ESP 8266

Setup

The chip

- ESP 8266 is the most common wifi chip there is
- There are multiple boards that use ESP chips and are as follows


ESP-01


ESP-02


ESP-03


ESP-04


ESP-05


ESP-06


ESP-07

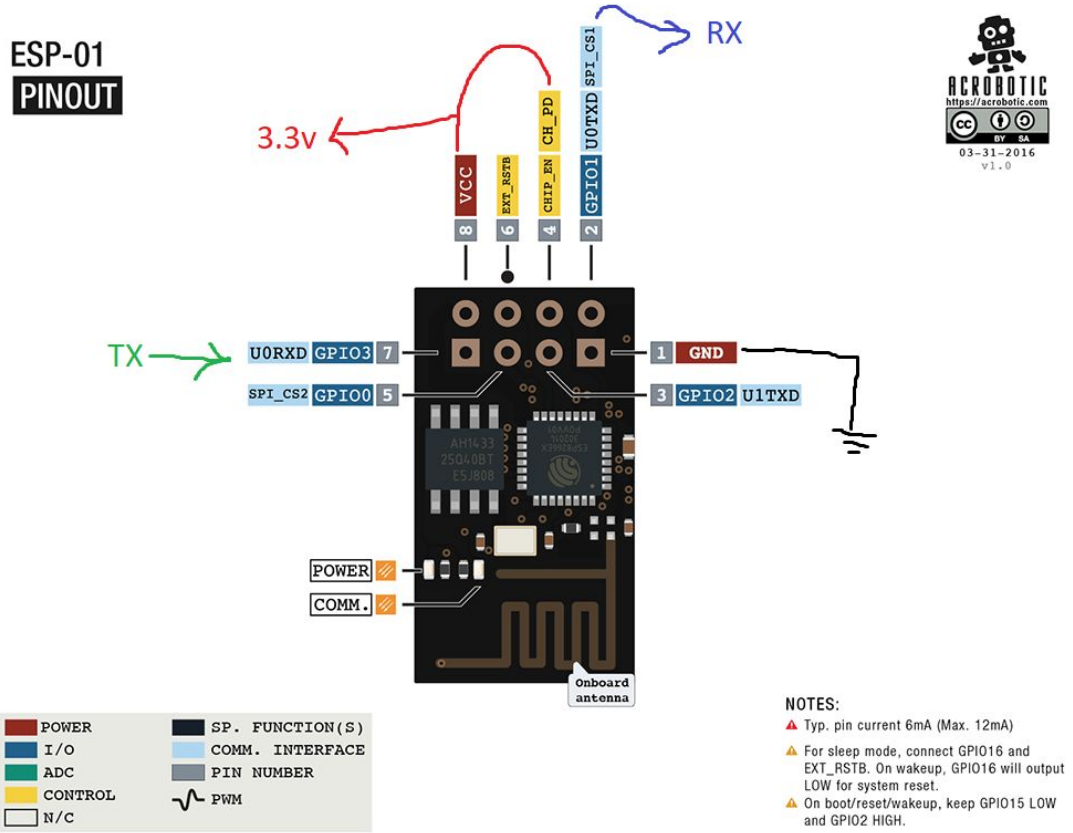

ESP-08


ESP-09

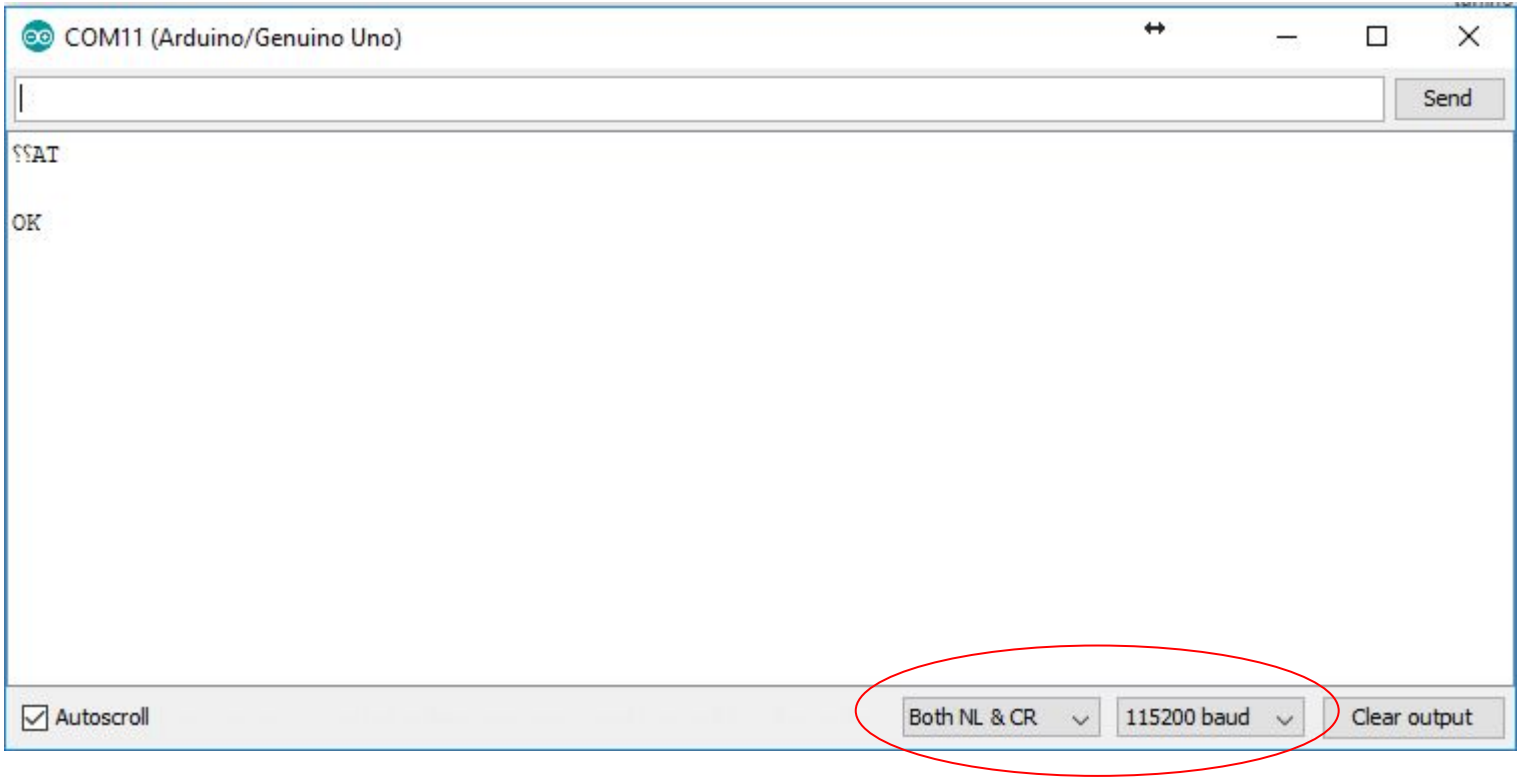

ESP-10


ESP-11

Pinout and Connections



AT commands in Serial Monitor



Basic Commands

Commands	Description
AT	Tests AT startup.
AT+RST	Restarts the module.
AT+GMR	Checks version information.
AT+GSLP	Enters Deep-sleep mode.
ATE	Configures echoing of AT commands.
AT+RESTORE	Restores the factory default settings of the module.
AT+UART	UART configuration. [@deprecated]
AT+UART_CUR	The current UART configuration.
AT+UART_DEF	The default UART configuration, saved in flash.
AT+SLEEP	Configures the sleep modes.
AT+WAKEUPGPIO	Configures a GPIO to wake ESP8266 up from Light-sleep mode.
AT+RFPOWER	Sets the maximum value of the RF TX Power.
AT+RFVDD	Sets the RF TX Power according to VDD33.
AT+RFAUTOTRACE	Sets RF frequency offset trace.
AT+SYSRAM	Checks the available RAM size.
AT+SYSADC	Checks the ADC value.
AT+SYSIOSETCFG	Sets configuration of IO pins.
AT+SYSIOGETCFG	Gets configuration of IO pins.
AT+SYSGPIODIR	Configures the direction of GPIO.
AT+SYSGPIOWRITE	Configures the GPIO output level
AT+SYSGPIOREAD	Checks the GPIO input level.

WiFi Commands

Commands	Description
AT+CWMODE	Sets the Wi-Fi mode (Station/AP/Station+AP). [@deprecated]
