

# UEFI & EDK II Training

Platform Build Lab – Windows – UP Squared

[tianocore.org](http://tianocore.org)



# PLATFORM BUILD LABS

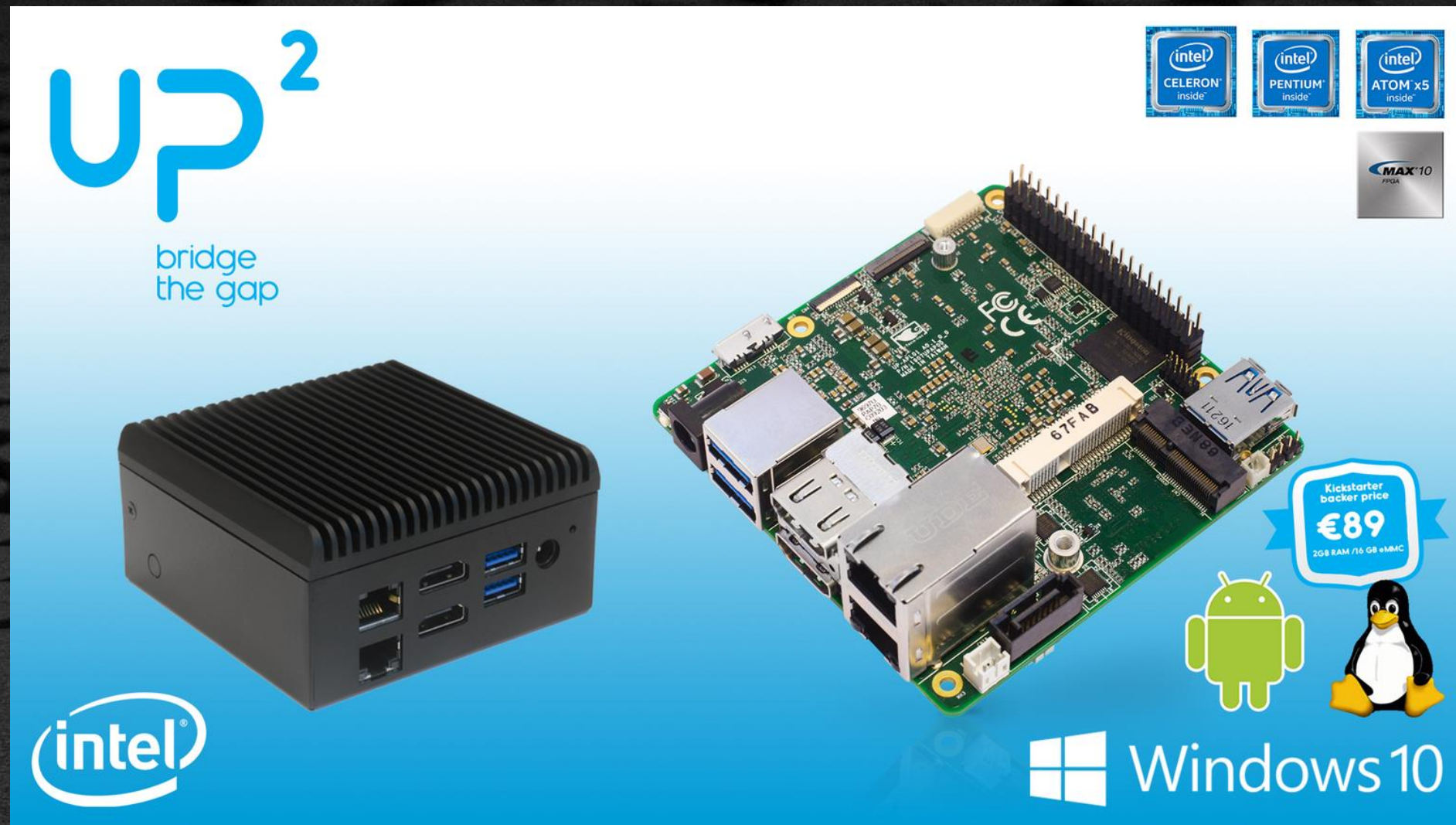
-  Hardware Setup for UP Squared
-  Build a EDK II Platform using UP Squared

# PLATFORM HW SETUP

Setup hardware for the Broxton - UP Squared



# EDK II PLATFORM (UP SQUARED)



Intel® Celeron™ processor N3350 Series  
(Formerly Apollo Lake)

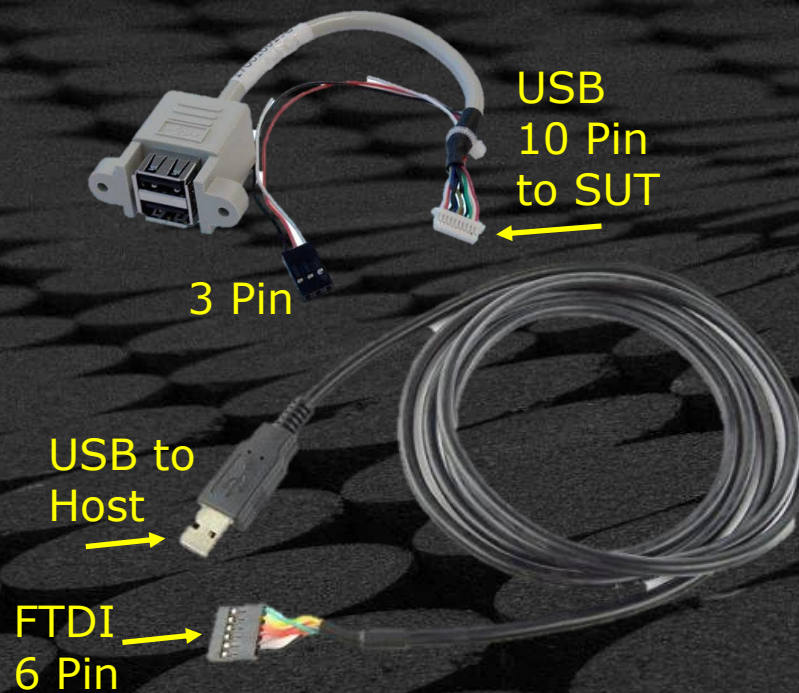
Available from [Aaeon](#)  
order at: [here](#)



# UP SQUARED WORKSHOP LAB HARDWARE



FTDI & USB Cables



5V\*\* Power Supply



USB thumb drive



**\*\*Warning do not use any other power supply than 5V or the board will Fry**



# INSTRUCTIONS FOR LAB MATERIALS

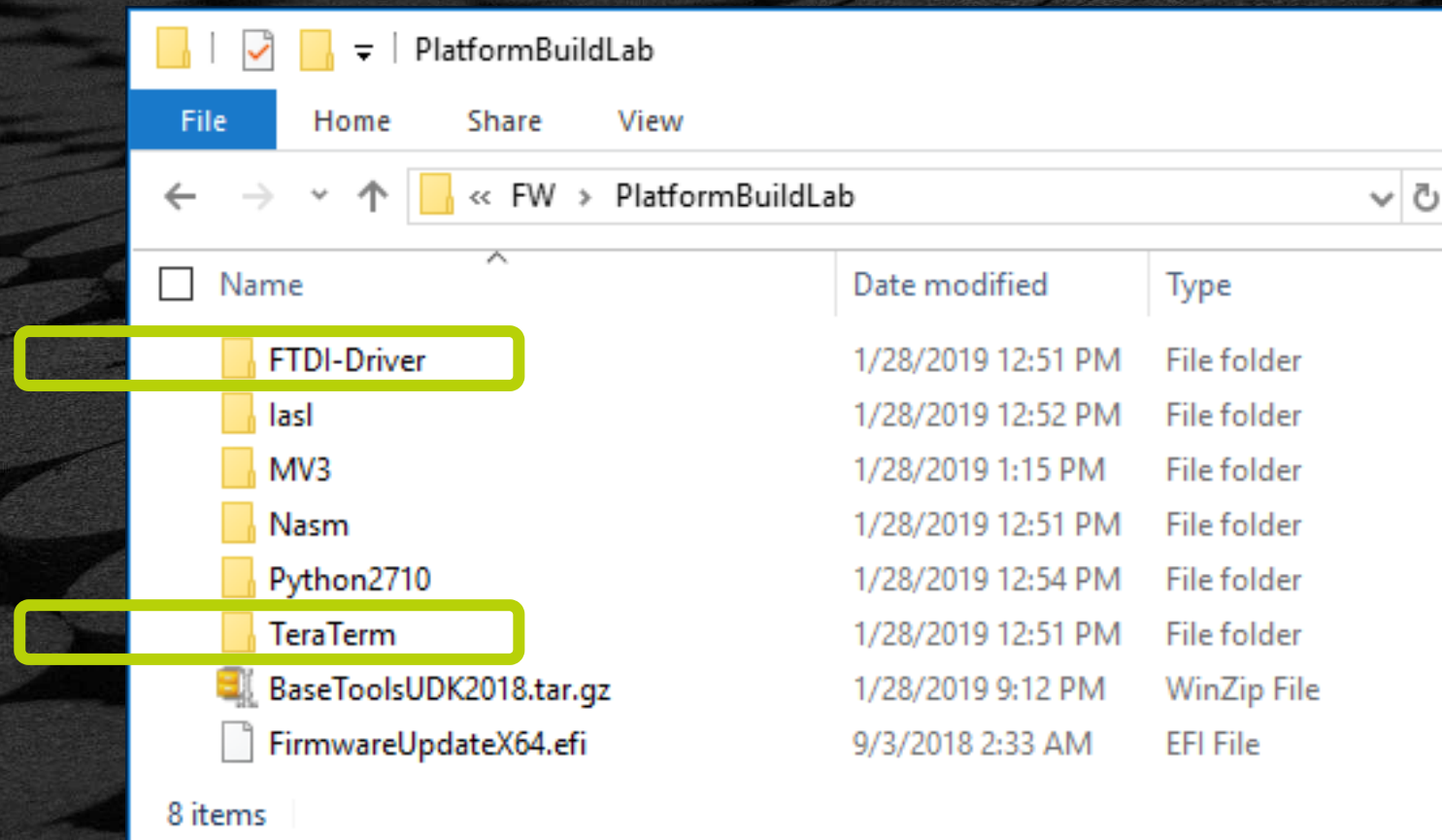
Directory C:\PlatformBuildLab\_UP2\_FW\FW\PlatformBuildLab

