RZ/V2H, RZ/V2N ISP SUPPORT PACKAGE GUIDE

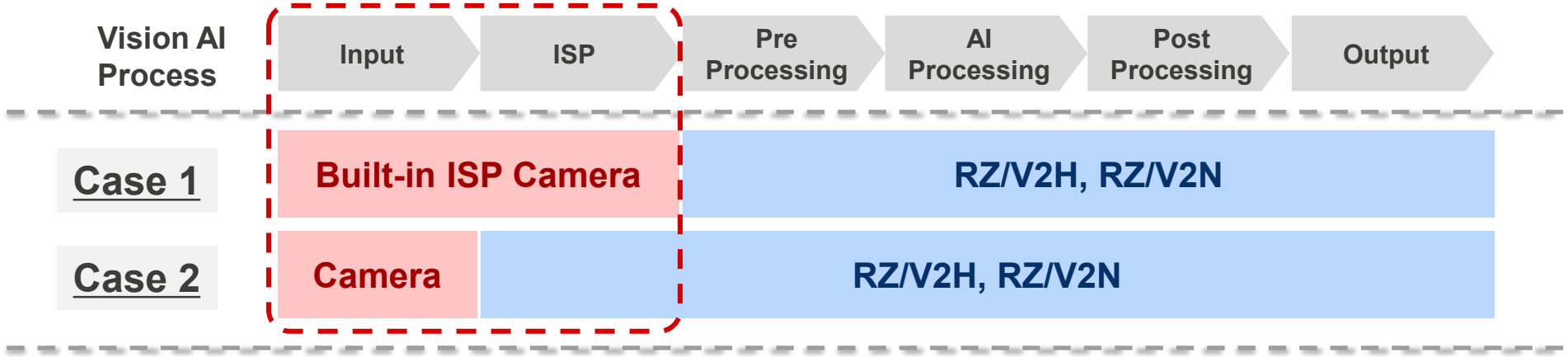
REV:1.00
APR. 9, 2026
RENESAS ELECTRONICS CORPORATION

Introduction for “Vision AI Application” of RZ/V Target

- As one of the key features of the RZ/V series, the **ISP*** offers as the “**entry point**” for bringing initial image data into the system to realize various “**Vision AI applications**”.

* ISP : Image Signal Processor

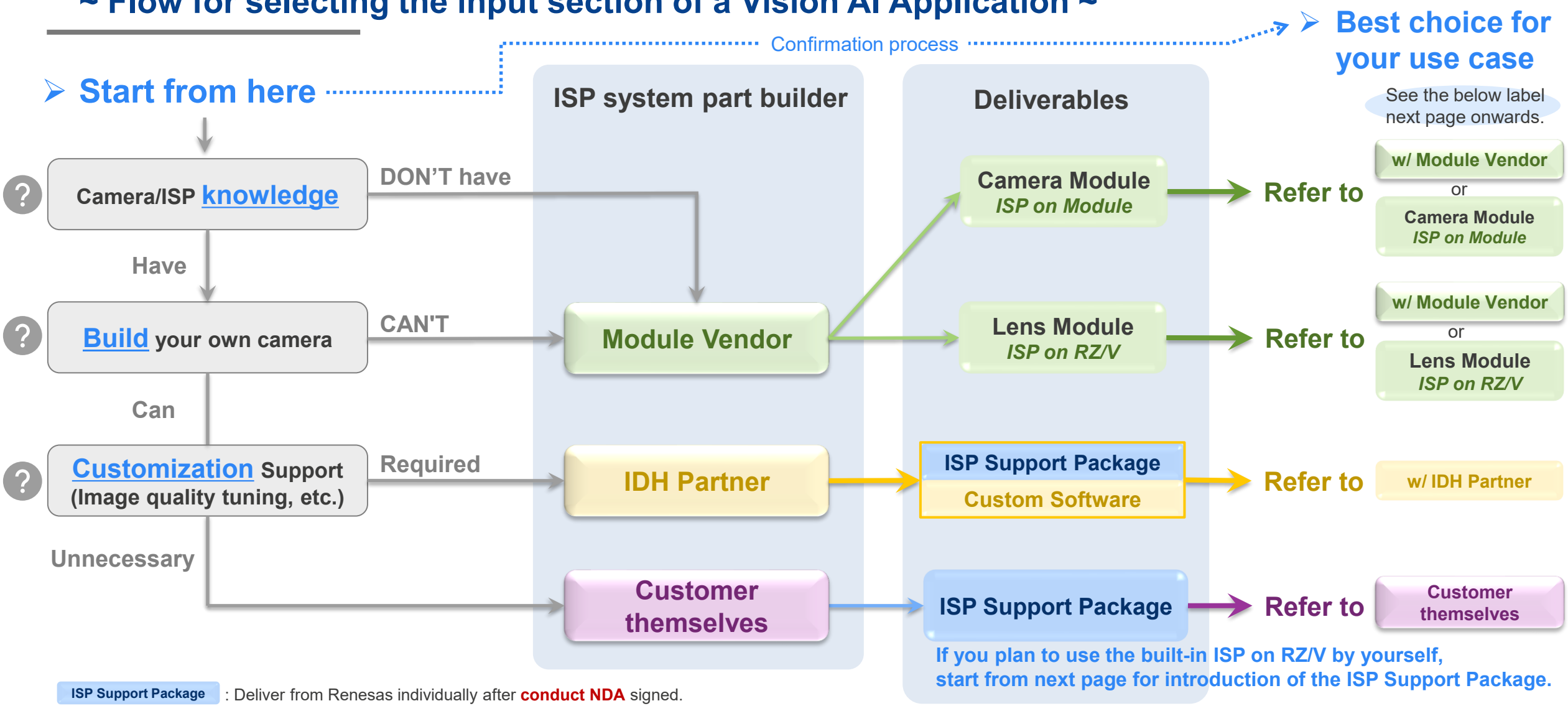
- The processing block, which is responsible for ISP processing, which is the precursor to AI, as below is generally implemented in the system in the following two patterns as **Case 1** or **Case 2**.



