DEEP DIVE INTO EK-RA8D1 RENESAS ADVANCED MCU KIT

RENESAS ELECTRONICS CORPORATION
RENESAS ADVANCED (RA) MCU KITS

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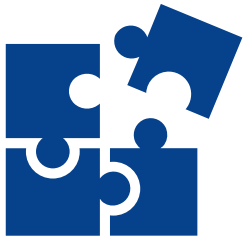
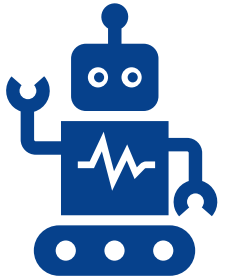
AGENDA





Vision & Objective of New RA Kits

Architecture Features & Benefits

Deep Dive Kit Features & User Experience

Getting Started Quickly

VISION OF RA KITS

Deliver an **unmatched innovation experience**
through scalable, flexible & ecosystem-ready Renesas Advanced MCU kits
that enable users to **bring their innovative products to market faster.**

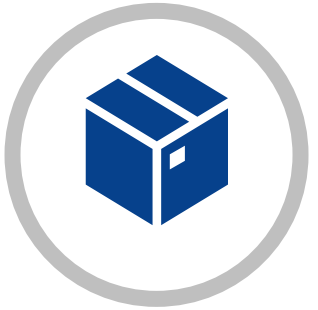
OBJECTIVE

To enable a large number of use cases so customers, engineers, developers, distributors, partners, etc. can do more


Proof-of-Concepts


Functional Evaluation


Getting Started Reference


Solutions & Demos

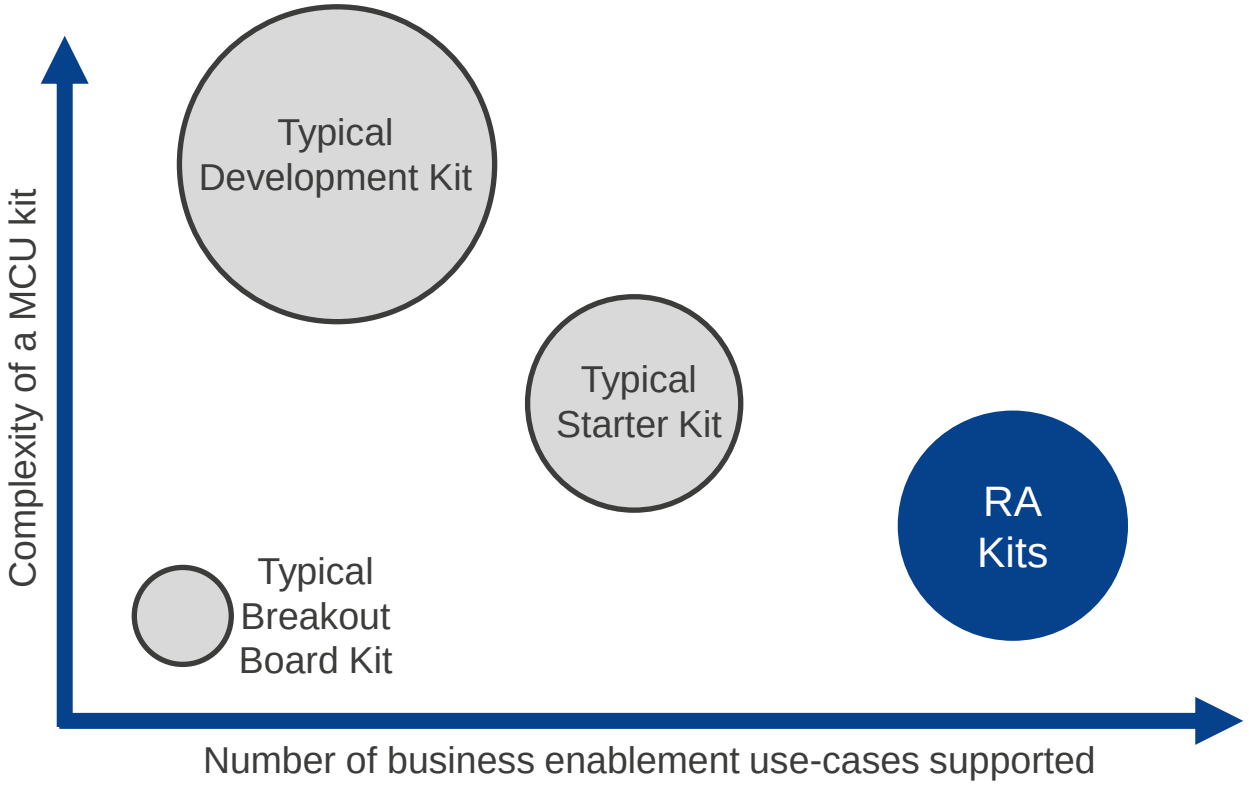

Trainings & Workshops


Maker Community

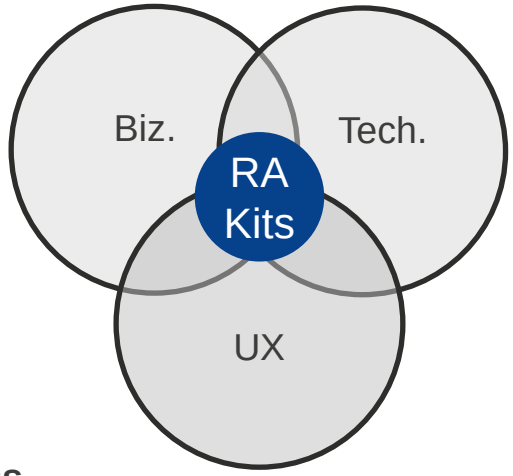

Research & Academia


Promotions & Lead Generation

STRATEGY



Size of the circle => Number of MCU features supported by the kit / All MCU features

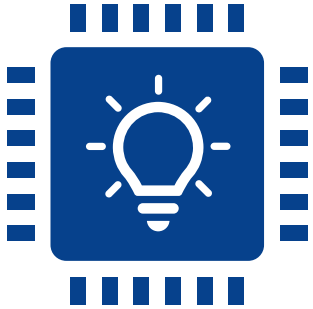


Business
- Serve global customer base
- Facilitate cross-selling
- Lower NRE & faster time to market

Technical
- Useful for innovation
- Support prioritized MCU peripherals
- Ecosystem ready

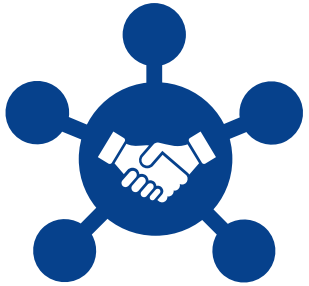
User Experience
- Delightful to use
- Beautifully designed & presented

DIFFERENTIATION THAT SETS YOU APART



Innovation Ready

A winning combination of standardization & flexibility



Ecosystem Ready

Enhance functionality on your terms

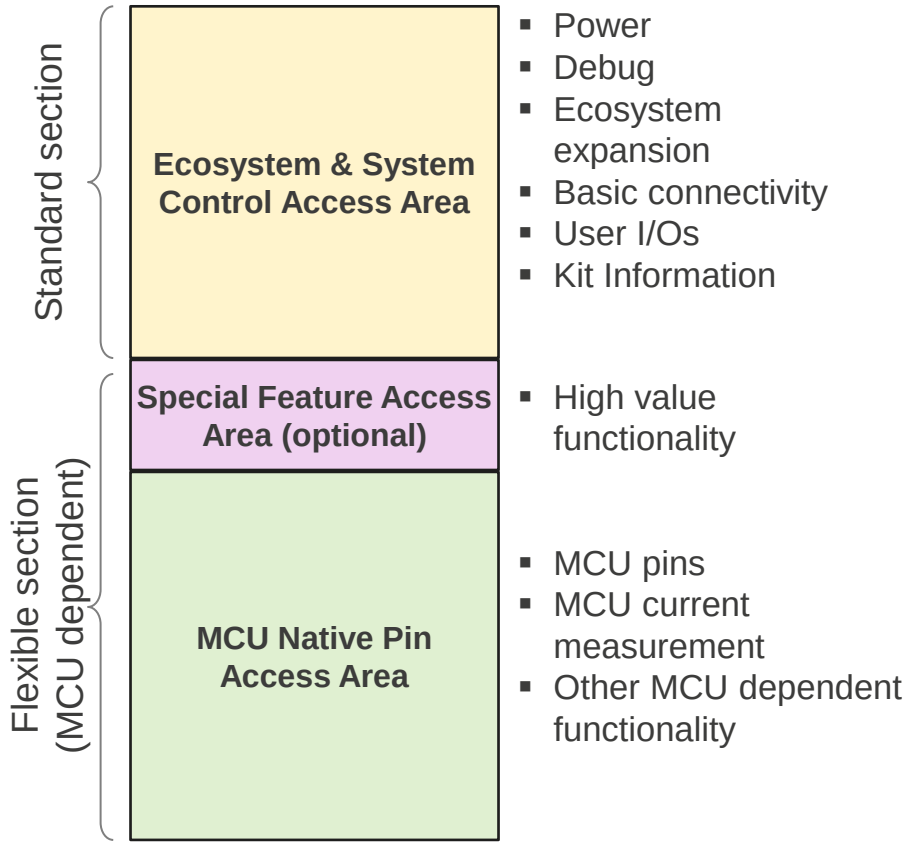
World Ready

Compliant with many international standards

Fun Ready

Take the guesswork out of your innovation experience

KIT ARCHITECTURE



- Power
- Debug
- Ecosystem expansion
- Basic connectivity
- User I/Os
- Kit Information

- High value functionality

- MCU pins
- MCU current measurement
- Other MCU dependent functionality

Key Features of Architecture

- Scalable design framework
- Feature access organization
- On-board access to most-popular ecosystems

