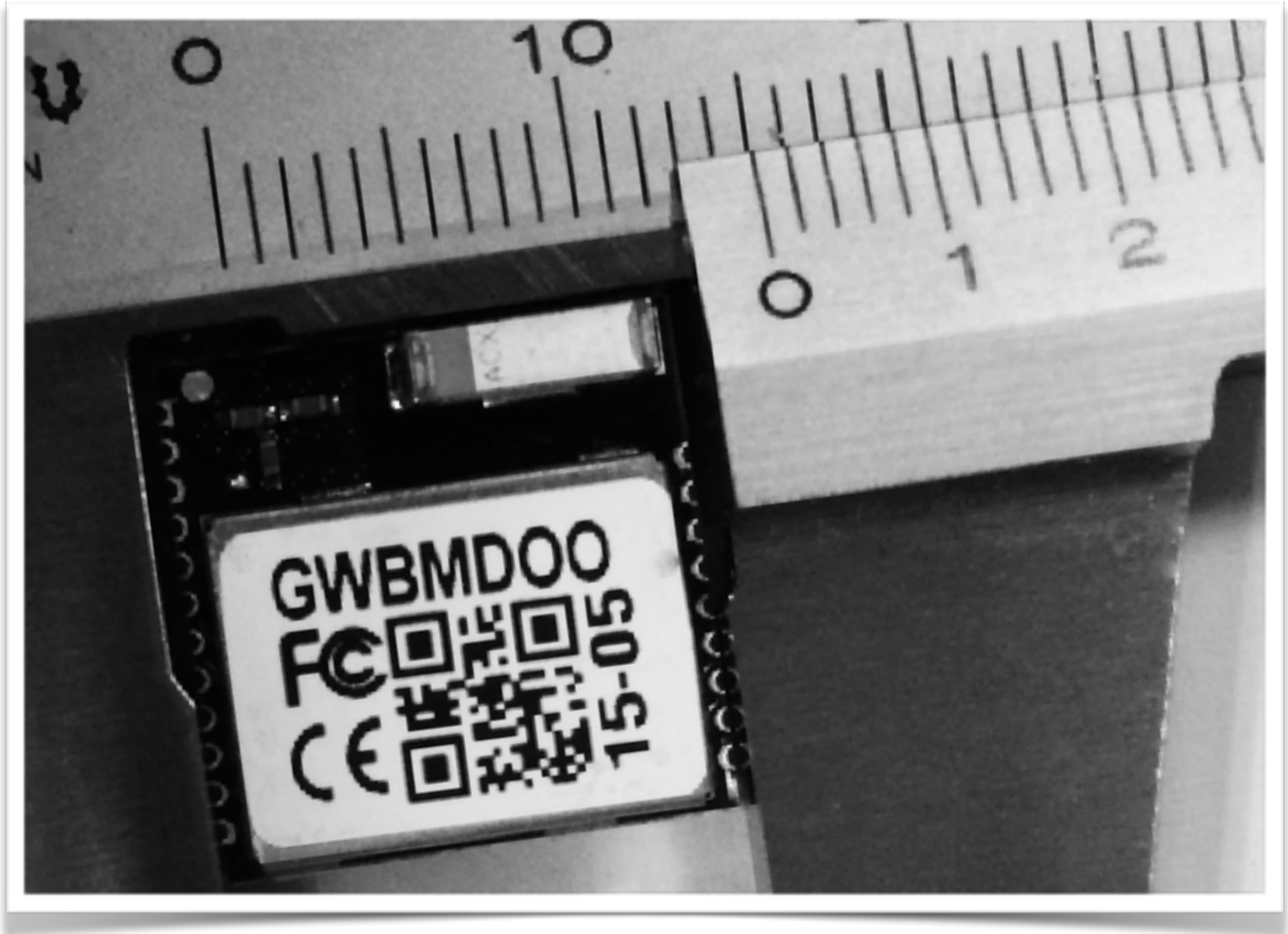




GWBMD30 Bluetooth 5 ready module

Data sheet version 0.9



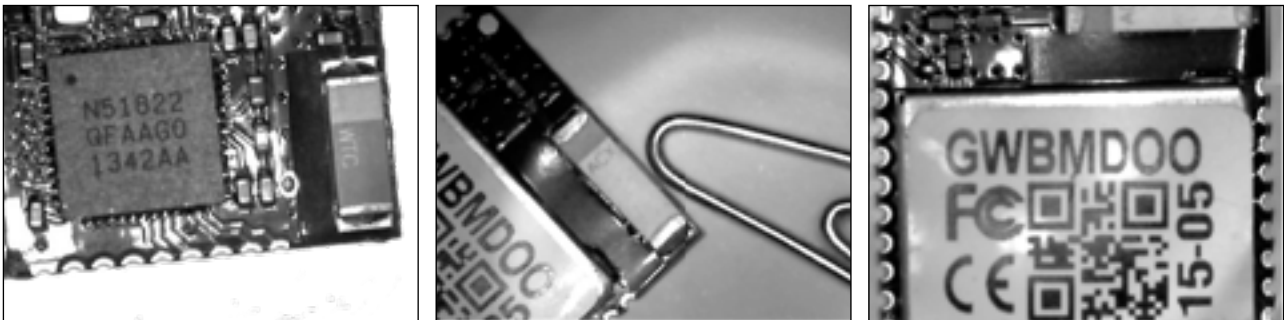
Introduction

Based on Nordic Semiconductor's nRF52832 BLE protocol processor, Gigawatt GWBMD30 Bluetooth 5 ready module provides a reliable and easy BLE solution, allowing users, even without any RF design experience, to bring their product or system, embedded with BLE features, to market in time.

Integrated with almost all peripheral components, such as RF matching network, Antenna, 32MHz Crystal, 32768Hz Crystal, and DC/DC inductor, GWBMD30 Bluetooth 5 ready module saves engineer resources from hardware design for BLE.