- For the above **Case 1** and **Case 2**, the next page shows the flow that explains what you should do next to build the “**Input**” to “**ISP**” processing section.

How to Build-in “ISP” in your Vison AI Application by RZ/V

~ Flow for selecting the input section of a Vision AI Application ~



ISP Support Package : Deliver from Renesas individually after **conduct NDA** signed.

CONTENTS

This document helps you **decide whether the ISP Support Package fits your Vision AI development** and **How to start**.

Each page includes a label indicating the intended target audience.
Please kindly use it as your reference when reading.
As an example, this page is intended for all readers.

- w/ Module Vendor
- w/ IDH Partner
- Customer themselves

OVERVIEW

RZ/V Target Application for Vision AI

- **RZ/V Series** is an Edge-AI MPU that focused on various Vision-AI applications.
- It combines a **dedicated hardware ISP*** as image sensor interface with scalable AI performance.
- Customers can easily select the most **suitable RZ/V series** for specification of AI use cases/applications.

* ISP : Image Signal Processor

Vision AI Application e.g.

Vision-AI Related Reference Parameter

- **AI Performance**: Low ⟷ High
- **Camera Capability**: Single camera ⟷ Multi Camera
- **Sensing Speed**: Low speed ⟷ High speed

✓ Recommended RZ/V series for AI-Applications

RZ/V2H	MIPI CSI2:4ch	8TOPS (for Dense) 80 TOPS (for Sparse)
RZ/V2N	MIPI CSI2:2ch	4TOPS (for Dense) 15 TOPS (for Sparse)
RZ/V2L	MIPI CSI2:1ch	0.5TOPS (for Dense)

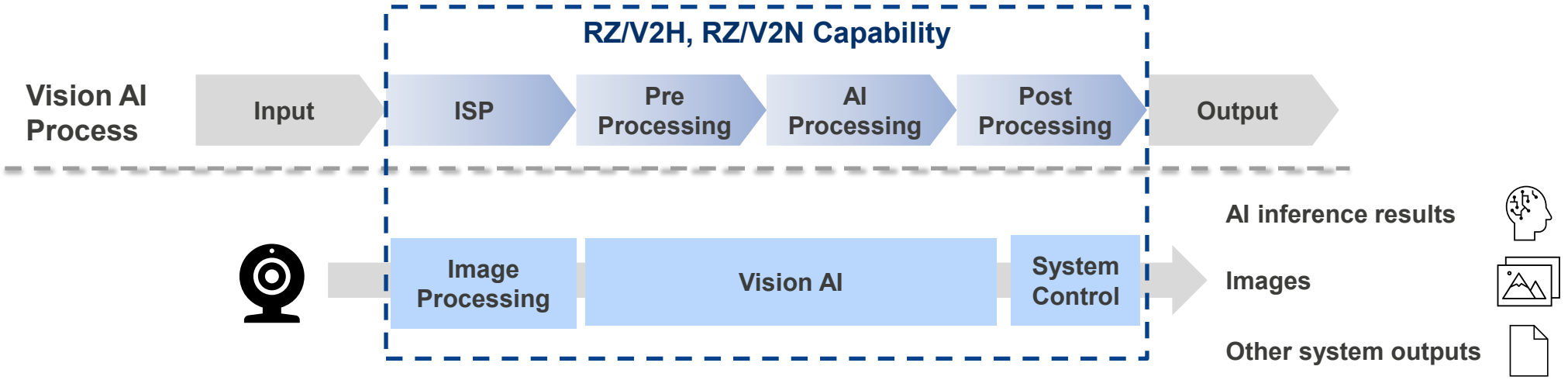
w/ Module Vendor

w/ IDH Partner

Customer themselves

What is RZ/V + Vision AI ?

- The **RZ/V** series of RZ Family is a MPU designed for "**Vision AI applications**".
- RZ/**V2H** and RZ/**V2N** of RZ/V series are equipped with an AI accelerator and an ISP.
- Basically **"Vision AI" can be completed with a single chip.** Neither external ISP nor additional LSI is required.
- By using the built-in ISP of RZ/V2H and RZ/V2N, **users can reduce the BOM cost** required to build a Vision AI system.
- This contributes to a **simplified system configuration** and **reduced development workload**.



