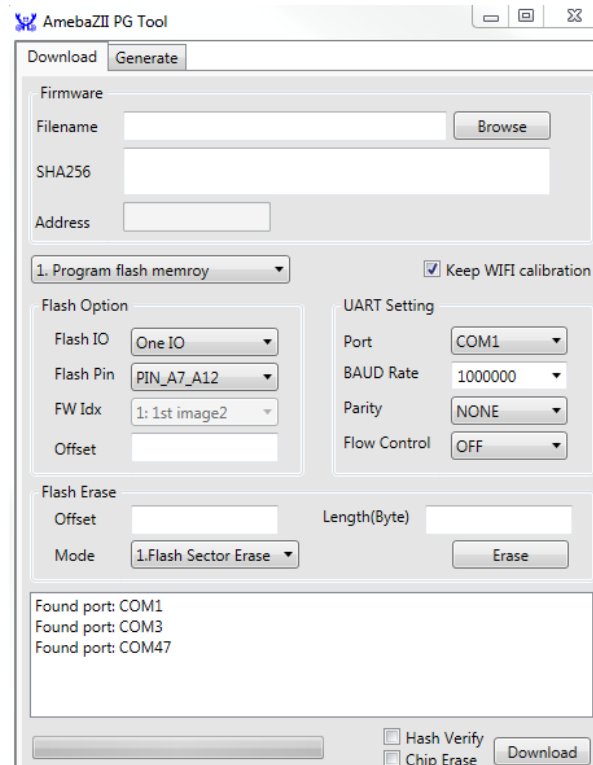


Fig 5-1 AmebaZII ImageTool UI

5.2 Environment Setup

5.2.1 Hardware Setup

User needs to connect CON3 to user's PC via a Micro USB cable. Add jumpers for J34 and J33 (J33 is for log UART which has two jumpers) if there is no connection.

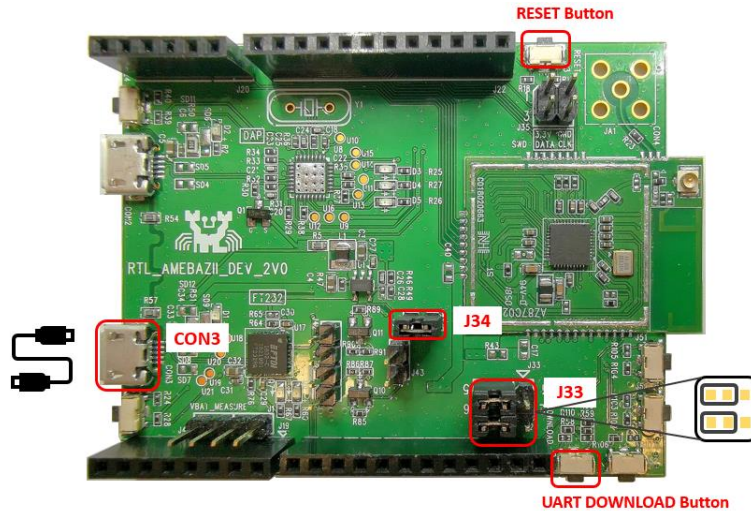


Fig 5-2 Ameba-ZII EVB V2.0 Hardware Setup

5.2.2 Software Setup

- Environment Requirements: EX. WinXP, Win 7 Above, Microsoft .NET Framework 3.5
- AmebaZII_PGTool_v1.2.8.exe

5.3 Image Download

User can download the image to demo board by following steps:

- 1) Trigger Ameba-ZII chip enter **UART download mode** by:
 - a. Press and hold the **UART DOWNLOAD** button then press the **RESET** button and release both buttons. And make sure the log UART is connected properly.
 - b. If the chip enters **download mode**, the below log should be shown on log UART console.