The tiny form factor of GWBMD30 allows it to be adapted into different applications, such as portable, handheld devices...etc.

GWBMD30 is certified with different countries' standards, which reduces customer's resources for qualification and allows products to be time to market.



Applications

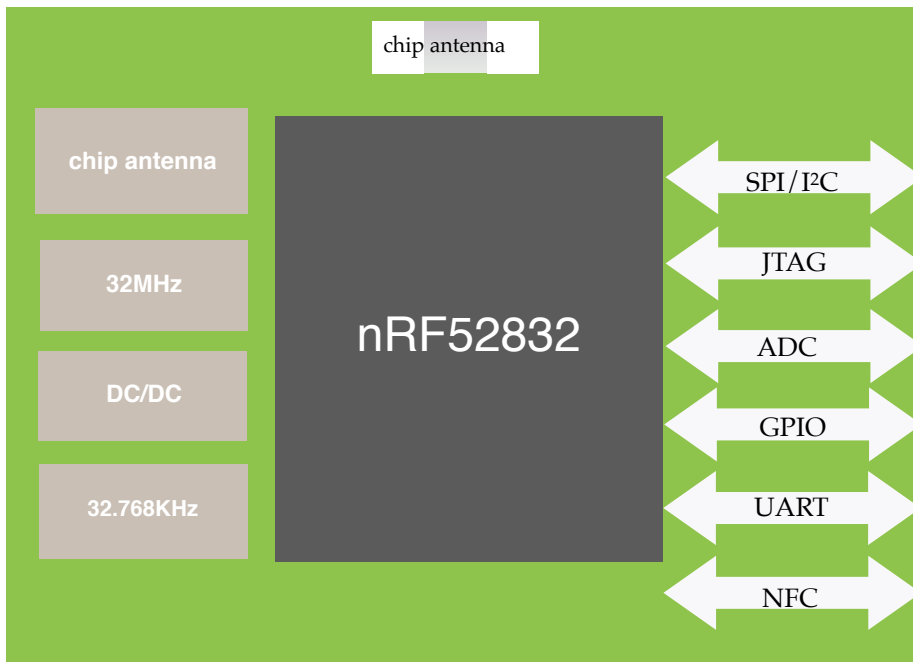
- Phone accessories
- Computer peripherals
- Remote controls for TV, STB and media systems
- Beacons
- Proximity and security alert tags
- Sports and fitness sensors
- Healthcare and lifestyle sensors
- Game controllers
- Home Automation
- Smart RF tags for tracking and social interaction

Feature

- Based on nRF52832, 32bit Cortex-M4F Bluetooth 5 ready Processor
- Integrated with chip antenna
- On board 32MHz / 32768Hz Crystal
- On board DC/DC converter
- 256kB flash/32kB RAM
- Small form factor: 15mm x 15mm, compatible with previous BLE module:GWBMD00
- Lower power consumption than GWBMD00
- Higher sensitivity than GWBMD00
- Bluetooth 5 ready (with appropriate firmware)
- Multi-protocols: BLE, ANT and 2.4GHz proprietary
- 12 GPIO
- NFC ready
- Excellent link budget (up to 95 dB)
- Programmable output power up to +4dBm
- Rich and flexible I/Os including UART/I2C/SPI/PWM/JTAG
- FCC, CE, TELEC, KCC certification (to be confirmed)

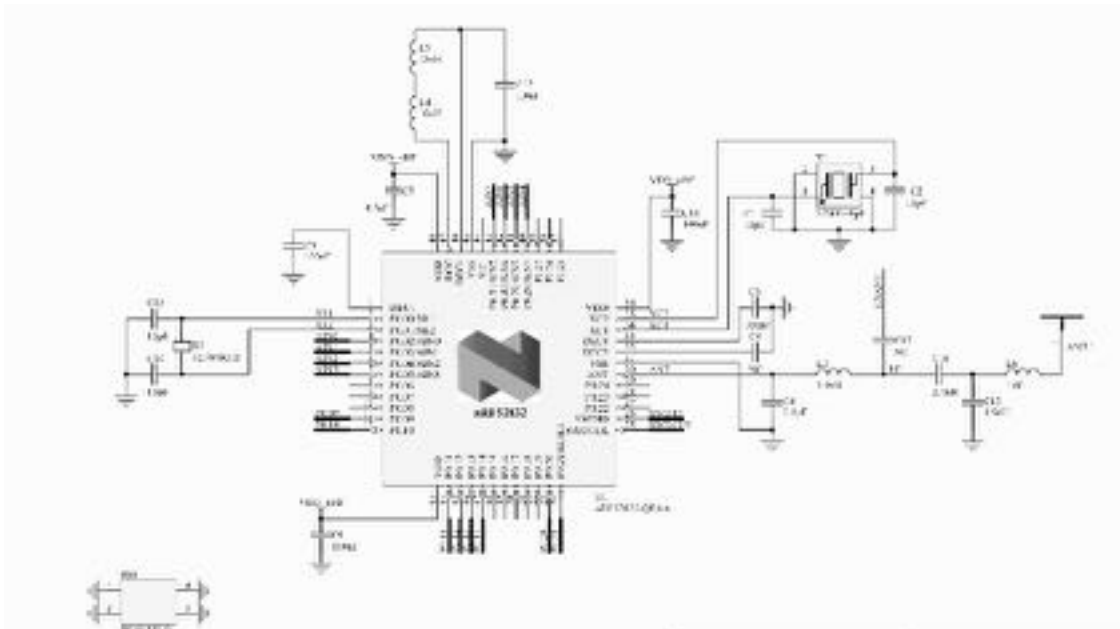
Hardware information

Block Diagram



GWBMD30 Block Diagram

Module Schematic



Electrical Specification

	Description	Typical
General	Operation voltage	1.7V to 3.6V DC
	Supply current	5.4mA peak RX, 5.3mA peak TX (0dbm)
	Microcontroller	32-bit ARM Cortex M4F
	GPIO	12 configurable
	Oscillators	32MHz crystal oscillator 32kHz crystal oscillator
	Digital I/O	X2 Hardware SPI master UART
	Operation temperature	-10 ~ +60°C
RF	Frequency band	2.4GHz ISM (2.40000 – 2.4835GHz)
	Modulation	GFSK
	Data rate	250kbps, 1 Mbps, 2 Mbps
	TX Power	-20 to +4dBm in 4dB steps
	Sensitivity	-95dBm at 1Mbs -89dBm at 2Mbs
	RF Range (indoor)	~15m

