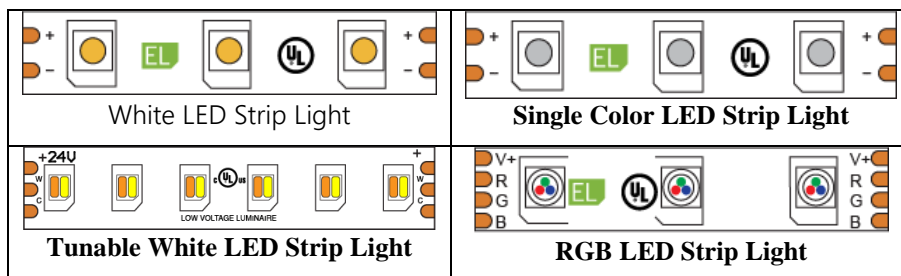


LED Strip Light Manual



LED strip light, also known as LED tape light, is highly flexible and customizable making it perfectly suited for many different types of lighting applications. Unlike traditional lighting sources LED strip light can bend, flex and adapt to fit any installation's needs. LED strip light is also cuttable making it the perfect solution for any custom installation. With Environmental Lights' hundreds of LED strip light options, including a wide selection of colors and configurations, we are confident we can provide a solution to meet your lighting needs.

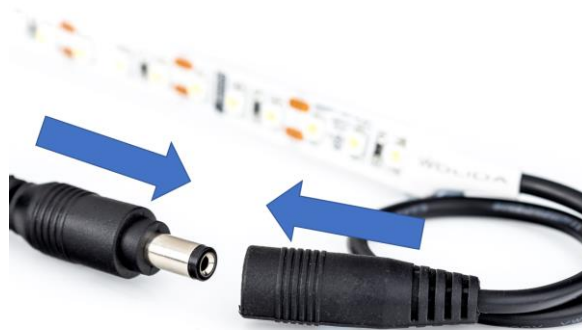
LED strip light can be generally categorized as single color or multi-color. Single color LED strip light, has a positive cathode and a negative anode and can be powered by connecting each electrode to the respective positive and negative output of an LED driver. Multi-color LED strip light, including tunable white, RGB, and RGB+, can be used with a controller to create a variety colors and color changing patterns. Multi-color LED strip light has a single positive cathode and a separate negative anode for each color. Controllers change the relative brightness of each channel to produce different colors and effects.



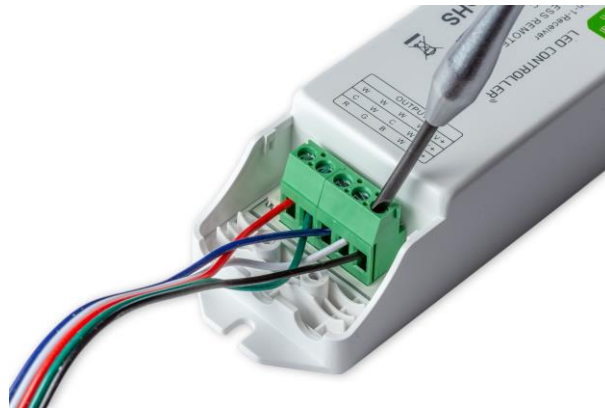
LED Strip Light Technology

There are three main components of LED strip light: flexible printed circuit board (PCB), light emitting diodes (LEDs), and resistors or current control IC's. The PCB serves as the flexible mounting surface and conductor. LED strip light PCB also has solder pads on every cutting increment that allow for secure electrical connections. The LEDs are the light emitting devices transforming electrical energy into light energy. Resistors or CurrentControl IC's act to limit the amount of current being distributed to each LED to ensure consistent output along the entire run of LED strip light. We carefully control the quality of our components to ensure our products will perform reliably and optimally.