Benefits of Architecture

- ✓ Applicable across RA MCUs – new kits
- ✓ Shorter learning curve for users
- ✓ Improved user experience
- ✓ Maximize hardware design reuse
- ✓ Lower NRE
- ✓ Faster time to market
- ✓ Brings more innovation to users
- ✓ Allows for vast functionality expansion
- ✓ Fuels partner engagement and ecosystem utilization

KIT ARCHITECTURE

Standard section

Ecosystem & System Control Access Area

- Power
- Debug
- Ecosystem expansion
- Basic connectivity
- User I/Os
- Kit Information

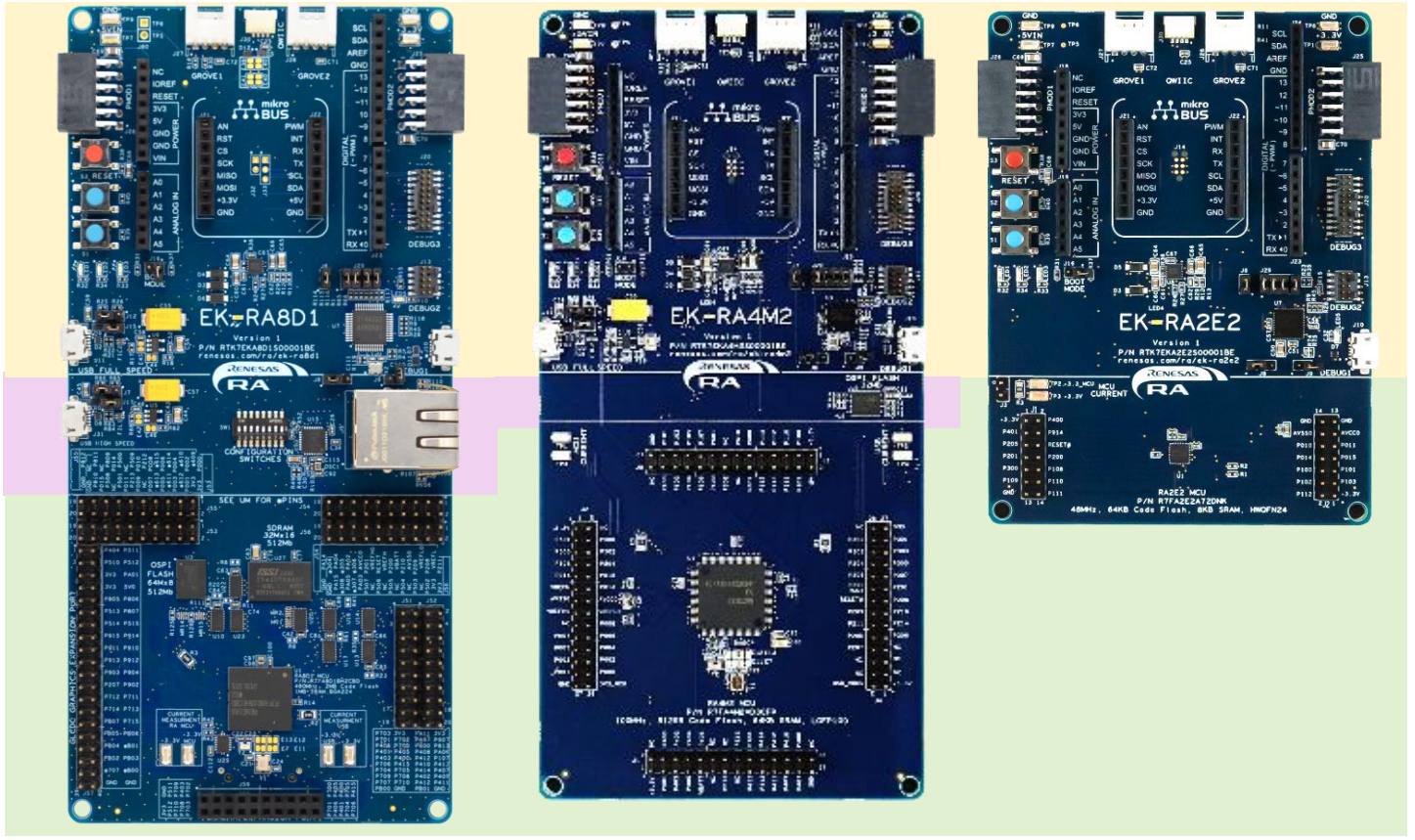
Flexible section (MCU dependent)

Special Feature Access Area (optional)

- High value functionality

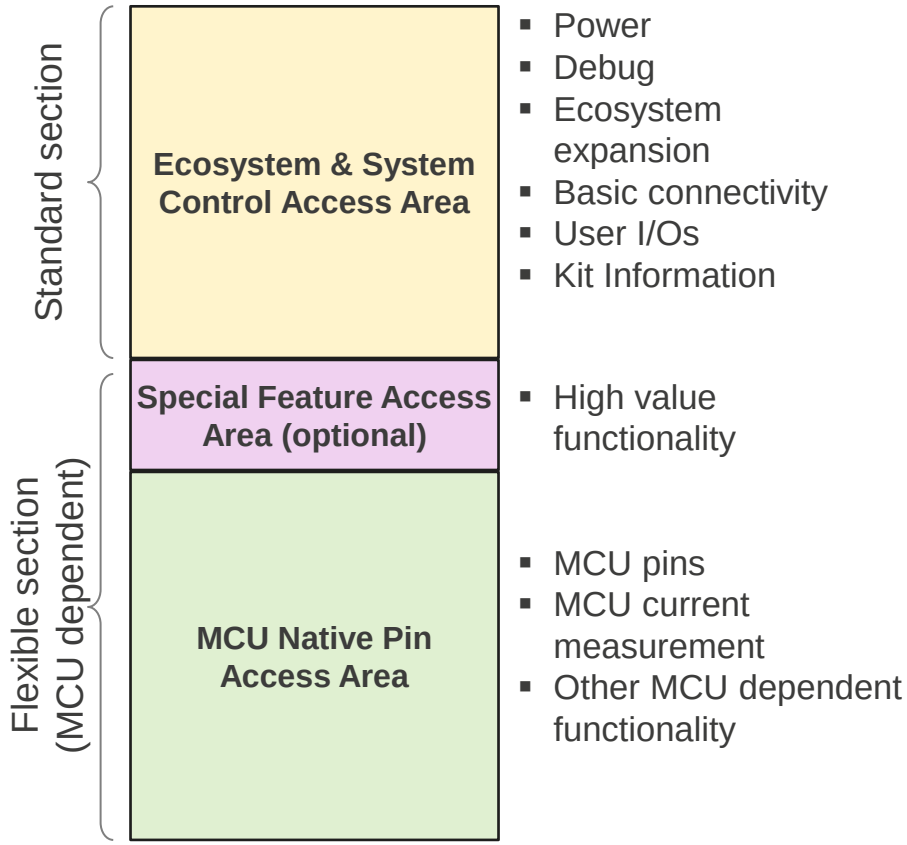
MCU Native Pin Access Area

- MCU pins
- MCU current measurement
- Other MCU dependent functionality



EK-RA8D1 Board | EK-RA4M2 Board | EK-RA2E2 Board

KIT ARCHITECTURE



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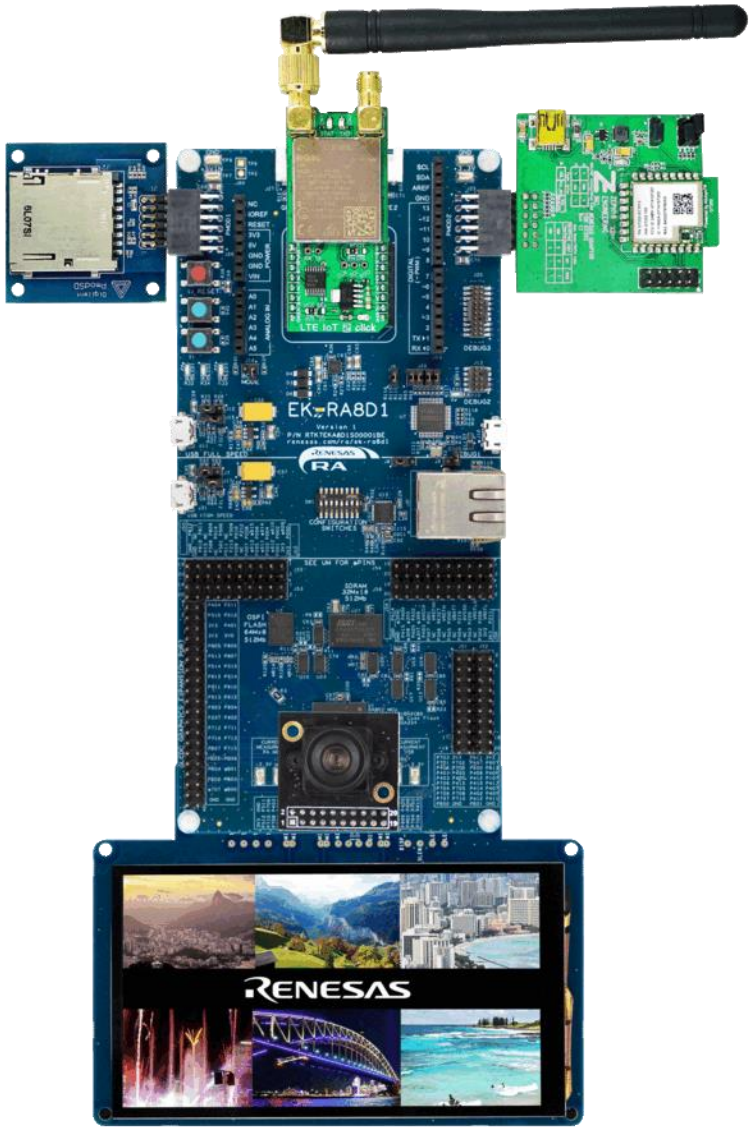


