

WINC1500

Wireless Module

(UART Firmware Upgrade)



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Upgrade Steps summary

- 1) Atmel Studio 7: Generate Upgrade Firmware Files
- 2) Module comms & power
- 3) Execute RESET sequence before flashing
- 4) Run upgrade batch file

Hardware Requirements:

- USB to TTL UART Serial Converter (Eg: CP2102)
- WINC1500 module preferably mounted and connected to host mcu. Must be powered.

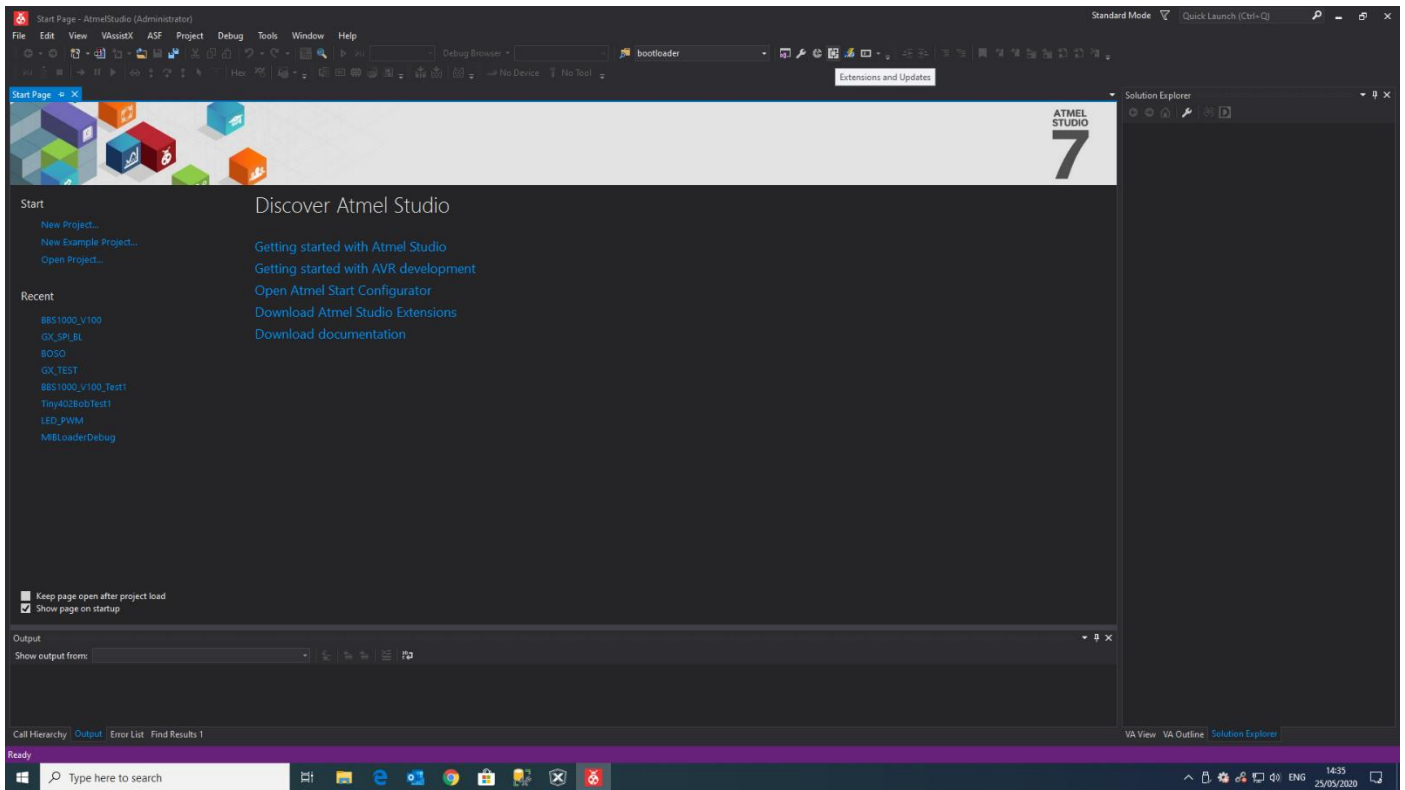
NB Notes:

- ❖ Atmel Studio is vital in generating the files that are all needed to perform the firmware upgrade
- ❖ Atmel Studio Framework has lower versions to upgrade to other relevant firmware versions
- ❖ If you considering implementing the WINC1500 in a design, add jumper pins to the UART RX/TX/GND pins to easily facilitate upgrading the WINC1500 modules firmware
- ❖ Module upgrading can also be done via the host connected SPI interface and using the Atmel Studio 7 “Serial Bridge” example project as a guide
- ❖ The actual firmware programming takes about 30 seconds to complete
- ❖ This walkthrough upgraded a version 19.4.4 module to 19.6.1

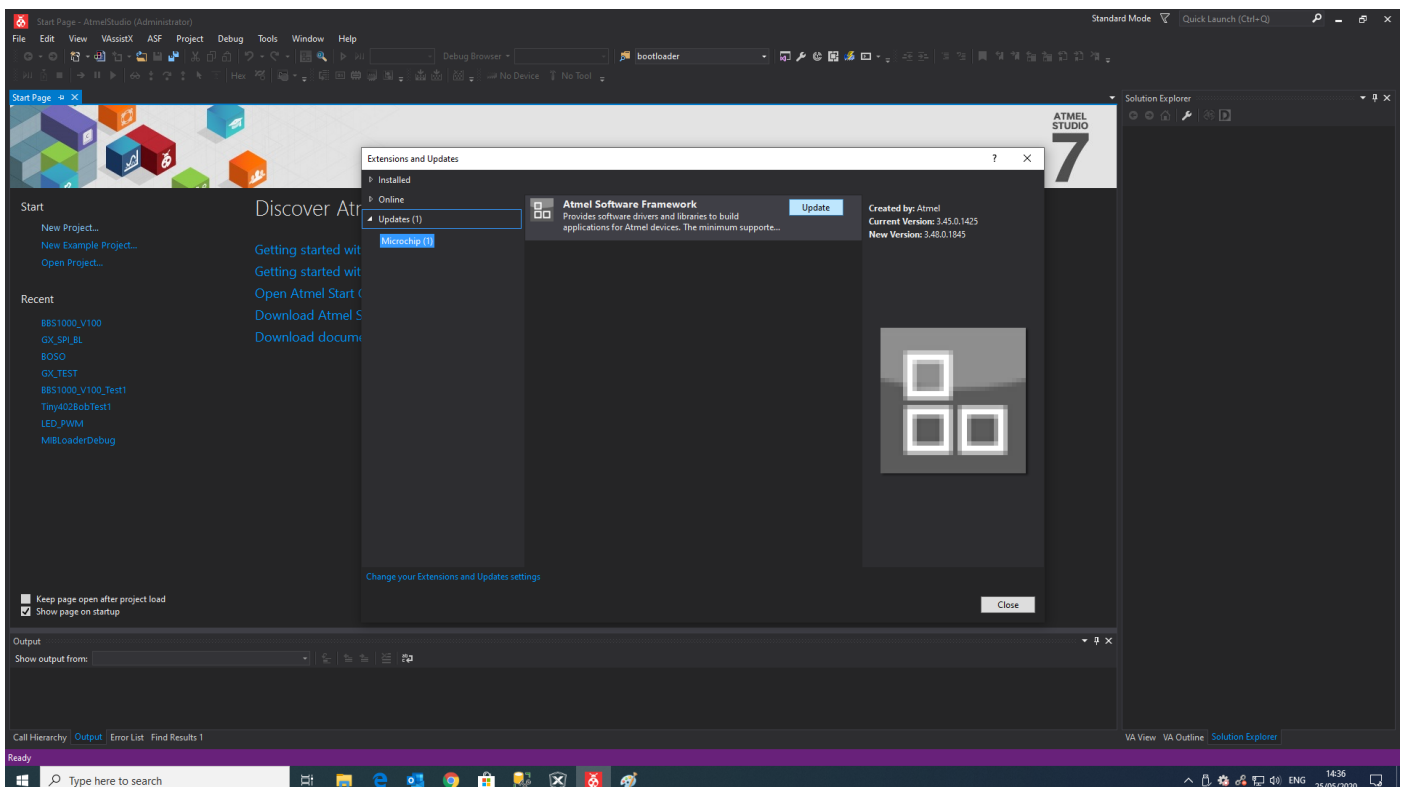
Atmel Studio 7: Generate Upgrade Firmware Files

