LED Color-Mixing Linear Lighting Manual

Use our top quality red-green-blue LED flexible strips (strip lighting) or rigid strips for accent lighting in coves, edge lit glass and a host of other applications. Controlling them is easy and inexpensive with our Programmable Micro Remote LED Controller. Or, you can select the Easy Stand Alone DMX Controller for very sophisticated but easy programming. Select your own colors and timing, write to the stand-alone controller and enjoy state-of-the-art affordable LED accent lighting! The Traxon Light Drive is an elegant DMX controller suitable for wall mounting.

Ceiling Cove Lighting with LED Strips
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Introduction

Ceiling Cove with LED Strip Lighting

We’ve helped thousands of people design with linear LED light, and they’ve used our flexible LED strips to make projects involving bars, restaurants, hotels, casinos, architectural models, edge lit glass signs and curtain walls, entertainment centers, indirect cove lighting, limousines, glass block floors, trade show booths, egress lighting, decorative chandeliers, coin-operated machines, home theaters, wine cellars, yachts and cruise ships.

EnvironmentalLights specializes in LED linear lighting, providing:

- the best products;
- the best selection of lights, drivers and connectors;
- the best technical support;
- the best information; and
- the best service, supported by inventory we can ship to you today.
Typical Edge-Lit Glass Applications of Linear LED Lighting
Back-Lit Decorative Features are Easy to Achieve

Linear RGB (Red-Green-Blue) LED Lighting Choices

EnvironmentalLights.com now offers the following RGB products:

- two different levels of brightness (luminous flux) in red-green-blue (RGB) color-changing LED strips;
- Superflat LED rope, a flat PVC-coated, cuttable waterproof rope that is much brighter than regular rope light;
- triplex waterproof modules;
- 22.5” rigid RGB strips.

Extensive technical information on each series, including power requirements and design criteria, appear beginning on page 31.
4-Wire Red-Green-Blue LED Strip Lights (RGBrf-reel, -foot or -kit)

Definitions:

- “5050” refers to the size of the LED nodes used in the RGB flex strips, superflat rope and modules. Dimensions are 5.0 mm x 5.0 mm, hence “5050.” Most 5050 LEDs are actually 3 LEDs in one package, and sometimes we call them “triplex nodes.” They may be all one color or red, green and blue. This document deals only with RGB nodes, but we have a full line of excellent single color node products, also.

- “Common anode” means that the red, green and blue diodes share the anode (+12 or +24 volts.) Each color has its own control line, so these RGB LED systems are 4-wire systems: common anode, red, green and blue. If you ground red, green or blue, the corresponding diode will light. By lighting red and green, you get yellow. By lighting all 3 diodes, you get a cool white. To warm it up, reduct the blue.

- A “controller” dims red, green and blue in a coordinated fashion to change color balance. Generally, our controllers either drive the 4-wire strips or modules directly, or they use DMX (standard serial lighting signal) to drive a decoder, which decodes (converts) DMX to 4-wire signal. With 255 brightness levels on each of the primary colors (red, green and blue,) you can mix $255^3 = 16.6$ million colors.

Note: All LEDs are NOT created equal. In general, our products are brighter, and deliver higher-quality light than products from our competition that look similar. They also generate truer white when all the LEDs are lit. The reason is simple. We spend more for the components to deliver the best available products for your job.
All our linear lights are sold in quantities from sample size to huge. For large jobs, it is a good idea to order samples first. Most of our samples are 1 foot (30 cm) long and include a non-dimming driver. With those sample kits, you can touch the red, green or blue wire to the driver cathode (ground side) and light the corresponding color. We also sell a deluxe sample kit that includes a controller for demonstration purposes. You can use the controller for a project, if you like.

The “regular” brightness flexible strip is the most popular RGB LED strip we sell:

- It is adequately bright for many applications. It has 30 nodes per meter.
- It is less expensive than double density.
- We have sold it for a long time, and our customers have been using it successfully for a wide variety of applications for years.
- It is available in a waterproof version.
- It uses 5050 (5.0 x 5.0 mm) LED triplex nodes, where one diode is red, one green and one blue.
- Sold on 5-meter (16.4 foot) reels, cuttable every 10 cm (~4 in.) 10 mm wide.

The “double density” is also very popular:

- It much brighter than the regular because it has twice as many nodes (60 per meter);
- It is available in a waterproof version.
- Sold on 5-meter (16.4 foot) reels, cuttable every 5 cm (~2 in.) 10 mm wide.
- Also available in monochrome (single color,) described separately.

“Superflat rope” is a new product that has already been used for some beautiful landscape and other projects. It has many benefits, including:

- Far brighter than traditional LED rope because it uses high brightness SMD (surface mounted devices) instead of the low flux LEDs used in traditional rope.
- Colors are emitted from a point light source, unlike traditional RGB rope, where the individual red, green, and blue LEDs are separated by an inch or more. So when you light red and blue, for instance, you get magenta, instead of a red light here and a blue one over there, like with regular RGB rope.
- PVC coated, so it’s IP67 waterproof.
- This is a 24 volt DC product, and we have a full line of controllers and drivers to support it.
- Built to allow 20-meter (65.6 foot) runs with no additional power taps. Rugged.
- Sold on 20-meter (65.6 foot) reels, by the foot or in sample kits.
- Cuttable every 10 cm (~4 inches), unlike most rope, which is cuttable on much longer increments. Cut the dimension you need within inches, not feet.
- Very flat-only 5 mm (0.2 inches) high. 17 mm wide.
- Full line of accessories available.
- Superflat has 5050 LEDs, 60 per meter, hence the name “sf5050-60-RGB.”
- Also available in soft white and daylight white, described separately.

“**Triplex LED modules**” are also new, and support the line by offering the same color palette in a 5050 module, also known as a “pod.” LED modules are sometimes used in channel letter signs to replace neon or fluorescent lights; however, they have many other uses because they are so versatile. Features:

- Same high-brightness LED nodes as our 5050-60 strip series.
- Epoxy-encased IP67 package, made from high grade aluminum. 67 x 14 x 8 mm.
- Peel-and-stick backing makes it easy to mount and position these lights wherever you like.
- Sold on 25-module chains, with 10 cm (~4 inches) of wire between modules.
- Works on the same controllers and drivers as our strips.
- Also available in single color, described separately.

**LED Rigid Strips** are very narrow (8mm ~ 0.31 inches) and are cuttable every 2.25 inches, using a hack saw. Features include:

- Pin connectors on both ends. Each strip ships with two 4-wire cable connectors, pictured at right
- Strips have through-holes to make soldering easier, should you choose to solder.
- Works with all our color controllers.

**Regular versus Waterproof LED Linear Lights**

With our **waterproof LED strips**, you can cut to the length you need and use in fountains, fish tanks and water features. And you can waterproof the ends, too.
The superflat rope is also waterproof. Cuttable on 10 cm (~4 inch) increments, suitable for runs up to 65.6 feet (20 meter) runs, it is far superior to rope, and you can make waterproof connections at the ends.

The sign modules are waterproof, and they are very versatile. You can stick them just about anywhere you like.
## Relevant Parts

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Non-Dimming Power Supplies (Drivers)

We offer a huge selection of non-dimming power supplies at 5, 12 and 24 volts DC, including:

- Adapters
- Enclosed Supplies
- DC to DC Converters
- Mounting Kits
- Waterproof Supplies

Controller Options

You have numerous excellent controller options, including the RGB LED Controller (Remote Control-10 Zones), RGB LED Dimmer (3 channel), Programmable Micro Remote Control (PMRC) at bottom middle of this picture, Sound-to-Light controller below, Traxon Light Drive at left and Easy Stand Alone U8 at upper right. Or you can use any DMX system with our decoders.
RGB LED Controller (Remote Control-10 Zones)

The RGB10 is an easy-to-use controller for 4-wire Red-Green-Blue 12 or 24 volt DC LED strips or other LEDs. The remote control has a touch sensitive color wheel with thirty steps allowing you to instantly set your lights to the desired color. The remote also has 10 different zones that can be controlled separately or simultaneously in any combination, with multiple receivers allowed in each zone. The remote can create and store custom color sequences. You can choose whether to fade or step through the color cycle and adjust the speed and brightness. The RF remote control has a range of about 50 feet and works through walls. There is a USB port to charge the internal battery.

