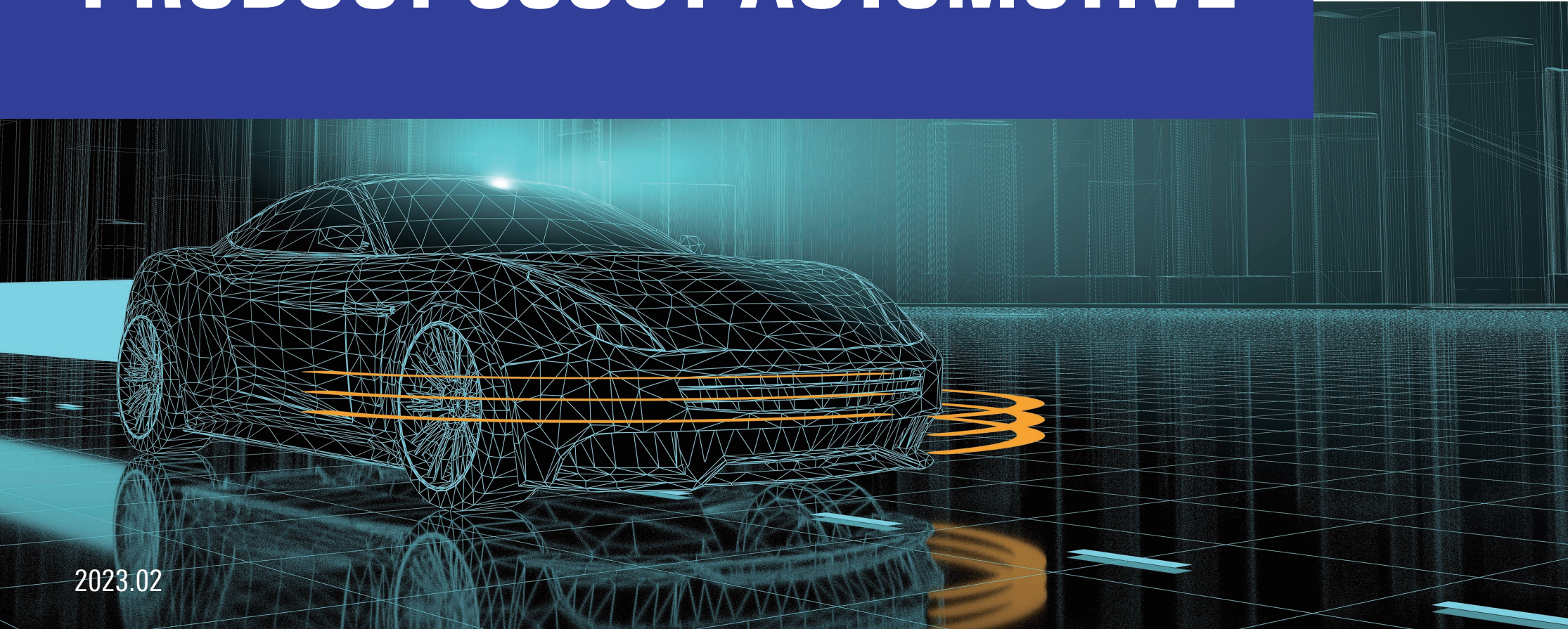


PRODUCT SCOUT AUTOMOTIVE



IAR Embedded Workbench (RL78 & RH850)

- Integrated development environment for C/C++
- Package includes project manager, editor, compiler, assembler, linker, simulator and C-Spy 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.iar.com



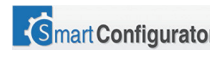
Green Hills Multi (RH850)

- 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



AP4, Applilet3, SmartConfigurator (RL78 & RH850)

- Peripheral driver code generator for RL78 & RH850 devices
- Based on graphical user interface settings the peripheral driver initialization and API function code will be generated
- Available for free at <http://www.renesas.com/ap4>
- SmartConfigurator: <https://www.renesas.com/software-tool/smart-configurator>



Wind River Diab Compiler (RH850)

- Integrated development environment for 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
- For more information visit www.windriver.com



Renesas CS+ (RL78 & RH850)

- Integrated development environment for C Package includes project manager, editor, compiler, assembler, linker simulator and debugger
- Supports ELF/DWARF debugging format
- Different License Options: locked to PC, dongled, floating
- Different License Types: permanent
- For more information visit www.renesas.com/cs+



Renesas e2studio (RL78 & RH850)

- Integrated development environment based on Eclipse platform
- Support IAR compiler, GHS RH850 compiler and Renesas CC-RL compiler
- Supports ELF/DWARF debugging format
- For more information visit www.renesas.com/e2studio



Renesas Graphic Library (RGL)

- For RH850/D1x
- Driver stack for all graphic related macros
- Simple interface for graphics programming
- Production quality code
- Easy to integrate into no-OS and RTOS environment
- Example programs for the best possible out of the box experience
- Contact your Renesas Sales representative for more information



