EPD-X15

Quick Start Guide

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X15 QUICK START GUIDE

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WHAT'S THE IN THE BOX

In the box you will find an EPD-X15 board inside an ESD bag. Alongside the X15 a mini CD was provided containing this Quick Start Guide.

Figure 2 - EPD-X15 Kit contents

TOP EDGE AND BOTTOM SIDE

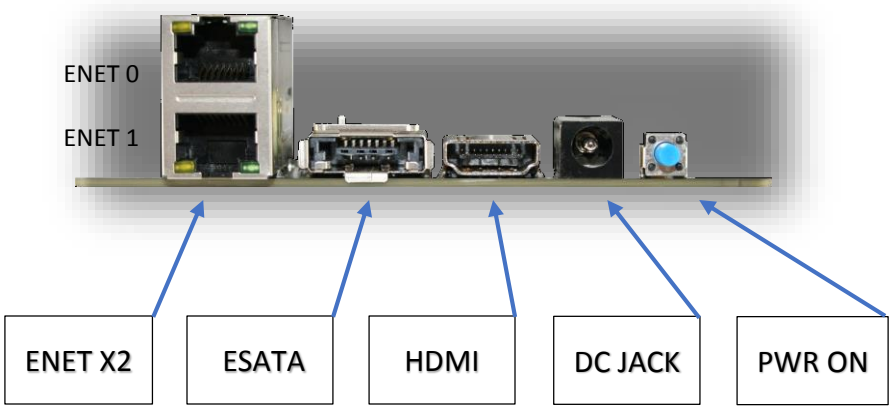


Figure 3 – X15 Side View of Top Edge

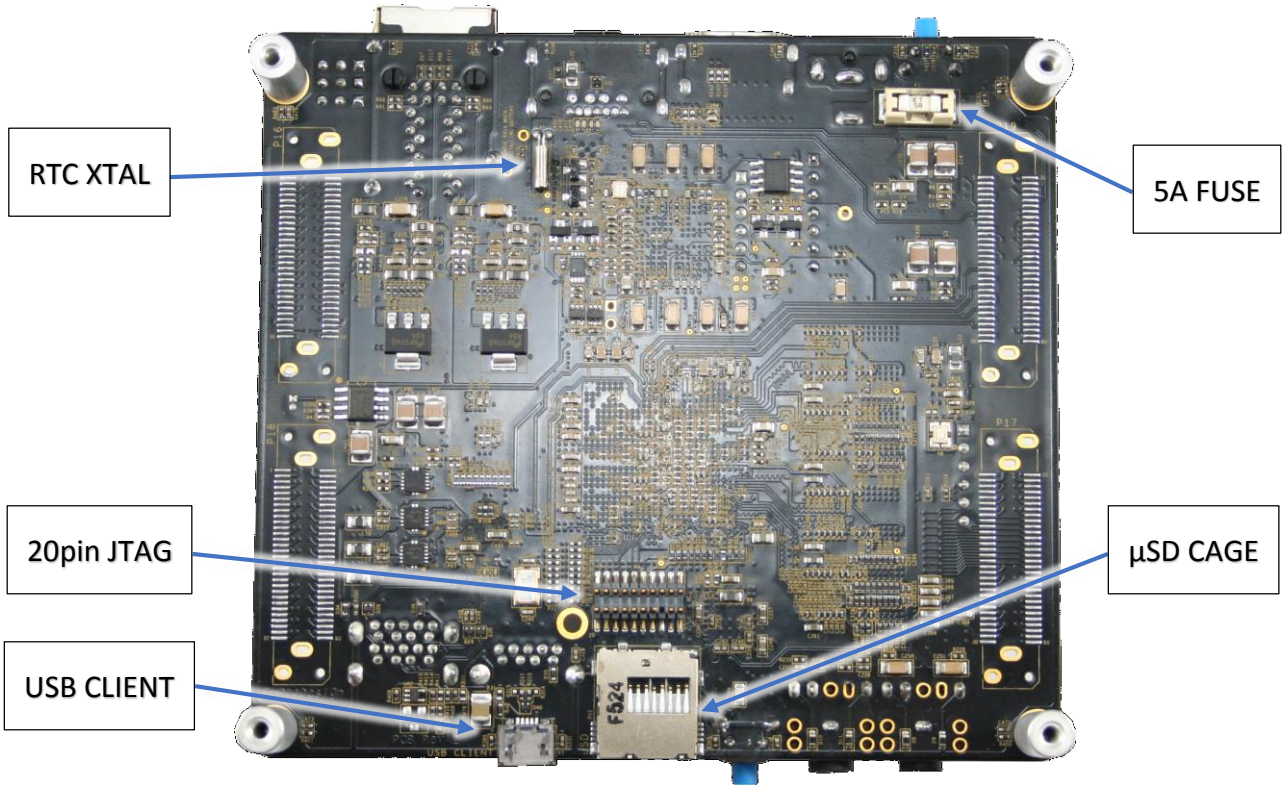


Figure 4 – Bottom side of X15

TOP SIDE AND BOTTOM EDGE

Figure 4 shows the edge connectors and the on-board headers and optional devices

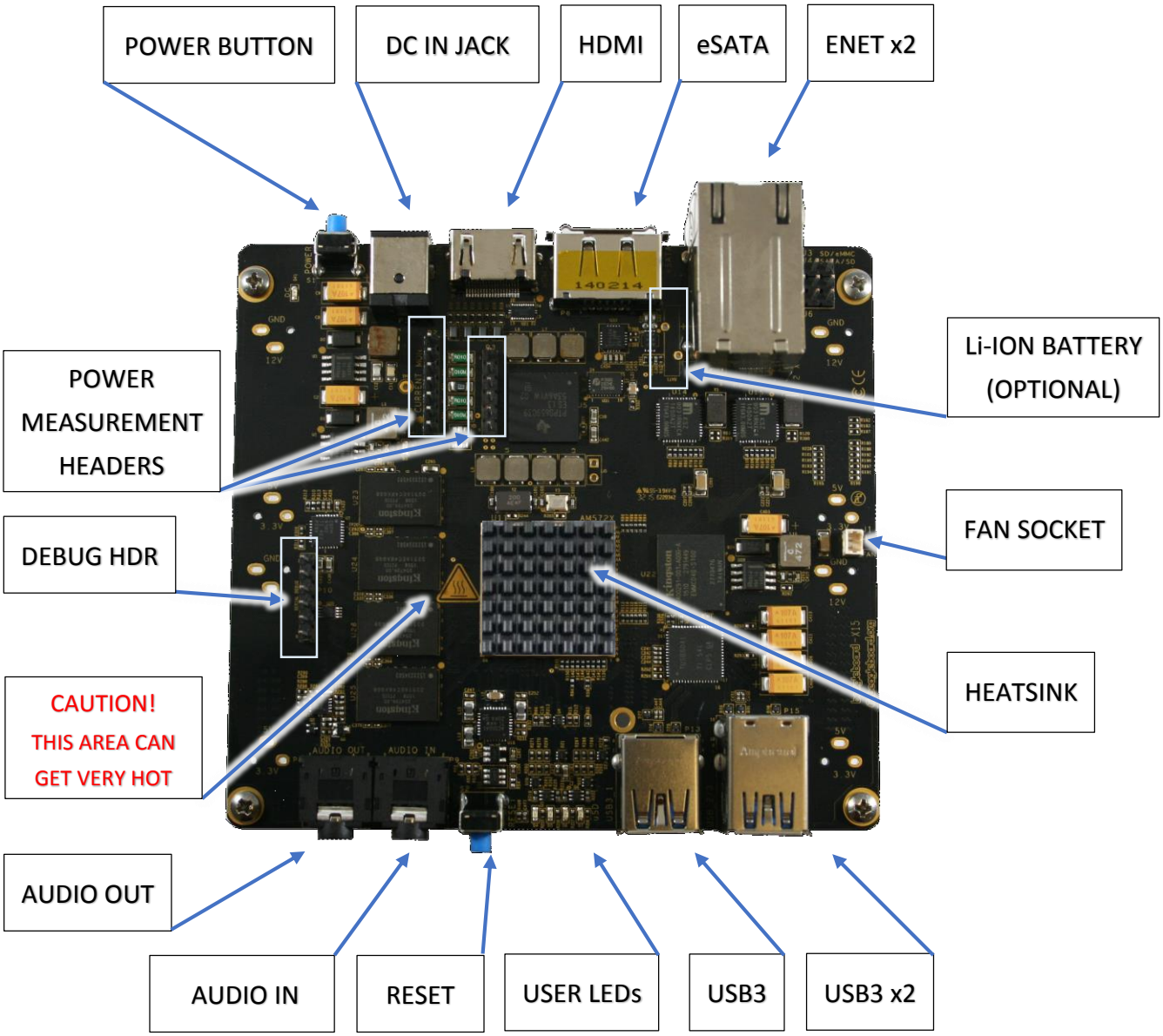


Figure 5 – TOP Side of X15 Major Interfaces

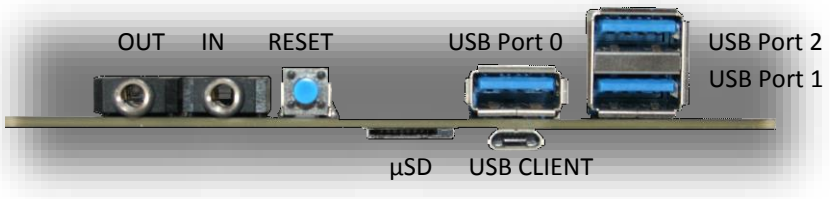


Figure 6 – X15 Side View Bottom Edge

MAJOR COMPONENTS

Figure 7 shows the major IC and components on the EPD-X15.