You can use our universal power supplies (drivers) on 100-240 Volts AC, 50 or 60 Hz, to generate 12 or 24 volts DC to operate the controller just about anywhere in the world.

The receiver is rated at 5 amps per channel which is 180 watts per receiver at 12 volts or 360 watts per receiver at 24 volts. Our regular density RGB LED strip uses up to 30 watts per 5 meter reel and the double density RGB LED strip uses up to 40 watts per 5 meter reel. Therefore, you can control 6 reels of regular density RGB LED strip or 4.5 reels of double density LED strip at 12 volts.

Programmable Micro Remote LED Controller

The PMRC Programmable Controller is an easy-to-use, powerful controller you can use with 4-wire Red-Green-Blue strip lighting or modules. It works on 12 or 24 Volts DC. The controller unit has a program display, and the unit can be used to write your own program for your lights.
Programmable Micro Remote LED Controller (PMRC), and Wall Mount Controller

You can use our universal power supplies on 100-240 Volts AC, 50 or 60 Hz, to generate 12 or 24 Volts DC to operate the controller just about anywhere in the world. All the RGB linear lights we sell use 12 VDC, except the superflat rope, which uses 24 volts DC.

We designed this controller based on requests from many customers who asked for a simple controller that would enable them to mix their own custom colors, and program variable hold and fade times. People also wanted to be able to dim or brighten their lights easily. They also asked for longer cycle times on the standard color changing programs (step and fade) than are available on other controllers. The PMRC achieves all of that. It includes a handsome decora-style wall mount control. Fits a standard gang-box, but uses radio frequency signals to communicate with the controller, so you don’t need to wire it to anything.

The Programmable Micro Remote LED Controller (PMRC) lets you choose from 10 modes:
1. White
2. Red
3. Green
4. Blue
5. Cyan (Green + Blue)
6. Magenta (Red + Blue)
7. Yellow (Red + Green)
8. Step Change mode (white, red, green, yellow, blue, magenta, cyan, white…)
9. Fade Change mode (white, red, yellow, green, cyan, blue, magenta, white…)
10. DIY Program (your own Do-It-Yourself program) The program will execute from the beginning of the next step. If the program was interrupted at step 5, it will re-commence at step 6.

You can also dim the lights, change the speed and turn the lights off using the remote control. Manual available.
Sound-to-Light LED Controller

The Sound-to-Light LED Controller flashes your LED strips to the music. You can use the built-in microphone or a standard audio coaxial jack on the side of the unit. It also has several functions that do not use the audio input, including various steady-burn color selection functions and color fade programs. The hand-held remote control communicates with the controller using infrared light, similar to a TV remote control. The controller’s IR “eye” is on the end of a 20-inch cable, so you can place the controller out of site and have the only the eye in view. The remote requires line-of-site visibility and will not work through walls.

You can use this controller with 4-wire Red-Green-Blue 12 or 24 volt DC LED strips or other LEDs.

Sound-to-Light LED Controller for RGB LED Strips - 12 or 24 VDC

You can also dim the lights, change the speed and turn the lights off using the remote control. Manual available.
RGB LED Dimmer (3 channel)

The three channel LED dimmer is an easy way to mix colors with any 12 or 24 volt RGB LED product. Apply the correct DC voltage to the inputs and the controller will generate pulse dimming signals on three separate output channels (red, green and blue).

- Output is 12 or 24 VDC, matching the driver you use.
- Smooth pulse width modulation dimming all the way down to 0%.
- Terminal block outputs and inputs, with plastic touch guard.
- 1 year manufacturer limited warranty, conditioned on not overloading the dimmer.

Traxon Light Drive Wall-Mount DMX Controller

The Traxon Light Drive is a state-of-the-art multi-zone DMX controller. Its many sophisticated functions are described in the owner’s manual available on our web site that also ships with the controller. It lets you dial in just the color you want, program steps of your show, and vary brightness and speed. The remote control at right is sold separately.

EnvironmentalLights.com has designed a custom cable that enables you to supply power to the TLD and connect the TLD to your DMX decoders to drive Red-Green-Blue LED strip lighting from EnvironmentalLights.com.
We ship the Traxon Light Drive with 2 of these special cables to enable you to connect both DMX outputs on the back of the Light Drive directly to our decoders. You must apply power to the Traxon Light Drive through exactly one of these special cables. The Light Drive itself consumes very little power, so one of our small 12 watt 12 Volt DC adapters is adequate. The power that lights your LEDs is applied to the decoder or further down the line, if you use amplifiers. Power supply is available with European plug.

The TLD ships with two custom cables, like the one at left, plus the power supply shown at right. Circuit diagrams at the end show how to connect the Traxon Light Drive. Manual available.
Easy Stand Alone Computer-Programmable DMX Controller

**Easy Stand Alone** is a deluxe controller that features a simple, easy to learn "mixer board" that runs on your PC. Use your Windows PC to program the stand-alone controller box. Disconnect the controller from the computer, power the controller with the included adapter and connect it to the lights. It allows you to:

- independently set red, green and blue levels from 0-100% using sliders on your computer;
- control many different color LED devices simultaneously, so one wall washer is showing one color, while your RGB panel or flexible LED strips are showing another;
- to create "shows" comprising "scenes" and "steps;"
- control color levels and overall dimming level for each step;
- control duration of each step;
- control fade time from step to step;
- address many devices independently at each step;
- control whether the scene repeats;
- control which scenes are played and when;
- use the color wheel or separate R, G and B fader slides to dial in the exact color you want;
- save your programs to your computer's hard disk;
- write your programs to the controller, so it can operate by itself in Stand Alone mode.

控制器功能在2种模式：连接到您的计算机，接收信号和电源通过USB电缆；或在Stand Alone模式，接收电源从适配器。兼容Windows XP/Vista/SEVEN 32-bit或64-bit版本；不兼容Apple，Windows 98或其他操作系统。符合标准DMX控制协议。

The SLESA-U8 includes: A controller box, adapter and USB cable (hardware); a CD (software) containing the software and [manuals](#) and our custom getting started guide.
**Amplifiers (Repeaters) to Extend Your Installation**

Extend your installation almost without limits using amplifiers, also called “boosters” or “repeaters.” Amplifiers require their own power supplies (drivers.) They work with 12 or 24 volt drivers. With these amplifiers as building blocks, you can build an installation that is very large. Refer to the diagrams at the end and contact us if you are unsure how to engineer the system. This is how we get the big jobs done.

RGBX Repeater-Studio 4-Channel - 12 or 24 VDC

AMP4
DMX Decoders

DMX is a standard protocol for delivering light programs. Whether you buy our Traxon or Easy Stand Alone DMX controllers or you have a $20,000 state-of-the-art stage lighting DMX console, you can drive our strip lighting using the “missing link,” a DMX decoder. It converts DMX to 4-wire signal suitable for driving RGB LED strip lighting and other 12 or 24 VDC LEDs. It comes with a helpful manual.

![DMX Decoder](image)

**Figure 1**

DMX Input (3 or 5-pin) into either RJ45 port (top) and RJ45 cable to daisy chain to next decoder (bottom)

**Figure 2**

Power Input and Analog Output to LEDs

The DMX-4-5000-3 ships with the 3-pin XLR cable shown above in Figure 1 and mates with standard 3-pin DMX outputs. The DMX-4-5000-5 ships with the 5-pin XLR cable shown above in Figure 2 and mates with standard 5-pin DMX outputs. Each will also include an RJ45 jumper to connect to the next decoder, if any.
We also offer two 24-channel decoders, the DMX-24-5000 and the DMX-24-2000S:

**DMX-24-5000**

Full details of this 24-channel, 1 amp per channel decoder are available in this manual.

