



CONTINECT

Wireless Solution

**MCU Embedded
Wireless LAN 802.11ax
+ Bluetooth® Low Energy 5.4
+ 802.15.4 Module**

**WKR612AA1
Overview**

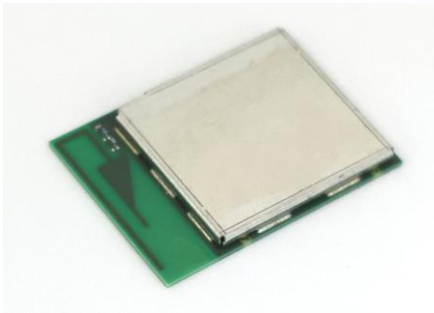
- ◆ Overview
Product summary (this document)
- ◆ Data Sheet
Specifications
- ◆ Application Note
Design information
- ◆ Apply for Regulatory Certification & FLASH FCB
Application methods for "Radio regulations" and "FCB of flash ROMs".
- ◆ Evaluation Board/Kit Manual
User manual for the evaluation kit and board for module evaluation.
- ◆ External Antennas List
List of antennas that can be used as external antennas.
- ◆ FAQ
Document summarizing frequently asked questions.

These documents can be viewed and downloaded by accessing the following URL.

[WKR612AA1 Wireless LAN Module | KAGA FEI](#)

**MCU Embedded
Wireless LAN 802.11ax
+ Bluetooth[®] Low Energy 5.4
+ 802.15.4 Module**

WKR612AA1



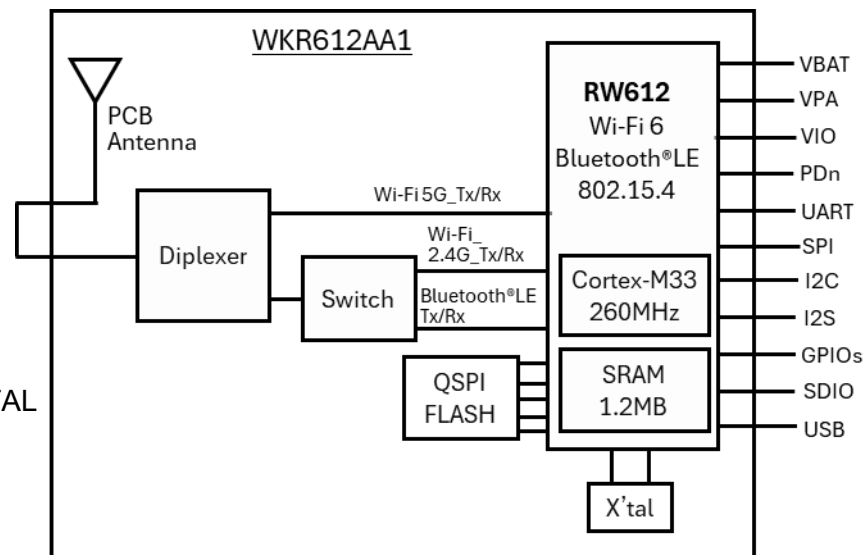
Features

- Supports Wi-Fi 6 1x1 dual band + *Bluetooth*® Low Energy + 802.15.4
 - Integrated with NXP RW612 chipset
 - IEEE 802.11 a/b/g/n/ac/ax
 - Band Width : 20MHz
 - OFDMA, MU-MIMO
 - Security : WPA3, WPA2, AES
 - *Bluetooth*® Low Energy 5.4 : LE 2M, LE Coded
 - 802.15.4 supporting Thread
 - Built-in Application Processor, FLASH memory 8MByte
- Module Configuration
 - Single antenna configuration for Wi-Fi, *Bluetooth*® LE , and 15.4
 - Integrated Antenna, Diplexer, Tx/Rx switch, Filter, PA, LNA and XTAL
 - Support external antenna.
 - Power supply : 3.3V (Typ.)
- Host Interface / Peripheral Interface
 - UART, SPI, SDIO, USB / I2C, I2S, GPIOs
- Outline
 - 26.9 x 19.0 x 2.1 mm (Max)
- Wide Operating Temperature Range
 - -40 to +85 deg C
- Radio certification
 - FCC, ISED, MIC,
 - ETSI EN 300 328 / EN301 893 conducted test report available

