

# Atala OLED Lighting and the Future of Mobility

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# Introduction

Traditional automotive lighting technologies have historically had one focus - provide basic illumination to increase safety. But as technology has advanced and user sentiment evolved, both drivers and vehicle manufacturers have increasingly called for more durable, longer lasting, specialized, and customizable lighting solutions.

The automobile itself has evolved beyond its utility to simply move us from place to place. It has become a symbol that embodies freedom, personal independence, and the unique personality of the driver. Car manufacturers adopt the latest technologies, including new developments in automotive lighting, to allow for more expression of these symbols, define their brand, and differentiate their products in the market.

The automotive lighting industry remains in a state of rapid transformation. Autonomous vehicles, electrification, and connectivity are among the factors influencing the way we interact with car lighting—both inside and out.



*Audi Q8 with Atala Digital 1.0 rear lighting*

AUDI AG. (August, 2024). *Audi Q8*. [Image]. Audi Media Center. [www.audi-mediacycenter.com/en/photos/detail/audi-q8-120861](https://www.audi-mediacycenter.com/en/photos/detail/audi-q8-120861)

As vehicle-to-everything (V2X) technology and autonomous driving reshape how cars exchange information with road users and the surrounding environment, lighting as a form of communication is crucial for road safety and will play a pivotal role in the future of mobility.



*Aerial view showing different road users at a busy city street intersection at night*

In addition, shifts toward more sustainable automotive manufacturing practices underscore the importance of energy efficiency, reduced waste, and responsible sourcing of materials—including for automotive lighting.

Is there a solution ready to meet the future needs of the automotive industry? Yes, and it's called Atala—the brightest, most reliable, and longest lasting organic light emitting diode (OLED) lighting technology on the road.

# What is Atala?

Atala is OLEDWorks' cutting-edge automotive lighting brand. It offers the perfect synergy of OLED innovation and style to match any design vision. Atala enables light design within the panel itself, not the lens—saving space and reducing complexity without the need for diffusors, heat sinks, or complex optical lenses.

Atala offers perfectly even light and crisp segmentation that creates a visually striking experience and an immediate sense of elegance. This functional, dynamic light technology has an ultra-thin, flat, or flexible form to accommodate and inspire design ambition. Highly visible and well-defined logos, shapes, and segments are all individually controlled for superior communication and branding capabilities.



*Audi Q8 featuring Atala Digital 1.0 rear lighting*

AUDI AG. (August, 2024). Audi Q8. [Image]. Audi Media Center. [www.audi-mediacenter.com/en/photos/detail/audi-q8-120861](http://www.audi-mediacenter.com/en/photos/detail/audi-q8-120861)

Atala OLED panels are also highly reliable and energy efficient. Having passed the rigorous testing of world-leading OEMs and Tier 1 suppliers, Atala automotive certified OLED technology meets robust requirements and can withstand the harsh environments of the road.



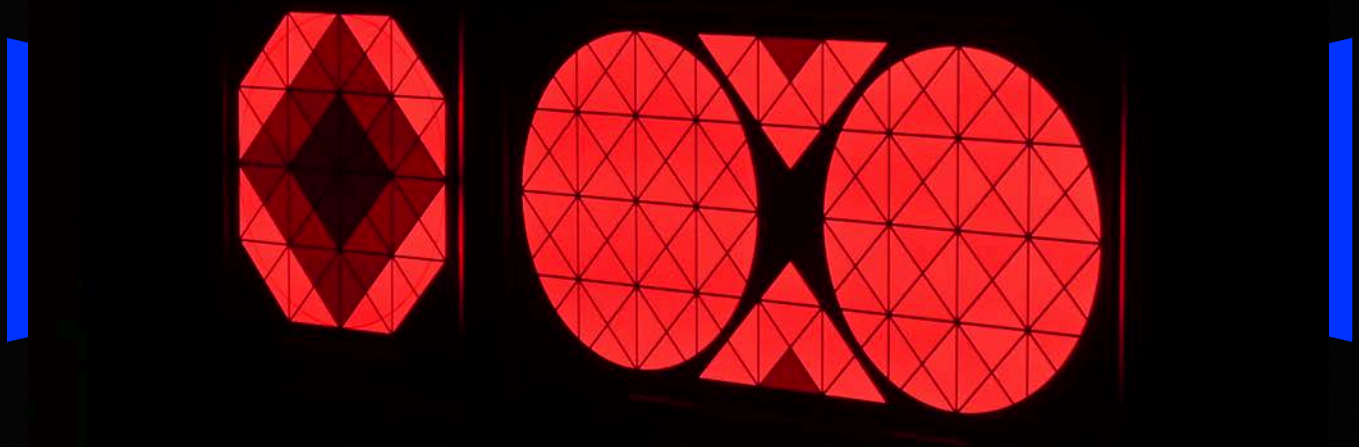
*Rendering of an Atala logo panel on the back of a motorcycle*