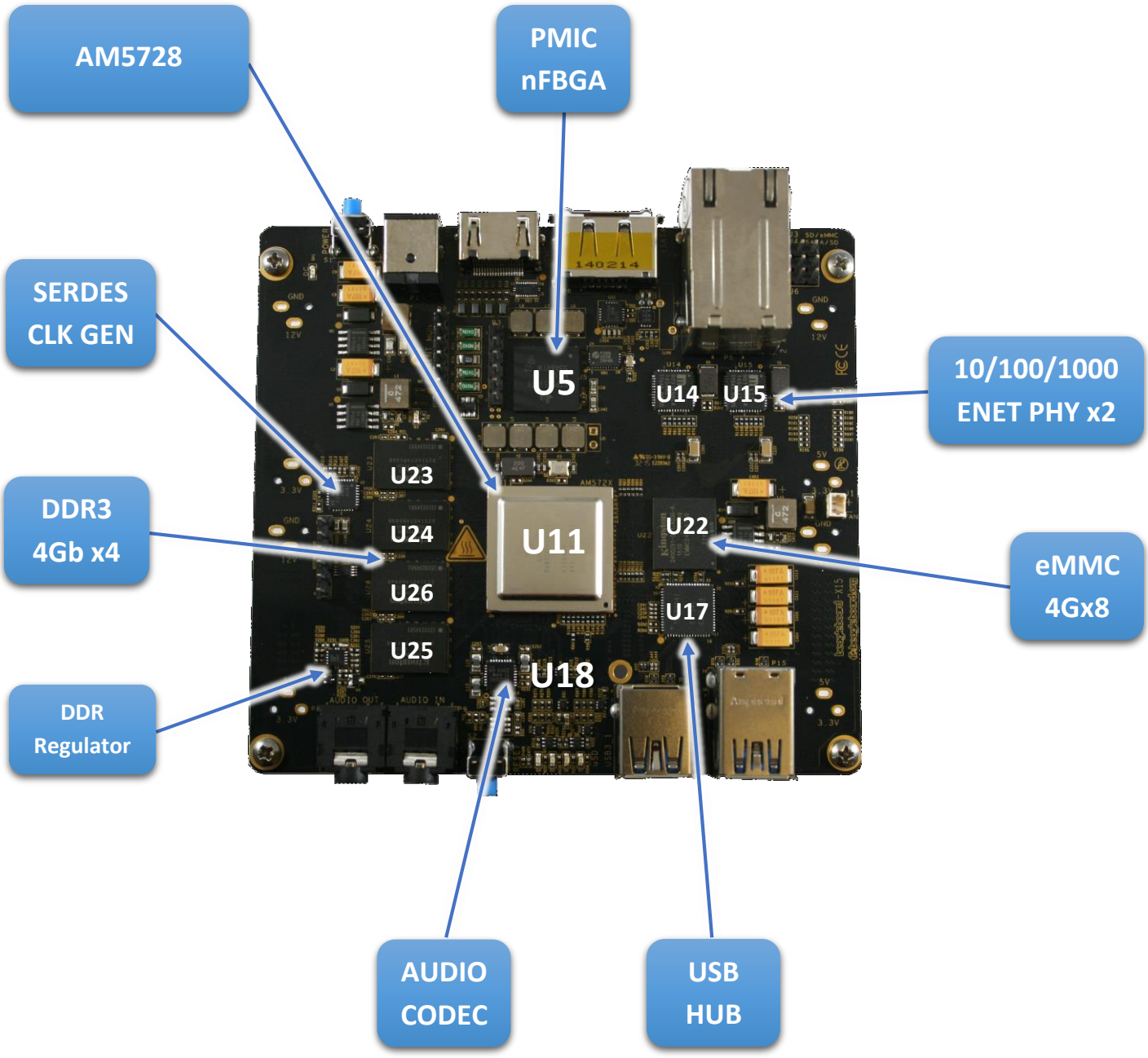


Figure 7 - Locations of major ICs on the EPD-X15

CHECK IT OUT

WHAT YOU WILL NEED

Table 1 shows the accessories needed to test all X15 peripherals. Some of these items may need to be purchased if the user does not already own them. For power supply and serial cables please observe power requirements when purchasing. The power jack on the EPD-X15 accepts a 2.5mm barrel to differentiate it from other board supplies.

Table 1 – LIST OF NEEDED ACCESSORIES

DC POWER SUPPLY • 12V Supply • 60W (5A min) • 2.5mm x 5.5mm Barrel Plug Size • Option 1: TRG70A120 • Option 2: VEF65US12 • Option 3: CENB1060A1203F01 • Option 4: TRG70A120-02E01 • Option 5: PSAC60M-120 (needs adapter below)	
2.5mm ADAPTER • Needed only for 12V supplies that have 2.1mm plug • Can be purchased online • One such source: http://www.newark.com/multicomp/c4074/2-5mm-dc-socket-to-2-1mm-dc-plug/dp/71T9782	
TTL TO USB SERIAL CABLE • 3.3V USB to SERIAL • Can be purchased from various sources • One such cable can be purchased here: http://www.digikey.com/product-detail/en/TTL-232R-3V3/768-1015-ND/1836393	
HDMI AUDIO-VIDEO CABLE • Off the shelf quality Cable • HDMI-A Male to HDMI-A Male • Preferably 3ft or longer	

ETHERNET CABLE • Two cables needed if both interfaces used • Use Cat5e cables • ENET PHYs have Auto MDI/MDI-x • Crossover or straight cables can be used	
AUDIO CABLE • 3.5mm jacks on both ends • Need two if Speakers do not come with one	
SPEAKERS • Any desktop speaker system • With 3.5mm cable	
HDMI MONITOR • HD monitor capable of 1080P • With integrated audio • Or Output jack for Audio	
MICRO SD CARD • 4GB to 16GB • Class 10 • Standard Adapter	
eSATA ADAPTER CABLE • eSATA to SATA cable • Combo cable	
SATA DRIVE • SATA HDD - Hard Disk Drive • SATA SSD - Solid State Drive	

USB THUMB DRIVE • USB3.0 thumb drive • Needed for file storage • Or to boot from USB3	
WIRELESS KEYBOARD/MOUSE • Wireless combo will save USB ports used • Less wire clutter	

Besides the accessories mentioned it is assumed the user has a PC or Laptop running Linux or Windows.

