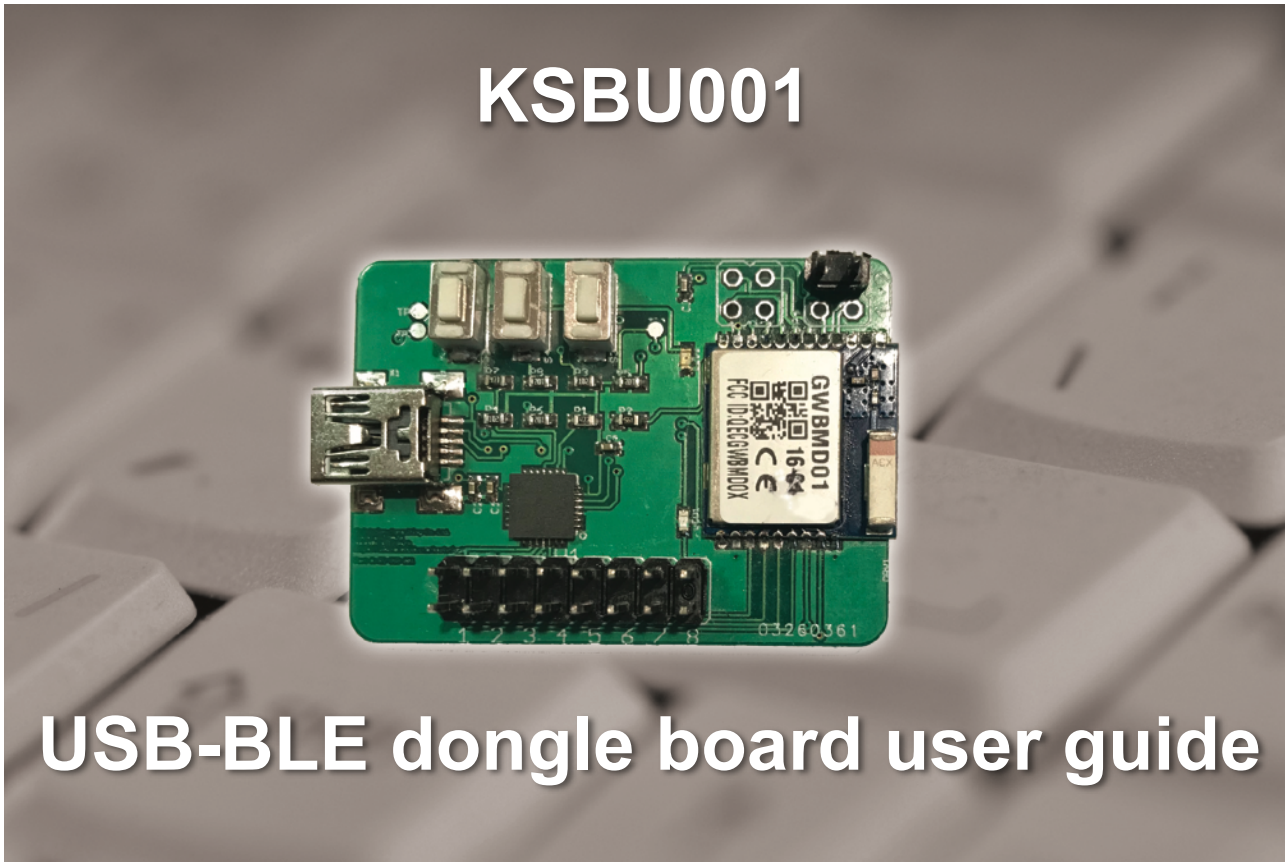
K-Solution Consulting Company Ltd.

KSBU001



USB-BLE dongle board user guide

version 1.0

Introduction

KSBU001 is an easy kit base on GWBMD0x BLE module. It provides a simple bridging solution between USB and BLE. The GWBMD0x has already embedded with our KAT firmware, which provides BLE-UART tunnelling with AT-Command as well. KSBU001 configured with GWBMD0x and Silicon Lab CP2012 USB-UART convertor chip, hence user can simply connect KSBU001 to PC's USB port and make the BLE connection.

