WiFi Enabled MicroSD Network Drive

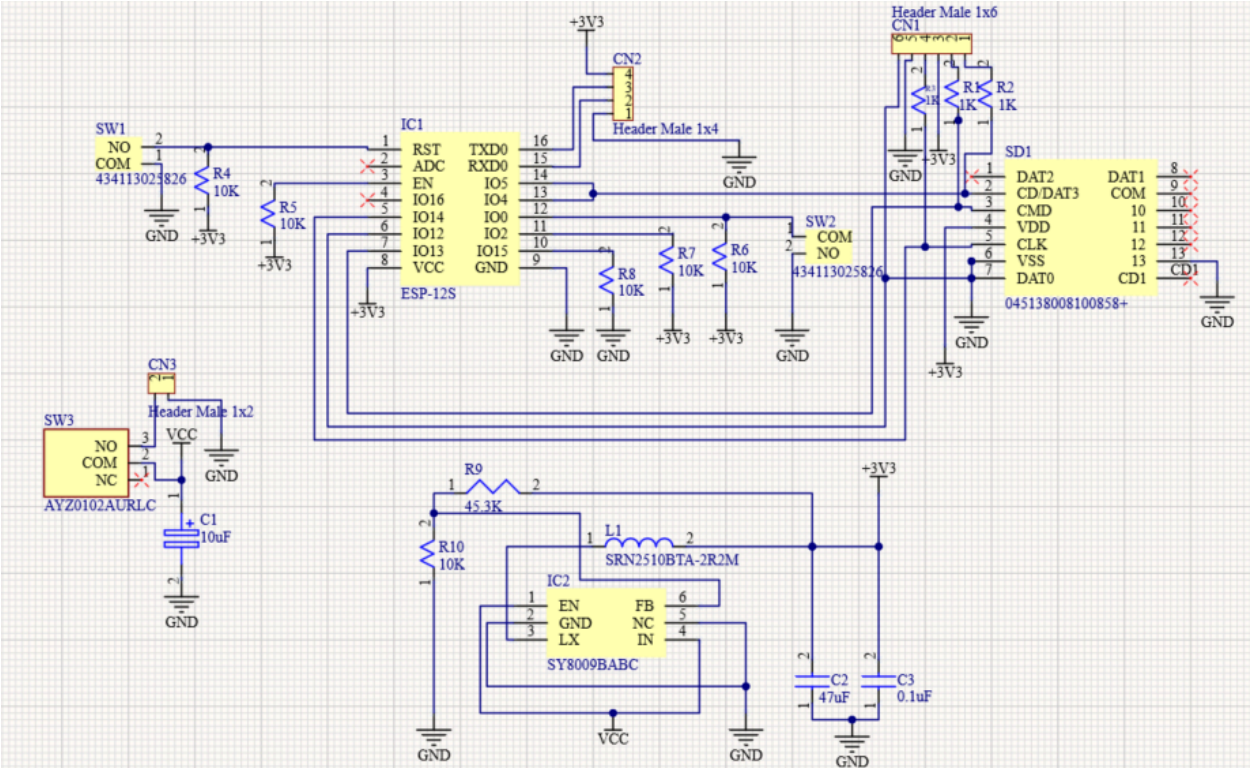
What if you could create your own network drive using inexpensive, easily accessible components? With this project, you can build a WiFi-enabled MicroSD network drive. Let's dive into the process of creating this device, from circuit design to PCB layout.

Project Overview

This project aims to transform a MicroSD card into a network drive accessible over WiFi. The core components of this device include:

- ESP8266 (ESP-12F) module: A versatile WiFi microcontroller that serves as the brain of the device.
- MicroSD card slot: Allows for data storage and retrieval.
- Voltage regulator: Ensures stable power supply.
- Capacitors and resistors: Provide necessary filtering and resistance for stable operation.
- Switches and connectors: Facilitate user interaction and connectivity.

Circuit Design



Circuit Schematic

How It Works

- Powering the Device: The voltage regulator (IC2) ensures a stable 3.3V supply to the ESP8266 and MicroSD card slot, essential for reliable operation.
- WiFi Connectivity: The ESP8266 module connects to a WiFi network, making the device accessible as a network drive.
- MicroSD Card Access: Data from the MicroSD card is accessed via the SPI interface, allowing the ESP8266 to manage file transfers over the network.
- User Interaction: Switches allow for resetting the device, entering flash mode for firmware updates, and controlling power, providing user control over the device's operations.
- Network Drive Functionality: Once connected to WiFi, the device acts as a network drive, where users can access and manage files stored on the MicroSD card from any networked device.