**DMX-24-2000S**

Full details of this 24-channel, 3 amp per channel decoder are available in this manual.
Linear Light Features

- Stunning color-changing visual effects. High brightness LEDs create state-of-the-art LED accent lighting.
- Extremely easy to install because our ribbon is cuttable on very short intervals, allowing you to cut your pieces to fit your installation’s requirements. Much easier to work with than traditional rope light, which has cutting intervals measured in feet or meters. Also, the regular ribbon is over twice as bright as rope light perpendicular to the tape, so it’s better for cove lighting and most other applications requiring directional lighting. The other strips we sell are even brighter.
- Several great controller options to meet any need or budget (discussed above.) You can also use our DMX Decoder (DMX-4-5000) to decode the DMX signal you generate with your own equipment.
- LED spacing and cutting intervals appear beginning on page 31.
- Ribbon can be cut with a wire cutter and rigid strips can be cut with a hack saw.
- Low voltage systems are easy to wire.
- Ultrabright, extremely efficient LED lights are economical to operate and maintenance-free.
- The LEDs are very energy-efficient and very bright. They’re especially good at generating color because they only generate light at the color you choose, which saves a lot of power and heat versus halogen and other technologies, where inefficient color-filter systems are required.
- Shock resistant, rugged and durable.
- No UV generated, so it’s safe for humans and objects, in general. Great for museums, displaying documents, artwork and other UV-sensitive subjects.
- Lights have up to 50,000 hour lifetime, if properly driven and heat is allowed to escape.

Linear Light Applications

- Decorative and accent lighting, including indirect cove lighting
- Signs
- Hotels, office buildings, homes, casinos, wine cellars, yachts, limos, home theaters and sculpture illumination
- Downlighting and uplighting features
- Edge lighting glass plates, art or other accent pieces: for a dramatic effect, sand blast your company’s logo or other pattern into a plate of glass and edge light with LED linear lighting.
Instructions

Please take the following general precautions when installing any sort of LED lighting:

1. This equipment, like all electrical equipment, should be installed by a qualified person. You should have the basic tools and knowledge of the trade. If you do not, get help.

2. Never light a coiled LED ribbon or rope for more than a few seconds. LEDs generate heat and if lit in a coil, they will get hot and will suffer immediate thermal and, possibly, mechanical damage. LED strip lighting returned on warped reels has been abused and is not returnable. LED strip lighting lit in coils for more than a few seconds also tends to have broken solder joints and bad segments.

3. Never wire systems with the power on. Even if you take care not to hurt yourself, you may damage the LEDs or equipment by creating current spikes. Always shut the power off before making connections.

4. Do not expose LEDs, controllers or other electronics to intense electro-magnetic fields, including lightning. Use an isolator such as our DMX512 Isolation Amplifier 3-pin (121-3) or isolator/splitter, such as our DMX512 Isolated Splitter / Amplifier (1 input-3 output) 3-pin (123-3) on outdoor installations if you want to protect your controllers and other electronics from lightning.

5. Our controllers, boosters, decoders and power supplies are generally not waterproof. Keep them dry.

6. Always observe proper polarity to avoid damaging components.

7. Supply the ribbons with correct voltage (12 or 24 volts DC) only. (12 volt AC systems, such as some landscaping systems, will light the LEDs, but they will flicker and be dim because they only operate half of each cycle.) In vehicular installations, remember to use a suitable voltage limiter, such as our 50 Watt SD-50A-12 or 100 Watt UDC-2812-8. Your alternator or other charging system will probably drive the system voltage above 12 volts DC and this may harm your LEDs or supporting electronics. Be sure the voltage regulator or limiter can handle the current your light installation demands. Our DC to DC converters just mentioned will also pick up a low voltage of as low as 10.5 volts and provide your lights 12 volts.

8. If you use your own power supplies, be sure they are regulated. Some inexpensive wall wart supplies and other power supplies allow the voltage to go above the rated voltage in certain low-load situations.

9. It is a good idea to allow around 20-25% or more margin for safety with power supplies. In most cases, our power ratings are already conservative. For example, our RGB ribbon typically consumes 25 watts in the worst case (all-white, all the time) condition versus the rated wattage of 36 watts. Our regular monochrome ribbon tends to consume 19 to 23 watts, depending on color, versus a rated wattage of 24 watts. This document explains how to build large scale systems—just be sure to buy enough hardware to get the job done.
10. We offer all the connectors you need to avoid soldering. If you choose to solder directly to LED ribbon or LED rigid strips, use a typical 15 watt solder pen, not a high-wattage gun. Do not follow the “textbook” advice to heat the joint and then apply solder to flow the connection. You may apply too much heat and ruin the nearest LED. Tin the wire, tip load the pen with solder and quickly apply to the ribbon or strip, taking care to wet the solder pad with solder on the ribbon or strip to ensure a secure connection. You can make a fine solder joint that is both electrically and mechanically solid in less than a second. It takes a little practice, which is why we recommend just using our connectors instead. Your LED strips, reels or modules have passed quality assurance testing. We cannot accept returns of LED products damaged by improper soldering. If you damage the LED near your solder joint, just cut the segment off and try again on the next segment.

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, controller, power supply and any other required hardware 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 or controller. We usually recommend running no more than about 17 feet of RGB strip lighting. If you need to run more than around 17 feet, you should split the run into sections and run power lines next to the ribbon to restore voltage for successive segments. In this manner, you can use a “bus structure” to turn an electrical circuit that is wired in a “star” configuration into something that looks like a long line of light. This is explained on page 37. Call if you need assistance with larger projects. We can help you select the required power supplies and, for RGB systems, booster amps.
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 it. You will also know if you damage anything during installation, which is helpful in trouble-shooting because manufacturing defects and installation damage typically have very different solutions.
5. Cut, damaged and previously installed ribbon or strips are not returnable, so please call first if you have questions. Our customers have very few problems with our LED lights, as long as they follow the instructions and call if they have questions.

Once you have tested the system successfully, you are ready to install it.
Connectors-General Notes

The LED ribbon is easily connected using our convenient connectors, which eliminate the need to solder. Just click them on. They will get your project done quickly. They must be installed right side up. If the LEDs face up, the solder bumps should face up. If they don’t work, take them off and turn them over. If you peel off the wax paper on the back of the ribbon to expose the adhesive, you may need to put a small square of masking tape on the back of the end of the ribbon to thicken the ribbon so the connector will stay on.
The pictures below show how to connect monochrome ribbon. RGB ribbon is similar. We don’t offer “left” and “right” rf4-to-ribbon connectors, so please pay attention to the ribbon’s markings, not the wire colors.

If you peel off the wax paper on the back to expose the adhesive, you may find that the connector will not clamp tightly onto the ribbon because the connector expects a thicker ribbon. Just put a small piece of masking tape on the back of the ribbon, as we show at right.

Some of our drivers (power supplies) ship with the male connector. This is industry standard. Adapters ship with the connector on the right and certain monochrome dimming and cage supplies ship with a 20” 14-gauge whip you can connect to the terminal block to be the functional equivalent of the adapter; however, you can buy an extra whip to connect to the terminal block. Monochrome ribbon ships with the female connector on the outside end of the reel, so you can plug a reel into an adapter. Our color changing remote control operated controllers have a power input port similar to the female connector so you can power them with our adapters or cage supplies (using the male whip.) We use 2.1 mm ID connectors for 12 or 24 volts, not 2.5.

We also offer splitters and luminaire disconnects:

- Low voltage Y-Splitter
- PowerPlug Luminaire Disconnect Large
- PowerPlug Luminaire Disconnect Small
Connectors-Sheath Waterproof Strips

1. Use a sharp wire cutter to cut the ribbon on a cut line. Do not cut between the lines.

2. Cuff the sheath.

3. You’ll probably need to put a little masking tape on the BACK of the ribbon to “shim” it so the connector will be snug and stay on. Our connectors are designed to fit the ribbon if the wax paper on the back of the non-waterproof version is left on. The masking tape replaces the thickness of the wax paper. Trim the masking tape to fit the ribbon.

4. Turn the ribbon over, slide the connector on and push the connector together to lock it to the ribbon. Slide a 4-hole cap onto the wires (RGB) or 2-hole cap (monochrome,) as shown. If you have trouble making the electrical connection, see detailed instructions called ribbon_connections.pdf, available separately. The most common problem is that the connector is upside down. Solder bumps must be up if the LEDs are up. The connection is made on the top of the ribbon, which is why the tape on the back doesn’t interfere.

