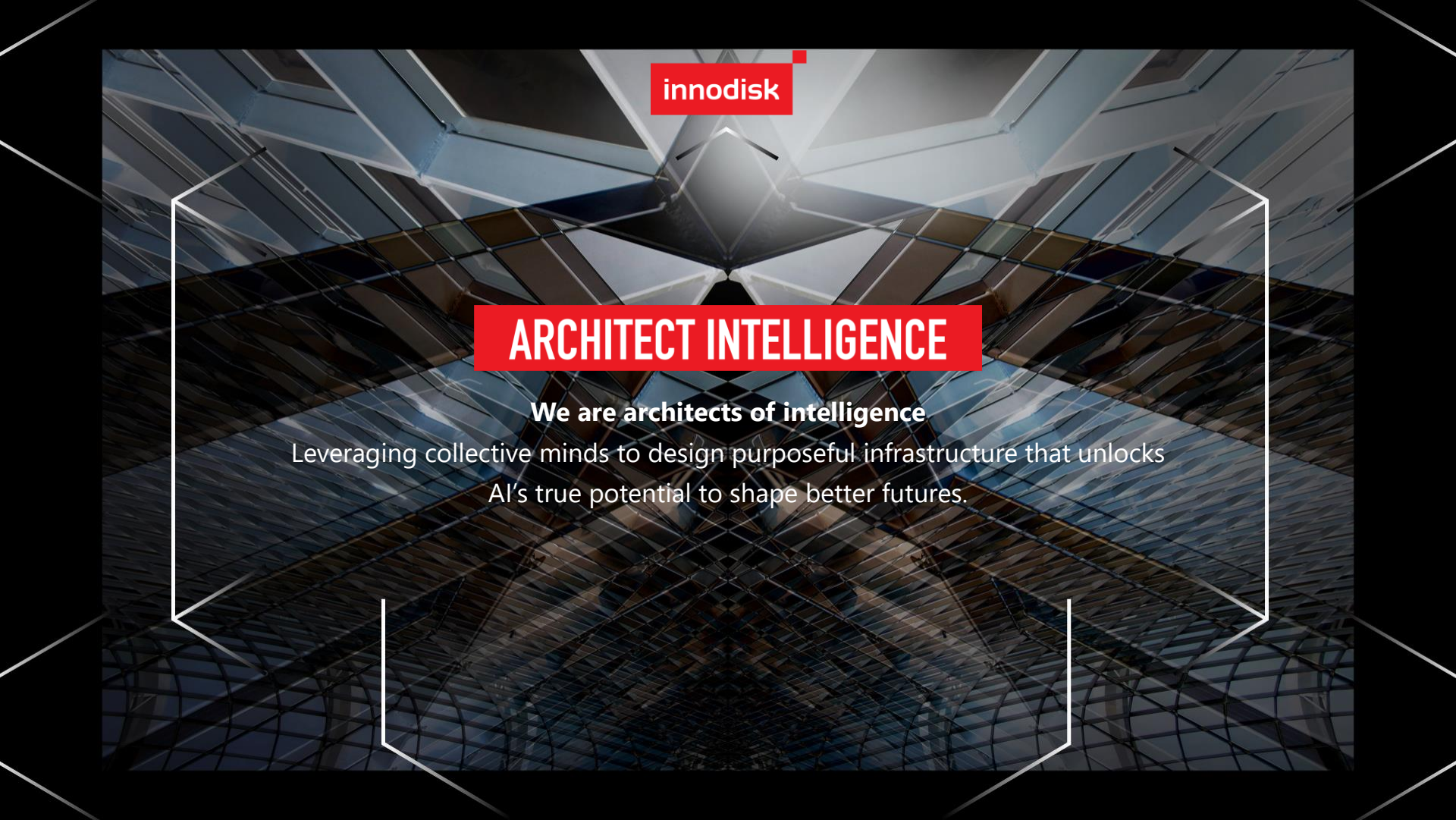
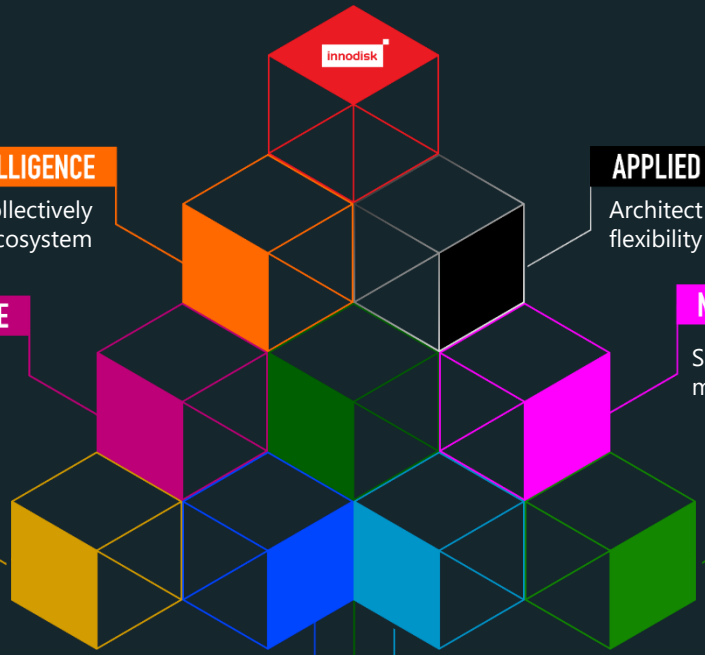
Innodisk Camera Module Introduction

