Indiana Christmas Mini

Power Injection

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About me

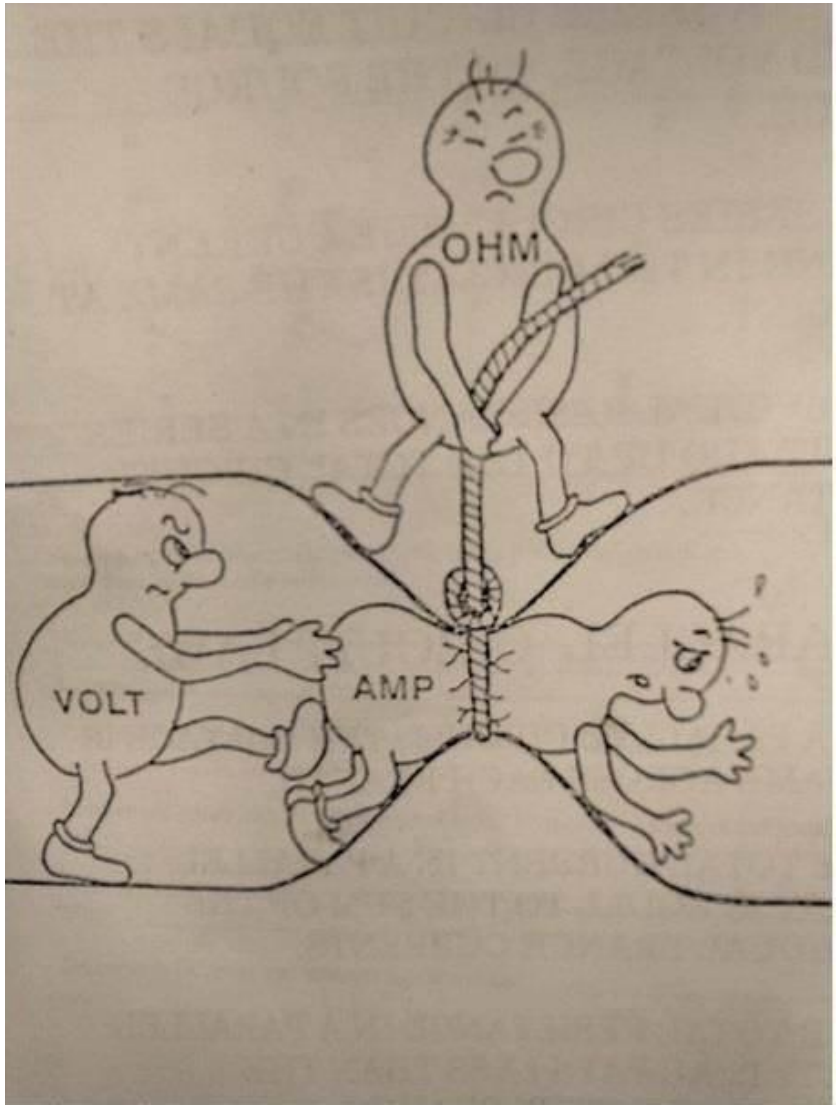
- **Brownsburg, Indiana**
- **Wife Lacy, 3 children**
  (Livie and Dane)
- **IT sales**
- **Sequenced light show since 2013**

Why Power Inject?

1. The LEDs (lights) we use are “low voltage” devices
2. Voltage decreases along the length of any wire. This is based on many factors (size, resistance, type, etc.)

