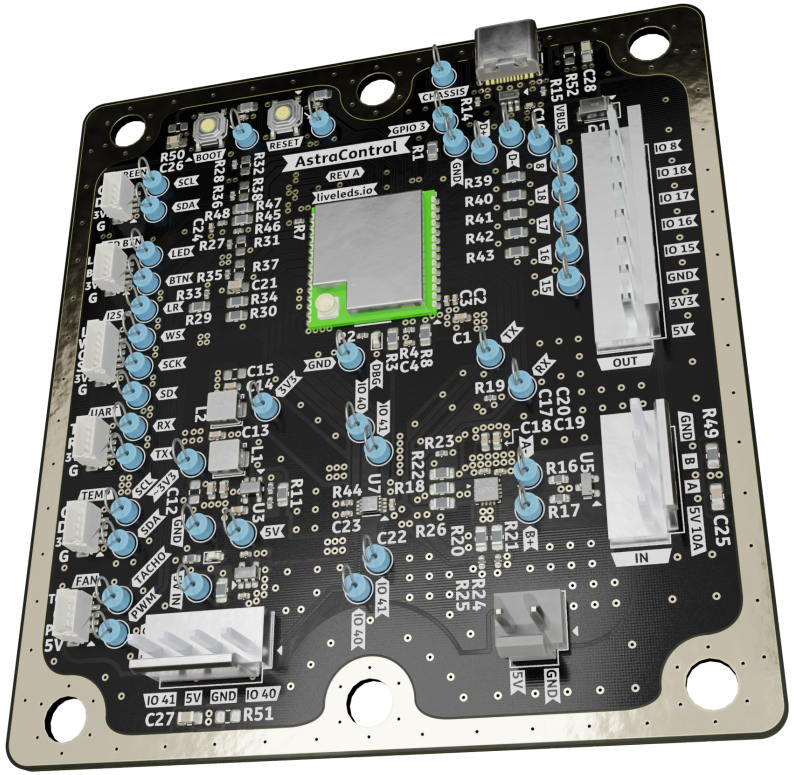
AstraControl

In review

ESP32-based control PCB uses WiFi with an external antenna and 5Mbps RS-485 for communication, supporting various sensors and HMI devices for high-power LED fixtures or strips. One device can act as master or all fixtures will receive data from a dedicated receiver.

Features

- Up to 5V 10A Input
- USB C
- External WiFi Antenna
- 5Mbps RS485 (half-duplex)
- ESP32-S3 SoC integrating Wi-Fi 4 and Bluetooth 5 (LE)
- 2x I2C Auxilary (Qwiic connector)
- 4 Channel LED PWM
- 4x 5V GPIO
- 4 Wire 5V Fan
- 5V to 3.3V Step Down DC-DC
- UART
- I2S (Qwiic connector)
- External button and status LED



Render for reference only

File: overview.kicad_sch

File: block_diagram.kicad_sch

Board Name	Project Name	Company	Sheet Title	Sheet Path & File Name	Date	Revision	Size	Sheet
AstraControl	AstraBeam	LiveAstra Technologies	AstraControl - Schematic	/ AstraControl.kicad_sch	2024-08-26	**B**	**A4**	**1** of **16**

Overview

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8	Power Connectors	16	Misc

Notes

- Second time creating a PCB. Mistakes were probably made.
- Some features are not necessary but used for learning and experimentation.
- PCB components are spread apart a bit more than the minimum allowed clearance for easy debuging and adjustments.
- Some aspects of the schematic / PCB are more verbose to aid in the review process.

QST1

Question

Something is unclear or a missing piece of information potentially needs to be explored further.

INF1

Information

Generic information box to inform about specifics of the part or layout, notes, helpful information.

CRT1

Critical

It is critical to follow the instructions here. Failure to do so will result in poor performance or failuire.

WRN1

Caution

Extra care is required here. Pay attention to details, routing, and try your best to follow the advice.

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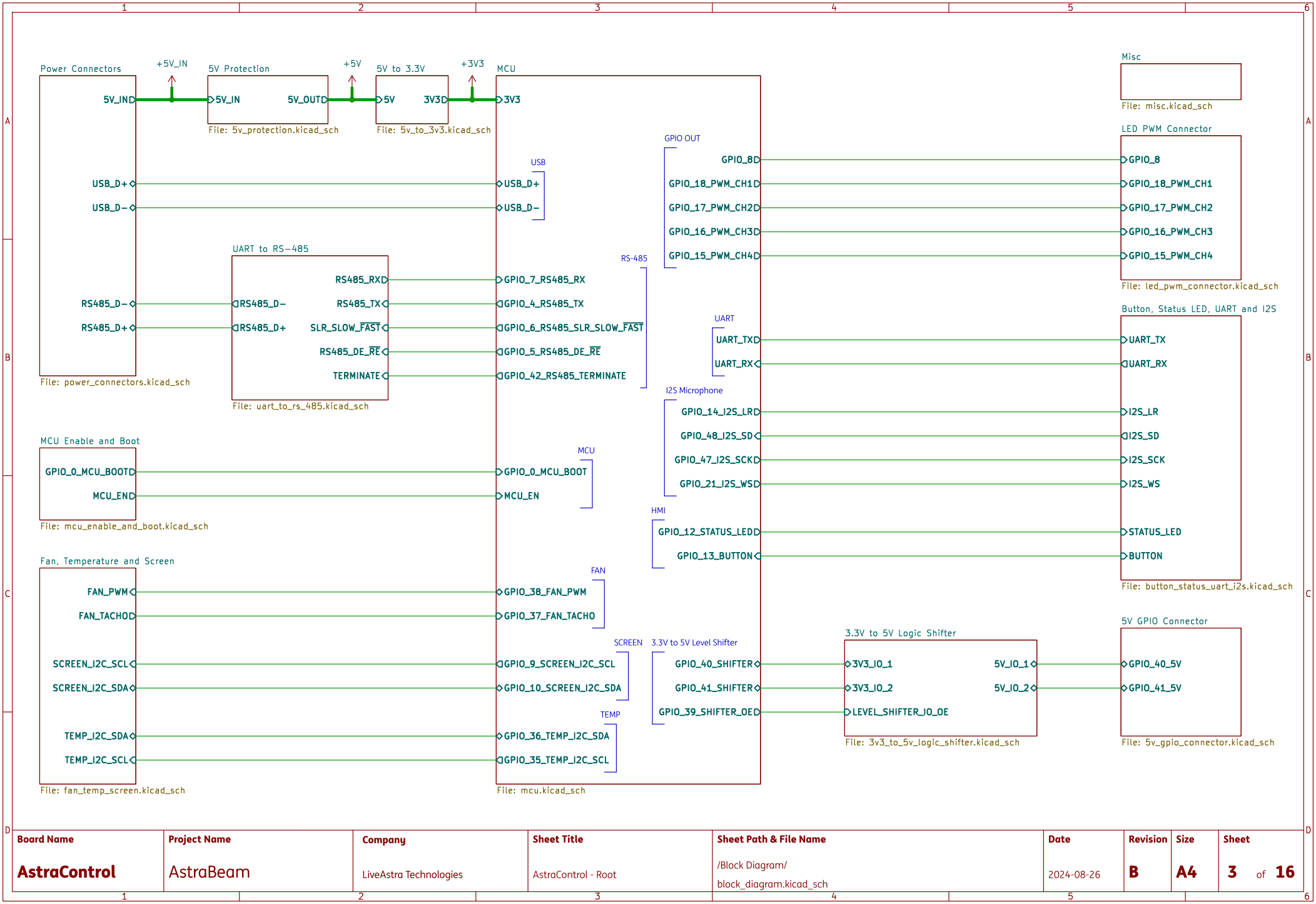
AstraControl	AstraBeam	LiveAstra Technologies	AstraControl - Root	/Overview/ overview.kicad_sch	2024-08-26	**B**	**A4**	**2** of **16**