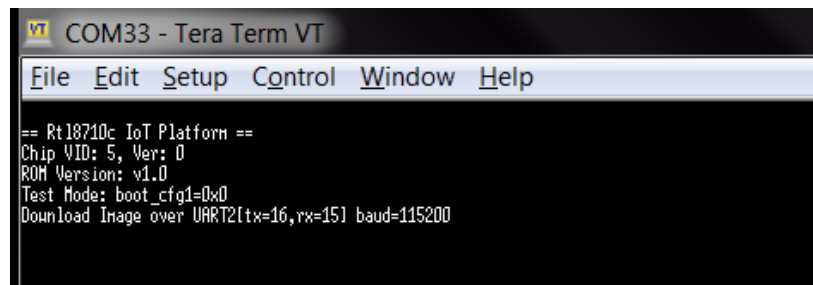
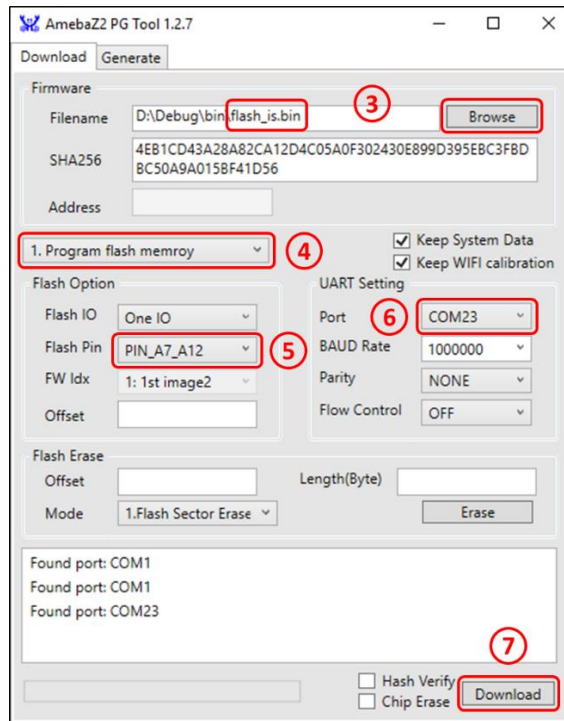


Fig 5-3 Ameba-ZII UART download mode

- c. After confirming it is in download mode, **remember to disconnect the log UART console before using Image Tool to download**, because the tool will also need to connect to this log UART port.

- 2) Open **AmebaZ2 PG Tool**



- 3) “Browse” to choose the image to be downloaded (amazon-freertos/projects/realtek/amebaZ2/IAR/aws_demos/Debug/Exe/flash_is.bin)
- 4) Choose “1. Program flash memory”
- 5) Choose correct “Flash Pin” according to the IC part number

Flash Pin	IC part number
PIN_A7_A12	RTL8710CX/RTL8720CM
PIN_B6_B12	RTL8720CF

- 6) Choose the correct **UART port** (use **rescan** to update the port list)
 - 7) Click “Download” to start downloading image. While downloading, the status will be shown on the left bar.
- Note:** It’s recommended to use the default settings unless user is familiar with them.

