

Hilitand LTC3780 Automatic Step UP/Down Converter User Manual

Model: LTC3780

1. Introduction

The Hilitand LTC3780 Automatic Step UP/Down Converter is a non-isolated DC-DC power module designed to provide a stable output voltage regardless of whether the input voltage is higher or lower than the desired output. This module features constant voltage (CV), constant current (CC), and undervoltage protection (UV), making it suitable for various applications such as battery charging, LED drivers, device power supplies, and automotive power sources.

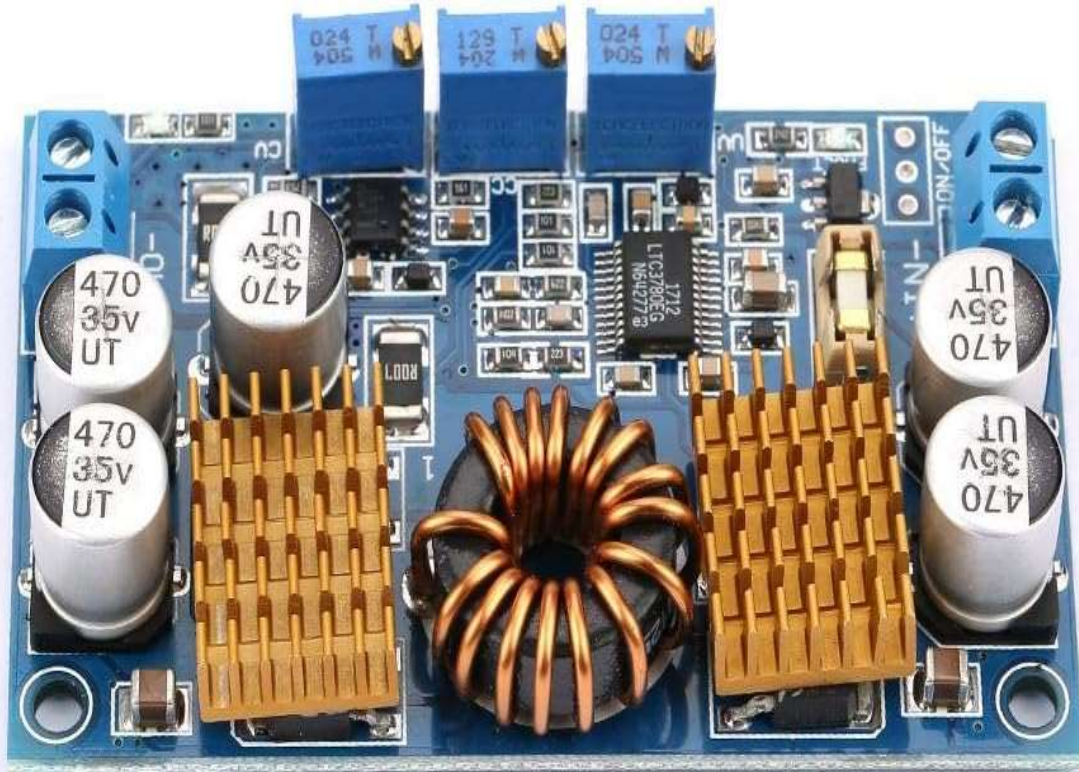


Image 1.1: Overview of the Hilitand LTC3780 Automatic Step UP/Down Converter module.

2. Safety Information

- Always ensure correct input and output polarity. Incorrect connections can damage the module and connected devices.
- This module does not support reverse input protection. If reverse polarity is a concern, connect a Schottky diode in series at the input.
- This module does not support output backflow protection. When connecting to batteries or inductive loads, connect a Schottky diode in series at the output.
- Ensure adequate heat dissipation, especially when operating at higher power levels (above 80W). Overheating can lead to reduced performance or damage.
- Do not exceed the maximum input voltage of 32V or the maximum output current of 10A.
- Handle the module with care to avoid electrostatic discharge (ESD) damage.

3. Product Features

- **Automatic Step UP/Down (Boost/Buck) Function:** Maintains stable output voltage regardless of input voltage fluctuations (within specified range).
- **Constant Voltage (CV) Output:** Adjustable output voltage from 1V to 30V.
- **Constant Current (CC) Output:** Adjustable output current up to 10A (max).
- **Input Undervoltage Protection (UV):** Prevents damage to the input source by cutting off output when input voltage drops below a set threshold.
- **Short Circuit Protection:** Built-in protection against output short circuits.
- **High-Quality Components:** Utilizes premium chips, low resistance, high-frequency capacitors, a thickly plated circuit board, oxidized heat sinks, and a sendust inductor for improved performance and heat management.