Feature

- Base on GWBMD0x BLE module, which core is Nordic nRF51822
- AT-command mode (AT-CMD MODE) for configuration
- USB to BLE tunneling (TRANSPARENT MODE)
- Flexible for project development purpose
- BLE connection indication
- Auto sleep mode after 3 minutes without connection for saving power
- UART speed up to 115200bps
- Flow control support
- Default setting
  - Name: KSOL
  - BAUD: 9600,8,n,1

Basic structure

The block diagram of KSBU001 is as following:

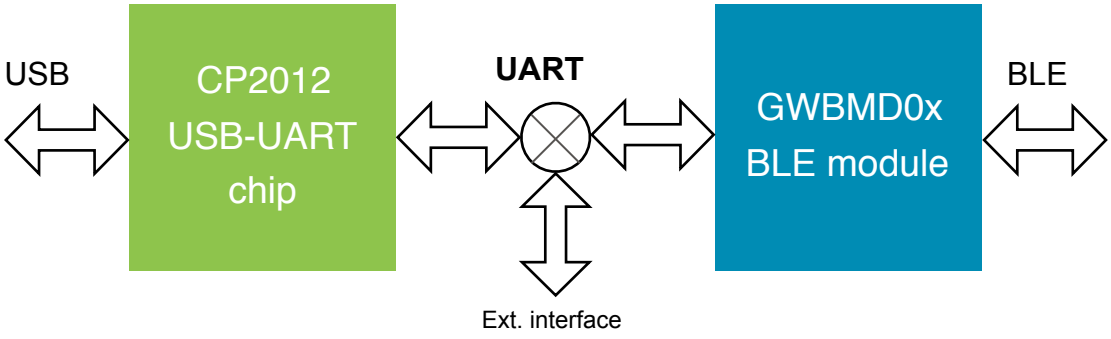
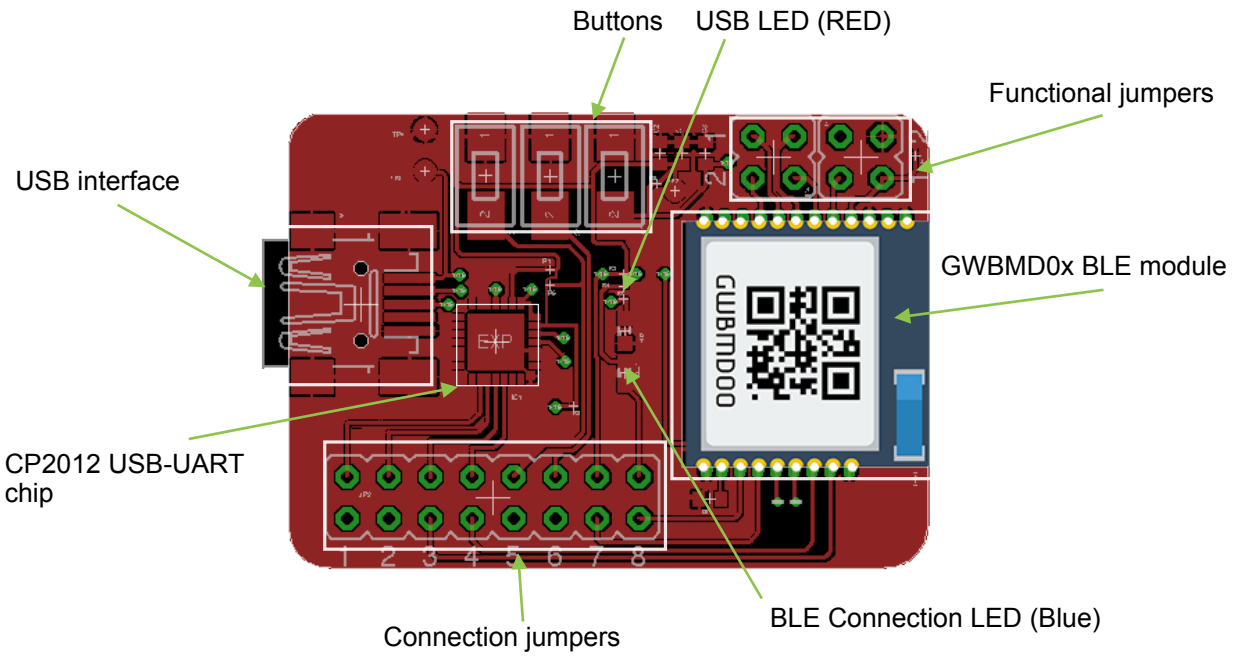