6 MQTT Demo

6.1 Get Device Log

Install Tera Term to get device log

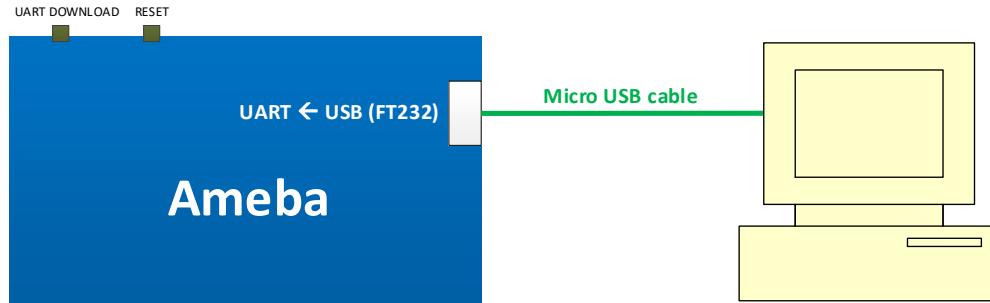
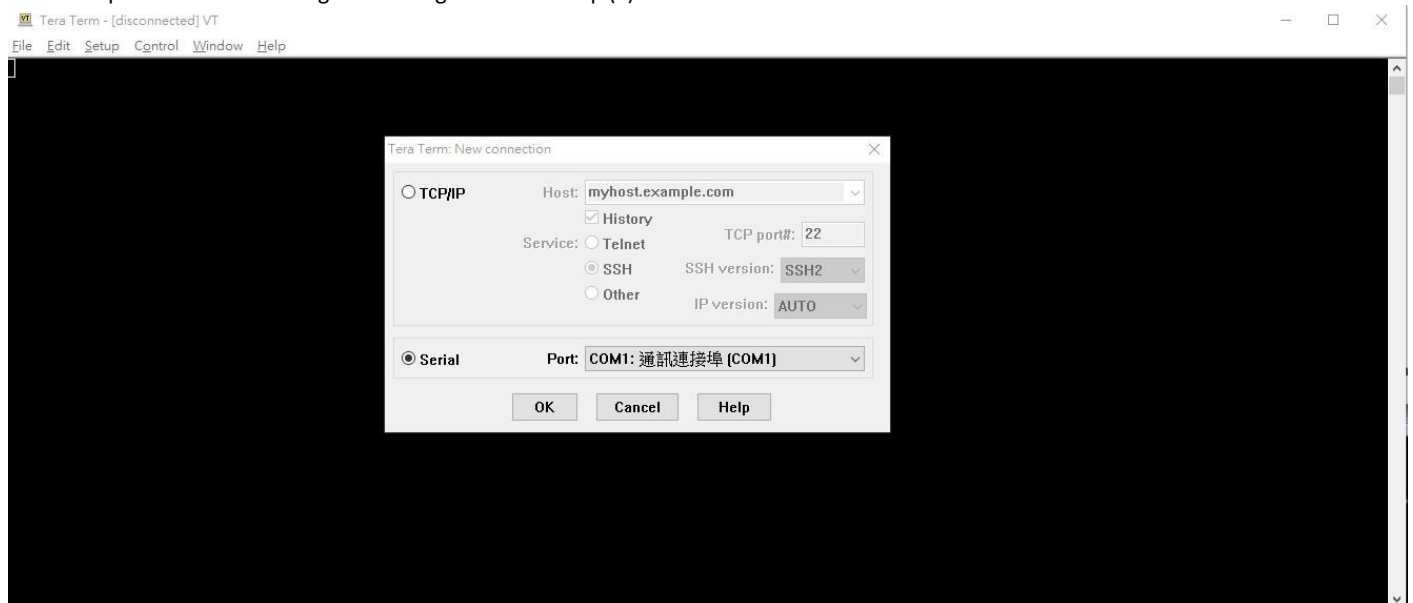


Fig 6-1 Hardware setup

The serial port is same with ImageTool that get from 5.4 step (6).