Ensure you have Atmel Studio 7 installed with the latest / relevant version of Atmel Studio Framework.

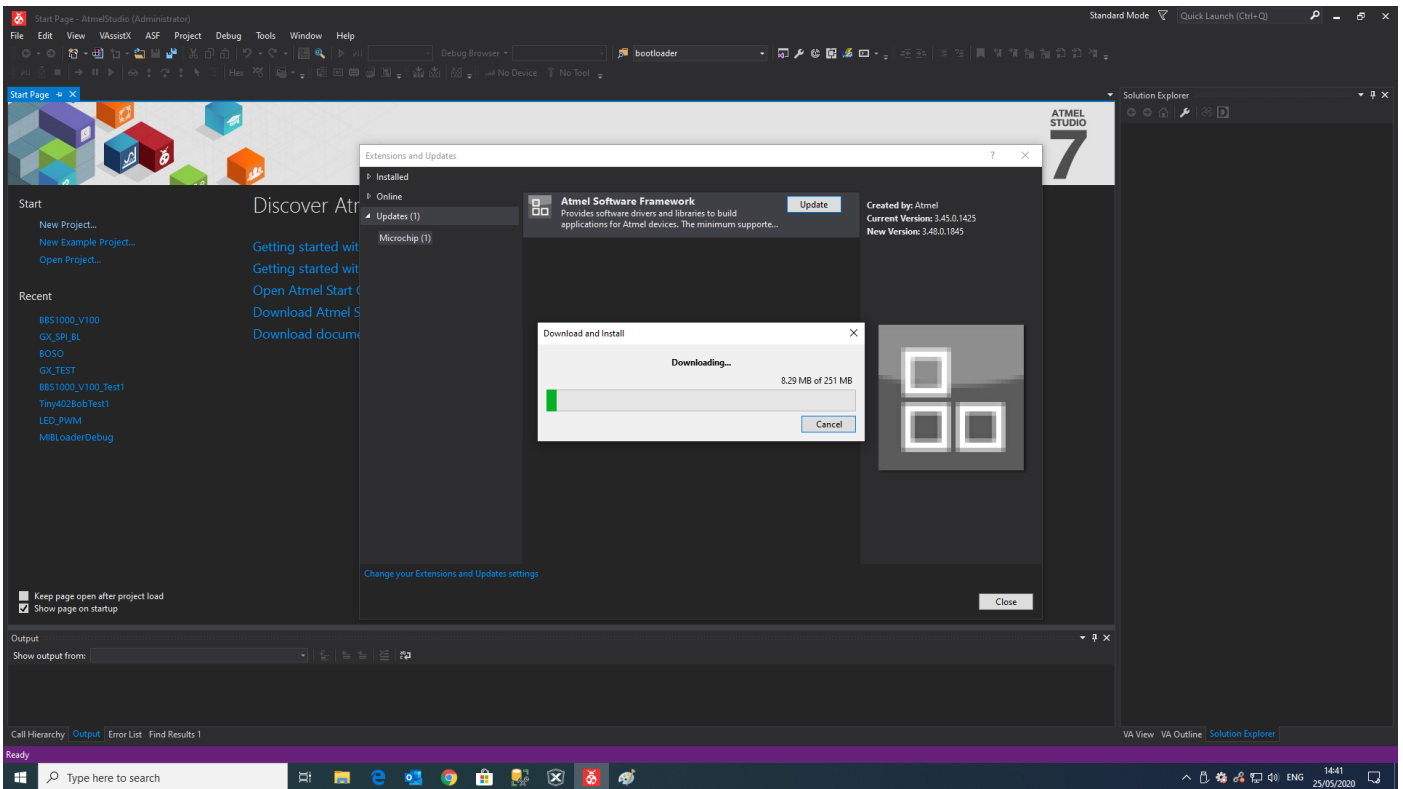
- Select Extensions & updates icon on the toolbar



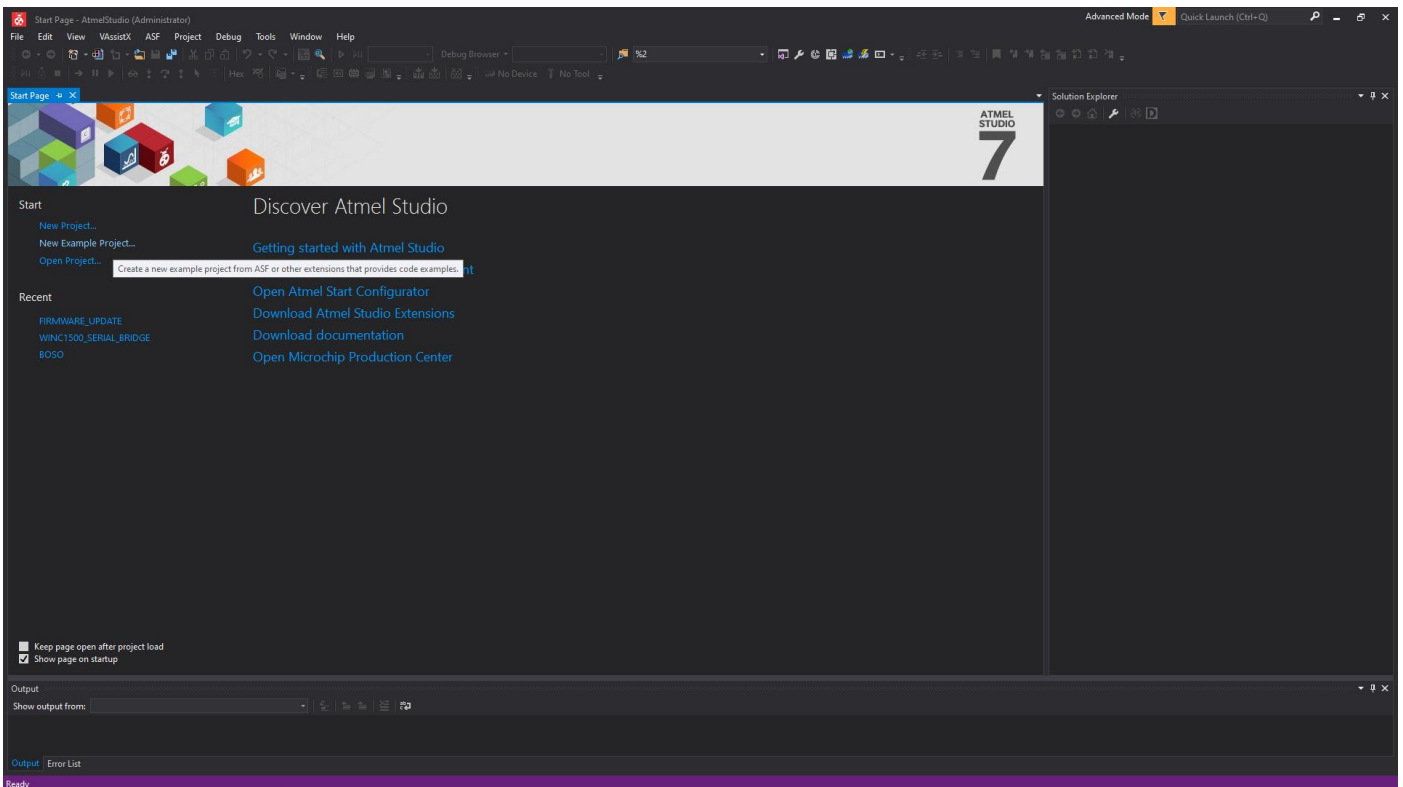
- Click on “Updates” and then click on “Update” on the Atmel Software Framework to proceed