5. TEST your ribbon to be sure it lights by applying +12VDC to the + trace and Ground to the other - trace to be sure the diodes all light. If you have a connection problem, NOW is the time to fix it, before you put the waterproof adhesive on. After successfully lighting all diodes, roll the cuff back over the connector as shown above.
6. Apply the included adhesive liberally.

7. Apply adhesive to the inside of the cap, slide the cap over the connector and gently press out any bubbles. The adhesive sets up slowly, so you have time to work with it.

8. Wipe off excess adhesive and let dry for 24 hours.

9. Follow the same procedure for the dead end, using the no-hole cap:
Connectors-Superflat Rope

Never link more than 20 meters (65 feet) on one electrical branch.

Connect to the superflat rope by pushing a 4-pronged connector into the end of the cut rope. Use the approved glue we sell with this product and heat shrink tubing to make the connection waterproof. The 1.6” x 1.2” heat shrink is for the live end (“Front Connector”) in the attached diagram. Use the 1.0” x 1.0” heat shrink elsewhere, such as for splicers, T, L and + connectors and dead ends. Green/Yellow wire is for common anode (+24 Volts DC). Blue wire is for blue light. Green wire is for green light. Brown wire is for red light. To make connections,

1. Position heat shrink on the strip.
2. Insert prongs into strip noting polarity.
3. Check connection by lighting the strip to be sure it works.
4. Turn off power, and apply glue. Be sure glue makes contact with all parts of the joint for a waterproof connection.
5. Use a heat gun (not included) to shrink the tubes over the joint for a mechanically solid waterproof connection. If you don’t do a great job waterproofing both ends, water will seep into the lighting, cause oxidation, and ruin it.

It’s easy to affix your superflat rope to a surface using the tie downs:

Cut marks are hot-stamped into the PVC every 6 LED nodes. Use a sharp knife.
Design Criteria for Controllers, Amps and Power Supplies

The following charts typically use 25% oversizing (5/4 of estimated actual power consumption.) These numbers are conservative, since additional margin for error is built into the ratings of the power supplies themselves. Using a more powerful driver than you need is not a problem for these components.

This is really important. We get questions about it every day. There are two limits you need to keep in mind:

1. How much load can you put on each driver? (See the following charts to answer that.)
2. How much wire and lighting can you drive in one branch without making a home run to the driver? The answer is generally one “unit of sale,” which is a reel or set of modules. In the case of our high brightness undercabinet lights, it’s about 8 feet (2.4 meters.) (Go to wiring instructions on page 37 to learn about proper wiring technique.)

They are very different concepts. Examples:

1. How much load can you put on each driver?

Let’s say you put 5 reels of 24 watt regular strip on a 60-watt driver. You don’t violate #2 above, but you do violate #1. The driver’s not big enough and your installation won’t work. You need a more powerful driver.

2. How much wire and lighting can you drive in one branch without making a home run to the driver?

Let’s say you have a 150-watt driver and you connect 50 feet (about 3 reels) of regular strip lights in a single line. You don’t violate #1–your driver is large enough (150>> 24 watts x 3 reels.) You do exceed the branch length limit of 16-20 feet, so after 20 feet your lights will become ever dimmer. In an RGB installation, they will be the wrong color and appear to respond strangely to the controller. Shorten your branches by making home runs to the driver or controller.

Or, let’s say you want to put the same 3 reels of regular strip light at the end of a 50 foot run of 18 gauge wire. Using 12 volts, 18 gauge, 6 amps load and 50 feet, we calculate you’ll drop 3.95 volts. If you power your head end with 8 volts, it will barely light. At the tail end of each reel, it will probably be dark. You need thicker wire or a shorter run. Put the driver closer to the lights, if you can. Using a higher wattage driver won’t help with this problem. You could adjust the driver voltage up to compensate for the drop, but very few drivers allow enough adjustment to accomplish that, plus if you have any lights closer to the driver, you run the risk of burning them out with excessive voltage (and, therefore, current.)

Use thicker wire, make more home runs and move your drivers, controllers or boosters closer to the lights.
LED Strip Light 4-Wire Red-Green-Blue (regular 30 nodes/meter)  12 Volt DC

---

### Power Consumption

<table>
<thead>
<tr>
<th></th>
<th>Watts per node</th>
<th>200.0 mWatts/node</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>30.0 Watts/reel</td>
<td></td>
</tr>
</tbody>
</table>

### Non-Dimming Supplies (Drivers)

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Part Number</th>
<th>Watts (nominal)</th>
<th>Watts (de-rated)</th>
<th>Number of nodes</th>
<th>Reels</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Watt 12 VDC Power Supply (North American Plug)</td>
<td>Driver-24-12-NA</td>
<td>24</td>
<td>19</td>
<td>96</td>
<td>0.6</td>
<td>10.5</td>
</tr>
<tr>
<td>35 Watt 12 VDC Waterproof Power Supply</td>
<td>LPV-35-12</td>
<td>35</td>
<td>28</td>
<td>140</td>
<td>0.9</td>
<td>15.3</td>
</tr>
<tr>
<td>60 Watt 12 VDC Power Supply</td>
<td>Driver-60-12</td>
<td>60</td>
<td>48</td>
<td>240</td>
<td>1.6</td>
<td>26.2</td>
</tr>
<tr>
<td>60 Watt 12 VDC Waterproof Power Supply</td>
<td>LPV-60-12</td>
<td>60</td>
<td>48</td>
<td>240</td>
<td>1.6</td>
<td>26.2</td>
</tr>
<tr>
<td>84 Watt 12 VDC Power Supply</td>
<td>Driver-84-12</td>
<td>84</td>
<td>67</td>
<td>336</td>
<td>2.2</td>
<td>36.7</td>
</tr>
<tr>
<td>150 Watt 12 VDC Power Supply with PFC</td>
<td>SP-150-12</td>
<td>150</td>
<td>120</td>
<td>600</td>
<td>4.0</td>
<td>65.6</td>
</tr>
<tr>
<td>150 Watt 12 VDC Waterproof Power Supply with PFC</td>
<td>HLG-150H-12</td>
<td>150</td>
<td>120</td>
<td>600</td>
<td>4.0</td>
<td>65.6</td>
</tr>
<tr>
<td>240 Watt 12 VDC Power Supply with PFC</td>
<td>SP-240-12</td>
<td>240</td>
<td>192</td>
<td>960</td>
<td>6.4</td>
<td>105.0</td>
</tr>
<tr>
<td>192 Watt 12 VDC Waterproof Power Supply with PFC</td>
<td>HLG-240H-12</td>
<td>192</td>
<td>192</td>
<td>960</td>
<td>6.4</td>
<td>105.0</td>
</tr>
<tr>
<td>300 Watt 12 VDC Power Supply with PFC</td>
<td>SP-300-12</td>
<td>300</td>
<td>256</td>
<td>1,280</td>
<td>8.5</td>
<td>139.9</td>
</tr>
<tr>
<td>264 Watt 12 VDC Waterproof Power Supply with PFC</td>
<td>HLG-320H-12</td>
<td>264</td>
<td>264</td>
<td>1,320</td>
<td>8.8</td>
<td>144.3</td>
</tr>
<tr>
<td>480 Watt 12 VDC Power Supply with PFC</td>
<td>SP-480-12</td>
<td>480</td>
<td>384</td>
<td>1,920</td>
<td>12.8</td>
<td>209.9</td>
</tr>
<tr>
<td>750 Watt 12 VDC Power Supply with PFC</td>
<td>SP-750-12</td>
<td>750</td>
<td>600</td>
<td>3,000</td>
<td>20.0</td>
<td>328.0</td>
</tr>
</tbody>
</table>

### DC to DC Converters (Voltage Protection)

<table>
<thead>
<tr>
<th></th>
<th>Watts (nominal)</th>
<th>Watts (de-rated)</th>
<th>Number of nodes</th>
<th>Reels</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overvoltage protection-12VDC maximum output, 50 Watt (DC to DC Step Up/Down Buck Boost Converter)</td>
<td>SD-50A-12</td>
<td>50</td>
<td>40</td>
<td>200</td>
<td>1.3</td>
</tr>
<tr>
<td>Overvoltage protection-12VDC maximum output, 100 Watt (DC to DC Step Up/Down Buck Boost Converter)</td>
<td>UDC-2812-8</td>
<td>100</td>
<td>80</td>
<td>400</td>
<td>2.7</td>
</tr>
</tbody>
</table>

