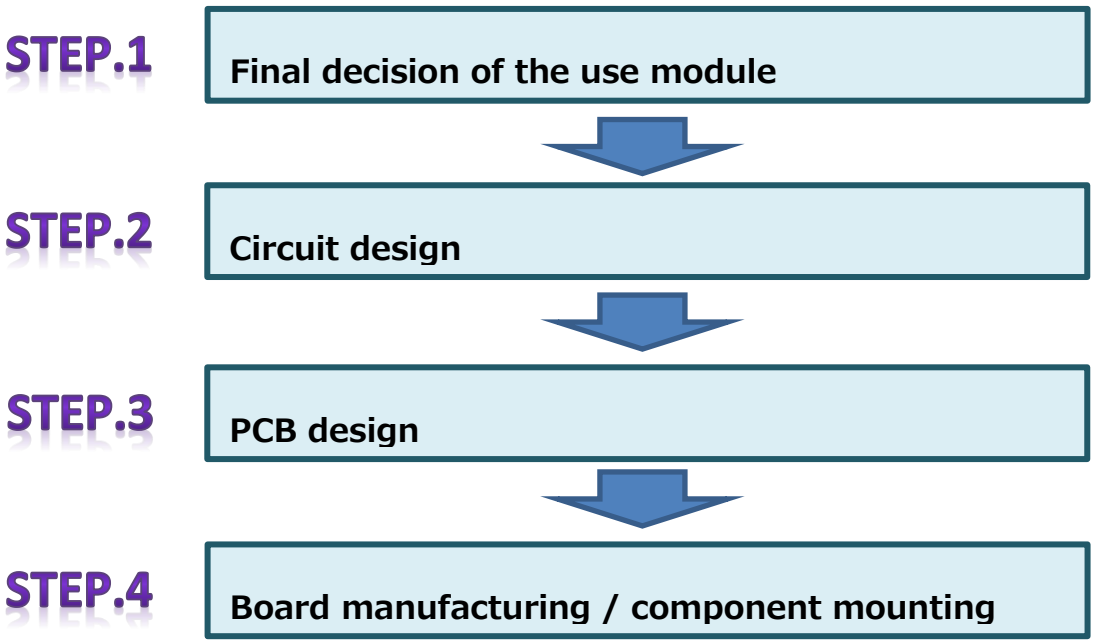
Flow of hardware development by the customer

This section describes the flow of hardware development by the customer.



Step.1 Final decision of the use module

The module (MK71511 or MK71521) to be used is finalized based on the evaluation and examination results of the feasibility study.

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

Step.2 Circuit design

After deciding which module to use, create a circuit diagram.

When creating a circuit diagram, refer to the application circuits described in the MK71511 datasheet and MK71521 datasheet, and pay attention to the following precautions / checklists when designing the circuit.

❑ Precautions / check list when designing a circuit

1. Power Line (Power Supply)

□ **Is there a circuit configuration in which a decoupling capacitor (example: 1 to 10uF) and a bypass capacitor (example: 10 to 100pF) can be placed in the immediate vicinity of the power supply terminal VBAT (10PIN)?**

[Supplement] If the power line is noisy or the power supply voltage fluctuates significantly, it is recommended to place decoupling capacitor (e.g.: 1 to 10uF) and bypass capacitor (e.g.: 10 to 100pF) in the immediate vicinity of the power supply terminals VBAT (10PIN).

[Reference] The MK71511 / MK71521 module has a circuit configuration that conforms to the reference circuit (DC / DC regulator setup) described in the Product Specification of nRF52811 / nRF52832, and also has a bypass capacitor inside the module.

2. Terminal processing

□ **Are the XL1 terminal (24PIN) and the terminal XL2 (25PIN) unconnected? (For MK71511 / MK71521)**

[Supplement] Since it is used as a crystal oscillator terminal inside the module, be sure to disconnect it.

□ **Is the DCO terminal (7PIN) unconnected?**

[Supplement] This is test terminal and cannot be used as an external power supply, so be sure to disconnect it.

□ **Are the N.C. terminals (1PIN, 2PIN) unconnected?**

□ **Are the unused terminals of P0.02–P0.31 unconnected?**

[Supplement] P0.02–P0.31 is a GPIO terminal. Functions such as UART can be assigned by setting with the application software. There is no problem if the unused GPIO terminal is not connected.

3. Antenna connection wiring

□ **Are the ANT terminal (3PIN) and RFIO terminal (35PIN) connected via a 0Ω jumper resistor as in the application circuit example? Also, have you added any parts other than the 0Ω jumper resistor?**

[Supplement] The radio wave certification test of MK71511 / MK71521 is carried out with the configuration of the application circuit example. If you change the configuration or add parts other than the 0Ω jumper resistor (LC, etc.), you may need to recertify the radio wave.

