

Getting Started with MinnowBoard Turbot Dual Ethernet (Dual-E)

 minnowboard.org/tutorials/getting-started-minnowboard-turbot-dual-e/

Essentials

Hardware components



HDMI Monitor x1
Standard monitor with an HDMI input, capable of at least 800×600 resolution. Higher resolutions up to 1920×1280 are supported.



Power
Supply 5v 4
Amp
5V 4A, 5.5 x
2.1mm barrel
connector,
center
positive

x1



USB
Keyboard
Standard
USB
keyboard to
interact with
the UEFI and
BootManager
shell. A
Multimedia
combo
keyboard
with a
trackball or
touchpad will
also work
and provide
the mouse
capability for
OS installs
and latter
tutorials. The
keyboard or
keyboard
combo can
be wired or
wireless with
a wireless
receiver USB
dongle.

x1



USB Mouse x1
Optional for this Getting Started tutorial, but will be utilized for OS installs and latter tutorials.



USB Hub x1
Depending on the boot media used, and the OS install target media, the two on-board USB ports may not be enough, so a generic USB hub can be used to provide additional USB ports.

Note that the upper port is USB 2.0, and the bottom port is USB 3.0.

Software components

Tools

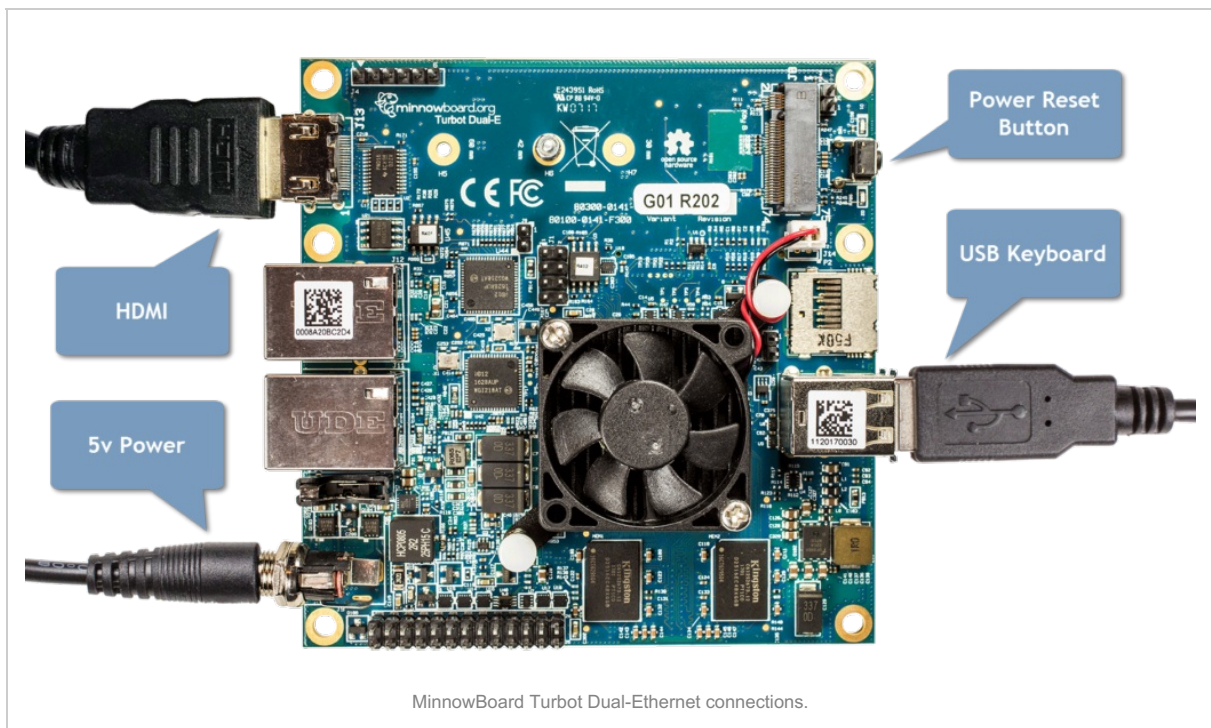


Host Computer or Laptop x1
Use a host computer to download OS images, prepare a boot media, and view this getting started tutorial. Click on the link for a more detailed description of what is needed.

