Imaging Solutions for Embedded and Edge Applications

Image Sensing Overview

Image sensing is a critical element of a variety of modern technologies – automation, robotics, security systems, medical applications, drones, traffic cameras, and driver assistance systems, are just a few examples where image sensing ensures that critical tasks are accomplished without a glitch. Image sensing has seen massive growth in recent years due to its increased application in vision systems for IoT. Embedding the right image sensor technology into IoT end nodes can drive greater accuracy in inspection, depth sensing, object recognition, and tracking.

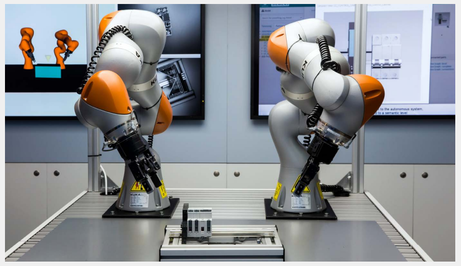
There are many ways the latest image sensing and camera technologies amplify the impact of humans in a variety of industrial and commercial processes.

Beyond the Human Eye: Multispectral, microscopic and high-speed imaging are good examples of vision capabilities that can be incorporated into cameras to identify special aspects of products, personnel, or processes, regardless of the environment.

Exceptional Quality: Special cameras allow for quality levels that no amount of human inspection can afford. Contactless dimension measurement, defect identification, etc. are just a few cases where image sensors augment human processes and ensure that standards for quality are met.

Reach: Cameras can go to places that humans cannot go. This makes cameras particularly valuable in mundane applications like pipe inspection to lifesaving applications in internal medicine. Space exploration and underwater exploration would not be possible without cameras.

Artificial Intelligence: Cameras have become invaluable for artificial intelligence. Facial recognition for security, occupancy detection, damage assessment, gesture detection, etc. are key applications making our world safer and helping users engage with providers in new ways.