Volts = Amps x Resistance

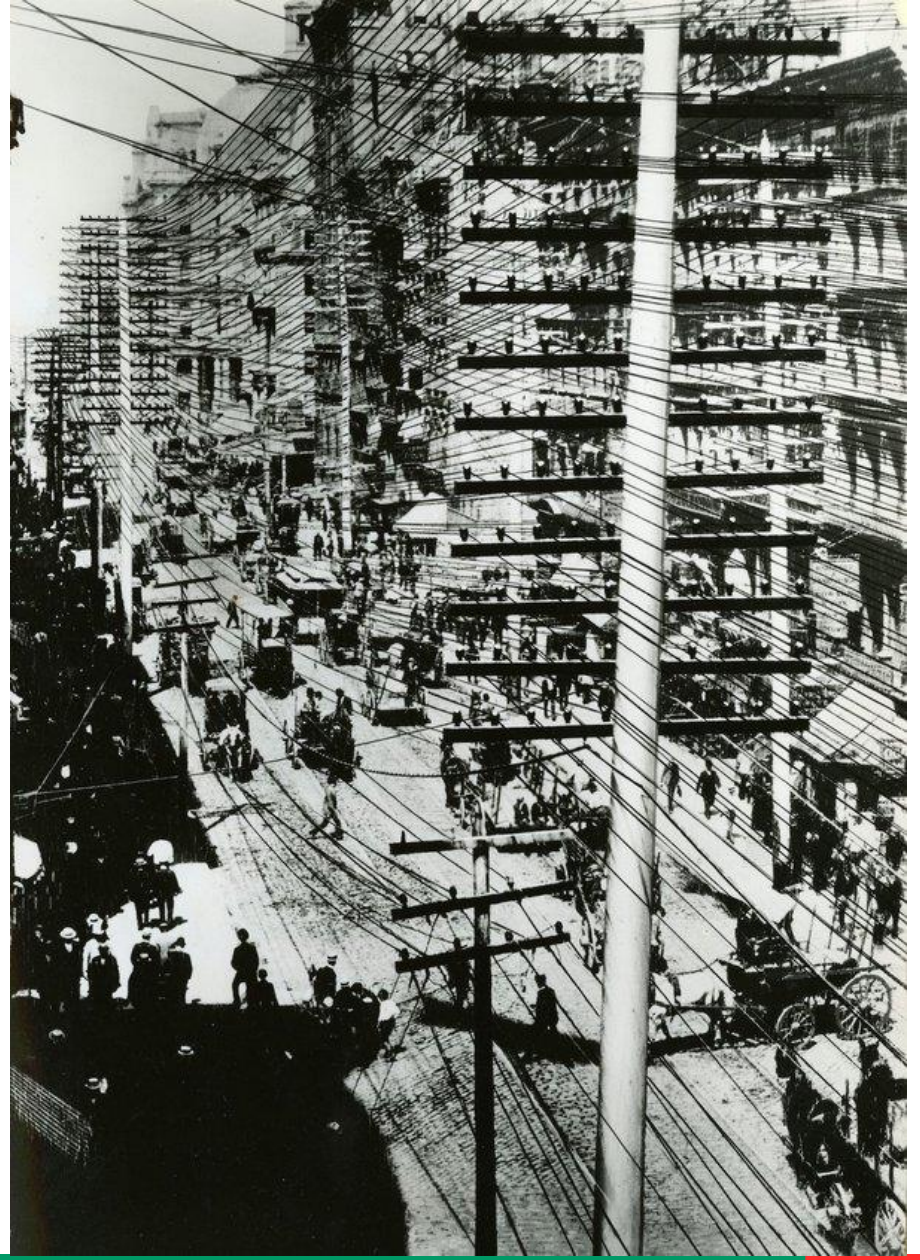
We are battling voltage drop.
And the lower the voltage the tougher the battle.



Power Supplies
Power = Voltage x Current

360W/120Vac = 3 Amps

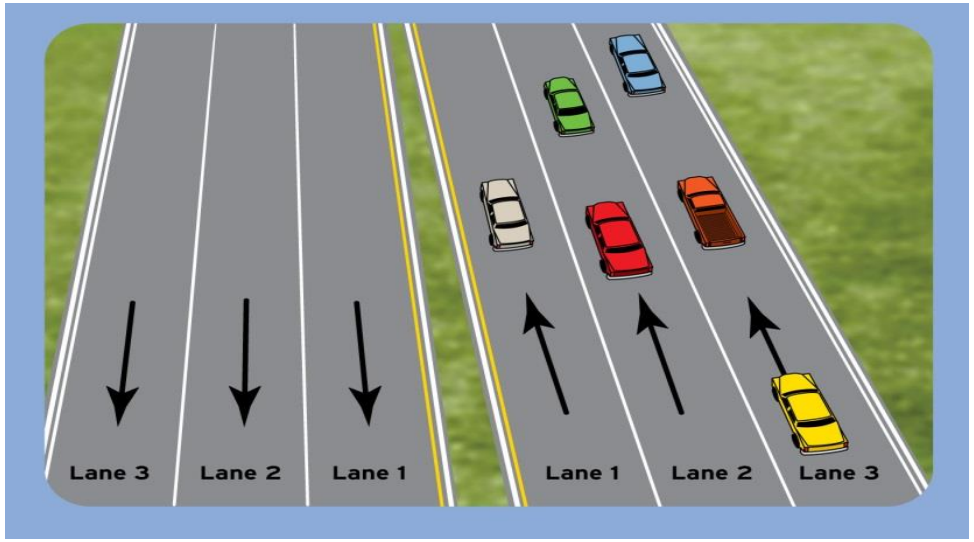
360W/12V = 30 Amps
360W/5V = 72 Amps



Wire gauge and resistance

- Gauge is a measure of wire size (lower gauge is larger diameter)
- Every wires has resistance

