PCB DESIGN PORTFOLIO

Wasif Saboor

Electrical Engineer | PCB Design Engineer

Designing Reliable PCB Solutions for Embedded Systems, Industrial Electronics & Power Electronics Applications

Portfolio 2026

About Me

I am an **Electrical Engineer** with **1.5+ years of hands-on experience** in **PCB design and embedded hardware development**, specializing in designing reliable PCB solutions for embedded systems, industrial electronics, and power electronics applications. My expertise includes schematic capture, multilayer PCB layout, footprint and library development, power supply PCB design, and hardware validation using **Altium Designer**. I have designed **2-layer, 4-layer, and 6-layer PCBs**, focusing on optimized component placement, signal integrity, power distribution, and manufacturable designs. Alongside PCB development, I have practical experience in embedded systems integration, electronics prototyping, testing, and hardware troubleshooting.

Technical Expertise

- PCB Layout Design (2, 4 & 6 Layers)
- Schematic Capture
- Multilayer PCB Design
- Footprint & Library Development
- Power Supply PCB Design
- Component Placement & Routing
- Signal & Power Integrity
- Design Rule Check (DRC) & Gerber Generation
- Embedded Hardware Integration
- Electronics Testing & Troubleshooting
- Hardware Validation

Technical Skills

PCB Design & Layout

- Altium Designer
- Schematic Capture
- PCB Layout Design (2, 4 & 6 Layers)
- Multilayer PCB Design
- Component Placement
- Signal & Power Routing
- Ground Plane Design
- Power Supply PCB Design
- Footprint & Library Development
- Design Rule Check (DRC)
- Gerber & Manufacturing File Generation

Embedded Hardware

- Arduino
- ESP32
- UART, I^2C & SPI Communication
- Sensor Integration
- Embedded Hardware Debugging

Software & Design Tools

- Altium Designer
- EasyEDA
- Proteus
- MATLAB/Simulink
- Arduino IDE

Electronics & Hardware

- Circuit Design & Analysis
- Power Electronics
- Electronics Prototyping
- Hardware Testing & Troubleshooting
- Hardware Validation

Professional Experience

Product Development Engineer
Comcept Private Limited

Feb 2025 – Jan 2026

Worked as a PCB Design and Product Development Engineer, contributing to the design, testing, and development of embedded hardware and power electronics products. Responsible for schematic design, PCB layout, hardware validation, and product development using Altium Designer.

Key Responsibilities

- Designed **2-layer PCB layouts** for Single and Multiple Dispenser Control Systems.
- Developed a **100W (48V) LED Search Light PCB** with optimized power routing and thermal considerations.
- Designed Solar LED Street Light PCBs and worked on programmable solar charge controller integration.
- Designed AGS Display System PCB and embedded display interface circuits.
- Performed schematic capture, PCB routing, and hardware debugging using Altium Designer.
- Conducted PCB testing, component assembly, and validation of Fuel Price Display Control Cards.
- Participated in product sourcing and technical evaluation of AC & DC EV Charging Stations.
- Supported prototype development, testing, and electronics troubleshooting.

PCB Design Program (PEC GET Program)
National Electronics Complex of Pakistan (NECOP)

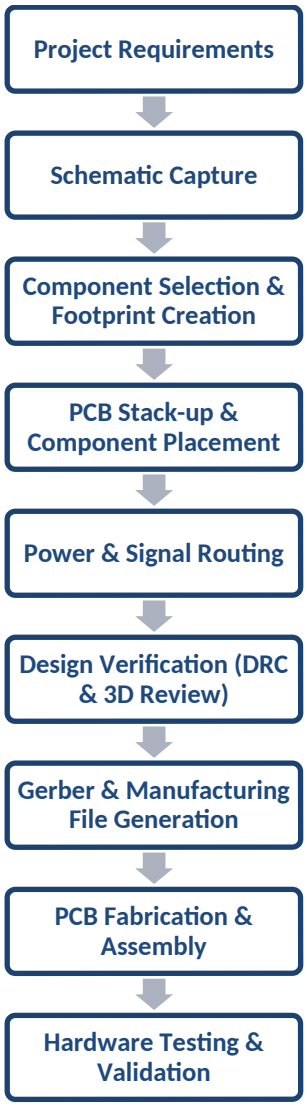
Jan 2026 – Present

Working as a PCB Designer on multilayer embedded hardware and power electronics projects, focusing on schematic design, PCB layout, and custom component library development.

Key Responsibilities

- Designed **4-layer and 6-layer PCBs** using Altium Designer.
- Developed schematics and PCB layouts for **1553 Evaluation Board**, **ADC Development Board**, and **Upconversion PSU Power Board**.
- Created custom footprints and schematic symbols from component datasheets.
- Implemented optimized power distribution, grounding, and signal routing techniques.
- Generated manufacturing outputs including DRC verification and Gerber files.
- Assisted in hardware integration, testing, and PCB design validation.

PCB Design Workflow



Featured PCB Projects

Single Dispenser PCB Design

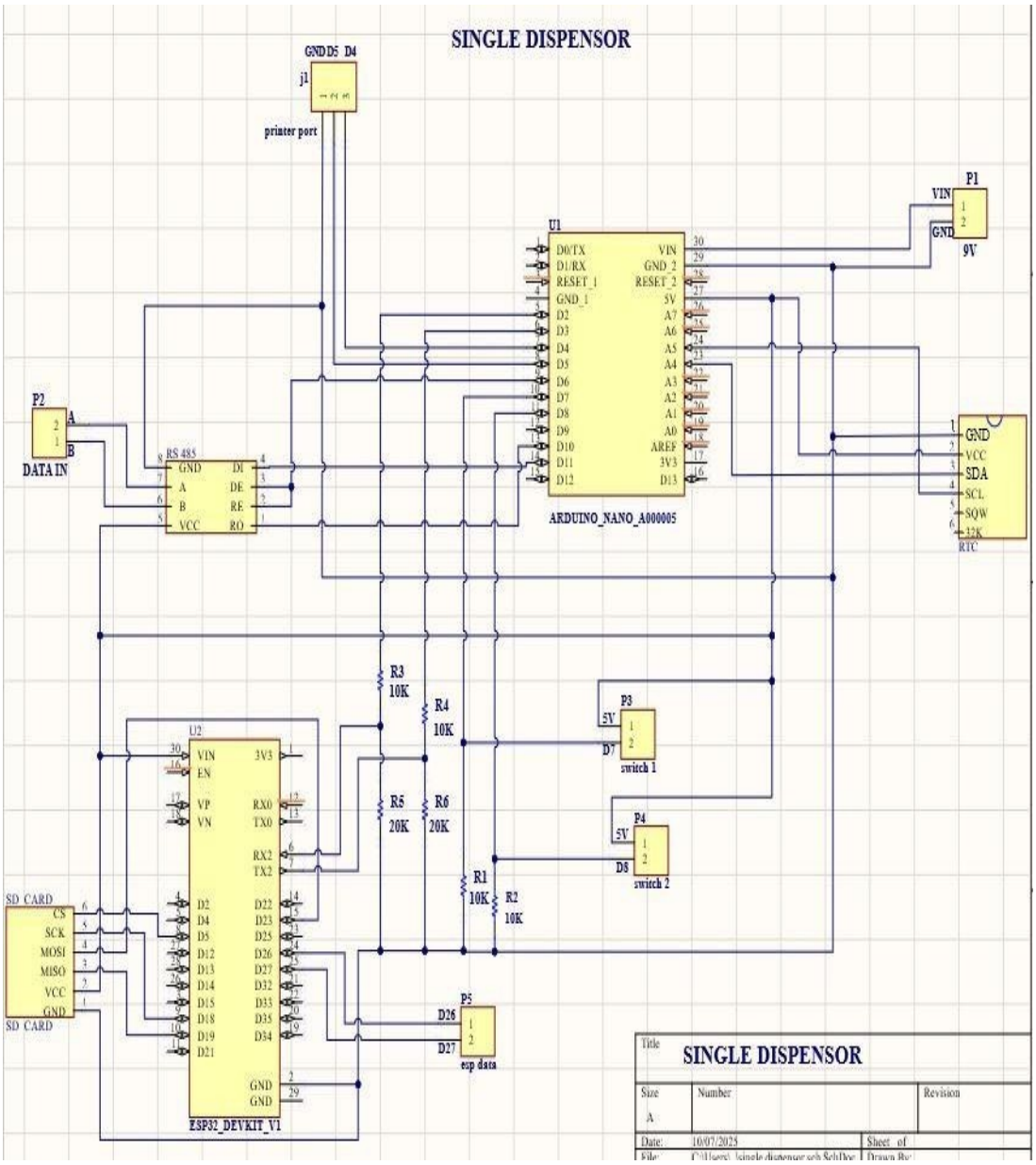
Designed a compact 2-layer embedded PCB for dispenser automation in Altium using ESP32 and Arduino Nano. The system integrates RS485 communication, RTC module, SD card logging, external switch inputs, and data communication interfaces. The PCB was optimized for compact routing, reliable communication, and embedded control applications.

