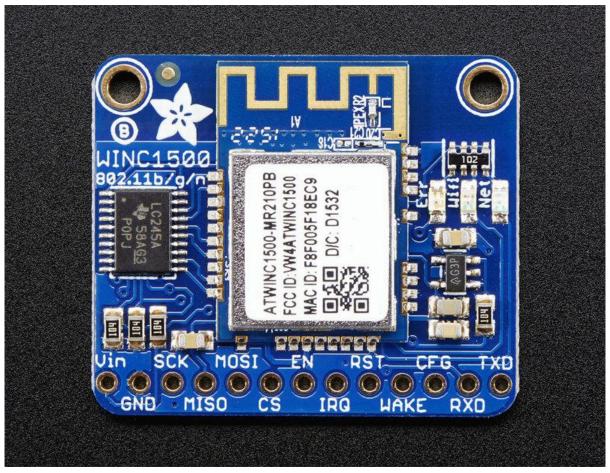


## Adafruit ATWINC1500 WiFi Breakout

Created by lady ada



https://learn.adafruit.com/adafruit-atwinc1500-wifi-module-breakout

Last updated on 2021-11-15 06:37:27 PM EST

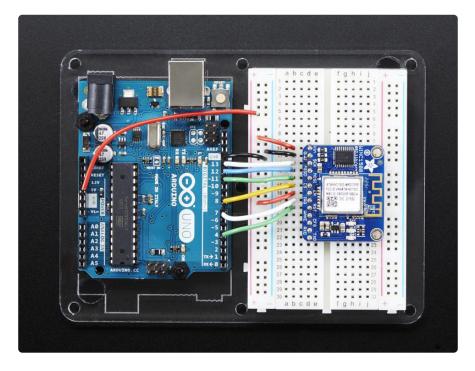
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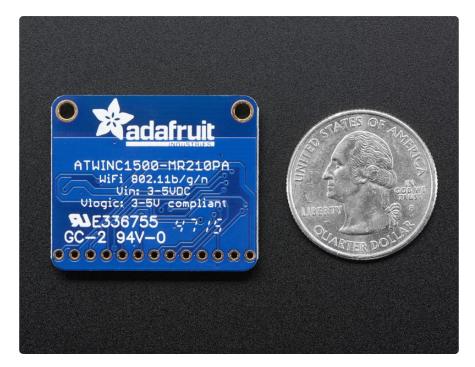
#### Overview



Connect your Arduino to the Internet with this fine new FCC-certified WiFi module from Atmel. This 802.11bgn-capable WiFi module is the best new thing for networking your devices, with SSL support and rock solid performance - running our adafruit.io MQTT demo for a full weekend straight with no hiccups (it would have run longer but we had to go to work, so we unplugged it). We like these so much, they've completely replaced the CC3000 module on all our projects.

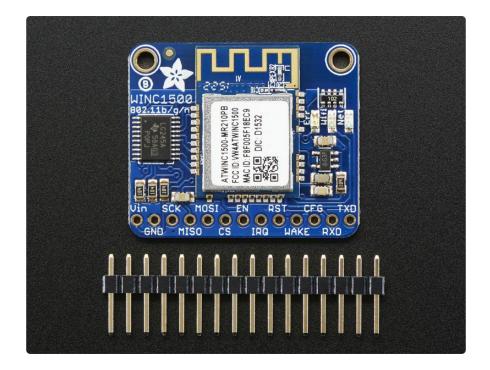


The ATWINC1500 uses SPI to communicate, so with about 5 or 6 wires, you can get your wired up and ready to go. Right now the Atmel-supplied library works great with Arduino M0 & M4, but won't work with 328P, or 32u4 and may not work on other Arduinos. You can clock it as fast as 12MHz for speedy, reliable packet streaming. Communication is done through the standard Client & Server interface so all your Ethernet & older WiFi code is easy to adapt. Scanning/connecting to networks is very fast, a few seconds.