AT+CWMODE_CUR	Sets the Wi-Fi mode (Station/AP/Station+AP); configuration not saved in the flash.
AT+CWMODE_DEF	Sets the default Wi-Fi mode (Station/AP/Station+AP); configuration saved in the flash.
AT+CWJAP	Connect to an AP. [@deprecated]
AT+CWJAP_CUR	Connects to an AP; configuration not saved in the flash.
AT+CWJAP_DEF	Connects to an AP; configuration saved in the flash.
AT+CWLAPOPT	Sets the configuration of command `AT+CWLAP`.
AT+CWLAP	Lists available APs.
AT+CWQAP	Disconnects from an AP.
AT+CWSAP	Sets the configuration of the ESP8266 SoftAP. [@deprecated]
AT+CWSAP_CUR	Sets the current configuration of the ESP8266 SoftAP; configuration not saved in the flash.

WiFi Commands

AT+CWSAP_DEF	Sets the configuration of the ESP8266 SoftAP; configuration saved in the flash.
AT+CWLIF	Gets the Station IP to which the ESP8266 SoftAP is connected.
AT+CWDHCP	Enables/Disables DHCP. [@deprecated]
AT+CWDHCP_CUR	Enables/Disables DHCP; configuration not saved in the flash.
AT+CWDHCP_DEF	Enable/Disable DHCP; configuration saved in the flash.
AT+CWDHCPS_CUR	Sets the IP range of the DHCP server; configuration not saved in the flash.
AT+CWDHCPS_DEF	Sets the IP range of the DHCP server; configuration saved in the flash.
AT+CWAUTOCONN	Connects to an AP automatically on power-up.
AT+CIPSTAMAC	Sets the MAC address of the ESP8266 Station. [@deprecated]
AT+CIPSTAMAC_CUR	Sets the MAC address of the ESP8266 Station; configuration not saved in the flash.
AT+CIPSTAMAC_DEF	Sets the MAC address of ESP8266 station; configuration saved in the flash.