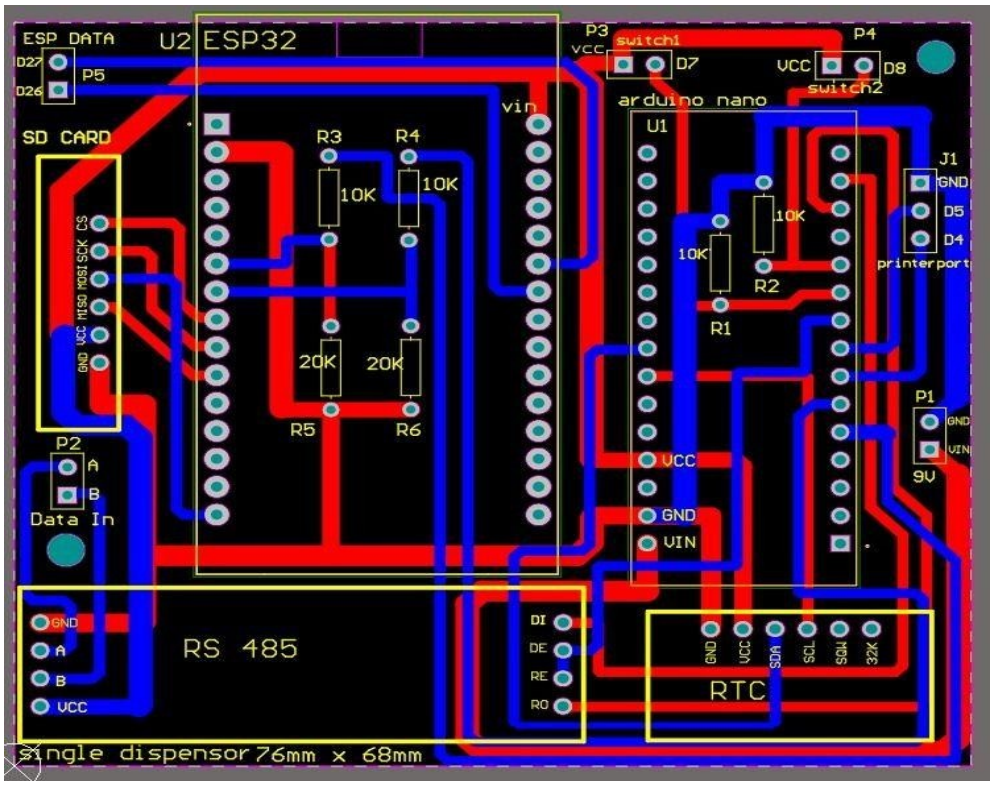
Technologies Used

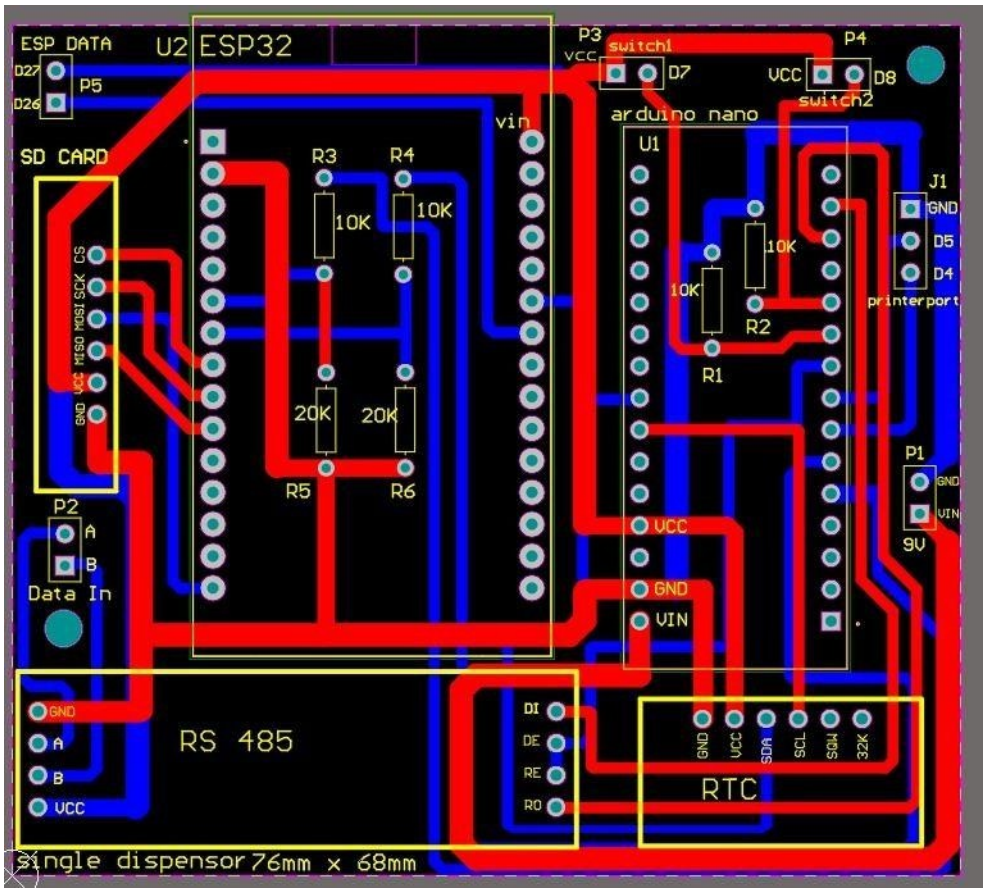
- ESP32
- Arduino Nano
- RS485
- RTC DS3231
- SD Card Interface
- Embedded PCB Design

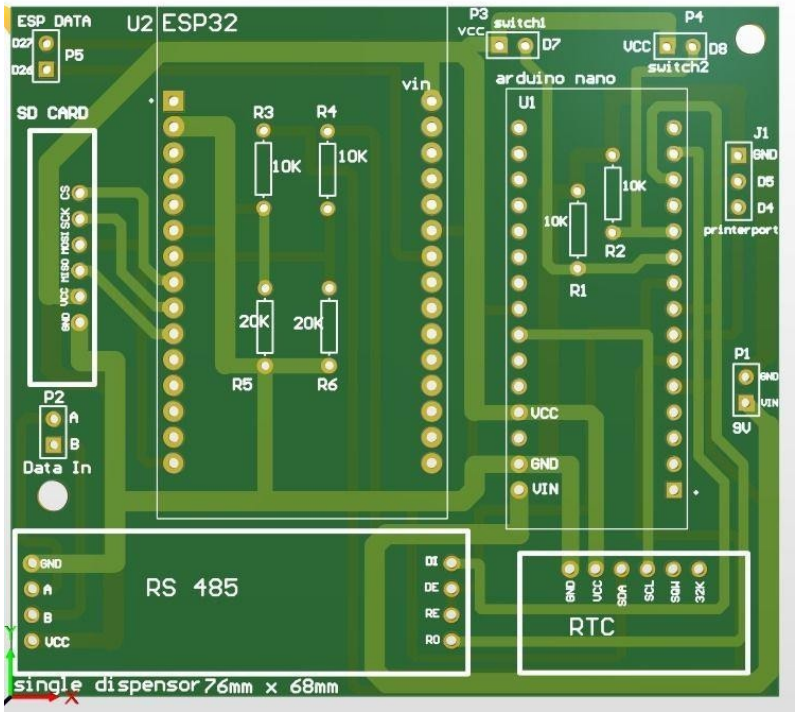
Skills Demonstrated

- Schematic Design
  - PCB Layout
  - Routing Optimization
  - Embedded Hardware Integration
  - Communication Interface Design


SINGLE DISPENSOR
GND D5 D4
j1
printer port
P1
VIN
GND
9V
U1
D0/TX
D1/RX
RESET_1
GND_1
D2
D3
D4
D5
D6
D7
D8
D9
D10
D11
D12
VIN
GND_2
RESET_2
5V
A7
A6
A5
A4
A3
A2
A1
A0
AREF
3V3
D13
ARDUINO_NANO_A000005
P2
A
B
DATA IN
RS 485
GND
A
B
VCC
DI
DE
RE
RO
GND
VCC
SDA
SCL
SQW
32K
RTC
R3
10K
R4
10K
R5
20K
R6
20K
R1
10K
R2
10K
P3
5V
D7
switch 1
P4
5V
D8
switch 2
U2
VIN
EN
VP
VN
3V3
RX0
TX0
RX2
TX2
D2
D4
D5
D12
D13
D14
D15
D18
D19
D21
D22
D23
D25
D26
D27
D32
D33
D35
D34
GND
GND
ESP32_DEVKIT_V1
SD CARD
CS
SCK
MOSI
MISO
VCC
GND
SD CARD
P5
D26
D27
esp data
Title
SINGLE DISPENSOR
Size
A
Number
Revision
Date:
10/07/2025
Sheet of


ESP_DATA
U2 ESP32
P5
SD CARD
R3
R4
10K
20K
R5
R6
vin
P3
switch1
D7
P4
D8
switch2
arduino nano
U1
R1
R2
J1
GND
D5
D4
printerport
P1
9V
P2
A
B
Data In
RS 485
DI
DE
RE
RO
RTC
SDA
SCL
SQW
32K
VCC
VIN
single dispensor 76mm x 68mm


ESP_DATA
U2 ESP32
P5
SD CARD
R3
R4
10K
20K
R5
R6
vin
P3
switch1
D7
P4
D8
switch2
arduino nano
U1
R1
R2
J1
GND
D5
D4
printerport
P1
9V
P2
A
B
Data In
RS 485
DI
DE
RE
RO
RTC
SDA
SCL
SQW
32K
VCC
VIN
single dispensor 76mm x 68mm


ESP DATA
U2 ESP32
P5
SD CARD
R3
R4
10K
10K
vin
P3
switch1
D7
P4
VCC
D8
switch2
arduino nano
U1
J1
GND
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D4
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10K
10K
R2
R1
20K
20K
R5
R6
P1
GND
VIN
9V
P2
A
B
Data In
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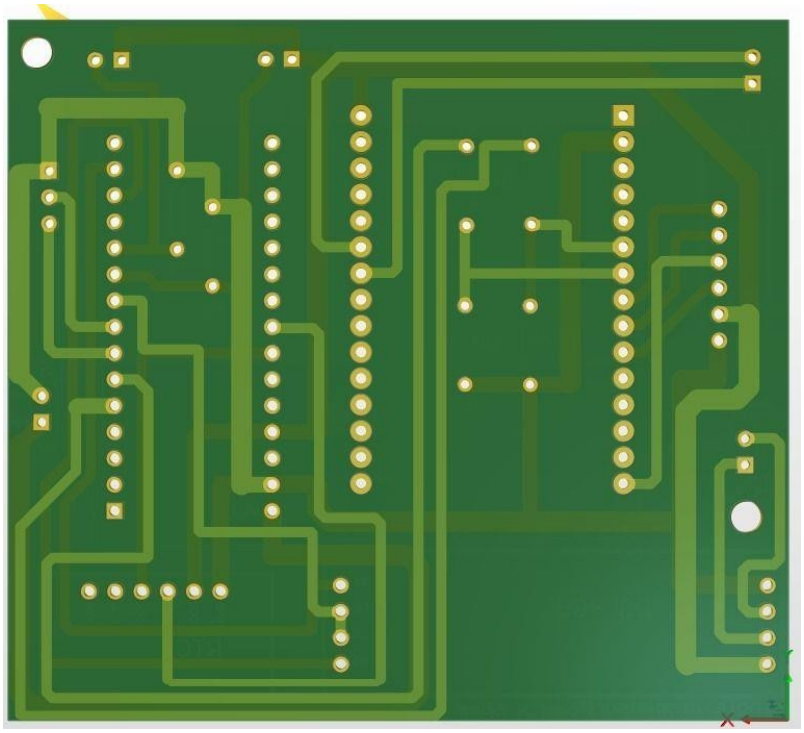
GND
VIN
GND
A
B
VCC
RS 485
DI
DE
RE
RO
RTC
single dispensor76mm x 68mm



Multi Dispenser PCB Design

Software Used

- Altium Designer

Main Controllers

- Arduino Mega 2560
- Espressif Systems ESP32 DevKit

PCB Specifications

- Double-layer PCB
- Size: 91 mm × 110 mm
- Compact embedded hardware design

Integrated Modules

- RTC Module
- SD Card Module
- RS485 Communication Module

Key Features

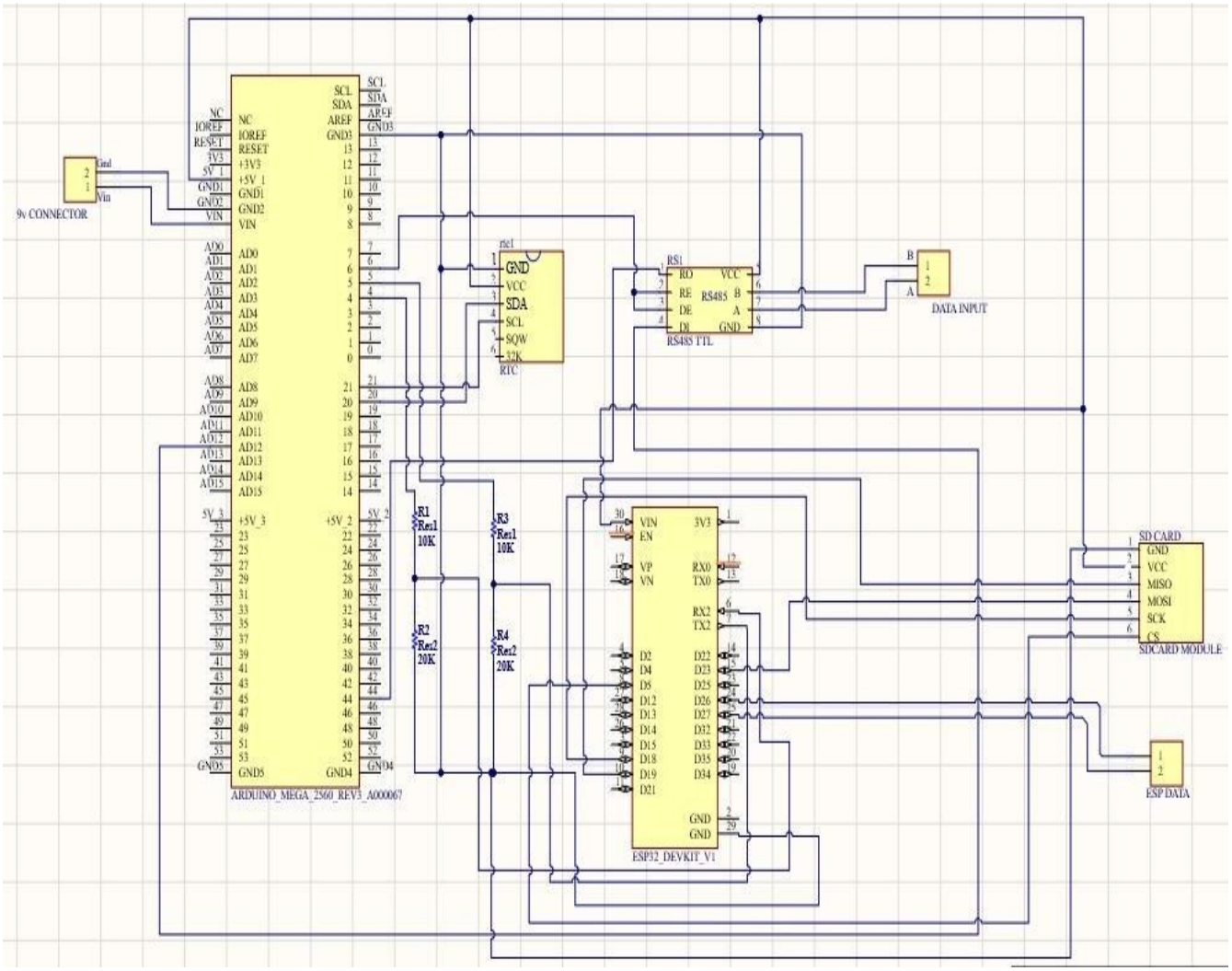
- IoT-ready architecture
- Real-time data logging
- Industrial communication support
- Mixed-voltage interfacing (5V & 3.3V)