ISP : Image Signal Processor

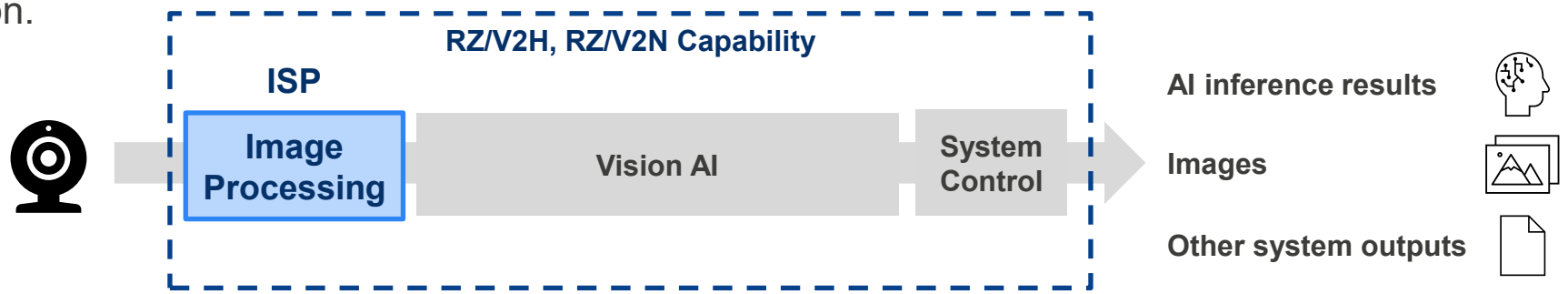
w/ Module Vendor

w/ IDH Partner

Customer themselves

ISP as the “Entry Point” to Vision AI

- As **one of the key features of the RZ/V series**, the ISP serves as the **“entry point”** for bringing initial image data into the system to realize various **“Vision AI applications”.**
- The RZ/V2H and RZ/V2N feature a **built-in ISP (Arm® Mali™-C55)** that includes **all the mechanisms required for camera control**.
- The ISP performs **initial preprocessing on RAW image data** captured by a camera (lens + sensor), converting it into a format suitable for Vision AI applications.
- It also improves AI recognition accuracy by adjusting image quality parameters such as brightness, edge enhancement, and color correction.



*From the **next page**, the content will focus on the “ **ISP Support Package** “ provided by Renesas, intended for* Customer themselves .

Customer with the w/ Module Vendor *or* w/ IDH Partner *use cases, please proceed to **page 19**, and then to **page 23** , respectively.*

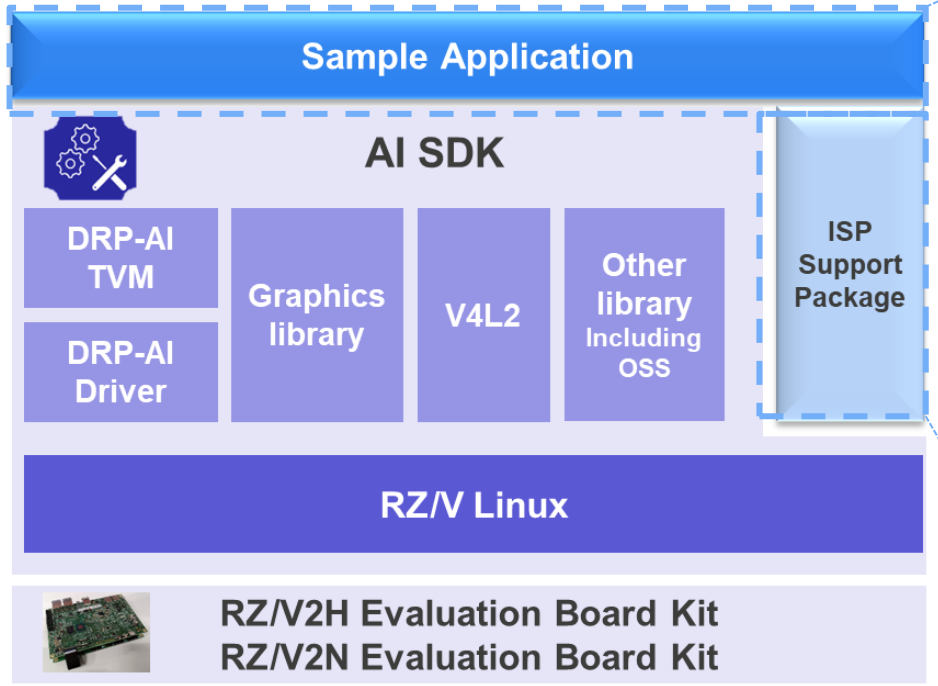
WHAT CAN DO WITH THE “ISP SUPPORT PACKAGE”

ISP Support Package

Customer themselves

What is the ISP Support Package

- The **ISP Support Package** is a package for customers' development with ISP on RZ/V2H or RZ/V2N included a reference sample software, documents, and image quality tuning tools.
- The **ISP Support Package** can be used by integrating it into the **AI SDK**.



