

Integrate Bluetooth technology into your products in hours

This document will show you how to integrate the Bluetooth feature into your product in hours.

Choose your method to integrate the Bluetooth technology

Now, more and more products have integrated the Bluetooth feature to increase the convenience and competition in market. If you are considering integrate the Bluetooth into your device, you will find it is difficult to start up.

The first approach is to take a long time to learn about the Bluetooth technology, then deal with 2.4GHz hardware design, hardware design and firmware programming of the related chipset. A lot of time will be spent on testing on the hardware problems, signal performance and firmware reliability. It is worth to do so if you are intend to produce a large amount of product. However, this approach will consume much time, even if you are a practitioner.

The second approach is to use a Bluetooth Module. If you do not have enough knowledge about Bluetooth, intend to include the Bluetooth feature in products in small to medium quantities, or limited time to the market. Using Bluetooth Module is the best approach.

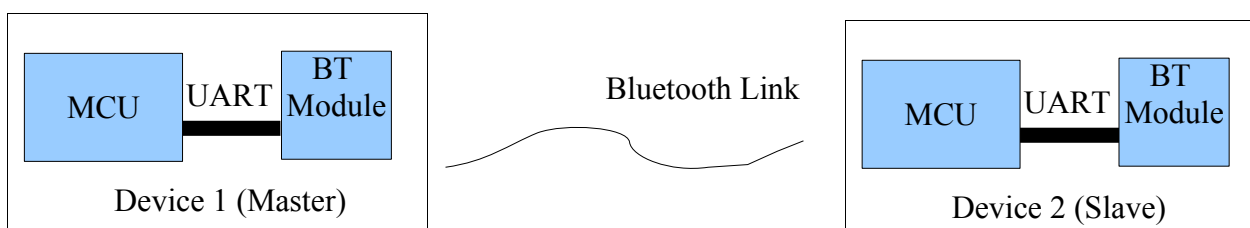
Bluetooth Module

Bluetooth Module integrate the hardware, firmware, RF and even antenna to implement the Bluetooth technology. It will save you a lot of time for development. You don't need the Bluetooth knowledge to use the Bluetooth Module.

The Bluetooth Module can be connected to any host such as MCU through UART port or PC through RS232 port (COM port). By using a provide command set for SPP profile, your MCU or PC can control the Bluetooth Module to establish a Bluetooth wireless link with other devices. It will save a lot of your time

We supply Bluetooth Modules, BTR170 for class 1 (100m) and BTR310 for class 2 (10m) in difference applications using SPP profile.

Blow diagram shows the concept and assume antenna integrated on the Bluetooth Module.



In summary, using Bluetooth Module have many advantages as below:

1. No need to deal with 2.4GHz and firmware. Save a lot of development time.
2. Bluetooth technology knowledge is not required.

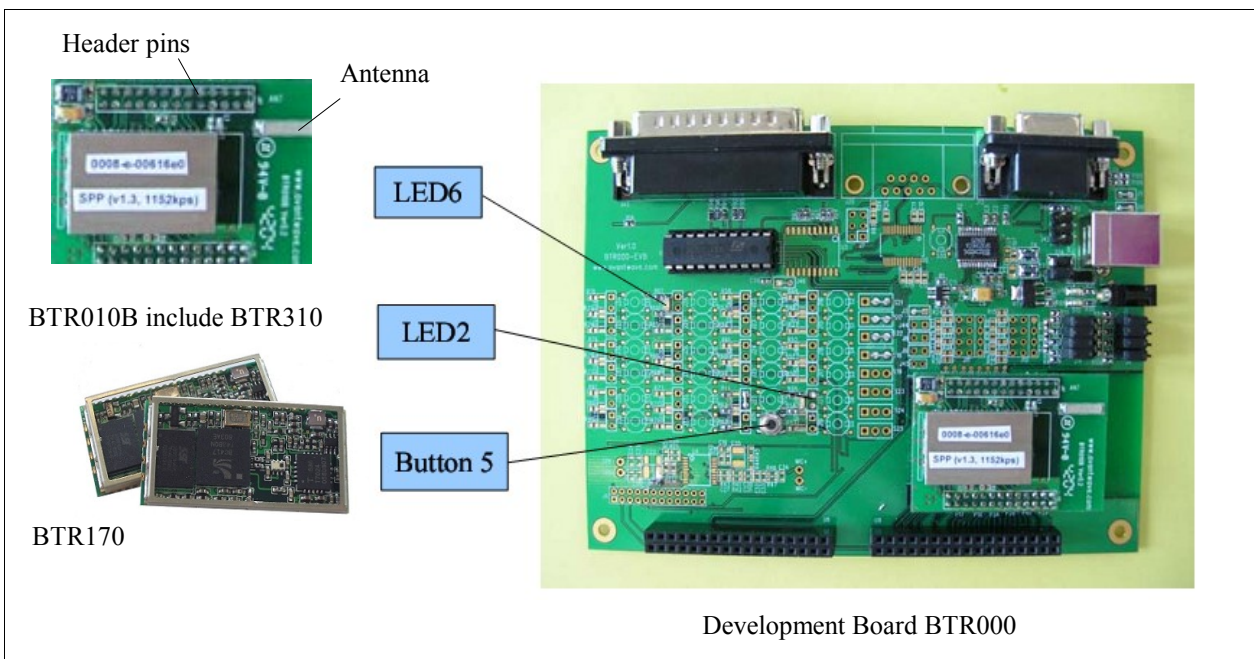
3. Simple to use.
4. Suitable for small to medium quantities products.
5. Comply to Bluetooth specification without risk.
6. Better Reliability.

