

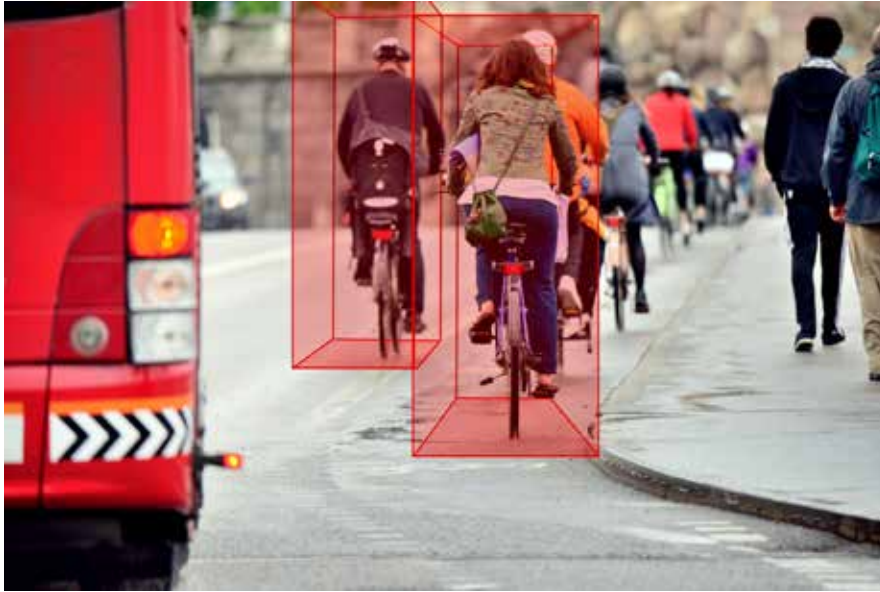


360 degrees guarding driving & road users safety

## oToGuard

Integrated ADAS Product for Commercial Vehicle

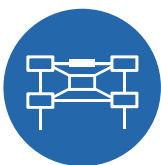
## The World's First All-in-one Commercial Vehicle ADAS Product



oToGuard is equipped with 1 automotive-grade ECU system, 8 cameras, and vision-AI deep learning technology. The vision-AI algorithm can detect and classify different kinds of vehicles/pedestrian/two-wheeler riders/lane marking and other objects for different purpose. With 2 front-view cameras, it supports FCW, LDW, MOIS (UN R159) ADAS functions from 0~100 meters without blind spots. With 4 sideview cameras, it supports two sides of BSIS (UN R151) to protect vulnerable road users, especially pedestrian and two-wheeler riders within 40 meters without blind spot. With 1 rear view camera, it can support rearview monitoring and combine with other cameras mentioned above to support AVM as well. With 1 in-cabin IR camera, the vision-AI algorithm can recognize over 100 drivers' identification and categorize over 10 kinds of driving status. Furthermore, its less than 20 centimeter high-precision lane detection can operate on straight and curve roads with a radius over 250m which allows the vehicle to enable level 2<sup>+</sup> ADAS functions such as ACC, AEB, LCA, LKA, etc.

### Product Key Features

- All-in-one system for 360-degree and in-cabin ADAS solution with automotive-grade camera & ECU
- Support multiple level 0~2<sup>+</sup> ADAS functions including ACC/AEB, AVM, BSIS/BSD, DMS, FCW/HMW/PCW, LDW/LKA/LCA, MOIS, etc.
- Built-in time-synced (<3ms) event-triggered video recording for fleet management
- All camera modules' images can be seamlessly integrated with DVR to reduce the quantity of camera usage in vehicles
- Comply with TW/UN regulation for large commercial vehicle (UN R130, R151, R159)
- 3D facial landmark AI tracking technology to identify up to 100 drivers and classify driver's behavior precisely including inattention, dozing, smoking, calling, etc.



Centralized hardware architecture design



ADAS



Multi-sensor time-synchronized event-triggered recording function



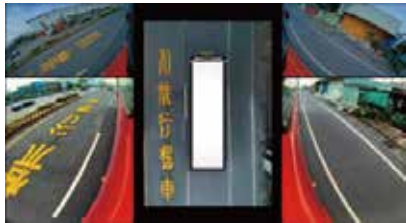
UN regulations



Driver monitoring system

### 360-degree comprehensive protection via vision-AI technology

oToGuard is equipped with vision-AI technology, enabling it to detect and classify various types of vehicles, pedestrians, cyclists, lane markings, and other objects. Currently, it supports over 10 features to achieve Level 0 to Level 2<sup>+</sup> functions for heavy commercial vehicles. Depending on the vehicle's speed, it automatically switches between different ADAS functions to enhance vehicle safety in various driving scenarios.