SETUP INSTRUCTIONS

Standalone w/Display and Keyboard/Mouse

In this configuration, the board works more like a PC, totally free from any connection to a PC as shown in **Figure 7**. It allows you to create your code to make the board do whatever you need it to do. It will however require certain common PC accessories. These accessories and instructions are described in the following section

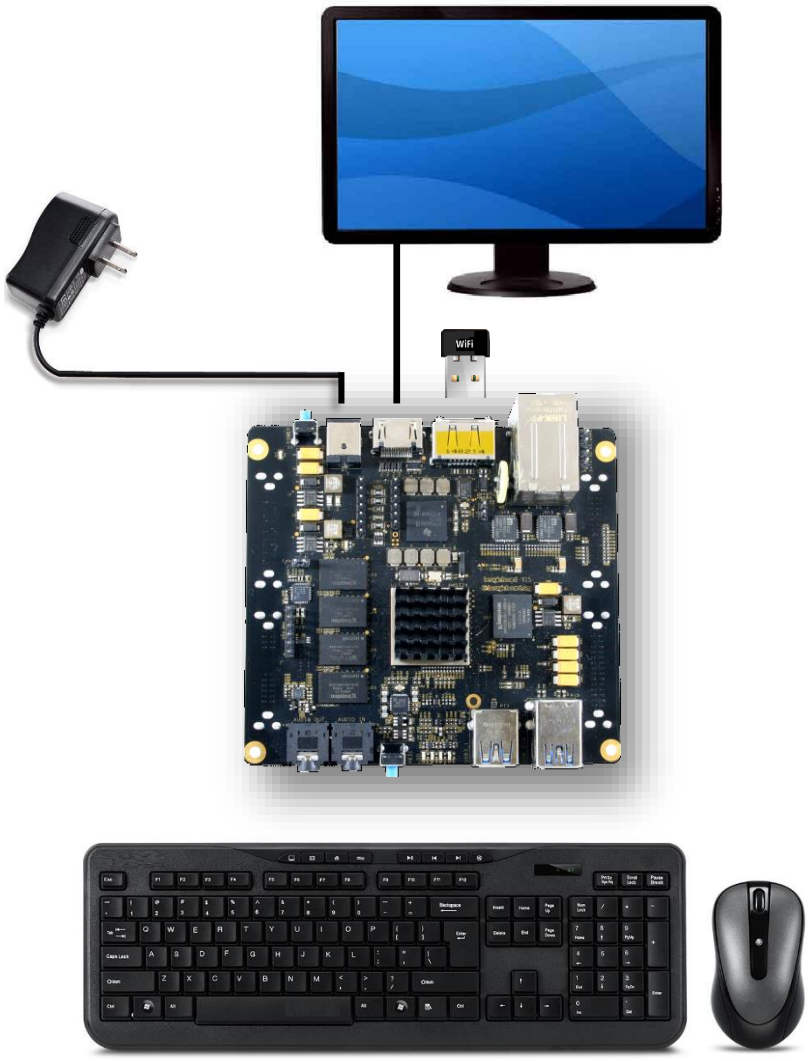


Figure 8 - Desktop Configuration

Additionally an Ethernet cable can be connected for network access.

PLUG IN YOUR CABLES

ETHERNET

There are two ports on the Ethernet connector on X15. Plug cable into either port. Notice the orientation of cable insertion between the two ports in **Figure 8**.

Figure 9 - ETHERNET PORTS

HDMI

Plug in HMDI cable into P11 HDMI connector on the top edge of the X15 board.

Figure 10 – HDMI PORT

ESATA

Plug in eSATA cable as shown in Figure 10.

Figure 11 –eSATA PORT

KEYBOARD AND MOUSE

To avoid using up multiple USB ports a Wireless keyboard and mouse combination is preferred. The transceiver can be installed in either USB port including P6 eSATA connector.

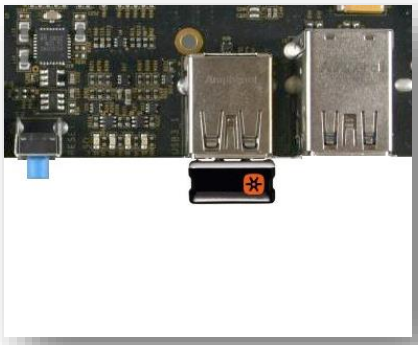


Figure 12 – Keyboard Transmitter

AUDIO

To playback and record audio, insert speaker cable into Audio OUT jack of the X15 and an audio source into the Audio IN jack.

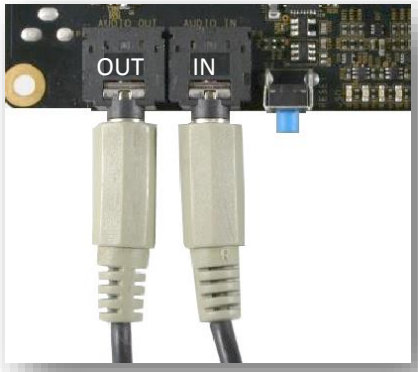


Figure 13 – AUDIO JACKS

MICRO SD CARD

On the bottom edge of the X15 board, on the bottom side is the micro SD card cage. I booting from SD card the micro SD card is inserted as shown in Figure 12 with the top side facing up. Change boot settings on J3-J4-J6 as shown in the next section.

Figure 14 – micro SD CAGE

BOOT STRAPPING

J3, J4 and J6 can be strapped with Shunts for different booting options.

See Figure 15 for details.

		1-2	2-3
BOOT from SD then eMMC	J3		X
	J4		X
	J6		X
BOOT from UART	J3	X	
	J4	X	
	J6	X	
BOOT from SATA then SD	J3	X	
	J4		X
	J6		X

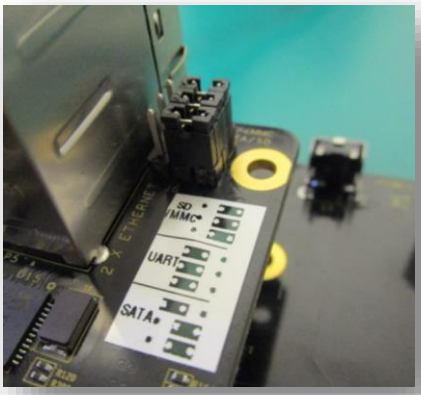


Figure 15 – BOOT JUMPERS

SERIAL DEBUG

Plug in the USB to Serial cable into the 6 pin header P10. Observe correct orientation. Pin1 is located at the top side of the header.

PIN NUMBER	SIGNAL
1	Ground
4	Receive
5	Transmit

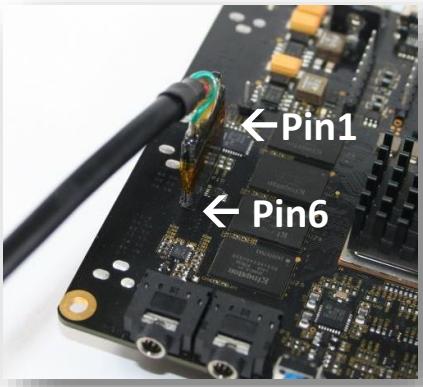


Figure 16 – SERIAL DEBUG PORT

TERMINAL SETUP

Plug the USB end into your PC or Laptop and invoke **MINICOM** or **TERATERM** or your favorite Terminal emulator program. The settings for serial communications are:

Baud rate:	115200
Data:	8 bit
Parity:	none
Stop:	1 bit
Flow control:	none

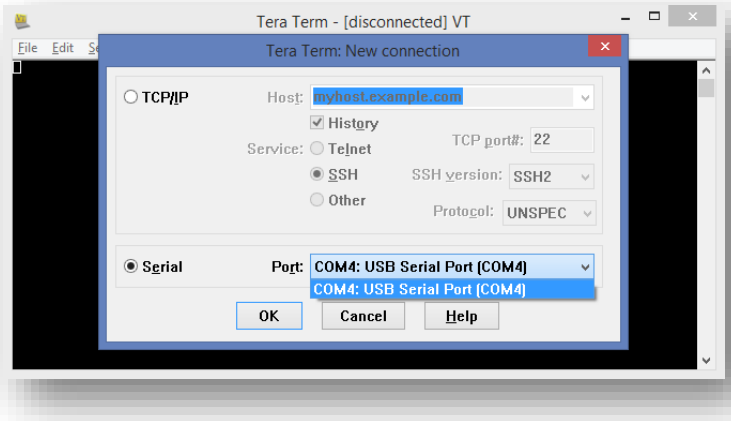


Figure 17 – TERMINAL WINDOW

PLUG IN POWER

Once all the needed cables are inserted, plug in the DC power adapter into the P1 jack. This is a 2.5mm center contact and requires a supply that comes with a 2.5mm jack or an adapter to 2.5mm. See **Table 1** for more info.

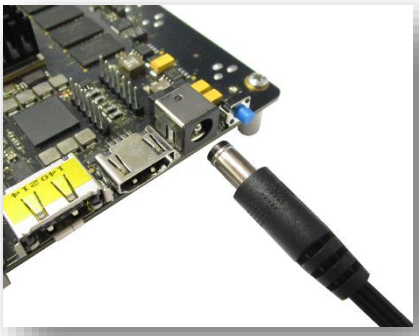


Figure 18 – DC IN JACK P1

POWER LEDS

Once the power plug is inserted in P1, the Power LED D41 will light up.