Current flow is analogous to traffic flow



Power Supplies
Power = Voltage x Current

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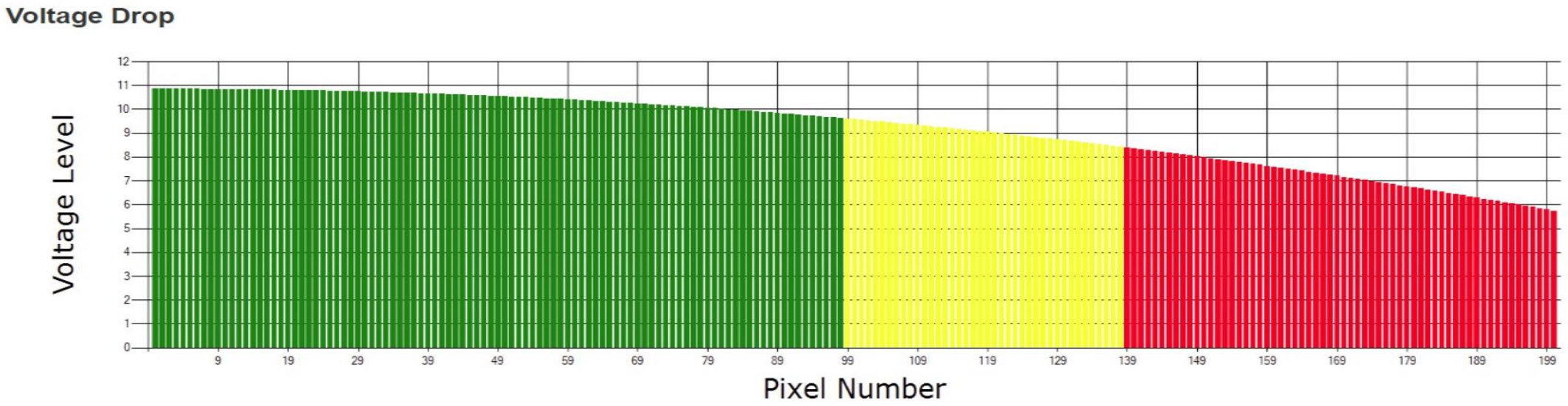
How does this impact your display?

Voltage drop without power injection



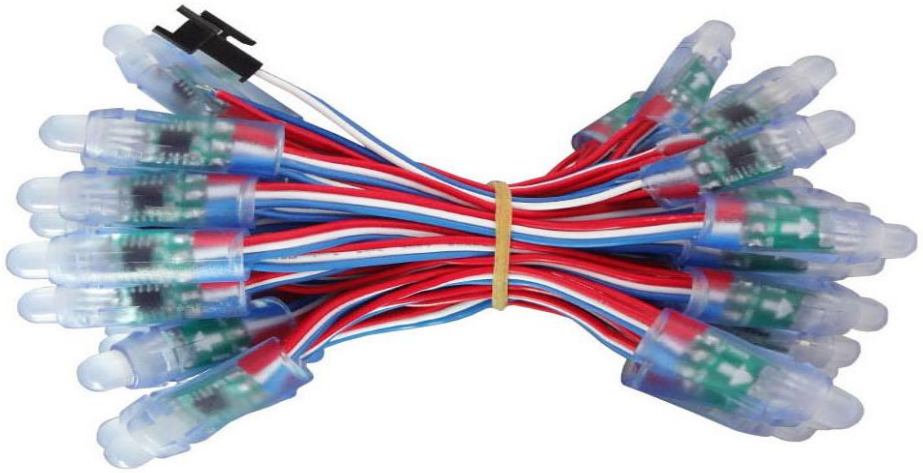
Based on 12V pixels!