ISP Support Package

- **Supported image sensor:** IMX415 (8Mpix, rolling shutter), supports both single-channel and dual-channel modes
- **Input format and size:** RAW12
  (1) 4K@30fps (*1), (2) Full HD@60fps, (3) 4K@15fps (*1), (4) Full HD@30fps
- **Output format and size:** YUV422(YUY2), YUV420(NV12), RGB565, RAW12, RAW16
  (1) 4K@30fps (*1), (2) Full HD@60fps, (3) 4K@15fps (*1), (4) Full HD@30fps
- **Main image quality tuning functions:**
  Black level correction, White balance gain, Defective pixel correction, Color correction / gamma correction, Edge enhancement and sharpness filter, Down-scaling and cropping, Dynamic range / shading correction, HDR precision management

**1. For RZ/V2N, 4K input is not supported when using dual sensors.*
Please refer to the "Supported Sensor / Operation Mode", "Supported Functions" for details.

Deliverables

Category	Items	Contents	Remarks
Document	Arm's Document	Release notes Software technical reference manual Calibration tool guide Control tool guide	—
	ISP Document	ISP support package release notes ISP support package sample application release notes Software User's Manual	
	Other	Hardware User's Manual IMX415 reference circuit diagram Image Quality Tuning Guide ISP Support Package Getting Started Guide ISP Support Package Sensor Replacement Guide	
Software	Driver source code recipe	V4L2 Device driver IV-CTRL driver CRU driver Sensor I2C driver (IMX415)	V4L2 device driver (Arm offering)
	3A software binary	AE / AWB / AF	Arm offering AF (Auto Focus) not verified
	Arm's tool	Calibration tool Control tool	Arm offering
	Sample application	1. Monitoring and output to the display 2. Encoding output data from the ISP and processing data with DRP-AI 3. Processing output data from ISP with DRP-AI and displaying to HDMI	—

Supported Sensor / Operation Mode

Supported Sensor: **Sony IMX415** / RGB raw / 8MP / Rolling shutter

✓ : Supported

No. of IMX415s	Operation Mode		Frame Rate (fps)	RZ/V2H	RZ/V2N	Remarks
1 (Single)	4K (All Pixel)	Normal	30	✓	✓	
		DOL	30	✓	✓	
		HDR	15	✓	✓	
	F-HD (2x2 Binning)	Normal	60	✓	✓	
		DOL	60	✓	✓	
		HDR	30	✓	✓	
2 (Dual)	4K (All Pixel)	Normal	30 x 2	✓	-	
		DOL	15 x 2	✓	-	
		HDR	15 x 2	✓	-	
	F-HD (2x2 Binning)	Normal	60 x 2	✓	✓	
		DOL	30 x 2	✓	✓	
		HDR	30 x 2	✓	✓	
	2K + 4K	Normal	2K: 60 4K: 30	✓	-	Only master and master mode
			2K: 30 4K: 15	✓	✓	Only master and master mode

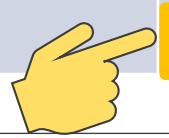
Supported Functions

Function	Remarks
Defect pixel correction	
Black level correction	
Data aggregation for AE/ AWB/ AF	
AE (**A**uto **E**xposure), **AWB** (**A**uto **W**hite **B**alance)	This sample software is provided in Binary and can be replaced with user's algorithm.
2D noise reduction (Sinter) 3D noise reduction (Temper)	3D-NR is default OFF setting. *Note. Please also review the limitation No. 9 on **page 22**.*
Demosaic	RGGB Bayer only
Flicker correction	Default OFF setting
Tone mapping settings	
Wide Dynamic Range correction (2 DOL screens / 2 HDR screens / 1 Iridix screen)	DOL and HDR are output from the sensor in virtual channels (VC). *Note. Please also review the limitation No. 9 on **page 22**.*
Chromatic aberration correction	
Purple fringing correction	
Shading correction	Default setting does not include correction values
Sharpness correction	
Resize (downscaling)	
RAW image acquisition	It can be used with the calibration tool.

Sensor Replacement procedure

- The **“ISP Support Package Sensor Replacement Guide”** is included in the ISP Support Package.
- This guide describes the procedure for replacing the default sensor (IMX415) in the ISP Support Package to the sensor users want to use.
- By using the **ISP Support Package Sensor Replacement Guide** together with the specification sheets and data sheets of the target sensor, users can replace the default sensor.

Category	Items	Contents	Remarks
Document	Arm’s Document	Release notes Software technical reference manual Calibration tool guide Control tool guide	—
	ISP Document	ISP support package release notes ISP support package sample application release notes Software User’s Manual	
	Other	Hardware User’s Manual IMX415 reference circuit diagram Image Quality Tuning Guide ISP Support Package Getting Started Guide **ISP Support Package Sensor Replacement Guide**	



HOW TO GET STARTED WITH VISION AI USING THE “ISP SUPPORT PACKAGE”

ISP Support Package

Customer themselves

Quick Started Guide (1/3)

- There are **two ways** to start developing Vision AI applications using the built-in ISP.
- Since the required preparation differs depending on the case, users should check which approach want to take before moving on.

Case A When users want to **first quick run & try** the Vision AI application.

Case B When users want to run Vision AI **after integrating the ISP Support Package** (*1).