Instructions

1. 1 Connect your MinnowBoard Turbot Dual-E

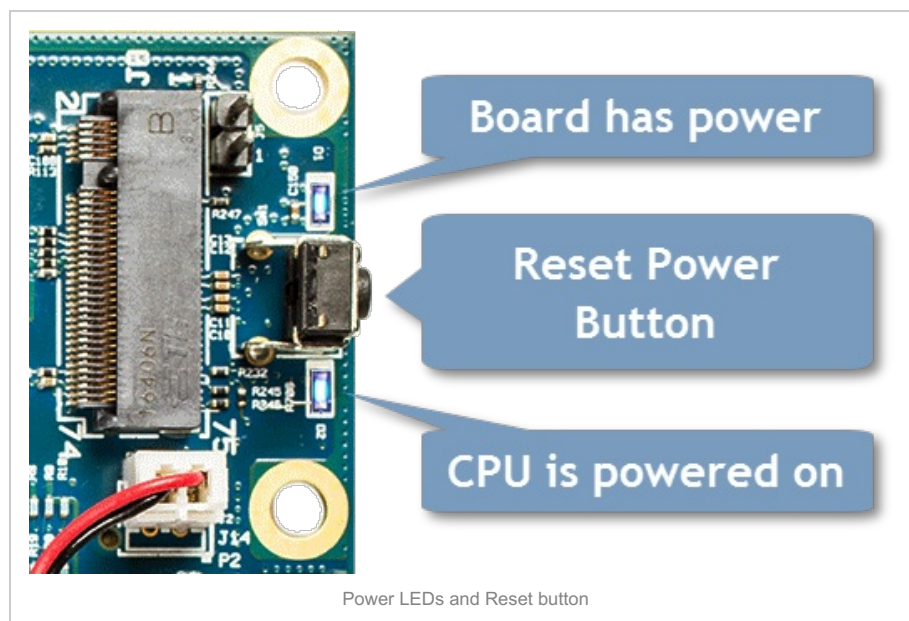
- Connect the monitor cable (HDMI male to HDMI male) to a 1920×1080 or larger monitor and to the MinnowBoard Turbot Dual-E.
- Connect a USB keyboard to the MinnowBoard Turbot Dual-E USB 2.0 connector (top USB port).
- Connect the power cable to the MinnowBoard Turbot Dual-E, but don't plug it into the wall outlet quite yet. Your setup should look like the image below.



2. 2 Connect 5V power

CAUTION: Make sure the supply is 5 Volt. The same barrel plug is also common on 9V and 12V power supplies, and using one of those will trip the over-voltage protection on board and the board will not power up, causing the power-on LED to remain off.

- Once you are all set, plug the power supply into the wall outlet and power up the board.
- There are two LEDs on the board that give you information about the board's power:
 - D1 (top, above the power/reset button) is on when the board has 5 volt power connected
 - D2 (lower, below the power/reset button) is on when the CPU has power
- For example, if you do an OS shutdown and power off, D1 will be on but D2 will be off (indicating the board has power applied, but the CPU has been turned off).



3. 3 Interact with the UEFI shell

- When the MinnowBoard Turbo Dual-E is first powered on, it will do a quick memory check and then start running the on-board firmware for the UEFI shell. (For now, let's ignore options for pressing an **F2**, **Delete**, or **Esc** key.) The UEFI shell is a firmware program that lets you examine and configure the board, move files between connected devices (for example, a USB memory stick and SD card), set the system date and time, and more.