Image 3.1: The LTC3780 module is suitable for applications like battery charging and voltage stabilization.

4. Specifications

Parameter	Value
Module Type	Non-isolated Boost/Buck (Step UP/Down)
Input Voltage	DC 5V-32V (recommended 10V above for optimal performance)
Output Voltage	DC 1V-30V (infinitely adjustable)
Output Current	10A (max), less than 7A for long-term operation
Output Power	80W (recommended), 130W (max with improved heat dissipation)
Output Ripple	50mV (measured at 5A, 12V to 12V)
Short Circuit Protection	Yes
Reverse Input Protection	No (Schottky diode recommended)
Output Backflow Protection	No (Schottky diode recommended for batteries/inductive loads)
Dimensions (L x W x H)	77.6mm x 46.5mm x 15mm (approx. 3.1 x 1.8 x 0.6 inches)
Weight	45g (approx. 1.6oz)

5. Setup and Connections

Refer to the diagram below for proper connection points and adjustment potentiometers.

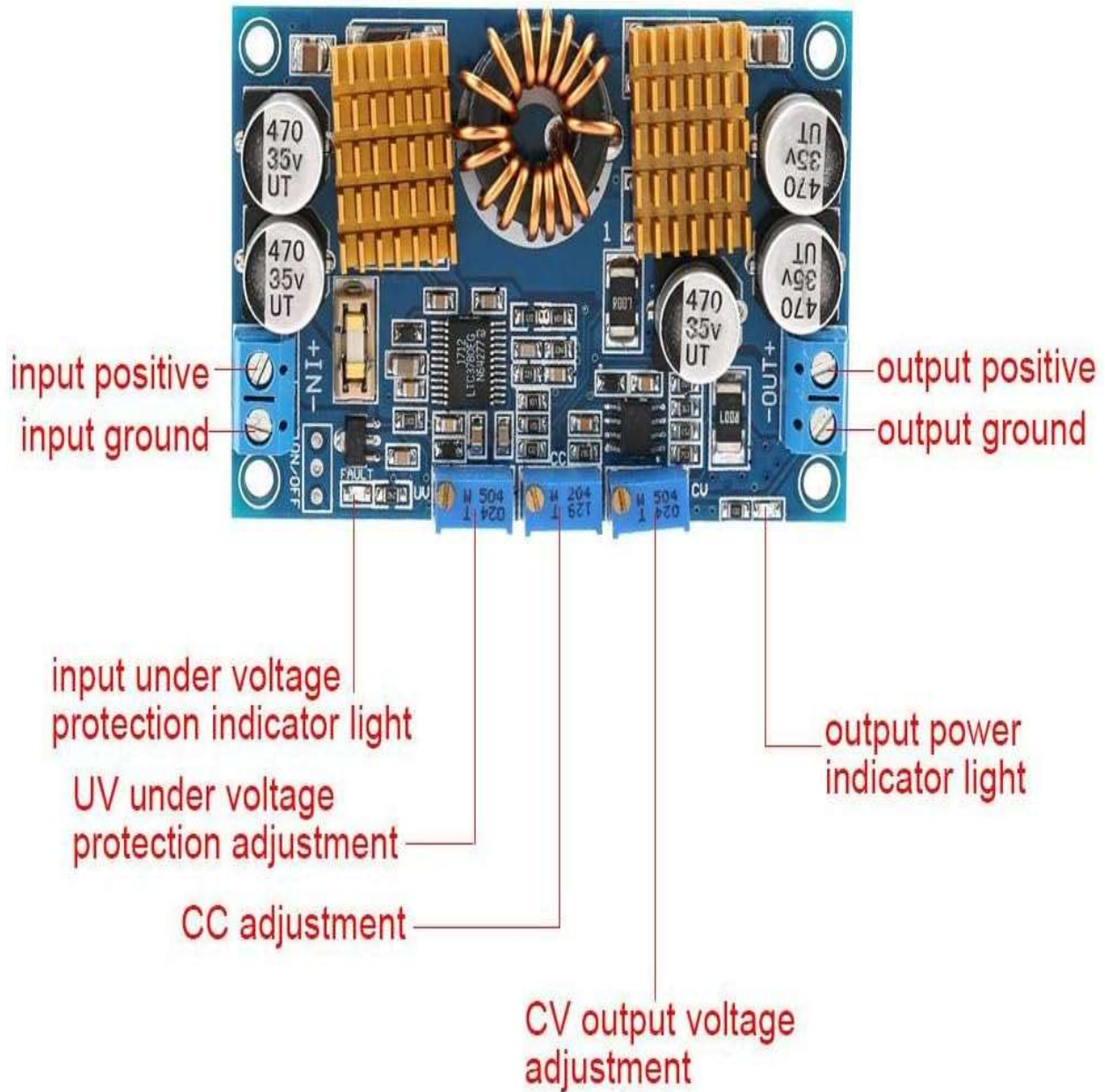


Image 5.1: Connection terminals and adjustment points on the LTC3780 module.