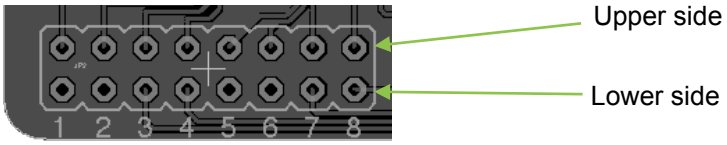
diagram 1: Basic block diagram

Board description

- The following is the KSBU001 board diagram



- Connection jumpers

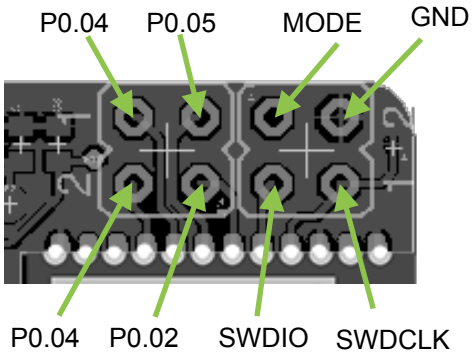


The pin of Connection jumpers is defined as following:

Pin	name	Description	Upper side connection	Lower side
1	CTS	UART flow control pin	CP2012 CTS pin	GWBMD0x CTS pin
2	RTS	UART flow control pin	CP2012 RTS pin	GWBMD0x RTS pin
3	TXD	UART Tx pin (from GWBMD0x)	CP2012 RXD pin	GWBMD0x Tx pin
4	RXD	UART Rx pin (from GWBMD0x)	CP2012 TXD pin	GWBMD0x Rx pin
5	BUT1	Push button 1	Push Button 1	GWBMD0x Button 1 pin
6	BUT0	Push button 0	Push Button 0	GWBMD0x Button 0 pin
7	MODE	Mode selection	Mode Jumper	GWBMD0x MODE_SEL pin
8	CONNECT	Connection indication	Connection LED	GWBMD0x BLE_CONNECT pin

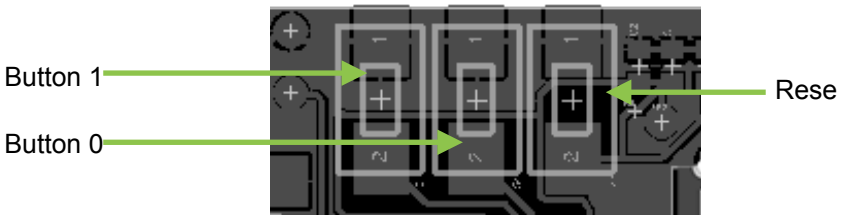
Connecting Upper and Lower side of Connection jumpers enables GWBMD0x to connect to CP2012 chip and external circuit. Users can also connect GWBMD0x to external circuit through lower side of Connection jumpers.

- Functional jumpers



SWDIO and SWDCLK pins are JTAG pins for firmware programming. User can program their own firmware into GWBMD0x through this interface.
MODE pin is connected to MODE pin of Connection jumpers. It is pulled high by default and drive the GWBMD0x into AT-CMD mode when reset. Connect this pin to the GND pin will drive the GWBMD0x to tunnelling mode after reset.
P0.02 to P0.05 pins connect to GWBMD0x as GPIO pins, which can be configured through AT-command.

