

| Series | Nickname/Group | Part number | Core | FPU | Clock Speed [MHz] | GPU | GPU Clock Speed [MHz] | DDR-Interface | Flash Interface | Video Output | Video Input | External bus | High Speed Interface | CAN/CAN FD | Ethernet 100 Mbit/1 GBIT | USB | MLB | SPI | UART | I ² C | Pins | Packages | T _J max [°C] | Other features |
|------------|----------------|-------------|---|-----|---------------------|---------------------------------|-----------------------|---------------------------|--|--------------------------------|--------------------------------|--------------|----------------------|------------|--------------------------|---------------|-----------------|-----|------|------------------|------|----------|-------------------------|---|
| R-Car Gen3 | R-Car H3 | R8A77951 | 4x Cortex A57 4x Cortex A53 Cortex R7 | ✓ | 1700 1200 800 | PowerVR - GX6650 D/AVE-HD | 600 | 4x 32-bit LPDDR4-3200 | Parallel Serial Flash Raw NAND 2x eMMC 4x SDIO | Digital Out LVDS 2x HDMI | 2x Digital 3x MIPI- CSI2 | ✓ | 2x PCIe SATA | 2/2 | -/1 | 3.0 4x 2.0 | 3-pin MOST50 | 4 | 11 | 7 | 1384 | BGA | 125 | Audio DSP, Security, Safety, Video HW codec, Image Processor, Timers, WDT, PWMs |
| | R-Car H3N | R8A77951BN | 4x Cortex A57 4x Cortex A53 Cortex R7 | ✓ | 1500 1200 800 | PowerVR - GX6650 D/AVE-HD | 600 266 | 2x 32-bit LPDDR4-3200 | Parallel Serial Flash Raw NAND 2x eMMC 4x SDIO | Digital Out LVDS HDMI | 2x Digital 2x MIPI- CSI2 | ✓ | 2x PCIe SATA | 2/2 | -/1 | 3.0 2x 2.0 | 3-pin MOST50 | 4 | 11 | 7 | 1022 | BGA | 125 | Audio DSP, Security, Safety, Video HW codec, Image Processor, Timers, WDT, PWMs |
| | R-Car M3 | R8A77961 | 2x Cortex A57 4x Cortex A53 Cortex R7 | ✓ | 1800 1300 800 | PowerVR - GX6250 D/AVE-HD | 700 266 | 2x 32-bit LPDDR4-3200 | Parallel Serial Flash Raw NAND 2x eMMC 4x SDIO | Digital Out LVDS HDMI | 2x Digital 2x MIPI- CSI2 | ✓ | 2x PCIe | 2/2 | -/1 | 3.0 2x 2.0 | 3-pin MOST50 | 4 | 11 | 7 | 1022 | BGA | 125 | Audio DSP, Security, Safety, Video HW codec, Image Processor, Timers, WDT, PWMs |
| | R-Car M3N | R8A77965 | 2x Cortex A57 Cortex R7 | ✓ | 1800 800 | PowerVR - GE7800 D/AVE-HD | 700 400 | 1x 32-bit LPDDR4-3200 | Parallel Serial Flash Raw NAND 2x eMMC 4x SDIO | Digital Out LVDS HDMI | 2x Digital 2x MIPI- CSI2 | ✓ | 2x PCIe SATA | 2/2 | -/1 | 3.0 2x 2.0 | 3-pin MOST50 | 4 | 11 | 7 | 1022 | BGA | 125 | Audio DSP, Security, Safety, Video HW codec, Image Processor, Timers, WDT, PWMs |
| | R-Car E3 | R8A77990 | 2x Cortex A53 Cortex R7 | ✓ | 1200 800 | PowerVR - GE8300 D/AVE-HD | 600 400 | 2x 16-bit DDR3(L)-1866 | Parallel Serial Flash Raw NAND 1x eMMC 3x SDIO | Dig. Out / LVDS LVDS | 2x Digital MIPI-CSI2 | ✓ | PCIe | 2/2 | -/1 | 3.0 2x 2.0 | 3-pin MOST50 | 4 | 11 | 8 | 552 | BGA | 125 | Audio DSP, Security, Safety, Video HW codec, Image Processor, Timers, WDT, PWMs |
| | R-Car D3 | R8A77995 | 1x Cortex A53 | ✓ | 1000 | PowerVR - GE8300 D/AVE-HD | 600 400 | 1x 16-bit DDR3(L)-1866 | Raw NAND Serial Flash 1x eMMC | Dig. Out / LVDS LVDS | 1x Digital | - | - | 2/2 | -/1 | 2.0 | 3-pin MOST50 | 4 | 8 | 4 | 401 | BGA | 125 | Security, Safety, Image Processor, Timers, WDT, PWMs |