5.1 Connection Terminals

- **Input Positive (+IN):** Connect the positive terminal of your DC input power source.
- **Input Ground (-IN):** Connect the negative terminal of your DC input power source.

- **Output Positive (+OUT):** Connect the positive terminal of your load.
- **Output Ground (-OUT):** Connect the negative terminal of your load.

5.2 Adjustment Potentiometers

- **CV (Constant Voltage) Adjustment:** This potentiometer adjusts the output voltage. Turn clockwise to increase voltage, counter-clockwise to decrease.
- **CC (Constant Current) Adjustment:** This potentiometer adjusts the output current limit. Turn clockwise to increase the current limit, counter-clockwise to decrease.
- **UV (Under Voltage Protection) Adjustment:** This potentiometer sets the input undervoltage protection threshold. When the input voltage drops below this set point, the output will be disabled. Turn clockwise to increase the UV threshold, counter-clockwise to decrease.

5.3 Indicator Lights

- **Input Under Voltage Protection Indicator Light:** Illuminates when the input voltage falls below the set UV threshold.
- **Output Power Indicator Light:** Illuminates when the module is providing output power.

6. Operating Instructions

Follow these steps to configure and operate your LTC3780 module:

1. **Connect Input Power:** Connect your DC input power source (5V-32V) to the +IN and -IN terminals. Ensure correct polarity.
2. **Set Output Voltage (CV):**
 - Connect a voltmeter to the +OUT and -OUT terminals.
 - Adjust the **CV potentiometer** until the desired output voltage (1V-30V) is displayed on the voltmeter.
3. **Set Output Current Limit (CC):**
 - This step requires a suitable load or an ammeter in series with a short circuit (for precise setting).
 - Connect your load or a short circuit (with an ammeter) to the output.
 - Adjust the **CC potentiometer** to set the maximum desired output current. If using a short circuit, ensure the ammeter can handle the current.
4. **Set Input Undervoltage Protection (UV):**
 - Connect a voltmeter to the +IN and -IN terminals.

- Adjust the **UV potentiometer** to the desired input voltage threshold. When the input voltage drops below this value, the output will turn off to protect the input source.
- 5. **Connect Load:** After setting the voltage, current, and UV protection, connect your actual load to the +OUT and -OUT terminals.

7. Maintenance

- Keep the module clean and free from dust and debris to ensure proper airflow and heat dissipation.
- Regularly inspect connections for tightness and corrosion.
- Ensure the operating environment is within specified temperature and humidity ranges.
- If operating at high power, periodically check the temperature of the heat sinks. If they are excessively hot, consider adding external cooling.

8. Troubleshooting

- **No Output Voltage:**
 - Check input power supply: Ensure it is connected correctly and providing voltage within the 5V-32V range.
 - Check UV protection: The input undervoltage protection indicator light may be on if the input voltage is too low. Adjust the UV potentiometer or increase input voltage.
 - Check for short circuits: Ensure there is no short circuit at the output.
 - Verify connections: Ensure all input and output wires are securely connected.
- **Output Voltage is Incorrect/Unstable:**
 - Adjust the CV potentiometer carefully to set the desired output voltage.
 - Ensure the load is not drawing more current than the CC limit. If it is, the module will operate in constant current mode, and the voltage may drop. Increase the CC limit if necessary.
 - Check for excessive load: If the load exceeds the module's power capabilities, the output may be unstable.
- **Module Overheating:**
 - Reduce the output power or current.
 - Ensure proper airflow around the module.
 - Consider adding an external fan or larger heat sinks if operating continuously at high power.

- **Fault Light On:**
 - This typically indicates an issue such as undervoltage at the input or an internal fault. Refer to the 'No Output Voltage' section.

9. Warranty and Support

Hilitand is committed to providing high-quality products and excellent customer service. If you encounter any issues with your LTC3780 module or require technical assistance, please contact Hilitand customer support. We strive to offer sincere service and intimate after-sales support to ensure customer satisfaction.

For further assistance, please refer to the official Hilitand store or contact your retailer.