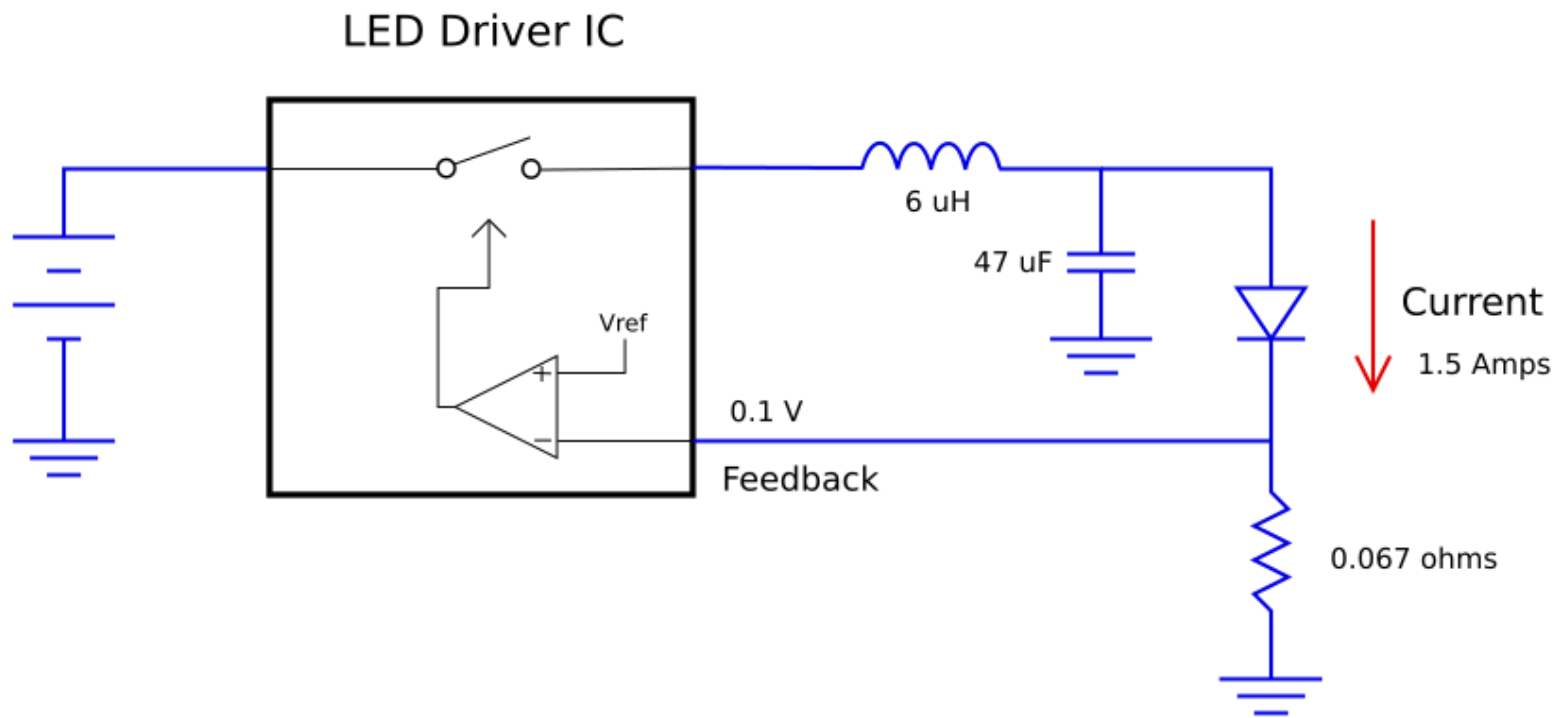




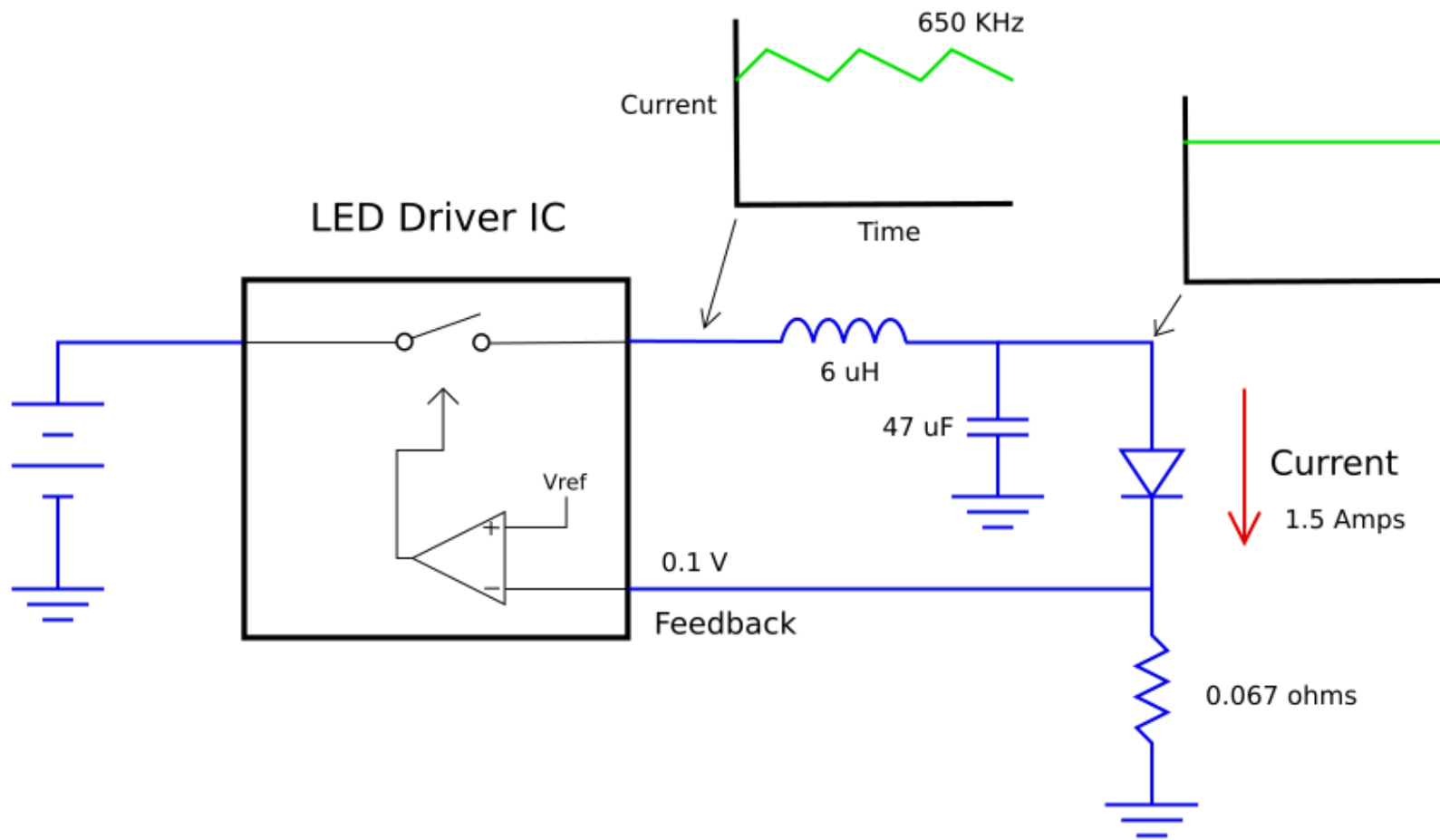
# **Non-linear Effects in High Power LEDs**