6.2 Run MQTT Demo

Default setting of SDK are enable MQTT demo. Once the AmebaD EVB has rebooted, the application will automatically start run MQTT demo and communicate to IoT Core.

```

COM6 - Tera Term VT
File Edit Setup Control Window Help
#calibration_ok:[2:19:11]
#interface 0 is initialized
interface 1 is initialized

Initializing WIFI ...
WIFI is not running
WIFI initialized

init_thread(58), Available heap 0x24ac0
0 56 [example_a] Wi-Fi module initialized. Connecting to AP...
WIFI is already running
Joining BSS by SSID RealEZ-2.4G...

RTL8721D[Driver]: set ssid [RealEZ-2.4G]

RTL8721D[Driver]: rtw_set_wpa_ie[1136]: AuthKeyMgmt = 0x2

RTL8721D[Driver]: rtw_restruct_sec_ie[3763]: no pmksa cached

RTL8721D[Driver]: start auth to 80:2a:a8:d4:93:c4

RTL8721D[Driver]: auth alg = 2

RTL8721D[Driver]:
OnAuthClient:alghthm = 0, seq = 2, status = 0, sae_msg_len = 0

RTL8721D[Driver]: auth success, start assoc

RTL8721D[Driver]: association success(res=4)
wlan1: 1 DL RSVD page success! DLBcnCount:01, poll:00000001

RTL8721D[Driver]: ClientSendEAPOL[1522]: no use cache pmksa

RTL8721D[Driver]: set pairwise key to hw: alg:4(WEP40-1 WEP104-5 TKIP-2 AES-4)

RTL8721D[Driver]: set group key to hw: alg:4(WEP40-1 WEP104-5 TKIP-2 AES-4) keyid:2

1 8000 [example_a] Wi-Fi Connected to AP. Creating tasks which use network...
2 8007 [example_a] IP Address acquired 192.168.89.151
3 8019 [example_a] Write certificate...
4 8080 [iot_threa] [INFO ][DEMO][8079] -----STARTING DEMO-----
5 8086 [iot_threa] [INFO ][INIT][8086] SDK successfully initialized.

...

6 15504 [iot_threa] [INFO ][DEMO][15504] Successfully initialized the demo. Network type for the demo: 1
7 15513 [iot_threa] [INFO ][MQTT][15513] MQTT library successfully initialized.
8 15522 [iot_threa] [INFO ][DEMO][15522] MQTT demo client identifier is ameba-ota (length 9).
9 17272 [iot_threa] [INFO ][MQTT][17272] Establishing new MQTT connection.
Interface 0 IP address : 192.168.89.15110 17283 [iot_threa] [INFO ][MQTT][17283] Anonymous metrics (SDK language, SDK version) will be provided to AWS IoT. Reconfigur
e with AWS_IOT_MQTT_ENABLE_METRICS set to 0 to disable.
11 17302 [iot_threa] [INFO ][MQTT][17302] (MQTT connection 100337e0, CONNECT operation 100339a0) Waiting for operation completion.
12 17421 [iot_threa] [INFO ][MQTT][17421] (MQTT connection 100337e0, CONNECT operation 100339a0) Wait complete with result SUCCESS.
13 17433 [iot_threa] [INFO ][MQTT][17433] New MQTT connection 100381d0 established.
14 17443 [iot_threa] [INFO ][MQTT][17443] (MQTT connection 100337e0) SUBSCRIBE operation scheduled.
15 17452 [iot_threa] [INFO ][MQTT][17452] (MQTT connection 100337e0, SUBSCRIBE operation 100339e0) Waiting for operation completion.
16 17612 [iot_threa] [INFO ][MQTT][17612] (MQTT connection 100337e0, SUBSCRIBE operation 100339e0) Wait complete with result SUCCESS.
17 17624 [iot_threa] [INFO ][DEMO][17624] All demo topic filter subscriptions accepted.
18 17632 [iot_threa] [INFO ][DEMO][17632] Publishing messages 0 to 1.
19 17640 [iot_threa] [INFO ][MQTT][17640] (MQTT connection 100337e0) MQTT PUBLISH operation queued.
20 17650 [iot_threa] [INFO ][MQTT][17650] (MQTT connection 100337e0) MQTT PUBLISH operation queued.
21 17659 [iot_threa] [INFO ][DEMO][17659] Waiting for 2 publishes to be received.
22 17752 [iot_threa] [INFO ][DEMO][17752] MQTT PUBLISH 0 successfully sent.
23 17784 [iot_threa] [INFO ][DEMO][17784] Incoming PUBLISH received:
Subscription topic filter: iotdemo/topic/1
Publish topic name: iotdemo/topic/1
Publish retain flag: 0
Publish QoS: 1
Publish payload: Hello world 0!
24 17804 [iot_threa] [INFO ][MQTT][17804] (MQTT connection 100337e0) MQTT PUBLISH operation queued.
25 17814 [iot_threa] [INFO ][DEMO][17814] Acknowledgment message for PUBLISH 0 will be sent.
26 17825 [iot_threa] [INFO ][DEMO][17825] MQTT PUBLISH 1 successfully sent.
27 17841 [iot_threa] [INFO ][DEMO][17840] Incoming PUBLISH received:
Subscription topic filter: iotdemo/topic/2
Publish topic name: iotdemo/topic/2
Publish retain flag: 0
Publish QoS: 1
Publish payload: Hello world 1!
28 17861 [iot_threa] [INFO ][MQTT][17861] (MQTT connection 100337e0) MQTT PUBLISH operation queued.
29 17870 [iot_threa] [INFO ][DEMO][17870] Acknowledgment message for PUBLISH 1 will be sent.
30 17883 [iot_threa] [INFO ][DEMO][17883] 2 publishes received.
31 17889 [iot_threa] [INFO ][DEMO][17889] Publishing messages 2 to 3.
32 17897 [iot_threa] [INFO ][MQTT][17897] (MQTT connection 100337e0) MQTT PUBLISH operation queued.
33 17907 [iot_threa] [INFO ][MQTT][17907] (MQTT connection 100337e0) MQTT PUBLISH operation queued.
34 17916 [iot_threa] [INFO ][DEMO][17916] Waiting for 2 publishes to be received.
35 18021 [iot_threa] [INFO ][DEMO][18021] MQTT PUBLISH 3 successfully sent.
36 18030 [iot_threa] [INFO ][DEMO][18029] MQTT PUBLISH 2 successfully sent.
37 18039 [iot_threa] [INFO ][DEMO][18038] Incoming PUBLISH received:
Subscription topic filter: iotdemo/topic/4
Publish topic name: iotdemo/topic/4

...

