System Solution Guide - Preview

Drone

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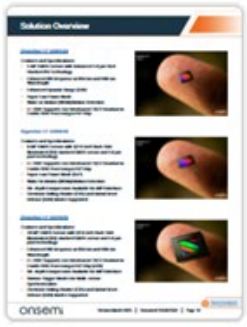

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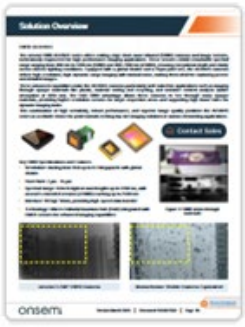

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Block Diagram - Machine Vision

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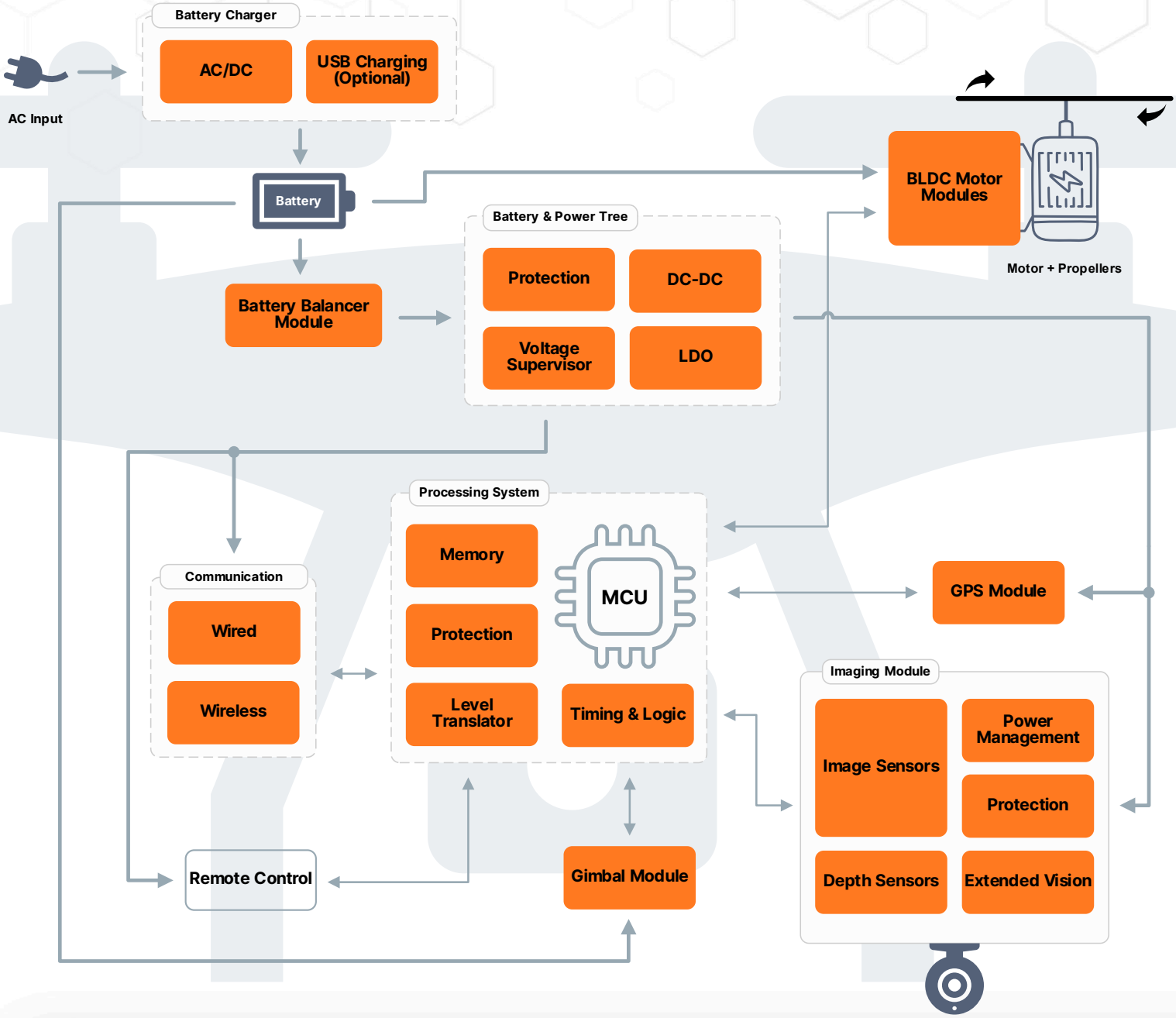
Block Diagram - Drone

The block diagram below illustrates an industrial drone solution featuring recommended products from **onsemi**. This solution integrates multiple image sensing technologies, utilizing **onsemi's** Global and Rolling Shutter sensor families. Most of the functional block devices, including power management, communication, and many more, can be sourced from **onsemi's** comprehensive range of solutions.