This module works with 802.11b, g, or n networks & supports WEP, WPA and WPA2 encryption. The datasheet says it can do Soft-AP mode but we don't have any code to actually use that.

Since this is our new favoritest SPI-protocol WiFi module we've decided to make a little breakout for it. The breakout comes with level shifting on all the input pins so you can use it with 3V or 5V logic. A 3.3V voltage regulator that can handle the 300mA spikes lets you power from 3-5.5VDC. There's also 3 LEDs that you can control over the SPI interface (part of the library code) or you can have controlled by the Arduino library. They'll light up when connected to an SSID, or transmitting data.



Comes with a stick of header you can solder on, to plug into a breadboard and a set of tutorials & code so you can follow along!

### Pinouts



The ATWINC1500 module does have a bunch of pins, but they're pretty easy to understand. Lets check it out!

### **Power Pins**

- Vin this is the power-in pin. Connect to 3.3 5.5VDC
   The wifi module can draw up to 300mA during transmit (for small blips of time)
   So make sure that your power supply can supply it.
- GND ground for signal and power

### SPI Pins

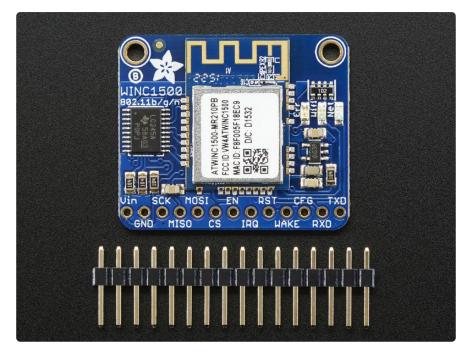
This is how you send and receive data from the module

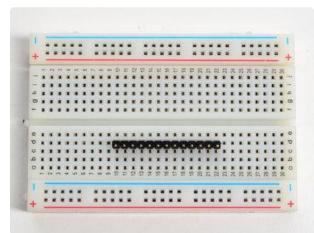
- SCK SPI clock input, 3V or 5V compliant
- MISO SPI data out from module, 3.3V line level
- MOSI SPI data into module, 3V or 5V compliant
- CS SPI chip select, pull down when transmitting to/from the ATWINC. By default this is pulled to Vin with a 100K resistor

#### Other SPI Interface Pins

- EN Enables the entire module, by default tied low with a 100K resistor. Tie to 3-5V to keep the module on all the time, connect to a ground signal to disable the module
- IRQ Interrupts from the module, connect to your microcontroller's INT input line. 3.3V logic level
- RST Module reset, by default tied low with a 100K resistor. Pull high to bring out of reset.
- Wake wake input signal, used to wake up the module (not used in existing code, but available if you can figure it out!) 3-5V logic in
- CFG allows you to select between SPI (default) or UART data transport. Since we don't have any UART code, keep disconnected
- RXD/TXD UART data transport pins. Since we don't have any UART code, keep disconnected

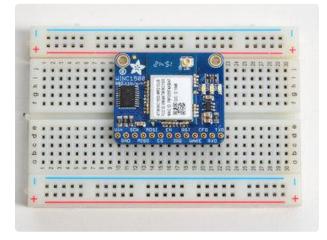
### Assembly





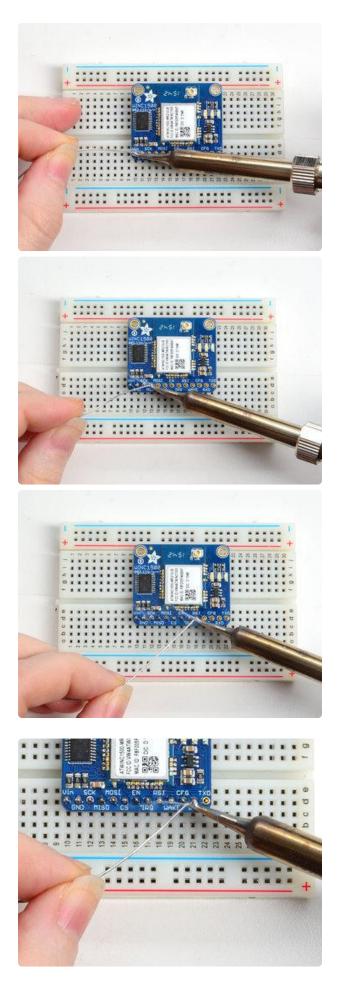
#### Prepare the header strip:

Cut the strip to length if necessary. It will be easier to solder if you insert it into a breadboard - long pins down



#### Add the breakout board:

Place the breakout board over the pins so that the short pins poke through the breakout pads



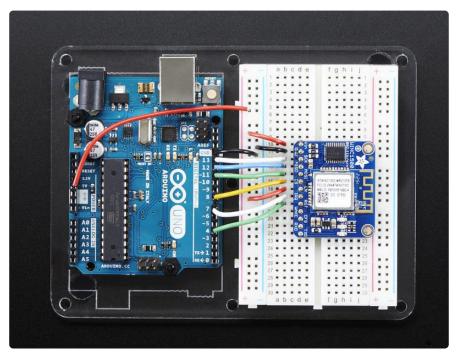
And Solder! Be sure to solder all pins for reliable electrical contact.

(For tips on soldering, be sure to check out our Guide to Excellent Soldering (https://adafru.it/aTk)).



You're done! Check your solder joints visually and continue onto the next steps

# Wiring & Test



For this initial demo we'll be using an Arduino UNO to connect. You can also use an Arduino Zero, but you'll have to use the ICSP 6-pin header not pins 11,12,13

- Vin connect this to 3.3V or 5V, whichever is the logic voltage of the microcontroller you're using. For UNO this will be 5V, for Zero its 3.3V
- GND connect to common ground
- SCK Connect to SPI clock. On UNO this is pin #13 on Zero its on the <u>6-pin ISP</u> header (https://adafru.it/iCE)
- MISO Connect to SPI MISO. On UNO this is pin #12 on Zero its on the <u>6-pin ISP</u> header (https://adafru.it/iCE)
- MOSI Connect to SPI MOSI. On UNO this is pin #11 on Zero its on the <u>6-pin ISP</u> header (https://adafru.it/iCE)

For the remaining pins, you can be a little flexible:

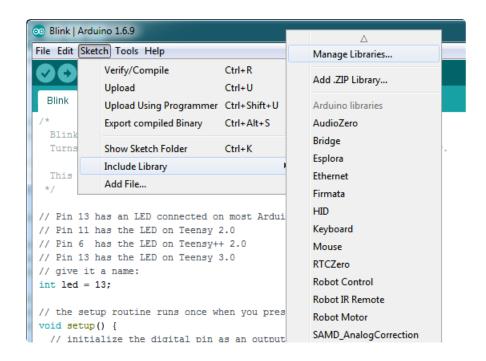
- CS Connect to any digital I/O pin, we use #8 by default
- EN connect this to 3.3V or 5V, whichever is the logic voltage of the microcontroller you're using. For UNO this will be 5V, for Zero its 3.3V; later on if you want to enable/disable the module, connect it to a digial I/O pin
- IRQ Connect to any digital I/O pin, preferrably one with an interrupt capability. We use #7 by default
- RST Connect to any digital I/O pin. We use #4 by default

You can change these pins later but for now use them, so you can verify your setup!

### Install the Library

We will start by installing the official Arduino WiFi101 library (https://adafru.it/kUF).

We want the latest version so visit the Library Manager



Type in wifi101 and when the library comes up, click Install or Update to make sure its the most recent one!

If you're not familiar with installing Arduino libraries, please visit our tutorial: <u>All About</u> Arduino Libraries (https://adafru.it/aYM)!

Restart the Arduino IDE.

Use the very latest version of the Arduino IDE!

#### **Check Connections & Version**

Before we start, its important to verify you have the right setup & firmware version.