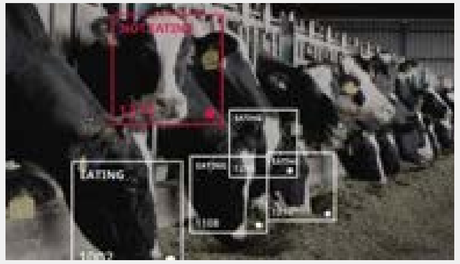


Robotics/AI & ML Systems

Automotive/Traffic

Security Access Control

Medical/Dental Equipment



Agriculture/Livestock

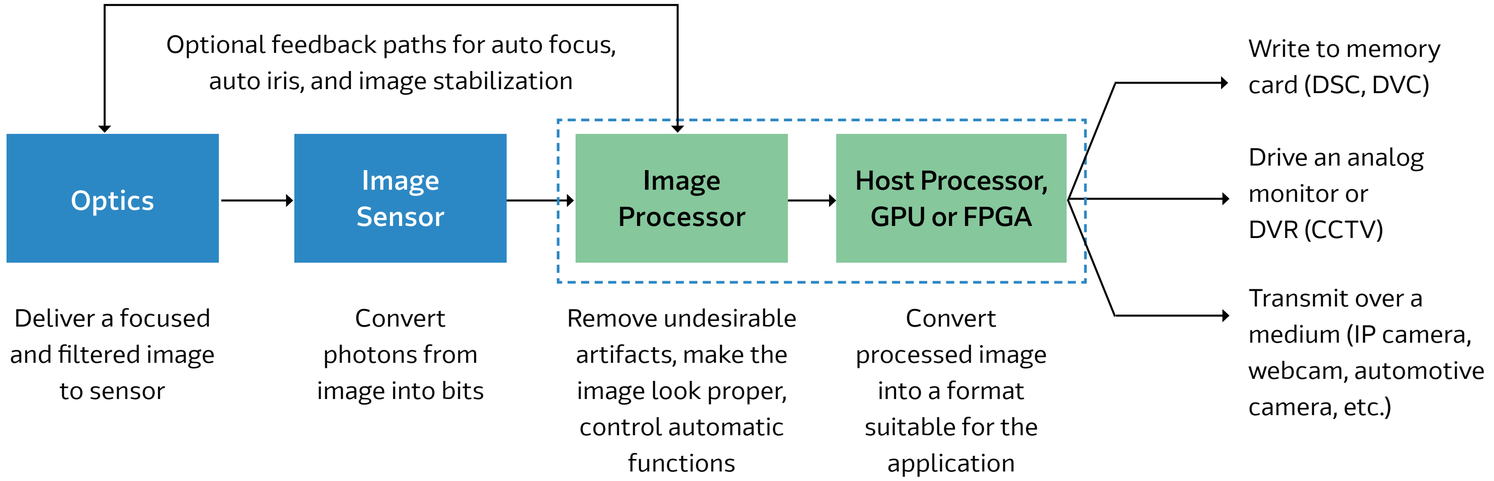
Drones

Warehouse Management and Logistics

VR/AR Systems

A Complete Image Sensing System

A typical image sensing system has three main hardware components – an image acquisition block comprising optics and the image sensor, a processing engine to analyze and act on the information, and a communication interface to connect to the external world. All these components play a significant role in the performance of an imaging system. Proper selection and integration of all these components, including cameras, sensors, processors, firmware, drivers, application software, and cables result in optimal system performance.



Selection Criteria

Optics

- Optical filter
- Focal length and zoom
- Len mounting
- Image stabilization
- Color and IR filter
- Field of view (FOV)
- Aperture
- Options for lens grouping

Image Sensors

- Shutter speed
- Pixel size/count (resolution)
- Frames per second (FPS)
- Dynamic range
- Signal to noise (SNR)
- Image format/compression
- Shutter type

Processors/ISPs

- Required compute capacity (Number of ISP/CPU/GPU cores)
- On-chip imaging accelerators
- AI/ML accelerators
- Regulatory/certification
- I/O interface support

Additional Selection Criteria for Image Sensing Systems

Below are system-level considerations that play a critical role in system-level architecture definition and build vs. buy decisions.

- **Product requirements**
  - Power: Battery-powered or plugged in
  - Performance and image quality
  - Price: High-end or cost critical
  - Product size: Mounted or handheld
- **Selecting the right lens/sensor combination**
  - Distance to objects: variable or fixed, aerial, zoom capability, etc.
  - Indoor or outdoor, light conditions, fixed or mobile application
  - Sensor format: Some formats have more off-the-shelf lenses available
- **Time-to-market objectives**
- **Future-proofing, scalability, ease of upgrading**
- **Ease of integration**

Designing Image Sensing Solutions

Engineers have the choice to assemble various components of the system themselves by procuring individual components or buying modules. Time-to-market, in-house expertise, and the risk of failure drive the choice. Building a system has the advantage of offering the greatest flexibility of customization and can be very cost-effective for high-volume applications. However, building a system can involve high upfront development costs and pose project risks. Also, future-proofing the system and integration with other aspects of the manufacturing process will require additional effort and constant upkeep.

In contrast, modules offer a high level of integration and limit customization. Fully integrated systems that come with smart cameras are small, compact, all-in-one vision systems that incorporate lens, image sensors, system storage, and processors into a single device. These are increasingly popular as they take away the hassle of assembling all the components. Fast time-to-market and low risk are additional benefits accrued by buying a pre-built system.

Chip-down Design

Pros

- Design flexibility and customization to fit application needs
- Cost-efficient for high-volume applications

Cons

- Slow time-to-market, multiple design cycles and increased chances for design failure
- Resource and expertise intensive
- Low ROI for small volume applications

Module-based Design

Pros

- Fast development and ease of design reuse
- Faster time to market and lowered design risk, especially for small form-factor applications

Cons

- Less design flexibility
- Design must fit module
- The product size may be limited

Finished Product

Pros

- Extremely fast time-to-market
- Zero hardware design required. Focus on software, configuration, and application

Cons

- Limited hardware flexibility for customizations
- Low ROI for high-volume applications

onsemi Image Sensor Portfolio for Chip-down Designs

onsemi leverages the most advanced CMOS imaging technologies to provide the broadest, most capable portfolio of image sensors for industrial, automotive, and consumer applications. onsemi's image sensing portfolio ranges from VGA to over 50 MP (megapixel) resolution, and from 4 to over 800 fps (frames per second). The broad portfolio enables flexibility in configuration and combines optimal performance characteristics, such as high-speed, high sensitivity, and high image quality to match specific application requirements. It also provides an easy upgrade path for existing customers and allows OEMs to leverage a single camera design to support multiple products to accelerate time-to-market.