FTDI Driver for Serial UART Cable (COM Port)

<http://www.ftdichip.com/FTDrivers.htm>

TeraTerm (terminal software for COM Port)

<https://en.osdn.jp/projects/ttssh2/releases/>





# Setup UP Squared Test System

## Hardware:

- System Under Test (SUT) – UP Squared
- FTDI USB to 3.3V TTL Cable (6 pin)
- USB / Uart EP-CBUSB10PFL01 (3 pin & 10 pin)
- 5V 6 amp power supply
- 3 jumper wires (black, red, white)

Connect the USB 10 pin header to SUT

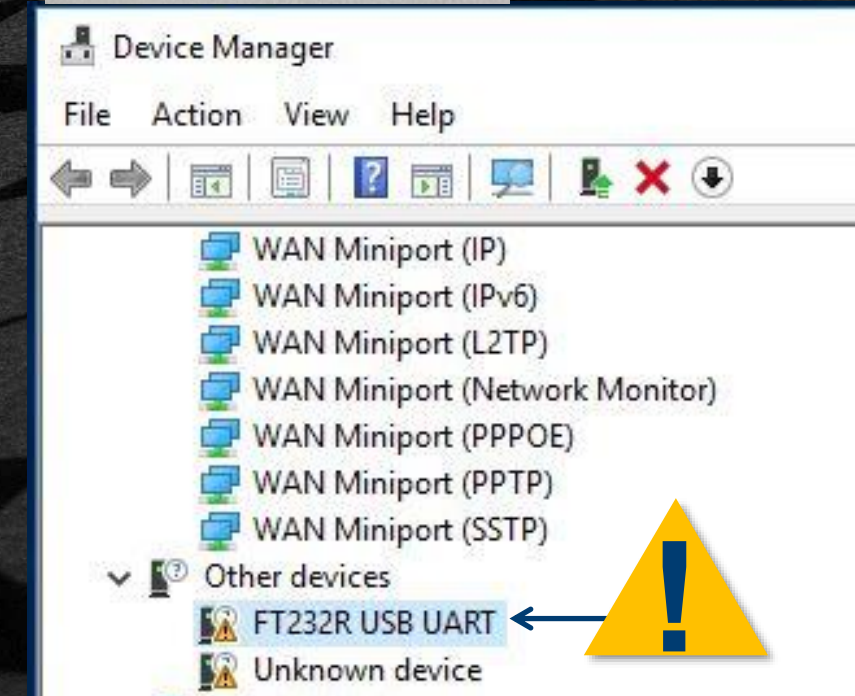
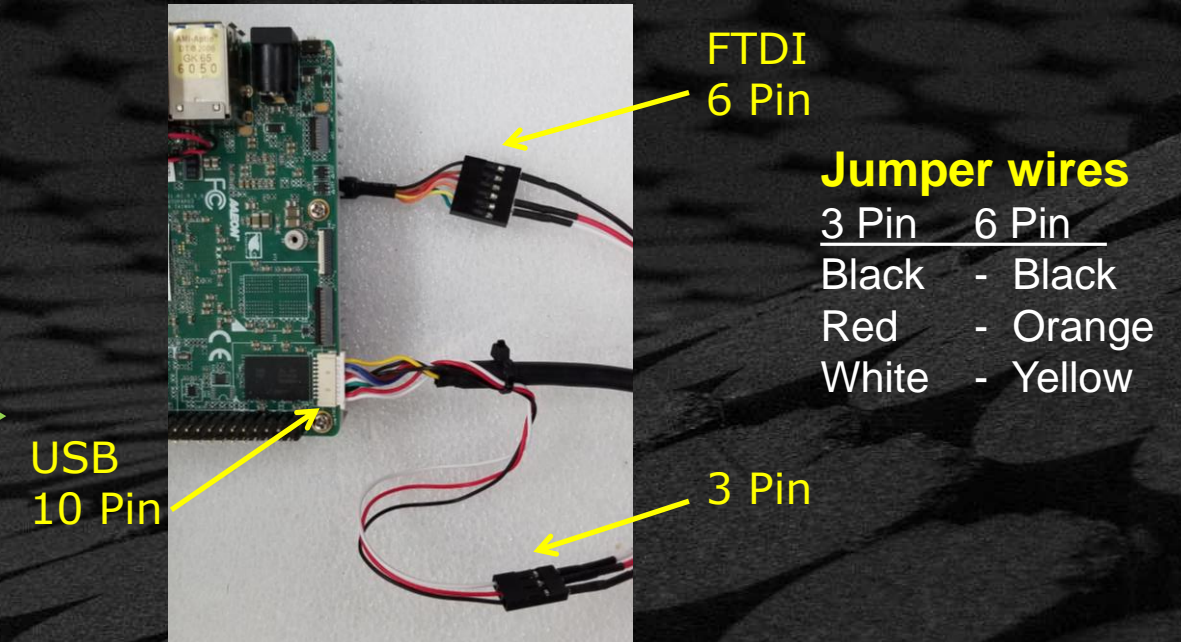


Connect the FTDI USB w/ 6 pin to 3 pin connector using jumper wires

Connect the FTDI USB Type A connector to Host (Laptop)

On your Host Go to the “**Device Manager**” in the control panel.


Under the “**Other devices**” category you will see a yellow ⚠ with a warning icon next to it.