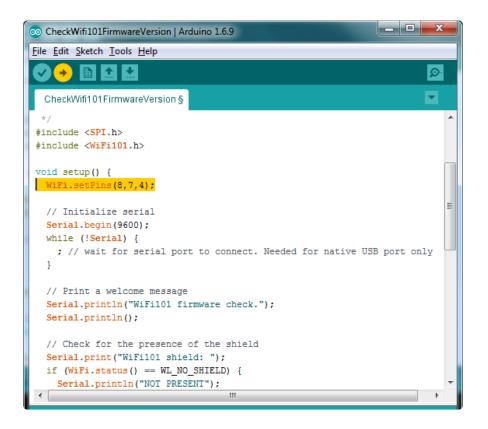
Load up the WiFi101->CheckWifi101Firmware sketch

				-		
💿 Bli	nk   Arduino	1.6.9		RTClib	•	
File E	Edit Sketch	Tools Help		RTCZero	•	
	New	Ctrl+N		SAMD_AnalogCorrection	•	
	Open	Ctrl+O		SPI	•	
	Open Recent			Temboo	•	
	Sketchbook			TinyWireM	•	
	Examples	1		USBHost	•	. 13
	Close	Ctrl+W	•	WiFi101		AP_SimpleWebServer
	Save	Ctrl+S		Wire		CheckWifi101FirmwareVersion
	Save As	Ctrl+Shift+S		RETIRED	1	ConnectNoEncryption
	Page Setup	Ctrl+Shift+P		Examples from Custom Libraries		ConnectWithWEP
	Print					ConnectWithWPA
	Print	Ctrl+P		AccelStepper	]	FirmwareUpdater
	Preferences	Ctrl+Comma		Adafruit BME680 Library	1	MDNS WiFiWebSenver

Note that to use the official Arduino WiFi101 Library, we must configure it to use the pins specific to the ATWINC1500 Breakout. With each example sketch, you'll need to add WiFi.setPins(8,7,4); to the top of the setup function, before WiFi.status() is called.

//Configure pins for Adafruit ATWINC1500 Breakout
WiFi.setPins(8,7,4);

Like so:



Upload to your Arduino and open up the Serial Console at 9600 baud:

👓 COM220 (Arduino/Genuino Uno)	l	<u> </u>
		Send
WINC1500 firmware check.		<u>^</u>
WINC1500: DETECTED		
Firmware version installed: 19.4.4		
Firmware version required : 19.4.4		
Check result: PASSED		E
		-
V Autoscroll	Both NL & CR 🚽	9600 baud 👻

You should see the firmware version. If your version has not PASSED follow this page to update your firmware! (https://adafru.it/vff)

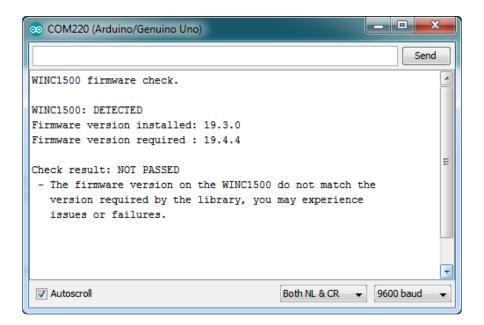
If you have version 19.3 or less, the firmware is too old

If you get not response, the firmware is either waaay to old, or something is amiss with your wiring!

If you get a warning that says

WiFi101 shield: DETECTED Firmware version installed: 19.5.2 Latest firmware version available : 19.5.4

Specifically with 19.5.4 and 19.5.2, you can continue without updating



## Scanning WiFi

Now that you have the right firmware version, lets scan for network!

Don't forget to add WiFi.setPins(8,7,4) at the top of setup()

Run the WiFi101->ScanNetworks example to see a list of available visible networks

			Se
MAC: C6:7F:F1:	5:F0:F8		
Scanning avail	able networks		
** Scan Networ	ks **		
number of avai	lable networks:2		
0) adafruit10	Signal: -66 dBm Encryp	tion: WPA	
1) DG1670AD2	Signal: -91 dBm Encryp	tion: WPA	

### Connect & Read Webpage

OK finally you get to connect and read some data!