Industrial

High-speed, scalable portfolio

- PYTHON 25K — 25MP 4.5um
- PYTHON 16K — 16MP 4.5um
- PYTHON 5000 — 5MP 4.8um
- PYTHON 2000 — 2MP 4.8um
- PYTHON 1300 — 1.3MP 4.8um
- PYTHON 480 — VGA 4.8um

Machine Vision & Intelligent Traffic Systems

Performance, price, speed
29 x 29 mm cameras, system solutions

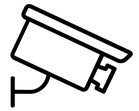
- XGS 32000 — 32MP 3.2um
- XGS 45000 — 45MP 3.2um
- XGS 20000 — 20MP 3.2um
- XGS 30000 — 30MP 3.2um
- XGS 12000 — 12MP 3.2um
- XGS 16000 — 16MP 3.2um
- XGS 8000 — 8MP 3.2um
- XGS 9400 — 9MP 3.2um
- XGS 3000 — 3MP 3.2um
- XGS 5000 — 5MP 3.2um
- XGS 2000 — 2MP 3.2um

Edge AI

Small sensors, low power
NIR optimized

- AR0234 — 2MP 3.0um GS
- AR0135 — 1MP 3.75um GS
- AR0144 — 1MP 3.0um GS
- AR1335 — 13MP 1.1um RS
- AR0821 — 8MP 2.1um RS
- AR0522
- AR0521 — 5MP 2.2um RS
- AR0830 — 8MP @ 60 fps

Machine Vision Everywhere



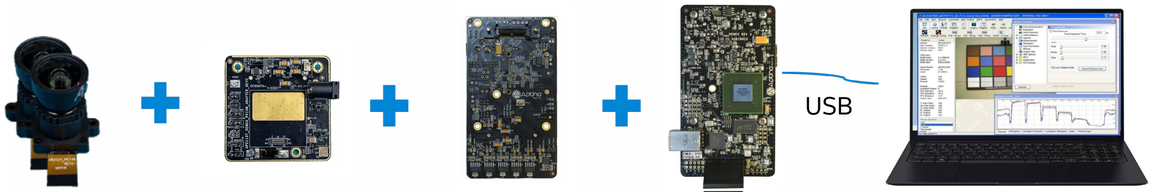
Event detection
Very low power, flexible states

- ARX3A0 — VGA 2.2um pGS
- LiDAR/SiPM — R Series
- SPAD Arrays — Pandion

onsemi PRISM Module and Evaluation Hardware

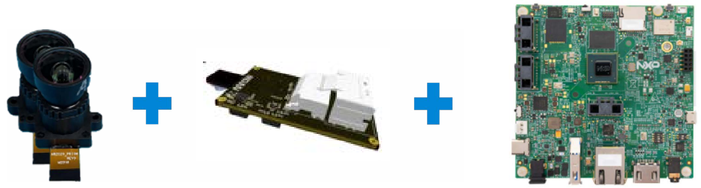
onsemi offers PRISM (Premier Reference Image Sensor Module) image sensing solutions that are released in tandem with each new sensor launch. These PRISM image sensing modules represent onsemi's commitment to providing not just sensors, but complete solutions that simplify the integration process and help customers fast track image sensing solution development.

Evaluation Hardware Using the onsemi AP1302 Image Sensing Processor



PRISM Module + PRISM Adaptor (part #: PRISM1-ADPTR-DM3D1-GEVB) + AP1302 ISP Board (Optional) + onsemi Demo3 — USB — onsemi Devware

Evaluation Hardware with Industry Leading SoCs and GPUs



PRISM Module + Platform Adaptor + Application Processor Evaluation Kits

Options

- NXP - i.MX8 and i.MX9 processors
- NVIDIA – Jetson Orin
- Qualcomm – RB5
- Intel – Alder Lake, Raptor Lake

Get in touch with Arrow to learn more about these modular evaluation platforms based on onsemi PRISM modules. We will help you put the bundle together

These Modules Offer Several Key Advantages:

- **Comprehensive Design Resources:** Each PRISM module comes with detailed documentation including schematics, optical specifications, validation reports, and software.
- **Quality Assurance:** The modules adhere to onsemi's rigorous performance standards and Image Sensor Application Specific (IAS) requirements.
- **Accelerated Development:** By offering pre-validated solutions alongside new sensors, onsemi enables partners and customers to significantly speed up their product development cycles.
- **Reduced Engineering Effort:** The ready-to-use nature of PRISM modules minimizes the design work required by customers.
- **Faster Time-to-Market:** With much of the integration and validation work already completed, companies can bring their products to market more quickly.