Steve Reames

Marble Mountain Lights, LLC

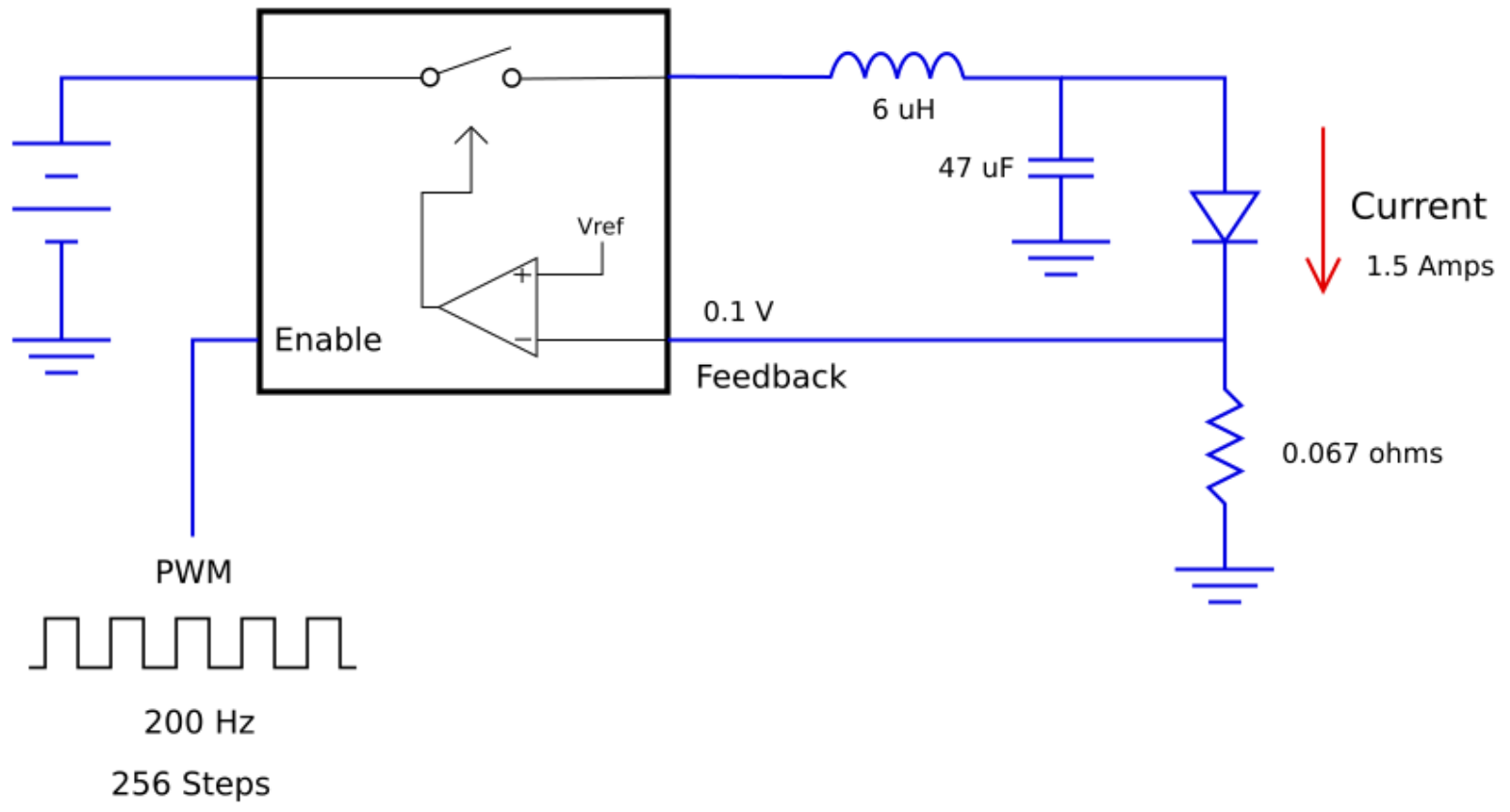


Resistor sets maximum output