- Buttons



The most left buttons is a RESET buttons, pressing this button will reset GWBMD0x module. The rest are Button 0 and Button 1. The function of Button 0 and 1 are as following:

Status	Advertising or scanning	Sleep	Connected
Button 0	Sleep	wake up	Disconnect (needs to hold for 2 sec)
Button 1	Turn off whitelist (needs to hold for 2 sec)	wake up and delete bond information, factory default value	N/A

diagram 2: MOD_SEL pin description

- LED

  USB LED (Red)

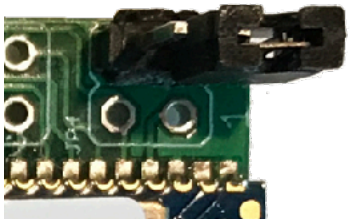
  This LED indicates USB connection with PC status. It will turn ON when the USB is succefully connected with PC.

  BLE Connection LED (Blue)

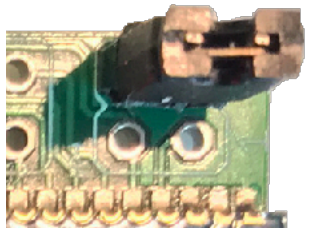
  When a BLE connection is successfully built, This LED will turn ON; otherwise, it will blink at 0.5Hz, 50% duty cycle. This LED is connected to BLE_Connect pin of GWBMD0x.

Operation mode

There are two operations modes for users: AT-CMD mode and Tunnelling mode. The mode is selected by MODE jumper. When the MODE jumper is open, GWBMD0x will enter AT-CMD mode after reset; and will enter Tunnelling mode if MODE jumper is shorted.

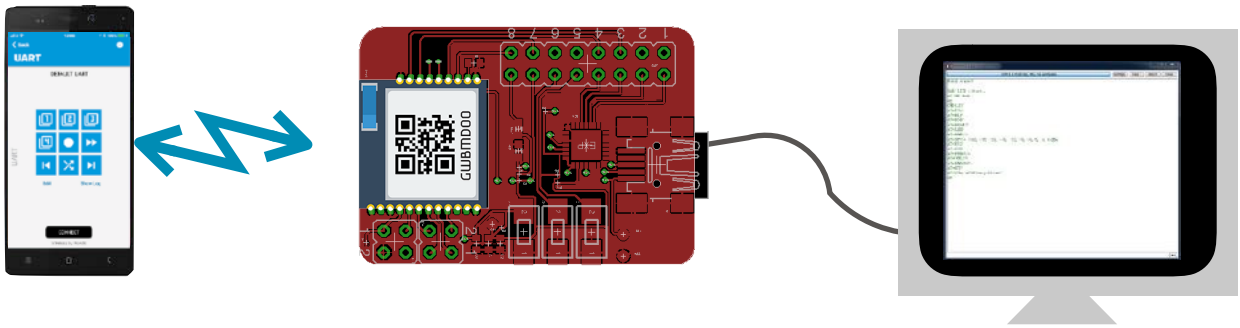


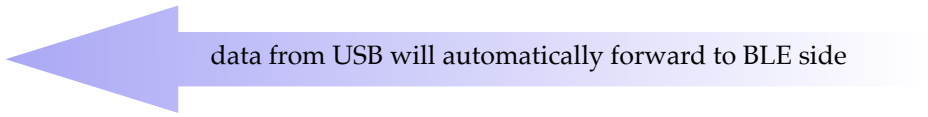
Open: AT-CMD mode



Closed: Tunnelling mode

Tunnelling mode:
Under this mode, GEBMD0x will act as bridge and data will be exchanged between USB (or UART port of GWBMD0x) after it is connected to a smart phone or tablet through BLE. Any data sent from USB before BLE connection will be ignored.



