



February 22, 2022

**BY EMAIL**

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National Highway Transportation Safety Administration  
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**Re: NHTSA Docket No. NHTSA-2022-0013**

Dear John Piazza,

NHTSA has proposed modifying FMVSS-108 to authorize the use of Adaptive Driving Beam technology, even though NHTSA has never authorized the use of flat source emitter LED technology for vehicle headlights. Because LEDs emit light from a flat surface, LED light is toxic, hazardous, and discriminatory, and because NHTSA has never approved a spatially non-uniform light source for use in a headlight system, LED headlights are illegal.

The use of Adaptive Driving Beam technology will not solve the issue of eye damage caused by 100,000,000 nit light beams hitting the eye. ADB will not solve the issue of so-called 6500K color temperature LED headlights that cause massive glare and eye damage due to the intense spike of 450 nanometer blue wavelength light. ADB systems will not solve the problem of LED flicker caused by Pulse Width Modulation. ADB systems will be an additional system sitting on top of the existing LED headlight systems which are unauthorized and dangerous.

Currently, NHTSA staff have not been trained in the differences between a spherical emitter of light and a flat surface emitter. Without the understanding of how a flat surface emitter distributes light, NHTSA cannot possibly authorize the use of a system such as ADB which is reliant on flat surface emitters. Before authorizing ADB, NHTSA must proceed through a rigorous training program to educate all staff on the spatial, spectral, and temporal properties of LED light beams, and how LED light beams cause eye damage and neurological interference, thus decreasing safety and creating illegal discrimination.

**H.R. 3684**

The requirement to allow ADB comes Congress' authorization of the Infrastructure, Investment and Jobs Act (H.R. 3684) on November 15, 2021. The section requiring NHTSA to authorize ADB is Section 24212, shown below.

SEC. 24212. <<NOTE: 49 USC 30111 note.>> HEADLAMPS.

(a) Definitions.--In this section:

(1) Adaptive driving beam headlamp.--The term ``adaptive driving beam headlamp'' means a headlamp (as defined in Standard 108) that meets the performance requirements specified in SAE International Standard J3069, published on June 30, 2016.

(2) Standard 108.--The term ``Standard 108'' means Federal Motor Vehicle Safety Standard Number 108, contained in section 571.108 of title 49, Code of Federal Regulations (as in effect on the date of enactment of this Act).

(b) <<NOTE: Deadline.>> Rulemaking.--Not later than 2 years after the date of enactment of this Act, the Secretary shall issue a final rule amending Standard 108--

(1) to include performance-based standards for vehicle headlamp systems--

(A) to ensure that headlights are correctly aimed on the road; and

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(B) requiring those systems to be tested on-vehicle to account for headlight height and lighting performance; and

(2) to allow for the use on vehicles of adaptive driving beam headlamp systems.

(c) Periodic Review.--Nothing in this section precludes the Secretary from--

(1) reviewing Standard 108, as amended pursuant to subsection (b); and

(2) revising Standard 108 to reflect an updated version of SAE International Standard J3069, as the Secretary determines to be--

(A) appropriate; and

(B) in accordance with section 30111 of title 49, United States Code.

However, the Soft Lights Foundation had previously submitted text for HR 3684 that required NHTSA to study the effects of flat surface LED headlights on eyes, the elderly, and those with disabilities. This study text is found in the original version of H.R. 3684 that was passed by the House of Representatives on June 18, 2021.<sup>12</sup> This text is shown below.

<sup>1</sup> <https://rules.house.gov/sites/democrats.rules.house.gov/files/BILLS-117HR3684RH-RCP117-8.pdf>

<sup>2</sup> <https://www.billsponsor.com/bills/36606/house-bill-3684-congress-117/text/eh#section=HE35B289517FF48B696B1861BF8CE06B9>

## **SEC. 10108. Study and report on motor vehicle lamps.**

(a) **IN GENERAL.**—Not later than 18 months after the date of the enactment of this Act, an entity described in subsection (b) that is competent to carry out the requirements of this section, and that is selected by the Secretary (in consultation with the Director of the National Institute of Standards and Technology and the Director of the National Institutes of Health), shall complete a study and submit to the Secretary a report on the effects of non-uniform luminance from Light Emitting Diode (LED) and Light Amplification by Stimulated Emission of Radiation (LASER) motor vehicle lamps on the vision of elderly drivers and roadway safety. The study and report shall consider, at a minimum, motor vehicle headlights, daytime running lights, brake lights, tail lights, turn signals, and flashing lights on public safety and maintenance vehicles.