D41 - 12V Present LED

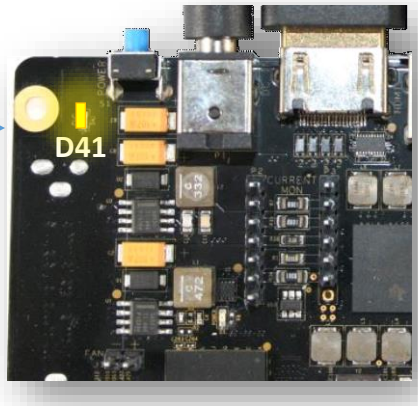


Figure 19 – DC 12V LED

TURN ON HD MONITOR

Once power is connected, turn on HDMI monitor. Change input to the HDMI port the X15 is connected to.

Figure 20 – MONITOR POWER BUTTON

TURN ON X15 POWER

Though power is plugged in and the terminal is connected there will be no activity observed on the terminal. LED D41 will glow.

D41 - 12V Present LED

To turn ON the X15 main power press the blue momentary switch S1. This will cause LED D3 to glow showing that the board power is ON.

D3 - POWER ON LED

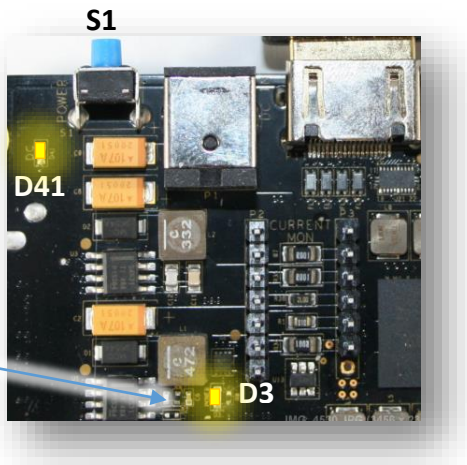


Figure 21 – POWER LEDs

BOOTING

At this point the software present in eMMC will start to boot and activity can be seen on the terminal.

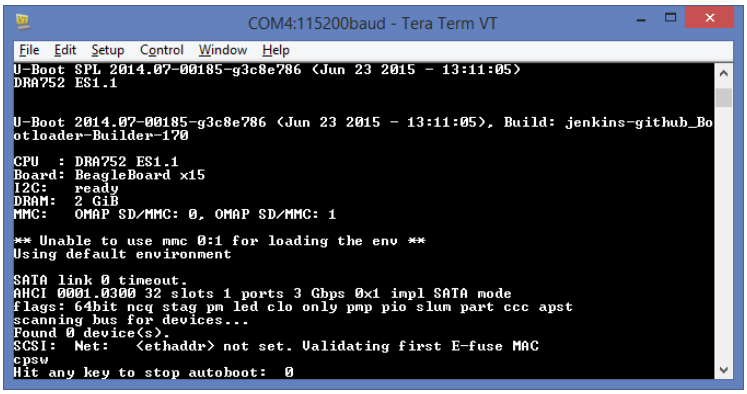


Figure 22 – POWER LEDs

USER LEDS

During the botting process the user may notice that the user LEDs will blink.

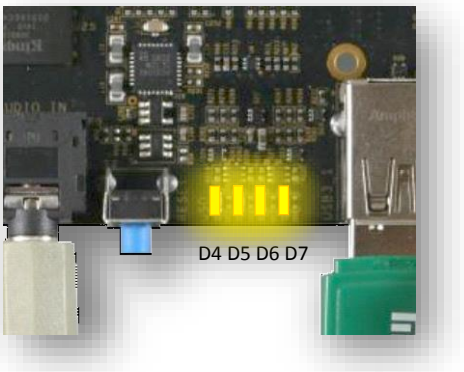


Figure 23 – POWER LEDs

Once the X15 interfaces are connected your system is ready to test. The next section will go through what you can

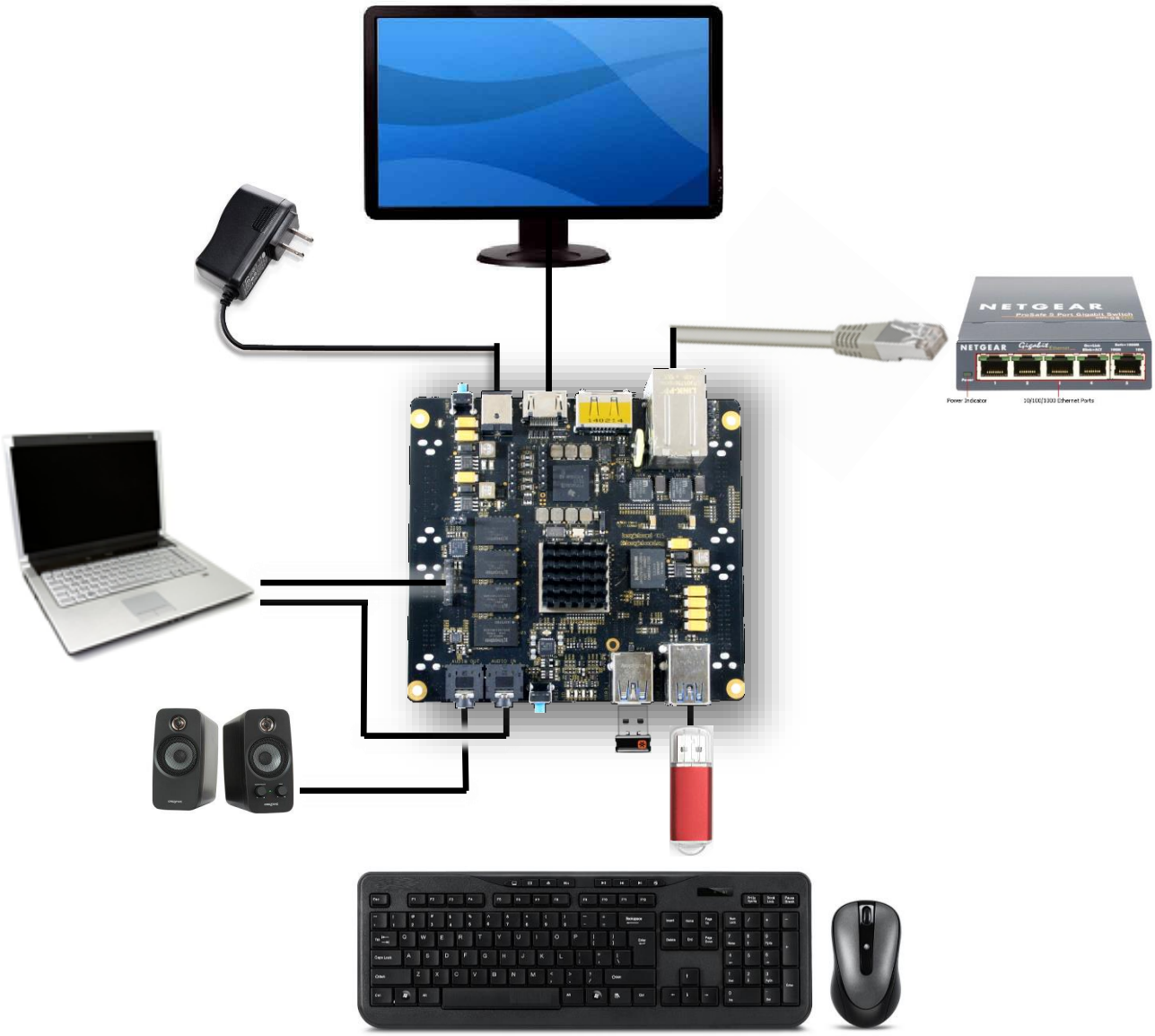


Figure 24 - Complete X15 system ready for test

TESTING

DEBUG:

The Serial debug port on the processor is UART3 via a single 1x6 pin header. In order to use the interface a USB to TTL adapter will be required. The header is compatible with the one provided by FTDI and can be purchased from various sources. Signals supported are TX and RX. None of the handshake signals are supported. On the PC you will see activity that will take you to login prompt.