| Series | Nickname | Part number | Real Time Core Freq / KDMIPS | Application Core | GPU / Frequency | Computer Vision / Frequency | Deep Learning (TOPS) | Other Accel. | Video Codec | Audio Codec | DDR Interface | Flash Interface | Video Input | Video Output | High Speed Interface | Auto I/F | Ethernet 100Mbit/1GBIT | ASIL | Pins / Package | Other Features |
|-----------|-----------|-------------|---------------------------------|----------------------------------|------------------|-----------------------------|----------------------|---|-------------------------|-------------|-----------------------|--------------------|---|---|----------------------|-------------------------------|------------------------------------|-----------------|-----------------------------|--|
| R-Car V3x | R-Car V3M | R8A77970 | CR7 Lockstep 800MHz/2k DMIPS | 2x CA53 800MHz/ 3.6k DMIPS | No | 2Cve / 400MHz | 0.3 TOPs | 1x ISP, 4x IMR | H264 Enc | No | 32bit DDR3L-1600 | 2x QSPI | 1x MIPI-CSI2 (4L) 2x Digital Vin TTL | 1x DU 1x LVDS (OpenLDI) 1x Digital Vout TTL | No | 2x CAN 2.0B/FD, Flexray | 1x Gbit AVB | Up to ASIL B | FCBGA 0.8mm 419 balls | 4x UART 4x SPI 5x I2C Security JTAG |
| | R-Car V3H | R8A77980A | CR7 Lockstep 800MHz/2k DMIPS | 4x CA53 1GHz/9.2k DMIPS | No | 5Cve / 533MHz | 3.7 TOPs | 2x ISP, 5x IMR, 1x DOF, 1x STV, 5x ACF | H264 Enc | No | 32bit LPDDR4-3200 | 2x QSPI 1x eMMC | 2x MIPI-CSI2 (4L) 2x Digital Vin TTL | 1x DU 1x LVDS (OpenLDI) 1x Digital Vout TTL | 1x PCIe 2.0 | 3x CAN 2.0B/FD, Flexray | 1x Gbit AVB 1x Gbit Std port | Up to ASIL C | FCBGA 0.8mm 538 balls | 4x UART 6x SPI 7x I2C Security JTAG |
| | R-Car V3U | R8A779A0D | CR52 Lockstep 1GHz/2k DMIPS | 8 x CA76 1.8GHz/93k DMIPS | GE7800 600MHz | 8Cve / 533MHz | 60 TOPs | 4x ISP, 6x IMR, 2x DOF, 2x STV, 4x ACF, 2x SMD, 2x DSP | H264 Enc, H264 Codec | No | 128bit LPDDR4-4266 | 2x QSPI 1x eMMC | 4x MIPI-CSI2 | 2x MIPI-CSI2 2x DU | 4x PCIe 4.0 | 8x CAN 2.0B/FD, Flexray | 6x GBIT AVB | Up to ASIL D | FCBGA 0.8mm 1992 pins | 4x UART, 6x SPI, 7x I2C, Security JTAG |

Other features: Cve Computer Vision Engine, DOF Dense Optical Flow, DU Display Unit, IMR Image Rectifier, ISP Image Signal Processor, SMD Simple Instruction Multiple Data, STV Stereo Vision, WDT Window Watchdog Timer

Green Hills Multi (R-Car)

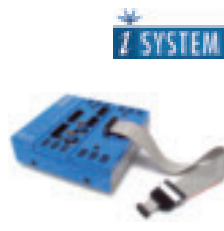

- Integrated development environment for C/C++
- Package includes project manager, editor, compiler, assembler, linker, simulator and debugger
- Supports ELF/DWARF debugging format
- Different license options: locked to PC, dongled (USB), floating
- Order code depends on target platform and license type
- For more information visit www.ghs.com

AUTOSAR


- Standard Peripheral Abstraction Layer (SPAL) Drivers, Communication Drivers and Complex Drivers for R-CAR
- For AUTOSAR AR4.X based MCAL for R-CAR
- Very high software quality standards supplemented by many years experience
- Worldwide support infrastructure with interface for 1st and 2nd level support in Europe
- Cooperation with various BSW/OS vendors and integrators
- Flexible Mass-Production Licenses
- Free-of-charge Development Licenses for up to 500 prototypes