(b) **ENTITY DESCRIBED.**—An entity described in this subsection is—

(1) nonprofit research institution;

(2) an institution of higher education (as defined in section 101(a) of the Higher Education Act of 1965 ([20 U.S.C. 1001\(a\)](#))); or

(3) a consortium of institutions described in paragraph (1) or institutions described in paragraph (2), or both.

(c) **CONTENTS OF REPORT.**—The report required by subsection (a) shall include, at a minimum, the following:

(1) Measurements and evaluation of peak luminance, spectral power distribution, and flicker from lamps described in subsection (a).

(2) An evaluation of the effects (including specifically for elderly drivers), if any, on vision, health, and safety of individuals exposed to light from lamps described in subsection (a), including an evaluation of risks (including specifically for elderly drivers) of temporary or long-term impairment of vision and light-induced psychological stress and seizures.

(d) **SUBMISSION OF REPORT AND RECOMMENDATIONS.**—Not later than 90 days after the completion of the study and report required by subsection (a), the Secretary shall publish in the Federal Register and submit to the Committee on Energy and Commerce of the House of Representatives, the Committee on Transportation and Infrastructure of the House of Representatives, and the Committee on Commerce, Science, and Transportation of the Senate—

(1) such report; and

(2) if appropriate, recommendations regarding measures to reduce the risks to roadway safety of glare from the lamps described in subsection (a).

(e) **PUBLIC NOTICE AND COMMENT.**—In developing the scope of the study required by subsection (a), the Secretary shall provide for a period of public notice and comment.

(f) **DEFINITIONS.**—In this section:

(1) **MOTOR VEHICLE.**—The term “motor vehicle” has the meaning given such term in section 30102(a) of title 49, United States Code.

(2) **SECRETARY.**—The term “Secretary” means the Secretary of Transportation.

It is unknown who or why this text to study the safety of LED headlamps was removed from the final version of H.R. 3684 that was signed into law. The removal of the study text was especially harmful considering that NHTSA's mission is to ensure that vehicle lighting systems are safe. Before ADB can be authorized, NHTSA must study how light from a flat surface emitter affects the eye and neurological systems.

Section 24212 of H.R. 3684 that was passed on November 15, 2021 allows NHTSA two years before authorizing ADB systems. Therefore, before ADB is authorized, these two years must be spent rigorously studying the impacts of light from a flat surface emitter, such as an LED, on human health, human and Artificial Intelligence vision, the impacts of the spectral power distribution on glare and eye damage, and the impacts of flicker caused by Pulse Width Modulation and other electrical systems.

## NHTSA Rebuttals

In our communications with NHTSA over the past several years, NHTSA staff has made various claims as to why NHTSA does not need to study flat surface LED light sources. Here we rebut those claims.

**Claim 1) - NHTSA FMVSS-108 is technology neutral.** – While it may have been somewhat possible to be technology neutral in setting standards for lighting when all light sources were spherical emitters and emitting light uniformly, it is impossible to claim that FMVSS-108 can be technology neutral when the light source is from a flat surface. LED light is entirely different, with a bullet-shaped non-uniform spatial energy profile that necessitates an entirely new set of standards to address the issue of non-uniform energy.

In addition, LEDs in car headlights have a spectral power distribution never before seen in vehicle headlights. NHTSA currently has no regulations to protect human eyes from high energy blue wavelength light. These regulations must be written before NHTSA can authorize ADB.

Also, NHTSA has no regulations for protecting us from flicker. This flicker is easily seen in videos taken of LED headlight and LED taillights. This flicker is annoying for some, but life-threatening for others.

FMVSS-108 is not technology neutral. FMVSS-108 is only applicable to spherical emitters and cannot be used for flat surface sources of light.

**Claim 2) – NHTSA already studied glare in the 2007 report.** – NHTSA claims that their 2007 report Nighttime Glare and Driving Performance: Research Findings<sup>3</sup> is a sufficient study of headlight glare and that no further study is required. However, the 2007 was only for spherical emitters and did not include any flat surface LED emitters. It is exceedingly clear, based on science, research, and driver comments, that LED headlights create excessive, dangerous glare. Here is a video of this blinding glare from LED headlights. Video: <https://youtu.be/sQHpkG7UhA>

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<sup>3</sup> <https://www.nhtsa.gov/sites/nhtsa.gov/files/811043.pdf>



Figure 1 - LED Headlight Glare

There is a petition to ban blinding LED headlights that has tens of thousands of signatures and comments.<sup>4</sup> NHTSA cannot possibly state that LED headlight glare is the same as halogen/tungsten headlight glare after viewing the comments on the petition. Below are some of the recent comments from the public:



**Nicola Tomlinson**

3 days ago

It's so dangerous to blind someone that's driving.



