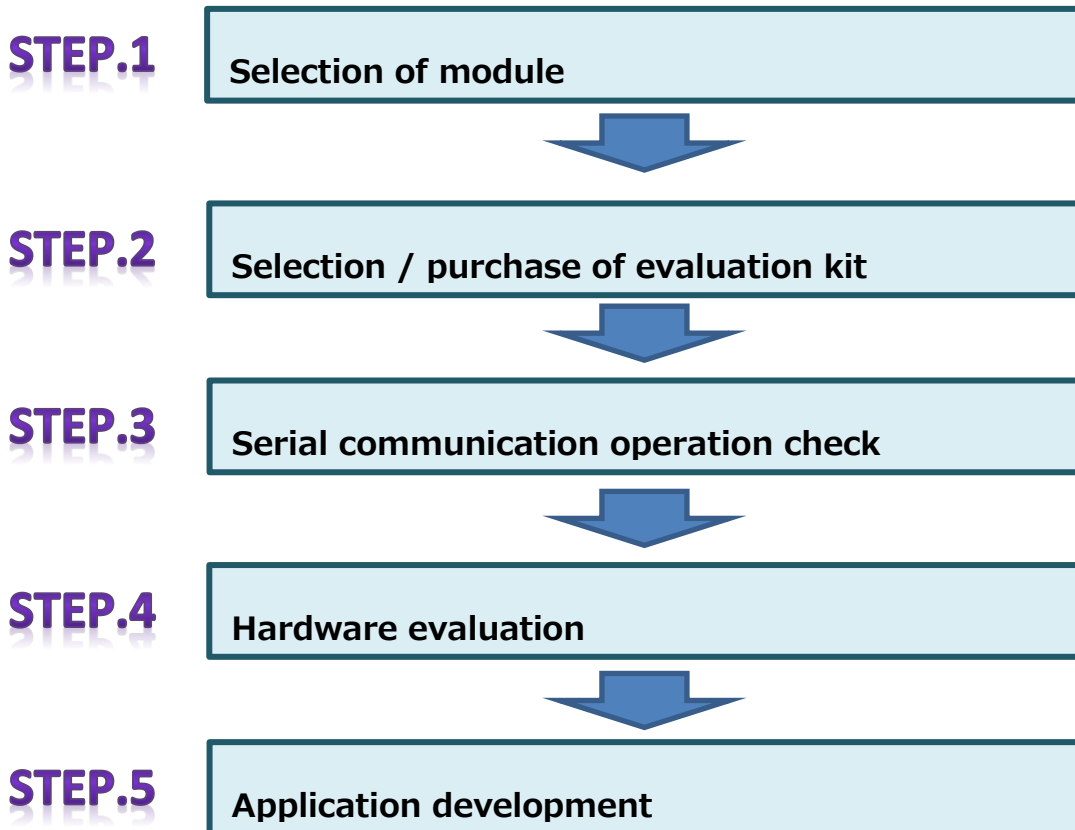# Flow of evaluation / examination by customers

Here, we will explain the flow of evaluation and examination by our customers.

STEP.1 | Selection of module

STEP.2 | Selection / purchase of evaluation kit

STEP.3 | Serial communication operation check

STEP.4 | Hardware evaluation

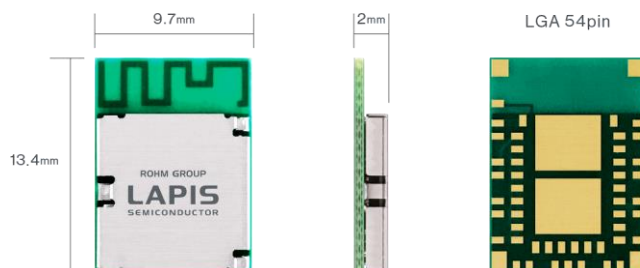**STEP.5** | Application development

Step.1 Selection of module

First, select the module to use. There are two products in the Bluetooth v5.2 certified module made by Lapis Technology.

