



System Solution Guide - Preview

Advanced Driver Assistance Systems (ADAS)



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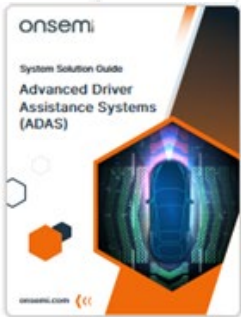
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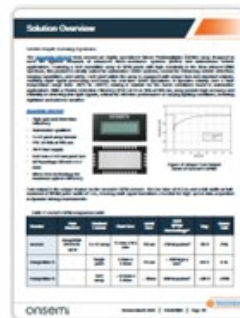
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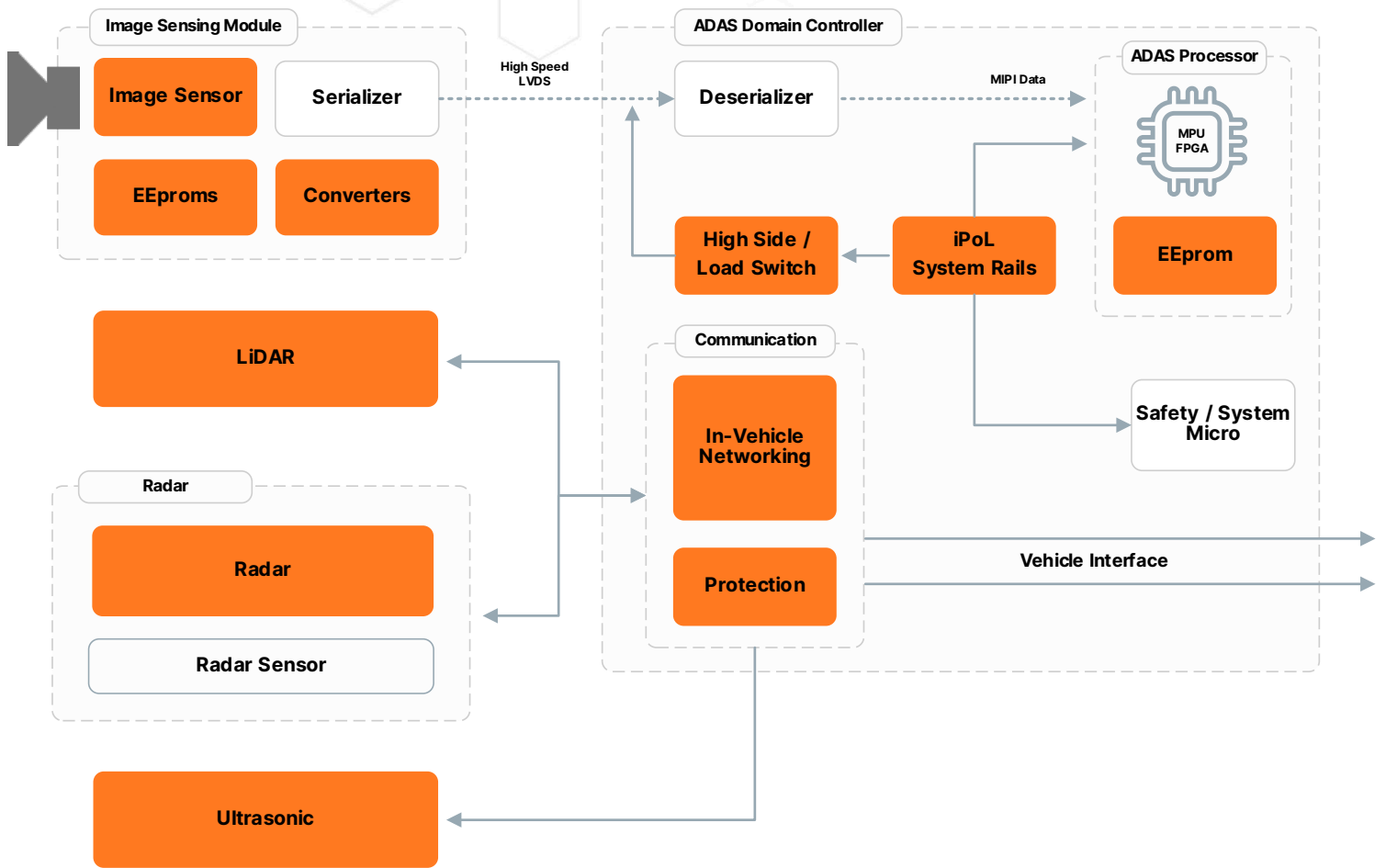
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Block Diagram - ADAS