Appleye Compact Camera Module (CCM) Offerings for Small Form-factor Applications

Arrow Electronics is introducing a family of camera modules based on sensor technology from onsemi. The modules provide original equipment manufacturers (OEMs) with a simple and cost-effective path to incorporating a wide range of camera functionalities in their products. All camera modules comply with onsemi IAS standard and have the same connector and pinout, providing compatibility with the popular 96boards development ecosystem. Arrow has partnered with Timesys for Linux drivers.

AP-VISION-MT9M114-105
AE-CCM-MT9M114-C-105

onsemi MT9M114 1.2Mp

- 1/6” 1296 x 976 RGB
- Internal ISP
- 720p @ 30fps
- Fixed focus 126° FOV
- F# 2.0
- Length: 24.25 mm

Target Applications:

- IoT Applications
- Embedded applications
- Monitor cameras
- AR/VR
- Surveillance and medical

AP-VISION-AR0145-60
AE-CCM-GS-AR0145-M-74

onsemi AR0145 1Mp

- 1/4.3” 1260 x 800 Mono
- 1Mp @ 120fps
- Fixed focus 74.2° HFOV
- F# 2.2
- Length: 23.5 mm

Target Applications:

- Bar code scanning
- Biometrics
- Robotics & drones
- 3D & stereo cameras
- Machine vision
- Eye tracking

AP-VISION-AR0830-83
AE-CCM-AR0830-C-68

onsemi AR0830 8Mp

- 1/2.9” 3840 x 2160 color
- 8Mp @ 60fps
- Fixed focus 74.4° FOV
- F# 1.8
- Length: 23.48 mm

Target Applications:

- 4K video
- Door camera
- Access control
- Robotics & drones
- 3D & Stereo cameras
- Machine vision

AP-VISION-AR1335-74
AE-CCM-AR1335-C-65-AF

onsemi AR1335 13Mp

- 1/3.2” 4208 x 3120 color
- 13Mp @ 30fps
- Auto focus 64° FOV
- F# 2.0
- Length: TBD mm

Target Applications:

- 4K Video conferencing
- Drone cameras
- AI vision
- Body camera
- Sports camera

All Modules Now in Stock at Arrow.com. These modules can be customized, or new modules developed for a low NRE cost

Development Resources for Appleye CCM Modules

Arrow created camera mezzanine cards compliant with the 96boards specification. Compatibility with the 96boards open platform enables customers to rapidly start implementation of new imaging designs and to optimize systems once operational. The mezzanine board has the onsemi AP1302 image signal processor (ISP). The ISP offloads core functions like sensor configuration and calibration, image format conversation, basic transformations, and autofocus from the processor.

Development Board Connectivity

NXP


- MCIMX8M-EVKB, Mini-SAS cable to ARR-ONS-IAS2-NXP adapter board
- I.MX8 Thor96, SRT-VISION96-AR0830 / AR1335 Mezzanine board
  Linux driver available Here

STMicroelectronics

- STM32MP1 Avenger96, SRT-VISION96-AR0830 / AR1335
  Linux driver available Here

Qualcomm

- eInfochips EICQRB5165, ARR-ONS-IAS2-QRB adapter board and 30-pin ribbon cable

NVIDIA


- NVIDIA® Jetson Orin Nano™ Developer Kit, ARR -ONS-IAS2-CSI2 adapter board and 22-pin ribbon cable
- Orin – JetCarrier96, SRT-VISION96-AR0830 / AR1335

Note: Reach out to your NVIDIA FAE for more information on the Orin JetCarrier96 board

Appleye CCM Modules Compatible with onsemi Demo3 System and DevWareX

The modules are compatible with onsemi's Demo3 EVK system and DevWareX software which allows for many possibilities for testing, debugging, and analysis.