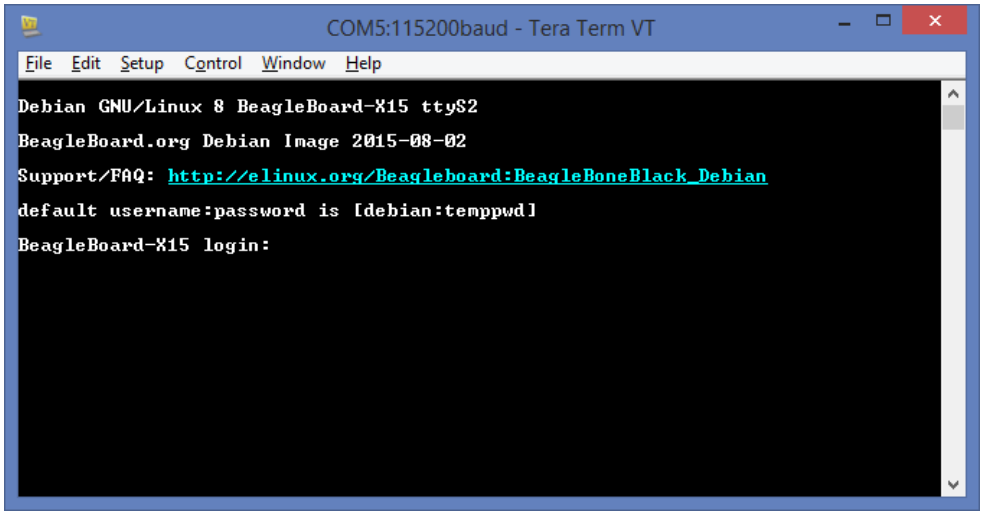


Figure 25 - Terminal activity on the Tera Term

A few seconds after the board power is turned on, the image in eMMC will boot and the Debian desktop will soon show up on the HDMI monitor.

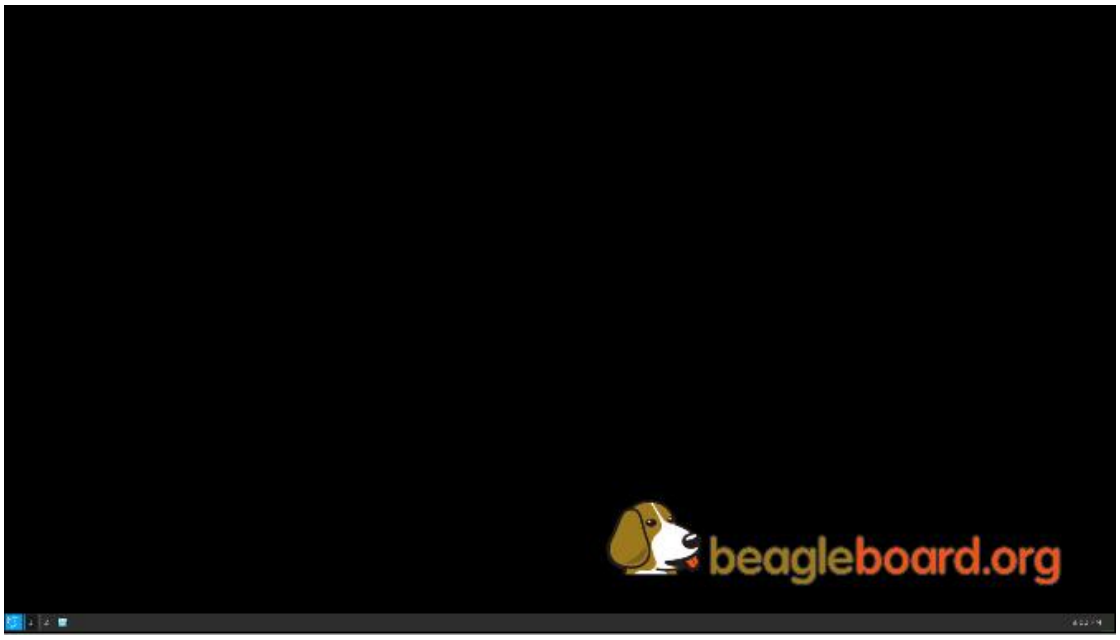


Figure 26 - Debian Desktop

ETHERNET

Assuming the Ethernet cable is connected to one of the ENET ports on the EPD-X15 a quick test can be performed by pointing the mouse to the bottom left corner of the Desktop and clicking the Debian menu logo. From here point to Internet → Chromium Browser.

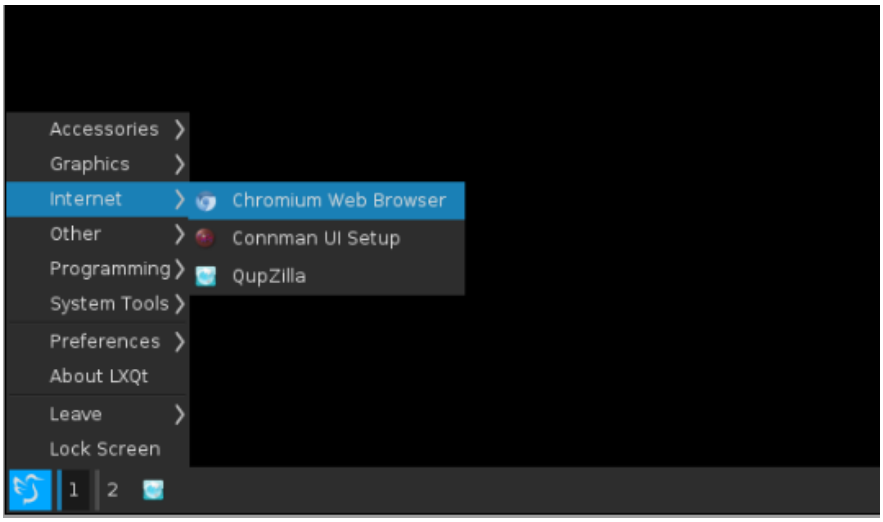


Figure 27 - Open Web Browser

The browser window will open and if there is an internet connection, the browser will go to the homepage.

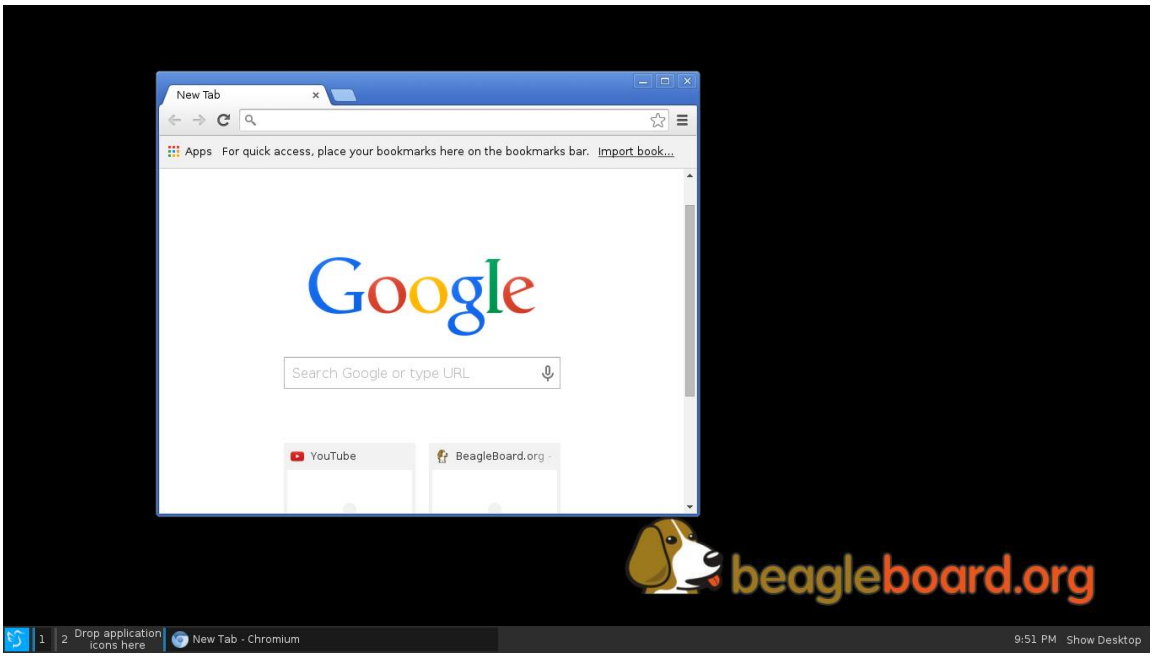


Figure 28 - Browser opens to the home page

The second Ethernet port can be similarly tested by moving the cable from ENET0 to ENET1. See **Figure 3**

SPEAKERS

To test the sound of your EPD-X15 you can open a sound file and play it back. In the example below, a simple file is played via the Chromium Web browser. The sound file was present in a USB flash drive plugged into one of the USB3/2 connectors at the bottom edge of the board.