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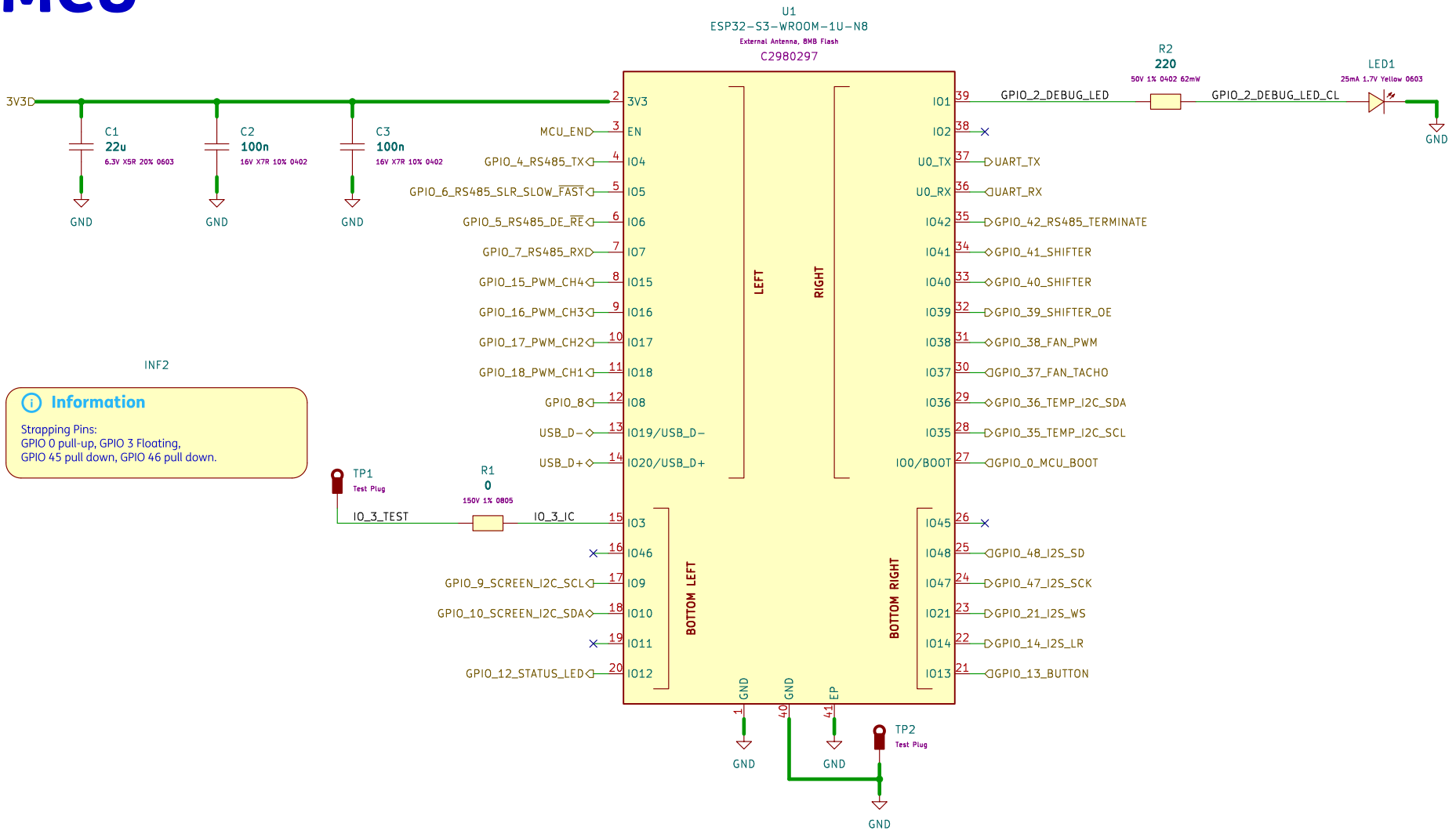
AstraControl	AstraBeam	LiveAstra Technologies	AstraControl - Root	/Block Diagram/ block_diagram.kicad_sch	2024-08-26	**B**	**A4**	**3** of **16**

