BTF-LIGHTING SP803E

BTF-LIGHTING ESP-32 WLED WiFi Controller SP803E Instruction Manual

Model: SP803E

1. Introduction

This manual provides detailed instructions for the installation, operation, and maintenance of the BTF-LIGHTING ESP-32 WLED WiFi Controller SP803E. This controller is designed to manage various types of LED strips, offering advanced features such as Wi-Fi control, music synchronization, and dynamic lighting effects. Please read this manual thoroughly before use to ensure proper setup and optimal performance.

Figure 1: BTF-LIGHTING SP803E Controller Overview

2. Product Overview and Features

The SP803E is an ESP-32 based WLED WiFi controller capable of managing up to 2048 pixels for RGB IC and RGBW IC LED strips. It supports both SPI addressable and PWM LED strips, offering versatile lighting control options.

Key Features:

- **Wide Compatibility:** Supports SPI Addressable LED strips (WS2811, WS2812, WS2815, SK6812 RGBW, WS2814 RGBW) and PWM Dimming LED strips (Single-color, CCT Dual White, RGB).
- **Broad Voltage Input:** Compatible with DC5V, DC12V, and DC24V power supplies. Ensure the power supply voltage matches your LED strip's voltage.
- **Triple Safety Protections:** Includes reverse polarity protection, backfeed prevention, and data port surge protection for enhanced reliability.
- **Music Dynamic Mode:** Features a built-in microphone for real-time music synchronization, allowing LED effects to react to audio rhythms.
- **LED Matrix Spectrum Effect:** Configurable for rectangular LED matrices, enabling unique music spectrum visualizations with adjustable parameters like color, saturation, and direction.
- **2.4GHz Wi-Fi Control:** Seamless control via the WLED app (WLED Native APP or WLED+ APP) on smartphones or tablets, without requiring an additional gateway.
- **UART USB Type-C Port:** For firmware updates and advanced configuration.

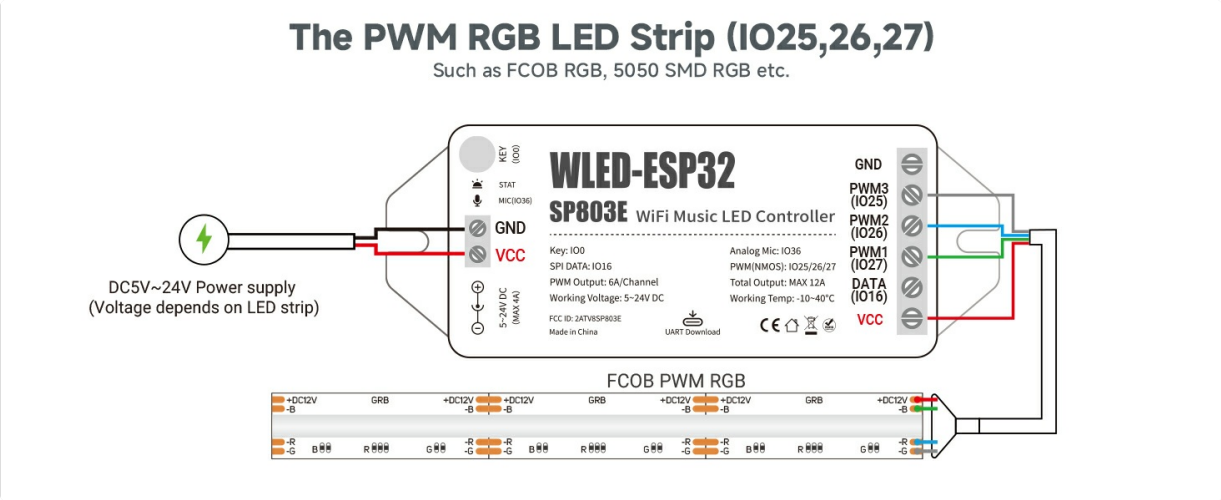

Figure 2: SP803E Product Details and Port Identification

3. Safety Information

Adhere to the following safety guidelines to prevent damage to the device or injury:

- **Voltage Matching:** Always ensure the input power supply voltage (DC5V, DC12V, or DC24V) precisely matches the working voltage of your connected LED strip. Mismatched voltages will damage the LED strip or the controller.
- **Power Supply:** The packing list does not include a power supply. Use a certified power supply that meets the voltage and current requirements of your LED setup.
- **Indoor Use Only:** This device is designed for indoor use. Avoid exposure to moisture, water, or extreme temperatures.
- **Current Capacity:** The controller has a total output capacity of MAX 12A. Ensure the total current draw of your LED strips does not exceed this limit.
- **Reverse Polarity Protection:** While the controller has reverse polarity protection, always double-check wiring before applying power to prevent potential issues.
- **Data Port Surge Protection:** The data port includes surge protection, but it is still advisable to handle connections carefully.

4. Setup and Installation

4.1 Wiring the LED Controller

Connect your LED strip to the SP803E controller according to the type of LED strip you are using. Ensure all connections are secure before applying power.

4.1.1 SPI Addressable RGB/RGBW LED Strip (One-wire Data)

For LED strips such as WS2811, WS2812B, SK6812 RGBW, etc., connect the Data line to the controller's **DATA (IO16)** terminal, GND to **GND**, and VCC to **VCC**. Ensure the power supply voltage matches the LED strip's voltage.

Figure 3: SPI Addressable One-wire Data LED Strip Wiring

4.1.2 SPI Addressable RGB LED Strip (Dual Wire Data)

For LED strips such as WS2815, SK9822, etc., connect the Data line to the controller's **DATA (IO16)** terminal, the Clock line (if applicable, though WS2815 is typically one-wire data with redundant data line) or a second data line to another available GPIO if configured, GND to **GND**, and VCC to **VCC**. Always refer to your specific LED strip's datasheet for exact wiring.

Figure 4: SPI Addressable Dual Wire Data LED Strip Wiring

4.1.3 PWM Single Color LED Strip

For single-color LED strips (e.g., FCOB, 5050, 5630, 3014, 3528), connect the positive (+) terminal of the LED strip to the controller's **VCC**, and the negative (-) terminal to any of the **PWM (IO25, IO26, or IO27)** terminals.

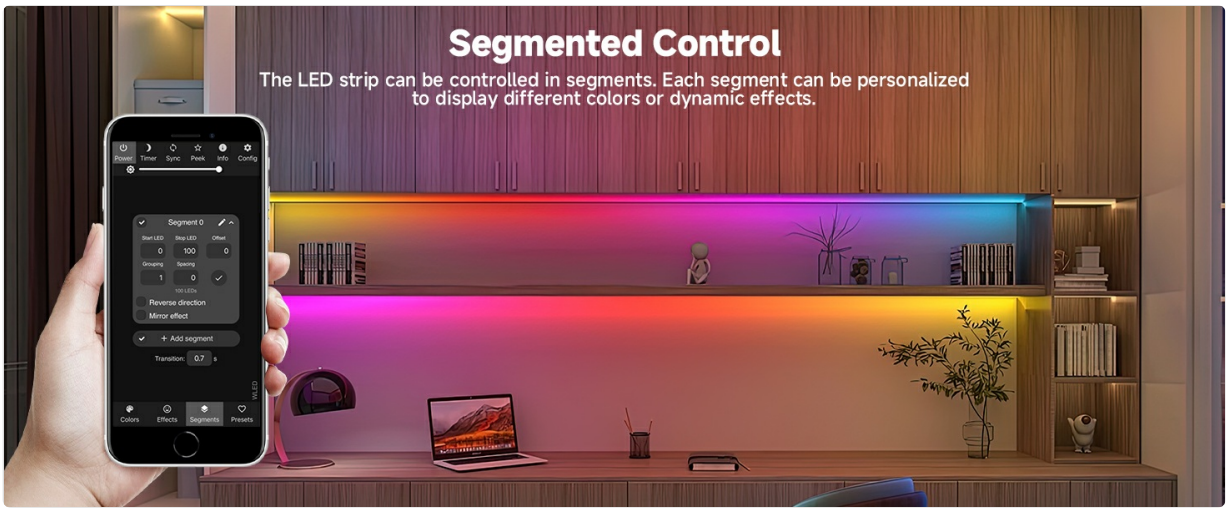

Figure 5: PWM Single Color LED Strip Wiring

4.1.4 PWM CCT LED Strip

For CCT (Correlated Color Temperature) LED strips (e.g., FCOB CCT, 5050 SMD CCT), connect the common positive (+) terminal to the controller's **VCC**. Connect the Warm White (WW) and Cool White (CW) terminals of the LED strip to two separate **PWM (IO25, IO26, or IO27)** terminals on the controller.