4. SWD Debug Port

□ **Is the SWDIO pin (45PIN) and SWDCLK pin (44PIN) configured so that a debugger such as J-Link can be connected?**

[Supplement] SWD (Serial Wire Debug) is a debug interface that controls the debugger with two bidirectional data signals (SWDIO) and clock (SWDCLK). Use J-Link etc. to write firmware and application software from this interface.

5. Reset

□ **When inputting a reset signal from outside the module, is the reset signal connected to the intended pin assignment?**

6. Other

□ **Is the terminal number of the module shown in the circuit diagram correct?**

□ **Are all the GND terminals of MK71511 and MK71521 connected to GND? (GND terminals : 4,6,11,15,20,21,31,32,36,42,43,52,53,54PIN)**

Step.3 PCB design

Next, we will design the PCB.

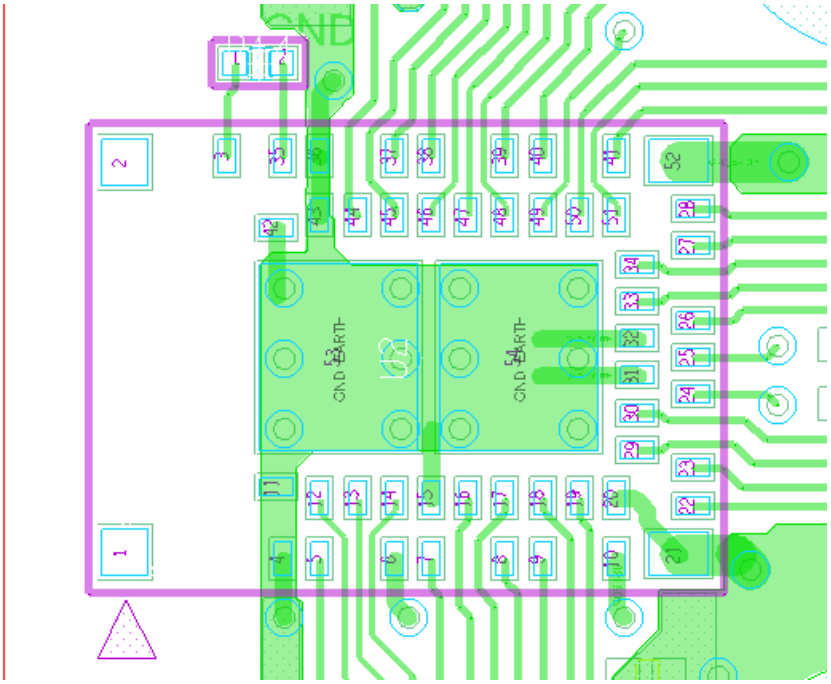
The following documents describe precautions when designing a PCB, so be sure to refer to them when designing a PCB.

「Bluetooth low energy Module（MK71511/MK71521) Application Note
－PCB Design Guidelines－」

Here, when designing a PCB, we will explain an example of wiring with only one layer of the motherboard (the customer manufactured board), and the restrictions on the board thickness and copper foil placement area from the above application notes.

❑ Wiring example with only one layer of the motherboard

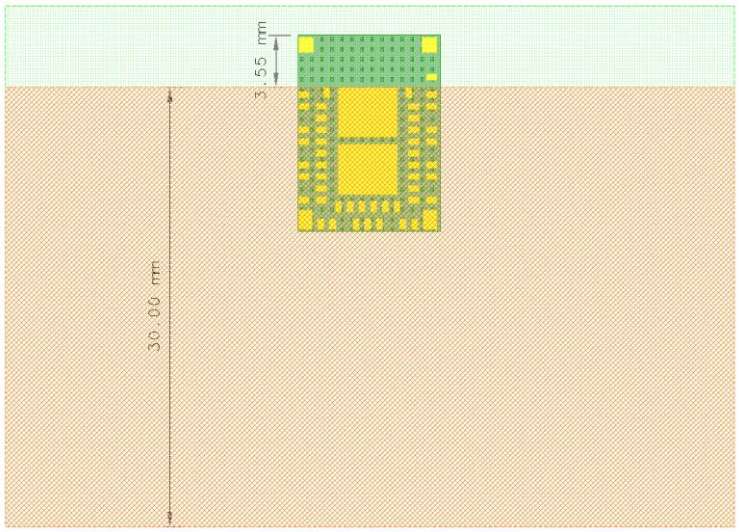
Due to the PAD arrangement on the back of the module of MK71511 / MK71521, wiring can be performed only on the first layer of the motherboard as shown below. Please refer to the application note-Board design guidelines-for the restrictions and precautions when wiring with only one layer.