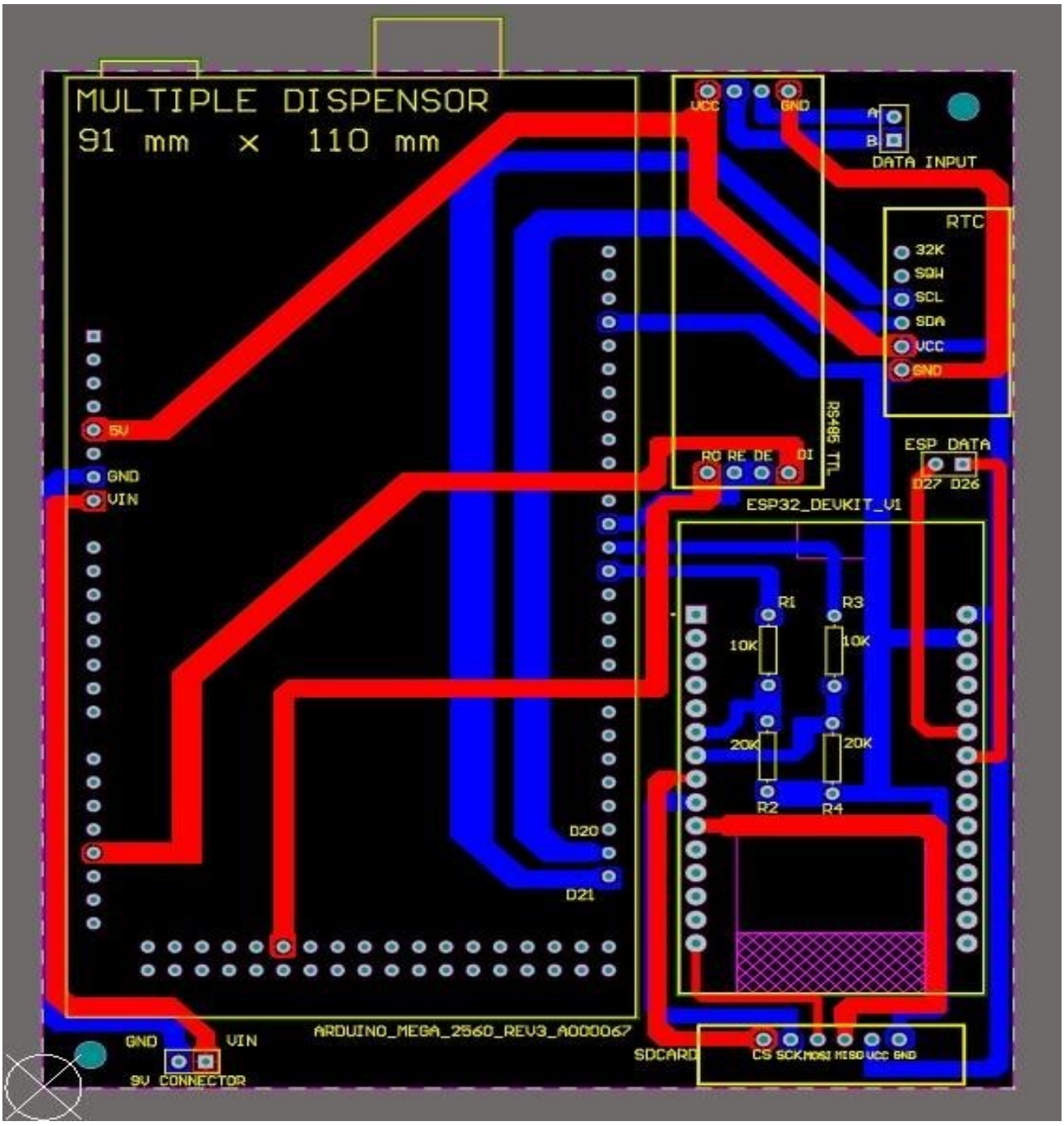
PCB Design Concepts

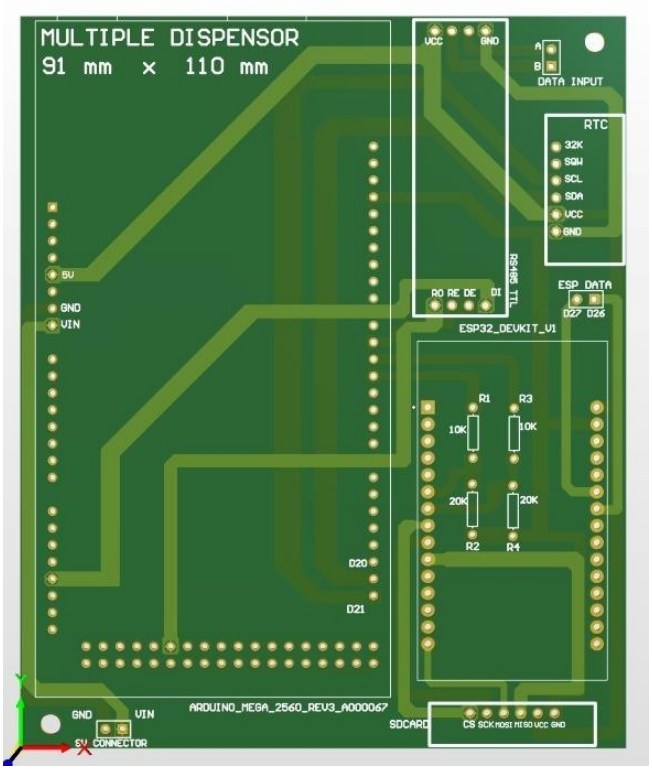
- Optimized signal routing
- Efficient power distribution
- Ground management
- Compact component placement

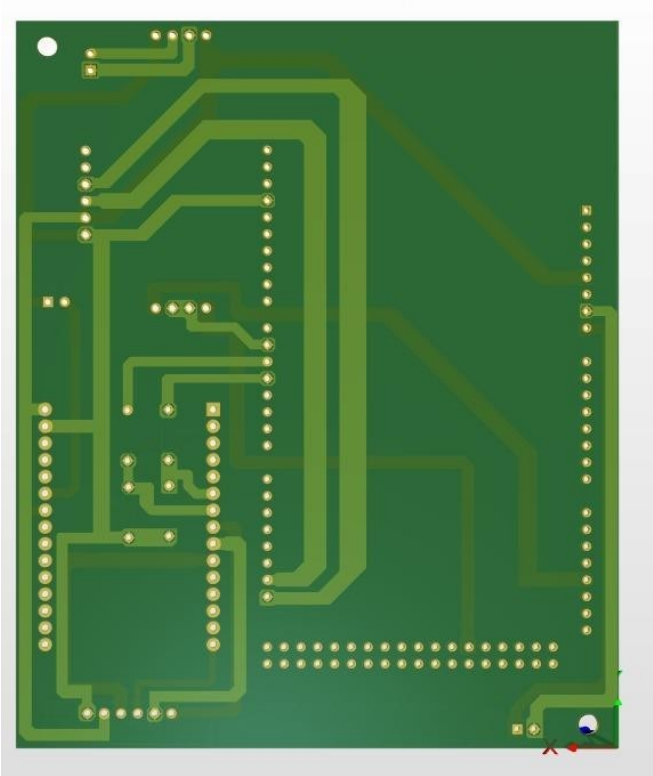
Skills Demonstrated

- Schematic Design
- PCB Layout & Routing
- Embedded Systems Design
- Multi-controller Integration
- Industrial Communication Design


9v CONNECTOR
Gnd
Vin
ARDUINO_MEGA_2560_REV3_A000067
RTC
RS485 TTL
DATA INPUT
ESP32_DEVKIT_V1
SDCARD MODULE
SD CARD
ESP DATA
R1
Res1
10K
R3
Res1
10K
R2
Res2
20K
R4
Res2
20K


MULTIPLE DISPENSOR
91 mm × 110 mm
VCC
GND
A
B
DATA INPUT
RTC
32K
SQW
SCL
SDA
VCC
GND
RS485 TTL
RO RE DE DI
ESP DATA
D27 D26
ESP32_DEVKIT_V1
5V
GND
VIN
R1
R3
10K
10K
20K
20K
R2
R4
D20
D21
GND
VIN
9V CONNECTOR
ARDUINO_MEGA_2560_REV3_A000067
SDCARD
CS SCK MOSI MISO VCC GND


MULTIPLE DISPENSOR
91 mm x 110 mm
VCC
GND
A
B
DATA INPUT
RTC
32K
SQW
SCL
SDA
VCC
GND
RS485 TTL
RO RE DE DI
ESP DATA
D27 D26
ESP32_DEVKIT_V1
5V
GND
VIN
R1
R3
10K
10K
20K
20K
R2
R4
D20
D21
ARDUINO_MEGA_2560_REV3_A000067
GND
VIN
5V CONNECTOR
SDCARD
CS SCK MOSI MISO VCC GND