Low speed mode (≤ 20kph)



High speed mode (>20kph)



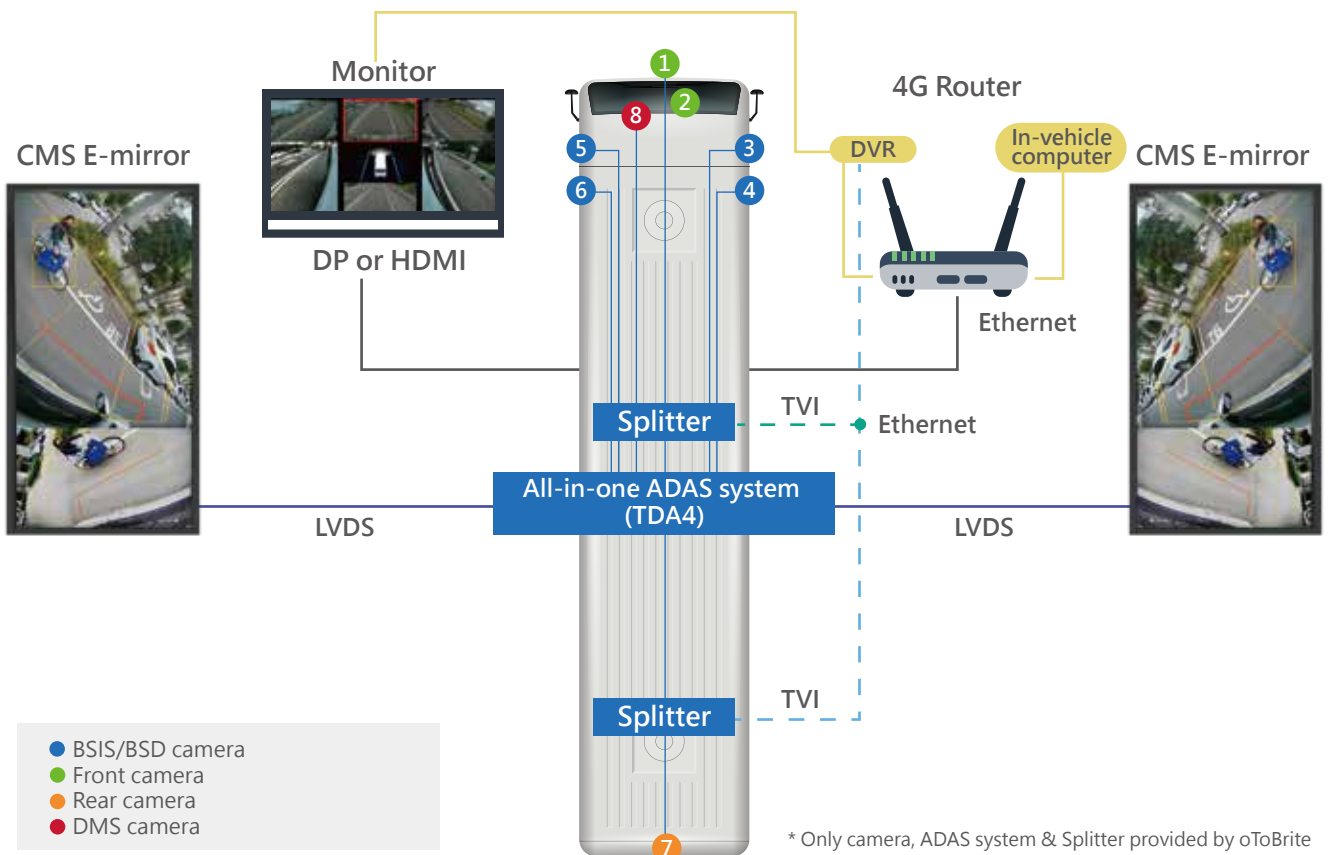
Making turns mode





Reverse mode

Functions	Operating at	Note
<b>Level 0</b>		
AVM	≤ 20 kph	
BSIS/BSD	BSIS: ≤ 35 kph BSD: 40~150 kph	UN R151 · Switch function between 30~35 kph
DMS	≥30 kph	Face ID, fatigue, inattention & distraction
FCW/HMW/PCW	FCW/HMW: 30~150 kph PCW: 7~50 kph	
LDW	50~150 kph	UN R130
MOIS	≤ 15 kph	UN R159
Rear view	Reverse mode	UN R158 (only camera system)
<b>Perception for Level 2<sup>+</sup></b>		
ACC	30~150 kph	With cut-in handling
AEB	By scenarios	
LCA	50~150 kph	Lane change assist
LKA	50~150 kph	

