

# First to FuSa

On the road to fully autonomous vehicles, nothing is more important than ensuring that automotive electronic and electrical (E/E) systems meet rigorous safety standards. With 30 years of automotive technology innovation, Micron again leads the industry by introducing the first low-power DDR5 DRAM evaluated for automotive safety systems up to ASIL-D.

## Without FuSa, autonomous vehicles aren't possible

### What is FuSa?

Functional safety (FuSa) is the absence of unacceptable risk due to hazards caused by malfunctioning E/E systems. Since both safety and non-safety systems are typically tied to the same memory and processor, assuring reliability across all automotive applications is a top priority.

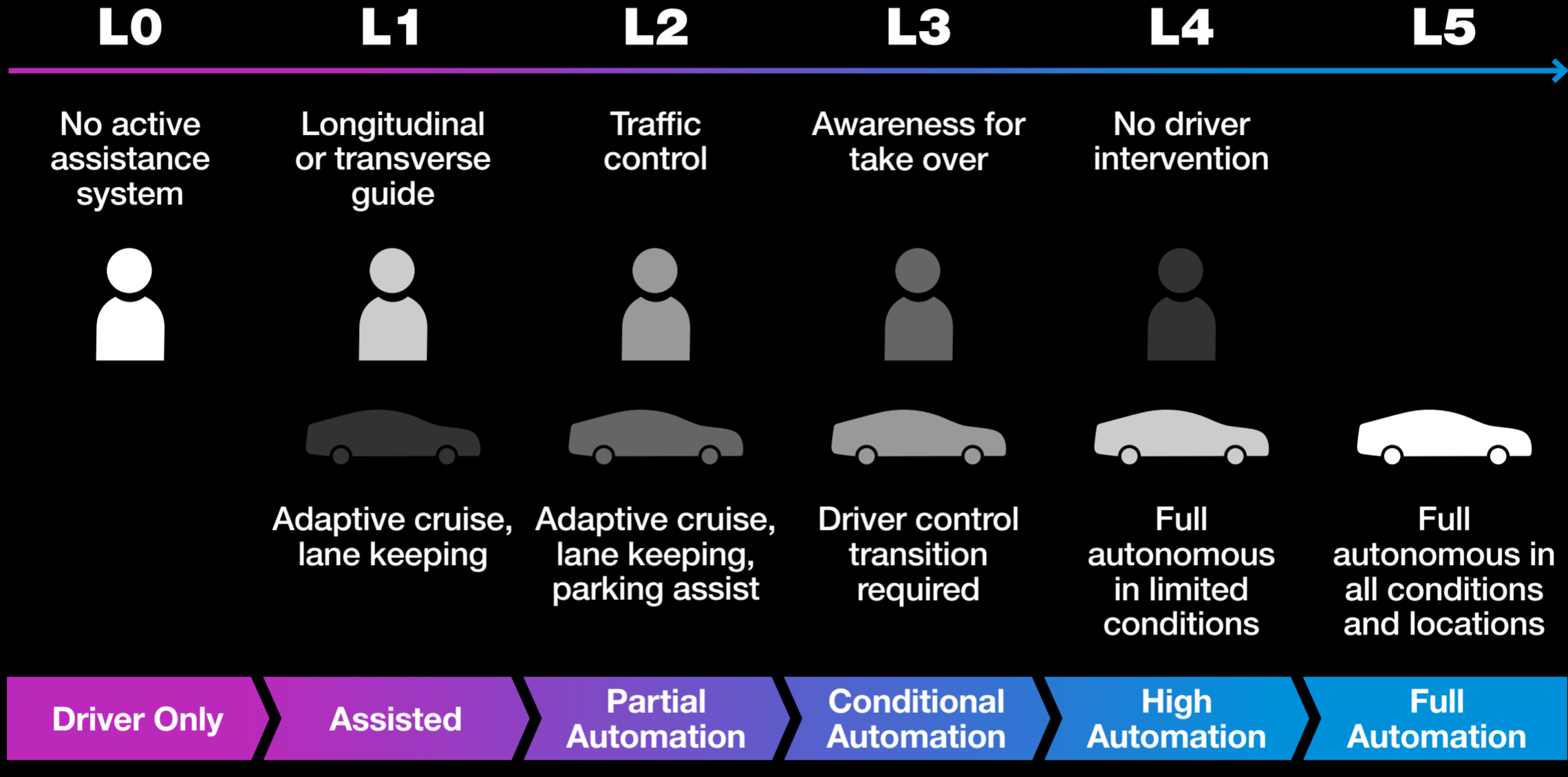
The most stringent set of automotive safety requirements is called **ASIL-D**.