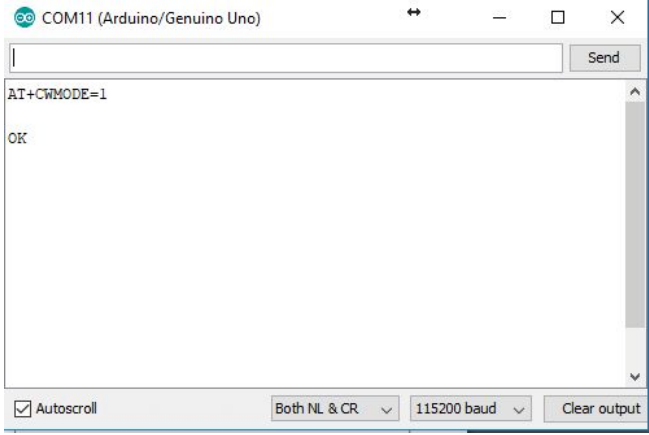
WiFi Commands

AT+CIPAPMAC	Sets the MAC address of the ESP8266 SoftAP. [@deprecated]
AT+CIPAPMAC_CUR	Sets the MAC address of the ESP8266 SoftAP; configuration not saved in the flash.
AT+CIPAPMAC_DEF	Sets the MAC address of the ESP8266 SoftAP; configuration saved in the flash.
AT+CIPSTA	Sets the IP address of the ESP8266 Station. [@deprecated]
AT+CIPSTA_CUR	Sets the IP address of the ESP8266 Station; configuration not saved in the flash.
AT+CIPSTA_DEF	Sets the IP address of the ESP8266 Station; configuration saved in the flash.
AT+CIPAP	Sets the IP address of ESP8266 SoftAP. [@deprecated]
AT+CIPAP_CUR	Sets the IP address of ESP8266 SoftAP; configuration not saved in the flash.
AT+CIPAP_DEF	Sets the IP address of ESP8266 SoftAP; configuration saved in the flash.
AT+CWSTARTSMART	Starts SmartConfig.
AT+CWSTOPSMART	Stops SmartConfig.
AT+CWSTARTDISCOVER	Enables the mode that ESP8266 can be found by WeChat.
AT+CWSTOPDISCOVER	Disables the mode that ESP8266 can be found by WeChat.
AT+WPS	Sets the WPS function.
AT+MDNS	Sets the MDNS function.
AT+CWHOSTNAME	Sets the host name of the ESP8266 Station.

Modes - make it station

The chip can be made to work in three modes

1. Station
2. Soft AP
3. Station + soft AP



4.2.1. AT+CWMODE—Sets the Wi-Fi Mode (Station/SoftAP/Station+SoftAP)

[@deprecated] This command is deprecated. Please use AT+CWMODE_CUR or AT+CWMODE_DEF instead.

Commands	Test Command: AT+CWMODE=?	Query Command: AT+CWMODE? Function: to query the current Wi-Fi mode of ESP8266.	Set Command: AT+CWMODE=<mode> Function: to set the current Wi-Fi mode of ESP8266.
Response	+CWMODE:<mode> OK	+CWMODE:<mode> OK	OK
Parameters	<mode>: ▸ 1: Station mode ▸ 2: SoftAP mode ▸ 3: SoftAP+Station mode		
Note	The configuration changes will be saved in the system parameter area in the flash.		
Example	AT+CWMODE=3		

Search for WiFi Networks

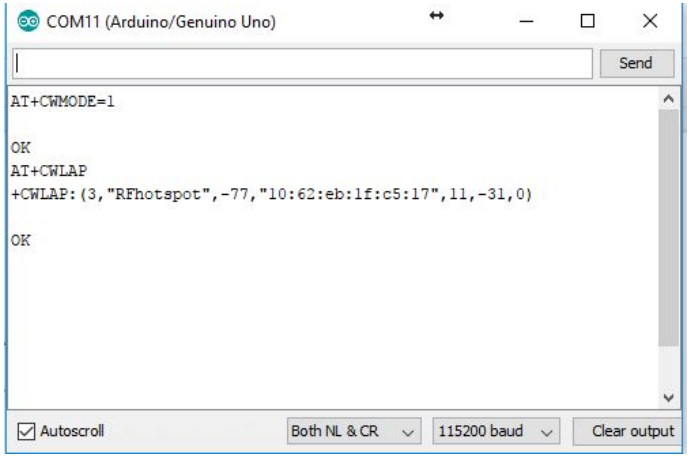
4.2.8. AT+CWLAP—Lists Available APs

Commands	Set Command: `AT+CWLAP=<ssid>[,<mac>,<ch>]` Function: to query the APs with specific SSID and MAC on a specific channel.	Execute Command: `AT+CWLAP` Function: to list all available APs.

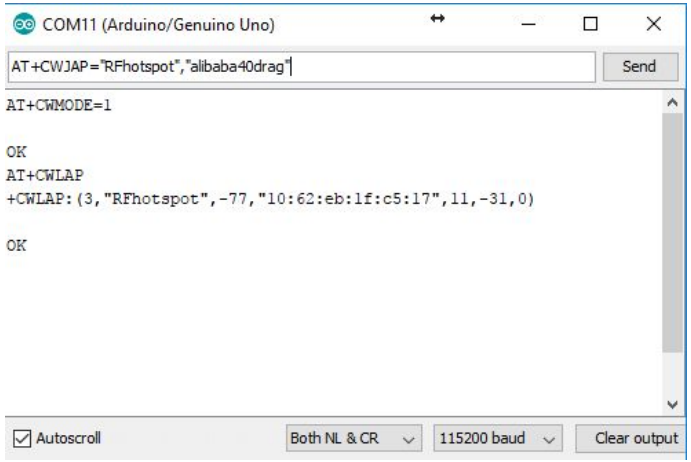
Response	`+CWLAP:<ecn>,<ssid>,<rssi>,<mac>,<ch>,<freq offset>, <freq calibration>`
	`OK`
	or
	`ERROR`
		`+CWLAP: <ecn>,<ssid>,<rssi>,<mac>,<ch>,<freq offset>, <freq calibration>`
		`OK`