### Controllers, Amps (Repeaters) and Decoders

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Watts (nominal)</th>
<th>Watts (de-rated)</th>
<th>Power Limitation</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGB LED Controller (Receiver)</td>
<td>RGB10-Receiver</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>Programmable Micro Remote Controller</td>
<td>PMRC</td>
<td>150</td>
<td>80</td>
</tr>
<tr>
<td>Sound-to-Light LED Controller</td>
<td>STL</td>
<td>150</td>
<td>80</td>
</tr>
<tr>
<td>RGB LED Dimmer (3 channel) - 12 or 24 VDC</td>
<td>RGB-3-Dimmer</td>
<td>108</td>
<td>108</td>
</tr>
<tr>
<td>RGBX Repeater-Studio 4-Channel (per 3 channels)</td>
<td>AMP4</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>DMX Decoder-Studio 4-Channel (per 3 channels)</td>
<td>DMX-4-5000</td>
<td>180</td>
<td>180</td>
</tr>
<tr>
<td>DMX Decoder-Studio 24 channel (per 3 channels)</td>
<td>DMX-24-5000</td>
<td>36</td>
<td>36</td>
</tr>
<tr>
<td>DMX Decoder-Studio 24 channel (per 3 channels)</td>
<td>DMX-24-2000S</td>
<td>108</td>
<td>108</td>
</tr>
</tbody>
</table>

---

Your power limit is set by the weakest link in the branch. If you use a 60 watt supply to drive a 150 watt controller, your limit is 60 watts, de-rated to 48. Using a more powerful component than you need is not a problem for these components.
LED Strip Light Double Density 4-Wire Red-Green-Blue (60 nodes/meter)  12 Volt DC

Cut Marks

Solder Pads

(Power supplies are typically de-rated at 80%)

Recommended Limits

<table>
<thead>
<tr>
<th>Watts (nominal)</th>
<th>Watts (de-rated)</th>
<th>Number of nodes</th>
<th>Reels</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>40</td>
<td>300</td>
<td>1.0</td>
<td>16.4</td>
<td></td>
</tr>
</tbody>
</table>

Your power limit is set by the weakest link in the branch. If you use a 60 watt supply to drive a 150 watt controller, your limit is 60 watts, de-rated to 48.

Using a more powerful component than you need is not a problem for these components.

Non-Dimming Supplies (Drivers)

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Part Number</th>
<th>Watts</th>
<th>Watts</th>
<th>Number of nodes</th>
<th>Reels</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Watt 12 VDC Power Supply (North American Plug)</td>
<td>Driver-24-12-NA</td>
<td>24</td>
<td>19</td>
<td>144</td>
<td>0.5</td>
<td>7.9</td>
</tr>
<tr>
<td>35 Watt 12 VDC Waterproof Power Supply</td>
<td>LPV-35-12</td>
<td>35</td>
<td>28</td>
<td>210</td>
<td>0.7</td>
<td>11.5</td>
</tr>
<tr>
<td>60 Watt 12 VDC Power Supply</td>
<td>Driver-60-12</td>
<td>60</td>
<td>48</td>
<td>360</td>
<td>1.2</td>
<td>19.7</td>
</tr>
<tr>
<td>60 Watt 12 VDC Waterproof Power Supply</td>
<td>LPV-60-12</td>
<td>60</td>
<td>48</td>
<td>360</td>
<td>1.2</td>
<td>19.7</td>
</tr>
<tr>
<td>84 Watt 12 VDC Power Supply</td>
<td>Driver-84-12</td>
<td>84</td>
<td>67</td>
<td>504</td>
<td>1.7</td>
<td>27.6</td>
</tr>
<tr>
<td>150 Watt 12 VDC Power Supply with PFC</td>
<td>SP-150-12</td>
<td>150</td>
<td>120</td>
<td>900</td>
<td>3.0</td>
<td>49.2</td>
</tr>
<tr>
<td>150 Watt 12 VDC Waterproof Power Supply with PFC</td>
<td>HLG-150H-12</td>
<td>150</td>
<td>120</td>
<td>900</td>
<td>3.0</td>
<td>49.2</td>
</tr>
<tr>
<td>240 Watt 12 VDC Power Supply with PFC</td>
<td>SP-240-12</td>
<td>240</td>
<td>192</td>
<td>1,440</td>
<td>4.8</td>
<td>78.7</td>
</tr>
<tr>
<td>192 Watt 12 VDC Waterproof Power Supply with PFC</td>
<td>HLG-240H-12</td>
<td>192</td>
<td>192</td>
<td>1,440</td>
<td>4.8</td>
<td>78.7</td>
</tr>
<tr>
<td>300 Watt 12 VDC Power Supply with PFC</td>
<td>SP-300-12</td>
<td>300</td>
<td>256</td>
<td>1,920</td>
<td>6.4</td>
<td>105.0</td>
</tr>
<tr>
<td>264 Watt 12 VDC Waterproof Power Supply with PFC</td>
<td>HLG-320H-12</td>
<td>264</td>
<td>264</td>
<td>1,980</td>
<td>6.6</td>
<td>108.2</td>
</tr>
<tr>
<td>480 Watt 12 VDC Power Supply with PFC</td>
<td>SP-480-12</td>
<td>480</td>
<td>384</td>
<td>2,880</td>
<td>9.6</td>
<td>157.4</td>
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<tr>
<td>750 Watt 12 VDC Power Supply with PFC</td>
<td>SP-750-12</td>
<td>750</td>
<td>600</td>
<td>4,500</td>
<td>15.0</td>
<td>246.0</td>
</tr>
</tbody>
</table>

DC to DC Converters (Voltage Protection)

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Part Number</th>
<th>Watts</th>
<th>Watts</th>
<th>Number of nodes</th>
<th>Reels</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Overvoltage protection-12VDC maximum output, 50 Watt (DC to DC Step Up Down Buck Boost Converter)</td>
<td>SD-50A-12</td>
<td>50</td>
<td>40</td>
<td>300</td>
<td>1.0</td>
<td>16.4</td>
</tr>
<tr>
<td>Overvoltage protection-12VDC maximum output, 100 Watt (DC to DC Step Up Down Buck Boost Converter)</td>
<td>UDC-2812-8</td>
<td>100</td>
<td>80</td>
<td>600</td>
<td>2.0</td>
<td>32.8</td>
</tr>
</tbody>
</table>

Controllers, Amps (Repeaters) and Decoders

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Part Number</th>
<th>Watts</th>
<th>Watts</th>
<th>Number of nodes</th>
<th>Reels</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGB LED Controller (Receiver)</td>
<td>RGB10-Receiver</td>
<td>180</td>
<td>180</td>
<td>1,350</td>
<td>4.5</td>
<td>73.8</td>
</tr>
<tr>
<td>Programmable Micro Remote Controller</td>
<td>PMRC</td>
<td>150</td>
<td>80</td>
<td>600</td>
<td>2.0</td>
<td>32.8</td>
</tr>
<tr>
<td>Sound-to-Light LED Controller</td>
<td>STL</td>
<td>150</td>
<td>80</td>
<td>600</td>
<td>2.0</td>
<td>32.8</td>
</tr>
<tr>
<td>RGB LED Dimmer (3 channel) - 12 or 24 VDC</td>
<td>RGB-3-Dimmer</td>
<td>108</td>
<td>108</td>
<td>810</td>
<td>2.7</td>
<td>44.3</td>
</tr>
<tr>
<td>RGBX Repeater-Studio 4-Channel (per 3 channels)</td>
<td>AMP4</td>
<td>180</td>
<td>180</td>
<td>1,350</td>
<td>4.5</td>
<td>73.8</td>
</tr>
<tr>
<td>DMX Decoder-Studio 4-Channel (per 3 channels)</td>
<td>DMX-4-5000</td>
<td>180</td>
<td>180</td>
<td>1,350</td>
<td>4.5</td>
<td>73.8</td>
</tr>
<tr>
<td>DMX Decoder-Studio (24 channel) (per 3 channels)</td>
<td>DMX-24-5000</td>
<td>36</td>
<td>36</td>
<td>270</td>
<td>0.9</td>
<td>14.8</td>
</tr>
<tr>
<td>DMX Decoder-Studio (24 channel) (per 3 channels)</td>
<td>DMX-24-2000S</td>
<td>108</td>
<td>108</td>
<td>810</td>
<td>2.7</td>
<td>44.3</td>
</tr>
</tbody>
</table>