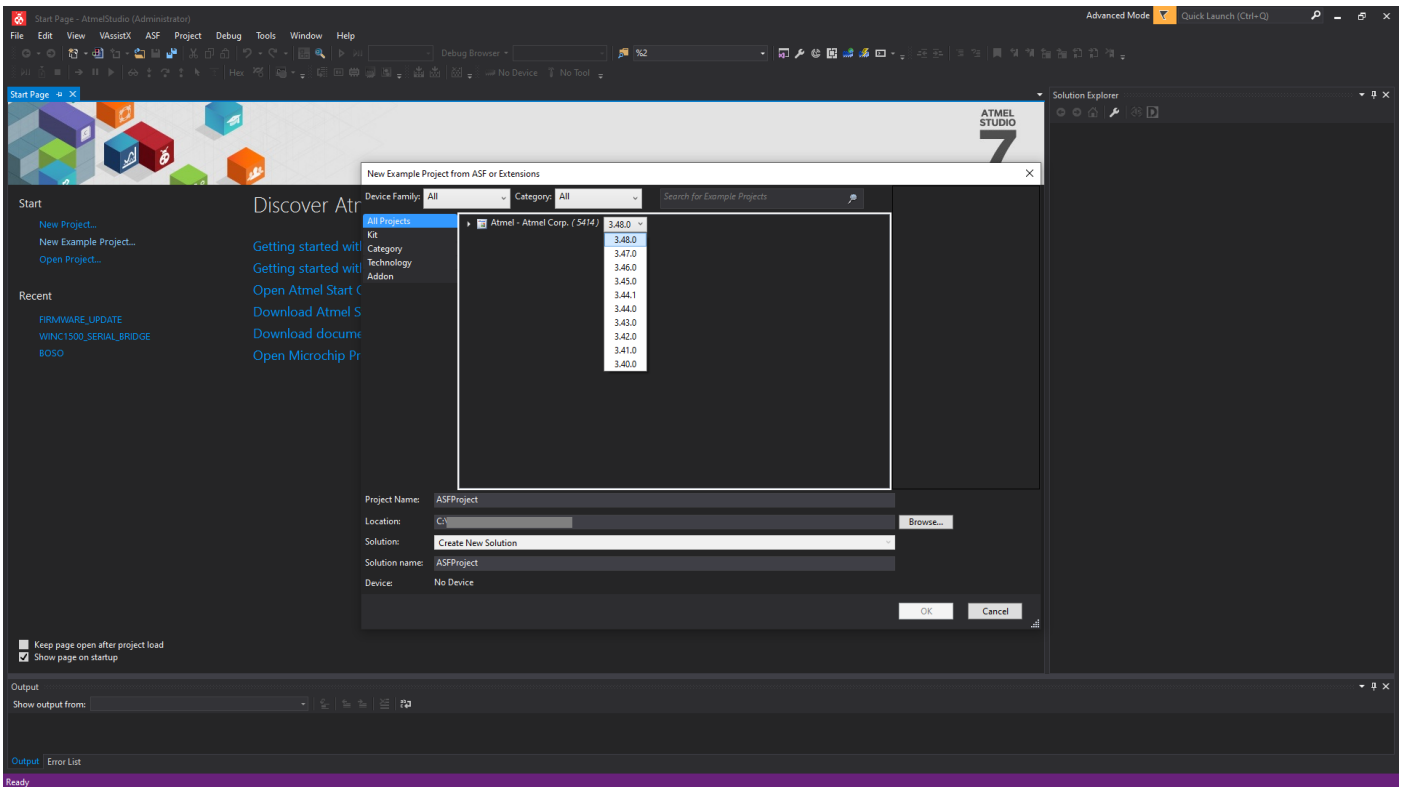
- Wait for download to complete, install & restart



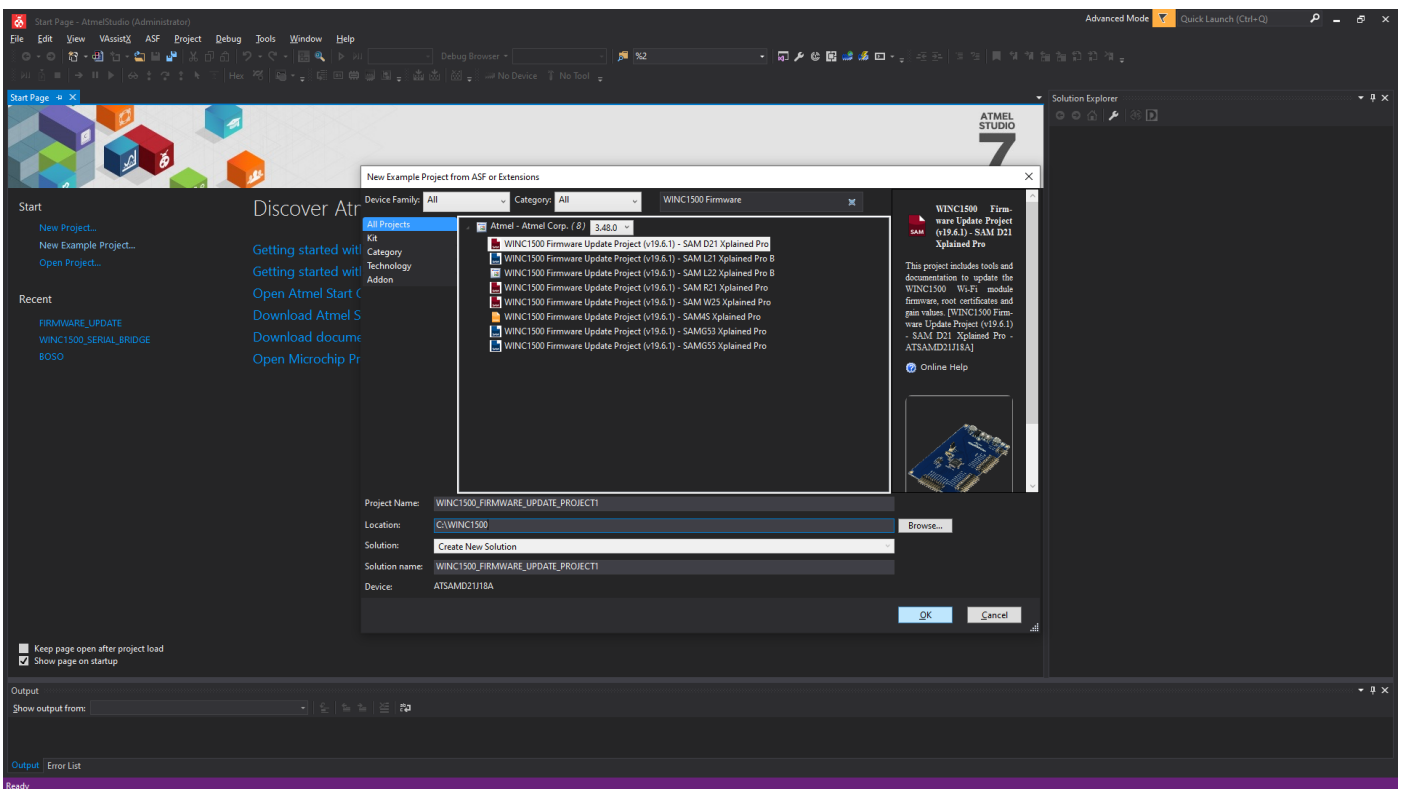
- Click "New Example Project"



