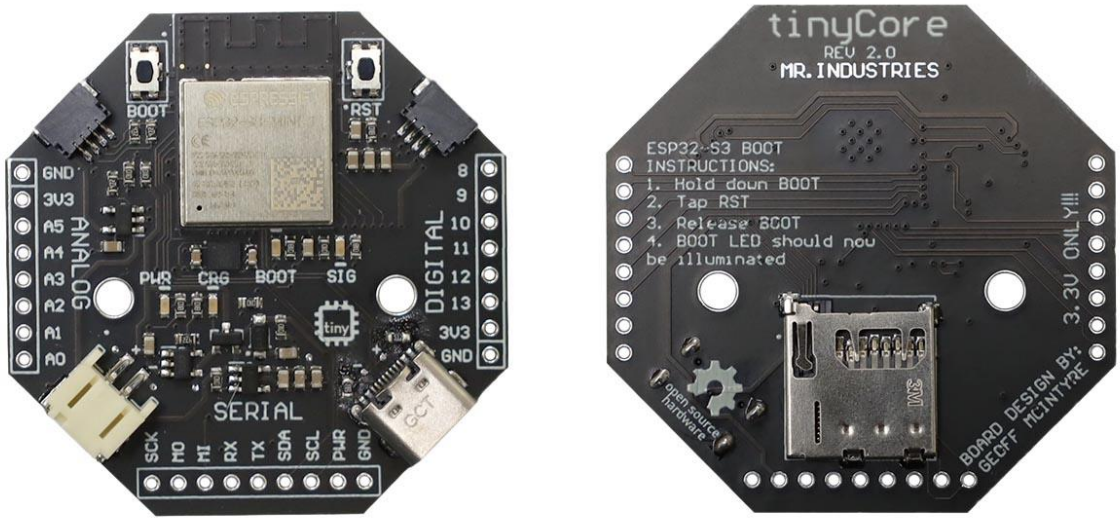
# User Datasheet

Version 2.0




**Description:** tinyCore has been designed from the ground up to bridge the gap between university and industry. The board itself is a highly integrated platform based on the ESP32-S3 chip. We believe that this board will help speed up your learning and design process with advanced embedded systems.

**Target Audience:** Students, Hobbyists, Young Professionals

# tinyCore ESP32-S3 Technical Specifications

## Processor:

- Dual-core Xtensa LX7 32-bit processor
- Operating frequency up to 240 MHz
- RISC-V Ultra Low Power Co-processor (ULP)

## Memory:

- 512 KB of SRAM
- 384 KB of ROM
- No PSRAM

## Security:

- Hardware acceleration for: AES-128/256, SHA-2, RSA, RNG, HMAC
- Secure Boot
- Flash Encryption
- Digital Signature

## Peripherals:

- 23 programmable GPIOs with support for interrupt/wake-up
- 14-channel 12-bit SAR ADC with up to 14 ADC channels
- I2S, I2C, UART, SPI, USB Serial/JTAG
- Micro SD Card via SPI
- 6-DOF IMU (Motion sensor)
- USB-C for Serial Bootloader and HID/MIDI control

## Connectivity:

- 2.4 GHz Wi-Fi 5 (802.11 b/g/n)
- Bluetooth Low Energy (BLE)
- Supports mesh networking

## Power Management:

- Ultra-low deep-sleep current of 8μA (RTC timer + RTC memory + ULP active)
- 3.3V LDO Power Regulator (up to 6V)
- Dedicated LDO for I2C power