R-Car e²studio


- e² studio is a complete, state of the art development environment supporting Renesas R-Car V series, based on an open source Eclipse CDT.
- Supported Core/Devices: Cortex A53 dual on Renesas R-Car V3M and R-Car V3H, A76 on R-Car V3U
- Package includes
 - » Modern Arm Cores, Cortex A/R in R-Car SoC are supported with HSSTP high speed trace
 - » ADAS plug-in's are available. "Debug Trace Agent", "Bus Traffic Monitor", "Image Viewer", "Pin Configurator", etc.
 - » C99 toolchain optimized to 64 threads CVengine with ISO26262 TCL3 capable
 - » Support SIL development with IMP-SimTools
- Hardware Support
 - » Renesas Starter Kit board and embedded Yocto Linux.
 - » Lauterbach JTAG incl. scripting and semi-hosting
- e²studio basic features : Based on Eclipse "Oxygen" with CDT support.
- See e² studio global web site : <<https://www.renesas.com/eu/en/software-tool/e-studio>>

iSYSTEM


- Universal emulator and debugger system:
 - » On-chip debugging for RL78, RH850 and R-Car
 - » In-Circuit Emulation of RL78
 - » On-Chip and Off-Chip Trace (Parallel and AURORA) for RH850
 - » Off-Chip HSSTP Trace for R-Car
 - » Support for common compiler platforms
 - » Software API for 3rd party tools and test automation
- For more information visit www.isystem.com

Lauterbach


- Universal debugger system TRACE32™
 - » On-chip debugging for RL78, RH850 and R-Car
 - » On-Chip and Off-Chip Trace (Parallel and AURORA) for RH850
 - » Off-Chip HSSTP Trace for R-Car
 - » Support for common compiler platforms
 - » Software API for 3rd party tools and test automation
- For more information visit www.lauterbach.com

R-Car Starter Kit Premier (R-Car H3)


- Equipped with
 - » 1384-pin R-Car H3 device on SIP module
 - » 8 GB LPDDR4-3200 SDRAM
 - » 64 MB QSPI flash
 - » 128 GB eMMC
 - » Ethernet, Micro SD, USB, Micro HDMI display out
 - » Add. interfaces & SOC signals via COM Express connector (440-pin)
 - » JTAG interface
- Package includes
 - » Starter Kit
 - » Power supply
 - » USB and HDMI cable
- Software
 - » Linux BSP / MMP / Graphics Libraries available
- Order codes: Y-ASK-RCAR-H3-8GB-WS30 / RTP0RC77951SKBX010SA03
Y-SICA20I2P (JTAG Debug Adapter)

R-Car Starter Kit Pro (R-Car M3)

- Equipped with
 - » 1384-pin R-Car M3 device on SIP module
 - » 8 GB LPDDR4-3200 SDRAM
 - » 64 MB QSPI flash
 - » 128 GB eMMC
 - » Ethernet, Micro SD, USB, Micro HDMI display out
 - » Add. interfaces & SOC signals via COM Express connector (440-pin)
 - » JTAG interface
- Package includes
 - » Starter Kit
 - » Power supply
 - » USB and HDMI cable
- Software
 - » Linux BSP / MMP / Graphics Libraries available
- Order codes: Y-ASK-RCAR-M3W-8GB-WS30 / RTP8J77961ASKB0SK0SA05A
Y-SICA20I2P (JTAG Debug Adapter)

Kingfisher Expansion Board (R-Car H3/M3)


- For R-Car H3/M3 evaluation
- Expansion board to be used in combination with the R-Car H3/M3 starter kit board
- Equipped with
 - » Wireless & Automotive network connectivity (WiFi, Bluetooth, 2x CAN-FD)
 - » 2ch display output (1x HDMI, 1x LVDS)
 - » SD Card, USB2.0/3.0, Mini PCIe
 - » 7.1 Audio output, Video input, CSI camera I/F, FM/AM radio
 - » JTAG debug connector
- Software
 - » Linux BSP / MMP / Graphics Libraries available
- Board dimensions: 180 mm x 198 mm
- Order codes: Y-SBEV-RCAR-KF-M06 (Kingfisher Advanced Carrier Board)
Y-SBEV-RCAR-KF-GMSL02
(4 port GMSL camera input option-board)