- With just your power, monitor, and keyboard connected, you'll see the following:

```
UEFI Interactive Shell v2.1
EDK II
UEFI v2.50 (EDK II, 0x00010000)
map: No mapping found
Press ESC in 1 seconds to skip startup.nsh or any other key to continue.
Shell>
```

- The `map: No mapping found` message simply indicates there is no filesystem storage device found, which makes sense because there's nothing plugged into the USB or microSD card slot.
- If you don't see this, then either there is a bootable image located on an SD card or the USB flash drive (remove the media and reset), or the firmware has been changed or corrupted. See the [Updating the Firmware](#) tutorial for instructions on how to replace or update it.
- At this shell prompt, you can interact with the board. Let's check on the system date using the `date` command:

```
Shell> date
09/10/2015
Shell>
```

- As you can see, the board doesn't know what the date really is. (It's showing you the date the firmware was built.) You may see a different date depending on which firmware version you're running. You can set the correct date on the board using the `date` command:

```
Shell> date 7/27/2017
Shell> date
07/27/2017
Shell>
```

- You can also set the time by using the `time` shell command (using a 24-hour clock). Give it a try yourself by entering: `time 16:36` for 4:36 PM (use your current local time), and then check the time by entering: `time`
- If you install a battery (3v CR1225) on the MinnowBoard Turbot Dual-E, it will remember the date and time while the board is turned off, so you won't have to set the date and time when you power up the board.
- At this point, you've got the MinnowBoard Turbot Dual-E powered up, and you can explore the board using the UEFI shell. The `help -b` command will display all the UEFI shell commands. You can learn more about the UEFI shell and its commands in the [Updating the Firmware](#) tutorial and at the [Intel Developer Zone](#).
- If you enter `exit` to the UEFI shell, you'll be taken to the UEFI boot menu. There you can explore and set board configuration options, including boot order, which we will use in the next step.

LEARN:

- [Updating the Firmware](#)

4. 4 Using the UEFI boot menu to boot and start Ubuntu

The UEFI Boot Menu is ground control for what happens when the board is first powered up. It also decides what to do next. We'll briefly outline what to look for and which settings to change to move you through this tutorial. More extensive descriptions and expanded tutorials are available and linked for your reference.

- Prepare an OS install USB flash drive. Here we use Ubuntu by way of example, following the first few steps of the [Installing Ubuntu 16.04.3 LTS](#) tutorial.
- Plug the USB flash drive into the lower USB 3.0 port.
- Reset the MinnowBoard Turbot Dual-E by one of the following methods:
 - Power cycling – unplugging the power cable for ten seconds
 - Pressing **Ctrl+Alt+Delete** simultaneously
 - Pressing and holding the **Power** button on the board for six seconds, and pressing again to power up again
- If the USB image is not automatically loaded and you end up in the UEFI shell, do the following steps:
 - Type `exit` to get into the UEFI Boot menu.

[Show Me](#)

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- GNU GRUB version 2.02~beta2-36
- *Try Ubuntu without installing
 - Install Ubuntu
 - OEM install (for manufacturers)
 - Check disc for defects
- GRUB Install options