Autosar MCAL

- Standard Peripheral Abstraction Layer (SPAL) drivers,
- Communication drivers and test drivers
- AUTOSAR ARX based MCAL for RH850
- Worldwide support infrastructure with interface for 1st and 2nd level support in Europe
- Cooperation with various BSW/O vendors and integrators
- Flexible mass-production licenses
- Free-of-charge development licenses for limited prototypes



Renesas is working closely with multiple partners in order to extend the software offer and support customer requirements. A complete list of SW solutions, and its contact can be found under: <https://www.renesas.com/eu/en/products/microcontrollers-microprocessors/rh850-automotive-mcus/software-tools>

E2 On-Chip Debugging Emulator (RL78 & RH850)

- On-Chip Debugging Emulator for all RL78 and RH850 devices
- Supports fast in-circuit flash programming (Download speed 2 times faster than E1)
- Supports various Target Interfaces
 - » LPD (Low Pin Debug) for RH850
 - » Single-pin for RL78
 - » Supports power supply to target
 - 3.3V ... 5V (max. 200mA)
 - » Supports hot plug-in function (including connector)
- Package includes USB interface cable and 14-pin target cable
- Order code: RTE0T00020KCE00000R



E2 Lite On-Chip Debugging Emulator

- E2 Lite On-Chip Debugging Emulator (RL78 only)
- On-Chip Debugging Emulator for all RL78 devices
- Supports single-pin target interface for RL78
- Support 3.3V (max. 200mA) power supply to target
- Package includes USB interface cable and 14-pin target cable
- Order code: RTE0T00020KCE00000R



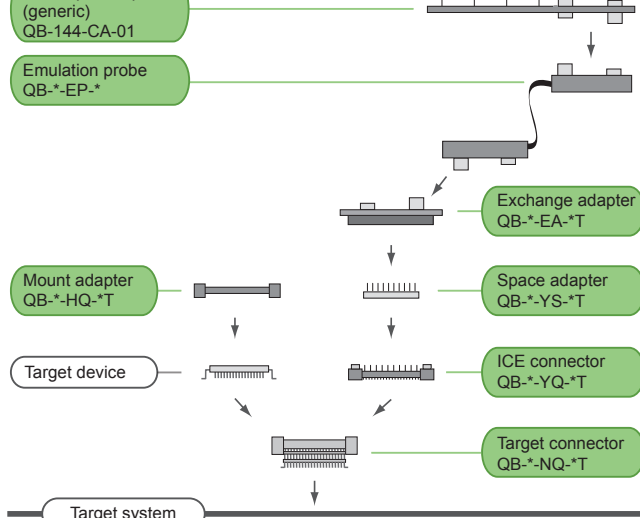
IECUBE In-Circuit Emulator (RL78)

- For RL78 devices
- Package includes
 - » IAR Embedded Workbench (size limited)
 - » USB cable, power supply
- Order codes:
 - Y-OB-RL78F12-ZZZ-EE (RL78/F12)
 - Y-OB-RL78F14-ZZZ-EE (RL78/F13 & RL78/F14)
 - Y-OB-RL78F15-ZZZ-EE (RL78/F15)
 - Y-OB-RL78D1A-ZZZ-EE (RL78/D1A)
 - Y-OB-RL78D1A2-ZZZ-EE (RL78/D1A, 512 KB version)



Please visit <https://www.renesas.com/eu/en/software-tool/iecube-r178-family> for socket references and additional tool information.

Socket System (RL78)



IE850 In-Circuit Emulator (RH850)

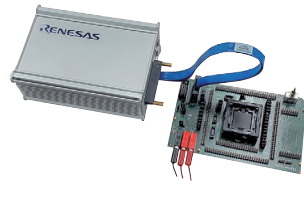
- For RH850/D1x devices
- Universal main unit, device dependent emulation probe
- Package includes
 - » USB cable, power supply
- Order codes:
 - Y-OB-V850E2-EE (main unit)
 - RTE7701460EPA00000R (Emulation Probe for RH850/D1M2H, RH850/D1M2, RH850/D1M1A, RH850/D1M1-V2, RH850/D1L2H, RH850/D1L2, RH850/D1L1 and RH850/D1S1)



Please visit <https://www.renesas.com/eu/en/software-tool/ie850> for socket references and additional tool information.

IE850A Emulator featuring AURORA Trace (RH850/E2M and RH850/U2A16)

- For RH850/E2M and RH850/U2A16 devices
- The IE850A emulator features 9 GB of memory for storing histories of program execution, enabling the saving and checking of histories of program execution over longer periods, and is equipped with a rich variety of debugging functions, such as events, tracing, and time measurement.
- Order codes:
 - Y-RTE0T0850AKCT00000J-EU (IE850A Emulator main unit)
 - Y-RH850-E2X-40NM-EMU-ADAPTER-REV2 (Emulation Adapter for RH850/E2M)
 - RTE7702200EAB00000J (Emulation Adapter for RH850/U2A16)



Please visit <http://www.renesas.com/eu/en/products/software-tools/tools/emulator/ie850a.html> for additional tool information.

