

## 18th December 2017 Adding a Bluetooth module to the MINI VNA Tiny

The VNA module was ordered by AliExpress and arrived about two weeks later.



[[http://3.bp.blogspot.com/-3hBIRyZhu1I/WjeSzqE7VyI/AAAAAAAAAKFA/32S3bc3GIG8T4Mv7FIGMJSuJ6tqye6RcwCK4BGAYYCw/s1600/20171215\\_152658.jpg](http://3.bp.blogspot.com/-3hBIRyZhu1I/WjeSzqE7VyI/AAAAAAAAAKFA/32S3bc3GIG8T4Mv7FIGMJSuJ6tqye6RcwCK4BGAYYCw/s1600/20171215_152658.jpg)]

VNA Set includes a special case (well designed small plastic case), VNA, Calibration Set (0ohm, open, 50ohm), and 2 cables.



[[http://4.bp.blogspot.com/-wdIs7KUWnLw/WjeTQPvu3rI/AAAAAAAAAKFI/Es-Xrf9CkNk2bZ6EK-iNAlIkfU9zwIBbQCK4BGAYYCw/s1600/20171215\\_152741.jpg](http://4.bp.blogspot.com/-wdIs7KUWnLw/WjeTQPvu3rI/AAAAAAAAAKFI/Es-Xrf9CkNk2bZ6EK-iNAlIkfU9zwIBbQCK4BGAYYCw/s1600/20171215_152741.jpg)]

VNA as 2 RF Connector and 1 mini USB Connector.



[[http://4.bp.blogspot.com/-qliQZHsU6KA/WjeTbtgEBHI/AAAAAAAAKFU/8d-CF2JzPMUTn4FmbIR5YCMvA03T9nEwgCK4BGAYYCw/s1600/20171215\\_213421.jpg](http://4.bp.blogspot.com/-qliQZHsU6KA/WjeTbtgEBHI/AAAAAAAAKFU/8d-CF2JzPMUTn4FmbIR5YCMvA03T9nEwgCK4BGAYYCw/s1600/20171215_213421.jpg)]



[[http://3.bp.blogspot.com/-JFe4pe9Rplg/WjeTdQKEWuI/AAAAAAAAKFc/GLLzKUsdJVQsz\\_JeWdgFpWWzyd1a0Jc\\_wCK4BGAYYCw/s1600/20171215\\_213449.jpg](http://3.bp.blogspot.com/-JFe4pe9Rplg/WjeTdQKEWuI/AAAAAAAAKFc/GLLzKUsdJVQsz_JeWdgFpWWzyd1a0Jc_wCK4BGAYYCw/s1600/20171215_213449.jpg)]

I tried simple test about function of VNA with computer, It worked perfectly.

And...then..  
of course, I opened the cover!

(I easily found the hidden screw below sticker)



[http://3.bp.blogspot.com/-Aqr-u7EqxyE/WjeT4ygecal/AAAAAAAAAKFk/ZHCi0INMVZ8mHe6P9z\_aQTmzjZ8z197uACK4BGAYYCw/s1600/20171215\_214259.jpg]



[http://3.bp.blogspot.com/-HC-jMs8rm9E/WjeUvO7xmVI/AAAAAAAAAKFw/TBPYq5cPj4YykBNyUmi7FEX83C0mnmN1ACK4BGAYYCw/s1600/20171215\_214443.jpg]



[http://2.bp.blogspot.com/-s\_t510kHKLE/WjeUzD30chl/AAAAAAAAAKF4/1uwH8vJ3YZgvXgeiYwC\_FNZ\_\_PcB86vzgCK4BGAYYCw/s1600/20171215\_214821.jpg]

(Main controller is ATMEGA32A4U)

[http://www.atmel.com/images/Atmel-8069-8-and-16-bit-AVR-AMEGA-A4-Microcontrollers\\_Datasheet.pdf](http://www.atmel.com/images/Atmel-8069-8-and-16-bit-AVR-AMEGA-A4-Microcontrollers_Datasheet.pdf)

The FTDI (TTL To USB - FT230XS) Chip show in upper pictuers.