# Atala Benefits

Atala OLED panels consist of carbon-based organic layers, sandwiched between two electrodes, that emit light when a DC current is applied. In contrast to a point source light seen in traditional inorganic LEDs, OLEDs emit light evenly across the entire surface of the panel, which offers key performance benefits to carmakers.

## Homogeneous Surface Emission

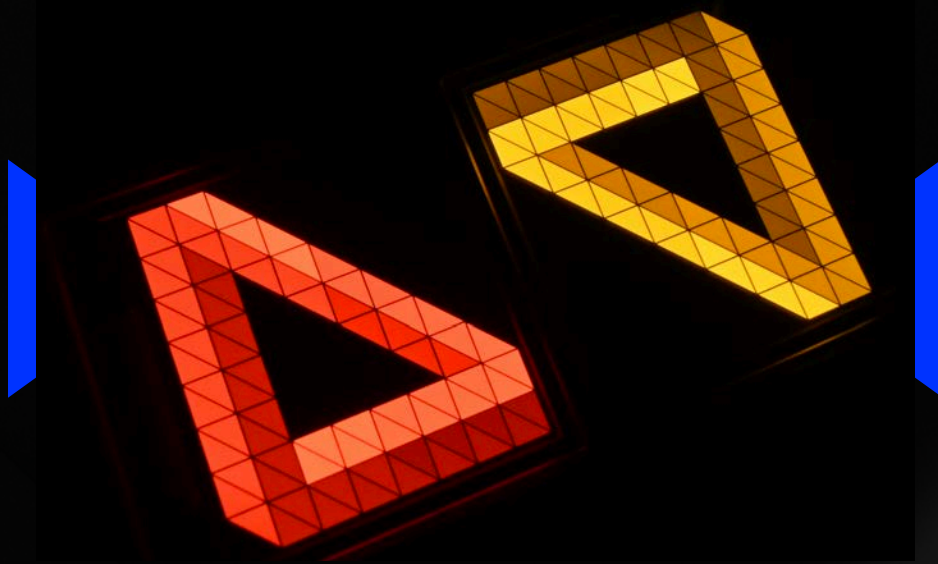
Atala OLEDs are Lambertian emitters, which provide a perfectly homogeneous surface light and ultra-wide viewing angle. They are virtually free of glare and provide an immediate sense of elegance and beauty to any vehicle. Additionally, the even distribution of light equates to a similarly even distribution of heat, eliminating hotspots and simplifying thermal management.



*Atala Digital panels with high contrast between segments*

## Segmentation and Dynamic Animation

Atala OLEDs are individually addressable for precise control over luminance of each segment/pixel. Atala panels have highly uniform segments/pixels with sharp, high contrast edges and narrow (nearly invisible) gaps that enable homogenous light signatures. These features allow for dynamic animation capabilities (and 3D visual effects within a 2D surface). Through symbology and animation, Atala products provide superior communication, increased safety, and unique branding potential for automakers.