R-Car V3M Starter Kit


- Equipped with :
 - » R-Car V3M
 - » 2 Gbytes DDR3L-1600
 - » 64 Mbytes Hyper Flash
 - » 64 Mbytes QSPI Flash
 - » 16GBytes eMMC
 - » HDMI, RGB, LVDS, MipiCSI2,
 - » EthernetAVB, Can-FD, I2C,
 - » JTAG, Debug Interface
 - » On board Connector with SOC signals
- Package include
 - » Starter Kit
 - » Power Supply
 - » USB& HDMI Cable
- Software
 - » Linux BSP (Linux.Org)
 - » Configuration tools
 - » Mimi Monitor
- Order codes: Y-ASK-RCAR-V3M-WS20 (with Rohm PMIC)
Y-ASK-RCAR-V3M-WS20-REV2 (with Renesas PMIC)

R-Car V3H Starter Kit


- Equipped with :
 - » R-Car V3H
 - » 2 Gbytes DDR3L-1600
 - » 64 Mbytes Hyper Flash
 - » 64 Mbytes QSPI Flash
 - » 16GBytes eMMC
 - » HDMI, RGB, LVDS, MipiCSI2
 - » EthernetAVB, B-Ethernet, Can-FD, I2C
 - » JTAG, Debug Interface
 - » On board Connector with SOC signals
- Package include
 - » Starter Kit
 - » Power Supply
 - » USB& HDMI Cable
- Software
 - » Linux BSP (Linux.Org)
 - » Configuration tools
 - » Mimi Monitor
- Order codes: Y-ASK-RCAR-V3H-WS11 (with Rohm PMIC)
Y-ASK-RCAR-V3H-WS20 (with Renesas PMIC)

R-Car E3 Development Board 'EBISU'


- For R-Car E3
- Equipped with:
 - » R-Car E3
 - » 64 MB NOR Flash Memory
 - » 2GB DDR3L-DRAM-1866
 - » 32GB eMMC
 - » USB 3.0/2.0, LAN
 - » 2ch display output (1x HDMI, 1-2x LVDS, 1x Analog RGB)
 - » HDMI and CVBS video input
 - » Audio Output and Microphone Input
 - » JTAG debug/trace connector
- Board dimensions: 230mm x 160mm
- Package includes CD with user's manual, schematic and boot software
- Order code: Y-R-CAR-E3-BOARD-DEV-WS11 / RTP0RC77990SEB0020SA00

R-Car D3 Development Board 'DRAAK'


- For R-Car D3
- Equipped with:
 - » R-Car D3
 - » 64 MB NOR Flash Memory
 - » 512MB DDR3L-SDRAM-1856
 - » 16GB eMMC
 - » USB 2.0, LAN
 - » 2ch display output (1x HDMI, 1-2x LVDS, 1x Analog RGB)
 - » HDMI and CVBS video input
 - » JTAG debug/trace connector
- Board dimensions: 210mm x 160mm
- Package includes CD with user's manual, schematic and boot software
- Order code: Y-R-CAR-D3-BOARD-DEV-WS11 / RTP0RC77995SEB0010S

R-Car H3/M3/M3N Development Board 'SALVATOR-XS'


- For R-Car H3, M3 and M3N
- Equipped with:
 - » R-Car H3/M3/M3N SiP
 - » 64 MB NOR Flash Memory
 - » 8GB LPDDR4-DRAM-3200 [H3 and M3] or 2GB LPDDR4-DRAM-3200 [M3N]
 - » 32GB eMMC
 - » USB 3.0/2.0, SD, LAN, SATA, PCIe
 - » 3-4ch Display output (1-2x HDMI, 1x LVDS, 1x Analog RGB)
 - » JTAG debug/trace connector
- Board dimensions: 210mm x 160mm
- Package includes CD with user's manual, schematic and boot software
- Order codes: Y-R-CAR-M3N-SIP-BOARD-SKT-ES20 / RTP0RC77965SIPB012S-S
Y-R-CAR-M3W-8GB-BOARD-SKT-WS30 / RTP0RC77965SIPB0012SS5A
Y-R-CAR-H3-8GB-BOARD-SKT-WS30 / RTP0RC77965SIPB0012S-S03

R-Car V3M Development Board 'EAGLE'


