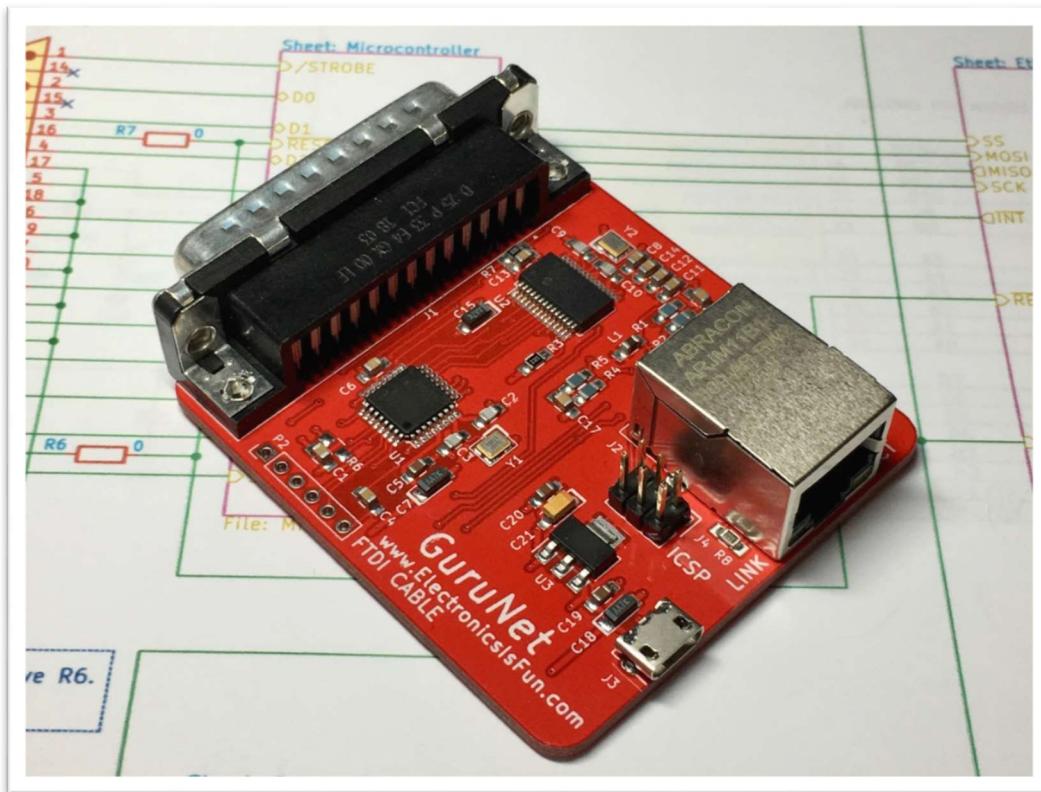


# GURUNET

Ethernet card for Commodore Amiga computers



From Electronics Is Fun  
[www.ElectronicsIsFun.com](http://www.ElectronicsIsFun.com)  
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# GURUNET CARD INTRODUCTION

The GuruNet card is an Ethernet adapter for the Amiga line of computers. The GuruNet connects to the parallel port of the computer and provides up to 10Mbp/s communications over standard CAT-5 wiring. It is an integrated version of the PlipBox developed by Lallafa that is 100% compatible with the PlipBox firmware and drivers.