*Atala Digital panels displaying a triangle pattern*

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A lot of clever ideas can be done with segmented OLED technology that can also boost safety, or also build up trust for autonomous driving cars—if you’re doing gesturing with lighting to indicate that it’s safe for pedestrians to cross the street, for instance.

- Dr. Werner Thomas, Project Manager OLED-Lighting at AUDI AG. From the [“Why OLED Lighting in Automotive: The OEM and Tier 1 Supplier Perspectives”](#) webinar.

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*Atala Digital panels with intrinsic segmentation showing a snowflake pattern*

## **Slim Profile for System Simplicity**

The tens or hundreds of individually addressable, high contrast segments are housed in an Atala panel profile of 1 millimeter or less. This is all possible even with the glass substrate, encapsulation, and electrical components needed.

Without any need for waveguides, diffusers, or heatsinks, Atala can save the total lighting system significant space as compared to traditional LED lighting technologies. This system simplicity also helps reduce supply chain complexity and reduces labor requirements for system installation.

## Weight and Energy Efficiency

The thin profile and lightweight components of Atala reduce overall system weight and, by extension, fuel consumption. Atala is also an energy efficient technology, which is particularly important given the transition to electric vehicles, where all energy savings translate to longer driving range.

### Atala products have the:

- ✓ Thinnest profile of 1 millimeter (mm) or less
- ✓ Highest brightness
- ✓ Longest lifetimes of OLED lighting on the road



*Infographic showing the benefits of Atala products*

# Personalization and Branding with Atala

Branding is a crucial design element in the competitive automotive industry, where customers have a wide range of vehicle options. A strong brand can help an automaker demonstrate their unique design in a competitive marketplace, reinforce perceptions of quality and reliability, and build customer loyalty. Lighting plays a pivotal role in brand recognition, and Atala offers unique possibilities for branding and personalization.



*Lighting signature possibilities with Atala Digital 2.0 technology*

Beyond brand-specific lighting, Atala also allows auto makers to develop signature lighting options for the driver, allowing drivers to select their own lighting identity and make the car feel more personalized to their tastes. Before now, incorporating new lighting upgrades involved switching the entire lighting unit and often required the work of a mechanic. With the digitalization of Atala lighting and individually addressable OLED segmentation, changing the light signature on a car is as easy as hitting a button.

Digital lighting signatures even open the potential for new revenue streams for vehicle manufacturers through custom lighting packages that can be purchased and downloaded over-the-air (OTA).



*Rendering of a taillight design incorporating the Atala logo*

# Atala Exterior Applications

## Taillights

Atala's uniform surface emission and capability for high contrast segmentation makes it the ideal choice for taillight applications.

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**OLEDs enable us to move into digital lighting design...this allows our customers to choose between different lighting styles and design patterns, and OLED is a perfect match for doing this.**

- Dr. Werner Thomas, Project Manager OLED-Lighting at AUDI AG. From the [“Why OLED Lighting in Automotive: The OEM and Tier 1 Supplier Perspectives”](#) webinar.