PM Malcolm/ Leo/ Steven 2024/05/24


innodisk
ARCHITECT INTELLIGENCE
We are architects of intelligence
Leveraging collective minds to design purposeful infrastructure that unlocks
AI's true potential to shape better futures.



COLLECTIVE INTELLIGENCE

Partners' solutions collectively create an intelligence ecosystem

APPLIED INTELLIGENCE

Architect your intelligence solutions with flexibility that apply to achieve goals

MACHINE-LEARNING INTELLIGENCE

AI training and inference maximize the value of insights in each application field

MANAGEMENT INTELLIGENCE

Software and services improve efficiency in managing objects in real-world situations

SENSING INTELLIGENCE

Sensors continuously monitor operational information from physical environments

COMPUTING INTELLIGENCE

Accelerated computing technologies streamline processing and analytics

DATA INTELLIGENCE

Optimized memory and storage solutions for secure data capture and empowering intelligence

EXTENDED INTELLIGENCE

Modularized peripherals expand the capabilities of existing solutions

CONNECTING INTELLIGENCE

Enable real-time transmissions between all innovative applications/scenarios

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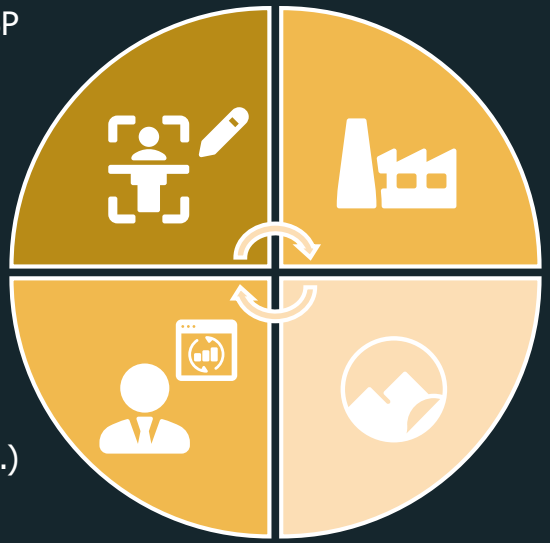
SENSING INTELLIGENCE

Innodisk Camera Strength

Design

- Integrate from lens, sensor, ISP to camera module.
- Customized services upon request.
- MIPI camera driver development.



Manufacturing

- Produce in Innodisk manufacturing site.
- Mass production tool.
  - High traceability
  - High consistency

Reliability

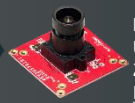
- Test report(chamber, EMI…etc.)
- Image quality report
  - Lab verification
  - Outdoor verification

Image Quality

- Optimized for different applications.
- Customized services upon request.