Open up the WiFi101->WiFi101WebClient example, then edit the ssid and pass variables to contain your network and password



Add the following lines at the top of setup()

```
//Configure pins for Adafruit ATWINC1500 Feather
WiFi.setPins(8,7,4);
```

It will connect to the website in server and read the webpage manually:

COM52 (Adafruit Feather M0 (Native USB Port))
Send
Attempting to connect to SSID: 10th Floor
Connected to wifi
SSID: 10th Floor
IP Address: 10.0.0.92
signal strength (RSSI):-46 dBm
Starting connection to server
connected to server
HTTP/1.1 200 OK
Date: Wed, 21 Sep 2016 22:33:32 GMT
Expires: -1
Cache-Control: private, max-age=0
Content-Type: text/html; charset=ISO-8859-1
P3P: CP="This is not a P3P policy! See https://www.google.com/support/accour
Server: gws
X-XSS-Protection: 1; mode=block
X-Frame-Options: SAMEORIGIN
Set-Cookie: NID=87=kmIfFqMh8M_7gv9BDt982kjfllc-imsU4d-X3fZthsS_ye4Sfa541V330
Accept-Ranges: none
Vary: Accept-Encoding
Connection: close
html

That's it! pretty easy, huh? There's other examples you can try such as server mode, UDP data transmission & SSL

## Updating Firmware

If you're running 19.5.2 there is no need to update to 19.5.4, despite what the WiFi101 library says it should work just fine and you could brick your device by updating, it is not perfectly foolproof! Thanks :)

As new versions of the WiFi101 library come out, you may end up getting a complaint that the library and WINC1500 firmware are out of sync:

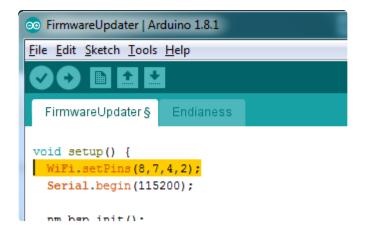
COM21 (Adafruit Feather M0)	
1	Send
WiFi101 firmware check.	
WiFi101 shield: DETECTED	
Firmware version installed: 19.4.4	
Latest firmware version available : 19.5.2	
Check result: NOT PASSED	
- The firmware version on the shield do not match the	
version required by the library, you may experience	
issues or failures.	
	▼ 115200 baud ▼

No problem - you can update the firmware through your Arduino/compatible! Start by loading up the FirmwareUpdater sketch

e Edit Sketch	Tools Help		
New Open Open Recent	Ctrl+N Ctrl+O		
Sketchbook	•		
Examples	I		
Close	Ctrl+W	WiFi101	AP_SimpleWebServer
Save	Ctrl+S	Examples for Adafruit Feather M0	CheckWifi101FirmwareVersion
Save As Ctrl+Shift+S I2S Page Setup Ctrl+Shift+P SAMD_AnalogCorrection	125	ConnectNoEncryption ConnectWithWEP	
		ConnectWithWPA	
Print	Ctrl+P	SPI	
		USBHost	FirmwareUpdater
Preferences	Ctrl+Comma	Wire	MDNS_WiFiWebServer
			Provisioning WiFiWebServer

If you are using a Feather M0 or WINC1500 breakout, don't forget to update the pins as necessary with setPins()!

If you are using a WiFi101 or WINC1500 shield, you do not have to add setPins() code



Upload it to your board. Make sure the Serial console is not open before or after uploading.