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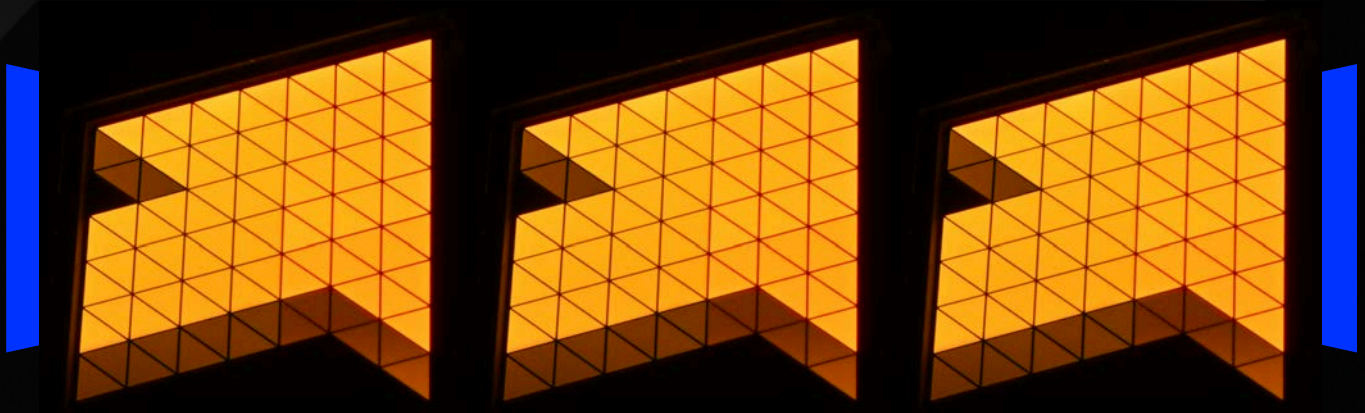
Atala provides clear illumination that is equally visible from nearly every angle. This is key to improving safety through visibility of the entire vehicle width and form, particularly at night. Segmentation not only allows for design differentiation through unique lighting signatures, but also enhances safety through automated hazard notifications and other communication symbols.

## Stop and Turn Lights

Atala products currently on the road achieve a maximum brightness of 2,000 cd/m<sup>2</sup>, which is perfectly suitable for taillights, but not yet bright enough for stop or turn applications. But with new innovations in product formulation and OLED stack architecture, emerging Atala technology is changing this equation.

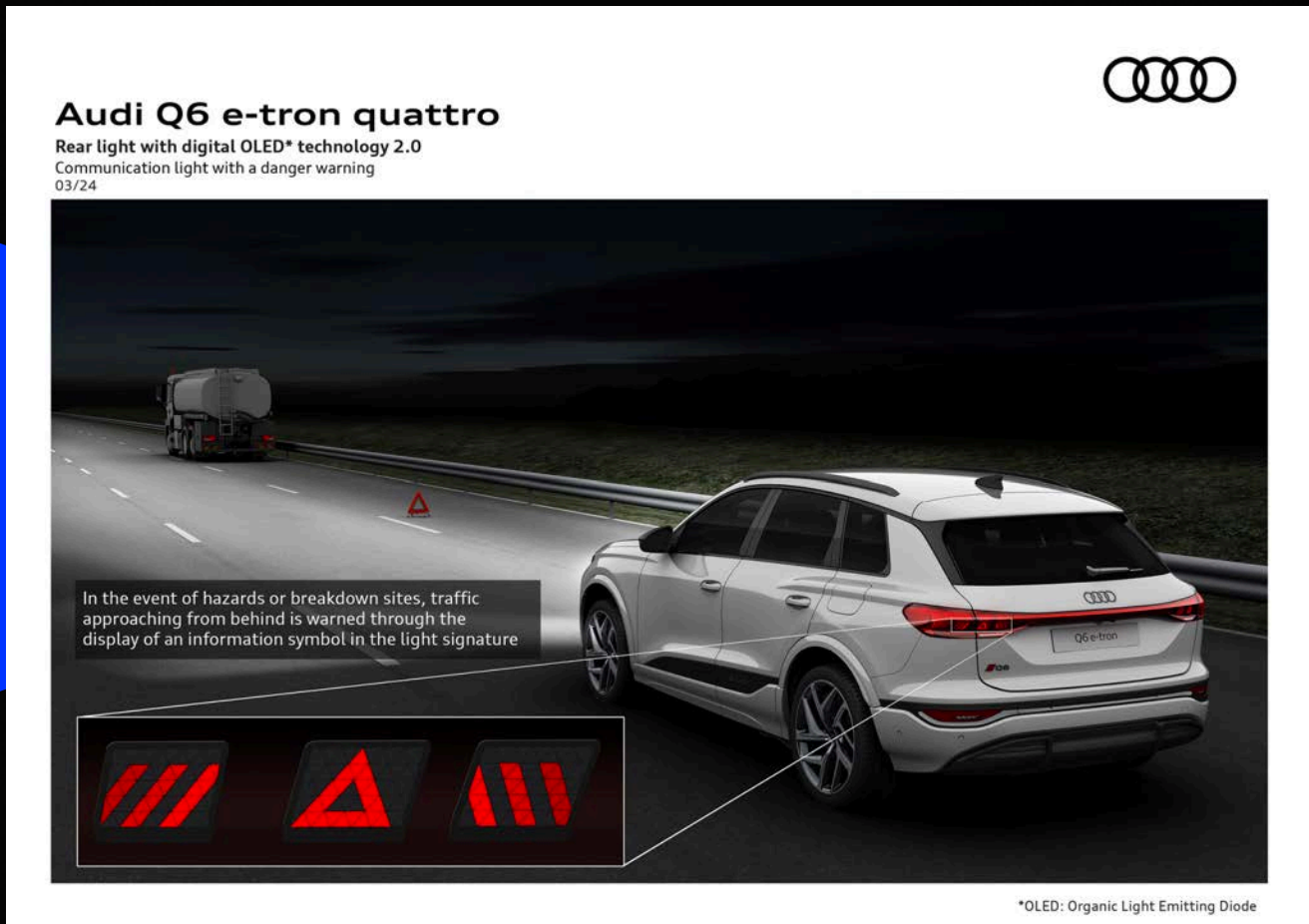
Recent prototypes demonstrate red Atala panels that can achieve a brightness of 20,000 cd/m<sup>2</sup> or more for red at high efficiency, which is bright enough for turn and stop signaling. Atala amber panels have also shown exceptionally high brightness for where amber turn signals are desired.