MCU



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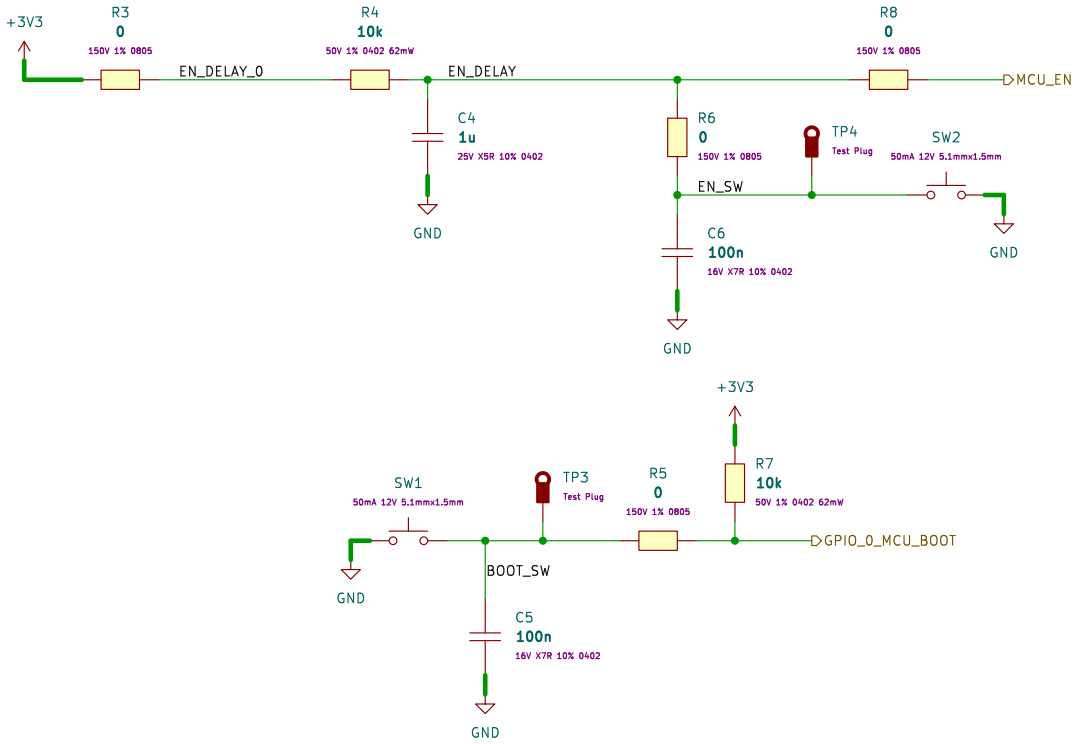
MCU Enable & Boot

INF3

Information

To ensure that the power supply to the ESP32-S3 chip is stable during power-up, it is advised to add an RC delay circuit at the EN pin.



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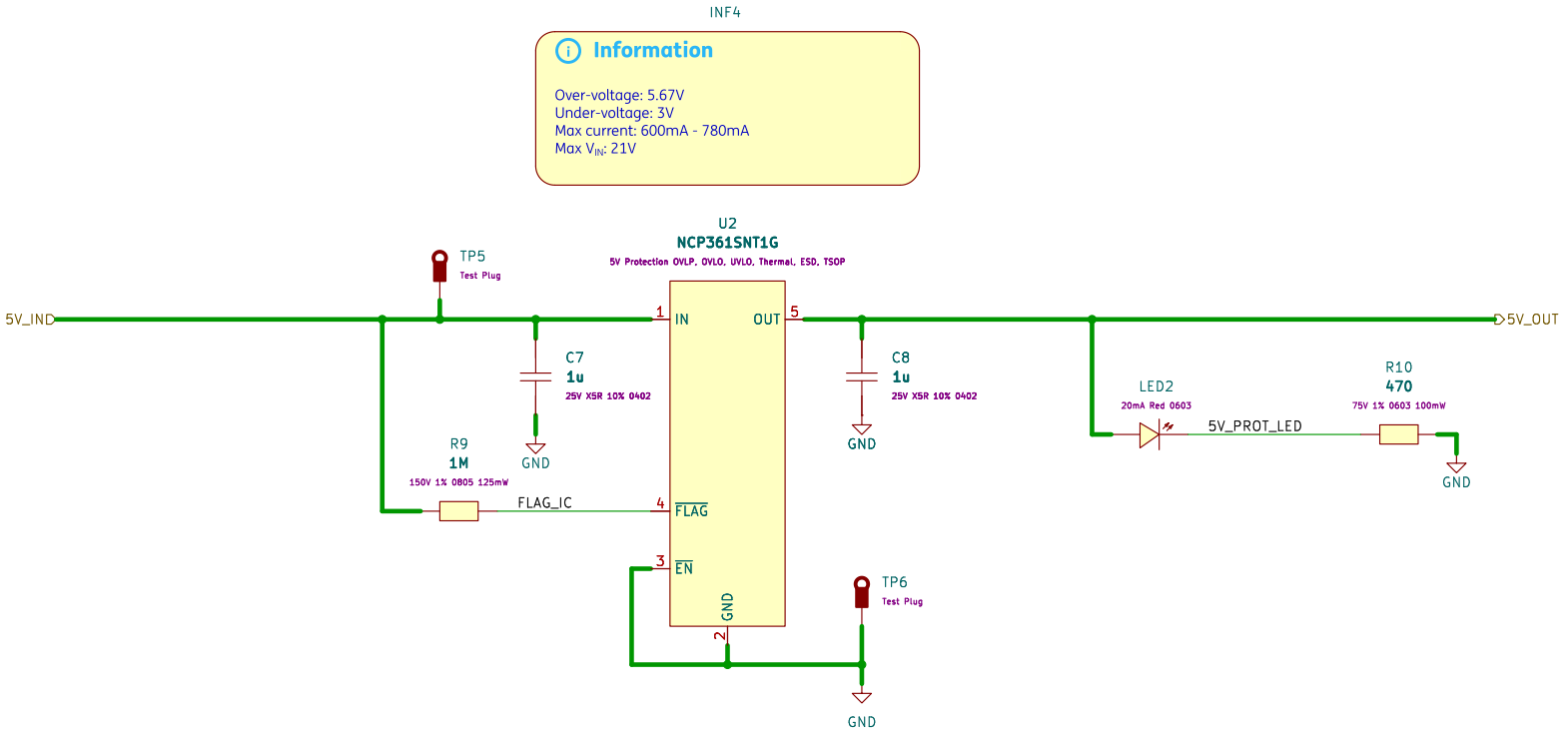
AstraControl	AstraBeam	LiveAstra Technologies	AstraControl - Root	/Block Diagram/MCU Enable and Boot/ mcu_enable_and_boot.kicad_sch	2024-08-26	**B**	**A4**	**5** of **16**