- Generate initialization files
- Log register changes when setting modes
- Save or load images for analysis
- Watch specific registers
- Manual white balance adjustments

Image Analytics

- Intensity graphs
- Noise measurements
- Image histograms
- Vectorscope graphs

AGB1N0CS-GEVK

ADLINK Camera Solutions and Development Kits

ADLINK is an industry change agent & market disruptor, a partner-centric organization that is driven by a philosophy to be the best, not the biggest. To be the best ADLINK is customer selective, this selective approach allows ADLINK to prioritize resources and investment on these select customers.

Core Offerings

Product Category	Product Families	onsemi Products Featured
Kits	NEON Starter Kit	AR0234, MT9P031
Solutions	AI Enabled Smart Camera	AR0234, MT9P031
Firmware and application-level software	Support for V4L2 interface, OpenCV, G-streamer, models from NVIDIA TAO, NGC Catalog	

Markets Served

Smart Manufacturing

Food and Beverage

Logistics

Agriculture

Smart City

Featured Solutions

NEON-2000-ONO Series

ADLINK's NEON-2000-ONO Series of NVIDIA Jetson-based industrial AI cameras integrate the Orin Nano, an image sensor, an optimized OS, and broad I/O for vision applications in a compact chassis with verified thermal stability, reducing total cost of ownership on integration and troubleshooting, as well as minimizing cabling and space requirements for installation.

AI Camera Development Kit

Designed to make Proof of Concept (PoC) easier, the ADLINK AI Camera Dev Kit integrates the NVIDIA® Jetson Nano™ SOC, an 8MP color MIPI camera module and validated software drivers to save effort on integration and solve compatibility issues. DI/O, COM, and LAN ports make the ADLINK Vision Dev kit ideal for building an AI vision proof of concept quickly and easily.

D3 Pre-Configured and Custom Cameras

Grow Seamlessly from Concept to Production

D3 is an NVIDIA Elite Partner and Intel® Gold Partner that provides U.S.-based products, design services, and manufacturing of vision solutions. By leveraging our unique Define - Design - Deploy methodology, our team can optimize our solutions to meet the requirements of your desired use case.

DEFINE: Enable off-the-shelf cameras with software pre-configured on our NVIDIA, Texas Instruments, and Intel® processing platforms to quickly find the embedded vision system that best suits your application.

DESIGN: Work with our design services team to customize the standard cameras used in defining your system and refine the design to your volume production requirements.

DEPLOY: Leverage our dependable capabilities as an American original design manufacturer (ODM) to deploy the final product and establish your market position faster than the competition.

Core Offerings

Category	D3 Products	Integrated onsemi Sensors
Vision Starter Kits	DesignCore® Velocity Series Cameras + DesignCore® NVIDIA® Jetson Orin™ NX 8-Camera GMSL2 Carrier Board	AR0234
Pre-Configured Cameras	DesignCore® Velocity Series: FPD-Link™ III, GMSL2, MIPI CSI-2 in 55° - 180° FOV Variants	AR0234
Custom Cameras	Email Arrow to learn more about our custom camera offerings	AR0234, AR0820, AR0821, AR0823 (offered in full-color & IR-enabled)
Services	– ISP tuning – 3rd party processor and camera integration – Vision systems architecture consultation – Custom deep learning and synthetic model development – Integration of AI accelerators into hardware design	AR0234, AR0820, AR0821, AR0823 (offered in full-color & IR-enabled)

Markets Served

- Robotics
- Industrial
- Machine Vision
- Defense (ITAR Capable)
- Automotive (ADAS)
- Transportation
- Aerospace
- Medical
- Smart Cities

Featured Solutions

Vision Starter Kits

Embedding vision solutions into your product has never been easier thanks to D3's new plug-and-play starter kits. Gather high-quality data with two of D3's DesignCore® Velocity Series cameras, powered by onsemi image sensors, which can be placed meters away from the processor by leveraging a SerDes interface into your robotics or industrial application. Run powerful AI algorithms on the included NVIDIA® Jetson Orin™ NX processing platform or newly compatible UP Squared Pro 7000 powered by Intel®.

Pre-Configured Camera Module Expansion

D3's camera selection tool to expand your starter kit into a system tailored to your application with pre-configured 55° - 180° FOV offerings. Go PRO for uncompromising image quality and an IP67 seal rating.