「MK71511」：module with nRF52811
「MK71521」：module with nRF52832

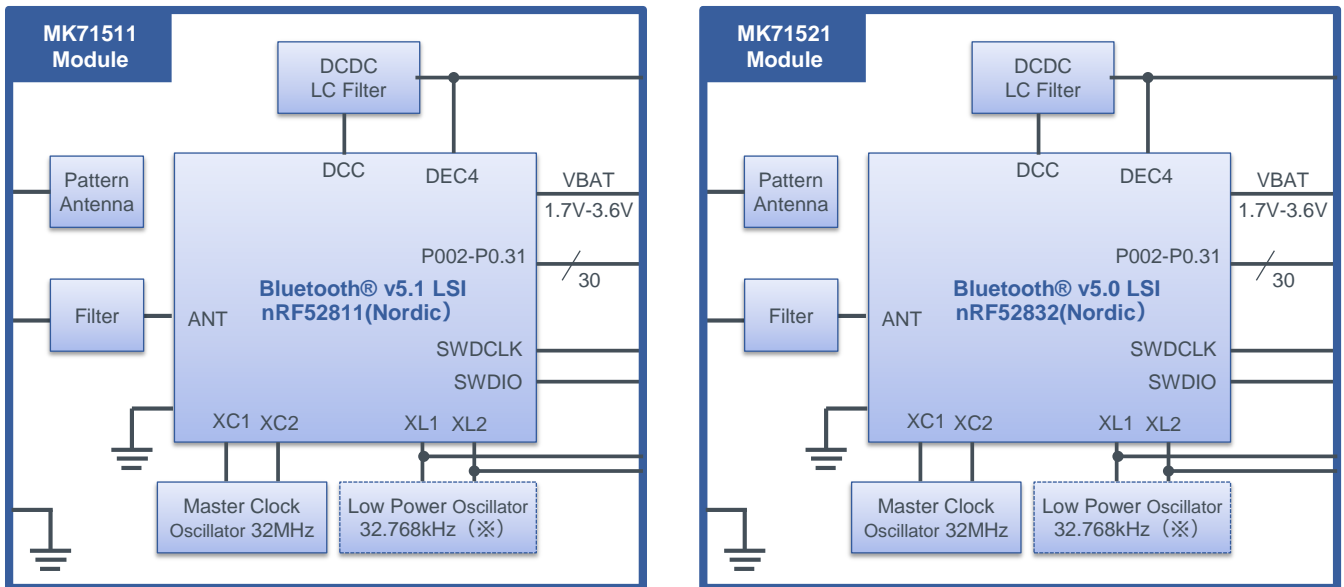The module size of MK71511 and MK71521 is the same (9.7mm[W]×13.4mm[D]×2mm[H]) , and it is pin compatible (LGA 54pin).

Select the module to be used by referring to the specification comparison table and schematic block diagram below.

Specification comparison table

		MK71511	MK71521
Dimension		9.7mm(W) x 13.4mm(D) x 2.0mm(H)	
Packaging		54pin LGA pin compatible	
Bluetooth low energy LSI		Nordic nRF52811	Nordic nRF52832
Bluetooth Qualification		v5.2 (RF-PHY Component Qualification)	
Core MCU		Arm® Cortex®-M4 processor (64MHz)	Arm® Cortex®-M4 processor with FPU (64MHz)
Memory size	Flash	192KB	512KB
	RAM	24KB	64KB
RF characteristics	Maximum output power	＋4dBm	
	Receiver sensitivity (1Mbps)	-97dBm	-96dBm
Current consumptions	TX (0dBm)	5.8mA	7.1mA
	RX (1Mbps)	6.1mA	6.5mA
Function	2Mbps	○	○
	Long-range	○	―
	Extended advertising	○	○
	Direction finding	○	―
Radio certification	Japan/ Construction type certification	certification no: 006-000797	certification no: 006-000798
	USA/FCC	FCC ID:2ACIJ71511	FCC ID:2ACIJ71521
	Canada/ISED	IC:20971-71511	IC:20971-71521
	Europe	EN300 328 V2.2.2	
HW I/F	GPIO	30	30
	SPI	2ch (M/S)	3ch (M/S)
	UART	1 (～1,000kbps)	
	I2C	1ch (M/S)	2ch (M/S)
	I2S	―	1ch
	PWM	4ch	3 x 4ch
	ADC	8ch (12-bit, 200kHz)	
	NFC	―	○

Electrical characteristics	Power supply voltage range	1.7V～3.6V(TYP 3.0V)
	Operating temperature range	-40～85℃

Schematic block diagram

MK71511 Module

DCDC LC Filter

Pattern Antenna

Filter

DCC | DEC4

VBAT 1.7V-3.6V

Bluetooth® v5.1 LSI nRF52811(Nordic)