5V Protection



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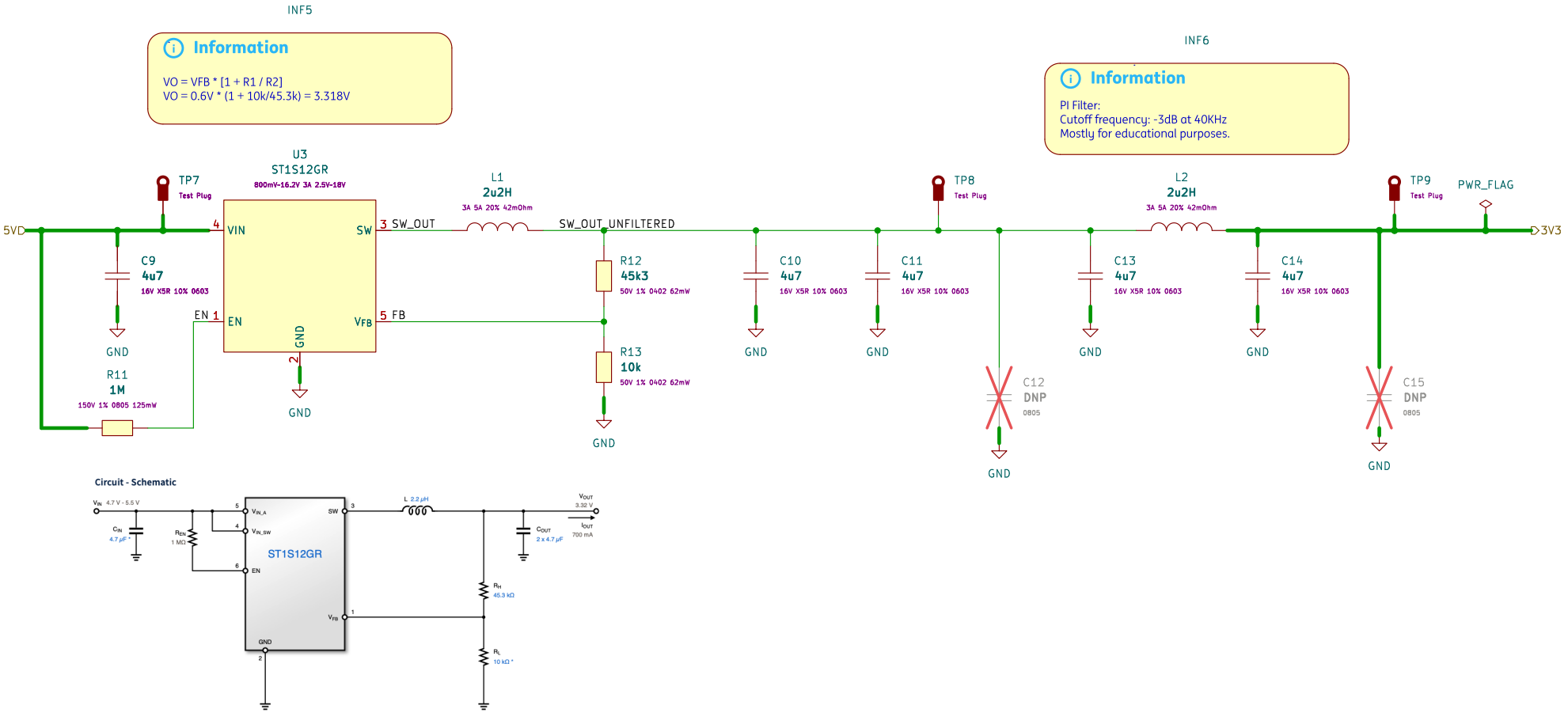
AstraControl	AstraBeam	LiveAstra Technologies	AstraControl - Root	/Block Diagram/5V Protection/ 5v_protection.kicad_sch	2024-08-26	**B**	**A4**	**6** of **16**

5V to 3.3V



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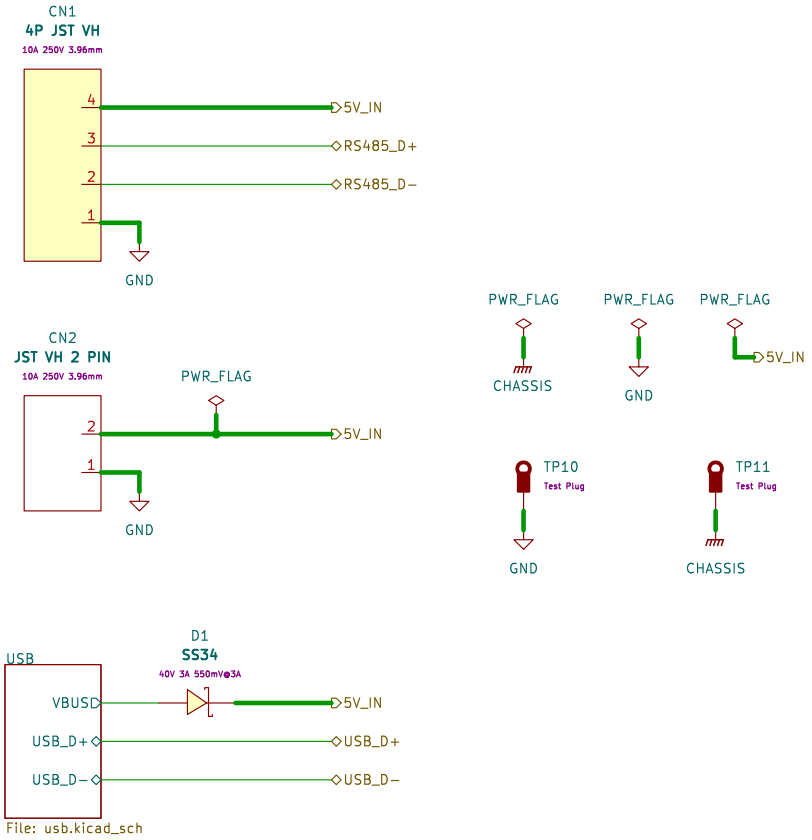
AstraControl	AstraBeam	LiveAstra Technologies	AstraControl - Root	/Block Diagram/5V to 3.3V/ 5v_to_3v3.kicad_sch	2024-08-26	**B**	**A4**	**7** of **16**