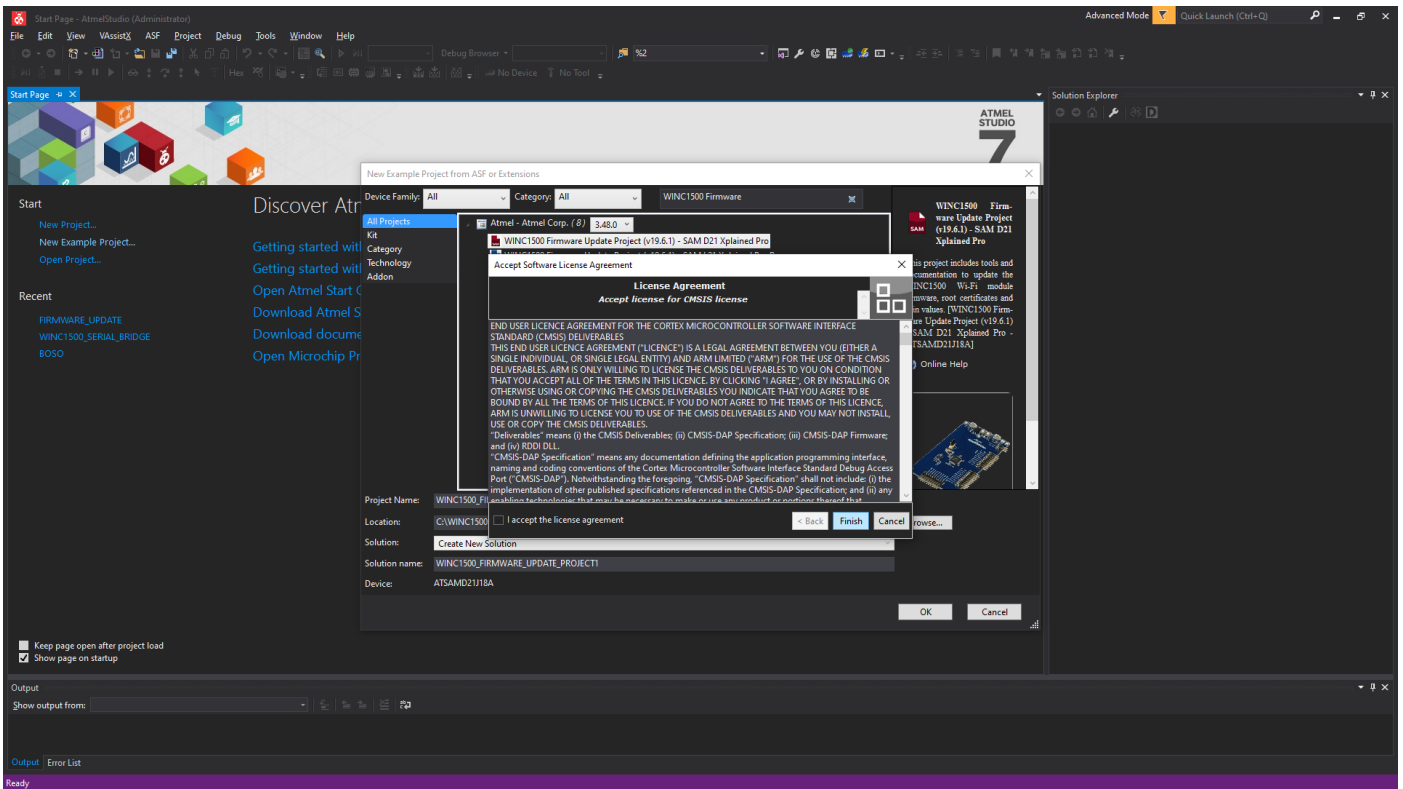
- Select the framework version, enter a project name & location to save to



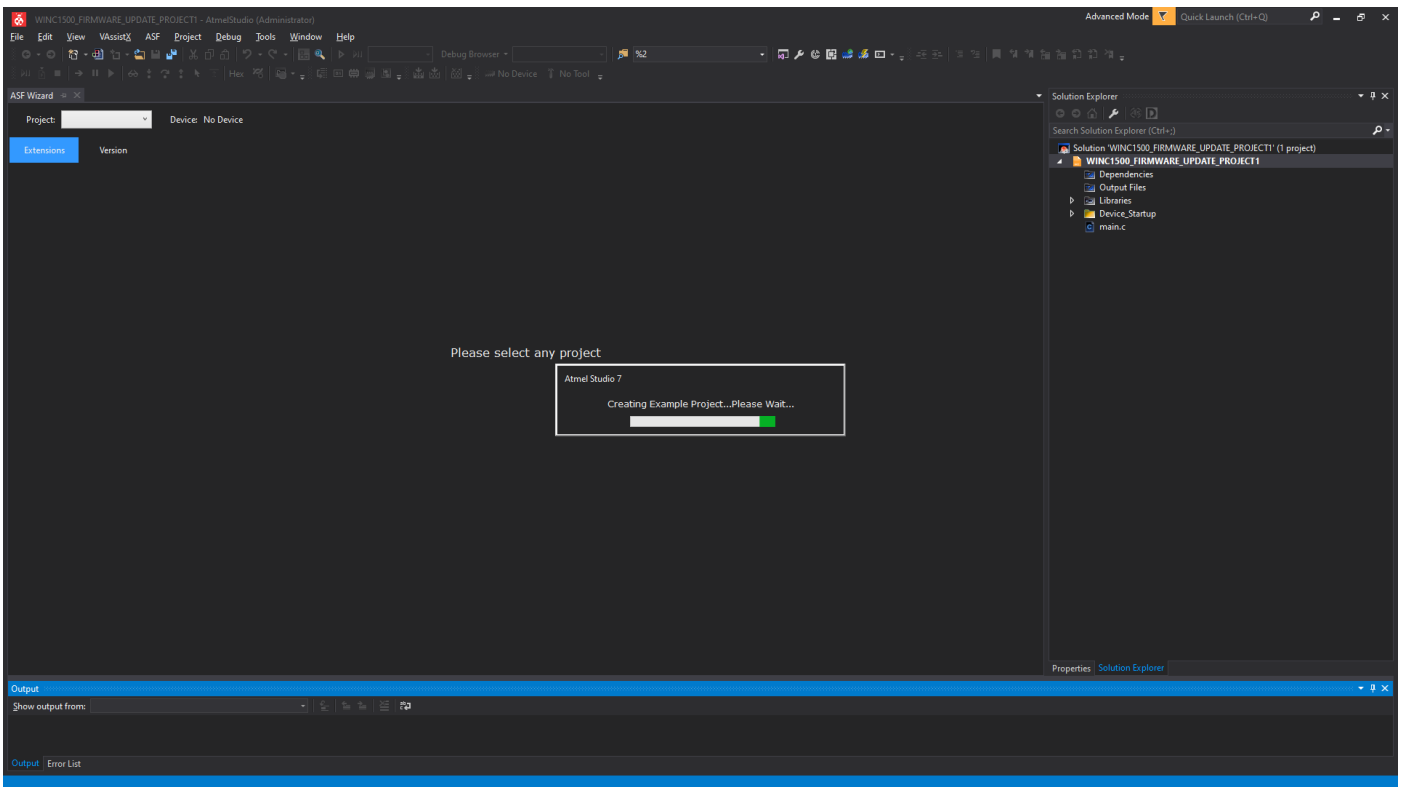
- In the search box type “WINC1500 Firmware” then select the SAM D21 Xplained Pro option (don’t worry this creates a blank project with all the required firmware, documents & batch files)