### LED Driver IC



# Measures of Light

- Like items can be compared in percentage

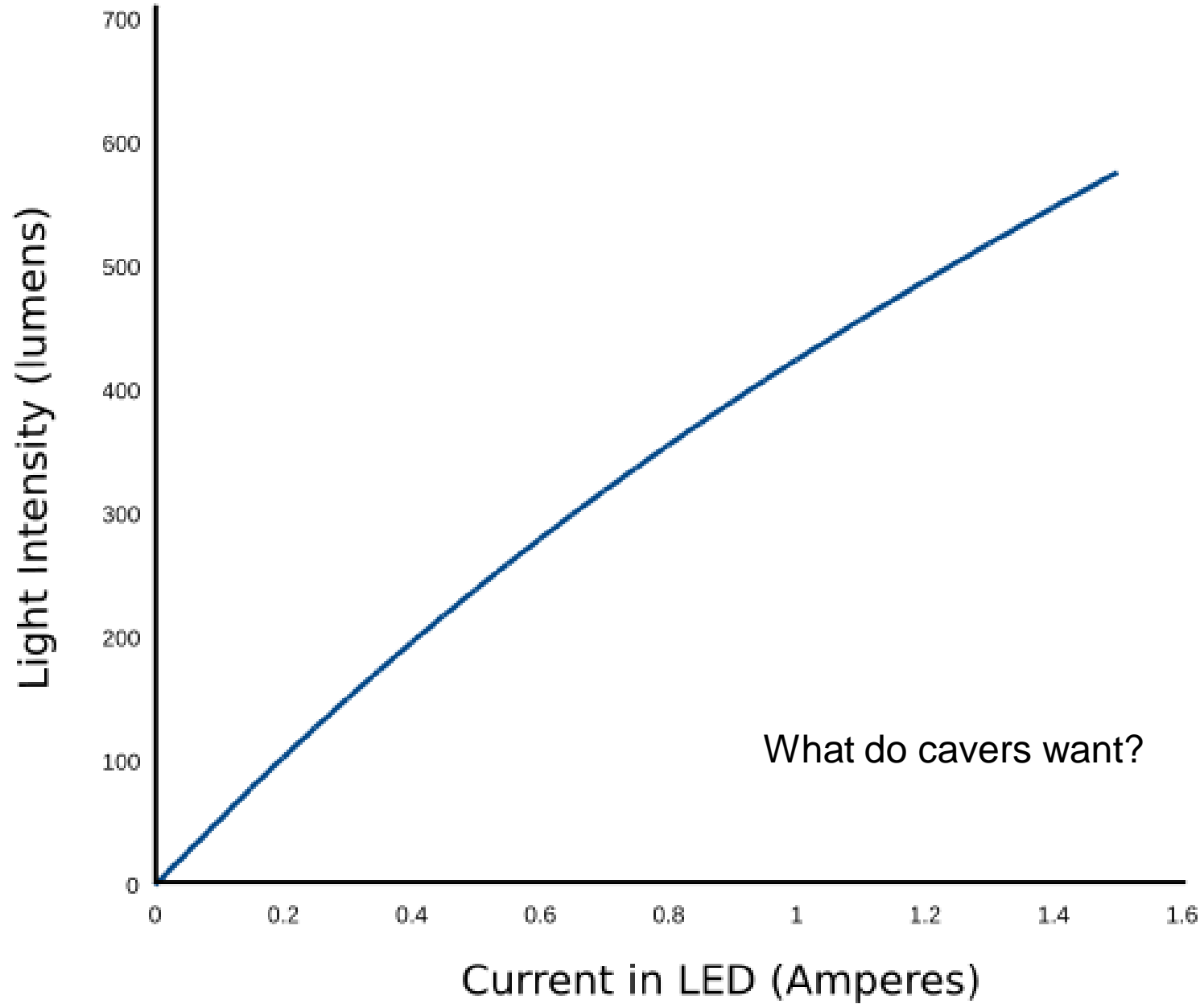
We use the word “efficiency”

