

BEFORE THE U.S. FEDERAL TRADE COMMISSION

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PETITION FOR RULEMAKING TO REQUIRE  
PUBLICATION OF THE LUMINANCE METRIC FOR  
PRODUCTS WITH LIGHT EMITTING DIODES

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SUBMITTED BY  
SOFT LIGHTS FOUNDATION  
ON  
NOVEMBER 26, 2023

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## **I. Introduction and Summary**

Luminance is the metric for light that describes the amount of light that passes through, is emitted from, or is reflected from a particular area, and falls within a given solid angle and is measured in candela per square meter. Luminance measures the density of light emitted by a flat surface, and thus luminance is the metric that chip makers for Light Emitting Diodes place on their specification sheets to convey the intensity of the light emitted by the chip.

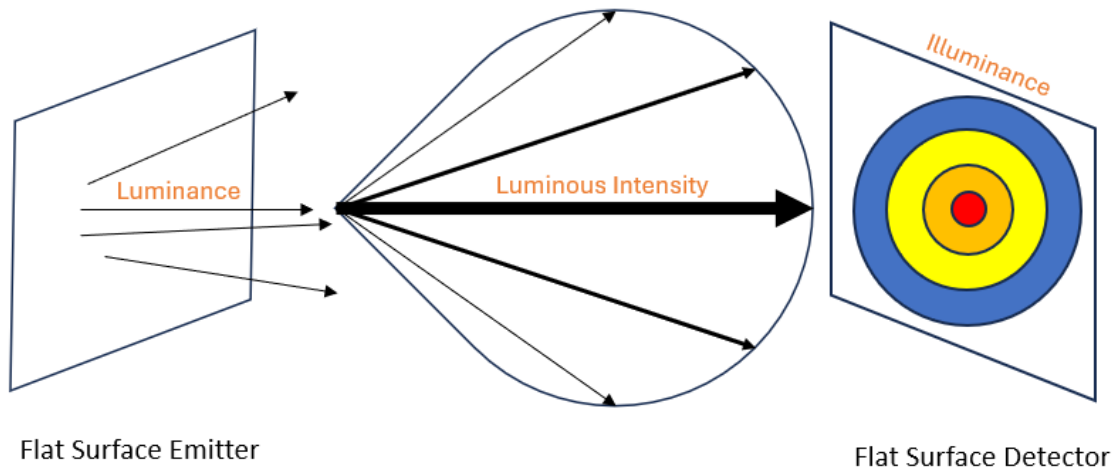
The luminance metric is of critical importance for purchasers and consumers of products that use LEDs because luminance conveys the intensity of the light. Currently, however, the luminance metric is typically only available in the chip-level specifications and is not placed on product labelling for access by the consumer. This petition requests that the Federal Trade Commission require the luminance value to be displayed on product packaging and made accessible on spec sheets and product websites.

## **II. Statement of Facts**

### **A. Physics of LEDs**

Light Emitting Diodes emit light from a flat surface. The metric for measuring the light emitted by a flat surface is called 'luminance' and is measured in candela per square meter, or "nit" in industry parlance. Luminance is the density of the light from a flat surface emitter.

The flat surface of the LED causes the light rays to overlap, creating a Lambertian spatial profile and non-uniform illuminance at the destination. This is shown in Figure 1.



A flat surface emitter creates a Lambertian spatial profile.

Luminance: candela/m<sup>2</sup>  
 Luminous Intensity: candela  
 Illuminance: lumens/m<sup>2</sup> (lux)

*Figure 1 - LED Lighting Vocabulary*

Even though there is just one luminance value, because of the inherent lensing of an LED chip, there are multiple illuminance values. The illuminance values will depend on the distance from the source. Due to the small size of an LED chip, measuring the illuminance values with precision is technically challenging.

Measuring the luminance value for the LED chip is also technically challenging and typically requires a laboratory, but the LED chip makers all have this equipment and include the luminance value in the specifications for their LED chips.

## **B. LED Displays**

Figure 2 shows the specifications for a 24-inch LED computer monitor. The third line states “Brightness: 400 cd/m<sup>2</sup>. Even though it’s called “brightness” in this context, the cd/m<sup>2</sup> means candela per square meter, which are units for the metric luminance. The LED industry often uses the word “nits” as an equivalent name for candela per square meter.



Figure 2 - LED Monitor Specs<sup>1</sup>

The fact that the LED display industry displays the luminance value as an important value for the consumer tells us that the luminance value is an important value for the consumer for any product that uses LEDs. The luminance value tells the consumer how intense the light is. In many situations, the consumer will wish to limit this intensity, whether to protect their eyes or to limit glare.

### C. Other LED Products

In addition to LED displays, there are many other products that use LEDs. In this section we include several, but by no means exhaustive, examples of products that use LEDs.