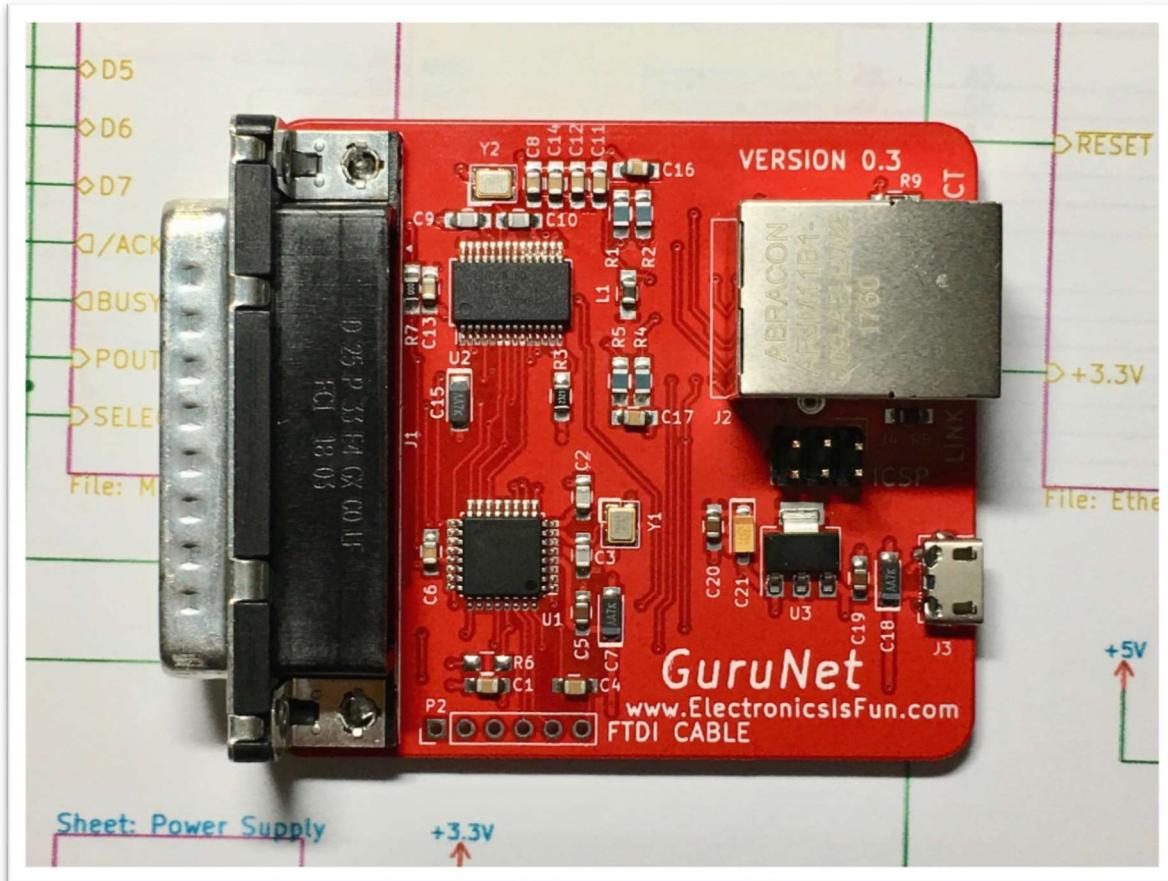
The GuruNet is a low cost alternative to internal network cards available on the market today. It can be installed on the parallel port of the computer and powered by a user supplied power adapter.

This manual provides information on how to install and use the GuruNet card.

This manual and support files can be downloaded from:

<http://ElectronicsIsFun.com>

Additional information including updates to the firmware package and schematic files are provided at Electronics Is Fun and Lallafa's blog.



### System Requirements

1. A Commodore Amiga computer (A500, A600, A1200, A2000, or A3000).
2. TCP/IP stack software (AmiTCP, MiamiDX, Roadshow, Genesis, etc).
3. Plipbox SanaII driver file.
4. GuruNet card
5. +5V power Adapter with micro-USB connector (User supplied).

## GETTING STARTED

Installing the GuruNet card simple and only takes a few minutes.

1. *Make sure the computer is off.*
2. *Find the parallel port on the rear of the computer.*
3. *Plug a network cable to the RJ-45 connector (J2)*
4. *Connect the +5V power adapter to the mini USB connector (J3) on the GuruNet.*
5. *Plug the power adapter to an AC power.*
6. *Turn the system power on.*

The GuruNet is now ready to use. It can be used with commercial networking software that is SanaII compatible. The plipbox driver, and a TCP/IP stack are required to get online.

***NOTE: Additional information is required for configuration. For example, an IP address and a port number.***

## USING THE GURUNET CARD

This manual does not cover networking software installation or use.

The user should reference the documentation provided with their networking software for information on installing and configuring the networking stack (TCP/IP), browser, or any other user supplied software.

Details on installing the plipbox driver is provided in the firmware release available at:

<http://lallafa.de/blog/amiga-projects/plipbox/>

As of this writing the current package is **v0.6 17.01.2015 - plipbox-0.6.zip**

This package the source and binaries for the firmware and plipbox device driver along with instructions on installation and use. A doc folder is provided that contains all the documentation on installation and use. In the Amiga folder, you will find the plipbox device drivers for the 68000, 68020, 68030, 68040 processors. Reference the amiga.md document for details on installation. The firmware binaries and source can be found in the avr folder.

The firmware.md document contains information and details on how to perform tests and monitoring the operation of the firmware.

## ADVANCED TOPICS

The GuruNet card boot loader and operating firmware can be updated using an ICSP programmer and the Atmel Studio IDE. The Arduino IDE is required if there is a need to update the bootloader.