PRODUCT DEVELOPMENT ROADMAP

USB

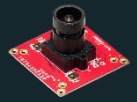


EV2U-SGR1
USB
2M@ 30 FPS
Low Light

EV2U-RMR1
USB
2M@ 30 FPS
HDR

EV2U-RMR2
USB
2M@ 30FPS
HDR

EV5U-RGR1
USB
5M@ 30 FPS

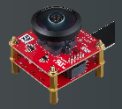


EV2U-SSR1
USB
2M@ 30 FPS
Low Light

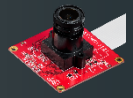
ES: 2024 Q4

PRODUCT DEVELOPMENT ROADMAP

MIPI



EV2M-GOM1
MIPI 15 Pins
2M@ 30 FPS
Fisheye



EV2M-OOM1
MIPI 15 Pins
2M@ 60 FPS
Global Shutter

EVDM-OOM1
MIPI 22 Pins
13M@ 20 FPS
HDR

EV2M-OOM2
MIPI 22 Pins
2M@ 30 FPS
Low Light

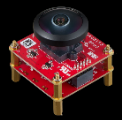
ES: 2024 Q4

EV8M-OOM1
MIPI 22 Pins
8M@ 30 FPS
HDR

ES: 2024 Q4

EV5M-NSM1
MIPI 22 Pins
5M@ 30 FPS
HDR

MIPI over Type C



EV2C-GOM1
2M@ 30 FPS
Fisheye

EV2C-OOM1
2M@ 60 FPS
Global Shutter

EVDC-OOM1
13M@ 20 FPS
HDR

EV2C-OOM2
2M@ 30 FPS
Low Light

EV8C-OOM1
8M@ 30 FPS
HDR

GMSL

EVDF-OOM1
SerDes GMSL2
13M@ 20 FPS
HDR

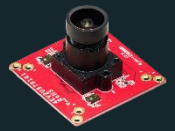
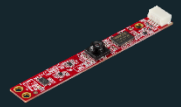
ES: 2024 Q4

EV5F-NSM1
SerDes GMSL2
5M@ 30 FPS
HDR

PRODUCT DEVELOPMENT ROADMAP

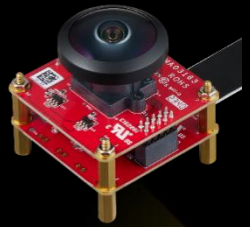
	P/N	Interface	Resolution	Frame Rate	HDR	Global Shutter	Low Light	Fisheye	Optional DMIC	External Trigger	FOV (D/H/V)	Operating Temp(˚C)	Dimension L x W (mm)	Sample Ready
1	 EV2U-SGR1	USB	2MP	30 fps			○		○		121˚/102˚/54˚	-20˚~70˚C	38 x 38	✔
2	 EV2U-RMR1	USB	2MP	30 fps	○				○		77°/69°/42°	-20˚~70˚C	60 x 8	✔
3	 EV2U-RMR2	USB	2MP	30 fps	○				○		86°/72°/38°	-20˚~70˚C	58 x 25	✔
4	 EV5U-RGR1	USB	5MP	30 fps							73°/63°/49	-20˚~50˚C	62 x 8	✔
5	 EV2U-SSR1	USB	2MP	30 fps			○		○	○	121˚/102˚/54˚	-20˚~70˚C	38 x 38	
6	 EV2M-OOM1	MIPI	2MP	60 fps		○					104˚/86˚/46˚	-30˚~70˚C	38 x 38	✔
7	 EV2M-GOM1	MIPI	2MP	30 fps				○			230°	-30˚~70˚C	38 x 38	✔
8	 EV2M-OOM2	MIPI	2MP	30 fps			○			○	91°/71°/52°	-30˚~70˚C	30 x 30	
9	 EV8M-OOM1	MIPI	8MP	30 fps	○					○	91°/71°/52°	-30˚~70˚C	30 x 30	
10	 EVDM-OOM1	MIPI	13MP	20 fps	○						91°/71°/52°	-30˚~70˚C	30 x 30	✔
11	 EVDF-OOM1	GMSL	13MP	20 fps	○						91°/71°/52°	-30˚~85˚C	35 x 34	

Camera Interface COMPARISON CHART

				
	USB 2	**USB 3**	**MIPI CSI-2**	**SerDes (GMSL)**
Max. Cable length(M)	5M	3M	0.3-0.5M	15M
Bandwidth	0.48Gbps	5Gbps	5Gbps/ 2 lanes MIPI 10Gbps/ 4 lanes MIPI	5Gbps/ 2 lanes MIPI 10Gbps/ 4 lanes MIPI
Camera Driver	UVC (USB video Class)	UVC	Driver customize	Driver customize
YUV2 (uncompressed) resolution @ fps	2MP 5fps 5MP 1-3fps	2MP 60fps 5MP 30fps	2MP 120fps 5MP 60fps, 8MP(4K) 30fps	2MP 120fps 5MP 60fps, 8MP(4K) 30fps
CPU loading (decode)	☹	😐	☺	☺

MIPI (AI Platform)