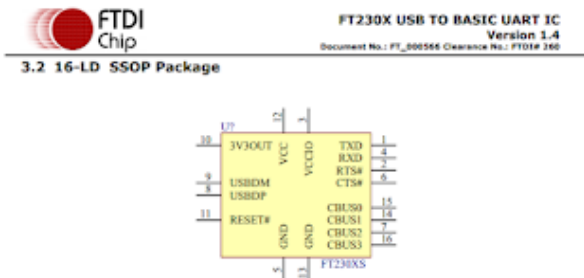


Figure 3.2 SSOP Schematic Symbol

[<http://1.bp.blogspot.com/-KJyfCRgv1jE/WjeWLwVAAAnI/AAAAAAAAAKGE/IAUqUc2Zq8YzefAYydBpiv5b8itWMPXrwCK4BGAYYCw/s1600/%25EC%259D%25B4%25EB%25AF%25B8%25EC%25A7%2580%2B1.png>]  
[http://www.ftdichip.com/Support/Documents/DataSheets/ICs/DS\\_FT230X.pdf](http://www.ftdichip.com/Support/Documents/DataSheets/ICs/DS_FT230X.pdf)

The FTDI chip makes the effort to transfer the UART signal from the main controller(AT Mega) to the computer (USB Port).

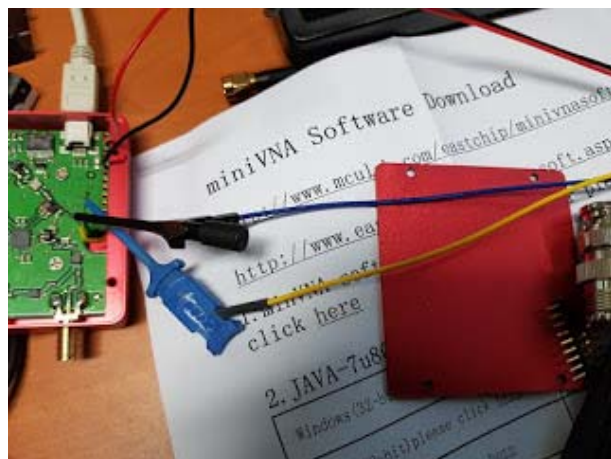
The Bluetooth module can be connected to the UART.

Solder the RX and TX wires as shown below.



[[http://4.bp.blogspot.com/-2SscyP964h8/WjeW-Pluz\\_I/AAAAAAAAAKGQ/vpCM7VpJA48VWcxnC-e3\\_FLe8gGk3YxfgCK4BGAYYCw/s1600/20171216\\_110957.jpg](http://4.bp.blogspot.com/-2SscyP964h8/WjeW-Pluz_I/AAAAAAAAAKGQ/vpCM7VpJA48VWcxnC-e3_FLe8gGk3YxfgCK4BGAYYCw/s1600/20171216_110957.jpg)]

And after mounting the PCB, I tested it with a logic analyzer.



[<http://1.bp.blogspot.com/-t087-LSKOw4/WjeXYpR1u->

[IAAAAAAAKGY/pNy3Bdc7hvQhyW\\_7IKgFCduWfOXwa74egCK4BGAYYCw/s1600/20171216\\_140824.jpg](http://1.bp.blogspot.com/-t087-LSKOw4/WjeXYpR1u-IAAAAAAAKGY/pNy3Bdc7hvQhyW_7IKgFCduWfOXwa74egCK4BGAYYCw/s1600/20171216_140824.jpg)]

The logic analyzer measurement result confirmed that it is communicating at the speed of 921600.

My Bluetooth module is about \$ 3, so I checked the manual and confirmed that it supports 921600 speed.

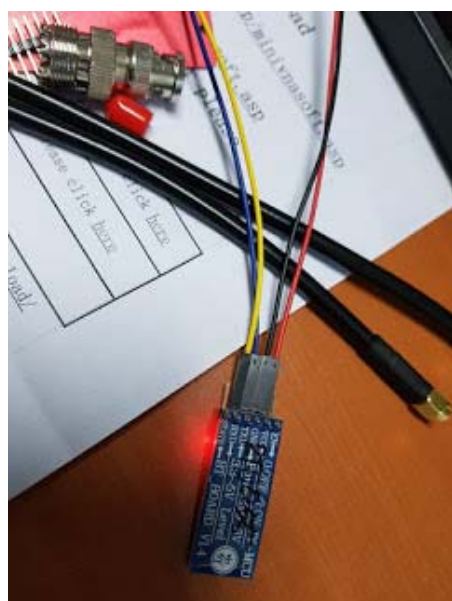
<http://www.martyncurrey.com/hc-06-zg-b23090w-bluetooth-2-0-edr-modules/>

Note that the settings differ for each Bluetooth module.!!!