iSYSTEM

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



PLS

- Universal Debug Engine for debugging, trace and testing:
 - » UAD2pro, UADnext, UAD3+ support for RH850
 - » Support for common compiler platforms
 - » Software API for 3rd party tools and test automation
- For more information visit www.pls-mc.com



Flash Programmer PG-FP6

- Supports RL78 and RH850 flash microcontrollers
- For development, prototyping and mass production
- Windows™ and terminal interface
- Host-controlled and stand-alone operation
- 256 MB internal memory for up to 8 program codes incl. setup data
- USB2.0 and RS-232 interface
- Order code: RTE0T0001FWREA0000R



Renesas Flash Programming Software (RFP) for Microsoft Windows™

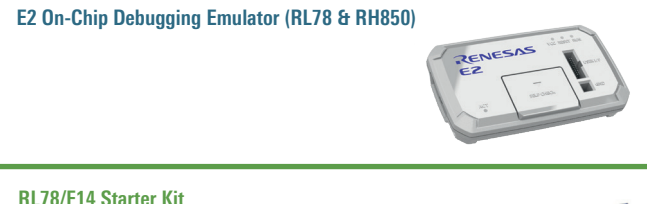
- Supports RL78 and RH850 flash microcontrollers
- For development and prototyping
- Works with
 - » E2 On-Chip Debugging emulator and E2 Lite On-Chip Debugging emulator and direct RS-232/UART connection
 - » Graphical user interface
 - » Ability to save programming settings in workspace files
 - » Support for automated programming using scripts
- Available for free at <http://www.renesas.com/rfp>



E2 Lite On-Chip Debugging Emulator (RL78 only)



E2 On-Chip Debugging Emulator (RL78 & RH850)



RL78/F12 Starter Kit

- Equipped with
 - » 48-pin RL78/F12 device (RSF109GE)
 - » LIN interface
 - » One switch, two LEDs
 - » Breadboard area (2.54 mm pin pitch)
 - » 20 MHz main clock resonator
 - » 14-pin debugging and programming interface
- Package includes
 - » E2 Lite On-Chip Debugging Emulator
 - » RL78/F12 target board
 - » Evaluation versions of the tools and sample software can be downloaded from website www.renesas.com/Y-ASK-RL78F12-V2
- Order code: Y-ASK-RL78F12-V2



RL78/F13 Starter Kit

- Equipped with
 - » 80-pin device (RSF108MG)
 - » CAN & LIN interface
 - » One switch, two LEDs
 - » Breadboard area (2.54 mm pin pitch)
 - » 4 MHz main clock resonator
 - » 14-pin debugging and programming interface
- Package includes
 - » E2 Lite On-Chip Debugging Emulator
 - » RL78/F13 target board
 - » Evaluation versions of the tools and sample software can be downloaded from website www.renesas.com/Y-ASK-RL78F13-V2
- Order code: Y-ASK-RL78F13-V2



RL78/F14 Starter Kit

- Equipped with
 - » 100-pin device (RSF10PPJ)
 - » CAN & LIN interface
 - » One switch, two LEDs
 - » Breadboard area (2.54 mm pin pitch)
 - » 4 MHz main clock resonator
 - » 14-pin debugging and programming interface
- Package includes
 - » E2 Lite On-Chip Debugging Emulator
 - » RL78/F14 target board
 - » Evaluation versions of the tools and sample software can be downloaded from website www.renesas.com/Y-ASK-RL78F14-V2
- Order code: Y-ASK-RL78F14-V2



RL78/F15 Starter Kit

- Equipped with
 - » 144-pin RL78/F15 (RSF113TL) device
 - » 14-pin debug and flash programming interface
 - » CAN + LIN interface
 - » 4 MHz main clock resonator
 - » One switch, two LEDs
 - » Universal breadboard area (2.54 mm pitch)
- Package includes
 - » E2 Lite On-Chip Debugging Emulator
 - » RL78/F15 target board
 - » Evaluation versions of the tools and sample software can be downloaded from website www.renesas.com/Y-ASK-RL78F15-V2
- Order code: Y-ASK-RL78F15-V2



RH850/F1KM-S1 Starter Kit

- Equipped with
 - » 100-pin RH850/F1KM-S1 device (R7F701684)
 - » 2 CAN-FD, LIN, UART/RS232 interface
 - » rotary switch with LEDs and push button
 - » potentiometer for analogue measurements
 - » pin headers for direct access to all microcontroller I/O pins
 - » 14-pin debugging and programming interface
- Package includes
 - » GHS MULTI evaluation license (90 days)
 - » IAR EWRH850 Kickstart license (128KB or 30 days)
 - » Renesas CS+ evaluation license (60 days)
 - » E1 On-Chip debugging Emulator
- Order code: Y-ASK-RH850F1KM-S1-V3