0.66 inches = 1.67 cm
1.97 inches = 5 cm

[72x51]Copyright EnvironmentalLights.com  33  All Rights Reserved 4/7/16
# RGB LED SuperFlat Rope-Regular 60/meter 5050 LEDs

**Part Name**: sf5050-60-RGB-20

<table>
<thead>
<tr>
<th></th>
<th>Watts (nominal)</th>
<th>Watts (de-rated)</th>
<th>Number of LEDs</th>
<th>Reels</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Spacing between nodes</strong></td>
<td></td>
<td></td>
<td>0.66 inches = 1.67 cm</td>
<td></td>
<td></td>
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<tr>
<td><strong>Cutting interval</strong></td>
<td></td>
<td></td>
<td>3.94 inches = 10 cm</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Nodes per 20-meter (65.6-foot) reel</strong></td>
<td></td>
<td></td>
<td>1,200</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power consumption per node</strong></td>
<td></td>
<td></td>
<td>133 mWatts/node</td>
<td></td>
<td></td>
</tr>
<tr>
<td><strong>Power consumption per reel</strong></td>
<td></td>
<td></td>
<td>160 Watts/reel</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

*Power supplies are typically de-rated at 80%*

**Recommended Limits**

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Part Number</th>
<th>Watts</th>
<th>Watts (de-rated)</th>
<th>Number of LEDs</th>
<th>Reels</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Branch Length Limit</td>
<td>160</td>
<td>1,200</td>
<td>1.0</td>
<td>65.6</td>
<td></td>
<td></td>
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</tbody>
</table>

Your power limit is set by the weakest link in the branch. If you use a 60 watt supply to drive a 150 watt controller, your limit is 60 watts, de-rated to 48.

Using a more powerful component than you need is not a problem for these components.

### Non-Dimming Supplies (Drivers)

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Part Number</th>
<th>Watts</th>
<th>Watts (de-rated)</th>
<th>Number of LEDs</th>
<th>Reels</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>24 Watt 24 VDC Power Supply (North American Plug)</td>
<td>Driver-24-24-NA</td>
<td>24</td>
<td>19</td>
<td>144</td>
<td>0.1</td>
<td>7.9</td>
</tr>
<tr>
<td>35 Watt 24 VDC Waterproof Power Supply</td>
<td>LPV-35-24</td>
<td>35</td>
<td>28</td>
<td>210</td>
<td>0.2</td>
<td>11.5</td>
</tr>
<tr>
<td>60 Watt 24 VDC Waterproof Power Supply</td>
<td>LPV-60-24</td>
<td>60</td>
<td>48</td>
<td>360</td>
<td>0.3</td>
<td>19.7</td>
</tr>
<tr>
<td>65 Watt 24 VDC Power Supply</td>
<td>Driver-65-24</td>
<td>65</td>
<td>52</td>
<td>390</td>
<td>0.3</td>
<td>21.3</td>
</tr>
<tr>
<td>90 Watt 24 VDC Power Supply</td>
<td>Driver-90-24</td>
<td>90</td>
<td>72</td>
<td>540</td>
<td>0.5</td>
<td>29.5</td>
</tr>
<tr>
<td>100 Watt 24 VDC Waterproof Power Supply with PFC</td>
<td>HLG-100H-24</td>
<td>100</td>
<td>80</td>
<td>600</td>
<td>0.5</td>
<td>32.8</td>
</tr>
<tr>
<td>150 Watt 24 VDC Power Supply with PFC</td>
<td>SP-150-24</td>
<td>150</td>
<td>120</td>
<td>900</td>
<td>0.8</td>
<td>49.2</td>
</tr>
<tr>
<td>150 Watt 24 VDC Waterproof Power Supply with PFC</td>
<td>HLG-150H-24</td>
<td>150</td>
<td>120</td>
<td>900</td>
<td>0.8</td>
<td>49.2</td>
</tr>
<tr>
<td>240 Watt 24 VDC Power Supply with PFC</td>
<td>SP-240-24</td>
<td>240</td>
<td>192</td>
<td>1,440</td>
<td>1.2</td>
<td>78.7</td>
</tr>
<tr>
<td>240 Watt 24 VDC Waterproof Power Supply with PFC</td>
<td>HLG-240H-24</td>
<td>240</td>
<td>192</td>
<td>1,440</td>
<td>1.2</td>
<td>78.7</td>
</tr>
<tr>
<td>312 Watt 24 VDC Power Supply with PFC</td>
<td>SP-320-24</td>
<td>312</td>
<td>256</td>
<td>1,920</td>
<td>1.6</td>
<td>105.0</td>
</tr>
<tr>
<td>320 Watt 24 VDC Waterproof Power Supply with PFC</td>
<td>HLG-320H-24</td>
<td>320</td>
<td>256</td>
<td>1,920</td>
<td>1.6</td>
<td>105.0</td>
</tr>
<tr>
<td>480 Watt 24 VDC Power Supply with PFC</td>
<td>SP-480-24</td>
<td>480</td>
<td>384</td>
<td>2,880</td>
<td>2.4</td>
<td>157.4</td>
</tr>
<tr>
<td>750 Watt 24 VDC Power Supply with PFC</td>
<td>SP-750-24</td>
<td>750</td>
<td>600</td>
<td>4,500</td>
<td>3.8</td>
<td>246.0</td>
</tr>
</tbody>
</table>

### Controllers, Amps (Repeaters) and Decoders

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Part Number</th>
<th>Watts</th>
<th>Watts (de-rated)</th>
<th>Number of LEDs</th>
<th>Reels</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>RGB LED Controller (Receiver)</td>
<td>RGB10-Receiver</td>
<td>360</td>
<td>360</td>
<td>2,700</td>
<td>2.3</td>
<td>147.6</td>
</tr>
<tr>
<td>Programmable Micro Remote Controller</td>
<td>PMRC</td>
<td>150</td>
<td>80</td>
<td>600</td>
<td>0.5</td>
<td>32.8</td>
</tr>
<tr>
<td>Sound-to-Light LED Controller</td>
<td>STL</td>
<td>150</td>
<td>80</td>
<td>600</td>
<td>0.5</td>
<td>32.8</td>
</tr>
<tr>
<td>RGB LED Dimmer (3 channel) - 12 or 24 VDC</td>
<td>RGB-3-Dimmer</td>
<td>216</td>
<td>216</td>
<td>1,620</td>
<td>1.4</td>
<td>88.6</td>
</tr>
<tr>
<td>RGBX Repeater-Studio 4-Channel (per 3 channels)</td>
<td>AMP4</td>
<td>360</td>
<td>360</td>
<td>2,700</td>
<td>2.3</td>
<td>147.6</td>
</tr>
<tr>
<td>DMX Decoder-Studio 4-Channel (per 3 channels)</td>
<td>DMX-4-5000</td>
<td>360</td>
<td>360</td>
<td>2,700</td>
<td>2.3</td>
<td>147.6</td>
</tr>
<tr>
<td>DMX Decoder-Studio (24 channel) (per 3 channels)</td>
<td>DMX-24-5000</td>
<td>72</td>
<td>72</td>
<td>540</td>
<td>0.5</td>
<td>29.5</td>
</tr>
<tr>
<td>DMX Decoder-Studio (24 channel) (per 3 channels)</td>
<td>DMX-24-2000S</td>
<td>216</td>
<td>216</td>
<td>1,620</td>
<td>1.4</td>
<td>88.6</td>
</tr>
</tbody>
</table>
RGB LED Modules-Triplex 5050 LEDs  12 Volt DC

rgb-module-5050-3

<table>
<thead>
<tr>
<th>Module length</th>
<th>2.63 inches = 6.7 cm</th>
</tr>
</thead>
<tbody>
<tr>
<td>Distance between modules</td>
<td>3.94 inches = 10 cm</td>
</tr>
<tr>
<td>Modules per set (13.6 feet = 4.1 meters)</td>
<td>25</td>
</tr>
<tr>
<td>Power consumption per module</td>
<td>720 mWatts</td>
</tr>
<tr>
<td>Power consumption per 25-module set</td>
<td>18.0 Watts</td>
</tr>
</tbody>
</table>