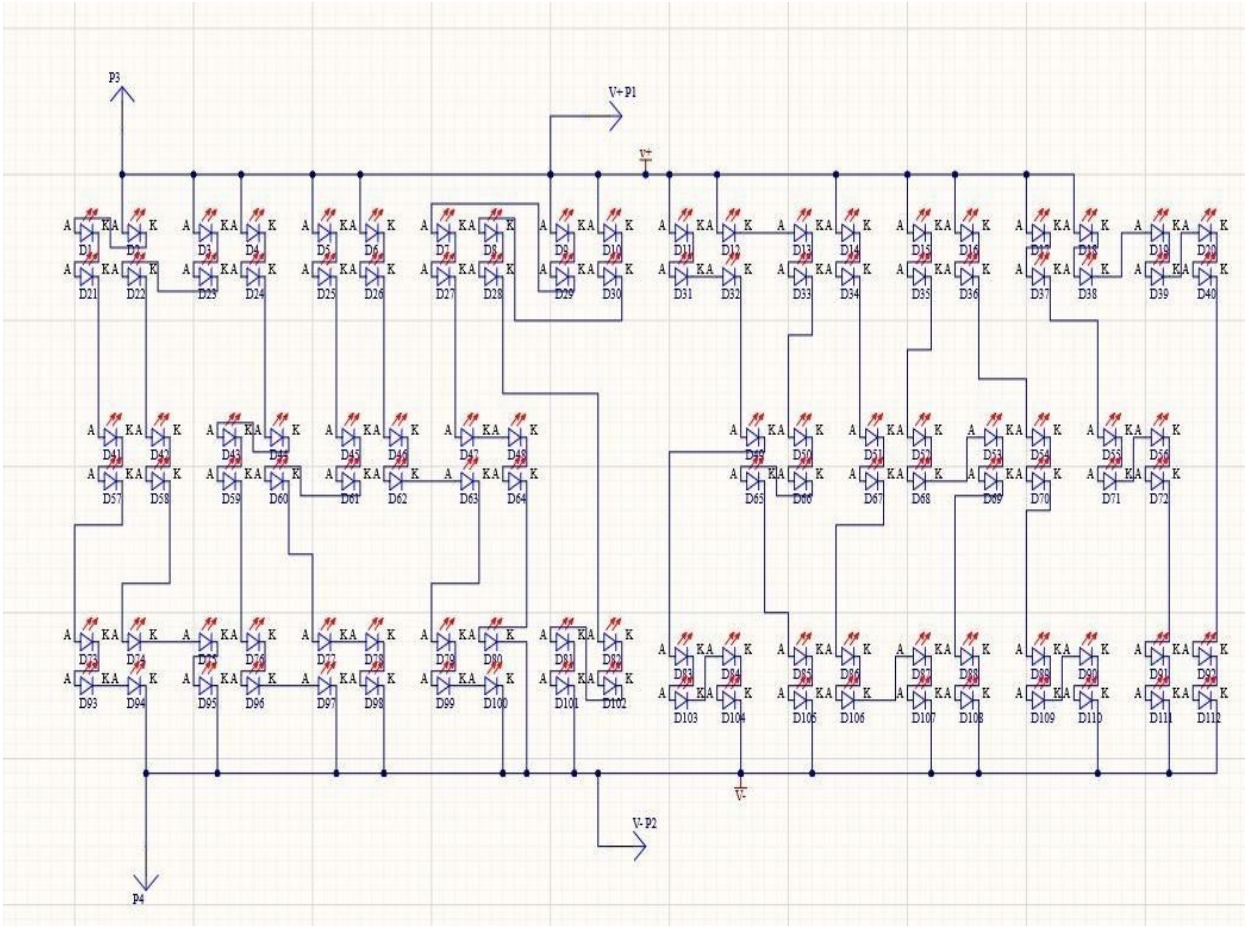


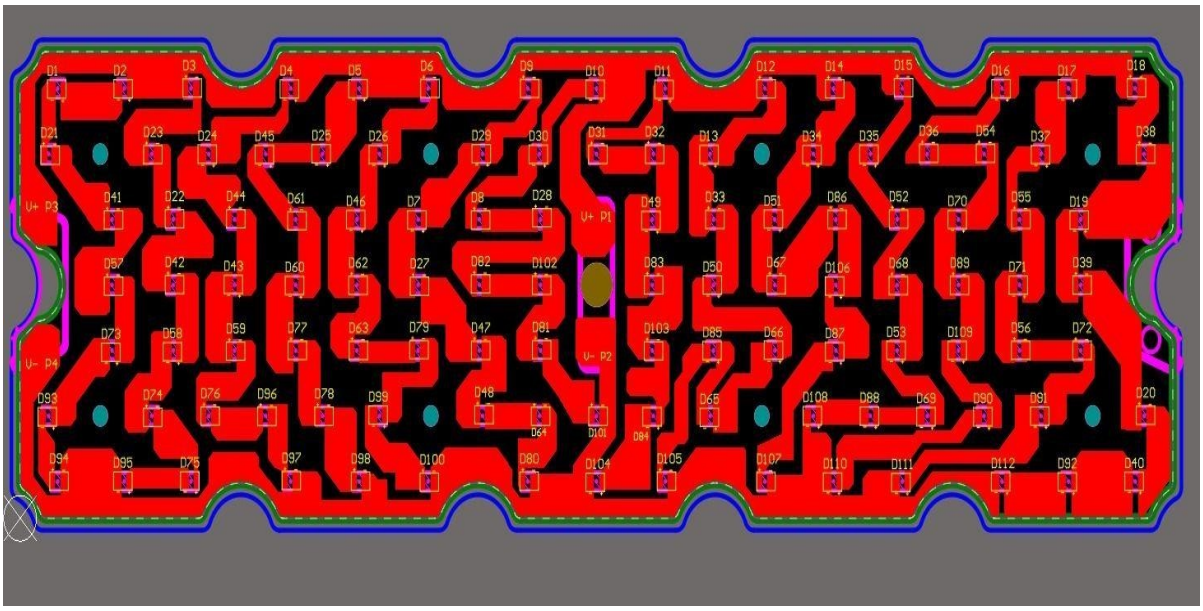
48V LED Search Light PCB

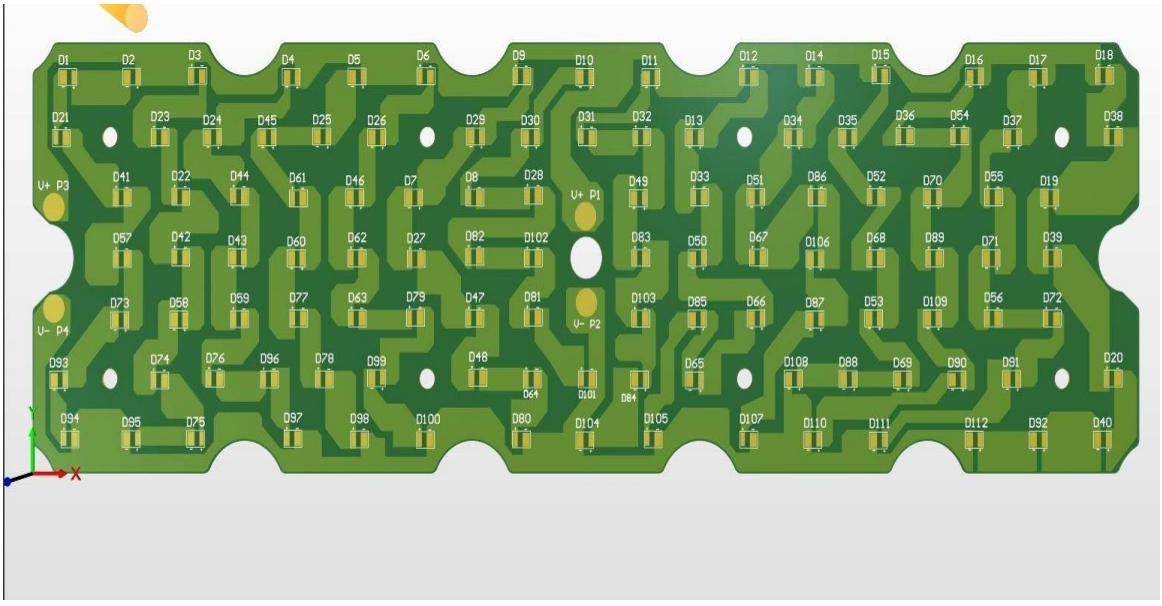
Designed a single layer custom high-power 48V LED Search Light PCB in Altium Designer featuring 112 LEDs with optimized routing, thermal management, and efficient power distribution.
Implemented copper pours, controlled trace widths, and strategic via placement to support high-current LED strings while minimizing voltage drops. Integrated mechanical mounting constraints and enclosure compatibility considerations for practical hardware implementation.

Skills Demonstrated

- PCB Layout & Schematic Design
- High-Current Power Distribution
- Thermal Management Techniques
- Trace Width & Via Optimization
- DRC, Net Class & Gerber Generation
- Real-World Hardware Design Constraints