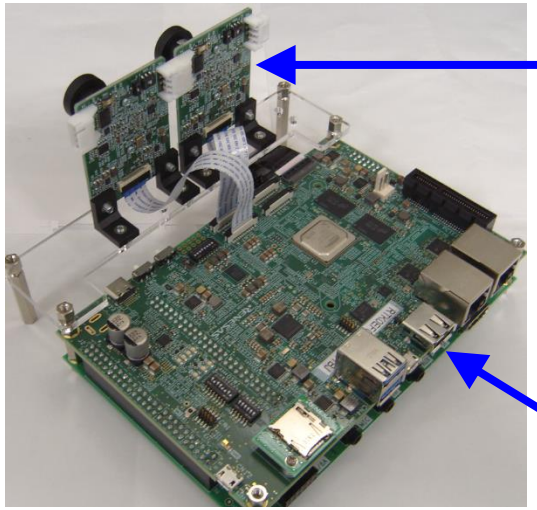
*(*1) There are several conditions for the distribution of the ISP Support Package. Please read the "Condition of Distribution" section on **page 25** as well.*

Quick Started Guide (2/3)

Step1 : How to Get the Required Hardware and Software

◆ Evaluation Kit

- Board :
  - ➢ RZ/V2H: RZ/V2H-EVK
  - ➢ RZ/V2N: RZ/V2N-EVK
- Sensor :
  - ➢ SONY IMX415: IMX415 Board-M12
    (M12 lens mount with a lens attached) from CSM.SOL.



◆ Software, Documents

Case A

- Binary file
- Getting Started Guide for binary

- *The binary version can be downloaded **without** an NDA from the ISP Support Package page at RZ/V2H and RZ/V2N.*
- *The binary version will be available from **the end of April 2026** later.*

Case B

- **AI SDK** : Renesas RZ/V AI | The best solution for starting your AI applications.
- **ISP Support Package** (*1) : RZ/V2H ISP Support Package, RZ/V2N ISP Support Package
- **Getting Started Guide** : It is included in the “ISP Support Package”

*(*1) There are several conditions for the distribution of the ISP Support Package. Please read the “Condition of Distribution” section on **page 25.***

Quick Started Guide (3/3)

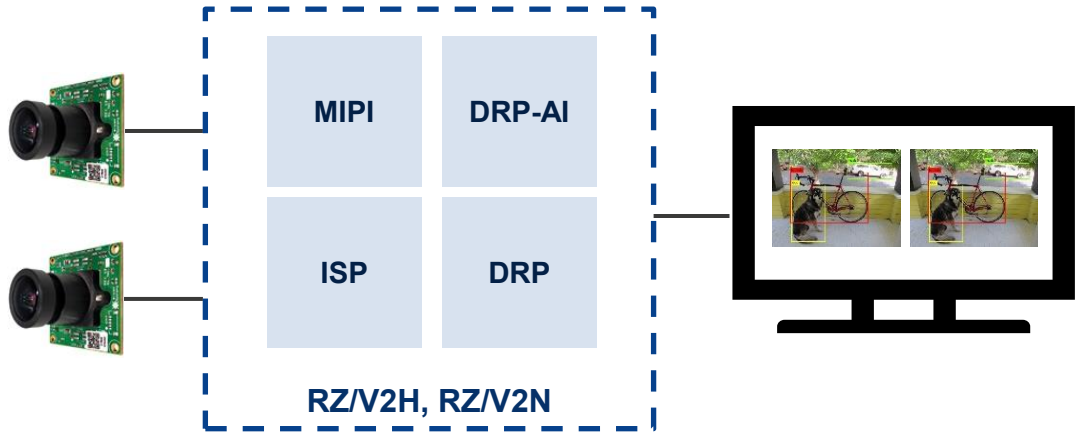
Step2 : Environment Setup in the Getting Started Guide

- Please refer to the **Getting Started Guide** that matches each case and set up your environment accordingly.

Step3 : Executing Vision AI Application

- Please follow the procedure and run Sample Application No. 3 (*1).
- For the execution method and detailed specifications, please refer to the ISP Support Package Sample Application Note.

*(*1)Sample Application No.3 : Processing output data from ISP with DRP-AI and displaying to HDMI*



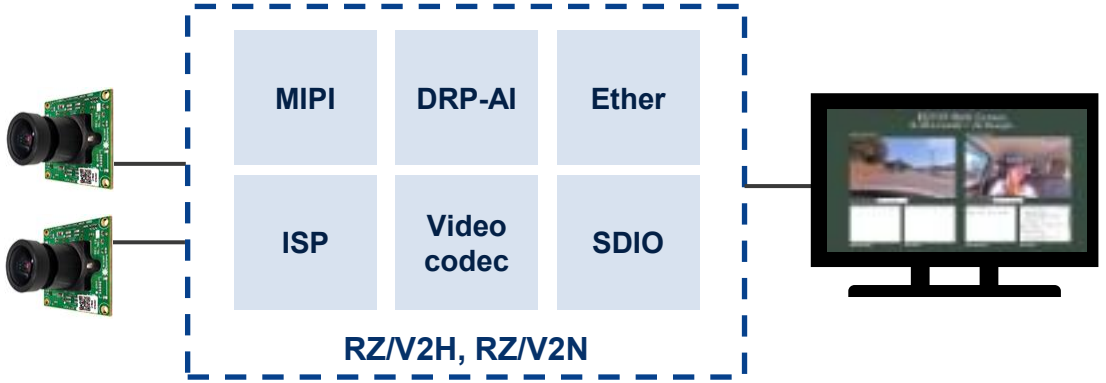
Example of Vision AI solution by RZ/V series
~ DMS (Driver Monitoring System) ~

w/ Module Vendor
w/ IDH Partner
Customer themselves

Example of AI application: DMS (Driver Monitoring System)

Detection for…
- Head poses (CENTER, DOWN, LEFT & RIGHT).
- Blink
- Yawn
- **Gaze**

✓ **E.g. Human_gaze_detection**



Please refer to the video to see how it works! (youtube)

For other AI applications, please refer to our website.