Figure 6: PWM CCT LED Strip Wiring

4.1.5 PWM RGB LED Strip

For RGB LED strips (e.g., FCOB RGB, 5050 SMD RGB), connect the common positive (+) terminal to the controller's **VCC**. Connect the Red (R), Green (G), and Blue (B) terminals of the LED strip to the three **PWM (IO25, IO26, and IO27)** terminals on the controller.

Figure 7: PWM RGB LED Strip Wiring

4.2 Power Supply and Voltage Supplementation

For longer LED strip installations, voltage drop can occur, leading to dimming at the end of the strip. Consider voltage supplementation for optimal brightness.

4.2.1 Series Connection & Voltage Supplementation

When connecting multiple LED strip rolls in series, ensure the power supply output voltage matches the LED strip's working voltage. For extended lengths, supplement power at intervals along the strip to maintain consistent brightness.

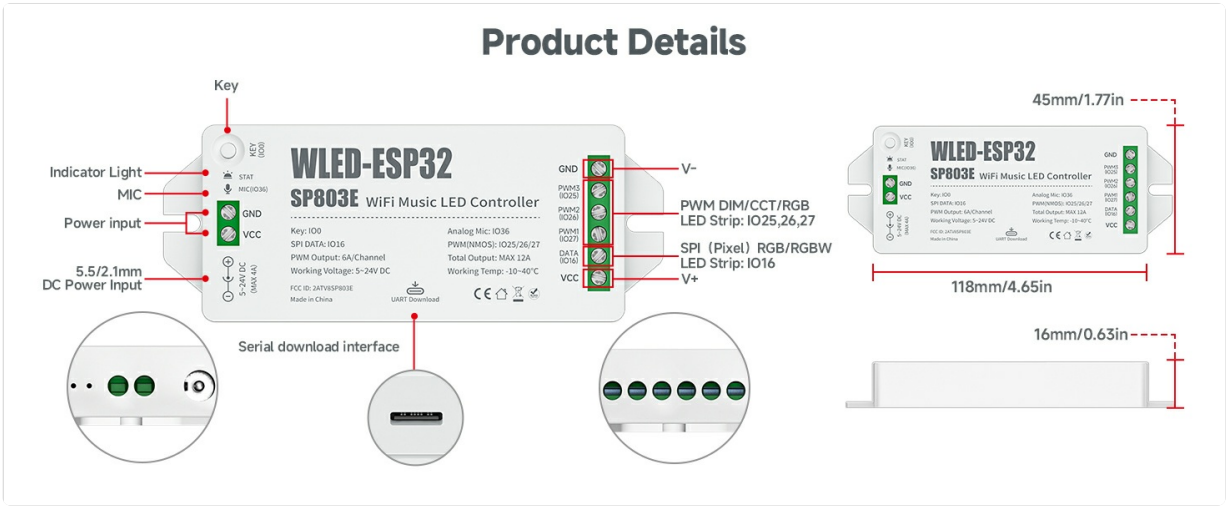

Figure 8: Series Connection with Voltage Supplementation

4.2.2 Parallel Connection & Voltage Supplementation

For parallel connections, a signal amplifier may be used to ensure consistent data signal integrity across multiple LED strips. Each parallel strip should receive its own power connection from the main power supply or a distribution block.