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Solution Overview

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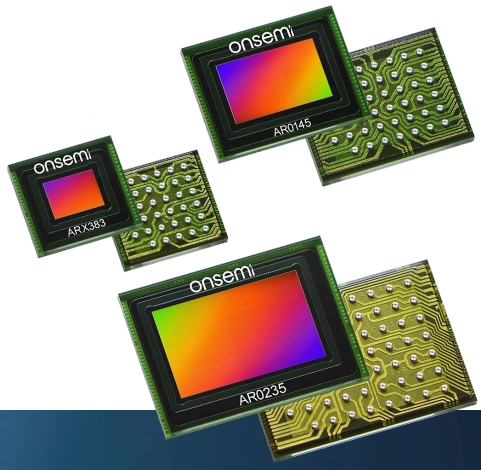
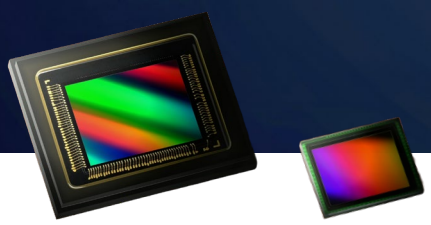
Drone Sensing Systems

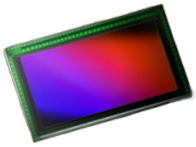
When selecting image sensors for drones, it's crucial to consider the specific conditions and requirements of your application. Typically, a system might use six to eight sensors, but up to twelve sensors are not uncommon. Global shutter sensors, which capture the entire image simultaneously, are ideal for moving objects as they prevent distortions and motion artifacts. This is particularly important for applications like mapping, surveying, and industrial inspections, where precision is crucial. By capturing the entire frame simultaneously, global shutters prevent distortions such as the "jello effect" and motion blur, which are common with rolling shutters.

- **Low power image sensors** are beneficial due to their low power consumption and the ability to be placed in multiple locations, providing a comprehensive view of the scene.
- **High Dynamic Range (HDR)** cameras are essential in drone technology for capturing detailed and accurate images in varying lighting conditions. They balance exposure in both bright and dark areas, ensuring no details are lost in challenging lighting conditions.
- **High Resolution:** 20-megapixel Hyperlux AR2020 will further enhance these capabilities, allowing for even more detailed and accurate inspections and surveys
- **Extended Vision:** Seeing Beyond the Visible with Swir

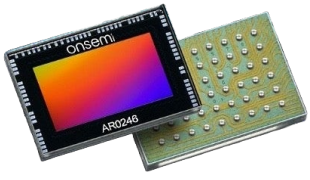
Hyperlux SG Family
Global Shutter Technology

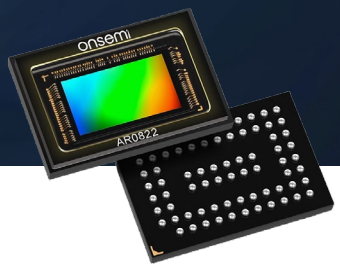






Hyperlux LP
Low Power Consumption





Hyperlux LH
High Dynamic Range

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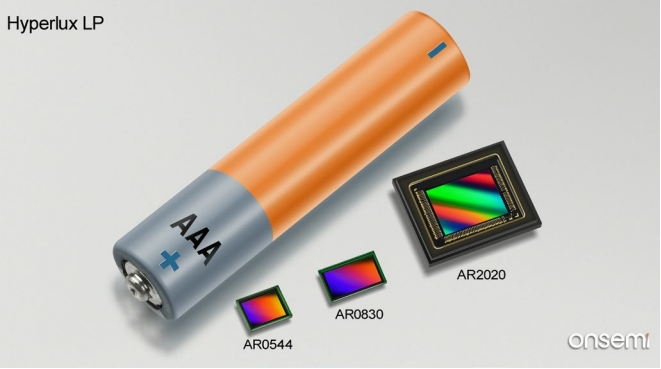
Hyperlux SG – Global Shutter Image Sensor Family

The Hyperlux SG global shutter image sensor family from **onsemi** captures high-speed, distortion-free images, making it ideal for barcode scanning, machine vision, and robotics. Models like ARX383, AR0145, and AR0235 offer up to 120 fps, programmable regions of interest, auto-exposure, and low-power operation. These sensors are designed to deliver exceptional image quality even in challenging lighting conditions. Their compact form factor makes them suitable for a wide range of industrial applications.