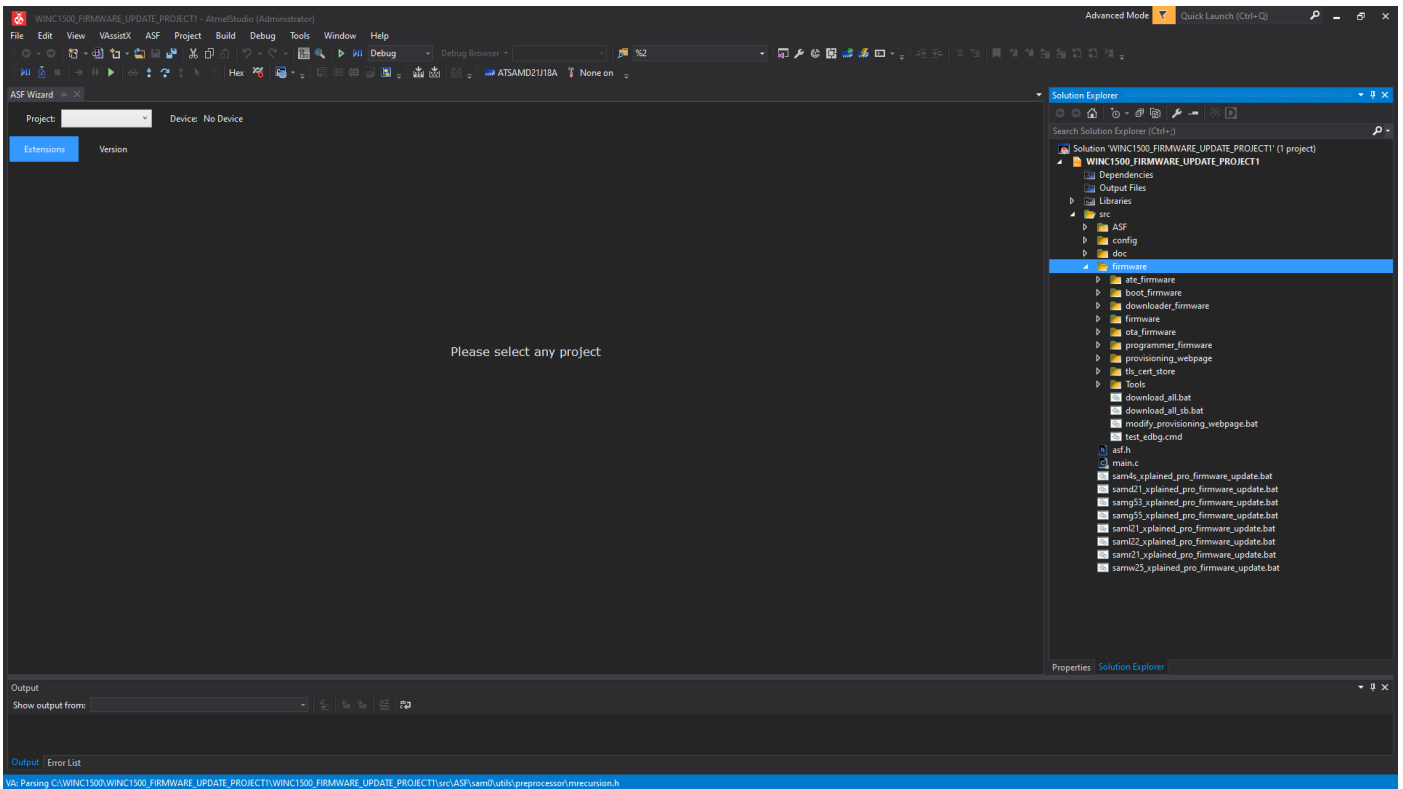
- Accept the license agreement



- Wait for the project to be created



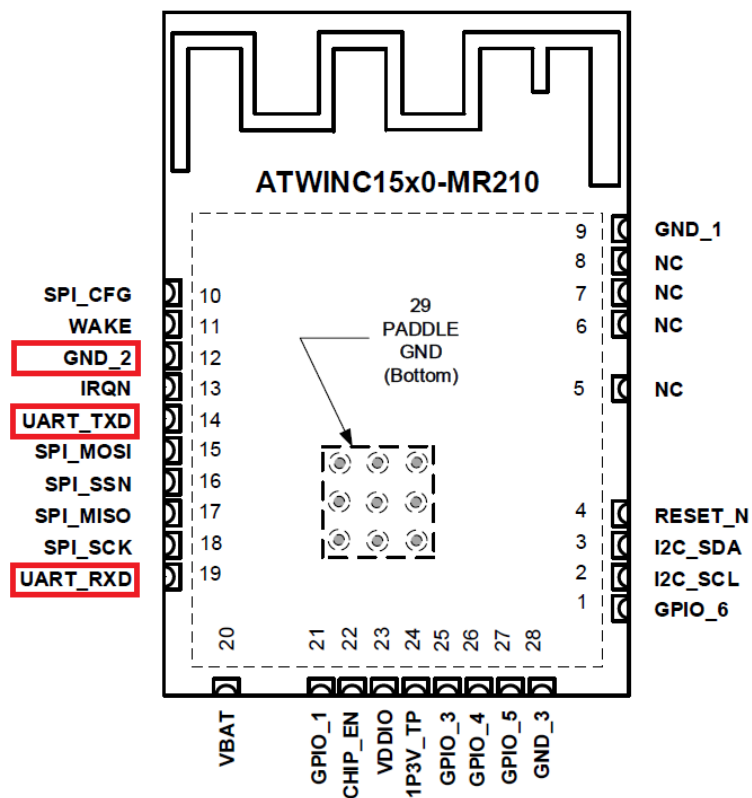
- Navigate on the PC and COPY the entire folder named “firmware” highlighted below to your “C:\” directory as is