A typical LED lighting system requires LED strip light, an LED driver and an optional controller. Most of our LED strip light requires a 12 Volt or 24 Volt DC power input. An LED power supply (also referred to as an adapter or driver) needs to be connected to an AC input, typically 120VAC in the USA. It will output a low voltage DC output compatible with our LED strip light. It is very important to make sure that you are purchasing the proper voltage LED driver for your lighting system. Supplying the incorrect voltage to your LED strip light will cause the LED strip light to overheat and fail. Additionally, we carry a multitude of options to control your lighting system including high voltage and low voltage options.



Most of our white and single color LED strip light comes installed with a female barrel connector on one end of the reel. To power our white and single color LED strip light, simply connect the female barrel plug to a male barrel plug from an LED power supply. Alternatively, some drivers come with bare wire leads and can be connected by using wire nuts or many of the connectors listed on our website.



Multi-color strip requires a controller to fully utilize all the color options. Most of our multi-color LED strip light reels come installed with a bare wire lead. While we offer several varieties of controllers, the majority of our controllers feature screw terminal blocks that allow for quick and secure connections. To install into a screw terminal block, first insert the bare wire leads into the controller output and screw down the terminals to secure. Insert the outputs of one of our LED drivers into the controller inputs to supply power to both the controller and the lights. For further instructions on how to use or wire any of our controllers, check the associated manuals and videos on our product pages.

If using an adapter style LED driver with preinstalled 2- or 3-prong plugs, simply plug the LED strip into the adapter and then plug the adapter directly into a 120VAC outlet. For LED drivers without preinstalled plugs, a qualified installer should be consulted. Wiring to 120VAC is dangerous and should only be done by experienced professionals.

LED Strip Light Customization

Flexibility is the name of the game when it comes to LED strip light. That applies to more than the physically bendable product and nearly infinite applications. LED strip light can be customized in a variety of ways right out of the box. This allows you to tailor a 'stock' product for your specific application. This section will focus on post-manufacturing customization, which can be done at the job site or by our in-house customization team in San Diego. Environmental Lights also offers complete product customization and large-scale manufacturing for big projects. Contact us for more information.

Length

One of the easiest and most common ways that LED strip light is customized is by modifying the length. All LED strip light offered by Environmental Lights can be cut at designated points to more precisely fit your specific application. The distance between cutting points, or cutting increment, varies by strip model due to the specific characteristics of that strip. Be sure to pay attention to this specification when selecting a product because some models may fit your application better than others. Higher LED density and lower voltage will generally result in shorter cutting increments. The cutting increment can be found in the features and/or specifications section of the product page. The measurement in millimeters is exact.

- Fully dimmable
- UL Listed
- 50.0 watts per reel | 10.0 watts per meter
- 6,825 lumens per reel | 1,365 lumens per meter
- **Cuttable every 2.5 in | 62.5 mm**

Manufacturer	EnvironmentalLights
Min. Cutting Increment (English)	2.46 in
Min. Cutting Increment (Metric)	62.5 mm
Power (Watts)	50

Cutting to length is straightforward. The most important thing is to make sure that the power is off before any cutting is done. Then, simply measure out the desired length of LED strip light and cut at the closest cutting line. You will be cutting through the copper layers within the strip, which can dull standard scissors. Wire cutters or heavy-duty scissors are recommended to ensure consistent, clean cuts.



Waterproof LED strip light can be cut in the same way as non-waterproof LED strip. The difference is that it needs to be re-sealed at the cut end to maintain the waterproof rating. The waterproofing process is fairly simple, but it is very important to follow all of the steps to ensure a good seal. Improper waterproofing can cause LED strip failures in the field. Please view our video on waterproofing strip light for more details.