Hyperlux LP - Image Sensor Family

The **onsemi** Hyperlux LP image sensor family is designed for a range of applications, including the AR2020, AR0544, and AR0830. These sensors offer exceptionally low power consumption, ensuring devices run longer and more efficiently. With the innovative wake-on-motion feature, your device can stay in a low-power state until motion is detected, saving even more energy. Additionally, the sensors provide excellent performance in low-light and NIR wavelengths. Moreover, the Smart ROI (Region of Interest) in the AR2020 sensor allows for intelligent focus on specific areas, enhancing performance and precision.



Hyperlux LH - Image Sensor Family

The onsemi Hyperlux LH image sensor family is designed for a range of applications, including the AR0822 and AR0246. These sensors achieve stunning 4K video quality with enhanced NIR and eHDR capabilities, ensuring exceptional image performance in various lighting conditions. With industry-leading 120dB ultra-high dynamic range (HDR), these sensors provide clear and accurate images even in challenging environments. The compact design of the Hyperlux LH sensors makes them ideal for integration into space-constrained systems, enhancing both performance and efficiency.

The sensors are designed with a 2.0 µm pixel size, contributing to their high sensitivity and image clarity. Furthermore, these sensors are built for low power consumption, making them ideal for battery-operated devices and reducing overall energy costs in systems.

Solution Overview

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SWIR - Extended View

The **onsemi** SWIR ACUROS series offers cutting-edge short-wave infrared (SWIR) cameras and image sensors, meticulously engineered for high-performance imaging applications. These sensors exhibit remarkable spectral range ranging from 400 nm to 1700 nm (SWIR) and 400-2100 nm (eSWIR), ensuring exceptional depth and clarity across diverse lighting conditions. Equipped with a global shutter and a 15µm pixel size, the ACUROS cameras deliver high-resolution, high-dynamic-range imaging with minimal noise, making them ideal for capturing precise and detailed images.

These advanced capabilities make the ACUROS cameras particularly well-suited for applications such as imaging through opaque materials like plastic, material sorting and recycling, and moisture content analysis (water absorption at 1450 nm). The CQD SWIR advantage allows these cameras to 'see through' many opaque materials, providing higher resolution sensors for larger inspection areas and supporting high frame rates for dynamic imaging tasks.

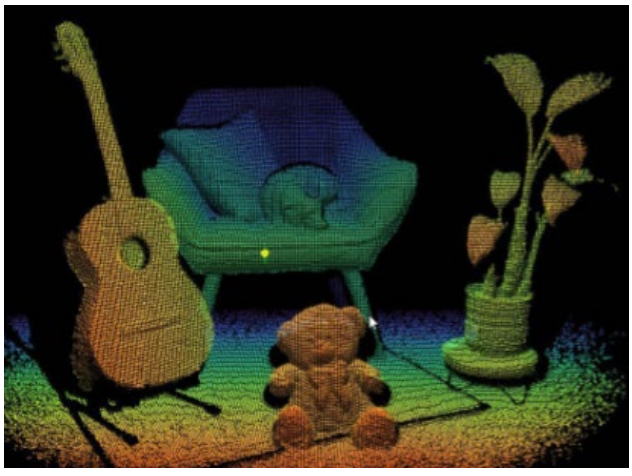
This combination of high sensitivity, robust performance, and superior image quality positions the ACUROS series as a reliable choice for professionals seeking top-tier imaging solutions in various demanding applications.

Smart iToF Global Shutter Depth Sensors - AF0130 & AF0131

onsemi AF0130 and AF0131 Smart Indirect Time of Flight (iToF) 1.2 MP CMOS sensors are designed for exceptional depth sensing and imaging. These sensors feature a 1/3.2-inch optical format and BSI CMOS global shutter technology, including 1.2 MP CMOS Smart iToF Sensor with Advanced 3.5 µm Pixel Stacked BSI Technology, superior low-light and ambient-light performance, enhanced NIR response at 850 nm and 940 nm wavelength (QE > 40%), dual laser operation for increased depth range, and laser eye safety monitoring.

Key features of Hyperlux ID depth iToF sensors include :

- High Depth Accuracy: Provides accurate distance measurements, crucial for tasks requiring precise 3D mapping and object detection.
- High Frame Rates: Capable of capturing fast-moving objects (60 – 100 fps), ensuring reliable performance in dynamic environments.
- Low Power Consumption: Optimized for energy efficiency (400 mW in Mode2.2 (100 MHz) @ 30 fps and 0.35 ms exposure 600 mW in Mode3.2 (100+120 MHz) @ 30 fps and 0.35 ms exposure), making them suitable for battery-powered and multi-sensor systems.



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