(Power supplies are typically de-rated at 80%)

Recommended Limits

<table>
<thead>
<tr>
<th>Part Name</th>
<th>Part Number</th>
<th>Watts (nominal)</th>
<th>Watts (de-rated)</th>
<th>Number of Modules</th>
<th>25-Module Sets</th>
<th>Feet</th>
</tr>
</thead>
<tbody>
<tr>
<td>Branch Length Limit</td>
<td></td>
<td>18</td>
<td>25</td>
<td>1.0</td>
<td>13.6</td>
<td></td>
</tr>
</tbody>
</table>

Your power limit is set by the weakest link in the branch. If you use a 60 watt supply to drive a 150 watt controller, your limit is 60 watts, de-rated to 48.

Using a more powerful component than you need is not a problem for these components.

Non-Dimming Supplies (Drivers)

24 Watt 12 VDC Power Supply (North American Plug)  Driver-24-12-NA  24 19 27 1.1 14.5
35 Watt 12 VDC Waterproof Power Supply            LPV-35-12           35 28 39 1.6 21.2
60 Watt 12 VDC Power Supply                       Driver-60-12         60 48 67 2.7 36.3
60 Watt 12 VDC Waterproof Power Supply            LPV-60-12           60 48 67 2.7 36.3
84 Watt 12 VDC Power Supply                       Driver-84-12         84 67 93 3.7 50.8
150 Watt 12 VDC Power Supply with PFC             SP-150-12            150 120 167 6.7 90.7
150 Watt 12 VDC Waterproof Power Supply with PFC  HLG-150H-12       150 120 167 6.7 90.7
240 Watt 12 VDC Power Supply with PFC             SP-240-12            240 192 267 10.7 145.1
192 Watt 12 VDC Waterproof Power Supply with PFC  HLG-240H-12       192 192 267 10.7 145.1
300 Watt 12 VDC Power Supply with PFC             SP-320-12            300 256 356 14.2 193.4
264 Watt 12 VDC Waterproof Power Supply with PFC  HLG-320H-12       264 264 367 14.7 199.5
480 Watt 12 VDC Power Supply with PFC             SP-480-12            480 384 533 21.3 290.1
750 Watt 12 VDC Power Supply with PFC             SP-750-12            750 600 833 33.3 453.3

DC to DC Converters (Voltage Protection)

Overvoltage protection-12VDC maximum output, 50 Watt
(DC to DC Step Up/Down Buck Boost Converter)  SD-50A-12  50 40 56 2.2 30.2
Overvoltage protection-12VDC maximum output, 100 Watt
(DC to DC Step Up/Down Buck Boost Converter)  UDC-2812-8  100 80 111 4.4 60.4

Controllers, Amps (Repeaters) and Decoders

RGB LED Controller (Receiver)  RGB10-Receiver  180 180 250 10.0 136.0
Programmable Micro Remote Controller  PMRC  150 80 111 4.4 60.4
Sound-to-Light LED Controller  STL  150 80 111 4.4 60.4
RGB LED Dimmer (3 channel) - 12 or 24 VDC  RGB-3-Dimmer  108 108 150 6.0 81.6
RGBX Repeater-Studio 4-Channel (per 3 channels)  AMP4  180 180 250 10.0 136.0
DMX Decoder-Studio 4-Channel (per 3 channels)  DMX-4-5000  180 180 250 10.0 136.0
DMX Decoder-Studio (24 channel) (per 3 channels)  DMX-24-5000  36 36 50 2.0 27.2
DMX Decoder-Studio (24 channel) (per 3 channels)  DMX-24-2000S  108 108 150 6.0 81.6
LED 4-Wire Red-Green-Blue 22.5 Inch Rigid LED Strip 12 Volt DC

(spacing between nodes = 0.75 inches = 1.9 cm)
(Cutting interval = 2.25 inches = 5.72 cm)
(Nodes per 22.5 inch strip = 30
(Power consumption per node = 240.0 mWatts/node
(Power consumption per strip = 7.2 Watts/strip

(Power supplies are typically de-rated at 80%)

<table>
<thead>
<tr>
<th>Recommended Limits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Part Name</td>
</tr>
<tr>
<td>-------------------</td>
</tr>
<tr>
<td>Branch Length Limit</td>
</tr>
</tbody>
</table>

Your power limit is set by the weakest link in the branch. If you use a 60 watt supply to drive a 150 watt controller, your limit is 60 watts, de-rated to 48.

Using a more powerful component than you need is not a problem for these components.

Non-Dimming Supplies (Drivers)

| 24 Watt 12 VDC Power Supply (North American Plug) | Driver-24-12-NA | 24 | 19 | 80 | 2.7 | 5.0 |
| 35 Watt 12 VDC Waterproof Power Supply | LPV-35-12 | 35 | 28 | 117 | 3.9 | 7.3 |
| 60 Watt 12 VDC Power Supply | Driver-60-12 | 60 | 48 | 200 | 6.7 | 12.5 |
| 60 Watt 12 VDC Waterproof Power Supply | LPV-60-12 | 60 | 48 | 200 | 6.7 | 12.5 |
| 84 Watt 12 VDC Power Supply | Driver-84-12 | 84 | 67 | 280 | 9.3 | 17.5 |
| 150 Watt 12 VDC Power Supply with PFC | SP-150-12 | 150 | 120 | 500 | 16.7 | 31.3 |
| 150 Watt 12 VDC Waterproof Power Supply with PFC | HLG-150H-12 | 150 | 120 | 500 | 16.7 | 31.3 |
| 240 Watt 12 VDC Power Supply with PFC | SP-240-12 | 240 | 192 | 800 | 26.7 | 50.0 |
| 192 Watt 12 VDC Waterproof Power Supply with PFC | HLG-240H-12 | 192 | 192 | 800 | 26.7 | 50.0 |
| 300 Watt 12 VDC Power Supply with PFC | SP-300-12 | 300 | 256 | 1,067 | 35.6 | 66.7 |
| 264 Watt 12 VDC Waterproof Power Supply with PFC | HLG-320H-12 | 264 | 264 | 1,100 | 36.7 | 68.8 |
| 480 Watt 12 VDC Power Supply with PFC | SP-480-12 | 480 | 384 | 1,600 | 53.3 | 100.0 |
| 750 Watt 12 VDC Power Supply with PFC | SP-750-12 | 750 | 600 | 2,500 | 83.3 | 156.3 |

DC to DC Converters (Voltage Protection)

| Overvoltage protection-12VDC maximum output, 50 Watt (DC to DC Step Up Down Buck Boost Converter) | SD-50A-12 | 50 | 40 | 167 | 5.6 | 10.4 |
| Overvoltage protection-12VDC maximum output, 100 Watt (DC to DC Step Up Down Buck Boost Converter) | UDC-2812-8 | 100 | 80 | 333 | 11.1 | 20.8 |

Controllers, Amps (Repeaters) and Decoders

| RGB LED Controller (Receiver) | RGB10-Receiver | 180 | 180 | 750 | 25.0 | 46.9 |
| Programmable Micro Remote Controller | PMRC | 150 | 80 | 333 | 11.1 | 20.8 |
| Sound-to-Light LED Controller | STL | 150 | 80 | 333 | 11.1 | 20.8 |
| RGB LED Dimmer (3 channel) - 12 or 24 VDC | RGB-3-Dimmer | 108 | 108 | 450 | 15.0 | 28.1 |
| RGBX Repeater-Studio 4-Channel (per 3 channels) | AMP4 | 180 | 180 | 750 | 25.0 | 46.9 |
| DMX Decoder-Studio 4-Channel (per 3 channels) | DMX-4-5000 | 180 | 180 | 750 | 25.0 | 46.9 |
| DMX Decoder-Studio (24 channel) (per 3 channels) | DMX-24-5000 | 36 | 36 | 150 | 5.0 | 9.4 |
| DMX Decoder-Studio (24 channel) (per 3 channels) | DMX-24-2000S | 108 | 108 | 450 | 15.0 | 28.1 |
Achieving Large Installations by Using Proper Wiring Technique

Our linear LED products are designed so you only need to apply power to one end of the reel or 25-module set. In larger installations, to ensure your LED lights receive the proper voltage (and, therefore, current,) you need apply power at various points in your circuit. Otherwise, the resistance in the wires and circuit boards will cause the voltage at your LEDs to drop. That causes the lights to be less bright in areas far from your drivers (power supplies.)