Flexible architecture for various scenarios in large commercial vehicles



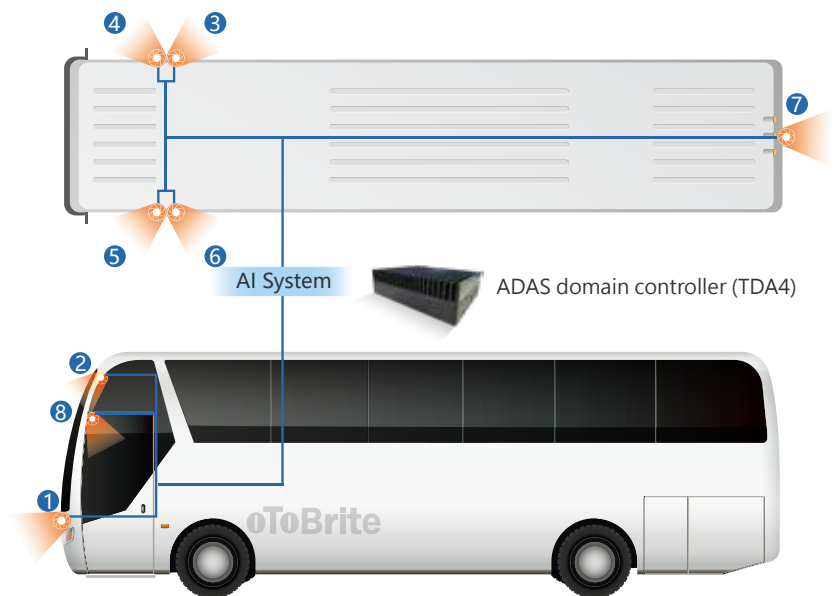
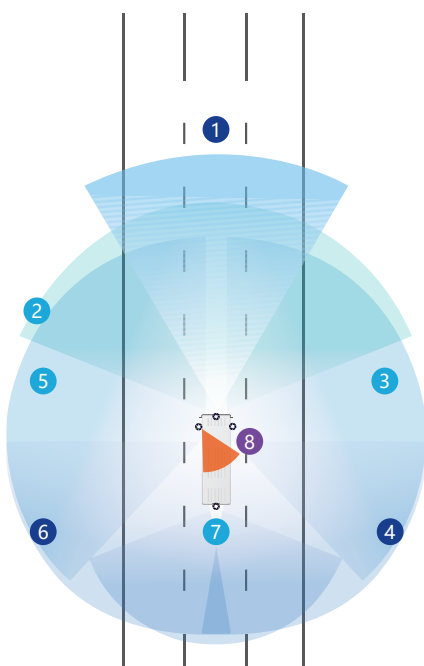
Highly integrated ADAS/Fleet Management Total Solution

	Existing solution	Our solution
Solution	Different system from different vendors 	Highly integrated solution 
Number of system	6 (AVM, BSD, BSIS, DMS, FCW/LDW, fleet management)	1
Supply chain management	Complex with multiple vendors to manage	Simple
Overall cost	High (product, installation complexity, quality, etc.)	Low
Quality	Mostly aftermarket or commercial grade	Automotive grade from domain controller SoC, manufacturing, testing, etc.
Image resolution	<=1M pixels	1~2M pixels
Time-synced video recording	Not easy to achieve	<3ms time-synced event triggered video recording
Extension	None	OTA, Level 2 ADAS functions

## Product Specifications

Hardware	
SoC	TI TDA4V MidEco
Display	1 x Display port, 2 x LVDS port
CAN bus	4 x CAN/CAN-FD
Ethernet	1 x Gigabit (RJ45), 1 x 100 Base-T
GPIO	3
USB	1 x 3.0 Type A
Storage extension	Micro-SD card slot
General info	
Operation Voltage	DC 9-32V
Power Consumption	15W
IP rating	ECU: IP51, Camera: IP67/69K (DMS camera: IP5X)
Operating Temperature	-40°C ~ +85°C
Storage temperature Range	-40°C ~ +95°C
Reliability	ISO 16750-4 / IEC 60068-2
EMC	ISO 16750-2 / ISO 10605 / VSCC 56-3

## Detection coverage and installation position



*driving life easier and safer*



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