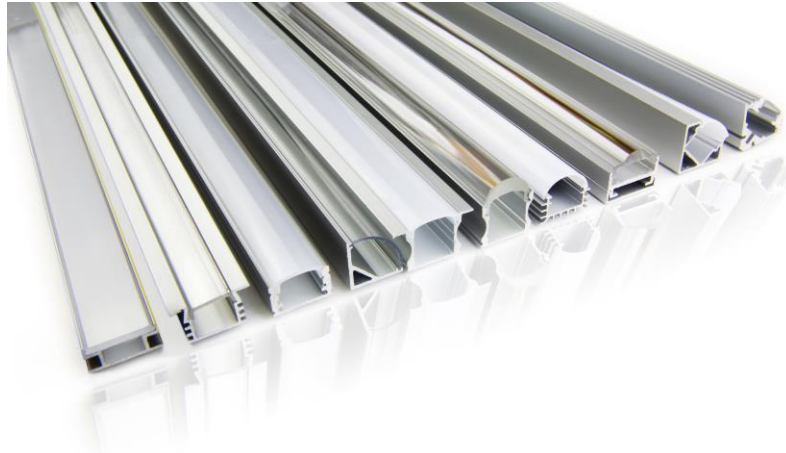
Connectors



After cutting your LED strip light, you are going to need a way to connect it to a power supply or controller. The best way to do this is with soldering, which provides the smallest and most secure connection, both mechanically and electrically. Please refer to our online videos and documentation about soldering for more information.

Sometimes it may not be practical or feasible to solder the connections needed for your project. Environmental Lights offers a selection of connectors for these kinds of situations. Different options are available depending on the specific LED strip product. The best way to navigate to compatible connectors is to look through the accessories tab for the desired product(s). Key things to keep in mind when selecting a connector are whether it is permanent or removable, the amperage rating and the physical size of the connector.

LED Channel



Many LED strip light projects use its small size and flexibility to seamlessly integrate with the built environment. No light fixture needed. For those other applications, there is LED channel. An LED channel system consists of a base, often aluminum, and a top, often plastic. The desired LED strip light is installed into a channel system to create a custom fixture that is not only visually appealing, but also protects the LEDs and helps them run cooler to extend their lifetime. This mix-and-match approach means there are nearly endless combinations. Channel systems can also be cut to length, giving you the perfect fit with the exact lighting and look to suit your project.

Selecting the ideal channel system can be intimidating given the wide array of options, but a few simple steps can help narrow down the choices. Once you have selected the LED strip that meets your requirements, consult the LED Channel Systems page where you will find the LED Channel Compatibility chart as well as navigation facets. These facets give a quick way to filter channel systems that are the right size and application for your LEDs. Select the inside width options that are greater than or equal to the width of the desired LED strip. From there you can browse the online images to find the look you want.

SHOP BY

INSIDE WIDTH
<input type="checkbox"/> 8 mm (2)
<input type="checkbox"/> 10 mm (5)
<input type="checkbox"/> 10.5 mm (12)
<input type="checkbox"/> 11 mm (28)
<input type="checkbox"/> 11.5 mm (4)
<input type="checkbox"/> 12 mm (7)
<input type="checkbox"/> 12.5 mm (2)
<input type="checkbox"/> 13 mm (10)
<input type="checkbox"/> 13.5 mm (1)
<input type="checkbox"/> > 14.4 mm (40)

There are a few other important things to note when selecting a channel system for your LEDs. One of the most common reasons for using an LED channel system is to create a diffused look that eliminates the appearance of individual dots of light from the LEDs. The best way to achieve this look is to use a combination of higher density LEDs strip and taller channel systems. Another important aspect of the channel system is the accessories. Some channel systems are available with alternative mounting methods like magnets or different kinds of clips. If you need something that isn't available on our website or just want a little guidance, please reach out to us for help.