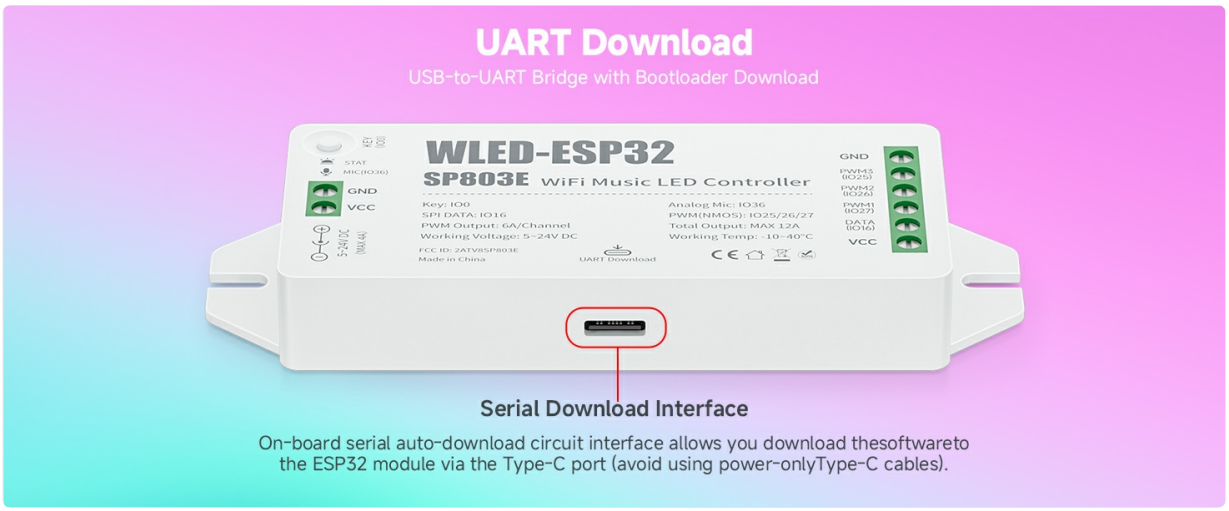

Figure 9: Parallel Connection with Voltage Supplementation

4.3 WLED App Configuration Steps

The SP803E controller is managed via the WLED app. Follow these steps to connect and configure your device:

1. **Power On:** Connect the controller to a suitable power supply. The indicator light will illuminate.
2. **Connect to WLED-AP:** On your phone or tablet, go to Wi-Fi settings and connect to the Wi-Fi network named "WLED-AP". The default password is "wled1234".
3. **Access Control Page:** After a successful connection, your device should automatically redirect to the WLED control page in your browser. If not, manually enter 4.3.2.1 in your browser's address bar.
4. **Configure Wi-Fi Settings:** Within the WLED interface, navigate to "WiFi Setup". Enter your home 2.4GHz Wi-Fi network name (SSID) and password. Tap "Save & Connect". The controller will restart and attempt to connect to your home network.
5. **Add Device in App:** Open the WLED Native APP or WLED+ APP. Tap the "+" button to add a new device. You can use "Discover Devices" or manually enter the IP address of the controller (which can be found in your router's connected devices list after it connects to your home Wi-Fi).
6. **Control:** Once added, select the controller from the list to enter the control interface and begin customizing your lighting.