Connect RA kits with ecosystem add-ons to enhance the functionality to support variety of end-applications

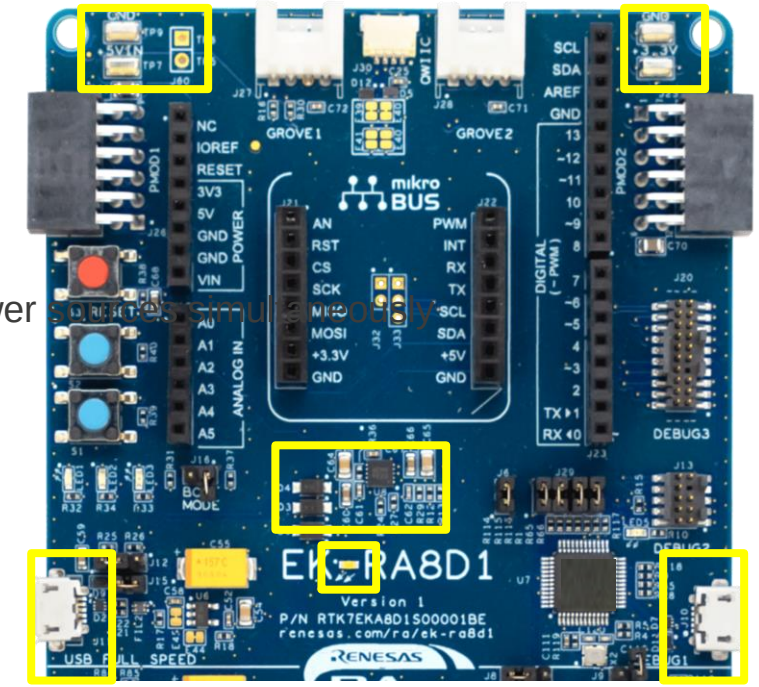
THE WORLD OF INNOVATION AWAITS YOU!

EK-RA8D1
Evaluation Kit for RA8D1 MCU Group

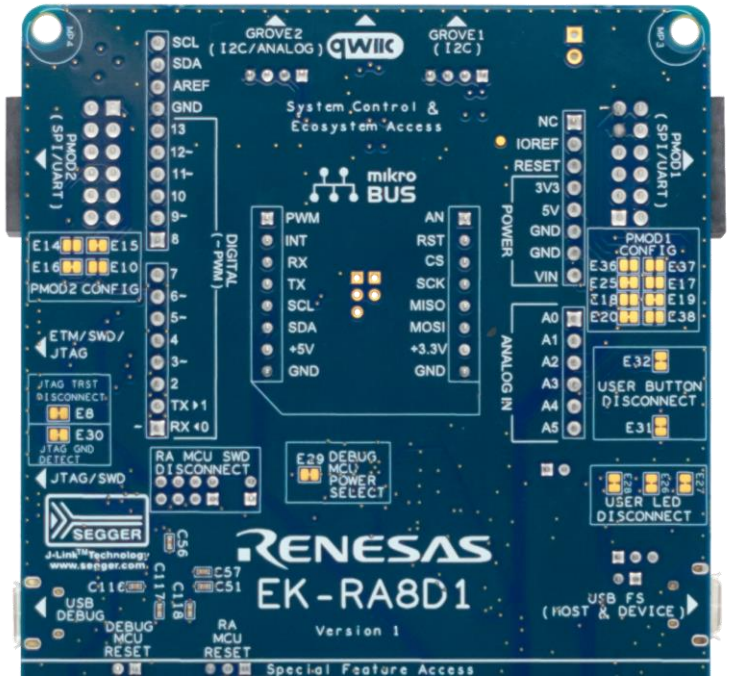
ECOSYSTEM & SYSTEM CONTROL ACCESS AREA

Power

- Multiple power inputs
  - USB debug
  - USB full speed
  - Clamping loops & through holes
- On-board LDO 5 V to 3.3 V, 2 A
- 3.3 V test clamping loop
- Power LED (white)
- Superimpose currents by connecting multiple power sources simultaneously



Front

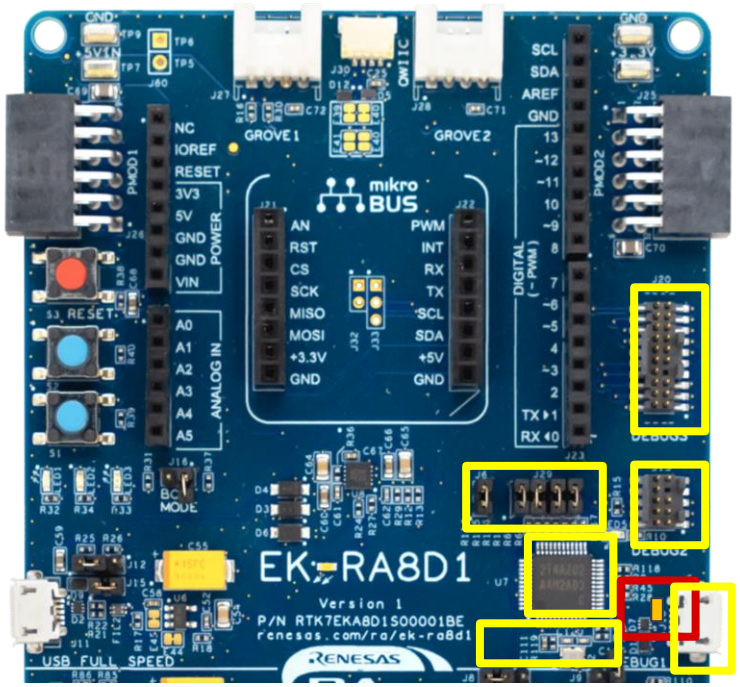


Back

ECOSYSTEM & SYSTEM CONTROL ACCESS AREA

Debug & Trace

- RA4M2 debug MCU
- Segger J-Link™ firmware
- Debug connectors
  - Micro USB (SWD)
  - 10-pin Cortex (SWD, JTAG)
  - 20-pin Cortex (SWD, JTAG, ETM)
- Debug status LED (orange)
  - Solid – debug drivers detected
  - Blinking - debug drivers not detected
- Debug modes selection jumpers



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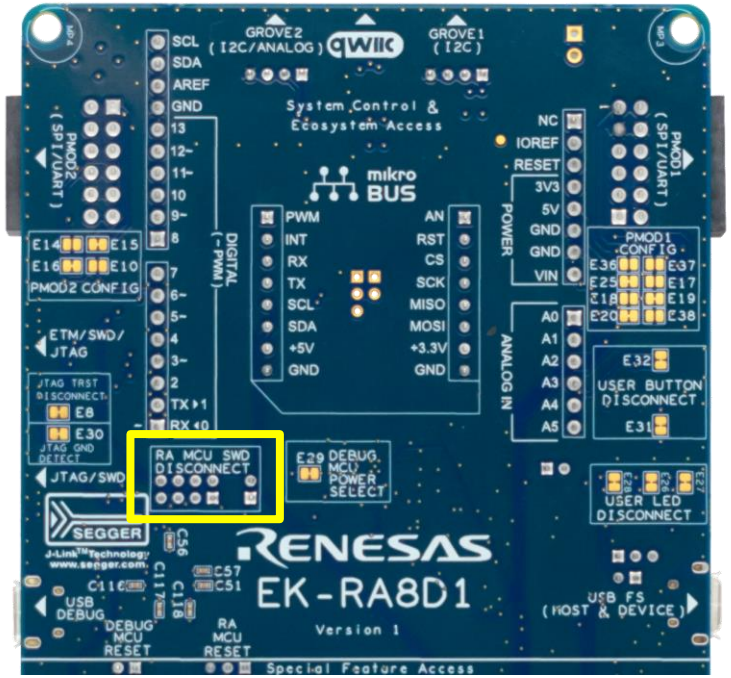

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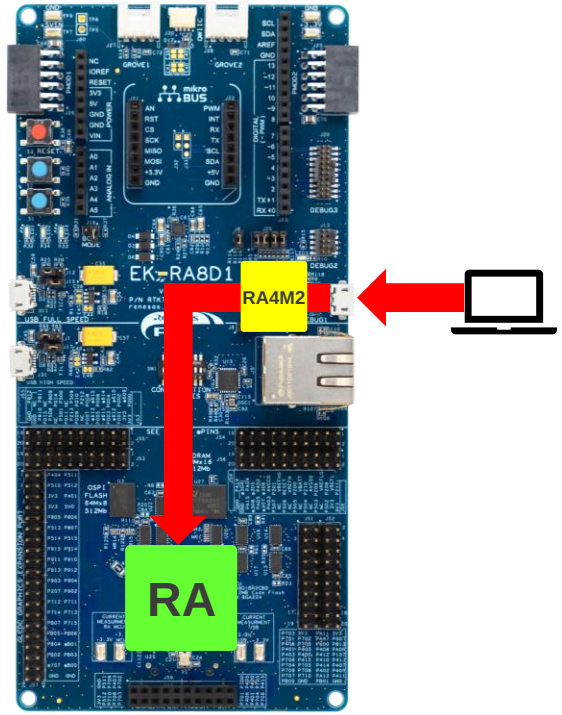
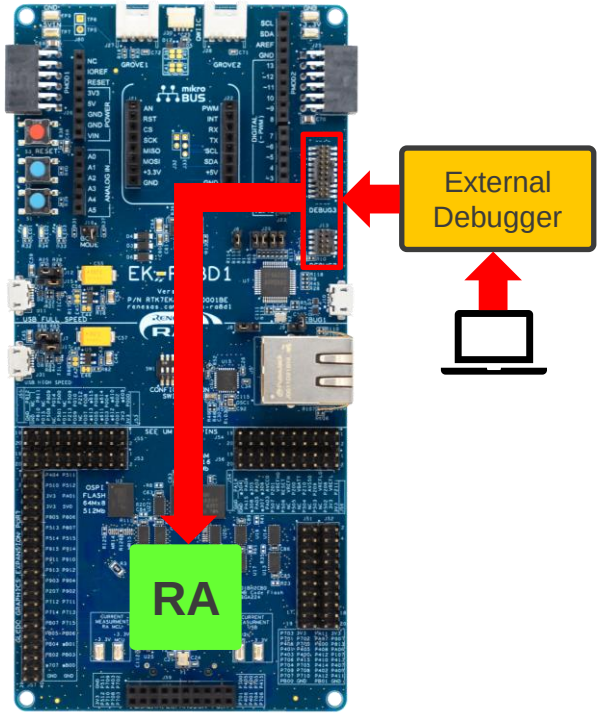
MULTIPLE DEBUG MODES