With the expansion of Atala into stop and tail functionality, manufacturers will be able to offer an elegant OLED rear combination lighting system that provides superior communication and animation capabilities.



*Atala prototype panels showing amber colored arrows*

Atala lighting can effortlessly offer additional symbology once it is available and certified for stop function—such as a flashing exclamation point to indicate a sudden stop that alerts rear-approaching drivers and other road users. Dynamic light functionality can improve safety by catching a road user’s attention quickly, potentially allowing for faster response times and decision-making opportunities to maneuver and proactively avoid dangers.



*Illustration of communication and safety features powered by Atala Digital 2.0 technology in the Audi Q6 e-tron quattro*

AUDI AG. (August, 2024). Audi Q6 e-tron quattro. [Image]. Audi Media Center. [www.audi-mediacenter.com/en/photos/detail/audi-q6-e-tron-quattro-123163](http://www.audi-mediacenter.com/en/photos/detail/audi-q6-e-tron-quattro-123163)

## Badging

Automakers have indicated a desire to increase immediate recognition of their vehicles at night, which led the Atala team to develop illuminated badging as a solution. The homogeneous nature of Atala lighting enables manufacturer logos and additional branding elements to be included within the panel design itself.



*Prototype of red Cadillac badge using Atala Digital technology*

Atala prototypes have demonstrated exterior branding potential within both 2D and 3D designs—expanding the possibilities for brand differentiation at all times of the day, and especially at night. To meet the branding demands of the industry and evolving requirements, both white and red Atala badging solutions are currently in development through the [Joint Development Program](#).

# Atala Interior Applications

As autonomous vehicles become more prevalent, vehicle interiors will increasingly emphasize comfort and luxury for passengers to relax during their commute. Lighting that can be customized to passengers' needs will play a significant role in crafting personalized experiences.



*Interior renderings featuring Atala technology*

Interior Atala solutions carry the same benefits as rear exterior solutions like space reduction, weight reduction, and efficiency. In addition, the diffuse nature of OLEDs means that they are virtually glare-free and create a comfortable and soft lighting experience. OLED lighting has no harmful UV light output, and is rated as exempt for all photobiological risks by the IEC, making it a healthier lighting solution that can be placed close to the user. Also, segmented panels can increase interior branding potential with crisp, clear illumination of logos as well as enhance communication capability through the use of light to communicate the time remaining to a destination.

