Envistia XL6009 Boost-Buck

Envistia XL6009 DC-DC Boost Buck Converter Instruction Manual

Model: XL6009 Boost-Buck | Brand: Envistia

1. Introduction

The Envistia XL6009 DC-DC Boost Buck Converter is a versatile power supply module designed to convert an input voltage ranging from 5V to 32V into a stable output voltage between 1.5V and 35V. This module utilizes the XLSEMI XL6009 chip, providing a single solution for applications requiring both step-up (boost) and step-down (buck) voltage conversion. It is particularly useful for maintaining a consistent output voltage even when the input voltage fluctuates significantly.

2. Key Features

- **Wide Input Voltage Range:** Accepts input voltages from 5V to 32V.
- **Adjustable Output Voltage:** Provides a continuously adjustable output voltage from 1.5V to 35V via an onboard potentiometer.
- **High Efficiency:** Achieves up to 94% conversion efficiency through efficient MOSFET switching.
- **Advanced Design:** Features a high switching frequency of 400KHz for reduced ripple and fast response time.
- **Durable Construction:** Designed for industrial-grade operation with a temperature resistance from -40°C to +85°C.

3. Module Connections

Proper connection of the input and output terminals is crucial for safe and correct operation. The module features clearly labeled solder pads for input and output.

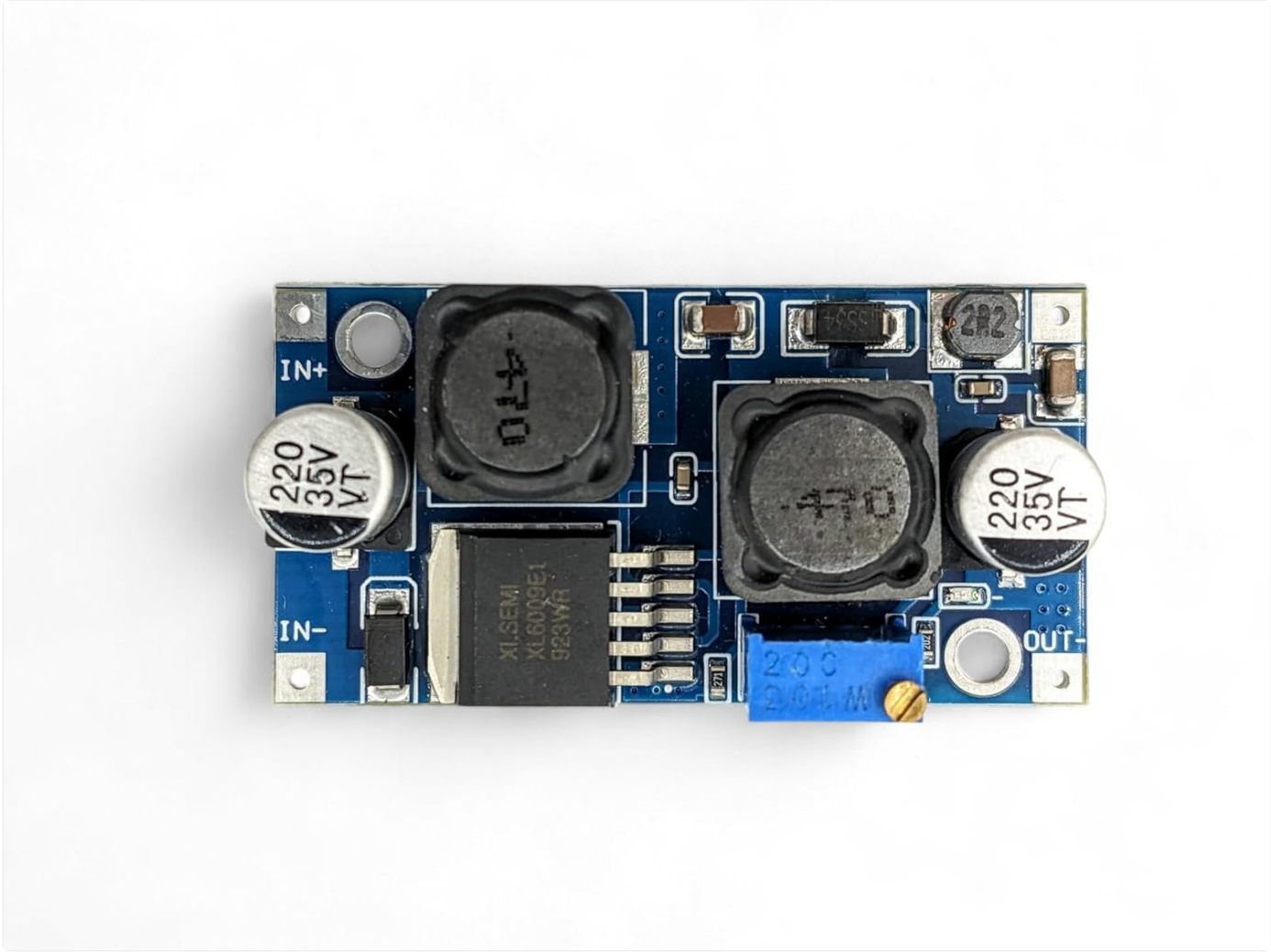

Figure 1: Angled view of the XL6009 module, highlighting the IN+ (Input Positive), IN- (Input Negative), OUT+ (Output Positive), and OUT- (Output Negative) terminals.

- **IN+ and IN-:** Connect your DC input voltage source (5V to 32V) to these terminals. Ensure correct polarity: IN+ for positive, IN- for negative.
- **OUT+ and OUT-:** Connect your load or device requiring the regulated voltage to these terminals. Ensure correct polarity: OUT+ for positive, OUT- for negative.

The module also includes two 3mm mounting holes for secure installation.

