

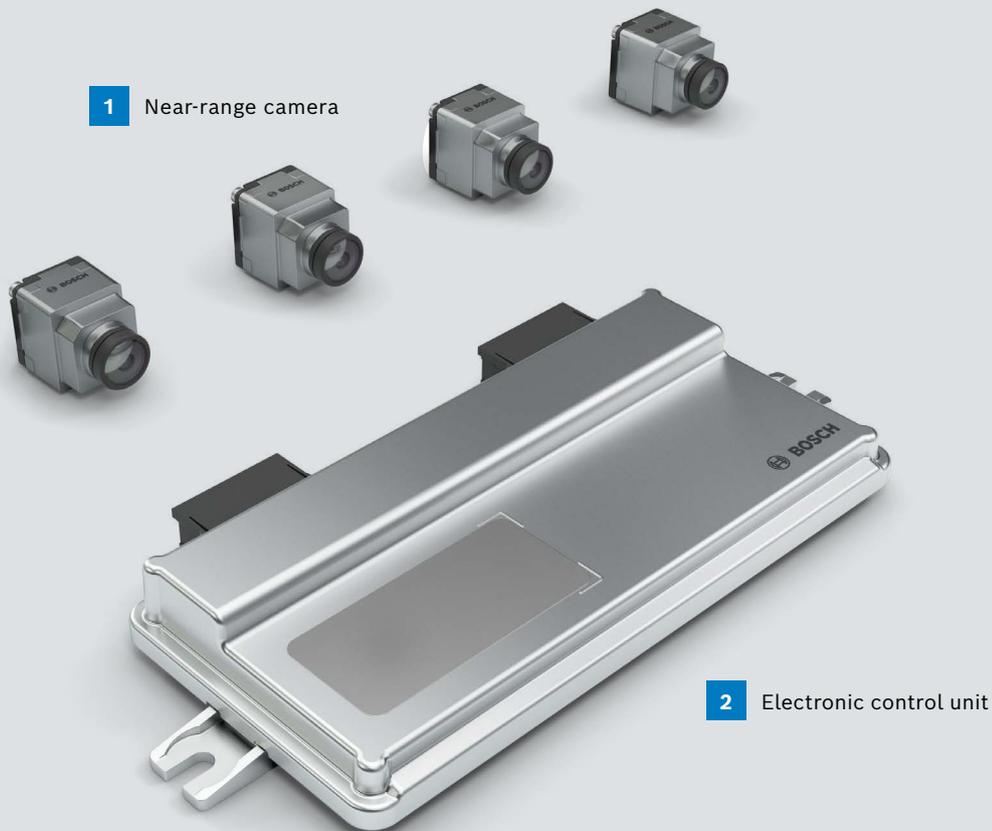
Multi-camera system for industrial trucks and off-highway vehicles

Video-based driver assistance systems



PRODUCT BENEFITS

- 360° surround view in tight situations
- Realistic display of the vehicle and its surroundings in different perspectives
- Driving lane indication serves as maneuvering and positioning support
- Reliable collision warning system in dangerous situations using neural networks:
 - Active acoustic and optical warning of stationary and moving objects
 - Optimal detection of kneeling, standing and moving persons in the vicinity of the vehicle



1 Near-range camera

2 Electronic control unit

✓ **innovative functions** for more comfortable maneuvering

✓ **pioneering image processing** with 360° surround view

TASKS

The multi-camera system from Bosch for industrial trucks and off-highway vehicles facilitates precise maneuvering in tight situations. Four cameras are combined into one system to create a 360° surround view of the vehicle's current surroundings.

TOP VIEW

An efficient algorithm is used to generate a natural image for the driver from the image data. The multi-camera system from Bosch uses four compact near-range cameras to calculate a top view in order to view the entire surroundings of the vehicle up to 8×8m. The driver receives a realistic image of his/her own vehicle as the current surroundings are displayed in real time.

DRIVING LANE INDICATION

Based on steering-angle and driving direction signals, a driving lane is displayed. The color of the driving lane is adjustable in order to increase its visibility on different surfaces.

AUTOMATIC ZOOM

Optionally, the field of view is automatically adjusted based on the current driving speed. This helps to obtain a better overview of the surroundings while driving fast, and a more detailed view when maneuvering in tight situations.

COLOR ADJUSTMENT

The brightness and white balance of the images are automatically adjusted to produce a uniform output image.

AUTOMATIC CALIBRATION

If the alignment of the camera is disturbed by external influences and the camera does not shift more than $\pm 3^\circ$ in each axis, this shift is compensated by the system.

SPLIT SCREEN

In split-screen mode, the screen optionally displays two images at the same time, e.g. top view and panorama view.

PANORAMA VIEW

In this mode, the field of view of the front or rear camera is opened up to 180°.

FRONT, SIDE AND REAR VIEW

The images of the front, side and rear camera can be depicted in full or split screen. Switching between the different views is possible based on the vehicle signals. Alternatively, the images of each camera can be selected manually for display.

VIRTUAL PANNING

Dependent on the steering angle, the camera can pan digitally. This allows the driver to receive a display only of the area relevant to him/her.

COMPENSATION OF DEFECTIVE HARDWARE

If one or more cameras should fail, the field of view of the remaining cameras is enlarged in order to display the greatest possible area.

EASY DIAGNOSTICS AND CALIBRATION PROCEDURE

A simplified diagnostics and calibration procedure makes it possible to adapt the system to different vehicle variants.

TECHNICAL CHARACTERISTICS

Field of view (effective) and resolution	
Field of view camera, horizontal	$\geq 185^\circ$
Field of view camera, vertical	$\geq 120^\circ$
Field of view system, horizontal	360°
Top view zoom level	8×8m
Max. resolution	WXGA (1280×800 pixel) (adaptable, depending on customer's display)
Interfaces	
Video out	Automotive Ethernet (IEEE100BaseT1, H.264)
Electricity	
Supply voltage control unit	9–16V
Supply voltage camera	8V via control unit
Power consumption	≤ 14 W (control unit + 4 cameras)
Environmental conditions	
Control unit	IP5K
Camera	IP6K7K
Lens	IP6K9K
Operating temperature	-40°C bis 80°C
Mech. load	Up to 500m/s ² for control unit and camera (according to standards in the automotive industry)