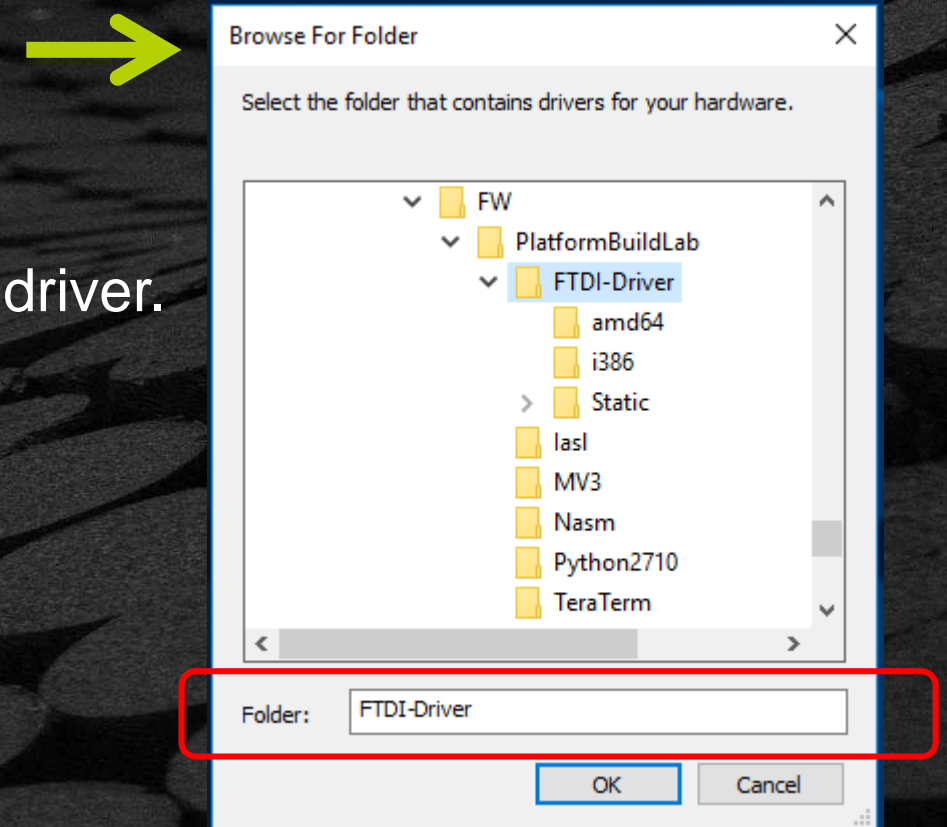
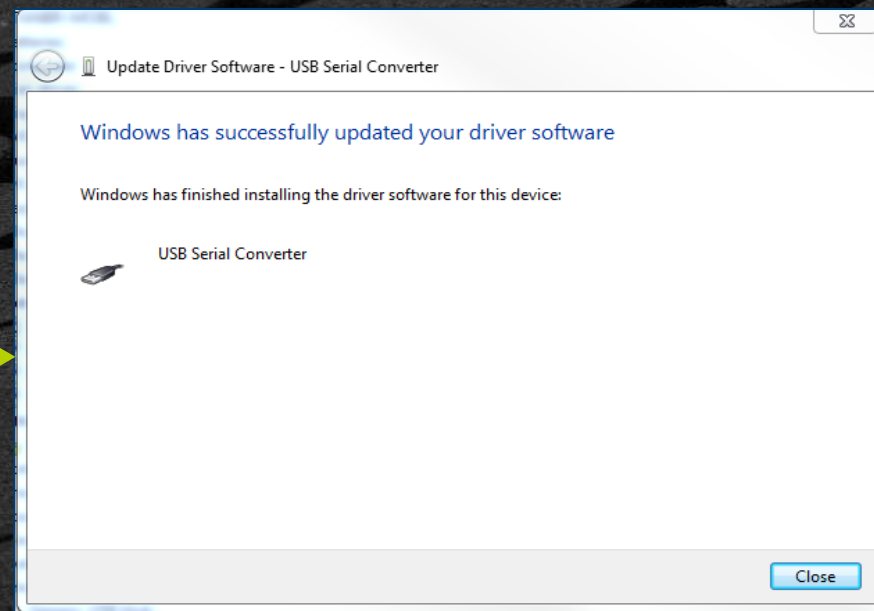
# Install the FTDI Device Driver on Host

**SKIP** if you have the FTDI Device driver already installed

- Right click yellow  and select "Update Driver Software" from the **Device Manager** menu
- Select "Browse my computer for driver software".
- Click the **Browse** button. – Click ☒ on "Include subfolders"
- Browse to the location of the folder you unzipped earlier for the FIDI driver.
- Click on the folder and press **OK**.

- Press **Next**.

Driver will be installed



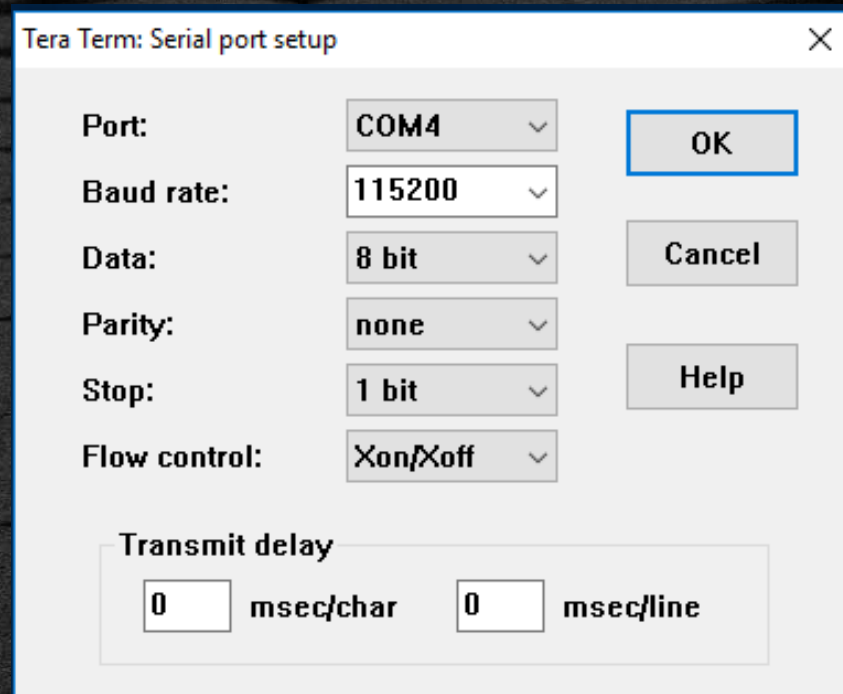


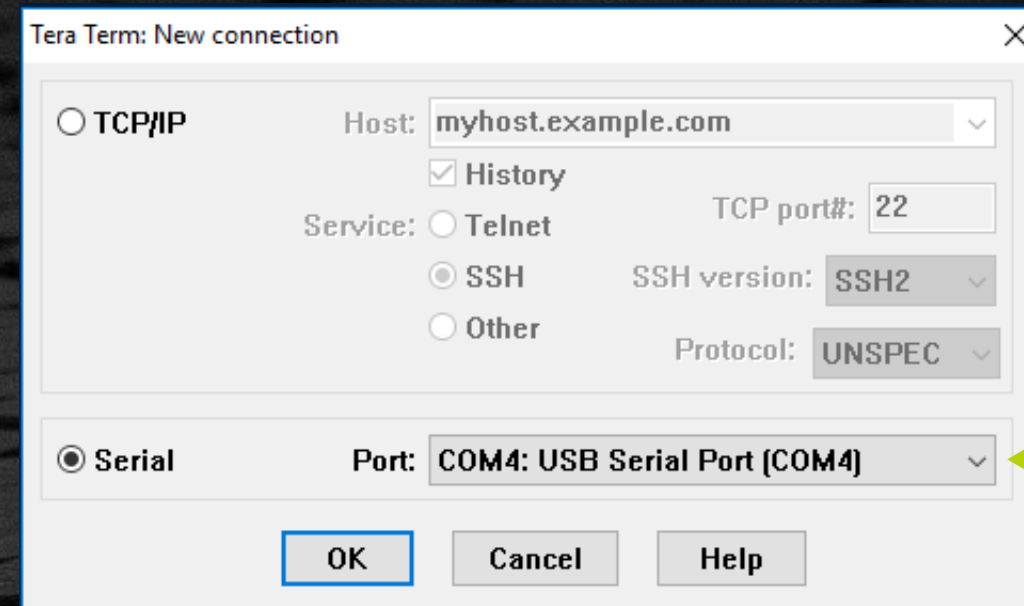
# Setup TeraTerm

Unzip and Install TeraTerm

Open TeraTerm Software

Select the serial port assigned




Choose the correct COM Port number

Go to **Setup->Serial Port** and set the following:

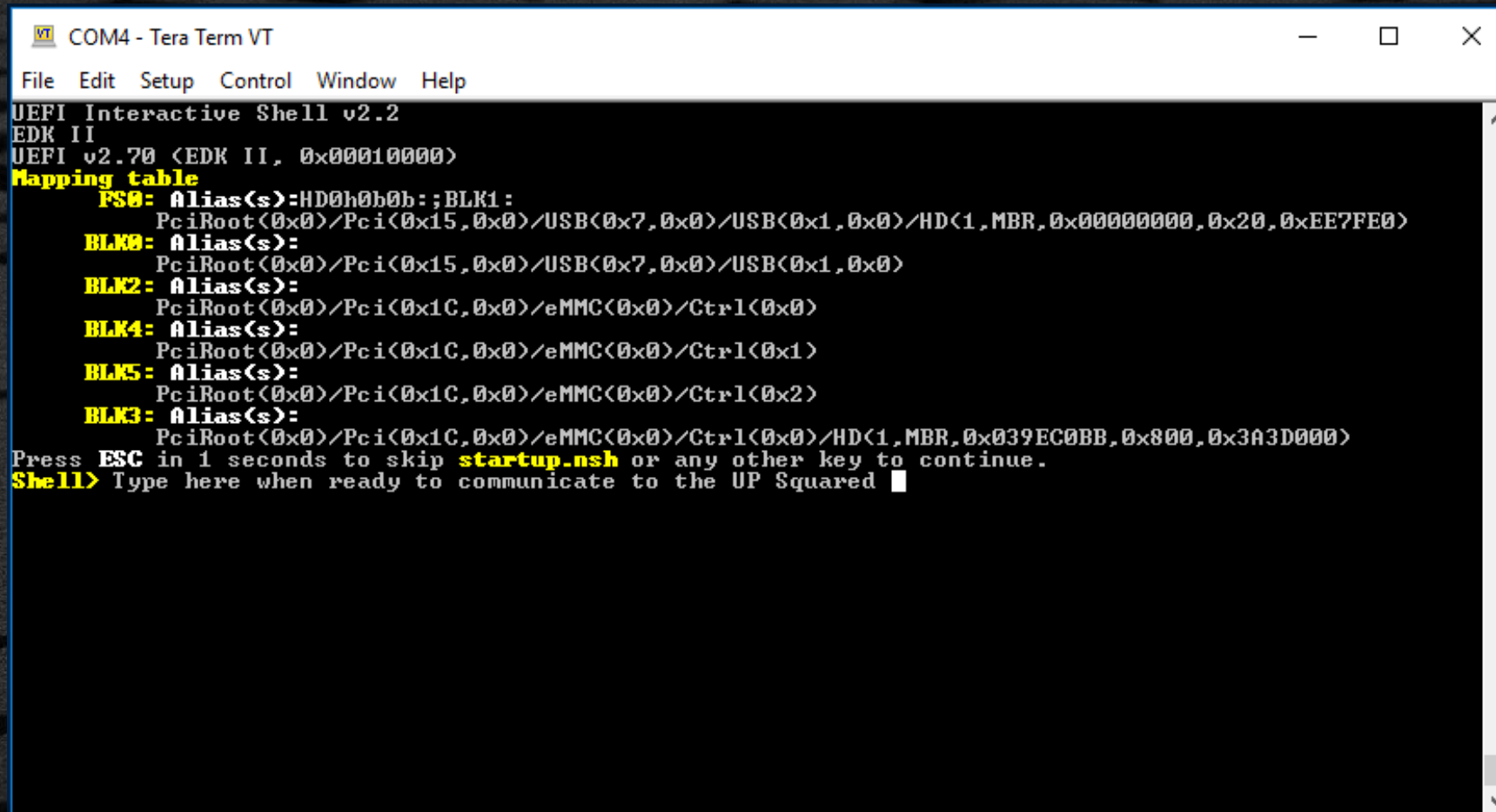
- Baud: 115200
- Parity: None
- Data Bits: 8
- Stop Bits: 1
- Flow Control: Xon/Xoff