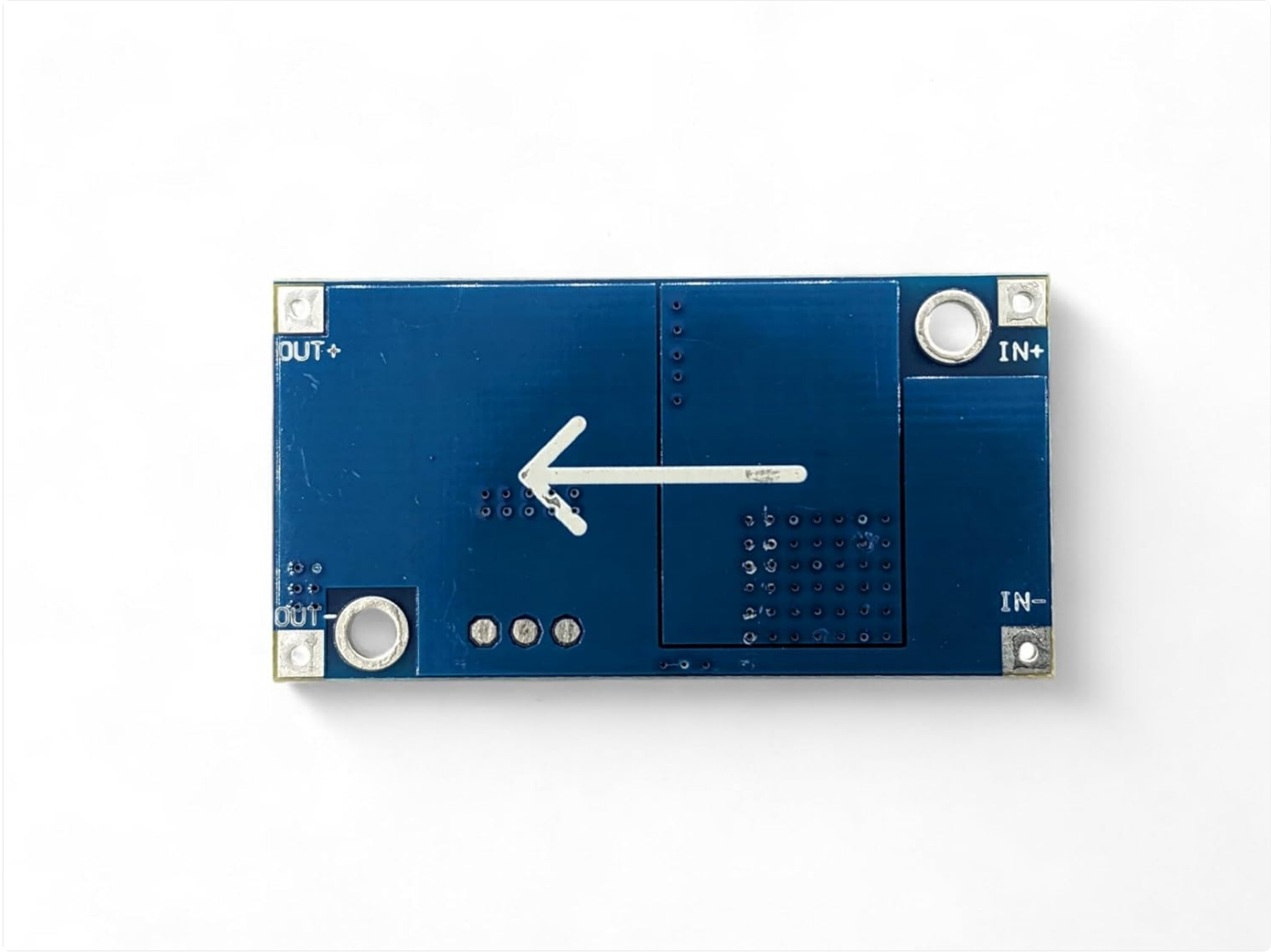

Figure 2: Bottom view of the XL6009 module, illustrating the two 3mm mounting holes for installation.

4. Operating Instructions

4.1. Voltage Adjustment

The output voltage of the XL6009 converter is continuously adjustable using the onboard blue potentiometer. To adjust the output voltage:

1. Connect the input voltage source to IN+ and IN-.
2. Do **not** connect the load to the output terminals yet.
3. Connect a voltmeter to the OUT+ and OUT- terminals.
4. Using a small screwdriver, carefully turn the potentiometer clockwise to increase the output voltage or counter-clockwise to decrease it.
5. Adjust until the desired output voltage is displayed on the voltmeter.
6. Once the desired voltage is set, disconnect the input power, then connect your load to the output terminals.