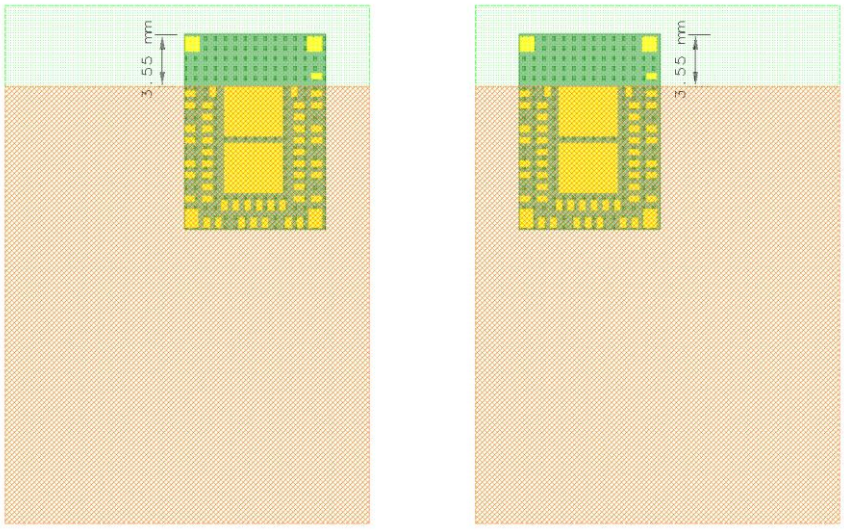
❑ Board thickness and copper foil placement area

Depending on the module mounting position with respect to the motherboard, the restrictions on the board thickness and the copper foil placement area will change.
Please refer to the application note -PCB Design Guidelines- for detailed explanations.

Module mounting position (Case 1) When conductors are not placed on the left and right of the antenna :

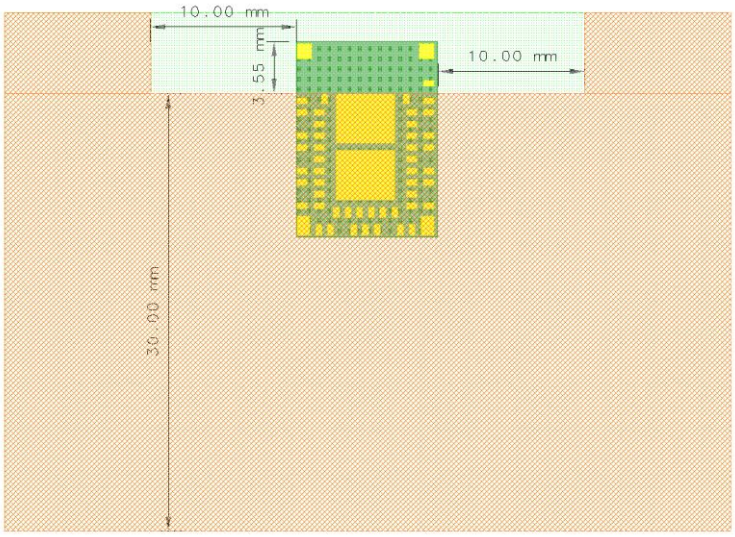


■the outline of the motherboard ■the copper foil placeable area of the motherboard



■the outline of the motherboard ■the copper foil placeable area of the motherboard

Module mounting position (Case 2) When conductors are placed on the left and right of the antenna :



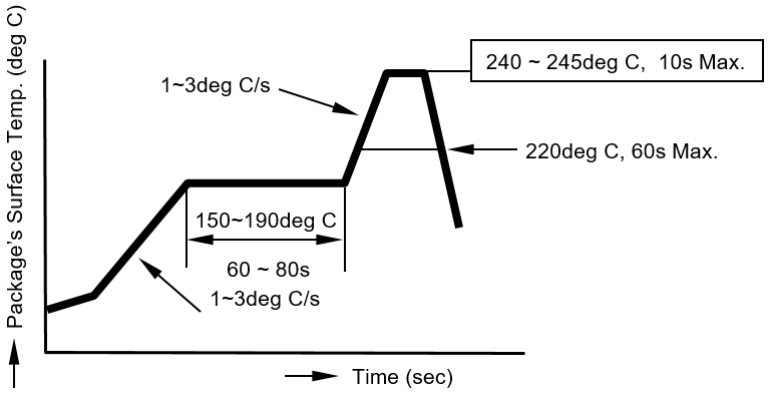
the outline of the motherboard the copper foil placeable area of the motherboard

Step.4 Board manufacturing / component mounting

After manufacturing the board, parts are mounted.
This section describes precautions (reflow conditions, etc.) when mounting components.

❑ Board mounting (soldering)

Products are permitted to following contents for board mounting (soldering).
Boards must be mounted within twice and within maximum temperature of temperature profile as following.



Opened dry pack products must be mounted within 168H. Opened dry pack products must be stored at 5 to 30 deg C and 30 to 60% humidity on a daily average.

For documents related to the storage conditions of dry pack products and the treatment of products that have exceeded the storage duration after opening the dry packaging, we will provide the documents according to the customer's request.
Please contact the following inquiries.
Inquiries : support-ble@lapis-tech.com

❑ Precautions for mounting

1. When mounting this product on a double-sided board, do not mount this product on the initial mounting side.
   (Reflow on the opposite side where the module is mounted is prohibited.)
2. Due to the nature of the material, the shield case may discolor, but it does not affect product performance or quality.