**Louise Dell**

3 days ago

I have been blinded far too many times by these lights and have had many near misses! In the dark they dazzle you, and then you can't see properly for minutes after

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<sup>4</sup> <https://www.change.org/p/u-s-dot-ban-blinding-headlights-and-save-lives>



**Naomi Hildebrand**

1 week ago

These lights are great for seeing....if you're the one driving with them. For everyone who has to drive with these lights shining in their face, it can cause or worsen a migraine and/ or it makes everything other than the lights look black! Therefore it temporarily blinds the driver from the road ahead....



**Joyce Hinman**

1 week ago

As someone with an astigmatism in both eyes, these lights are quite blinding. I have driving glasses that don't even work with the LED and HID lights.



**Shirley Borlace**

2 weeks ago

I get blinded by them and can't see where I'm going.



**Angela Smith**

2 weeks ago

### I have experienced dangerous driving conditions due to LED lights

The mission of the National Highway Transportation Safety Administration is to write regulations to keep the public safe. As is clear from the comments on the petition, LED headlights are dangerous and must be removed from the roadways.

ADB systems will not solve this glare issue. NHTSA must conduct a new study for headlight glare for flat surface LED headlights before ADB can be authorized.

#### **Claim 3) – LED headlights comply with luminous intensity maximums set in FMVSS-108.**

NHTSA's current test procedures are only applicable to spherical emitter light sources, and yet the vehicle manufacturers use these NHTSA test procedures<sup>5</sup>, thus producing invalid results. Because of the flat surface of the LED chip and its very small size, LEDs create a beam with most of the energy within 2 degrees of the center of the chip. When measured in a lab with precision instruments, the peak luminance will be in the millions, tens of millions, or hundreds of millions of nits. When converted to luminous intensity, the value will far exceed even the highest allowed luminous intensity of 70,000 candelas set in FMVSS-108.

The reason the automakers are self-certifying LED headlights as compliant with FMVSS-108, when they are in fact not compliant, is because they are measuring the light at 100 feet from the headlight and collecting data that misses the peak intensity of the LED headlight within the picometer or femtometer precision that is necessary. The automaker engineers are then feeding this invalid data into software programs that perform the calculations and produce invalid results from the invalid data. If

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<sup>5</sup> [https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/tp-108-13\\_tag.pdf](https://www.nhtsa.gov/sites/nhtsa.gov/files/documents/tp-108-13_tag.pdf)

the manufacturers instead relied on the spec sheets from the chip makers for peak luminance and luminous intensity, it would become immediately obvious that LED headlights exceed the maximum allowed luminous intensity specified in FMVSS-108.

NHTSA must take action to resolve this precision measurement issue for LED headlights with the automakers before ADB systems can be authorized.

**Claim 4) – LED headlights are safe and comply with the Federal Motor Vehicle Safety Act of 1966.**

The Federal Motor Vehicle Safety Act of 1966<sup>6</sup> prohibits the automakers from designing vehicles that are unsafe. Using a flat surface LED chip as a headlight is not only non-compliant with FMVSS-108, but this decision to use LEDs in headlights also violates the prohibition against designing cars that are unsafe. All vehicles with LED headlights are dangerous, violate the law, and must be recalled to protect the public from injury or death.

As per the Federal Motor Vehicle Safety Act, NHTSA must establish 5-year plans for testing motor vehicle safety standards.<sup>7</sup> NHTSA has failed to do this for headlight systems. Because NHTSA has failed to establish 5-year plans for headlights, and because NHTSA has failed to train staff on the difference between spherical and flat surface light emitters, and because NHTSA is not enforcing compliance with FMVSS-108 for headlights, the automakers are violating the Federal Motor Vehicle Safety Act without being held accountable.

SEC. 102. As used in this title—  
(1) “Motor vehicle safety” means the performance of motor vehicles or motor vehicle equipment in such a manner that the public is protected against unreasonable risk of accidents occurring as a result of the design, construction or performance of motor vehicles and is also protected against unreasonable risk of death or injury to persons in the event accidents do occur, and includes nonoperational safety of such vehicles.