# POWER ON UP SQUARED

Connect the Power supply cable to the UP Squared board

UP Squared should boot to the UEFI Shell in the TeraTerm window.



```
COM4 - Tera Term VT
File Edit Setup Control Window Help
UEFI Interactive Shell v2.2
EDK II
UEFI v2.70 (EDK II, 0x00010000)
Mapping table
  PS0: Alias(s):HD0h0b0b:;BLK1:
      PciRoot(0x0)/Pci(0x15,0x0)/USB(0x7,0x0)/USB(0x1,0x0)/HD(1,MBR,0x00000000,0x20,0xEE7FE0)
  BLK0: Alias(s):
      PciRoot(0x0)/Pci(0x15,0x0)/USB(0x7,0x0)/USB(0x1,0x0)
  BLK2: Alias(s):
      PciRoot(0x0)/Pci(0x1C,0x0)/eMMC(0x0)/Ctrl(0x0)
  BLK4: Alias(s):
      PciRoot(0x0)/Pci(0x1C,0x0)/eMMC(0x0)/Ctrl(0x1)
  BLK5: Alias(s):
      PciRoot(0x0)/Pci(0x1C,0x0)/eMMC(0x0)/Ctrl(0x2)
  BLK3: Alias(s):
      PciRoot(0x0)/Pci(0x1C,0x0)/eMMC(0x0)/Ctrl(0x0)/HD(1,MBR,0x039EC0BB,0x800,0x3A3D000)
Press ESC in 1 seconds to skip startup.nsh or any other key to continue.
Shell> Type here when ready to communicate to the UP Squared
```