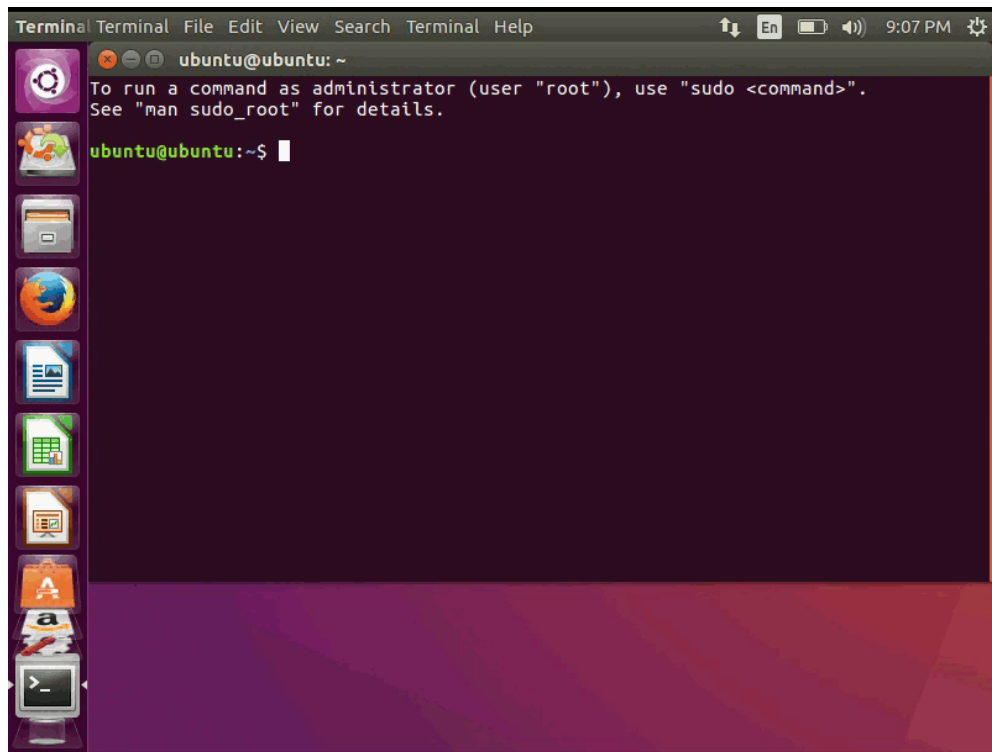
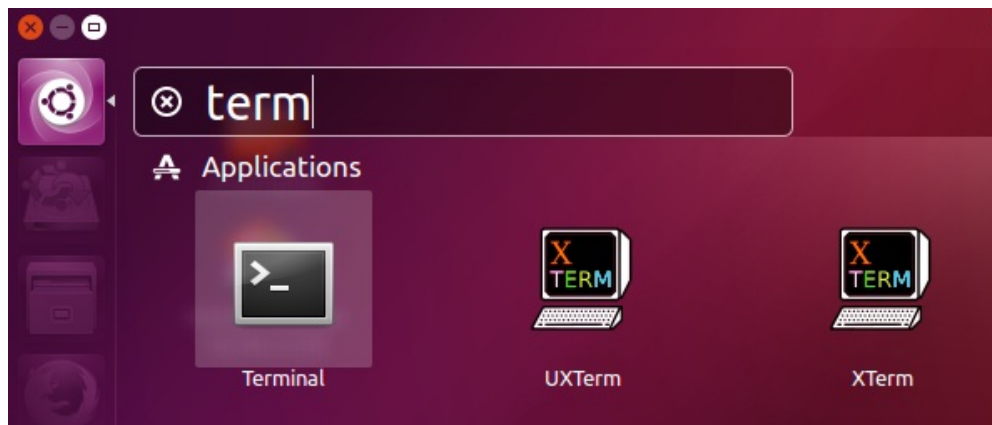
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- Best Practice: Boot Media Selection
- Installing Ubuntu 16.04.3 LTS

- o On the desktop, click the icon at the top of the left icon stack, or press the **Window** key, and start typing 'terminal'.



- When the Terminal application is shown, click on it.



- In the terminal, type this text:

```
cat << 'EOF' > hello.py
print("Hello, World!")
EOF
python3 hello.py
```

[Show Me](#)

- The terminal should show “Hello, World!”
- You can continue to experiment with the desktop. For example, edit the hello.py program by typing `gedit hello.py &` which opens a graphical editor. This allows you to change the program. Remember to press the **Save** button at the top right of the window when you are done editing.
- Back in the terminal window, you can run your changed program by typing `python3 hello.py` again, or pressing the up arrow twice to recall the previous command.
- Remember that when you shut down Ubuntu, or power off the MinnowBoard Turbot Dual-E, none of your masterworks will be retained. You are running a trial image that keeps everything in volatile main memory, and it is lost at the end of the session.

6. 6 Congratulations! What's next?

So far, you are off to a great start! You have:

- Powered on your board
- Become familiar with connecting the display, keyboard, and mouse

- Experienced getting an OS up and running
- Wrote a full-fledged program that announced itself to the world

The MinnowBoard Turbot is primarily an embedded development platform, so interacting with ‘real world’ components is a critical function. Next, we suggest the [Blinking an LED](#) and [Connecting a Device or Sensor to the LSE Header](#) tutorials. These two tutorials are building on what you’ve done so far—they continue to use Ubuntu as the base Operating System, and you can launch straight into them.