.06 Amps
100%

Smart RGB Pixels

- Watts (P) = E*I
- 36W = 12V * 3 Amps

50 Count String

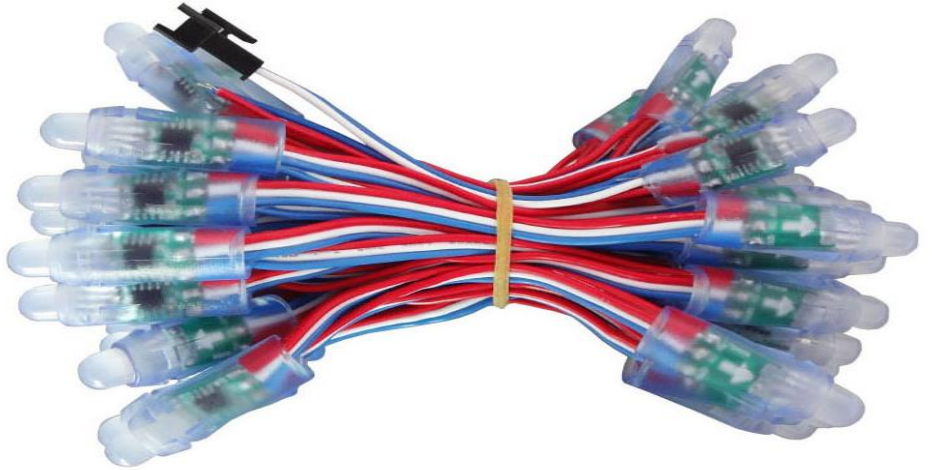


36 Watts

.06 Amps
100%

12 Volt vs. 5 Volt

Power = Voltage x Current



Each pixel requires .06 Amps at 100% brightness

360/12 = 30 Amps

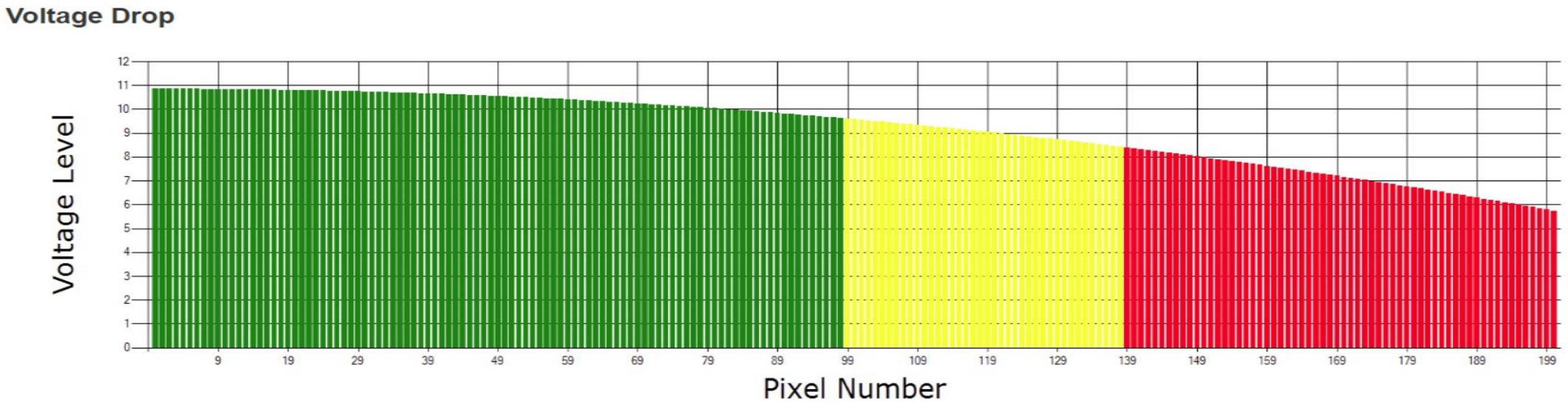
30/.06 = 500 Pixels

360/5 = 72 Amps

72/.06 = 1200 Pixels

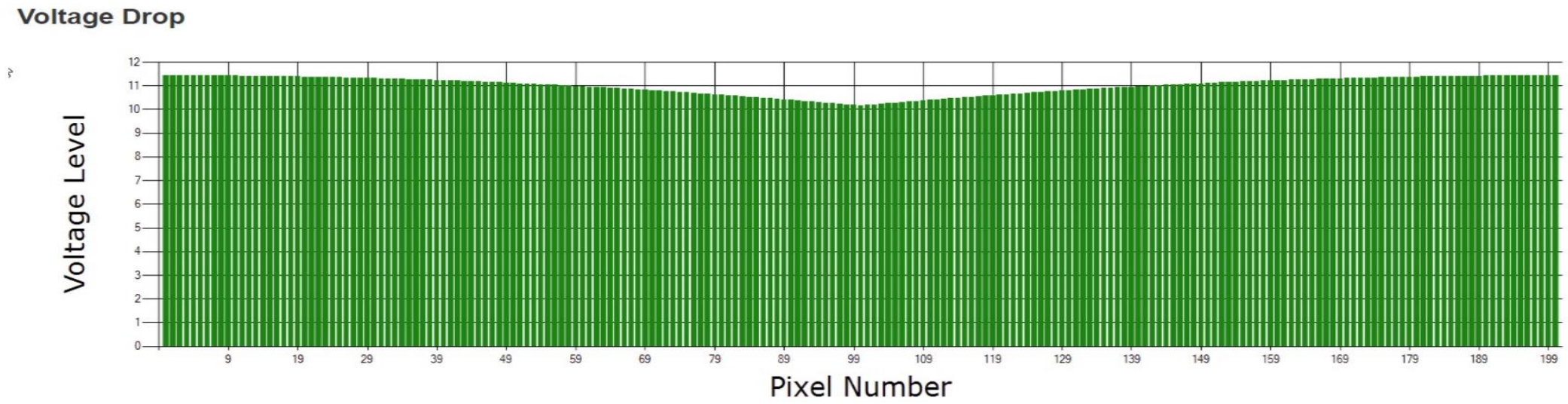
How do you power inject?