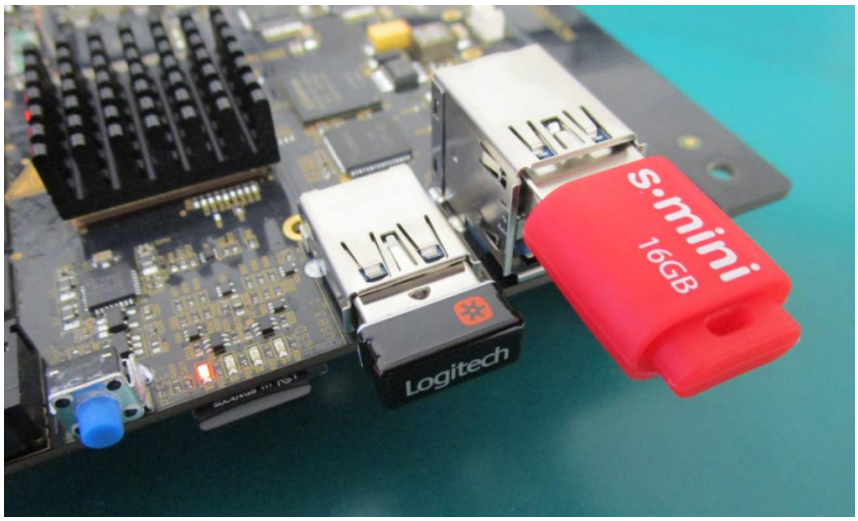


Figure 29 - Insert USB Flash Drive into any unused USB port

On the Debian Desktop a window will pop-open and ask you if you want to see the contents of the newly installed flash drive. Also on the Tera Term console you can also read the logs associated with the insertion of the drive.

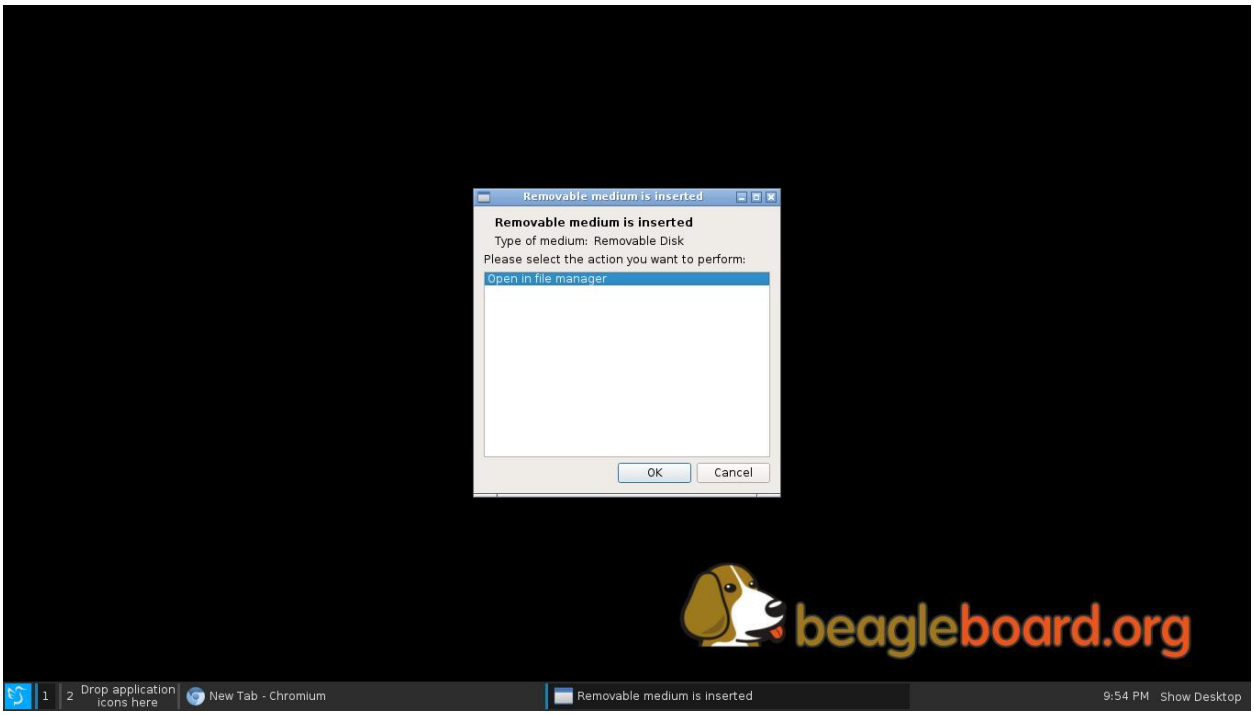


Figure 30 - Media Inserted window

Click ‘Open in file Manager’ to see the contents of the flash drive. Proceed to open the sound file. In case there is no music player installed yet, open the wav file with Chromium Brower. Then click play

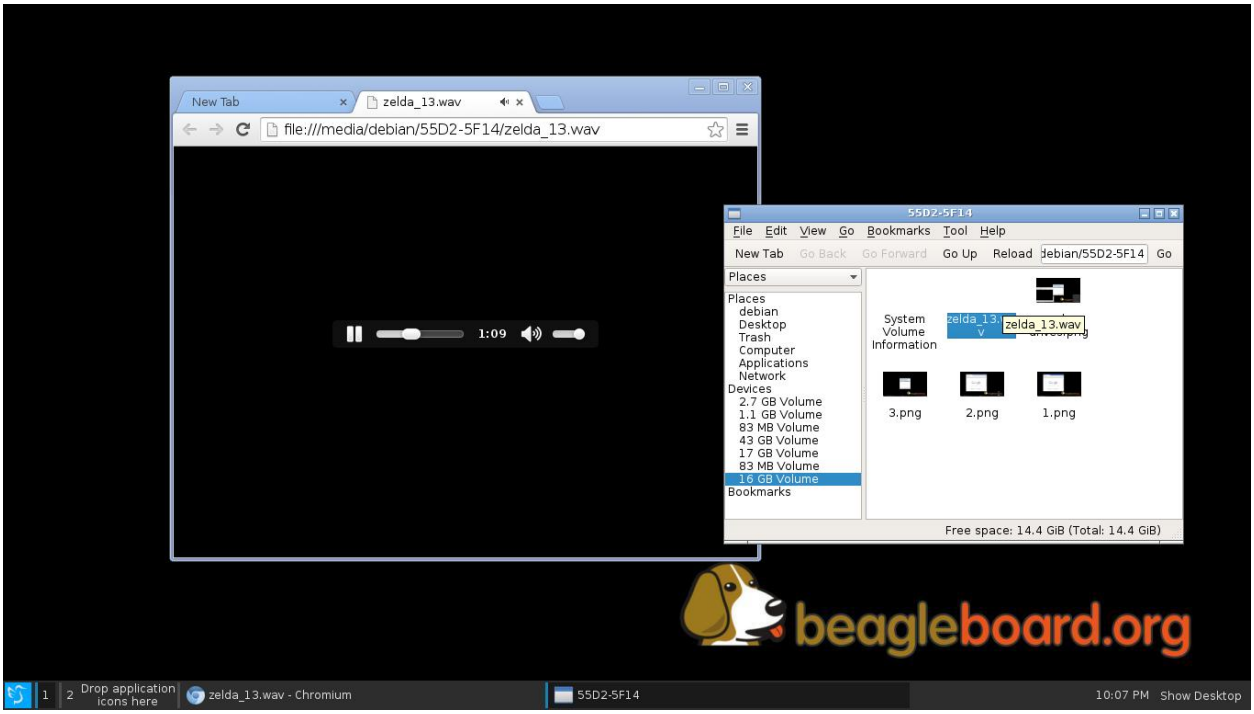


Figure 31 - Open and Play sound file

To adjust volume make sure your speakers are connected and the speaker volume is turned to a nominal volume. The X15 volume can be adjusted by clicking on the lower right hand side left of the clock (icon missing in this example) and adjusting the volume lever up and down.

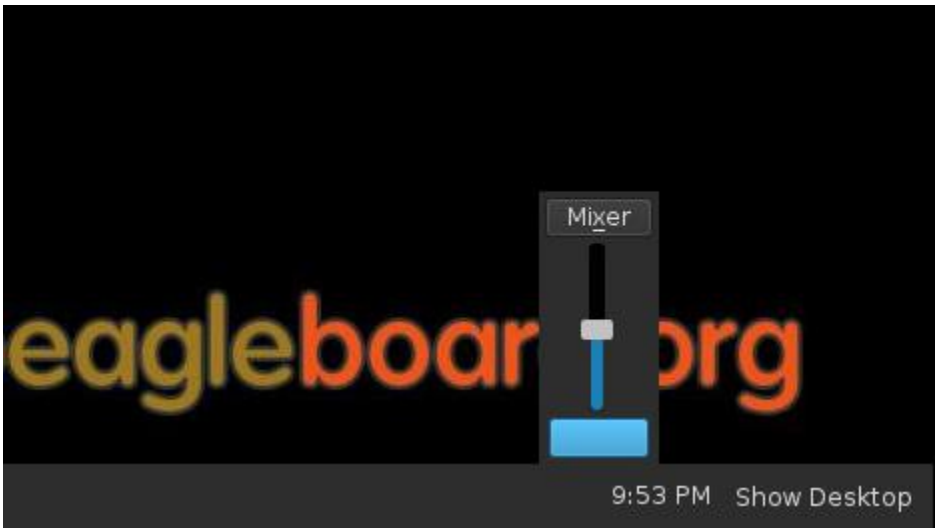


Figure 32 - Debian Volume adjustment

Audio In can be similarly tested by using a 3.5mm to 3.5mm audio cable between a PC playing a sound file and the X15 recording it via connector jack P9.