Pin Assignment



Pin	name	Type	Description
1	GND	GND	Ground
2	EXANT	ANT	External Antenna
3	GND	GND	Ground
4	P0.21	I/O	General purpose IO
5	P0.20	I/O	General purpose IO
6	P0.10	I/O	General purpose IO
7	P0.09	I/O	General purpose IO
8	P0.05	I/O	General purpose IO
9	P0.04	I/O	General purpose IO
10	P0.03	I/O	General purpose IO

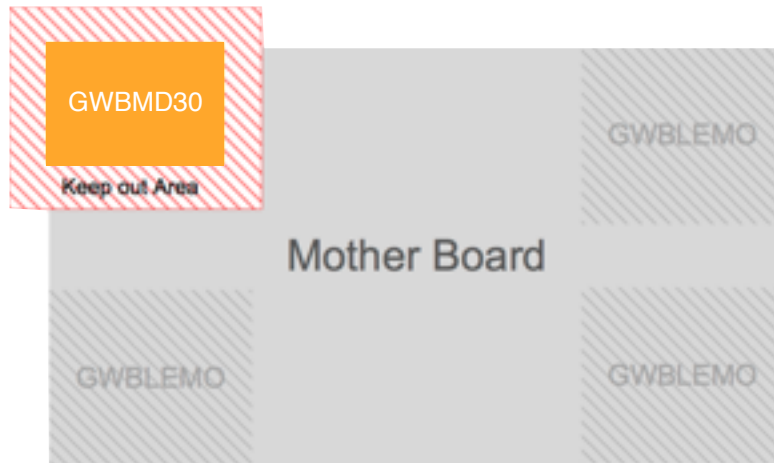
Pin	name	Type	Description
11	P0.002	I/O	General purpose IO
12	GND	GND	Ground
13	GND	GND	Ground
14	3.3VIN	POWER	+3.3V Power Input
15	P0.11	I/O	General purpose IO
16	P0.12	I/O	General purpose IO
17	P0.13	I/O	General purpose IO
18	P0.14	I/O	General purpose IO
19	SWCLK	I/O	SWD Clock
20	SWDIO	I/O	System reset (active low), SWD Data
21	GND	GND	Ground

Mounting GWBMD30

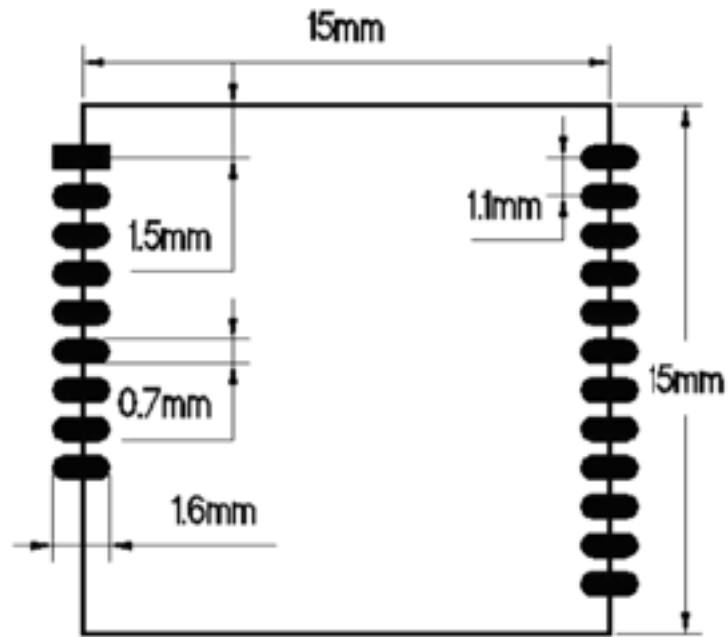
GWBMD30 is RF sensitive; in order to obtain the best performance, it is recommended to mount the module at corner of mother board, and with some marginal space.

Also, keep it away from metal components, such like speakers, transformers, batteries, big aluminium capacitors, heat sinks and Metal Panels.

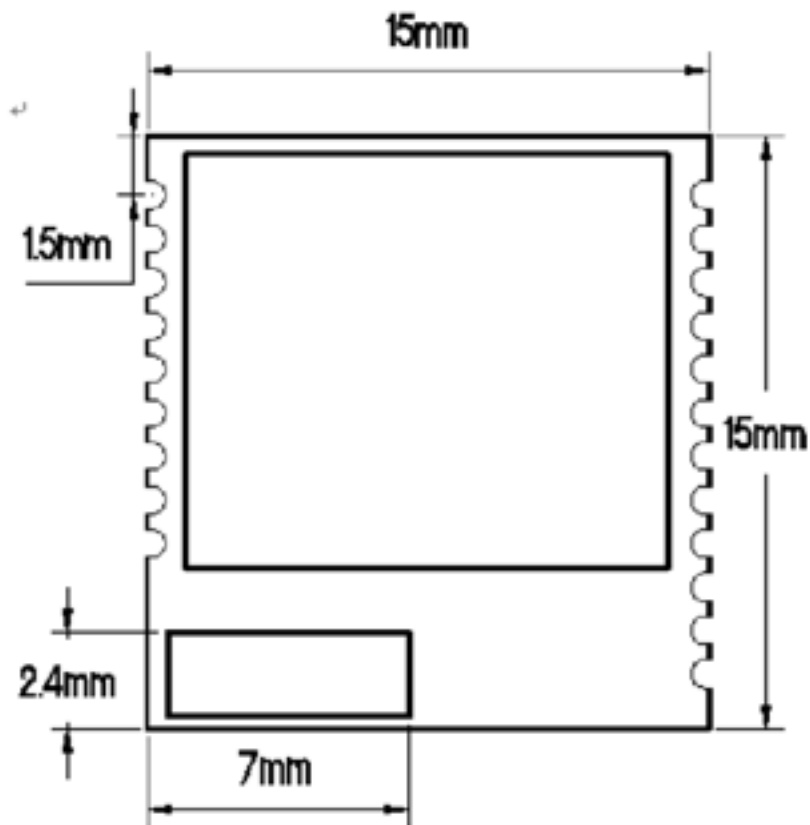
The figure below illustrates how to mount the GWBMD30 module. Improper mounting will decrease the RF performance dramatically.