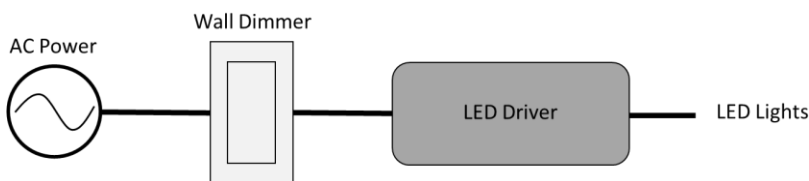
Controls



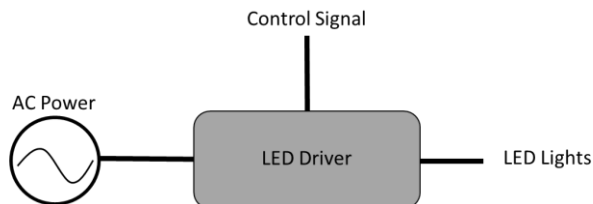
The final piece of the LED lighting system is the controller. While not a required component in a lighting system, controllers allow for extra customization and controllability after the lights have been installed. There are a variety of ways to control an installation of LED strip ranging from classic in-wall dimmers to more advanced app or software-based controls. Controllers can generally be broken down into two categories: integrated into the LED power supply or located between the LED power supply and the LEDs. Only one type of controller should be used on a given LED load. Using multiple controllers can cause improper operation or even damage to the products. There are numerous videos and documents on the Environmental Lights website that delve more deeply into the topics of dimming and controllers. As always, feel free to reach out if you need any assistance selecting the right products.

The most common LED power supplies with integrated control are dimming drivers intended for white or single-color LED products. This style of control has the benefit of simplicity because there are fewer components and wiring connections. It is also generally easier for situations where an existing lighting installation is being retrofitted with LEDs. Dimming LED drivers can be further broken down into two categories: phase dimming and dimming signal. Phase dimming drivers utilize a traditional style wall dimmer that reduces the amount of AC power going from the wall into the driver. This dimming, in turn, causes the driver to reduce the output power to the LEDs. It is very important to use a compatible wall dimmer for this kind of driver, otherwise, you may get poor performance or even damage the driver. Wall dimmers can ONLY be used with compatible dimming power supplies. Using a wall dimmer on a non-dimming LED power supply can be dangerous and damage the products. On the other hand, dimming drivers that use a dimming signal, like 0-10V or a built-in knob, reduce the output power to the LEDs without modifying the incoming AC power. This generally results in better low-end dimming performance because the power input to the driver is not interrupted.

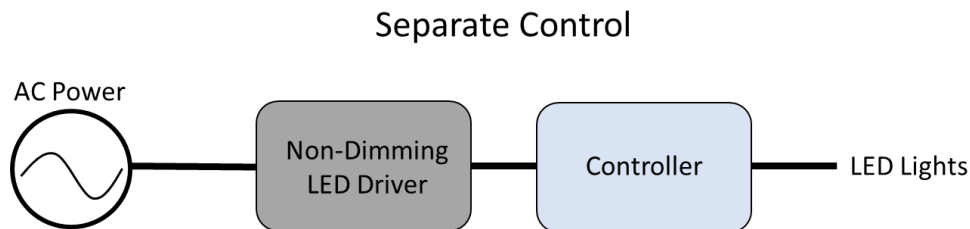
Phase Dimming



Control Signal Dimming



Separate controllers, that sit between the power supply and LED lighting, come in a huge variety of configurations. These kinds of controllers are ideal for multi-color strip light or where programming and other software controls are desired. The controllers are sorted by the number of output channels. Note that the same controller can appear in multiple categories if it can be configured to operate with different numbers of output channels. For example, some 4-channel controllers can be set to operate in either 1, 2, 3 or 4-channel modes. When selecting a controller, other things to keep in mind include power handling, number of zones, saved scenes, app control and remote control.