Intel



Intel® Core™ Ultra processor

Raptor Lake 13th

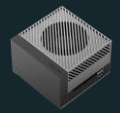
Alder Lake 12th

AMD

Xilinx KV260

Xilinx K26

NVIDIA



Jetson AGX Orin

Jetson Orin NX

Jetson Orin Nano

Jetson Xavier

NXP

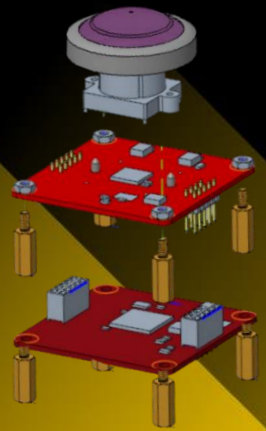
i.MX 8M Plus

Rockchip

RK 3588 PRO

Camera Image Signal Processor

Innodisk Camera



Lens

Sensor

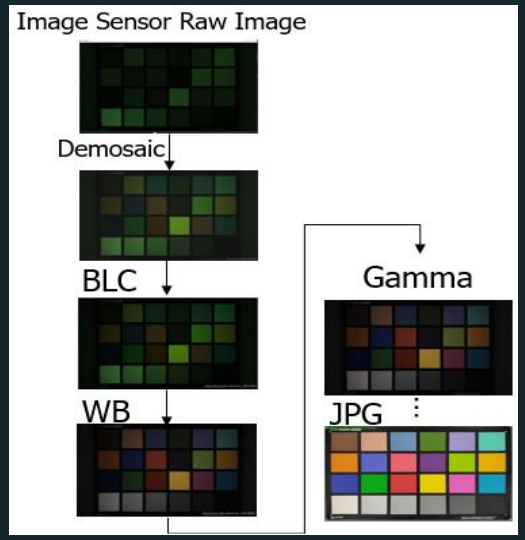
Raw

ISP

JPG

Host

< Step 1 >
Adjustable Image Quality



< Step 2>
Environment Adaptive

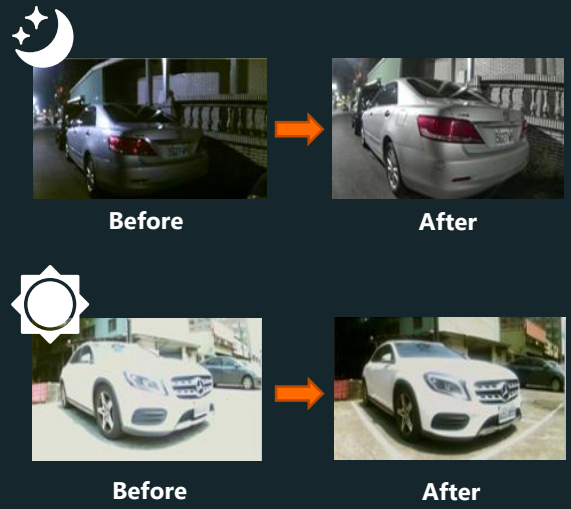


Image Signal Processor: convert RAW data into acceptable color space.

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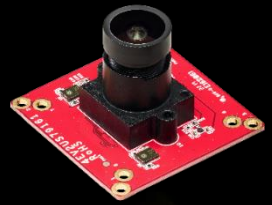
Target Market

SENSING INTELLIGENCE

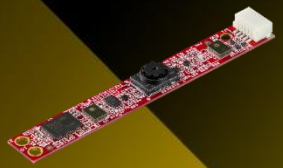
USB Target Market



EV2U-SGR1
USB / Low Light
2M@ 30 FPS
Microphone optional

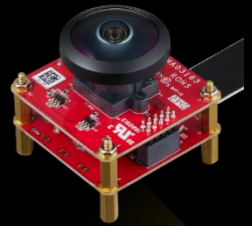
EV2U-RMR2
USB / HDR
2M@ 30FPS
Microphone optional