Applications

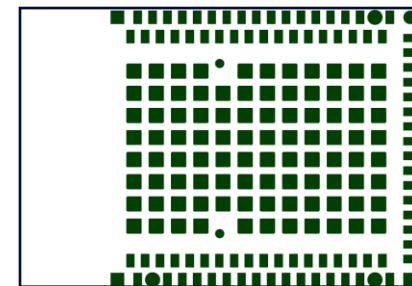
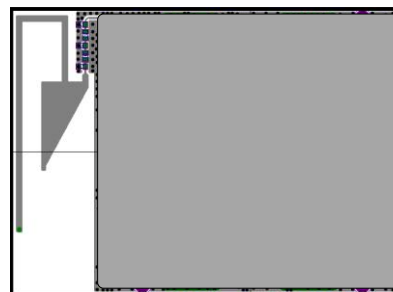
- Industrial Automation
- IoT Gateways
- Smart home
- Smart devices
- Smart appliances
- Smart accessories

Block Diagram



Outline (Top view)

26.9x19.0x2.1 mm



Module Pad Layout

All specifications are subject to change without notice.

The *Bluetooth*® word mark and logos are owned by the *Bluetooth*® SIG, Inc. and any use of such marks by KAGA FEI Co., Ltd. is under license.

General Electrical Specification



Topr.= 25 degrees C, Supply voltage=Typical voltage

Parameter	Description	Min.	Typ.	Max.	Units
Frequency Range	11b / g / n	2412	-	2472	MHz
	11a / n / ac / ax	5180	-	5825	
	<i>Bluetooth</i> [®] LE	2402	-	2480	
	802.15.4	2405	-	2480	
Supported Bandwidth		-	20	-	MHz
Operation Voltage	VBAT	3.14	3.3	3.46	V
	VPA	3.14	3.3	3.46	
	VIO	1.71 / 3.14	1.8 / 3.3	1.89 / 3.46	
TX Output Power	2.4G:11b / g / n / ax	-	16 / 15 / 15 / 15	-	dBm
	5G:11a / n / ac / ax	-	15 / 15 / 13 / 13	-	
	<i>Bluetooth</i> [®] LE	-	6	-	
	802.15.4	-	6	-	
RX Sensitivity	2.4G:11b / g / n / ax	-	-88.4 / -74.7 / -72.6 / -66.5	-	dBm
	5G:11a / n / ac / ax	-	-74.8 / -72.9 / -69.2 / -66.3	-	
	<i>Bluetooth</i> [®] LE 2M / LE Coded125k	-	-99 / -106.5	-	
	802.15.4	-	-103.2	-	
Power Consumption	Burst TX 11a 54M (15dBm)	-	380	-	mA
	11ac RX 5G	-	100	-	mA
	Sleep (Wi-Fi mode)	-	0.21	-	mA
General Operation Temperature Range		-40	25	85	deg-C

WKR612AA1-EV_ : Wireless LAN Module Evaluation Board/Kit

WKR612AA1-EVB / EVK are the evaluation board and kit for the WKR612AA1. For RF evaluation and software development in early stages.

*J-Link LITE is required to write customer software to the module.

The J-Link Lite is only delivered and supported as part of an evaluation kit, which includes an evaluation board. It may only be used with the evaluation board it came with, and is not to be used for commercial product development.

WKR612AA1-EVK includes:

No.	Item	Description	Qty
1	WKR612AA1-EVB	Evaluation Board for WLAN module WKR612AA1 with USB mini-B interface cable	1
2	Debug tool	J-Link Lite : Debug probe for software development	1
		Flat cable : Connect the JTAG signals between WKR612AA1-EVB and J-Link LITE	
		USB cable: Connect J-Link Lite to PC	

*In addition, a guide to registering on the Kaga FEI limited website is also included.



