Atlas Scientific Environmental Robotics EZO-EC

Atlas Scientific EZO-EC Embedded Conductivity Circuit User Manual

Model: EZO-EC

1. Introduction

The Atlas Scientific EZO-EC Embedded Conductivity Circuit is a highly accurate and versatile device designed for measuring conductivity, total dissolved solids (TDS), salinity, and specific gravity in various liquid solutions. This circuit provides precise data for environmental monitoring, industrial processes, and scientific research, integrating seamlessly into embedded systems via UART or I2C communication protocols.

2. Key Features

- Measures Conductivity, Total Dissolved Solids (TDS), Salinity, and Specific Gravity (sea water only).
- Wide Conductivity Range: 0.07 to 500,000+ µS/cm.
- High Accuracy: +/- 2%.
- Flexible Communication: Supports UART and I2C data protocols.
- Operating Voltage: 3.3V to 5V.

3. Product Overview

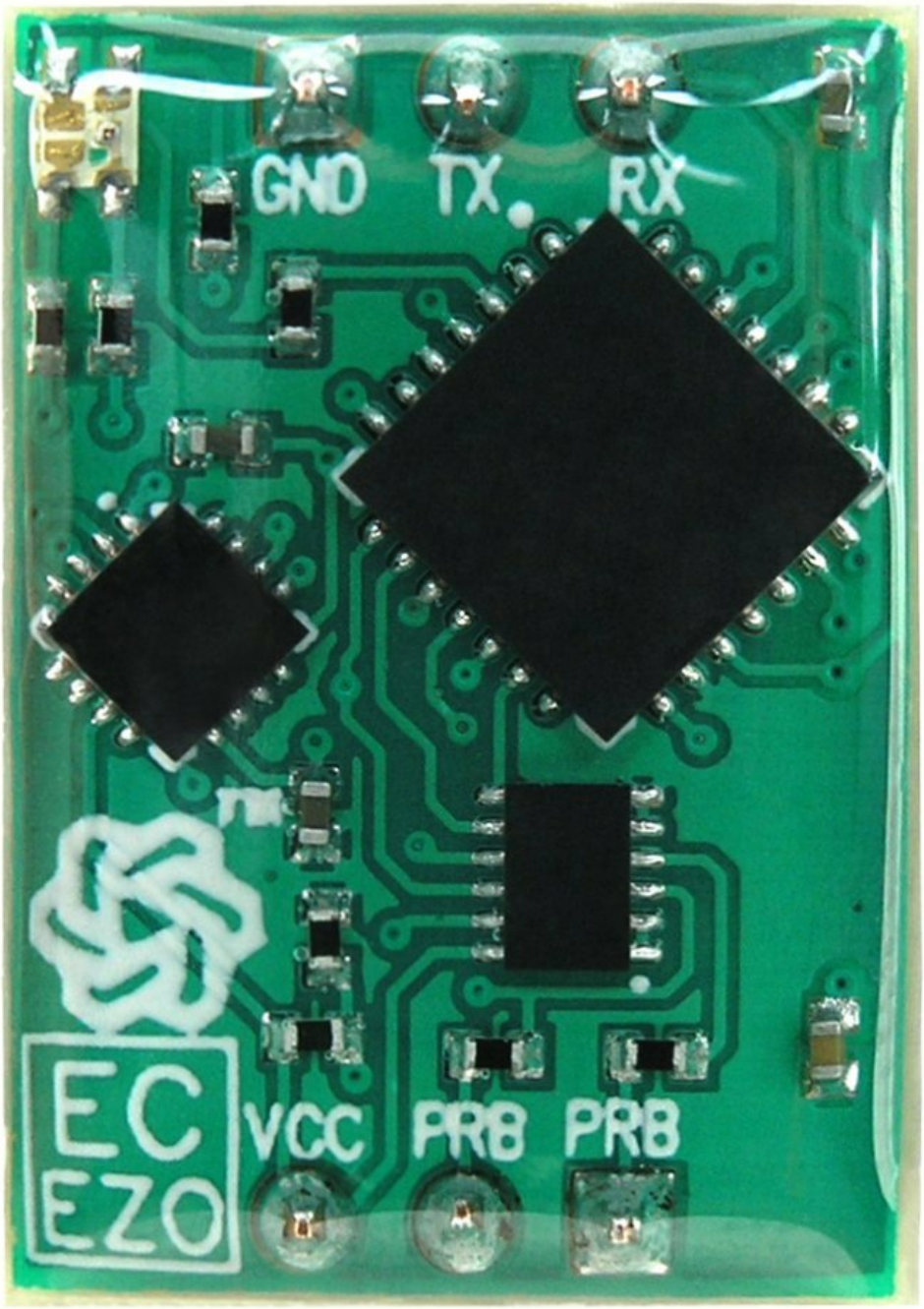

Figure 1: Top view of the EZO-EC circuit board. This image displays the main components and connection points, including ground (GND), transmit (TX), receive (RX), voltage common collector (VCC), and probe (PRB) pins.