BTR310 and BTR170 Bluetooth Modules

BTR170 and BTR310 are for class 1 and class 2 applications respectively. The Bluetooth Module such as BTR310 and BTR170 provide a command set named SPP340 for the SPP profile. You can use this command set to control the Bluetooth module to establish Bluetooth wireless connection to other Bluetooth device. Host such as MCU or PC can issue commands to the Bluetooth Module and get the command responses from it via UART communication. By using the commands, the wireless connection will be established, the MCU or PC can transmit data via the same UART port and communicate with the other Bluetooth device. The command and data share the same UART port. After connection, any information send to the UART port will be the data transmitted between devices.

Development hardware

The low cost approach is to buy a pair of BTR010B to develop master and slave devices. BTR010B is integrated with a Bluetooth Module, antenna and two rows of header pins provided for connection with your MCU and circuit. The size is 45mmx31mm. It minimize external components, no need for RF design and antenna layout and also easy for hand soldering for developing your device. BTR010B provide the simple and fast way to use directly on your projects and products using in small quantities.



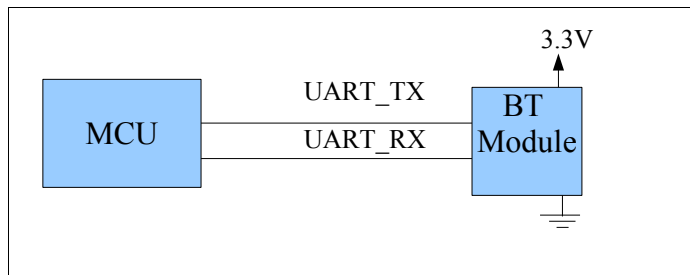
However, if you have enough budget, you can consider to buy a development board which has the BTR010B plugged onto it. It can connect to PC through a RS232 port (COM port), by using RS232 protocol software, you can issue command to and receive response from the BTR010B and establish the Bluetooth connection to other devices. LPT port is available for firmware upgraded for the Bluetooth module. Software upgrade tools are provided.

For user has BTR010B only, but want to connect to PC for development and firmware upgrade, circuits are provided. To save the cost, user can built the circuit only (such as on breadboard) under necessary. Also, the software upgrade tool is supply freely.

For reasons of smaller size or low price for medium size quantity, users should use the Bluetooth Module BTR310 or BTR170 directly onto their product.

Application Circuit

For simple application without UART handshake, only four pins (3.3V, GND, UART_TX, UART_RX) are need to be connected as below.



There are more optional pins available to be connected.

1. Optional one pin for returning connected status to to the Command Mode to receive commands again.
2. Optional three pins for LED indication of “under searching of other Bluetooth devices”, “auto-reconnecting under link loss” and “Connected with other Bluetooth device”.
3. Optional pins of SPI port for firmware upgrade.
4. UART handshake pins.

Please refer to the application circuit for details of connections.

Development software

The most easy approach is to use a PC to test commands. User should install some RS232 analyzer software on PC and then connect the development board to it.

Basically, you need a software to issue commands (hex code) to the PC com port and use another software to view the response codes on such port. Please see Software Design Noted – Develop with Binary Command Mode for the concept, free of charge development software tool, and method.

Also, software for firmware upgrade tools are available free of charge.

SPP340 commands

Commands can issued from MCU or PC through the UART to the Bluetooth Module to control the setup of Bluetooth link.

The SPP340 command set provide commands for below functions,

- read the BT address of the module itself

- read the software version and information of the module itself
- set local name, so other device can see your device's model, e.g. Model - 1234
- set baud rate "on the fly"
- Inquiry
- Set Discoverable and/or Connectable
- Select Device from the inquiry response list
- pairing
- connection with inquiry device
- connection with known BT address
- Set PIN Code
- List Paired Devices
- Clear Paired Device List

Example for Connection as Master

The command sequence will be,

hex command	command meaning
30 00 ff	(Inquiry Request – it inquiry to all Bluetooth Device)
32 01 01 ff	(Select Device Request – it select the first device in the required list)
34 00 ff	(Connection Request – it perform connection to the selected device)

It will be as a master device if connection is successful.

Example for Connection as Slave

The only command is 31 01 03 ff, means Set Discoverable and Connectable and ready to accept connection. It will be as a slave device if connection is successful.

Now, you understand integrating Bluetooth feature on your device as Master or Slave is very easy.

Application circuit for hardware development

Application circuit for BTR010B is available.

Hardware design notes for the hardware with BTR310 and BTR170 are available.

It will speed up your hardware development time.

Command Examples for software development

Software Design Note – connection examples for SPP340” and “command table - SPP340CMDtable.xls” provide command examples in more details.

It will speed up your software development time.

Applications

BTR310 and BTR170 with SPP340 profile are suitable for below application and more.

Cable replacement between Bluetooth enabled devices

Point-of-sales (POS) systems

Telemetry and machine-to-machine devices

Fitness and sports telemetry devices

Industrial PCs and laptops

RS232 cable replacement

And more

In conclusion, integrating Bluetooth technology into your product is not difficult. By using Bluetooth Module integrate with antenna, such as BTR010B with development software tools and command examples, you can have a product with Bluetooth feature in hours.

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