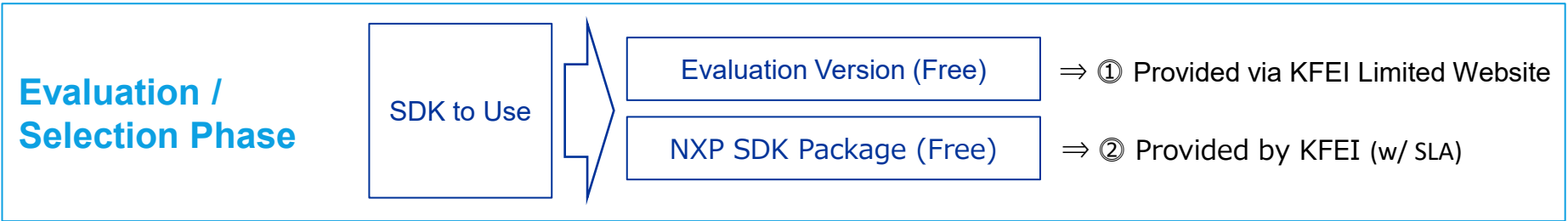
WKR612AA1-EVB includes:


No.	Item	Description	Qty
1	WKR612AA1-EVB	Evaluation Board for WLAN module WKR612AA1 with USB mini-B interface cable	1



Package Name	Contents	Availability	Source
① Evaluation Version	Binay image Manual	Free for evaluation	Kaga FEI Limited Website *Please see the attached guide.
② SDK Package	Full source code Manual	Request SLA	*Please contact Kaga FEI
③ SDK Patch	Differential Update files Manual	Publicly available	Kaga FEI Website https://www.kagafei.com/jp/eng/products/wireless-modules/wlan/WKR612AA1.html

Selection Guide



	NXP SDK 
Provider	NXP or KagaFEI (SLA required)
Usage	Evaluation only (Requires development for production use)
UI / Application	Demo for each individual function
OS	Free RTOS
Configuration	Modify source code for each function
Customer Support	Support for evaluation board inquiries
Maintenance	Handled by customer
Documents	English
Customization	Handled by customer

*SLA: Software License Agreement

WLAN	NXP SDK
Application	Sample demo
Protocol	TCP
	UDP
	DHCP
	HTTP
	MQTT
WLAN	STA•AP
	WPS
	OTA
	WPA2•3
	11ac•ax

Bluetooth® LE	NXP SDK
Application	Sample demo
Profile	HTP, PXP, IPSP, etc
Protocol (Core Host)	ATT
	GAP
	GATT
	SM
	L2CAP
	HCI
	v5.4

802.15.4	NXP SDK
Application	Sample demo
Protocol	Mesh
	TCP
	UDP
	IPv6
	DHCPv6
	DNSv6
	6LoWPAN
802.15.4	Open Thread
	MAC•PHY

Software package based on NXP SDK, adapted for our module.
For evaluation use before product development.