RF – Power out / power in  $\rightarrow$  %

- Un-like items must has units attached

Light is measured in Lumens

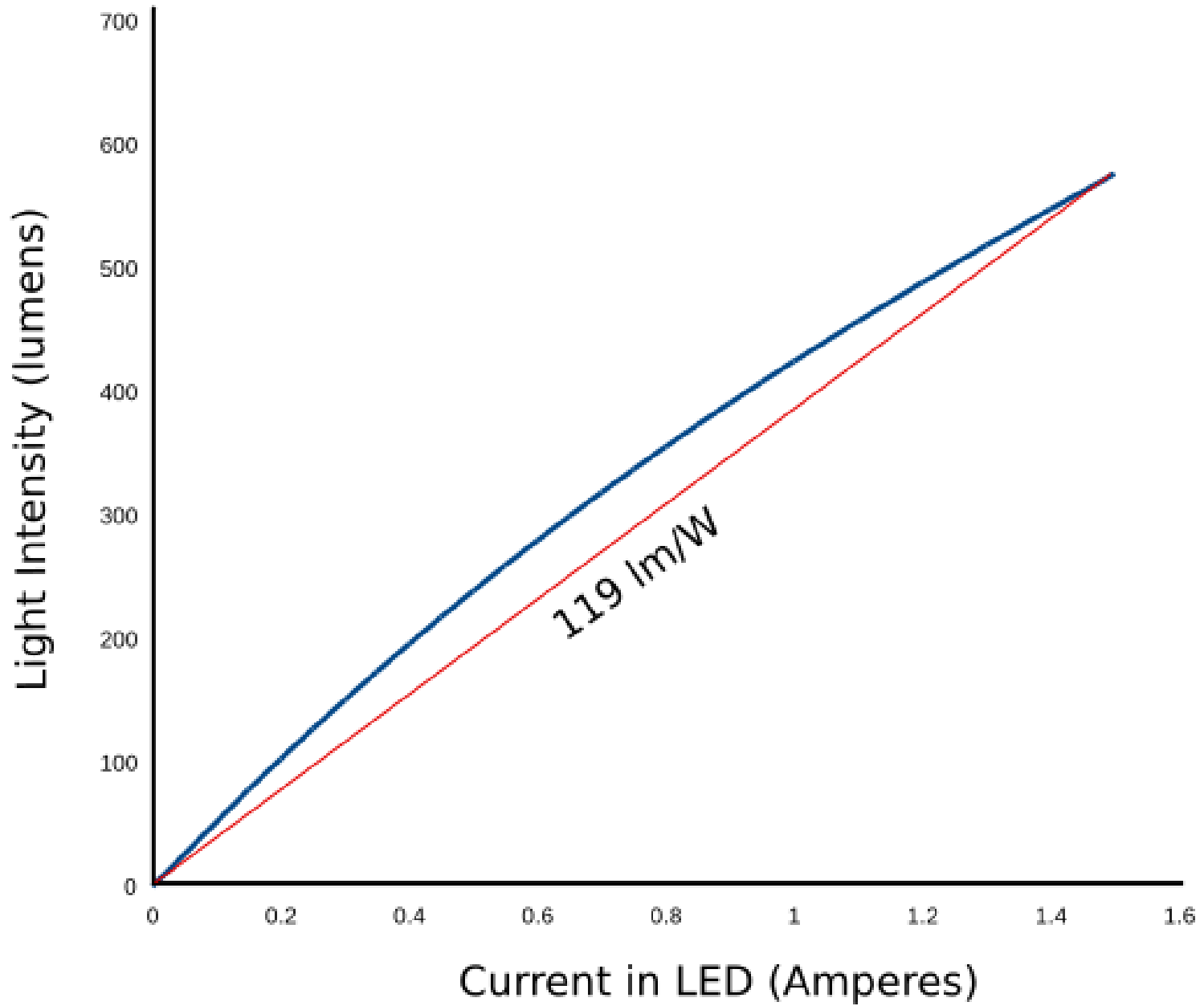
“efficacy” is light / power  $\rightarrow$  lm/W