The HC-06 I have set the baud rate and bluetooth name by the following command.

AT+BAUDB

AT+NAMECEC\_VNA



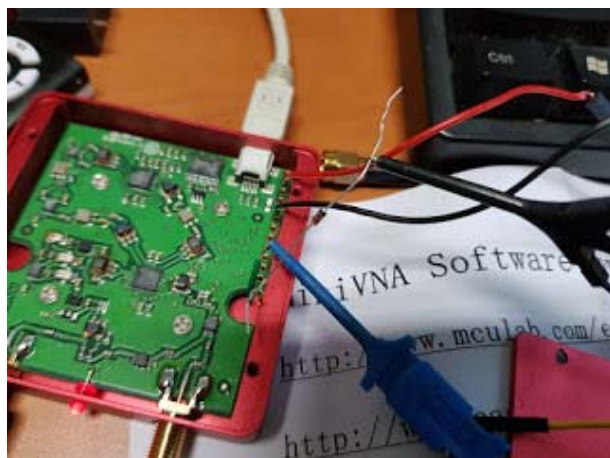
[<http://1.bp.blogspot.com/-2sOqSiP2BAQ/WjeZROoPmNI/AAAAAAAKGk>

[/9\\_9eK370fKcdZ3Azp1pt3ESlaQD3dFGoACK4BGAYYCw/s1600/20171216\\_140841.jpg](http://1.bp.blogspot.com/-2sOqSiP2BAQ/WjeZROoPmNI/AAAAAAAKGk/9_9eK370fKcdZ3Azp1pt3ESlaQD3dFGoACK4BGAYYCw/s1600/20171216_140841.jpg)]

I installed Blue VNA on my smartphone and experimented. and it worked perfectly.

I connected the VNA module to the PC while the Bluetooth module was connected, Communication between the PC and the VNA was not normal and the A mark displayed. When the Bluetooth module is removed, it communicated normally again.

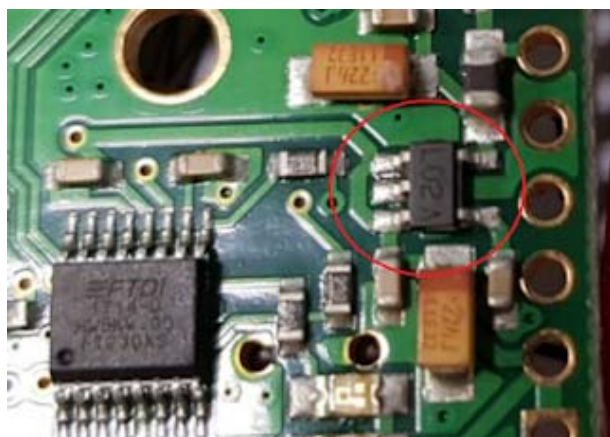
I thought it was the signal interference by the Bluetooth module and I decided to install the diode as below.



[[http://3.bp.blogspot.com/-2cGW12UYibE/WjeabOW90sI/AAAAAAAAAKGw/rP9Zf2KTh3wTe4DbDsC1\\_ephp-1OFfz0QCK4BGAYYCw/s1600/20171216\\_142506.jpg](http://3.bp.blogspot.com/-2cGW12UYibE/WjeabOW90sI/AAAAAAAAAKGw/rP9Zf2KTh3wTe4DbDsC1_ephp-1OFfz0QCK4BGAYYCw/s1600/20171216_142506.jpg)]

It worked perfectly. Perhaps the diodes would be okay for signaling. i use 1N4148.

My bluetooth module need 5Volt power supply, so I connected it as shown in the picture above. If your module requires 3.3Volt power, You can use the regulator on the back of the PCB. (Marked L02A)



[[http://2.bp.blogspot.com/-HfyVpvNfwuk/WjebuRpjCPI/AAAAAAAAAKG8/TJOWO5hWRaEuiJxgRCez15hYOBxDY\\_\\_wCK4BGAYYCw/s1600/%25EC%259D%25B4%25EB%25AF%25B8%25EC%25A7%2580%2B2.png](http://2.bp.blogspot.com/-HfyVpvNfwuk/WjebuRpjCPI/AAAAAAAAAKG8/TJOWO5hWRaEuiJxgRCez15hYOBxDY__wCK4BGAYYCw/s1600/%25EC%259D%25B4%25EB%25AF%25B8%25EC%25A7%2580%2B2.png)]  
<http://instrumentation.obs.carnegiescience.edu/ccd/parts/LP2980.pdf>

I supplied power to the blouses module as shown below. The green wire and the yellow wire with the diode are RX and TX lines.