Physical Dimension



PCB Land Pattern

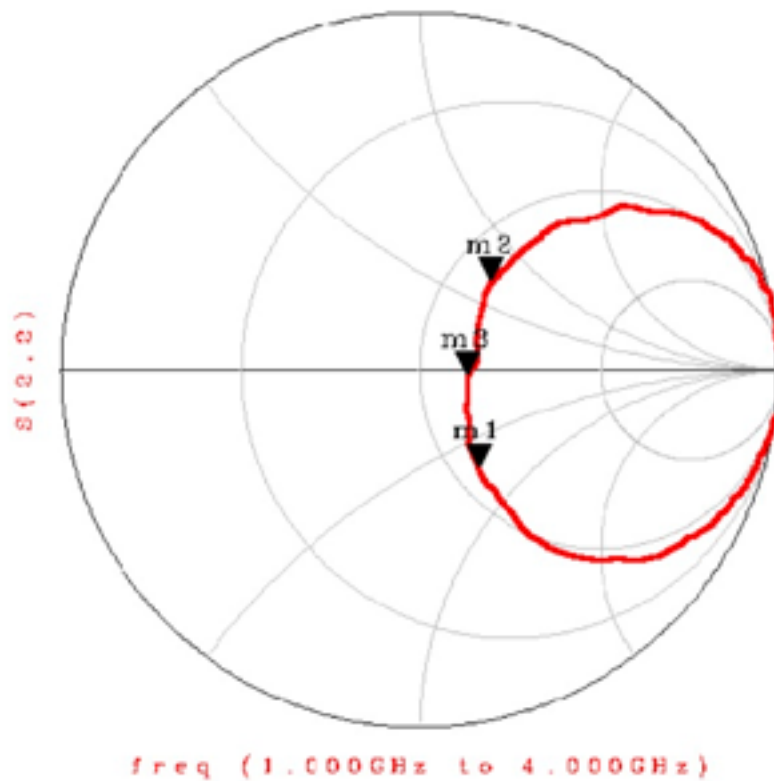
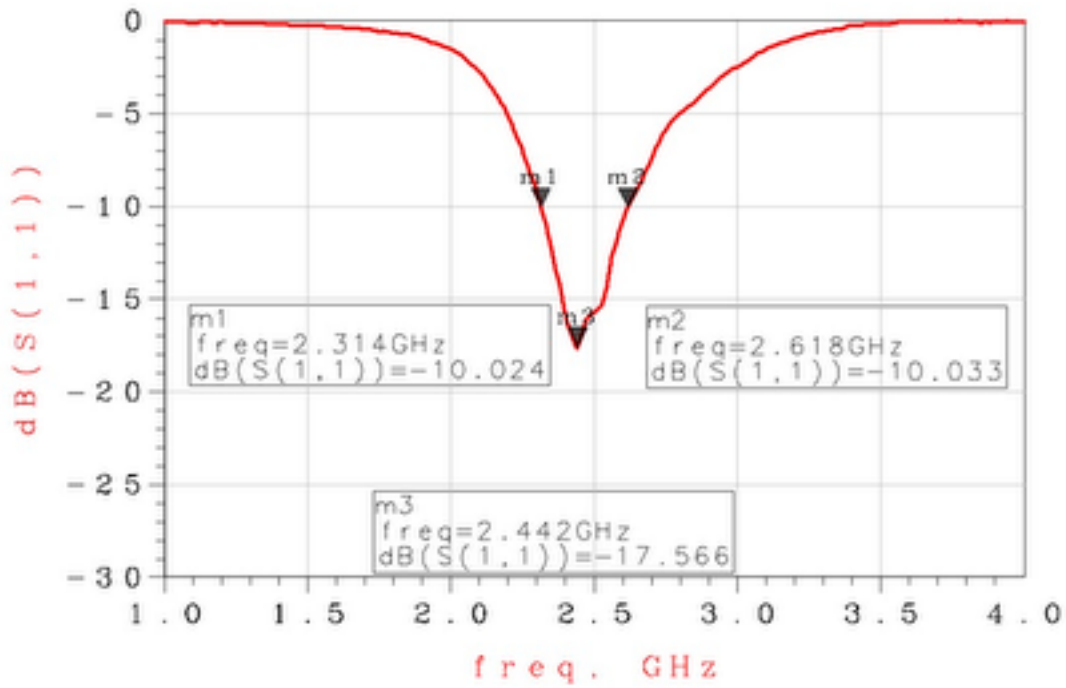