Power connectors



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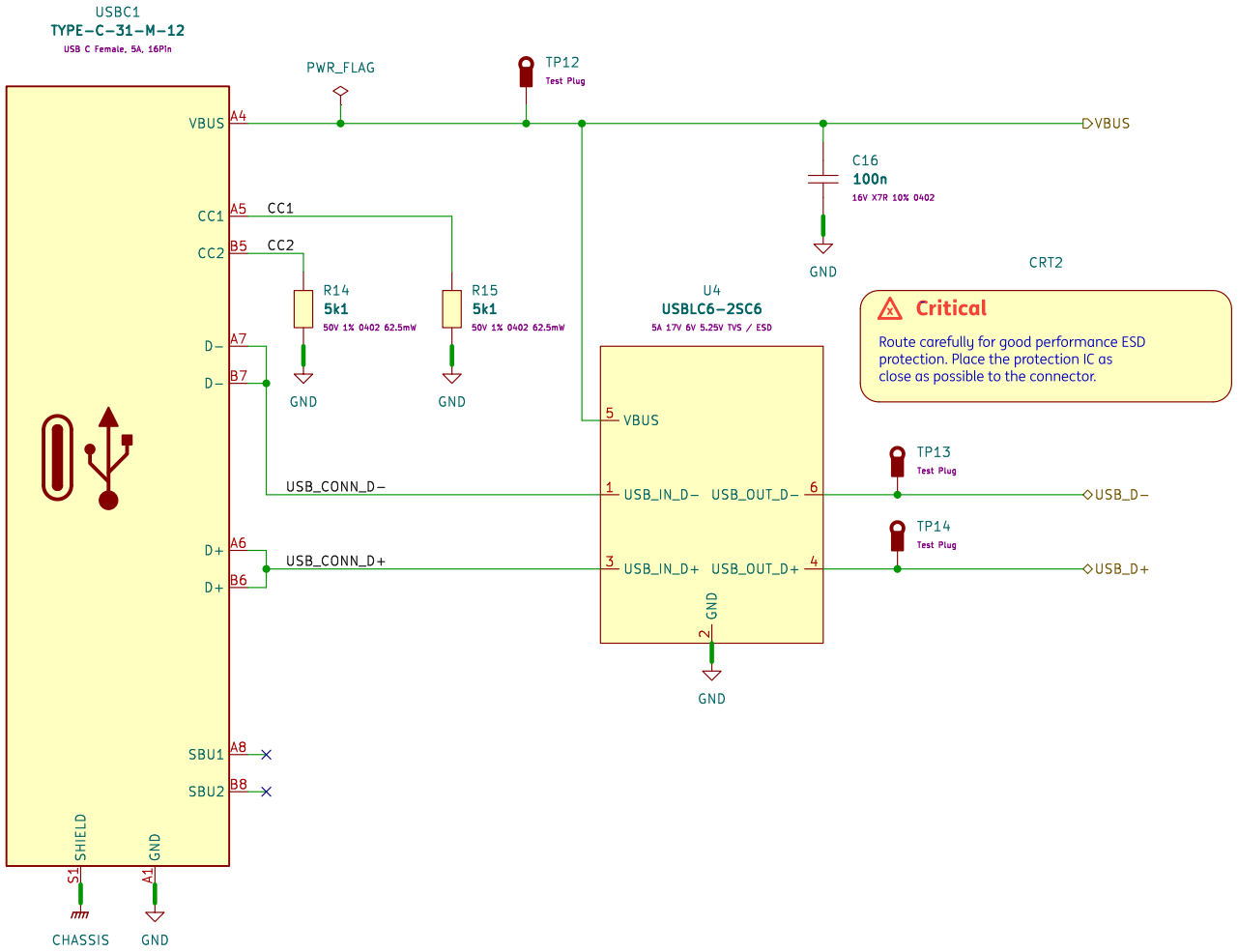
USB C



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UART to RS-485

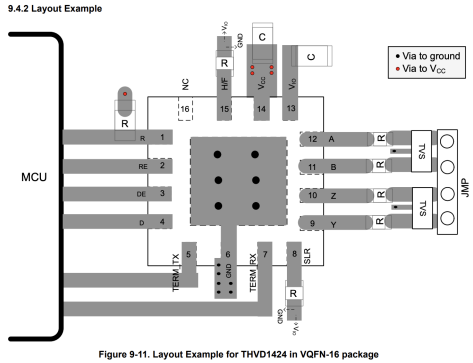
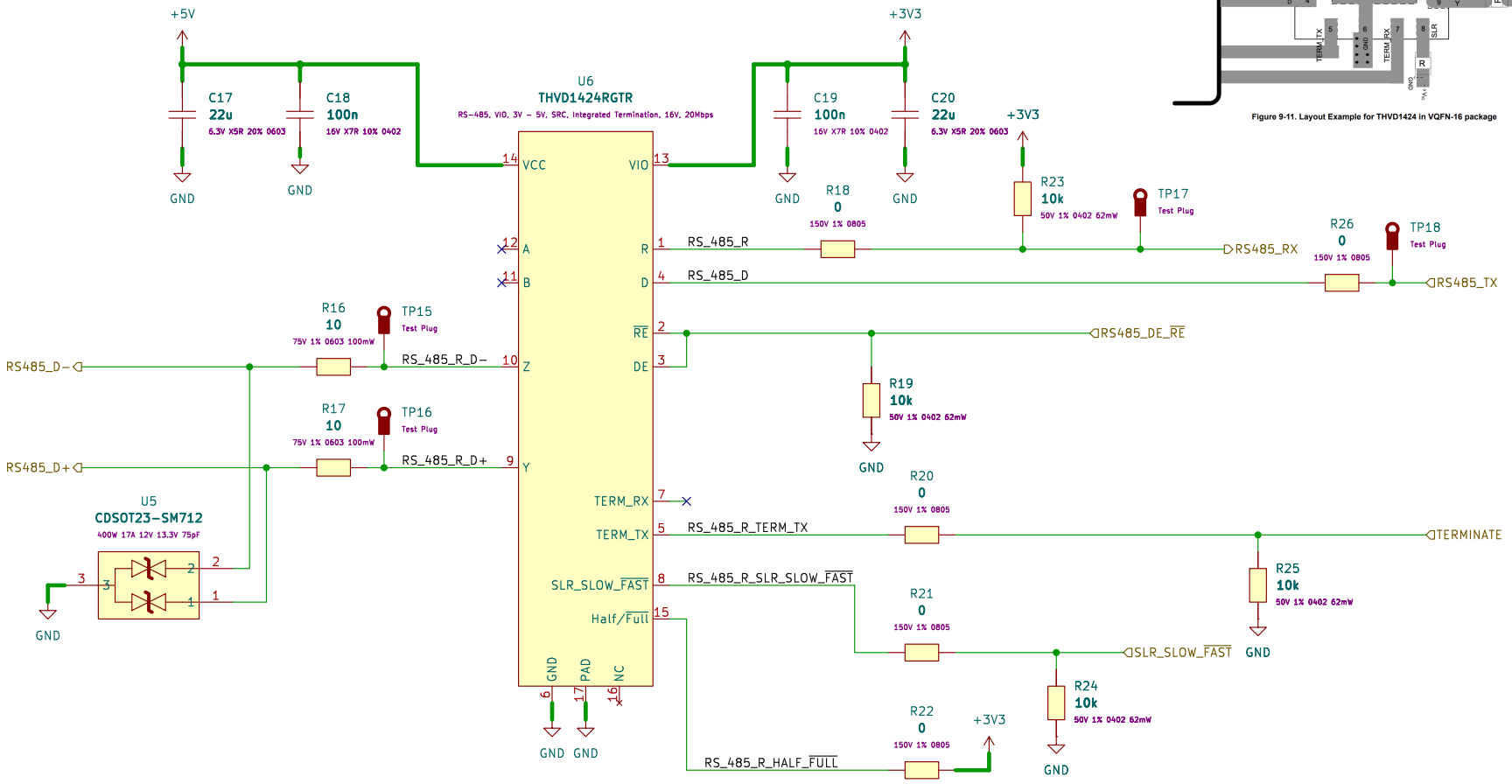