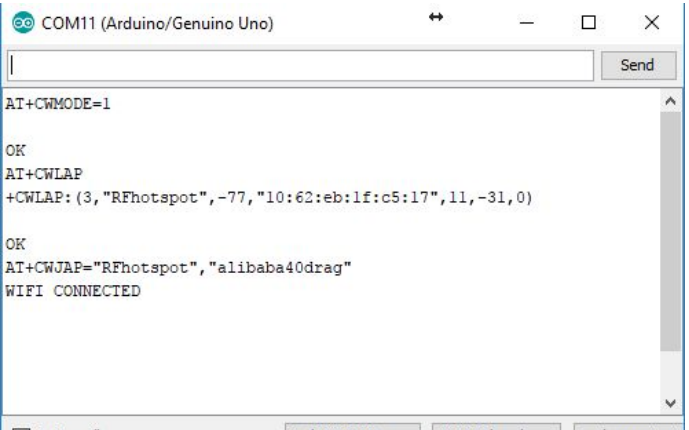
Parameters	• `<ecn>`: encryption method. ▸ `0`: OPEN ▸ 1: WEP ▸ 2: WPA_PSK ▸ 3: WPA2_PSK ▸ 4: WPA_WPA2_PSK ▸ 5: WPA2_Enterprise (AT can NOT connect to WPA2_Enterprise AP for now.) • `<ssid>`: string parameter, SSID of the AP. • `<rssi>`: signal strength. • `<mac>`: string parameter, MAC address of the AP. • `<freq offset>`: frequency offset of AP; unit: KHz. The value of ppm is `<freq offset>`/2.4. • `<freq calibration>`: calibration for frequency offset.	

Examples	`AT+CWLAP="Wi-Fi","ca:d7:19:d8:a6:44",6`
	or search for APs with a designated SSID:
	`AT+CWLAP="Wi-Fi"`	



Connect to a Network





4.2.4. AT+CWJAP—Connects to an AP

[@deprecated] This command is deprecated. Please use `AT+CWJAP_CUR` or `AT+CWJAP_DEF` instead.

Commands	Query Command: `AT+CWJAP?` Function: to query the AP to which the ESP8266 Station is already connected.	Set Command: `AT+CWJAP=<ssid>,<pwd>[,<bssid>]` Function: to set the AP to which the ESP8266 Station needs to be connected.

Response	`+CWJAP:<ssid>,<bssid>,<channel>,<rssi>`
	`OK`
		`OK`
		or
		`+CWJAP:<error code>`
		`ERROR`

Parameters	`<ssid>`: a string parameter showing the SSID of the target AP.	• `<ssid>`: the SSID of the target AP. • `<pwd>`: password, MAX: 64-byte ASCII. • `[<bssid>]`: the target AP's MAC address, used when multiple APs have the same SSID. • `<error code>`: (for reference only) ▸ 1: connection timeout. ▸ 2: wrong password. ▸ 3: cannot find the target AP. ▸ 4: connection failed. This command requires Station mode to be active. Escape character syntax is needed if SSID or password contains any special characters, such as , or " or \.
Note	The configuration changes will be saved in the system parameter area in the flash.	

Examples	`AT+CWJAP="abc","0123456789"`
	For example, if the target AP's SSID is `"ab\,c"` and the password is `"0123456789"\"`, the command is as follows:
	`AT+CWJAP="ab\\\,c","0123456789\"\\"`
	If multiple APs have the same SSID as `"abc"`, the target AP can be found by BSSID:
	`AT+CWJAP="abc","0123456789","ca:d7:19:d8:a6:44"`	