The tools used to create the firmware and program GuruNet are provided free of charge and are available directly from Atmel (now MicroChip).

<https://www.microchip.com/mplab/avr-support/atmel-studio-7>

Additionally, the bootloader can be obtained from the Arduino IDE available from [Arduino.cc](https://www.arduino.cc).

<https://www.arduino.cc/en/Main/Software>

***The current version available is ARDUINO 1.8.7***

Developing new firmware or modifying the current firmware will be left as an exercise for the user. It is beyond the scope of this document. However, this section will provide some details on what is required to get started.

The GuruNet card is based on the ATMega328PB microcontroller and the Microchip ENC28J60 stand-alone Ethernet controller. The microcontroller contains 32KB of flash program memory and 2KB of internal SRAM. The Ethernet controller interfaces to the microcontroller over the SPI bus.

A 6-pin ICSP connector (J4) is provided onboard to facilitate uploading firmware. An AVRISM mkII programmer or other Atmel Studio compatible programmer is required to upload new firmware to the GuruNet card.

The bootloader (optiboot) programmed into the GuruNet is part of the Arduino IDE. It is commonly located in the Arduino install directory.

On my system the file is located in the following path:

```
C:\Program Files  
(x86)\Arduino\hardware\arduino\avr\bootloaders\optiboot\opt  
iboot_atmega328.hex
```

*The location of the optiiboot\_atmega328.hex file may vary based on your Arduino IDE installation location.*

Programming the firmware will require a binary image of the firmware and setting of the **fuse bits**. The firmware is available for download from Lallafa's Blog. The package contains the complete source and binaries for the firmware along with the source and binaries for the plipbox driver.

<http://lallafa.de/blog/amiga-projects/plipbox/>

The package is also provided as a download at:

<https://electronicsisfun.com/download>

Additional documentation is also contained in this package that describes how to use the debug interface and how to install the Amiga plipbox.device driver (amiga.md file).

When programming the GuruNet from the Atmel studio, you will need the bootloader file, the firmware file and the fuse values.

## FUSE VALUES:

CFD = CFD\_DISABLED

BODLEVEL = 2V7

RSTDISBL = []

DWEN = []

SPIEN = [X]

WDTON = []

EESAVE = []

BOOTSZ = 256W\_3F00

BOOTRST = [X]

CKDIV8 = []

CKOUT = []

SUT\_CKSEL = EXTXOSC\_8MHZ\_XX\_16KCK\_14CK\_65MS

EXTENDED = 0xF5 (valid)

HIGH = 0xDE (valid)

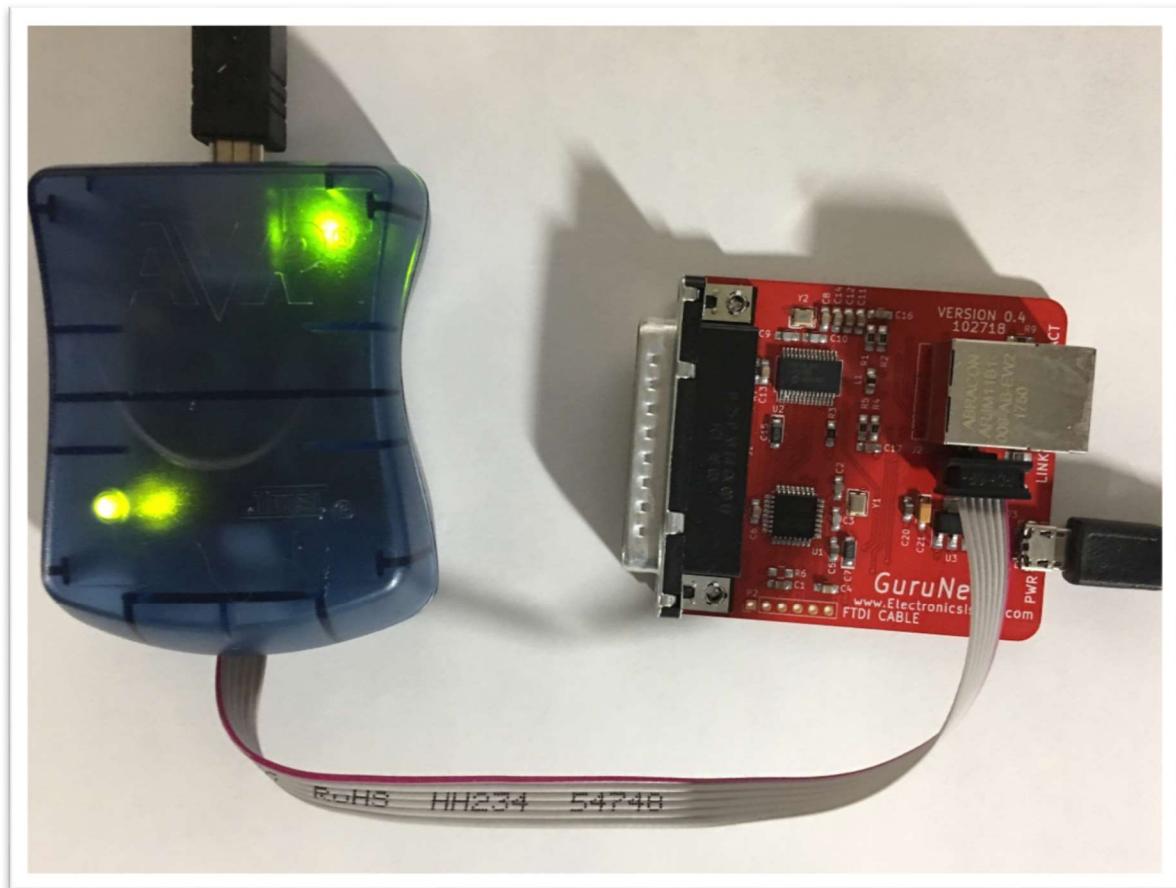
LOW = 0xFF (valid)