EV2U-RMR1
USB / HDR
2M@ 30 FPS
Microphone optional



EV5U-RGR1
USB
5M@ 30 FPS

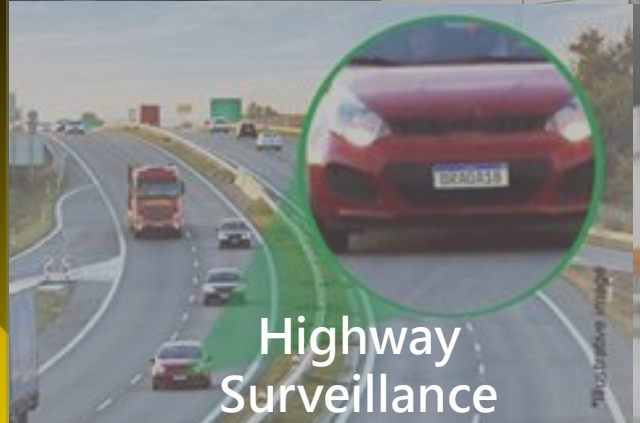
MIPI Target Market



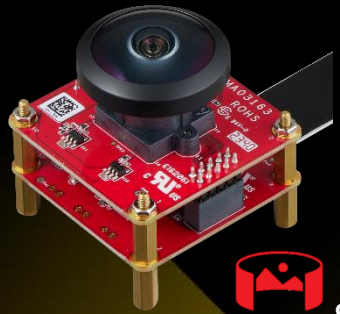
EV2M-GOM1
MIPI 15 Pins
2M@ 30 FPS

EV2M-OOM1(GS)
MIPI 15 Pins
2M@ 60 FPS

EVDM-OOM1 (HDR)
MIPI 22 Pins
13M@ 20 FPS
8M@ 30 FPS



PRODUCT OVERVIEW
MIPI



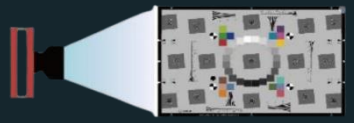
360° calibration

EV2M-GOM1

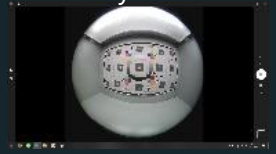
MIPI Fixed Focus Camera Module

- Max. Resolution: 1920 x 1080 @ 30fps
- ISP inside, fisheye De-warping
- Platform Support: INTEL, Nvidia Jetson, Xilinx
- Complies with CE/FCC Class A

<De-warping>

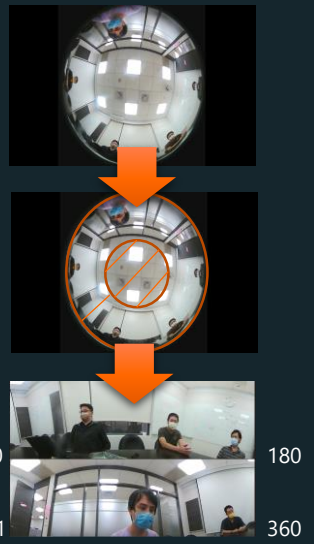


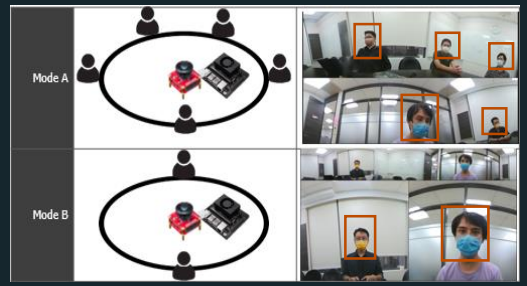
Fish-eye mode



Normal FOV mode

FOV 180 degree mode





PRODUCT OVERVIEW
MIPI

Global Shutter

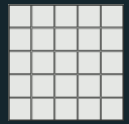
EV2M-OOM1

MIPI Fixed Focus Camera Module

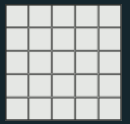
- Max. Resolution: 1920 x 1200 @ 60fps
- ISP inside, Global Shutter
- Platform Support: INTEL, Nvidia Jetson, Xilinx
- Complies with CE/FCC Class A

<Shutter Comparison>

Global Shutter



Rolling Shutter



Resolution	FPS (MIPI 2 lanes)
1920 x 1200 (2.3MP)	60
1920 x 1080 (FHD)	60
1920 x 720 (HD)	120

PRODUCT OVERVIEW
GMSL

EVDF-OOM1

GMSL2 Fixed Focus Camera Module

- Max. Resolution: 4192 x 3120 (13MP) @ 20fps
- Lens D/H/V FOV:91°/71°/52°
- Platform Support:
- Nvidia Jetson Xavier NX/Nano; Xilinx FPGA; Intel
- Complies with CE/FCC Class A
- Feature: ISP inside, HDR, pixel binning

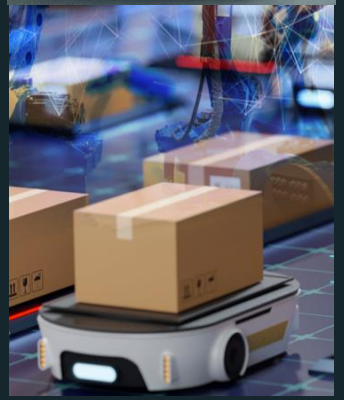
<Camera Housing>

IP67

IP67 water-dust housing design

Resolution	FPS (MIPI 4 lanes)
4192 x 3120 (13MP)	20
3840 x 2160 (4k)	30
1920 x 1080 (FHD)	60