ESATA

To test the eSATA interface you will need a cable and drive as described in **Table 1.** Simply plug in the cable into connector P6 and the drive will be detected. The connector also accepts a USB 2.0 flash drive or other USB 2.0 devices.

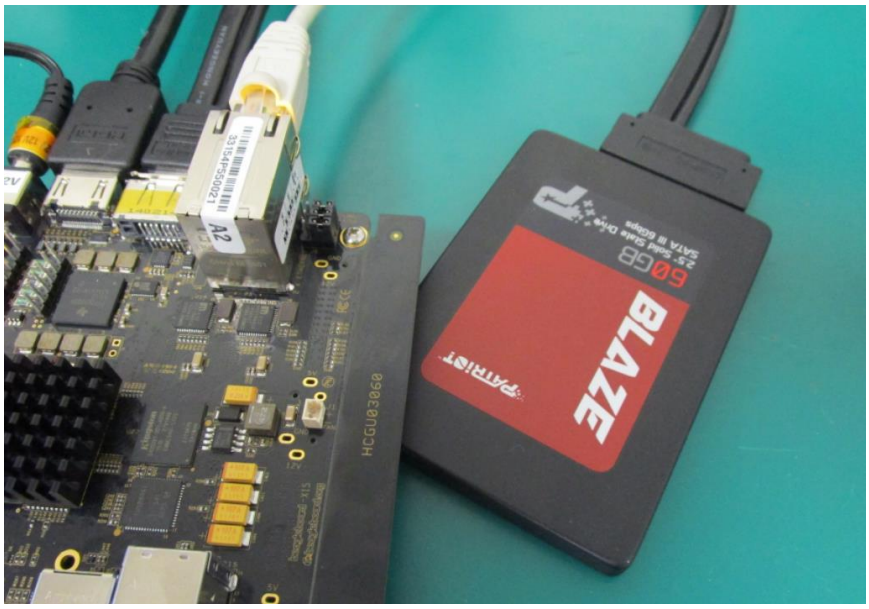


Figure 33 - Plug in eSATA cable and SSD

When plugged in the eSATA or USB will be listed on the Debian Desktop as shown below:

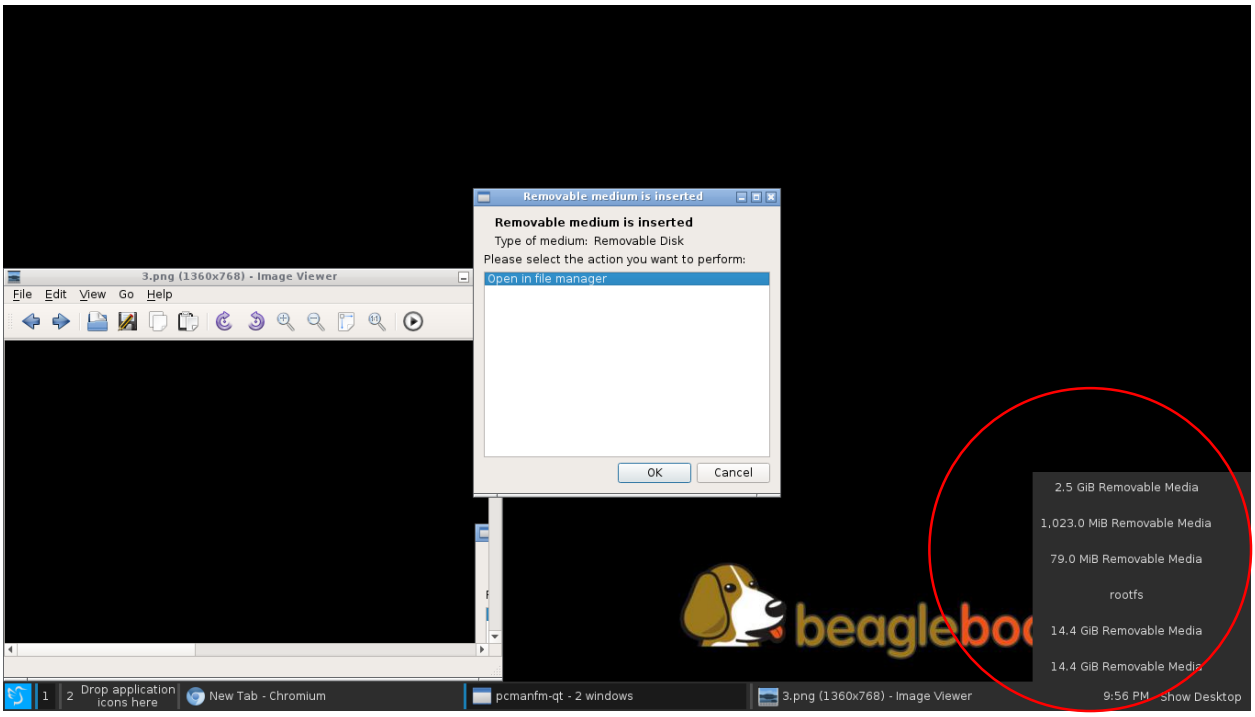


Figure 34 - Attached drives show up in Debian pop-up window

To power OFF the board you can Press-and-Hold the power button for 12 seconds.

Another way to power off the board is to use the '**shutdown'** command at the terminal prompt. The board will then start powering off.

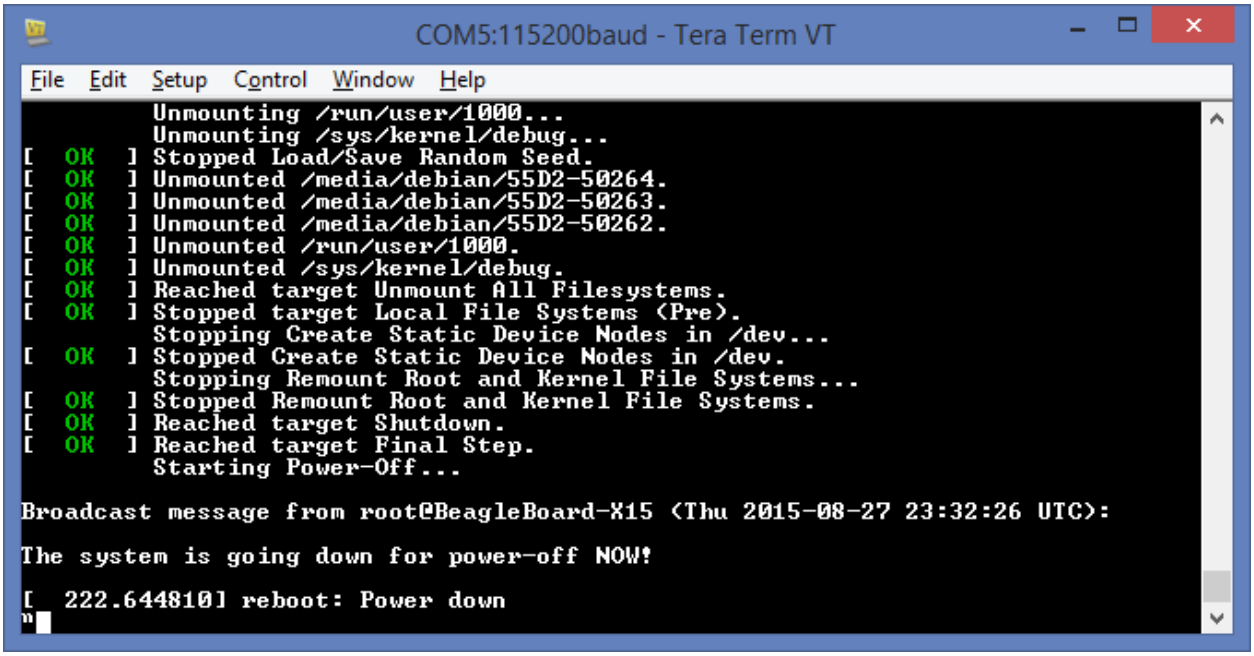


Figure 35 - Powering OFF using the shutdown command

To **RESET** the board you can press the RESET button S2. Pressing once should reboot the board.