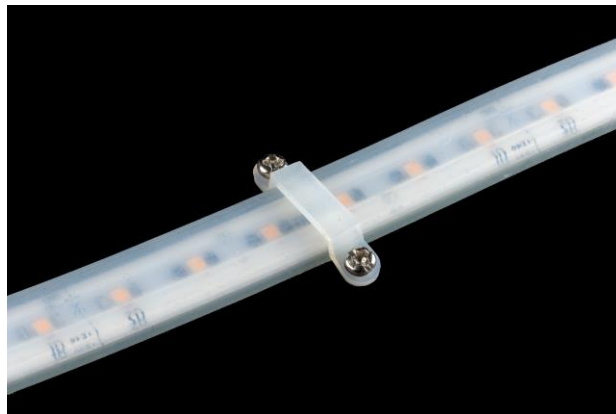


DMX is a subset of this group, where the controller is separate from the power supply. DMX is a professional standard that allows a wide variety of controllers and devices to interact seamlessly. It is commonly used in concerts, nightclubs and live theater applications as well as many others. These systems tend to be more complicated but provide a huge amount of control and scalability. Features and price vary widely depending on the capabilities that a given application requires. Check out our online resources or reach out to one of our sales engineers today for more information.

LED Strip Light Installation

All LED strip light comes installed with adhesive tape on the back. Ensure that the mounting surface is clean and free of any dust before applying. Once ready, simply peel back the tape liner and press the LED strip light onto the surface ensuring the strip light is lying flat and making full contact with the mounting surface. Adhesive tape is intended to be permanent and should not be reused.

Waterproof LED strip light also comes with tie-downs for more secure connections. Secure the tie downs every half meter for best results.



Safety Precautions

Please take the following precautions:

1. This equipment, like all electrical equipment, should be installed by a qualified person.
2. Do not expose these LEDs, dimmers or power supplies to intense electro-magnetic fields, including lightning.
3. The controllers and power supplies are not waterproof. Keep them dry.
4. Always observe proper polarity.

When installing LED lighting, it is a good idea to follow this “dry-run” procedure:

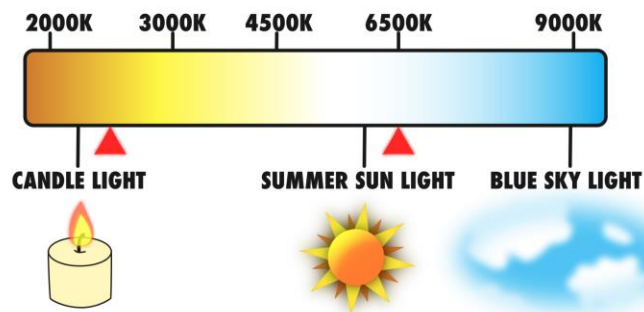
1. Be sure you have everything you need before you start.
2. Lay out your lights and power supply on the floor or table.
3. There is some resistance in the LED lighting. If you see any color fading or dimming at the end of a long run, you may have too many LEDs for your power supply and you might need a bigger supply or shorter runs. Call if you need assistance with larger projects.
4. Connect everything and test it to be sure it works and you have it connected properly. It is unlikely, but possible, that some part of your system is defective or was damaged during shipment. If that is the case, it will be very helpful to you to know that before you do all the work involved in installing custom LED lighting systems. You will also know if you damage anything during installation, which is really helpful in trouble-shooting because manufacturing defects and installation damage typically have very different solutions.

Once you have tested the system successfully, you are ready to install it. We recommend you install LEDs, electronic controls and dimmers in such a way that you have access to them in case they fail. All electrical components can fail.

Technical Directory

Brightness: Brightness, measured in lumens, is the measurement of the luminous flux from a light source. Brightness tells us how much light is being radiated by a light source. LED strip light is often characterized by the lumens per meter length.

CCT: The correlated color temperature, or CCT, refers to the degree of warmth or coolness of a white light, measured in Kelvins (K). Warm white is typically 2700K and Daylight white is typically around 6500K. The standard CCT's offered are 2400K, 2700K, 3000K, 4000K, 5000K and 6500K.