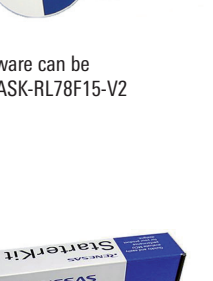
RH850/F1K Starter Kit

- Equipped with
 - » 176-pin RH850/F1K PREMIUM device (R7F701587)
 - » 2 CAN-FD, LIN, UART/RS232 interface
 - » rotary switch with LEDs and push button
 - » potentiometer for analogue measurements
 - » pin headers for direct access to all microcontroller I/O pins
 - » 14-pin debugging and programming interface
- Package includes
 - » GHS MULTI evaluation license (90 days)
 - » IAR EWRH850 Kickstart license (128KB or 30 days)
 - » Renesas CS+ evaluation license (60 days)
 - » E1 On-Chip debugging Emulator
- Order code: Y-ASK-RH850F1K-V3



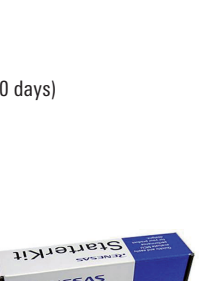
RH850/F1KM-S4 Starter Kit

- Equipped with
 - » 176-pin RH850/F1KM-S4 device (R7F701649)
 - » Ethernet, FlexRay, 2 CAN-FD, LIN, UART/RS232 interface
 - » rotary switch with LEDs and push button
 - » potentiometer for analogue measurements
 - » pin headers for direct access to all microcontroller I/O pins
 - » 14-pin debugging and programming interface
- Package includes
 - » GHS MULTI evaluation license (90 days)
 - » IAR EWRH850 Kickstart license (128KB or 30 days)
 - » Renesas CS+ evaluation license (60 days)
 - » E1 On-Chip debugging Emulator
- Order code: Y-ASK-RH850F1KM-S4-V3



RH850/F1KH-D8 Starter Kit

- Equipped with
 - » 176-pin RH850/F1KH-D8 device (R7F701609)
 - » Ethernet, FlexRay, 2 CAN-FD, LIN, UART/RS232 interface
 - » rotary switch with LEDs and push button
 - » potentiometer for analogue measurements
 - » pin headers for direct access to all microcontroller I/O pins
 - » 14-pin debugging and programming interface
- Package includes
 - » GHS MULTI evaluation license (90 days)
 - » IAR EWRH850 Kickstart license (128KB or 30 days)
 - » Renesas CS+ evaluation license (60 days)
 - » E1 On-Chip debugging Emulator
- Order code: Y-ASK-RH850F1KH-D8-V3



RH850/F1KM-S1 BLDC Starter Kit

- Equipped with
 - » 100-pin RH850/F1KM-S1 device (R7F701684)
 - » 2 CAN-FD, LIN, UART/RS232 interface
 - » rotary switch with LEDs and push button
 - » potentiometer for analogue measurements
 - » pin headers for direct access to all microcontroller I/O pins
 - » 14-pin debugging and programming interface
- Package includes
 - » GHS MULTI evaluation license (90 days)
 - » IAR EWRH850 Kickstart license (128KB or 30 days)
 - » Renesas CS+ evaluation license (60 days)
 - » E1 On-Chip debugging Emulator
 - » IPS Sensor
- Order code: Y-BLDC-RH850F1KM-S1-V2



RH850/C1M-A2 Starter Kit

- Equipped with
 - » RH850/C1M-A2 device
 - » 2 CAN-FD, 1 LIN/SENT, 1 USB/UART interface
 - » rotary switch with LEDs and push button
- Motor Control Features
 - » Access to R/D (resolver-to-digital converter)
 - » Output for motor control signals
 - » Inputs for resolver signals for motor control
- Package includes
 - » GHS MULTI evaluation license (90 days)
 - » IAR EWRH850 Kickstart license (128KB or 30 days)
 - » Renesas CS+ evaluation license (60 days)
 - » E1 On-Chip debugging Emulator
 - » sample code software
- Order Code: Y-ASK-RH850C1M-A2



RL78/F1x Target Boards

- For RL78/F1x evaluation
- Equipped with
 - » RL78/F12, RL78/F13, RL78/F14 or RL78/F15
 - » 14-pin debugging and programming interface
 - » CAN & LIN interface
 - » 4 or 20 MHz main clock resonator
 - » switch, 2 LEDs
 - » Breadboard area (2.54 mm pitch)
 - » Board dimensions: approx. 110 mm x 55 mm
- Order codes:
 - QB-RSF109GE-TB (RL78/F12)
 - QB-RSF108MG-TB (RL78/F13)
 - QB-RSF10PPJ-TB (RL78/F14)
 - Y-OB-RSF113TL-TB-V2 (RL78/F15)