Voltage drop without power injection

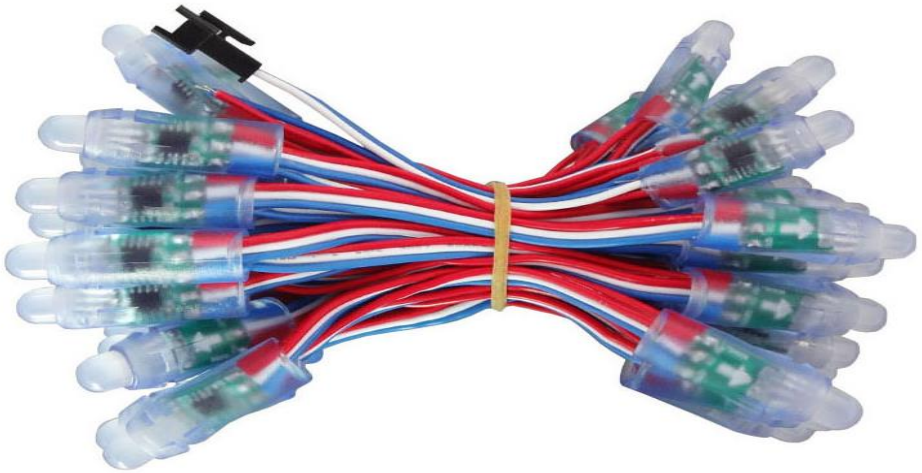


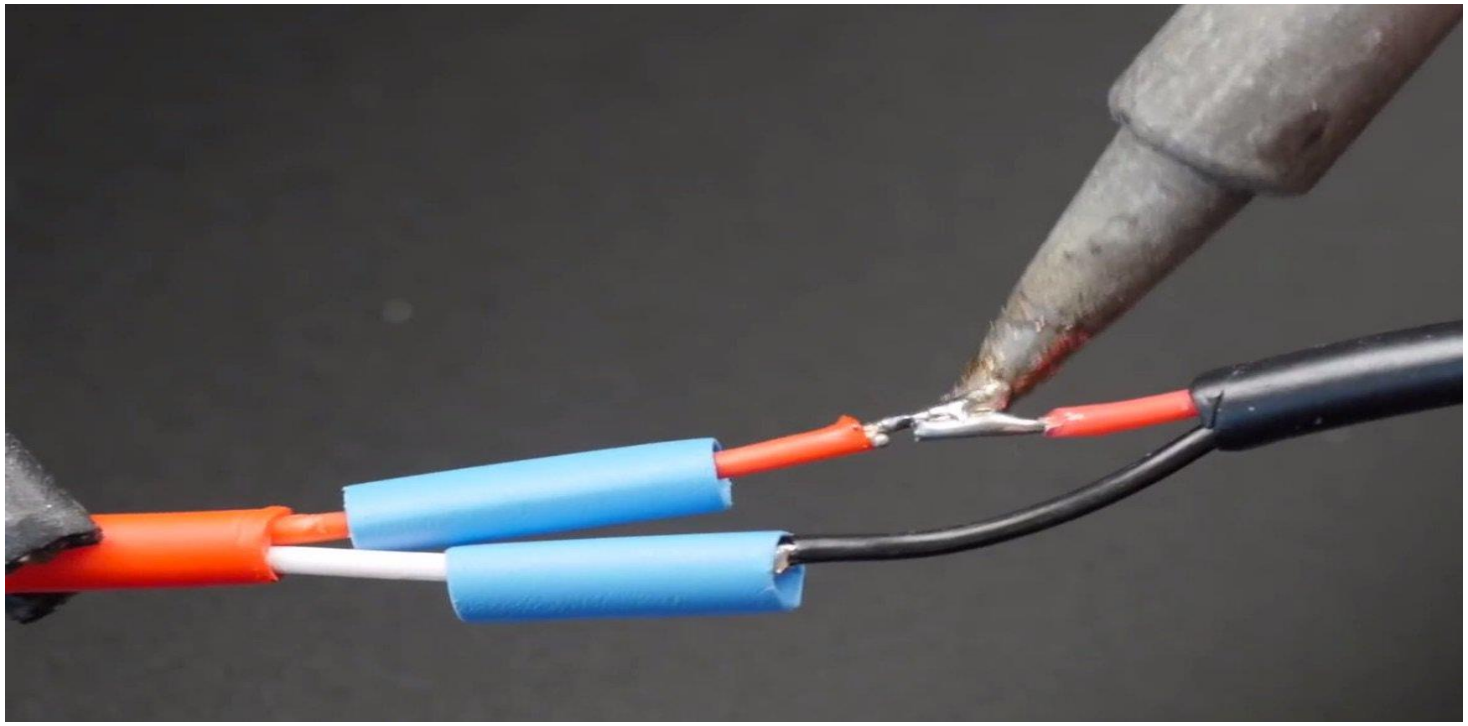
Based on 12V pixels!