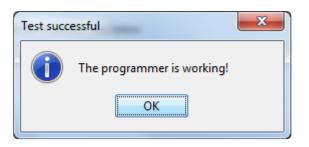
Then select the Updater tool built into the IDE

💿 FirmwareUpdat	er   Arduino 1.8.1	
File Edit Sketch	Tools Help	
FirmwareUpda	Auto Format Archive Sketch Fix Encoding & Reload	Ctrl+T
<pre>// payloadL } UartPacket;</pre>	Serial Monitor Serial Plotter	Ctrl+Shift+M Ctrl+Shift+L
static const	WiFi101 Firmware Updater Board: "Adafruit Feather M0	)"
<pre>#define CMD_R #define CMD_W #define CMD_E</pre>	Port: "COM21 (Adafruit Feat Get Board Info	ther M0)"
<pre>#define CMD_M #define CMD_H</pre>	Programmer: "USBtinyISP" Burn Bootloader	Þ

Select the right COM port, and click Test Connection

6	WiFi101 Firmware/Certificates Updater	
n 🗌	1. Select port of the WiFi module	
A	If the port is not listed dick "Refresh list" button to regenerate the list	
	COM1	Refresh list
x	COM21	
		Test connection

If all is good you'll get a confirmation



Next, select the firmware - we of course recommend the latest version!

lf you don't	see the right/matching version you may need to update the IDE
lf you don't	see the right/matching version you may need to update the IDE  WiFi101 Firmware/Certificates Updater  I. Select port of the WiFi module If the port is not listed dick "Refresh list" button to regenerate the list COM1 COM21  Refresh list Test connection 2. Update firmware Select the firmware from the dropdown box below  WINC1501 Model B (19.5.2)  WINC1501 Model B (19.5.2)  WINC1501 Model B (19.4.4) WINC1501 Model A (19.4.4)
	3. Update SSL root certificates Add domains in the list below using "Add domain" button arduino.cc:443 Add domain Remove domain Upload Certificates to WiFi module

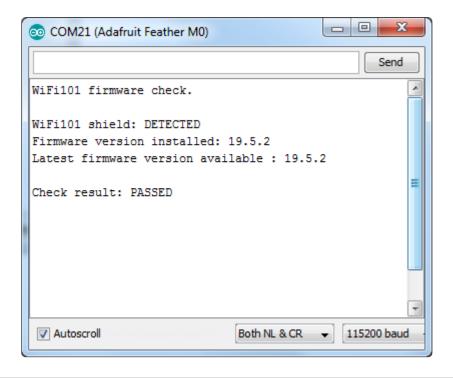
Once you feel ready - make sure the USB cable is connected solidly! Click Update Firmware

💿 WiFi101 Firmware/Certificates Updater	
1. Select port of the WiFi module	
If the port is not listed click "Refresh list" button to regenerate the list	
COM1 COM21	Refresh list
	Test connection
2. Update firmware	
Select the firmware from the dropdown box below	
WINC1501 Model B (19.5.2)	•
Update Firmware	
3. Update SSL root certificates	
Add domains in the list below using "Add domain" button	
arduino.cc:443	Add domain
	Remove domain
Upload Certificates to WiFi module	
Programming 413604 bytes	

And a minute or two later...

Success	X
1	The firmware has been updated!
	ОК

Now you're ready to rock! Reload the Firmware Check sketch from before, this time you will see:



# Updating SSL Certificates

If you're trying to connect to a computer or service via SSL and the connection is failing, you may need to update the certificates built into the WINC1500. By default it comes with many of the most popular SSL certificates but you may bump into a site that requires one that isnt included.

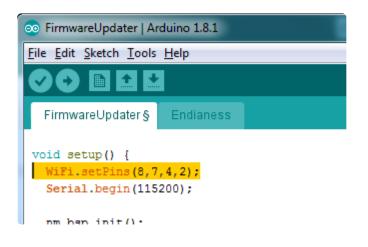
Its quite easy to update the certificates, you'll need to upload some code and run the uploaders but it only has to happen once

CheckWifi101Fi	rmwareVersion	Arduino 1.8.1	
File Edit Sketch	Tools Help		
New Open Open Recent Sketchbook	Ctrl+N Ctrl+O		
Examples Close Save Save As	Ctrl+W Ctrl+S Ctrl+Shift+S	WiFi101 Examples for Adafruit Feather M0 12S	AP_SimpleWebServer CheckWifi101FirmwareVersion ConnectNoEncryption
Page Setup Print	Ctrl+Shift+P Ctrl+P	SAMD_AnalogCorrection SPI USBHost	ConnectWithWEP ConnectWithWPA FirmwareUpdater
Preferences	Ctrl+Comma	Wire	MDNS_WiFiWebServer Provisioning_WiFiWebServer

Start out by uploading the FirmwareUpdater sketch from WiFi101

If you are using a Feather M0 or WINC1500 breakout, don't forget to update the pins as necessary with setPins()!

