OHMS LAW - Resistors for LEDs

LED Light Resistors using power at 0.020 Amperage
All Ohms are at lowest resistance for the voltage and you can go actually a little higher for each.
This chart below is most used voltages used at the Bethesda North Hospital Train Display
To get the correct resistors for the application.

You need to have the correct current from the power supply.
Then divide that current into the voltage that you will be using.
That is OHM's law. See example below.
The below Ohms are calculated at .020 amperage or current average wall wart transformer

3.	Volts =	150	Ohms
3.5	Volts =	175	Ohms
5.	Volts =	250	Ohms
6.	Volts =	300	Ohms
9.	Volts =	450	Ohms
12.	Volts =	600	Ohms
14.	Volts =	700	Ohms
16.	Volts =	800	Ohms
18.	Volts =	900	Ohms
24.	Volts =	1200	Ohms

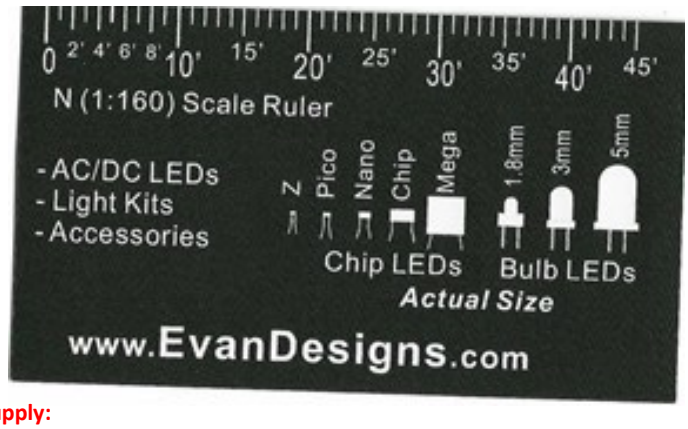
OHM'S LAW
Voltage to use 12 Volts
Current (Amperage) 0.020
Divide the Current into the Voltage
Gives the Value of Resistance to use 600 Ohms
Voltage / Current
12 / 0.020

Code Calculator45
https://www.digikey.com/en/resources/conversion-calculators/conversion-calculator-resistor-color-code.

Basic Resistor to use for lighting a 3V LED using 12V DC power
Add one 660 OHM Resistor in line near the led to operate on 12 V DC
Change the plug from the 3 V 2 pin to the 12 V DC 4 Pin Configuration.

The LED is ready to operate

LED Power Supply Information



Power Supply:

Wire these lights to:

5-12 volt Battery

Or

Regulated 12V DC Transformer

The LEDs will not work correctly

With Unregulated DC Transformers

Including Model Train Power Supplies

Or most commonly found transformers.

LED Light Ideas:

Do not use Hot Glue it is too hot.

Holding Wax, Goop, White Glue

and tape are all suitable for LEDs.

TOO BRIGHT?

Add a small amount of

similar-color paint. Enamel takes down

the brightness 50% or more

These lights are guaranteed to

Stay lit for 2 full years, if run at

the correct voltage range.

If a light should fail, contact

Us with an Explanation o how

the fail occurred for a free

replacement light of th4e same

size/color/voltage.

Evan Designs

18163 Health Parkway

Fort Collins CO 80524

www.EvansDesigns.com

Copper Ampacity Chart

Copper

Table 310.15(B)(16) (formerly Table 310.16) Allowable Ampacities of Insulated Conductors Rated Up to and Including 2000 Volts, 60°C through 90°C (140°F through 194°F), Not More Than Three Current-Carrying Conductors in Raceway, Cable, or Earth (Directly Buried), Based on Ambient Temperature of 30°C (86°F)