PCB Layout

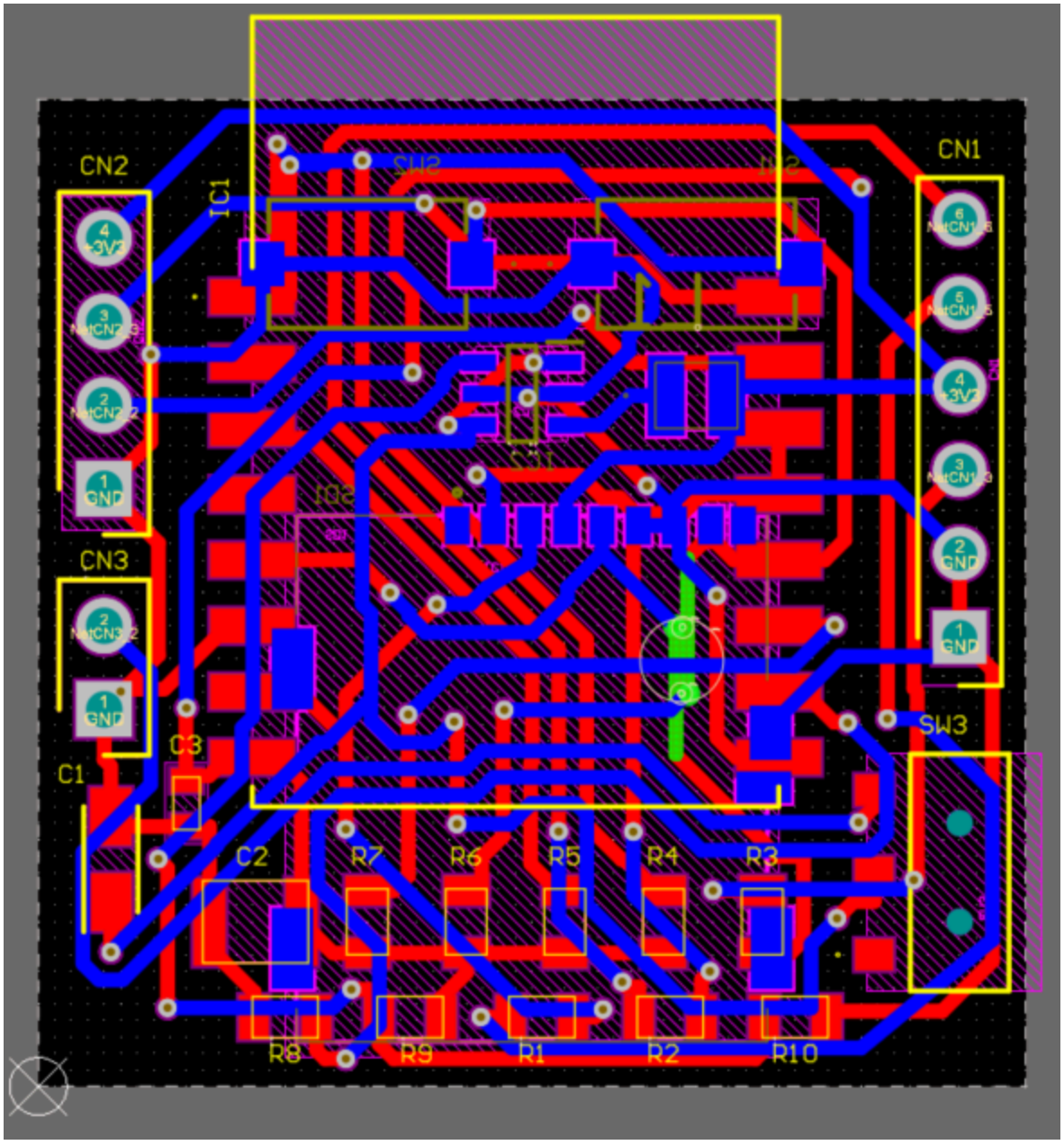
To implement this design, a 2-layer PCB layout was created with the following stack-up:

Layer	Material	Type	Thickness	Weight	Dielectric Constant (Dk)	Dissipation Factor (Df)
Top Overlay	Overlay	Overlay	-	-	-	-
Top Solder	Solder Resist	Solder Mask	0.025mm	-	3.5	-
Top Layer	Copper	Signal	0.036mm	1 oz	-	-
Dielectric 1	Core-009	Core	0.704mm	-	4.5	0.02
Bottom Layer	Copper	Signal	0.036mm	1 oz	-	-
Bottom Solder	Solder Resist	Solder Mask	0.025mm	-	3.5	-
Bottom Overlay	Overlay	Overlay	-	-	-	-

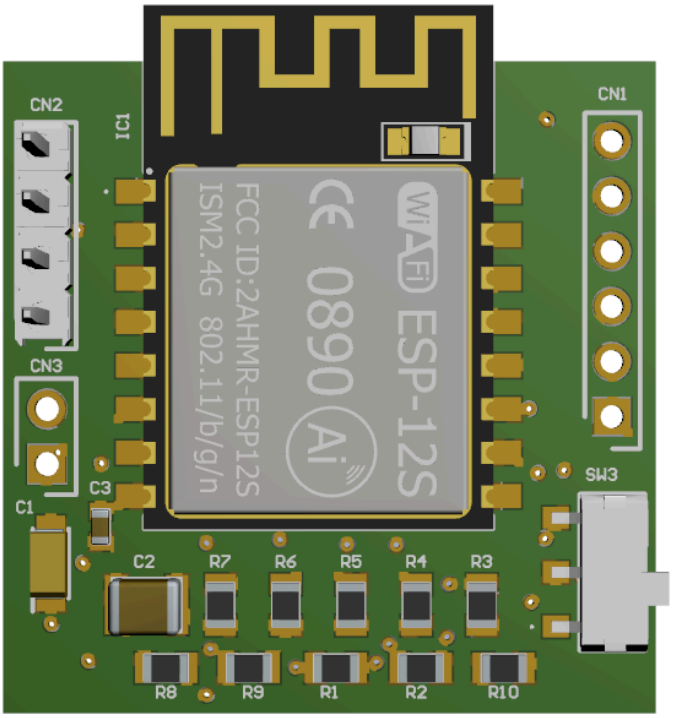
PCB Layer Stack-Up Configuration

Design Rules:

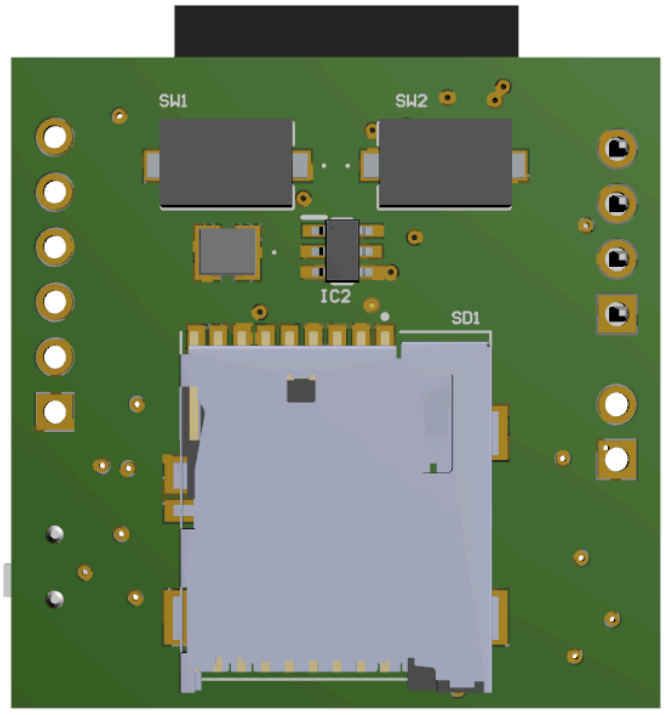
- Minimum Clearance: 0.3mm, ensuring adequate spacing between traces to prevent short circuits.
- Preferred Routing Width: 0.5mm, balancing current-carrying capacity and layout density.
- Via Diameter: 0.6mm with a hole size of 0.3mm, facilitating inter-layer connections



PCB 2D LAYOUT



TOP VIEW OF PCB



BOTTOM VIEW OF PCB

Building the Network Drive

- Program the ESP8266 with the appropriate firmware to handle WiFi connections and file transfers(will be updated later).
- Configure the firmware with your WiFi network credentials to enable network drive functionality.
- Power the device and connect it to your network.
- Use a computer or mobile device to access the network drive. Ensure file transfers are smooth and the connection is stable