Figure 9-11. Layout Example for THVD1424 in VQFN-16 package



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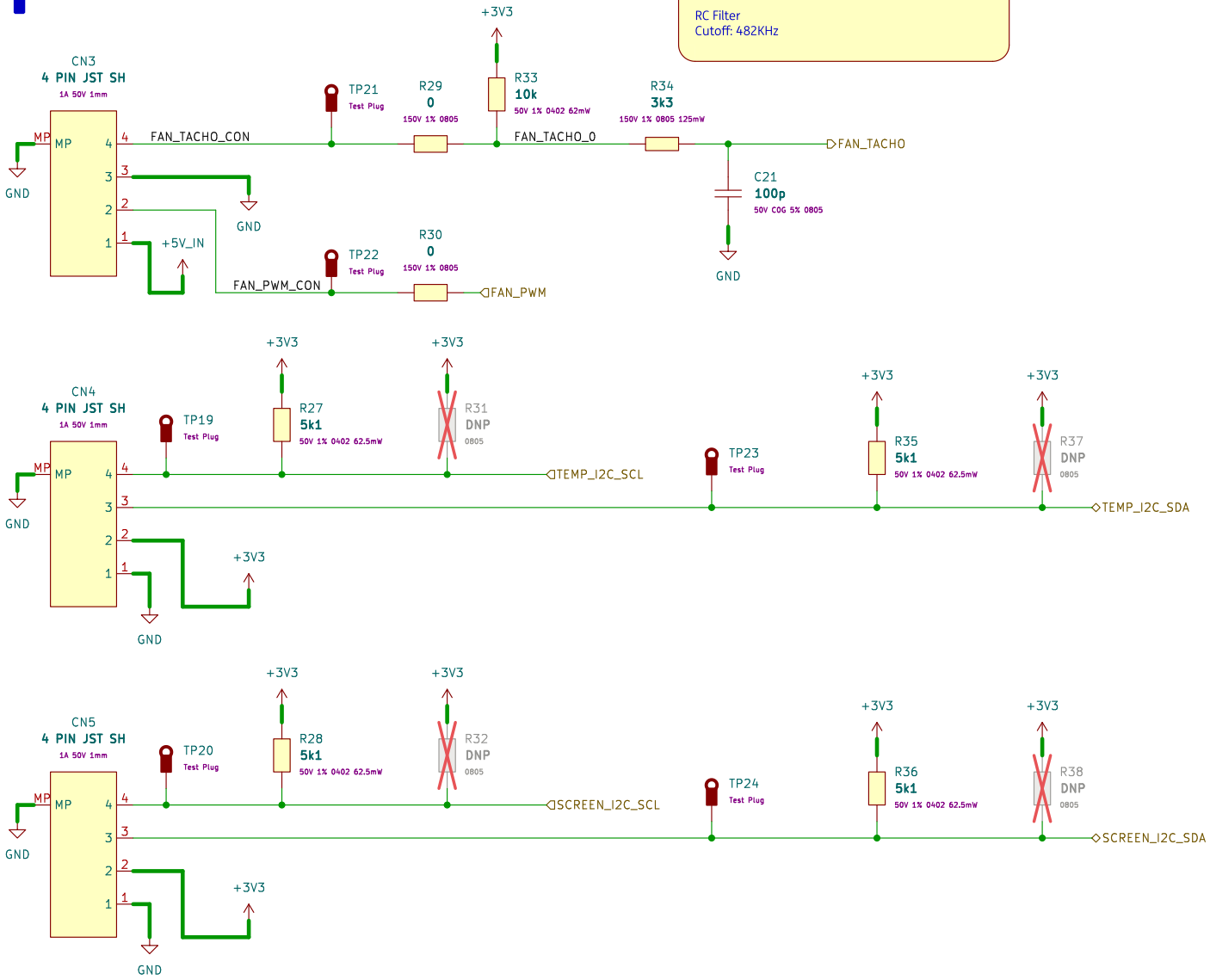
AstraControl	AstraBeam	LiveAstra Technologies	AstraControl - Root	/Block Diagram/UART to RS-485/ uart_to_rs_485.kicad_sch	2024-08-26	**B**	**A4**	**10** of **16**