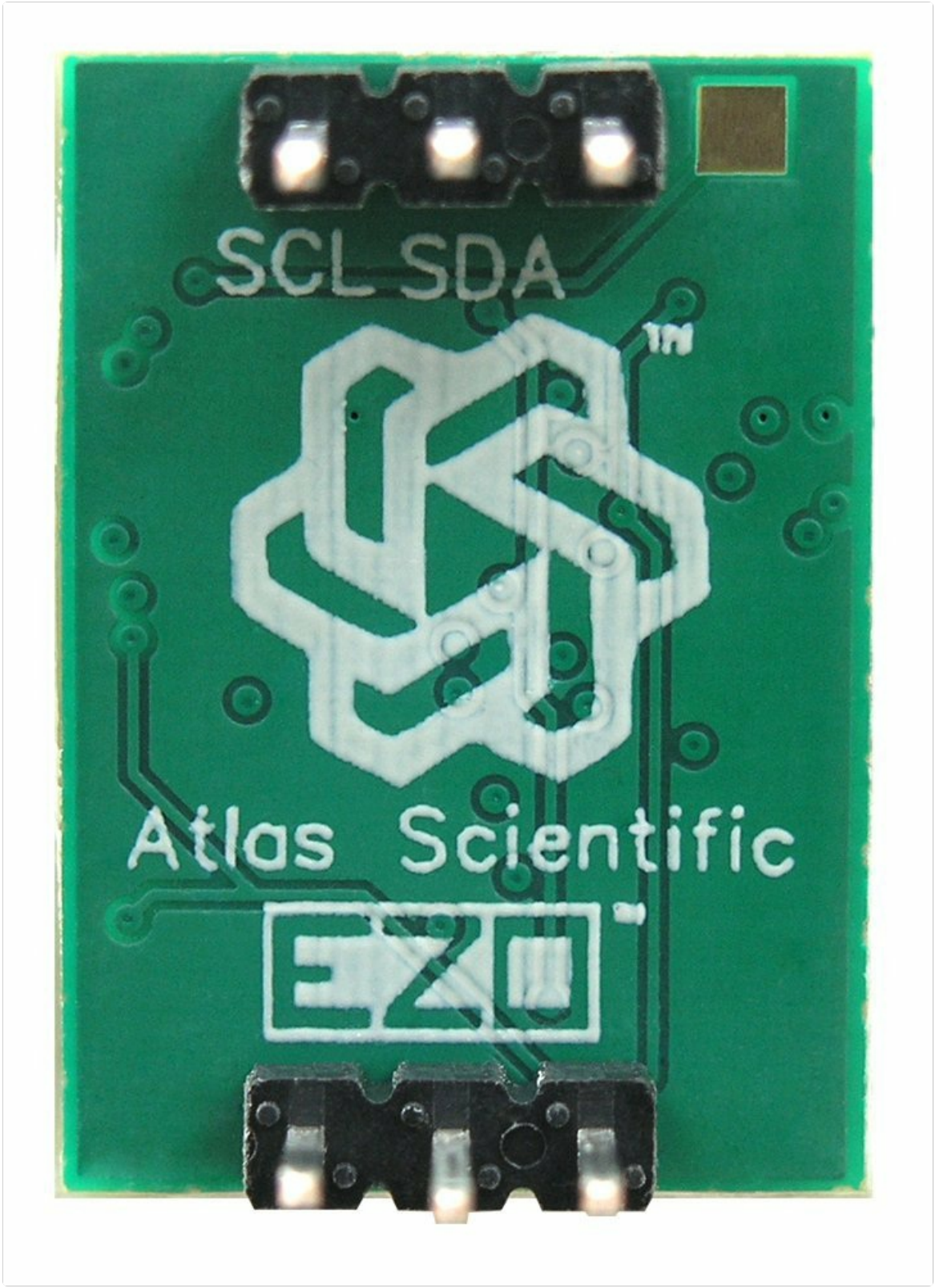

Figure 2: Bottom view of the EZO-EC circuit board. This side features the Atlas Scientific logo and pins for Serial Clock (SCL) and Serial Data (SDA), used for I2C communication.