Leopard Imaging Camera Module Solutions and Development Kits

Leopard Imaging is a global leader that provides high definition (HD) embedded cameras and AI-based imaging solutions — focusing on core technologies that improve image processing in autonomous vehicles, drones, IoT, robotics, and healthcare devices. As an NVIDIA Elite Partner and a member of the AWS Partner Network, Leopard Imaging also works closely with Intel, Qualcomm, onsemi, and other companies in producing advanced camera solutions. With high-tech and manufacturing capabilities in the US and Asia, the entire team at Leopard Imaging is dedicated to providing camera technology with excellent quality products and extraordinary services — consistently aligning with certified quality management systems.

Core Offerings

Product families	Product types	onsemi product featured	Firmware support
Driver monitoring systems (DMS) cameras	– Modules – Kits (with USB 3.0)	AR0144IVEC	Gesture and facial expression recognition software solutions
DMS cameras	– Modules – Kits (Qualcomm automotive platform)	AR0234AT	Runs Qualcomm automotive platform
Robotics and drones	– Modules – Kits (USB 3.0, GMSL2 with RAW or YUV)	AR0234CS Camera	Runs on USB 3.0, GMSL2
OMS cameras	– Modules – Kits (Ambarella CV2 or GMSL2)	AR0239 RGB-IR Camera	Runs on Ambarella CV2 and GMSL2
Camera for IoT and drones	– Modules – Kits (NVIDIA Jetson™ or USB 3.0)	AR0821CS	Runs on Jetson and USB 3.0
Stereo camera	– Modules – Kits (NVIDIA Jetson™ platform)	AR0234CS	3D Depth engine on NVIDIA Jetson™ platform

Markets Served

– Autonomous Driving, ADAS, Drone, Robotics, and IoT

Featured Solutions

LI-USB30-AR0821-MIPI-135H Camera

The LI-AR0821-MIPI-135H is a MIPI CSI-2 camera with onsemi 8.3MP sensor AR0821 which has high sensitivity, high dynamic range with low power consumption. This camera outputs 3848 x 2168 RAW data.

Features onsemi AR0821 Sensor

LI-USB30-AR0234CS-YUV-GMSL2-060H Camera

The LI-AR0234CS-YUV-GMSL2 is equipped with onsemi CMOS digital image sensor AR0234CS, AP1302 ISP and Maxim GMSL2 Serializer MAX9295A/B. This camera outputs 1920 x 1200 YUV data.

Features onsemi CMOS Image Sensor AR0234CS

Leopard Imaging Camera Solutions and Development Kits

Product Families	Product Types	onsemi Product Featured	Firmware Support
HyperLux	– Modules – Kits (with USB 3.0)	AR0823 AR0341	USB3.0 Run on NVIDIA Jetson™
HyperLux-LP	– Modules – Kits	AR2020 AR0830	USB3.0 (AR0830) Run on NVIDIA Jetson™
Automotive sensors	– Modules – Kits (USB3.0, GMSL2 with RAW or YUV)	AR0231 AR0233 AR0820	USB3.0 Run on NVIDIA Jetson™
Industrial markets	– Modules – Kits	AR1335 AR0821 M144	USB3.0 Run on NVIDIA Jetson™

Markets Served

Autonomous Driving | ADAS | Drone | Robotics | IoT

Featured Solutions

LEOPARD IMAGING

LI-AR0830-YUV-MIPI-078H

The LI-AR0830-YUV-MIPI-078H is a MIPI camera with onsemi 1/2.9-Inch 8Mp CMOS digital image sensor AR0830 and AP1302 ISP. This camera outputs YUV image data.

Features onsemi CMOS Image Sensor AR0830

LI-USB32-AR2020-079H

The LI-USB32-AR2020-079H is equipped with onsemi 20Mp CMOS digital image sensor AR2020, with USB 3.2 GEN2 10Gbps high speed support and register access function support. This camera provides raw data streaming.