## FTDI CABLE CONNECTOR (P2)

A 6-pin FTDI connector (not populated) can be used with an FTDI TTL-232R-5.0V cable (user supplied) to access the debug interface and monitor data transactions.

Required hardware:

- *GuruNet Board*
- *AVRISP mkII programmer*
- *+5V power adapter with micro usb plug.*

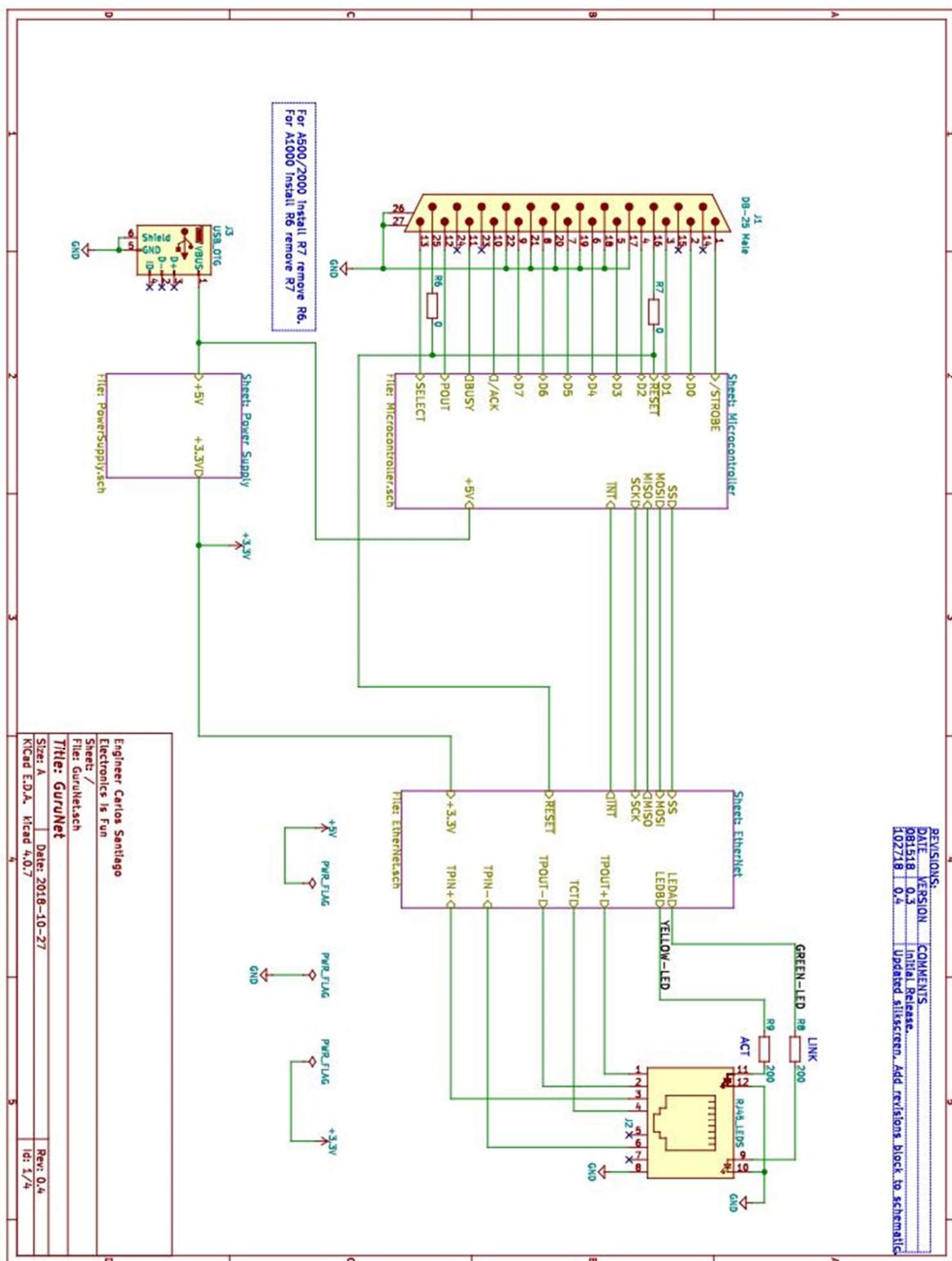


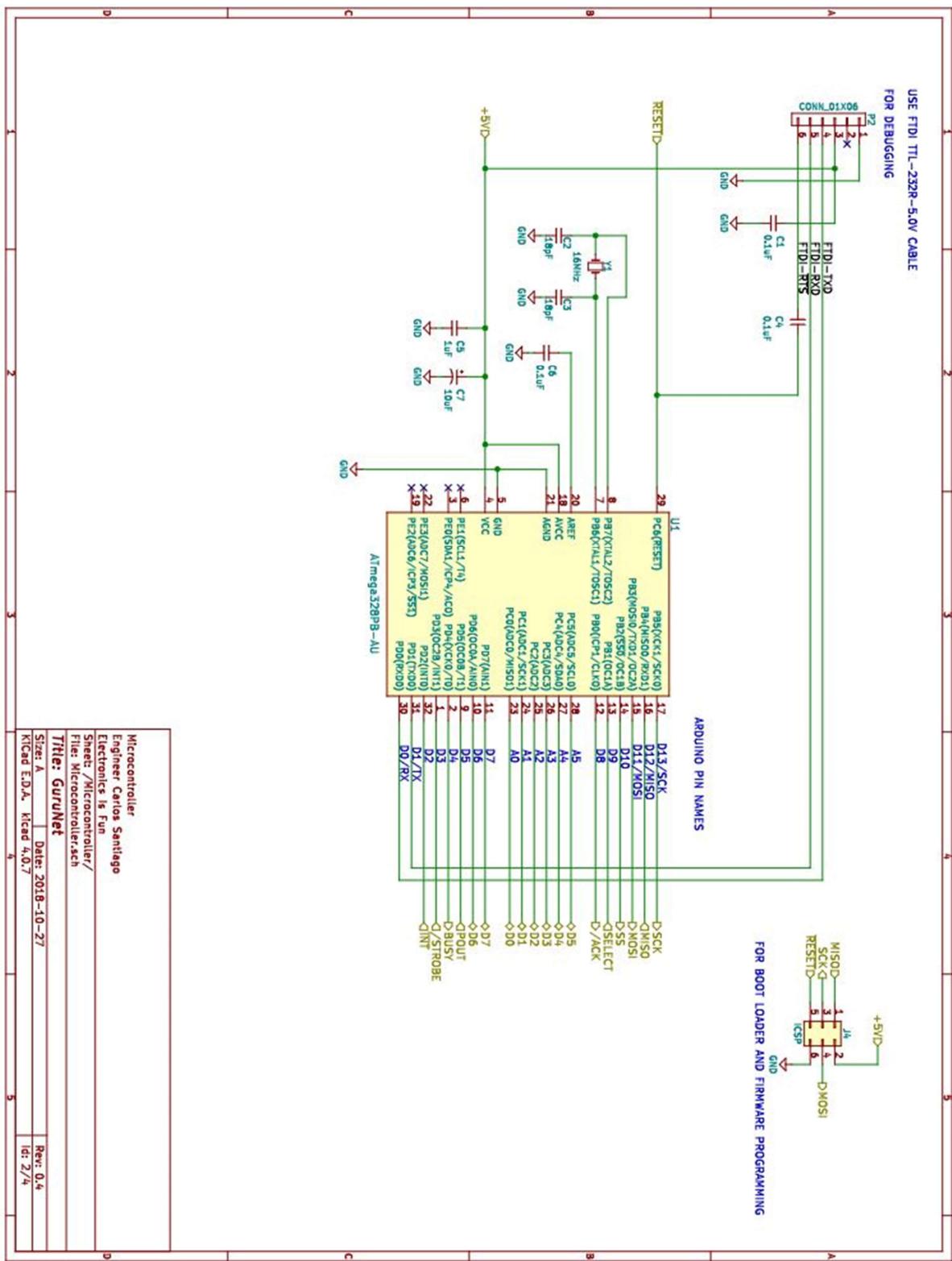
## UPDATING THE BOOTLOADER, FIRMWARE, AND FUSES:

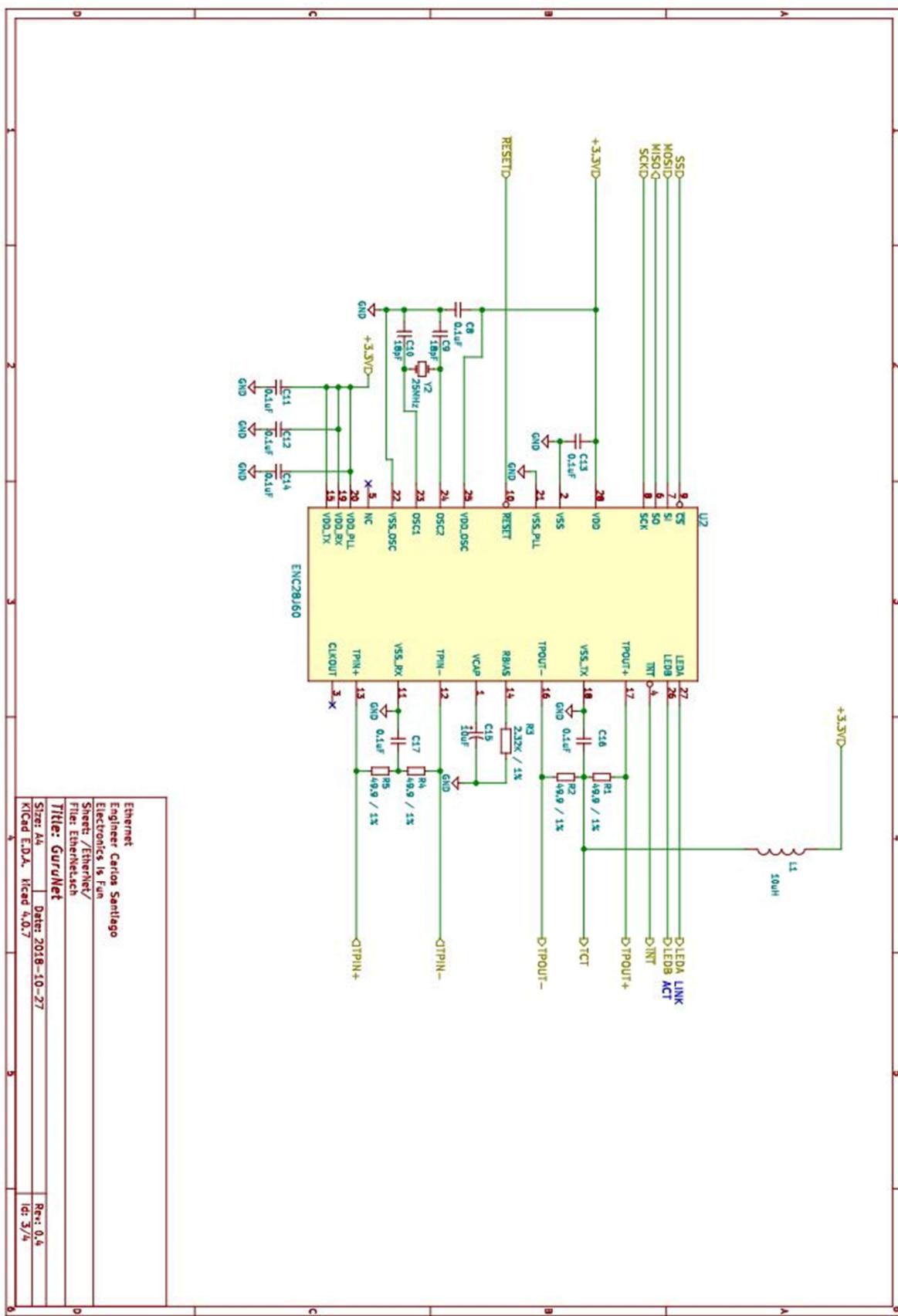
1. Download and install the Arduino IDE (make note of the installation location, it will be needed later to find the bootloader file)
2. Download and install the Atmel Studio.
3. Download and unzip the firmware package (current version is v0.6 17.01.2015 – plipbox-06.zip)
4. Attach the AVRISP mkII programmer to an available USB port on your system.
5. Attach the programmer, and power adapter to the GuruNet as shown in the figure above.
6. Open Atmel Studio and from the tools menu select “Device Programming”.
7. Select AVRISP mkII under the Tool heading.
8. Select the Atmega328PB under the Device heading.
9. ISP will be selected under the Interface heading. Click on the Apply button.
10. Click the Read button, The Device signature and Target Voltage will be displayed.
11. Select Memories in the sidebar. Under the Flash heading click the browse button at the far right and navigate to the path where the Arduino IDE bootloader file is stored.
12. Check the “Verify Flash after Programming” box and click the Program button.
13. Under the Flash heading click the browse button at the far right and navigate to the path where the plipbox (plipbox-0.6-57600-nano-atmega328.hex) firmware file is stored.
14. Check the “Verify Flash after Programming” box and click the Program button.
15. Select the Fuses in the sidebar. In the Fuse Register values enter the EXTENDED, HIGH, and LOW values (0xF5, 0xDE, 0xFF) and click program.