Debug On-Board



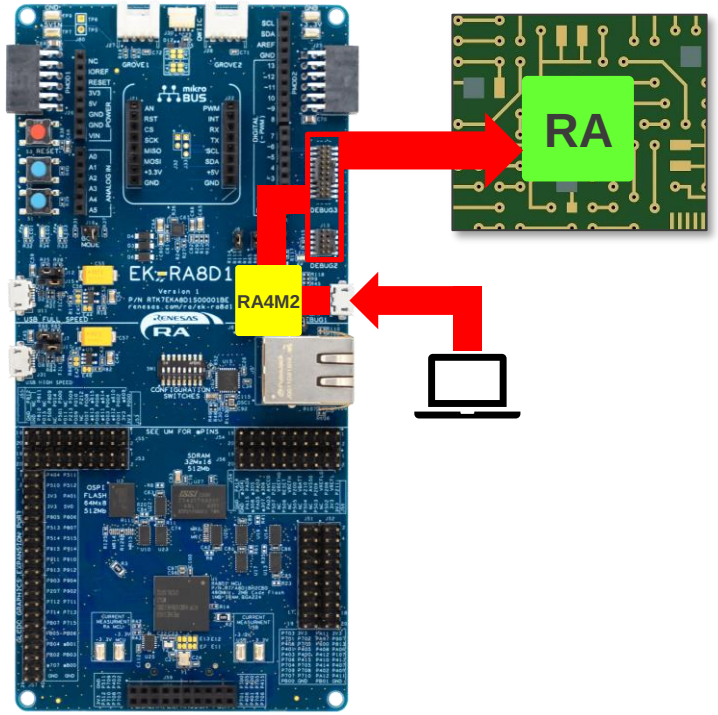
Interface: SWD
Connector: USB Debug

Debug In



Interface: SWD, ETM, JTAG
Connectors: 10-pin, 20-pin

Debug Out



Interface: SWD
Connectors: USB Debug, 10-pin, 20-pin

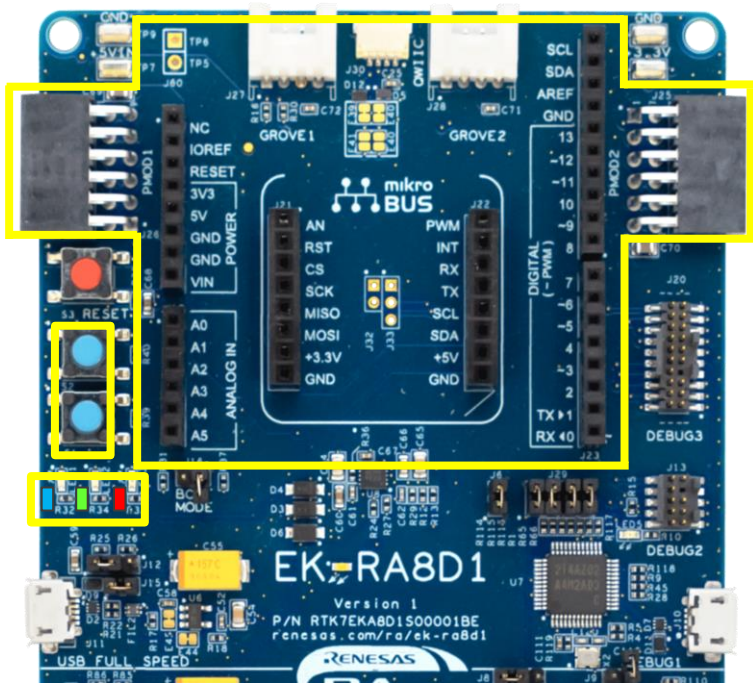
ECOSYSTEM & SYSTEM CONTROL ACCESS AREA

Ecosystem Expansion

- 2 SeeedGrove® system (I2C/Analog)
- 2 Digilent Pmod™ (SPI & UART)
- Arduino™ (Uno R3)
- MikroElektronika™ mikroBUS
- SparkFun® Qwiic®

User I/O

- 3x User LEDs (red, blue, green)
- 2x User buttons (blue)
- Disconnect traces



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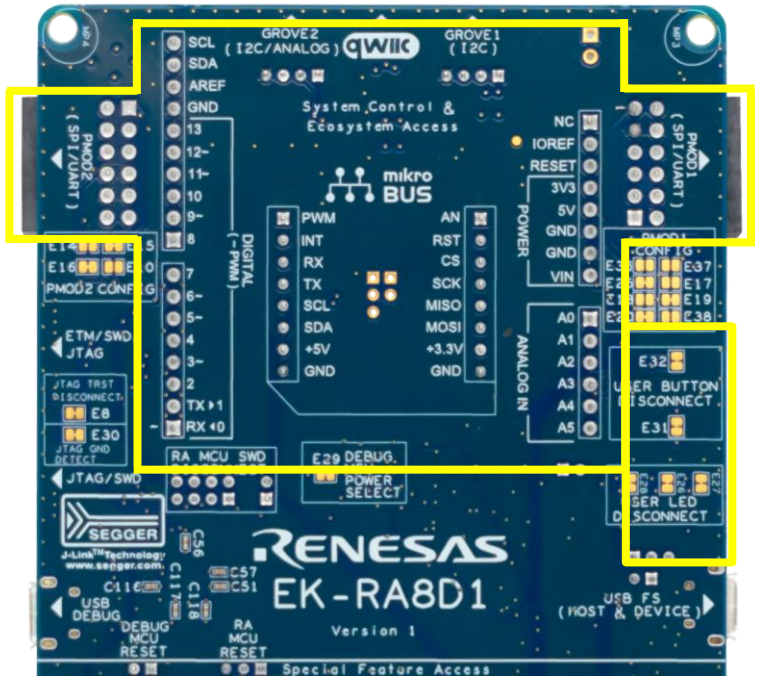


Back

ECOSYSTEM & SYSTEM CONTROL ACCESS AREA

Serial Connectivity

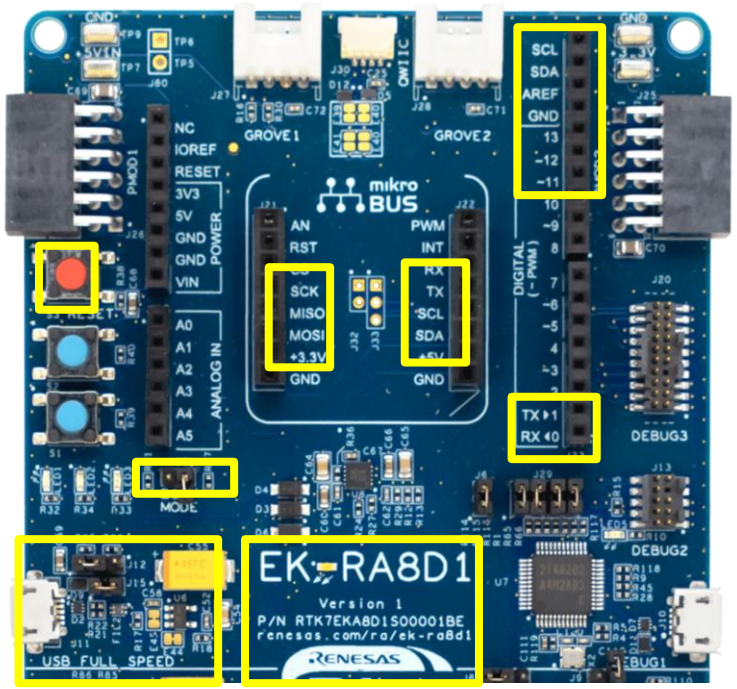
- SPI, I2C and UART through ecosystem headers
- USB full speed (host & device)
  - Micro AB connector

System Control

- Reset button (red)
- Boot configuration jumper

Others

- Kit information area
  - Version number
  - Orderable part number
  - Website



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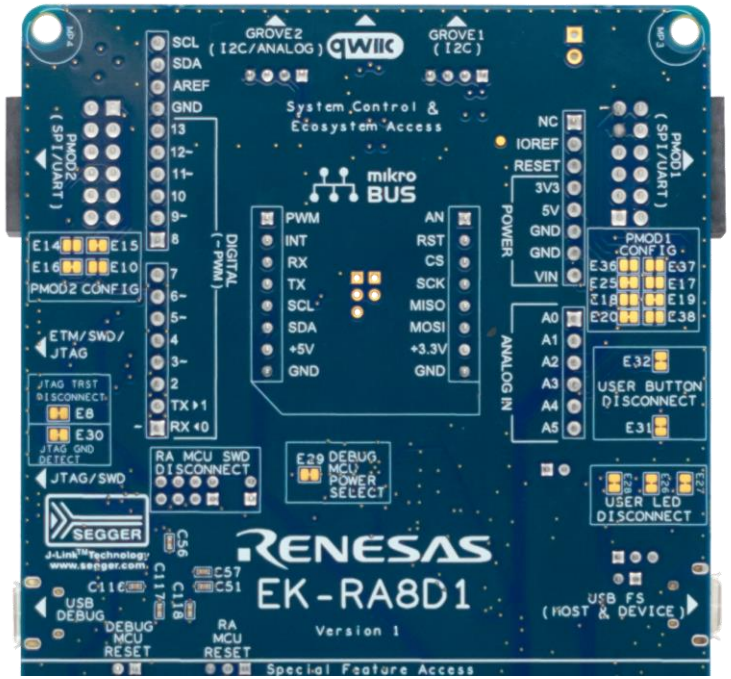