```

```

Publish payload: Hello world 16!
132 19827 [iot_threa] [INFO][MQTT][19827] (MQTT connection 100337e0) MQTT PUBLISH operation queued.
133 19837 [iot_threa] [INFO][DEMO][19837] Acknowledgment message for PUBLISH 16 will be sent.
134 19851 [iot_threa] [INFO][DEMO][19851] 2 publishes received.
135 19857 [iot_threa] [INFO][DEMO][19857] Publishing messages 18 to 19.
136 19865 [iot_threa] [INFO][MQTT][19865] (MQTT connection 100337e0) MQTT PUBLISH operation queued.
137 19876 [iot_threa] [INFO][MQTT][19876] (MQTT connection 100337e0) MQTT PUBLISH operation queued.
138 19885 [iot_threa] [INFO][DEMO][19885] Waiting for 2 publishes to be received.
139 19953 [iot_threa] [INFO][DEMO][19953] MQTT PUBLISH 18 successfully sent.
140 19980 [iot_threa] [INFO][DEMO][19980] Incoming PUBLISH received:
Subscription topic filter: iotdemo/topic/3
Publish topic name: iotdemo/topic/3
Publish retain flag: 0
Publish QoS: 1
Publish payload: Hello world 18!
141 20001 [iot_threa] [INFO][MQTT][20001] (MQTT connection 100337e0) MQTT PUBLISH operation queued.
142 20011 [iot_threa] [INFO][DEMO][20011] Acknowledgment message for PUBLISH 18 will be sent.
143 20053 [iot_threa] [INFO][DEMO][20053] MQTT PUBLISH 19 successfully sent.
144 20069 [iot_threa] [INFO][DEMO][20069] Incoming PUBLISH received:
Subscription topic filter: iotdemo/topic/4
Publish topic name: iotdemo/topic/4
Publish retain flag: 0
Publish QoS: 1
Publish payload: Hello world 19!
145 20089 [iot_threa] [INFO][MQTT][20089] (MQTT connection 100337e0) MQTT PUBLISH operation queued.
146 20099 [iot_threa] [INFO][DEMO][20099] Acknowledgment message for PUBLISH 19 will be sent.
147 20108 [iot_threa] [INFO][DEMO][20108] 2 publishes received.
148 20116 [iot_threa] [INFO][MQTT][20116] (MQTT connection 100337e0) UNSUBSCRIBE operation scheduled.
149 20129 [iot_threa] [INFO][MQTT][20128] (MQTT connection 100337e0, UNSUBSCRIBE operation 100339e0) Waiting for operation completion.
150 20322 [iot_threa] [INFO][MQTT][20321] (MQTT connection 100337e0, UNSUBSCRIBE operation 100339e0) Wait complete with result SUCCESS.
151 20335 [iot_threa] [INFO][MQTT][20335] (MQTT connection 100337e0) Disconnecting connection.
152 20347 [iot_threa] [INFO][MQTT][20347] (MQTT connection 100337e0, DISCONNECT operation 100339e0) Waiting for operation completion.
153 20359 [iot_threa] [INFO][MQTT][20359] (MQTT connection 100337e0, DISCONNECT operation 100339e0) Wait complete with result SUCCESS.
154 20371 [iot_threa] [INFO][MQTT][20371] (MQTT connection 100337e0) Connection disconnected.
155 20380 [iot_threa] [INFO][MQTT][20380] (MQTT connection 100337e0) Network connection closed.
156 21622 [iot_threa] [INFO][MQTT][21622] (MQTT connection 100337e0) Network connection destroyed.
157 21631 [iot_threa] [INFO][MQTT][21631] MQTT library cleanup done.
158 21637 [iot_threa] [INFO][DEMO][21637] Demo completed successfully.

lwIP_DHCP: dhcp stop.
Deinitializing WIFI ...
159 21772 [iot_threa] [INFO][INIT][21772] SDK cleanup done.
160 21777 [iot_threa] [INFO][DEMO][21777] -----DEMO FINISHED-----

```

6.3 Monitoring MQTT messages on the cloud

To subscribe to the MQTT topic with the AWS IoT MQTT client

1. Sign in to the AWS IoT console.
2. In the navigation pane, choose Test to open the MQTT client.
3. In Subscription topic, enter iotdemo/#, and then choose Subscribe to topic.

