

EWN-8720CMN1AA Getting Started Guide

Version: A0

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1 EWN-8720CMN1AA Module

1.1 General Specifications

EWN-8720CMN1AA Module home page: https://eardatek.com/about/contact.html

EWN-8720CMN1AA is a highly integrated module with a low power 802.11n Wireless LAN compatible network controller, the IC it uses is RTL8720CM. It combine a Real-M300(KM4) CPU that is based on ARMv8-M architecture, and carry WLAN MAC, a 1T1R capable WLAN baseband, an RF circuit, and Bluetooth Low Energy(BLE) in a single chip.



Figure 1-1 EWN-8720CMN1AA Module Appearance View

1.2 Features

MCU Features

- Real-M300(KM4) clock frequency up to 100MHz
- I-Cache 32KB/D-Cache 16KB
- Supports DMA
- EXecute In Place (XIP) on flash

Internal Memory

- Supports 384KB ROM
- Supports 256KB RAM
- Supports external flash interface
- Supports MCM embedded 4MB Psram
- Supports 2Mbit~32Mbit Flash

Wi-Fi Features

- > 2.4GHz 802.11 b/g/n
- Support low power Tx/Rx for short-range application
- Support WPA/WPA2/ WMM/WPS
- Frame aggregation for increased MAC efficiency
- Low latency immediate High-Throughput Block Acknowledgement
- > Long NAV for media reservation with CF-End for NAV release

Bluetooth Low Energy

- Bluetooth Low Energy(BLE) 4.2
- Supports LE secure connections/LE scatternet
- Supports 1 Master/1 Slave

Secure

- Supports secure boot
- ➢ Wi-Fi WEP, WPA, WPA2, WPS
- MD5/SHA-1/SHA2-224/SHA2-256/HMAC/AES Crypto engine

Interface

- SPI/SDIO/UART interface
- SPI/I2C master for sensor
- ▶ I2S, PWM and GPIO
- > 1 GDMA with 2 channels

1.3 PCB Layout Overview

Module Size (Unit: mm): 18.0(±0.2) *25.50(±0.3)*2.9(±0.2)



Figure 1-2 EWN-8720CMN1AA Module Size

1.4 Pin-Out Reference



Figure 1-3 EWN-8720CMN1AA Module Pin Definition

PIN	Definition	Description	
1	GND	Ground	
2	VCC	Supply power 3.3V;	
3	CHIP_EN	1:Enable chip 2:Shutdown chip	
4	GPIOA_0 (TEST_MODE_SEL)	JTAG_CLK/UART1_IN/PWM[0] 1:Enter into test/debug mode 0:Normal operation mode	
5	GPIOA_1 (Autoload_Fail)	JTAG_TMS/UART1_OUT/PWM[1] 1:eFUSE settings are not loaded 2:eFUSE settings are loaded	
6	GPIOA_2	JTAG_TDO/UART1_IN/PWM[2]/SPI_CSn/I2C_SCL	
7	GPIOA_3	JTAG_TDI/UART1_OUT/PWM[3]/SPI_SCL/I2C_SDA	
8	GPIOA_4	JTAG_TRST/UART1_CTS/PWM[4]/SPI_MOSI	
9	9 GPIOA_7 Flash_SPI_CS/SPI_M_CS/SPI_CSn		
10	GPIOA_8	Flash _SPI_CLK/SPI_M_CLK/SPI_SCL	
11	GPIOA_9	Flash _SPI_WP/SPI_M_DATA[2]/SPI_MOSI/UART0_RTS	
12	GPIOA_10 Flash _SPI_SO/SPI_M_DATA[1]/SPI_MISO/UART0_CTS		
13	GPIOA_11	Flash _SPI_SI/SPI_M_DATA[0]/I2C_SCL/UART0_OUT/PWM[0]	
14	14 GPIOA_12 Flash _SPI_HOLD/SPI_M_DATA[3]/I2C_SDA/UART0_IN/PWM[1]		
15	GND	Ground	
16	GPIOA_13	UART0_IN/PWM[7]	
17	GPIOA_14	SDIO_INT/UART0_OUT/PWM[2]	
18	GPIOA_15	SDIO_D[2]/UART2_IN/PWM[3]/SPI_CSn/I2C_SCL	
19	GPIOA_16	SDIO_D[3]/UART2_OUT/PWM[4]/SPI_SCL/I2C_SDA	
20	GPIOA_17	SDIO_CMD/ PWM[5]	
21	GPIOA_18	SDIO_CLK/ PWM[6]	
22	GPIOA_19	SDIO_D[0]/UART2_CTS/PWM[7]/SPI_MOSI/I2C_SCL	
23	GPIOA_20	SDIO_D[1]/UART2_RTS/PWM[0]/SPI_MISO/I2C_SDA	