<Target Market>



PRODUCT OVERVIEW
GMSL

EVDF-OOM1

GMSL2 Fixed Focus Camera Module

- Max. Resolution: 4192 x 3120 (13MP) @ 20fps
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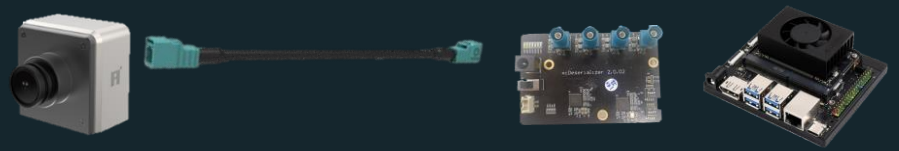
- Platform Support:
- Nvidia Jetson Xavier NX/Nano; Xilinx FPGA; Intel
- Complies with CE/FCC Class A
- Feature: ISP inside, HDR, pixel binning

<Stage 1>
Camera +Partner with MAX9296 Deserializer on board

MAX9295 MAX9296

<Stage 2>
Camera + Deserializer board



MAX9295 MAX9296

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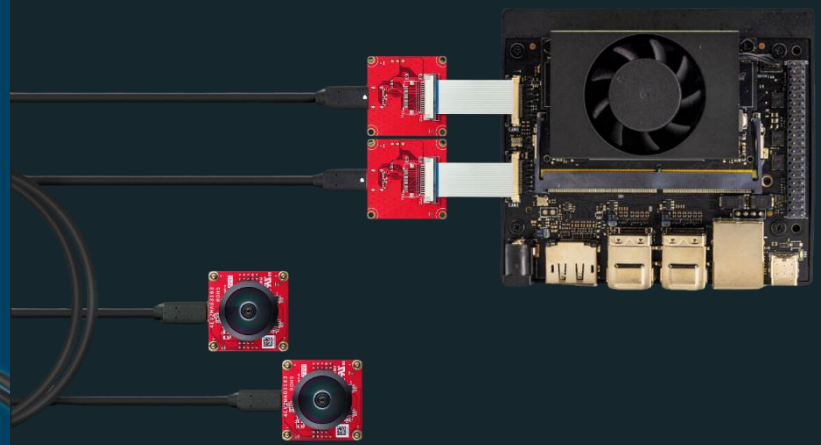
MIPI over Type-C

SENSING INTELLIGENCE

Camera Interface
MIPI over Type-C

	MIPI CSI-2	EXCLUSIVE MIPI over Type-C	SerDes (GMSL)
			
Working Distance	0.3 meter	**> 0.3 meter**	15 meter
Application	Internal Cable	**External Cable**	External Cable
Price	Low	**Affordable**	Costly

Camera Interface
MIPI over Type-C Target Market



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Case Study

SENSING INTELLIGENCE

Case Study
PARKING METER

Item: EV2U-SGR1

Region: Asia

Type: Smart City

Application: Smart Parking Meter

Selling Point: Low light, ROI, MIT

<Highlight>

- Custom IQ tuning to adapt both low-light and daylight environments, ensuring clear visibility of vehicle plates
- ROI will not affect by ambient light.

KEY CHALLENGES
PARKING METER

A

Wide Field

Wide-Angle Camera
Capture the vehicle and surroundings with a wider field of view.

B

Various Scenarios

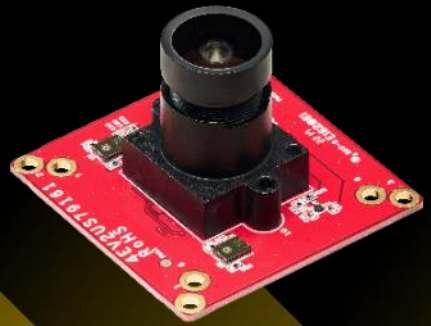
Low Light Camera
Capture Stunning Images Even in Dim Environments

C

Power Saving

Fast Auto Exposure
Capture a clear image instantly with Fast Auto Exposure Convergence, saving power.

PRODUCT OVERVIEW
PARKING METER



EV2U-SGR1

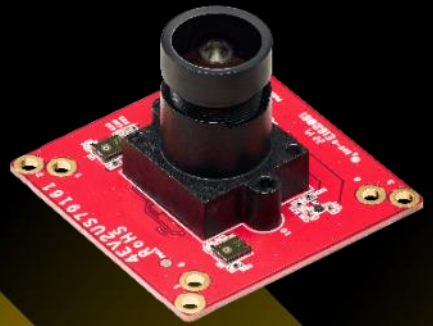
USB2.0 Fixed Focus Camera Module

- Low Light with 1920x1080@30fps
- Lens D/H/V FOV:121°/102°/54°
- OS Support: Windows, Linux, Android, MacOS (UVC)
- Compliant to USB2.0 and USB Video Class
- Complies with CE/FCC Class A

<Low Light>
Capture Stunning Images Even in Dim Environments

<Dynamics choice of Lens Support>
Wide range of lenses empowers to capture stunning images in any situation.