# END OF LAB

Return to the Beginning or ➤ to continue

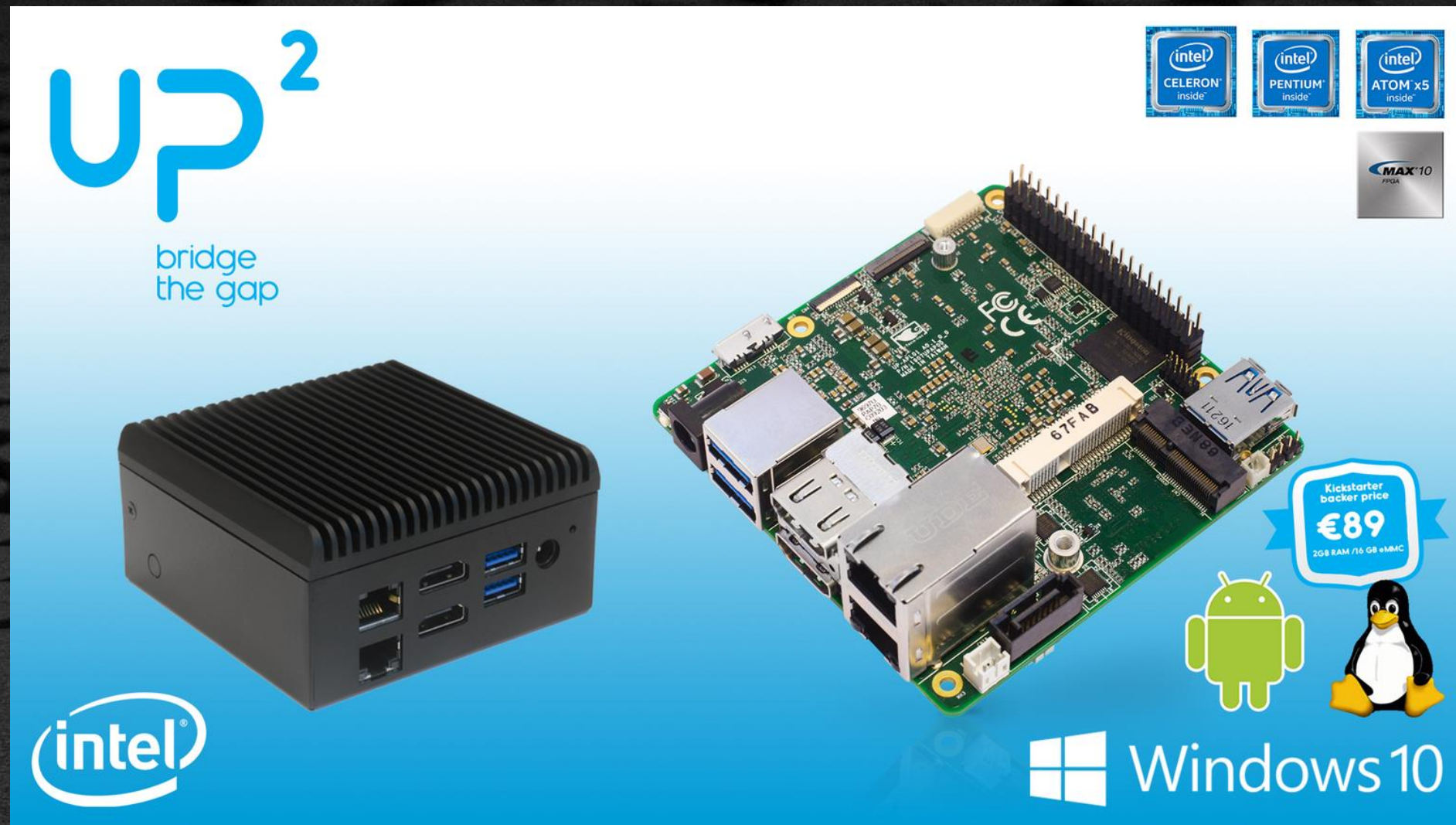




# BUILD UP SQUARED



# EDK II PLATFORM (UP SQUARED)



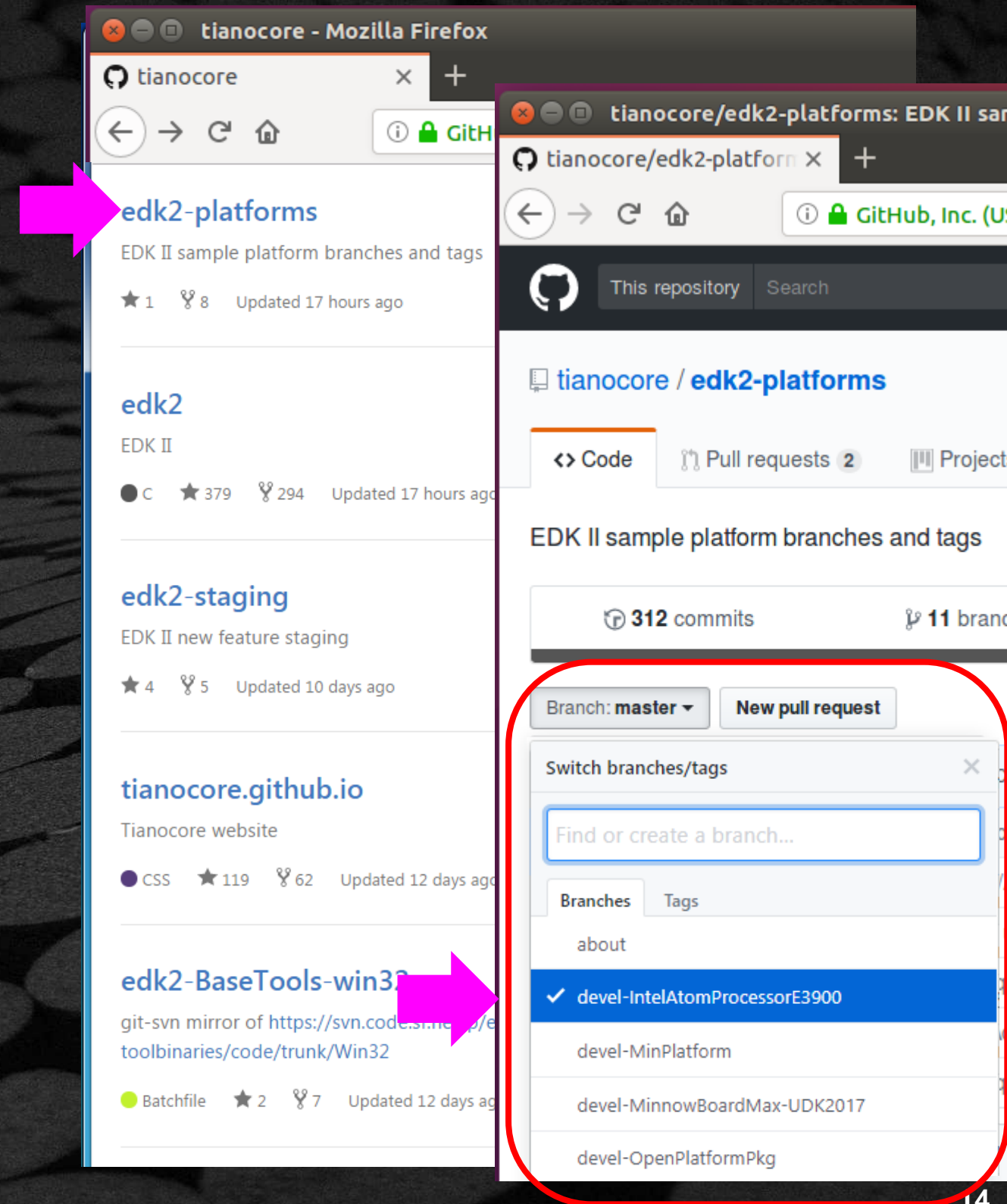
Intel® Celeron™ processor N3350 Series  
(Formerly Apollo Lake)

Available from [Aaeon](#)  
order at: [here](#)



# Where to get Open Source UP Squared

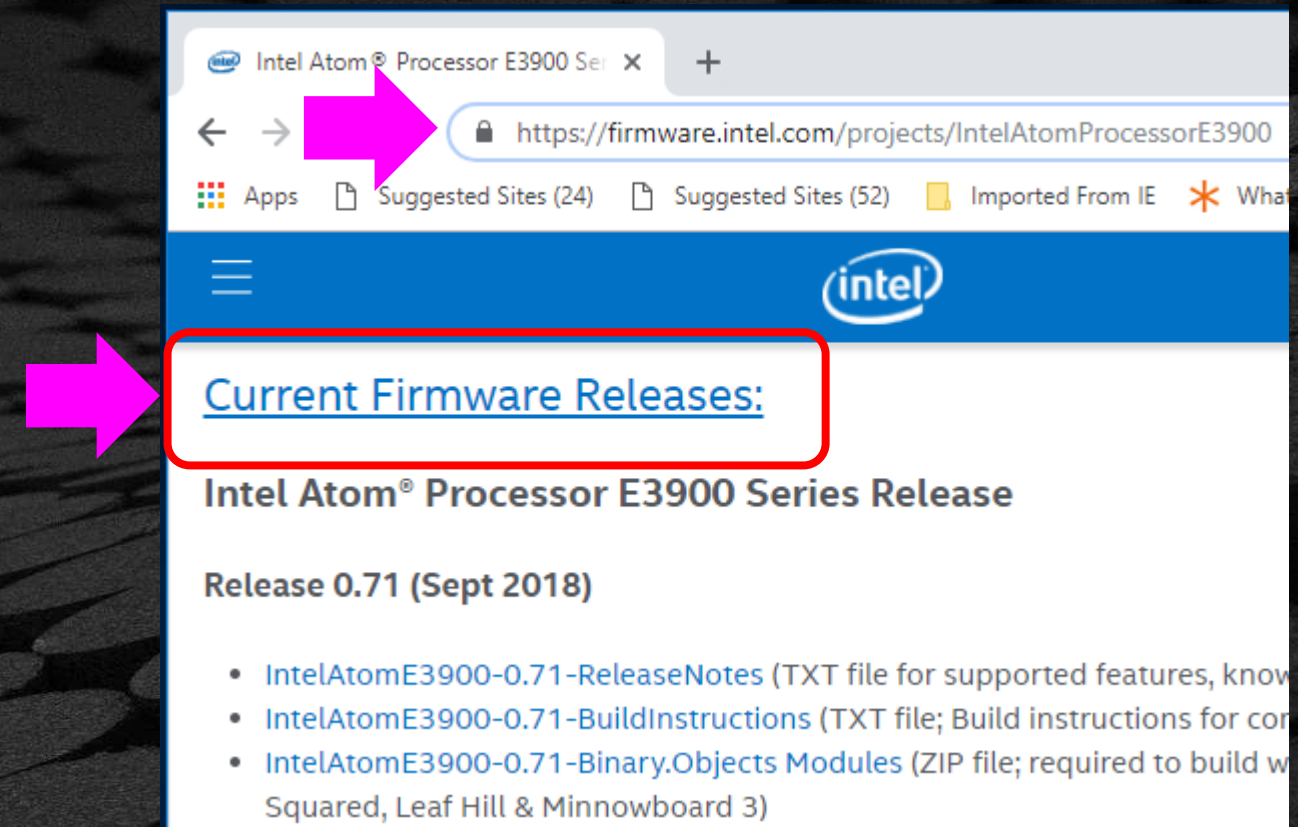
- Open Source Up<sup>2</sup> Wiki
- V .71 - Github Link
- Binary Object Modules  
firmware.intel.com
- How to Build: Release Notes





# Where to get Open Source UP Squared

- Open Source Up<sup>2</sup> Wiki
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firmware.intel.com
- How to Build: Release Notes





# Download UP Squared Lab Source

Download the lab material zip from :  [github.com](https://github.com/tianocore-training/PlatformBuildLab_UP2_FW.zip)  
[PlatformBuildLab\\_UP2\\_FW.zip](https://github.com/tianocore-training/PlatformBuildLab_UP2_FW.zip)

OR

Use git clone to download the PlatformBuildLab\_UP2\_FW

```
C:/> git clone https://github.com/tianocore-training/PlatformBuildLab_UP2_FW.git
```

Directory PlatformBuildLab\_UP\_FW will be created

/FW

/PlatformBuildLab

- |                         |                                  |
|-------------------------|----------------------------------|
| - iasl                  | - Asl Compiler                   |
| - FTDI-Driver           | - Serial / USB cable             |
| - MV3                   | - UP Squared Source for the Labs |
| - FirmwareUpdateX64.efi | - UEFI App to flash              |
| - TeraTerm              | - Terminal app                   |