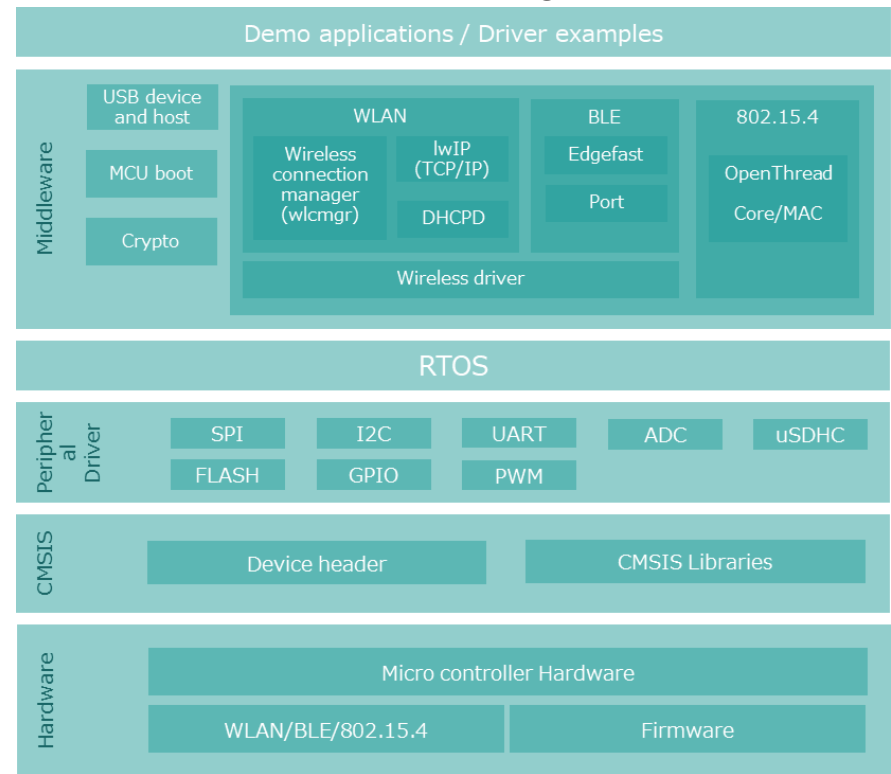
*For production use, customers must ensure software functionality and quality.

NXP SDK provides sample applications to run each function individually.

Includes software with certified Tx power tables and flash configuration implemented by KFEI.

- Certified Tx Power Tables
Pre-certified Tx power tables implemented for Japan, US, Canada, and Europe regulations.
- FLASH Configuration
Configuration optimized for Winbond embedded flash is pre-implemented.

NXP SDK Configuration



For customers who have obtained the SDK directly from NXP, we also provide an SDK difference package for applying the transmit power table and FLASH configuration.

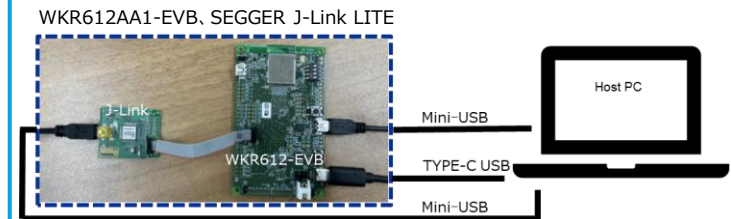
NXP SDK packages and configuration for WKR612AA1

◆ Available Software Packages

① EVK Evaluation Package (Binary Image)

Customers who purchased WKR612AA1-EVK/EVB can obtain it from the limited user site. Pre-built firmware is included, allowing easy operation check. ※Refer to the instructions included with EVK/EVB for access details. Includes sample applications, manufacturing test tools (binary), and documents.

EVK Hardware Configuration



② SDK Package (Full Source Code)

Full source code adapted from NXP SDK for WKR612AA1 is available. To obtain our SDK, an SLA based on a license agreement between NXP and Kaga FEI is required. Includes full source code and documents.

③ SDK Patch Package (Source Code Diff)

For customers who have registered an NXP account and obtained the SDK from GitHub, the SDK modification instructions (difference) for the WKR612AA1 and instructions on how to apply wireless regulations can be obtained from the public website. Includes source code diff and documents.

For software package access, please contact Kaga FEI.

① EVK Evaluation Package (Binary Image)

	Access	Contents	Description
Document	Limited Website	WKR612AA1 User Guide	Firmware rewrite guide, target operation guide, WLAN samples, Bluetooth® LE samples, 802.15.4 samples, MFG samples, RF evaluation, certification tools
Software	Limited Website	WLAN sample	Peripheral AP scan, AP connection, Ping/iperf command, AP mode
		Bluetooth® LE sample	Communication demo with smartphone app (Wireless UART for cable replacement)
		15.4 sample	Thread connection demo (ping connection)
		MFG sample	RF evaluation and certification tools

※ Customers who purchased WKR612AA1-EVK/EVB can download from the limited user site.