PRODUCT OVERVIEW
PARKING METER



EV2U-SGR1

USB2.0 Fixed Focus Camera Module

- Low Light with 1920x1080@30fps
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- OS Support: Windows, Linux, Android, MacOS (UVC)
- Compliant to USB2.0 and USB Video Class
- Complies with CE/FCC Class A

<Region Of Interest>
ROI can help to reduce misjudgments.

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<Fast Auto Exposure Converge>
Fast Auto Exposure converge captures a clear image instantly and save power for edge devices.

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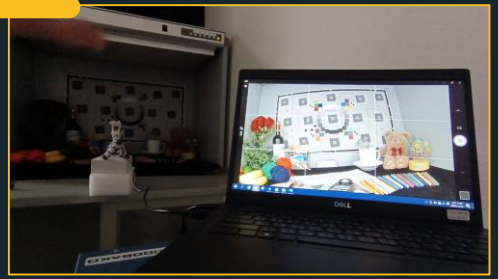
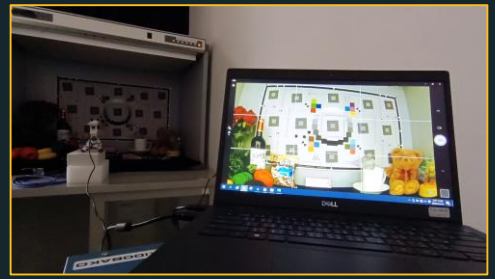
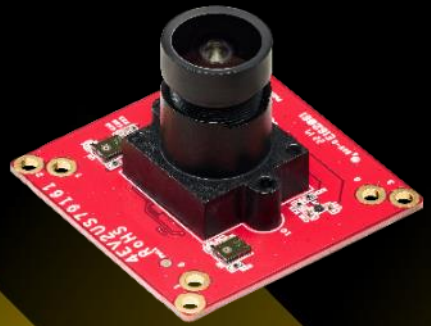


Competitor



USB CAMERA



EV2U-SGR1

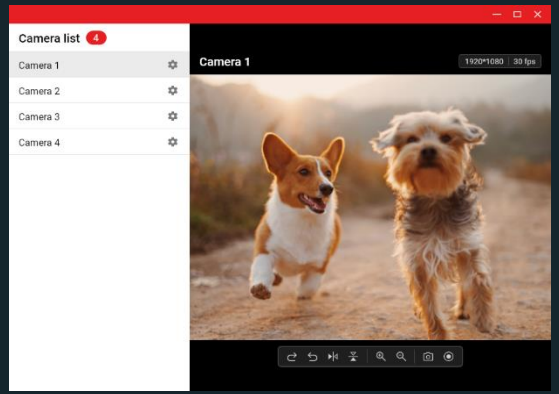
USB2.0 Fixed Focus Camera Module

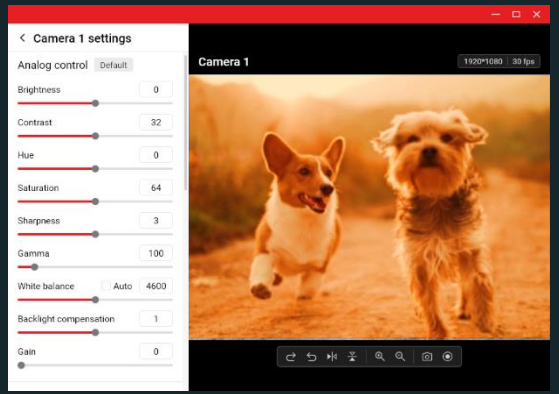
- Low Light with 1920x1080@30fps
- Lens D/H/V FOV:121°/102°/54°
- OS Support: Windows, Linux, Android, MacOS (UVC)
- Compliant to USB2.0 and USB Video Class
- Complies with CE/FCC Class A

<iViz>

Analog parameters fine tune for Multiple Camera

- Support Windows and X86 Linux
- Click and save for your diverse user scenarios.
- Easily save and load .ini files, facilitating duplication and deployment.