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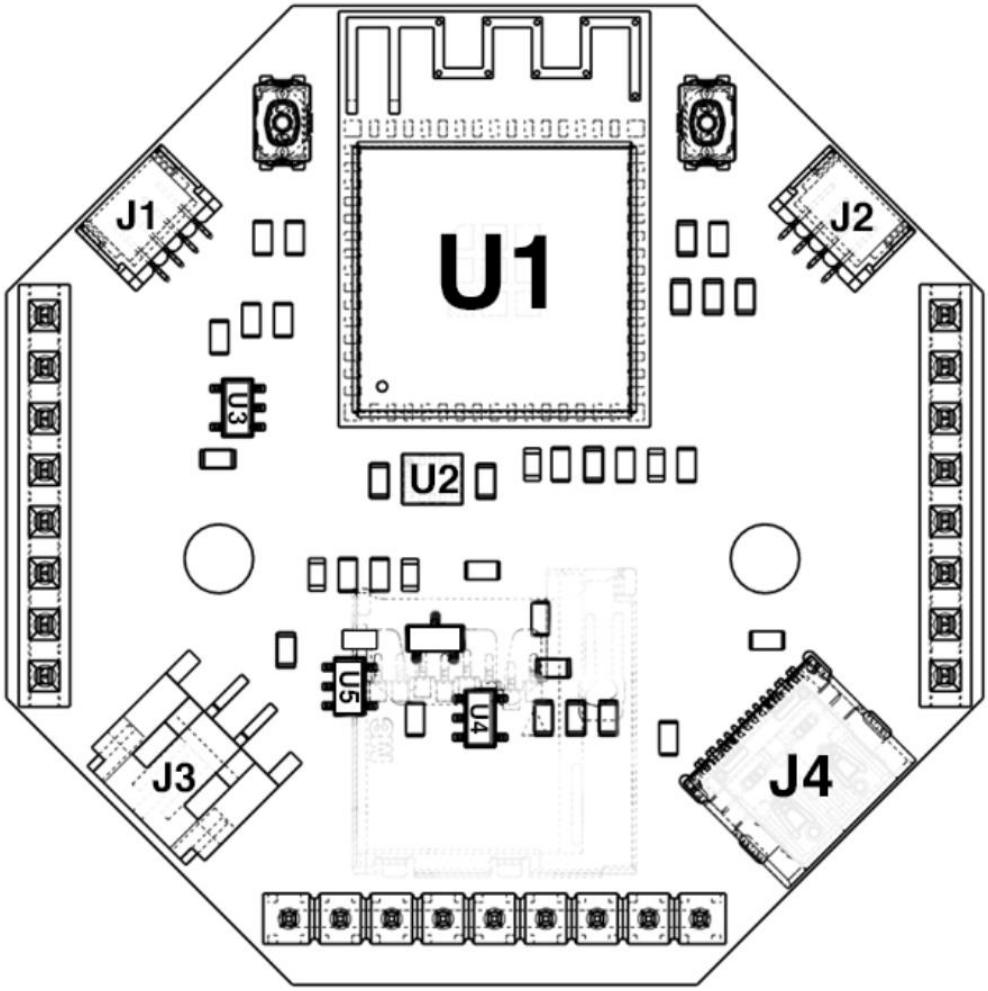
## 3.1: Board Topology (High Level)