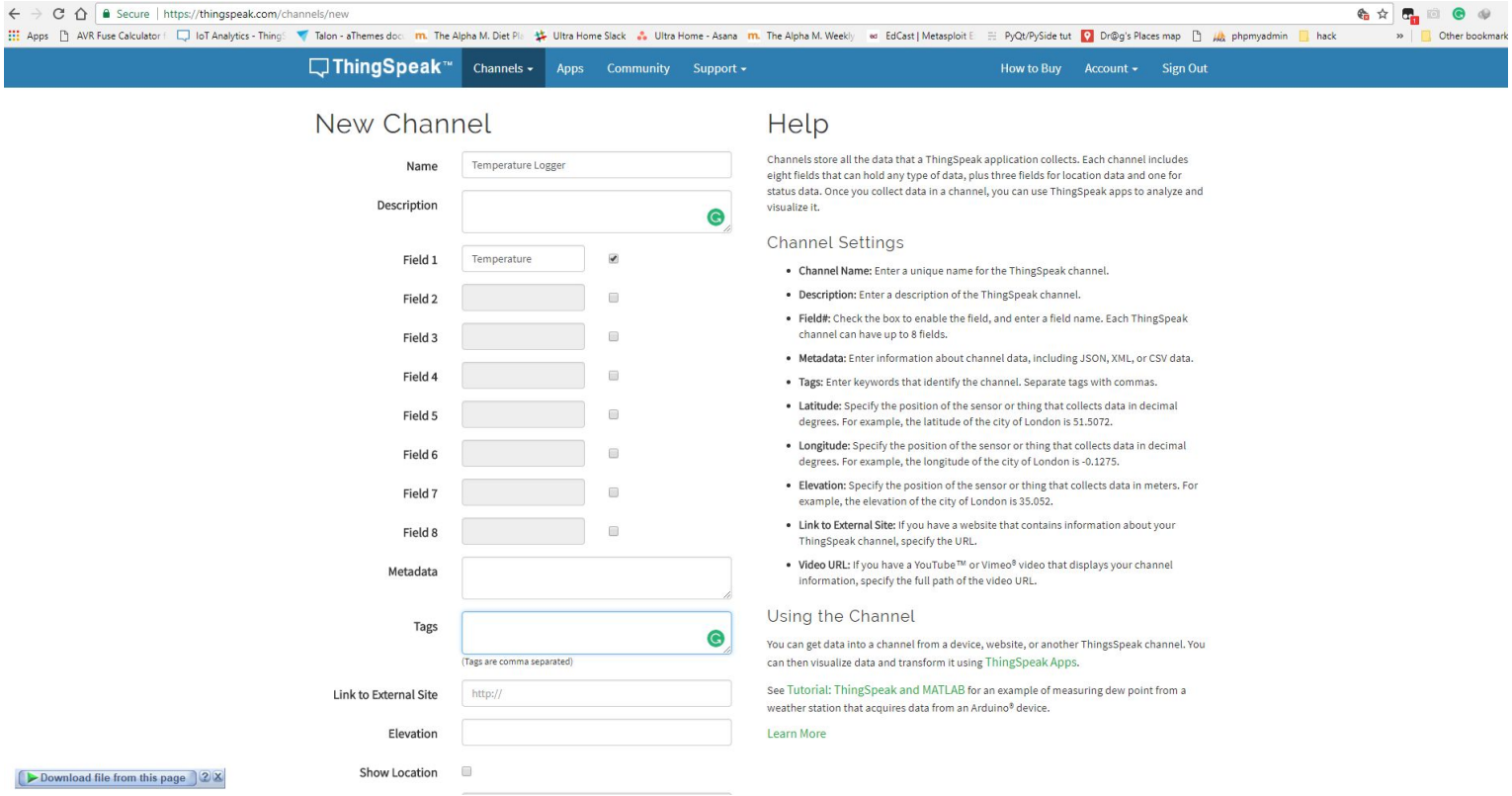
TCP Commands

Command	Description
AT+CIPSTATUS	Gets the connection status
AT+CIPDOMAIN	DNS function
AT+CIPSTART	Establishes TCP connection, UDP transmission or SSL connection
AT+CIPSSLSIZE	Sets the size of SSL buffer
AT+CIPSEND	Sends data
AT+CIPSENDEX	Sends data when length of data is <length>, or when \0 appears in the data
AT+CIPSENDBUF	Writes data into TCP-send-buffer
AT+CIPBUFRESET	Resets the segment ID count
AT+CIPBUFSTATUS	Checks the status of TCP-send-buffer
AT+CIPCHECKSEQ	Checks if a specific segment is sent or not
AT+CIPCLOSE	Closes TCP/UDP/SSL connection
AT+CIFSR	Gets the local IP address
AT+CIPMUX	Configures the multiple connections mode