Voltage graph with power injection



Solder + Shrink Tubing





Solder Seal Connectors

Power Injection T's

Rules to go by ?

For 5V pixels

No more than 50 pixels from then nearest injection point

For 12 V pixels

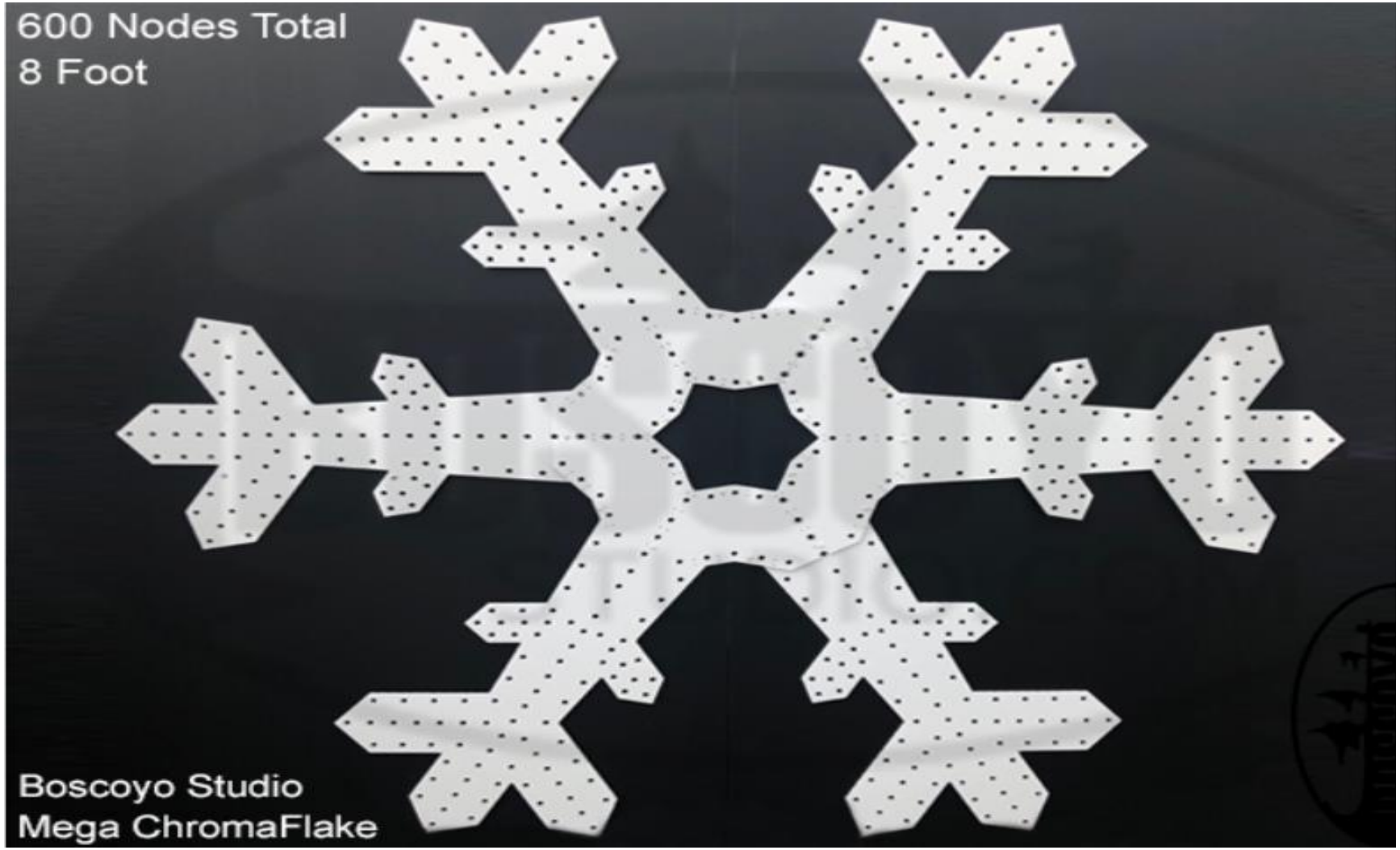
No more than 100 pixels from the nearest injection point