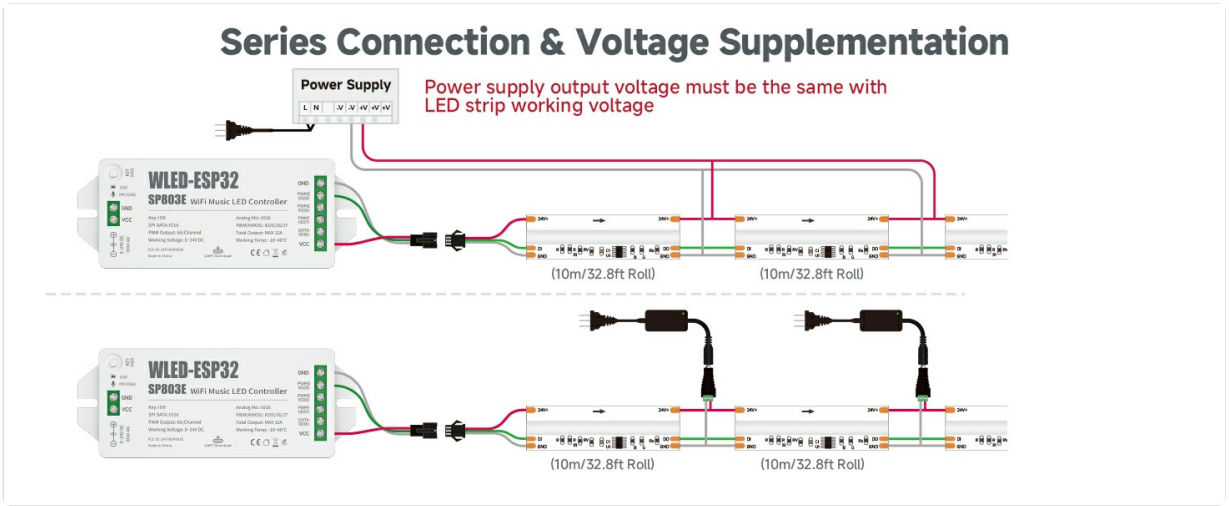

Figure 10: WLED App Configuration Steps

5. Operation

5.1 WLED App Control

The WLED app provides comprehensive control over your LED strips. You can adjust colors, brightness, apply various effects, and manage segments.

- **Color Selection:** Use the color wheel or predefined color palettes to choose static colors.
- **Dynamic Effects:** Select from a wide range of built-in dynamic effects to create various lighting moods.
- **Brightness Adjustment:** Control the overall brightness of your LED strips.
- **Segmented Control:** Divide your LED strip into multiple segments and apply different colors or effects to each segment independently.