Dimension

Antenna characteristic

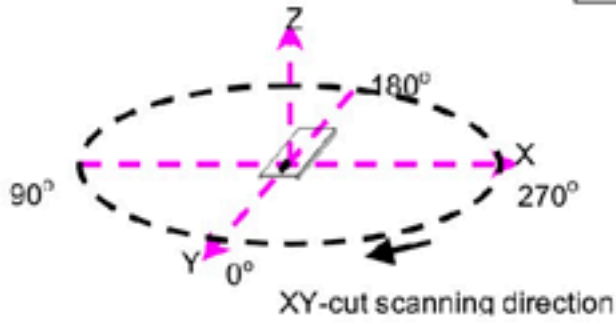
Frequency Range (MHz)	Peak Gain (dBi typ)	Average Gain (dBi typ)	VSWR	Impedance
2400-2500	2.0(XZ-V)	0.5(XZ-V)	2 max	50Ω

Return Loss

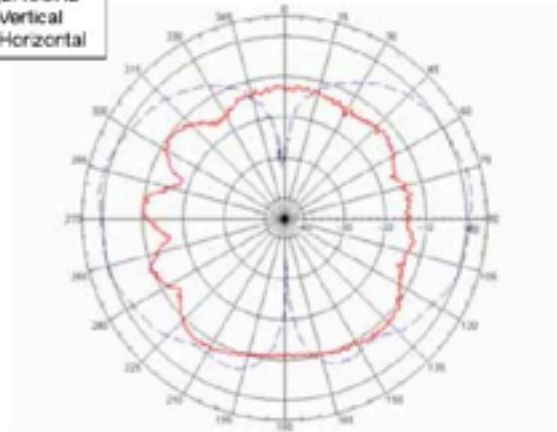


❖ Radiation Patterns

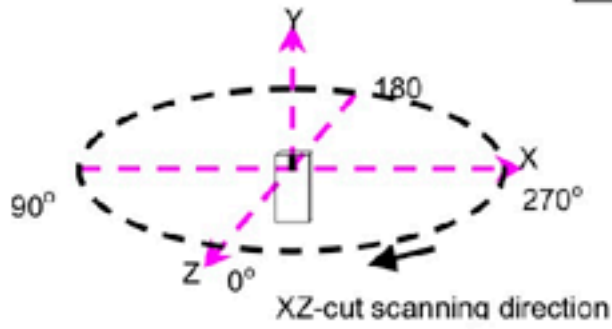
XY-V/XY-H



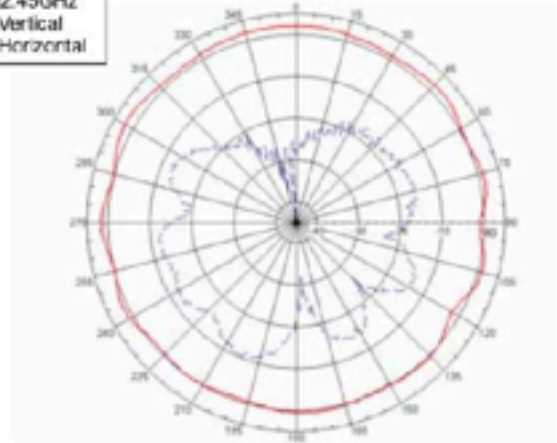
XY cut @2.45GHz
 — Vertical
 Horizontal



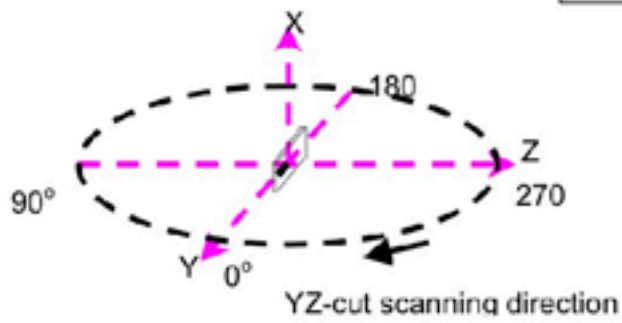
XZ-V/XZ-H



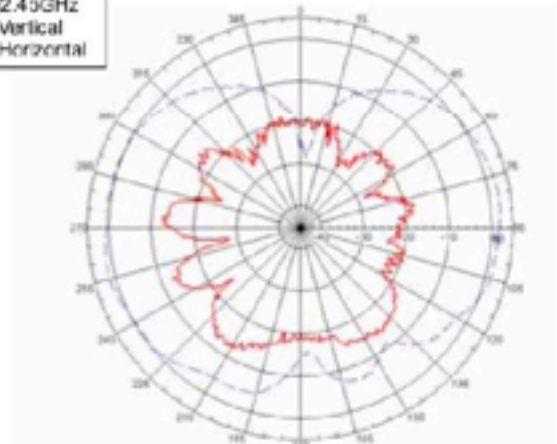
XZ cut @2.45GHz
 — Vertical
 Horizontal



YZ-V/YZ-H



YZ cut @2.45GHz
 — Vertical
 Horizontal

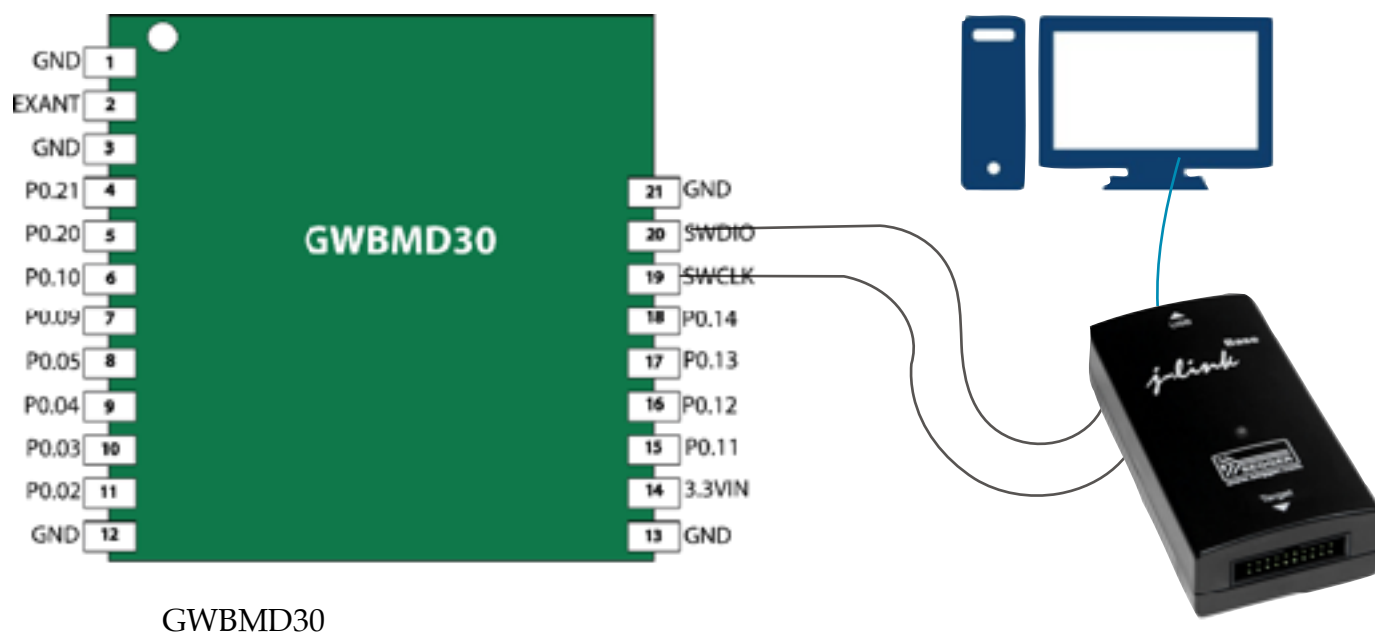


JTAG connection

Pin 4 (SWDCLK) and 5 (SWDIO) of GWBMD30 are JTAG interface for the purpose of firmware programming and real time debugging.

Segger J-Link adaptor from SEGGER Microcontroller (www.segger.com) is recommended for connecting GWBMD30 and computer.

It is also recommended to have a pin header on the mother board connecting to Pin4 and 5 of GWBMD30 for firmware upgrading and recovering purpose.



UART/SPI/I²C and GPIO

GWBMD30 module provides 12 General Purpose I/O (GPIO), which can be mapped to UART, SPI and I²C port by software. It provides high flexibility to engineer for different circuit layout requirement.

nRF52832

Nordic Semiconductor's nRF52832 is the core of GWBMD30 BLE module. nRF52832 is ARM[®] CortexTM-M4F core CPU, embedded with 2.4GHz RF and other functional blocks. Like other ARM Cortex M4 CPU, user can easily develop the source code by different tools. Through the software for the ARM core, user is able to control all the functional blocks.