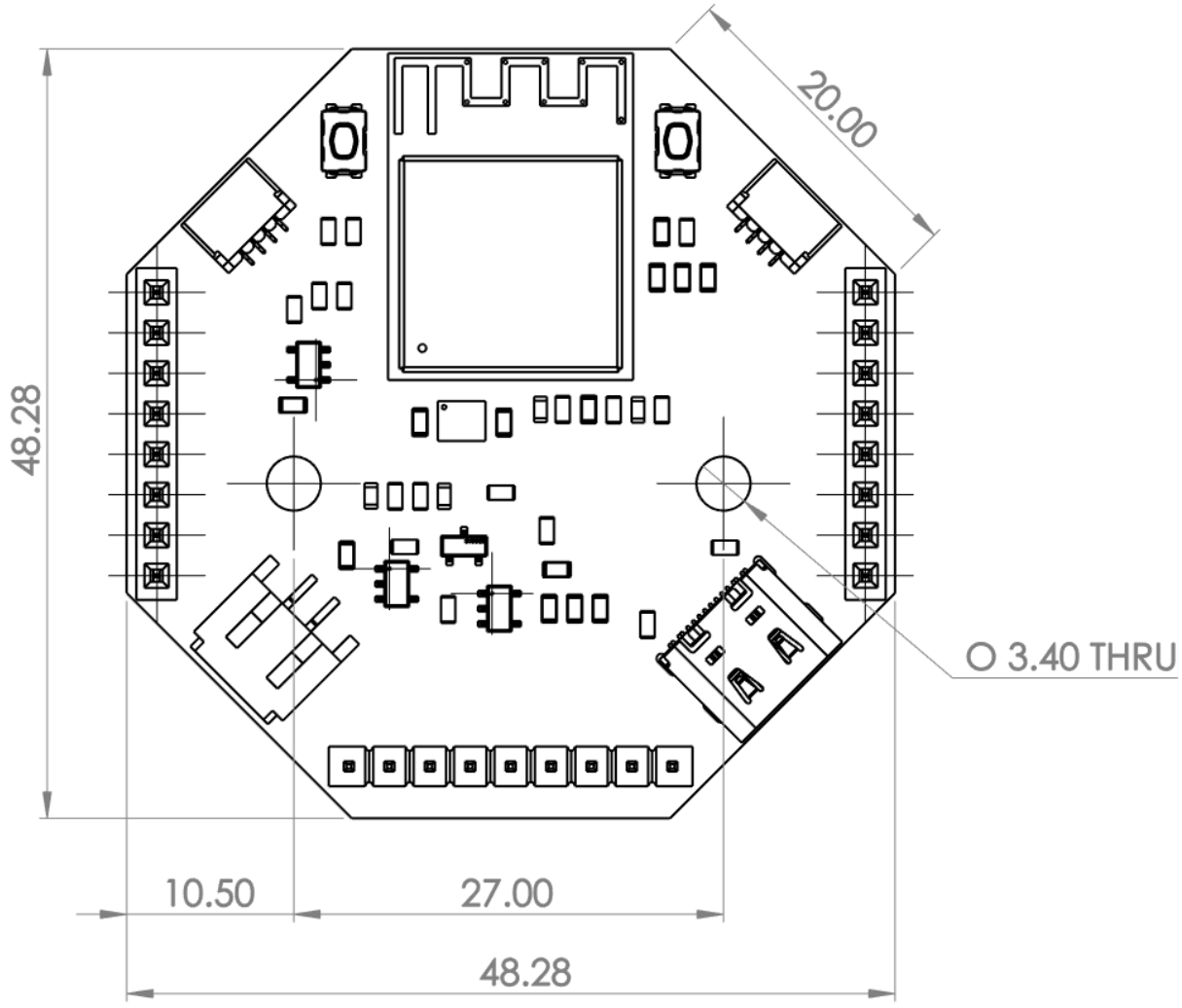



| Ref. | Description |
|---|---|
| U1 | ESP32-S3-MINI-1-N8 Microcontroller |
| U2 | LSM6DSOTR 6-DoF Inertial Measurement Unit |
| U3, U4 | AP2112K-3.3TRG1 LDO Regulator |
| U5 | MCP73831 LiPo Charge Management |
| J1, J2 | STEMMA QT/Qwiic JST SH 4-pin I2C Connectors |
| J3 | S2B-PH-SM4-TB JST PH 2-Pin LiPo Battery Connector |
| J4 | USB4105-GF-A USB-C Connector |