RH850 Evaluation Platform - F1Kx Adapter Boards

- For RH850/F1K and F1Kx evaluation
- To be used in combination with the RH850 Evaluation Platform main boards or stand-alone operation
- Equipped with
 - » Burn-in socket to adapt RH850/F1Kx devices
 - » pin headers for direct access to all microcontroller I/O pins
 - » 8 Signal LEDs
 - » Reset circuit, Oscillator circuit
 - » 14-pin debug and flash programming connector
- Board dimensions: 160 mm x 100 mm
- Package includes CD with user's manual and schematic
- Order codes:
 - Y-RH850-F1X-048PIN-PB-T1-V1 (RH850/F1KM-S1, 48 pin)
 - Y-RH850-F1X-064PIN-PB-T1-V1 (RH850/F1KM-S1, 64 pin)
 - Y-RH850-F1X-080PIN-PB-T1-V1 (RH850/F1KM-S1, 80 pin)
 - Y-RH850-F1X-100PIN-PB-T1-V3 (RH850/F1K, F1KM-S1/S4, 100-pin)
 - Y-RH850-F1X-144PIN-PB-T1-V3 (RH850/F1K, F1KM-S4, 144-pin)
 - Y-RH850-F1X-176PIN-PB-T1-V4 (RH850/F1K, F1KM-S4, F1KH-D8 176-pin)
 - Y-RH850-F1X-233PIN-PB-T2-V1 (RH850/F1KM-S4, F1KH-D8, 233-pin)
 - Y-RH850-F1X-324PIN-PB-T1-V1 (RH850/F1KH-D8, 324-pin)



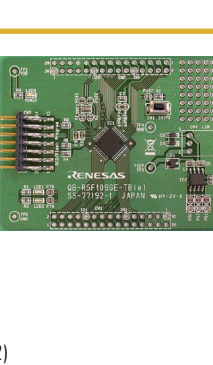
RH850 Evaluation Platform - P1M-E, P1x-C Adapter Boards

- For RH850/P1M-E, P1x-C evaluation
- To be used in combination with the RH850 Evaluation Platform main boards or stand-alone operation
- Equipped with
 - » Burn-in socket to adapt RH850/P1M-E, P1x-C devices
 - » pin headers for direct access to all microcontroller I/O pins
 - » 8 Signal LEDs
 - » Reset circuit, Oscillator circuit
 - » 14-pin debug and flash programming connector
- Board dimensions: 160 mm x 100 mm
- Package includes CD with user's manual and schematic
- Order codes:
 - Y-RH850-P1X-100PIN-PB-T1-V2 (RH850/P1M-E, 100-pin, 0.5 mm p. p.)
 - Y-RH850-P1X-144PIN-PB-T1-V2 (RH850/P1M-E, 144-pin, 0.4 mm p. p.)
 - Y-RH850-P1XC-080PIN-PB-T1-V1 (RH850/P1x-C, 80-pin, 0.4 mm p. p.)
 - Y-RH850-P1XC-100PIN-PB-T1-V1 (RH850/P1x-C, 100-pin, 0.4 mm p. p.)
 - Y-RH850-P1XC-144PIN-PB-T1-V1 (RH850/P1x-C, 144-pin, 0.4 mm p. p.)
 - Y-RH850-P1XC-156PIN-PB-T1-V2 (RH850/P1x-C, 156-pin)
 - Y-RH850-P1XC-292PIN-PB-T1-V2 (RH850/P1x-C, 292-pin)
 - Y-RH850-P1XC-404PIN-PB-T1-V2 (RH850/P1x-C Emulation Device supporting AURORA Trace)



RH850 Evaluation Platform - E2M Adapter Boards

- For RH850/E2M evaluation
- To be used in combination with the RH850 Evaluation Platform or stand-alone operation
- Equipped with
 - » Burn-in socket to adapt RH850/E2M devices
 - » pin headers for direct access to all microcontroller I/O pins
 - » 8 Signal LEDs
 - » Reset circuit, Oscillator circuit
 - » 14-pin debug and flash programming connector
- Board dimensions: 160 mm x 100 mm
- Package includes CD with user's manual and schematic
- Order codes:
 - Y-RH850-E2X-292PIN-PB-T1-V2 (RH850/E2x, 292-pin)
 - Y-RH850-E2X-373PIN-PB-T1-V3 (RH850/E2x, 373-pin)
 - Y-RH850-E2X-468PIN-PB-T1-V1 (RH850/E2x, 468-pin)