A good rule of thumb is to use 18 gauge minimum wire for power injection runs
Longer runs could require a larger wire

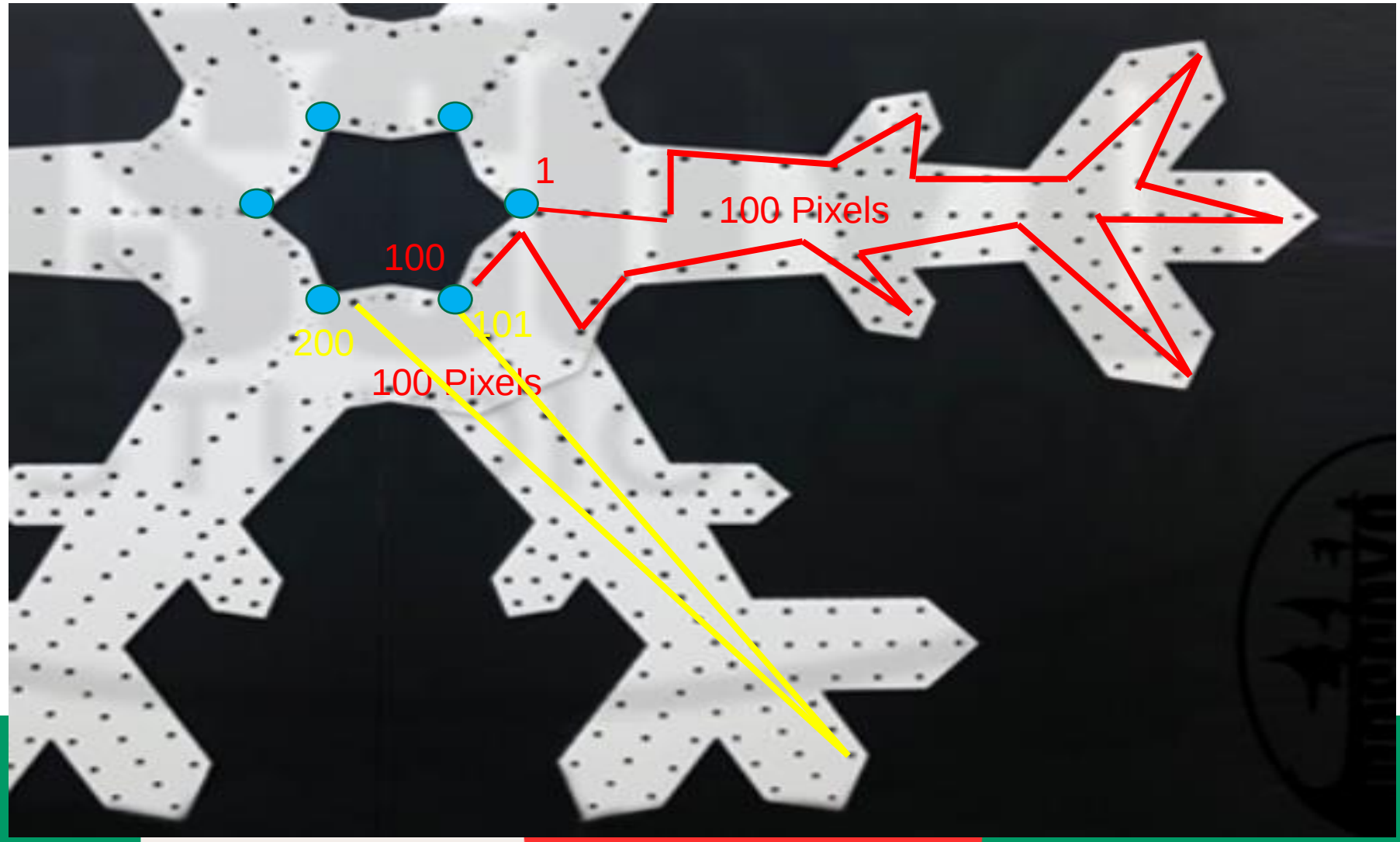
Gage No.	Ohms per 1000 Feet			Gage No.	Ohms per 1000 Feet			Gage No.	Ohms per 1000 Feet			Gage No.	Ohms per 1000 Feet		
0	0.1			10	1			20	10			30	100		
1		.125		11		1.25		21		12.5		31		125	
2			.16	12			1.6	22			16	32			160
3	.2			13	2			23	20			33	200		
4		.25		14		2.5		24		25		34		250	
5			.32	15			3.2	25			32	35			320
6	.4			16	4			26	40			36	400		
7		.5		17		5		27		50		37		500	
8			.64	18			6.4	28			64	38			640
9	.8			19	8			29	80			39	800		