Do not plan to exceed one “unit of sale” in length without making a home run to the power supply your main power bus. A unit of sale is 1 reel (5 meters for strips, 20 meters for Superflat rope) or 1 set of 25 modules. For our undercabinet lights, the branch limit is 13 feet (4 meters.)

On a 12 volt product, for example, you may see 12 volts at the head end by the driver, and 11.6 volts at the other end. Anything above 11.5 volts will be fine. Under 11.5 volts, and you may start to notice a little drop-off in brightness. In single color installations, this may be tolerable. In color changing installations, the red, green and blue diodes will respond differently, and you may see the color shift unacceptably.

One technique to prop up the voltage on a longer line, or even over a single reel is to apply power to both ends. So a circuit diagram like this:

...could be wired like this:

We receive questions about what wire gauge to use, how far one can run supply lines, and so forth. The simple answer is that if you put a volt meter on your LED strip and see at least 11.5 or 23 volts (for 12 or 24 volt products, respectively,) at full brightness, that is fine. Usually, we recommend 16 gauge stranded or solid copper wire for small installations and 12 gauge or thicker for larger installations; however, ensuring proper voltage and wiring is the responsibility of the installer, not us. Use a knowledgeable pro for complicated or larger installations.

The complicated answer to questions about wire gauge depends on how big the load is, how it is distributed in your installation, the wire gauges you use, the resistance of your connections and the voltage (12 or 24 VDC.) The math for multi-luminaire installations with non-zero connection resistance is complicated and dependent on assumptions that are difficult to make. The best approach is empirical: lay your coil of cable on the ground, connect the lights you will use to the driver using the cable and measure the voltage at the lights. If it is satisfactory, install the
product. If not, use thicker cable, or make more home runs, or power both ends or various points in the installation. In general, wire like spokes of a wheel, not like a serpent. You’ll have less voltage drop.

This is a little like landscape lighting, where you have long lines and you need to pay attention to voltage drop at the luminaire to ensure proper performance; however, these LED strips have no on-board voltage regulation, unlike expensive LED landscape lights which have voltage regulation inside the luminaire to “buck” excessive voltage or “boost” deficient voltage. This means you have to pay more careful attention to voltage drop with LED linear lighting than LED landscape lighting.
Larger Scale Installation Using RGB LED Controller (Remote Control-10 Zones)

RGB LED Controller (Remote Control-10 Zones)

Receiver 1

RGB10-Receiver

RGB strips, superflat rope, or modules

(4 wires: red, green, blue, common)

(2 wires, +V & ground)

12 or 24 VDC Driver

Do not exceed the product's specified branch length limit.

Do not exceed the power rating of the lowest-rated driver, amp or controller.

When powering superflat rope, use 24 volt components.
Do not mix 12 and 24 volt systems, except at the DMX level. (You may put both 12 and 24 volt decoders on the same DMX output.)
Small Scale Installation Using Programmable Micro Remote LED Controller

Programmable Micro Remote Controller

Use FemaleMiniPlug
(2 wires, +V & ground)

RGB strips,
superflat rope,
or modules

(4 wires: red, green,
blue, common)

12 or 24 VDC Driver

Do not exceed the product's specified branch length limit.

Do not exceed the power rating of the lowest-rated driver, amp or controller.

When powering superflat rope, use 24 volt components.
Do not mix 12 and 24 volt systems, except at the DMX level. (You may put both 12 and 24 volt decoders on the same DMX output.)

Small Scale Installation Using Sound-to-Light Controller

Sound-to-Light Controller

Use FemaleMiniPlug
(2 wires, +V & ground)

RGB strips,
superflat rope,
or modules

(4 wires: red, green,
blue, common)

12 or 24 VDC Driver

Do not exceed the product's specified branch length limit.

Do not exceed the power rating of the lowest-rated driver, amp or controller.

When powering superflat rope, use 24 volt components.
Do not mix 12 and 24 volt systems, except at the DMX level. (You may put both 12 and 24 volt decoders on the same DMX output.)
Circuit Diagrams for Controllers (Continued)

Larger Scale Installation Using Programmable Micro Remote LED Controller

Use FemaleMiniPlug (2 wires, +V & ground)

Do not exceed the product's specified branch length limit.
Do not exceed the power rating of the lowest-rated driver, amp or controller.

When powering superflat rope, use 24 volt components. Do not mix 12 and 24 volt systems, except at the DMX level. (You may put both 12 and 24 volt decoders on the same DMX output.)
Circuit Diagrams for Controllers (Continued)

<table>
<thead>
<tr>
<th>Easy Stand Alone DMX Controller</th>
<th>DMX Decoder</th>
<th>RGB strips, RGBColorPlus, superflat rope, or modules</th>
</tr>
</thead>
<tbody>
<tr>
<td>SLESA-U8</td>
<td>DMX-4-5000</td>
<td>(5 wires: red, green, blue, other, and common)</td>
</tr>
<tr>
<td>OR</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Stick 2 Sunlite Touch-Sensitive Intelligent Control Keypad (DMX Controller)</td>
<td>12 or 24 VDC Driver</td>
<td></td>
</tr>
</tbody>
</table>

- Do not exceed the product's specified branch length limit.
- Do not exceed the power rating of the lowest-rated driver, amp or controller.
- When powering superflat rope, use 24 volt components. Do not mix 12 and 24 volt systems, except at the DMX level. (You may put both 12 and 24 volt decoders on the same DMX output.)
Larger Scale Installation Using Easy Stand Alone DMX Controller (SLESA-U8 OR STICK-GU2)

Do not exceed the product's specified branch length limit.

Do not exceed the power rating of the lowest-rated driver, amp or controller.

When powering superflat rope, use 24 volt components. Do not mix 12 and 24 volt systems, except at the DMX level. (You may put both 12 and 24 volt decoders on the same DMX output.)

RGB strips, RGBColorPlus, superflat rope, or modules

AMP4

(5 wires: red, green, blue, other, common)

MaleMiniPlug

(2 wires, +12V & ground)

12 or 24 VDC Adapter

24 watts is adequate

Amp 1

AMP4

(2 wires, +V & ground)

12 or 24 VDC Driver

etc.

Amp 2

AMP4

(2 wires, +V & ground)

12 or 24 VDC Driver
Circuit Diagrams for Controllers (Continued)

Large Scale Installation Using Traxon Light Drive DMX Controller

---

DMX Decoder (Zone 1)

DMX-4-5000

MaleMiniPlug

12 or 24 VDC Driver

AMP4

RGB strips, RGBColorPlus, superflat rope, or modules

(5 wires: red, green, blue, other, common)

(2 wires, +V & ground)

---

DMX Decoder (Zone 2)

DMX-4-5000

MaleMiniPlug

12 or 24 VDC Driver

AMP4

RGB strips, RGBColorPlus, superflat rope, or modules

(5 wires: red, green, blue, other, common)

(2 wires, +V & ground)

---

Power tap

24 watts is adequate

---

Power tap (not used, since zone 1 cable provides power to controller)

---

2 cables with the TLD.

---

2 cables

---

When powering superflat rope, use 24 volt components.

Do not mix 12 and 24 volt systems, except at the DMX level. (You may put both 12 and 24 volt decoders on the same DMX output.)

---

Do not exceed the product's specified branch length limit.

---

Do not exceed the power rating of the lowest-rated driver, amp or controller.

---

RGB strips, RGBColorPlus, superflat rope, or modules

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