Conductor Size (AWG or KCMIL)	60°C/140°F TW & UF	75°C/167°F RHW, THHW, THW, THWN, XHHW, USE, ZW	90°C/194°F TBS, SA, SIS, FEP, FEPB, MI, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, XHH, XHHW, XHHW-2, USE-2 & ZW
18	--	--	14
16	--	--	18
14*	15	20	25
12*	20	25	30
10*	30	35	40
8	40	50	55
6	55	65	75
4	70	85	95
3	85	100	115
2	95	115	130
1	110	130	145
1/0	125	150	170
2/0	145	175	195
3/0	165	200	225
4/0	195	230	260
250	215	255	290
300	240	285	320
350	260	310	350
400	280	335	380
500	320	380	430
600	350	420	475
700	385	460	520
750	400	475	535
800	410	490	555
900	435	520	585
1000	455	545	615

Aluminum or Copper-Clad Aluminum

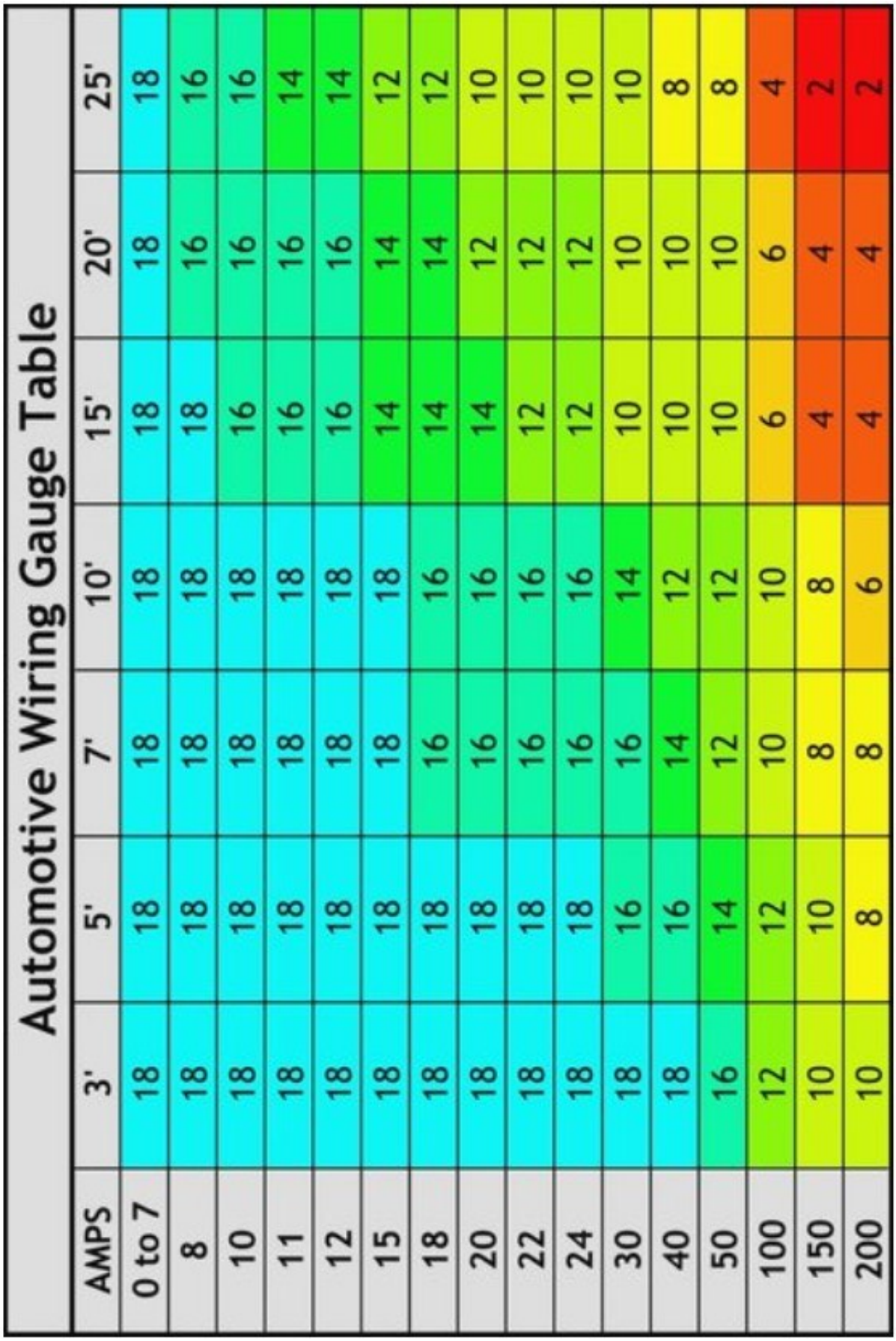
Table 310.15(B)(16) (formerly Table 310.16) Allowable Ampacities of Insulated Conductors Rated Up to and Including 2000 Volts, 60°C through 90°C (140°F through 194°F), Not More Than Three Current-Carrying Conductors in Raceway, Cable, or Earth (Directly Buried), Based on Ambient Temperature of 30°C (86°F)

