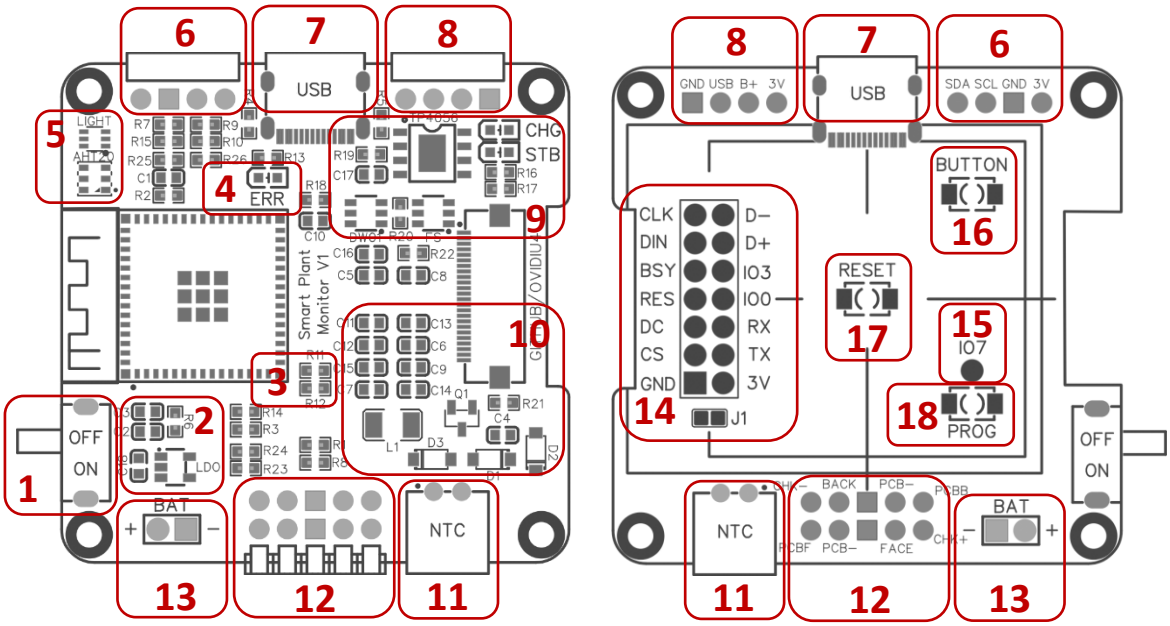
Smart Plant Monitor

Based on the ESP32-S3-MINI-1

Board Overview:



1. ON/OFF Switch: Connects the LDO (2) to the battery charge/protection (9) circuit.
2. 3.3V LDO: Powers all components and sensors
3. Board Thermistor: This thermistor is used to measure the board temperature. If a battery is installed over it, it can detect overheating
4. “ERR” LED: This LED is used as a status LED to signal different states of the device (Booting, firmware updating, etc.)
5. Air and Light sensors: Will measure air humidity and temperature, ambient and IR light. The light sensor can wake up the processor when certain threshold in Lux is met (Detect day time, etc.)
6. I2C Header: Can be used to connect external devices (Relays, etc.)
7. USB Port: Can be used to charge the battery and to program the ESP32-S3
8. Voltage test pins: Can be used to measure/calibrate the different voltage levels of the board. Can also be used to inject voltage (Connect the USB pin to a 6V solar panel, connect the B+ pin to an external Li-Po battery instead of the internal one (13), etc.
9. Li-Po Charge and protection circuit: Offers various protection features:
    a. 400 mA max charging / discharging current
    b. Short circuit protection

    c. Over charge protection
    d. Over discharge protection
10. E-Ink display power circuit
11. NTC connector: Used to attach an external 10K NTC thermistor (Can be used to monitor soil temperature, etc.)
12. Soil probe connector
13. Internal Li-Po battery connector
14. Test pads: Wires can be soldered directly to the test pads and they can be reconfigured in software for your personal use
15. IO7: Connected directly to GPIO7 of the ESP32-S3. Please add a current limiting resistor (max 40mA) to avoid burning of the processor
16. Button: Hold down for 5 sec at startup to change boot mode to config mode. Hold for 10 sec to factory reset the device
17. Reset: Can be shorted to reset the device (Pulls the EN pin low)
18. Prog: Hold down at startup to enter programming mode. Used when programming via USB using Arduino IDE or other software

Board Pinout:

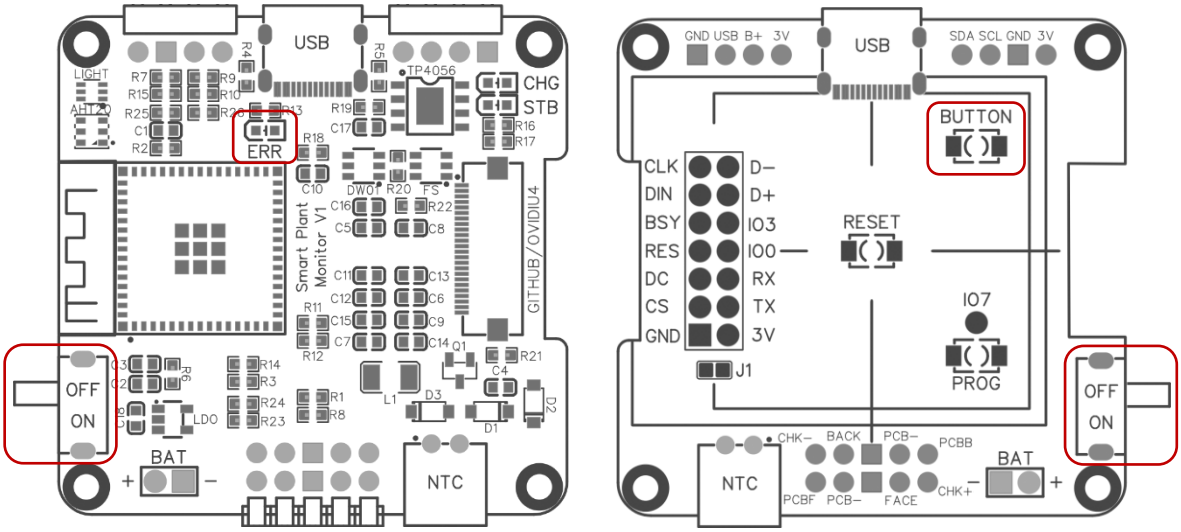
Please see below the default pinout for the device with the corresponding GPIO connections.

For more details please check the schematic

Smart Plant Monitor Pin	ESP32-S3-MINI-1 Pin	Remarks
“Prog” button (18)	GPIO0	Input. Pulled low via 10K resistor
“Face” (12)	GPIO1	Input. No resistor
“Back” (12)	GPIO2	Input. No resistor
“IO3 “ (14)	GPIO3	No resistor
Battery Voltage	GPIO4	Input. R23-R24 voltage divider
“CHK+” (12)	GPIO5	Output. 10K resistor in series
“CHK-” (12)	GPIO6	Input. Pulled low via 100K resistor
“IO7 “ (15)	GPIO7	No resistor
External Thermistor (11)	GPIO8	Input. Pulled low via 10K resistor
“PCBF” (12)	GPIO9	No resistor
“PCBB” (12)	GPIO10	No resistor
“PCB-“ (12)	GND	10K resistor in series
PCB Thermistor (3)	GPIO11	Input. Pulled low via 10K resistor
Light Interrupt	GPIO12	Input. Pulled high via 10K resistor
VBUS Voltage	GPIO13	Input. R25-R26 voltage divider
“DIN” (14)	GPIO14	SPI MOSI
“CLK” (14)	GPIO15	SPI CLK
“CS” (14)	GPIO16	SPI CS
“DC” (14)	GPIO17	SPI D/C
“RES” (14)	GPIO18	SPI RES
USB D-	GPIO19	
USB D+	GPIO20	
“BSY” (14)	GPIO21	SPI Busy
“BUTTON” (16)	GPIO38	Input. Pulled low via 10K resistor
“ERR” LED (4)	GPIO40	
SCL (6)	GPIO41	I2C SCL. Pulled high via 5.1K resistor
SDA (6)	GPIO42	I2C SDA. Pulled high via 5.1K resistor
“RX” (14)	RXD0	No resistor
“TX” (14)	TXD0	No resistor

Note: Some of the test pads do not have series resistors attached. To avoid damaging the ESP32 please consider adding current limiting resistors if you intend to use the pins for other purposes

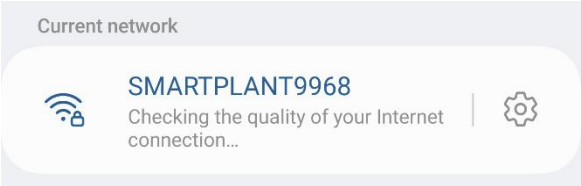
First time setup:



1. Press and hold the top button (marked with “BUTTON”)
2. Flip the power switch to “ON”
3. Wait for 5 seconds
4. The “ERR” LED will blink rapidly 3 times to signify that the “Setup Mode” is active.