P3
V+ P1
V+
V-
V- P2
P4



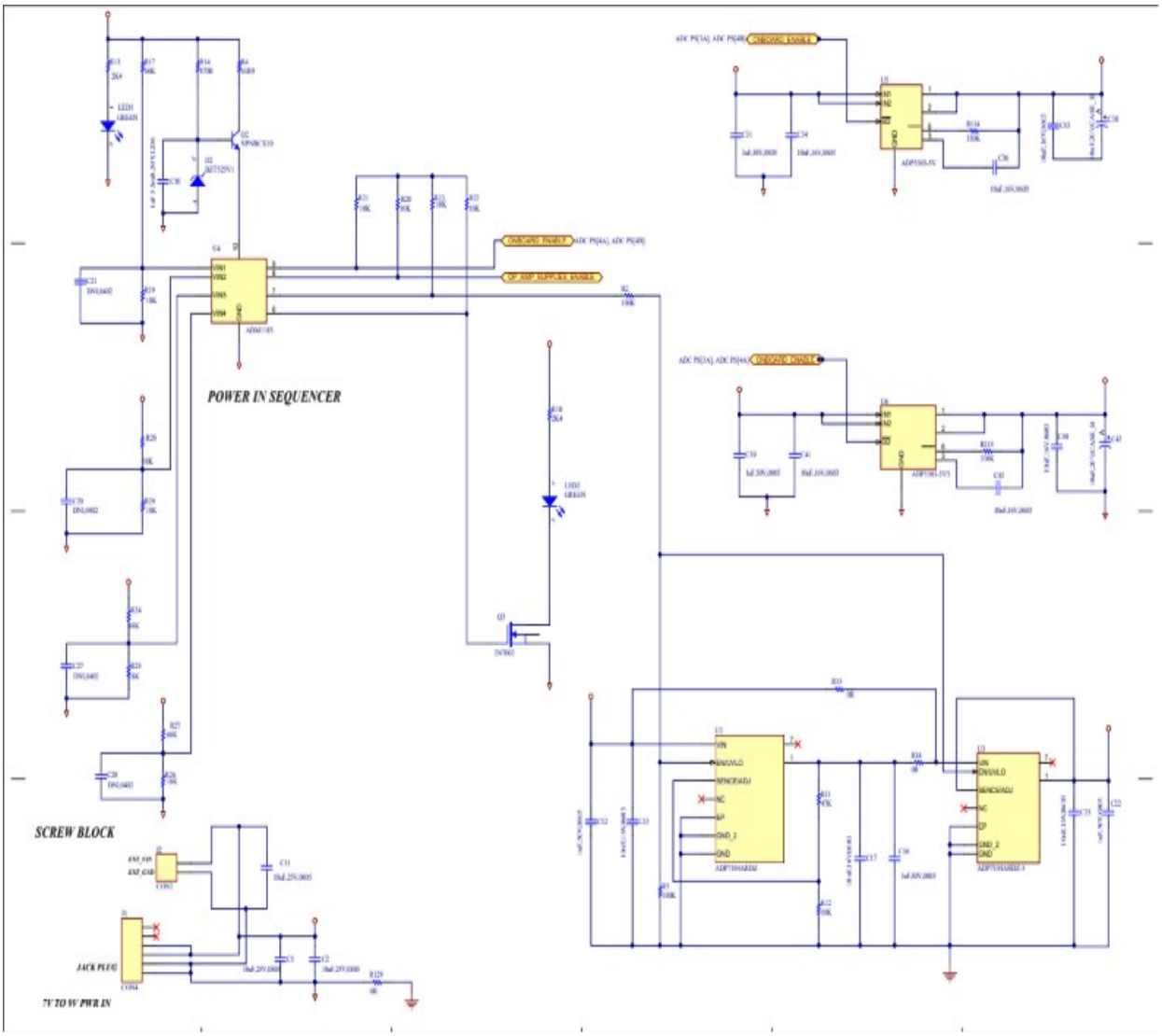


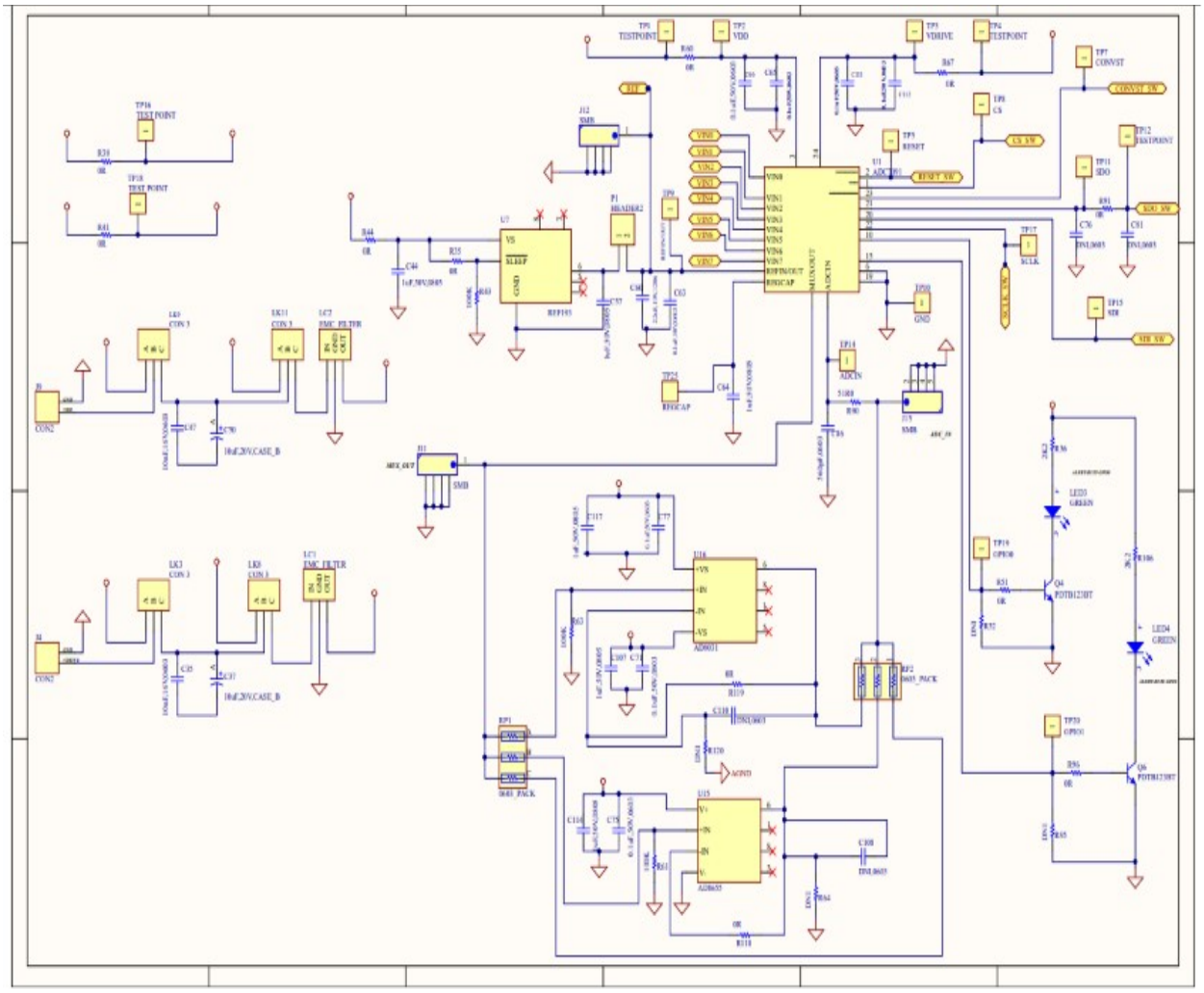
ADC Development Board

This design presents a complete ADC Development Board engineered for high-precision analog-to-digital conversion. The system integrates a reference voltage source, input signal conditioning, and a digital interface for seamless data acquisition. It is suitable for instrumentation, sensor interface, and general-purpose analog measurement applications.

Main ICs Used

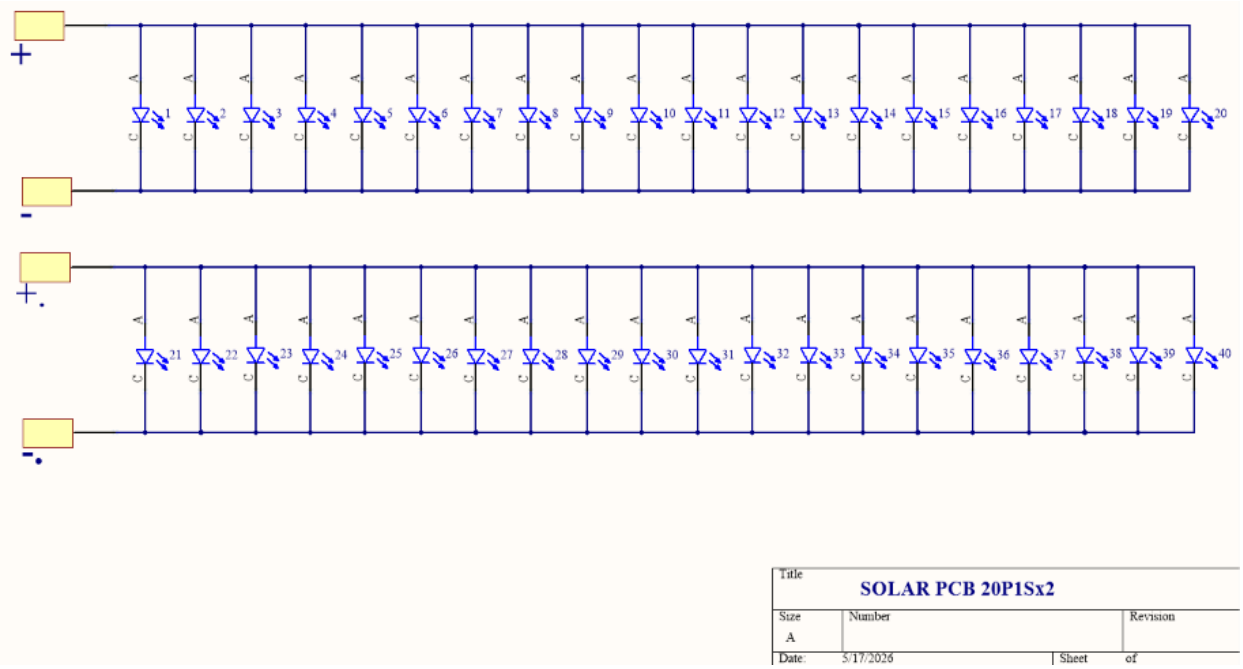
- ADM1185 Power Sequencer
- ADP3303-5V Voltage Regulator
- ADP3303-3V3 Voltage Regulator
- ADP7104 Low Noise LDO Regulator
- ADC7091 16-bit SAR Analog-to-Digital Converter
- REF193
- AD8655 CMOS OP AMP
- AD8031 High-Speed, Low-Power Operational Amplifier

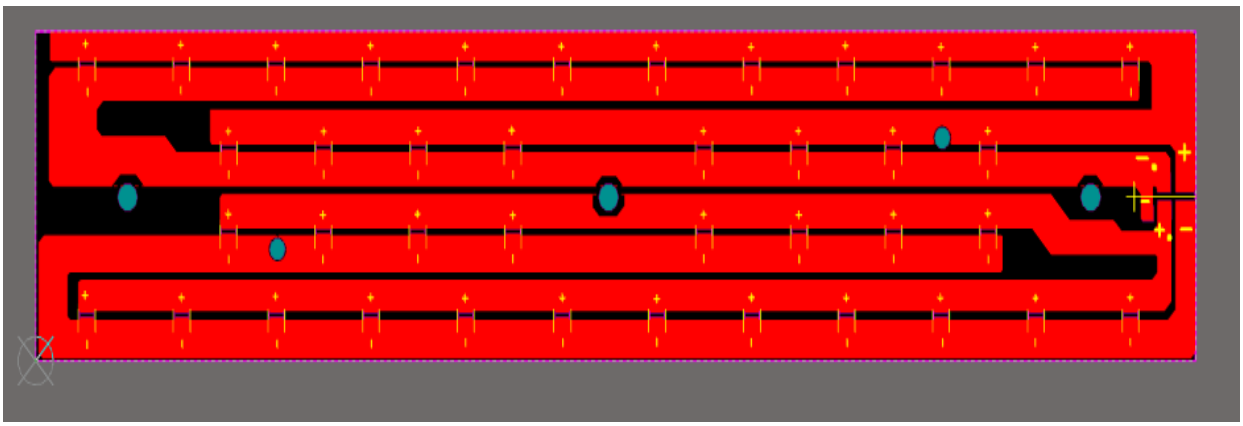

POWER IN SEQUENCER
SCREW BLOCK
JACK PLUG
7V TO 9V PWR IN



Solar PCB (5P8S)

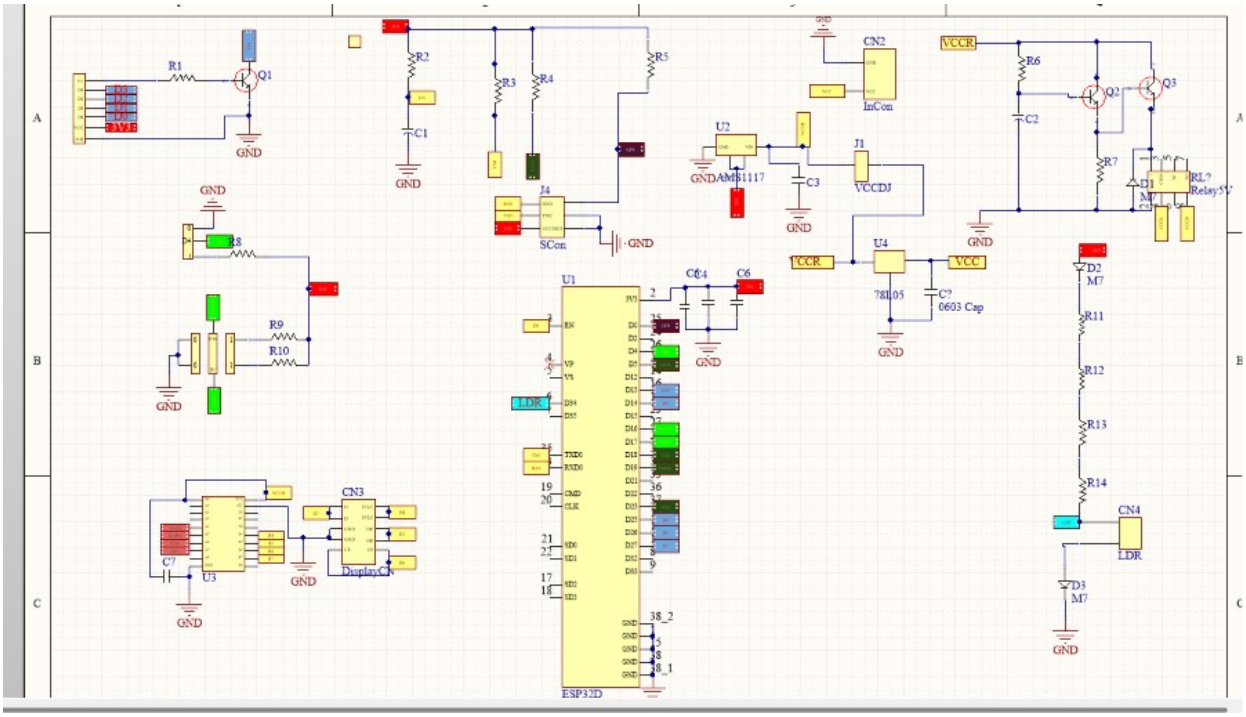
Designed a single-layer (Top Layer) Solar LED PCB featuring 40 LEDs arranged in a 5P8S (5 Parallel × 8 Series) configuration for efficient illumination and power distribution. The PCB was optimized for uniform current sharing, low power loss, and reliable operation in solar-powered lighting applications. Careful component placement and power routing were implemented to achieve a compact, cost-effective, and manufacturer design while ensuring stable LED performance and thermal reliability.