Conductor Size (AWG or KCMIL)	60°C/140°F TW & UF	75°C/167°F RHW, THHW, THW, THWN, XHHW, USE, ZW	90°C/194°F TBS, SA, SIS, FEP, FEPB, MI, RHH, RHW-2, THHN, THHW, THW-2, THWN-2, XHH, XHHW, XHHW-2, USE-2 & ZW
--	--	--	--
--	--	--	--
--	--	--	--
12*	15	20	25
10*	25	30	35
8	35	40	45
6	40	50	55
4	55	65	75
3	65	75	85
2	75	90	100
1	85	100	115
1/0	100	120	135
2/0	115	135	150
3/0	130	155	175
4/0	150	180	205
250	170	205	230
300	195	230	260
350	210	250	280
400	225	270	305
500	260	310	350
600	285	340	385
700	315	375	425
750	320	385	435
800	330	395	445
900	355	425	480
1000	375	445	500

Wire Gauge Chart for Length in Feet

Total Approx. Circuit Amperes	Wire Gauge (For Length In Feet)												
12VDC	3	5	7	10	15	20	25	30	40	50	75	100
1	18	18	18	18	18	18	18	18	18	18	18	18
1.5	18	18	18	18	18	18	18	18	18	18	18	18
2	18	18	18	18	18	18	18	18	18	18	16	16
3	18	18	18	18	18	18	18	18	18	18	14	14
4	18	18	18	18	18	18	18	18	16	16	12	12
5	18	18	18	18	18	18	18	18	16	14	12	12
6	18	18	18	18	18	18	16	16	16	14	12	10
7	18	18	18	18	18	18	16	16	14	14	10	10
8	18	18	18	18	18	16	16	16	14	12	10	10
10	18	18	18	18	16	16	16	14	12	12	10	10
11	18	18	18	18	16	16	14	14	12	12	10	8
12	18	18	18	18	16	16	14	14	12	12	10	8
15	18	18	18	18	14	14	12	12	12	10	8	8
18	16	16	16	16	14	14	12	12	10	10	8	8
20	16	16	16	16	14	12	10	10	10	10	8	6
22	14	16	14	14	12	12	10	10	10	8	6	6
24	14	14	14	14	12	12	10	10	10	8	6	6
30	12	12	12	12	10	10	10	10	10	6	4	4
40	10	8	8	8	8	8	8	8	6	6	4	2
50	8	8	8	8	8	8	8	8	6	6	2	2
100	4	4	4	4	4	4	4	4	4	2	1	1/0
150	2	2	2	2	2	2	2	2	2	1	2/0	2/0
200	1/0	1/0	1/0	1/0	1/0	1/0	1/0	1/0	1/0	1/0	4/0	4/0

Automotive Wiring Gauge Table



Automotive Wiring Gauge Table							
AMPS	3'	5'	7'	10'	15'	20'	25'
0 to 7	18	18	18	18	18	18	18
8	18	18	18	18	18	16	16
10	18	18	18	18	16	16	16
11	18	18	18	18	16	16	14
12	18	18	18	18	16	16	14
15	18	18	18	18	14	14	12
18	18	18	16	16	14	14	12
20	18	18	16	16	14	12	10
22	18	18	16	16	12	12	10
24	18	18	16	16	12	12	10
30	18	16	16	14	10	10	10
40	18	16	14	12	10	10	8
50	16	14	12	12	10	10	8
100	12	12	10	10	6	6	4
150	10	10	8	8	4	4	2
200	10	8	8	6	4	4	2