## US Access Board

We see no indication that NHTSA has collaborated with the US Access Board to ensure that the technology for LED headlights and Adaptive Driving Beams do not discriminate. The US Access Board was created when Congress passed the Americans with Disabilities Act in 1990 and was further strengthened with Congress’ passage of the ADA Amendments Act of 2008. The mission of the US Access Board is to develop guidelines to ensure that those with disabilities are not discriminated against using new technologies. As can be seen in Figure 2, the US Department of Transportation has not assigned a member to the US Access Board, which impedes NHTSA’s ability to collaborate with the US Access Board.

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<sup>6</sup> <https://www.govinfo.gov/content/pkg/STATUTE-80/pdf/STATUTE-80-Pg718.pdf>

<sup>7</sup> <https://www.govinfo.gov/content/pkg/STATUTE-80/pdf/STATUTE-80-Pg718.pdf>

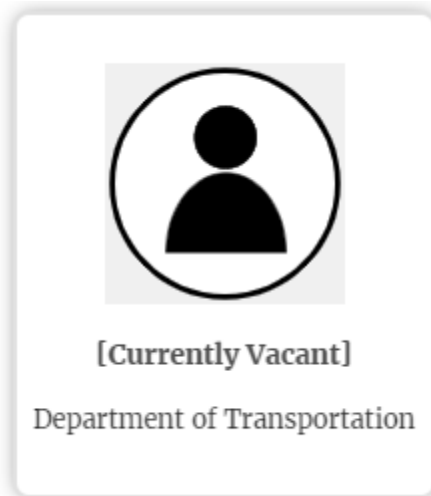


Figure 2 - US Access Board Federal DOT Member

Before NHTSA can approve an ADB system, the Department of Transportation must assign a member to the US Access Board and then NHTSA must collaborate with the US Access Board to ensure that flat surface light emitters and ADB systems do not discriminate against those with epilepsy, migraines, Autism Spectrum Disorder, PTSD, lupus, bipolar disorder, and other neurological disabilities.

## ADB Systems Don't Work

NHTSA performed an analysis of ADB systems prior to approval of the final rule and determined that ADB systems don't work.<sup>8</sup> In this section, we analyze some of the key quotes from the NHTSA ADB study.

**Quote: ADB headlamps utilize technology that actively modifies a vehicle's headlamp beams to provide more illumination while not glaring other vehicles.** – The concept of providing “more illumination” is not contrasted with the other system, so “more” is meaningless. However, tens of thousands of motorists have already signed a petition stating that headlights are already too bright<sup>9</sup>, so providing more illumination using an ADB is dangerous.

An ADB system does not provide “more illumination”, so this statement is false. ADB systems turn off pixels to reduce illumination from the LEDs. When all LED pixels are turned on, this would be the maximum illumination, but that is not due to the ADB system.

The statement “while not glaring other vehicles” ignores the glare to pedestrians and wildlife, and is an impossible statement to make, considering that LED systems use so-called 6500K LED headlight systems with excessive amounts of blue wavelength light.

Given these statements and given the lack of training of NHTSA staff on the difference between spherical emitters and flat surface emitters, it seems clear that NHTSA does not understand how ADB systems function and the impacts of ADB systems on eyes and nervous systems.

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<sup>8</sup> <https://www.nhtsa.gov/sites/nhtsa.gov/files/2022-02/ADB-Final-Rule-02-01-2022-web.pdf>

<sup>9</sup> <https://www.change.org/p/u-s-dot-ban-blinding-headlights-and-save-lives>



**Quote: *The requirements adopted today are intended to amend the lighting standard to permit this technology and establish performance requirements for these systems to ensure that they operate safely.*** – As noted earlier, ADB systems are an extra system on top of flat surface emitter light sources that are dangerous, and which have never been approved by NHTSA. So long as NHTSA has no regulations for peak luminance, absolute spectral power distribution, and flicker, it is impossible to make a safe ADB system.

**Quote: *ADB has the potential to reduce the risk of crashes by increasing visibility without increasing glare.*** – Potential to reduce risk of crashes is not the same as actually reducing crash risk. After years of study, NHTSA has failed to show that ADB systems reduce crash risk, and therefore the ADB system must not be authorized.

**Quote: *At the same time, there is a risk that intense headlamp illumination may be directed towards oncoming or preceding vehicles.*** – Failing to realize that headlights also impact pedestrians, bicyclists, babies, children, the elderly, people with disabilities, and wildlife invalidates any study that does not include these groups.