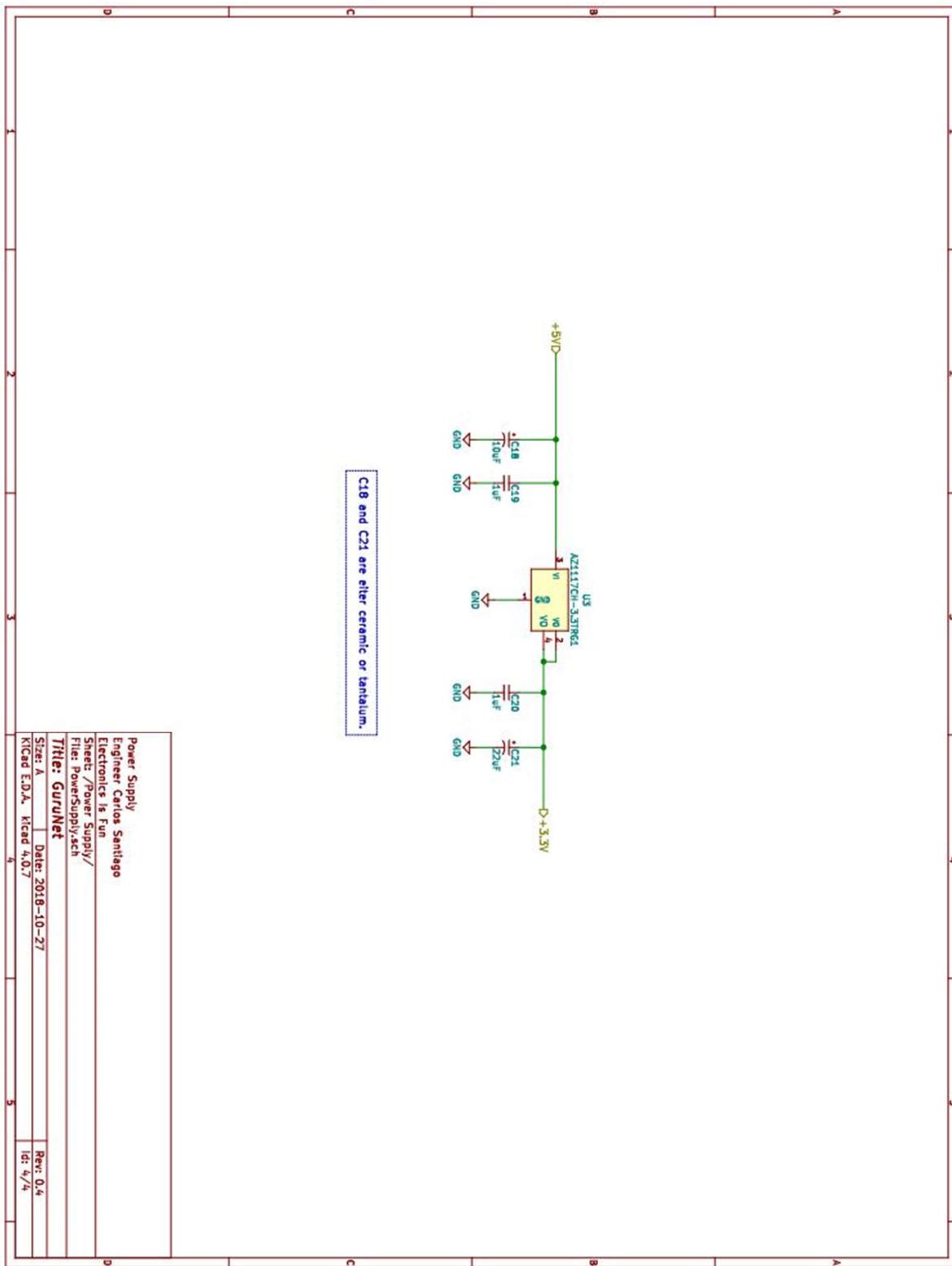
Programming of the bootloader and firmware is complete. Close and exit the Atmel studio. Disconnect the programmer and power.