RH850 Evaluation Platform -

SYSTEM ON CHIP

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 Gen3e	R-Car H3e	R8A779M0	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 H3e-2G	R8A779M1	4x Cortex A57 4x Cortex A53 Cortex R7	✓	2000 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 H3Ne	R8A779M8	4x Cortex A57 4x Cortex A53 Cortex R7	✓	1500 1200 800	PowerVR - GX6650 D/AVE-HD	600	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 H3e-2G	R8A779M1	4x Cortex A57 4x Cortex A53 Cortex R7	✓	2000 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 M3e	R8A779M2	2x Cortex A57 4x Cortex A53 Cortex R7	✓	1800 1300 800	PowerVR - GX6250 D/AVE-HD	700	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 M3e-2G	R8A779M3	4x Cortex A57 4x Cortex A53 Cortex R7	✓	2000 1300 800	PowerVR - GX6250 D/AVE-HD	700	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 M3Ne	R8A779M4	2x Cortex A57 Cortex R7	✓	1800 800	PowerVR - GE7800 D/AVE-HD	700	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 M3Ne-2G	R8A779M5	2x Cortex A57 Cortex R7	✓	2000 800	PowerVR - GE7800 D/AVE-HD	700	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 E3e	R8A779M6	2x Cortex A53 Cortex R7	✓	1200 800	PowerVR - GE8300 D/AVE-HD	600	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 D3e	R8A779M7	1x Cortex A53	✓	1000	PowerVR - GE8300 D/AVE-HD	600	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/Group	Part number	CPU system	Clock Speed [MHz]	SRAM [MB]	Memory I/F	High Speed Interface	CAN FD	Ethernet 100 Mbit/2.5 Gbit	FlexRay	LIN	UART	I ² C	ASIL level	Package	Other features
R-Car Gen4	R-Car S4-8	R8A779F4	8x Cortex A55 1x Cortex R52 2x RH850 G4MH	1200 1000 400	8	LPDDR4x-3200 (ECC corrected) 32bit (=> 12.8 GB/s) 2x OSPI 1x Hyperflash Serial NOR Flash I/F (OCTAL FLASH) eMMC 5.01	2x PCIe V4.0 (2 lanes)	16	1 AVB/3x Gbit TSN + swit	1	16	4	7	D	FCBGA 780 0.8mm pitch	HSM, crypto core Communication IP H/W acceleration Enhanced power management features LV PMIC RAA271005 HV PMIC RAA271041 Timing IC RC21212 JTAG debug I/F
	R-Car S4N-8	R8A779F5	8x Cortex A55 1x Cortex R52 2x RH850 G4MH	1200 1000 400	8	LPDDR4x-3200 (ECC corrected) 32bit (=> 12.8 GB/s) 2x OSPI 1x Hyperflash Serial NOR Flash I/F (OCTAL FLASH) eMMC 5.01	2x PCIe V4.0 (2 lanes)	16	1 AVB/3x Gbit TSN + swit	-	16	4	5	D	FCBGA 780 0.65mm pitch	HSM, crypto core Communication IP H/W acceleration Enhanced power management features LV PMIC RAA271006 HV PMIC RAA271041 Timing IC RC21212 JTAG debug I/F
	R-Car S4-4	R8A779F6	4x Cortex A55 1x Cortex R52 2x RH850 G4MH	1200 1000 400	8	LPDDR4x-3200 (ECC corrected) 32bit (=> 12.8 GB/s) 2x OSPI 1x Hyperflash Serial NOR Flash I/F (OCTAL FLASH) eMMC 5.01	2x PCIe V4.0 (2 lanes)	16	1 AVB/3x Gbit TSN + swit	-	16	4	5	D	FCBGA 780 0.8mm pitch	HSM, crypto core Communication IP H/W acceleration Enhanced power management features LV PMIC RAA271005 HV PMIC RAA271041 Timing IC RC21212 JTAG debug I/F
	R-Car S4N-4	R8A779F7	4x Cortex A55 1x Cortex R52 2x RH850 G4MH	1200 1000 400	8	LPDDR4x-3200 (ECC corrected) 32bit (=> 12.8 GB/s) 2x OSPI 1x Hyperflash Serial NOR Flash I/F (OCTAL FLASH) eMMC 5.01	2x PCIe V4.0 (2 lanes)	16	1 AVB/3x Gbit TSN + swit	-	16	4	5	D	FCBGA 780 0.65mm pitch	HSM, crypto core Communication IP H/W acceleration Enhanced power management features LV PMIC RAA271006 HV PMIC RAA271041 Timing IC RC21212 JTAG debug I/F

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 OSPI	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 I ² C 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 OSPI 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 I ² C Security JTAG

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 V4x	R-Car V4H	R8A77960LA01BA	3x CR52 Lockstep 1.4GHz/9k DMIPS	4x CA76 1.8GHz / 49 kDMIPS	AXM-8256 600MHz 150 GFLOPS	4x Computer Vision Engine	34 TOPS	2x ISP, 5x IMR, 1x SMD, 1x DOF, 4x DSP	H.264 Enc./ H.264 Codec	No	64-bit LPDDR5-6400 LPDDR4-4266	2x OSPI 1x eMMC	2x MIPI-CSI2	2x DU 2x MIPI CSI2/ DSI-output	2x PCIe 4.0	8x CAN 2.0/FD, FlexRay	3xGbit AVB, 1xGbit TSN	Up to ASIL-D	FCBGA 1135 pins 0.65mm pitch 25x25mm	4x UART 6x SPI 7x I ² C I2S Security JTAG
	R-Car V4M	R8A779HLL31BA	3x CR52 Lockstep 1.4GHz/9k DMIPS	4x CA76 1 GHz / 27 kDMIPS	BXS-4-64 1GHz 50 GFLOPS	4x Computer Vision Engine	17 TOPS	1x ISP, 5x IMR, 1x SMD, 1x DOF, 2x DSP	H.264 Enc.	No	32-bit LPDDR5-6400 LPDDR4x-4266	2x OSPI 1x eMMC	2x MIPI-CSI2	1 x DU 1 x MIPI CSI2/ DSI-output	1x PCIe 4.0	4x CAN 2.0/FD, FlexRay	3xGbit AVB,	Up to ASIL-D	FCBGA 729 pins 0.65mm pitch 19x19mm	4x UART 6x SPI 4x I ² C I2S Security JTAG