# Atala Sustainability



Atala's form factor, functionality, and exceptional performance and quality also afford many sustainability advantages:

- *Reduced energy consumption, which supports longer ranges in electric vehicles.*
- *Fewer lighting fixture components translate to reduced weight, less plastic waste, reduced greenhouse gas emissions, and improved fuel efficiencies.*
- *Sustainable, organic materials that are free of any toxic metals reduce the manufacturing footprint and allow for easier end of life recycling.*

In addition to a 2021 lifecycle analysis (LCA) done by the Rochester Institute of Technology, an LCA by the Department of Energy shows that thermal heat sinks that inorganic LED lighting requires can have the highest environmental impact in the manufacturing and disposal steps. With no need for thermal heat sinks, the ultra-thin and lightweight profile of Atala OLEDs translates to overall weight and space savings within the taillight system, reducing fuel consumption and overall environmental impact.

# Atala Reliability Testing

Our robust and automotive-qualified lighting technology has passed the rigorous reliability testing of world-leading OEMs and Tier 1 suppliers, following guidance from AEC-Q-102 standards (Table 1).

Test	Duration	Result
-40C (2,000 cd/m <sup>2</sup> operational & storage)	>2,000 hr	Pass
60C (2,000 cd/m <sup>2</sup> operational)	20,000 hr	Pass
85C (2,000 cd/m <sup>2</sup> operational)	>5,000 hr	Pass
85C (storage)	>5,000 hr	Pass
105C (storage)	>1,000 hr	Pass
85C/85%RH (storage)	>9,000 hr	Pass
85C/85%RH (2,000 cd/m <sup>2</sup> operational)	>2,000 hr	Pass
-40C/85C Thermal Shock (storage)	>1,000 hr cycles	Pass
-40C/85C Thermal Cycling (2,000 cd/m <sup>2</sup> operational)	>2,000 hr	Pass
ESD HBM/MM		Pass
Mechanical Shock & Vibration		Pass
H2S, Mixed Gas & Solar Environments		Pass
Combination Testing (2,000 cd/m <sup>2</sup> operational & storage)	Up to 4,000 hr	Pass

Table 1: Atala Reliability Test Performance

Atala products are designed to last the lifetime of the vehicle—current panels are designed with lifetimes around 15 years—and new research continues to improve Atala’s unmatched capabilities and high standards of performance. This extends to improved performance and efficiency, with Atala demonstrating double efficacy and tripled lifetimes over the past five years.

# Atala Digital

Atala Digital takes automotive lighting into the 21<sup>st</sup> century. First seen in the taillights of the 2022 Audi A8, Atala Digital showcased the unprecedented uniformity and homogeneity of OLED lighting that cannot be replicated with other lighting technologies. Built on traditional rigid glass substrates, these products are the brightest and most durable automotive lighting technology on the road. With the development of higher segmentation options, Atala Digital products offer dynamic lighting capable of showcasing complex animations and communicating important safety information.



## Current Tech Specs

Glass Type: Rigid

Panel Thickness: 1mm

Brightness: 2,000 cd/m<sup>2</sup>

# Atala Wave

Ride the wave of OLED innovation with Atala Wave, the first commercially available bendable OLED lighting for vehicle design. With its elegantly curved profile, Atala Wave builds upon the success of rigid Atala Digital products, further elevating the sophistication and luxury of the vehicles that adopt it.

Atala Wave is precisely manufactured on a flexible glass substrate, allowing it to bend and follow the contours of the vehicle. The introduction of Atala Wave allows manufacturers to design vehicle lighting in three dimensions.



