AI Single Board Computer

# Kakip®

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RENESAS RZ READY

"Kakip" is an AI single-board computer with both brain and physical control, and is equipped with Renesas' AI-MPU "RZ/V2H" at its core. 3 CPUs can be controlled by multi-OS, for example, Linux can control applications including AI image processing, while RTOS can control external devices. The DRP-AI3 (*1) AI accelerator, which has excellent power performance (TOPS/W) of AI processing, enables high-speed AI image processing of 4-channel camera images, and rule-based image processing such as OpenCV can be efficiently distributed processing with DRP (*2). DRP enables efficient acceleration of OpenCV and other image processing. Despite its many interfaces, it is compacted to the card size, making it a very easy-to-handle. It can be used for research and development of various embedded applications including robotics, POC production, and education.
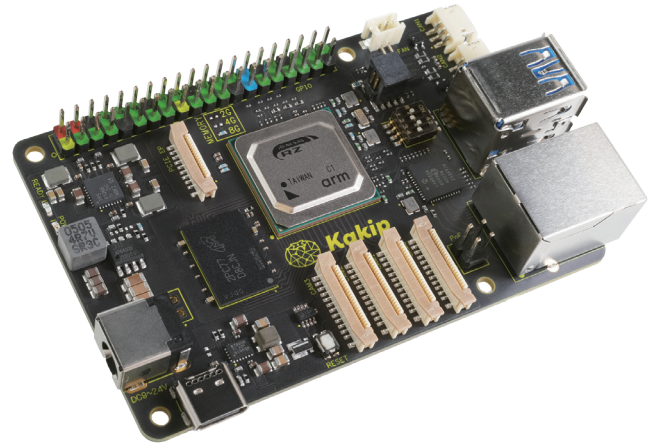
(*1)(*2)
DRP (Dynamically Reconfigurable Processor) is Renesas' proprietary hardware that executes applications while dynamically switching connections between arithmetic units.
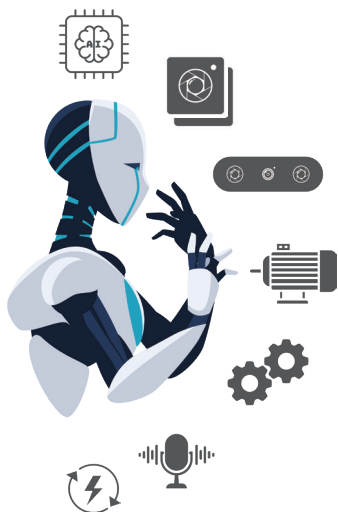
Core Processor

AI-MPU: Renesas "RZ/V2H" (R9A09G057H48GBG)

CPU	Cortex-A55 Quad-Core 1.1GHz Cortex-R8 Dual-Core 800MHz Cortex-M33 200MHz
Accelerators	DRP-AI3 (INT8) / DRP (STP4)
Option Equipped	Mali-G31 GPU / Mali-C55 ISP Security IP

Applications

Multi-operation and process acceleration contribute to R&D and POC production in various applications.

Multi CPU

Cortex-A55
Linux
(Rich Application)

Cortex-R8
RTOS
(Real Time Application)

Cortex-M33
Arduino / RTOS
(Voice/Power/Wakeup)

Accelerators

DRP-AI3
(AI Accelerator)

DRP
(Vision Dynamics Accelerator)