## SCHEMATICS

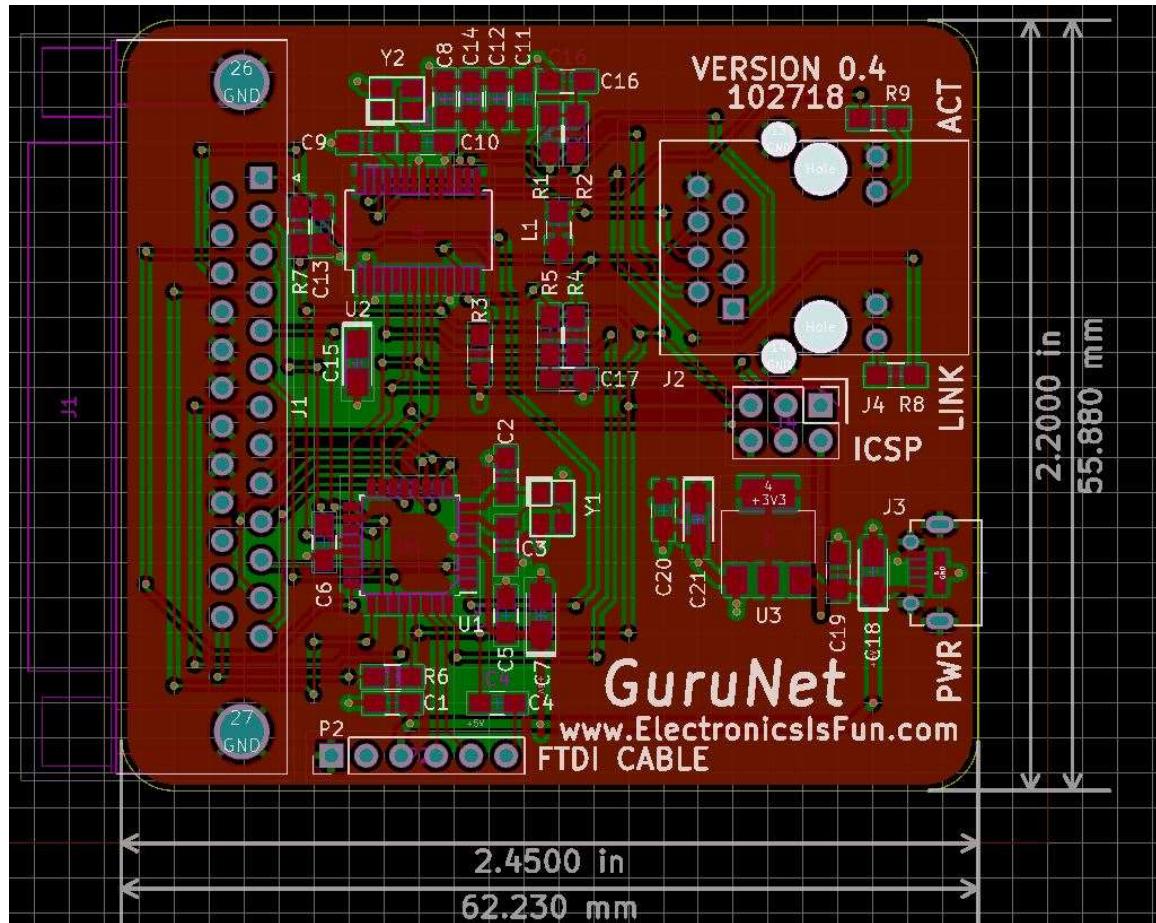








## BOARD LAYOUT



# GLOSSARY

Term	Definition
IP Address	Internet Protocol Address. Every device on the internet is assigned a unique address that is usually (4) bytes long for example 192.168.1.100.
BBS	Bulletin Board System.
Bootstrap	A small program that starts the process of loading other larger programs, or an operating system.

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