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Block Diagram - DC EV Charger

Block diagram below represents ADAS solution recommended by onsemi. Majority of the functional block devices can be sourced by the onsemi solutions as shown in the following device tables. The diagram provides an illustrative representation of sensing technologies deployed in the front, rear, and surrounding areas. These include image sensor, LiDAR, ultrasonic and radar solutions, which have been divided into four key stages. The primary distinction between these two systems is their utilization of image sensors and the ability of the front and rear systems to detect ultrasonic signals.



Use our Interactive Block Diagrams Tool



Open IBD Tool

ADAS Front and Rear - Image Sensing

Hyperlux™ AR0823AT

The **onsemi AR0823AT** image sensor offers a cutting-edge solution for Advanced Driver Assistance Systems in the automotive industry, setting a new standard for safety and performance. It is designed to meet the stringent requirements of automotive applications. This (8.3MP, 1/1.8-inch) CMOS digital image sensor excels in dynamic range, image quality, and low-light performance, ensuring optimal functionality in diverse driving conditions.

Key Benefits:

- **Exceptional Image Quality:** The [AR0823AT](#) features a 3840 H x 2160 V active-pixel array with a 2.1 μm pixel size, delivering high-resolution images with superior clarity. This pixel enables more than 150 dB of dynamic range and a 70-degree FOV without the need for auto exposure adjustment.
- **Enhanced Safety Mechanisms:** Incorporating advanced HDR image combination with LED flicker mitigation, the AR0823AT significantly reduces latency, enabling real-time functional safety mechanisms.
- **Robust Performance in Low Light:** Equipped with a Super-Exposure BSI (backside illumination) pixel, the sensor excels in low-light scenarios, maintaining high image quality and ensuring reliable operation during nighttime driving or in poorly lit environments.



Hyperlux™ AR0820AT

Features

- High Performance 2.1 μm Automotive Grade Backside Illuminated (BSI) Pixel with DR-Pix™ Technology
- Advanced On-Sensor HDR Reconstruct with Flexible Exposure Ratio Control
- Fast Full Resolution Video Capture of 3840 x 2160 at up to 40 fps in 3-exposure HDR and 30 fps in 4-exposure HDR
- 2 x 2 In-pixel Binning Mode and Color Binning Mode
- Data Interface: 1.25 Gbps/Lane, 4-lane MIPI CSI-2
- Selectable Automatic or User Controlled Black Level Control
- Multi-Camera Synchronization Support
- Multiple CFA Options including RGB, and RCCC, RCCB



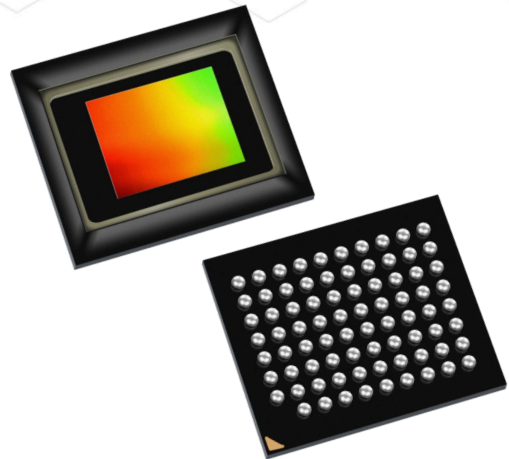
The **onsemi AR0820AT** image sensor is designed for Advanced Driver Assistance Systems (ADAS) in the automotive industry, providing superior image quality and robust performance across diverse driving conditions. This 1/2-inch CMOS digital image sensor, featuring a 3848 H x 2168 V active-pixel array, excels in capturing high-resolution images in both linear and high dynamic range (HDR) modes with rolling-shutter readout.