BLE stack is not hard-coded in the nRF52832, instead, Nordic will provide the stack as SoftDevice for BLE, it provide high flexibility for the nRF52832 and also allow it compatible with the latest version of BLE, as long as the hardware is capable.

Software information

Firmware structure

As GWBMD30 is based on Nordic Semiconductor nRF52832, all firmware information for nRF52832 is also applicable to GWBMD30.

Firmware for GWBMD30 (or nRF52832) consists of two main components: SoftDevice and Application.

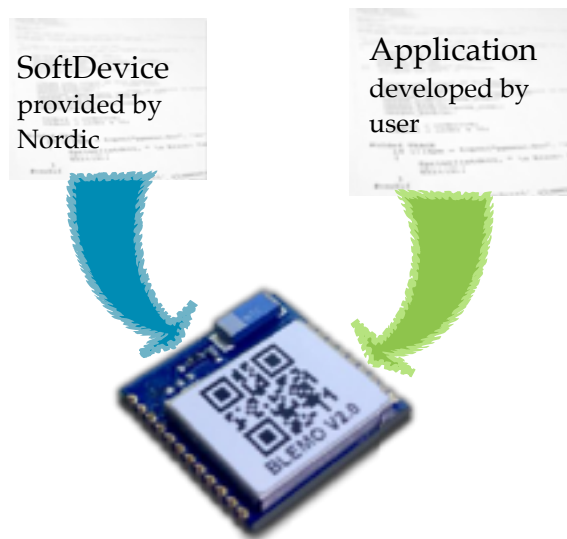
SoftDevice is provided by Nordic as a precompiled HEX file, and consists of different protocol stack solutions, providing a full API for controlling nRF52832. Different SoftDevices are available for nRF52832 as follows:

- S112: Bluetooth low energy peripheral protocol stack, Bluetooth 5.0 compliant, up to 4 connections
- S132: Bluetooth low energy Central and Peripheral protocol stack, Bluetooth 5.0 compliant, up to 20 connections
- S140: Bluetooth low energy Central and Peripheral protocol stack, Bluetooth 5.0 compliant, up to 20 connections
- S212: ANT™ protocol stack
- S332: Combined ANT™ and Bluetooth low energy (BLE) protocol stacks

Instead of hard code the protocol, the advantage of SoftDevice is the high flexibility, allowing the module can keep up with the latest BLE version. SoftDevice can be downloaded at Nordic web site (<https://www.nordicsemi.com>).

SoftDevice consumes a portion of nRF52832's RAM and flash memory, therefore, not 100% of RAM and flash memory can be allocated for application code purpose.

Application code is the application layer developed by user.