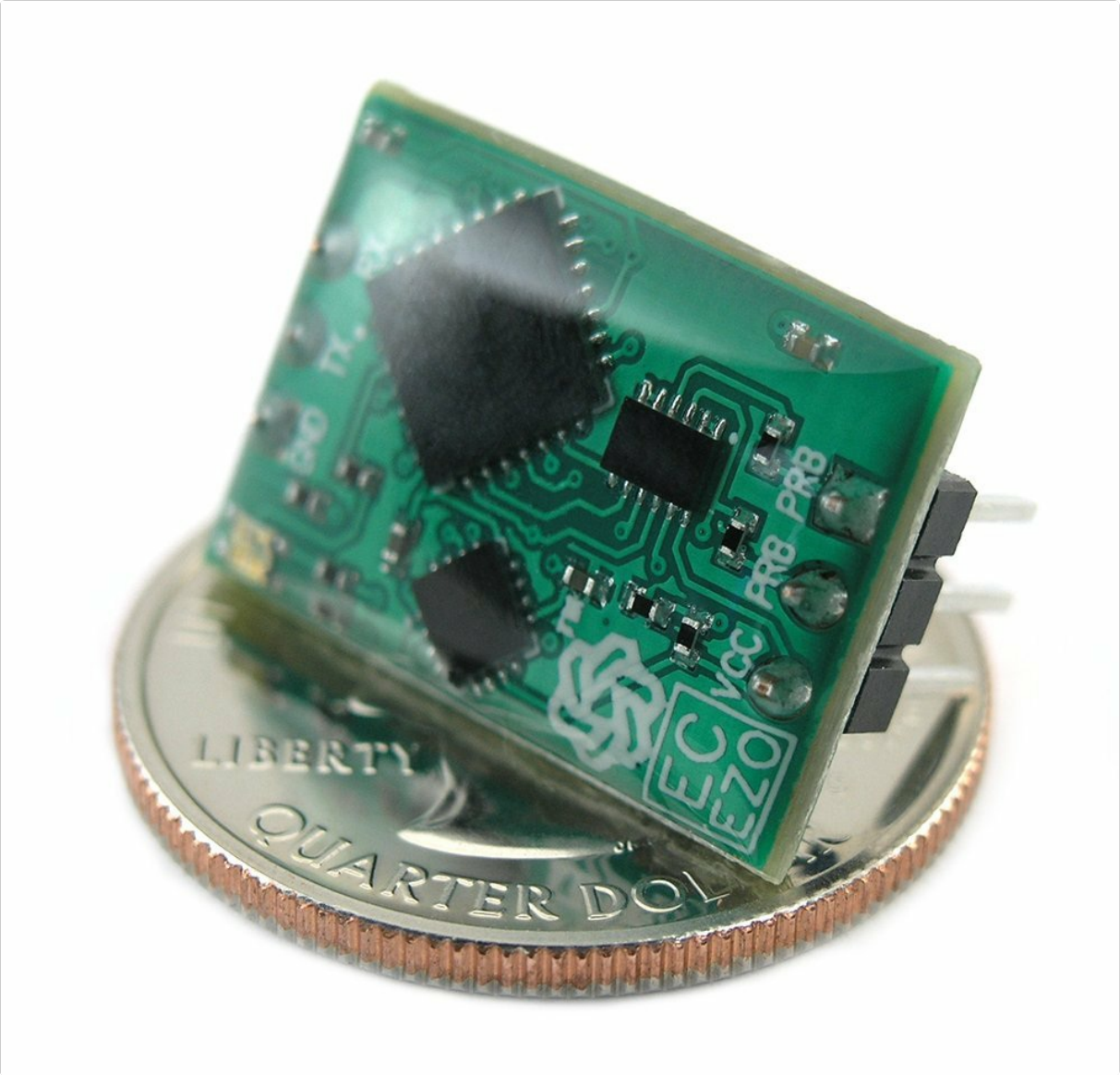

Figure 3: EZO-EC circuit board shown next to a quarter for scale. This image highlights the compact dimensions of the embedded circuit.