## 3.2: Power Tree

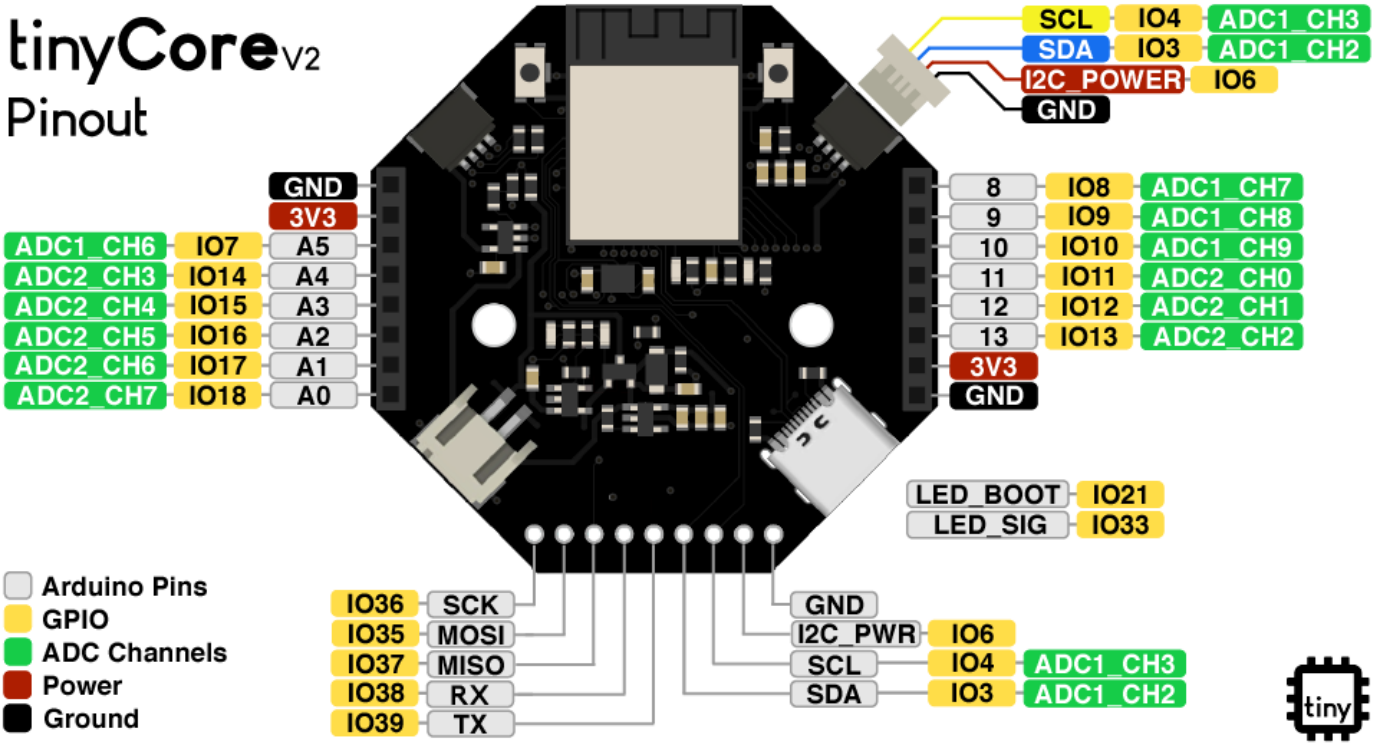
## 3.3 Board Outline & Mounting Holes

The board was designed to be an octagon of approximately 50x50mm. The mounting holes are made for standard M3 Screws, and the headers are standard 2.45mm spacing.



# 4. Connector Pinouts

## 4.1: Pinout Diagram




## 4.2: Analog Pins

| Pin | Function | Type | Description |
|---|---|---|---|
| 1 | GND | Power | Ground |
| 2 | +3V3 | Power | +3V3 Power Rail |
| 3 | A5 | Analog/GPIO | Analog input 5 /GPIO7 |
| 4 | A4 | Analog/GPIO | Analog input 4 /GPIO14 |
| 5 | A3 | Analog/GPIO | Analog input 3 /GPIO15 |
| 6 | A2 | Analog/GPIO | Analog input 2 /GPIO16 |
| 7 | A1 | Analog/GPIO | Analog input 1 /GPIO17 |
| 8 | A0 | Analog/GPIO | Analog input 0 /GPIO18 |

## 4.3: Digital Pins

| Pin | Function | Type | Description |
|---|---|---|---|
| 1 | D8 | Digital/GPIO | Digital pin 8/GPIO |
| 2 | D9 | Digital/GPIO | Digital pin 9/GPIO |

| | | | |
|---|---|---|---|
| 3 | D10 | Digital/GPIO | Digital pin 10/GPIO |
| 4 | D11 | Digital/GPIO | Digital pin 11/GPIO |
| 5 | D12 | Digital/GPIO | Digital pin 12/GPIO |
| 6 | D13 | Digital/GPIO | Digital pin 13/GPIO |
| 7 | +3V3 | Power | +3V3 Power Rail |
| 8 | GND | Power | Ground |

## 4.4: Serial Pins

| Pin | Function | Type | Description |
|---|---|---|---|
| 1 | SCK | SPI/GPIO | SPI Serial Clock Output |
| 2 | MOSI | SPI/GPIO | SPI Main Out Secondary In |
| 3 | MISO | SPI/GPIO | SPI Main In Secondary Out |
| 4 | RX | Serial/GPIO | Serial Receive |
| 5 | TX | Serial/GPIO | Serial Transmit |
| 6 | SDA | I2C/GPIO | I2C Data Line |
| 7 | SCL | I2C/GPIO | I2C Clock Line |
| 8 | I2C_POWER | Power | Separate I2C +3V3 Power Rail (Default On) |
| 9 | GND | Power | Ground |

# 5. Board Operation

5.1 Getting Started – Arduino IDE

5.2 Sample Sketches

5.3 Online Resources

# 6. Company Information

tinyCore is developed and maintained by **MR.INDUSTRIES**: McIntyre-Reeves Industries LLC, based in Boulder, Colorado.

# 7. Relevant Links

| Reference | Link |
|---|---|
| Arduino IDE | https://www.arduino.cc/en/Main/Software |
| Espressif ESP-IDF | https://docs.espressif.com/projects/esp-idf/en/stable/esp32s3/get-started/index.html |
| MR. INDUSTRIES Website | https://mr.industries |
| MR. INDUSTRIES Docs | https://docs.mr.industries |
| Official YouTube Channel | https://www.youtube.com/@FacioErgoSum |

# 8. Revision History

| Date | Revision | Changes |
|---|---|---|
| 3/23/25 | 1 | Datasheet Release |