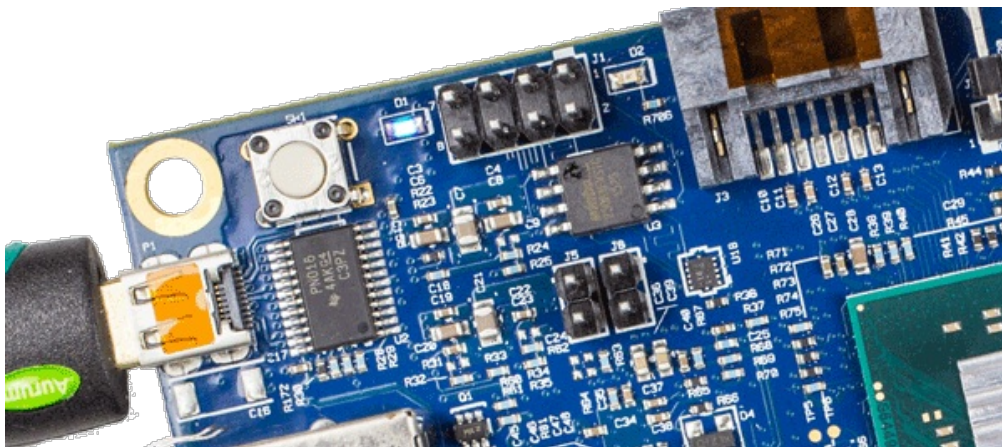
You might also consider selecting an OS at this time and come back to interacting with the ‘real world’ after you install it.



Choosing an Operating System

- October 19, 2017November 6, 2017
- [Operating Systems](#)

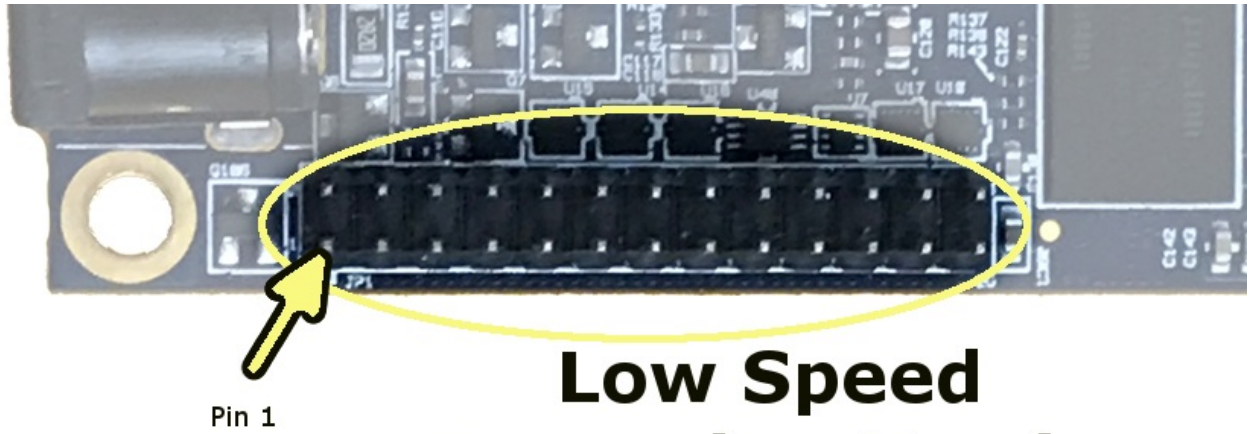
There are many choices for Operating System (OS), and this tutorial provides guidance to select the optimal one for your application. MinnowBoard development boards are powerful enough to support self-hosted[...]



Blinking an LED

- August 1, 2017November 20, 2017
- [Projects](#)

For IoT devices, blinking an LED is a common “Hello World” example used to show a short example running. Here’s a quick tutorial to blink the MinnowBoard Turbot D2 LED[...]



Low Speed Expansion Header

Connecting a Device or Sensor to the Low Speed...

- August 30, 2017January 23, 2018
- [Projects](#)

At the end of this tutorial, you will be able to connect an accelerometer to the LSE v1 header via I2C, manipulate device settings, and read the data stream. For[...]