4. Specifications

Attribute	Value
Measurement Capabilities	Conductivity, Total Dissolved Solids (TDS), Salinity, Specific Gravity (sea water only)
Conductivity Range	0.07 – 500,000+ µS/cm
Accuracy	+/- 2%
Data Protocols	UART & I2C
Operating Voltage	3.3V – 5V
Product Dimensions	0.8 x 0.73 x 0.35 inches
Weight	0.07 ounces

5. Components Required

To operate the EZO-EC Embedded Conductivity Circuit, the following components are typically required:

- **EZO-EC Circuit:** The main conductivity measurement module.
- **Conductivity Probe:** An external conductivity probe with a BNC connector is necessary for measurements. The EZO-EC circuit does not include a probe.
- **Microcontroller/Host System:** An Arduino, Raspberry Pi, or similar microcontroller for communication and data processing.
- **Power Supply:** A stable 3.3V to 5V DC power source.
- **Connecting Wires:** For connecting the circuit to the microcontroller and power supply.

6. Setup Instructions

1. **Connect Power:** Connect the VCC pin of the EZO-EC circuit to your 3.3V-5V power supply and the GND pin to the ground of your system.
2. **Connect Communication:**
    - **For UART:** Connect the TX pin of the EZO-EC to the RX pin of your microcontroller, and the RX pin of the EZO-EC to the TX pin of your microcontroller.
    - **For I2C:** Connect the SCL pin of the EZO-EC to the SCL pin of your microcontroller, and the SDA pin of the EZO-EC to the SDA pin of your microcontroller. Ensure appropriate pull-up resistors are used if not already present on your microcontroller board.
3. **Connect Conductivity Probe:** Attach your BNC-connector conductivity probe to the PRB pins on the EZO-EC circuit. Ensure a secure connection.
4. **Initial Power-Up:** Apply power to your system. The EZO-EC circuit should power on.

7. Operating the EZO-EC Circuit

The EZO-EC circuit operates by receiving commands and sending data via its chosen communication protocol (UART or I2C). Refer to the official Atlas Scientific EZO-EC datasheet and communication protocol documentation for detailed command sets and responses.

7.1. Calibration

Accurate measurements require proper calibration of the conductivity probe with the EZO-EC circuit. Calibration typically involves using known conductivity solutions (e.g., 12.88 mS/cm, 1.413 mS/cm) and following the calibration commands outlined in the official documentation.

7.2. Reading Measurements

Once calibrated, send the appropriate command (e.g., "R" for continuous reading or specific commands for conductivity, TDS, salinity, or specific gravity) to the EZO-EC circuit. The circuit will return the measured value through the selected communication interface.

7.3. Temperature Compensation

Conductivity measurements are highly dependent on temperature. The EZO-EC circuit supports temperature compensation. It is recommended to integrate a temperature sensor into your system and provide temperature readings to the EZO-EC circuit for more accurate conductivity calculations.

8. Maintenance

- **Probe Cleaning:** Regularly clean your conductivity probe according to the probe manufacturer's instructions to prevent buildup that can affect accuracy.
- **Recalibration:** Recalibrate the EZO-EC circuit and probe periodically, especially if measurements drift or after extensive use.
- **Storage:** Store the EZO-EC circuit in a dry, non-condensing environment when not in use. Ensure the conductivity probe is stored properly (e.g., in storage solution) as per its specific instructions.
- **Connections:** Periodically check all electrical connections for corrosion or looseness.

9. Troubleshooting

- **No Reading/Incorrect Reading:**
  - Verify all power and communication connections are secure and correct.
  - Ensure the conductivity probe is properly connected and immersed in the solution.
  - Check if the probe is clean and not damaged.
  - Perform a calibration with fresh calibration solutions.
  - Confirm the correct communication protocol (UART/I2C) is selected and configured in your microcontroller code.
- **Communication Errors:**
  - For UART, check baud rates.
  - For I2C, verify device address and pull-up resistors.
  - Ensure no other devices are conflicting on the same communication bus.
- **Inaccurate Temperature Compensation:**
  - Verify the temperature sensor is accurate and providing correct data to the EZO-EC circuit.
  - Ensure the temperature compensation commands are being sent correctly.
- **"Not complete, needs many more parts" (as per customer review):**The EZO-EC is an embedded circuit. It requires an external conductivity probe and a host microcontroller to function as a complete measurement system. It is not a standalone device.

10. Warranty and Support

Atlas Scientific products are designed for reliability and performance. For specific warranty information, technical support, and detailed documentation, please refer to the official Atlas Scientific website or contact their customer service directly. Keep your purchase receipt for warranty claims.
Manufacturer: Atlas Scientific
Website: www.atlas-scientific.com