PIN	Definition	Description
27	GPIOA_23	LED_0/PWM[7]
38	GND	Ground
		Table 1- EWN-8720CMN1AA Module Pin

Definition Description

Notes:

1、UART download: Using A15&A16, and before power on.

2. Default states of all pins are High-impedance; Unused pins should be kept floating.

3. Some IO are used to connect to the flash of the module. It is recommended not to use these IO. As shown in the table.

PIN	Definition	Description
9	GPIOA_7	Flash_SPI_CS
10	GPIOA_8	Flash _SPI_CLK
11	GPIOA_9	Flash _SPI_WP
12	GPIOA_10	Flash _SPI_SO
13	GPIOA_11	Flash _SPI_SI
14	GPIOA_12	Flash _SPI_HOLD

Table 2- EWN-8720CMN1AA Module Flash definition

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".



AWS Services - Resource Groups - +	hank.su +	Singapore +	Support +
Creating AWS IoT things			ф Ю
An IoT thing is a representation and record of your phylsical 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.			
Cancel Create a single thing			
Feedback Q Endish (US) Provide Services for or its attitudes	Il rights reserve	ed. Privacy Police	/ Terms of Use

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

CREATE A THING		
Add your devi	ice to the thing registry	STEP 1/3
This step creates an e	entry in the thing registry and a thing shadow for your device.	
Name		
TestDevice		
Apply a type to thi	ais thing	
Using a thing type sin things with a common	mplifies device management by providing consistent registry data for things tha on set of attributes, which describe the identity and capabilities of your device, a	t share a type. Types provide nd a description.
Thing Type		
No type selected	Create a type	
Adding your thing to a	a group allows you to manage devices remotely using jobs.	
Adding your thing to Thing Group Groups /	a group allows you to manage devices remotely using jobs.	Create group Change
Adding your thing to a Thing Group /	a group allows you to manage devices remotely using jobs.	Create group Change
Adding your thing to . Thing Group Groups / Set searchable thin Enter a value for one	a group allows you to manage devices remotely using jobs. ing attributes (optional) or more of these attributes so that you can search for your things in the registr	Create group Change
Adding your thing to: Thing Group Groups / Set searchable thi Enter a value for one Attribute key	a group allows you to manage devices remotely using jobs. Ing attributes (optional) or more of these attributes so that you can search for your things in the registry Value	Create group Change
Adding your thing to . Thing Group Groups / Set searchable thin Enter a value for one Attribute key Provide an attribut	a group allows you to manage devices remotely using jobs. ing attributes (optional) or more of these attributes so that you can search for your things in the registr te key, e.g. Manufacturer. Value Provide an attribute value, e.g. Acm	Create group Change
Adding your thing to Thing Groups / Groups / Set searchable thin Enter a value for one Attribute key Provide an attribut Add another	a group allows you to manage devices remotely using jobs. ing attributes (optional) or more of these attributes so that you can search for your things in the registre Value te key, e.g. Manufacturer Provide an attribute value, e.g. Acm	Create group Change
Adding your thing to Thing Groups Groups / Set searchable thin Enter a value for one Attribute key Provide an attribut Add another Show thing shadow	a group allows you to manage devices remotely using jobs.	Create group Change
Adding your thing to Thing Groups / Groups / Set searchable thin Enter a value for one: Attribute key Provide an attribut Add another Show thing shadow	a group allows you to manage devices remotely using jobs. ing attributes (optional) or more of these attributes so that you can search for your things in the registr te key, e.g. Manufacturer Value Provide an attribute value, e.g. Acm	Create group Change