If you are using a WiFi101 or WINC1500 shield, skip this step



and upload it!

After uploading be sure to note what is the name of the COM or Serial port for the Arduino Zero or Feather...You'll need this for the next step

💿 Fir	mwareUpdater	Arduino 1.6.7			
File B	dit Sketch To	ools Help			
		Auto Format	Ctrl+T		
		Archive Sketch			
Fir	mwareUpda	Fix Encoding & Reload			
22	#include	Serial Monitor	Ctrl+Shift+M		
23		Serial Plotter	Ctrl+Shift+L		
24		Senar Protect	Controlline - C		
25		Board: "Adafruit Feather M0 (Native USB Port)	• •	<b>&gt;</b>	
	// If you	Port		Serial ports	
27	// guide	Poli		Serial ports	
28	#define W	Dreammen en "LICPtiny JCD"		COM1	
29	#define W	Programmer: "USBtinyISP"	1	COM3 (Adafruit Feather M0 (Native USB Port)	
30	#define W	Burn Bootloader			-
31	#define WIN	C_EN 2 // or, tie EN to VCC		COM15	
20	(/ The CDT .	ning of the WINCIEGO (SCV MOST MISO)	all and all has		

Upload it to your Feather. Make sure the Serial console is not open before or after uploading.

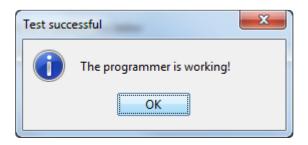
Then select the Updater tool built into the IDE

💿 FirmwareUpdater   Arduino 1.8.1			
File Edit Sketch	Tools Help		
FirmwareUpda	Auto Format Archive Sketch Fix Encoding & Reload	Ctrl+T	
<pre>// payloadL } UartPacket;</pre>	Serial Monitor Serial Plotter	Ctrl+Shift+M Ctrl+Shift+L	
static const	WiFi101 Firmware Updater		
#define CMD_R #define CMD_W #define CMD_E	Board: "Adafruit Feather M0" Port: "COM21 (Adafruit Feather I Get Board Info	► M0)"	
<pre>#define CMD_M #define CMD_H</pre>	Programmer: "USBtinyISP" Burn Bootloader	Þ	

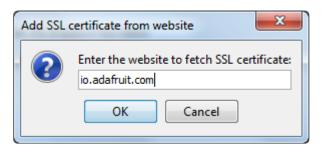
Select the right COM port, and click Test Connection

0	WiFi101 Firmware/Certificates Updater	
1	1. Select port of the WiFi module	
A	If the port is not listed click "Refresh list" button to regenerate the list	
I A	COM1 COM21	Refresh list
K.		Test connection

If all is good you'll get a confirmation



Now at the bottom of the page, click Add Domain and type in the URL of the site you want to access:



Then click Upload Certificates

💿 WiFi101 Firmware/Certificates Updater	
1. Select port of the WiFi module	
If the port is not listed click "Refresh list" button to regenerate the list	
COM1	Refresh list
COM21	Keirearniac
	Test connection
2. Update firmware	
Select the firmware from the dropdown box below	
WINC1501 Model B (19.5.2)	•
Update Firmware	
3. Update SSL root certificates	
Add domains in the list below using "Add domain" button	
arduino.cc:443 io.adafruit.com:443	Add domain
	Remove domain
Upload Certificates to WiFi module	
6	

A few moments later...success!