AWS IoT

Monitor

Onboard

Manage

Greengrass

Secure

Defend

Act

Rules

Destinations

Test

Software

Settings

Learn

MQTT client Info

Connected as iotconsole-1597037785600-0

Subscriptions

Subscribe to a topic

Publish to a topic

Subscribe

Devices publish MQTT messages on topics. You can use this client to subscribe to a topic and receive these messages.

Subscription topic

iotdemo/#

Subscribe to topic

Max message capture Info

100

Quality of Service Info

☒ 0 - This client will not acknowledge to the Device Gateway that messages are received
 ☐ 1 - This client will acknowledge to the Device Gateway that messages are received

MQTT payload display

☒ Auto-format JSON payloads (improves readability)
 ☐ Display payloads as strings (more accurate)
 ☐ Display raw payloads (in hexadecimal)

Publish

Specify a topic and a message to publish with a QoS of 0.

Specify a topic to publish to, e.g. myTopic/1

Publish to topic

```

1 {
2   "message": "Hello from AWS IoT console"
3 }

```

AWS IoT

Monitor

Onboard

Manage

Greengrass

Secure

Defend

Act

Rules

Destinations

Test

Software

Settings

Learn

Subscriptions

iotdemo/#

Export Clear Pause

Publish

Specify a topic and a message to publish with a QoS of 0.

iotdemo/#

Publish to topic

```

1 {
2   "message": "Hello from AWS IoT console"
3 }

```

iotdemo/acknowledgements

August 10, 2020, 13:41:07 (UTC+0800)

Export Hide

We cannot display the message as JSON, and are instead displaying it as UTF-8 String.

Client has received PUBLISH 6 from server.

iotdemo/acknowledgements

August 10, 2020, 13:41:07 (UTC+0800)

Export Hide

We cannot display the message as JSON, and are instead displaying it as UTF-8 String.

Client has received PUBLISH 7 from server.

iotdemo/topic/2

August 10, 2020, 13:41:07 (UTC+0800)

Export Hide

We cannot display the message as JSON, and are instead displaying it as UTF-8 String.

Hello world 9!

iotdemo/topic/1

August 10, 2020, 13:41:07 (UTC+0800)

Export Hide

We cannot display the message as JSON, and are instead displaying it as UTF-8 String.

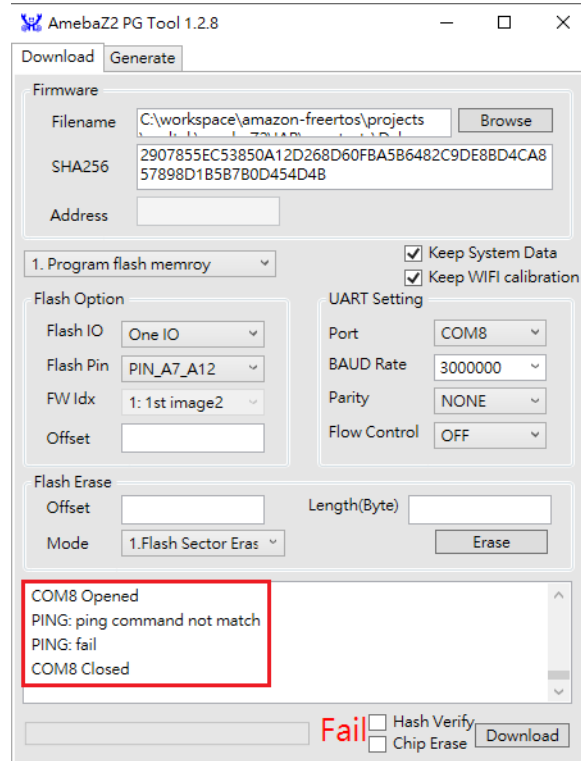
7 Troubleshooting

If these steps don't work, look at the device log in the serial terminal. You should see some text that indicates the source of the problem.