SDK

Nordic provides 4 types of SDK for nRF52832:

1. nRF5 SDK - General purpose SDK
2. nRF5 SDK for Mesh - SDK for developing Mesh network
3. nRF5 SDK for Thread and Zigbee - SDK for Thread and Zigbee protocols
4. nRF5 SDK for IoT - SDK for IoT purpose, including IPv6 feature

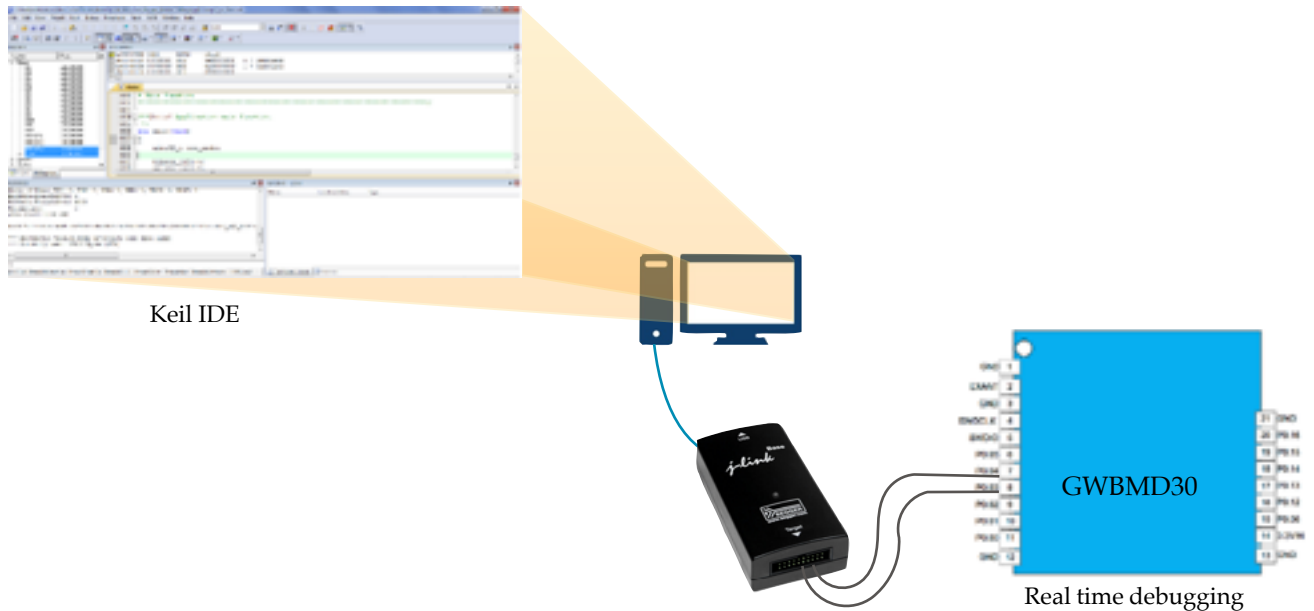
In order to obtain the SDK, please visit Nordic website and contact Nordic local offices.

Compile and debug

As the core GWBMD30 is ARM core, there are many different compilers available on the market, and here we just put some of them as an example.

On-line compiler

Free on-line compiler is provided by ARM® 's developer site. It is a comprehensive on-line tools



that allows user to build the application code on line for nRF52832. Once the code is compiled, user can then download the hex code and program into GWBMD30 module.

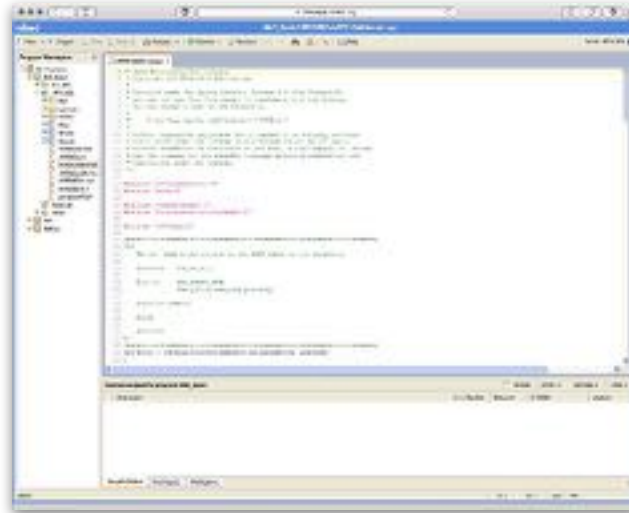
For more information, please refers to: <https://developer.mbed.org>

Real-time debugger is not possible when developer using on-line compiler. Developer needs to download the compiled code, together with the S110 SoftDevice into the module and test if it is operated as expected.

Integrated Development Environment (IDE)

There are different IDE available on the market, and here we take Keil's IDE (www.keil.com) as an example.

The IDE provides not only coding ability, but also firmware downloading and real-time debugging feature to firmware developer. A SEGGER JTAG adaptor is required for real-time debugging and firmware download.



Firmware programming

As mentioned above, the firmware can be download to the module through JTAG adaptor and Nordic nRFGo Studio software tool.

With appropriate boot loader loaded into the module through the JTAG adaptor and nRFGo Studio, the module can also support Over-the-Air programming (OTA), which allows the firmware to be upgraded over BLE connection. OTA is only possible for 256K version only.