AWS Services - Resource G	roups ~ 🛠	۵	hank.su + Singapore +	Support +
	CREATE A THING Add a certificate for your thing	511EP 2/3		ф Ф
	A certificate is used to authenticate your device's connection to AWS IoT.			
	One-click certificate creation (recommended) This will generate a certificate, public key, and private key using AWS IoT's certificate authority.	Create certificate		
	Create with CSR Upload your own certificate signing request (CSR) based on a private key you own.	2 Create with CSR		
	Use my certificate Register your CA certificate and use your own certificates for one or many devices.	Get started		
	Skip certificate and create thing You will need to add a certificate to your thing later before your device can connect to AWS IoT.	Create thing without certificate		
🗨 Feedback 🛛 🚱 English (US)	© 2008 - 20	020, Amazon Web Services, Inc. or its affiliates. All r	ights reserved. Privacy Policy	Terms of Use

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

	naha . K	nunkisu - Singupore -	Support -
	Certificate created!		ф © Ю
	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 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 Dewnload Activate 3 Cancel Done Attach a policy		
🗨 Feedback 🚱 English (US)	© 2008 - 2020, Amazon Web Services, Inc. or its affiliates. All r	ights reserved. Privacy Policy	y Terms of Use





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"

dWS Services	→ Resource Groups → ★ 🛆 h	iank.su + Singapore + Support +
AWS IoT Amonitor Onboard Amage Greengrass Greengrass Greengrass Cas Role Allases Authorizers Defend Act Test	Nessance Groups V L Image: Comparison of the second sec	Anksu Sungapore Support (
Software Settings Learn		

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

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		Create a policy					^
÷						Д О	
		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.				() (A)	
		Name				0	
		TestPolicy					L
							L
		Add statements Policy statements define the types of actions that can be performed by a resource. Advanced more	le				L
			1				L
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		Recourse ARN					L
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		Effect					L
		Allow Deny Remove					L
							L
		Action iot.Connect					L
		Decentre ADM					L
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Feedback	english (US	© 2008 - 2020, Amazon Web Services, inc. or ha animat	co. All n	ignts reserved	. Privacy Policy	/ Terms of Use	

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.

9		
AWS IoT	Things	Create
Monitor		(2)
Onboard	Search things Q Fleet Indexing ()	Card 👻 🐼
Wanage		
Things	TestDevice	
Types	NOTINE .	
Thing groups		
Billing Groups		
Joos		
 Groopgrass 		
P dreeligrass		
♥ Secure		
Policies		
CAs		
Role Aliases		
Authorizers		
Defend		
Act		
Test		
Software		
Settings		
Learn		
🗨 Feedback 🛛 🧐 Englis	sh (US) @ 2008 - 2020, Amazon Web Services, Inc. or it	s affiliates. All rights reserved. Privacy Policy Terms of Use

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

÷				
	Things > TestDevice			
	TestDevice NO TYPE		Actions -	
	Details Security	Certificates Create certificate View other options		
	Billing Groups Shadows Interact Activity	28f51b14e8b8953fe3		
	Jobs Violations Defender metrics	٠		
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• Feedback • Fnolish (US)		@ 2004 - 2020 Amazon Web Services Inc	or its affiliates. All	riphts reserved.	Pityacy Policy	Terms of Like