Other features:	CvE DOF	Computer Vision Engine Dense Optical Flow	DU IMR	Display Unit Image Rectifier	ISP SMD	Image Signal Processor Simple Instruction Multiple Data	STV WDT	Stereo Vision Window Watchdog Timer
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R-Car e² Studio


- e² Studio is a complete, state of the art development environment supporting Renesas R-Car V series based on an Open Source Eclipse CDT
- Complete environment available to download, included in the R-Car SDK package.
- Supports R-Car V3x, R-Car V4H and the corresponding Evaluation boards and starter kits running embedded linux.
- Includes:
 - » HSSTP high speed Trace for ARM cores
 - » ADAS plug-ins: "Debug Trace Agent" for computer vision hardware accelerators, Bus Traffic Monitoring, image Viewer, Pin configurator.
 - » Support the Computer Vision simulators
- For more information refer to: <https://www.renesas.com/software-tool/e-studio-r-car>

R-Car CNN toolchain

- Network conversion from Caffe or ONNX model to binary for efficient execution on R-Car Gen3 CNN architecture
- Easy to use through single line command & GUI support
- Support for various R-Car V3x architectures through single click option
- Manual & automatic execution optimisation features to maximise efficiency
- Support for programmable layers on Renesas Cve architecture for flexibility
- Seamless integration with ONNX Runtime on ARM CPUs for wide ONNX networks execution
- Built-in 16-bit & 8-bit quantization capabilities
- Support for SIL & HIL
- Windows & Linux support
- Integrated within R-Car SDK

R-Car SDK

R-Car Software Development Kit: Easy to start, easy to access, easy to use, easy to develop. It includes:

- » Development tools, Simulation platform
- » Target libraries
- » Sample code and Documentation

- Multiple variants of the R-Car SDK are available:
- R-Car SDK Linux reference package:
 - » Available under ELA on [renesas.com](https://www.renesas.com) for R-Car V3x and S4, V4H
 - R-Car SDK certified:
 - » ASIL Target Libraries are compiled with certified compiler.
 - » OS dependent package. Please contact Renesas for more information.

Autosar MCAL


- Standard Peripheral Abstraction Layer (SPAL) drivers, communication drivers and test drivers
- For AUTOSAR AR4.X based MCAL for Cortex R
- 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

Security Software

Renesas provides a variety of software for implementing strong security functions, such as:

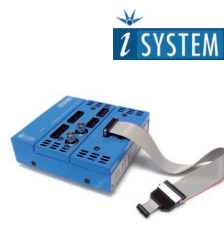
- secure boot functions that prevent modifications to programs;
- security level management functions that correspond to the product lifetime; and trusted execution environments.
- enables OTA updating, which allows application and OS upgrades without the driver having to return to the car dealer.
- Renesas plans to sequentially roll out a variety of security software packages to respond to system structures and needs, and to support the hypervisor.

CR7 SDK

R-Car CR7 Software Development Kit: reference solution for Easy To Start on CR7. It includes:

- FreeRTOS CR7 SW:
 - » BSP
 - » 2D Gfx libraries
 - » Video decoders
 - Virto based inter-processor communication driver (Linux on CA5x).
- Please contact Renesas for more information.

Renesas is working closely with multiple partners in order to extend the software offer and support customer requirements. From OS vendors to system integration. For more information refer to the Renesas consortium WebPage: [R-Car Consortium Partners | Renesas](#)

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 H3e-2G)


- 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-H3E-8GB-WS30 / RTP8J779M1ASKB0SK0SA003 Y-SICA20I2P (JTAG Debug Adapter)

Kingfisher Expansion Board (R-Car H3/M3)

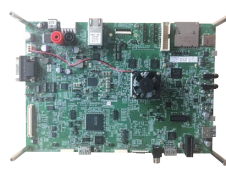

- For R-Car H3/M3 evaluation
- Expansion board to be used in combination with the R-Car H3/M3 starter kit board
- Equipped with
 - » Wireless & Automotive network connectivity [Wi-Fi, Bluetooth, 2x CAN-FD]
 - » 2ch display output (1x HDMI, 1x LVDS)
 - » SD Card, USB2.0/3.0, Mini PCIe
 - » 7.1 Audio output, 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 V3H2
 - » 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-WS21 (with Renesas PMIC)

R-Car E3 Development Board "EBISU"


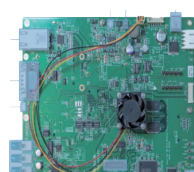
- For R-Car E3
- Equipped with:
 - » R-Car E3
 - » 64 MB NOR Flash Memory
 - » 2GB DDR3L-DRAM-1866
 - » 32GB eMMC
 - » USB 3.0/2.0, LAN
 - » 2ch display output (1x HDMI, 1-2x LVDS, 1x Analog RGB)
 - » HDMI and CVBS video input
 - » Audio Output and Microphone Input
 - » JTAG debug/trace connector
- Board dimensions: 230mm x 160mm
- Package includes CD with user's manual, schematic and boot software
- Order code: Y-R-CAR-E3-BOARD-DEV-WS11 / RTP0RC77990SEB002SA00