Renesas RZ/V AI | The best solution for starting your AI applications.

LIMITATION

Limitations of ISP Support Package (1/2)

No.	Limitations	Notes
1	The ISP Support Package supports up to dual sensors.	Please refer to the release notes for information on support for connecting more than three sensor units.
2	When connecting dual sensors, connect the same CMOS sensor.	Support different sensors combination in future version updates.
3	The ISP Support Package supports only the Sony IMX415 sensor.	If users want to change the sensor, please replace it by the customers themselves according to the Sensor Replacement Guide.
4	Lens shading correction is supported, but the correction value is not included	Set the parameters according to the lens used by the customers
5	The difference in color between camera 1 and camera 2	This is not the issue of ISP, but it is greatly affected by subject and lens shading.
6	When shooting an LCD screen, magenta may appear	This occurs when the difference between the surrounding color temperature and the color temperature of the liquid crystal is large, and the proportion of the liquid crystal on the screen is small. (No countermeasures)
7	There are some functions that cannot be supported by GStreamer provided.	Renesas will continue to make improvements, but we ask customers to make corrections.

Limitations of ISP Support Package (2/2)

No.	Limitations	Note
8	Flicker correction is compatible with 50Hz/60Hz fluorescent lamp environments. High-speed blinking of LEDs, etc., cannot be removed by the flicker correction function.	Flicker correction is default OFF setting. Please turn it on by yourself. The oscillation frequency of the LED is not specified, so it cannot be automatically corrected. In order to prevent this, please take measures such as using a CMOS sensor of the global shutter and using manual exposure in the case of a fixed light source environment.
9	The processing performance (FPS) of the ISP is affected by the DDR access load when each function is enabled. Therefore, when using features such as DOL, HDR, or 3DNR, the achievable FPS will decrease.	The performance figures provided for the ISP represent its processing capability “From image input to expansion into DDR.” When outputting the expanded data externally or when AI processing is used in combination, the achievable FPS will be lower compared to the ISP-only performance. Depending on the customer’s use case (ISP-only or combined with other units), please adjust the following loads and confirm whether the intended configuration is feasible: • Input-side load: image size, input FPS, etc. • Output-side load: AI processing FPS, output data volume, image output FPS, etc.

w/ Module Vendor

w/ IDH Partner

Customer themselves

SUPPORT POLICY

w/ Module Vendor

w/ IDH Partner

Customer themselves

Renesas Support Policy

RZ/V2H ISP Support Package | Renesas , RZ/V2N ISP Support Package | Renesas

Items	Form	Q&A and issue analysis (*1)		Maintained by Renesas
		EVK + CSM IMX415 module	Customer board	
Customer developed/modified software (includes image quality adjustment, sensor change)	-	NOT Supported	NOT Supported	NOT Supported
Customer added OSS	-	NOT Supported	NOT Supported	NOT Supported
Renesas developed software	Source Code	Supported	NOT Supported	Supported
	Binary	Supported	NOT Supported	Supported

*(*1) Firstly, customers need to investigate which part has a problem: Renesas' deliverables or customer's developed part.*

*Note: If support outside the standard scope is required, please consult with our IDH partner as shown on slide **page 31**.*

w/ Module Vendor

w/ IDH Partner

Customer themselves

Terms of Use

❑ Condition of distribution

To provide the ISP Support Package, the following conditions must be met.

- ✓ **Arm's approval**
  - Arm's competitors and embargoed manufacturers are not approved.
  - In the case of a special dealer, approval will not be granted unless the purpose of use and support destination are clarified.
    This is because there is a concern about disclosure to an unspecified number of people.
- ✓ **NDA with Renesas – the ISP support package is controlled under NDA.**
- ✓ **Agree to the license agreement- Automatically processed when downloading from a secure site.**

First, please submit a Secure Access request from the ISP Support Package download page.
RV/V2H download link, RZ/V2N download link

❑ Prohibitions

Secondary distribution from customers, partners, distributors

w/ Module Vendor

w/ IDH Partner

Customer themselves

PARTNER COLLABORATION

Current collaborative Lens Module Vendors

- When users purchase a module from a module vendor, they must use the software provided by that vendor.
- The ISP Support Package provided by Renesas cannot be used.