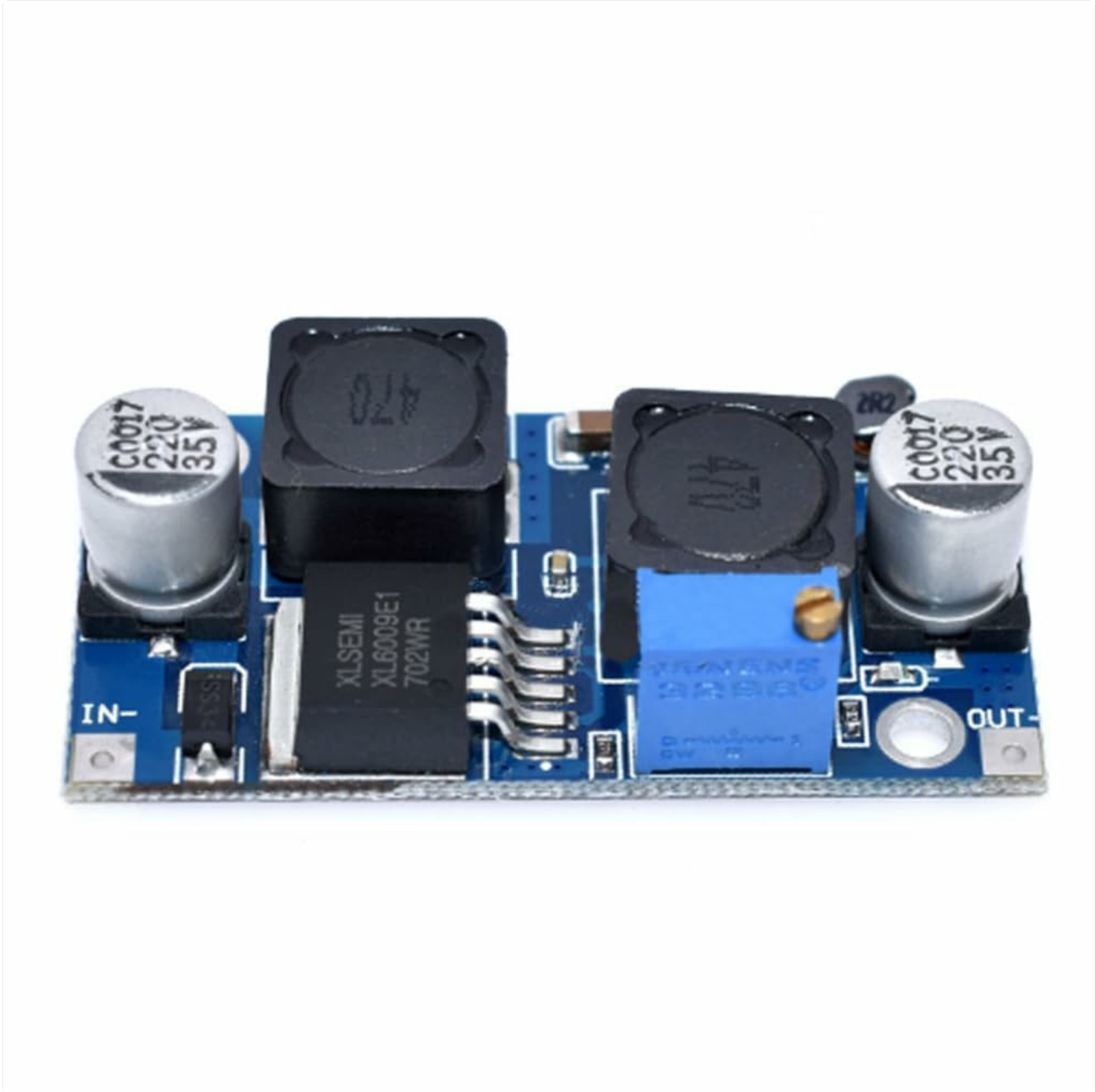

Figure 3: Side view of the XL6009 module, indicating the location of the blue potentiometer used for output voltage adjustment.

4.2. Operation Principle

The module operates in two stages:

- The first section boosts the input voltage (5V to 32V) to an internal voltage greater than 35V.
- The second section then steps down (bucks) this internal voltage to the user-set output voltage level (1.5V to 35V) via the onboard potentiometer. This architecture allows the module to function as both a boost and buck converter, providing a stable output regardless of whether the input is higher or lower than the desired output.

5. Typical Applications

This converter is suitable for a variety of applications, including:

- Automotive voltage regulation.
- Voltage regulation for solar photovoltaic and wind power systems.

- Applications requiring stable voltage output from broadly varying or unstable input voltages.

6. Technical Specifications

Specification	Value
Module Type	Non-isolated step-up & down (Boost & Buck)
Input Voltage	5V - 32V
Output Voltage	1.5V - 35V (continuously adjustable)
Output Current	1.5A (Max)
Output Power	20W (Natural cooling), 25W (with heat sink)
Conversion Efficiency	80% to 94% (varies with input/output voltage and current)
Operating Temperature	Industrial grade -40°C to +85°C
Full Load Temperature Rise	45°C
Operating Frequency	400KHz
Voltage Regulation	± 0.5%
Dynamic Response Speed	5% 200uS
Dimensions (LxWxH)	48mm x 23mm x 11mm (1.89 x 0.91 x 0.43 inches)
Weight	15 grams (0.529 ounces)

7. Important Safety Information

- **No Short Circuit Protection:** This module does not include built-in short circuit protection. It is highly recommended to install an external fuse or protection circuit at the input.
- **No Input Reverse Polarity Protection:** The module lacks reverse polarity protection for the input. Always ensure correct polarity (IN+ to positive, IN- to negative) to prevent damage. Consider adding a reverse protection diode in series with the input for added safety.