CRI: Color Rendering Index (CRI) is the measurement of how faithfully a light source reveals the colors of objects. The index range is from 0 to 100. The higher the CRI, the better the color accuracy. CRI is an important lighting feature for skin tones, decorating, merchandising and more.

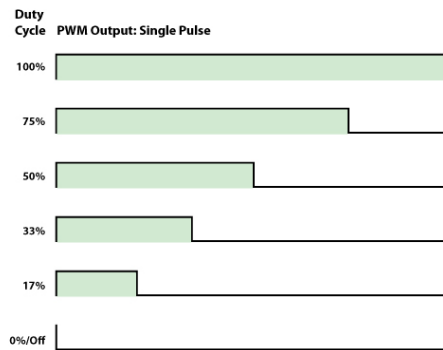
CurrentControl: CurrentControl LED strip light uses current regulating ICs instead of resistors to control how much current is provided to the LEDs. These ICs ensure a steady amount of current is provided to the LEDs even when the voltage slightly falls. CurrentControl is recommended for long run length LED strip light products as it ensures even color even with the voltage drop that occurs along the reel.

Density: The density of an LED Strip light is the number of LEDs for a given length. A higher density LED strip light will have a lower likelihood of showing hot spots when installed, while a lower density LED strip light will tend to be lower in cost due to the few components needed. The standard units for density are LEDs per meter.

LED Package Size: The most common differentiator of LED types, the LED package size refers to the actual dimensions of the LED package. The dimensions are provided in length by width in mm. For example, a 2835 package size refers to an overall size of 2.8mm by 3.5mm. Common package sizes including 3528, 2835, 5050, and 2216. Different package sizes tend to have different performance characteristics, such as heat dissipation, reliability and durability.

Phase Dimming: Method of dimming where the dimmer is situated between the power supply and AC source. The dimmer blocks a portion of the AC voltage sine wave which reduces the amount of power entering the power supply and thereby reduces the output power to dim the load.

Pulse Width Modulation (PWM): PWM is a very common method of dimming LED lights that works by very rapidly turning them on and off (pulsing) for periods that visually appear as a steady dimmed light. The brightness level is adjusted by altering the percentage of the time the lights are on (100%) to the time they are off (0%).



Voltage Drop: Voltage drop is the dip in voltage at the end of a conductor such as wire or LED strip. The drop in voltage tends to be greater with thinner conductors and long lengths. This dip in voltage can result in a visible difference between two ends of an LED reel and can be mitigated by purchased products with CurrentControl. Use the voltage drop calculator on our website located in the Resources tab to avoid this problem.

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Wire Gauge and Voltage Drop Calculators

For 12 or 24 volt DC systems, we recommend using wire thick enough to maintain at least 11 or 22 volts, respectively, throughout the system. Below those potentials, you may see some dimming in single color systems, and you may see incorrect colors in RGB systems because the red, green and blue diodes do not dim at the same rate. If you use long LED linear lights, such as tape or linkable bars, you will have additional voltage drop within the lighting itself, so wire to additional points in the lighting line, if necessary.

<p>Wire Gauge Calculator</p> <p>Material: <input type="text" value="Copper"/></p> <p>Voltage (VDC or 1-phase AC): <input type="text" value="24"/></p> <p>Voltage Drop (%): <input type="text" value=".43"/></p> <p>Current (amps): <input type="text" value="20"/></p> <p>Length (feet): <input type="text" value="200"/></p> <p>Result: Gauge (AWG): <input type="text" value="8"/></p>	<p>Voltage Drop Calculator</p> <p>Material: <input type="text" value="Copper"/></p> <p>Gauge (AWG): <input type="text" value="8"/></p> <p>Voltage (VDC or 1-phase AC): <input type="text" value="24"/></p> <p>Current (amps): <input type="text" value="20"/></p> <p>Length (feet): <input type="text" value="200"/></p> <p>Result: Drop (VDC): <input type="text" value="10.3"/></p>
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