For general troubleshooting information about Getting Started with FreeRTOS, see [Troubleshooting getting started](#).

7.1 Image Tool Download Fail

Please check device in UART_DOWNLOAD mode or not. Refer 5.3 for more detail.



7.2 ERROR: Invalid Key

Please check **WIFI_SSID** and **WIFI_PASSWORD** in in ambd_amazon-freertos/blob/master/demos/include/aws_clientcredential.h


```

Enter SSID for Soft AP started
3 1098 [example_a] Wi-Fi configuration successful.
4 1108 [iot_threa] [INFO ][DEMO][1108] -----STARTING DEMO-----

5 1115 [iot_threa] [INFO ][INIT][1115] SDK successfully initialized.

LwIP_DHCP: dhcp stop.
Deinitializing WIFI ...
WIFI deinitialized
Initializing WIFI ...
WIFI initialized

Joining BSS by SSID ...

ERROR:Invalid Key
ERROR: Can't connect to AP
Joining BSS by SSID ...

ERROR:Invalid Key
ERROR: Can't connect to AP
Joining BSS by SSID ...

```

7.3 Failed to establish new MQTT connection

Please check **clientcredentialIMQTT_BROKER_ENDPOINT** in `ambd_amazon-freertos/blob/master/demos/include/aws_clientcredential.h`

```

6 12508 [iot_threa] [INFO ][DEMO][12508] Successfully initialized the demo. Network type for the demo: 1
7 12517 [iot_threa] [INFO ][MQTT][12517] MQTT library successfully initialized.
8 12524 [iot_threa] [INFO ][DEMO][12524] MQTT demo client identifier is ameba-ota (length 9).
9 12624 [iot_threa] [ERROR][NET][12624] Failed to resolve [redacted].amazonaws.com.
10 12934 [iot_threa] [ERROR][MQTT][12934] Failed to establish new MQTT connection, error NETWORK ERROR.
11 12943 [iot_threa] [ERROR][DEMO][12943] MQTT CONNECT returned error NETWORK ERROR.
12 12951 [iot_threa] [INFO ][MQTT][12950] MQTT library cleanup done.
13 12957 [iot_threa] [ERROR][DEMO][12957] Error running demo.
Interface 0 IP address : 192.168.90.185
LwIP_DHCP: dhcp stop.
Deinitializing WIFI ...
14 13094 [iot_threa] [INFO ][INIT][13094] SDK cleanup done.
15 13099 [iot_threa] [INFO ][DEMO][13099] -----DEMO FINISHED-----

```

7.4 TLS_Connect fail

Please check **keyCLIENT_CERTIFICATE_PEM** and **keyCLIENT_PRIVATE_KEY_PEM** in `ambd_amazon-freertos/blob/master/demos/include/aws_clientcredential_keys.h`

```

8 13501 [iot_threa] [INFO ][DEMO][13501] Successfully initialized the demo. Network type for the demo: 1
9 13511 [iot_threa] [INFO ][MQTT][13511] MQTT library successfully initialized.
10 13518 [iot_threa] [INFO ][DEMO][13518] MQTT demo client identifier is ameba-ota (length 9).
11 20102 [iot_threa] [ERROR] Private key not found. 12 20107 [iot_threa] TLS Connect fail (0x7d4, [redacted].amazonaws.com)
13 20115 [iot_threa] [ERROR][NET][20115] Failed to establish new connection. Socket status: -1.
14 20424 [iot_threa] [ERROR][MQTT][20424] Failed to establish new MQTT connection, error NETWORK ERROR.
15 20433 [iot_threa] [ERROR][DEMO][20433] MQTT CONNECT returned error NETWORK ERROR.
16 20441 [iot_threa] [INFO ][MQTT][20441] MQTT library cleanup done.
17 20447 [iot_threa] [ERROR][DEMO][20447] Error running demo.
Interface 0 IP address : 192.168.90.185
LwIP_DHCP: dhcp stop.
Deinitializing WIFI ...
18 20586 [iot_threa] [INFO ][INIT][20586] SDK cleanup done.
19 20591 [iot_threa] [INFO ][DEMO][20591] -----DEMO FINISHED-----

```