② SDK Package (Full Source Code)

	Access	Contents	Description
Document	SLA Agreement	WKR612AA1 QuickStart Guide	How to obtain toolchain, how to obtain MCUXpresso-SDK, build execution, target operation guide
	NXP Public	NXP WEB site Document	Release notes, developer tutorials
			Instructions for building, debugging, flashing, and running WLAN sample applications; IDE setup and required tools
Software	NXP Public	MCUXpressoIDE_xx.x.x_xxxx.exe	Compiler, debugger (development environment)
	SLA Agreement	SDK_*_*_*_WKR612.zip	Full source code of NXP MCUXpresso-SDK

※ Requires SLA agreement based on a license contract between NXP and Kaga FEI.

③ SDK Patch (Source Code Diff)

	Access	Contents	Description
Document	WEB Release	How to modify SDK for WKR612	How to modify NXP SDK for WKR612AA1
Software	WEB Release	SDK_*_*_*_WKR612_diff.zip	WKR612AA1 source code diff

※ Available from the public website.

You can use NXP sample software that can control the WKR612AA1 by the host CPU. Module handles wireless functions, host CPU handles upper applications and protocols.

- ✓ Various stack functions implemented.
- ✓ Tag-Length-Value (TLV) protocol used for I/F.
- ✓ Sample applications for the host CPU provided.

I/F : UART, SPI, USB, SDIO (TLV protocol)

Host CPU :

Sample Application

(RTOS on RT1060, Linux on i.MX8)

WKR612AA1 :

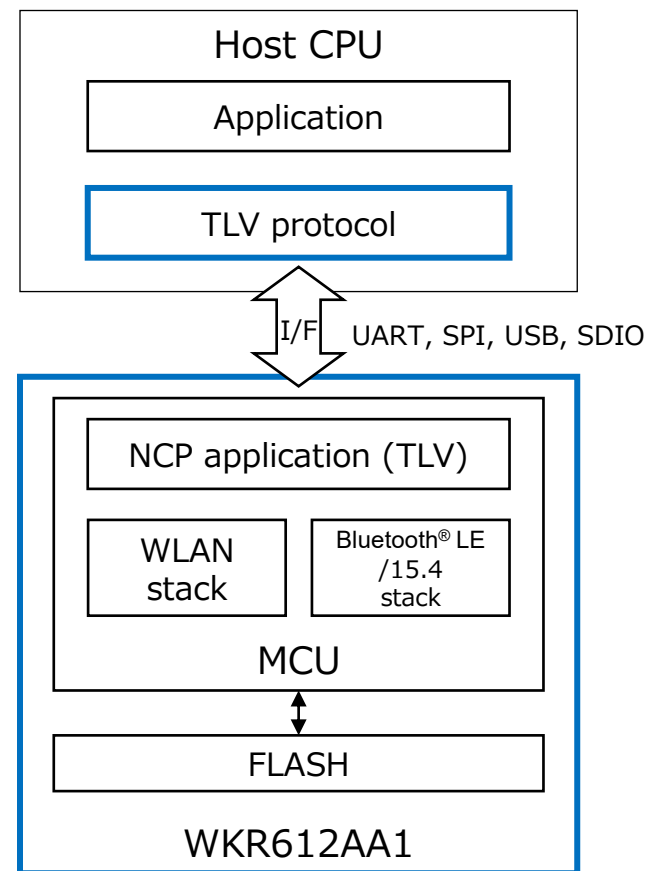
WLAN : Socket, HTTP Communication

Bluetooth® LE : GAP, GATT, L2CAP Communication

802.15.4 : TCP, UDP Communication (Open Thread)

The following functions are implemented:

WLAN	Bluetooth® LE	802.15.4
STA / AP mode, WPA2/3	Power mode	Open Thread
EAP-TLS, EAP-PEAP	GAP	Child / Leader mode
IEEE-PS, Deep-sleep	GATT	TCP, UDP
HTTP, WebSocket, Socket	L2CAP	
WPS-PIN, WPS-PBC		
WPA Supplicant		





KAGA FEI