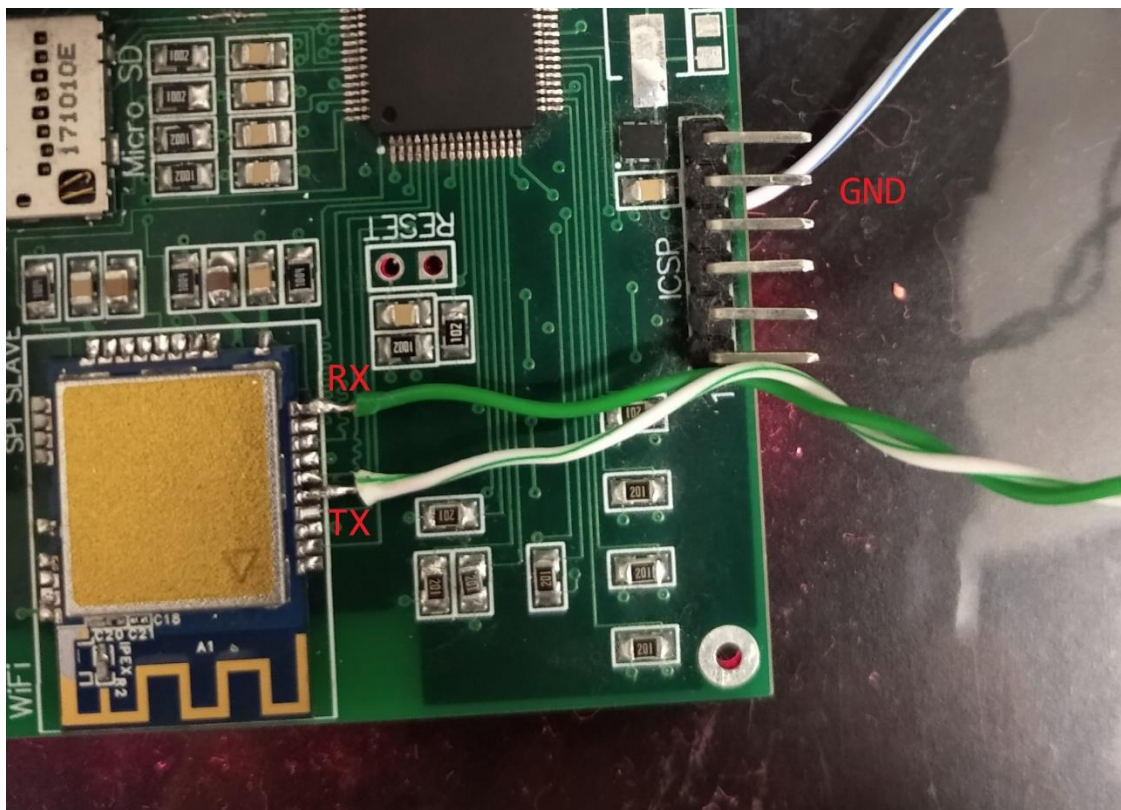
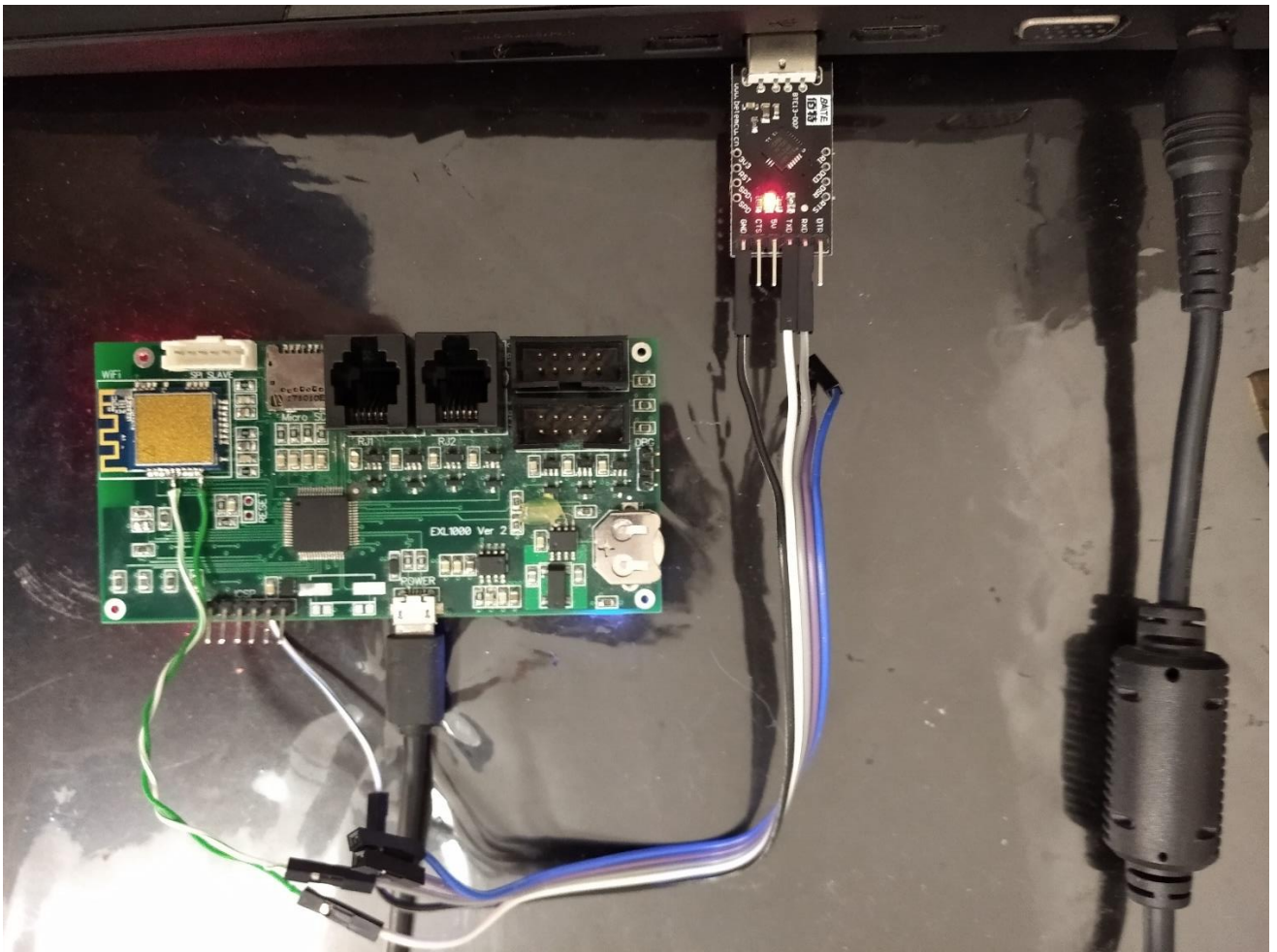


Module comms & power

- The WINC1500 module needs to be connected to the PC via a USB to TTL UART Serial converter (Eg: CP2102)
- USB converter must be set up for 115200, N, 8, 1 on the PC
- May need to remove any other COM devices plugged into PC
- Connect to the PC using three wires (indicated below)
 - o UART_RXD
 - o UART TXD
 - o GND

- The module must be powered correctly with 3.3v to all relevant power & ALL ground pins
- The “WAKE” pin kept high from power up (if controlled by host MCU)