Features onsemi CMOS Image Sensor AR2020

Embedded Vision Product Overview

TechNexion

Camera Modules

Image Signal Processor (ISP)

OEM Integration

S-Mount (M12) Lens Options

Resolutions from 1MP to 13MP

Global and Rolling Shutter

USB3 Type C Cameras

C-Mount and S-Mount Lens Options

USB Type-C 5Gbps Interface

Resolutions from 1MP to 13MP

Global and Rolling shutter

FPD-Link III Cameras

High-speed Serial Link up to 15m

Single-wire Coax (FAKRA)

Robust, Compact, IP68 Housing

Resolutions from 1MP to 13MP

Global and Rolling shutter

onsemi Camera Modules

Rolling Shutter

Low Light

AR0521 5MP	AR0522 5MP (N)
AR0821 8.3MP (H C)	AR0822 8MP (H N C)
AR1335 13MP (H C)	

Applications

Access Control
Image Analysis
Security
Surveillance
Inspection
Microscopy
Drone

(H) **HDR:** Captures images in high dynamic range modes
(N) **Near-IR+:** Enhanced NIR response
(C) Color Only

Global Shutter

	Low Power
AR0144 1MP	AR0145 1MP (M) Coming soon
AR0234 2.3MP	AR0235 2.3MP (M) Coming soon

Applications

Navigation
High-speed Inspection
Failure Analysis
Machine Vision

(M) Mono Only

onsemi

ARROW

Arrow Electronics and onsemi Image Sensing Portfolio

Implementing an imaging system requires a thorough analysis of the requirements, evaluation, and prototyping to ensure that the final solution achieves business objectives. Comprehensive solution providers like Arrow offer solutions for chip-down and module options and can also support with design services.

Arrow's image sensing ecosystem simplifies design, reduces risk, and lowers time-to-market for solutions based on onsemi image sensors. Coupled with service offerings for every step of the design and deployment phase, Arrow helps OEMs develop leading applications for industrial, automotive, consumer, and healthcare markets.

Technology	Ecosystem															
	ADLINK	Appleye	D3 Engineering	elnfochips	Intel	Lattice	Leopard Imaging	Microchip	NVIDIA	NXP	OMRON	onsemi	Qualcomm	STMicro	Thundercomm	Timesys
Image Sensor												√				
Camera Module		√	√				√				√					
ISP/MPU/FPGA			√	√	√	√	√	√	√	√	√	√	√	√	√	
SW Firmware/ Driver, Tuning			√	√	√		√			√	√	√	√		√	√
Smart Camera	√			√	√										√	

Arrow Engineering Services for Image Sensing Application Design

Module Customization

- Small changes can be made to the existing module for a low NRE
  - Flex length, connector or the pinout, FOV, etc.
- New module can be designed in as short as four weeks for $1,000-$1,500 NRE
  - Using a different camera sensor depending on sensor
  - Different off-the-shelf lens

Imaging System Design

- Sensor Selection
- ISP/FPGA selection
- Integration with host processor
- Training on imaging systems
- Image Tuning
  - Sensor characterization for parameters that affect image quality
  - Lens and color shading compensation
  - Auto exposure and auto white balance tuning
  - High-performance image pipe tuning
  - High-quality image pipe tuning
  - Subjective and custom image tuning

Complete System Design

- Hardware development
- Multilayer PCB design
- Lighting and illumination
- SW driver development
- SW OS porting
- SW application development
- Inventory management
- AI app development
- Video analytics
  - Motion detection
  - Situation analysis

Ordering Information

Appleye Compact Camera Modules (CCM)