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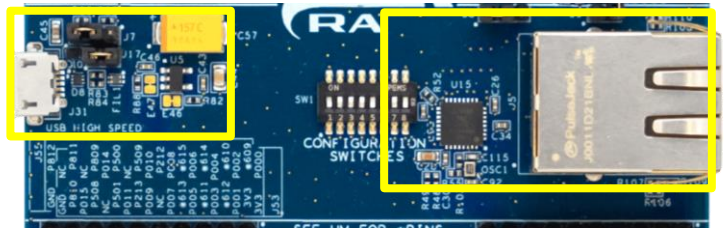
SPECIAL FEATURES ACCESS AREA

High Speed Connectivity

- Ethernet PHY
  - RJ45 with integrated magnetics
  - RX & TX LEDs
  - RMII disconnect traces
- USB full speed (host & device)
  - Micro AB connector



Front

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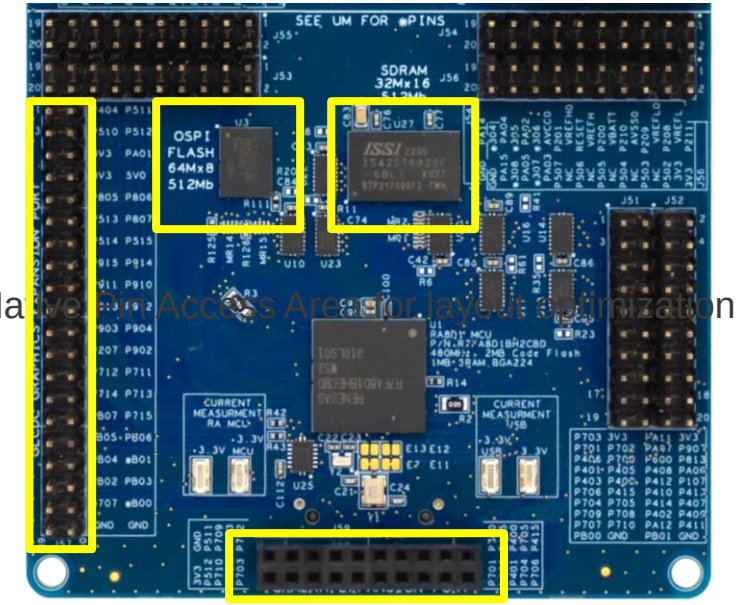
SPECIAL FEATURES ACCESS AREA

High Speed Connectivity

- Ethernet PHY
  - RJ45 with integrated magnetics
  - RX & TX LEDs
  - RMII disconnect traces
- USB full speed (host & device)
  - Micro AB connector

The following special features are provided the MCU Native Pin Access Area for layout optimization:

- 64 MB Octo-SPI flash
- 64 MB SDRAM
- MIPI Graphics Expansion Port
- Parallel Graphics Expansion Port
- Camera Expansion Port



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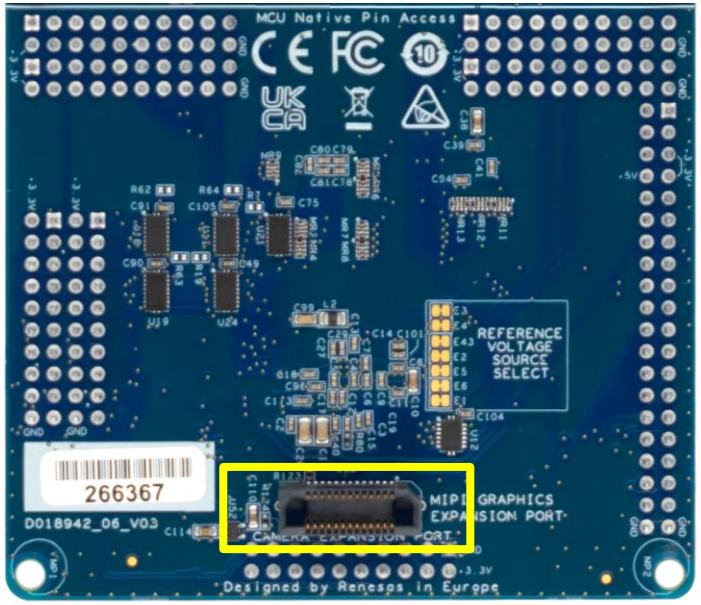

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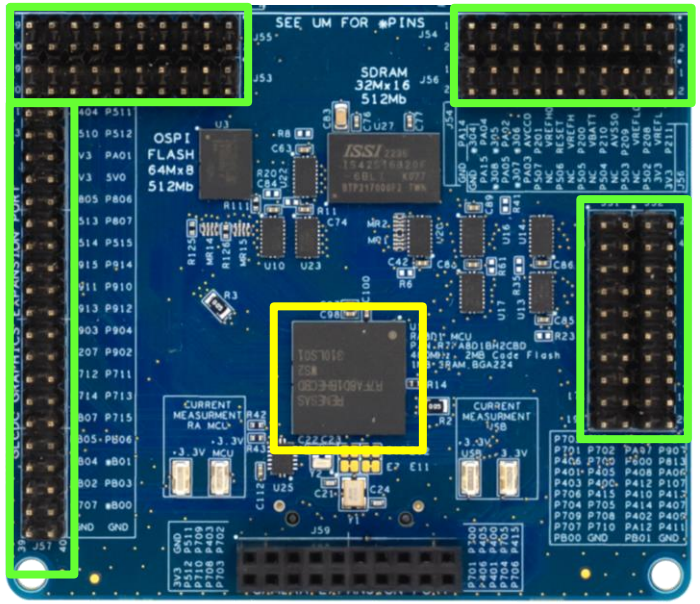
MCU NATIVE PIN ACCESS AREA

RA8D1 MCU

- R7FA8D1BHECBD

MCU Breakout pins

- Male headers
- 3.3 V & ground available on each header



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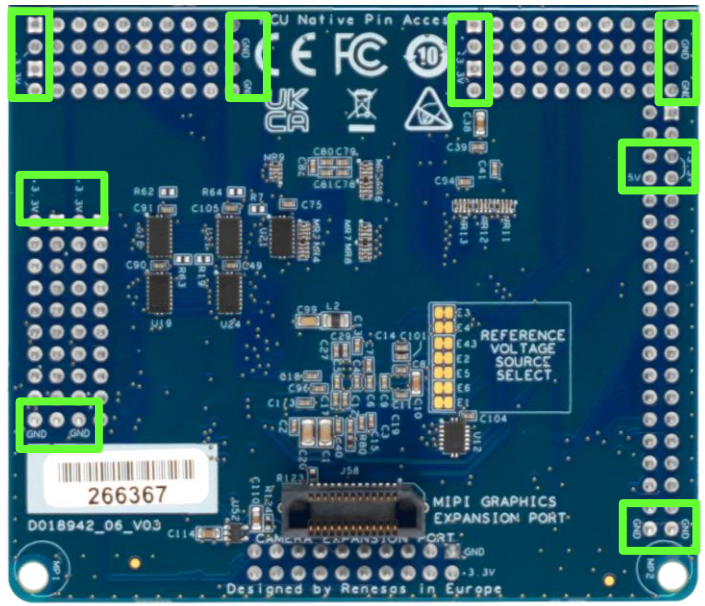

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MCU NATIVE PIN ACCESS AREA

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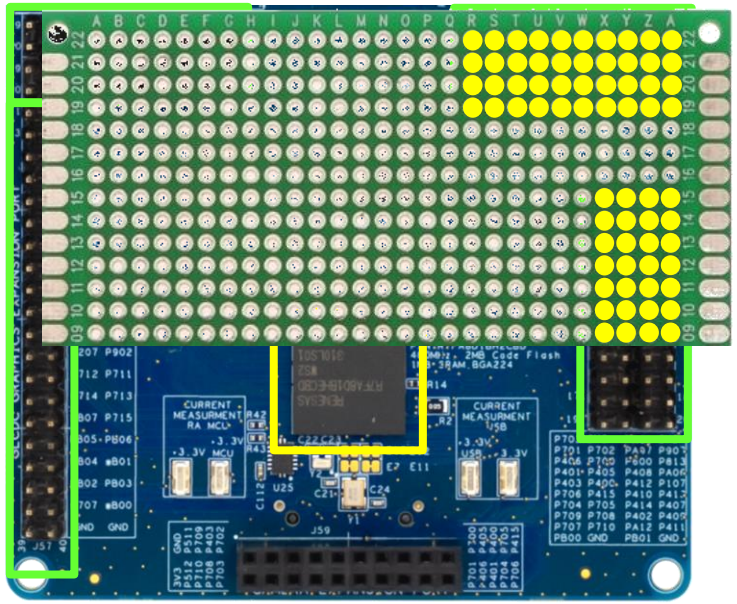
MCU Breakout pins

- Male headers
- 3.3 V & ground available on each header
- Enhanced prototyping support