Hyperlux AR0341AT

onsemi's AR0341AT is a highly advanced 1/3.6-inch CMOS digital image sensor designed specifically for automotive applications, offering exceptional performance and versatility. It features a 1920 x 1536 active-pixel array, capturing images in high dynamic range with LED flicker mitigation using a rolling-shutter readout. The 2.1 μm Super Exposure (SE) BSI pixels enable an impressive 150 dB of dynamic range, eliminating the need for auto exposure adjustments and ensuring clarity in both low and extremely bright lighting conditions. The sensor's advanced HDR image combination and flexible exposure ratio control ensure top-tier image quality under diverse lighting conditions.

Features:

- On-chip Combined HDR RAW Output: Up to 26-bit (>150 dB) with effectively lossless companding down to 16 or 12-bit.
- Advanced HDR Image Combination with Flexible Exposure Ratio Control
- Real-time Functional Safety Mechanisms and end of frame fault reporting
- Data Interfaces: 4-lane MIPI CSI-2
- Dual Output Datapath to Enable Multi-function Systems



LiDAR Depth Sensing Systems

The **ArrayRDM-0112A20** from **onsemi** are highly specialized Silicon Photomultiplier (SiPMs) array designed to meet the rigorous demands of advanced driver-assistance systems (ADAS) and autonomous vehicle applications. Featuring a 1x12 monolithic array of SiPM pixels with high sensitivity in the Near-Infrared (NIR) spectrum, this product is ideally suited for automotive LiDAR systems, crucial for enhancing vehicle detection, ranging capabilities, and safety. Each pixel within the array is equipped with unique fast and standard outputs, enabling rapid signal processing necessary for real-time ADAS operations. It operates reliably over a wide temperature range from -40°C to $+105^{\circ}\text{C}$, making it suitable for the harsh conditions found in automotive applications. With a Photon Detection Efficiency (PDE) of 13 or 16% at 905 nm, array provide high accuracy and reliability in detecting low-light signals, critical for effective performance in varying lighting conditions, including nighttime and adverse weather.

ArrayRDM-0112A20

- High gain and detection efficiency
- Automotive qualified
- 1 x 12 pixel array format
- PDE of 16% at 905 nm
- 30 V bias supply
- 0.47 mm x 1.12 mm pixel size
- QFN package (10 mm x 5.2 mm)
- Micro-lens technology for maximum optical efficiency

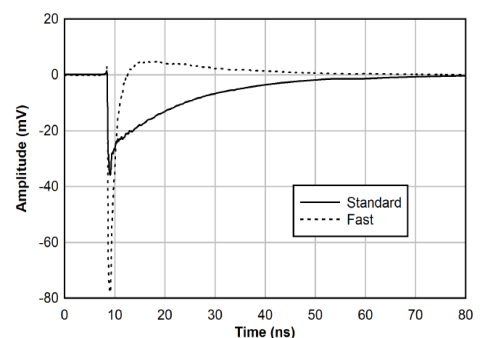
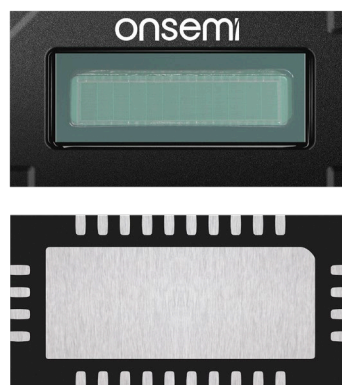


Figure 4: Unique Fast Output mode of **onsemi's** SiPMs

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