Execute RESET sequence before flashing

- The WINC1500 module must be in the correct state to allow firmware upgrading
- Reportedly some user “just left CHIP_EN high all the time, reset the board, didn't do the last sequence as it requires an MCU, both the firmware and cert upgrade passed”
- The functional code below indicates the timing of the respective signals

```
void WINC1500_Reset_Seq(void)
{
    WIFI_ENABLE_Clear();
    WIFI_RESET_Clear();

    vTaskDelay(1);      // 1mSec Delay

    WIFI_ENABLE_Set();

    vTaskDelay(10);    // 10mSec Delay

    WIFI_RESET_Set();
}
```

Run upgrade batch file

- In Windows open a "Command Prompt" and be sure to run as administrator
- Ensure the steps above were followed correctly and the generated "firmware" was copied to the "c:\\"
- Type "c:\firmware>download_all.bat UART SAMD21 3A0 0 0" then press "enter"

Runs autonomously without any user intervention. Below are the logs of a successful upgrade.

```
c:\firmware>download_all.bat UART SAMD21 3A0 0 0
```

```
Defaulting to RSA key cert pair @ and
```

```
Defaulting to ECDSA certificate @
```

```
Mode UART
```

```
Chip 3A0
```

```
Downloading Image... (pod 0) (comport )
```

```
image_downloader.exe -no_wait -aardvark 0 -vflash_path ../../vflash_image_downloader.bin -bf_bin
```

```
../../boot_firmware/release3A0/boot_firmware.bin -pf_bin
```

```
../../programmer_firmware/release3A0/programmer_firmware.bin -df_bin
```

```
../../downloader_firmware/release3A0/downloader_firmware.bin -fw3a0_path
```

```
../../firmware/m2m_aio_3a0.bin
```

```
*****
```

```
* >Programmer for WINC1500 SPI Flash< *
```

```
* Owner: Atmel Corporation *
```

```
*****
```

```
SVN REV 16761 SVN BR branches/rel_1500_19.6.1
```

```
Built at May 23 2018 14:34:49
```

```
Virtual Flash Path ../../vflash_image_downloader.bin
```

```
Firmware Path (3A0) ../../firmware/m2m_aio_3a0.bin
```

```
>>Initialize programmer.
```

```
Detecting ports...
```

```
(APP)(INFO)Built-in WINC1500 UART Found
```

```
Avail port COM4
```

```
1 of ports found
```

```
(APP)(INFO)Built-in WINC1500 UART Found
```

```
Chip id 1503a0
```

```
>Waiting for chip permission...
```

```
OK.
```

```
Flash ID c21320c2
```

```
(APP)(INFO)Flash Size 4 Mb
```

```
>>Loading this FW: ../../firmware/m2m_aio_3a0.bin
```

```
----- NOW Programming Firmware Image Version -----
```

```
Firmware ver : 19.6.1 Svnrev 16761
```

```
Min driver ver : 19.3.0
```

```
Firmware Build May 23 2018 Time 14:39:16
```

```
----- Previous Firmware Image Version -----
```

```
Firmware ver : 19.4.4 Svnrev 0
```

```
Min driver ver : 19.3.0
```

```
Firmware Build Nov 19 2015 Time 22:36:45
```

```
WINC1500 Firmware Upgrade
```

>Start erasing...

Done

#Erase time = 1.641000 sec

>Start programming...

Done

#Programming time = 20.172000 sec

(APP)(INFO)----- BEGIN EFUSE DUMP -----

(APP)(INFO)(Efuse)Ver = 0,bank idx = 0,used = 1,invalid = 0

(APP)(INFO)(Efuse)Valid = 1,MAC = xxxxxxxxxxxxxxxxxxxx

(APP)(INFO)(Efuse)Valid = 0,PATxGainCorr = 00

(APP)(INFO)(Efuse)Valid = 1,FreqOffset = 0000

(APP)(INFO)----- END EFUSE DUMP -----

>>Image downloaded successfully.

(APP)(INFO)----- BEGIN EFUSE DUMP -----

(APP)(INFO)(Efuse)Ver = 0,bank idx = 0,used = 1,invalid = 0

(APP)(INFO)(Efuse)Valid = 1,MAC = xxxxxxxxxxxxxxxxxxxx

(APP)(INFO)(Efuse)Valid = 0,PATxGainCorr = 00

(APP)(INFO)(Efuse)Valid = 1,FreqOffset = 0000

(APP)(INFO)----- END EFUSE DUMP -----

No nEfuse correction applied.

Saving vflash to ../../vflash_image_downloader.bin

>>This task finished after 22.45 sec

1 file(s) copied.

Downloading Gain Values...

```
gain_builder.exe -table 1 ../gain_sheets/atwinc1500_mr210pb_gain_setting.csv -index 1 -aardvark 0 -
vflash_path ../../vflash_gain_builder.bin -bf_bin ../../boot_firmware/release3A0/boot_firmware.bin -pf_bin
../../programmer_firmware/release3A0/programmer_firmware.bin -df_bin
../../downloader_firmware/release3A0/downloader_firmware.bin -no_wait
```

* >TX Gain Builder for WINCxxxx < *

* Owner: Atmel Corporation *

SVN REV 16761 SVN BR branches/rel_1500_19.6.1

Built at May 23 2018 14:33:35

Virtual Flash Path ../../vflash_gain_builder.bin

>>Init Programmer

Detecting ports...

(APP)(INFO)Built-in WINC1500 UART Found

Avail port COM4

1 of ports found

(APP)(INFO)Built-in WINC1500 UART Found

Chip id 1503a0

>Waiting for chip permission...

OK.

Flash ID c21320c2

(APP)(INFO)Flash Size 4 Mb

WINC1500 Firmware Upgrade

Reading vflash from ../../vflash_gain_builder.bin
 Active gain table index = 1
 Setting file has been opened:
 "../gain_sheets/atwinc1500_mr210pb_gain_setting.csv"
 Initializing values
 >Extracting data from file...
 Done
 >Building tables...
 Done

Table - 1							
CH/REG	00001240	00001244	00001248	0000124C	00001250	00001254	00001258
01	01200143	00000101	00000000	00000000	11110000	22221111	00002222
02	01C9016B	01430197	00000000	00000000	11110000	11110211	00003021
03	01C9016B	00000197	00000000	00000000	11110000	11110211	00000221
04	01C9016B	00000197	00000000	00000000	11110000	11110211	00000211
05	01C9016B	00000197	00000000	00000000	11110000	11112211	00000211
06	01C9016B	00000197	00000000	00000000	11110000	11112211	00000211
07	01C9016B	00000197	00000000	00000000	11110000	11112211	00000211
08	01C9016B	00000197	00000000	00000000	11110000	11112211	00000211
09	01C9016B	00000197	00000000	00000000	11110000	11112211	00000211
10	01C9016B	00000197	00000000	00000000	11110000	11112211	00000211
11	016B0143	00000197	00000000	00000000	11110000	00001211	00000000
12	01C9016B	00000197	00000000	00000000	11110000	11112211	00000211
13	01C9016B	00000197	00000000	00000000	11110000	11112211	00000211
14	01C9016B	00000197	00000000	00000000	11110000	11112211	00000211

>Reading data...
 Done.
 >Start erasing...
 Done
 #Erase time = 0.047000 sec
 >Start programming...
 Done
 #Programming time = 0.218000 sec

TX Gain values have been downloaded successfully.
 Saving vflash to ../../vflash_gain_builder.bin

>>This task finished after 0.72 sec
 1 file(s) copied.