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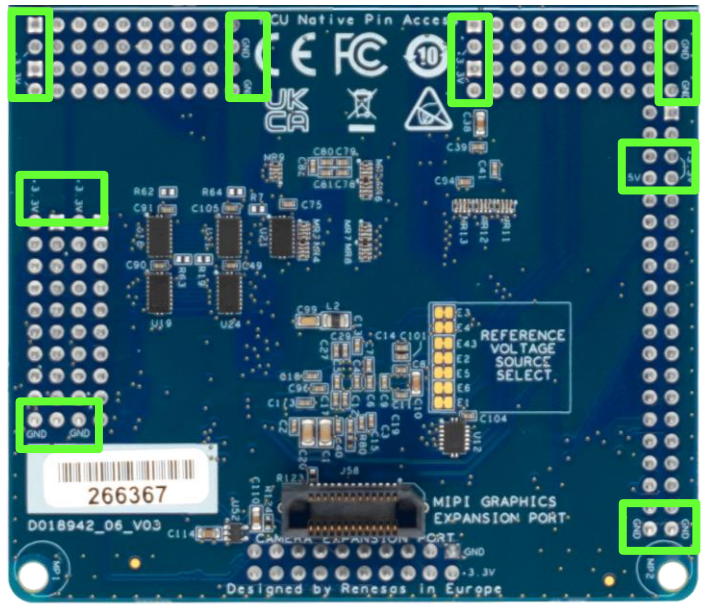

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MCU NATIVE PIN ACCESS AREA

RA8D1 MCU

- R7FA8D1AHECBD

MCU Breakout pins

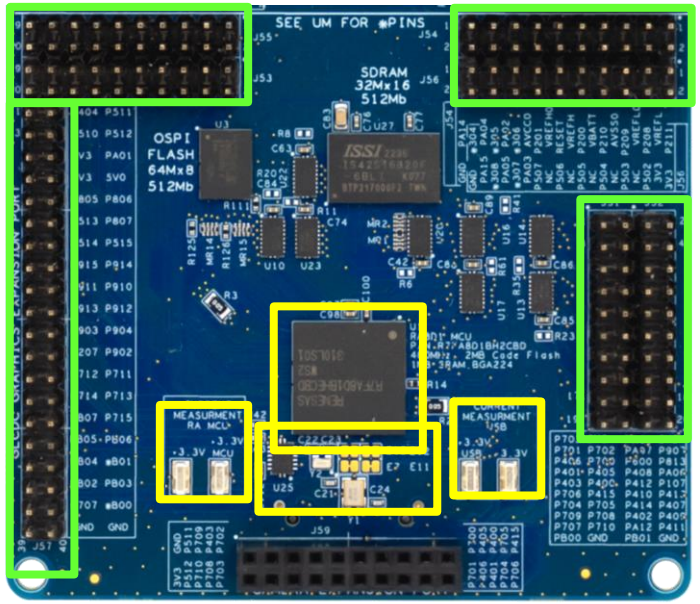
- 2x 40-pin, 2x 50-pin male headers
- 3.3 V & ground available on each header
- Enhanced prototyping support

Current Measurement

- MCU & USB current

Others

- Clock generation & source selection
- Reference voltage selection traces



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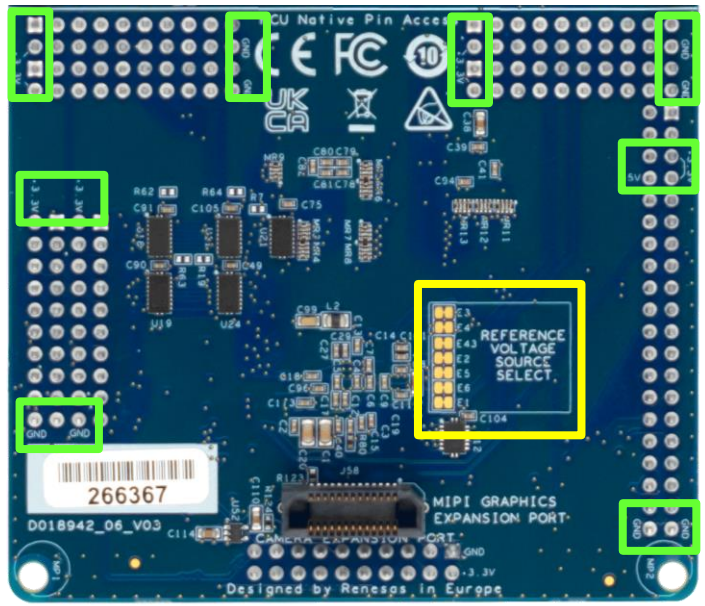
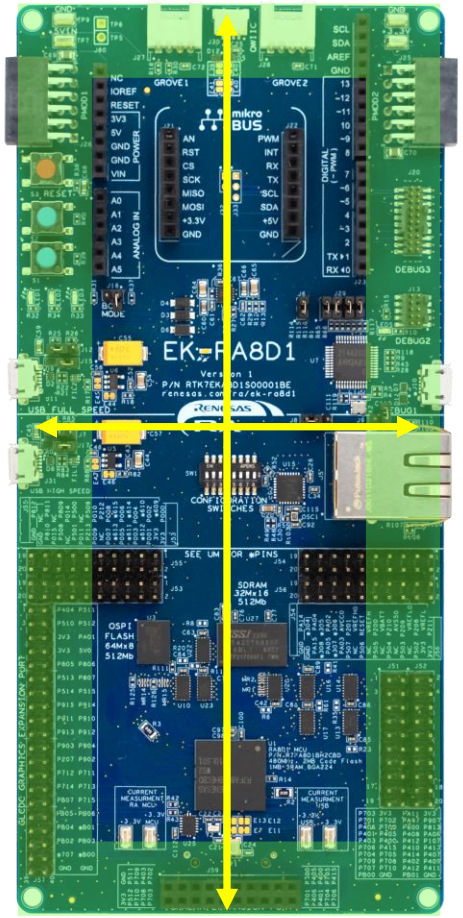


Back

UX ENHACEMENTS

1. Practical & Aesthetic Layout & Placement

- Design symmetry & segmentation
- Connectors & button placement along the PCB edges for convenient access
- Prototyping friendly break-out connector
- Vertical & horizontal placement alignment
- Clamping connectors – clamp, solder, contact
- Simultaneous use of multiple features
  - Except Arduino & MikroBUS connectors due to physical limitations



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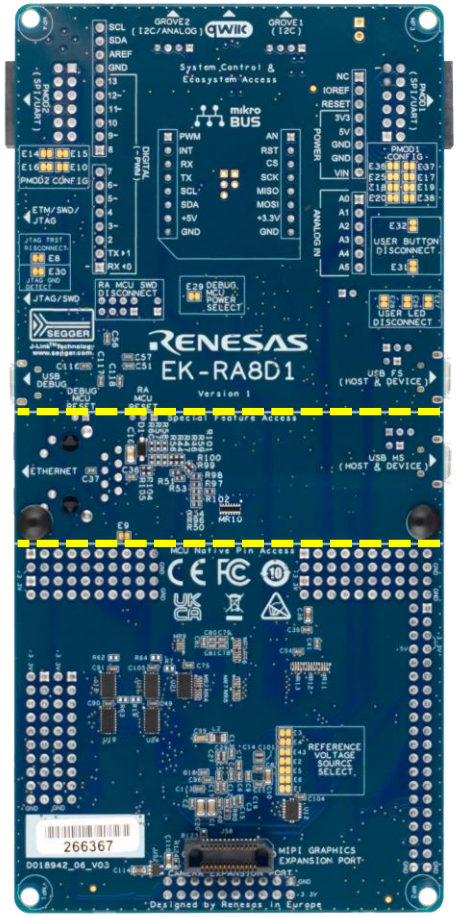

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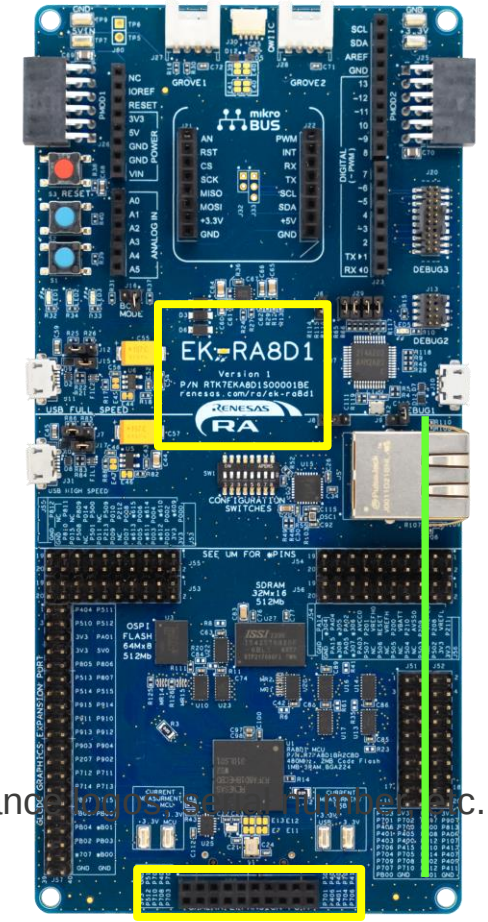
2. “Using” & “Buying” Friendly Silk Screen

- Consistent font type & size
- Descriptive labeling
- Vertical & horizontal text alignment & rotation
- Help text – URLs, MCU & kit orderable part numbers, version number, compliance logos, serial number, etc.