3 Configure AmebaZ2 Amazon FreeRTOS

3.1 Download Source Code from github

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

Search or jump to 🕧 Pull	I requests Issues Marketplace Explore			
ambiot / amazon-freertos				⊙ Wa
<> Code ① Issues 1 ♣♣ Pull requests		🗓 Security 🗠 Insights 🚯 Settings		
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LF C	aranches Tags	First commit for amazon-freertos-v202007 with AamebaD and AmebaZ2	14 days ago	Readme
~	' master default	First commit for amazon-freertos-v202007 with AamebaD and AmebaZ2 Replace If with crlf to pass idt check	14 days ago 16 days ago	ate with License
	amebaz2-v1.4.7	[AmebaZ2] Support freertos v10.3.0 on AmebaZ2	7 hours ago	Releases 2
	View all branches	[AmebaZ2] Support freertos v10.3.0 on AmebaZ2	7 hours ago	S ambd-amazon-freertos-2020 (Latest) 16 days ago
	tests	First commit for amazon-freertos-v202007 with AamebaD and AmebaZ2	14 days ago	+ 1 release
	tools	First commit for amazon-freertos-v202007 with AamebaD and AmebaZ2	14 days ago	
	vendors	[AmebaZ2] Support freertos v10.3.0 on AmebaZ2	7 hours ago	Packages
C	.gitignore	[AmebaZ2] Support freertos v10.3.0 on AmebaZ2	7 hours ago	No packages published
C	AmebaD_Amazon_FreeRTOS_Getting	Update README and Getting_Started_Guide v1.4	8 days ago	Publish your first package
C	AmebaZ2_Amazon_FreeRTOS_Getting	First commit for amazon-freertos-v202007 with AamebaD and AmebaZ2	14 days ago	
C	CHANGELOG.md	First commit for amazon-freertos-v202007 with AamebaD and AmebaZ2	14 days ago	Contributors 2

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 **Donwload 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

EKRDATEK



3.3 Get Thing Name

aws Services	Resource Groups 🗸 🔺	۵	hank.su •	Singapore 👻	Support 🗸	
AWS IoT	Things				Create	ф Ф
Monitor Onboard	Search things Q Fleet Indexing ()				Card 🔹	6
 ✓ Manage Things Types Thing groups Billing Groups 	TestDevice 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"

<pre>#define clientcredentialMQTT_BROKER_ENDPOINT</pre>	"xxxxxxxxxxxxxx.amazonaws.com"
<u> </u> /*	
* @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.	
- */	
<pre>#define clientcredentialMQTT_BROKER_PORT</pre>	8883
7/*	
* (brief Port number the Green Grass Discovery u	se for JSON retrieval from cloud is using.
	0440
#define clientcredentialGREENGRASS_DISCOVERY_PORT	8443
<u> </u> /*	
* Gbrief 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 n	etwork password.
- */	
#define clientcredentialWIFI_PASSWORD	"password"
* Obrief Wi-Fi petwork security type	
*	
* @see WIFISecurity t.	
*	
* @note Possible values are eWiFiSecurityOpen, e	WiFiSecurityWEP, eWiFiSecurityWPA,
* eWiFiSecurityWPA2 (depending on the support of	your device Wi-Fi radio).
- */	
#define clientcredentialWIFI_SECURITY	eWiFiSecurityWPA2
#endif /* ifndef AWS CITENTCREDENTIAL H */	

3.4.1 Setup Thing's Private Key and Certificate

Filled keyCLIENT_CERTIFICATE_PEM and keyCLIENT_PRIVATE_KEY_PEM in "amazonfreertos/blob/master/demos/include/aws_clientcredential_keys.h" by xxxxxxx-certifiacte.pem and xxxxxxxx-private.pem.key.

Certificate creat	ed!		
Download these files and retrieved after you close to In order to connect a dev	save them in a safe place. Certificat this page. vice, vou need to download the foll	es can be retrieved a	at any time, but the private and public keys cannot be
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 downlo A root CA for AWS IoTDo Activate	ad a root CA for AWS loT: wnload		

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



Final aws_clientcredential_keys.h overview.