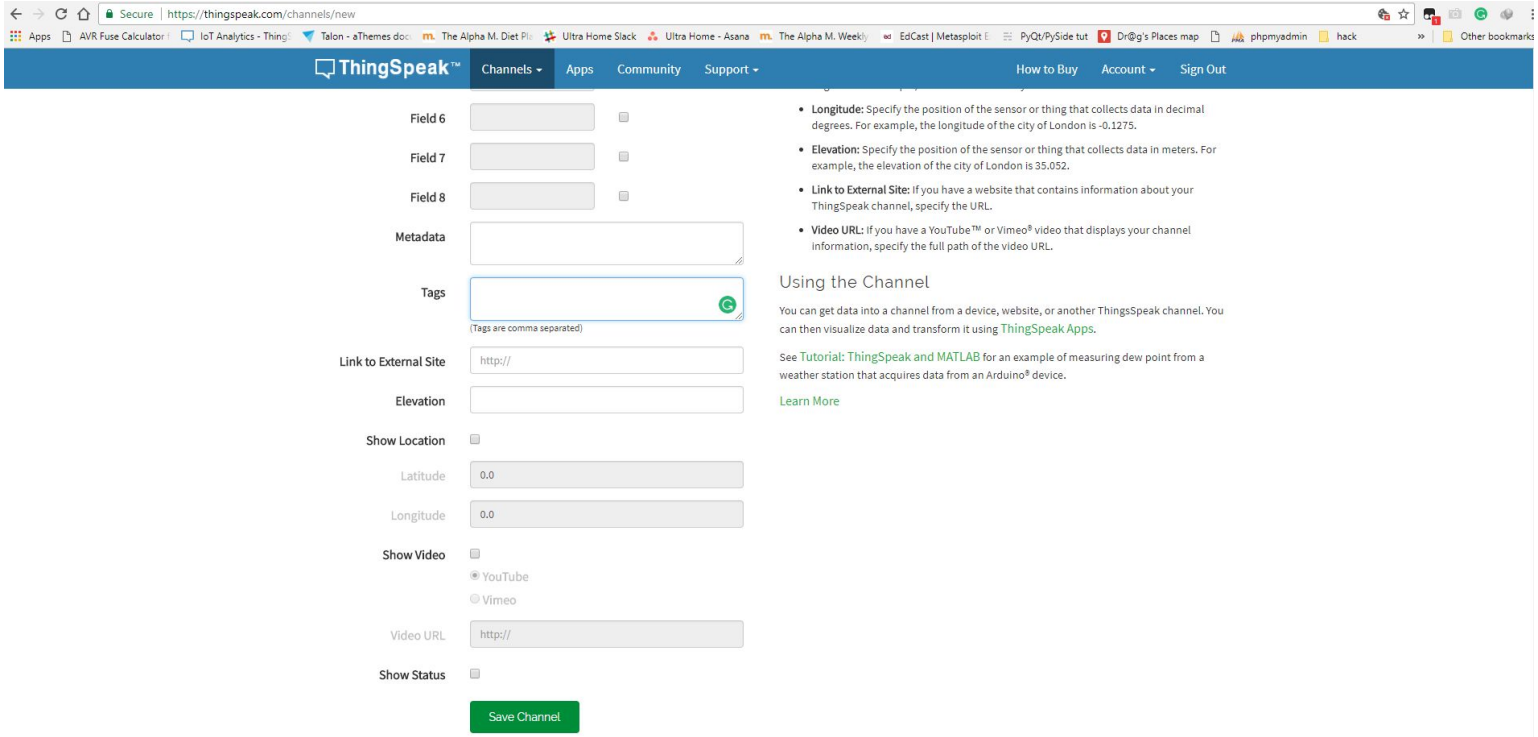
TCP Commands

AT+CIPSERVER	Deletes/Creates a TCP server
AT+CIPMODE	Configures the transmission mode
AT+SAVETRANSLINK	Saves the transparent transmission link in the flash
AT+CIPSTO	Sets timeout when ESP8266 runs as TCP server
AT+PING	Ping packets
AT+CIUPDATE	Upgrades the software through network
AT+CIPDINFO	Shows remote IP and remote port with +IPD
AT+CIPSNTPCFG	Configures the time domain and SNTP server.
AT+CIPSNTPTIME	Queries the SNTP time.
AT+CIPDNS_CUR	Sets user-defined DNS servers; configuration not saved in the flash
AT+CIPDNS_DEF	Sets user-defined DNS servers; configuration saved in the flash

IoT - Thingspeak.com



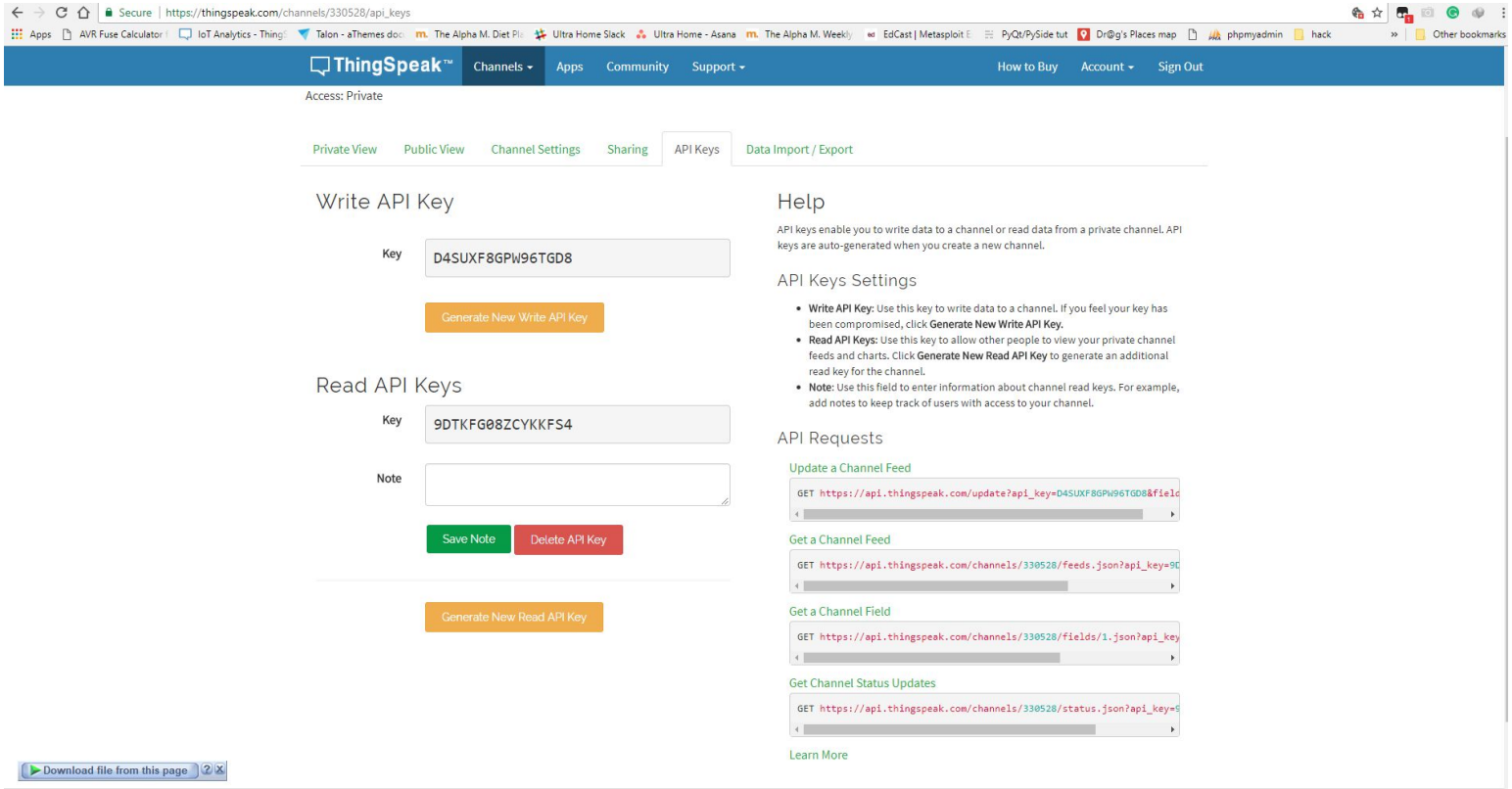
IoT - Thingspeak.com



IoT - Thingspeak.com

Update a Channel Feed

```
GET https://api.thingspeak.com/update?api_key=D4SUXF8GPW96TGD8&fielc
```