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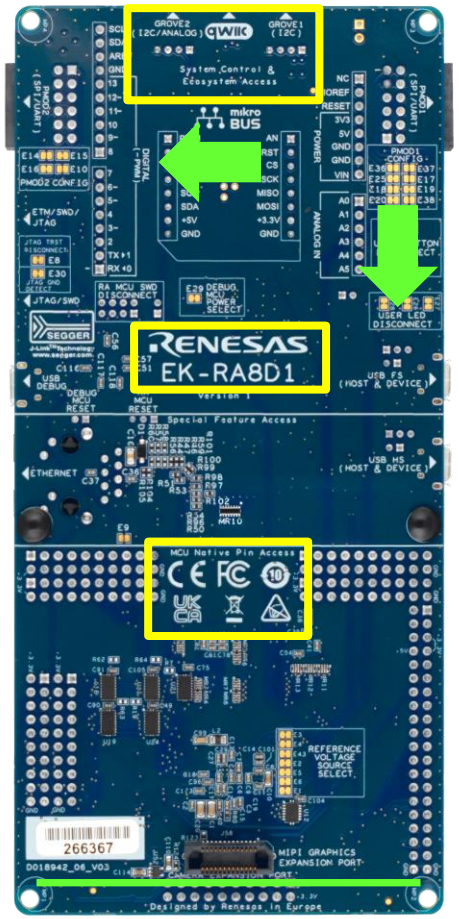

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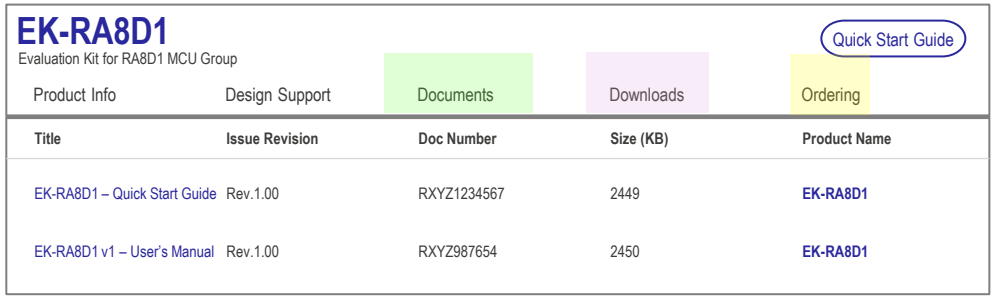
UX ENHACEMENTS

3. Website

- **renesas.com/ra/<kitname>**
- Easy to find collateral
- Easy to order – live distributor stock
- Consistently & professionally branded
- High resolution pictures

4. Print Collateral

- Consistently & professionally branded
- Extensive & well-structured documentation
- Consistent & intuitive file/folder nomenclature
  - Kit name
  - Document type



EK-RA8D1
Evaluation Kit for RA8D1 MCU Group

Quick Start Guide

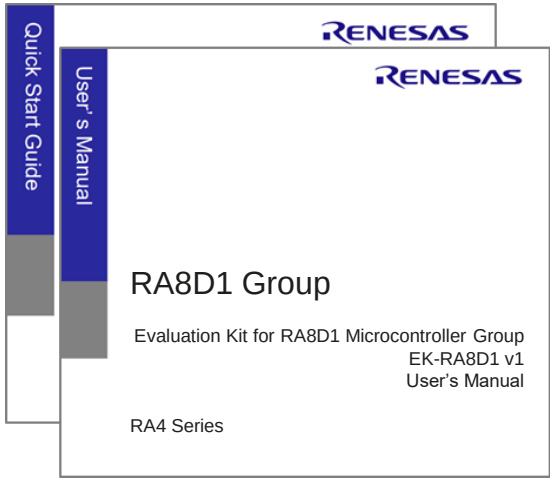
Product Info | Design Support | Documents | Downloads | Ordering

Title	Issue Revision	Doc Number	Size (KB)	Product Name
EK-RA8D1 – Quick Start Guide	Rev.1.00	RXYZ1234567	2449	EK-RA8D1
EK-RA8D1 v1 – User's Manual	Rev.1.00	RXYZ987654	2450	EK-RA8D1

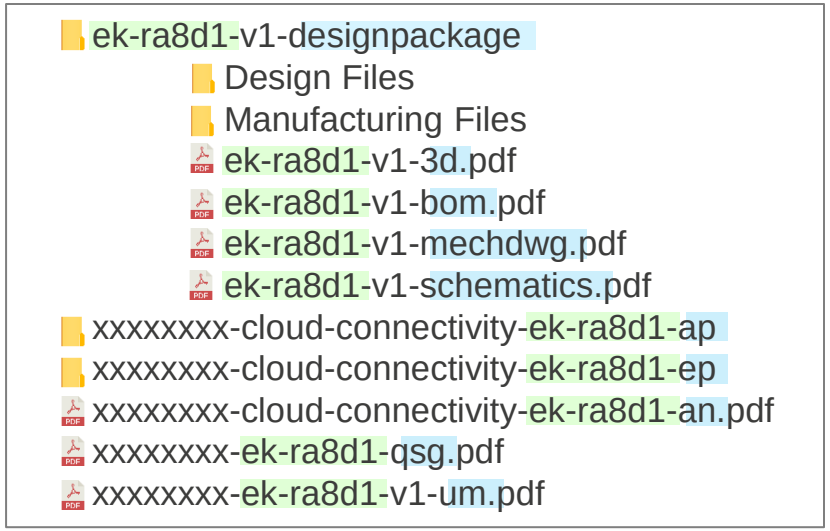
Easy to find collateral

Tools Orderable Part Number (s)	Production Status	Manufacturer	Suggested Single Tool Price	Standard Packaging Quantity	Description	Distributor Stock	Distributors	Distributor Purchase
RTK7EKA2L1S00001BE	Mass Production	Renesas	call	1	Evaluation Kit for RA8D1 MCU Group	5	Future	Buy
						5	Digi Key	Buy
						5	Mouser	Buy

Easy to order



Consistently & professionally branded documentation



Intuitive & consistent file & folder nomenclature

UX ENHACEMENTS

5. Version Synchronization

Across All Version-specific Collateral

- User's manual
- Kit board
- Orderable part number
- Packaging
- Design package
  - 3D drawings
  - BOM
  - Mechanical drawings
  - Schematics
- **Exclusions**
  - Quick start guide
- **Case-by-case exceptions**
  - Example projects
  - Application notes
  - Application projects

EK-RA8D1

Evaluation Kit for RA8D1 MCU Group

Quick Start Guide

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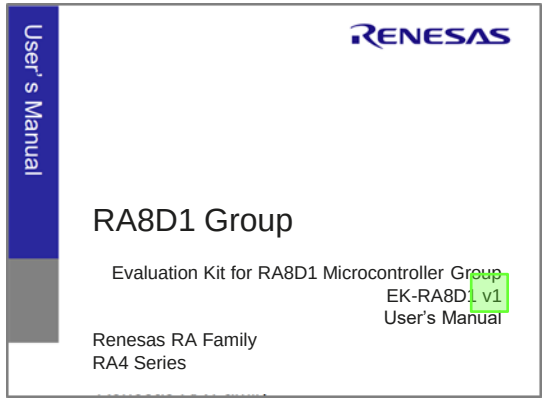
EK-RA8D1 v1 – User's Manual	Rev.1.00	RXYZ987654	2450	**EK-RA8D1**

Website

Packaging



User's manual

Kit version number & orderable part number

- ek-ra8d1-v1-designpackage
  - Design Files
  - Manufacturing Files
  - ek-ra8d1-v1-3d.pdf
  - ek-ra8d1-v1-bom.pdf
  - ek-ra8d1-v1-mechdwg.pdf
  - ek-ra8d1-v1-schematics.pdf
- xxxxxxxx-cloud-connectivity-ek-ra8d1-ap
- xxxxxxxx-cloud-connectivity-ek-ra8d1-ep
- xxxxxxxx-cloud-connectivity-ek-ra8d1-an.pdf
- xxxxxxxx-ek-ra8d1-qsg.pdf
- xxxxxxxx-ek-ra8d1-v1-um.pdf

All version-specific collateral

WORLD READY

Certifications

EMC/EMI Standards

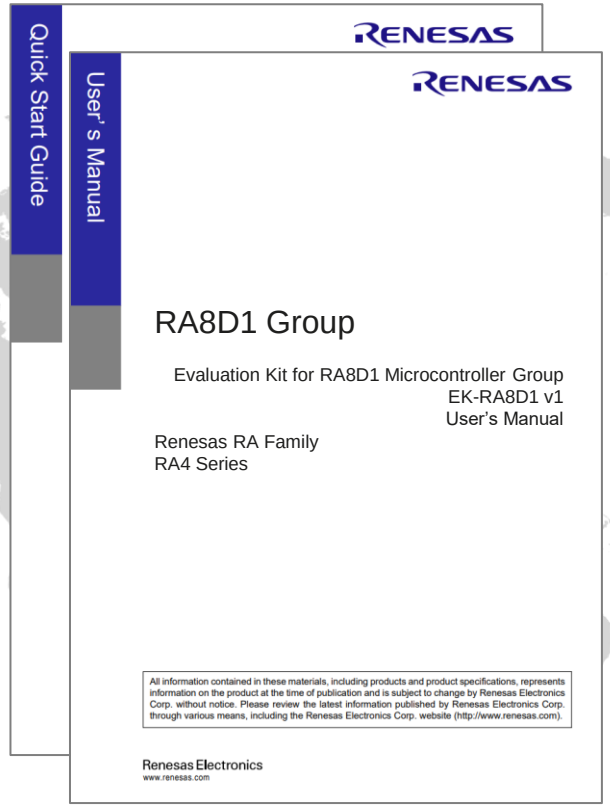
- FCC Notice (Class A) – Part 15
- Innovation, Science and Economic Development Canada ICES-003
  Compliance: CAN ICES-3 (A)/NMB-3(A)
- CE Class A (EMC Directive 2004/108/EEC)
- Taiwan Chinese National Standard 13438, C6357 compliance, Class A limits
- Australia/New Zealand AS/NZS CISPR 32:2015, Class A