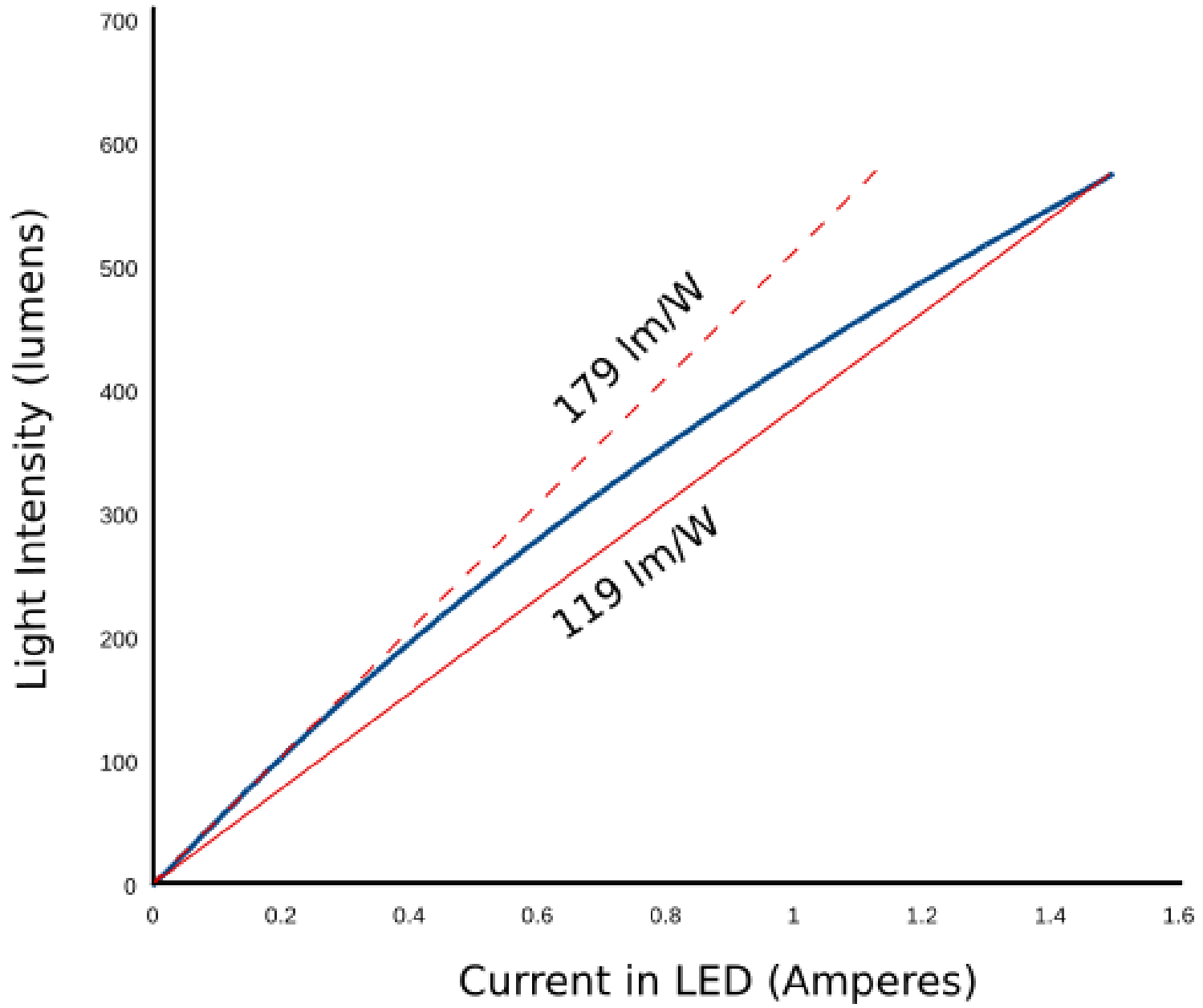
# About the Human Eye

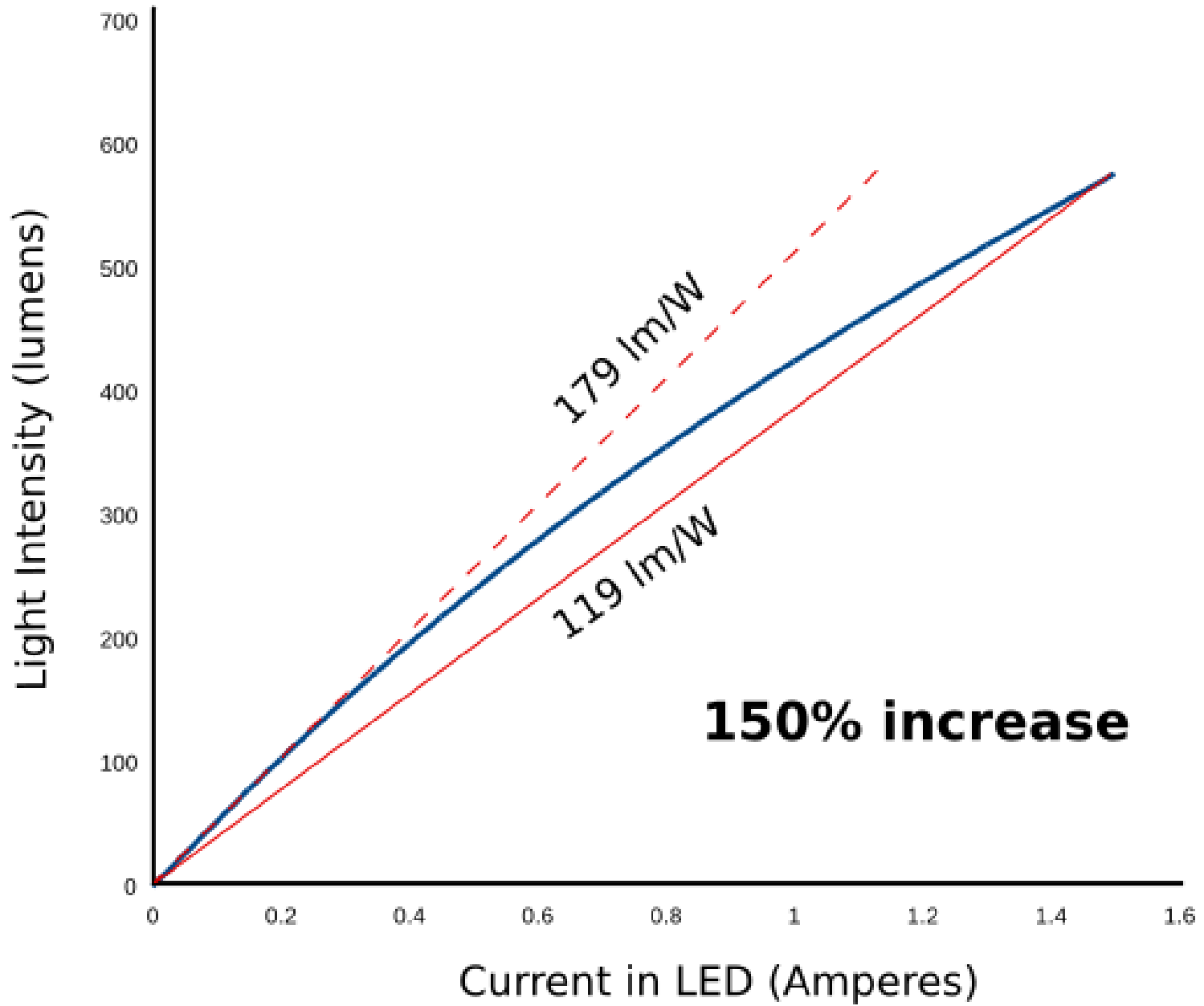
- Responds to the **average** light intensity.
- Visually, output is logarithmic.

