

## The Characterization of LED Flexible Strip Voltage Drop Over The Travel Distance Length

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### Abstract

When we are working with high power LED flexible strip projects, We may have observed the warnings about voltage drop which is affecting the LED flexible strip brightness and uniformity. How long distance could it run without seeing significant drop in brightness? In this article, we will share the characterization results of LED flexible strip voltage drop over the travel distance length.

### Why Voltage Drop Happens

Firstly, the LEDs that are farther away from the power supply end have to have power carried across a longer distance of copper trace to reach it. The internal resistance of the copper traces increases as the length of distance increases, and this in turn reduces the amount of voltage that can reach the LEDs that are located farther from the power supply.

Secondly, the copper traces nearer to the power supply have to handle a lot more current flow in as it needs to carry all of the current that is used by the LEDs further downstream. As current density in copper increases, its resistance increases. Thereby, it further reducing the actual voltage applied to all of the downstream LEDs.

Lastly, this also applies to the connectors and all wiring between the power supply and the LED flexible strip as well. The wire gauge of the connecting wires needs to be sufficient, otherwise, some voltage may be lost before it even reaches the LED flexible strip.





## Test and Measurement Setup

3 types of LED flexible strip were tested with single power feed input which are 15W/M @ 24V LED strip controlled with resistor (CV24V), 12W/M @ 24V LED strip controlled with constant current IC (CC24V) and 12W/M @ 48V LED strip controlled with constant current IC (CC48V) respectively.

For the 15W/M @ 24V LED strip controlled with resistor (CV24V), it was prepared in 5 meters and 10 meters in lengths with single power feed input respectively .

For the 12W/M @ 24V LED strip controlled with constant current IC (CC24V), it was prepared in 20 meters in length with single power feed input.

For the 12W/M @ 48V LED strip controlled with constant current IC (CC48V), it was prepared in 30 meters in length with single power feed input.

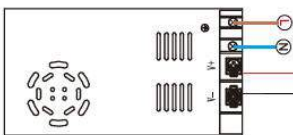
The wire length between AC-DC power supply constant voltage driver and LED flexible strip was 0.5 meters with AWG 14 wire size.

The LED flexible strip's brightness was measured by Lux meter, Konica Minolta T-10.

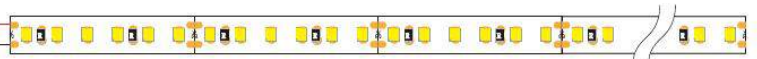
The LED flexible strip's voltage was measured by digital Multimeter, Agilent U1241B.

All measurements were done in the dark room.

**AC-DC Power  
Supply Constant  
Voltage Driver**



**LED Flexible Strip  
(CV24V/CC24V/CC48V)**



Lux Meter



## Characterization Results

The Figure 1 and 2 chart below are the measurement results from CV24V , CC24V and CC48V LED flexible strip.