Fan Temperature Screen

INF7

Information

RC Filter
Cutoff: 482KHz



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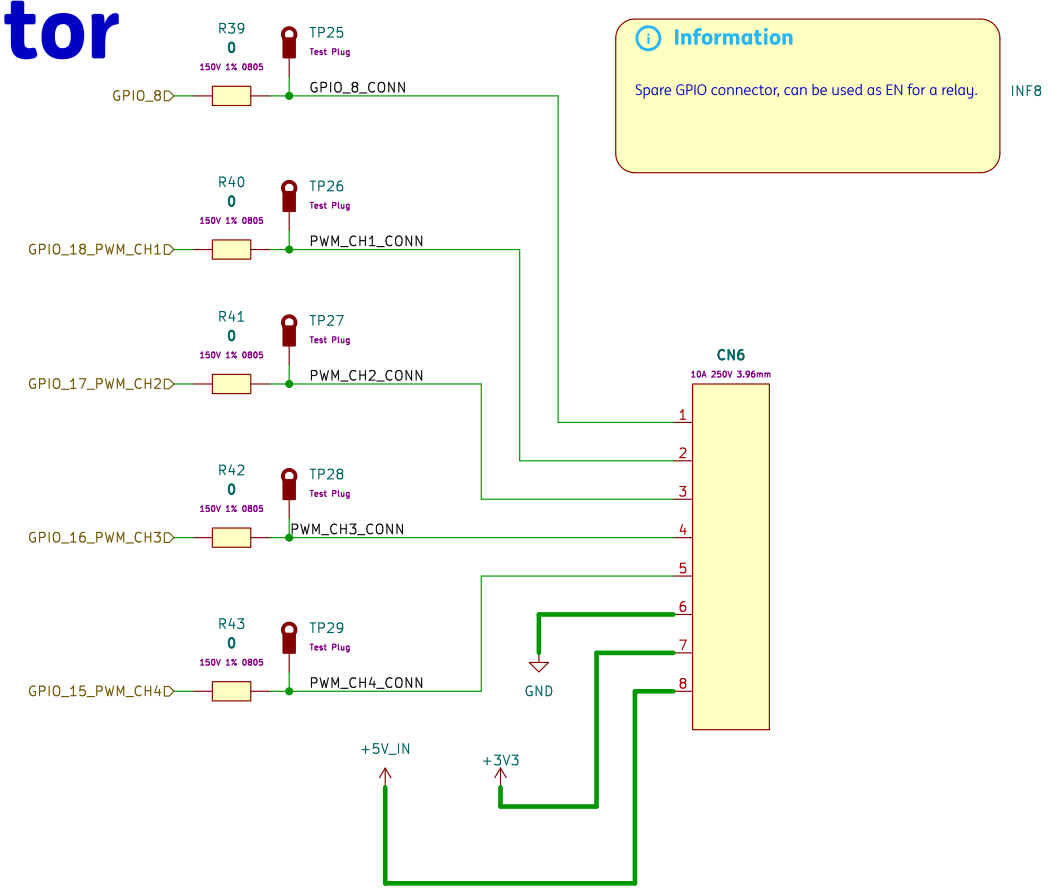
AstraControl	AstraBeam	LiveAstra Technologies	AstraControl - Root	/Block Diagram/Fan, Temperature and Screen/ fan_temp_screen.kicad_sch	2024-08-26	**B**	**A4**	**11** of **16**

PWM Connector



Information

Spare GPIO connector, can be used as EN for a relay. INF8

Board Name	Project Name	Company	Sheet Title	Sheet Path & File Name	Date	Revision	Size	Sheet
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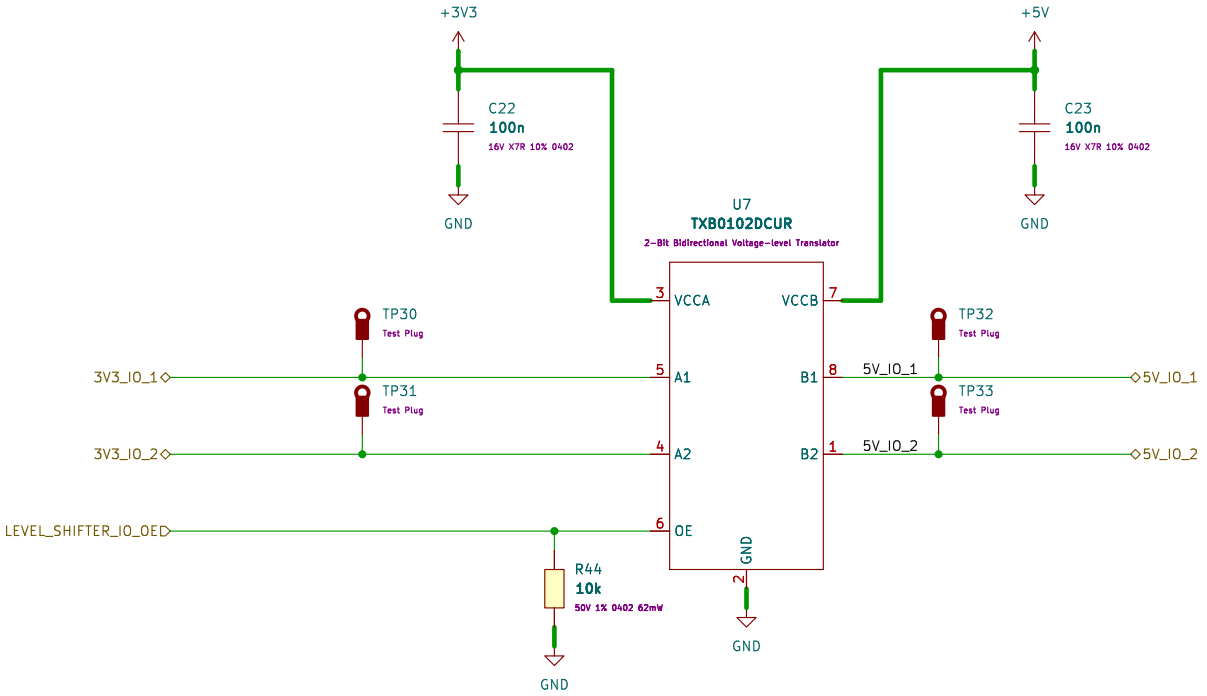
3V3 to 5V Logic Shifter



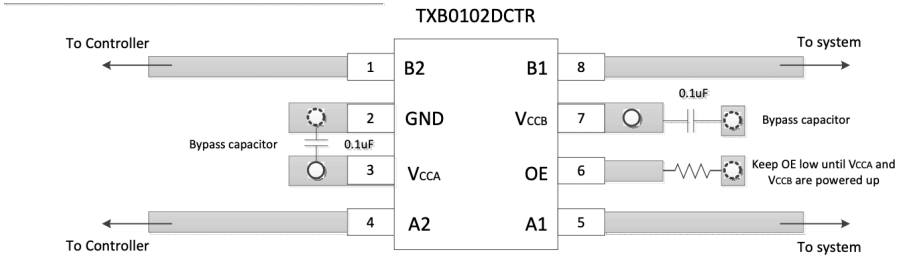


Figure 9. TXB0102 Layout Example

PIN		TYPE(1)	DESCRIPTION
NAME	NO.		
B2	1	I/O	Input/output B2. Referenced to V_{CCB}
GND	2	S	Ground
V_{CCA}	3	S	A-port supply voltage. 1.1 V ≤ V_{CCA} ≤ 3.6 V, V_{CCA} ≤ V_{CCB}
A2	4	I/O	Input/output A2. Referenced to V_{CCA}
A1	5	I/O	Input/output A1. Referenced to V_{CCA}
OE	6	I	3-state output-mode enable. Pull OE low to place all outputs in 3-state mode. Referenced to V_{CCA}
V_{CCB}	7	S	B-port supply voltage. 1.65 V ≤ V_{CCB} ≤ 5.5 V
B1	8	I/O	Input/output B1. Referenced to V_{CCB}