- Equipped with:
 - NOR flash memory
 - » Two serial NOR flash memory devices for QSPI0
 - » Serial NOR flash memory device for QSPI1
 - SDRAM :
 - » LPDDR3-SDRAM for DBSC4
 - Display interfaces :
 - » HDMI output connector for LVDS
 - Video input interfaces :
 - » 4 camera input connectors for CSI2 channel 0
 - Network interfaces:
 - » Gigabit Ethernet (GbE) connector for EthernetAVB
 - » CAN connector for CANFD0
 - Peripheral interfaces:
 - » 'Debug Serial' connector for SCIF0
 - Debugger interfaces:
 - » 20-pin JTAG connector
 - » HSSTP connector for LVDS
 - Peripheral connectors:
 - » Four EXIO connectors for DPAD, VIN0, MMC, and other modules
- Power supply: 12.0-V DC input
- Operating temperature : +25 degrees C at ambient temperature
- Order Code: Y-R-CAR-V3M-BOARD-DEV-ES20 / RTP8A77970ASKB0EG0SA001#WS

R-Car V3H Development Board 'CONDOR-I'


- Equipped with:
 - NOR flash memory:
 - » Two serial NOR flash memory devices for QSPI0,
 - » Serial NOR flash memory for QSPI1
 - SDRAM:
 - » LPDDR4-SDRAM for DBSC4
 - Display interface:
 - » HDMI output connector for LVDS
 - Video input interfaces :
 - » camera input connectors for CSI2 channel 0
 - » camera input connectors for CSI2 channel 2
 - Storage interface:
 - » eMMC memory for MMC
 - Network interfaces:
 - » PCIe x 4 connectors (2 lanes) for PCIe
 - » Ethernet AVB PHY connector for EthernetAVB
 - » Gigabit Ethernet (GbE) connector for GETHER
 - » CAN connector for CANFD0_A
 - Peripheral interfaces:
 - » 'Debug Serial' connector for SCIF0 or HSCIF0_B
 - Debugger interfaces:
 - » 20-pin JTAG connector for JTAG1
 - » 20-pin JTAG connector for JTAG2
 - » HSSTP connector through LVDS
 - » HSSTP connector through PCIe0
 - Peripheral connectors:
 - » Three EXIO connectors for DPAD, GETHER (RMII), Flex Ray, VIN0, and other modules
- Power supply: 12.0-V DC input
- Operating temperature: +25 degrees C at ambient
- Package includes CD with User's Manual, Schematic and boot software
- Order Code: Y-RCAR-V3H-CONDOR-I-BRD-WS20 / RTP8A77980ASKB0CW0SA001#WS

R-Car V3U Development Board 'FALCON'


- Equipped with
 - NOR flash memory:
 - » Serial NOR flash memory device for QSPI0
 - » HyperFlash memory device for QSPI0 and QSPI1
 - SDRAM:
 - » Four LPDDR4X devices for DBSC4
 - Display interface:
 - » Mini display port connector for DSI0
 - » GMSL output connector (FAKRA) for DSI0 and DSI1
 - Video input interfaces : x3 GMSL input connectors (FAKRA) for CSI0 to CSI3
 - Storage interface: eMMC memory for MMC
 - Network interfaces:
 - » OcuLink connector for PCIe0 and PCIe1 (4 lanes), OcuLink connector for PCIe2 and PCIe3 (4 lanes)
 - » Gigabit Ethernet (GbE) connector for EtherAVB0
 - » Six Ethernet AVB ports (MATEnet) for EtherAVB0 to EtherAVB5
 - » Two FlexRay connectors for FlexRay_A and FlexRay_B
 - » Peripheral interfaces : Debug serial connector for SCIF0/HSCIF0
 - Debugger interfaces: 20-pins JTAG connector for JTAG1, JTAG connectors for JTAG2
 - Peripheral connectors:
 - » EX-SPI connector for QSPI0
 - » Two break-out board connectors (EXIO connectors A and B)
 - » Ethernet sub-board connector
 - » CSI and DSI sub-board connector
 - » Mode switch-board connector
 - Power supply: Two 12.0-V DC inputs (D12.0V1 and/or D12.0V2)
 - Operating temperature: +25 degrees C at ambient
 - Package includes CD with User's Manual, Schematic and boot software
 - Order Code: Y-RCAR-V3U-FALCON-BRD-DEV-WS10 / RTP8A779A0ASKB0FS0SA000#WS



Download this Product Scout at
<https://www.renesas.com/eu/en/document/bro/product-scout-automotive-0>