**10**

Total number of failures per 114,000 years by an ASIL-D system<sup>1</sup>

### Taking autonomy to the next level

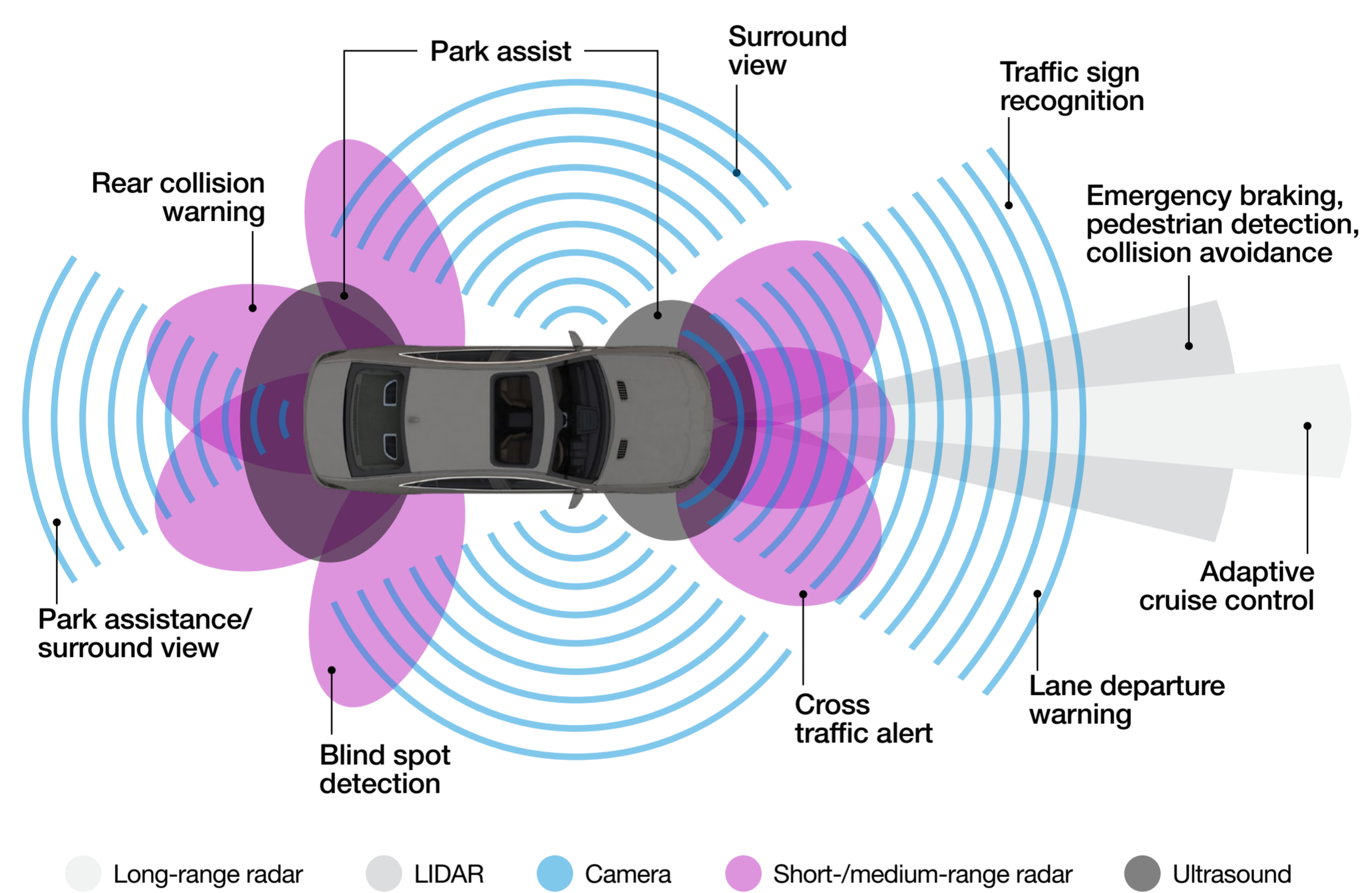
Modern vehicles equipped with advanced driver-assistance systems (ADAS) fall into the L1 to L2 range, with some supporting up to L3 capabilities. Higher levels of ADAS/AD capabilities are accelerating the need for data-centric levels of compute performance at the intelligent edge. Micron's innovations in memory and storage are helping the automotive industry make this shift a reality.