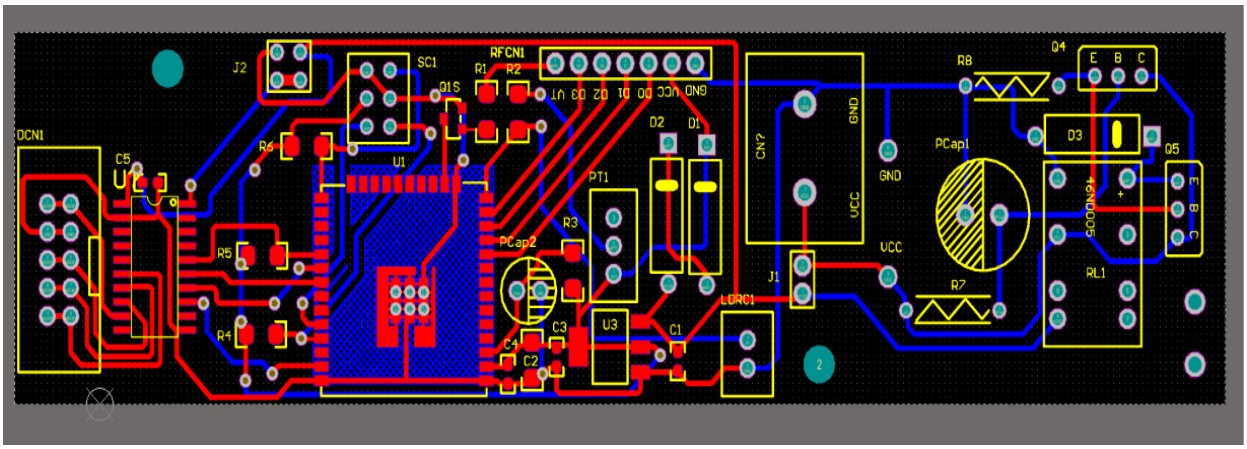


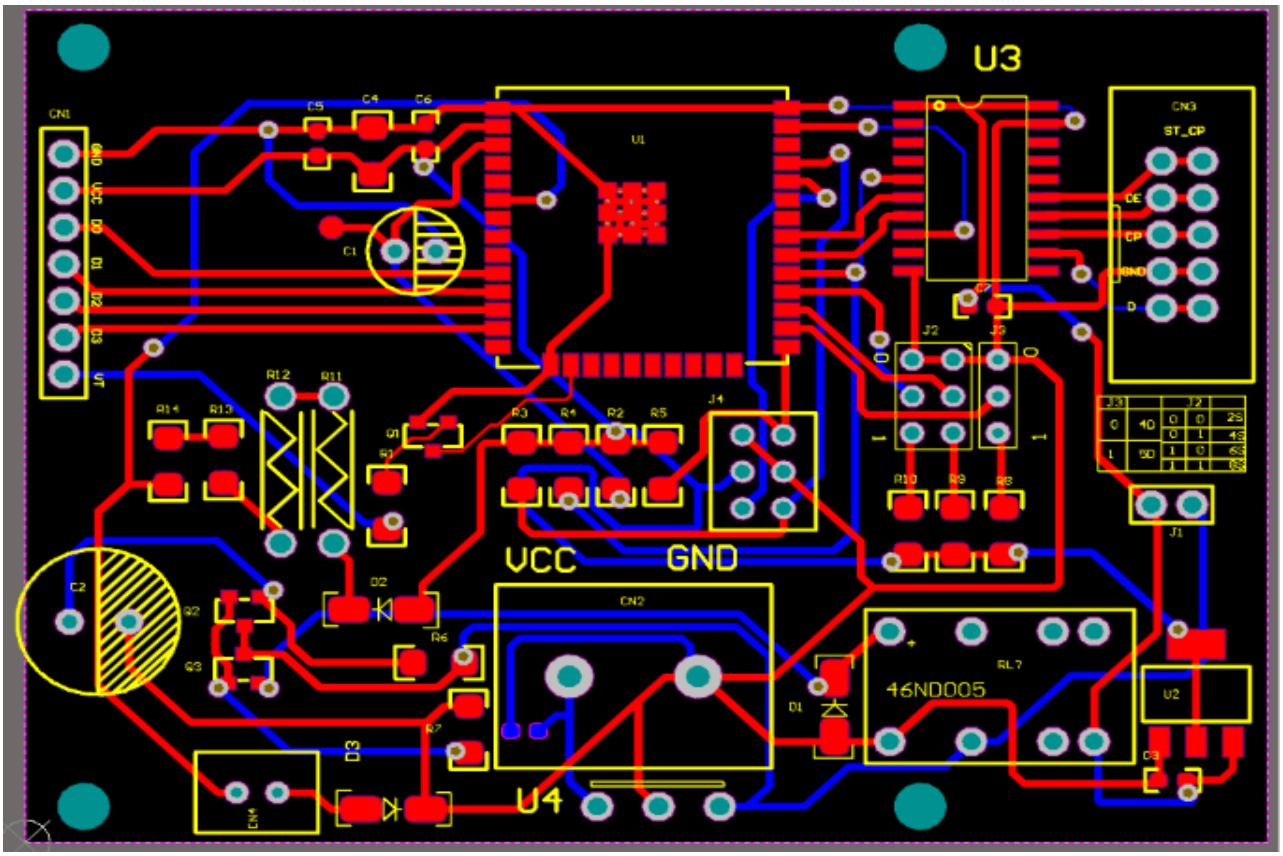


Fuel Display Card

Designed a 2 Layer ESP32-based Fuel Price Display Control Card integrating power regulation, display control, communication interfaces, relay driving, and ambient light sensing into a compact embedded system. The board receives fuel price data, processes it through the ESP32, and updates the display in real time. The design incorporates stable 5V and 3.3V power supplies, efficient signal routing, and reliable hardware control to ensure accurate, continuous, and dependable operation in fuel station display applications.

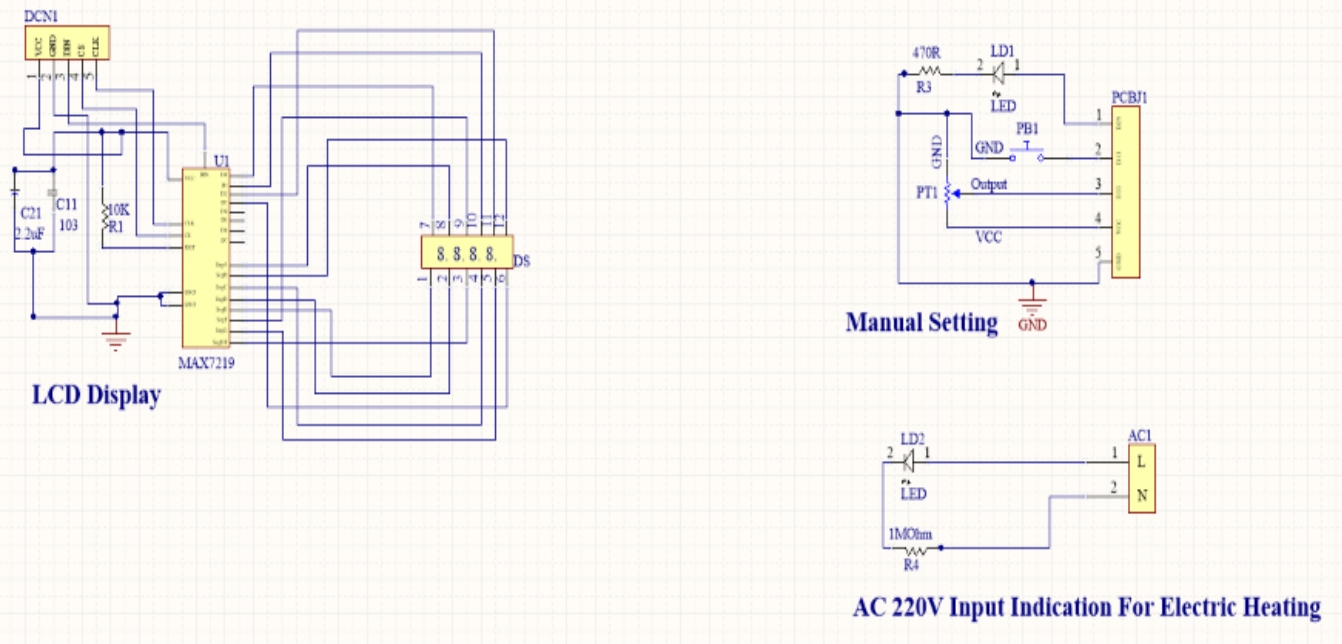


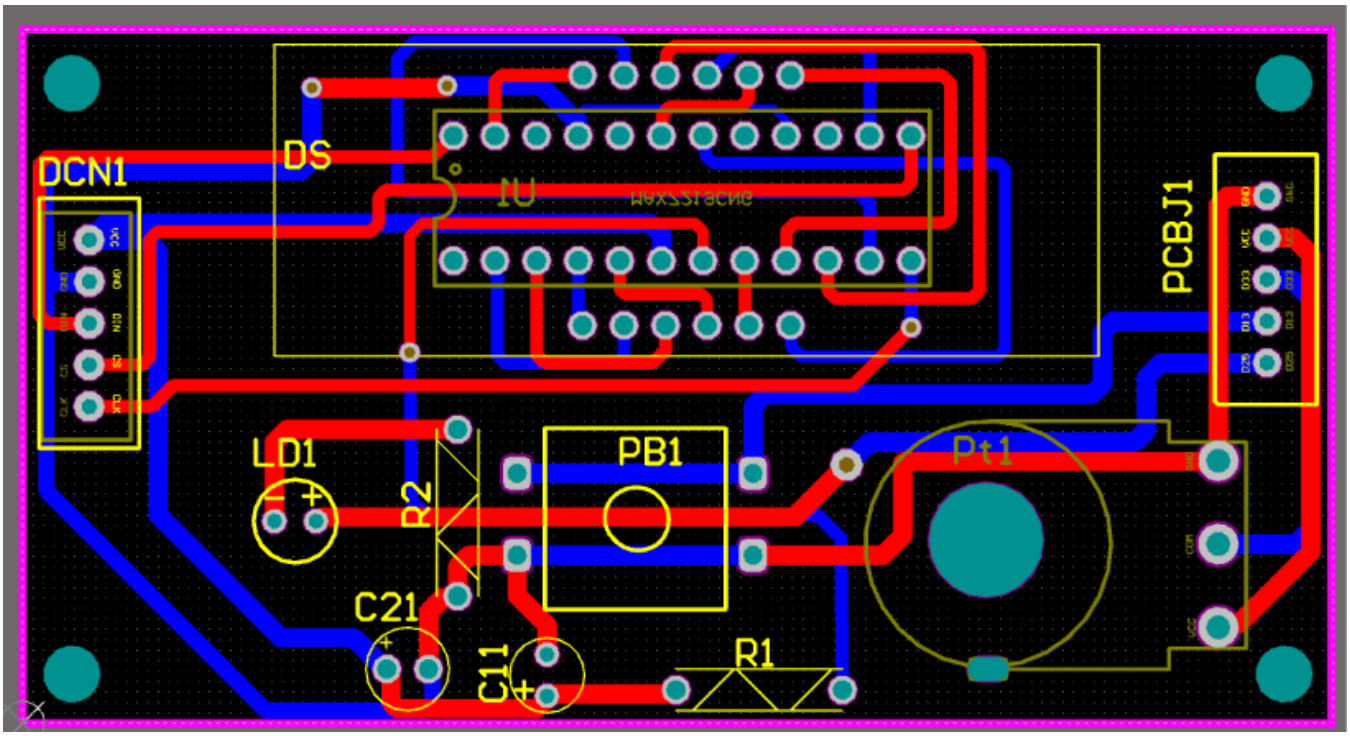



U3
CN1
GND
VCC
D0
D1
D2
D3
ST
U1
C5
C4
C6
C1
CN3
ST_CP
OE
CP
GND
D
J2
J3
R12
R11
R14
R13
S1
R3
R4
R2
R5
J4
R10
R9
R8
J1
VCC
GND
C2
Q2
Q3
D2
R6
R7
D3
CN2
CN4
U4
D1
RL7
46ND005
U2

Automatic Geyser System(AGS) Display Board

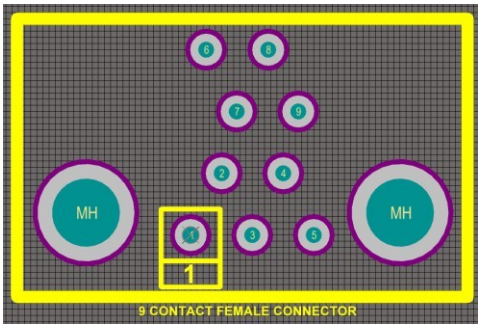
Designed a 2-layer (Top & Bottom) AGS Display System PCB integrating a MAX7219 display driver, an 8-digit 7-segment LED display, manual control interface, and 220V AC input indication circuitry. The design provides real-time system status display, user interaction through a push-button interface, and reliable AC power indication. The PCB features optimized component placement, signal routing, and power distribution to ensure stable and efficient embedded system performance.