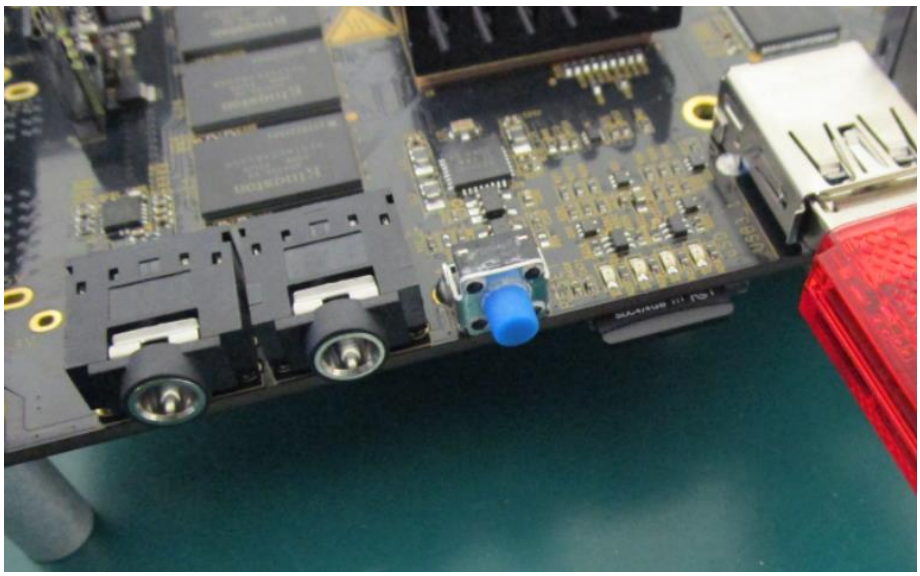
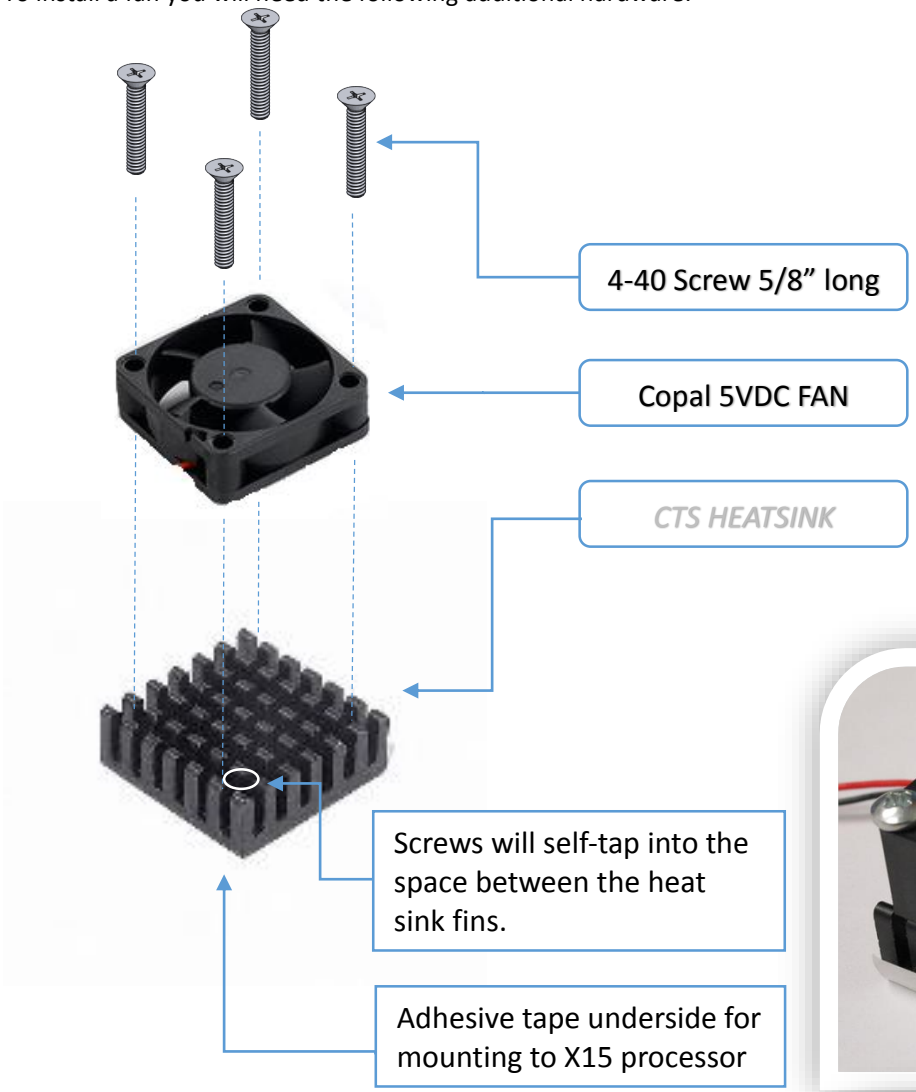


Figure 36 - The RESET Button P2

FAN

The EPD-X15 is comes with a heatsink installed that can accept an off the shelf fan. The fan will connect to the socket located on the top side of the board, on the left edge as shown in **Figure 5 . NOTE, under some conditions the area close to the processor can get very hot to touch. Observe cautions: SEE Figure 5.**

To install a fan you will need the following additional hardware:



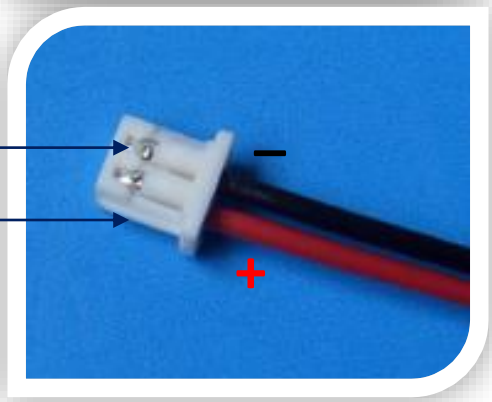


Table 2 shows the parts list for the EPD-X15 Fan.

Table 2 - Fan Bill of Materials

1	**1**		**FAN**	**COPAL**	**F251R-05LB**	**FAN AXIAL 25X10MM 5VDC WIRE**
2	**4**		**Machine Screw**	**McMaster**	**96640A059**	**Box of 100 4-40 Flat head Machine screws 5/8" Black**
3	**1**		**Connector Housing**	**MOLEX**	**0510210200**	**CONN HOUSING 2POS 1.25MM NATURAL**
4	**2**		**Contact**	**MOLEX**	**0500588000**	**CONN TERM FEMALE 28-32AWG TIN**

Figure 36 shows the connection for the fan cable.

Connector Assembly Instructions:

Attention must be paid to the orientation of the crimped contact inside the plastic jacket. Follow insertion direction shown by the picture on the right. **NEG (-)** wire as shown on the previous page.

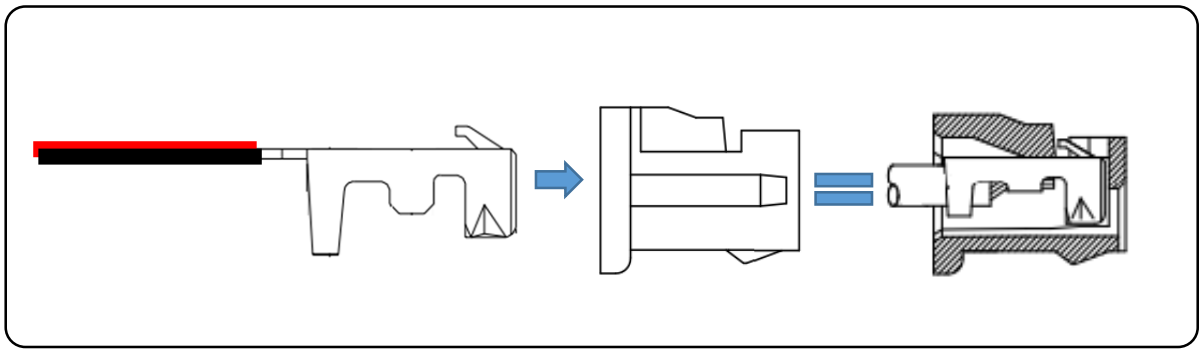


Figure 37 - Polarity details for Fan connector