Downloading TLS Client RSA Certificate Materials...

 * WINC1500 TLS Certificate Flash Tool *

Reading vflash from ../../vflash_tls_cert_flash_tool.bin
 Detecting ports...
 (APP)(INFO)Built-in WINC1500 UART Found

WINC1500 Firmware Upgrade

```

Avail port COM4
1 of ports found
(APP)(INFO)Built-in WINC1500 UART Found
Chip id 1503a0
>Waiting for chip permission...
OK.
TLS Certificate Store Update Success on Flash
Saving vflash to ../../vflash_tls_cert_flash_tool.bin
Downloading TLS Client ECDSA Certificate Materials...
*****
* WINC1500 TLS Certificate Flash Tool *
*****
Reading vflash from ../../vflash_tls_cert_flash_tool.bin
Detecting ports...
(APP)(INFO)Built-in WINC1500 UART Found
Avail port COM4
1 of ports found
(APP)(INFO)Built-in WINC1500 UART Found
Chip id 1503a0
>Waiting for chip permission...
OK.
Detecting ports...
(APP)(INFO)Built-in WINC1500 UART Found
Avail port COM4
1 of ports found
(APP)(INFO)Built-in WINC1500 UART Found
Chip id 1503a0
>Waiting for chip permission...
OK.
TLS Certificate Store Update Success on Flash
Saving vflash to ../../vflash_tls_cert_flash_tool.bin
1 file(s) copied.
Downloading root certificates...
root_certificate_downloader.exe -n 12 ..\binary\BaltimoreCyberTrustRoot.cer ..\binary\DigiCert.cer
..\binary\DigiCertSHA2.cer ..\binary\EnTrust.cer ..\binary\GeoTrust.cer ..\binary\GlobalSignRoot.cer
..\binary\GlobalSignRoot2.cer ..\binary\GTSGIAG3.cer ..\binary\NMA_Root.cer ..\binary\PROWL_Root.cer
..\binary\QuoVadis_Root.cer ..\binary\VeriSign.cer -no_wait -aardvark 0 -vflash_path
../../vflash_root_certificate_downloader.bin -bf_bin ../../boot_firmware/release3A0/boot_firmware.bin -
pf_bin ../../programmer_firmware/release3A0/programmer_firmware.bin -df_bin
../../downloader_firmware/release3A0/downloader_firmware.bin -e
*****
* > WINC1500 Root Certificate Flash Downloader < *
*****
SVN REV 16761 SVN BR branches/rel_1500_19.6.1
Built at May 23 2018 14:35:53
Virtual Flash Path ../../vflash_root_certificate_downloader.bin
Detecting ports...
(APP)(INFO)Built-in WINC1500 UART Found
Avail port COM4
1 of ports found
(APP)(INFO)Built-in WINC1500 UART Found
WINC1500 Firmware Upgrade

```

Chip id 1503a0
>Waiting for chip permission...
OK.
Flash ID c21320c2
(APP)(INFO)Flash Size 4 Mb
Reading vflash from ../../vflash_root_certificate_downloader.bin
>Start erasing...
Done
#Erase time = 0.063000 sec

>>>Found Certificate:
>>> Baltimore CyberTrust Root
>Start erasing...
Done
#Erase time = 0.031000 sec
>Writing the certificate to SPI flash...
>Start programming...
Done
#Programming time = 0.218000 sec

Done

>>>Found Certificate:
>>> DigiCert High Assurance EV Root CA
>Start erasing...
Done
#Erase time = 0.047000 sec
>Writing the certificate to SPI flash...
>Start programming...
Done
#Programming time = 0.219000 sec

Done

>>>Found Certificate:
>>> DigiCert SHA2 High Assurance Server CA
>Start erasing...
Done
#Erase time = 0.047000 sec
>Writing the certificate to SPI flash...
>Start programming...
Done
#Programming time = 0.234000 sec

Done

>>>Found Certificate:
>>> Entrust Root Certification Authority
>Start erasing...
Done
#Erase time = 0.062000 sec

WINC1500 Firmware Upgrade

>Writing the certificate to SPI flash...
>Start programming...
Done
#Programming time = 0.234000 sec

Done

>>>Found Certificate:
>>> GeoTrust Global CA
>Start erasing...
Done
#Erase time = 0.047000 sec
>Writing the certificate to SPI flash...
>Start programming...
Done
#Programming time = 0.234000 sec

Done

>>>Found Certificate:
>>> GlobalSign Root CA
>Start erasing...
Done
#Erase time = 0.063000 sec
>Writing the certificate to SPI flash...
>Start programming...
Done
#Programming time = 0.218000 sec

Done

>>>Found Certificate:
>>> GlobalSign
>Start erasing...
Done
#Erase time = 0.062000 sec
>Writing the certificate to SPI flash...
>Start programming...
Done
#Programming time = 0.219000 sec

Done

>>>Found Certificate:
>>> Google Internet Authority G3
>Start erasing...
Done
#Erase time = 0.047000 sec
>Writing the certificate to SPI flash...
>Start programming...
Done

#Programming time = 0.218000 sec

Done

>>>Found Certificate:

>>> AddTrust External CA Root

>Start erasing...

Done

#Erase time = 0.047000 sec

>Writing the certificate to SPI flash...

>Start programming...

Done

#Programming time = 0.235000 sec

Done

>>>Found Certificate:

>>>

>Start erasing...

Done

#Erase time = 0.046000 sec

>Writing the certificate to SPI flash...

>Start programming...

Done

#Programming time = 0.235000 sec

Done

>>>Found Certificate:

>>> QuoVadis Root CA 2

>Start erasing...

Done

#Erase time = 0.047000 sec

>Writing the certificate to SPI flash...

>Start programming...

Done

#Programming time = 0.250000 sec

Done

>>>Found Certificate:

>>> VeriSign Class 3 Public Primary Certification Authority - G5

>Start erasing...

Done

#Erase time = 0.063000 sec

>Writing the certificate to SPI flash...

>Start programming...

Done

#Programming time = 0.234000 sec

Done

WINC1500 Firmware Upgrade

Ben Emmerich

Rev 1.00.00

25 May 2020

All certificates have been downloaded
Saving vflash to ../../vflash_root_certificate_downloader.bin

>>This task finished after 6.19 sec
Readback flash... (pod 0) (comport)
image_cloner.exe -no_wait -span 524288 -aardvark 0 -out_path ../../readback_flash.bin

* >Programmer for WINC1500 SPI Flash< *
* Owner: Atmel Corporation *

SVN REV 16761 SVN BR branches/rel_1500_19.6.1
Built at May 23 2018 14:35:16
File to save copy of flash path ../../readback_flash.bin

>>Initialize programmer.
Detecting ports...
(APP)(INFO)Built-in WINC1500 UART Found
Avail port COM4
1 of ports found
(APP)(INFO)Built-in WINC1500 UART Found
Chip id 1503a0
>Waiting for chip permission...
OK.
Flash ID c21320c2
(APP)(INFO)Flash Size 4 Mb
Retrieving flash image... ../../readback_flash.bin
Wrote flash image to ../../readback_flash.bin

Verifying...
***** Flash programming verified OK *****
***** Download worked *****

OK

#####

Downloading ends successfully
Press any key to continue . . .

c:\firmware>