[[http://1.bp.blogspot.com/-F9ui6mWonps/WjecTpltffI/AAAAAAAAAKHI/1-Tt6yI71M8m86yD1UfE\\_1DHNkvcKgk\\_ACK4BGAYYCw/s1600/20171216\\_144349.jpg](http://1.bp.blogspot.com/-F9ui6mWonps/WjecTpltffI/AAAAAAAAAKHI/1-Tt6yI71M8m86yD1UfE_1DHNkvcKgk_ACK4BGAYYCw/s1600/20171216_144349.jpg)]



[[http://1.bp.blogspot.com/-u8eSdWOUcYo/WjedGR6KzLI/AAAAAAAAAKHU/SCSZNzxaF34-xu5YRJUTyNSv4nsXMLN0QCK4BGAYYCw/s1600/20171216\\_144810.jpg](http://1.bp.blogspot.com/-u8eSdWOUcYo/WjedGR6KzLI/AAAAAAAAAKHU/SCSZNzxaF34-xu5YRJUTyNSv4nsXMLN0QCK4BGAYYCw/s1600/20171216_144810.jpg)]



[[http://3.bp.blogspot.com/-qUj-XRgzBGk/WjedLMqJm3I/AAAAAAAAAKHc/kTPlEh2yrlZaPBF1dUxXFdYwOEzJAxfwCK4BGAYYCw/s1600/20171216\\_145549.jpg](http://3.bp.blogspot.com/-qUj-XRgzBGk/WjedLMqJm3I/AAAAAAAAAKHc/kTPlEh2yrlZaPBF1dUxXFdYwOEzJAxfwCK4BGAYYCw/s1600/20171216_145549.jpg)]

If you can, connect the antenna of the Bluetooth module as shown below. (you can use any line.) If you want, you can disconnect the internal antenna (use shape knife!) and calculate the wavelength of 2.4Ghz.



[[http://2.bp.blogspot.com/-mOZWZkdbT9U/WjedPuhSwHI/AAAAAAAAAKHk/SHE9yXpQ\\_LQJx5iRe6LIJ\\_2HN5NwjQheACK4BGAYYCw/s1600/20171216\\_151720.jpg](http://2.bp.blogspot.com/-mOZWZkdbT9U/WjedPuhSwHI/AAAAAAAAAKHk/SHE9yXpQ_LQJx5iRe6LIJ_2HN5NwjQheACK4BGAYYCw/s1600/20171216_151720.jpg)]

closed the cover, and Completed!!!





[[http://3.bp.blogspot.com/-Oha5JyR4tQE/WjedcBHRqpl/AAAAAAAAAKHs/YvBrevjoyT8wqAiR3sb\\_w0gXL7Q0xt7uwCK4BGAYYCw/s1600/20171216\\_155541.jpg](http://3.bp.blogspot.com/-Oha5JyR4tQE/WjedcBHRqpl/AAAAAAAAAKHs/YvBrevjoyT8wqAiR3sb_w0gXL7Q0xt7uwCK4BGAYYCw/s1600/20171216_155541.jpg)]

### And Calibration



### Test Helical Antenna with Android Tablet



It worked perfectly!  
So let's experiment how far from the communication it is.



It was possible to use at a distance of more than 50m!



[[http://3.bp.blogspot.com/-BTm7fQ3ySsQ/Wjeg-x-CMjI/AAAAAAAAKH4/oHZQfL9EIQAS1kiOSc3SRlrXypH36Cs1wCK4BGAYYCw/s1600/20171216\\_164034.jpg](http://3.bp.blogspot.com/-BTm7fQ3ySsQ/Wjeg-x-CMjI/AAAAAAAAKH4/oHZQfL9EIQAS1kiOSc3SRlrXypH36Cs1wCK4BGAYYCw/s1600/20171216_164034.jpg)]

The Bluetooth module was completely hidden !!

Bests 73  
KD8CEC

Posted 18th December 2017 by [Ian Lee](#)

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