1. e-con Systems: Cameras for Renesas

No.	P/N	Sensors used	type	Camera Spec (Pixel / Shutter type)	Product
1	e-CAM37_CURZH	IMX900	RGB raw	3MP / Global shutter	RZ/V2H
2	e-CAM80_CRUZH	IMX415	RGB raw	8MP / Rolling shutter	RZ/V2H, RZ/V2N
3	e-CAM86_CURZH	IMX678	RGB raw	8MP / Rolling shutter	RZ/V2H

2. Innowave: Off-The-Shelf Camera Modules

No.	P/N	Sensors used	type	Camera Spec (Pixel / Shutter type)	Product
1	INV-AR0246FF-2MP	AR0246	RGB raw	2MP / Rolling shutter	RZ/V2H

To be increased more support module in the future...

e-con Systems: Supported Module (1/2)

1. e-CAM37_CURZH: Product Link

e-CAM37_CURZH - 3MP Sony® Pregius S IMX900 Color Camera for Renesas RZ/V2H

Highlights

- Houses e-CAM315_CUMI900_MOD - 3 MP Camera Module based on Sony® Pregius S™ IMX900 sensor
- Global Shutter
- Plugs directly into the Renesas RZ/V2H development kit
- High-speed MIPI CSI-2 interface to connect with the CPU
- Multicamera support for RZ/V2H (upto 2 cameras)
- It uses Renesas RZ/V2H ISP for image processing

Sample Price CONTACT US

Documents DOWNLOAD

2. e-CAM80_CURZH: Product Link

e-CAM80_CURZH - 8MP Sony® STARVIS™ IMX415 Camera for Renesas RZ/V2H

Highlights:

- Houses e-CAM83_CUMI415_MOD - 8MP camera based on Sony® STARVIS™ IMX415 CMOS image sensor with S-mount lens holder
- Ultra low light performance
- Plugs directly into the Renesas RZ/V2H development kit
- Multicamera support for RZ/V2H (upto 2 cameras)
- It uses Renesas RZ/V2H ISP for image processing

Sample Price CONTACT US

Documents DOWNLOAD

e-con Systems: Supported Module (2/2)

3. e-CAM86_CURZH: Product Link

e-CAM86_CURZH - 8MP (4K) Sony® Starvis 2 IMX678 Camera for Renesas RZ/V2H

Highlights:

- Houses e-CAM810_CUMI678C_MOD - 8MP Sony® STARVIS2 IMX678 Camera Module
- Enhanced Low light performance
- Superior NIR sensitivity
- Plugs directly into the Renesas RZ/V2H development kit
- High-speed MIPI CSI-2 interface to connect with the CPU
- Multicamera support for RZ/V2H (upto 2 cameras)
- It uses Renesas RZ/V2H ISP for image processing

Sample Price CONTACT US

Documents DOWNLOAD

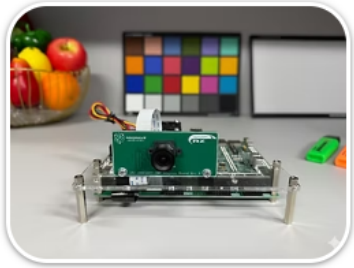
Innowave: Supported Module

1. INV-AR0246FF-2MP: Product Link

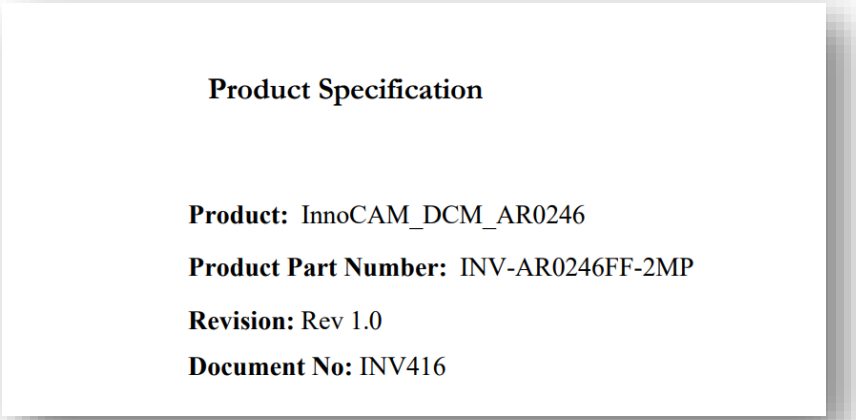
RENESAS

INV-AR0246FF-2MP/ Renesas RZ/V2H

Resolution	2MP
Sensor Vendor	OnSemi
Image Sensor	AR0246
Interface	MIPI
Focus	FF
Optical Size	1/4"
EFL	3.6mm
FOV (Degrees)	D=73, H=61, V=34
Focus Range	70mm~∞
Module Size	22x21mm



- INV-AR0246FF-2MP Datasheet (PDF) is here



Product Specification

Product: InnoCAM_DCM_AR0246

Product Part Number: INV-AR0246FF-2MP

Revision: Rev 1.0

Document No: INV416

RENESAS

Current collaborative Camera Module Vendors

- There are many **Camera Module Vendors** who can support RZ/V series.
- For the list of supported modules, please refer to "**RZ/V Available Partner Camera Module List**".