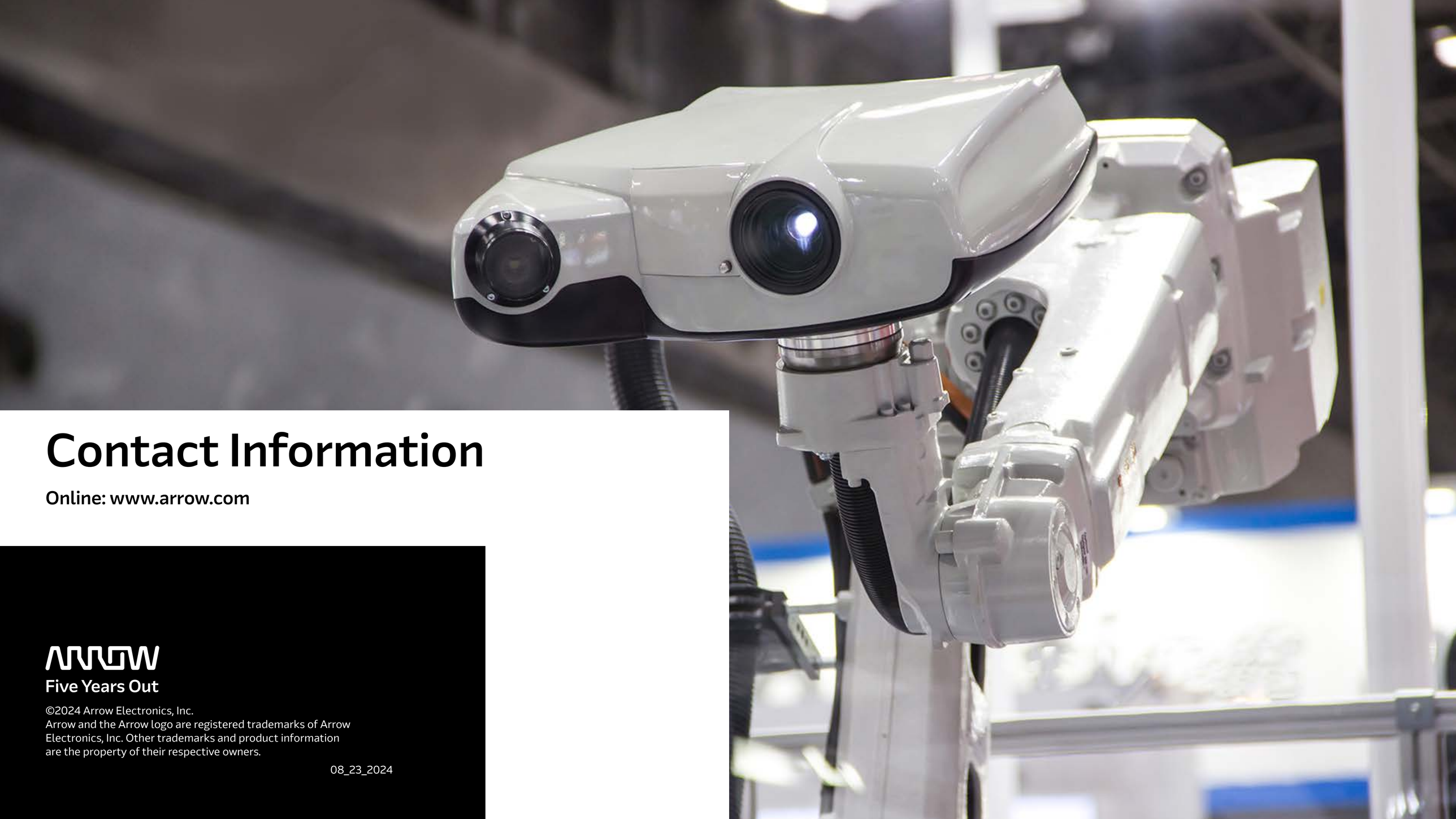
Description	Part Number
Compact camera module based on onsemi AR1335 sensor	AP-VISION-AR1335-74
Compact Camera module based on AR0830	AP-VISION-AR0830-83

Interface Boards

Description	Part Number
Interface board to the NXP MCIMX8M-EVKB mini SAS camera connector	ARR-ONS-IAS2-NXP
Adapter board to the eInfochips Qualcomm EICQRB5165 30-pin camera connector	ARR-ONS-IAS2-QRB
Adapter board to a 15-pin camera connector	ARR-ONS-IAS2-CSI2
Shiratech 96boards mezzanine card based on onsemi AR1335 image sensor	SRT-Vision96-AR1335
Shiratech 96boards mezzanine card based on onsemi AR0830 image sensor	SRT-Vision96-AR0830

Development Boards

Description	Part Number
onsemi Demo3 base board	AGB1N0CS-GEVK
Camera module Adapter Board: PRISM to Demo3 system	PRISM1-ADPTR-DM3D1-GEVB
NXP evaluation board	MCIMX8M-EVKB
96boards single-board computer powered by the NXP i.MX 8M SoC, incorporating a quad-core 64-bit ARM® Cortex-A53	I.IMX8_THOR96
ST Microelectronics Avenger96 board features dual ARM® Cortex-A7 cores and an ARM® Cortex-M4 core	STM32MP157AAC
eInfochips Qualcomm® ARR-ONS-IAS2-QRB adapter board and 30-pin ribbon cable	EICQRB5165
PRISM1-ADPTR-NXPM1-GEVK adapter board and 22-pin ribbon cable	NVIDIA® Jetson Orin Nano™ Developer Kit



Contact Information

Online: www.arrow.com

Five Years Out

08_23_2024