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"

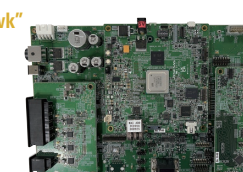

- For R-Car H3, M3 and M3N
- Equipped with:
 - » R-Car H3/M3/M3N SiP
 - » 64 MB NOR Flash Memory
 - » 8GB LPDDR4-DRAM-3200 [H3 and M3] or 2GB LPDDR4-DRAM-3200 [M3N]
 - » 32GB eMMC
 - » USB 3.0/2.0, SD, LAN, SATA, PCIe
 - » 3-4ch Display output (1-2x HDMI, 1x LVDS, 1x Analog RGB)
 - » JTAG debug/trace 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 / RTP0RC7796SIPB0012SS5A Y-R-CAR-H3-8GB-BOARD-SKT-WS30 / RTP0RC7795SIPB0012S-S03
- Y-R-CAR-M3NE-2GB-BRD-DEV-WS11 / RTP8J779M5ASKB0SLOSA103 (with soldered M3Ne-2G)
- Y-R-CAR-M3WE-8GB-BRD-DEV-WS30 / RTP8J779M3ASKB0SLOSA103 (with soldered M3e-2G)
- Y-R-CAR-H3E-8GB-BRD-DEV-WS30 / RTP8J779M1ASKB0SLOSA103 (with soldered H3e-2G)

R-Car V3M Development Board "EAGLE"


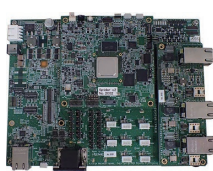
- Equipped with:
- NOR flash memory
 - » Two serial NOR flash memory devices for QSPI0
 - » Serial NOR flash memory device for QSPI1
 - SDRAM :
 - » LPDDR4-SDRAM for DBSC4
 - Display interfaces :
 - » HDMI output connector for LVDS
 - Video input interfaces :
 - » 4 camera input connectors for CSI2 channel 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 / RTP8A77970ASKB0E60SA001#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 / RTP0RC77980SEBS012SA01

R-Car V4H Development Board "White Hawk"


- Equipped with:
- NOR flash memory:
 - » Serial NOR flash memory (64 MB) device for QSPI0
 - » HYPERFLASH™ memory device (64 MB) for QSPI0 and QSPI1
 - SDRAM:
 - » LDDR5 – 6400, 8 GB, 64-bit, 1 module
 - Display interface:
 - » 2x eDP (mini display port connector) for DSI0 and DSI1
 - » 2x GMSL2 output (FAKRA) for DSI0 and DSI1
 - Video input interfaces:
 - » 2x GMSL2 input (Quad HFM FAKRA) for CSI0-1 via C-PHY
 - Storage interfaces: eMMC memory (32GB)
 - Network interfaces:
 - » OcuLink connector for PCIe0 and PCIe1 (4 lanes)
 - » Gigabit Ethernet (GbE) connector for Ether AVB0
 - » 3x Ethernet AVB + 1x Ethernet TSN ports (MATenet) for EtherAVBx and EtherTSN0
 - » 2 FlexRay connectors for FlexRay A and FlexRay B
 - » Peripheral interfaces: Debug serial connector for SCIF0/HSCIF0
 - Debugger interfaces: 20-pins JTAG connector for JTAGx
 - Peripheral connectors:
 - » EX-SPI connector for QSPI0
 - » 2 break-out board connected (EXIO connectors A and B)
 - » Ethernet sub-board connector
 - » CSI and DSI sub-board connector
 - » Mode switch-board connector
 - Power supply: 12.0-V DC inputs for mother board or 5V for CPU board only
 - Operating temperature: +25 degrees C at ambient
 - Package includes CD with User's Manual, Schematic and boot software
 - Order Code: Y-RCAR-V4H-WHITEHAWK-BRD-WS10 / RTP8A77960ASKB0FS0SA000

R-Car S4 Reference Board "Spider"


- Features
- Reduces the board size and BoM costs through MCU core integration into R-Car SoC, and use a single board to control both MCU domain and application SoC domain, which previously required separately.
 - The reference board consists of a CPU board with core SoC, power management IC (PMIC) and memory, and an interface board, enabling support for a variety of networks.
 - Supports 16 channels of CAN FD (can be used as 16 channels of LIN and 8 channels of SENT by multi-function), 2 channels of FlexRay, 2 channels of PCIe V4.0 x2 lanes, and 3 channels of 5G-USXGMII for Ethernet.
 - The core system is realized by installing the R-Car S4, LPDDR4x-3200 memory and HyperFlash™ memory on the CPU board, which contributes to shortening the time to market by simplifying the design.
 - The combination of pre-regulators and PMICs developed for R-Car S4 can provide various supply voltages to meet functional safety requirements up to ASIL D in accordance with ISO 26262.
 - Order Code: RTP8A779F0ASKB0SP2S



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