For RZ/V2H

[RZ/V2H] AVAILABLE PARTNER CAMERA MODULE LIST

Camera vendor	P/N	Sensors used	Type	Camera Spec (Pixel / Shutter type)	ISP	Status	Note
TechNexion	TEVS-AR0144	AR0144	YUV	1MP / Global shutter	on camera	MP	Necessary S/W and documentation are provided by Technexion P/N for RZ/V2H has the suffix, "*-RPI22"
	TEVS-AR0145	AR0145	YUV(mono)	1MP / Global shutter	on camera	MP	
	TEVS-AR0234	AR0234	YUV	2MP / Global shutter	on camera	MP	
	TEVS-AR0521	AR0521	YUV	5MP / Rolling shutter	on camera	MP	
	TEVS-AR0522	AR0522	YUV(mono)	5MP / Rolling shutter	on camera	MP	
	TEVS-AR0821	AR0821	YUV	8MP / Rolling shutter	on camera	MP	
	TEVS-AR0822	AR0822	YUV	8MP / Rolling shutter	on camera	MP	
	TEVS-AR1335	AR1335	YUV	13MP / Rolling shutter	on camera	MP	
e-con Systems	e-CAM22_CURZH	IMX462	YUV	2MP / Rolling shutter	on camera	MP	Necessary S/W and documentation are provided by e-con systems (Note1) Doesn't work with "RZ/V2H ISP Support Package" provided by Renesas
	e-CAM25_CURZH	AR0234	YUV	2MP / Global shutter	on camera	MP	
	e-CAM[illegible]ZH	IMX415	RGB raw	8MP / Rolling shutter	on MPU	MP	
	e-CAM80_CR[illegible] (Note1)	IMX[illegible]5	RGB raw	8MP / Rolling shutter	on MPU	MP	
	e-[illegible]	A[illegible]		8MP / Rolling shutter	on camera	MP	
Shikino High-Tech	KBCR-S08MM	O[illegible]10	YUV	1.3MP / Rolling shutter	on camera	MP	Necessary S/W and documentation are provided by Shikino High-Tech
ArduCam	SKU: B0541	IMX[illegible]78	YUV	8.3MP / Rolling shutter	on camera	MP	Necessary S/W and documentation are provided by Arducam
	SKU: B0542	AR2020	YUV	20MP / Rolling shutter	on camera	MP	
	SKU: B0543	IMX283	YUV	20MP / Rolling shutter	on camera	MP	
	SKU: B0544	AR2020	YUV(mono)	20MP / Rolling shutter	on camera	MP	
	SKU: B0545	IMX585	YUV	8.3MP / Rolling shutter	on camera	MP	
	SKU: B0546	IMX462	YUV	2MP / Rolling shutter	on camera	MP	
	SKU: B0547	AR0234	YUV	2.3MP / Global shutter	on camera	MP	
CSM.SOL	IMX415 board for V2H	IMX415	RGB raw	8MP / Rolling shutter	on MPU	MP	Reference camera module for evaluation of RZ/V2H ISP support package

For RZ/V2N

[RZ/V2N] AVAILABLE PARTNER CAMERA MODULE LIST

Camera vendor	P/N	Sensors used	Type	Camera Spec (Pixel / Shutter type)	ISP	Status	Note
TechNexion	TEVS-AR0144	AR0144	YUV	1MP / Global shutter	on camera	MP	Necessary S/W and documentation are provided by Technexion P/N for RZ/V2H has the suffix, "*-RPI22"
	TEVS-AR0145	AR0145	YUV(mono)	1MP / Global shutter	on camera	MP	
	TEVS-AR0234	AR0234	YUV	2MP / Global shutter	on camera	MP	
	TEVS-AR0521	AR0521	YUV	5MP / Rolling shutter	on camera	MP	
	TEVS-AR0522	AR0522	YUV(mono)	5MP / Rolling shutter	on camera	MP	
	TEVS-AR0821	AR0821	YUV	8MP / Rolling shutter	on camera	MP	
	TEVS-AR0822	AR0822	YUV	8MP / Rolling shutter	on camera	MP	
	TEVS-AR1335	AR1335	YUV	13MP / Rolling shutter	on camera	MP	
e-con Systems	e-CAM22_CURZH	IMX462	YUV	2MP / Rolling shutter	on camera	MP	Necessary S/W and documentation are provided by e-con systems
	e-CAM[illegible]ZH	AR0234	YUV	2MP / Global shutter	on camera	MP	
Shikino High-Tech	KBCR-S08MM	OX01F10	YUV	1.3MP / Rolling shutter	on camera	MP	Necessary S/W and documentation are provided by Shikino High-Tech
CSM.SOL	IMX415 board for V2H	IMX415	RGB raw	8MP / Rolling shutter	on MPU	MP	Reference camera module for evaluation of RZ/V2H ISP support package

To be increased more support partners in the future...

w/ IDH Partner

Customer themselves

Current collaborative IDH Partners

➢ Thundersoft Japan Co., Ltd.

- Contact Person: Hiroaki Naganuma
- e-Mail: hiroaki.naganuma@thundersoft.com
- Supported Summary: MM Solutions Camera ISP

➢ NEC Corporation

- Contact Person : Kentaro Zushi
- e-Mail: k-zushi@nec.com
- Supported Summary: RZ/V テクニカルサポート

To be increased more support partners in the future…

Revision history

Rev.	Date	Description	
		Page	Summary
1.0	Apr 9, 2026	-	First edition issued.

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