**Quote: *ADB systems are an improvement over “auto hi-beam” technology currently available in the United States because they are capable of providing more illumination than a lower beam without increasing glare.*** – This statement ignores the fact that ADB relies on switching to flat surface emitters, which have already been shown to be toxic, hazardous, and discriminatory. Ignoring this issue is a major flaw in this analysis.

**Quote: *When operating in automatic mode, instead of simply switching between the upper and lower beams, an ADB system is able to provide a dynamic, adaptive beam pattern that changes based on the presence of other vehicles or objects, providing less illumination to occupied areas of the road and more illumination to unoccupied areas of the road.*** – The study fails to examine the consequences of the tremendous amount of light switching will have on driver vision and neurological safety. An ADB system cannot be approved until NHTSA has studied the effects of hundreds of vehicles automatically switching light intensities at the same time.

**Quote: *ADB systems can therefore provide more illumination than existing lower beams without glaring other motorists (if operating correctly).*** – By inserting the parenthetical (if operating correctly), NHTSA seems to be suggesting that ADB systems fail and that there will be negative consequences due to these failures.

**Quote: *First, it amends FMVSS No. 108 to allow ADB systems. It amends, among other things, the existing headlamp requirements so that ADB technology is permitted.*** – The ADB system cannot be authorized because the ADB system requires flat source emitters, which themselves have never been approved by NHTSA.

**Quote: *Second, this final rule adopts requirements to ensure that ADB systems do not increase glare to other motorists beyond current lower beams.*** – Millions of people are already being injured by low beam LED headlights. An ADB system will likely not increase glare from LED headlights, but since LED headlights are not approved, this statement is meaningless.

**Quote: NHTSA is sensitive to concerns about glare due to the numerous complaints from the public it has received and its own research (prompted, in part, by these complaints and a 2005 Congressional mandate to study the risks from glare).** – As noted earlier, NHTSA has failed to study glare from flat surface emitters and has failed to create regulations of absolute spectral power distribution. Stating that NHTSA is sensitive to concerns about glare while ignoring the problem is unacceptable.

**Quote: Third, it adopts component-level laboratory-tested requirements related to both glare and visibility, as well as a limited set of other system requirements, such as requirements for manual override and fail-safe operation.** – The testing requirements proposed for ADB are unacceptable, as the proposed testing requirements do not account for the need to test at the chip level in near-field conditions for peak luminance and spectral power distribution, and no testing requirements were established for regulating flicker.

**Quote: In drafting this final rule, NHTSA considered two major regulatory alternatives.** – Neither of these alternatives establishes safety limits for peak luminance, spectral power distribution, or flicker to protect human eyes and human neurological systems.

**Quote: NHTSA has determined that quantifying the benefits and costs is not practicable in this rulemaking because of limitations on the agency's ability to accurately estimate the target population and the effectiveness of ADB. We have, however, identified the problem this rule is intended to address, considered whether existing regulations have contributed to the problem, qualitatively assessed the costs and benefits, and considered alternatives. This final rule appropriately balances the needs for visibility and glare prevention, and adopts requirements that are both practicable and sufficient to assess whether an ADB system operates safely.** – This is perhaps the most egregious statement in the final rule. Stating that quantifying benefits and costs is not practicable is unacceptable considering the dramatic consequences of eye damage and neurological interference from flat surface LED light emitters. Also, stating that NHTSA has considered existing regulations is not the same as saying that NHTSA understands that existing regulations do not permit flat surface LED emitters for use in headlights. As noted earlier, ADB systems cannot operate safely until NHTSA has developed regulations for peak luminance, absolute spectral power distribution, and flicker, and has collaborated with the US Access Board to ensure that this technology does not discriminate.

**Quote: (FMVSS No. 108 establishes maximum levels of intensity the upper beam may not exceed.)** – Flat surface LED headlight beams exceed this upper limit and are therefore illegal. Adding an ADB system on top of an illegal headlight is senseless.

**Quote: Visibility has an obvious, intuitive relation to safety: The better drivers can see the road, the better they can react to road conditions and obstacles to avoid crashes.** – It has been well documented that the high-glare LED headlights with excessive blue wavelength light increase glare reflecting off road surfaces, signs, rain, and snow. The authorization of an ADB system will not solve this safety problem.