/	
T	/*
3/*	· gbrief PEM-encoded client private key.
* @brief PEM-encoded client certificate.	* Atoda If you are supply one of the FreeDTOS down prejects out this
*	to the private box that will be used for TIS align publics, set this
* Atodo If you are running one of the FreeBTOS demo projects, set this	<pre>% co the private key that will be used for fild different authentication. % *</pre>
* to the certificate that will be used for TIS client authentication	* Gnote Must include the PEM header and footer:
	* "BEGIN RSA PRIVATE KEY\n"\
· ·	* "base64 data\n"\
Gnote Must include the PEM header and footer:	* "END RSA PRIVATE KEY\n"
* "BEGIN CERTIFICATE\n"\	- */
* "base64 data\n"\	#define keyCLIENT PRIVATE KEY PEM \
* "END CERTIFICATE\n"	"BEGIN RSA PRIVATE KEY\n"\
- */	"MIIEpAIBAAKCAQEAwop96WNucGebARFjD80+CLsqcBNn/AHyhEcozLZC8qoECUOn\n"\
#define kevCLIENT CERTIFICATE PEM \	". \n"\
"BEGIN CERTIFICATE\n"\	": \n"\
"MITDWICCLEWATERATIVATDLSSOCHERDSBDprT4Im1uusi2vMa0cCSacSID3DOFB\p"\	". \n"\
	\n"\
	\n"\
"\\n"\	" (II / II
" \n"\	п. (тлп)
" \n"\	"
" \n"\	", \n"\
" \n"\	" \n"\
п \Дп\	" \n"\
" \ <u>n</u> "\	". \n"\
п (<u>)</u> п()	"
п (ули)	"· \\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\\
1 (m.)	". \n"\
(11 \	". \n"\
\n"\	
" \n"\	
"k5+NsBroU/YdvOUmzKn6XfI4nX4hLQJ2TbhAT8aqlounGk62GqCbxt4mg5bB0w==\n"\ "END CERTIFICATE"	"AZjzZ6QJYLb5/PFZ90E5448kpyaAoS2ke86+R4r4YOMBK+I5RVbfSQ==\n"\ "END RSA PRIVATE KEY\n"