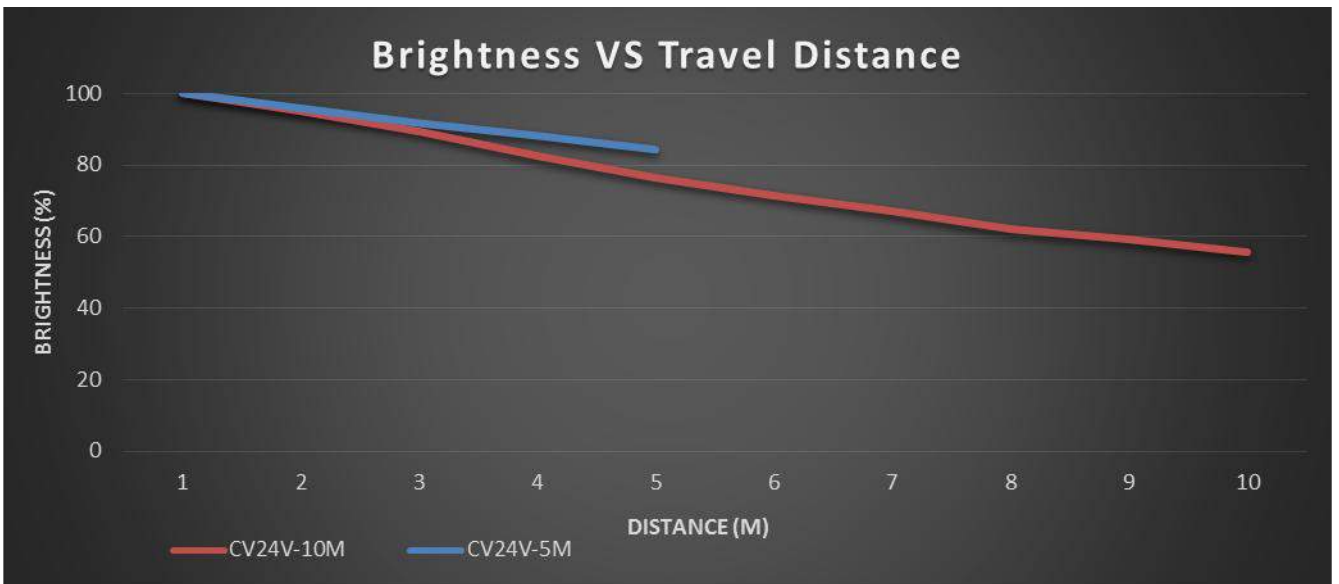


Figure 1: The characteristic of CV24V LED flexible strip with single power feed input

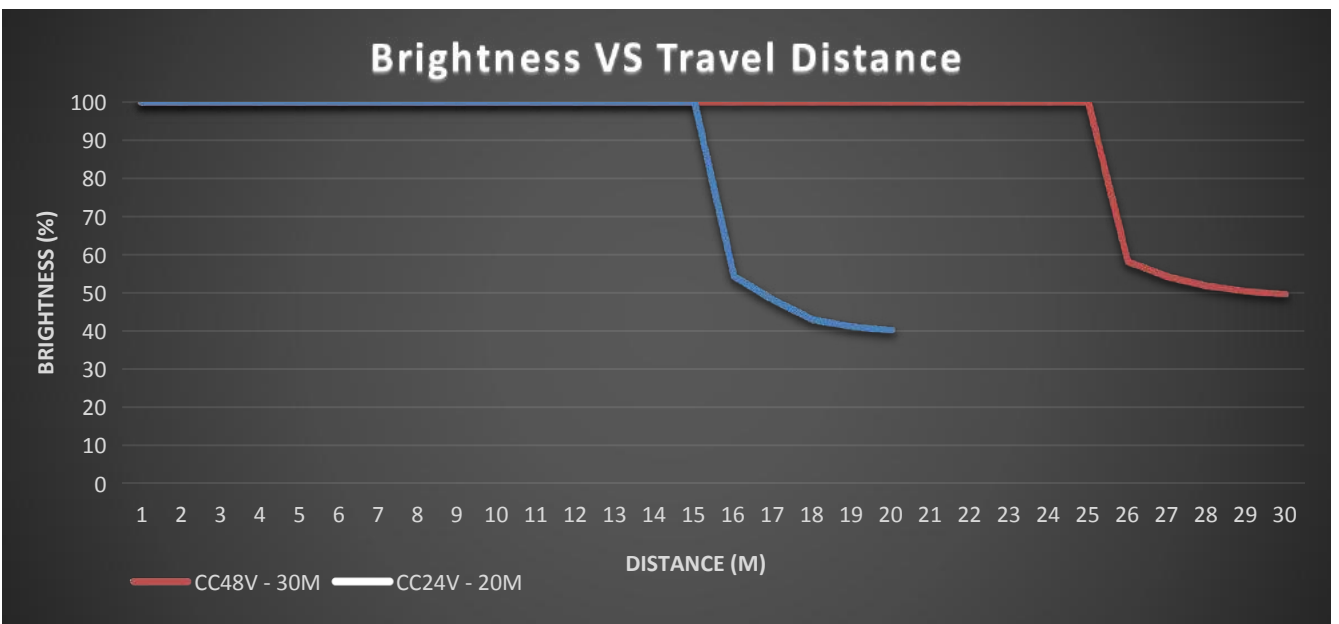


Figure 2: The characteristic of CC24V & CC48V LED flexible strip with single power feed input



## LED Flexible Strip Design In Consideration

- Constraint in Location & Space + Long Travel Distance (>10 meters)

If the lighting design application has long travel distance and the location or space constraint to locate the LED power supply driver, then the designer should consider to use CC24V or CC48V LED flexible strip . The application example like the hidden light for the long corridor.

- No Constraint in Location & Space + Short Travel Distance (<5 meters)

If the lighting design application has short travel distance and no location or space constraint to locate the LED power supply driver, then the designer should consider to use CV24V LED flexible strip . The application example like the hidden light for the mirror frame or wardrobe.

## Conclusion

Based on the characterization results above, it will help to make the right judgement during design in application and further improve the lighting quality in the project.