**Quote: Empirical evidence suggests that headlamp glare decreases visibility distance, increases reaction time, and reduces detection probability, among other things.** – This quote references the 2007 NHTSA Glare study which did not study glare from LED headlights which have far more dangerous blue wavelength light than tungsten/halogen.

**Quote: *Discomfort attributable to glare might also indirectly affect crash risk.*** – NHTSA is dramatically understating the risk of eye damage caused by repeated exposure to blue wavelength light and exceedingly dense luminance of LED light beams. Instead of the word “discomfort”, NHTSA should be using the phrase “permanent eye damage.”

**Quote: *The potential problems associated with glare are highlighted by the thousands of complaints NHTSA has received from the public on the issue, as well as congressional interest.*** NHTSA received more than 5,000 comments, most of which concerned nighttime glare from front-mounted lamps. – NHTSA received 5,000+ comments on glare from halogen headlights, but there are over 30,000 signatures and public comments to ban LED headlights on the petition, “Ban Blinding Headlights and Save Lives!”<sup>10</sup> – With 5,000 comments about headlamp glare from halogen headlights, NHTSA studied the issue, and yet with 30,000+ comments about headlamp glare from LED headlights, NHTSA has done nothing.

**Quote: *Research has shown that most drivers under-utilize the upper beams.*** – This research was done before flat surface LED headlamps were introduced. Upper beam LED headlights are so bright, so hazardous, and so toxic, that drivers typically only employ upper beams out of anger at the oncoming driver. Lower beam LED headlights are already too bright and dangerous. The use of upper beam LED headlights is assault.

**Quote: *So, for example, when an ADB-equipped vehicle (operating in automatic mode) travelling on an otherwise unoccupied roadway encounters an oncoming vehicle, it switches from an upper beam providing high light levels in both close-in and longer distance regions to an adaptive beam providing reduced intensity (similar to a lower beam) near the oncoming vehicle and unreduced intensity (similar to an upper beam) elsewhere.*** – One of the massive problems with ADB systems is its failure to recognize pedestrians, bicyclists, and wildlife. It is unacceptable to damage the eyes of humans or wildlife due to NHTSA’s lack of regulation of peak luminance and spectral power distribution.

**Quote: *The adaptive beam is particularly useful for distance illumination of pedestrians, animals, and objects in or near the road when other vehicles are present and thus preclude use of the upper beam.*** – This is an extremely troubling statement, as it exemplifies NHTSA’s focus on the driver of a vehicle, and treats pedestrians and animals as merely objects to be illuminated. Pedestrians and animals have eyes that are dark-adapted and using rod cells for vision. Being illuminated by an LED headlight may provide vision for the driver but will destroy the vision of the pedestrian or animal. This is unacceptable.

**Quote: *Shortly before the NPRM was published in October 2018, the National Transportation Safety Board (NTSB) published a special investigation report that examined pedestrian crashes and related phenomena.*** – These reports by the NTSB did not address the use of LED headlights, or the use of LED streetlights or LED floodlights in the environment. The NTSB supported ADB systems without understanding the difference between a spherical emitter and flat surface emitter.

**Quote: *“Motor vehicle safety” is defined in the Safety Act as “the performance of a motor vehicle or motor vehicle equipment in a way that protects the public against unreasonable risk of accidents occurring because of the design, construction, or performance of a motor vehicle, and against unreasonable risk of death or injury in an accident, and includes nonoperational safety of a motor***

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<sup>10</sup> <https://www.change.org/p/u-s-dot-ban-blinding-headlights-and-save-lives>

**vehicle.”** – Flat surface emitters are unacceptably dangerous and place the public at unreasonable risk of death or injury due to the non-uniform spatial properties of the light, and lack of regulation of peak luminance and spectral power distribution. Any vehicle with an LED headlight system is inherently unsafe, and therefore illegal.

**Quote: *The agency carefully considered these statutory requirements in developing this final rule.*** – Considering the statutory requirements and acting to protect the public are not the same thing. By developing the final rule for ADB headlight systems, NHTSA fails to protect the public from inherently dangerous LED light beams.

**Quote: *As the Supreme Court has explained, statutes should be construed harmoniously, so that “when two statutes are capable of coexistence,” they should be construed as each having effect.*** – Since the Motor Vehicle Safety Act prohibits the design of unsafe vehicles, and since flat surface LED headlights are inherently unsafe, it is clear that the authorization of an ADB system that utilizes unsafe LED technology cannot be made.