Case Study
Vending Machine

Item: EV2U-RMR1

Region: Asia

Type: Kiosk

Application: Vending machine

Selling Point: Tailored for custom needs

<Highlight>

- Stable Quality
- long longevity

Case Study
Smart Street Lamp

Item: EV2M-GOM1

Region: EU

Type: Smart City

Application: Smart Street Lamp

Selling Point: Wide angel, de-wraping

<Highlight>

- One camera, surrounding view
- PTZ tool to expand FOV
- Custom IQ tuning enhances the optimal image quality for monitoring

Case Study
Intel MIPI Camera

innodisk intel

Item: MIPI Camera

Region: Asia

Type: IPC, SI

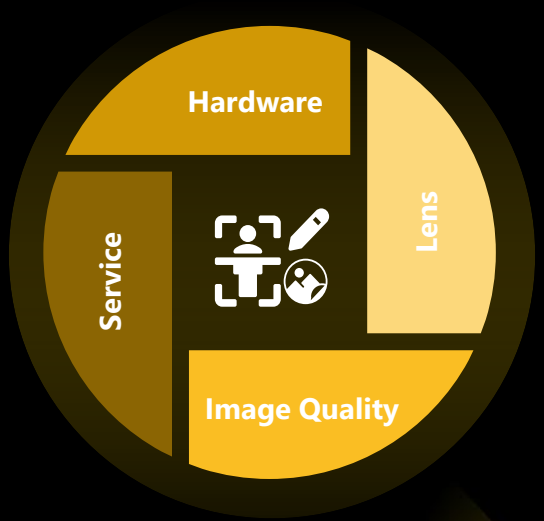
Application:

Selling Point: Sole Taiwan Intel MIPI Camera provider

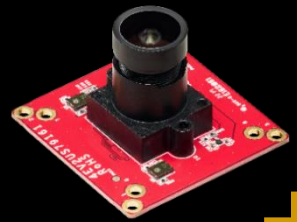
<Highlight>

- Sole Taiwan Intel MIPI Camera provider
- Localise support

CAMERA DESIGN SERVICE

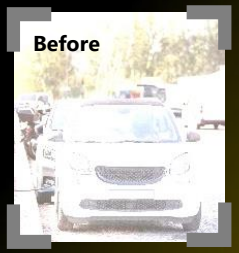


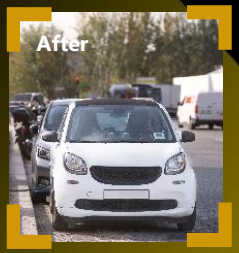
Hardware
PCBA, Size



Versatile Lens Selection

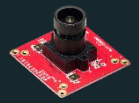
Image Quality Tuning





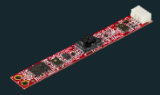
Exceed your experience

USB



EV2U-SGR1
USB / Low Light
2M@ 30 FPS

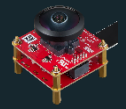
EV2U-RMR2
USB / HDR
2M@ 30FPS



EV2U-RMR1
USB / HDR
2M@ 30 FPS

EV5U-RGR1
USB
5M@ 30 FPS

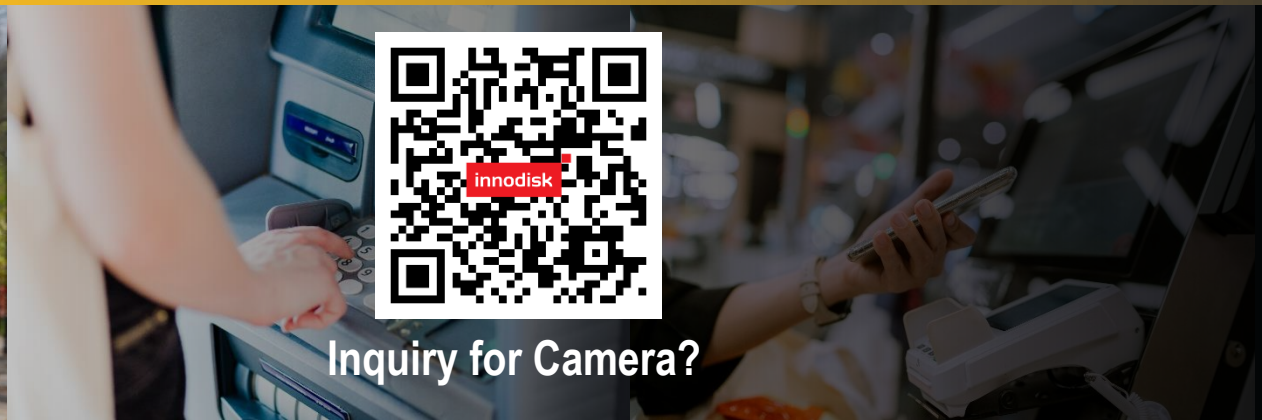
MIPI



EV2M-GOM1
MIPI 15 Pins
Fisheye
2M@ 30 FPS

EV2M-OOM1
MIPI 15 Pins
Global Shutter
2M@ 60 FPS

EVDM-OOM1
MIPI 22 Pins
HDR
13M@ 20 FPS
8M@ 30 FPS



Inquiry for Camera?

innodisk

ARCHITECT INTELLIGENCE