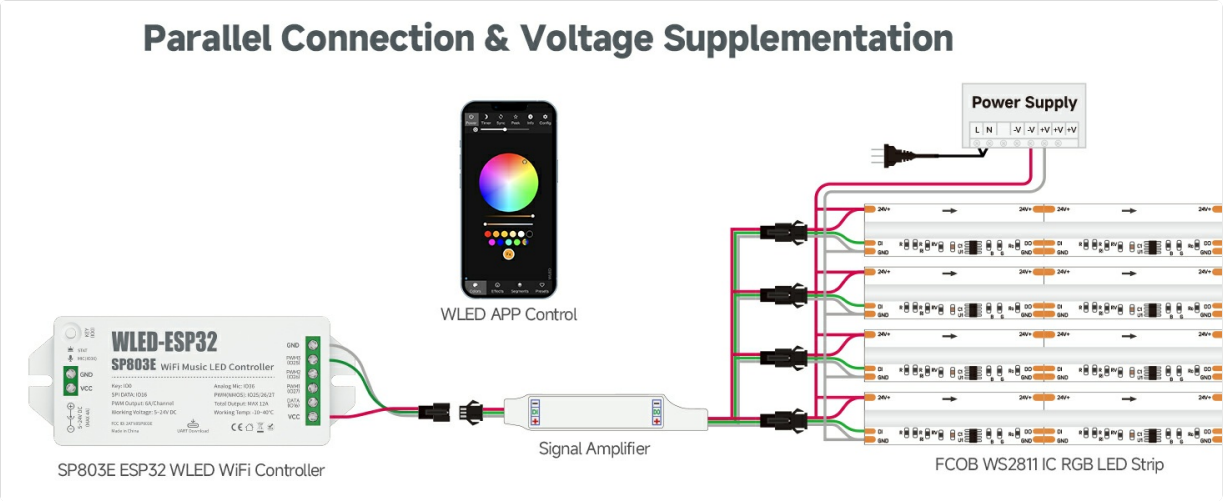

Figure 11: WLED App Control Interface

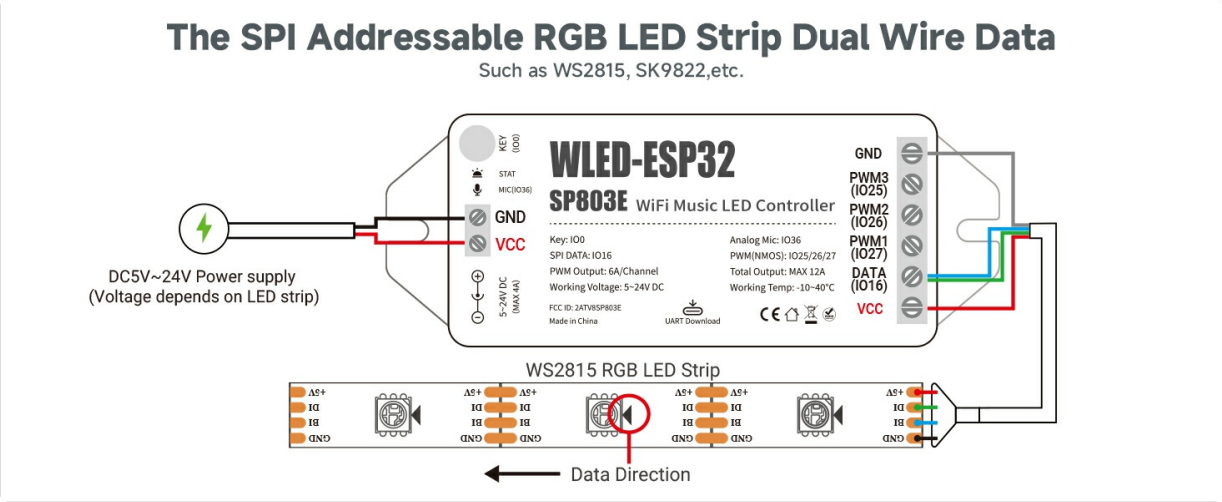

Figure 12: Segmented Control in WLED App

5.2 Music Dynamic Mode

The built-in microphone allows the controller to synchronize lighting effects with music or ambient sounds. To activate:

1. Ensure the controller's microphone is not obstructed.
2. In the WLED app, navigate to the "Effects" section.
3. Select a music-reactive preset. The lights will now respond to sound.
4. For advanced customization, explore the "LED Preferences" or "2D Configuration" settings for LED matrix spectrum effects, adjusting parameters like color, saturation, and direction of the sound column.

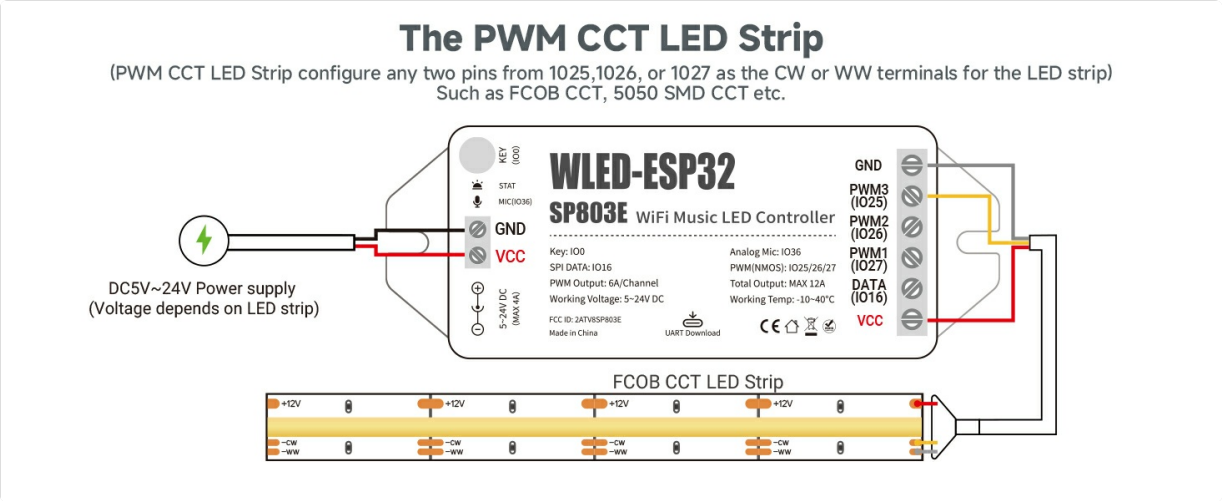

Figure 13: Music Synchronization Feature

5.3 Synchronization Function

On the same Wi-Fi network, multiple WLED controllers can be synchronized to display coordinated lighting effects. This is useful for larger installations or multiple rooms where a unified lighting theme is desired.