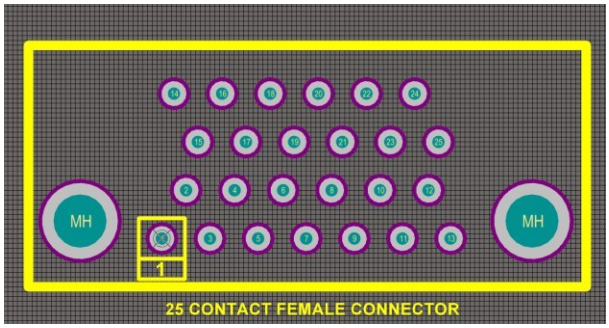

DCN1
DS
IU
PCBJ1
LD1
R2
PB1
P1
C21
C11
R1

PCB Libraries/ Footprint Design Section

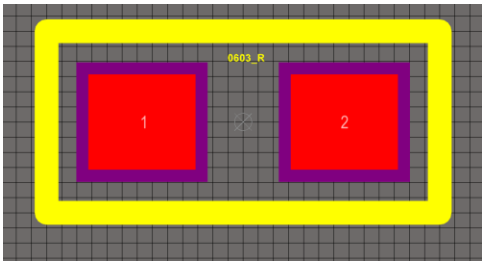
Designed custom PCB footprints and schematic symbols



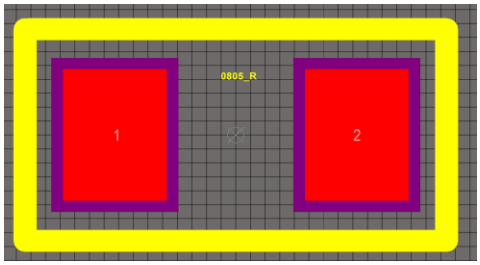
9 contact female connector



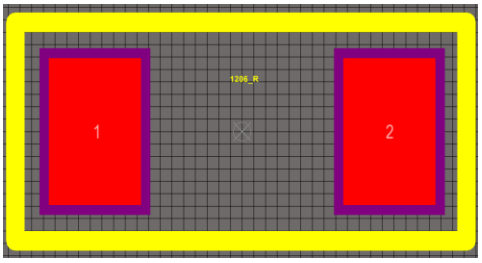
25 contact female connector



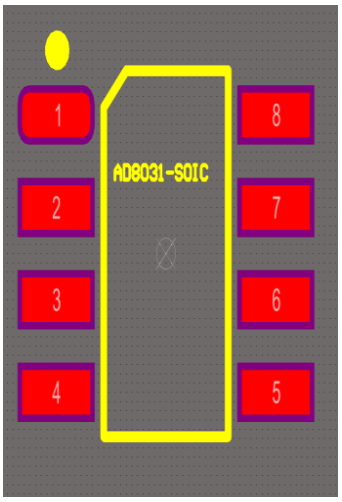
0603_R



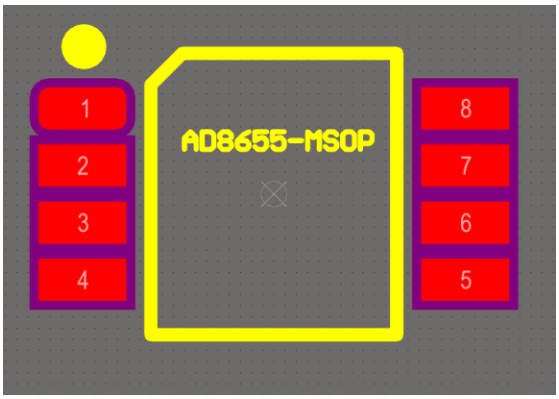
0805_R



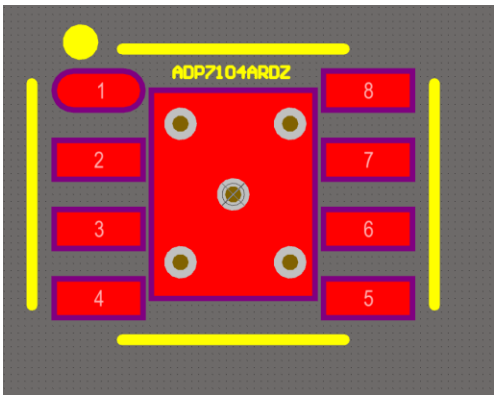
1206_R



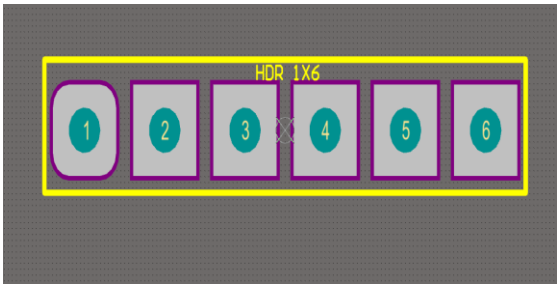
AD8031-SOIC



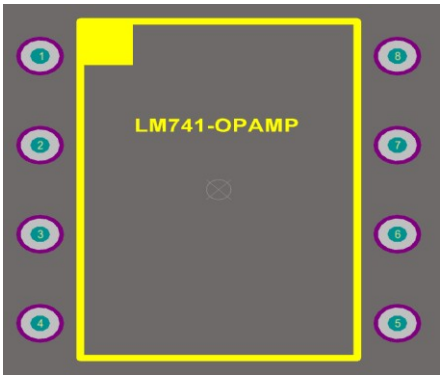
AD8655-MSOP



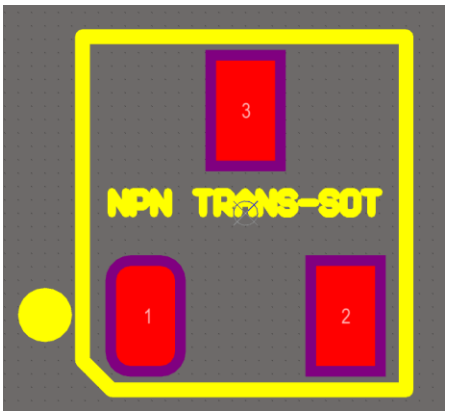
AD7104-ARDZ



HDR 1X6



LM741-OPAMP



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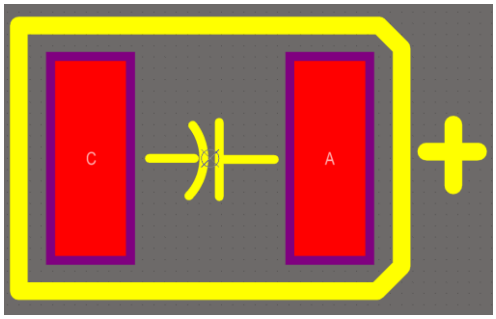

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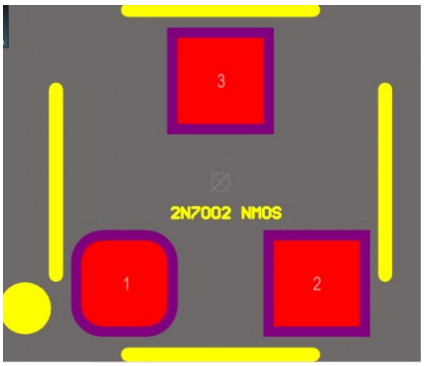

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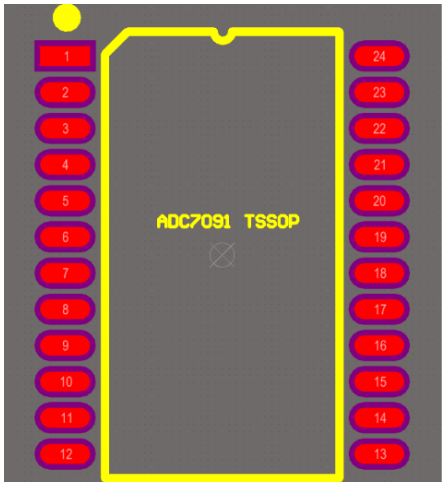

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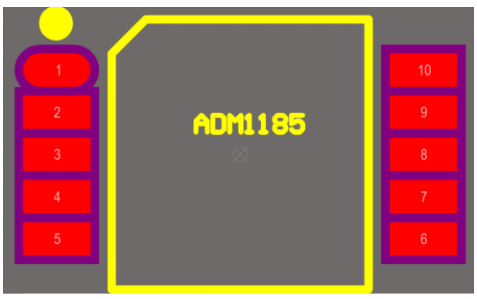

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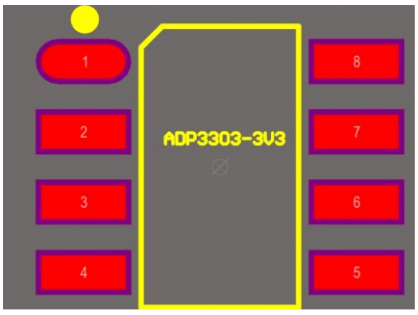

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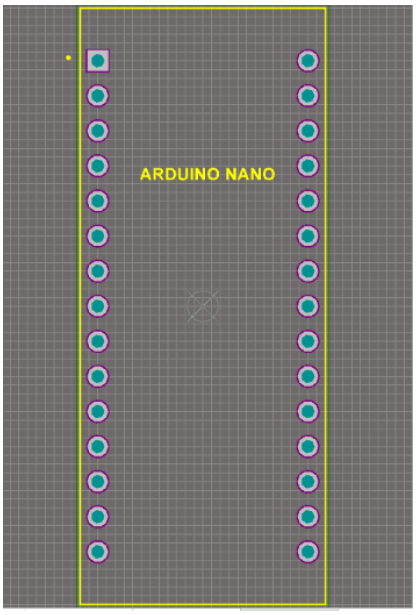

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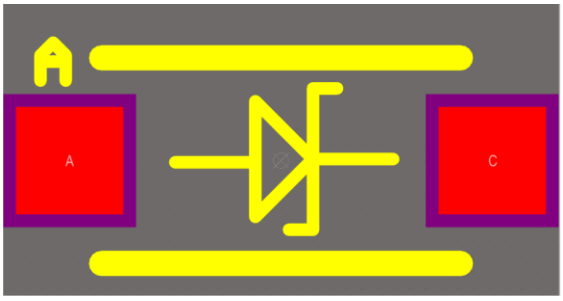
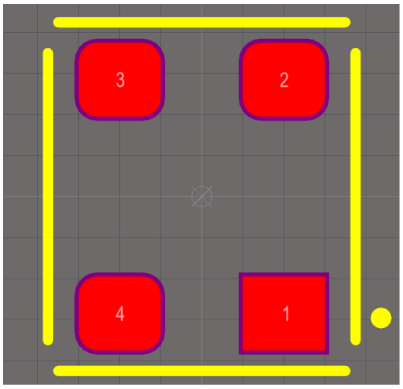


BZT52 DIODE



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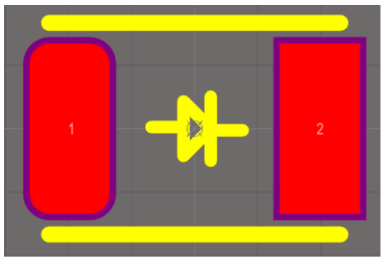

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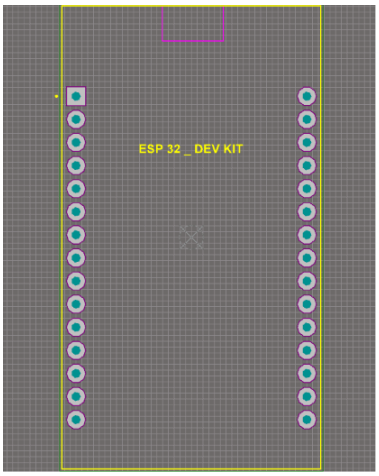
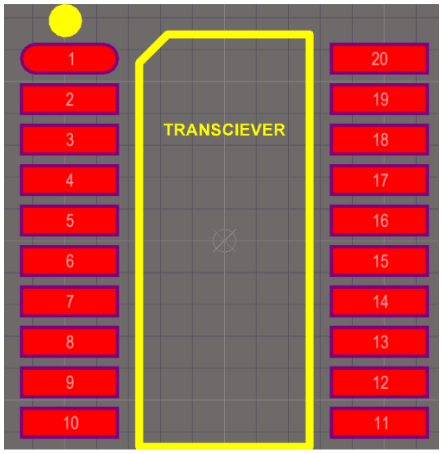