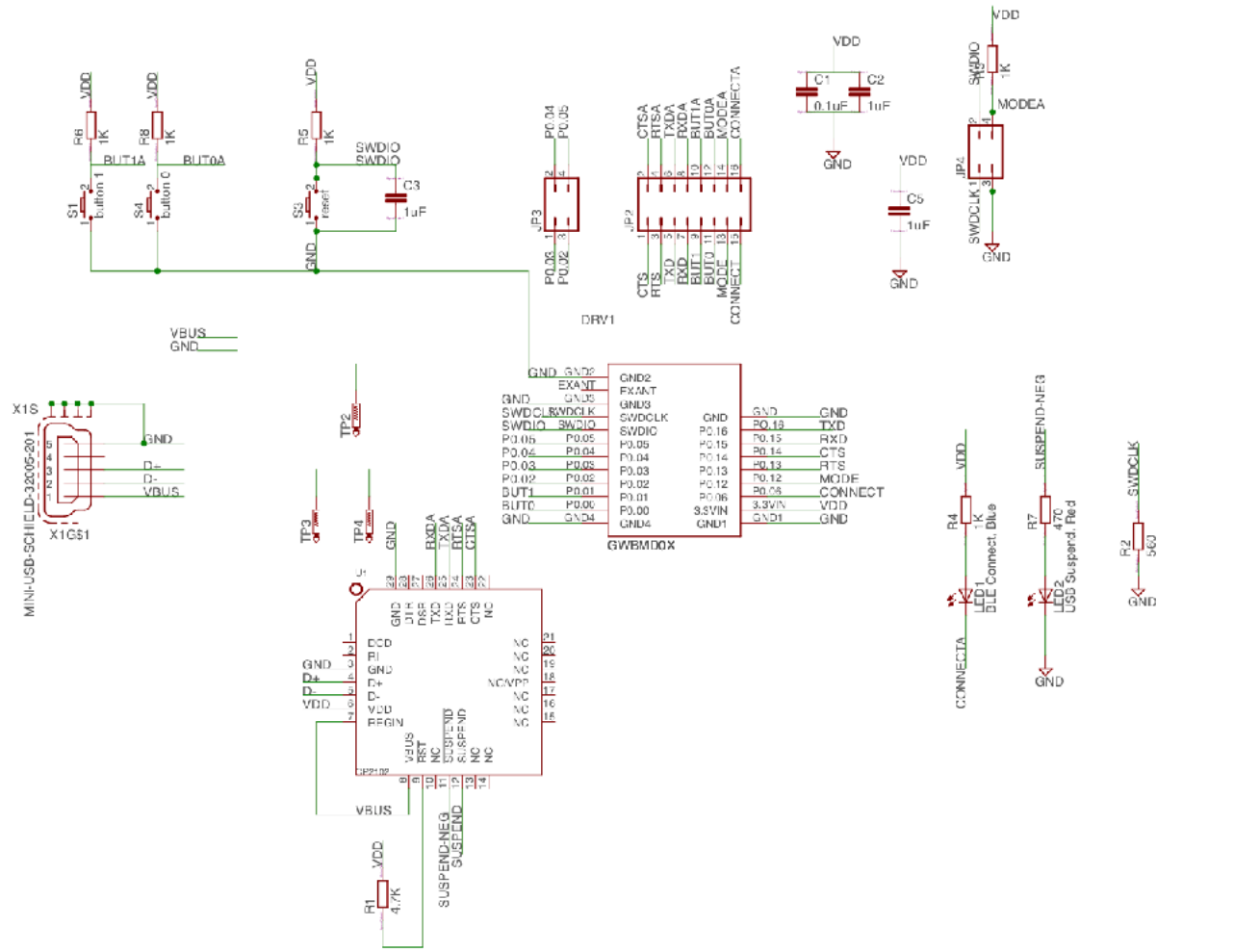


AT-CMD mode:

User can configure the GWBMD0x by using AT-Command. Beside configuration, user can also send and retrieve received data using AT-Command.

Below is AT-Command table:

	Action	enquiry	return value	set	return value
System	MAC addr	AT+ID?	Current address	AT+ID=ADDR	New ADDR if success,
	Help	AT+HELP	All AT commands		
	Reset	AT+RESET			
	Factory Default	AT+DEFAULT	- BAUD = 9600, TXP = 0, NAME = KSOL, Flow control disabled		
	Sleep mode	AT+SLEEP			
BLE	Change name	AT+NAME?	- current name Default:KSOL	AT+NAME= New name	
	Change PIN code	AT+PIN? (not available in 128K version)	Current PIN code	AT+PIN=New PIN AT+PIN=NULL	- new PIN //PIN MUST be 6 digit - disable PIN code
	TX power	AT+TXP ?	Current TX Power value	AT+TXP= new value value : -40, -30, -20, -16, -12, -8, -4, 0 and 4	- new value
	Start advertising	AT+BDCS			
	Stop advertising	AT+BDCE			
UART	BAUD rate	AT+SPEED?	Current baud	AT+SPEED=BAUD, BAUD = 2400, 4800, 9600, 14400, 19200, 28800, 38400, 57600, 115200	- New BAUD if success note: data byte, parity and stop bit are fixed at 8,N,1
	CTS, RTS control pin	AT+CTRL?	- 0 : disable - 1 : enable	AT+CTRL= 0/1	- 0: disable CTS, RTS (default) - 1: enable CTS, RTS
	Send Data			AT+SEND=DATA	- no return value if success DATA length must be less than or equal to 20 bytes
	Receive Data	AT+GET?	- DATA in received buffer - NULL if received buffer is empty		
GPIO	Set Port 0 GPIO as input			AT+DPIxx=y Set P0.xx as input pin xx: 00 to 31 y: 0 - no pull up; 1 - pull up enabled	- GPIO P0.xx SET INPUT w/NOPULL (or PULLUP) example: AT+DPI02=0: set Port 0.02 as input port, no internal pull up AT+DPI15 = 1: set P0.15 as input port, enable internal pull up
	Set Port 0 GPIO as output			AT+DPOxx=y Set P0.xx as output and the status is y xx: 00 to 31 y: 0 or 1	- GPIO P0.xx SET OUTPUT y example: AT+DPO02=0: set Port 0.02 as output port and the value is 0 AT+DPO15=1: set Port 0.15 as output port and the value is 1
	Get GPIO status (for input only)	AT+RPxx? xx: 00 to 31	- GPIO P0.xx IS 1 (or 0) example: AT+RP03: enquire the status of P0.03, return the value of that pin		

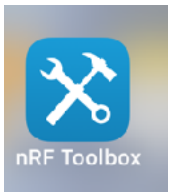


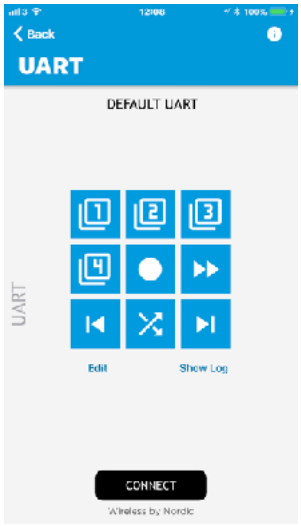
KSBU001 circuit diagram

GWBMD0x BLE module pin assignment

APP

It is recommended that nRF Toolbox APP from Nordic Semiconductor is used for BLE connection. Both iOS and Android are available on APP store. Click the “UART” in this APP to open the UART function for BLE connection and data transmission.

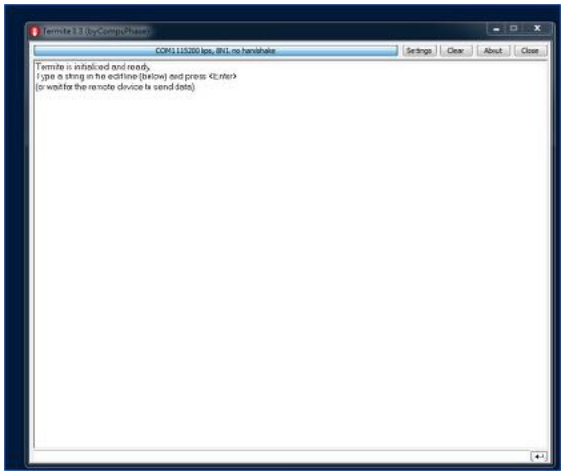


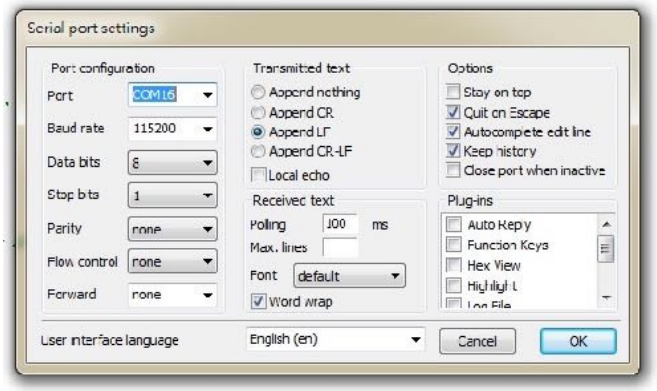


User can also use any other SPP (Serial Port Protocol) APP developed base on Nordic nRF51822 chip.