ANT

P002-P0.31 /30

SWDCLK
SWDIO

XC1 XC2 | XL1 XL2

Master Clock Oscillator 32MHz

Low Power Oscillator 32.768kHz（※）

MK71521 Module

DCDC LC Filter

Pattern Antenna

Filter

DCC | DEC4

VBAT 1.7V-3.6V

Bluetooth® v5.0 LSI nRF52832(Nordic）

ANT

P002-P0.31 /30

SWDCLK
SWDIO

XC1 XC2 | XL1 XL2

Master Clock Oscillator 32MHz

Low Power Oscillator 32.768kHz（※）

Step.2　Selection / purchase of evaluation kit

■ Evaluation kit type

There are two types of evaluation kits for Lapis Technology Bluetooth v5.2 certified modules.
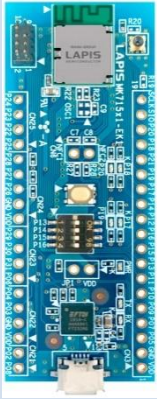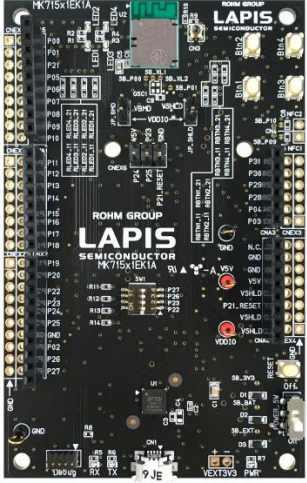
Small simple type "MK715x1 evaluation kit Mini"
Arduino pin compatible type "MK715x1 evaluation kit"

Both evaluation kits are initially written with sample applications for serial communication using UART. Therefore, you can easily perform the initial evaluation immediately after connecting to a PC with a USB cable. You can easily check the operation of serial communication using the smartphone app "BLE Tool".

The Arduino pin compatible type "MK715x1 evaluation kit" is compatible with Arduino Uno R3 (Rev.3), and various commercially available shields [*1] can be connected. When creating prototypes using various shields, we recommend using this "MK715x1 Evaluation Kit".
*1: Limited to shields with analog and digital I / F of 3.6V or less.

In addition, the "MK715x1 Evaluation Kit Mini Plus" and "MK715x1 Evaluation Kit Plus" that include the "J-Link LITE" debug probe for Arm Cortex are also available for applications such as rewriting programs in modules.

Type	Evaluation kit name	Product number	Constitution	Picture
Small simple type	MK715x1 Evaluation kit Mini	MK71511EK1 MK71521EK1	MK71511/MK71521 Evaluation Board (small simple type)	
	MK715x1 Evaluation kit Mini Plus	MK71511EK1P MK71521EK1P	MK71521/MK71521 Evaluation Board (small simple type) USB cable J-Link LITE	
Arduino pin compatible type	MK715x1 Evaluation kit	MK71511EK1A MK71521EK1A	MK71511/MK71521 Evaluation Board (Arduino pin compatible type)	
	MK715x1 Evaluation kit Plus	MK71511EK1AP MK71521EK1AP	MK71511/MK71521 Evaluation Board (Arduino pin compatible type) USB cable J-Link LITE	

■**Purchase evaluation kit**

Once you have decided which evaluation kit to use, please purchase the evaluation kit via an internet trading company or your sales representative.

Step.3　Serial communication operation check

Evaluation Kit Mini / Evaluation Kit contains a sample application for serial communication using UART in the initial state, so you can easily perform initial evaluation immediately after connecting to a PC.

For how to check the operation of serial communication, refer to the included quick start guide.

Step.4　Hardware evaluation

Various hardware evaluations can be performed using the evaluation kit Mini or the evaluation kit.
We have prepared the following application notes on hardware evaluation, so please refer to them as necessary.

❑**Current consumption measurement**
The following document describes how to measure current consumption using the evaluation kit Mini.

「Bluetooth low energy Module（MK71511/MK71521）Application Notes
－Current consumption measurement－」

❑**Connection distance measurement**
The following document describes how to measure the connection distance using the evaluation kit Mini.

「Bluetooth low energy Module（MK71511/MK71521）Application Notes
－Connection distance measurement－」

❑**Throughput measurement**
The following document describes how to measure throughput using the evaluation kit Mini.

「Bluetooth low energy Module（MK71511/MK71521）Application Notes
－Throughput measurement－」

Step.5　Application development

Evaluation kit Mini or evaluation kit can be connected to expansion boards and external components according to the customer's application. Develop applications by connecting the required expansion boards and external components.

After selecting sample software and building a software development environment, the customer will develop the application. For details, refer to the software development flow.