   Note: Holding the top button for 10 seconds will factory reset the device

5. Release the top button
6. From your smartphone or computer search for and connect to the device WIFI.
   The network name will always be like “SMARTPLANTXXXX” where the last 4 characters are the device ID. Keep this name in mind.
   The network password is “SMARTPLANT”



7. Open your browser and navigate to http://smartplantxxxx.local, replacing the last 4 characters with the ID of the device from the previous step.
   Alternatively, you can navigate to http://192.168.4.1

8. Navigate to the “WIFI” page
9. Enter your WIFI SSID and Password and press “Submit”

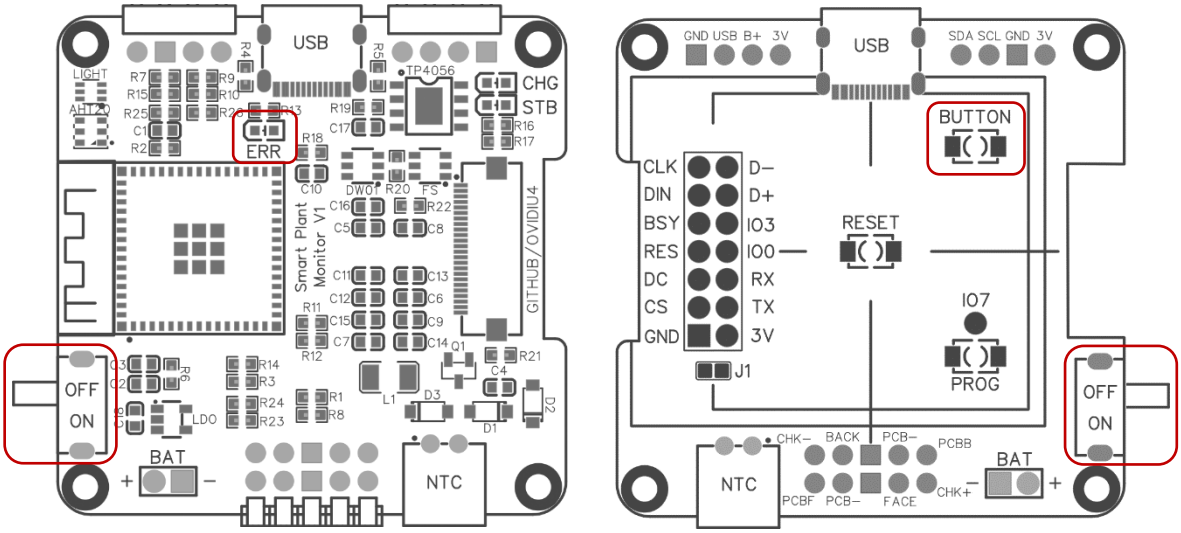
10. Navigate to the “HOME” page and press “Restart”
11. Press and hold the top button (marked with “BUTTON”)
12. Wait for 5 seconds
13. Release the top button
14. The “ERR” LED will blink rapidly 3 times to signify that the “Setup Mode” is active.

15. Go to your Home Assistant interface and click on your name from the side menu
16. Scroll down to “Long-Lived Access Tokens”
17. Generate a new token, giving it a name that will help you remember what it is for
18. Copy this token somewhere safe

19. Open your browser and navigate to http://smartplantxxxx.local, replacing the last 4 characters with the ID of the device from the previous step.
    Alternatively, you can navigate to the IP address you obtain from your Router
20. Navigate to the “CONFIG HA” page
21. Enter your Home Assistant URL (including port).
    This can be an external URL or a NabuCasa URL. Do not add any trailing slashes “/”
22. Enter the Home Assistant token you generated earlier
23. Press “Submit” and confirm a connection code of “200” or “201” is returned
    Alternatively you can go to home assistant and search for a new entity called “SMARTPLANTXXXX_TEST”. A random number is sent to this entity upon testing the connection.

24. Flip the power switch to “OFF”
25. Flip the power switch to “ON”
26. The device is fully configured and will now create and update multiple entities, one for each of the sensors it monitors

Updating the Firmware:



1. Press and hold the top button (marked with “BUTTON”)
2. Flip the power switch to “ON”
3. Wait for 5 seconds
4. The “ERR” LED will blink rapidly 3 times to signify that the “Setup Mode” is active.

   Note: Holding the top button for 10 seconds will factory reset the device

5. Release the top button
6. Open your browser and navigate to http://smartplantxxxx.local, replacing the last 4 characters with the ID of the device from the previous step.
   Alternatively, you can navigate to the IP address you obtain from your Router
7. Navigate to the “FIRMWARE” page
8. If there are any updates available for your device the “Update” button will be available
   If there are no updates or if there is a connection issue, the “Update” button will be replaced by a “Refresh” button
9. Press the “Update” button
   Your device will now check that all files required for the update are available on GitHub
   The device will then download the required files and start the update

   Note: Do not power off the device during the firmware update. The update is finished when the “ERR” LED is turned off and stays off. The device will automatically restart after the update

10. Confirm that the update was successful either by booting in the “Setup Mode” and navigating to the “FIRMWARE” page or by checking the value of the “Software Version” entity in your Home Assistant instance