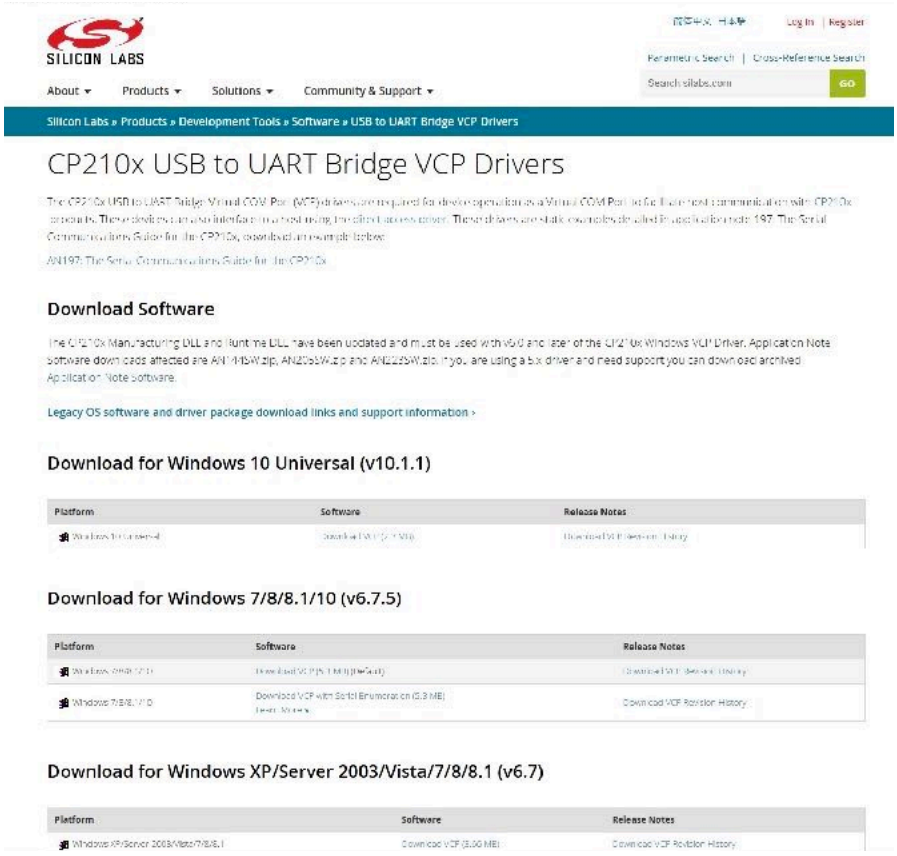
PC Terminal software and Driver

Typically, all serial terminal software are workable with KSBU001. We use Termite for our testing (Termite is a freeware from CompuPhase Inc.). In Termite, please select "Append LF" as LineFeed is a MUST for AT-Command.





CP2102 from Silicon LABS is used in KSBU001, hence user need to download the corresponding driver from Silicon LABS website.



Reference

1. Bluetooth SIG (https://www.bluetooth.com)
2. GWBMD0x datasheet (http://www.k-sol.com.hk/assets/gwbmd0x-datasheet-v2.12.pdf)
3. BLE module AT-command for GWBMD0x user guide (http://www.k-sol.com.hk/assets/at-command-user-guide-rev-1.5.pdf)
4. Nordic nRF5 SDK (http://infocenter.nordicsemi.com/topic/com.nordic.infocenter.sdk/PLUGINS_ROOT/com.nordic.infocenter.sdk5.v12.2.0/index.html)

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