### FuSa in ADAS

ADAS, by definition, assists drivers in achieving greater safety, and these systems will be increasingly required to meet the highest FuSa standards (ASIL-D). ADAS relies on sensor data that describes a vehicle's exterior environment.

To function properly, massive amounts of this data are fed into processors using next-generation memory and storage and processed in near real time.



### Driving the need for automotive-qualified memory

Fully autonomous vehicles will generate more data than ever before from more sources: radar, lidar, C-V2X, image recognition, 5G and more. This massive data will need to be processed in the vehicle in near-real-time, driving the need for memory designed to handle rugged auto environments while meeting FuSa standards.

**4TB**  
Average daily data today's cars generate<sup>2</sup>

**600+**  
Tera operations per second (TOPS) required to process autonomous vehicle data (rivals data center compute<sup>4</sup>)

**20TB**  
Average daily data autonomous vehicles will generate<sup>3</sup>

**100M**  
Lines of code run by today's high-end vehicles (up to 300 million in the future<sup>5</sup>)

### Micron is at the heart of automotive innovation

Micron's deep expertise is born from 30+ years of close collaboration with automotive customers during the system architecture definition phase of their product.

**#1** supplier of automotive memory (based on market share)

**30+** years of experience and commitment to automotive technology innovation

**Trillions of miles** on the road accumulated by Micron automotive memory and storage solutions since 1991<sup>6</sup>

As modern vehicles evolve from Level 2/3 ADAS systems to Level 4/5 autonomy where massive data volumes are processed at the intelligent edge, memory that meets the strictest FuSa standards will become integral to achieving full autonomy. Micron's automotive-certified LPDDR5 is the first FuSa-supported product in an expanding portfolio of functional safety-focused products.

#### Sources

<sup>1</sup>ISO 26262, "Road vehicles — Functional safety," International Organization for Standardization (ISO), revised 2018  
<sup>2</sup>"100 Million Lines of Code, 4 TB Data Per Day — Is That Your Next Car?" Futuremonger, January 2017, [www.futuremonger.com/100-million-lines-of-code-4-tb-data-per-day-is-that-your-next-car-a2724e9bd3fa](http://www.futuremonger.com/100-million-lines-of-code-4-tb-data-per-day-is-that-your-next-car-a2724e9bd3fa)  
<sup>3</sup>"Data storage is the key to autonomous vehicles' future," IoTNOW Transport, February 2019, [www.iotnowtransport.com/2019/02/12/71015-data-storage-key-autonomous-vehicles-future/](http://www.iotnowtransport.com/2019/02/12/71015-data-storage-key-autonomous-vehicles-future/)  
<sup>4</sup>"Busy Road Ahead for Automotive Memory," EETimes, February 2021, [www.eetimes.com/busy-road-ahead-for-automotive-memory/](http://www.eetimes.com/busy-road-ahead-for-automotive-memory/)  
<sup>5</sup>"How Many Lines of Code Does It Take?" VisualCapitalist, February 2017, [www.visualcapitalist.com/millions-lines-of-code/](http://www.visualcapitalist.com/millions-lines-of-code/)  
<sup>6</sup>Estimate based on Micron's calculations