<sup>1</sup> <https://www.dajingmedical.com/Products/yyjsq.html>

## 1. LED Flashing Lights

Figure 3 shows the extreme intensity of the LED flashing lights on an emergency vehicle. First responders and the staff who maintain their vehicles currently have no practical access to the luminance of these lights to be able to make decisions such as restricting the luminance to protect first responder vision, cognitive functioning, and safety, or ensuring the protection of civil rights for the public.



*Figure 3 - LED Flashing Lights<sup>2</sup>*

## 2. LED Street Lights

An LED street light is shown in Figure 4.

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<sup>2</sup> <https://www.whelen.com/all-products/>

# GELF3

GlasWerks® Luminescent  
LED Hallbrook® Extended



Figure 4 - LED Street Light

The table in Figure 5 shows the wattage, Correlated Color Temperature, Color Rendering Index, Lumens, and Lumens per Watt. What the spec sheet does not show is the luminance, and thus neither city engineers nor the public know how intense the light is and whether it is comfortable or exceeds safety thresholds.

**PERFORMANCE DATA**  
Lumen and Wattage Data

Lumen Package	System Wattage	Distribution	2700K, 70 CRI		3000K, 70 CRI		4000K, 70 CRI	
			Lumens	LPW	Lumens	LPW	Lumens	LPW
P10	30	ASY	3,738	126	3,870	130	4,122	139
		SYM	3,860	130	3,995	134	4,256	143
		PTH	3,681	124	3,811	128	4,059	137

Figure 5 - LED Street Light Specs<sup>3</sup>

<sup>3</sup> <https://img.acuitybrands.com/public-assets/catalog/1319602/gelf3.pdf>

### 3. LED Flashlights

The Gear Light S2000 contains a warning about eye injury and includes the number of lumens in the spec sheet, but does not show the luminance, which is the metric the consumer needs to know to know how intense the light beam is to understand the danger this flashlight poses to others.

**WARNING:** To avoid eye injury, do not stare directly into the light beam or shine the beam directly into anyone's eyes. This product is not designed, intended, or recommended for children or hazardous environments.

Figure 6 - Gear Light Warning

Light Source Type	LED
Material	Aluminum
Included Components	1x S2000 LED Flashlight, 1x AA Battery Holder, 1x Operation Guide, 1x Warranty Card
Product Dimensions	7.5"D x 1.3"W x 1.3"H
Item Weight	0.7 Pounds
Water Resistance Level	Water Resistant
Brand	GearLight
Brightness	1200 Lumen

Figure 7 - Gear Light s2000 Spec Sheet

### 4. LED Indicator Lights

LED indicator lights have become more intense, often causing discomfort or eye pain. At night, the LED light on an appliance can illuminate an entire room.



Figure 8 - LED Indicator Lights

#### 5. LED Vehicle Headlights and Daytime Running Lights

LED headlights and Daytime Running Lights can have a luminance that exceeds 70,000,000 candela per square meter. This information is in the spec sheet from the LED chip maker but is not easily accessible to technicians or the public. Figure 9 shows the intense DRLs or headlights of a Ford Bronco.



Figure 9 - 2021 Ford Bronco LED Headamps<sup>4</sup>

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<sup>4</sup> <https://motorillustrated.com/ford-bronco-grille-and-headlights-revealed-in-new-teasers/51219/>



Figure 10 shows the specs from Hella for their LED headlight chips as of the year 2013 which shows that the headlights have a luminance of approximately 70,000,000 candela per square meter.

### 3 LED HEADLIGHTS ADVANTAGES: COMPARISON

LEDs are superior in several aspects. They might be more expensive to purchase than normal light bulbs or halogen bulbs, but their use pays for itself in a short time. The automotive industry in particular uses the positive features of the LED and employs it increasingly in new vehicles due to the following advantages:

Light Source	Luminous flux [lm]	Efficiency [lm/W]	Colour temperature [K]	Luminance [Mcd/m <sup>2</sup> ]
Conventional bulb W5W	~ 50	~ 8	~ 2700	~ 5
Halogen bulb H7	~ 1100	~ 25	~ 3200	~ 30
Gas discharge D2S	~ 3200	~ 90	~ 4000	~ 90
LED 2.5 Watts	~ 120 (2010) ~ 175 (2013)	~ 50 (2010) ~ 70 (2013)	~ 6500	~ 45 (2010) ~ 70 (2013)

Figure 10 - Hella LED Headlight Specs<sup>5</sup>

Clearly, since the luminance value is an important metric for Hella to convey to the headlight designer, this same luminance value is of critical importance to the public and government regulators.

#### D. FTC Lighting Facts Label

Figure 11 shows the current FTC Lighting Facts Label. The label displays the total luminous flux (called “brightness” on the label) in lumens. The label also displays the Correlated Color Temperature (called “Light Appearance” on the label) in Kelvin.