## Previous Lab Setup Requirements

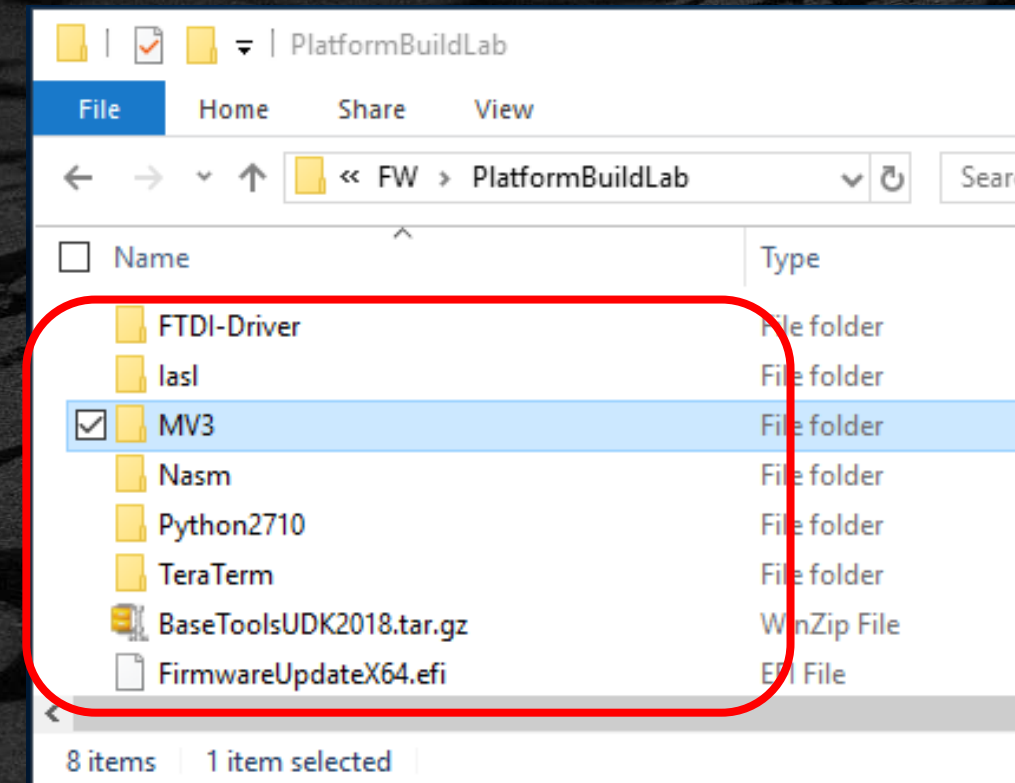
NASM

Copy ...Lab\_Material\_FW\FW\Nasm to C:\

## Additional Lab Setup – .../FW/PlatformBuildLab

Directories

- MV3 – UP Squared Project source code
- iasl – iasl Assembler copy to platform tools
- FTDI-Driver – Driver for Serial/USB Uart cable
- Nasm – Nasm Assembly compiler- Same as previous lab
- TeraTerm – TeraTerm application

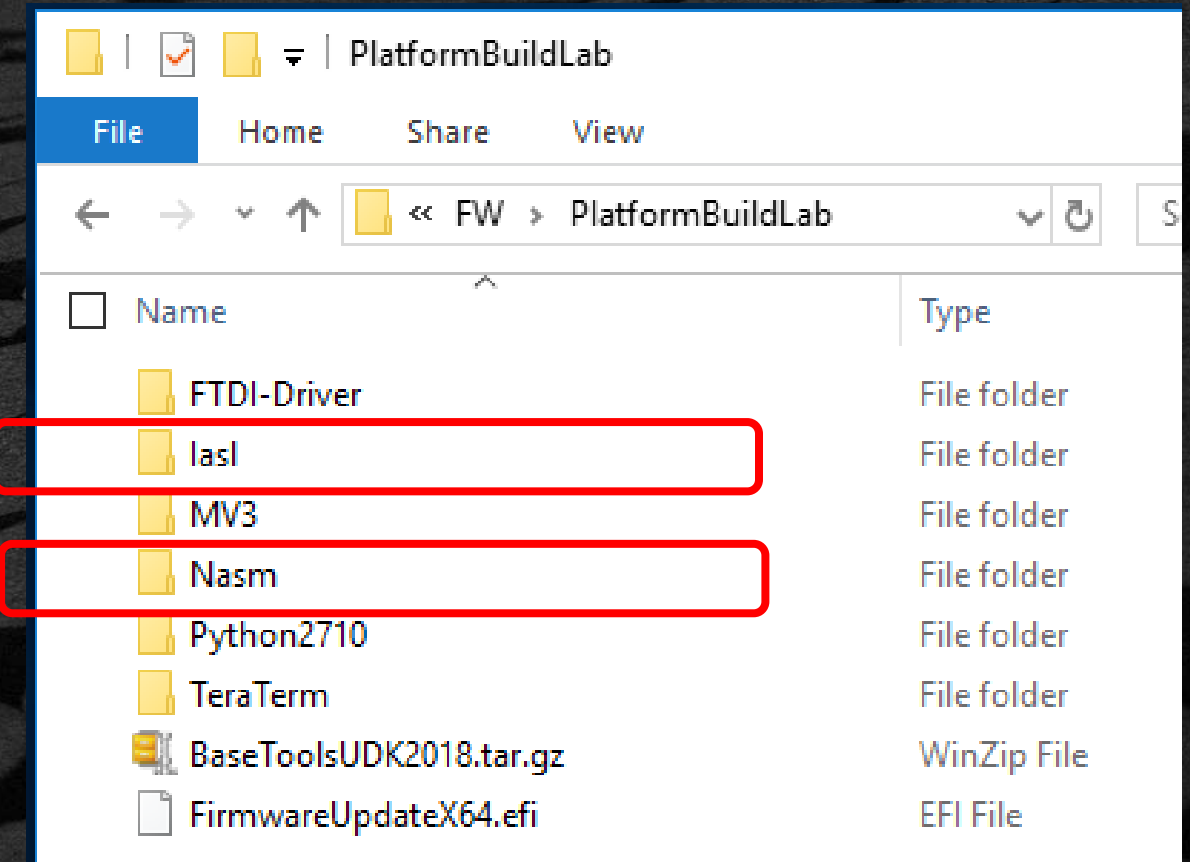




## Directory

C:\PlatformBuildLab\_UP2\_FW\FW\PlatformBuildLab  
from Download or zip

- 1 Copy \Nasm Folder to C:\
- 2 Copy \iasl Folder to  
C:\FW\MV3edk2-platforms\Platform\  
BroxtonPlatformPkg\Common\Tools\iasl
- 3 Install Python 2.7 from [link](#)  
(if not already installed)





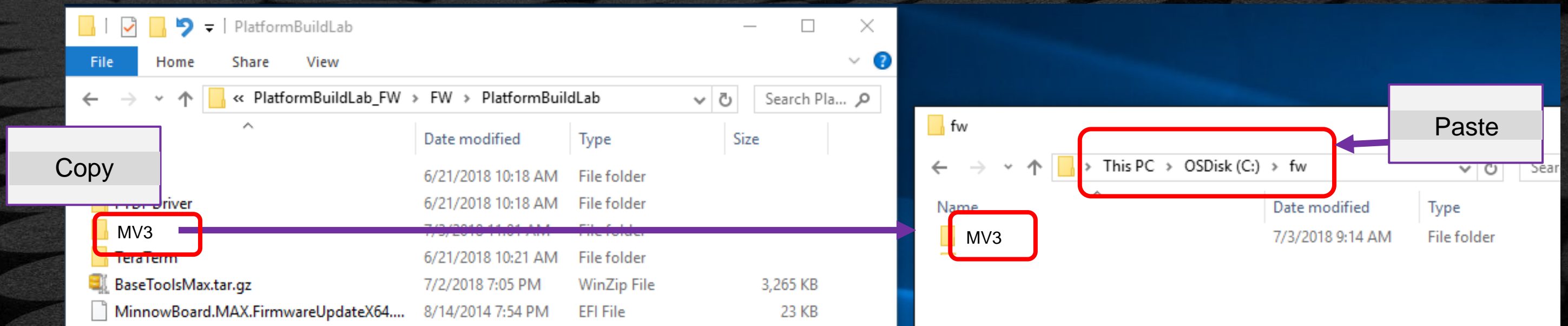
# COPY UP SQUARED SOURCE

## 4 Open a VS Command prompt

Create a working space source directory under the home directory

```
C:\> mkdir FW
```

From the FW/PlatformBuildLab folder, copy and paste folder “..FW/MV3” to C:/FW/MV3





# PLATFORM SOURCE DIRECTORY STRUCTURE

/MV3 (work space dir)

/edk2

/(UDK2018 Directories)

/BaseTools (from BaseToolsUDK.tar.gz)

/edk2-platforms



Invoke the Build script from here

BuildBIOS script

/Platform

/BroxtonPlatformPkg

(Platform Dirs)

PlatformPkg.dec, fdf, dsc

/Silicon

/BroxtonSoC

/BroxtonFspPkg

/BroxtonSiPkg



Platform Project directory

(includes platform build scripts `BuildIFWI` → `BuildBxtBios` called from above `BuildBIOS` above)



# STEPS TO BUILD & INSTALL FIRMWARE

- 1 Open VS command prompt
- 2 Cd to project directory :  
C:\FW\MV3\edk2-platforms
- 3 Invoke the build process script: **BuildBIOS**
- 4 Locate build output (.BIN file for BIOS image)
- 5 Flash binary image onto the platform
- 6 Reset and verify the firmware to