## Current Tech Specs

Glass Type: Bendable

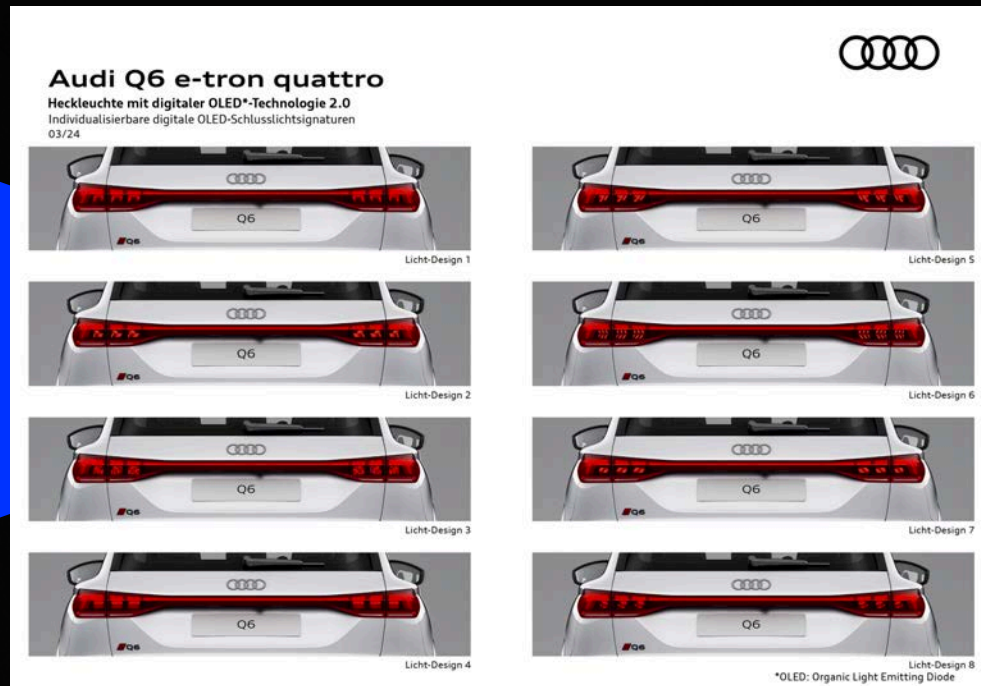
Panel Thickness: 0.1mm

Brightness: 2,000 cd/m<sup>2</sup>

# Atala on the Road

In addition to passing stringent reliability testing, Atala lighting products are gaining validation from their growing presence on the road and the continuing interest shown by major automotive manufacturers. Atala products are on the road today, as seen in the rear taillights of the Audi A8, Q8, Q7, Q5, A5/S5, Q6 e-tron, and A6 e-tron. OLEDWorks champions Audi's commitment to digital OLED design that provides their customers with premier personalization options and advanced safety lighting that redefines how cars communicate with the surrounding environment.

OLED lighting developments are increasingly presented at tradeshow within future vehicle generation lineups, and OLEDWorks engages in many diverse and productive conversations with leading carmakers about the expansion of Atala's presence on the road.



*Illustration of the Audi Q6 e-tron quattro rear light with customizable OLED light signatures*

AUDI AG. (August, 2024). Audi Q6 e-tron quattro. [Image]. Audi Media Center. [www.audi-mediacenter.com/en/photos/detail/audi-q8-120861](http://www.audi-mediacenter.com/en/photos/detail/audi-q8-120861)

# Atala Resources

The merits of Atala as an automotive lighting solution are many, and not all are covered in this eBook. If you have additional questions and/or would like to learn more, we've included a few additional resources below.

## Subscribe to the OLEDWorks Newsletter

The OLEDWorks newsletter is the best place to learn about advancements in Atala OLED technology and OLEDWorks company news.

[Subscribe to be among the first notified of new content.](#)

## Download our Automotive Design Guide

Our Guide for Automotive Manufacturers provides more details on the technical specifications of Atala products, including design considerations and tips for electrical and mechanical integration.

[Download the guide to see how Atala can fit within your products.](#)

## Schedule an Atala Tech Day

With Atala Tech Days, our team visits vehicle OEMs directly to share the unique advantages and versatility of OLED lighting with your team. We will provide you with interactive demonstrations of a range of Atala technology offerings and share how Atala can help differentiate your brand.

[Schedule your Atala Tech Day](#)