ESP32_DEVKIT



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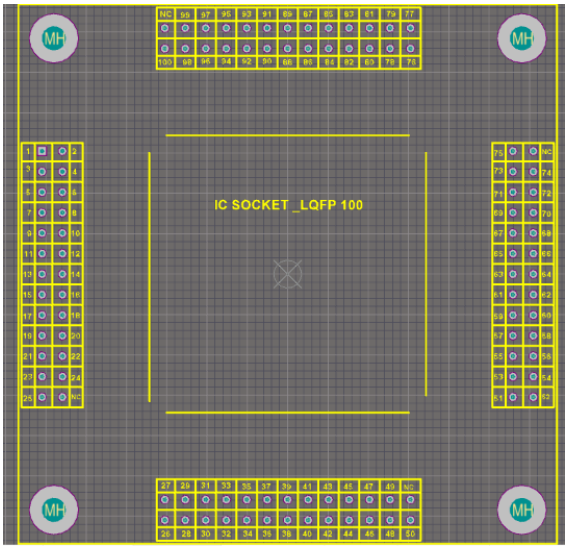
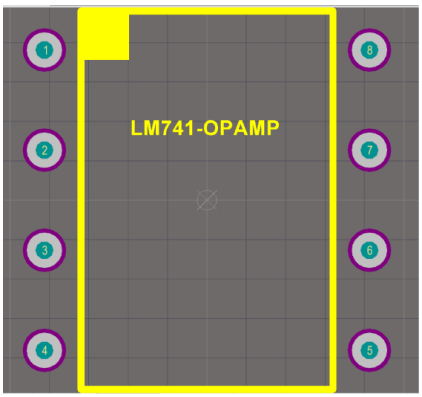


IC SOCKET _LQFP100



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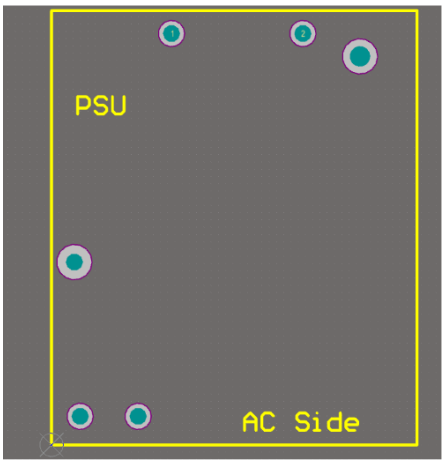

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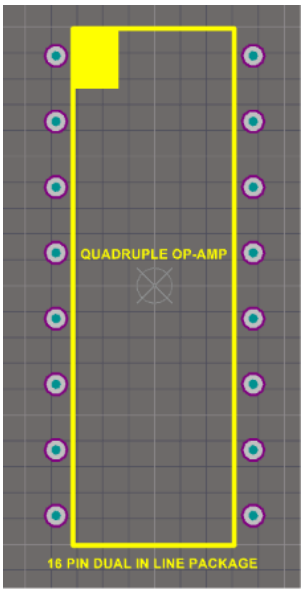
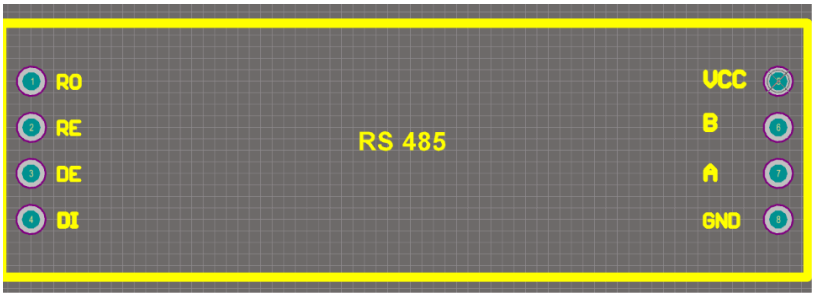
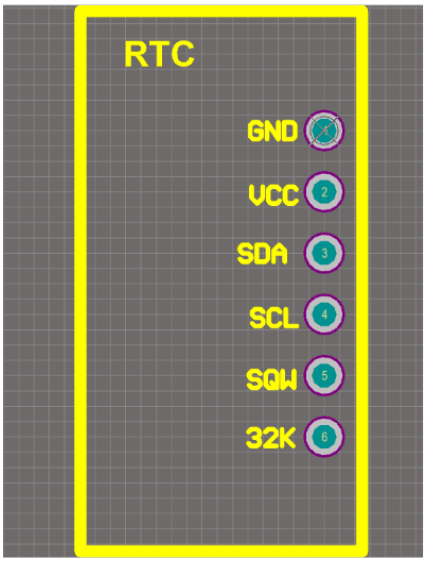


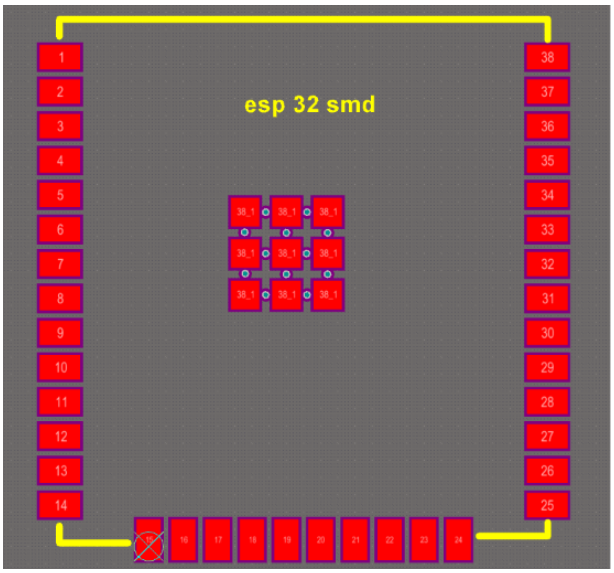
QUADRUPLE OP-AMP



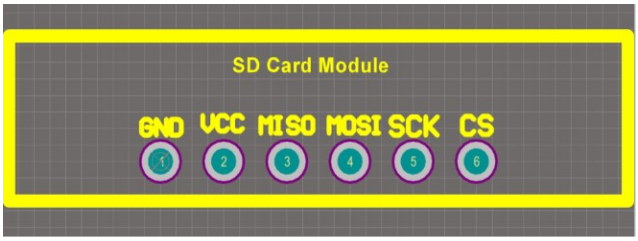
RS 485 TTL CONVERTOR



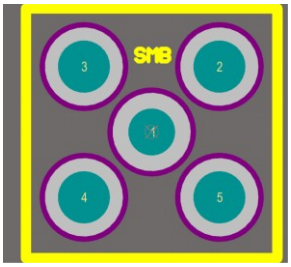
REAL TIME CLOCK



ESP 32 SMD



SD CARD MODULE



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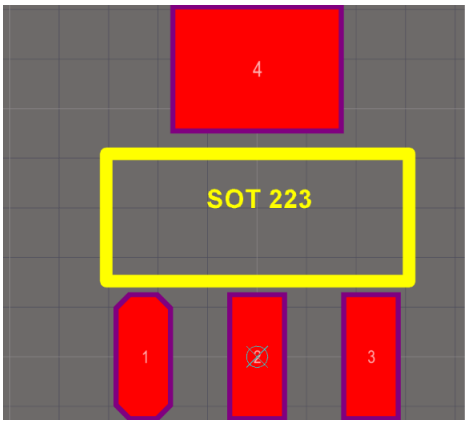
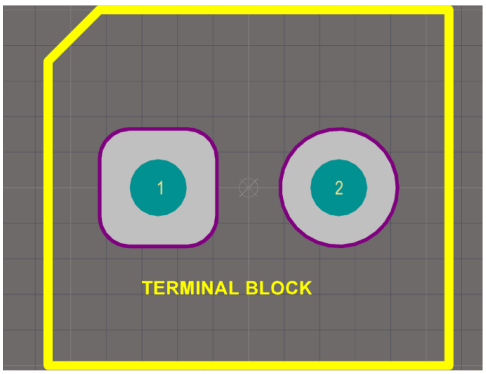
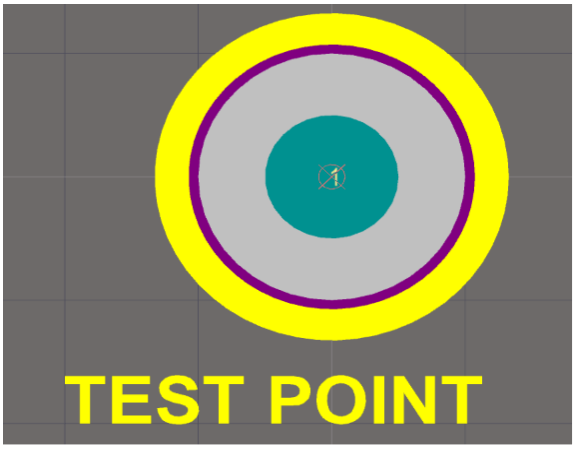


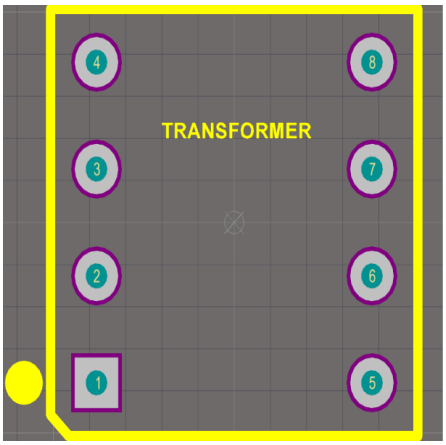
SOT 223



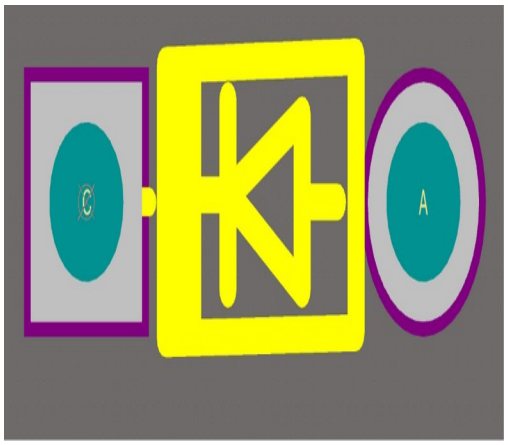
TERMINAL BLOCK

TEST POINT

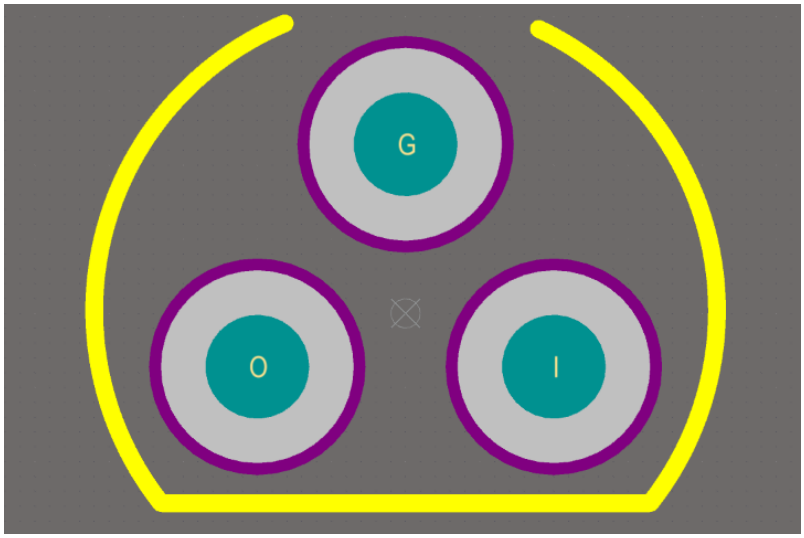




TRANSFORMER



DIODE RL207



IC78L05

Contact

Lets Connect

Thank you for reviewing my portfolio.

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