For Robot Developper

- AMR (Autonomous Mobile Robot) やHSR (Human support Robot) : decentralization of processing
- On-board drone image processing and control
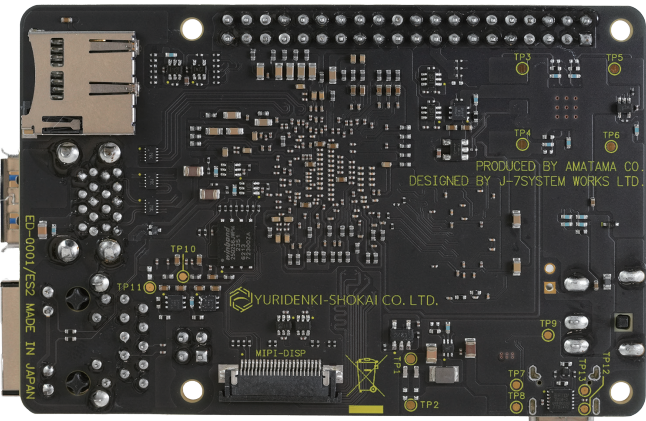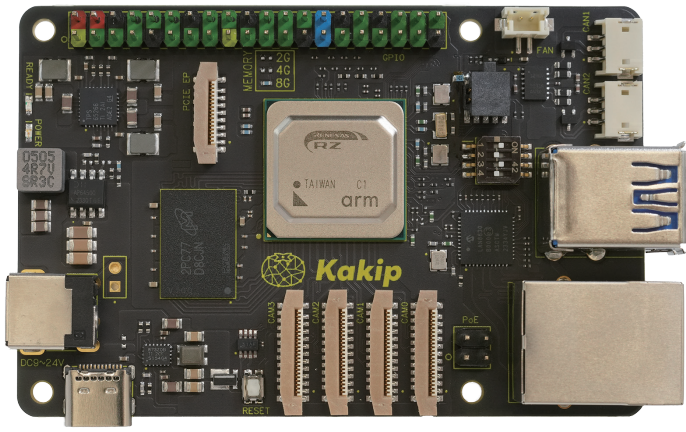- Robot Competition and other hobby and technology verification

FA / Logistics

- Safety monitoring and unattended response control in manufacturing equipment
- Safety systems for construction equipment and forklifts

Others

- CCTV and Smart broadcasting

Hardware Specifications

It is in the form of a single board computer that is easy to handle for many engineers. Although the size of a card, it is equipped with a high-performance core chip and many interfaces, providing high-speed AI processing of up to 80 TOPS, image processing such as OpenCV, and multi-OS control in a fanless environment. (Heat sinks are required)
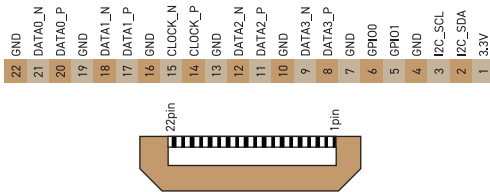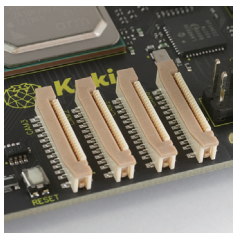
AI-SBC "Kakip" Spec

Memory	LPDDR (2GB / 4GB / 8GB) *2GB / 4GB is not available as standard
Video In	MIPI-CSI2 4Lane x4 (22pin)
Video Out	MIPI-DSI 4Lane x1 (22pin)
Ethernet	10 / 100 / 1000 Base-T (RJ45) Additional power supply is needed for PoE
USB	Type-A (USB3.2 Gen2) x2 Type-C (USB2.0 FS) x1 *Not for Power In
PCIe	PCIe Gen3 (x4) End Point x1
CAN FD	CAN FD x2
RTC	Equipped
SD Card	microSD (for Linux Boot / Application)
Power Supply	DC9-24V / 25W（Max） *12V Recomended (DC Jack Φ5.5/2.1, Center +)
Strage Temp.	-15℃ ～ 60℃
Operating Temp.	0℃ ～ 40℃

Interfaces

MIPI-CSI2

4-channel video input is possible via 22-pin MIPI-CSI2 connector.