**Quote: *Due to this “relatively stringent standard,” implied repeals are “rare,”<sup>43</sup> and have generally been limited to situations “where provisions in two statutes are in irreconcilable conflict, or where the latter Act covers the whole subject of the earlier one and is clearly intended as a substitute.*** – The Motor Vehicle Safety Act of 1966 and the ADB requirement of the Infrastructure, Investment and Jobs Act of 2021 are in irreconcilable conflict. The directive by Congress to authorize ADB when ADB systems are designed to supplement the dangerous and illegal LED headlight system cannot be achieved without violating the Motor Vehicle Safety Act and the Americans with Disabilities Act. Therefore, the ADB system cannot be legally implemented without NHTSA first studying and developing safety standards for peak luminance, absolute spectral power distribution, flicker, and ensuring that LED headlight systems do not discriminate.

**Quote: *We therefore conclude that paragraph (c) should not be read to preclude NHTSA from issuing a final rule that imposes requirements beyond SAE J3069 if the agency concludes that SAE J3069 does not meet the need for safety under the Safety Act.*** – NHTSA itself has concluded that NHTSA may impose any requirements necessary to comply with the Motor Vehicle Safety Act of 1966. Such requirements for flat surface emitter lighting systems include maximums for peak luminance, regulation of absolute spectral power distribution, regulations to protect the human eye and neurological systems from LED light beams, and regulations for LED flicker. The Infrastructure, Investment, and Jobs Act does not preclude NHTSA from studying the effects of flat surface light sources, does not prevent NHTSA from collaborating with the US Access Board, and does not prevent NHTSA from explicitly prohibiting the use of flat surface emitters.

**Quote: *The stimulus vehicle would be equipped with sensors near the driver’s eyes (or rearview mirrors) to measure the illuminance from the ADB headlamps.*** – Illuminance is not the main concern with flat surface emitters. The main concern is the density of the light, luminance, which is essentially unchanged by distance. By choosing not to measure the luminance of the light beam with picometer or femtometer precision, NHTSA has no way of knowing the amount of glare or eye damage caused by the LED light beam. NHTSA must revise its test procedures to include precision measurements of density of the light as it reaches the eye.

**Quote: To evaluate ADB performance, we proposed a set of maximum allowed illuminance values (glare limits).** – This is a senseless measure when using flat surface LED light sources. Measuring the illuminance (in lux), provides no information on the density of the light, which for a highly directional source such as an LED chip, is the most critical metric. LED chips are already approximately 100,000,000 nits of non-uniform luminance, whereas human comfort level is 300 nits of uniform luminance. NHTSA must set standards for peak luminance before authorizing ADB systems or creating testing procedures that ignore luminance.

**Quote: We proposed to test each type of maneuver at various test and stimulus vehicle speeds (from 0 to 70 mph) on both a straight test path and on left and right curves of varying radii: a “short” curve (with radii from 98 m to 116 m), a “medium” curve (223 m to 241 m), and a “large” curve (335 m to 396 m).** – NHTSA is ignoring many real-world scenarios such as: 1) When a driver is exiting a driveway and turns their head left to see if there are any oncoming vehicles. 2) Multiple vehicles. 3) Hills. 4) Vehicles turning into parking lots. 5) Impacts on babies in strollers. 6) Impacts on people with light sensitivity disabilities.

**Quote: Second, we tentatively believed that market forces would ensure an ADB system’s switching device will operate robustly with respect to environmental conditions.** – If market forces were so good at delivering safe systems, we wouldn’t have needed the Motor Vehicle Safety Act of 1966, we wouldn’t have needed the Americans with Disabilities Act, and we wouldn’t have over 30,000 signatures on a petition demanding that LED blinding headlights be banned. It is unacceptable for an organization with “Safety” in its name to simply rely on market forces to keep us safe.

**Quote: As noted earlier, however, the ECE requirements are not sufficiently objective to be incorporated into an FMVSS.** – NHTSA’s reliance on “objective” data, while ignoring the quality of the data (such as luminance, spectral power distribution, and flicker metrics), makes the object data useless for keeping people safe. If 30,000 people have taken the time to sign a petition to NHTSA telling them that their real-world experiences with LED headlights are putting them at high risk of injury or death, then NHTSA must stop relying on invalid objective data and rely more on real-world subjective data from the public.