Get Request to Push Data

Update a Channel Feed

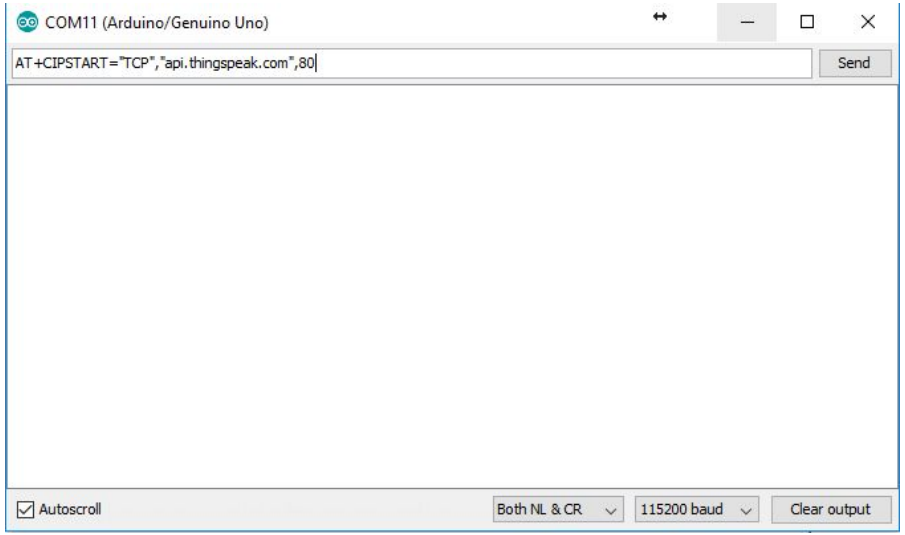
```
GET https://api.thingspeak.com/update?api_key=D4SUXF8GPW96TGD8&fielc
```

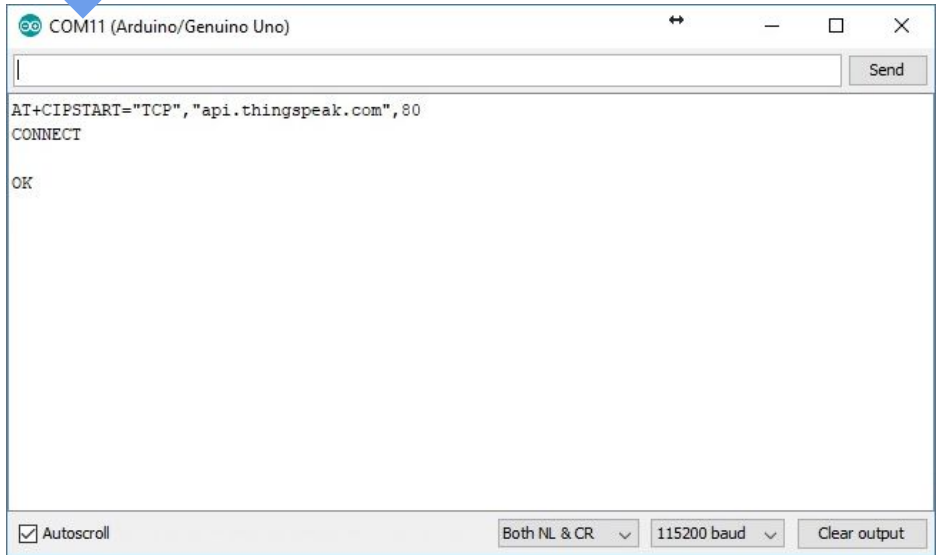
```
1  AT+CIPSTART="TCP","api.thingspeak.com",80
2  AT+CIPSEND=73
3  GET https://api.thingspeak.com/update?api_key=D4SUXF8GPW96TGD8&field1=9
4
```