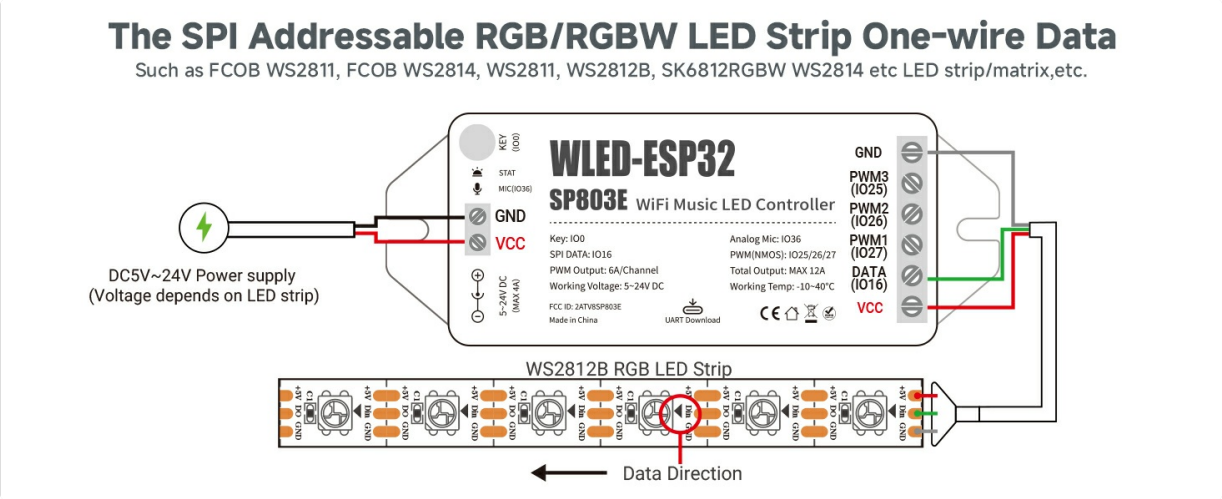

Figure 14: Synchronization Function in Action

6. Specifications

Feature	Specification
Model	SP803E
Controller Type	ESP-32 WLED WiFi Controller
Max Pixels Supported	2048 (for RGB IC & RGBW IC)
Supported LED Types	SPI Addressable (WS2811, WS2812, SK6812 RGBW, WS2814, WS2815), PWM (Single-color, CCT, RGB)
Working Voltage	DC 5V-24V
PWM Output Current	6A/Channel

Total Output Current	MAX 12A
Connectivity	2.4GHz Wi-Fi
Control Method	WLED App (iOS/Android)
Special Features	Built-in microphone, Music Sync, Dynamic Modes, Segmented Control, LED Matrix Support
Firmware Update	UART USB Type-C Port
Operating Temperature	10°C to 40°C
Dimensions	Approximately 118mm x 45mm x 16mm (4.65 x 1.77 x 0.63 inches)
Weight	Approximately 2.08 ounces

7. Troubleshooting

If you encounter issues with your SP803E controller, refer to the following common problems and solutions:

- **No Power/Indicator Light Off:**
  - Check power supply connection and ensure it is providing the correct voltage (5V, 12V, or 24V DC).
  - Verify the power supply is functional.
  - Ensure the power input terminals are correctly wired (VCC and GND).
- **LEDs Not Lighting Up or Incorrect Colors:**
  - Confirm the LED strip's working voltage matches the power supply voltage.
  - Check all wiring connections (Data, VCC, GND) between the controller and the LED strip. Ensure data direction is correct for addressable strips.
  - Verify the LED type and pixel count are correctly configured in the WLED app under "LED Preferences".
  - Ensure the correct GPIO pin is selected for the data output in the WLED app (IO16 for SPI, IO25/26/27 for PWM).
  - Test with a shorter length of LED strip or fewer pixels to rule out power delivery issues (voltage drop).
- **Cannot Connect to WLED-AP Wi-Fi:**
  - Ensure the controller is powered on and the indicator light is active.
  - Confirm you are selecting the correct Wi-Fi network "WLED-AP" and entering the default password "wled1234".
  - Try resetting the controller by holding the "KEY (IO0)" button for 10 seconds.
- **Cannot Connect to Home Wi-Fi Network:**
  - Ensure your home Wi-Fi is 2.4GHz. The controller does not support 5GHz networks.
  - Double-check the Wi-Fi SSID and password entered in the WLED app.
  - Move the controller closer to your Wi-Fi router to improve signal strength.