So WiFi101 Firmware/Certificates Updater	
1. Select port of the WiFi module	
If the port is not listed click "Refresh list" button to regenerate the list	
COM1 COM21	Refresh list
	Test connection
2. Update firmware Select the firmware from Success WINC 1501 Model B (19 The certificates have been uploaded! OK 3. Update SSL root certificates Add domains in the list below using "Add domain" button	
arduino.cc:443 io.adafruit.com:443	Add domain
Upload Certificates to WiFi module	Remove domain
Done!	

#### What SSL/TLS support is available with the WINC1500?

Officially Atmel lists TLS 1.0 & 1.1, however we have noticed that the firmwares shipping on boards today seem to also support TLS 1.2 (verified by checking the results of www.howsmyssl.com (https://adafru.it/mgf)).

The supported ciphers are:

- TLS\_DHE\_RSA\_WITH\_AES\_128\_GCM\_SHA256
- TLS\_RSA\_WITH\_AES\_128\_GCM\_SHA256
- TLS\_DHE\_RSA\_WITH\_AES\_128\_CBC\_SHA256
- TLS\_DHE\_RSA\_WITH\_AES\_128\_CBC\_SHA
- TLS\_RSA\_WITH\_AES\_128\_CBC\_SHA256
- TLS\_RSA\_WITH\_AES\_128\_CBC\_SHA

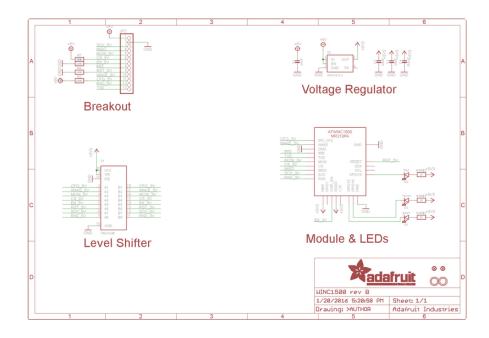
### Downloads

### **Datasheets & Files**

- All the details you could ever want are over at the Atmel website (https://adafru.it/kUD)
- EagleCAD PCB files on GitHub (https://adafru.it/oeL)
- Fritzing objects in the Adafrut Fritzing library (https://adafru.it/aP3)

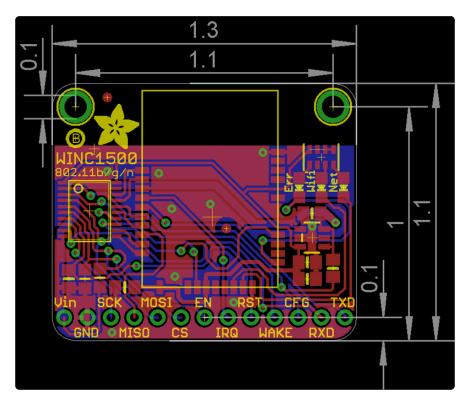
### Schematic

Click to embiggen. Please note we ship with the 'PB rev module, not 'PA!



## **Fabrication Print**

Dimensions in inches



#### **X-ON Electronics**

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Click to view similar products for WiFi Development Tools - 802.11 category:

Click to view products by Adafruit manufacturer:

Other Similar products are found below :

YSAEWIFI-1 SKY65981-11EK1 QPF7221PCK-01 SIMSA915C-Cloud-DKL SIMSA433C-Cloud-DKL ISM43903-R48-EVB-E QPF4206BEVB01 RN-G2SDK SKY85734-11EK1 SKY85735-11EK1 ENW49D01AZKF ESP-LAUNCHER MIKROE-2336 EVAL\_PAN1760EMK 3210 EVAL\_PAN1026EMK ATWINC1500-XPRO 2471 DM990001 WRL-13711 2999 ATWILC3000-SHLD DFR0321 TEL0118 3213 DFR0489 WRL-13804 DEV-13907 UP-3GHAT-A20-0001 3405 TEL0078 2680 2702 2821 3044 3606 3653 4000 4172 4178 4201 4285 4289 CS-ANAVI-25 CS-ANAVI-26 CS-ANAVI-23 CS-ANAVI-24 CS-ANAVI-28 CS-ANAVI-29 CS-ANAVI-30