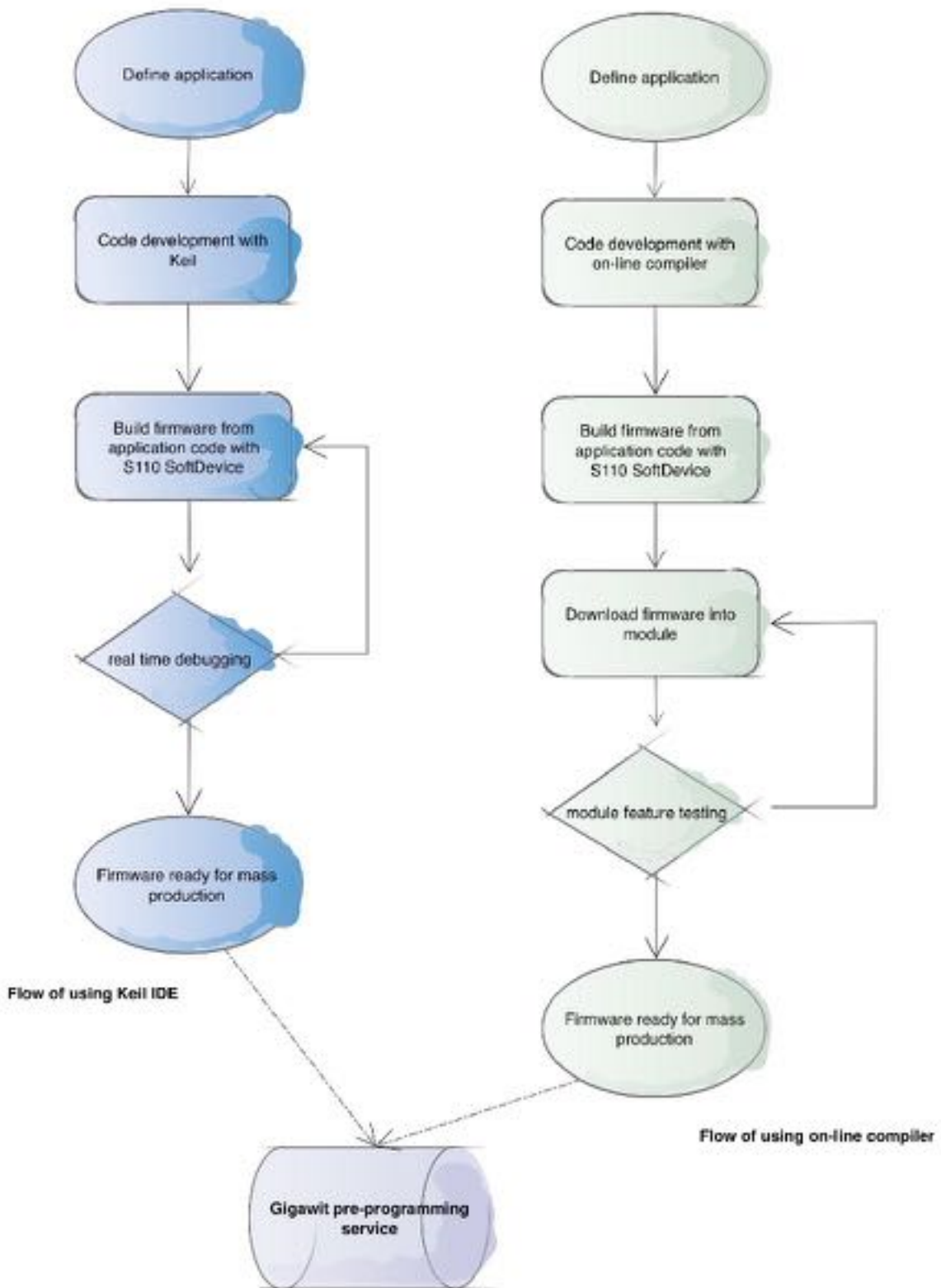
Firmware development service

Firmware develop service for GWBMD30 module, hence customer do not need to spend their resource on the BLE feature development. As our engineers are experts for Nordic nRF52832 chip, usually we can delivery customised firmware within a month.

We also provide firmware pre-programming service, where customer can submitted us the compiled code file, then we delivery the module with the file pre-programmed, so that customer can put the modules into their production line directly.

These services may require NRE charge. For the details, please contact our local sales representative or distributor.

Software development flow



Certification

Reference

BLE information:

Bluetooth® Developer Portal

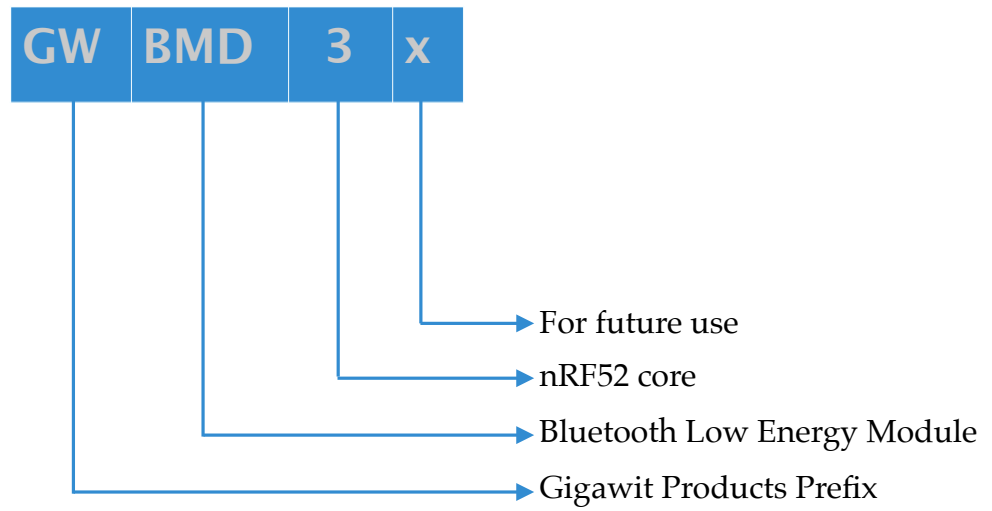
<http://developer.bluetooth.org/>

nRF52 Series Reference information:

[http://infocenter.nordicsemi.com/index.jsp?](http://infocenter.nordicsemi.com/index.jsp?topic=%2Fcom.nordic.infocenter.nrf52%2Fdita%2Fnrf52%2Fchips%2Fnrf52832_ps.html)

[topic=%2Fcom.nordic.infocenter.nrf52%2Fdita%2Fnrf52%2Fchips%2Fnrf52832_ps.html](http://infocenter.nordicsemi.com/index.jsp?topic=%2Fcom.nordic.infocenter.nrf52%2Fdita%2Fnrf52%2Fchips%2Fnrf52832_ps.html)

Ordering part number



Revision History

I.

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