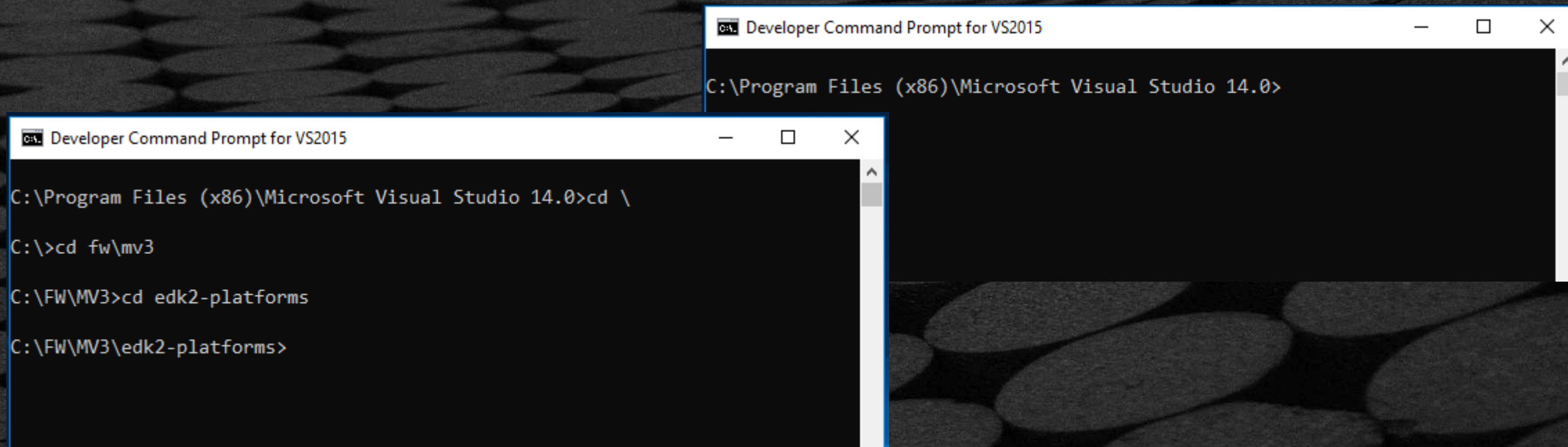
***Next slide will follow the above steps***



# OPEN A VS COMMAND PROMPT

Follow Steps from [here](#) to Pin the Visual Studio Command Prompt to the Windows Task Bar

**1** Open a Visual Studio Command Prompt



```
Developer Command Prompt for VS2015
C:\Program Files (x86)\Microsoft Visual Studio 14.0>

Developer Command Prompt for VS2015
C:\Program Files (x86)\Microsoft Visual Studio 14.0>cd \
C:\>cd fw\mv3
C:\FW\MV3>cd edk2-platforms
C:\FW\MV3\edk2-platforms>
```



## Platform Build Scripts

Many Platforms have a bash or bat script file to pre or post process the EDK II build process

For UP Squared Broxton Platform: `BuildBIOS.bat` or `BuildBIOS.sh` calls: `BuildIFWI` from the platform package directory

- pre build processing
- calls `BuildBxtBios` - a platform script to preform the EDK II build
- determines date
- board ID
- post build stitching



# BUILD PROCESS FOR DEBUG BIOS

From the VS Command Prompt ... ENTER:

2 cd C:\FW\MV3\edk2-Platforms

3 BuildBIOS.bat /J /UP /A /x64 /vs<sup>nn</sup> Broxton Debug

```
Developer Command Prompt for VS2015 - BuildBIOS.bat /J /UP /A /x64 /vs15 Broxton Debug
BIOS ID binary file created: Build\BroxtonPlatformPkg\DEBUG_VS2015x86\IA32\BiosId.bin

GenBiosId utility, version: v2.0b 11/18/2016
Copyright (c) 2005 - 2016, Intel Corporation. All rights reserved.

BIOS ID created: UPBOARDA.X64.0071.D01.1901282341
BIOS ID binary file created: Build\BroxtonPlatformPkg\DEBUG_VS2015x86\X64\BiosId.bin
Building ResetVector...
continue with build after Building ResetVector
Modifying Conf files for this build...

***** About to call EDK II build *****

DEFINE ENBDT_PF_BUILD          = TRUE
DEFINE APLK_SETUP_ENABLE_BUILD = TRUE
DEFINE X64_CONFIG              = TRUE
DEFINE UP2_BOARD               = TRUE
DEFINE MINNOW3_MODULE_BOARD    = FALSE
DEFINE LOGGING                 = TRUE

Check above Build Macros for correctness
PLATFORM_NAME is BroxtonPlatformPkg
Invoking normal EDK2 build... with the following:
call build -j EDK2.log -D LOGGING=TRUE -D UP2_BOARD=TRUE
Press any key to continue . . .
```

Press Enter to  
Continue the build

**Errors**

Note: RC.EXE Resource Compiler See [Link](#):

Where <sup>nn</sup> is the Visual Studio  
Year Version



# EXAMINE BUILD PARAMETERS

```
build -D LOGGING=TRUE -D UP2_BOARD = TRUE
        . . . -D Option (n)
```

## MACROS

Logging

UP<sup>2</sup> Board

## Properties from Conf\Target.txt

TARGET	= <b>DEBUG</b>	Build Mode
TARGET_ARCH	= <b>IA32 X64</b>	CPU Architecture
TOOL_CHAIN_TAG	= <b>VS2015x86</b>	VS Tool Chain
ACTIVE_PLATFORM	= <b>.. BroxtonPlatformPkg /PlatformPkgX64</b>	Platform DSC file
MAX_CONCURRENT_THREAD_NUMBER	= <b>1</b>	Thread Count



# Platform Build and PCD Parameters

## Platform Parameters

Many Platform Parameters are defined in a top .DSC file that controls PCD and build switches

For UP Squared:

**Build Switches** (dynamic)

DefineAtBuildMacros.dsc - Updated from BuildBIOS command line

PlatformDsc/BuildOptionsEDKII.dsc - Like PCDs on command line

**EDK II and Platform feature options**

PlatformDsc/Defines.dsc - Manually updated before build command



# BUILD PROCESS FOR RELEASE BIOS

From the VS Command Prompt ...Enter:

**3** BuildBIOS.bat /J /UP /A /x64 /vsnn Broxton Release

```

Developer Command Prompt for VS2015 - BuildBIOS.bat /J /UP /A /x64 /vs15 Broxton Release
Copyright (c) 2005 - 2016, Intel Corporation. All rights reserved.

BIOS ID created: UPBOARDA.X64.0071.R01.1901282345
BIOS ID binary file created: Build\BroxtonPlatformPkg\RELEASE_VS2015x86\X64\BiosId.bin
Building ResetVector...
continue with build after Building ResetVector
Modifying Conf files for this build...

***** About to call EDK II build *****

DEFINE ENBDT_PF_BUILD          = TRUE
DEFINE APLK_SETUP_ENABLE_BUILD = TRUE
DEFINE X64_CONFIG              = TRUE
DEFINE UP2_BOARD               = TRUE
DEFINE MINNOW3_MODULE_BOARD    = FALSE
DEFINE LOGGING                 = FALSE
Check above Build Macros for correctness
PLATFORM_NAME is BroxtonPlatformPkg
Invoking normal EDK2 build... with the following:
call build -j EDK2.log -D LOGGING=FALSE -D UP2_BOARD=TRUE
Press any key to continue . . .
    
```

Press Enter to  
Continue the build

**NOTE: MACRO**

**Logging**

**Set to False**



# DEBUG & RELEASE DIFFERENCES

Slower boot because the time it takes to display debug info

Larger image because of debug code & embedded info

Uses the serial port for debug string output

Contains detailed debug strings that show the boot process and various ASSERT/TRACE errors



# BUILD PROCESS COMPLETED

## 4 Locate the build .BIN image

```
Build_IFWI is finished.  
The final IFWI file is located in C:\FW\MV3\edk2-platforms\Platform\BroxtonPlatformPkg\Common\Tools\Stitch\  
=====
```

C:\FW\MV3\edk2-platforms>

The platform build script post build process will stitch the multiple firmware volumes generated by the EDK II build process into the final .BIN image.

The script displays the location of the final .BIN



## 5 Flash the binary image

### 1. Access UP Squared Binary image file from folder

- C:\FW\MV3\edk2-platforms\Platform\BroxtonPlatformPkg\Common\Tools\Stitch
- DEBUG UPBOARDA.X64.0071.D01.\_date\_.bin
- RELEASE UPBOARDA.X64.0071.R01.\_date\_.bin