Wire gauge standard vs Resistance

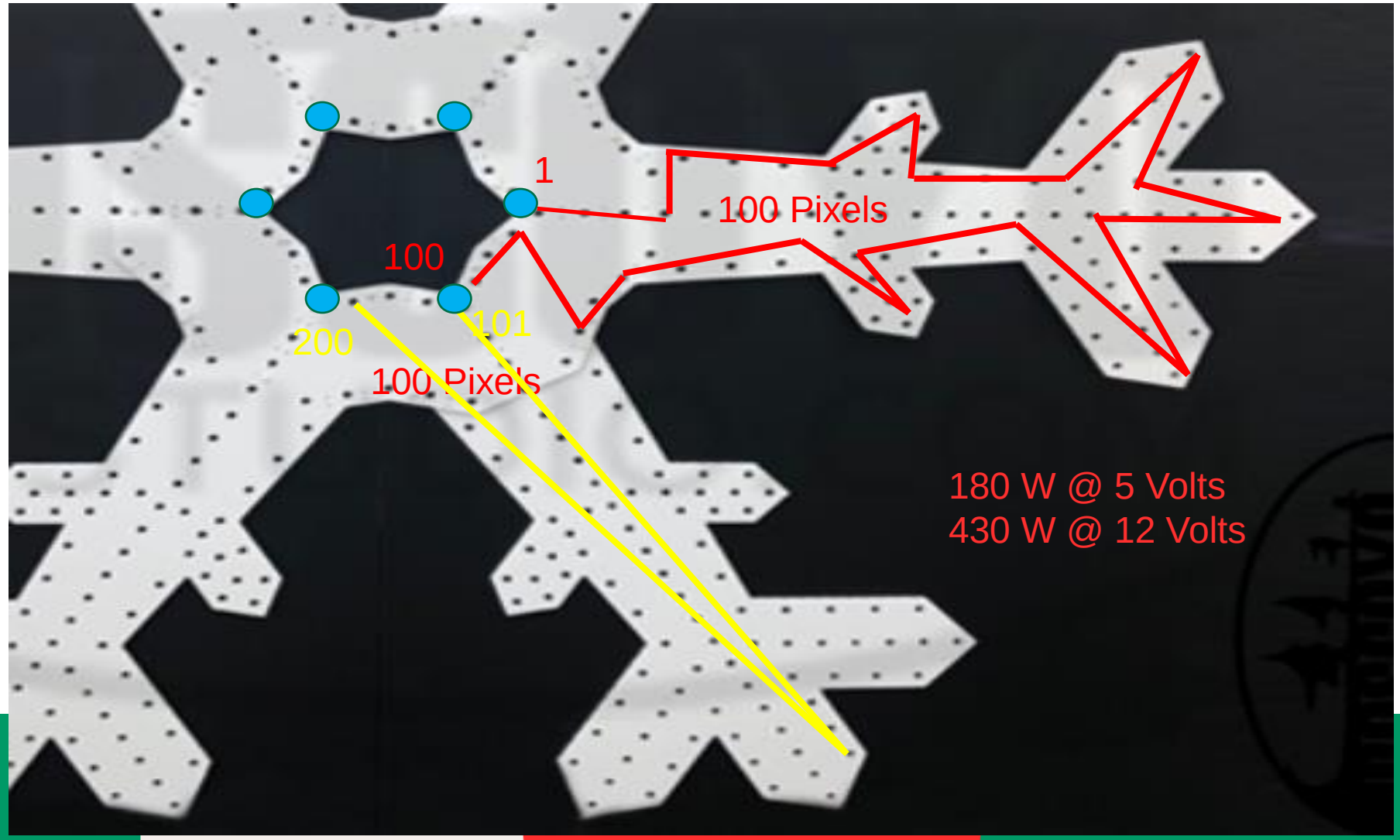
Real case examples


600 Nodes Total
8 Foot
Boscoyo Studio
Mega ChromaFlake

100 Pixels per arm



600 x .06 = 36 Amps



Summary

1. Stay within furthest power injection point (100 for 12V, 50 for 5V)
2. Consider Power injection runs and resistance
3. Monitor your total Wattage per power supply

Questions?