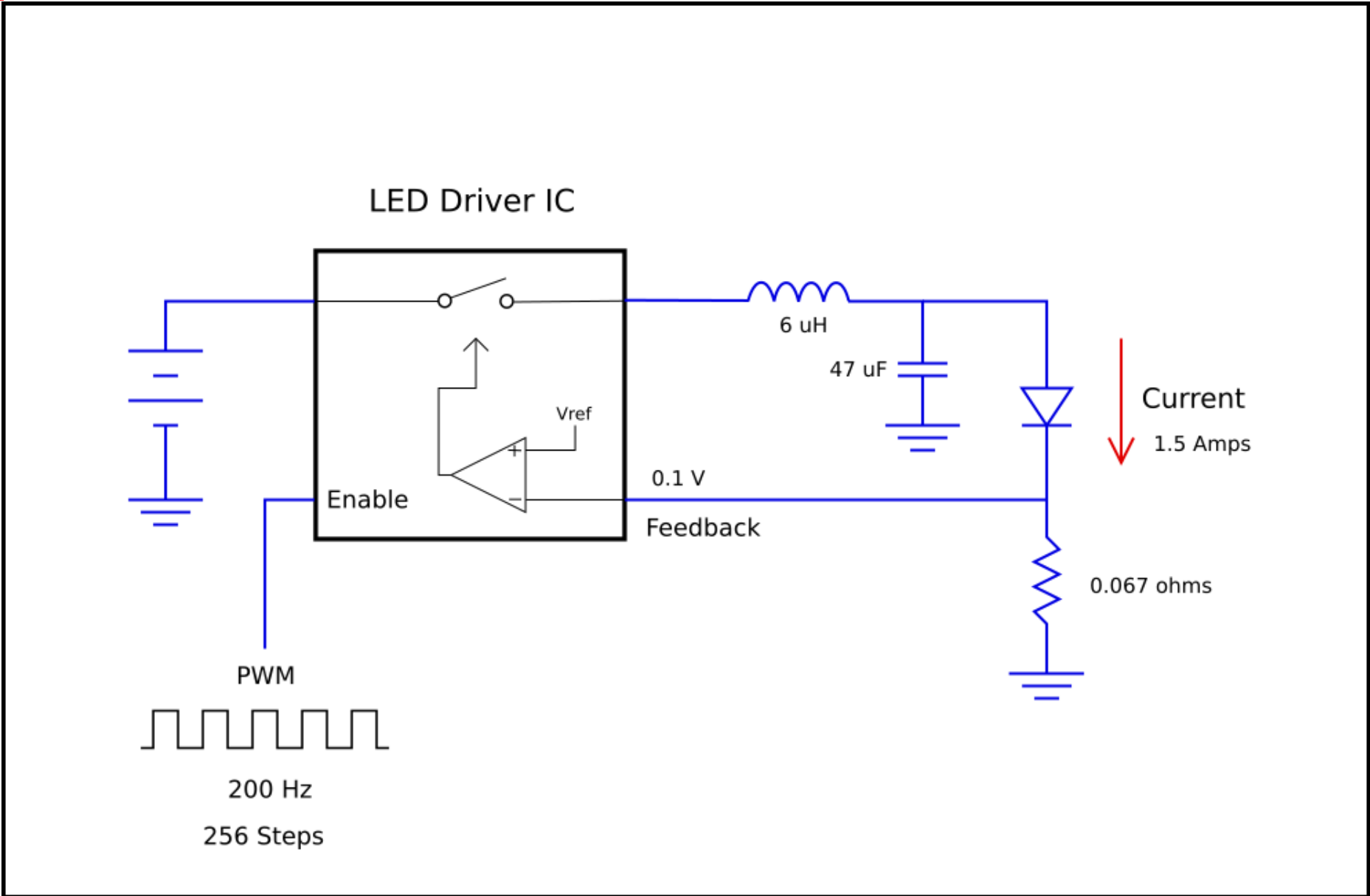




	LED 1				LED 2				
4									
5									
6	Current (A)	Model	Cree XLamp XP-G2 (BWT)		Model	(none)			
7		Flux	S3 [156]	156.0	Flux				
8		Price	\$ -	Tsp (°C)	25	Price	\$ -	Tsp (°C)	25
9		ΔVf	0.000	Multiple	x1	ΔVf	0.000	Multiple	x1
10		LED Im	LED Im/W	LED Vf	LED W				
11	0.150	78.5	186.98	2.8	0.42				
12	0.200	103.3	182.56	2.83	0.566				
13	0.250	127.5	178.54	2.85	0.714				
14	0.300	151	174.8	2.88	0.864				
15	0.350	173.9	171.37	2.9	1.015				
16	0.400	196.3	167.89	2.92	1.169				
17	0.450	218	164.66	2.94	1.324				
18	0.500	239.2	161.64	2.96	1.48				
19	0.550	259.9	158.67	2.98	1.638				
20	0.600	280	155.82	2.99	1.797				
21	0.650	299.7	153.13	3.01	1.957				
22	0.700	318.9	150.63	3.02	2.117				
23	0.750	337.6	148.15	3.04	2.279				
24	0.800	355.9	145.74	3.05	2.442				
25	0.850	373.8	143.49	3.06	2.605				
26	0.900	391.2	141.29	3.08	2.769				
27	0.950	408.4	139.18	3.09	2.934				
28	1.000	425.1	137.12	3.1	3.1				
29	1.100	457.5	133.24	3.12	3.434				
30	1.200	488.8	129.56	3.14	3.773				
31	1.300	518.9	126.05	3.17	4.117				
32	1.400	548.2	122.76	3.19	4.466				
33	1.500	576.7	119.57	3.22	4.823				
34	1.600								







# The Reames Circuit