Total number of Bytes in the GET request. Including CR and LF at the end

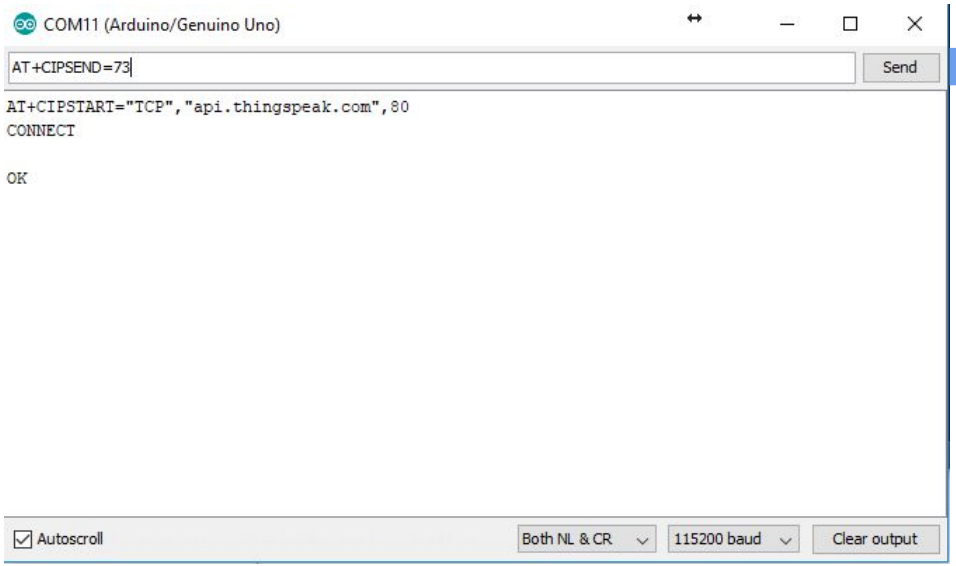
Value to be pushed

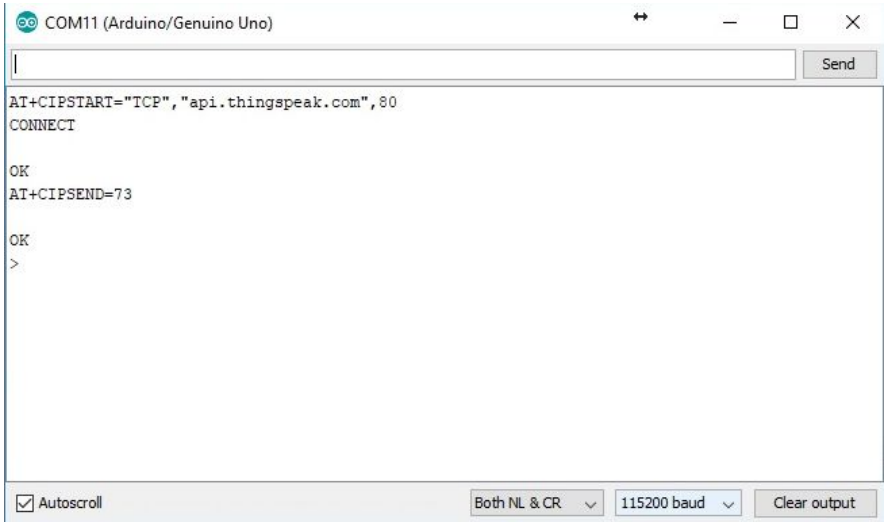
Push Data from Serial Monitor - TCP connection



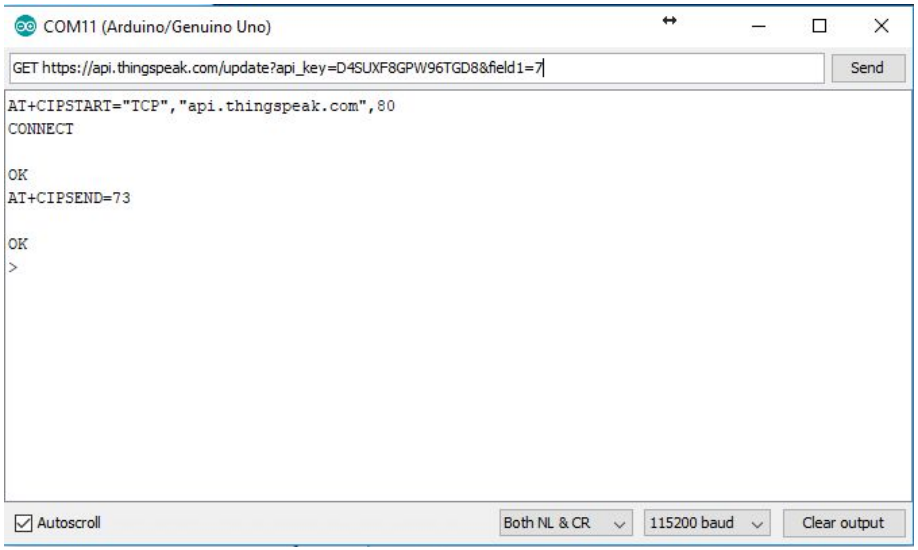


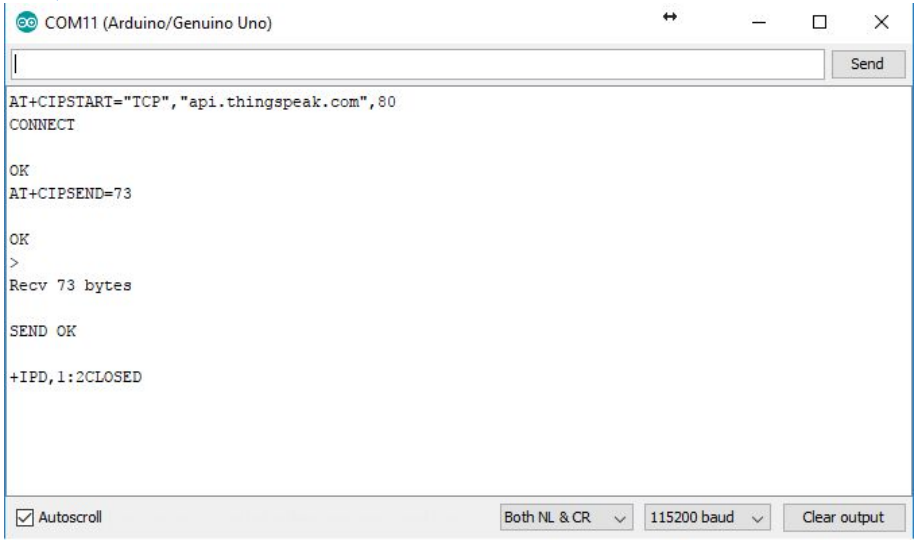
Push Data from Serial Monitor - Specify number of bytes to be sent





Push Data from Serial Monitor - send the get request





Visualize the data