<sup>5</sup> <https://www.hella.com/techworld/us/Technical/Automotive-lighting/LED-headlights-833/>

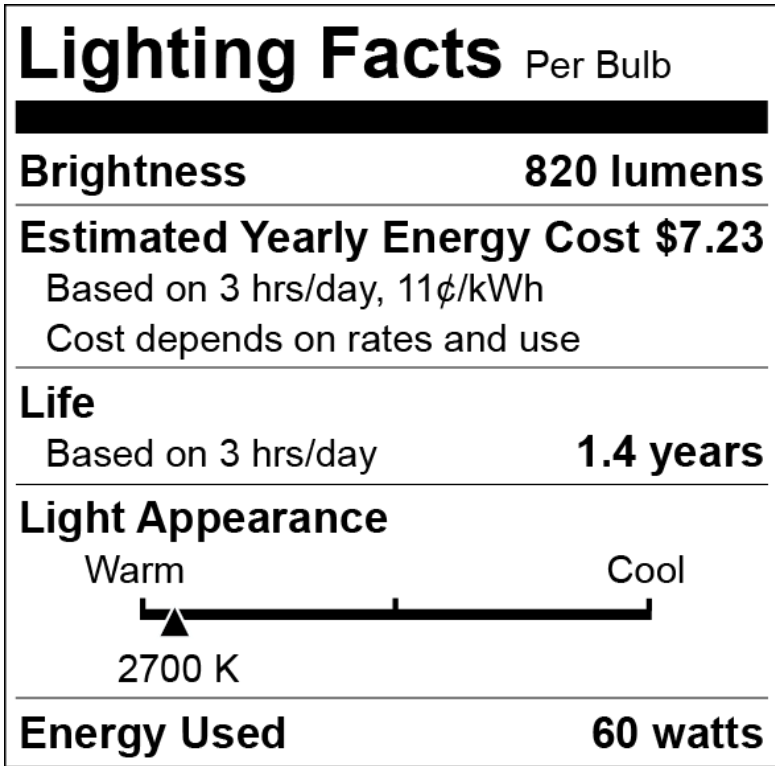


Figure 11 - FTC Lighting Facts Label

What is missing from the existing FTC Lighting Facts Label is the luminance value (which could be called “Intensity” on the label) in candela per square meter (which could be “nits” on the label). This petition proposes that the FTC Lighting Facts Label display the Intensity in nits, as shown in Figure 12


<b>Lighting Facts</b> Per Bulb	
<b>Brightness</b>	<b>820 lumens</b>
<b>Intensity</b>	<b>500 nits</b>
<b>Estimated Yearly Energy Cost \$7.23</b> Based on 3 hrs/day, 11¢/kWh Cost depends on rates and use	
<b>Life</b> Based on 3 hrs/day	<b>1.4 years</b>
<b>Light Appearance</b>	
<div style="display: flex; justify-content: space-between; align-items: center;"> <span>Warm</span> <span>Cool</span> </div>  <div style="display: flex; justify-content: center; align-items: center; margin-top: 5px;"> <span>2700 K</span> </div>	
<b>Energy Used</b>	<b>60 watts</b>

Figure 12 - Proposed Lighting Facts Label with Intensity

#### E. Food and Drug Administration Regulation

The US Food and Drug Administration is the only federal agency with the authority and mandate from Congress, as per 21 U.S.C. 360hh – 360ss, to regulate and publish performance standards for products that use LEDs. This includes LED vehicle headlights, LED General Service Lamps, LED flashing lights, LED street lights, LED indicator lights, LED flashlights, and many others. Despite the requirements of 21 U.S.C. 360ii, the FDA has not yet published the required performance standards for any LED product.

On June 12, 2022, the Soft Lights Foundation submitted citizen petition FDA-2022-P-1151, requesting that the FDA comply with 21 U.S.C. 360ii and publish performance standards for LED

products.<sup>6</sup> The FDA has responded that they are investigating the situation, but have taken no action to regulate LED products. However, it is expected that the FDA will eventually publish the required performance standards for LED products, and that this will require placing restrictions on the luminance of a product. This would be similar to the restrictions on radiance that are placed on laser products as detailed in 21 C.F.R. 1040.10.

Given the likely impending regulations on luminance from the FDA, products will need to show the luminance value for the product. The FDA may be reliant on the FTC to publish the luminance labeling requirements for LED products.

### **III. Conclusion**

In this petition, we have shown the following:

1. Luminance is the key metric for measuring the intensity of light from an LED.
2. Luminance is already shown on the packaging and marketing materials for LED televisions and LED monitors.
3. Luminance is a critical metric for consumers, technicians, engineers, and government regulators to be able to make decisions about protecting comfort, health, safety, and civil rights.
4. The FDA will need the luminance value to be placed on LED product packaging, user manuals, and product websites to ensure that the LED product meets FDA requirements.

For the reasons detailed above, we request that the FTC:

1. Modify the Lighting Facts Label to include Intensity in nits.

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<sup>6</sup> <https://www.regulations.gov/document/FDA-2022-P-1151-0001>

2. Require all products that use LEDs to show the luminance of the LEDs on product spec sheets, user manuals, marketing materials, and product websites.

Respectfully Submitted by:

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