- Restart your Wi-Fi router and the controller.

- **Music Mode Not Responding:**
  - Ensure the built-in microphone is not covered or obstructed.
  - Verify that a music-reactive effect is selected in the WLED app.
  - Increase the volume of the music source.

- **Controller Unresponsive/Frozen:**
  - Perform a soft reset by briefly pressing the "KEY (IO0)" button.
  - Perform a hard reset by disconnecting and reconnecting power.
  - If issues persist, consider updating the firmware via the USB Type-C port.

8. Maintenance

To ensure the longevity and optimal performance of your BTF-LIGHTING SP803E controller, follow these maintenance guidelines:

- **Cleaning:** Gently wipe the controller with a dry, soft cloth to remove dust. Do not use liquid cleaners or solvents.
- **Environment:** Keep the controller in a dry, indoor environment, away from direct sunlight, high humidity, and extreme temperatures.
- **Firmware Updates:** Periodically check the official WLED documentation or community forums for firmware updates. Updates can introduce new features, improve performance, and fix bugs. Firmware can be updated via the USB Type-C port using a compatible browser and the WLED installer website.
- **Connections:** Periodically inspect all wiring connections to ensure they remain secure and free from corrosion.

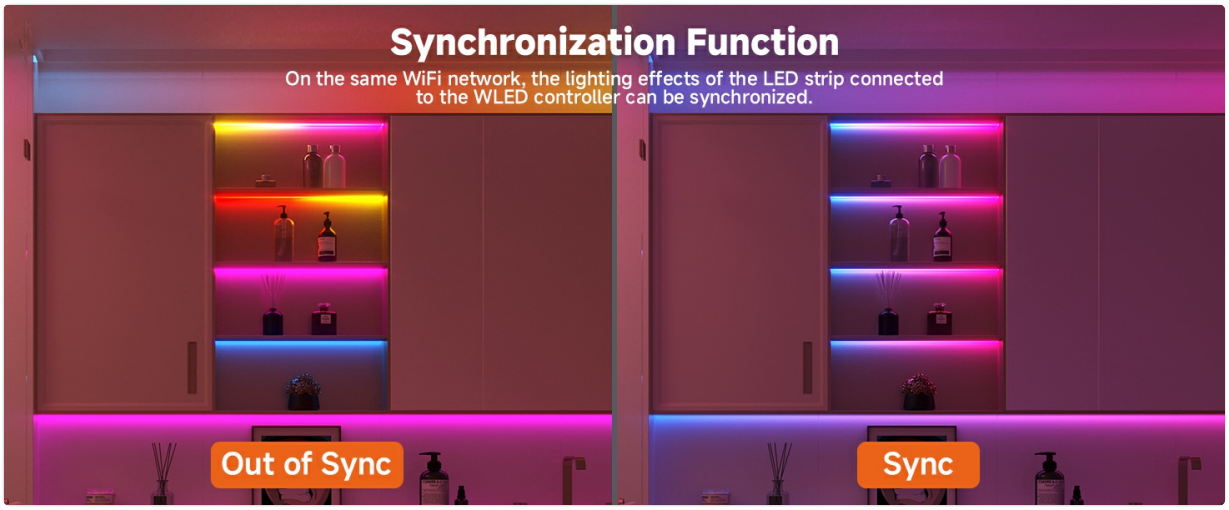

Figure 15: UART Download Interface for Firmware Updates

9. Warranty and Support

For warranty information and technical support, please refer to the specific terms provided by your retailer or contact BTF-LIGHTING directly through their official website or customer service channels. Keep your purchase receipt as proof of purchase for any warranty claims.