**Quote: The proposal applied more of the current component-level photometric requirements to the ADB system to regulate both glare and visibility.** – NHTSA cannot possibly regulate glare without regulating the amount of blue wavelength light emitted by the headlight. NHTSA currently ignores the spectral power distribution of the headlight. NHTSA cannot authorize ADB systems without restricting blue wavelength light.

**Quote: Several individuals who opposed the proposal thought that it would increase glare.** – It seems unlikely that the ADB system would increase glare. However, because NHTSA does not regulate peak luminance or blue wavelength light, glare is already a massive safety issue. Authorizing ADB does nothing to address the fundamental issue of glare from a flat surface emitter.

**Quote: The proposed compliance criterion was that any recorded illuminance value greater than the applicable glare limit would be considered a test failure, except that values above the applicable glare limit lasting no longer than 0.1 second (s) or over a distance of no longer than 1 m would not be considered test failures.** – NHTSA’s allowance of unregulated light beams directed into the eye for up to 0.1 seconds is unacceptable. NHTSA has performed no studies to understand how much eye damage

occurs from a 100,000,000 nit, 6500 Kelvin LED headlight once, or multiple times. NHTSA has not examined the pain that this causes. NHTSA has not performed any studies on how driver attitude changes when being repeatedly assaulted by 100,000,000 nit light. The only way to protect the eye is to prohibit the use of high luminance, high color temperature light in totality.

**Quote: *The area of reduced intensity exceeded the limits in the 60-120 m range as well as the 30-60 m range. Because these exceedances last longer than 0.1 s. and occur while the vehicle pitch is less than 0.3 degrees from the average pitch throughout the run, these exceedances would be considered possible noncompliances.*** – NHTSA confirms that the ADB system does not work properly.

**Quote: *For example, Auto Innovators suggested only specifying straight and small-radius curve scenarios because the small-radius curve was the most stringent test with 46 failures out of 127 valid test runs (36.2% failure rate), while the failure rates for the straight, mid, and large radius test scenarios were 26.6%, 26.7%, and 22.4%, respectively.*** – These are excessively high failure rates for curves and NHTSA. No data was provided for hills, vehicles of different heights, or vehicles pulling trailers.

**Quote: *NHTSA is removing the term “spike” and replacing it with a clearer description of the adjustment: The agency will not consider, in determining compliance, “single illuminance values or consecutive illuminance values occurring over a span of no more than 0.1 seconds that exceed the applicable maximum illuminance[.]”*** – Measuring illuminance for a flat surface emitter is the wrong metric. The concern is the thermal and chemical damage done to the eye by the high-density, high-energy blue wavelength light from a flat surface emitter. NHTSA must measure luminance, not illuminance, for flat surface emitters.

**Quote: *In either case, if the glare limit is not exceeded for more than 0.1 s, the exceedance will not be considered a noncompliance.*** – This is unacceptable. Assaulting a person, even for no more than 0.1 seconds, is still assault. The cumulative effects of repeated assault by unregulated LED light beams are likely to cause severe physical damage to the eye, and severe emotional trauma. The light itself must be regulated such that, no matter how long the light is directed at the eye, the eye is still protected, and the light must never cause emotional trauma.

## Summary

NHTSA cannot currently authorize Adaptive Driving Beam for the following reasons:

- 1) ADB is a supplementary system for flat surface LED emitters which have never been approved by NHTSA. Therefore, an ADB system, if used with LEDs, would itself be illegal.
- 2) ADB systems were shown by NHTSA’s own studies to have an unacceptably high failure rate.
- 3) NHTSA has no regulations for peak luminance, absolute spectral power distribution, or flicker. Without these regulations, ADB systems are dangerous.
- 4) Allowing exceedingly intense light to reach the eye for up to 0.1 seconds will allow unacceptable levels of thermal and chemical damage and will also result in psychological trauma.
- 5) NHTSA has not shown that ADB systems are safe in real-life situations such as on hills, or when entering or exiting parking lots.
- 6) NHTSA must measure luminance, not illuminance, for light from a flat surface LED emitter and the precision must be at the picometer or femtometer scale.

- 7) The ADB system in conjunction with flat surface emitters is an inherently unsafe design, prohibited by the Motor Vehicle Safety Act of 1966.
- 8) An ADB system combined with LEDs is discriminatory technology that violates the Americans with Disabilities Act.

Sincerely,



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cc:

Congresswoman Carolyn Maloney, Chair, US House Oversight Committee  
Congressman Peter DeFazio, Chair, US Transportation and Infrastructure Committee  
Senator Jeff Merkley, Oregon