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
```

Fine aws_demo_config.h in amazon-freertos\vendors\realtek\boards\amebaZ2\aws_demos\config_files and add 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. (<u>https://github.com/ambiot/amazon-freertos</u>)
- 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 stepby-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.

File Edit View Project Simulator Tools	Window Help					
5 C 🗋 🛍 🗶 🖴 🗳 🖆	- < Q > \$) HE < 📮 > 🕢 🗈 🐘 🌒 🛥 📭 💿 🔸 📜 🛲 📜				
Workspace		ĸ				
amazon_freertos	~					
Files		FreeDTOS I/I 1 2				
Papplication_is - amazon_freertos @ERAM @SBAM	Options	*t (C) 2018 Amazon.com, Inc. or its affiliates. All Rights Reserved. on is hereby granted. Free of charge, to any person obtaining a copy of				
- 🖽 💼 amazon	Make	tware and associated documentation files (the "Software"), to deal in				
⊢⊞ ■ bluetooth	Compile Rebuild All	<pre>vare without restriction, including without limitation the rights to y, modify, merge, publish, distribute, sublicense, and/or sell copies of</pre>				
-⊕ i console	Clean	<pre>vare, and to permit persons to whom the Software is furnished to do so, to the following conditions:</pre>				
He in network	C-STAT Static Analysis	copyright notice and this permission notice shall be included in all r substantial portions of the Software.				
H penpheral H user H user	Add 2	WARE IS PROVIDED "AS IS", WITHOUT WARRANTY OF ANY KIND, EXPRESS OR				
	Remove Rename Version Control System	Including but not limitsd to the Warrantiss of Merchantability, fittless fitcular process and nonintringement. In no symp shall the anthrops or produces be liable for any claim, damages of other liability, whether fion of contract, fort or othermise, arising fram, out of or in on with the software or the use or other balling in the software.				
	Open Containing Folder File Properties	vs.amaion.com/freertos vv.FreeRTOS.org				
	Set as Active #include #includ	"includes. 4/ "FreeROS.h" "task.h" "main.h" "platform_stdlib.h"				
	<pre>#if (CONF #include #endif</pre>	IG_LWIP_LAYER == 0) "FreeRTOS_IP.h"				
application_is	<					

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.

👷 AmebaZII P	G Tool		
Download G	ienerate		
Firmware —			
Filename			Browse
SHA256			
Address			
1. Program f	ash memroy 🔹	V	Keep WIFI calibration
- Flash Option	1	UART Setting	
Flash IO	One IO 🔹	Port	COM1 •
Flash Pin	PIN_A7_A12 •	BAUD Rate	1000000 -
FW Idx	1: 1st image2 🔻	Parity	NONE -
Offset		Flow Control	OFF •
Flash Erase			
Offset		Length(Byte)	
Mode	1.Flash Sector Erase 🔻		Erase
Found port: (Found port: (Found port: (COM1 COM3 COM47		
		Hash	Verify Erase Download

Fig 5-1 AmebaZII ImageTool UI

5.2 Environment Setup

5.2.1 Hardware Setup

The hardware connection diagram is shown below.





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. First, ensure that the log UART is properly connected. As shown in figure 5-2, flip the mode selector switch to position 1, then flip the reset switch to position 2, and finally flip the reset switch to position 1.
 - 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.

Notes:

After downloading, if you want to switch to normal operation mode, follow the instructions below. As shown in figure 5-2, flip the mode selector switch to position 2, then flip the reset switch to position 2, and finally flip

the reset switch to position 1.

2) Open AmebaZ2 PG Tool

EKRDATEK

🙀 Ameba	Z2 PG	Tool 1.2.7					-		×
Download	Gen	erate							
Firmware			_	_	1	3	_		_
Filenar	ne	D:\Debug	\bin flash_is	s.bin		૭	В	rowse	
SHA25	6	4EB1CD43 BC50A9A0	A28A82CA 015BF41D56	12D40 5	05A0F3	02430E8	399D395E	BC3FBD	>
Addres	s								
1. Program	m flas	h memroy	×	4)	>	Keep Syst Keep WIF	em Dat I calibra	a atior
Flash Opt	tion				UART	Setting			
Flash IC		One IO	~		Port	(6)	COM23	v	
Flash Pi	in [PIN_A7_A12	2 ~ (5)	BAUD	Rate	100000) ~	
FW Idx		1: 1st image	e2 v	$\overline{}$	Parity		NONE	v]
Offset					Flow C	ontrol	OFF	v]
Flash Eras	se								
Offset				Le	ngth(B)	/te)			
Mode		1.Flash Sect	or Erase 💙]			Era	se	