Waste, Recycling and Material Selection

- EU RoHS
- China SJ/T 113642014, 10-year environmental protection use period

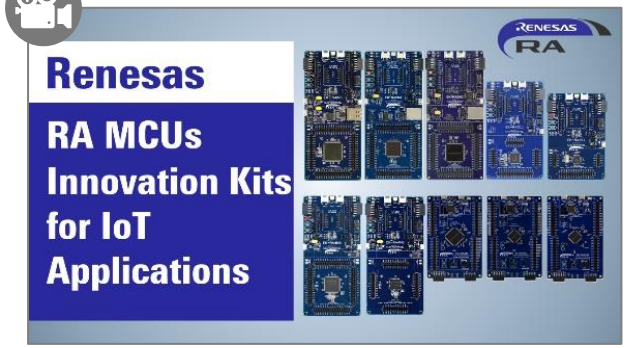
Safety Standards

- UL 94V-0



User's manual & quick start guide available in English & Japanese

TOP NOTCH COLLATERAL (PPTS, VIDEOS)



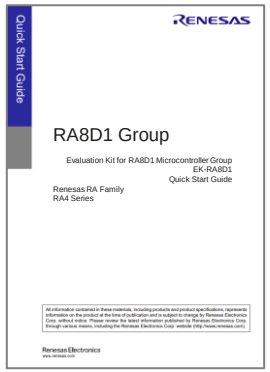
Click the thumbnails to view videos
Presentations and videos are available on renesas.com/ra/ek-ra8d1

TOP NOTCH COLLATERAL (WEB, BLOGS)

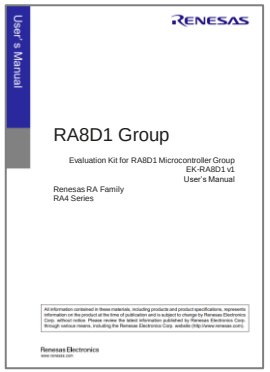
EK-RA8D1 information and blogs are available on renesas.com/ra/ek-ra8d1
RA kit page renesas.com/ra/kits

TOP NOTCH COLLATERAL - ENGINEERING

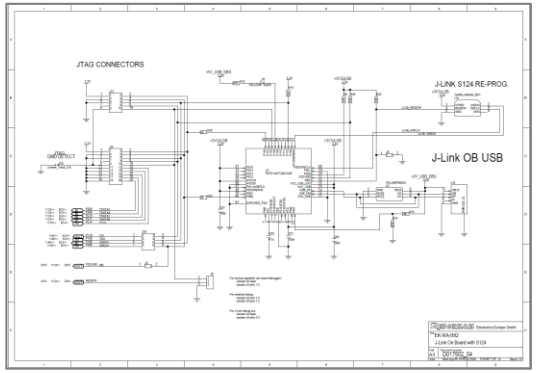
Design Package



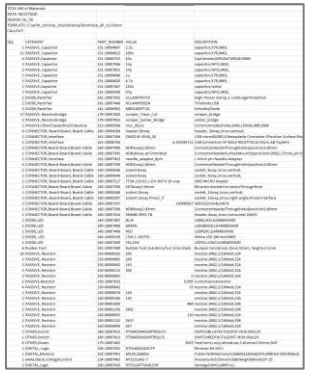
Quick start guide



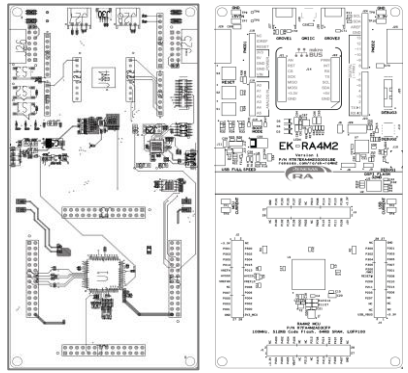
User's manual



Schematics



Bill of Materials



Design & manufacturing files

Example Projects

All items are available on renesas.com/ra/ek-ra8d1

GETTING STARTED IS EASY!

Take the guesswork out of your innovation experience for an unmatched, systematic & methodical approach to start developing

Watch the video

Click the image to watch the video

GETTING STARTED IS EASY!

1. **Get your kit**
2. **Familiarize with your kit**
3. **Download & install software & tools**
4. **Explore & customize example projects**
5. **Expand functionality**

I. Choose your favorite kit

Kit Name	Orderable Part Number	Kit Contents
EK-RA8D1	RTK7EKA8D1S01001BE	EK-RA8D1 board, MIPI Graphics Expansion Board, Camera Expansion Boars, Ethernet cable, USB device, & USB host cables

II. Order it from one of the leading global or regional distributors

Sampling of distributors
(List subject to change; please refer to renesas.com/ra/ek-ra8d1 for the list of distributors stocking the kit)

GETTING STARTED IS EASY!

1. Get your kit
2. **Familiarize with your kit**
3. Download & install software & tools
4. Explore & customize example projects
5. Expand functionality

I. Get quick start guide & user's manual

Kit Name	Kit Homepage
EK-RA8D1	renesas.com/ra/ek-ra8d1

Quick start guide & user's manual

II. Execute the Quick Start (QS) example project (EP) that is pre-programmed on the kit

Quick Start example project

GETTING STARTED IS EASY!

1. Get your kit
2. Familiarize with your kit
3. **Download & install software & tools**
4. Explore & customize example projects
5. Expand functionality

I. Download & install software & tools using the *FSP with e² studio installer* that includes:

- **Flexible Software Package** – includes Hardware Abstraction Layer (HAL) drivers, Board Support Package (BSP), libraries, etc.
- **e2 studio** – Integrated Development Environment

Item	Download page
FSP with e² studio installer	renesas.com/ra/fsp

II. Need help anytime?

- Ask questions, get answers from experts & collaborate with community renesas.com/ra/forum

GETTING STARTED IS EASY!

1. Get your kit
2. Familiarize with your kit
3. Download & install software & tools
4. **Explore & customize example projects**
5. Expand functionality

I. Explore & customize Quick Start Example Project

- Visit EK-RA8D1 webpage renesas.com/ra/ek-ra8d1 and scroll down to “Documentation & Downloads” section
- Download EK-RA8D1 Example Project Bundle
- Extract the downloaded file xxxx-ek-ra8d1-exampleprojects.zip
- Browse to xxxx-ek-ra8d1-exampleprojects\ek_ra8d1_quickstart\quickstart_ek_ra8d1_ep to locate the source code of the QS EP
- Refer to the quick start guide for instructions on modifying, rebuilding & programming the QS EP on your kit

II. Explore & customize additional Example Projects

- In the EK-RA8D1 Example Project Bundle downloaded in the step above, browse to xxxx-ek-ra8d1-exampleprojects\ek_ra8d1\ to locate the example projects provided for this kit
- Open xxxx-ek-ra8d1-exampleprojects.pdf to view the list of tool chain supported for each example project and additional reference documents

GETTING STARTED IS EASY!

1. Get your kit
2. Familiarize with your kit
3. Download & install software & tools
4. Explore & customize example projects
5. **Expand functionality**

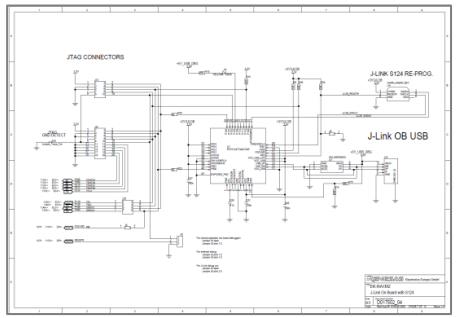
I. Choose from hundreds of add-on modules from the supported ecosystems to build custom proof-of-concept hardware

ARDUINO, qwiic, Grove, DIGILENT Pmod Peripheral Modules, mikroBUS™ a rocking new pinout standard!

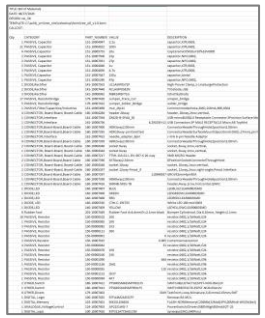
II. Choose from numerous software IPs from Renesas ecosystem partners for additional features

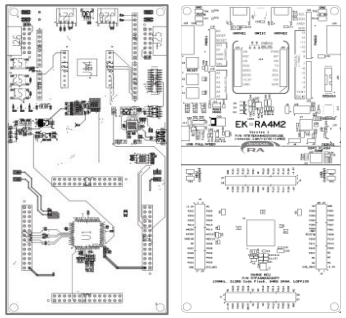
Microsoft Azure, aws, SEGGER, altia, DSP CONCEPTS, sensory, AliOS Things, SECURE RF Securing the Internet of Things, CMX SYSTEMS

III. Refer to the kit design package to develop your custom board with feature enhancements



Schematics


BOM



Design & manufacturing files

USEFUL RESOURCES

Ordering & Documentation

User Manual, Design Package, Quick Start Guide
renesas.com/ra/ek-ra8d1

Example Projects

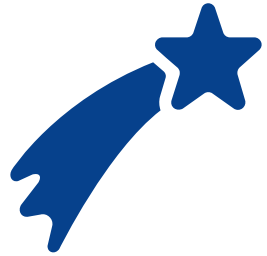
Access FSP and Example Projects for RA Kits
renesas.com/ra/KitEP

Video Library

Learn more about RA MCU, Kits, FSP, and Tools
renesas.com/ra/videos

Support Community

Ask questions from experts
Collaborate with community
renesas.com/ra/forum



Feedback & Feature Requests

Tell us how we are doing and how can enhance your experience
renesas.com/ra/KitFeedback

BRING YOUR BIG IDEAS TO LIFE

Unmatched Innovation Experience

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