Pin	Signal
22	GND
21	DATA0_N
20	DATA0_P
19	GND
18	DATA1_N
17	DATA1_P
16	GND
15	CLOCK_N
14	CLOCK_P
13	GND
12	DATA2_N
11	DATA2_P
10	GND
9	DATA3_N
8	DATA3_P
7	GND
6	GPIO0
5	GPIO1
4	GND
3	I2C_SCL
2	I2C_SDA
1	3.3V

GPIO

Kakip has standard GPIO

3.3V_PWR	1	2	5V_PWR
GPIO_2	3	4	5V_PWR
GPIO_3	5	6	GND
GPIO_4	7	8	GPIO_14
GND	9	10	GPIO_15
GPIO_17	11	12	GPIO_18
GPIO_22	13	14	GND
GPIO_23	15	16	GPIO_23
3.3V_PWR	17	18	GPIO_24
GPIO_10	19	20	GND
GPIO_9	21	22	GPIO_25
GPIO_11	23	24	GPIO_8
GND	25	26	GPIO_7
GPIO_0	27	28	GPIO_1
GPIO_5	29	30	GND
GPIO_6	31	32	GPIO_12
GPIO_13	33	34	GND
GPIO_19	35	36	GPIO_16
GPIO_26	37	38	GPIO_20
GND	39	40	GPIO21
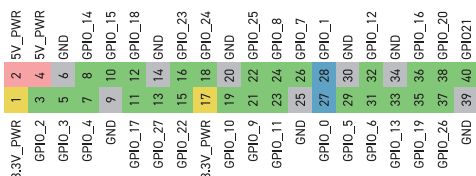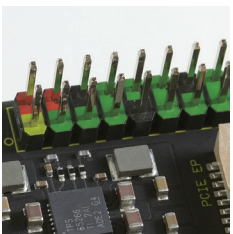
40pin (2x20) 2.54mm

Others

Unique interfaces such as CAN FD and PCIe EndPoint as well as standard interfaces are fully equipped.
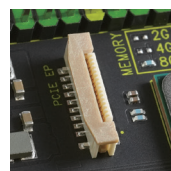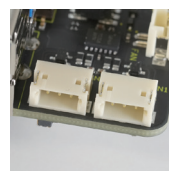

MIPI-DSI

Ethernet / USB-A
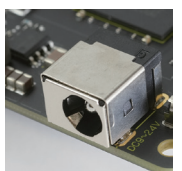

PoE Power Input

USB Type-C

PCIe EndPoint

CAN FD

micro SD

Power Input

OS & Development Tools

OS / Driver

- Ubuntu 24.04 (*Kernel Ver. 5.1)
- Drivers（DRP-AI3 / DRP / General Interfaces）
- FreeRTOS for Cortex-R8
- FreeRTOS for Cortex-M33

Development Tools

AI Image Processing
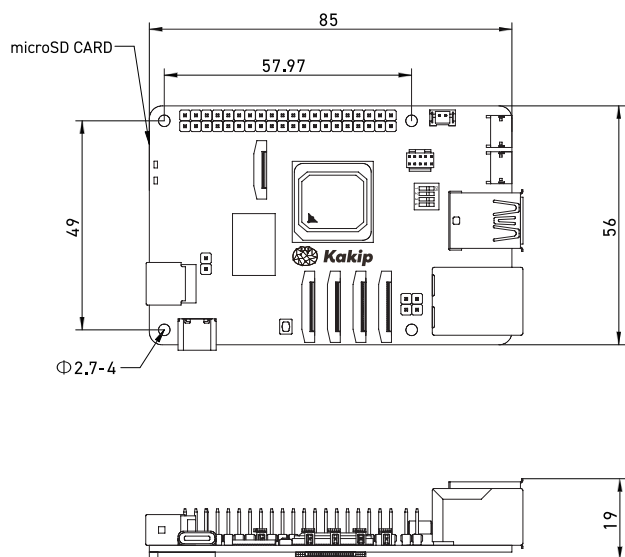- Renesas RZ/V2H AI SDK v5.00

Multi OS（Based on OpenAMP）
- RZ/V Multi OS Package

Video Codec対応（H.264 / H.265）

Others

"ROS2"、"Rivz"、"Gazebo" supported

Dimensions

microSD CARD

85

57.97

49

56

Φ2.7-4

19

Product Information

Official Web Site

Official site of "Kakip" series. Public announcements of product information, information on exhibitions and press releases, etc., and distribution of BSP (OS image) are available.

Online Manual

Kakip's operation manual is available online and updated as needed.

GitHub

Kakip's development environment and demonstration applications, which are available as open source, are deployed on GitHub.

Contact

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