Found po	rt: CC	M1							
Found po	rt: CC	M1							
Found po	ort: CC	M23						\overline{O}	1
					[Hash	Verify	0	
					[Chip	Erase	Downlo	ad

- 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).

🛄 Tera Term - [disconnected] VT					
<u>File Edit Setup Control Window H</u> elp					
 Tera Term: New connect	ion		×		^
О тср/ір	Host: myho	st.example.com	~		
s	His ervice: O Tel	tory net TCP port#: 22			
	SSI	H SSH version: SSH2	~		
	O Oth	IP version: AUTO	~		
Serial	Port: COM	1: 通訊連接埠 (COM1)	~		
	ок с	ancel Help			
					~

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:algthm = 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.		
<pre>/ 15513 [iot_threa] [INFO][OWD][15513] MQIT library successfully initialized. 8 15522 [iot_threa] [INFO][OWD][15522] MQIT demo client identifier is ameba-ota (length 9). 9 17272 [iot_threa] [INFO][MQIT][17272] Establishing new MQIT connection. Interface 0 IP address : 192.168.89.15110 17283 [iot_threa] [INFO][MQIT][17283] Anonymous metrics (SDK language, SDK version) will be provide e with AMS_IOT_MQIT_ENABLE_METRICS set to 0 to disable. 11 17302 [iot_threa] [INFO][MQIT][17302] (MQIT connection 100337e0, CONNECT operation 100339a0) Waiting for operation completion. 12 17421 [iot_threa] [INFO][MQIT][17421] (MQIT connection 100337e0, CONNECT operation 100339a0) Wait complete with result SUCCESS. 13 17433 [iot_threa] [INFO][MQIT][17431] (MQIT connection 100337e0, SUBSCRIBE operation scheduled. 14 17443 [iot_threa] [INFO][MQIT][17432] (MQIT connection 100337e0, SUBSCRIBE operation scheduled. 15 17452 [iot_threa] [INFO][MQIT][17421] (MQIT connection 100337e0, SUBSCRIBE operation 100339e0) Wait complete with result SUCCESS. 17 17624 [iot_threa] [INFO][MVIT][17624] (MQIT 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][17622] Publishing messages 0 to 1. 19 17640 [iot_threa] [INFO][MVIT][17640] (MQIT connection 100337e0) MQIT PUBLISH operation queued. 20 17650 [iot_threa] [INFO][MVIT][17650] (MQIT connection 100337e0) MQIT PUBLISH operation queued. 21 17752 [iot_threa] [INFO][DEMO][17752] MQIT PUBLISH operation 100337e0] Subscription topic filter: iotdemo/topic/1 Publish retain flag: 0 Publish retain flag:</pre>	∙d to AWS IoT	. Recompi
<pre>25 17814 [lot_threa] [INFO][DEWD][17814] Acknowledgment message for PUBLISH 0 will be sent. 26 17825 [iot_threa] [INFO][DEWD][17825] MQTT PUBLISH 1 successfully sent. 27 17841 [iot_threa] [INFO][DEWD][17840] Incoming PUBLISH received: Subscription topic filter: iotdemo/topic/2 Publish topic name: iotdemo/topic/2 Publish payload: Hello world 1! 28 17861 [iot_threa] [INFO][MQTT][17861] (MQTT connection 100337e0) MQTT PUBLISH operation queued. 29 17870 [iot_threa] [INFO][DEWD][17870] Acknowledgment message for PUBLISH 1 will be sent. 30 17883 [iot_threa] [INFO][DEWD][17883] 2 publishes received. 31 17889 [iot_threa] [INFO][DEWD][1789] Publishing messages 2 to 3. 32 17877 [iot_threa] [INFO][DEWD][17899] Publishing messages 2 to 3.</pre>		
33 17907 [iot_threa] [INFO][MOTT][17907] (MOTT connection 100337e0) MOTT PUBLISH operation queued. 34 17916 [iot_threa] [INFO][DEMO][17916] Waiting for 2 publishes to be received. 35 18021 [iot_threa] [INFO][DEMO][18021] MOTT PUBLISH 3 successfully sent. 36 18030 [iot_threa] [INFO][DEMO][18029] MOTT 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]	(MQIT connection 100337e0) MQIT 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][20068]	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 20069 [10t_threa] [INFO][MQII][20069]	(mg)i connection 10055/00) mg)i Publish operation dueued.
147 20109 [iot_threa] [INFO][DEMO][20099]	Acknowledgment message for Publish 19 will be sent.
149 20106 [IOL_threa] [INFO][DERO][20106]	2 publishes received. (MOT compaction 100227c0) UNSUBSCRIBE opportion scheduled
140 20110 [IOC_CHIPEA] [INFO][MOTT][20110]	(MOTE connection 10035760) UNSUBSCRIBE Operation Scheduled.
150 20322 [iot_threa] [INFO][MOTT][20321]	(WOT connection 1003576), ONSOSSCRIDE operation 10033060 Waiting for operation completion.