- **Heat Management:** For continuous operation at higher power outputs (above 20W) or in ambient temperatures exceeding 40°C, additional heat sinking or forced air cooling may be required to prevent overheating and ensure optimal performance.
- **Voltage Limits:** Do not exceed the specified input (5-32V) or output (1.5-35V) voltage limits. Exceeding these limits can permanently damage the module.
- **Current Limits:** Do not exceed the maximum output current of 1.5A without proper cooling.
- **Handling:** Handle the module with care to avoid electrostatic discharge (ESD) damage.

8. Maintenance

The XL6009 converter is designed for reliable operation with minimal maintenance. To ensure longevity and consistent performance:

- Keep the module clean and free from dust and debris.
- Regularly inspect connections for tightness and signs of corrosion.
- Ensure adequate ventilation, especially when operating at higher loads or temperatures.

9. Troubleshooting

If you encounter issues with your XL6009 converter, consider the following:

- **No Output Voltage:**
  - Check input voltage: Ensure it is within the 5V-32V range.
  - Verify input polarity: Confirm IN+ and IN- are connected correctly.
  - Check potentiometer setting: The output might be set to a very low voltage. Adjust it slowly while monitoring with a voltmeter.
  - Inspect connections: Ensure all solder joints and wires are secure.
- **Incorrect Output Voltage:**
  - Adjust the potentiometer: Fine-tune the output voltage using a voltmeter.
  - Check load: Ensure the load is not drawing excessive current, which could cause voltage drop.
- **Module Overheating:**
  - Reduce load: Decrease the current drawn from the module.
  - Improve cooling: Add a heat sink or provide forced air cooling.
  - Check ambient temperature: Ensure the operating environment is within the specified range.

10. Warranty and Support

For warranty information or technical support regarding your Envistia XL6009 DC-DC Boost Buck Converter, please refer to the documentation provided at the time of purchase or contact your seller directly. Keep your purchase receipt for any warranty claims.