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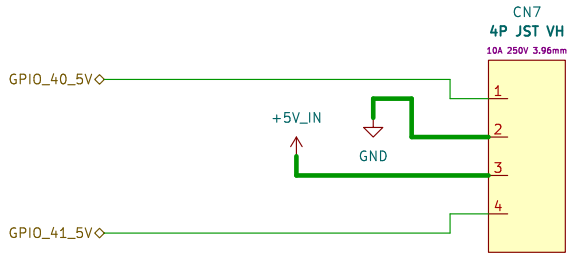
5V GPIO Connector



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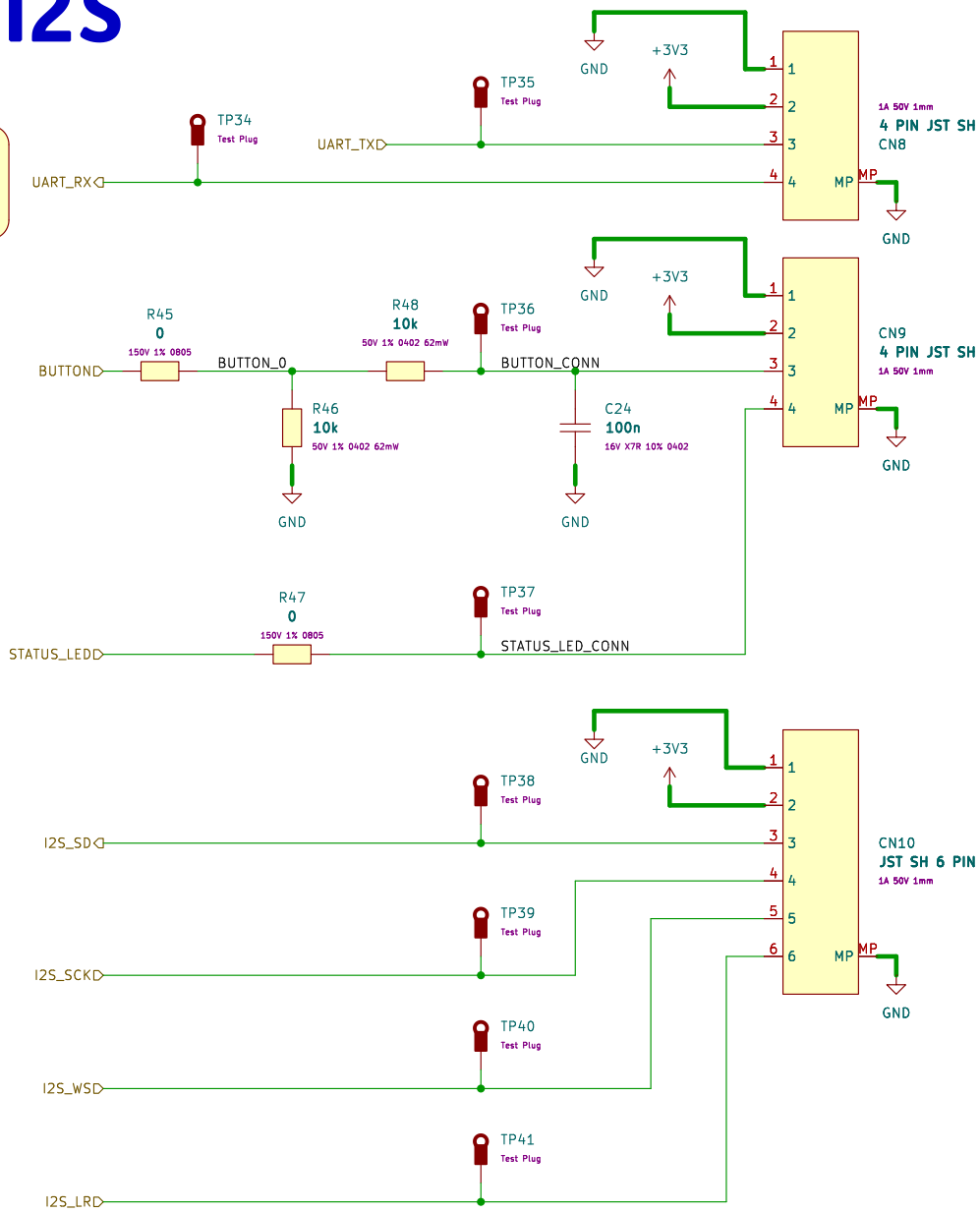
HMI UART I2S

INF9

Information

ESP32-S3 WROOM has a 499Omh resistor on the TX line.



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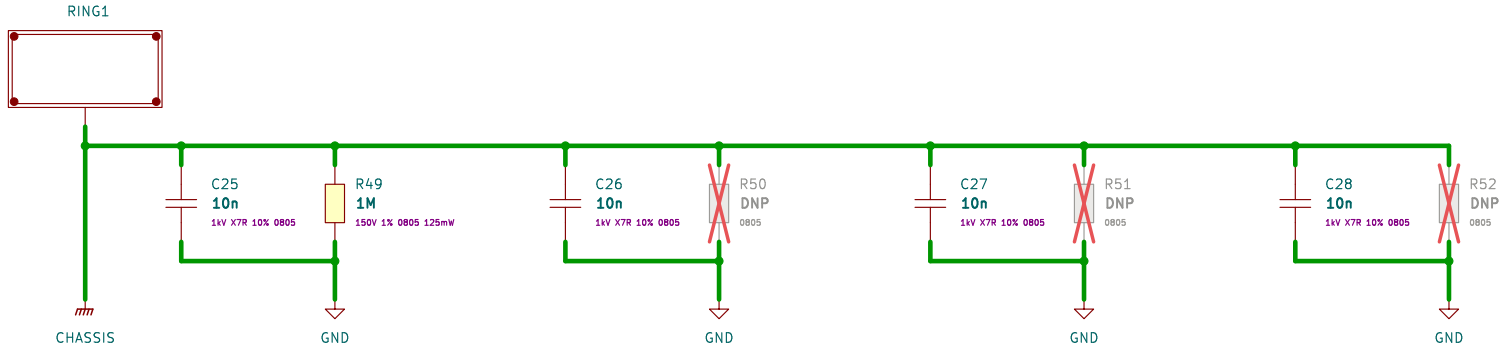
Misc



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