151 20335 [iot threa] [INFO][MOTT][20335]	(MOTT connection 100357e0) Disconnection (MOTT connection)
152 20347 [iot threa] [INFO][MOTT][20347]	(MOTT connection 100337e0, DISCONNECT operation 100339e0) Waiting for operation completion
153 20359 [iot threa] [INEO][MOTT][20359]	(MOIT connection 10033760, DISCONNECT operation 10033960) Wait complete with result SUCCESS
154 20371 [iot threa] [INFO][MOTT][20371]	(WOIT connection 100337c0) Connection disconnected.
155 20380 [iot threa] [INFO][MOTT][20380]	(MOTT connection 100337e0) Network connection closed.
156 21622 [iot threa] [INFO][MOTT][21622]	(MOIT connection 100337e0) Network connection destroyed.
157 21631 [iot threa] [INFO][MOTT][21631]	MOTT 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.

WS IOT	MQTT client Info	Connected as iotconsole-1597037785600-0
board	Subscriptions	
inage eengrass cure fend t t es stinations it	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/# 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 1 - This client will 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 C Auto-format JSON payloads (improves readability) Display payloads as strings (more accurate) Display raw payloads (in hexadecimal)
'tware tings rrn		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 3

AWS IOT	Subscriptions	lotdemo/#	Export Clear Pause
Monitor Onboard	Subscribe to a topic Publish to a topic	Publish Specify a topic and a message to publish with a QoS of 0.	
Manage	iotdemo/# ×	lotdemo/#	
Greengrass		1 { 2 "message": "Hello from AWS IoT console"	
Secure		3 }	
Defend		iotdemo/acknowledgements August 10, 2020, 13:41:07 (UTC+0800)	Export Hide
Act		We cannot display the message as JSON, and are instead displaying it as UTF-8 String.	
Destinations		Client has received PUBLISH 6 from server.	
Fest		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
Software		1	• • •
Settings			
Learn			

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.

💥 AmebaZ2 PG Tool 1.2.8	- 🗆 X
Download Generate	
Firmware	
Filename C:\workspace\amazon	-freertos\projects Browse
SHA256 2907855EC53850A12E 57898D1B5B7B0D454	D268D60FBA5B6482C9DE8BD4CA8 D4B
Address	
1. Program flash memroy 🗸 👻	✓ Keep System Data
Flash Option	UART Setting
Flash IO One IO 🗸	Port COM8 ~
Flash Pin PIN_A7_A12 ~	BAUD Rate 3000000 ~
FW Idx 1: 1st image2 🖂	Parity NONE ~
Offset	Flow Control OFF ~
Flash Erase	
Offset	Length(Byte)
Mode 1.Flash Sector Eras ~	Erase
COM8 Opened	^
PING: ping command not match	
COM8 Closed	
	>
	Fail Hash Verify Download

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 clientcredentialMQTT 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 t	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 (le	ength 9).
9 12624 [iot_threa] [ERROR][NET][12624] Failed to resolve	.amazonaws.com
10 12934 [iot_threa] [ERROR][MQTT][12934] Failed to establish new MQTT connection, en	rror 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	

TLS_Connect fail 7.4

Please check keyCLIENT_CERTIFICATE_PEM and keyCLIENT_PRIVATE_KEY_PEM in ambd_amazon-

Please Check KeyCLIENT_CCRTIFICATE_PEMM and KeyCLIENT_PRIVATE_KEY_PEMM in ambdd_a freertos/blob/master/demos/include/aws_clientcredential_keys.h 8 13501 [iot_threa] [INF0][DEM0][13501] Successfully initialized the demo. Network type for the demo: 1 9 13511 [iot_threa] [INF0][MQTT][13511] MQTT library successfully initialized. 10 13518 [iot_threa] [INF0][DEM0][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, 13 20115 [iot_threa] [ERROR][NET][20115] Failed to establish new connection. Socket status: -1. 14 20424 [iot_threa] [ERROR][NET][20115] Failed to establish new MQTT connection, error NETWORK ERROR. 15 20433 [iot_threa] [ERROR][DEM0][20433] MQTT CONNECT returned error NETWORK ERROR. 16 20441 [iot_threa] [ERROR][DEM0][20447] Error running demo. Interface 0 IP address : 192.168.90.185 LwIP_DHCP: dhcp stop. Deinitializing WIF1amazonaws.com) einītializing WIFI ... 8 20586 [iot_threa] [INFO][INIT][20586] SDK cleanup done. 9 20591 [iot_threa] [INFO][DEMO][20591] ------DEMO FINISHED-