### 2. Copy BIN files to a USB Thumb drive

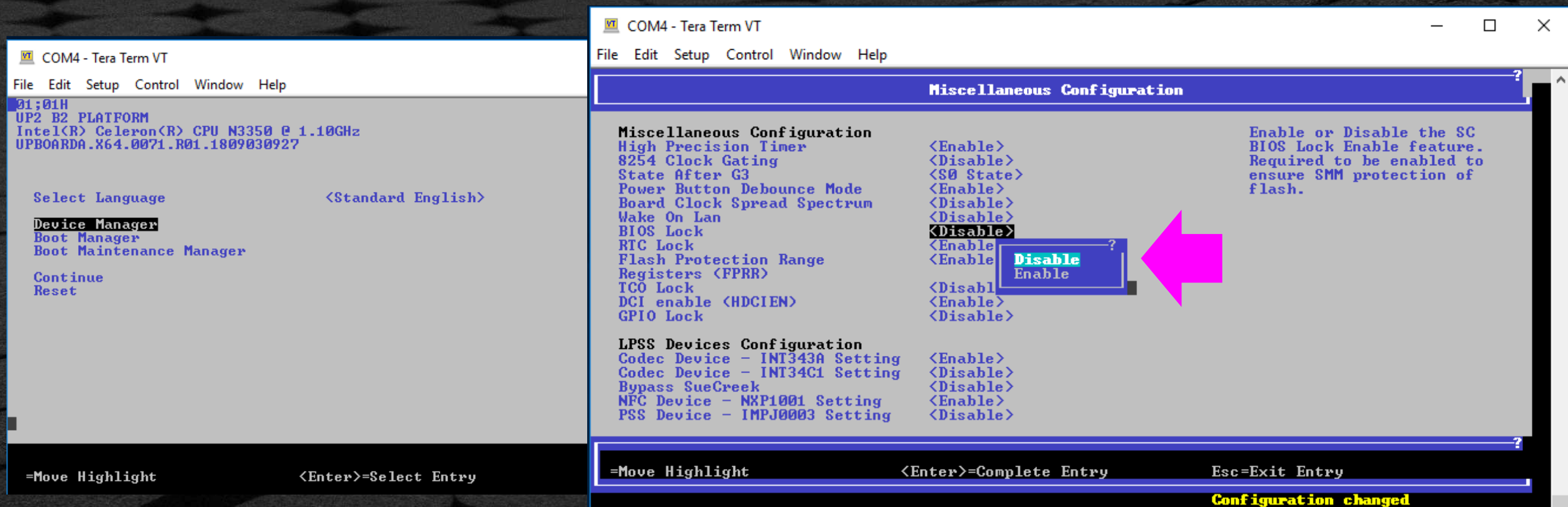
### 3. Copy FirmwareUpdateX64.efi to a USB thumb drive from /FW/PlatformBuildLab

### 4. Reset the UP Squared board and be prepared to type “F2” to enter System Setup



## 5. Set “BIOS Lock” to Disable in System Setup by the following:

- Inside Setup go to “Device Manager” → “System Setup” → “South Cluster Configuration” → “Miscellaneous Configuration”
- Open “BIOS Lock” and select “Disable”
- Press “F10” to save and then reboot





- ```
FS0:\> FirmwareUpdateX64.efi UPBOARDA.X64.0071.R01.1809030927.bin
```

```
FS0:\UP2\> FirmwareUpdateX64.efi UPBOARDA.X64.0071.R01.1809030927.bin
Intel(R) UDK2017 Firmware Update Utility for the Intel(R) Minnowboard 3
Version 0.61
Copyright(c) Intel Corporation 2006 - 2017

Reading file UPBOARDA.X64.0071.R01.1809030927.bin

Updating Firmware. This may take a few minutes.
.....
Update successful
Shutdown system in 1 seconds ...
```

[www.tianocore.org](http://www.tianocore.org)



# VERIFY AFTER FIRMWARE UPDATE

## 6 Reboot and Verify

- Verify that the Firmware was updated by checking the Date
- Go into setup by pressing “F2” after reboot
- The EDK II front page will show the BIOS ID with Date/time stamp

```
UP2 B2 PLATFORM
Intel(R) Celeron(R) CPU N3350 @ 1.10 GHz
UPBOARDA.X64.0071.R01.1809030927
```

```
1.10 GHz
2048 MB RAM
```

```
Select Language
```

```
<Standard English>
```

```
This is the option one
adjusts to change the
language for the current
system
```

```
Device Manager
Boot Manager
Boot Maintenance Manager
```

```
Continue
Reset
```



# SUMMARY

- ✱ Hardware Setup for UP Squared
- ✱ Build a EDK II Platform using UP Squared



# Questions?



# RETURN TO MAIN TRAINING PAGE



Return to Training Table of contents for next presentation [link](#)







BACKUP



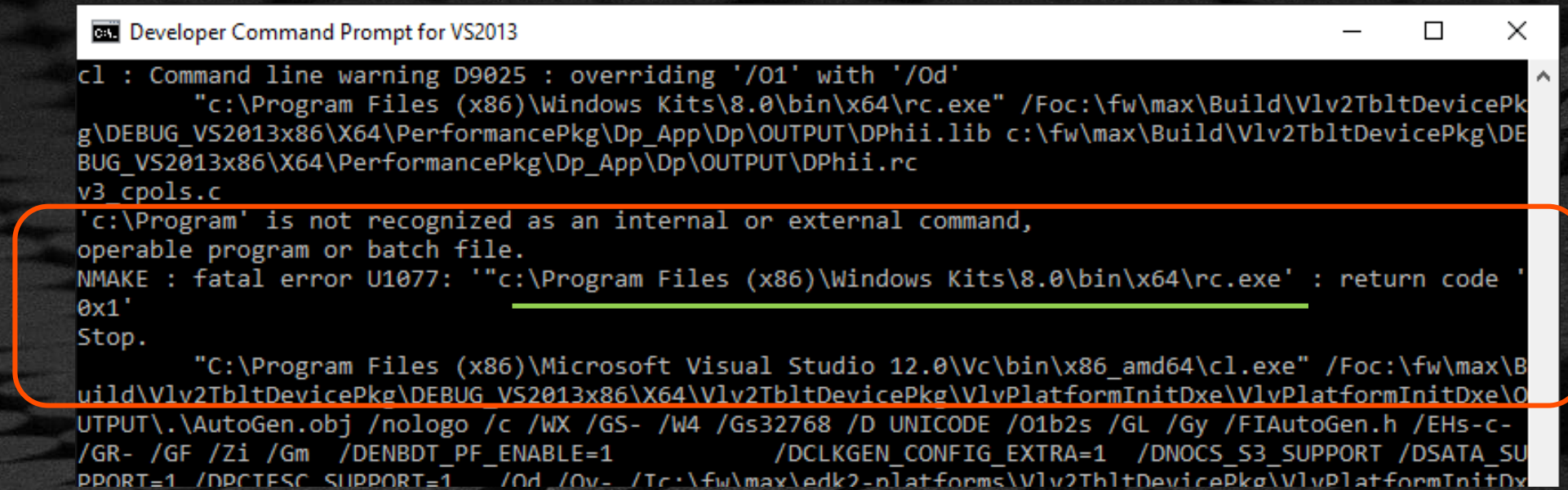
# BUILD ERRORS



# VISUAL STUDIO RESOURCE COMPILER ERROR – RC.EXE

The Rc.exe was not found  
and the build fails

Find where rc.exe is located  
and update the  
`tools_def.txt`



```

Developer Command Prompt for VS2013

cl : Command line warning D9025 : overriding '/O1' with '/Od'
      "c:\Program Files (x86)\Windows Kits\8.0\bin\x64\rc.exe" /Foc:\fw\max\Build\Vlv2TbлтDevicePkg\DEBUG_VS2013x86\X64\PerformancePkg\Dp_App\Dp\OUTPUT\DPHii.lib c:\fw\max\Build\Vlv2TbлтDevicePkg\DEBUG_VS2013x86\X64\PerformancePkg\Dp_App\Dp\OUTPUT\DPHii.rc
v3 cpols.c
'c:\Program' is not recognized as an internal or external command,
operable program or batch file.
NMAKE : fatal error U1077: '"c:\Program Files (x86)\Windows Kits\8.0\bin\x64\rc.exe' : return code '
0x1'
Stop.

      "C:\Program Files (x86)\Microsoft Visual Studio 12.0\VC\bin\x86_amd64\cl.exe" /Foc:\fw\max\B
uild\Vlv2TbлтDevicePkg\DEBUG_VS2013x86\X64\Vlv2TbлтDevicePkg\VlvPlatformInitDxe\VlvPlatformInitDxe\O
UTPUT\.\AutoGen.obj /nologo /c /WX /GS- /W4 /Gs32768 /D UNICODE /O1b2s /GL /Gy /FIAutoGen.h /EHs-c-
/GR- /GF /Zi /Gm /DENBDT_PF_ENABLE=1 /DCLKGEN_CONFIG_EXTRA=1 /DNOCS_S3_SUPPORT /DSATA_SU
PPORT=1 /DPCTESC_SUPPORT=1 /Od /Ov- /Tc:\fw\max\edk2-platforms\Vlv2TbлтDevicePkg\VlvPlatformInitDx

```

Update `MV3/Conf/tools_def.txt`

```

# Microsoft Visual Studio 2013 Professional Edition
DEFINE WINSDK8x86_BIN      = C:\Program Files (x86)\Windows Kits\8.1\bin\x64

# Microsoft Visual Studio 2015 Professional Edition
DEFINE WINSDK81x86_BIN    = C:\Program Files (x86)\Windows Kits\8.1\bin\x64

# Microsoft Visual Studio 2017 Professional Edition
DEFINE WINSDK10_BIN       = Location of Rc.exe

```